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INSTALLER PROFILE:
Built on Reputation
By David Steinkraus

ON THE COVER:
Sunset Septic has been providing onsite services for customers in Rolling Prairie, Indiana, for nearly 30 years. Wearing their signature bright yellow work clothes are, from left, Jon, Gale and Cody Houseknecht at a work site with a John Deere 317G skid-steer and Takeuchi TB125 mini-excavator. (Photo by Mark Lebryk)

Coming Next Month

ISSUE FOCUS: **Pumps**
Snapshot: What's new in Iowa?
Contractor Profile: Family business nears 50 years

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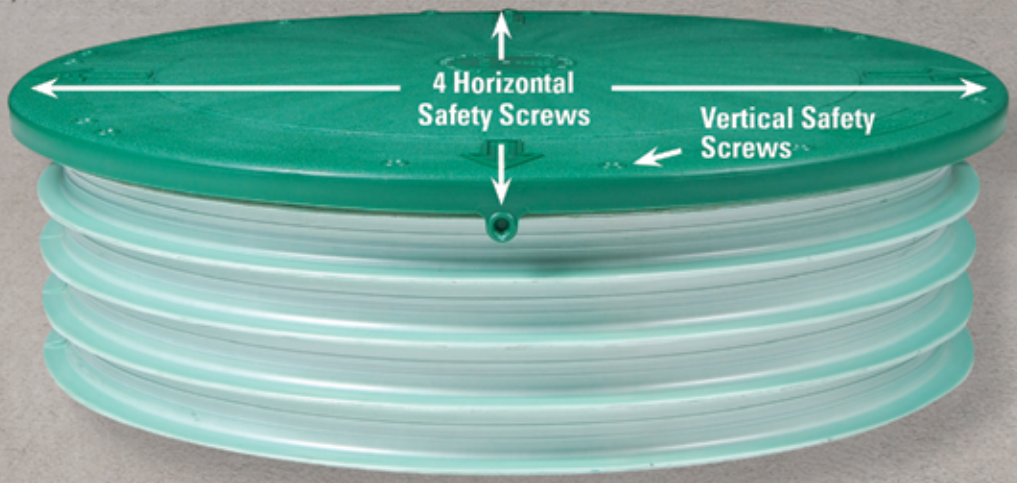

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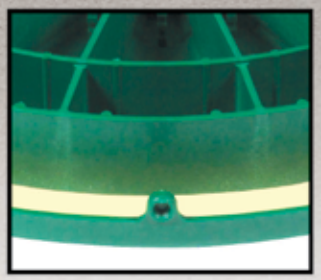

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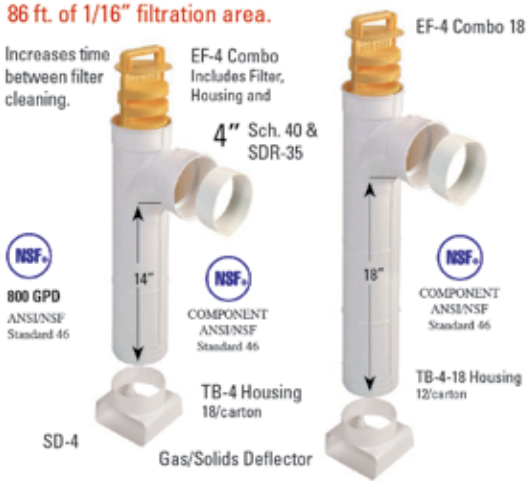

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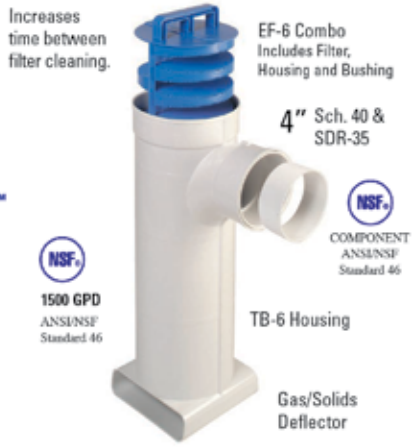

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6" Sanitary T-Baffle™

Injection molded T-Baffle™.

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August 2023

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DIVERSIFYING HELPS REACH ADDITIONAL CUSTOMERS

Add to Your Customer Base and the Bottom Line

The tools and skills you have as an onsite installer enable you to efficiently add other services to offer customers. This diversification adds to both the bottom line and customer base. When adding additional services to your company's offerings, your ability to reach more customers can dramatically increase. Columnist Todd Stair outlines some potential services to add that may fit your skill set. onsiteinstaller.com/featured

REINFORCE YOUR POLICIES

How to Avoid Workers' Compensation Fraud

Workers' compensation provides an important safety net for employees and business owners alike. As with any good system, workers' comp can be abused. Fraudulent claims cost businesses billions of dollars every single year. And while there is probably no way to totally eradicate workers' comp fraud, this article shares a few simple strategies that can minimize these abuses. onsiteinstaller.com/featured

WHAT'S HOLDING YOU BACK?

Don't Block Your Own Business Success

The business down the road is your competitor, but your real competition is you. Business is complicated, and it's always easier to see where you went off the rails after the fact. But there are also some very common places where we tend to compete with ourselves, self-erecting roadblocks to our own success, without really considering what we're doing. Columnists Carter Harkins and Taylor Hill share a list of ways you might be beating yourself and how to get out of your own way. onsiteinstaller.com/featured

Overheard Online

"When choosing a lender, ask some questions of the financial institution and determine if they are a good fit for you and your business. See if they have history and experience in financing businesses in your industry."

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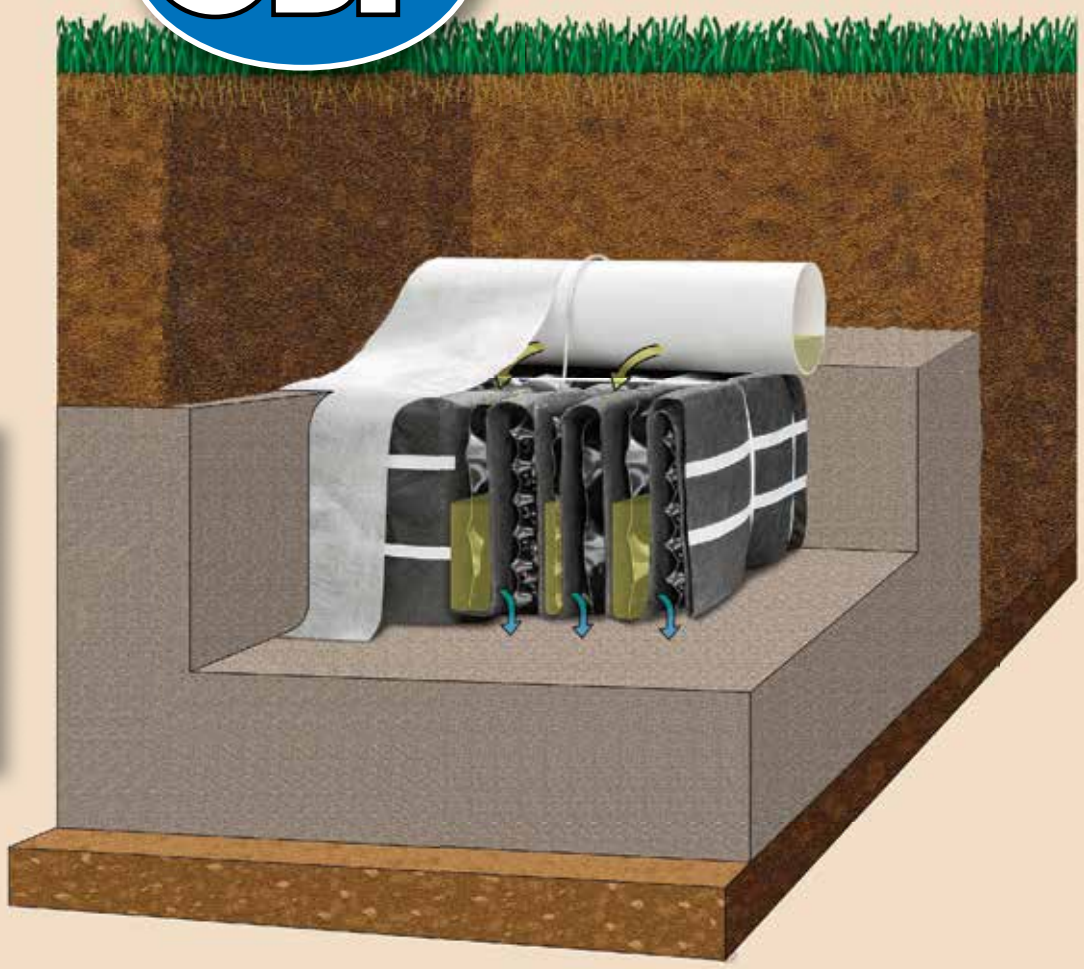

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U.S. DEPARTMENT OF LABOR HIRE Vets 2022 GOLD AWARD

Jim Kneiszel

Send your comments, questions or opinions to Jim Kneiszel at editor@onsiteinstaller.com

Support Our Troops and Hire a Veteran

Installers facing a worker shortage might find welcome relief in the 180,000 soldiers who leave the military every year

The other day I was talking to an onsite system installer with more work than he could handle. With residential development on the rise in his area, the phone kept ringing and he kept scheduling projects further out, past the end of the year. It was getting to the point that he either had to disconnect the phone service or pass along customers to other contractors … who are probably just as busy as he is.

"I'd hire a new person every week if I could find them," he told me. But, he said, there were just no skilled workers who wanted to take on this kind of physically taxing manual labor or were qualified to operate his machines. He felt like he had exhausted his networking possibilities and didn't hold out hope to assemble another installing crew.

After I hung up the phone, my thoughts turned to a press release sitting on my desktop promoting a program that links skilled trades companies with military veterans eager to find a new career path. I noodled around the internet and quickly found there are a few nonprofit organizations set up to match employers with veterans who had the skills to spring into action in the private sector. Among these are Helmets to Hardhats, a program administered by the Center for Military Recruitment, Assessment and Veterans Employment. And Hiring Our Heroes, a project of the U.S. Chamber of Commerce Foundation.

BY THE NUMBERS

If you already have veterans on your team, you might find them to be a great fit for the installing field. If you haven't considered recruiting veterans, here are some interesting statistics about this potential pool of job candidates. According to the U.S. Department of Defense:

- About 180,000 service members leave military service annually. Veterans make up 5.5% of the national workforce.
- Half of the 18.5 million veterans as of April 2022 were in the American workforce. Almost half of the veterans served in the Gulf War era; 66% are 45 years old or older, only 2% are under age 24.
- Female veterans tend to be younger. Women represent 10% of all veterans and 20% who served since 9/11 and 40% are in the post-9/11 group, compared to 23% of men.
- Nearly all enlisted service members have traditional high school diplomas and 9% have earned college credits. About 79% of service members score above the 50th percentile in aptitude testing.

When you take on a new veteran employee, consider starting an Employer Resources Group, or ERG. … **According to the Labor Department, veterans are a tight-knit group and they appreciate communication with others who understand and embrace their background.**

- It is harder to be accepted into the military than most secondary education institutions due to stringent enlistment standards. The military requires aptitude, medical, drug and physical testing.

Military members are trained in hundreds of different job categories, some that align well with the duties performed by onsite installers. According to an article at www.trade-schools.net, veterans are qualified for a variety of skilled trades in the private sector. Many vets have been trained as diesel mechanics, as many military vehicles use diesel engines.

Among the civilian jobs (and their average wages) cited as common for vets include landscape designer ($69,360); aircraft mechanic ($64,000); land surveyor ($63,420); electrician ($56,180); plumber ($55,160); auto mechanic (46,480); heavy equipment operator ($45,260); commercial tractor-trailer truck driver ($45,260); welder ($42,490); and light truck delivery driver ($34,730).

FITTING IN

Vets are also often well-suited to outdoor jobs. The article states that veterans who have seen combat duty sometimes don't want to work indoors and that many who suffer with mental conditions such as post-traumatic stress disorder, or PTSD, prefer to work in outdoor settings like those in the installing field.

According to the Defense Department, by and large "high-quality, drug-free, law-abiding, smart and educated young men and women enlist to serve our nation to be part of something greater than themselves." The Labor Department website lists many common traits found in vets that

would mesh with the needs of companies in the wastewater industry. Those include leadership readiness, a mission-focused approach to work, experience working with diverse teams, a strong work ethic, performance under pressure, loyalty and integrity.

If you are convinced the veteran workforce may hold the answer to your labor shortage, the next question is: How do you tap into this resource? Luckily a lot of assistance is available and sound tips for attracting vets to your company.

For example, the Labor Department points out that employers can receive free help posting vacancies where veterans can see them through local American Job Centers. Check out www.careeronestop.org or the National Labor Exchange at veterans.usnlx.com. The Labor Exchange works with the National Association of State Workforce Agencies and the Direct Employers Association to post an average of 2.9 million daily job listings for 300,000 employers.

Before you post those installing jobs, however, consider these tips gathered from the Labor Department and organizations promoting vet hiring:

Know the basics of the U.S. military

There are six branches of the U.S. military: Army, Navy, Marines, Air Force, Space Force and Coast Guard. There are two statuses of military personnel, active duty and reserve. There are about 2.2 million service members, 850,000 who are in the reserves, typically serving a minimum of one weekend per month and brought to active duty when needed. The Hiring Our Heroes website dives deeper into explaining the ranks, titles and responsibilities of military personnel. This background will be helpful when recruiting and interviewing veterans for job openings.

Involve your team in veteran recruiting

You may already employ one or several veterans. Invite them to help out in your recruiting process. Have them meet with veteran job candidates to convey their positive experience working for your company. You can also include your successful veteran workers' stories in online marketing or networking for new hires. When you take on a new veteran employee, consider starting an Employer Resources Group, or ERG, to make the vet comfortable with your company and team. According to the Labor Department, veterans are a tight-knit group and they appreciate communication with others who understand and embrace their background.

Establish your military commitment

Through social media channels, voice your support for the military and veteran hiring. Hiring Our Heroes recommends registering to participate in job fairs offered by the U.S. Chamber of Commerce. If you want to learn more, HOH offers free webinars with topics including Military 101, Employer Best Practices and Wounded Veteran Employment.

Write a job description aimed at informing veterans

Keep in mind the military language and mindset when developing a job description and be straightforward in your listing. Make it easy to learn the duties, for example operating excavating machines, assembling wastewater systems, all the jobs of an installer. Along with the posting, you might want to add a video showing installing work being done in the field or a message from an employee who is a veteran. Include your mission statement and outline clear goals and company values for veteran applicants. Remember that veterans want a job they feel qualified for, but also want a rewarding job that serves people. Rather than demand a certain level of education or knowledge of the wastewater industry for your job opening, stress "equivalent military background" to be inclusive.

Check into potential tax credits

According to the Labor Department, businesses hiring veteran workers may qualify for the Work Opportunity Tax Credit, which has been used by employers to save $1 billion. The WOTC can reduce the employer's federal income tax liability by up to $9,600 for each veteran hired, with no limit on the number of hires. For more information, go to www.doleta.gov/business/incentives/opptax/. The Labor Department also works with the U.S. Department of Veterans Affairs Vocational Rehabilitation & Employment program. Through the VR&E, companies hiring veterans with a service-connected disability may receive up to 50% back on the first six months of wages to cover training costs. Check the https://benefits.va.gov website.

Don't forget about the military spouses

Whenever a veteran is looking for work, often so is their husband or wife. Whether or not they also have a military work background, spouses of service personnel often have skills and experience to offer and they are accustomed to the same discipline and work ethic as their partners. Also, it's important to get the spouse of your new veteran employee on board with the career move in general as they both adjust to life outside the military.

IN THE TRENCHES

In some ways it seems like our installing community and the veteran workforce are the perfect fit. You desperately need proven, hardworking employees and they need a second career that provides for a bright future. If you've already had a positive experience hiring veteran workers, I'd like to hear about it. Drop me a line at editor@onsiteinstaller.com and I will share your stories with readers in a future column.

BUILT ON REPUTATION

Nearing 30 years of serving neighbors in Northwest Indiana, Sunset Septic dropped its website, doesn't advertise and thrives on great word-of-mouth recommendations

By David Steinkraus

When Jon and Gale Houseknecht bought a stagnant pumping business in 1995, they set about streamlining it for a new world.

They disposed of several old vacuum trucks and put their pumping equipment on a truck tractor-pulled semi-trailer that could be easily unhitched for other duties. As the years passed, the business grew and grew.

Today, the couple's Sunset Septic in Rolling Prairie, Indiana, continues to adapt. They run the business with their son Cody, and Jon has become involved with the Indiana Onsite Wastewater Professionals Association and its efforts to improve the industry.

About half of the company's revenue comes from installing, system repairs and onsite inspections. The other half comes from pumping.

Sunset Septic used to be on the internet. That lasted for only a year or two, Jon says. They had so much business that they didn't need the website. Also, the website brought work from nearby counties, but the quantity of work didn't support the cost of travel, Gale explains. Most jobs now come from referrals, and also from people seeing the company's brilliant yellow trucks.

On the company's newest truck, they made a major change with the lettering. In the past, Gale says, trucks had the company name, phone number and a list of services. She's reduced that to only name and phone number. For a motorist or anyone seeing the truck at a glance, name and phone number are what people need, she says. Later they can call and learn specific services the company provides.

Other marketing tools are small promotional items given to customers: pens, business cards and magnets shaped like the company's new truck. "Everything's yellow, of course," Gale adds.

"With the house market the way it was the last couple years, we were doing a lot of septic property transfers," Gale says. Coupled with those inspections were repairing a large number of problems revealed during inspections.

> "That probably was one of the hardest things to overcome was the real estate agents because you've kind of thrown a monkey wrench in their system. The agents who are really top notch will actually promote the septic inspection."
>
> Jon Houseknecht

SYSTEM REPLACEMENTS

Like onsite contractors in other parts of the country may be seeing, Jon says his crew encounters many metal tanks in older systems. "We've run across a lot of old houses where they've had metal tanks, or sometimes they have a septic tank and they're direct discharging into a ditch."

In addition to metal tanks, they find others built of cement blocks. Upgrades to 50-year-old systems due to a property transfer have been driving the business recently, Jon says. They comprise 35% to 40% of the jobs.

Replacements are typically standard gravity systems. About half use Infiltrator Water Technologies chambers in the drainfield, Jon says, and the other half use technology from Presby Environmental, an Infiltrator Company.

Property transfer jobs often become complicated, Gale says, because both the current homeowner and the new homeowner are involved. "We get a lot of people moving from Chicago out here," she says. Downtown Chicago is only 70 miles away. "So they've

Left to right, Cody Houseknecht, a delivery driver and Jon (right) Houseknecht maneuver a septic tank into place during a recent install project. Gale Houseknecht, far right, observes. (Photos by Mark Lebryk)

never had a septic system, don't know how they work, so we have to educate them," she says.

Buyers also have to be prepared for the mess that ensues during system replacement. Jon says he always tells people that in the middle of a project, the yard will look like a war zone. That helps especially for people coming from the city, Gale adds.

"What I do now — and this has all been trial and error for us — we involve both the seller and the buyer," Gale says. "We never used to. When we started doing this, it was just the seller because they were paying for it. But we have found the buyer needs to know what's going on as well, what's going to be installed, what the process is. We've found there's a lot less issues when everybody's involved, everything's aboveboard, everybody knows what's going on."

Aerobic units have a place along the Lake Michigan shore where it's common to have large houses on small lots. Sunset has also picked up some maintenance jobs for aerobic systems.

Sunset Septic

Rolling Prairie, Indiana

Owners: Jon and Gail Houseknecht
Founded: 1995
Employees: 3
Service area: 50-mile radius
Services: Onsite installation, inspections, excavating, maintenance, pumping, sewer cleaner and jetter work, sewer line replacement, repairs
Affiliation: Indiana Onsite Wastewater Professionals Association

One of those, Cody says, was advanced for a residential system because it used aerobic treatment with drip irrigation disposal. Sunset was called in because the system wasn't working. A well ejector pump sent water into the drip system, Jon says, and the impeller fins had broken off and plugged

On location at an install project, the Houseknechts assemble parts needed for a pipe run.

ADDING PORTABLE SANITATION

In the last few years, Sunset Septic has added portable sanitation to its installing, inspecting and pumping service offerings. The move has added a generation to this flourishing family business.

"We got into that when Cody got married," says Gale Houseknecht, who owns the company with her husband Jon. Cody is their son and works with them. "He bought the toilets from us. It's still Sunset Toilets, but it's his business," she adds. Gale takes calls for the business and schedules deliveries.

Portables are rented mostly for events such as weddings, parties, farm auctions and graduations, she says. "When I started the toilets, I decorated them. They were calling us the pretty potties."

They started Sunset Toilets with three Fleet series units from PolyJohn, and now they're up to 24 units plus five hand-wash stations and one ADA-compliant accessible unit, Cody says.

"We put some solar lights inside of them," Cody says. He built a trailer with a service unit including a 500-gallon wastewater tank and 100-gallon freshwater tank.

"It took me about four, five years to accumulate all the parts," Cody says. "Once I had them, I put it together."

"We've nicknamed it the Frankenstein trailer because we've robbed parts off several different projects," Jon adds.

The service trailer also has space to haul restrooms, he says, and he built a second, 24-foot trailer for deliveries. Need for the service trailer, which he can tow with a pickup, was clear after he'd been running the business for a while, Cody says.

"When I first started it, I was using the pump truck for service," he says. As he expanded his territory with one-way drives of 30 minutes or more, the cost structure changed. "It wasn't cost-effective to drive that big truck to pump out 20 gallons of waste."

the flowmeter. That system also had other issues, Cody says. It was a three-to-four-day job while they worked through the system piece by piece, waiting for a new pump and for a particulate filter that should have been in line after the pump, but wasn't.

Inspections often take more time than pumping, Jon says. There's a lot of diagramming and measuring involved, Gale says. If there's no diagram of a system on file with the health department, they'll make one and file it with the county. Sometimes there's a diagram but no indication of northerly direction.

They also like to dig up any distribution boxes and check for condition. "We had one this week, a concrete septic tank and a concrete distribution box. We looked at the distribution box, and the lid was cracked on it," Jon says.

Repairs like that will often be done later. The cracked D-box, for example, will first be reported to the buyer and seller, and then there will be negotiation over who will pay, Gale says. Easy repairs, such as a missing baffle, they do at the time of service, and it saves the owner the charge for a separate trip, Jon says.

ADDING A VACUUM TRUCK

The newest addition to the fleet is a 2012 Kenworth T660 converted box truck. It has a 3,600-gallon steel tank from Du-Mar Welding and a Jurop/Chandler pump. The Houseknechts built the truck themselves and cut 4 feet off the frame to install the tank. This truck has an onboard jetter, a 3,500 psi pressure washer installed in a box under the hose trays. Slides allow the jetter to be pulled in and out for access, and next to it is a hose reel with 200 feet of 3/8-inch line. A 125-gallon tank provides water for the jetter.

From a company leaving the pumping business, the Houseknechts bought an older Ford L8000 vacuum rig with a 2,400-gallon steel tank and Masport pump.

They still have the 1993 Kenworth T600 tractor that pulled the pumping trailer and now moves lowboys and dump boxes. The trailer holding the pumping equipment was old and deteriorating, Cody says, and it's easier to maneuver a straight truck in and out of people's driveways.

"We either needed to upgrade the trailer or go to a truck, and we decided to go to a truck," he says.

"It limited us having only the one semi," Gale says.

"This way, we have a truck we can haul equipment on, and if we need to pump a tank at the same time, we can do that," Jon says.

Also in the Sunset Septic inventory are:

- 2019 John Deere 317G skid-steer
- 2005 Takeuchi TB125 mini-excavator
- 2005 John Deere 410G backhoe loader
- 2012 Link-Belt 145X3 excavator
- 2000 John Deere 450H bulldozer
- 1978 International 3588 farm tractor for land application
- A Spectrum laser level
- A 20-foot trailer from Steel Trailers in Indiana, holds tools and pipe fittings
- A 5,000-gallon Houle (GEA Group) spreader with an injection unit for land-spreading septage.

> "We'd like to have legislation saying all property in the state of Indiana would have to go through a property transfer inspection. It would be a huge shot in the arm for our industry."
> Jon Houseknecht

Cody Houseknecht takes down a grade rod used to level a septic tank.

Jon Houseknecht prepares to release cables used to convey a septic tank into an excavation.

SEASONAL PUMPING

The land spreader is not used during winter because land application is forbidden when the temperature is below freezing, so septage goes to the local wastewater treatment plant.

Only about 10% of the tanks pumped by Sunset Septic are disposed of through the municipal plant, Cody says. When the temperature falls below about 25, Gale adds, they don't pump because people don't plow snow, the back end of the truck freezes and everything takes longer. "So a lot of our clientele, we try to do before the first of the year," she says. After Christmas is the usual time for snow and severe cold, and that's when they do maintenance, she says.

In the busy seasons, the Sunset Septic team will pump four to six tanks a day.

SERVING THE INDUSTRY

Jon is past president of the IOWPA, and he is involved in the work of advancing IOWPA and the industry.

"We've hired a legislative liaison, and our intention is to promote IOWPA statewide and get our name out there for the legislative branch," he says. "We'd like to have legislation saying all property in the state of Indiana would have to go through a property transfer inspection. It would be a huge shot in the arm for our industry because any property that sells would have to go through the IOWPA process."

At the moment, he explains, requiring time-of-sale inspections is done county by county.

If this goes through, Indiana will need a lot of certified inspectors to provide the service, Jon says. That's why IOWPA is also pushing education, he adds.

Another piece of legislation IOWPA favors would establish some kind of organization to govern the onsite industry. As in other fields, there are

Gale and Jon Houseknecht work on location at an install job in LaPorte, Indiana.

a few onsite people who don't follow the rules, Jon says, and it would help the industry to have a licensing authority like the boards that license real estate agents and electricians.

There are other state proposals that IOWPA is not on board with, Jon says. One is a proposed requirement for a perimeter drain around septic systems instead of a curtain drain. Sometimes, he says, there just isn't enough space on a lot to install a four-sided perimeter drain, but a one- to three-sided curtain drain would meet setback requirements.

ONSITE TRAINERS

The Sunset Septic team has become certified through IOWPA to do onsite training. They started this work in 2015 at

Cody Houseknecht uses a Link-Belt 145 excavator to backfill a new septic tank installation.

the invitation of state health officials, Gale says.

Jon says the first class's attendees included real estate agents and other people unfamiliar with the components of an onsite system. "The next day we loaded up a bunch of distribution boxes, different styles of piping, chambers and Presby pipe," Jon says.

Gale demonstrated how to do interviews to gather information, and Jon and Cody demonstrated tool use. They've trained people in their own LaPorte County, next door in Porter and Marshall counties, and in Brown County about 220 miles south.

Real estate agents in their county opposed time-of-sale inspections, Gale says. So they did a training just for people in real estate.

"That probably was one of the hardest things to overcome was the real estate agents because you've kind of thrown a monkey wrench in their system," Jon says. "The agents who are really top notch will actually promote the septic inspection."

Neighboring Porter County doesn't require inspections, he says. But the company has performed several inspections there on the referral of real estate agents who believe in their advantages. "It puts customers at ease because they don't have to worry about buying the house and a few months later having to install a $20,000 system," Jon says.

LOOK TO THE FUTURE

The Houseknechts are at the age when retirement is becoming a possibility, but it's not something they've actively looked at.

"We really need to sit down and think about that and visualize how it all plays out," Jon says.

"We're too young to retire," Gale says. "We like what we do."

Whenever they decide to walk away from the wastewater industry, they will leave a legacy of good service and a business that is more sunrise than sunset.

> "We involve both the seller and the buyer. We never used to. … We've found there's a lot less issues when everybody's involved, everything's aboveboard, everybody knows what's going on."
>
> Gale Houseknecht

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Sara Heger, Ph.D., is a researcher and instructor with the Onsite Sewage Treatment Program in the Water Resources Center at the University of Minnesota. She is also a certified designer and service provider. Send questions for Sara to editor@onsiteinstaller.com

It's Time for Tough Talk About Gravity Distribution

Systems are sized assuming even distribution along drainfield lines. How often do the results match the assumption?

By Sara Heger

With most conventional onsite systems, flow from the septic tank is via gravity with the goal of even distribution across the soil treatment area. Flows can be split through perforated piping and rock, synthetic media or hollowed-out chambers, and other mechanisms. Because soil drainfield size is partly flow-volume dependent, equal distribution across the soil drainfield is crucial to properly treat wastewater and preserve the life span of the soil. "Even distribution" includes both even flow volumes split between trenches/beds and even longitudinal dispersal across the length of each trench/bed.

Importantly, systems are sized with the assumption that even distribution is achieved. In other words, the long-term acceptance rate of a system only holds if effluent is distributed evenly.

Uneven distribution poses several threats to the health of a septic system, including ineffective secondary treatment and potential groundwater contamination. Soil pore clogging and impacts on soil longevity are other potential risks.

Uneven distribution can easily fly under the radar and produce consequences **such as a shorter soil treatment life span, pore clogging, and most detrimentally, groundwater contamination.**

COMMON OPTIONS

In some areas, header pipes directly distribute effluent from the primary treatment device to receiving drainfield pipes. A header pipe is the simplest method of effluent distribution, but there is no research available on the evenness of distribution with this technique, and once installed adjustments are not typically available.

A splitter tee is another option for parallel distribution drainfields. It operates very simply by splitting effluent into two flows with a baffle system inside a T-shaped pipe junction. A splitter tee can only split flows 50/50 and no research is available to document evenness over time. Certainly, with biofilm and sludge buildup, header pipes and splitter tees may be less effective at even distribution.

Gravity-fed distribution devices are advertised to distribute flow equally across drainfields and trenches and beds. In practice, equal distribution is nearly impossible to achieve with current gravity distribution devices. Studies conducted by Gill published in 2009 reveal that distribution boxes and splitter tees are unreliable.

Even when installed perfectly level, the distribution boxes performed poorly, preferencing two of four outlets. The tee splitters performed better than distribution boxes under perfect laboratory conditions. However, in the field both distribution devices performed poorly — over time, uneven solids deposition and biofilm growth made even distribution impossible.

A V-notch weir is often added or required with a traditional distribution box but provided marginal improvement in distribution efficacy. Distribution box service is essential to adjust the weir and clean the box of biofilm, sludge and scum, which can build up over time and effect the evenness of distribution.

FACTS IN THE FIELD

Realistically, distribution devices are not installed perfectly level. Settling and, in colder areas, freeze/thaw cycles undoubtedly unlevel even the best of installations. Many septic systems also only operate under low-flow conditions (< 0.53 gpm) that contribute to preferential drainage. Under typical low-flow velocities, a distribution box only off zero slope by a few degrees results in drainage to only one or two outlets.

Inserts in distribution boxes that are designed to be re-leveled are a good concept, but they build up in biofilm over time and require frequent maintenance and monitoring — not the general practice of gravity septic systems where typical maintenance is only cleaning the septic tank.

With some applications, the septic tank effluent is pumped into a distribution box. It is important that the pump not be too large and the energy from the pump dissipated to minimize short circuiting and uneven distribution.

Another distribution option is a drop box. Drop boxes differ from other gravity distribution devices because they dose trenches in serial. They are designed to load one bed before moving on to the next bed. The "evenness" of distribution is called into question for drop boxes when considering the completeness of trench loading and the contour loading rate.

In a study we performed at the University of Minnesota, more than 100 drop box trench systems five to 10 years old were evaluated for loading. We found 60% of the systems did not observe ponding at the end of the first

trench in the serial systems. The study suggests drop box systems do not guarantee even distribution along even a single trench because biomat layers were unable to form at the end of the trenches with a minimum of five years growth time.

This lack of biomat development calls into question our general understanding of biomat formation timelines, identifies our conservative design approach, and highlights that shorter trench installation may be helpful in the performance of systems. Incomplete trench loading in parallel distribution is more likely due to the dosing of all thelines from the start, however studies have not been conducted to test this.

KEEPING IT PASSIVE

Siphons can be used to dose flows and still align with the passive management of gravity systems. However, older research has found that siphons commonly trickle without frequent maintenance, reducing the efficiency of these devices. Pumps are the active alternative to siphon dosing and have been utilized in pressurized systems. However, once a pump is added, the system is no longer passive, which is often a goal of gravity-fed systems.

Many component manufacturers recognize on their websites that completely level installations are not possible and they have designed inserts such as V-notch weirs, baffles or internal leveling devices to improve distribution. In Contrast to a traditional distribution box, there are distribution devices containing a dosing manifold inside a distribution box. When enough volume builds up, the device triggers and releases effluent to the distribution box's outlets.

Mid-repair, the existing pump tank and pump line into a distribution box are being replaced. (Photos courtesy of Sara Hager)

Manufacturer tests on the SeptiSurge fluid manifold device showed even flows under lab conditions even when a 0.12-inch tilt was applied. The velocity of effluent induced by the "surge" likely overcomes some limitations of gravity distribution. Further distribution along the length of drainfield piping and forceful removal of biofilm buildup could result in more equal effluent loading.

The septic system industry — installers, regulators, product manufacturers — anecdotally realize that traditional gravity-fed distribution devices are unlikely to provide even-flow distribution. However, apart from research conducted by Gill, few studies exist. Many gravity-fed drainfields are likely receiving uneven distribution either laterally, between trenches or longitudinally because of poor installation, natural settling, biofilm/sludge buildup and low flow rates. There is no evidence to show current distribution devices are capable of even distribution.

The view inside a dirty distribution box.

Tree roots are clogging a distribution box.

THE BOTTOM LINE

Uneven distribution can easily fly under the radar and produce consequences such as a shorter soil treatment life span, pore clogging and most detrimentally, groundwater contamination. Despite recognizing the limitations of distribution technologies, many rules and regulations assume even distribution across gravity drainfields. There is no scientific evidence to support current distribution devices that can elicit even distribution both laterally and longitudinally.

Distribution systems that store doses or siphons could improve lateral and longitudinal distribution and overcome some off-level field conditions. More frequent and rigorous inspections of distribution boxes and other accessible technologies could also contribute to better distribution. However, the more effective alternative is replacing gravity distribution with pressure distribution, which can better guarantee flow across the entire soil treatment area.

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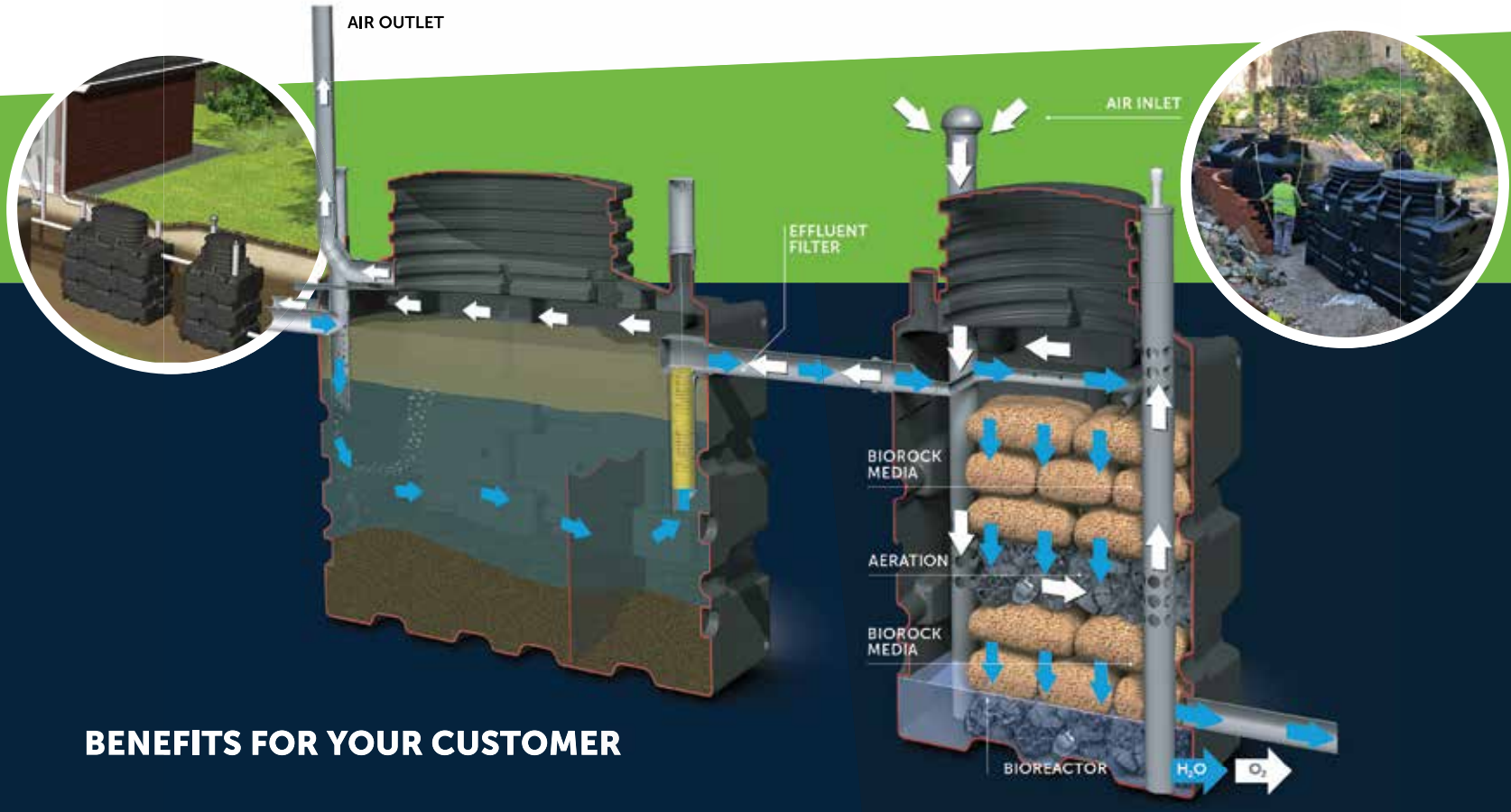

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MANUFACTURER	BRAND	GPD	RELEASED	DESCRIPTION	DISTRIBUTORS IN
Anua PO Box 77457 Greensboro, NC 27417 336-547-9338 info@anuainternational.com www.anuainternational.com	Quanics AeroCell Open Cell Foam Biofilter	NSF 400 to 1,500; Commercial per design	2000	AeroCell is a recirculating media biofilter providing stable treatment across a broad range of applications. AeroCell utilizes synthetic open cell foam cubes housed in a preassembled module. The media will not degrade over time and has a three-decade track record of performance. Pretreated effluent is timed dosed over the media using specially designed helical spray nozzles that provide uniform distribution. Treatment is optimized by recirculating effluent through the media multiple times. The mods are factory assembled and can be configured as a combined treatment and effluent dispersal system. Certified to NSF/ANSI Standard 40 with nitrogen reduction.	US and Canada
	Quanics BioCoir Coconut Fiber Biofilter	NSF 400 to 1,500; Commercial per design	2000	BioCoir is a recirculating media biofilter providing stable treatment across a broad range of applications. BioCoir utilizes coir media housed in a preassembled module. Coir are the fibers that comprise the thick husk of the coconut fruit. The coconut fiber is low cost and an upcycled resource. Pretreated effluent is timed dosed over the media using specially designed helical spray nozzles that provide uniform distribution. Treatment is optimized by recirculating effluent through the media multiple times. The mods are factory assembled and can be configured as a combined treatment and effluent dispersal system. Certified to NSF/ANSI Standard 40 with nitrogen reduction.	US and Canada
	PuraSys SBR	NSF 400 to 1,500; Commercial per design	2015	PuraSys SBR ships as boxed kit for installation in any septic tank. Kit includes control panel, floats, pre-drilled siphon pipe, PVC pipe stands, siphon/sludge pump, aerator, and drainfield pump. The system can be used for new construction or be retrofitted into existing tanks to renovate biologically failed drainfields. PuraSys SBR uses a unique batch process, where the treatment steps are done in a timed, sequential manner. The process is energy efficient since treatment occurs as needed, using intermittent aeration, mixing, and settling. Certified to NSF/ANSI 40 Class I and to NSF/ANSI 245 for nitrogen reduction.	US and Canada
BioMicrobics, Inc. 16002 W 110th St. Lenexa, KS 66219 913-422-0707 onsite@biomicrobics.com www.biomicrobics.com See ad page 8	HighStrengthFAST	1,000 to 9,000	1996	BioMicrobics' HighStrengthFAST Wastewater Treatment System treats wastewater produced by applications such as restaurants, cafes, malls, and hotels. Part of the proud FAST family of products, HighStrengthFAST is simply great technology: easy to install, easy to operate, always reliable. The proven process of attached growth combined with robust aeration makes the patented FAST system technologically innovative and extraordinarily consistent. HighStrengthFAST can be combined with NitriFAST for improved nitrogen removal, or MyFAST for applications greater than 10,000 gpd.	Global
	MyFAST	10,000 to 160,000	2005	Engineered to fit applications of 10,000 to 2,000,000 gpd, the MyFAST (and larger MacroFITT) Wastewater Treatment System uses multiple biological and physical processes to treat wastewater. Ideal for residential (multi-family properties, clustered subdivisions, and small municipalities) and high strength commercial applications, FAST (Fixed Activated Sludge Treatment) is simply great technology: easy to install, easy to operate, always reliable. The proven process of attached growth combined with robust aeration makes the patented FAST system technologically innovative and extraordinarily consistent. Decades of field performance show that FAST systems reduce nitrogen levels – including nitrates and other nitrogen compounds – at high percentages.	Global
	SeptiTech STAAR	500 to 27,000	2013	Designed for both domestic and commercial wastewater, the SeptiTech STAAR (Smart Trickling Anaerobic/Aerobic Recirculation) Filter Systems can treat from 100 to 27,000 gpd. The biological trickling filter achieves low levels of nitrate and with lower operating costs and power requirements than competing products. All below-grade system components fit in readily available concrete, plastic, or fiberglass tanks. The system is suitable for areas where large tracts of land are not available for land-intensive wastewater treatment systems. Especially appropriate for environmentally sensitive areas, the STAAR system reduces BOD5 and provides for efficient nitrification and denitrification.	Global
BIOROCK 685 John B Sias Memorial Pkwy., Ste. 330 Forth Worth, TX 76134 817-727-8227 septic@acuantia.com www.biorock.com See ad page 21	Acuantia BIOROCK - ECOROCK	450 to 750	2022	The ECOROCK is a small-sized wastewater treatment plant designed to be retrofitted to an existing primary tank for small to large sized homes. The ECOROCK-system functions as a two-stage treatment plant. The raw sewage first enters a Primary tank to provide preparation and initial breakdown of organic solids. The wastewater then passes into the ECOROCK unit through an effluent filter before discharging into drainfield. ECOROCK is an ideal product to help lower effort and cost for repairing an existing unit.	US
Delta Treatment Systems 9125 Comar Dr. Walker, LA 70785 800-219-9183 • 225-665-6162 info@deltatreatment.com www.deltatreatment.com See ad page 3 Delta Treatment continued >>	Whitewater DF	500 to 1,500	1993	The process occurs entirely within the self-contained treatment unit which is comprised of outer mixing tank and a cone-shaped settling chamber. Raw, unsettled domestic wastewater enters directly into the mixing tank where mixing occurs through an air distribution system. The mixed liquid then enters the settling chamber from the bottom. The settling chamber maintains a quiet condition which allows solids to settle down and re-enter the mixing chamber for more processing. The liquid from the ANSI/NSF 40 certified system is hydraulically displaced upward and is discharged as a clear, odorless treated water which meets or exceeds state water quality standards.	AL, AK, AZ, BC, BWI, CA, CO, FL, GA, HI, ID, IL, IN, IA, KY, LA, ME, MI, MD, MN, MO, MS, MT, NC, NM, NV, NY, OH, OK, ON, OR, TN, TX, UT, VA, WA, WI, WV

MANUFACTURER	BRAND	GPD	RELEASED	DESCRIPTION	DISTRIBUTORS IN
Delta Treatment Systems 9125 Comar Dr. Walker, LA 70785 800-219-9183 • 225-665-6162 info@deltatreatment.com www.deltatreatment.com See ad page 3	ECOPOD	500 to 250,000	2006	The ECOPOD Advanced Wastewater Treatment System is a FFBR (fixed film bioreactor) system that houses an engineered PVC media specifically designed to treat domestic wastewater. Five models accommodate daily flows ranging from 500 to 1,500 gpd, with customizable options available for commercial applications up to 250,000 gpd. The ECOPOD is ideal for individual residential installations, cluster designs, and small-to-medium commercial wastewater treatment applications. Self-contained, it can be inserted into a standard-sized septic tank or vault providing quiet, odorless operation. ECOPOD is certified to ANSI/NSF International Standards 40 and 245, FHA and VA acceptable, and suitable for intermittent usage.	AL, AK, AZ, BC, BWI, CA, CO, FL, GA, HI, ID, IL, IN, IA, KY, LA, ME, MI, MD, MN, MO, MS, MT, NC, NM, NV, NY, OH, OK, ON, OR, TN, TX, UT, VA, WA, WI, WV
	Enviro-Aire Package Plant	500 to 1,500	2005	The Enviro-Aire Package Plant consists of a three-step process to treat incoming wastewater. Raw wastewater enters the unit from a residence or facility. The first chamber is the primary chamber which separates the sludge (gross solids) and scum (floating solids) from the raw wastewater. Effluent then enters the aeration chamber where aerobic bacteria digest the organic waste. From the aeration chamber, the liquid enters the clarifier chamber, where additional water-solids separation occurs. Settled solids return to the aeration chamber for additional aerobic digestion. The air diffuser within the aeration chamber is a patented design to reduce back pressure on the air compressor and maintain constant, non-clogging air flow. The ANSI/NSF 40 certified system design is easy to operate and maintain and is engineered for low energy consumption.	IL, LA, MS, TX
E-Z TREAT ONE WATER SOLUTIONS **E-Z Treat Systems, Inc** PO Box 176 Haymarket, VA 20168 703-753-4770 Fax: 571-248-8837 www.eztreat.net See ad page 35	EZ 600 EZ 1200 Big EZ 3L Big EZ 4L Big EZ 5L Big EZ 6L	600 1,200 2,425 3,275 4,120 5,000	2000	E-Z Treat is a recirculating synthetic media filter. Certified to NSF/ANSI 40 class 1, 245 (nitrogen reduction) and 350 (water reuse). NSF 350 allows for reuse of treated effluent inside residences and commercial facilities. This ability can be used for non-potable activities such as toilet flushing and unlimited irrigation. They require minimal operation and maintenance and are highly energy-efficient. E-Z Treat is a scalable treatment system that accommodates designs from one-bedroom residential to 100,000 gpd commercial. System designs include single and mutli - family residences, camp-grounds, STEP systems, mobile home parks, schools and strip malls. They require minimal operation and maintenance and are highly energy-efficient.	US
eljen CORPORATION Innovative Environmental Products and Solutions Since 1970 **Eljen Corporation** 90 Meadow Rd. Windsor, CT 06095 800-444-1359 info@eljen.com www.eljen.com See ad page 9	GSF	Scaleable	1982	The Eljen Geotextile Sand Filter (GSF) is an advanced wastewater treatment and dispersal technology. The GSF system provides treatment and dispersal in the same footprint while keeping installations simple and maintenance minimal for domestic and commercial applications. The system requires no startup period. GSF Modules are uniquely designed to provide vertical surface area and oxygen transfer to support the biological treatment of nutrients and contaminants, increasing the soil's ability to accept effluent and the soil's long-term acceptance rate.	North America and Australia
FujiClean USA Toward Clean Water... **Fuji Clean USA** 41-2 Greenwood Rd. Brunswick, ME 04011 207-406-2927 Fax: 207-406-2929 info@fujicleanusa.com www.fujicleanusa.com See ad page 19	CE Series	500 to 1,350	2006 Japan 2015 US	FujiClean's CE model series averages 50,000 systems installed annually worldwide. The popularity is driven by a one-tank configuration, small footprint (7' x 4' for smallest model), low power draw (less than $6/month for most residential systems), easy plug & play installation, simple & efficient O&M, and consistent treatment (90-95% BOD and TSS removal). No preceding septic tank necessary. NSF 40 certified. There are no moving in-tank parts. An external air blower (FujiMAC RII) introduces oxygen to aerobic chambers and powers two internal air lift pumps, which manage sludge return and discharge of clean effluent.	Worldwide headquarters in Japan, US, Australia & Germany
	CEN Series (denitrification)	500 to 1,350	2011 Japan 2015 US	FujiClean's CEN technology provides enhanced denitrification into its standard treatment process and produces a consistently high-quality effluent (NSF 40/245 certified: 5 BOD, 6 TSS and 10 TN) from straight septic wastewater – no preceding septic tank necessary. No moving in-tank parts. The CEN5 is compact (about 8' x 4'), lightweight (about 475 lbs.), highly maneuverable and features a low power draw (one 80 L/min blower drawing 1.27 kWh/day), plug & play installation, and optional wireless telecommunication package that offers both dial and text capabilities. The CEN model series is producing best-in-class treatment numbers and lowest life cycle cost in multiple U.S. states.	
	Commercial Systems	1,350 to 6,000	2006 Japan 2015 US	Commercial FujiClean systems provide all the benefits of smaller systems – just scaled up in size. FujiClean's largest CE commercial system, the CE6KG, is now available. The CE6KG can treat up to 6,000 gpd; uses the same treatment technology, process flow and one-tank structure as the smaller CE systems. Like other FujiClean models, the compact size can be squeezed into the tightest of commercial sites with a footprint of only 36' x 6.5' (including built-in septic tank). Other models available with both CE an CEN (denitrification) technologies include CE14 (1,350 gpd), CE21 (1,900 gpd), CE30 (2,700 gpd) and CEN14 (1,350 gpd), CEN21 (1,900 gpd), and CEN50 (4,500 gpd).	
GEOMATRIX **Geomatrix Systems, LLC** 114 Mill Rock Rd. E Old Saybrook, CT 06475 860-510-0730 info@geomatrixsystems.com www.geomatrixsystems.com	SoilAir	1 - 100,000+	1998	SoilAir is a patented technology that intermittently aerates the leach field and the surrounding soils rather than continuously aerating the wastewater in a tank. The soils in the leach field become a massive enhanced treatment system. Since air has 21,000 times the capacity to hold oxygen than water, this process provides unprecedented rejuvenation of failed septic systems, extends the lifespan of new leach fields and enhances treatment. SoilAir is effective at treating high strength wastewater and has been successful at oxidizing ATU sludge out of systems. SoilAir's systems have been extensively tested.	US and Canada
	GeoMat	1 - 100,000+	2005	The GeoMat passive treatment and leaching system is ultralow profile, designed for maximum treatment and infiltration. GeoMat is 1" thick and available in widths of 12" and 39". It is comprised of an entangled filament core, a hydroscopic membrane and an internal gravity or LPP pipe. The shallow burial depth and high surface area to void space ratio of GeoMat results in unprecedented aeration. This increased oxygen results in increased removal of pathogens, B.O.D., T.S.S., and nutrients such as nitrogen and phosphorus. When installed on 6" of specified sand, GeoMat treatment levels have been tested to meet NSF/ANSI Standard 40.	Many States, Contact Manufacturer

MANUFACTURER	BRAND	GPD	RELEASED	DESCRIPTION	DISTRIBUTORS IN
Jet Inc. 750 Alpha Dr. Cleveland, OH 44143 800-321-6960 • 440-461-2000 Fax: 440-442-9008 email@jetincorp.com www.jetincorp.com See ad page 20	JCP	1,500 to 300,000	1970	Jet's Commercial Wastewater Treatment Extended Air and MBBR Plants are modular in design, can treat flows from 1,500 to 300,000 gallons of wastewater per day and allow for phased build out. This makes it possible for motels, shopping centers, restaurants, and service stations to be constructed along interstate highways far from any town. Factories and Subdivisions can be developed miles beyond sewer lines. Time-tested plants treat wastewater through the performance-proven 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 onsite 24/7 tech support, plant start up commissioning and operator training.	
	J-Series	500 to 1,500	1993	J-Series BAT Media Plant is a natural, organic, chemical-free system that uses nature's own resources to reduce wastewater to a clear, odorless liquid in just 24-hours. Employing the patented Biologically Accelerated Treatment process that supplies oxygen to naturally occurring microorganisms found in wastewater. Microorganisms attach themselves to the submerged Jet BAT Process Media, forming a "Biomass" to quickly and effectively treat wastewater. The 700 Series Aerator supplies the oxygen and the mixing that supports our exclusive treatment process, converting wastewater into colorless, odorless liquids and gasses. The J-Series, tested to NSF Standard 40, is available in 500 to 1,500 gpd in concrete and 500 to 800 gpd in a seamless plastic tank. Multiple system control options are available.	Worldwide
	CF-Series	500 to 1,500	2008	Jet's Nutrient Reducing BAT Media Plants offer variable capacity in a NSF-40/245 tested treatment system. The J-1500CF Series provides complete effluent treatment from 500 to 1,500 gpd. The 500 and 800 gpd PLT Series tanks are the lightweight, rotational molded alternative to the concrete J-1500CF Series. The seamless polyethylene tanks are easy to transport and install in the most difficult site conditions. J-1500CF Series utilize the proven 700++ aerator, effluent filter and the Jet 197 Control panel. The 197 Control panel cycles the aerator to reduce the nitrogen by over 60%.	
	R-Series	450 to 1,400	2016	R-Series utilize time proven BAT Media, Jet 700++ aerator and the Illumi-Jet UV Disinfection Unit to meet NSF Standard-350 for applications that require shallow discharge, direct discharge or reuse. The R-Series Plants offer variable flow capacity from 450 to 1,400 gpd in precast concrete and seamless, polyethylene tanks. The polyethylene tanks handle from 450 to 750 gpd that are the lightweight, rotational molded alternative to the concrete version. The seamless polyethylene tanks are easy to transport and install in the most difficult site conditions.	
MST Manufacturing, LLC 31 Affonso Dr. Carson City, NV 89706 877-473-7842 • 949-297-4590 Fax: 949-916-2093 microseptec@microseptec.com www.microseptec.com	EnviroServer	600, 1,200 and 2,500	1998	The EnviroServer ES is a combination of primary treatment, flow equalization, and secondary treatment by both fixed-growth and suspended-growth aerobic processes. The system consists of five chambers in one compact pre-engineered unit. The first chamber is a primary clarifier, the second chamber is the first aeration zone, the third chamber is the second aeration zone, the fourth chamber is the final clarifier, and the fifth chamber is the effluent chamber where an optional pump(s) and disinfection device may be installed.	Worldwide
Norweco, Inc. 220 Republic St. Norwalk, OH 44857 800-667-9326 • 419-668-4471 Fax: 419-663-5440 email@norweco.com www.norweco.com See ad page 7 **Norweco continued >>**	Singulair Model 960 and Model TNT (Total Nitrogen Reduction)	500 to 1,500	1996, 2006	The Singulair system is the state-of-the-art alternative to a troublesome septic tank for domestic wastewater treatment. Employing the extended aeration process, the Singulair plant provides flow equalization, pretreatment, aeration, clarification, tertiary filtration and optional chemical addition within a single precast concrete tank. Designed for domestic wastewater flows ranging from 500 to 1,500 gpd, performance of the Singulair system is certified by NSF International (Standards 40 and 245) and the Canadian Standards Association.	
	Singulair Green Model 960 and Model TNT (Total Nitrogen Treatment)	600	2010	The Singulair Green aerobic treatment system incorporates Norweco's advanced aerobic treatment process into a durable, watertight polyethylene tank. It is ideal for new or retrofit applications and can be installed easily in the most difficult jobsite with just a backhoe. Incorporating support ribs and inherently strong arch shape, the durable Singulair Green tank will provide decades of reliable performance. Designed for domestic wastewater flows up to 600 gpd, with treatment performance meeting or exceeding the strictest state and county requirements, Singulair Green is certified by NSF International (Standards 40 and 245).	
	Hydro-Kinetic	500 to 1,500	2012	The Hydro-Kinetic wastewater treatment system employs innovative Hydro-Kinetic filtration technology to produce the cleanest, most consistent effluent quality available. The Hydro-Kinetic system uses extended aeration and incorporates both suspended and attached growth processes to treat wastewater. The patented Hydro-Kinetic Bio-Film Reactor provides final treatment of the wastewater to a near pristine state. The Hydro-Kinetic system is the only NSF/ANSI Standard 40 and 245 certified residential wastewater treatment system to pass two consecutive tests without performing routine maintenance for a full 12 months. The Hydro-Kinetic system exceeds regulatory standards and is certified and listed to BNQ Standards CAN/BNQ 3680-600 and NQ 3680-910.	North America, Central America, South America, Europe, Africa and Middle East
	Singulair R3 and Singulair R3 Green	500 to 1,500	2018	The Singulair R3 REDUCES water consumption, REUSES treated effluent and RECYCLES water to conserve and recharge our groundwater. It provides the cutting-edge solution to chronic water shortages and reduces energy costs of water and wastewater treatment. The system efficiently treats incoming wastewater to the highest level for restricted indoor and unrestricted outdoor use. With unrivaled performance, the Singulair R3 system exceeds the effluent requirements of NSF/ANSI Standards 40, 245 and 350.	
	Singulair Solar	500 to 1,500	2020	The Singulair Solar system delivers an environmentally friendly solution for onsite wastewater treatment by utilizing renewable solar energy to generate electricity. Solar power is a 100% clean, renewable energy source that offers year round efficiency and reduces your carbon footprint. Singulair Solar technology requires no moving parts, providing quiet, efficient operation with minimal maintenance.	

MANUFACTURER	BRAND	GPD	RELEASED	DESCRIPTION	DISTRIBUTORS IN
Norweco, Inc. 220 Republic St. Norwalk, OH 44857 800-667-9326 • 419-668-4471 Fax: 419-663-5440 email@norweco.com www.norweco.com See ad page7	Singulair HK and Singulair HK Green	500 to 1,500	2022	The Singulair HK Green wastewater treatment system is specified in areas that require significant and consistent reduction of Total Nitrogen. This hybrid system combines both suspended and attached growth biological processes to produce superior effluent results with no service requirements for 18 months. The system meets or exceeds rigid regulatory standards and is performance certified and listed to NSF/ANSI Standards 40 and 245. Singulair HK Green achieved astounding certified effluent results of 3.0 mg/L CBOD, 4.4 mg/L TSS and 7.2 mg/L TN, an 84% reduction of TN.	North America, Central America, South America, Europe, Africa and Middle East
	Singulair Green with Integral Pump Chamber	600	2022	The Singulair Green tank with an optional 520 gallon integral pump chamber provides a single tank solution for situations that require a downstream pump tank. The Singulair Green with pump chamber returns only clean, highly treated effluent to the environment. The cutting edge features of this system make installation and maintenance of expanded treatment systems quick and easy. The all-in-one system provides superior structural integrity.	
Orenco Systems, Inc. 814 Airway Ave. Sutherlin, OR 97479 800-348-9843 • 541-459-4449 info@orenco.com www.orenco.com	AdvanTex AX-RT	Up to 750	2000	The AX-RT is a "plug and play" wastewater treatment system that can be shallowly buried and installed right behind a septic tank, as easily as a septic tank. Its compact design fits on small lots and reduces costs for excavation and installation. That means property owners (residential and small commercial) can buy AdvanTex quality at a competitive price. The AX-RT is designed to be easily maintained with an annual service call, thanks to its accessible, cleanable filters and media. And its high-quality, high-head pumps have been known to last over 20 years (as seen in the Elkton, Oregon, sewer system).	
	AdvanTex AX-100	2,500 to 12,000	2002	Orenco's patented AdvanTex Treatment Systems include the compact AX-100, which offers a small footprint, making it a viable option for small sites. It works as efficiently as a sand filter, enabling treatment of high-volume commercial and multi-family flows in tight spaces. The AX-100 is a premanufactured package, including the textile media, and has low maintenance requirements, low power use, and low life-cycle costs. It provides consistent, reliable treatment, even under peak flows, producing clear effluent that's ideal for reuse.	North and Central America, Australasia, Europe, and Africa
	AdvanTex AX-Max	1,750 to 100,000	2010	The AX-Max is a completely integrated, fully plumbed, and compact wastewater treatment system for commercial properties and communities. It's ideal for projects with strict discharge limits, limited budgets, and part-time operators. Like all AdvanTex Treatment Systems, the AX-Max is a recirculating media filter that produces outstanding effluent that's suitable for reuse, with significant nutrient removal. AX-Max systems are highly energy-efficient and require minimal operation and maintenance.	
Presby Environmental 143 Airport Rd. Whitefield, NH 03598 800-473-5298 • 603-837-3826 Fax: 603-837-9864 info@presbyeco.com www.presbyenvironmental.com See ad page 6	Advanced Enviro-Septic	Varies	1995	Advanced Enviro-Septic (AES) is a combined treatment and dispersal system. This effective and non-mechanical onsite system is designed for residential, commercial, and community use. AES has been proven to remove up to 99% of wastewater contaminants without the use of electricity or replacement media. AES does this quickly and naturally establishing multiple bacterial treatment environments throughout the system that break down and digest wastewater contaminants leaving the septic tank. This passive process allows the system to discharge highly purified wastewater, preventing soil clogging and groundwater contamination. AES has third party certifications from NSF, Cebedeau, BNQ, and SAI Global.	Worldwide
Zoeller Pump Company 3649 Cane Run Rd. Louisville, KY 40211 502-778-2731 zpcmarketing@zoeller.com www.zoellerpumps.com	Z-Cell High Performance Wetland	450 to 36,000+	2001	The Z-Cell technology can be used in residential, commercial, or small community applications for treating residential strength septic tank effluent. The Z-Cell is a timed dose system and the wastewater has a 36" vertical path to an outlet pipe below the wetland's surface. By moving water vertically, the fluid must pass through the horizontally oriented plant root zone. This eliminates short circuiting, an issue common in conventional constructed wetlands. During the growing season, evapotranspiration through plant leaves reduces the hydraulic load to downstream components. Produces better than secondary quality effluent.	Contact Manufacturer
	Recirculating Media Filters	450 to 36,000+	2001	Designed for use in residential, commercial, or small community applications for treating residential strength wastewater from a septic tank. Treatment occurs below grade as the fluid trickles down through the pore spaces of the media where aerobic organisms feed on the nutrients. Effluent leaves the system through an outlet pipe in the bottom of the filter. Multiple RMFs can be used together when greater capacities are needed. Effluent can be discharged above or below grade. Disposal must meet local health codes or guidelines. Produces better than secondary quality effluent.	Contact Manufacturer

SYSTEM PROFILE

An overview of the layout after precast tanks were set and lids placed. Also pictured, is a pile of the decomposed garbage muck that was removed to make room for the tanks.

Installer Scott Blaney backfills around the plumbed-in Anua BioCoir filters using his Kubota mini-excavator.

A Complex Treatment Solution Is on the Menu

New owners of a popular Georgia seafood restaurant require clean effluent and 2,500 feet of dripline to open for business

By Tim Dobbins

For generations, Desposito's Seafood Shack has been a staple establishment for Georgians and tourists looking for an authentic southern-style seafood experience in the Savannah area.

Setbacks due to the COVID-19 pandemic caused the restaurant to close and eventually change ownership in 2020. When the new owners acquired the restaurant, they lost the grandfather clauses that allowed it to operate with an outdated and tiny onsite system, a system that consisted of a single 1,000-gallon septic tank and roughly 50 feet of gravel bed drainfield.

It was so small the business had to wait until the end of the night when all the customers were gone to wash any dishes. So along with renovations to the building itself, an entirely new and substantially larger septic system was required before the business could be back up and operational.

Taking on the task

Unfortunately, it wasn't as simple as dropping in a bigger septic tank and moving on. The restaurant's proximity to the Intercoastal Waterway, local regulations and high water table created a challenge many installers shied away from. Most in the area passed on the prospect, but Scott Blaney, owner and operator of Reliable Septic Services, was willing and confident he could get it done.

The new owners met with Blaney after struggling to find an engineer that wanted the project. "They went through two different engineers and neither of them could come up with anything," he says. "They met me and I suggested Mike Fugate out of Atlanta with Smartwater Solutions. Mike jumped in there and came up with a plan."

Challenging prep work

The plan started with groundwork and for a number of reasons, getting the site prepped was a massive job all on its own.

"The restaurant actually sits on an old landfill that was used in the 1930s and '40s," Blaney says. "When I started digging, I hit a layer of decomposed garbage and glass bottles. I ended up hauling out 19 full dump truck loads of garbage muck."

Also, due to the restaurant's location within 150 yards of the Intercoastal Waterway, Blaney and the engineer had to abide by specific Georgia state requirements when it came to discharge into the drainfield.

They had two options. Either add fill above the water table to create at least 24 inches of vertical separation, or install a system that discharges 100% clean water. They ultimately decided to take the safest route possible and do both.

"The first thing I did was bring rock in and assemble the six zones of the drainfield," Blaney says. "The water table was only 12 inches below the surface, we hauled in 26 tandem dump trucks of sand and 300 tons of 57 stone to raise the system 30 inches and set the 2,500 feet of low-pressure pipe."

And even that presented more challenges than anticipated due to the fast rising costs of sand and rock. "I was paying $200 per load of sand,"

The Anua PuraACE reactor pods getting prepped before installation in the aeration tanks.

System Profile

Location:	Savannah, Georgia
Facility served:	Desposito's Seafood Restaurant
Designer:	Smartwater Solutions of Atlanta
Installer:	Reliable Septic Service
Type of system:	Select Precast Concrete septic tanks with Anua high-strength pretreatment units, Anua recirculating media biofilters and low pressure dispersal drainfield
Site conditions:	Disturbed soils and sand
Hydraulic capacity:	8,000 gpd

Blaney says. "After the years of COVID and things changed, it first went to $300, then about halfway through the project it went to $350."

Gearing up

Blaney rented two CASE 320 excavators for one week to dig the holes for the tanks. And due to the sheer size and weight of the concrete tanks needed for the system, he also used the large excavators to move and set them in place. Besides those excavators, Blaney and his operator spent time in a Kubota KX057-4.

"I'd say 90% of the job was done with my Kubota," Blaney says. "I use that to dig, backfill and everything else really."

System flows

Now hooked up and ready for use, water exiting the restaurant flows via gravity through approximately 10 feet of 4-inch, Schedule 40 PVC pipe before entering into a 2,500-gallon precast concrete grease trap, immediately followed by a 3,000-gallon septic tank, also precast. At the discharge end of the grease trap and septic tank, Polylok PL-625 effluent filters were installed.

After flowing through the grease trap and septic tank, water enters a 2,000-gallon pump tank where it is pumped into two, 2,000-gallon

The distribution box during plumbing.

> **"The restaurant actually sits on an old landfill that was used in the 1930s and '40s.** When I started digging, I hit a layer of decomposed garbage and glass bottles. I ended up hauling out 19 full dump truck loads of garbage muck."
>
> Scott Blaney

aeration tanks. Inside each aeration tank are two PuraACE (Anua) reactor pods for additional treatment of wastewater.

After aeration, water flows to a 2,000-gallon clarifier tank where it is pumped into two Anua model 1530 BioCoir coconut fiber biofilters for further treatment ensuring clean discharge. Following the BioCoir filters, water flows via gravity into a precast concrete distribution box.

"The D-box sends 20% of the water over to two more distribution tanks," Blaney says. "The remaining 80% goes through an Anua Puralinity pH Biobuffer and from there, it reenters the system in the clarifier tank."

The 20% that reaches the distribution tanks is pumped directly to the drainfield. Each distribution tank contains three water pumps that disperse water to three separate areas of the drainfield. Between the two tanks, six pumps push water throughout the entire drainfield. "Each pump is on a timed schedule alternating between zones to evenly spread out flow," Blaney says. "So no one area gets an overdose of water."

The Anua Puralinity pH Biobuffer set and ready to be plumbed (far right).

The system is set up that way so there isn't an overwhelming amount of volume entering the drainfield at one time and to ensure the water going into the drainfield is completely clean. "It's really one big drainfield, but it's broken into six equal parts," Blaney says. "It's 140 feet long by 75 feet wide and has 2,500 feet of dispersal pipe."

To feed the six areas, Blaney plumbed 2-inch PVC pipe to each zone. Once it reaches, it narrows to 1 1/4-inch PVC pipe. The pipe has 3/16-inch holes drilled every four feet and is positioned over the top of gravel and sand. The end of each distribution pipe is capped with a ball valve for easy pipe flushing and cleaning.

"We put in another 180 tons of sand for cover, then I covered that with geotextile filter cloth followed by another 10 loads of sand." The system ended up with a total mound height of 40 inches at the highest point.

Controlling the system's timing and pumps are three SJE Rhombus control panels. "There is one main master control panel that controls two other panels," Blaney says. "One for each of the two distribution tanks to control the timing of pumping."

With only a few final loose ends to tie up, the restaurant's much needed onsite system upgrade will be ready for its reopening and the wave of customers looking for their southern-style seafood fix.

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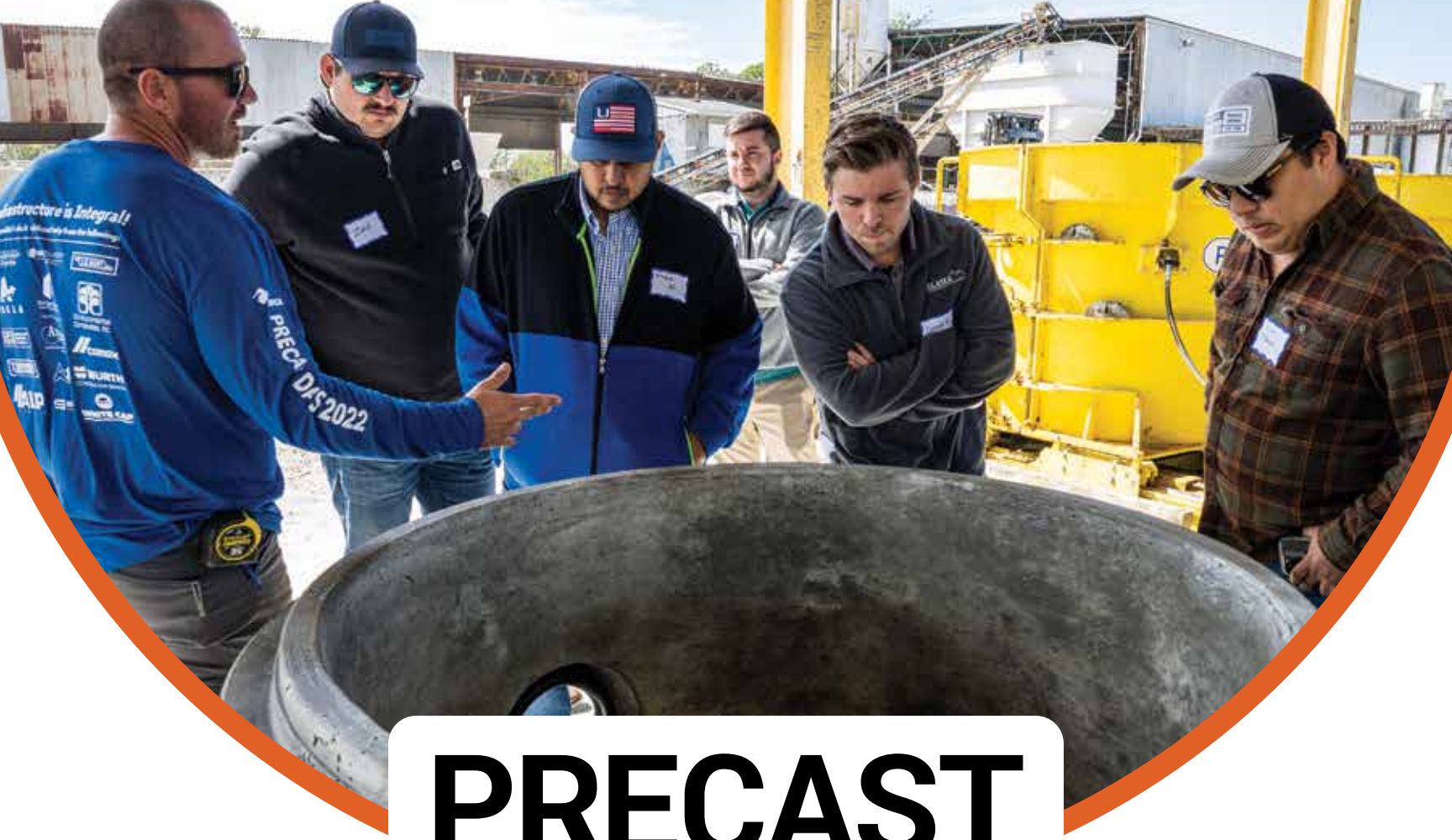

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Advanced Treatment Units

By Craig Mandli

ADVANCED TREATMENT UNITS

Eljen Geotextile Sand Filter

The GSF, or **Geotextile Sand Filter** system from **Eljen**, is designed to provide treatment and dispersal in the same footprint with easy installation and minimal maintenance. It is used for commercial and residential applications. Utilizing a two-stage pretreatment process, the geotextile modules apply filtered septic tank effluent to the soil, increasing the soil's ability to accept effluent and increase the long-term acceptance rate. Its design provides increased surface area for biological treatment that greatly exceeds the module's absorption area. Open-air channels within the module support aerobic bacterial growth on the module's geotextile fabric interface, surpassing the surface area required for traditional absorption systems. The system is tested and certified by NSF to NSF/ANSI Standard 40. **800-444-1359; www.eljen.com**

MicroSepTec EnviroServer ES

The **MicroSepTec EnviroServer ES** series utilizes five chambers to achieve primary settling, treatment and clarification in one tank. The units use a moving-bed biological reactor made for the residential market. The first compartment is the primary clarifier for settling sludge and solids. The second houses the first of two aeration chambers and contains bio-media providing surface area to promote a healthy population of microorganisms. The third compartment is used for further aeration to amplify the growth of nitrifying bacteria and the process of nitrification. The fourth chamber is the final clarifier where suspended solids settle out. Wastewater is then recirculated back to the primary clarifier in the first compartment, which contains enough carbon to promote denitrification removing high levels of nitrate. Clarified water then moves through an effluent filter before entering the fifth compartment, an effluent chamber for storage. **877-473-7842; www.microseptec.com**

HIGH-STRENGTH WASTEWATER TREATMENT

Anua PuraACE

The **PuraACE** from **Anua** is a drop-in-tank reactor pod for treating high-strength waste from restaurants, convenience stores or other facilities. The pods can be added to residential or commercial treatment systems that are overloaded. Treatment occurs by a submerged aerated filter process to reduce BOD, COD and ammonia. Built-in passive alkalinity control regulates pH without chemical addition. The pod housing isolates aeration to keep the heavy solids from mixing. The open channel media prevents clogging while the airlift recirculation enhances retention time. Multiple pods can be utilized for larger flows and loads. **336-547-9338; www.anuainternational.com**

Eliminite Commercial C-Series

The **Commercial C-Series** system from **Eliminite** is designed to provide reliable treatment with emphasis on total nitrogen reduction for high-strength waste applications such as worker camps, RV parks, restaurants, ski and golf resorts, breweries, mines and agricultural operations. It may be used with locally sourced tanks and components. MetaRocks treatment media is designed to withstand a variety of high-strength waste-loading scenarios, particularly where clogging and odor control are major considerations. The system is scalable and may be adapted to suit specific phasing requirements, site constraints and unique demands. **888-406-2289; www.eliminite.com**

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Jet Inc. J-1500CF Series

The **J-1500CF Series** nitrogen-reducing BAT media plant from **Jet Inc.** offers variable capacity in a NSF 245-tested treatment system. It provides complete effluent treatment from 500 to 1,500 gpd. The 500 and 800 gpd PLT Series tanks are the lightweight,

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The **PL-UV1 UV Disinfection Unit** from **Polylok** reduces bacteria levels from secondary effluent to meet strict water quality standards. Components of the compact unit are engineered and constructed to provide reliable disinfection and long operational life, according to the manufacturer. It has a dual-pass design, a long-life UV bulb, weatherproof electrical components and no chemical residual or harmful byproducts. It is easy to install and operate and uses little electricity. Rates for gravity flow only are 100 through 8,640 gpd, with 100 through 4,320 gpd with 30 mg/L BOD and 30 mg/L SS, and 4,321 to 8,640 gpd with 10 mg/L BOD and 10 mg/L SS. It offers a UV dose greater than 40,000 microwatt-seconds per square cm at 254 nanometers, with transmissivity of 65%. **888-765-9565; www.polylok.com**

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BioMicrobics BioBarrier

BioMicrobics BioBarrier is an MBR designed to meet stringent wastewater treatment requirements for BOD, TSS and TN. Depending on local regulations, the system may be used for water reuse, such as for flushing toilets. The system may also drastically reduce the size of the drainfield. It received NSF/ANSI certifications for onsite wastewater treatment (Standard 40, class I), for nitrogen reduction (Standard 245) and for water reuse (Standard 350). Residential models treat 500 to 3,000 gpd. **800-753-3278; www.biomicrobics.com**

Norweco Singulair Green

Norweco's Singulair Green with optional 520-gallon integrated pump tank offers an easy-to-install, all-in-one system for situations that require a downstream pump tank. The system with optional pump chamber returns clean, highly treated effluent to the environment. **800-667-9326; www.norweco.com**

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Michigan legislators make another push for statewide onsite code

By David Steinkraus

Democrats in the Michigan Legislature followed up on a promise and introduced four bills that together would create a statewide septic code. Michigan is the only state that lacks such a code.

Sponsors of the bills say their goal is to reduce bacterial contamination in the state's waterways. "We have a patchwork of local ordinances that aren't even covering the majority of septics," Rep. Phil Skaggs, a Democrat from East Grand Rapids and a lead sponsor of the bills, told the news site *MLive*.

"Everyone knows that we have to do something," said Sen. Sam Singh, D-East Lansing, according to the news service *Bridge Michigan*. "It's shameful that we're the only state in the country that doesn't have a statewide system."

Last year legislators introduced a bill to require system inspections at the time of sale. That failed. It was opposed by the Michigan Realtors, a trade group.

"It was a statewide point-of-sale inspection mandate. That's all it was. It had no structure behind it, no teeth in it, nothing like that," Brad Ward, vice president of public policy at Michigan Realtors, told *MLive*. He said the current bills look good.

Environmental groups are also on board.

A pair of bills are in both the House and Senate. One bill in each set (HB 4479 and SB 299) amends the public health code to: define what onsite systems are; specify what the duties of local health departments will be; require system inspections at least every five years; forbids installation of a proprietary treatment product after Jan. 1, 2026, unless it has been registered with the state and a permit has been issued; and require counties to phase out or repeal any time-of-sale inspection law.

The companion bill (HB 4480 and SB 300) creates a technical advisory committee in the state Department of Environment, Great Lakes and Energy to make recommendations about the standards, technologies and qualifications of people who would inspect and manage onsite systems. The 17-member committee would consist of representatives of the five regional health departments — each appointed by a top state political leader — and various specialists appointed by the governor including professional engineers, an installer, an onsite product manufacturer, an onsite service provider, and someone representing onsite system users.

The bill also creates an onsite fund for administrative costs, for grants to local health departments to carry out their duties, and for grants to lower-income people who need to upgrade their onsite systems.

Bills are subject to amendment in committee, but the initial versions of HB 4479 and SB 299 state that because onsite systems are subject to failure, which risks public health, there should be a connection to a public sewer system as early as possible.

Florida

The House passed a bill containing new rules for onsite systems. New septic tanks would be banned in areas covered by management plans for the Banana River Lagoon, Central Indian River Lagoon, North Indian River Lagoon and Mosquito Lagoon.

Onsite systems would be allowed if a municipal sewer connection isn't possible, but any onsite technology would have to remove at least 65% of nitrogen. Existing developments would have to move to a centralized system by 2030, but again, if that's not possible, onsite technology with a 65% nitrogen reduction would be required, reported *Florida Politics*.

A similar bill in the Senate was heading for a floor vote.

Washington, D.C.

The Rural Decentralized Water Systems Reauthorization Act, introduced in Congress in April, would increase support for low- and moderate-income households to upgrade wells and onsite systems, said a press release from two of the bill's sponsors, Sen. Cory Booker, D-New Jersey, and Sen. Shelley Moore Capito, R-West Virginia.

The act would reauthorize the Rural Decentralized Water Systems Grant Program through 2028, would increase the maximum loan or grant to $20,000, and would focus money on people earning 60% or less of the nonmetropolitan household income for an area.

Alabama

After an 18-month investigation into environmental justice in Lowndes County, the U.S. Justice Department reached an agreement with the state and a county health department.

The state will stop imposing fines, penalties, and threats of liens on people who cannot afford functional onsite systems, Assistant Attorney General Kristen Clarke said in prepared remarks. In addition, the state promised to collect data about onsite systems in Lowndes County, examine public health risks, and develop a long-term sanitation plan.

News reports noted that the county's dense black soil is incompatible with standard septic systems. As a result, county residents used straight pipes to move wastewater away from their homes and into ditches or low spots.

"Onsite septics are failing across the country, but Lowndes County is the only place I've seen where it's dealt with in a punitive manner," Catherine Coleman Flowers told the *New York Times*. Flowers won a MacArthur Fellowship, "genius grant," in 2020 for her work to raise public awareness of rural sanitation.

Indiana

Legislators approved a bill that would change oversight of onsite systems. House Bill 1402 would transfer authority over onsite systems from the state Health Department to a technical review panel composed of state officials, scientists, academics and onsite professionals, reported the *Indiana Capital Chronicle*.

The panel could amend state rules and approve new technologies. Any local ordinances stricter than state rules would be invalid unless approved by the panel.

Also in the bill is language from a separate bill that would allow property owners to override local health department decisions about onsite systems as long as the owners have a consultant who agrees.

New York

The state Legislature has approved a special wastewater management district in Suffolk County and also approved a 0.12-cent sales tax for a water quality restoration fund.

Implementing the sales tax addition will require approval in a mandatory referendum, reported *Riverhead Local*. The tax would generate an estimated $3.1 billion from 2024 through 2060 for projects to protect and rehabilitate groundwater and surface water.

For several years the county has worked to counter the effects of nitrogen pollution from the estimated 360,000-plus cesspools used for wastewater treatment. The county covers the eastern end of Long Island, and the county and several municipalities enacted laws requiring advanced nitrogen-reducing onsite systems for new construction and some building expansions.

The county government must now establish the wastewater district in local law, authorize rates and taxes, and create a 17-member board to manage the district.

North Carolina

A bill in the state Senate would change the qualifications for onsite inspectors.

Under current law, environmental health specialists do onsite system permit inspections, and they must hold a four-year degree in environmental health sciences and have special training, reported *The Dispatch* of Lexington, North Carolina.

In SB 616, Sen. Steve Jarvis, R-Lexington, proposes that someone with an associate's degree in health sciences could become an environmental health associate authorized to do some inspections, including of Type II and Type III onsite systems. Jarvis said an associate would be supervised by a specialist and would need six to nine months of special training.

Lillian Koontz, director of the Davidson County Health Department, which is in Jarvis' district, said changes proposed in the bill would help local health departments deal with the sharp decrease in the number of applicants qualified to be health specialists.

Minnesota

Winona County is using funds from the American Rescue Plan Act to help people upgrade or replace failing septic systems. The county program can provide up to $15,000, or 75%, of the cost of a new system, reported the *La Crosse Tribune*. Money is available for residential or commercial systems that are failing to protect groundwater or are an imminent threat to public health.

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www.powranm.org; 505-989-7676

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www.pa-seo.org; 717-761-8648

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Pennsylvania Septage
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Virginia Onsite Wastewater
Recycling Association;
www.vowra.org; 540-377-9830

WASHINGTON
Washington On-SiteSewage Association;
www.wossa.org; 253-770-6594

WISCONSIN
Wisconsin Onsite Water
Recycling Association;
www.wowra.com; 888-782-6815

Wisconsin Liquid Waste
Carriers Association;
www.wlwca.com; 888-782-6815

NATIONAL
Water Environment Federation;
www.wef.org; 800-666-0206

National Onsite Wastewater
Recycling Association;
www.nowra.org; 978-496-1800

National Association of
Wastewater Technicians;
www.nawt.org; 800-236-6298

CANADA
ALBERTA
Alberta Onsite Wastewater
Management Association;
www.aowma.com; 877-489-7471

BRITISH COLUMBIA
British Columbia Onsite
Wastewater Association;
www.bcossa.org; 778-432-2120

WCOWMA Onsite Wastewater Management of B.C.; www.wcowma-bc.com; 877-489-7471

MANITOBA
Manitoba Onsite Wastewater Management Association; www.mowma.org; 877-489-7471

Onsite Wastewater Systems Installers of Manitoba, Inc.; www.owsim.com; 204-771-0455

NEW BRUNSWICK
New Brunswick Association of Onsite Wastewater Professionals; www.nbaowp.ca; 506-455-5477

NOVA SCOTIA
Waste Water Nova Scotia; www.wwns.ca; 902-246-2131

ONTARIO
Ontario Onsite Wastewater Association; www.oowa.org; 855-905-6692

Ontario Association of Sewage Industry Services; www.oasisontario.on.ca; 877-202-0082

SASKATCHEWAN
Saskatchewan Onsite Wastewater Management Association; www.sowma.ca; 877-489-7471

CANADIAN REGIONAL
Western Canada Onsite Wastewater Management Association; www.wcowma.com; 877-489-7471

If you would like your wastewater trade association added to this list, send contact information to editor@onsiteinstaller.com

Advanced Treatment Units

By Craig Mandli

Secondary treatment units specified for subdivision

Problem: An Arkansas developer wanted to build a subdivision outside the range of city sewer service. To maximize property development, at least 260 homes were needed on the 60-acre development, including wastewater treatment and disposal. A compact wastewater treatment system needed to maximize development and meet a 100-foot residential setback requirement. To save space, an NPDES surface discharge permit with stringent levels for BOD, TSS, oil and grease, COD, total organic carbon, ammonia and phosphorus was obtained.

Solution: FujiClean USA treatment systems were specified. Due to complex topography, a combination of gravity sewer and two lift stations were utilized to deliver wastewater to a central collection point at the corner of the development. The combined final treatment system includes at 20,000-gallon trash/alum dosing primary treatment tank, a 20,000-gallon settling/equalization dosing tank, 12 FujiClean CE6KG secondary treatment units offering 72,000 gpd total capacity, a 1,500-gallon discharge tank and UV disinfection. The modular FujiClean treatment system allowed the developer to control cost and infrastructure during the build-out. A common operator building was constructed to house the UV, alum storage, flowmeter and control panels.

Result: The FujiClean systems were successfully implemented in the subdivision. 207-406-2927; www.fujicleanusa.com

ATU provides a low-maintenance solution and future growth opportunity

Problem: Geraldine, Alabama, needed a low-maintenance and expandable wastewater treatment system to treat all of its domestic waste to regulatory limits, allow for drip dispersal and handle flow fluctuations to retain consistent treatment ensuring no drip headworks clogging or excess dispersal field biomat development.

Solution: An ECOPOD Series ATU with a drip dispersal field from Infiltrator Water Technologies was selected for the 60,000 gpd system. The system reduces levels of nitrogen, BOD and TSS. It utilizes a stable and reliable fixed-film process to treat incoming wastewater from approximately 300 mg/L BOD/TSS loading down to the specified 30/30 effluent limit requirement. A STEP system at each home moves influent to the ECOPOD treatment system, which includes a flow equalization tank with duplex alternating pumps, four E1600 ECOPOD units installed in parallel, and a dosing chamber with duplex alternating pumps that provide controlled dispersal field dosing. Oxygen pumped into the system enables bacteria to thrive in greater numbers than would occur naturally speeding sewage breakdown for safe release into the environment. The entire intra-tank bioreactor treatment system is buried in a cast-in-place concrete tank, where both nitrification and denitrification occur.

Result: The system was designed with growth capabilities in mind. As the town expands, the easy, cost-effective addition of extra trains will keep wastewater treatment capacity in line with that growth. 800-221-4436; www.infiltratorwater.com

Preserving infrastructure during remediation of restaurant treatment system

Problem: The McDonald's restaurant in Chesaning, Michigan, utilized an ATU system followed by a sand filter and leach bed. After more than a decade of high-strength restaurant load, the leachfield and sand filter both failed.

Solution: SludgeHammer used the existing tanks. The modular bioreactor works in any type of tank, so clearing out the previous system components could give them a new lease on life. Sloan Septic conducted the renovation, pulling out the old equipment and rerouting some of the plumbing to create a sequential flow pattern. Sloan installed six S-86 aerobic bacterial generators and seven supplemental Medusa air diffusers for extra digestion, given the heavy organic loads. A few repairs on the zone valves in the leachfield completed the project.

Result: The system was restarted with an inoculation of SludgeHammer Blend facultative culture to see if biomat could be cleared out of the sand filter and leachfield. Some zone-switching allowed the system to work from day one, while the sand filter and rest of the field were biologically cleared. Now the system is fully functional and BOD testing showed an effluent strength of just 140 mg/L BOD, more than a 90% reduction. 231-348-5866; www.sludgehammer.net

SNAPSHOT

In Minnesota, Recruiting and Retaining Workers Is Job No. 1

In a tight job market for skilled trades, it's critical to find young talent and take care of your team

Compiled by Betty Dageforde

In Snapshot, we talk to a member of a state, provincial or national trade association in the decentralized wastewater industry. This time we visit a member of the Minnesota Onsite Wastewater Association.

Jake Bell
owner-operator
along with my father Jon Bell and my uncle Chad Bell, the founders

Business: **Bell Excavating Inc.,** Stillwater, Minnesota
Age: 36
Services we offer: We do septic installations, design and repair, as well as camera work and line cleaning. We also provide private utility locating. We don't provide pumping services but we network with a few good pumpers. We refer them and they refer us for installations and repair, which works out well.
Years in the industry: 24. I started helping out in the summers and after school.

Association involvement:

I've been a member of the Minnesota Onsite Wastewater Association for about eight years. I'm now on the board of directors, going into my second year. I got involved in 2015 when our company bought out Bill Wolfe Excavating, which had been a member for 20 years.

Benefits of belonging to the association:

The big thing for us is networking with other contractors, not only in our area but across the state. We enjoy getting to know these guys, being on a first-name basis with them and having the opportunity to call them with questions. The other main benefit is being able to voice our opinions and be involved in the state rule-making processes.

Biggest issue facing your association right now:

We're doing well right now but we recently had a few rocky years in between executive directors. The last couple years we've had a really good team so we're regrouping and getting our feet back under us. We're focusing on recruitment and retention. We are also trying to show companies across the state the training and networking benefits we can bring to them.

Our crew includes:

My mom Renae Bell does all the office work. Chris Rigney has been with us for 13 years and is our go-to guy for everything. He's reliable and knowledgeable, wears a lot of different hats and can pretty much do anything. My cousin Zach Bell is our newbie. He graduated from high school, got his CDL and last year came to work for us. It's been nice to have that breath-of-fresh-air younger guy getting into it because you don't get a lot of that and we're all getting older.

Typical day on the job:

I take care of getting all the supplies ready for the jobs. I make sure the truck is loaded and ready. Then I'm out with the crew doing installations. If I need to help with a design, look at a job or meet with customers I'll break free and do that, as my dad prefers to be out in the field running equipment.

The job I'll never forget:

We were putting in a new system for a house on the St. Croix River and they wanted to add sewer for their boathouse. We had to directional-drill down to the boathouse. The only way to get the pipe back up was to float it out into the water so we could get it all strung out. We had 2-inch pipe that was coiled and then we had other pipes so we could pull back the sewer line up to the house. As we got back up the hillside the head on the drill broke so we ended up having to go over a little bit of cliff and dig it up and finish bringing the pipe up manually into the house. But it was a cool job.

My favorite piece of equipment:

Our Caterpillar 308 excavator is a jack of all trades. We have various attachments for it and can get it into every job, big or small. I also like our vLocPro3 utility locator (Vivax-Metrotech). It makes our life a lot easier.

Most challenging site I've worked on:

A couple years ago we worked on a very tight site built into a hill. Everything from the tank to the mound was on a slope. To set the tanks we had to load all the dirt onto a dump truck, haul it offsite, then bring it back for the backfill. The mound was 150 yards up a hill so everything had to get pushed up the hill with a dozer. It was a job that you'd think would take two

» The Bell family, from left, Jon, Jake, Zach, Chris and Chad, with a Caterpillar 320CL excavator.

» Jake and Chris Bell and county inspectors Pete Ganzel and Alex Pepin looking at a pressurized mound installation. Risers are from Orenco Systems, tanks and lids from Wieser Concrete Products.

or three days but it ended up taking us five. Everything we thought would be okay, just wasn't. Looking back, there are a few things I would have done differently. It was just one of those learning experiences we'll never forget.

Oops, I wish I could take this one back:

We had a job for a big equine barn and an adjacent site with a house. We were trying to meet deadlines but with a record amount of rain that year we spent a lot of time waiting for things to dry out. Originally we were the septic contractor but they ended up hiring us to do all the site work and, looking back, I don't know that a company our size should have taken on the extra work. It would have been fine had the weather cooperated but trying to keep this project on track took us away from everything else we had scheduled and we had to put all our resources into it. It was one we probably should have walked away from.

The craziest question I've been asked by a customer:

Last year I had a customer who was adamant that when I grade their mound out I make a bear shape out of it. I didn't even attempt it. I knew it was an impossibility and would be hard to maintain with the rain and everything. And I didn't think the inspector would like it.

If I could change one industry regulation, it would be:

The biggest thing I've been working on, especially with our association, is our mentorship program. I feel there's something broken. You go to school, do your orientation, take a test, find a licensed contractor to be a mentor, and then do 15 installations under the mentor. Some of these experienced guys might do that in a month but somebody new with minimal knowledge of soils, different loading rates, time dosing and alarms, advanced treatment systems, just doesn't get enough knowledge in that short amount of time, in my opinion. But it's hard because people are saying we need more people in the industry. I agree, but they do need to be educated and trained properly to do a good job because our wastewater needs to be treated properly.

Best piece of small business advice I've heard:

When I was 18 and getting started, my dad hired me out to another company. It was a little bigger, 25 guys. The guy I was working for asked me if I planned on taking over someday, and I said I'd like to. He said, "Make sure you take care of your employees, I don't care how big you get, because your guys are everything. You think you can do it all but you can't. And keep a good image." We strive for that. We take care of our guys because without them we wouldn't be where we are. And we focus on image — show up with clean, tidy equipment that looks good and is well-maintained, along with yourself, because customers definitely notice.

If I wasn't working in the wastewater industry, I would:

I was a full-time fireman for three years because I just had to try something else, having done septic work since I was a kid. So, if I didn't have this, I'd probably pursue that again.

Crystal ball time – This is my outlook for the wastewater industry:

It's only going to get busier because there are more developments being put in. Moving forward, it's going to be a good industry to be in, especially with the technology coming up. We have great systems in place and they only seem to be getting better. And it's a safe industry to be in. Hopefully we can get more people into it so we can continue to provide good service to customers. ◻

PRODUCT SPOTLIGHT

Decompaction tool helps rejuvenate failed drainfields

By Tim Dobbins

K&P Enterprises owners Ken and Peggy Miller have seen their share of failing septic systems, and after years of replacing them and performing labor intensive restorations, they realized there had to be a better way of rejuvenating drainfields.

They created the EarthBuster, a product designed to help with a number of septic system issues like wet or soggy soil over drainfields, foul odors, sewage backing up into homes and gurgling sounds coming from drainpipes.

"The EarthBuster is a deep soil decompactor that uses compressed air to restore compacted soils and biomatted drainfields back to a point of sufficient fluid and air flow," says Ken Miller. "The fissures created from the compressed air take a path of least resistance, up and out, and with that, the EarthBuster enhances absorption and evaporation."

A pneumatic probe made from a 3/8-inch thick drawn over mandrel, or DOM pipe, measuring 84 inches long is pressed into the ground to the desired depth. An air compressor attached to the probe forces air into the drainfield, breaking up the soil and biomass film, allowing water to filter through the ground. Users generally repeat this process every three to five feet along the drainfield.

"With a minimum of a 185 cfm tow-behind compressor, the EarthBuster can release 30 gallons of compressed air multiple times in each probe along the outside of a lateral," Miller says.

The decompactor attaches to the front of a tractor, skid-steer, mini excavator, or any compact loader using a standard quick-attach mounting system. They are built so installers can hook up and use their own air compressor if they meet output requirements of 100 to 150 psi and 125 to 185 cfm. Compressors can also be rented from the company if needed.

The EarthBuster frame is manufactured with heavy rectangle carbon steel tubing. When assembled with all components, it weighs roughly 900 lbs. The steel is powder coated for protection from the elements.

Miller says the EarthBuster creates a long-term solution in lieu of replacing drainfields. He says contractors and private users report great long-term success without the headache of drainfield replacement. **406-670-8318; www.earthbuster.com**

INDUSTRY NEWS

Patent approved for Felling Trailers' Air Bi-Fold Ramps System

Felling Trailers was awarded a U.S. patent for its Air Bi-fold Ramps System. The Air Bi-fold Ramps System was introduced to the construction and paving industry at the 2020 CONEXPO-CON/AGG show. The system was featured on Felling's 25-ton FT-50-3 LP, a tri-axle low-profile flatbed tag trailer. Key features of the design are the operation of the flip ramp and also the controlled flow air ramp technology.

Anua completes acquisition of Sim/Tech

Anua International has acquired all assets of GAG Sim/Tech Filters. Sim/Tech will continue to operate as usual in Boyne City, Michigan. All current staff are being retained, including Operations Manager Darrell Maves and Plant Manager Chris Jones. Sim/Tech Filter manufacturing will be under the direction of Chief Operating Officer Marcelo Cassani.

Installers invited to comment on universal plumbing code

This fall, onsite professionals will have the opportunity to suggest changes in treatment policies through the Universal Plumbing Code. Published every three years by the International Association of Plumbing & Mechanical Officials, the UPC serves as a set of ideas and policies that have found their way into state or county regulations. A five-month window is open for public suggestions for the 2027 edition of the code. In the Uniform Plumbing Code, the onsite wastewater section is Appendix H, Private Sewage Disposal Systems.

The code has general statements, such as saying dispersal systems will be outside of an area that floods, and alternate systems will be acceptable to a government entity given sufficient data on its performance. One table lists setbacks of onsite systems from complications such as buildings, trees, streams and water wells. Another table lists the acceptable capacity of septic tanks based on the number of bedrooms in a dwelling: 750 gallons for one or two bedrooms in a single-family home, for example, and 3,500 gallons for a 10-unit apartment building with one bedroom per unit. A design table suggests the amount of leaching area per 100 gallons of wastewater. Other sections cover perk tests, septic tank construction, dispersal fields, cesspools, and inspections and testing.

IAPMO's timeline for the 2027 edition of the Uniform Plumbing Code says public proposals will be accepted until Jan. 2, 2024. For more information, go to https://codes.iapmo.org/home.aspx?code=UPC.

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