March 2023

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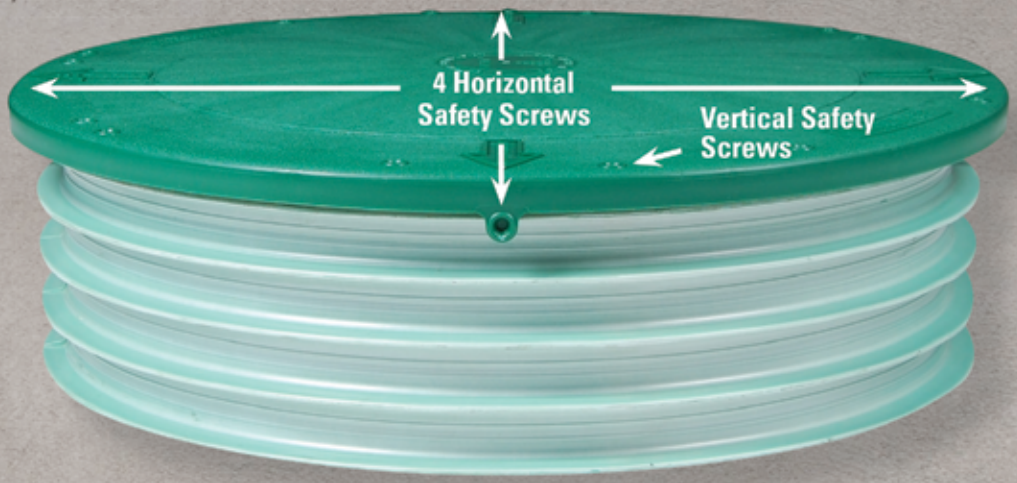

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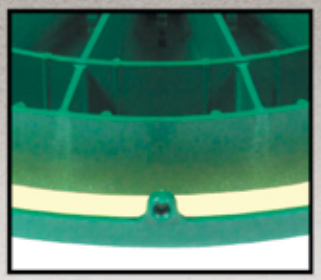

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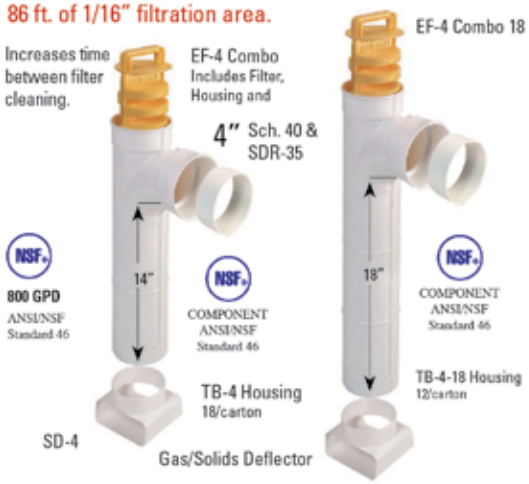

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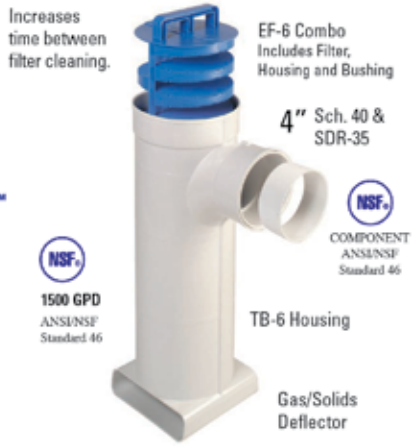

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Joe Karthein has built Sentinel Excavating as a one-man show designing and installing septic systems around Nelson, British Columbia. He is shown on a work site with a Kubota excavator. (Photo by Jess Phillips)

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ISSUE FOCUS: Large-Scale and Commerical Treatment Systems
Contractor Profile: Installing in North Carolina
Basic Training: The root of the problem

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Photo courtesy of Monarch Products Co.

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BENEFITS OF BELONGING

12 Reasons to Join Organizations

Membership in onsite organizations keeps you connected to a community of professionals and serves as a forum for the exchange of ideas and information among private industry professionals, government policymakers and regulators. In this article, 12 members of various state associations share why they joined and how they benefit from membership.

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5 KEY COMPONENTS

Fleet Planning Strategies

Developing and implementing an effective fleet maintenance plan can be easy. There are tools and technology available that can make it easier than ever before. It will help save your company plenty of time, frustration and money. This article shares five tips to help develop your fleet's maintenance plan.

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Overheard Online

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WEATHERPROOF EQUIPMENT

A Closer Look at Control Boxes

Outdoor equipment used in residential wiring must be weatherproof. The two most common types of weatherproof equipment are driptight and watertight. This article from expert Sara Heger breaks down different NEMA ratings for specific enclosure types, their applications, and the environmental conditions they are designed to protect against.

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Jim Kneiszel

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

Surprise! We Found an Area Where Installer Numbers Are Rising

Northern Idaho's Panhandle Region has 150 new onsite installing professionals since 2020

There's a story I recall from covering agribusiness for a newspaper many moons ago that in simple terms explains the concept of supply and demand through fluctuations in the price of pork. It's stuck with me for 30 years and it can be applied to the sustainability of most any business. It goes like this:

When the market price for hogs goes down, frustrated farmers sell off their stock and vow to never raise hogs again. This creates a shortage of pork, raising the price for hogs to the point that farmers see an opportunity, can't help themselves, and jump back in. Then, of course, the price goes down again. This cycle repeats over and over again and explains why farmers often like to complain even though they get to spend their days outside in the beauty of nature. Given the apparent nationwide shortage of onsite installers, I haven't considered the pig farmer analogy would apply to the wastewater industry. But after a recent conversation with Idaho onsite regulator Jason Peppin, I have to recognize it's possible for installers to rush into a fast-growing area, creating some supply and demand or — more likely — quality control issues.

Peppin, environmental health section manager for the Panhandle Health District, wrote a recent guest editorial in his local paper, the *Coeur d'Alene/Post Falls Press*, that did a great job of educating septic system users about proper care of their systems. He outlined information about protecting the freshwater resources in the Coeur d'Alene Lake watershed in Northern Idaho, one of the fastest-growing parts of the state. He offered basic consumer tips, which I will include separately here and that you are free to share with your customers.

Based in Hayden, Idaho, the Panhandle district covers five counties that have been flooded by new residents, particularly since COVID-19. Of the seven health districts in the state, Panhandle issues the most septic system permits, about 25% total permits and 33% of complex system permits, and had approximately 1,500 new systems installed in 2022, according to Peppin. This is for a region with a population of 262,000.

As you might expect, the increased demand has prompted more folks to try their hand at system installation as a business. But more on that later.

NEW TECHNOLOGY, PLEASE

You might associate northern Idaho with its beautiful natural assets and pristine waterways, but there are many challenges to protecting the features that attract so many visitors and new residents, Peppen explains. A history of mining operations and decades of development, especially around the popular lake areas, threaten the aquifer. Also, many antiquated onsite systems and a reluctance for cities to extend their municipal treatment to developing rural areas encourage wastewater officials to become proactive about onsite rules.

> **"Problems stem from a lack of asking questions.** Lately there's been a reluctance to ask questions and they're just installing the systems incorrectly."

The state has some of the most stringent drainfield setback requirements near water, up to 300 feet depending on the soil type on permitted properties. The setback for clay soils is 100 feet, loamy soil 200 feet, and sandy soil 300 feet. To protect the aquifer, the health district is accepting of new treatment technologies, with advanced products including Eljen and Presby Systems being utilized frequently.

In addition, the state has approved the use of whole-home wastewater incinerators as an alternative solution. A riverfront motel/restaurant was the first property to receive a commercial incinerator from ECOJOHN. Installing incinerators could cost roughly 10 times as much as a conventional septic system, and you have to add on top of that much higher operational costs. So Peppin says they are being considered more for commercial projects or multimillion dollar vacation homes where cost isn't a factor.

"Out of necessity, we really take a proactive look at technologies with extensive review and testing. It's a very robust process and it's easy for manufacturers to get in here," Peppin says.

A GLUT OF INSTALLERS

It's interesting to learn about efforts to advance decentralized wastewater treatment in Idaho. But one statistic Peppin shared concerned an explosion of licensed installers in the region. While in other parts of the country, installers are scarce and the workforce is aging, the Panhandle District has 350 licensed

installers — and each of them may have multiple crews working under the same licensure.

The numbers have risen steadily over the past decade, and 150 newly minted installers have been added since the pandemic started in 2020. Many of them have never operated an excavator or installed a system. This is a cycle Peppin has seen before. He started in 2004 and saw boom days before the real estate collapse of 2008 and 2009, when the number of installers fell precipitously.

"In the last several years we've been inundated with new installers," Peppin says. "With this new batch of installers, we're noticing people who haven't previously worked under other installers. There's usually a natural progression and they've worked in the industry in the past and are very experienced. With this new wave, there's a lot of people that have never installed a septic system. It's definitely more of an issue now with the growth."

To ensure a qualified installer workforce, the health district has relied on required refresher training every three years. Through this training, they share information on new technology, product approvals, and reviewing issues they see in the field. However with COVID-19, they haven't been able to conduct in-person training for three years, and consequently there are more problems getting systems to pass final inspection, Peppin explains.

DIG FIRST, QUESTION LATER

"We see across-the-board issues — installing systems too deep, not reading the permits, installing using unapproved components and systems they are not licensed to install. We don't know any of that until final inspections," he says. "Problems stem from a lack of asking questions. Lately there's been a reluctance to ask questions and they're just installing the systems incorrectly."

Compared to some states, Idaho has minimal requirements to obtain an installer's license; for example there is no required classroom training or apprentice process. Applicants must pass a test and have certain types of bonding. And the majority of systems do not require a designer or engineer, so the lack of experience can really show through.

As a result, it's not uncommon to put final inspection approvals on hold until problems are corrected. This can mean ripping out and reinstalling systems, moving locations, hiring an engineer or choosing a different technology. This adds to cost and frustration, and customers aren't happy about it.

"Idaho in general advertises itself as the least-regulated state in the country and a lot of people moving here expect there are no rules. They're coming from areas that are tightly regulated," he says. For these newcomers, Peppin explains, "It's almost like there is a magic black box in the yard that takes care of everything. They have no idea. And even just trying to get them to understand when we're looking at a tank and drainfield, there is no understanding. If we do our jobs right, we're regulating through education."

I expect the growth will continue in Idaho and hopefully there will be ample work to keep the growing number of installers busy well into the future. It also seems like health officials in the state are welcoming to the advanced solutions being presented by industry manufacturers to protect the environment and allow for further development. And lastly, officials like Peppin appear to be on the right track with refresher training to keep the local installing community up to speed with emerging technology.

All of that's good news, because I don't want our installers to end up in the same endless boom/bust business cycle as the pig farmers.

These are the general tips Jason Peppin shared with readers of his local newspaper:

- **Inspect your septic system annually for signs of failure.**
- **Pump septic tanks before scum levels reach 40%.**
- **Get to know your septic system and how it functions so the area can be protected.**
- **Preserve replacement area on your property to allow for a replacement system if your drainfield.**
- **Work with Panhandle Health District to upgrade your system if the existing system is not functioning properly or predates rules.**
- **Evaluate existing septic systems prior to purchasing properties and upgrade antiquated systems as part of the real estate transaction.**

THE SOLO PERFORMER

Overcoming a lack of experience and a cancer diagnosis, Canada's Joe Karthein built a successful one-man installing business

By Tim Dobbins

Eight years ago, Joe Karthein didn't have the foggiest idea how a septic system worked. Now, he not only installs them, but he also designs them.

Karthein's route to onsite system work was, as he says, convoluted. Several experiences led him to the industry, but since starting Sentinel Excavating in 2014, he has found success even through extremely difficult times.

"Back in my early 20s I went through a small business training program," he says. "That was so pivotal in me starting my first company." That company was an organic sauerkraut business, which Karthein owned and operated for seven years before selling in 2006.

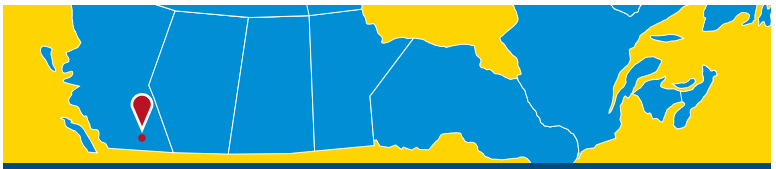
Next up in his professional career was a few years as a small business counselor offering professional advice for anyone looking to start their own company or grow an existing business. With a good grasp on what it takes to be successful, Karthein decided to pursue a career doing something that would be fruitful, and that he would enjoy.

"I actually saw there were a lot of opportunities locally," he says. "I knew there was work in excavation and loved the idea of working outside." Karthein now runs Sentinel Excavating as a one-man show serving a roughly 50-mile radius from Nelson, British Columbia, doing installs and system designs.

A BOLD BEGINNING

Digging into the world of excavation was a relatively smooth process for Karthein, thanks to his willingness to ask questions and learn from people around him.

"I knew a guy named Phillip Jackson, who started out as a health inspector back when health inspectors around here designed septic systems. I called him up after not seeing him for about 20 years and ended up inviting him over for lunch," Karthein says. "He explained to me how a septic system worked, and we took it from there."



Sentinel Excavating
Nelson, British Columbia, Canada

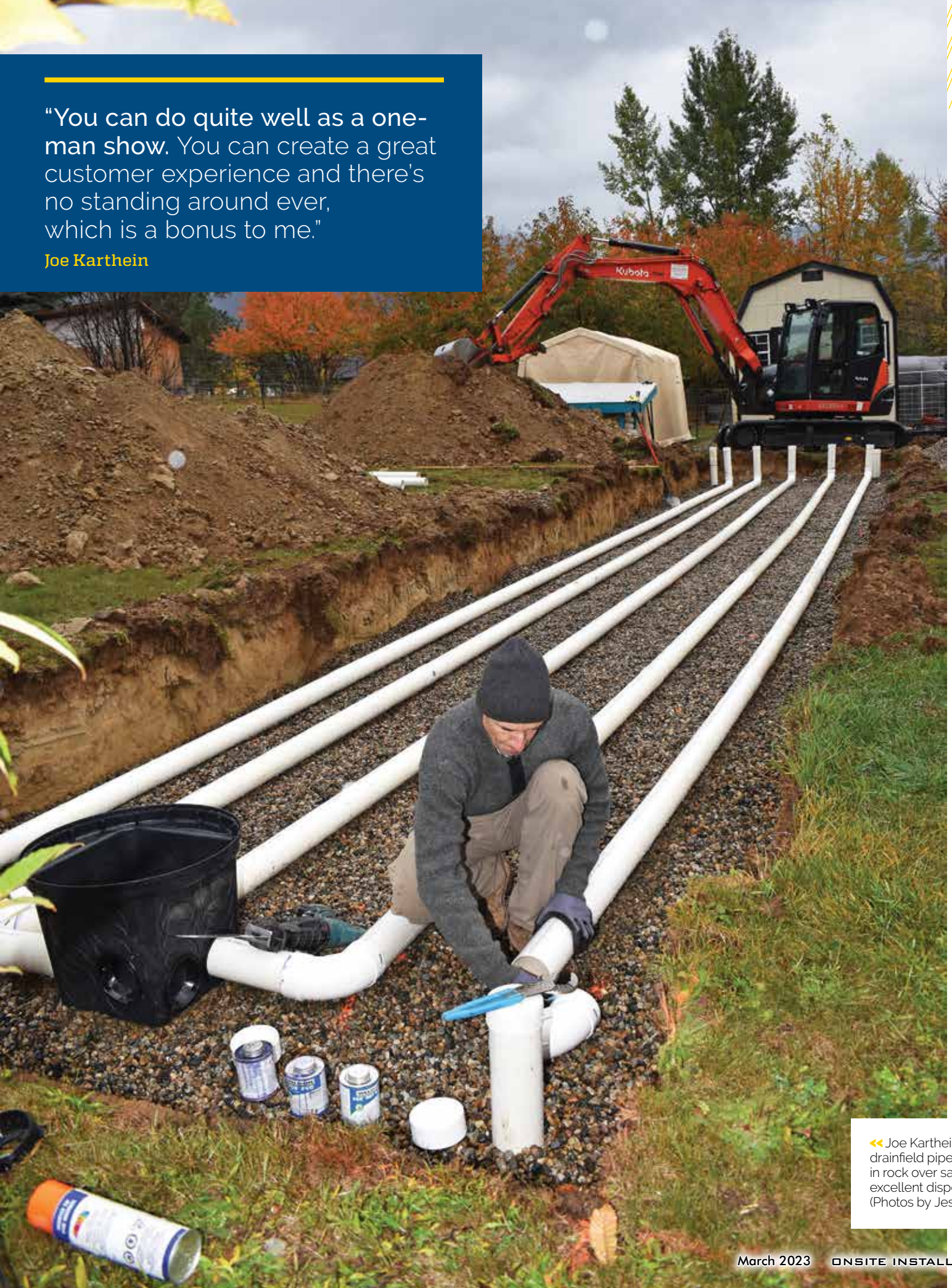
Owner:	Joe Karthein
Founded:	2014
Employees:	1
Service area:	A 50-mile radius
Services:	Septic system installation and design, soil testing, general excavation
Website:	www.sentinelexcavating.com

Jackson is now semi-retired, but it was his business, Fourways Environmental that helped get Karthein his first job. "He mentored me and was on the ground with me during my first few installs," Karthein says. "He brought me a lot of work and helped me so much."

Jackson's support was only one part of the path to success. Karthein's experience going through the small business training program shaped his outlook on business.

"The biggest thing I learned there was to not worry about the competition at all and just be the best that I can be," Karthein says. "More than that, I learned to use the competition as allies, to learn from them and to ask questions."

And that's exactly what he did. Besides Jackson, Karthein called several other local excavators and installers and inquired about the trade.



> **"You can do quite well as a one-man show.** You can create a great customer experience and there's no standing around ever, which is a bonus to me."
>
> Joe Karthein

<< Joe Karthein lays out drainfield pipe bedded in rock over sand for excellent dispersal. (Photos by Jess Phillips)

<< Karthein navigates his Kubota tracked skid-steer off a Maxx-D equipment trailer for another install job.

>> Karthein removed the backseat of his truck to create storage for a wide assortment of tools and bushings, couplers and adapters needed at a remote location.

"My motto is that I need to make a living, not a killing. I respect my clients and I want it to be a fair transaction."

Joe Karthein

He even asked the difficult questions like how much they charge and if they thought there was room in the market for him.

"You've got to be bold. I think the most important thing to be successful in business is to ask the right questions to the right people," Karthein says. "And most importantly, don't ask questions that reconfirm what you think you know. Ask questions to try to prove yourself wrong."

The strategy worked. "I got into this business, guns blazing, and the very first year I made a profit," he says. Those allies as it would turn out, would come in handy down the road for Sentinel.

OVERCOMING HARDSHIPS

In late 2021, Karthein received news that would greatly impact his business and overall mindset.

"I found out I had colorectal cancer and all the scans said it was not looking good for me at all," he says. "But, I had a pretty stoic outlook from the beginning. I actually felt pretty at peace and felt like I pushed the limits of a lifetime."

Karthein underwent surgery within two months of the initial diagnosis and is now cancer free. "It was a long and strenuous recovery, but I'm doing awesome now and feel stronger than ever," he says.

The recovery was tough on his body and business, putting him out of work for a while. "About two months after surgery I picked up a few jobs," Karthein says. "I just made sure to tell my clients my situation and explained that I may be moving slower or have to leave on occasion, but that I will bill accordingly."

His annual revenue in 2021 was about half of what it normally is, but the business survived. Karthein credits a few different things for his business enduring the hardship. "Preparing mentally is the biggest thing," he says. This is something he continues to work on. "I exercise even more now so I feel great. I'm physically stronger, and since the health scare my mentality is more grateful toward everything."

The other contributor was leaning on the relationships he formed with competitors when the going got tough. "One thing I taught clients during small business counseling is how important your contact list is," he says.

He records all vital information about clients, but also a memory trigger to remind himself of the specifics on the customer and job. He does the same with competing installers. When a customer calls him in need of help and he can't take the job, he goes back into his records and sends the

continued >>

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Karthein links PVC drain pipe coming from a distribution box.

FRIENDS IN THE INDUSTRY

Embracing the competition is proving smart business for Joe Karthein, owner and operator of Sentinel Excavating. Karthein serves a small mountainous area in British Columbia, and the rugged terrain creates conditions where no two jobs are the same. Many times he is reminded of the value in using the skills and knowledge of those around him.

"There's some really good folks in the industry, and I get more calls than I can deal with as a one-man operation," Karthein says. "There are particular jobs that I won't do, like subdivision work. I forward all that to good, trusted engineers."

Karthein understands the importance of having a trusting relationship with those you're feeding work to. Currently, the provincial regulations governing installers are set by Interior Health, and they place 100% of accountability on septic system planners and designers, whether they are engineers or registered onsite wastewater practitioners.

"What this does is lead to inadequate checks and balances on rogue engineers or practitioners who care more about making money than providing a safe and properly designed septic system," Karthein says. "There is a problem with people putting their stamp of approval on things that end up being health hazards just to get the job done cheap and quickly."

Karthein is careful to choose who he works with, only selecting engineers he knows will reflect positively on him and his business. "Who you hand work off to directly impacts your business," he says. "If I recommend an engineer or another installer to a client and they do a bad job, that will come back to me."

Luckily, Karthein has made good relationships along the way. "I'd say there are maybe 25 other businesses similar to mine in this area and 20 of them really like me and I'm happy to feed them work when possible," he says. "Like Krista and Steve Podwin from KSP Septic. They are both super intelligent and phenomenal to work with."

Having a few close allies in the industry creates a safety net for small businesses to help get through busy times or hardships, Karthein says. Don't be afraid to hand off work, he says, however to who and how you hand off work directly reflects your business, so choose wisely.

clients information on to another installer or engineer that he thinks will best serve and fit their needs.

Regardless of the circumstances, suggesting trusted competitors is his way of business. "There's more than enough work to go around and I can't do everything," he says.

INSTALLING IS JOB No. 1

Currently, septic system installs make up most of Karthein's workload, but he is choosing to design more plans these days.

"I have done more plans than ever this year. I've done eight designs already this year, and about 10 installs," Karthein says. "Installs certainly make up the majority of my work, and definitely the most of my revenue."In years past, Sentinel's revenue has been about 60% from septic installs and the rest in general excavation, but this year, installs have made up roughly 85-90% of the company's revenue. The reason is simple: Karthein likes doing it. "I've got to the point where I can pick and choose jobs," he says. "So, I end up doing what I want to do, which is often septics."

Karthein now averages 18 installs per year, which is slightly less than in the past. A couple years ago, he had a right-hand man who worked with Sentinel for about 5 years. The worker took a job with the city of Nelson and Karthein decided not to replace him.

"It's a very small-scale business, but it works for me," he says.

BECOMING CHOOSY

With an abundance of work in the area, and Karthein being the solo performer for Sentinel, choosing projects he wants is just part of the job.

Geography is one of the biggest factors — the closer the work, the better. Besides that, he just

tries to feel out clients and asks himself if they seem like people he wants to work with.

"Another thing that helps me decide is how I bill. I bill by the hour, and it works for me," Karthein explains. "I have a one-page document I send clients that explains everything about my rate structure and how I work. It always ends up being a win-win. If a customer sees that and isn't comfortable proceeding with me and my estimate, then I rule them out."

With that strategy, Karthein says he doesn't spend time making sure he doesn't lose money on quotes. He also thinks it allows him to get more work done because his time isn't spent on quotes that end up going to someone else. "My motto is that I need to make a living, not a killing," he says. "I respect my clients and I want it to be a fair transaction."

Also, he is very particular about engineers he chooses to work with, which also determines his involvement in specific jobs. "I love engineers that give me every detail I need to know, and I execute the plan," Karthein says. "I don't want an engineer that doesn't tell me the orifice size or how many holes there need to be in a pressure distribution system."

WEAR AND TEAR

Sentinel serves an area with mountainous terrain. "It's a skier's and mountain biker's paradise," Karthein says. "It's relatively warm, but we have steep mountains and tons of snow."

Located right in the middle of large mountains, Karthein finds himself constantly towing equipment up inclines that present challenges, one of which is getting trailers where they need to go. The key is not using something too large.

"In Canada, the big goosenecks with the right weight ratings are all like 36 to 45 feet long, and I can't use that up here," he says. Karthein's trailer is currently 30 feet, and he says there are times he even wishes he had a 26- or 28-foot unit due to the tight locations he constantly finds himself in.

He also acknowledges that wear and tear on a tow vehicle can be detrimental to your business if you don't have the right equipment and pay attention to vehicle gauges. Karthein says he watches the gauges in his Ram 3500 like a hawk to make sure he is not abusing his truck and says selecting the heaviest-duty options when buying are crucial.

"I use four-wheel drive low on solid pavement just to get up some hills around here," Karthein says. "You might go through four-wheel drive components a little faster, but doing that takes so much strain off your transmission and everything else."

Winter installs in the Nelson area aren't very practical and because of that, Sentinel operates about nine months of the year. "Basically, from

Karthein is shown at another beautiful British Columbia location where he often looks out over water and mountains while he works.

mid-December to mid-March I'm sitting on the sidelines, but if the weather and roads permit, I'll take a few winter jobs," he says.

The mountains also create extremely variable soil conditions. "There is everything. Just when I think I have an area figured out, I'll find something that surprises me," Karthein says. "There's no question, soil analysis is the hardest part of the job and one of the reasons I turn more complex projects over to an engineer. Two heads are better than one, especially when we are looking out for each other."

DIGGING HIS EQUIPMENT

Karthein utilizes a 2021 Kubota KX 080-4 excavator. A few add-ons like a skeleton bucket for rocks have proven extremely beneficial. "They are pretty useful when it's really rocky. When digging out a field, you can screen bigger rocks out so you have nice fill for putting on top of the drainfield," he says.

Along with the excavator, he has a 2016 Kubota SVL75 skid-steer that doesn't see a lot of hours, but for the hours it's used, it's crucial to his business. A 750-pound Wacker Neuson diesel compactor is also in his arsenal. That too, does not get a lot of use, but when it's needed, it's a must-have.

> "There's no question, soil analysis is the hardest part of the job and one of the reasons I turn more complex projects over to an engineer. Two heads are better than one."
>
> Joe Karthein

Karthein recently purchased a Diamond C LPD 210 dump trailer and he's not sure how he lived without it. "It's got two 10,000-pound axles with single wheels on it and is just awesome for scooping drain rock right out of the box, which is amazing for keeping job sites tidy because I no longer have to dump messy drain rock loads on people's manicured lawns," he says.

To pull the equipment, he recently purchased a 2022 Ram 3500 truck with a customized flat deck built by Mofab in Rossland, British Columbia. "I have built-in boxes below the deck both in front and behind the wheels as well, plus a long removable box on the driver's side for shovels, rakes, chainsaw, whatever," Karthein says.

With the flat deck and compartment modifications, Karthein opens options on what he can haul. "I can load all sizes of 8-foot-wide Premier Plastics septic tanks width-wise on top of the compartments," Karthein says. "I like Premier Plastics for their smaller tanks, and I use Canwest tanks for their large, low-profile tanks."

Along with Premier and Canwest, Karthein says his go-to systems for dispersal are Eljen systems or seepage beds or sand mounds. "I'm a big fan of seepage beds and trenches with drain rock if the soils allow it," he says. "Drain rock based systems are so proven, they just last and work."

MAKE A DIFFERENCE

Karthein has gone through a lot and come a long way in the past eight years. Though a small operation, Sentinel Excavating makes a big impact and Karthein wants it known that owning and operating a septic installation business on your own is not only possible, but rewarding.

"You can do quite well as a one-man show," Karthein says. "You can create a great customer experience and there's no standing around ever, which is a bonus to me."

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Jim Anderson, Ph.D., and Dave Gustafson, P.E., are connected with the University of Minnesota onsite wastewater treatment education program. Dave is Extension Onsite Sewage Treatment Educator. Jim is former director of the university's Water Resources Center and is now an emeritus professor. Readers are welcome to submit questions or article suggestions to Jim and Dave. Write to ander045@umn.edu.

Advanced System Monitoring Takes the Guesswork out of Troubleshooting

Flowmeters and smart toilets will warn of trouble in the treatment train before environmental issues or system failure sets in

By Jim Anderson and Dave Gustafson

A colleague pointed us to an article recently about smart toilets. This is what happens when people learn you are into sewage; they constantly bring you items or news stories about sewage. You probably have similar experiences.

The article explained that soon there will be toilets on the market that can be fitted with cameras and sensors to evaluate poop or urine to identify potential health problems. The information can alert the user to simple problems like dehydration based on the color of urine or more serious issues like colon or prostate cancer or even COVID.

As a sewage professional, knowing certain diseases are present when you are working on a system would be useful information relative to safety precautions you may take. This would depend on the homeowner sharing this information. However, as we have discussed in the past, you should always take proper precautions when working around sewage.

Foremost this means wearing personal protective equipment to protect you from bacteria or viruses. Use latex or rubber gloves and, where appropriate, gauntleted-over gloves for additional protection. Eye protection should be worn always, either glasses or goggles with side shields, and a face shield or face mask is a good idea.

These smart systems are here to stay and this presents a challenge for every installer and service provider to get up to speed on what is available and how it can be used to advantage.

With the onset of the Internet of Things approach, the possibilities for gathering data and information about various parts of our systems is almost unlimited. Having continuous or nearly continuous information about how the system is performing provides the opportunity to identify problems in real time. This allows you to intervene and fix any problem before the system fails entirely or some other part of the system is damaged.

COST PUSHBACK

Measuring flow is one area where relatively new and inexpensive monitoring sensors are available. Low-cost ultrasonic and pressure sensors accurately measure flow. Something similar has been available for water or electric meters for some time, which has been used primarily by utilities for billing purposes. We have long advocated for installation of water meters to get an idea of daily household flow numbers for system design, operation and troubleshooting.

Homeowners and installers have pushed back on this idea primarily due to the expense of water meters and the fact that they measure water usage and not wastewater flow. They cite uses such as car washing and landscape watering for questioning the value for septic system monitoring. While there are ways to account for these uses, the bottom line is they have not been widely installed by homes on septic systems except in cases where the system is having problems and a professional is trying to determine the cause. To us this is like to proverbial locking the barn door after the horse is running down the road!

Low-cost sensors are available now that can be placed at any location in the system we are interested in evaluating. Obviously, we would like to know the flow out of the septic tank; the outlet can be instrumented to obtain real time continuous flow information. The same can be done for any of the other system components. We have had some of this ability in systems utilizing pumps, where cycle counters and timers can be calibrated based on pump delivery. The advantage of the newer technology is you measure flow directly.

Monitoring possibilities do not end with direct measurement of flow. Smart toilet cameras can be attached at the same location as the sensor. The cameras can provide photos at certain timed intervals or when flow occurs. This gives a visual record of the flow out of the tank or other component. You can not only have data on the amount of flow but visual confirmation the flow has occurred and what effluent looks like coming out of the tank.

This type of information allows the service provider to see when flow occurs, time of day of flows, whether there are changes in appearance of the flow that would indicate excessive solids coming from a sewage tank. This type of monitoring would be helpful in identifying problems with aerobic treatment units or media filters. This is especially important when treatment units are placed in an especially environmentally sensitive area.

Any problem can be identified and addressed more quickly rather than relying on periodic visits by a technician.

NITROGEN MONITORING

Additional types of sensors provide valuable information. Total suspended solids can also be measured as a part of the flow determination. Calibration based on different effluent colors (such as flow out of a peat filter) combined with solids has the potential to improve management to reduce solids delivered to the final treatment and dispersal area. This could result in longer system life and fewer problems.

Additional sensors are coming on the market to measure nitrogen in the wastewater stream. These will be helpful in wellhead protection areas and areas where nitrogen is a surface water concern such as coastal estuaries. Rather than guessing or applying some rule of thumb estimate to nutrient loads based on research, these monitors will show whether the system is performing as expected.

Twenty years ago, this type of monitoring was talked about and the ability was there, but the expense was very large. What we see now is costs are one-third of what they were and continue to fall. These smart systems are here to stay and this presents a challenge for every installer and service provider to get up to speed on what is available and how it can be used to advantage. There are significant data management challenges to be overcome, but that will happen.

SYSTEM PROFILE

With landscaping in place, the Orenco Biotube filter assembly with its pump and floats is ready for installation in the pumping section of the two-chambered tank. (Photos courtesy Michael Davenport)

Tennessee Contractor Steps Up to Ease Municipal Wastewater Capacity

Michael Davenport installs 100 STEP systems for new housing to reduce flows at a Chattanooga treatment plant

By David Steinkraus

The job in an urban area wasn't typical for an onsite installer, but it was also intended to help the city of Chattanooga, Tennessee, deal with treatment capacity issues.

"Our wastewater treatment plant is overloaded as it is," says Michael Davenport, owner of Poop Dudes in Chattanooga. The problem is stormwater infiltration, he adds.

To ease the load on the wastewater plant, the city hired subcontractors to install septic tank effluent pumping, or STEP, systems for new-housing tracts and a few existing homes that had been on septic and where city sewer was available. Reducing the strength of wastewater and using the septic tanks to equalize flow means less demand on the city's plant.

In East Brainerd, an unincorporated area of large homes about 15 miles east of downtown Chattanooga and on the city's border, systems were set at single-family homes. In another neighborhood, on Lookout Mountain above the city to the south, buildings receiving onsite systems are town homes intended for senior citizens.

Simple STEP

The STEP system is simple.

Water comes out of each home in a 4-inch PVC pipe and runs 5 to 7 feet to a tank. Single family homes in East Brainerd received 1,500-gallon tanks. Town homes on Lookout Mountain received 2,000-gallon tanks.

All of the tanks are two-chamber concrete from Bradley Tank & Pipe in Cleveland, Tennessee. Inside each is an Orenco pump with a filter on its bottom. It's a neat item, but pulling pumps completely to clean filters could become a chore, Davenport says.

County specs call for a 24-inch riser (TUF-TITE, Inc.) over the pump chamber, a 10-inch inspection port above the outlet tee from the first chamber into the second, and a 6-inch inspection port over the inlet tee. Floats control the pump timing.

For the first year after installation, Poop Dudes is responsible for maintenance. After that, the county water and wastewater authority will take over pump maintenance, Davenport says. Residents will still be responsible for having their tank pumped.

Cost of the STEP systems is built into the price of the homes.

East Brainerd has closely spaced homes on small lots that didn't allow much space for systems. Installer Michael Davenport suggested that he be allowed to rotate tanks 90 degrees to better fit some spaces.

Each STEP system in East Brainerd had a pump chamber with an outlet connecting to the municipal sewer system. The systems were intended to reduce loading on the Chattanooga wastewater plant.

Total contract was for slightly more than 100 systems. Jobs were done as need arose. Homes are built and typically sell in a week, he says.

For the job Davenport used a 2021 Bobcat E32 mini-excavator and a 2016 Bobcat E50 excavator.

Tough rules

From a work standpoint, the jobs went smoothly. Davenport's team pushed out three systems per week when they started the contract, then settled into a routine of about one a week. Systems were done as homes in the development were sold, which left the company time for its other work: repairs, sewer lines, and site work in Nashville and Knoxville for Zaxby's, a regional restaurant chain.

The problem was the rigidity of the project rules.

"They've had trouble in Chattanooga finding contractors who would take on this job," Davenport says. At first he also refused the work. Davenport's company does septic work outside the city, but does quite a bit of drain cleaning in the urban area.

The company that took the bid eventually called Davenport and asked if he would take over as a subcontractor.

"It became a real nightmare for everybody involved," he says.

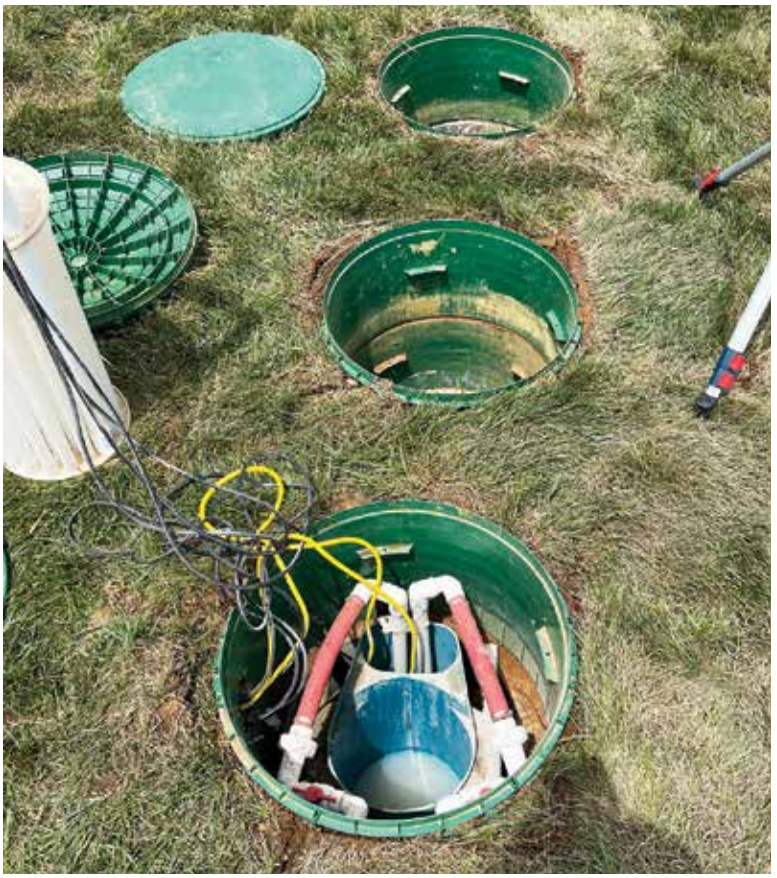
"We're talking about these tiny, cookie-cutter lots already. We're setting these huge 1,500-gallon tanks in a front yard," Davenport says. "We're putting these septic tank effluent pumps in places where they're pumping downhill."

System Profile

Location:	Chattanooga, Tennessee
Facility served:	Single family home development
Designer:	Hamilton County Water & Wastewater Treatment Authority
Installer:	Poop Dudes
Type of system:	STEP discharging to city sewer
Site conditions:	Backfill and compacted, hilly
Hydraulic capacity:	300-500 gpd

Lots in East Brainerd were very tight. In some cases STEP tanks had to be rotated in order to fit within the front lawns of homes.

STEP systems in East Brainerd consist of a two-chamber tank. One chamber receives influent from the house, and the other is a pump chamber tied to the municipal sewer. An Orenco Biotube filter completes the package.



"They've had trouble in Chattanooga finding contractors who would take on this job. … It became a real nightmare for everybody involved."

Michael Davenport

To make the job easier, Davenport suggested rotating the tanks 90 degrees. Original specifications called for them to be set less than 5 feet from utilities buried in the yard, which was against other rules.

Half the East Brainerd neighborhood is on municipal sewer, and the other half has municipal sewer plus STEP systems.

Each job had to be inspected by Hamilton County upon completion. Sometimes that took an hour, sometimes two days, Davenport says.

Working on Lookout Mountain brought a different challenge. Lots there had about 2 feet of soil on top of sandstone. A hydraulic hammer on the mini-excavator created holes for the tanks. One hole took about eight hours of hammering.

"Sometimes we subbed the hammering out. That way we didn't tie up both of our machines on the same job," Davenport says.

About three-fourths of the systems were installed in East Brainerd, with the rest on Lookout Mountain. Installations began in 2020 and were scheduled to finish in 2022.

Soil in East Brainerd was backfill that had been compacted. Before the neighborhood was created, the area was a wetland, Davenport says. Builders put in 40 to 50 feet of fill as a base for the houses and created wetland elsewhere to compensate for the loss of wetlands habitat.

"And you can tell it's fill because the soil will change every couple feet. You'll get some darker clayish soil and then it'll be more like chert," he says.

"The building contractor is doing all the backfilling for us, so we don't even have to use a skid-steer," Davenport says. Backfilling just means topsoil, he adds. His crew did the initial backfill to make sure the pipes were correctly bedded.

Another challenge in East Brainerd was piling dirt. Most of the time it was stored on driveways. The building contractor had a trucking company haul the excavated dirt away for use as fill somewhere else, he says. ☐

Serving the Industry

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www.aowainfo.org; 334-396-3434

ARIZONA
Arizona Onsite Wastewater
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www.azowra.org; 928-443-0333

ARKANSAS
Arkansas Onsite Wastewater Association;
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California Onsite Wastewater Association;
www.cowa.org; 530-513-6658

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Delaware On-Site Wastewater
Recycling Association;
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FLORIDA
Florida Onsite Wastewater Association;
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F.O.G. Alliance;
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www.owaidaho.org; 208-664-2133

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KANSAS
Kansas Small Flows Association;
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MAINE
Maine Association of Site Evaluators;
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Maine Association of
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www.mosmallflows.org; 417-631-4027

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Nebraska On-site Waste Water
Association;
www.nowwa.org; 402-476-0162

NEW ENGLAND
Yankee Onsite Wastewater Association;
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www.yankeeonsite.org; 781-939-5710

NEW HAMPSHIRE
New Hampshire Association
of Septage Haulers;
www.nhash.com; 603-831-8670

Granite State Onsite Wastewater
Association;
www.gsdia.org; 603-228-1231

NEW MEXICO
Professional Onsite Wastewater Reuse
Association of New Mexico;
www.powranm.org; 505-989-7676

NEW YORK
Long Island Liquid Waste Association, Inc.;
www.lilwa.org; 631-585-0448

NORTH CAROLINA
North Carolina Septic Tank Association;
www.ncsta.net; 336-416-3564

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Ohio Onsite Wastewater Association;
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OKLAHOMA
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OREGON
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PENNSYLVANIA
Pennsylvania Association of
Sewage Enforcement Officers;
www.pa-seo.org; 717-761-8648

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Pennsylvania Septage
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www.psma.net; 717-763-7762

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www.tnonsite.org

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www.txowa.org; 409-718-0645

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www.vowra.org; 540-377-9830

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

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Wisconsin Onsite Water
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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

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

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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

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

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

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

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

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

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

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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

SNAPSHOT

Goats on the Drainfield and Other Odd Encounters

NOWRA member Chris Chapman enjoys the daily challenges of the decentralized wastewater industry and hopes to attract more young people to the industry

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 National Onsite Wastewater Recycling Association.

Chris Chapman
owner

Business: Show Me Soils, Lonedell/St. Clair, Missouri

Age: 37

Services we offer: Onsite soil evaluations and onsite system inspections for real estate transactions. We manufacture precast septic tanks. And we are a distributor for Norweco products.

Years in the industry: My dad, John Chapman Sr., owned a septic installation business so I grew up in the industry "dragging pipe." By the time I was 10 or 12, I was working every summer.

Association involvement:

I've been in the National Onsite Wastewater Recycling Association for about 10 years and I'm currently on the board of directors. One thing I'm involved in is getting college kids and even high school kids interested in this industry through the emerging professionals program. We're still in the infant stages of that and trying to come up with different ideas. Some ideas include offering discounts or something to get kids to come to the shows.

We're trying to figure out how someone ends up in this industry if they don't have a connection of some sort. It's interesting and I really don't know the answer. It's kind of a weird thing to get into. I think we'll start at universities that have wastewater programs, maybe eventually have emerging professional groups on each campus.

There are some misconceptions about the industry. Everybody thinks you're pumping solid waste every day. But, no, there are a lot of different aspects to this. We like the phrase, "It's not what you think."

Benefits of belonging to the association:

The biggest thing for me is the networking across the U.S. When you work in a certain area, you think the way you do something is the only way it can be done. You're so set in your ways. I was like that so it's been very eye-opening to see how things are done across the country and not just in your area. It's really helped me broaden my horizons. Another thing I like is seeing all the behind-the-scenes stuff that you had no idea was being done to promote this industry — lobbying, for example.

Biggest issue facing your association right now:

Lack of funding. All the money for our industry goes to the big sewer people. So we're lobbying to get some of the different grants. About 25% of the U.S. population is on septic but we only get a tiny percentage of any funding. And one thing that gives this industry a bad name is everyone thinks so many of these systems are failing. If we got some of these grants and other funding, we could help people who can't afford to replace or repair their existing system.

Our crew includes:

Rachel Click, office manager; Krissy Blankenship, assistant office manager; Abby Gliedt, administrative assistant and soil report specialist; Kyley Henry, administrative assistant; Adam Brott, service manager, precast plant supervisor, inspector; Coby Chapman, routine service manager; Brenden Murphy, inspection manager; Tom Chura, inspector; Rick Wilcockson, semi-retired inspector and consultant; Scott Stroup, soil testing operator; Chad Blankenship, precast plant manager and boom truck operator; and Francis Feth, jack of all trades.

Typical day on the job:

The main thing I do is soil testing. We'll load up the excavator and get the truck and trailer ready to roll and then plot out where we are heading that day. I bring one guy with me. I lay the test pits out, he excavates them, I describe them, and he'll then follow back around and backfill. I usually do that six to eight hours a day, three to four days a week, three to five tests a day. On the other days I finalize reports or help with our precast division which we've only had since 2021.

The job I'll never forget:

We did a job for a couple who had 13 kids. It was the biggest drip system we'd ever put in. When we returned a few months later to see how everything had settled in, the whole drainfield was fenced off and there were 30 or 40 goats on it. It was wet so there were hoofprints everywhere. I said, "You've

continued >>

got to get these goats off this drainfield. They're going to destroy it." We came back a couple weeks later and they were all gone. I said, "I'm glad you got them off the drainfield. What happened to them?" He just smirked. He had them butchered — which isn't quite what I had in mind.

My favorite piece of equipment:

I've had probably 10 different-sized mini excavators to excavate soil pits since I started my business in 2011. This year I finally bought a brand-new John Deere 26G. And I've got a Cronkhite tilt-deck trailer so we don't have to lift ramps any more. It's really low-profile. I work in a lot of weird areas where it's tough to get a truck and trailer in so I don't want something too big, but some of the minis I've used over the years were too small. I think I've finally got the perfect setup.

Most challenging site I've worked on:

We have some very difficult jobs sites — pure rock, ravines, hills, extreme slopes. There are areas outside of St. Louis that have been developed for 30 years and you pull into a subdivision and wonder, why is somebody just now building a house there and how can they be thinking, "This is where I'm going to build my dream home"? It's because the good sites have been gobbled up. So you have to bring in everything, break all the rock out. We have to use plastic tanks more often now because there's no possible way to set a concrete tank on some of these hillsides.

Oops, I wish I could take this one back:

We haven't had any really bad projects and all-in-all I'm happy with my business. But there are times when I think, what if I only did soil testing and worked three days a week and I was the only person and didn't have to worry about anybody else and their livelihood, and not have all the stress and worries. That being said, I love my employees and we really are a family, so I'm glad I'm where I'm at.

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

My brother and I have a separate company that does septic pumping and customers will call a couple weeks after we've pumped their system, furious and wanting their money back because, "You just pumped my tank and it's already filled back up." We assure them that everything's working perfectly.

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

I think we need uniformity across all counties, all states. There are so many different codes. In one soil testing day I can do three or four different counties and they are completely opposite of each other. We just need everybody on the same page.

Chris Chapman holding son Luke, his wife Amanda holding son Henry

Best piece of small business advice I've heard:

My dad used to say, "You never lose money on a job you don't get." When I first started, if I didn't get every single job I was asked about, big or small, I'd be upset. But after all these years I now know you don't have to get every single job. You have to look at quality not quantity.

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

I have coached youth basketball for a decade so if I wasn't doing this I'd likely be a teacher and a basketball coach.

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

I think the outlook is really good. With all the lobbying and everything NOWRA is doing, I think we're going to start getting a bigger piece of the pie. I think this industry is getting ready to explode. People are buying land and getting further away from the cities and septic is going to be huge. That gets back to the need for more young people to join the industry. The shortage of workers in the wastewater industry is really starting to be seen. ◻

Would you like to see someone in your state or provincial wastewater trade association profiled in Snapshot?
Send your suggestions to Jim Kneiszel at editor@onsiteinstaller.com.

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Taxation of Onsite Wastewater Grants Ends in New York County

By David Steinkraus

Taxation of wastewater upgrade grants in Suffolk County, New York, is now a thing of the past.

The IRS recently reversed its 2020 policy of taxing grants made to citizens who upgraded onsite systems to reduce nitrogen pollution. The county, which occupies the eastern end of Long Island, has at least 360,000 cesspools and has had water quality problems along its Atlantic Ocean shore because of high nitrogen levels.

In its 2020 opinion, the IRS said the grant money counted as income because homeowners exercised some management of projects such as choosing a contractor, and because the grants were not given based only on need. Money for the new systems went directly to contractors, who were responsible for paying taxes on it, said news reports. As part of its program to clean up its coastline, the county makes grants of up to $30,000. By the end of 2022, 3,583 county residents had applied for upgrade grants.

Key to the IRS reversal was a statement from the U.S. Department of Agriculture. Last fall, the department posted a notice saying the Suffolk County grants are primarily for conserving soil and water resources or protecting and restoring the environment. Following that statement, news reports said, the IRS invoked one of its own rules: "Any program of a state or a political subdivision of a state under which payments are made to individuals primarily for the purpose of conserving soil, protecting or restoring the environment, improving forests, or providing a habitat for wildlife," should not be included in a person's gross income.

Homeowners who have already paid taxes on grants can file amended tax returns to have payments refunded.

The person who started the tax mess was Suffolk County Comptroller John Kennedy. In 2019, Kennedy was running for county executive against incumbent Steve Bellone who had made water quality a focus of his administration. Kennedy mailed IRS 1099 forms to homeowners although an opinion from the county's tax lawyer said the grants should not be taxable. Kennedy told a news outlet he disagreed, was concerned about the use of public funds for private benefit, and planned to request an opinion from the IRS. He blamed Bellone for the confusion over taxes. Bellone won the election.

North Carolina

The North Carolina Coastal Resources Commission has delayed a decision on new rules for oceanfront onsite systems. Last fall, the commission accepted the recommendation of its staff to postpone changes. That will allow time for more public comments and for input from a group of state and federal officials who have been meeting to consider structures threatened by erosion and the relocation of onsite systems threatened by sea level rise. Proposed changes to the rules would affect where onsite systems could be relocated to and would treat them as separate structures.

Three houses fell into the ocean last year, all on the Cape Hatteras National Seashore. Park officials identified 33 exposed onsite systems and drainfields, and began working with 24 homeowners to move their houses.

Coastal advocate Alyson Flynn told one news outlet that the land in the national seashore is subject to rapid erosion, so homes built far from the ocean are now much closer. "Some have multiple septic tanks because, over the years, as their septic tanks have become compromised, these homes have been allowed to replace their tanks so they can continue to rent or live in these properties," she said. "One of the issues that creates is a lot of different septic tanks on the oceanfront that are spewing out wastewater onto the public beach because these drainfields are now on the public oceanfront. It's a tragedy to see families here on vacation and setting up building sandcastles in a drainfield of wastewater."

South Carolina

Two South Carolina environmental groups have sued to force the use of a stricter standard when permitting septic tanks in a proposed development.

Charleston Waterkeeper and the Coastal Conservation League want the state Department of Health and Environmental Control to review septic tank use under standards in the coastal management law. At issue is a development of more than 200 homes in the northern end of Charleston County and near the Cape Romain National Wildlife Refuge. The land is marshy and low, and near the Atlantic Ocean. More than 400 acres is intended for the development, reported *The State* of Columbia, South Carolina.

The lawsuit asks a court to stop the department from issuing septic tank permits in coastal counties unless permits are reviewed under the coastal law, and another request is for public notice of septic tank permit requests.

Florida

Florida's Sarasota County wants to replace onsite systems with municipal sewer service, but found it can't pursue conversions just yet. The problem, reported *The Arcadian*, is that county wastewater treatment plants first need to be upgraded to advanced treatment to improve effluent quality. This won't happen for several years.

Construction of one advanced treatment plant, at a cost of $280 million, is underway with completion scheduled for December 2025. Work at a second plant, at an estimated cost of $150 to $200 million, is being designed with completion scheduled for December 2026. Improvements at the county's third plant, estimated at $250 million to $275 million, have not entered the design phase. The county has also committed more than $12 million to store reclaimed water and return it to the aquifer.

Colorado

The Colorado Water Quality Control Commission has given final approval to a direct potable reuse rule. This opens the way for water from sanitation districts to be reused as drinking water, reported *The Sopris Sun* of Carbondale, Colorado.

An opinion from Denver-based law firm Brownstein Hyatt Farber Schreck said reuse would reduce the expense and trouble of finding new water supplies, but it also noted that a significant investment will be required along with years of preparation.

The newspaper suggested use of this technology is likely to occur first in the urban corridor along the eastern edge of the Rocky Mountains. Carbondale has a population of 6,491 and is near the ski center of Aspen. Mark O'Meara, Carbondale utilities director, said there are no plans to make the significant infrastructure investment direct reuse would require. Nathan Nelson, treatment manager at the Aspen Consolidated Sanitation District, told the newspaper he could see Aspen adopting reuse because of the West's long drought and shrinking snowpack.

New York

A new block of state money has been allocated to New York's Warren County to fund onsite system upgrades in the Lake George watershed.

Property owners may be eligible for grants for up to 50% of the cost of replacing septic systems or cesspools or upgrading an existing system. The maximum grant is $10,000 per project. The county was awarded $635,000.

The lake, on the southeastern edge of Adirondack Park, has been known for the quality of its water, but in recent years residents have seen large algae blooms.

California

The state of California will receive a $9 million grant from the U.S. Environmental Protection Agency to fight nonpoint source pollution.

More than $4 million will be used in projects to reduce sediment loading and improve habitat on several rivers in northern California, reported *The Silicon Valley Voice* of Santa Clara, California. The state will also use some of the money to implement its Onsite Wastewater Treatment System Policy.

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

Distribution Equipment and Systems

By Craig Mandli

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EFFLUENT PUMPS

Ashland Pump effluent pumps

Heavy-duty effluent pumps from **Ashland Pump** are available in multiple horsepower sizes for various performance requirements and have efficient, permanent split-capacitor motors. The oil-filled pumps have an upper and lower ball bearing design and handle solids up to 3/4 inch. They are made of cast iron, with cast iron impellers and equipped with a piggyback switch (20-foot standard cord) or in manual configurations. They are offered in 3/10, 4/10, 1/2, 3/4, 1 and 1 1/2 hp models. **855-281-6830; www.ashlandpump.com**

Crane Pumps & Systems Barnes RAZOR

The 2 hp **Barnes RAZOR** grinder pump from **Crane Pumps & Systems** is suitable for light commercial and residential solids-handling applications, according to the maker. It is designed with axial cutting technology to reduce solids like flushable wipes, diapers and other non-biodegradable items. A single tool needed for disassembly. The plug-and-play cord also provides easy servicing without requiring removal of epoxy in the conduit. Its 1.25-inch discharge is suitable for preconfigured packaged systems and turnkey solutions. It is available in the Barnes EcoTRAN Pressure Sewer System for grinding in tough terrain. Numerous configuration options are available. **937-778-8947; www.cranepumps.com**

Liberty Pumps ProVore

The **ProVore** grinder from **Liberty Pumps** is designed for use in applications where addition of a bathroom or other fixtures below sewer lines requires pumping. It has the same V-Slice cutter technology used in the Omnivore Series. Powered by a 1 hp motor, this smaller grinder is designed to operate on a standard 115- or 230-volt circuit, requiring only a 20-amp breaker. No special wiring is needed. The pump comes with a 2-inch vertical-style discharge and a standard leg pattern matching the LE Series. This allows for easy retrofit into existing systems. Compact factory-assembled systems are available in simplex and duplex versions: the ProVore 380 and ProVore 680. **800-543-2550; www.libertypumps.com**

Orenco Systems Biotube ProPak Pump Packages

Biotube ProPak Pump Packages from **Orenco Systems** are complete, ready-to-install pump packages used for filtering and pumping effluent from single- or dual-compartment septic tanks to gravity or pressurized discharge points, with no need for a separate dosing tank. They include a PSC-Series Biotube filter cartridge, which filters up to two-thirds of suspended solids — only liquid from the tank's "clear zone" is pumped. Filters are also easy to remove and clean, without pulling the pump vault. All components are designed to be quickly installed and easily maintained. The high-head effluent pump is field serviceable and has a life span of 25-plus years with routine cleaning, according to the maker. Pump controls are designed for the specific package purchased, with multiple models available. Free PumpSelect software is designed to provide fast, error-free hydraulic calculations and system curves. **800-348-9843; www.orenco.com**

Webtrol Pumps WTE Series

WTE Series turbine effluent pumps from **Webtrol Pumps** include a stainless steel intake screen and cable guard. The enclosed urethane bearing is mounted in a polycarbonate top diffuser. They include a floating stack design, which prevents clogging, and impellers are constructed from glass reinforced Noryl. They offer up to 80 gpm and motor ranges from 0.5 to 5 hp. High heads of up to 840 feet are produced by a multistage design. They are designed as a solution for treatment and STEP systems, dripfield dosing, sewer force mains, among other applications. **800-769-7867; www.webtrol.com**

Zoeller Pump Turbine STEP Systems

Turbine STEP (Septic Tank Effluent Pump) Systems from **Zoeller Pump** are designed for use in a septic tank or pump tank. With a turbine effluent pump, float system and effluent filter set packaged in a polyethylene vault, it is suitable for use on new construction or repair sites when gravity flow is not an option and higher total dynamic head is required. The system is also useful in cluster systems, low-pressure pipe applications, gravel/sand filters, drip irrigation systems and other high head applications. Each system can be equipped with a control panel for use in either demand dose or timed dose applications. They are available in 1/2 through 3 hp sizes, in 1 1/4- or 2-inch discharges and flows up to 85 gpm. Alarm box or control panel packages are available. **800-928-7867; www.zoeller.com**

PUMP CONTROL PANELS

Aquaworx by Infiltrator Intelligent Pump Control Panel

The **Aquaworx by Infiltrator Intelligent Pump Control Panel** enhances pump system performance by monitoring liquid levels, controlling pumping time intervals, and logging events in real time. The easy-to-install panel calculates daily system flow utilizing a pressure transducer in the pump chamber and an embedded microprocessor in the pump controller. The handheld Aquaworx Tapper programmer broadcasts a wireless signal, allowing the user to program the panel from any Wi-Fi enabled device. The Aquaworx Tapper connects to the IPC panel using a standard RJ45 cable. Once connected, the user navigates to a website that provides all control settings for the panel, including control settings and a history of system function critical to troubleshooting and maintaining a pump-driven system. With the Tapper, the user can program and manage multiple panels and capture and download system events and settings onto a removable USB memory device. **800-221-4436; www.infiltratorwater.com**

SJE Rhombus Model 112

The redesigned **Model 112** control panel from **SJE Rhombus** has a user-friendly simplex controller. It controls one 120-, 208- or 240-volt AC single-phase pump in water and sewage installations. The simplex controller has a touch-safe housing clearly labeled and elevated in the enclosure. It features LED status indicators for pump run, power on, and float status; float push-to-test buttons; an HOA (hand, off and auto) switch; and form C auxiliary alarm contacts. There's also an optional adjustable seal failure circuit and red LED indicator. It includes built-in pump failure and float out-of-sequence detection. In addition, there are three user-selectable field programmable options: alarm steady state or flashing; alarm auto reset or manual reset; and optional seal failure alarm beacon plus horn activation. It is also UL Listed. **888-342-5753; www.sjerhombus.com**

SPI 50B019-120-240DD

The **50B019-120-240DD** control panel from **SPI** is a duplex timed-dosing panel for residential or commercial applications. It can be used with 120- or 240-volt power, and accommodates two dosing pumps controlled by a repeat-cycle timer. It has a durable, weather-resistant, NEMA 4X polycarbonate enclosure with SST latches; large, easy-to-access terminal block; circuit breakers for the pumps and control circuits; a rugged, externally mounted, UV-resistant alarm light; audible alarm and run-mute-test switch with UV-resistant sealing boot; definite purpose motor contactors; alternating relay; and pump hand-off-auto switches. Compressor hookups are available. Wiring schematic and detailed connection diagrams are provided, as well as mounting feet for the enclosure. It is UL-listed. **419-282-5933; www.septicproducts.com**

SUBMERSIBLE PUMPS

Franklin Electric FPS NCX Series

The **NCX Series** of explosion-proof submersible nonclog pumps from **FPS, a brand of Franklin Electric**, are certified for use in Class 1, Division 1 and Group C and D hazardous location requirements for municipal markets as well as any commercial or industrial application that requires an explosion-proof rating. The pumps are available in single- and three-phase power options to accommodate flows up to 625 gpm. Each unit is designed for serviceability and reliability with features including a field-adjustable wear plate, factory-standard dual-silicon carbide mechanical seals and chemical-resistant components. **866-271-2859; www.franklinengineered.com**

Gorman-Rupp SF Series

Gorman-Rupp's line of **SF Series** submersible pumps is suitable for moving solids-laden liquids in a variety of municipal, industrial and construction applications. Models are available in 3- to 8-inch discharge sizes, with flows up to 3,400 gpm and equipped with channel, vortex or semi-open impellers. All impeller types can pass a 3-inch spherical solid. Pumps are offered in both wet- and dry-pit configurations and can be permanently installed with a base elbow when fitted to a guide rail system. When portability is required, the pumps can be attached to a rugged portable/construction stand that maintains clearances for solids passage. Most models are available with CSA C-US approval for standard locations and FM and CSA-US approval (Class 1, Division 1, Groups C & D) for hazardous locations. **419-755-1011; www.grpumps.com**

Grundfos SE and SL

Designed for demanding situations, **Grundfos SE** and **SL** pumps ensure optimized performance with high wire-to-water efficiency, according to the maker. The SL range is for submerged installation and the SE range for dry and submerged installation. They are available with an S-tube impeller designed to meet today's wastewater challenges, such as dry solids content variation and water use fluctuation. The S-tube impeller offers hydraulic efficiency without compromising free passage. **800-926-6688; www.grundfos.com**

Polylok PL-CPE4A

The **Polylok PL-CPE4A** is a submersible, 4/10 hp, 115-volt, single-phase effluent pump with a 2-inch NPT vertical discharge. It has a maximum head of 38 feet and a maximum flow of 56 gpm. The pump is designed with a 3,450 rpm oil-filled permanent split-capacitor motor and has an amp rating of 6.6 for 115 volts, a rugged cast iron housing and volute equipped with a cast iron vortex impeller capable of passing 3/4-inch-diameter solids. The stainless steel shaft is supported by two single-row, oil-lubricated ball bearings. The shaft seal is an inboard design with a secondary Exclusion V seal. It has a 20-foot UL/CSA-listed power cable suitable for submersible service and fitted with a three-prong plug. The unit is supplied with an integrated clip for the included piggyback mechanical float switch and used for automatic operation. **888-765-9565; www.polylok.com**

Vertiflo Pump Series 900

The **Series 900** industrial vertical immersion vortex sump pump from **Vertiflo Pump** provides an unrestricted flow, since the impeller is not normally in contact with solids being pumped. Applications include chemical slurries, fragile food-processing solids, paper and pulpy solids, petroleum and oils, sewage, wastewater treatment and textiles. It handles solids up to 4 inches in diameter. It is designed for long life in severe service with heads to 170 feet, temperatures to 350 degrees F, and pit depths up to 26 feet with flows to 1,600 gpm. Construction options include cast iron, 316 stainless steel fitted, all 316 stainless steel, Alloy 20 and CD4MC. **513-530-0888; www.vertiflopump.com**

PRODUCT SPOTLIGHT

Bacterial generator designed for remediation for larger homes

By Tim Dobbins

Dairy manure lagoons inspired SludgeHammer to begin extensive research into the role certain facultative bacteria played in improving biological performance, which eventually lead to the development of their S-86 Aerobic Bacterial Generator.

"The original prototype was designed to grow those bacteria inside septic tanks so they could move into leachfields that had become clogged with mucus compounds in the biomat," says Dr. Daniel Wickham, founder of SludgeHammer. "This type of bacteria needs oxygen to actively grow in the tank, but once in the leachfield, they shift over to fermentative metabolism and get their oxygen from the sugar component in the mucus."

Over the years, SludgeHammer has refined its line of ABGs into products to fit a wide range of applications. "The S-86 is for remediation of larger homes," Wickham says. "It's also the core component we use in NSF 40-certified models for the new Advanced Treatment Systems and also for large community, commercial or industrial waste systems."

The S-86 is a self-contained bioreactor that installs into any standard tank with a water depth of at least 40 inches. It stands 36-inches tall with a 12-inch diameter and inside of the unit is a fine bubble diffuser at the base. Air is supplied by an external linear air blower through 1/2-inch PVC that is placed in a shallow trench so it can penetrate the tank riser and go directly down to the unit sitting at the bottom of the tank.

"Air rising through the column draws liquid from the tank into and through the column at a rate depending on the air delivery," Wickham says. "A typical S-86 aerated by an HP 80 blower will circulate 32,000 gpd through the bioreactor." Inside the unit is a coiled sheet of cuspated plastic that provides 120 square feet of surface area for a fixed-film colony of bacteria.

"Like our other units, it's certified under the International Association of Plumbing and Mechanical Officials and listed in the Universal Plumbing Code," Wickham says. "Improvements over time to the internal diffuser mechanism has allowed better air flow, extending the life of the air blower diaphragms as well as improving performance to the NSF 40 Class 1 level."

Wickham says installers appreciate the simplicity of installation inside locally sourced septic tanks. "They also acknowledge the biological efficiency that allows installation of units in residential inlet chambers, so solids and liquid waste are both digested," he says. **231-348-5866; www.sludgehammer.net**

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