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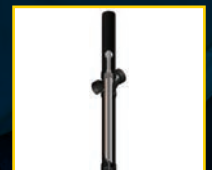
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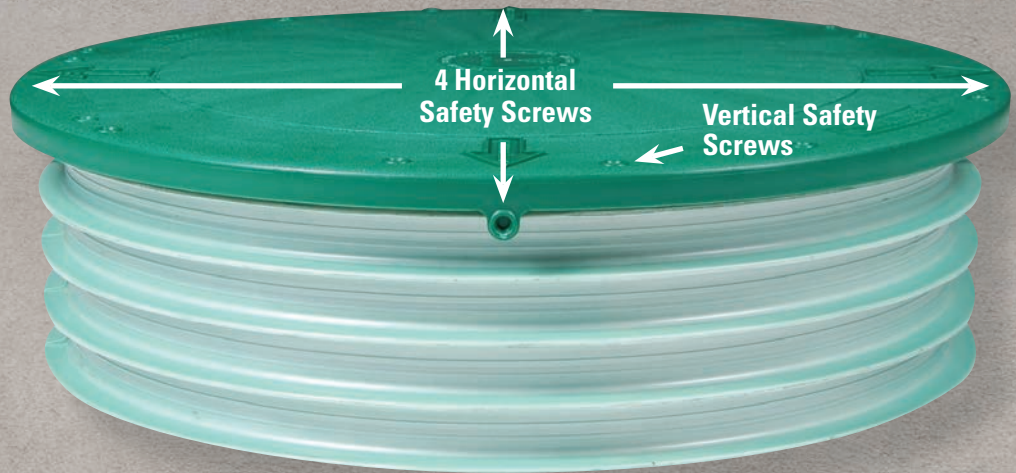
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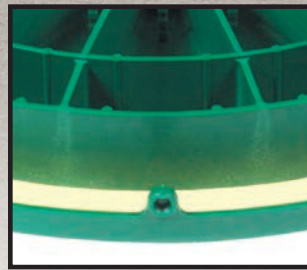
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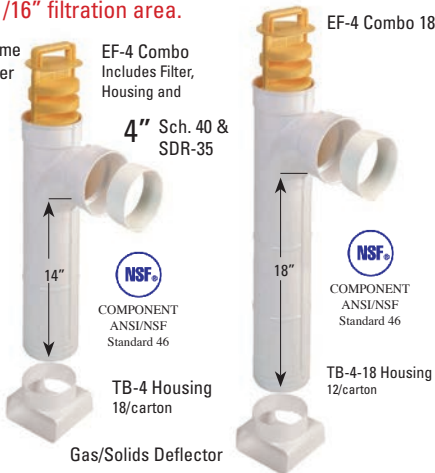


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INSTALLER PROFILE:

Never Back Down By Scottie Dayton

ON THE COVER:

In 20 years of running her business, The Wright Choice Septics, designer Penny Wright has built a reputation for taking on tough jobs. Wright is shown on a job site in Portsmouth, New Hampshire. (Photo by Oliver Parini)

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Jim Kneiszel



Will This Flip Be the Installer's Flop?

With the popularity of reality TV home remodeling shows, the risk grows that you'll become involved with clueless customers and their disastrous projects

You've probably seen an episode or two of popular house-flipping shows on cable TV. You know the type, where a Hollywood-cute couple — each looking like they don't know which end of a hammer to hold on to — walks through a dilapidated house, decides it's a remodeling project gold mine, and then pays a big pile of money for it.

The husband-and-wife actors are giddy and high-five each other when their bid is accepted. Then they bring in the construction experts who frown as they point out all of the problems with the rehab project. The flippers immediately disregard the advice of the professionals and set off to knocking down walls, filling a trash container with debris and making big plans to turn the crumbling dump into someone's dream home.

On TV, there's always a happy ending, as the investors walk away with a healthy profit on their investment and a video montage shows the sparkly new digs waiting for the happy next owners to move in. As I said, that's the TV version of the story — real life remodeling is often a messier affair.

AVOID THE FANTASY

House flipping shows portray a fantasy world designed to suck viewers into attempting their own daring real estate project, with the segments bookended by commercials for big-box home improvement stores trying to sell power tools and Sheetrock. They seek to minimize the complexities and inherent risks when unqualified people buy, fix and sell homes.

Unfortunately, reality looks more like a story out of Green, Ohio, south of Cleveland, where the new owners of a home were surprised to find their septic tank was located underneath an addition. As reported recently at www.cleveland19.com, the buyers were not told the septic tank access is located under the floor in their toddler's playroom.

A house-plumbing problem led to the unhappy discovery. A plumber investigating a back-up in a bathroom traced the septic tank to a hatch in the floor that was carpeted over.

"That day was when we found out the septic system was in our house," Kyle Branham told a local news reporter. "It is definitely inside the house, I would say about 60 feet from the back door, in fact."

A permit for the ill-conceived house addition was apparently approved, but somehow a required point-of-sale septic inspection wasn't performed. The new owners now face the prospect of having vacuum hoses dragged through the house to reach the tank for service.

"If we knew this, we wouldn't have bought the house," Amanda Branham said. "There's rules for a reason on where you can have a septic tank and where you can't have it."

RECOGNIZE THE FLIP

I suspect this is going to be a more common complaint as the house-flipping craze continues and owners are living in these homes for five to 10 years, then get a similar surprise as the Branham family when something goes wrong.

The problems that will inevitably come back to bite careless or deceptive flippers could have a negative impact on the onsite installing community if contractors aren't careful about who they work for. You can't risk squandering your hard-earned reputation installing or designing a system for a flipper who puts money above integrity.

Clearly, not all flippers are a problem. Plenty of reputable construction contractors buy homes to fix up and put back on the market. They're providing a valuable service by getting neglected homes occupied and back on the property tax rolls. You may already have a good working relationship with some of these established contractors in your community, building replacement systems or upgrades that will serve their buyers well for many years.

But you may encounter a less-reputable or unproven flipper. How should you handle it when they call? Here are a few precautions about partnering with flippers:

Learn to recognize the bad ones

Beware of the customers who call looking for slap-dash solutions to bring their septic systems up to code. Watch out for the would-be real estate titans who have spent all their money on granite countertops and showy fixtures and left little to address critical belowground infrastructure. Proceed with caution when the main goal of a homeowner is to shoehorn in one more bedroom than you think the drainfield could handle. You intuitively know when a project might come back to haunt you. Just say no.

Insist on following the rules

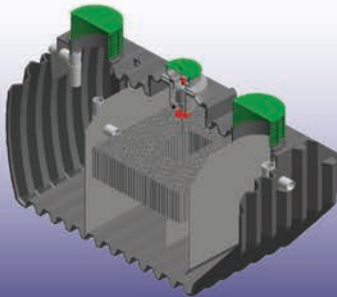
If you sniff out a questionable flipper, lay out your ground rules from the start. Tell them you are meticulous about following rules and regulations.

I talk to installers every week, and I can't remember the last company owner I spoke to who didn't have a waiting list of projects. If you do good work, you can afford to be choosy about who you work for.

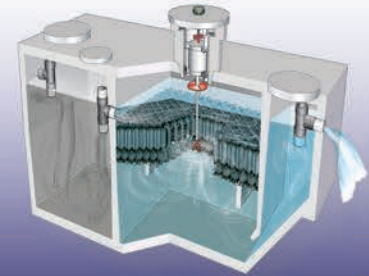


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You know the codebook inside out and you refuse to cut corners. Stress that you promise quality work and charge a fee reflecting that high performance. If this message scares away the customer, so be it. You don't want to work for someone who is willing to skimp on the important work that can't be seen in a 15-minute walk-through.

Get a quick look at the remodeling plans

Ask to see the architectural plans for any addition and walk around the yard. Is the square footage of the house now going to be more than the square footage of the lot? Some flippers may have no concept of the space needed for a replacement onsite system. Worse yet, they may have only learned the house is not hooked up to city sewer after they bought. If their plans look unrealistic after a few minutes of review, you may want to walk away and look for a better caliber of customer.

BE CHOOSY

As the economy continues to pick up and the demand for good, solid housing strengthens, your phone will ring more often. I talk to installers every week, and I can't remember the last company owner I spoke to who didn't have a waiting list of projects. If you do good work, you can afford to be choosy about who you work for.

You can't afford to take on a job where the customer wants to fudge numbers or build a substandard system. Attach yourself to that customer and you're sure to get a callback for a costly fix. Maybe from a couple like the Branhams, who don't want suction hoses dragged through their living room to pump the septic tank. ❑

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

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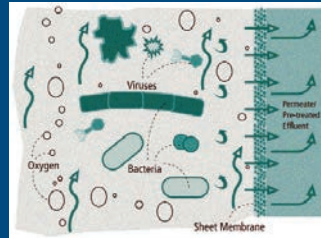
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SEPARATION PROCESSES

Membranes 101

There are two types of membranes found in decentralized wastewater treatment systems. They both use a separation process to remove issues in the source, although the contaminant load is very different in water compared to wastewater treatment. Here's a quick tutorial on reverse osmosis membranes and membrane bioreactors. onsiteinstaller.com/featured



TEMPERATURE AND TREATMENT

Impacts on Biological Activity

Treatment of septage relies heavily on biological activity, and the temperature of the wastewater directly impacts that activity. This exclusive online article explains the impacts of warm wastewater versus cold wastewater and solutions for dealing with each. onsiteinstaller.com/featured

Overheard Online

“Remember that the website isn't actually about you, it's about the value you can provide to your customers.”

- 5 Rules for Writing Content on Your Business Website

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DESIGN TIPS

Soil Loading Rate

The goal is to design a soil treatment area that can provide the needed treatment and acceptance of the effluent from the septic tank or other advanced treatment system. Here we discuss soil loading rates and the key soil and wastewater characteristics that affect treatment area design. onsiteinstaller.com/featured



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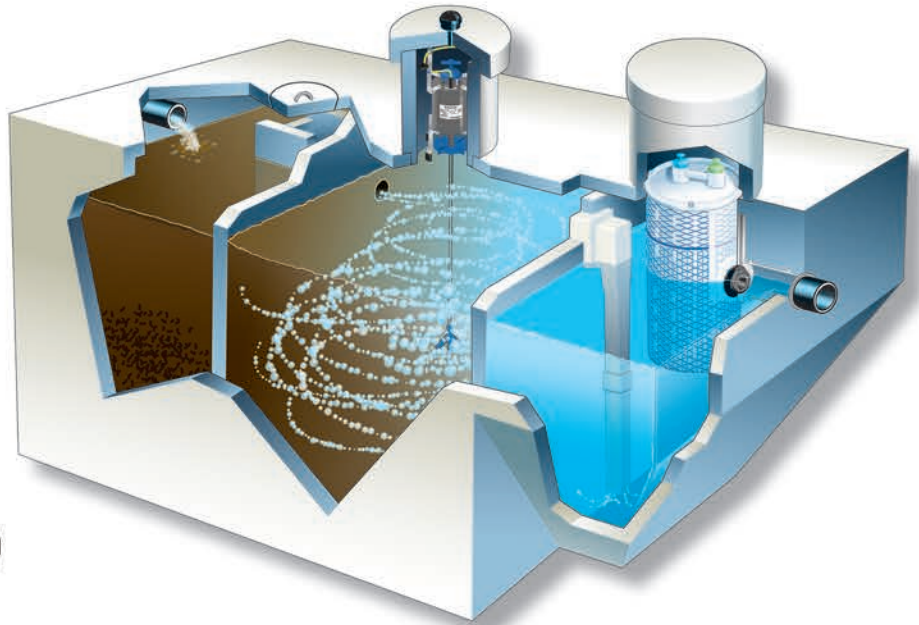
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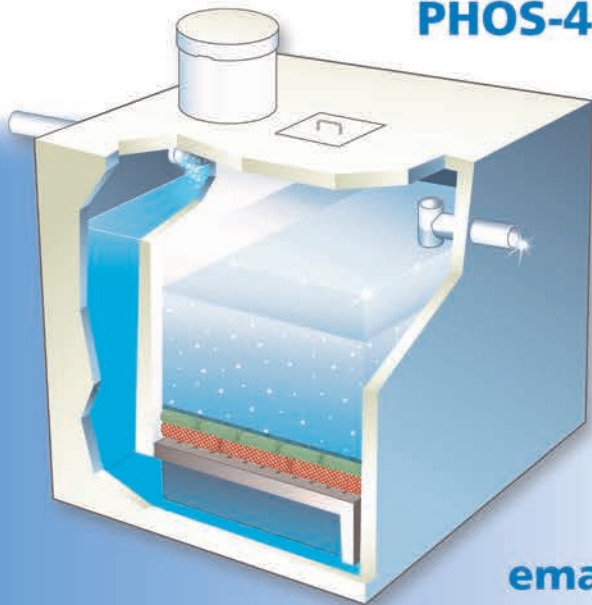
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NEVER BACK DOWN

When others walk away, this experienced New Hampshire system designer picks up difficult residential and commercial projects and makes them work

By Scottie Dayton

In March 2015, homeowners approached onsite designer Penny Wright of Nottingham, New Hampshire, to design a replacement system, but she was too ill to work. Throughout the summer and fall, 17 other designers evaluated the property and walked away in defeat. The owners finally got their system when Wright recovered.

Wright established her reputation for tackling projects nobody else wanted to touch while working for New Hampshire Soil Consultants. As a sideline, she opened The Wright Choice Septics in 1997, designing a few systems a year for friends. In 2008, the economic downturn caused NHSC to lay off its entire septic department.

<< Penny Wright reviews design plans for a septic system while on location at an installation. (Photos by Oliver Parini)

>> Wright visits a jobsite to check on a new system during installation. The risers and lids are from TUF-TITE Inc.



The Wright Choice Septics

- Location:** Nottingham, New Hampshire
- Owner:** Penny Wright
- Founded:** 1997
- Employees:** One
- Service area:** Rockingham, Strafford, Hillsborough, Merrimack, and Belknap counties
- Services:** Alternative system designs specializing in seacoast and challenging sites with small lots, wetlands, tidal marshes and ledges
- Association:** Granite State Designers and Installers
- Website:** www.thewrightchoiceseptics.com

Wright switched her business to full time, and was hired three weeks later to design a replacement system for a hotel on a cliff that dropped almost straight down to a river. The structure was built on a slab, and all the plumbing ran through it to the tanks, which straight-piped to the water. “No other designer would look at it,” Wright recalls. “That project launched my company, and I’ve remained busy ever since.”

SITE CHALLENGES

Wright spent 10 years becoming familiar with New Hampshire’s varied climates and soils. The former ranges from temperate in the south and coastal areas to frigid in the northern White Mountains. Of the state’s six soil groups, Group 3 (sand and loam) and Group 4 (ledges) are most common. The southern region where Wright works is densely populated, often with two- and three-bedroom cottages built after World War II on thumbprint lots, many on the back-barrier salt marshes.

“The homes had septic tanks straight-piped to the marshes,” says Wright. “Homes not on marshes had holding tanks, which residents popped holes in rather than pay for weekly or even more frequent pumping.”

In response to those environmental problems and the mid-1980s building boom, the state approved alternative products such as plastic leaching tubes and plastic chambers. But there were problems. “We’re constantly replacing them,” says Wright. Installers and septic evaluators report finding liquid in the leaching tubes and a biomat on the bottom.

“The aerobic bacteria were drowning and creating the biomat,” says Wright. She removed them from the equation by turning to aeration pretreatment. While no product is a perfect fit for every site, Wright prefers the Clean Solution ATU from Advanced Onsite Solutions (formerly Wastewater Alternatives). “The shoebox-size air compressor plugs into a standard outlet, makes less noise than a refrigerator, and doesn’t require a licensed electrician,” she says.





◀ Penny Wright consults with installer Chris Thompson of Chris-Co during an installation in Portsmouth, New Hampshire.

▼ Wright checks the Munsell Soil Color Book while inspecting a soil sample on location.



“If homeowners have a septic design or some other legal paper that shows a different number of bedrooms, then I’ll design for that. **Otherwise, I follow the tax card and not what clients tell me.”**

Penny Wright

While aeration pretreatment prolongs the life of leaching tubes and chambers, it doesn’t prevent the chambers from failing prematurely because they have lost up to half their volume. “Evaluators tell homeowners if they have septic problems, then a designer comes out to rectify them,” says Wright. “I’m finding 13- to 15-inch-high chambers one-third to one-half full of coarse sand due to settling. What confuses me is I’m not seeing any above-ground depressions associated with their sinking, and no one I’ve talked to has heard of an answer.”

Wright suspects the chambers were not installed correctly or a design flaw enables them to settle during backfilling and grading. In 2010, manufacturers widened the chamber lips and are recommending placing concrete sidewalk blocks under the corners where chambers meet to support them.

“The Granite State Designers and Installers installed five different drainfields at an adult day care facility in Stratford,” says Wright. “The fields are monitored every few months by Tom Canfield, who runs the state septic evaluator certification program. In the next few years, it will be interesting to see which changes, if any, have made a difference regarding leaching tubes and plastic chambers.”

BATTLE-TESTED SYSTEMS

Wright designs 30 to 35 systems per year, with 80 percent residential. Replacing those systems with 600 gpd designs equals 90 percent of her

work. Whenever possible, Wright prefers pretreatment aeration with traditional stone-and-pipe drainfields.

“The state gives such systems almost a 90 percent reduction — 900 to 1,200 square feet down to 150 square feet,” she says. “Stone-and-pipe is simple and reliable, while the smaller footprint enables people to use most of their yard.”

Her design challenges frequently include access — the most expensive system required renting a crane to lift components over the house — tiny lots, property line disputes, tidal buffers, shoreline regulations, and local conservation commissions. Such projects drag out for three to 12 months, and involve surveyors and advising clients to hire an attorney.

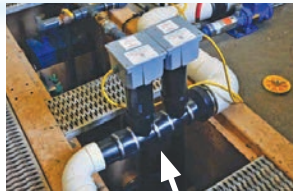
“Attorneys are proficient at obtaining legal access permits and explaining grandfathered rights to neighbors and officials,” says Wright. “In one instance, the abutter needed a replacement septic worse than my client. When the man’s attorney explained my client’s legal rights to the abutter, that person suddenly realized everything he would be up against for a septic repair and became much more cooperative.”

Wright always consults with clients on-site before accepting projects. Her homework includes referring to the Army Corps of Engineers soil map to gain a feel for the land, and obtaining the property’s tax card for a bedroom count. “If homeowners have a septic design or some other legal paper that shows a different number of bedrooms, then I’ll design for that. Otherwise, I follow the tax card and not what clients tell me,” she says.

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ADVICE ON MEDS

Working in the onsite industry for 21 years has taught Wright a few tricks that aren't in the state technical college's curriculum. For example, many lots are on ledge, especially in New Castle. To locate suitable test pit sites, she walks around the backyard with clients looking for multiple chipmunk holes. "In winter, chipmunks need sleeping quarters below the frost line and above the water table," she says. "They burrow in areas where the ledge probably dips, and that's where we'll dig, too."

Wright often encounters situations where a family member is taking medications that will harm the system's microorganisms. She advises patients receiving radiation and chemotherapy to rent a commode throughout treatment and to continue using it two to three weeks afterward to maintain the system's healthy microbial colony.

"People should ask their county and hospital social workers or the local Visiting Nurse Association about obtaining home medical equipment," says Wright. "The VNA also will have information on who can empty the commode's storage tank and dispose of the waste." She advises asking the VNA about safe home cleaning products or to suggest a certified biohazard cleaning company, as bleach and strong detergents will kill the microbes in the tank and field.

Wright also applies her magical touch to designing 1,000 to 20,000 gpd systems for shopping centers, senior-assisted living communities or subdivisions. Although this comprises only 20 percent of her work, rapid turnarounds on cookie-cutter systems are the company's bread and butter. "Most commercial projects come from professional engineers," says Wright. "I'm extremely good at limiting their liability, which is a huge sales point."

MAGIC ACT

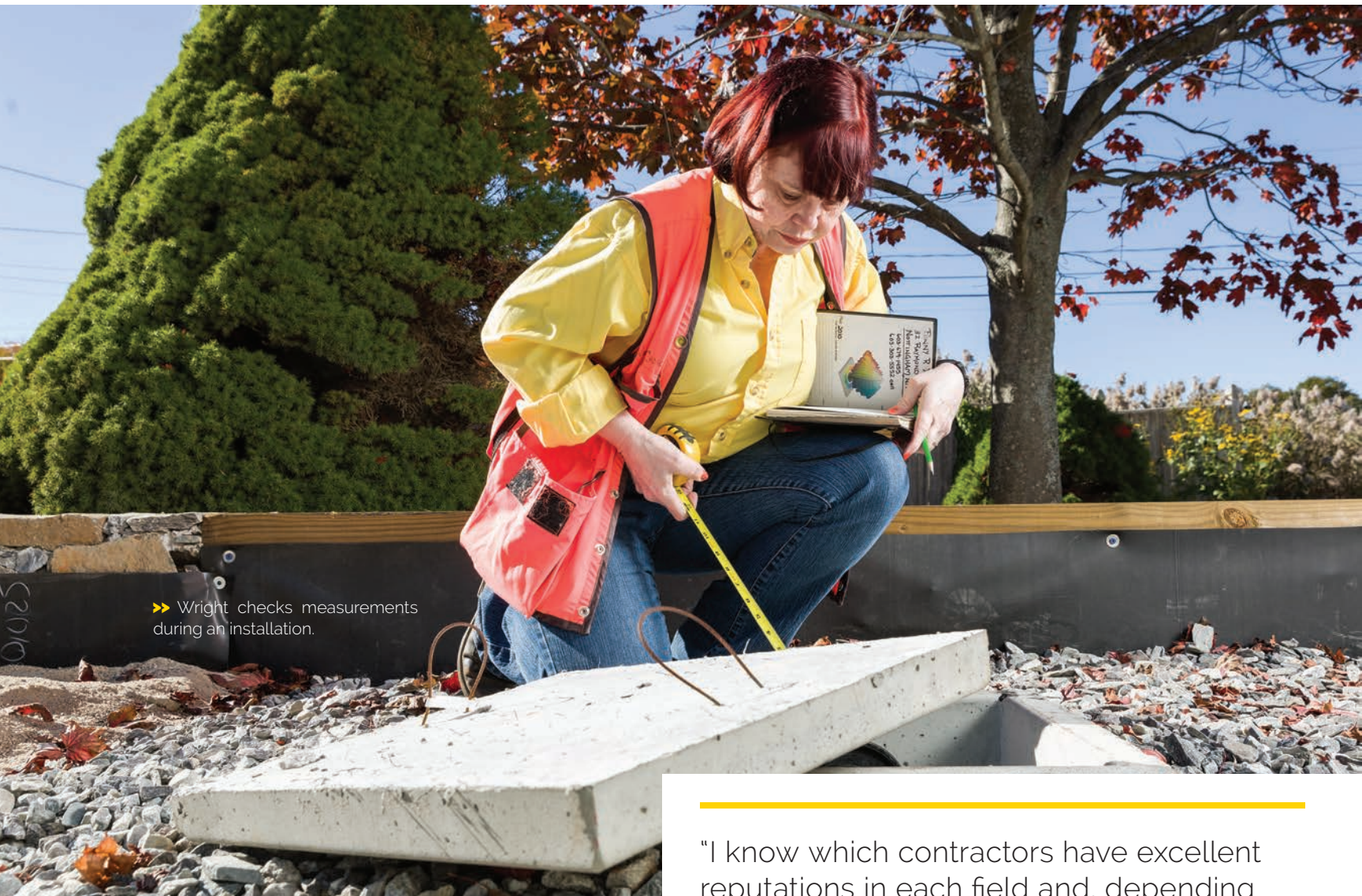
By day, Penny Wright wore work boots to evaluate properties before designing new or replacement onsite systems. By night or on weekends, she transformed into a mysterious woman in high heels and an evening gown, introducing magic acts.

"I couldn't speak in public," says Wright, owner of The Wright Choice Septics. "Therefore, I wanted my children to be comfortable doing it and to master other skills they would need as adults."

A chance meeting with Wendel Gibson, owner of Gibson Magic Co., let the genie out of the bottle. "The kids went crazy, because years ago my father had purchased one of Gibson's first magic effects and later gave it to them," says Wright. Gibson introduced the family to the Society of Young Magicians and Phillip, then 8, and Arwen, 6, became members.

Through the years, the children's involvement with magic taught them public speaking, how to run a business and schedule bookings, how to interact with the public, and how to apply science when building props for their acts. Wright benefited as well. "Magic is nothing but science presented artfully," she says. "Helping the kids build props taught me different ways to look at things. It's responsible for my reputation for thinking sideways, which is a reference to magic."

A perfect example is the girl who climbs into a magician's box. When the audience views her straight on, she is much broader than when she turns sideways. "Creating magic effects taught me how to fit septic components into places deemed impossible," says Wright. "Every one of my creative septic ideas is based on a magic trick."



» Wright checks measurements during an installation.

The state requires a licensed designer and installer — Wright is both — a professional engineer, and a construction inspection report for systems larger than 2,500 gpd. Wright monitors those installations, then writes the report. It includes copies of invoices to verify specified components were installed, and photos of utility locations to aid future contractors.

“The reports limit liability for all parties by ensuring that systems are installed correctly, but I go a step further,” says Wright. “I know which contractors have excellent reputations in each field and, depending on the site’s requirements, I assemble my A-team from them.” Such dedication produces brand loyalty. The owner of Nordic Village in Bartlett and Nestlenook in Jackson refuses anyone except Wright to touch his septic systems.

POSITIVE OUTCOMES

Another of Wright’s specialties is keeping commercial designs below 20,000 gpd to avoid the state’s perpetual ground discharge monitoring program. One example is Baxter Lake Campground, which had 365 lots, 321 of them with cabins. Only 110 lots were permitted for septic and 114 lots were permitted for community well water, with seven lots having both permits. The state agreed to permit the occupied lots, but the 44 unoccupied parcels were designated permanent green spaces.

“My 16,210 gpd design was based on six months of water meter readings from the four wells instead of sizing by soil,” says Wright. “Most soils were Group 3, which are assigned 1,250 gpd per acre.”

“I know which contractors have excellent reputations in each field and, depending on the site’s requirements,

I assemble my A-team from them.”

Penny Wright

The five septic tank/pump stations, sized according to the number of lots served, pumped to a 3,000-gallon dosing tank, then to the original undersized drainfield. Wright’s design specified repurposing the dosing tank to a buffer tank and building a new pump station. It pumped effluent to a distribution box feeding six 38.5-foot-wide by 100-foot-long drainfields in a large athletic field. Six fields enabled one to always be dormant.

Referrals from contractors and evaluators drive the business, but persuading local and state officials to consider multiple waivers and options requires involving them from day one. “Once they understand how a design will bring the lot as close as possible to current standards, they grant clients concessions they never thought possible,” says Wright. “It just takes being 100 percent open and honest.” □

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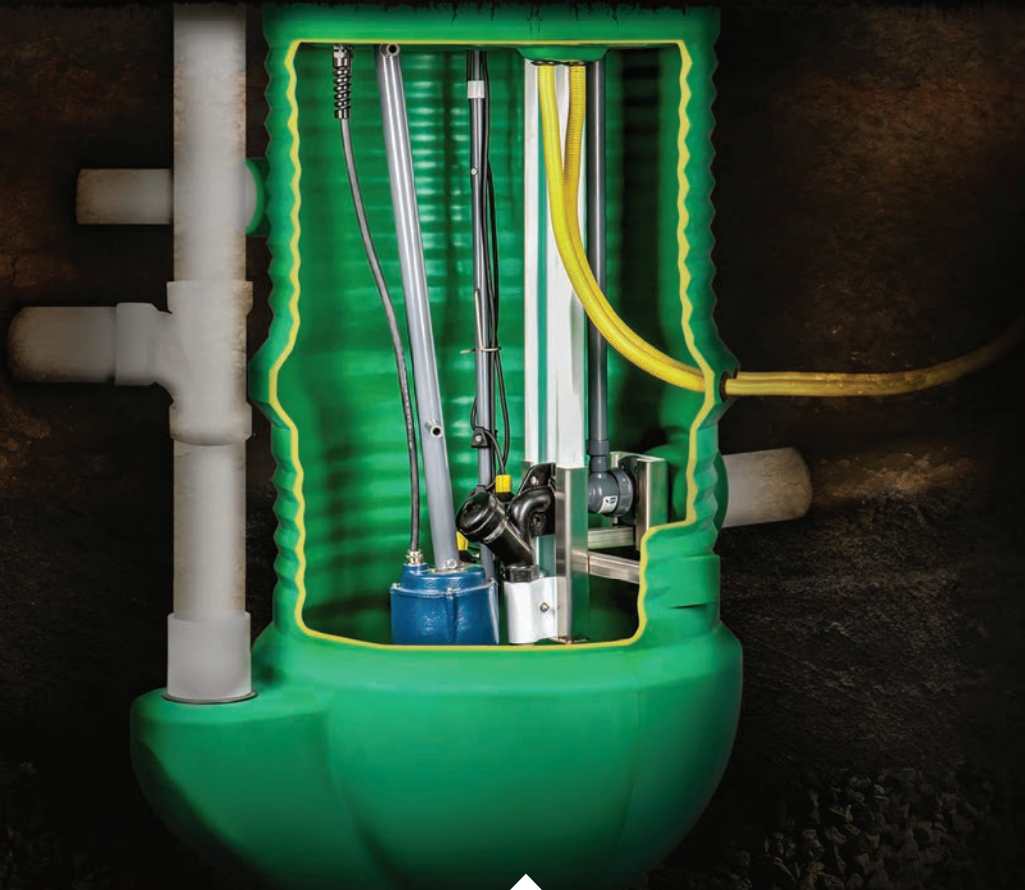
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Estimating Flow Is Trickier for Business Onsite Systems

Per-table and per-seat water usage and employee numbers are factored into wastewater treatment needs for taverns and restaurants

By Jim Anderson and David Gustafson

Last month, we covered estimating of average daily sewage flows for single-family residences. For other types of structures, the picture gets a little hazier from our perspective. The same per-person estimate is used, but other characteristics of the business or establishment may provide a better picture of the water use patterns and amounts. Examples are per seat, per meal, per car stall, or per square foot of area. We have seen all of these and combinations used to estimate flows. The characteristic that best fits the establishment should be used.

Most state codes have a table of values for different kinds of activities or establishments that are used to estimate the total average daily flow for design purposes. They are typically based on published values in established engineering publications. It has been our observation and it has been noted by others in publications that these values tend to err on the high side. Some are based more on peak flows rather than averages. For nonresidential situations, this is where the safety factor for estimated flows is built into the calculation.

BOD values for restaurants are often 3 to 5 times higher than typical residential wastewater. In addition, levels of fats, oils and grease are 2 to 5 times higher in restaurants.

As with residential flows, codes vary by state even though the numbers are probably based on the same studies and publications. A couple of examples for Minnesota and Arizona: For a bar and lounge, each state determines the estimated flow based on numbers of seats. Minnesota uses 30 gallons per seat and Arizona 36 gallons per seat. For a restaurant, the Minnesota number is 8 gallons per seat while in Arizona it is 7 gallons. Each state makes an addition to the estimate on a per-employee basis (Minnesota is 15 gallons per employee and Arizona 20 gallons per employee).

ACCURATE PROJECTIONS

Both states allow some deviation from these numbers based on criteria such as hours of operation, size in terms of square feet, and the type of operation: a restaurant serving alcohol versus one that does not, for example.

Just as with changing residential flow estimates, the system designer is responsible for making a case to alter the numbers to the state or local regulatory personnel.

Probably the best way to get an estimated flow for a nonresidence is to monitor flow and wastewater characteristics from the establishment before making design decisions about any of the system components. If it is a new establishment, data collected from a nearby establishment with similar characteristics would be best.

In Minnesota, there is a specified method to gather flow data. It is determined by averaging measured daily flows for a seven-day period where the establishment is operating at its maximum capacity. Getting accurate readings requires a close working relationship with the owner and an understanding of how flows change during each day and during different days of the week.

Anyone working in this industry recognizes estimating average daily flows only tells part of the story. There is usually a lot of flow variation during any day or week for residences and nonresidences alike. Understanding peak- and low-flow times and amounts needs to be accounted for in the design process.

For residences, two peak-flow periods are in the morning and evening. There can be large variations during the week due to work and school patterns, and whether there is in-home business activity. This information may require some additional system components or characteristics incorporated into the design, such as using a timer system to regulate flow. In other establishments, knowledge of flow patterns can change the entire system design and approach.

SEWAGE STRENGTH VARIES

Wastewater characteristics should be monitored. BOD and suspended solids levels in the effluent should be determined. For residences, we assume waste generated is of typical domestic sewage characteristics. With proper flow estimation, septic tank sizing and regular maintenance, septic tank effluent should have a BOD concentration of about 175 mg/L and a suspended solids level of less than 60 mg/L. This is incorporated into the soil sizing factors, which along with estimated flow determines final soil dispersal area size.

Nonresidential wastewater characteristics are often very different from residential numbers. This is most notably the case in restaurants and bars. BOD values for restaurants are often 3 to 5 times higher than typical

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residential wastewater. In addition, levels of fats, oils and grease are two to five times higher in restaurants.

Unless a change is made in the pretreatment choice during the design process, the soil treatment area will be subjected to these higher levels and result in faster development of a more resistant biomat leading to premature hydraulic failure. A method of pretreatment will need to be incorporated into the design and installation that brings organic loading more in line with residential waste. Use of media filters and aerobic treatment units are two ways to provide the additional treatment.

With this deeper look at estimating flow, you'll see there are variations and the opportunity to make different estimates based on residence and other establishment characteristics. But you must approach each situation with caution and have a sound basis either from published studies or local data.

As always, this should help all of us recognize that reducing water use and wastewater flows, and the quantity of organic loading will improve both the efficiency and longevity of our systems. □



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SYSTEM PROFILE

▼ The customized H-20 distribution box has dedicated 4-inch Schedule 80 PVC supply lines feeding six rows of three diffusers in the 28- by 29-foot drainfield. The control house and tanks (note riser on Ecoflo) are on the other side of the security fence. (Photos courtesy of Septic Experts)

He's No Joltin' Joe

An installer and onsite designer follow extreme high-voltage safety procedures as they help a New Jersey electricity substation upgrade its onsite system

By Scottie Dayton

Public Service Electric and Gas Co. (PSE&G) was upgrading its 230 kV Lumberton substation in Mount Holly, New Jersey. The control house, normally staffed by two people, had a small lavatory, but its onsite system had been removed in preparation for the expansion. The only available location for a replacement drainfield was a grassy area used for emergency parking.

The utility hired designer Doug Fine, P.E., of Fine Engineering in Three Bridges, New Jersey, noted for solving spatial issues with green technology. "The challenge was to make the space usable for parking and effluent disposal," says Fine. For suggestions, he turned to Joe Mayers of Septic Experts in Augusta, New Jersey.

Thirty years ago, Mayers had installed H-20 traffic-rated septic components. Drawing on his experience, he recommended H-20 concrete flow diffusers for the drainfield and an Ecoflo Coco Filter three-in-one treatment unit (Premier Aqua Tech) in an H-20 concrete tank. "The media in the Ecoflo is fragmented coconut husks, a renewable resource," he says.

The system, one of the first of its kind in the state, was one of Mayers' most dangerous locations. "The tanks were 8 feet from the leg of a 230 kV steel-lattice transmission line tower," he says. "I had power humming over my head, passing under my feet, and emanating from tractor-trailer generator sets on the side. It made me nervous."

System Profile

Location: Mount Holly, New Jersey

Facility served: Public Service Electric and Gas substation

Designer: Doug Fine, P.E., Fine Engineering, Three Bridges, New Jersey

Installer: J. Fletcher Creamer & Son, Hackensack, New Jersey

Installation consultant: Joe Mayers, Septic Experts, Augusta, New Jersey

Site conditions: Loamy sand, loading rate 12 minutes per inch, seasonal high water table 6 feet below grade

Type of system: H-20-rated pump-up gravity feed, Premier Tech Aqua

Hydraulic capacity: 650 gpd

“We needed special boots and a special hard hat, because electricity could follow the steam trail from a vented hat to the owner’s head.”

Joe Mayers

Site conditions

Soils are loamy sand with a loading rate of 12 minutes per inch and a seasonal high water table 6 feet below grade.

System components

Fine designed the system to handle 650 gpd. All components are H-20 rated with Schedule 80 PVC piping.

- 1,000-gallon, single-compartment monolithic concrete septic tank (Northeast Concrete)
- PL625 effluent filter (Polylok)
- Ecoflo Coco Filter (Premier Tech Aqua)
- Customized distribution box with baffle (Northeast Concrete)
- 18 type “L” (long end entry) flow diffusers (J.B. Concrete Products)
- Alarm system (Ecoflo package)



▲ Using a Palfinger PK 72002 crane, John Vitale, owner of Northeast Concrete Products, off-loads the tank for the Ecoflo Coco Filter septic system. The leg of a 230 kV steel lattice transmission line tower is 8 feet away.

System operation

Wastewater flows 96 feet through a 4-inch lateral from the control house to the septic tank and Ecoflo set in series. Inside the ATU, more solids settle out in the trash tank before gravity delivers effluent to a tipping bucket, which evenly distributes it over plates with channels and orifices. Liquid trickling down through the media collects at the bottom of the unit, then flows to the pump vault.

When activated, the on-demand pump in the vault cycles about two minutes, sending effluent 93 feet through a 2-inch force main to the distribution box. Dedicated 4-inch supply lines feed six rows of three diffusers in the 28-by 29-foot drainfield. The pipes, entering the side of the chambers 3 inches from the top, discharge into a 4-inch-diameter monolithic precast channel 8 feet long with 3/8-inch slots.

Effluent drips through the slots into the stone and sand bed. Two rows of six 5- by 2-inch-wide drain holes in the sides of the chambers allow effluent to move laterally as the water level rises. However, a biomat should not form after tertiary treatment. Premier Tech Aqua reports that independent tests show effluent averages 6 to 8 mg/L TSS, 7 to 3 mg/L BOD, 11 to 13 mg/L TKN, and 10 to 11 mg/L ammonia.

Tank installation

Mayers collaborated with PSE&G’s contractor, J. Fletcher Creamer & Son, to install the system. He was classified as an installation consultant by the utility and, as a Premier Tech Aqua certified installer, was the only one authorized to show the four workers where to place and how to assemble

▼ John Vitale (left), owner of Northeast Concrete Products in Hewitt, New Jersey, marks a location on the H-20 tank he designed and cast for an Ecoflo Coco Filter aerobic treatment unit. Mike Kaub, Premier Tech Aqua regional supervisor, assists with the customization.





◀ Workers from J. Fletcher Creamer & Son set the H-20 1,000-gallon concrete septic tank. A PSE&G safety worker, in the blue hard hat, monitors the process.

▼ J. Fletcher Creamer & Son use a 328D LCR Caterpillar excavator to off-load a 2,360-pound flow diffuser. Note the shovels and steel bar used to muscle the chambers into their locking position.

the components. PSE&G allowed Mayers to plumb the Ecoflo and install the pump.

A safety training course through the utility enabled Mayers and Fine to walk around the yard. “Safety was paramount, and there was a safety meeting every morning,” says Mayers. “The course taught us not to lift anything above our waists, not to hold metal objects in our hands, and to stay in our work area. We needed special boots and a special hard hat, because electricity could follow the steam trail from a vented hat to the owner’s head.”

A security fence with one gate enclosed the massive facility. The tanks were inside the fence, the distribution box and drainfield outside it. The yard teemed with multiple contractor crews and machinery, which was grounded to a subsurface grid with a cable every 15 feet.

Creamer’s 328D Caterpillar excavator was too wide to pass through the gate, so PSE&G removed a section of fence, enabling his crew to dig and shore the hole for the tanks. Meanwhile, John Vitale, owner of Northeast Concrete Products, loaded the 10- by 6-foot-square tank for the Ecoflo, the 9- by 6-foot-square steel reinforced septic tank, and the distribution box on his flatbed truck.

Three hours and 113 miles later, Vitale joined the queue of vehicles waiting to clear the gate. Once there, he waited for the ground worker and safety worker. When the pair arrived, the ground worker connected and disconnected grounding cables until Vitale had backed the truck near the hole. Then the safety worker ensured the truck was set properly and grounded. As Vitale set the tanks with a Palfinger PK 72002 crane, the safety worker watched the distance between it and the power lines. Creamer’s dump truck removing spoil went through an identical process.

An 18- by 18-foot by 8-inch-thick concrete slab reinforced with double layers of 4- by 4-gauge welded wire fabric covered both tanks. Creamer’s crew cast it on-site, and recessed the H-20 aluminum hatch 3/8 inch to protect it from snow plows. Then a PSE&G official asked Mayers to seal the tank tops with tar. “It was an afterthought by their engineers,” he says. “The hatch has a weep hole discharging down the side of the inlet riser. Without the tar, dissolved road salt in melting snow would drip on the concrete and erode it.”

Drainfield installation

Tank work (including connecting the lateral from the control house to the septic tank) and backfilling took a day. The next morning, workers excavated the 3-foot-deep force main trench running outside the fence, and the



5.5-foot-deep drainfield. Dump trucks filled the hole with 4.5 feet of C-33 concrete sand and 12 inches of 1.5-inch crushed, washed stone, and hauled away spoil.

Meanwhile, owner John Barnes of J.B. Concrete Products drove his flatbed tractor-trailer 244 miles from Putnam, Connecticut, to deliver the 8- by 4- by 1.5-foot-high diffusers. Creamer’s excavator operator set the 2,360-pound units.

“The chambers have tongue-and-groove ends and sides that lock them into one consecutive block,” says Mayers. “The men used shovels and a 6-foot-long steel bar to muscle the chambers into position as the machine operator lowered them the last few inches. He had to work in two different planes to ensure the tongue and grooves mated.” Lids on the chambers serve as inspection ports.

After workers set a 9.5-foot-long 4-inch Schedule 40 PVC monitoring well in one corner of the drainfield, they backfilled with stone. The 2-inch force main from the Ecoflo to the distribution box ran under the entrance gate, and was installed last to keep the road open for as long as possible. The project took 10 days, including spreading topsoil and grass seed.

Maintenance

Premier Tech Aqua maintains the service contract. The system is inspected every six months for the first two years, then annually. □

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Clarus Environmental Products 3649 Cane Run Rd. Louisville, KY 40211 800-928-7867 • 502-778-2731 www.clarusenvironmental.com See ad page 37	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
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Delta Environmental Products 8263 Florida Blvd. Denham Springs, LA 70726 800-219-9183 • 225-665-6162 Fax: 225-664-9467 www.deltaenvironmental.com  PENTAIR DELTA ENVIRONMENTAL	DF Series	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 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,
	Ecopod-N Series	500 to 1,500	2006	Wastewater enters a pretreatment/settling tank similar to conventional septic tanks. In this tank, debris and settleable solids settle to the bottom and are decomposed by anaerobic bacteria. The effluent leaves the pretreatment tank and enters the Ecopod-N Fixed Film Wastewater Treatment System reactor tank, where it is introduced to an oxygen-rich environment. In this oxygen-rich environment, a colony of bacteria, called the biomass, develops and is capable of digesting biodegradable waste into carbon dioxide and water.	
	Enviro-Aire Series	500 to 1,500	2005	The plant achieves treatment by a flow through process. Raw sewage enters a primary chamber, which has a hydraulic capacity of 346 gallons, providing a retention time of 16.6 hours. This chamber provides for separation of heavy, easily settled solids as well as floatable materials such as grease. Settleable solids accumulate on the bottom and floatable solids accumulate on the surface. Effluent from the clear layer flows into an aeration/mixing chamber with a 28-hr retention time. An aeration system provides for oxygenation of the primary effluent with the wastewater in the aeration/mixing chamber. Air is introduced by passing from the air pump to the air drop-line located in the chamber. The mixed liquor enters the settling chamber at the bottom and travels upward toward the discharge pipe. The quiet condition allows solids to settle down and re-enter the mixing chamber.	IL, LA, MS, TX
Eliminite, Inc. PO Box 359 Belgrade, MT 59714 888-406-2289 info@eliminite.com www.eliminite.com See ad page 38  MetaRocks	Eliminite Grizzly	Up to 50,000	1997	The Eliminite Grizzly system is designed for large-scale, high-volume, high-strength commercial applications where advanced nitrogen reduction is necessary. The system was originally developed to serve high-altitude commercial and resort developments in the Rocky Mountains where winter temperatures linger at or below 0 degrees F, and seasonal use patterns/dramatic fluctuations in flow and wastewater strength are the norm. It functions with little operator input and simple maintenance. C-Series systems serve high-altitude highway rest areas, resort communities, golf courses, ski areas, mixed-use residential communities, restaurants, RV parks, worker camps, corporate retreats, business parks and convenience stores. It is suited for use in multi-stage treatment trains and as a means of reducing waste strength prior to conveyance to municipal treatment facilities.	US

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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 17 	CE Series	450 to 1,000 single tank systems		Fuji Clean's CE model series averages 50,000 systems being installed annually worldwide. The popularity is driven by a small footprint (about 7' x 4'), low power draw (1.27kWh/day), easy plug & play installation and simple, efficient O&M and consistent treatment (90-95% BOD and TSS removal, NSF 40 certified, no preceding septic tank). There are no moving parts in the "contact filtration" treatment process. One 80 L/min external air blower (FujiiMAC) introduces oxygen aerobic chambers and powers internal air lift pumps, which manage sludge return and discharge of clean effluent.	Most States
	CEN Series	450 to 900 single tank systems		Fuji Clean's CEN technology provides enhanced denitrification into its standard contact filtration treatment process and produces a consistent high quality effluent (NSF 40/245 certified: 5 BOD, 6 TSS and 10 TN) from straight septic wastewater – no preceding septic tank necessary. There are no moving parts in the treatment process. 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. A proprietary electrolysis-based phosphorus reduction option (CRXII) is also available with this system.	
	Commercial Systems	1,000 to 6,000 single tank systems		Fuji Clean's largest CE commercial system, the CE6KG, is now available to supplement its existing CE21 (1,900 gpd), CE30 (2,700 gpd) models and CEN21 (1,900 gpd). The CE6KG, which can treat up to 6,000 gpd, uses the same treatment technology, process flow and one-tank structure as the smaller CE systems and can be squeezed into the tightest of sites. The footprint size is only 36' x 6.5' (including built-in septic tank).	
Hoot Systems, LLC 2885 Highway 14 E Lake Charles, LA 70607 888-878-4668 • 337-474-2804 questions@hootsystems.com www.hootsystems.com See ad page 31 	LA-Hoot	500 to 1,000	1986	LA-Hoot is an improved version from the original Hoot Treatment System introduced in 1984. Results are better than 10/10 mg/L on CBOD and TSS, with more than a 95% reduction of the wastewater influent. Two-year warranty/NSF Standard 40 certified.	Nationwide
	H-Series	500 to 1,200	1995	Five-stage, one piece system with a pretreatment tank, aeration chamber, final clarifier, optional disinfection device and a pump tank. Results are better than 5/5 mg/L on CBOD/TSS. A 99% reduction on CBOD and TSS. Marketed as BNR in MD and FL with Biological Nitrogen Reduction of >50%. Three-year warranty/NSF Standard 40 certified.	
	ANR	450 to 900	2007	Adds Advanced Nutrient Reduction to the Hoot System. Results of 5.8 mg/L on TN, better than 10/10/10 mg/L on CBOD/TSS and Total Nitrogen. Areas where 10 mg/L is the discharge limit for Total Nitrogen, the federal level for drinking water. Three-year warranty/NSF Standard 40 and 245 certified.	
Hydro-Action PO Box 640 Plymouth, IN 46563 800-370-3749 • 574-936-2542 info@hydro-action.com www.hydro-action.com 	AP Series and LP Series	500, 600, 750, 1,000, 1,500		The Hydro-Action technology utilizes an activated sludge treatment process, which constantly infuses oxygen to wastewater where aerobic bacteria metabolize the waste. Then it separates in a clarification chamber without the use of media filters, carbon additives, or expensive, high maintenance technologies. We offer our products in a three tank combination as a single unit: pretreatment, aerobic treatment, and pump tank design as the "Set-N-Go" unit. Tanks can be sold as individual treatment plants. 72" tall standard and 52" tall Low Profile systems available. NSF Standard 40 & 245 Nitrogen Reduction approved with testing results of an average CBOD5 of 4mg/L (98.5% reduction), TSS 9mg/L (95.25% reduction), and 5.1 mg/L dissolved oxygen. Nitrogen Reduction averaged less than 10mg/L TN and 79% reduction in Total Nitrogen removal.	US and International
	AN Series	440, 550, 660			
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 7 	J 1500 BAT Media Plant; J 500-800 PLT	500 to 1,500		Jet's residential wastewater treatment plants employ the Jet BAT Process Media which provides the ideal environment for nature's own bacteria to thrive and grow. Great numbers of these living microorganisms attach themselves to this submerged structure to create a "biomass" that rapidly treats wastewater. The Jet 700+ Aerator provides the mixing and fresh oxygen the microorganisms require to live while the Jet BAT Process Media provides the environment to support the microorganisms that allow natural filtration and biological reduction to take place. Available in concrete and plastic.	US and International
	R-Series	450 to 1,500			
MST Manufacturing, LLC 23362 Medero, Ste. C Mission Viejo, CA 92691 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.	AZ, CA, DC, DE, MD, NJ, NV, PA, VA

MANUFACTURER	BRAND	GPD	RELEASED	DESCRIPTION	DISTRIBUTORS
Norweco, Inc. 220 Republic St. Norwalk, OH 44857 800-667-9326 (NORWECO) 419-668-4471 Fax: 419-663-5440 email@norweco.com www.norweco.com See ad page 9	Hydro-Kinetic	500 to 1,500		The Hydro-Kinetic wastewater treatment system employs innovative Hydro-Kinetic filtration technology to produce the cleanest, most consistent effluent quality available. They Hydro-Kinetic system uses the extended aeration and attached growth processes to treat wastewater, and features innovative nitrification-denitrification technology. The Hydro-Kinetic FEU system is the only NSF/ANSI Standard 40 and 245 certified residential wastewater treatment system to pass two consecutive back-to-back tests without performing routine maintenance for a full 12 months. It quietly, efficiently and automatically pretreats, aerates, flow equalizes and filters all wastewater returning only the purest effluent back to the environment.	North America, Central America, South America, Europe, Africa and Middle East
	Singular Singular TNT (Total Nitrogen Treatment)	500 to 1,500		The Singular system is the state-of-the-art alternative to a troublesome septic tank for domestic wastewater treatment. Employing the extended aeration process, the Singular 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 Singular system is certified by NSF International (Standards 40 and 245) and the Canadian Standards Association.	
	Singular Green Singular Green TNT (Total Nitrogen Treatment)	500 to 1,500		The Singular 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 Singular 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, Singular Green is certified by NSF International.	
Premier Tech Aqua 1 Avenue Premier Riviere-du-Loup, QC G5R 6C1 Canada 800-632-6356 • 418-867-8883 Fax: 418-862-6642 pta@premiertech.com www.premiertechaqua.com See ad page 28 	Ecoflo	1 to Unlimited (cluster)	1995	Ecoflo is a wastewater treatment system that can be installed in different site conditions. It features a concrete or polyethylene tank, high-resistance plastic distribution system and integrated pump vault (when the treated effluent has to be pumped out to a surface disposal). It uses a quality-controlled filtering media to treat wastewater coming from the septic tank. No electric power is required to achieve treatment which exceeds standards. Filtering media and mechanical components are accessible for routine maintenance and verifications. Compact and modular, Ecoflo can be used for residential, commercial and small community projects.	US and Canada
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 ads pages 5, 27 	Advanced Enviro-Septic	Varies	2005	Advanced Enviro-Septic (AES) is a passive 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.	30 States and 14 Countries
Presby Environmental, Inc.	EnviroFin	Residential/Commercial	2016	The Enviro-Fin passive onsite wastewater treatment and dispersal system is designed to have a small footprint and ship easily, while maintaining and exceeding NSF/ANSI Standard 40 treatment. Effluent leaves the septic tank and enters the fin distribution unit, where it settles and breaks down suspended solids. Effluent is distributed to the eight treatment fins, which are filled with coarse green plastic fibers, filtering and digesting more suspended solids.	NH, ME, AL
SeptiTech - a subsidiary of Bio-Microbics, Inc. 69 Holland St. Lewiston, ME 04240 800-318-7967 • 207-333-6940 Fax: 207-333-3944 info@septitech.com www.septitech.com	SeptiTech STARR	500 to 27,000+	1996	SeptiTech STARR (Smart Trickling Anaerobic/Aerobic Recirculation) Filter Systems utilize an enhanced, biological, unsaturated media filter process to treat high organic loads that integrate with other technologies and accessories. ETV-EPA verified and NSF/ANSI Standard 40/245 certified, the simple, automatic and reliable equalization and clarification process of the STARR biological trickling filter technology also maintains low levels of Nitrate-N with all below-grade components that fit in readily available concrete, plastic or fiberglass tanks. With a disinfection system and a low-impact technology for irrigating plants (or other non-potable use), the STARR trickling filter systems are designed for direct discharge or water reuse.	Nationwide, Global
Waterloo Biofilter Systems Inc. PO Box 400 Rockwood, ON N0B 2K0 Canada 866-366-4329 • 519-856-0757 Fax: 519-856-0759 info@waterloo-biofilter.com www.waterloo-biofilter.com	Waterloo Biofilter	300 to 50,000	1994	The Waterloo Biofilter is an efficient, low maintenance trickle filter for treating residential & commercial wastewater. There is no aerobic sludge management and very low power consumption. Due to our field experience since 1994, the patented absorbent filter medium has a 20-year warranty. We offer a variety of small to large plug-and-play configurations for ease of installation. This includes attractive self-contained modules in 5,000 and 10,000 gpd ISO shipping container units, and remote camp units transportable by helicopter. During the latest term at an example school, the patented WaterNOx denitrification system removed 95% TN with cBOD & TSS < 5 mg/L. The new Waterloo EG-P is shown to remove TP to <0.3 mg/L as retrofits to houses with conventional soil beds and Waterloo Biofilters. Tested under the stringent NSF-EPA Environmental Technology Verification Program and proven in Canada's harsh environment with thousands of systems operating.	US and Canada



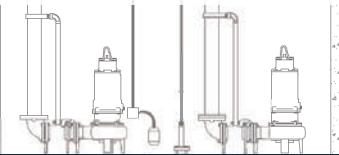
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Communities Take Differing Approaches to Wastewater Regulation Around Washington's Puget Sound

By David Steinkraus

Thurston County and the town of Lynden are at opposite ends of Puget Sound, and in the last month both took action on wastewater contamination in different ways.

Lynden lies about 100 miles north of Seattle, 3 miles from the Canadian border, and several miles inland from the sound, but the Nooksack River that drains the area flows into Portage Bay where the Lummi Nation has about 800 acres of shellfish beds. As part of the work to reduce fecal contamination in the bay, the city is waiving the \$6,682 fee for homeowners who want to disconnect their onsite wastewater systems and join Lynden's sewer system. Although the city is waiving the fee, homeowners will still bear the cost of connecting to sewer mains.

For about six months each year, fecal contamination prevents the tribe from using their beds for any commercial, ceremonial or subsistence fishing. Lummi Chairman Timothy Ballew II voiced support for the city's program. The tribe has also formed a partnership agreement with seven area farmers to keep manure out of the bay and to compensate shellfish users for any loss resulting from fecal pollution.

News reports said only 20 percent of sites monitored in Whatcom County, which encompasses Lynden, meet standards for bacterial pollution.

In Thurston County, which surrounds the state capital of Olympia on the south end of Puget Sound, county commissioners voted 3-0 in April to repeal a \$10 fee that applied to about 42,000 septic system owners and was part of the county plan to monitor its septic systems. Monitoring and managing onsite systems is now required of Washington counties under state law.

The fee was approved 2-1 in December with support from two now-retired Democratic members of the County Commission. Bud Blake, now the commission chairman, voted against the fee in December. He said he supports water quality, but thought the fee was not necessary. In the April vote to repeal the fee, he was joined by new commissioners John Hutchings and Gary Edwards.

More than 20 people testified at a public hearing about repeal of the fee. Supporters of the fee said \$10 is a bargain price for protecting the sound's fragile waters. Opponents said they are capable of monitoring their own septic systems and already pay for maintenance.

While all that was going on, the park district on Vashon Island, directly across Puget Sound from Seattle, discovered the historic home it has been renting out to vacationers for about nine years has no sanitation system. The problem surfaced when the lodge manager realized he never received a notice saying a septic tank needed pumping. The manager poked around and called in a wastewater professional, and they found sewage from the

home surfacing 10 feet from the mouth of Shinglemill Creek, a protected salmon stream.

It will cost the park district an estimated \$40,000 to install an onsite system. Park district commissioners did not commit to repairs at their meeting in mid-April. Rentals have been cancelled and park district staff is looking into grants and an insurance claim to cover costs. After it was given the home in 2008, the district spent \$179,000 on renovations, but the wastewater system was apparently overlooked.

California

One resident tried but failed to break a decade-long septic system moratorium in a California community.

The Quail Valley community is near Menifee, about 64 miles south-east of Los Angeles. Resident Frank Barcelo sought a permit for a subsurface-discharge system, saying he had a right to provide for a future home. An official of the Santa Ana Regional Water Quality Control Board said Barcelo presented no proof of his claimed right. The board denied Barcelo's request.

Quail Valley covers about 1 square mile and has about 500 homes. Many septic systems in the community failed following heavy rains in 2004 and 2005. Officials enacted a temporary moratorium and made it permanent in 2007.

The nonprofit group Inland Empire Waterkeeper opposed Barcelo's request, saying it would encourage other property owners to challenge the moratorium and saying that the conditions leading to the widespread septic failures have not changed. The solution is to extend sewer service to Quail Valley, said the group's attorney. But that could take years.

New Jersey

By a 4-1 vote, the state Senate's Environment and Energy Committee passed a resolution opposing a regulation that would increase the density of onsite systems in a rural region of New Jersey. The state Assembly passed an identical resolution in December.

The region in question is called the Highlands, and it is an expanse of woods, lakes and rolling hills in the central and northern parts of the state. Proposed regulation would allow more septic tanks per acre. Environmentalists objected, saying septic systems are a primary source of nitrate pollution. Residents of the Highlands have cited state regulations as an impediment to development, and state Department of Environmental Protection officials defend the regulation, saying it protects water quality while allowing minimal growth.

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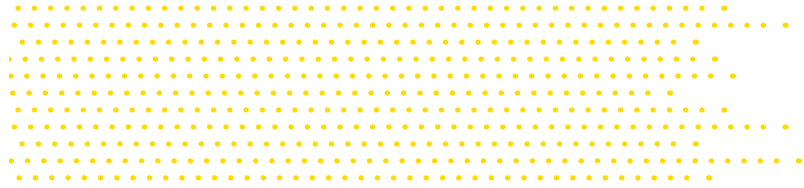


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Legislators say the proposed regulation violates the intent of a 13-year-old law to preserve and protect hundreds of thousands of acres in the Highlands.

Minnesota

A group of Amish from Fillmore County in the southeastern corner of the state filed a lawsuit in April as part of a years-long battle against regulations that require them to install onsite wastewater systems or holding tanks.

For the Amish it is a matter of religious choice. They say they reuse their graywater for watering their gardens.

“If we take a step in the wrong direction and teach our children and grandchildren and lead them in that direction, we will have to answer for it at the day of judgement. We are asking in the name of our Lord to be exempt and forgiven for this oppression that is being laid on us,” says one letter sent by 105 members of the community to the state about three years ago.

The Minnesota Pollution Control Agency — a defendant in the lawsuit along with Fillmore County — says the geology beneath the Amish homes is karst, and those eroded limestone structures easily transport contaminants to groundwater. News reports quoted Fillmore County Attorney Brett Corson as saying several other cases have been decided in favor of the county.

Amish in Ohio have made similar objections to wastewater regulations in that state, but those cases were either settled with a compromise or decided in favor of state and local government.

New York

All water suppliers in the state will be required to test for at least three unregulated contaminants under a provision in the state’s new budget.

The contaminants have all been found in Long Island’s aquifers. They are: 1,4-dioxane; perfluorooctanoic acid, or PFOA; and perfluorooctane sulfonate, or PFOS. A 12-member water quality council, also established by the budget, will recommend whether other contaminants should be added to the list for testing and whether the state should set standards separate from those in federal regulations.

All water providers, public or private, must test if they have at least five year-round connections or regularly serve at least 25 residents. State officials said this is the first regulation in the nation to require almost all water suppliers to test for contamination.

Wisconsin

Gov. Scott Walker’s proposed two-year budget would eliminate a fund that provides financial assistance for low-income citizens to replace aging septic systems shown to be contaminating groundwater or drinking water.

Currently, people making up to \$32,000 annually can apply to the Wisconsin Fund for grants for the work. In 2016, the fund paid about \$2.3 million to 654 property owners. A portion of county septic system permit fees are sent to the state to fund the program. □

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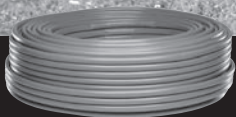
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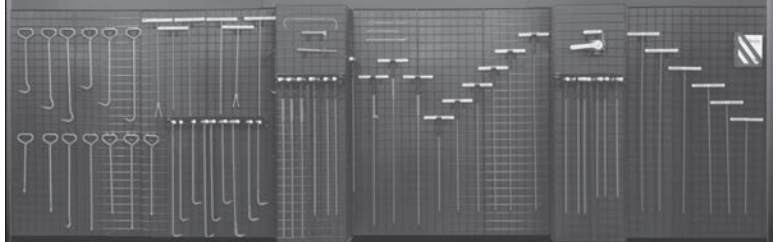


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Compiled by Betty Dageforde

In States Snapshot, we visit with a member of a state, provincial or national trade association in the decentralized wastewater industry. This time we learn about a leader in the Maryland Onsite Wastewater Professionals Association.



Eddie Harrison

Business: BAT Onsite LLC, Mount Airy, Maryland

Age: 57

Years in the industry: 35

What we do:

We service automated onsite systems including Maryland's BAT (Best Available Technology), drip, mound and other automated systems, concentrating on residential systems and commercial systems under 3,000 gpd. We check and clean filters, screens, aerators and distribution networks; maintain and repair control systems; and respond to alarm calls.

Association involvement:

I've been a MOWPA member since somewhere near the beginning — around 2000. I've been a board member since 2012 and president since 2014.

Benefits of belonging to the association:

The benefit is to be on the front line for any changes or developments in the industry. Our state is going through a lot of regulatory changes, and when you're a member you're able to stay on top of them. We also offer education to keep up with these changes, such as pumper training for ATUs, installer training, property transfer inspection training. Whatever the industry calls for, we try to meet that need with a training course.

Biggest issue facing your association right now:

State politics. Regulations have been thrust upon us that changed our industry and turned the way we operate upside down. Four years ago, the mandatory BAT on all new construction was rolled out with only six months to train, hire and retool to meet the demand, only to have the regulation rolled back three years later with only two months' notice, all because there was a new state administration that felt we didn't need it. Meanwhile, many businesses invested millions of dollars to meet the need, and now all that equipment can be put against the hedgerow to grow weeds. These changes were based on politics and not on science.

Our crew includes:

Jeanette Williams works in the office to keep my books straight, schedule work, and keep me straight. I also have one assistant in the field, Matthew Kidd.

Typical day on the job:

Pretty much every day we're heading in the direction of an alarm call. These automated systems all have alarms, and when the red light's flashing and the buzzer's buzzing, they call me. We go out to the site and repair what we can. I try to carry enough parts to fix most malfunctions. Some systems operate with blowers, some with pumps, and others aerators. It could be a float, relay, clogged pipe, broken pipe. When we're done with the alarm call we catch a couple routine services on the way home to fill the day out.

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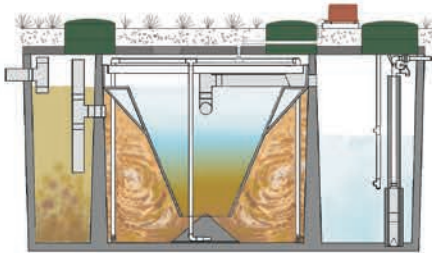
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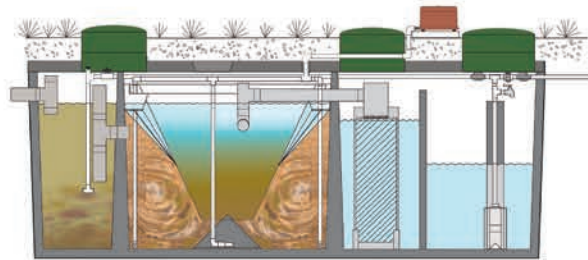
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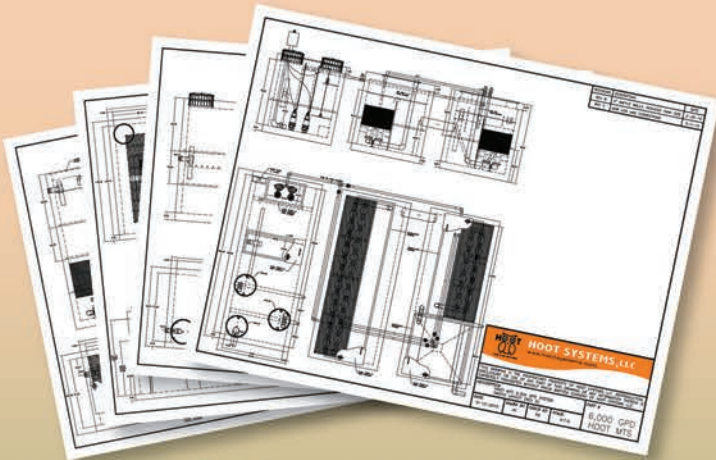
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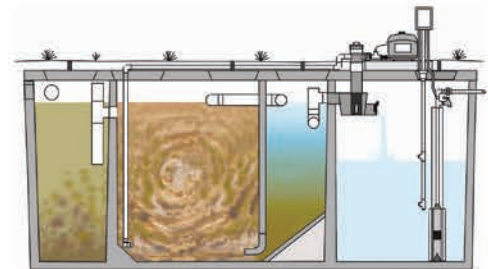


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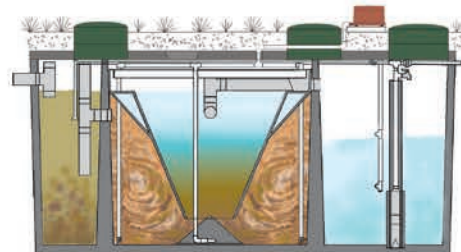


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» Matthew Kidd, Jeanette Williams and Eddie Harrison with company-outfitted Nissan NV2500 service van. (Photos courtesy of Eddie Harrison)

The job I'll never forget:

A homeowner had something installed 20 years ago, a Bio-Microbics pretreatment unit and a Geoflow drip dispersal system, and he did absolutely no service in 20 years. He said it was working fine when it was actually running down over the hill. He had built a shed over the treatment unit, including the blower, to hide the unit, then filled the shed with junk that buried the components. He fenced in the drip dispersal system into a horse paddock. The horses busted up all the headworks and relief valves. He called me because he was selling the property and needed the system certified for property transfer. When he called, he informed me that there was “nothing wrong” with the system and it was “working fine.” It cost him \$7,000 to repair the system that was “working fine.”

My favorite piece of equipment:

I'm happy with my service truck I set up myself. I've been driving it about a year. It's a Nissan NV2500 equipped with an Adrian Steel shelf package. I had an 1,800-watt inverter with ship-to-shore hookup installed that allows me to leave my chargers working when the truck is parked for the night. This also allows me to plug in an electric heater during those cold winter nights and keep my water tank from freezing. The 100-gallon aluminum water tank with a 12-volt pump allows me to clean filters and other parts at the site where pressurized water access is limited. I had the tank manufactured at a local welding shop with my design, and installed and plumbed it myself. I couldn't find an upfitter to do it. I also added insulation and plywood walls to help hold in the heat in winter and hold out the heat in summer. I recently had it painted with some awesome graphics from a local graphic artist, Jack of Arts.

Most challenging site I've worked on:

The house was on a hill off the street. There was a steep bank in front of the house and about 20 feet from the porch to the crest. On the left side of the front yard was a steep bank down to the driveway. On the right side, there was about 40 feet to the property line with a large tree in the middle of the side yard. I had to put a trench across the front of the house and a tank in the right-side yard. I had to dig the whole system backward. All of the materials in and spoils out had to go through that right-side yard and through the backyard. I had to pull all the dirt to me and then throw it up the hill. I had to dump the stone in the front of the trench and then straddle the ditch and throw the stone to the back of the trench, then set the tank. I did this all with a John Deere 510B with extendable dipper stick.



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

A customer had a frog in their second-story toilet. They tried to tell me there was something wrong with the septic tank that let the frog in. Of note, they had three boys between the ages of 6 and 11.

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

I wish the politicians and government appointees would call on our organization and bring us to the table before they make changes, not after. The tendency is they bring us to the table after they have made up their minds just to tell us about it. We can voice any complaints we want but the decision's already been made. We have a good rapport with the agency supervisors (permanent employees). They come to our meetings and work with us to improve the onsite industry, from the private side to the public side. But they can only work within the parameters their higher-ups set. I feel we have a good group of public and private sector representatives that participate with us.

Best piece of small-business advice I've heard:

It was from my dad — treat every customer with the utmost respect.

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

Be doing construction of some kind.

Crystal ball time — this is my outlook for the wastewater industry:

I think that the wastewater industry is getting much more automated and much more technical. So, in the future we'll see more and more demand for more technically trained individuals. □

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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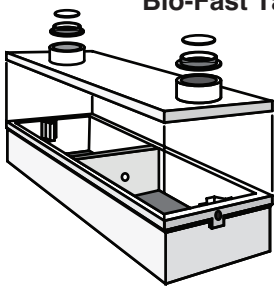
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Advanced Treatment Units

By Craig Mandli

DISINFECTION

Jet Inc. Illumi-Jet UV Disinfection Unit

The Illumi-Jet UV Disinfection Unit from Jet Inc. is capable of reducing fecal coliform bacteria levels to well below the most stringent U.S. treatment standards. It uses a germicidal lamp that emits 95 percent of the ultraviolet energy at the wavelength of 254 nanometers. This wavelength is in the region of maximum germicidal effectiveness and is lethal to virus, bacteria, protozoa and mold. The disinfection chamber couples directly to any system's 4-inch discharge pipe, and is permanently installed below grade. When fully inserted, the lamp housing is correctly positioned by an integrated keyway near the top of the disinfection chamber and creates a well-defined flow path, ensuring system effluent has the proper ultraviolet exposure time. Under standard operating conditions, fecal coliform reduction exceeds 99.9 percent. 800/321-6960; www.jetincorp.com.



Salcor 3G UV Wastewater Disinfection Unit

The 3G UV Wastewater Disinfection Unit from Salcor protects health, environment and property by inactivating pathogens, including deadly superbugs such as MRSA and Ebola. It can be used in residential, commercial and municipal environments, and is UL-certified NEMA 6P flood-proof (30 days underwater) and NSF Standard 40/Washington State Fecal Coliform Reduction Protocol six-month tested (with 21 upstream treatment systems). Rated at 9,000 gpd gravity flow, it is being used as a building block for large water recovery/reuse systems. When installed in 12-unit parallel/series arrays with ABS pipe fittings, systems are disinfecting over 100,000 gpd. Gravity flow equalizes without distribution boxes. Identical modular units increase plant reliability, reducing the need for spare parts and facilitating plant expansion. Units include a foul-resistant Teflon lamp covering, two-year long-life lamp, easy installation, minimal annual maintenance, and use less than 30 watts of power. 760/731-0745.



Scienco/FAST SciCHLOR

The SciCHLOR sodium hypochlorite generator system with multi-pass SciCELL electrochemical activation technology from Scienco/FAST can produce an available supply of disinfectant solution. It is available in sizes



of 10 to 60 pounds chlorine equivalent per day to provide a reliable method of safely producing liquid chlorine for medium to large on-site disinfection applications, while surpassing operational efficiency performance requirements, according to the manufacturer. Connected to an incoming water source and with operating modes of batch, continuous, clean, setup and diagnostic, the brine solution multi-passes through a low-voltage DC electrolytic cell to produce the sodium hypochlorite. When it reaches the low-level float setpoint, the system automatically restarts to replenish its water supply. If no solution is used, the system shuts down to save power. With an 800 ppm FAC sample taken from the generator, the solution killed 100 percent of the *Staphylococcus aureus* and *E. coli* organisms within 30 seconds, according to the maker. 866/652-4539; www.sciencofast.com.

ENGINEERED WETLANDS

Clarus Environmental Z-Cell

The Z-Cell from Clarus Environmental is a high-performance wetland designed for use in decentralized wastewater treatment applications where the effluent quality must meet or exceed secondary treatment standards. It can be used in residential, commercial or small community applications for treating residential-strength septic tank effluent. It is a timed-dose, pumped system and the wastewater has a 36-inch vertical path to an outlet pipe below the wetland's surface. By moving water vertically, the fluid must pass through the plant root zone. During the growing season, evapotranspiration through plant leaves reduces the hydraulic load to downstream components. 502/778-2731; www.clarusenvironmental.com.



NITROGEN REDUCTION SYSTEMS



Anua PuraSys SBR

The PuraSys sequencing batch reactor from Anua batches treatment in cycles, including aerobic and anaerobic steps, to clean water and reduce total nitrogen. It allows nitrification and denitrification to occur in the same chamber, saving space.

The smart controls adjust aeration for varying flows, eliminating excessive air that can lead to system failure through sludge bulking. Flexible tank configurations include the retrofit of existing tanks. The system can reduce BOD5 and TSS to less than 10 mg/L and provide greater than 50 percent total nitrogen reduction, according to the manufacturer. It can be scaled up for commercial applications. 336/547-9338; www.anuainternational.com.

Bio-Microbics MicroFAST

MicroFAST wastewater treatment systems from Bio-Microbics are recommended for individual, small community and commercial applications. With a small footprint, the system is integrated into a standard septic tank and does not require additional space. It is designed for low maintenance. Alternate modes of operation include recirculation of nitrified wastewater to the primary settling chamber for denitrification and (with the SFR feature) intermittent operation of the blower to reduce electricity usage and improve nitrogen performance in specific situations. 800/753-3278; www.biomicrobics.com.



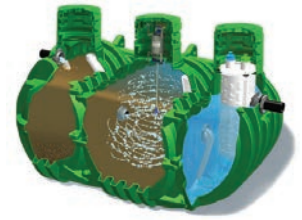
Orenco Systems AdvanTex AX20-RTUV

The AdvanTex AX20-RTUV treatment system from Orenco Systems is a self-contained module that treats typical septic tank effluent to better than secondary standards, with nitrogen reduction and ultraviolet disinfection. It's designed for homes with up to four bedrooms and is suited for small sites with poor soils or that require shallow bury. It helps protect surface waters and aquifers and is an effective solution for areas that have strict discharge limits. In a performance evaluation of 35 systems between 2005 and 2013, AdvanTex received the highest overall ranking for nitrogen reduction, process stability and low energy use (OSET NTP Performance Ranking, Water New Zealand, Nov. 2014). It is installed following a septic tank equipped with Biotube effluent filters. The unit eliminates the need for separate recirculation, treatment, discharge and disinfection tanks and basins, and reduces the number of risers and lids needed in the treatment train. 800/348-9843; www.orenco.com.



Norweco Singulair TNT

The Singulair TNT (Total Nitrogen Treatment) system from Norweco reduces total nitrogen by more than 68 percent. Certified performance data from NSF International verifies that the average effluent produced by the system contains 7 mg/L nitrate, 12 mg/L total nitrogen, 4 mg/L CBOD5 and 9 mg/L TSS. It offers flow equalization, effluent filtration and low electrical usage. Designed for easy installation, operation and maintenance, the system minimizes effluent nitrogen concentrations, without requiring effluent recirculation or the addition of dangerous chemicals. All treatment is accomplished within the tank. It is a reliable treatment method for nutrient reduction in onsite treatment and disposal systems, and complies with the most stringent regulations. 800/667-9326; www.norweco.com.



Premier Tech Aqua Ecoflo Biofilter

The Ecoflo Biofilter from Premier Tech Aqua is offered as a nitrogen-reducing unit, thanks to an add-on kit comprised of a pressurized flow divider that recirculates a fraction of the water back to the primary tank, and a simple control panel that manages the dosing pump cycles and monitors all records. It is available in ready-to-use rotomolded shells or as a kit to be integrated into existing tanks. The system uses a natural and compostable coco husk-based filtering media capable of sustaining high hydraulic load rates, according to the manufacturer, which says it is an ecological, high-performance and low-maintenance septic system. The system is NSF-245 certified. 717/479-0005; www.premiertechaqua.com.



SeptiTech STAAR

STAAR residential trickling filter systems from SeptiTech are NSF/ANSI Standard 40, Class I and NSF/ANSI Standard 245 (nitrogen removal) certified. The clean effluent prevents biomat formation and leachfield clogging. They are compatible with shallow drip, direct discharge, pressure distribution, spray irrigation and conventional leachfields. Utilizing an enhanced, biological, unsaturated media filter process, they are ETV-U.S. Environmental Protection Agency verified. With an optional UV disinfection system, the systems are designed for direct discharge or water reuse and engineered to fit most typical small-flow residential and commercial applications. 800/318-7967; www.septitech.com. □



CASE STUDIES

Rocky coastal properties present system challenges

Problem: Given local setback rules and challenging soil limitations on the rocky coast of Maine, many homeowners found themselves with over-board discharge units for the disposal of their wastewater.

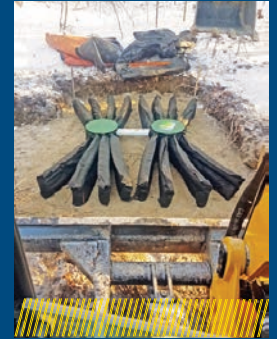


Solution: Fuji Clean USA systems have been a primary mechanism used in replacing these systems, and many of these properties are now able to adequately treat wastewater when they previously had no options. The Fuji Clean systems require a small footprint, no advanced septic tank requirement and reduced drainfield size due to the quality of effluent.

Result: According to Fuji Clean USA, the treatment systems are energy-efficient, environmentally friendly and have proven successful on coastal Maine properties. 207/406-2927; www.fujicleanusa.com.

New system allows for sale of property

Problem: The existing system at a residence in the town of Freedom, New Hampshire, was declared failed during a home inspection and in need of repair to sell the home. Installed more than 30 years ago, the system had a steel tank undersized for the current regulations for a three-bedroom home. A stream runs through the property, near the home, and wetlands are on the other side of road, making it difficult to meet the township's setback requirements.



Solution: A variance was needed from the town to submit the redesign to the state, allowing for minimum setbacks from the tank and leachfield. In addition to the setback variances, the limited area called for use of an EnviroFin system, a combined treatment and dispersal system from Presby Environmental. The steel tank was pumped and filled, and an EnviroFin system was installed.

Result: The EnviroFin system was successfully installed, allowing the sale to be completed. 800/473-5298; www.presbyeco.com.

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Trickling filters installed at campgrounds with site limitations

Problem: In the popular lake district of Whiteshell Provincial Park, eastern Manitoba, White Lake and Brereton Lake campgrounds required sewage treatment due to high water table and bedrock limitations.



Solution: The low-maintenance process designed by J.R. Cousins Consultants included septic tanks, Waterloo Biofilter absorbent trickle filters and UV disinfection. Phosphorus removal was required at Brereton for discharge into the surrounding high water table. To service the design flow of 27,738 gpd, or equivalence of 50 to 60 houses, pods of EC-P electrodes were clustered inside septic tanks. Phosphorus is removed as iron compounds in the aerobic trickling filters after the EC-P.

Result: In the first two years at Bereton Campground, effluent averaged cBOD less than 4 mg/L, TSS less than 4 mg/L, TP of 1.2 mg/L, and geometric mean E. coli less than 17 cfu/100 mL. Control panel electrical problems caused TP removal variations, with TP removal averaging greater than 88 percent compared to White Lake. White Lake Campground averaged cBOD of less than 3.8 mg/L, TSS less than 2.3 mg/L, TP of 10.4 mg/L, and E. coli less than 3.1 cfu/100 mL. 519/856-0757; www.waterloo-biofilter.com. □

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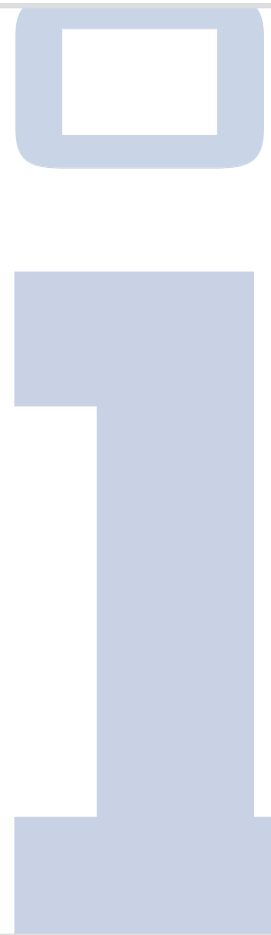
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PRODUCT NEWS

Franklin Electric's SubMonitor Connect

Franklin Electric's SubMonitor Connect electronic motor protector provides three-phase protection and enhanced troubleshooting proficiency. Featuring the FE Connect app, the SubMonitor Connect offers real date- and time-stamped system monitoring to improve troubleshooting while protecting three-phase systems from 1 to 700 hp, or those that require up to 1,000 amps. It protects against damage due to a variety of adverse conditions, such as low-flow wells, clogging, bound pumps, over/under power and voltage protection, voltage phase loss and unbalance, locked rotor, cycle fault and ground fault. 260/824-2900; www.franklinwater.com. □



INDUSTRY NEWS

SJE-Rhombus awarded the 2017 ESOP Company of the Year award

SJE-Rhombus was named the 2017 Employee Stock Ownership Plan Company of the Year at the annual ESOP Association Conference in Washington, D.C. Founded in 1975, the company has nearly 500 employees and eight locations globally.

Felling Trailers' employees earn CWI certifications

Ben Myhre, a welding trainer for Felling Trailers' Weld Training Center, and Kyle Wald, vice president of engineering for Felling, obtained their certified welding inspector certifications through the American Welding Society. The two will create a set of Felling Trailers certified weld standards implemented throughout the company. □

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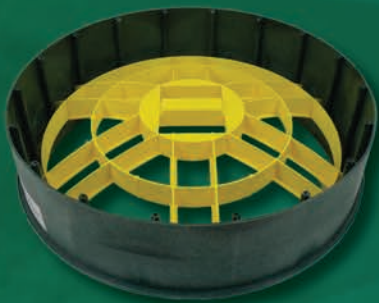
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