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ON THE COVER: Luke (left) and Jerry Snyder, of JerNan Septic & Rainwater Solutions, in Waco, Texas, have added water conservation planning and septic pumping to the family company's onsite installing expertise. They are shown during a pause in the action at a work site, with their Cat backhoe. (Photo by Jimmy Alford)

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- **System Profile:** Postage stamp lot, effective treatment

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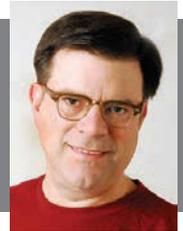
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Turning New Ground

At the start of the busy 2015 construction season, there's plenty of reason for optimism in the onsite industry

By Jim Kneiszal



April is a time of awakening for installers in many regions of the U.S. and Canada. Earth-moving equipment is being tuned up and readied for a busy construction season. For many installers, the project schedule is growing as builders and homeowners confirm orders for new construction and necessary upgrades of older systems.

As soon as the ground is adequately dry, installers working in northern climates will start putting in those sunup-to-sundown workdays that drain the energy and replenish the bank account. It's time to start bringing in the dollars after a climate-caused lull in many areas.

If communities take a responsible, measured approach to the best way to extend wastewater treatment to suburban and exurban areas, I'm convinced the role of decentralized systems will only be strengthened in the coming years.

I recently saw a letter to the editor in a small Virginia newspaper with a message that buoyed my hopes for continued growth in the onsite industry. It added to my optimism for both the upcoming season and the long-term outlook. The words of the writer, a small-town resident, validate the work of the installing community and show we're on the right track promoting quality decentralized wastewater treatment.

THINK SEPTIC FIRST

Opposing the annexation of property and the potential for expansion of a municipal sewer system in an area generally declining in growth, the writer implored local officials to consider the important role played by septic systems. He warned that potential high costs for a centralized sewer system in such a population demographic could discourage residential and economic development.

The writer said onsite systems have proven to be a compelling option for economical wastewater treatment in many situations, and beyond that, they are often a superior choice for the environment. He argued this is particularly true in his area in the Chesapeake Bay watershed.

"As long as much of the county is on septic systems, the effluent from those systems serves to recharge the aquifer and maintain our water supply," he wrote. "If sewage is diverted to a central treatment facility and the discharge pumped into the bay ... our aquifer does not get recharged and we may eventually run out of water."

This is a perceptive analysis of the wastewater treatment options for a dot on the map in Virginia, but we could come to the same conclusion in communities across North America. Sure, you're never going to get away from the Big Pipe sewage systems in major cities where sewers appear to be the best choice for treating wastewater. But it's equally true that many communities shouldn't jump to the conclusion that large-scale municipal sewers are the best answer.

And I think there has been a slow and widespread shift in attitude about the role of municipal sewers and decentralized wastewater treatment. With advances in onsite treatment technologies – and greater acceptance from state and county regulators – cities, towns and counties aren't as quick to make the choice to build new treatment plants and lay pipe.

POISED FOR PROGRESS

Every new year brings additional onsite solutions for systems on smaller lots, in poorer soils and built nearer to sensitive wetlands areas. At the same time, more installers are being trained to work with these technologies and feel empowered to suggest them under the right circumstances. Access to these technologies and qualified installers are opening up properties to development that would have had to lay fallow 10 or 20 years ago.

So yes, the onsite industry – its manufacturers, designers and field technicians – is playing a significant role in developing and maintaining infrastructure and driving economic growth. And if communities take a responsible, measured approach to the best way to extend wastewater treatment to suburban and exurban areas, I'm convinced the role of decentralized systems will only be strengthened in the coming years.

The U.S. Environmental Protection Agency, through its Memorandum of Understanding partnership with numerous wastewater trade groups and other entities, reflects a wider acceptance of decentralized wastewater treatment. These interested parties are confirming that private, individual and small-scale cluster treatment systems can be viewed as permanent wastewater solutions.

There's evidence that changing ideas about regional planning and

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conservation of natural resources open the door to more creative approaches to wastewater treatment. An emphasis on population density is clearly defining the patterns of municipal sewer expansion. And where sewers are thought to be too expensive to build and maintain, onsite systems are going to take hold. At the same time, a movement to reduce water usage has been successful, backing up the benefit of onsite systems in recharging groundwater supplies.

SEIZE THE DAY

In addition to more widespread acceptance of decentralized systems comes the need to upgrade older systems that are becoming more outdated every year. Just like the EPA is recognizing a strong role for new onsite technologies, federal and state agencies have a well-founded concern about identifying systems that are failing and causing pollution. Initiatives like time-of-sale inspections and mandatory septic tank pumping intervals will uncover more poorly functioning systems, and the installing community will be there to make necessary updates or put new systems in the ground.

All the indicators point to a bright future for the onsite industry. With proper training, adequate consumer education and marketing of your services, installers should be flush with work for years to come. Now get out there and start digging!

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AN ALTERNATE SOLUTION

Large-Scale Systems

An Alabama installer discusses his success with large-scale wastewater treatment systems. If big systems aren't your specialty, here's a look at some options to get your foot in the large-scale-treatment-installation door. onsiteinstaller.com/featured

DESIGN TIPS

More on Mounds

Still worried that mound design is a little tricky? Here's more from the mound series from onsite expert Jim Anderson. For sand bed size and more, we've got the answers here. onsiteinstaller.com/featured



JUGGLING ACT

Software Assistance

Running a small business is very much like juggling. You have to coordinate so many activities and so much information, all at the same time. Lucky for you, there are several types of business-management software that can help you out. Look at some recommendations here. onsiteinstaller.com/featured

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CISTERN ACT

Installer Luke Snyder adds water conservation technologies to his family's onsite business to promote sustainability for homeowners in the drought-stricken Southwest

By Scottie Dayton

As drought conditions deepened in recent years in the Southwest, Texas onsite installer Luke Snyder saw an opportunity to offer an added service to his customers who needed new or replacement wastewater systems. So the director of operations for his family's business specializing in advanced treatment systems lengthened the company name to JerNan Septic & Rainwater Solutions.

"Since aerobic treatment systems reclaim water, capturing runoff from roofs fit right in," says Snyder, who runs the Waco, Texas, company with his parents, Jerry and Nancy Snyder. The concept of rainwater catchment is gaining interest in the drought-stricken region, and many of JerNan's customers are intrigued by a message of sustainability.

Snyder, an accredited rainwater professional and inspection specialist through the American Rainwater Catchment Systems Association (ARCSA), teaches a water conservation/rainwater harvesting course at McLennan Community College. His long-range plan is to grow a full-service business

offering rainwater harvesting, remediation and onsite installations, landscaping, irrigation and drainage consultation, thereby treating each property as an individual watershed.

A FAMILY COMPANY

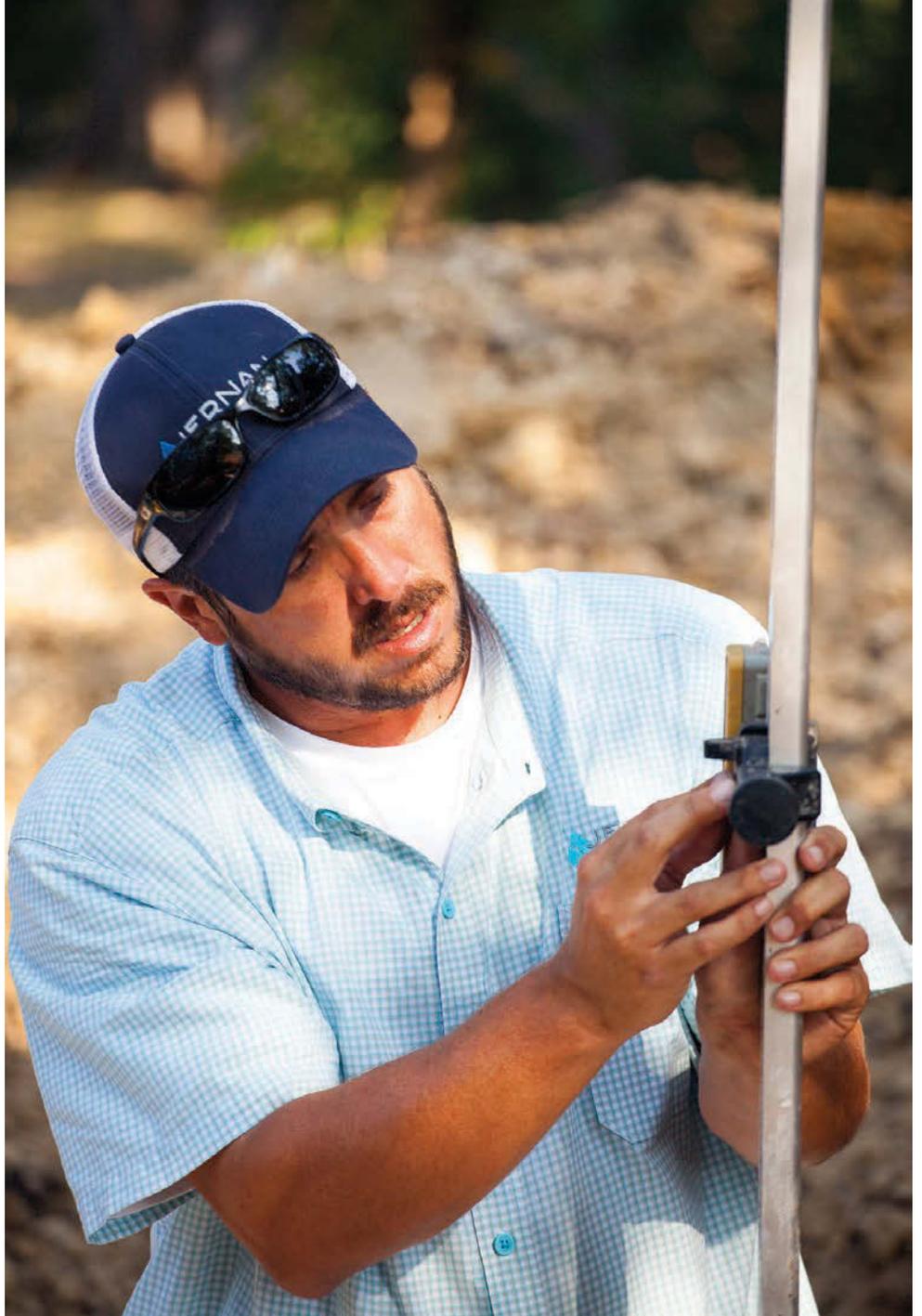
Jerry and Nancy Snyder started the septic business in 1997. Luke, 37, joined his father during breaks from earning associate degrees at McLennan. He studied marketing and public relations at Texas Tech University, leaving in his junior year to help grow the business.

"In 2000, the economy boomed with opportunities for expansion," says Luke Snyder. "Dad focused on communications and sales, and I did most of the labor." Remediation and repair of 500 to 600 gpd residential onsite systems generated 90 percent of the work. Maintaining 15 commercial systems and installing one or two of them each year comprised the remainder.

<< **OPPOSITE PAGE:** The JerNan work crew includes, from left, Justin Nix, Luke Snyder, Jerry Snyder and Nathan Vaughn.

▼ **BELOW:** Crew leader Nathan Vaughn completes some earth-moving work with JerNan's Cat skid-loader.

>> **RIGHT:** Luke Snyder puts the level to a new tank after installation. (Photos by Jimmy Alford)



Jerry Snyder's friend and mentor, Tim Taylor, executive director of the Texas Onsite Wastewater Association, introduced him to aerobic treatment units. Father and son took TOWA courses on the technology, and Luke became a licensed site evaluator. They distributed and installed units from Hydro-Action Industries (Aqua-Drip), Hoot Systems, Consolidated Treatment Systems (Nayadic and Multi-Flo) and Clearstream Wastewater Systems.

By the mid-2000s, however, poor installations, homeowner abuse and scant maintenance had given ATUs a bad reputation. "Lawns stank of sewage when irrigated and high-water alarms inundated us every Saturday afternoon," Luke Snyder recalls.

Fixing systems, including some of their own installs, was an epiphany for the younger Snyder. Much of the work involved replacing laterals from the house to the tank or 5 to 10 feet of supply pipe from the tank outlet.

"The proper bedding of tanks and pipes was never enforced," he says. "When contractors backfilled with excavated heavy clay or rock, the soil's weight caused piping to dip, crack or break. Seeing what happened underground made us better installers. Now we bed and backfill tanks and piping with fine gravel and components don't move."

JerNan Septic & Rainwater Solutions, Waco, Texas



OWNERS:	Jerry and Nancy Snyder
YEARS IN BUSINESS:	18
EMPLOYEES:	6
MARKET AREA:	75-mile radius
SPECIALTY:	Onsite installation, rainwater harvesting, graywater recycling, system maintenance and pumping
AFFILIATIONS:	Texas Onsite Wastewater Association, American Rainwater Catchment Systems Association, Texas Rainwater Catchment Association
WEBSITE:	www.jernan.com



Luke Snyder explains how two 10,000-gallon tanks work in the recent install of a rainwater collection system. Collecting rainwater is becoming popular in drought-stricken Texas.

Code of ethics

As director of operations for JerNan Septic & Rainwater Solutions, Luke Snyder too often sees county inspectors ignore infractions or parts of onsite inspections.

"When government creates and funds an agency such as the Texas Commission on Environmental Quality to write onsite regulations, then I expect those regulations to be enforced evenly and fairly," says Snyder. "Otherwise, some companies take shortcuts, enabling them to substantially undercut my estimates and those of all ethical installers."

Adhering to regulations and doing more for customers than required by the state's minimum standards allow Snyder to sleep at night.

"Historically cheap and lazy septic installers are partly responsible for the industry's bad reputation," he says. "I'm trying to reverse that stigma one person at a time."

ADDING A VACUUM TRUCK

By 2006, a service board full of repair work demanded prompt pumpouts. The family bought a used International truck with 2,200-gallon steel tank and Wallenstein pump from Mid Continent Truck Sales. Jerry Snyder, 66, climbed behind the wheel and A+ pumping service rolled out. He was quick to educate homeowners about needed repairs or potential problems.

His conversations usually caused the phone to ring at JerNan Septic, a 2,500-square-foot shop with two bays and an office on the family's 12 acres. It's also home to a 416D and a 416E backhoe and a 236B skid-loader, all from Caterpillar.

Remediations and repairs remain the family's bread and butter, but they averaged only 20 to 25 per year from 2008 to 2013, and commercial accounts evaporated. "We were more about survival than anything else," says Luke Snyder. "The business created by the pump truck is probably what carried us through the depression."

To battle a market driven by the lowest price tag, Snyder focuses on educating homeowners about system efficiency and recommends an ATU with flow equalization and drip irrigation. "Value may be one of the most overused and misused terms in marketing and pricing today," he says. "The real essence of value revolves around the tradeoff between the benefits customers receive from a product and the price they pay for it."

ACCURATE ESTIMATES

When called for estimates, Snyder never gives blanket prices. He visits every property, taking notes on site constraints, tree locations and family size. "It's common to find six to eight people living in a 1,600-square-foot house rated for 240 gpd, but they're generating 400 gpd," he says.

Snyder analyzes the family's October through March water bills, a time when they aren't filling swimming pools or irrigating. Daily consumption often averages 240 gpd. "Once people understand hydraulic flow, they realize why we upsize systems to 500 gallons or more per day," he says.

His presentations also explain why a system failed, what the repairs entail and how they will affect homeowners. "If I can give them that information, I usually close the sale," he says. "If they hesitate, my biggest sales tool is my proposal."

The three- to four-page estimates list brands, model numbers, how components work, where they will go and options with itemized prices. Another section lists components that surpass the state's minimum standards and Snyder installs to ensure a quality system. Using only Schedule 40 PVC pipe instead of SDR 21 pipe, the minimal, is one example and a hands-on sales tool.

After squeezing a length of thin-wall pipe out of round with his hands, Snyder lets homeowners hold it and a piece of Schedule 40 pipe in the other. It's obvious



Jerry Snyder oversees work during an installation.

to them which one is superior. Other educational tools are photographs of minimal versus quality components in installs and visiting similar installations. “Most clients are anxious to show off their systems, and their enthusiasm instills confidence,” says Snyder.

HAPPY CUSTOMERS

Proposals arrive with a cover letter thanking homeowners for the opportunity to serve them and drawing attention to notes in the estimate. “Our concern is always for the customers,” says Snyder. “It’s important to us

“Value may be one of the most overused and misused terms in marketing and pricing today. The real essence of value revolves around the tradeoff between the benefits customers receive from a product and the price they pay for it.”

Luke Snyder

that they buy the best system available, not the cheapest. The letter emphasizes that the information provided will help them make an educated decision regardless of which installer they choose.”

Snyder’s sales approach has had the desired effect. Satisfied customers tell their friends, which leads to calls requesting site evaluations instead of prices. However, state code mandates that aerobic systems have maintenance agreements. As people rejected the technology due to the annual service fee, Snyder diversified to conventional systems with low-pressure dosing, some 30 to 40 percent of remediations.

In 2014, he remediated 40 to 50 residential systems, and new construction accounted for up to 10 percent of business. “The company is growing, with up to seven employees at times,” says Snyder.

In 2008, Snyder diversified again by adding Rainwater Solutions to the company name. A typical rainwater system diverts runoff from the roof through underground piping to storage for potable or nonpotable use. Galvanized steel, bladder-lined storage tanks average 10,000 to 12,000 gallons, but range from 5,000 to 35,000 gallons depending on the job.

CATCHING RAIN

Snyder is an ARCSA accredited rainwater professional and rainwater harvesting inspector specialist for real estate transactions. He is also qualifying for the Rainwater Harvesting Master endorsement, the installation standard for such systems. It was created by the American National Standards Institute, American Society of Plumbing Engineers and ARCSA.

Most rainwater customers are affluent with homes in rural communities lacking water distribution systems. Drilling wells is more expensive than installing rainwater technology. Typical installations include screened gutters and downspouts with stainless steel screens that must be cleaned after the season’s first two rains.

Then a first flush device diverts a percentage of the first water of a storm to the ground, to a drainage network or to a dedicated irrigation tank. The system eliminates bird droppings and other materials on the roof from contaminating the storage and conveyance piping.

A 150-micron screen at the storage tank inlet catches particulates. Potable systems have a 20-micron filter, 5-micron filter, granular activated carbon filters to remove impurities affecting taste, and a UV disinfection system on the downstream side.

JerNan’s service board includes a full-use rainwater system for a house



The JerNan crew guides a septic tank for a Clearstream Wastewater Systems unit into place during an installation.

that will use city water as backup, and a system for a ranch with a brackish well for backup. “We’re working with a water quality specialist who will oversize filtration and treatment to accommodate the well water,” says Snyder.

While irrigating lawns with recycled graywater sounds appealing, Snyder believes regulations make it impractical for most residential situations. He suggests people install an ATU to handle all the water instead of two separate systems discharging to drip irrigation.

“Our concern is always for the customers. It’s important to us that they buy the best system available, not the cheapest.”

Luke Snyder

Snyder’s deepest concern is the effort required by homeowners to remain compliant. Laundry is the greatest challenge because the code prohibits water used to wash diapers or clothing contaminated with human excreta from entering the graywater system. “That means using the bypass system,” says Snyder. “Furthermore, if the graywater system is not in use, all the flow must divert to the onsite system or sewer.”

Snyder says graywater recycling is more practical for sewered properties and in some commercial applications. “I left graywater in my marketing strategy to open conversations with people who are interested in it,” he says. “So far, every system has been cost prohibitive.”

FINISHING TOUCHES

Besides educating people about systems, regulations and options, Snyder seeks to distinguish the company by making things perfect for customers. From compassionate communications to putting a level on a control panel and mounting it true to horizontal, he stresses to his workers to strive for perfection.

“When we leave a property, it’s ready for sodding,” says Snyder. “Homeowners don’t have to first clean up behind us. Our approach is to look for what caused the problem rather than address the symptoms. We never replace entire systems when replacing 4 feet of supply line at the septic tank outlet is the solution. The greatest gifts we give our customers are comfort and time in their lives.” □

MORE INFO:

Caterpillar, Inc.
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Jim Anderson, Ph.D., and David Gustafson, P.E., are connected with the University of Minnesota onsite wastewater treatment education program. David is extension onsite sewage treatment educator. Jim is former director of the university's Water Resources Center and is now an emeritus professor, as well as education program coordinator for the National Association of Wastewater Technicians. Readers are welcome to submit questions or article suggestions to Jim and David. Write to ander045@umn.edu.

The Ups and Downs of Site Evaluation

Identifying ideal slope characteristics can mean the difference between a chronically troublesome onsite system or one that works flawlessly

By Jim Anderson and David Gustafson

We have discussed specific soil characteristics – texture, structure, consistence and color – and how they affect soil treatment and system design. However, other surface features of the site and the surrounding area should be observed. These include the percent and direction of slope at the proposed site, vegetation types, presence of disturbed areas, flooding potential and geomorphic description.

After lot boundaries have been established, a site evaluator should make observations about the site to rule out areas that are obviously unsuitable. A quick check of the vegetation and topography can identify areas of wet soils, bedrock outcrops, steep slopes and drainage ways. The soil treatment area can then be located to avoid these areas.

If the installer is not the person performing the site evaluation, he or she should check these same features before beginning the installation. Potential problems should be discussed with the site evaluator and designer before proceeding to make sure these issues have been taken into consideration.

AN UPHILL BATTLE

The most basic slope observations are the percent and direction of slope. In addition, some other slope properties can be important. These include slope complexity, configuration, aspect and length. Slope will affect where the soil treatment area can be installed, the movement of water internally, amount of runoff, soil slippage, erosion potential, machinery use, and the occurrence and state of soil water.

Slope percentage across a site is determined by dividing the amount of vertical rise – or change in elevation – by the horizontal distance, called the run, and then multiplying the answer by 100. For example, what is the slope where there is a vertical rise of 6 feet in a run of 100 feet? It is simply 6 divided by 100 x 100, which provides a slope of 6 percent.

There are several ways to determine the slope. If surveying equipment was used during site evaluation, a benchmark is set; elevations, distances and contours are determined and provided on the plan given to the installer. Slope can be determined by determining elevation differences and the distance across the site. A word of caution: Other upslope areas from the system site should be evaluated to determine if there are run-on concerns that may not have been identified in the site evaluation and design. Additional water over the system can cause failure by “flooding” the system or create problems due to erosion and deposition.

Short of conducting additional surveying, the installer can use an abney hand level or a clinometer to determine slope directly. This allows a quick check of plan parameters and evaluation of other potential slope problems. For the abney hand level, the installer looks through a cross hairs on an object such as a surveying rod and moves a slide to level a bubble in the

A site evaluator should make observations about the site to rule out areas that are obviously unsuitable.

A quick check of the vegetation and topography can identify areas of wet soils, bedrock outcrops, steep slopes and drainage ways.

cross hairs. Slope is read directly off a scale on the level. Using a simple hand level without the scale, working with another person holding a rod, the installer can take a series of measurements at significant slope breaks on the site, determine the elevation difference between points and measure the horizontal difference between points, then calculate the slope as described above.

MORE TOOLS

A clinometer is also a hand-held device. An installer holds the instrument and looks through a lens alongside the housing. A horizontal line appears. Raising or lowering the clinometer, the line is placed at eye level on an object such as a surveying rod that is either upslope or downslope. The number closest to the sight line is the slope. This can be used by a single person to determine the slope directly.

In the old days, installers would use a 10-foot two-by-four, placing one end on the ground upslope, put a carpenter's level on the board, make sure the bubble was level and measure the distance the other end of the board was above the ground, and then calculate the slope. This works, but it only provides the slope over a 10-foot distance. It may not be representative of a longer slope and landscape conditions that are important to the site. So one of the other methods should be used.

When installing the soil treatment trenches on sites with significant slopes – anything over 1 percent – the bottoms of the trench should be level

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and on the contour. Contours are lines of equal elevation. The contour followed should be flagged for the excavation. This can ensure that the proper line is followed and separation is maintained. Identify any problems across the site with swales or drainage ways.

The bottoms of the trenches need to maintain proper separation distance between the trench bottom and any limiting soil layers. As the slope becomes steeper, equipment needs come into the picture. Wheeled backhoes can self-level on slopes using stabilizers. With tracked equipment, it may be necessary to create a bench if there is sufficient soil depth over the limiting layer. Most codes also have some restrictions relative to the maximum slope for installation of treatment trenches. And one last note: As slope increases, safety becomes more of a concern. Appropriate measures should be taken to ensure operator safety. □

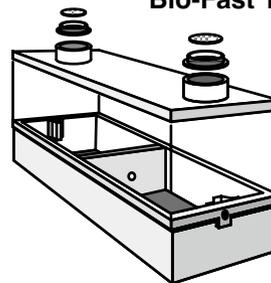
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Plugging In For Performance

If you're towing equipment or racking up big miles heading to the job site, an engine tuner may give your work trucks a modest power boost and a few more miles per gallon

By Ed Wodalski

Can an engine tuner (chip, module or programmer) improve the performance of your diesel pickup truck? The short answer is “yes,” but a longer explanation is in order.

While manufacturers of aftermarket performance products claim tuners can add 3-4 mpg, the actual savings, if any, largely depends on how and where you drive. By definition, performance products are designed to increase engine output. For example, a plug-and-play Juice Attitude CS programmer from Edge is purported to add 150 hp and 360 ft-lbs of torque (not recommended for stock vehicles) to a Dodge Ram 2500 with a 6.7L Cummins engine.

That's sweet for smoking Corvettes off the line, but it won't save you money at the pump. In fact, the added horsepower can make it difficult to keep your foot off the pedal, leading to increased engine wear and stress on your transmission and drivetrain. Simply put – you risk shortening the lifespan of your truck, voiding the manufacturer's warranty and the likelihood of being pulled over by the highway patrol.

On the other hand, if you tow heavy equipment, climb hilly terrain or travel long distances, an engine tuner could be your best friend.

CUSTOM PERFORMANCE

To make sure you're on your best behavior, manufacturers such as Edge and Bully Dog provide a Mileage Coach to help you gauge, monitor and conserve fuel consumption.

Bully Dog also makes digital watchdog gauges for Caterpillar, Cummins, Detroit, Mercedes and Paccar engines that include speed limiter adjustments, diagnostic reader and driving coach, as well



The beauty of an engine tuner is it enables you to customize your truck – from towing to off-road racing, often by toggling a switch or touching a GPS-like screen.

as an ECM tuner that includes economy tuning, economy/power tuning and custom tuning. Designed for fleet owners, the ECM tuner for Caterpillar promises a 15 to 18 percent power increase and 6 to 12 percent gains in fuel mileage.

The beauty of an engine tuner is it enables you to customize your truck – from towing to off-road racing, often by toggling a switch or tapping a touch screen.

The Edge Juice, for example, lets you choose from six on-the-fly power levels (25 hp, 70 ft-lbs; 40 hp, 90 ft-lbs; 50 hp, 120 ft-lbs; 65 hp, 160 ft-lbs; 80 hp, 200 ft-lbs; and 150 hp, 360 ft-lbs), as well as a stock (level 0) setting when needed. It comes with a 4.3-inch touch screen with optional backup camera capability for easy trailer hookup.

(continued)



Most engine tuners plug into your vehicle's onboard diagnostics port under the driver's side of the dash. (Photos by Ed Wodalski)

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ABOVE: The tuner's monitor easily mounts to the windshield.
RIGHT: Jason Maki, owner of K & S Service Center in Weston, Wisconsin, has a tuner in his 2014 Dodge Ram 2500 with 6.7L engine, primarily for added economy.



Another plug-and-play product, the Stryker Injector Duration module by TS Performance promises up to an additional 135 hp and 200 ft-lbs of torque and gains of 3-4 mpg.

As the name implies, engine tuners adjust your vehicle's computer settings, such as injection timing, fuel/rail pressure and injector pulse width for optimal performance.

Depending on the bells and whistles you choose, engine tuners can range in price from an average of about \$350 to several thousand dollars for Class 8 truck versions.

"Us brick-and-mortar businesses have a hard time beating the prices, but what we like to do is have people come into us so we can help educate them so they can get into the product they need."

Jason Maki

THE GOOD AND THE BAD

Jason Maki, owner of K & S Service Center in Weston, Wisconsin, carries a full line of diesel engine performance products, including Edge, Bully Dog and H & S Performance.

"All of them do different things," he says. "You get a little better performance, a little better efficiency and a little better economy. And that's what most people are looking for.

"Back in the late '90s, early 2000s, diesel performance was really a huge market," Maki says. "Guys with just a programmer or a module or chip could get 50, 80, 100, 140 horses out of their pickup. But when you get up to those higher horsepower levels, you've got issues.

"For the guys just looking for economy, you usually don't see a problem, but for the guys who want big power, you end up needing to do extra work on the engine and transmission."

Maki says stricter emission standards, such as the use of urea and diesel particulate filters, have decreased the demand for performance products in

recent years, even though today's tuners are compatible with modern diesel emission systems. Keep in mind, though, that removing an emission system is illegal, unless for off-road use.

Maki has an engine tuner in his 2014 Dodge Ram 2500 with 6.7L engine, primarily for added economy, and says even with today's stricter emission standards, performance programmers can add a few miles per gallon and about 50 hp.

Still, with today's lower fuel prices, is it really worth spending \$350 for a slight gain in fuel economy?

BENEFITS TO SOME DRIVERS

"It depends what you're doing," he says. "If you're just running around town, probably not. But if you put some miles on, if you're traveling for work, then these devices can help you. If you gain 2 mpg and you're putting 500,000 miles on, it definitely adds up."

A Cummins dealer, Maki advises truck owners that installing an engine tuner could void the manufacturer's warranty.

"We let them make that choice," he says. "But once they're out of warranty, the sky's the limit."

Most engine tuners plug into the vehicle's onboard diagnostics port under the driver's side of the dash and have a cable that can be run up the door seal to a window-mounted monitor. Installation takes about 15 minutes.

Tuners can be used for engine diagnostics, performance testing and speedometer calibration when changing tire size. They're also updatable over the Internet.

When shopping for an engine tuner, Maki recommends talking to a local dealer before purchasing online.

"You can find these all over the Internet, of course," he says. "Us brick-and-mortar businesses have a hard time beating the prices, but what we like to do is have people come into us so we can help educate them so they can get into the product they need: What are you trying to do with this truck? Are you doing towing? Are you looking for economy? And if they ever have issues, we're here to answer questions. That's something you won't always find on the Internet." □



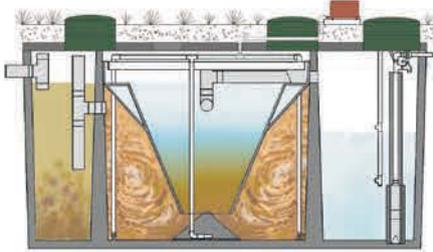
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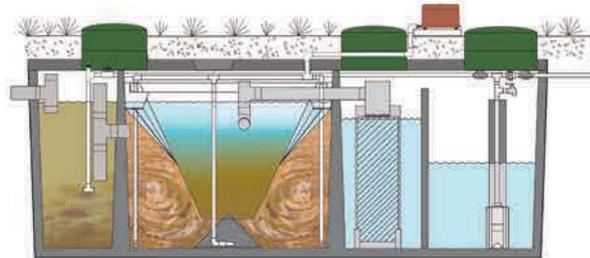
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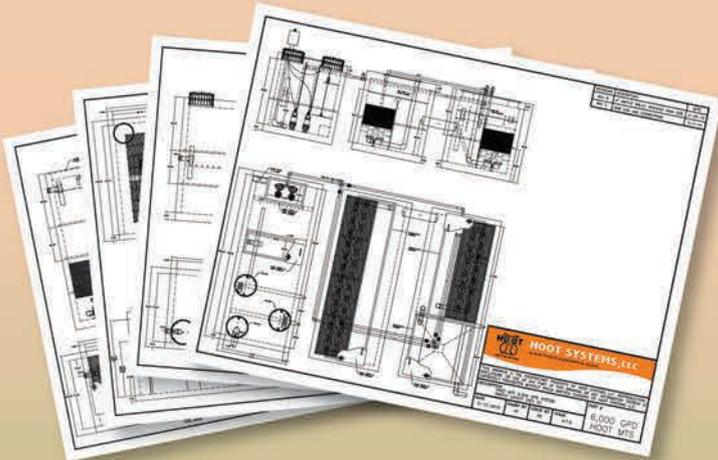
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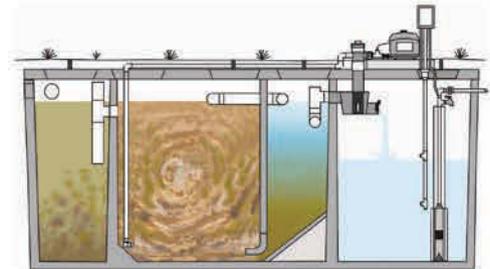


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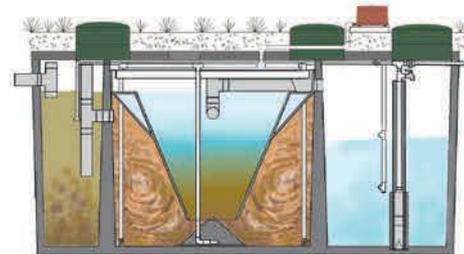


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	BioBarrier	500 to 160,000+	2009	The advanced membrane technology offers the highest quality effluent possible on the market. The BioBarrier was the first system to be approved for water reuse (NSF/ANSI Std. 350, class R) by NSF International. BioBarrier's unique operation sequence and low-foul, durable, flat-sheet membranes require no complicated backwash functionality. The pre-engineered, completely automated, modular MBR ships installation-ready and fits easily into both new and existing tank configurations. The immersed membrane technology utilized in the BioBarrier MBR and HSMBR System allows for installation into a smaller footprint with both above or below ground tank options. Also available in a winery wastewater system.	
Clarus Environmental Products 3649 Cane Run Rd. Louisville, KY 40211 800-928-7867 info@zoeller.com www.clarusenvironmental.com See ad page 27	Z-Cell High Performance Wetland	450 to 36,000+	2001	The Z-Cell technology can be used in residential, commercial, or small community applications for treating residential strength septic tank effluent. The Z-Cell is a timed dose system and the wastewater has a 36" vertical path to an outlet pipe below the wetland's surface. By moving water vertically, the fluid must pass through the horizontally oriented plant root zone. This eliminates short circuiting, an issue common in conventional constructed wetlands. During the growing season, evapotranspiration through plant leaves reduces the hydraulic load to downstream components. Produces better than secondary quality effluent.	Contact Manufacturer
	Recirculating Media Filters	450 to 36,000+	2001	Designed for use in residential, commercial, or small community applications for treating residential strength wastewater from a septic tank. Treatment occurs below grade as the fluid trickles down through the pore spaces of the media where aerobic organisms feed on the nutrients. Effluent leaves the system through an outlet pipe in the bottom of the filter. Multiple RMFs can be used together when greater capacities are needed. Effluent can be discharged above or below grade. Above grade disposal must meet local health codes or guidelines. Produces better than secondary quality effluent.	Contact Manufacturer
	Fusion	450 to 800	2006	Drop-in wastewater treatment units that use anaerobic and aerobic zones to produce secondary quality effluent. The "drop-in" system is easy to install and maintain. Filter media are never removed or replaced. Key operating features include the constant recirculation of treated wastewater and a twice-daily automatic backwash cycle that returns residual sludge to the head of the system. A quiet, programmable compressor delivers oxygen to aerobic zones, while consuming as little energy as a 65-watt light bulb. The Fusion's unique design enables it to be installed without a pretreatment tank, making it ideal for use on sites where space is limited.	AL, AR, CA, IN, KY, MI, MN, MO, NM, NY, OH, TX, VA, WA, WI, WV
Delta Environmental Products 8263 Florida Blvd. Denham Springs, LA 70726 800-219-9183 225-665-6162 Fax: 225-664-9467 www.deltaenvironmental.com 	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.	IL, LA, MS, TX
Ecological Tanks Inc. 2247 Hwy 151 N Downsview, LA 71234 800-277-8179 318-644-0397 Fax: 318-644-7257 aquasafe@bayou.com www.etiaquasafe.com	AS500L-C 4 + 75	500 to 600	2007	Ecological Tanks has expanded on their Aqua Safe® product line with the AS500L-C 4 + 75 concrete ATU. This all-in-one unit is a 500gpd unit which includes a 400 gal pre-treatment tank along with a 750 gal pump tank. This unit is shorter than the original Aqua Safe unit with a 54" inlet height. Also, the AS500L-C 4 + 75 has multiple access openings for concrete or poly risers which allow for easy access into the system for maintenance. The AS500L-C 4 + 75 units far surpass state effluent standards which are approved in over 25 states.	AL, AR, BWI, CA, FL, GA, HI, IL, IA, KS, LA, MS, MO, NM, NY, OH, OK, PA, SC, SD, TX, VA, WV

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Ecological Tanks Inc. - cont 2247 Hwy 151 N Downsville, LA 71234 800-277-8179 318-644-0397 Fax: 318-644-7257 aquasafe@bayou.com www.etiaquasafe.com	AA500-35NR / AS600 +NR	500 to 600	2009	Other additions to the Ecological Tanks product line are the Aqua Safe model AS600+4NR and the Aqua Aire model AA500-35NR. Both of these plants have successfully completed testing for NSF Standards 40 and 245. Standard 245 certifies that the listed plants have achieved at least 50% reduction in total nitrogen. A copy of the official listings for these plants can be obtained on the NSF website (www.nsf.org).	
Eliminite, Inc. PO Box 359 Begrade, MT 59714 888-406-2289 406-581-1613 info@eliminite.com www.eliminite.com	Eliminite Grizzly	1,500 to 50,000	2008	The Eliminite Grizzly system is designed for large-scale, high-volume, high-strength commercial and industrial applications in locations where daily operation and maintenance may not be available. The Grizzly system was invented in Montana where winters are long, temperatures routinely drop below 0F for extended periods, and seasonal use patterns/dramatic fluctuations in flow and wastewater strength are the norm rather than the exception. The Grizzly is designed to operate independently and achieves advanced Nitrogen reduction with little outside support; its resilience against upsets and clogging and its aggressive treatment approach can be used in challenging commercial applications	US
Eljen Corporation 125 McKee St. East Hartford, CT 06108 800-444-1359 Fax: 860-610-0427 info@eljen.com www.eljen.com See ad page 25 	GSF Geotextile Sand Filter System	Variable	1983	The Eljen GSF (Geotextile Sand Filter) product line is an advanced wastewater treatment and dispersal technology. The Eljen GSF's unique design provides treatment and dispersal in the same footprint while keeping installations easy and maintenance minimal. Independent testing has shown that the Eljen GSF's performance is compliant with NSF/ANSI Standard 40 and provides advanced treatment of septic tank effluent to better than secondary levels.	US and Europe
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 7 	CE5	450 to 2,700		Fuji Clean's CE technology averages 50,000 systems being installed annually. 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, excellent treatment (95% BOD and TS 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 (MAC "R") introduces oxygen aerobic chambers and powers internal air lift pumps, which manage sludge return and discharge of clean effluent.	Most States
	CEN5	450 to 1,680		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 phosphorus reduction option is also available with this system.	
Hoot Systems, LLC 2885 Highway 14 E Lake Charles, LA 70607 888-878-4668 337-474-2804 Fax: 337-477-7904 questions@hootsystems.com www.hootsystems.com See ad page 21 	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.	AL, AZ, CA, CO, FL, KS, LA, MA, MD, MN, NJ, OH, OK, PA, TX, VA, WI
	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 percent 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 574-276-9681 pete@hydro-action.com www.hydro-action.com See ad page 19 	AP Series and LP Series	500, 600, 750, 1,000, 1,500	1989	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 Nitrogen Reduction	AN400, AN500	2013		
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 31 	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

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 2	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
	Singulair	500 to 1,500		The Singulair system is the state-of-the-art alternative to a troublesome septic tank for domestic wastewater treatment. Employing the extended aeration process, the Singulair plant provides flow equalization, pretreatment, aeration, clarification, tertiary filtration and optional chemical addition within a single precast concrete tank. Designed for domestic wastewater flows ranging from 500 to 1,500 gpd, performance of the Singulair system is certified by NSF International (Standards 40 and 245) and the Canadian Standards Association.	
	Singulair Green	500 to 1,500		The Singulair Green aerobic treatment system incorporates Norweco's advanced aerobic treatment process into a durable, watertight polyethylene tank. It is ideal for new or retrofit applications and can be installed easily in the most difficult jobsite with just a backhoe. Incorporating patent-pending support ribs and inherently strong arch shape, the durable Singulair Green tank will provide decades of reliable performance. Designed for domestic wastewater flows up to 600 gpd, with treatment performance meeting or exceeding the strictest state and county requirements, Singulair Green is certified by NSF International.	
Orenco Systems, Inc. 814 Airway Ave. Sutherlin, OR 97479 800-348-9843 541-459-4449 Fax: 541-459-3884 www.orencosystems.com 	AdvanTex AX20 Series	500 to 1,000	2001	Orenco's AdvanTex AX20 Treatment Systems are, technically, not "ATU's". AdvanTex is a patented, packed bed filter that uses textile for treatment. Packed bed filters are known for outstanding effluent quality and low maintenance. With a pump that runs only a few minutes an hour, the AX20 uses just pennies of electricity per day. In addition to minimal electric bills, the AX20's low pumping and equipment replacement costs means that the system has very affordable life-cycle costs. AX20s are also easy to operate and maintain. And they require very little space, making them ideal for small sites.	US, Australia, Canada, Europe, Mexico and New Zealand
	AdvanTex AX100	2,500 to 5,000	2002	For a variety of commercial and community properties, Orenco offers the AdvanTex AX100 Treatment System. Not actually an "ATU," the AX100 also features the patented, AdvanTex packed bed filter technology, using highly efficient, lightweight textile for treatment. Packed bed filters are known for outstanding effluent quality, and they perform extremely well with variable flows. The AX100 also boasts low life-cycle costs, including electrical usage that is much less than that of other technologies. And its compact package makes it well suited for small sites. Also available is the AdvanTex AX-Max, a larger, pre-plumbed, "plug & play" version of the AX100.	
	AdvanTex AX-RT Series	500 to 1,250	2010	Technically not an "ATU," Orenco's AdvanTex AX-RT employs a patented, packed bed filter that consistently produces clear, odorless effluent and meets the strictest permit limits. In fact, the Maryland Department of the Environment ranked the AX-RT first in nitrogen-reduction among "Best Available Technology." The AX-RT is also known for low power costs and low operating and maintenance costs. It is a compact, pre-plumbed, "plug & play" system that can be shallowly buried and installed right behind a septic tank — and just as easily. Its simple design fits on the smallest lots and reduces costs for excavation and installation.	
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.premierrtech.com See ad page 8 	Ecoflo	1 to Unlimited (cluster)	1995	Ecoflo is a wastewater treatment system that can be installed in different site conditions. It features a fiberglass, 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 patented 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 ad page 5	Advanced Enviro-Septic	Varies		Advanced Enviro-Septic is the only Passive Treatment and Dispersal product of its kind that has earned third-party certification from NSF Class 1, Cebedeau, and BNQ. AES is designed for residential, commercial and community use, and proven to remove up to 99 percent of wastewater contaminants without use of electricity or replacement media. Advanced Enviro-Septic quickly and naturally establishes an ecosystem that breaks down and digests wastewater contaminants leaving the septic tank. The system discharges highly purified wastewater, preventing groundwater contamination and soil clogging.	US, Africa, Australia, Belgium, Canada, France, New Zealand, Puerto Rico
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 STAAR (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 patented STARR trickling filter systems are designed for direct discharge or water reuse.	Nationwide, Global

MANUFACTURER	BRAND	GPD	RELEASED	DESCRIPTION	DISTRIBUTORS
Waterloo Biofilter Systems Inc. PO Box 400 Rockwood, ON N0B 2K0 Canada 519-856-0757 Fax: 519-856-0759 info@waterloo-biofilter.com www.waterloo-biofilter.com  Waterloo Biofilter Systems Inc.	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 substantial 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 EC-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.	MA, MI, Canada
	Waterloo EC-P	300 to 50,000	2014	The patent-pending Waterloo EC-P permanently removes phosphorus from residential and commercial wastewater streams using electro-chemistry processes. Rather than separate and concentrate P in the septic tank where it must then be pumped out and treated elsewhere, the Waterloo EC-P removes precipitates Fe-P minerals on a filtration medium where they remain highly stable and unavailable to microbes. These small units are ideal for retrofits and new installations, and can be used with advanced treatment units or conventional soil-based beds. The system requires no chemical addition, does not increase sludge production, and uses very little energy. Electrodes typically last for up to 2 years before requiring replacement. With the Waterloo EC-P system, more than 98% of phosphorus is removed before entering groundwater supplies.	

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Design competition seeks new ways to bring wastewater treatment to rural Alaska villages

By Doug Day

The Alaska Department of Environmental Conservation has selected six teams to continue in its Alaska Water and Sewer Challenge. The research and development program is searching for better and more affordable methods for safe drinking water and sewage disposal for rural Alaska. While about 75 percent of the state's small rural villages have running water and sewage systems, around 4,500 homes lack such service. Some communities still use "honey bucket" systems in which toilets collect waste in plastic bags that are disposed of in sewage lagoons.

The teams selected for the next phase are Cowater Alaska, Dowl HKM Alaska, Summit Consulting Services, Tetra Tech, University of Alaska - Anchorage and Lifewater. Each will work with at least two communities from different regions to develop plans, with three selected for funding to develop prototype systems and conduct pilot testing in 2015 and 2016. Those that best meet specific performance criteria will receive additional funding for use and testing in the field. Those that demonstrate sustainable and durable improvements will be refined and deployed using available funding beginning in 2017.

The DEC says using decentralized water and sewer technology would prevent the need for communitywide utilities. "Each home would have its own stand-alone system, at a lower cost than that associated with piped and truck-haul systems," it said in announcing the next step in the program. "Although some of the parts for household-based systems are in use today, all the different pieces that would be needed for a rural Alaska home have not been put together. The challenge will be to accomplish this in a way that is affordable and durable over the long run." There is currently a \$660 million shortfall in funding to provide systems statewide.

Colorado

After discovering several counties had changed their regulations to require NAWT certification for onsite professionals, Colorado Professionals in Onsite Wastewater is offering training for those who need it. At least six counties adopted new regulations in late 2014 that require those who provide operations and maintenance service on high-level onsite treatment systems to have NAWT Operation & Maintenance 1 and 2 certifications. CPOW says the requirement applies to such systems as ATUs, aerators, recirculating filters and disinfection systems. It is working with counties to make sure service providers can continue to serve their customers.

Minnesota

The Minnesota Pollution Control Agency is developing procedures for issuing tickets for subsurface sewage treatment system violations. Legislation passed in 2014 allows the civil citations rather than Administrative Penalty

Orders that have been used in the past. The change is expected to eliminate some legal paperwork and provide more timely handling of cases. Currently, the MPCA has the authority to issue tickets for violations dealing with underground tanks and solid waste. Implementation is planned for the spring of 2015.

In other news, cities and townships in Minnesota will be surveyed to make sure local ordinances have been updated and that municipalities have the resources to conduct their subsurface sewage treatment system programs. Counties were required to update their ordinances to match new state rules by February 2014. Local municipalities with SSTS programs were given through December 2014 to update their ordinances to match county ordinances. Communities were also sent a fact sheet with updated requirements to continue with their SSTS programs. If they can't meet the requirements, the responsibility reverts back to the county.

There were 9,120 onsite systems installed across the state in 2013, according to an annual report from the MPCA. Of those, 8,724 were residential systems.

Type 1 systems (inground trenches and beds, above-ground, at-grades and mounds) accounted for 80 percent of the systems (7,362). Mound systems represented about 43 percent of all installations.

Delaware

The phase-in of new onsite wastewater provisions continues in 2015 in Delaware. Among the regulations that began in January 2014 are time-of-transfer inspections, new inspection protocols and a system to certify homeowners to maintain their own systems.

Regulations that took effect Jan. 1, 2015, include:

- Elimination of cesspools and seepage pits under certain situations.
- Required upgrading of all new and replacement systems within 1,000 feet of the Nanticoke River and Broad Creek as part of the multistate Chesapeake Bay cleanup agreement.
- Statewide performance standards for all innovative and alternative systems.
- Certification of all concrete system components by the Onsite Wastewater Accreditation Program.

Regulations set to begin Jan. 1, 2016, include requiring waste haulers to report septic tank pumpouts and a new license category for construction inspectors.

Wisconsin

Staggering its septic tank reminder notices seems to have worked in Jackson County. Local officials say the number of citations has gone down



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dramatically, from 300 in 2013 to just 40 in 2014. State law requires homeowners to have systems pumped and inspected every three years. The county used to send notices to all system owners in April and gave them until October to complete the work. It now splits the owners into groups and sends notices four times a year, giving homeowners just 45 days to comply. County officials plan to meet with septic pumpers later this year to get feedback and see if other improvements can be made.

Despite improved compliance, the county issued two hefty fines for violations dating back more than two years. At \$25 per day, one property owner was fined \$32,766 and another \$21,146 for failing to pay for past violations.

New York

Suffolk County awarded free septic systems to 19 families in December 2014 as part of a pilot program to reduce nitrogen from onsite systems and improve local water quality. More than 130 residents applied for the septic lottery and had to meet certain requirements to make sure the property qualified for an onsite system. Winners will receive free installation, monitoring and maintenance for five years and had to agree to host tours and inspections of their systems.

Valued at up to \$15,000 each, the systems will be used to test advanced wastewater treatment systems that can be used to reduce pollution on Long Island, an urban area just outside New York City where septic systems are still heavily used; Suffolk County has more than 360,000 homes served by onsite systems. □

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Opening Clogged Arteries

When a Missouri installer dug into a lake home's odorous septic system, he found oddly configured drainlines and 5-gallon buckets used for makeshift distribution boxes

By David Steinkraus

Jon Hancock, owner of Envirotek Systems in Kimberling City, Missouri, had a crew doing some repair work on a residential street at Missouri's Table Rock Lake. A well serving several properties was located a few doors away, and Hancock introduced himself to a homeowner as he searched for the water supply. The homeowner then stopped by to watch Hancock's crew work and asked Hancock to look at his system. It was obvious the system needed attention.

"The first time we pulled into the subdivision we could smell it. So could everyone else," Hancock says. The distribution field was across the street from the lakeside home, and aside from putting out a significant smell, Hancock saw at a glance that one end of the field was very wet. That's where the previous installer had put the distribution buckets – actual 5-gallon buckets with holes cut in the side for pipes to enter. They did a partial job of feeding the laterals. Water traveled only about 20 feet in the 150- to 184-foot-long pipes.

For the drainfield the previous installer used 10-foot lengths of perforated 4-inch pipe surrounded by gravel, but about every 20 feet those stopped and were alternated with sections of N-12 pipe cut in half and installed cut side down and filled with gravel.

"And all the pipe runs we checked, other than the far end, had never received any effluent at all. I tried to reverse engineer his thought process on

SYSTEM PROFILE

Location:	Table Rock Lake near Kimberling City, Missouri
Facility served:	Lakefront home
Designer/installer:	Envirotek Systems, Kimberling City, Missouri
Type of system:	LPP dispersal
Site conditions:	Rocky but loamy topsoil with flint, then rocky clay on top of hard pan
Hydraulic capacity:	720 gpd

that, and I never did come up with a good reason why he did what he did," Hancock says of the previous installer. "His workmanship was good, but he was not up to date on the technology we have available."

<< **Opposite Page:** By opening the drainfield at one end, the crew from Envirotek Systems avoided extensive digging to repair a system at Table Rock Lake in Missouri. At left, notice where the new pressure lines enter existing 4-inch pipe. The gray material is 1/4-inch base rock, also known as buckshot, and is tailings left from cleaning other rock. These tailings are easily distributed with a shovel, provide good bedding for pipes and when packed are almost like concrete. (Photos courtesy of Envirotek Systems)



ABOVE: The finished treatment system shows a low profile. The lake is in the background, and the customer's home is to the left. A Visi-Pump panel built by Envirotek Systems runs the equipment, but a switch allows transition to an older pump if a power failure affects the electronics. Custom Seal-R lids from Brenlin Company are also shown.

RIGHT: The system at Table Rock Lake was on land across the street from the customer's lakefront home. Workers from Envirotek Systems dug holes where necessary to install check valves or thread new pressure lines inside existing laterals. The row of bushes to the left mark the property line.

NEW SYSTEM FROM OLD

In designing the new system, Hancock took advantage of what was already in the ground. It saved his crew labor and saved the customer money.

The home sits below the level of the treatment site. Waste first flows to a grinder pump that pushes it through about 170 feet of 2-inch discharge pipe that rises about 15 feet from the house to the treatment area.

"I tried to reverse engineer his thought process on that, and I never did come up with a good reason why he did what he did. His workmanship was good, but he was not up to date on the technology we have available."

Jon Hancock

The pipe empties into the existing 700-gallon septic tank. It had been formed in the mold for a coffin vault, not uncommon in this area where companies use the same basic mold to expand into another market. The tank is divided into three chambers with the final chamber sloped for return treatment. An air pump had been connected originally but was removed when it quit working.

Hancock did not install a new air pump. The home is occupied only intermittently, and he does not believe an aerobic system is best in such situations because aerobic microbes require a steady supply of food. The





LEFT: Danny Addison from Envirotek Systems pulls up a piece of the halved N-12 pipe that a previous contractor used to fashion chambers.

ABOVE: An assembly of valves and pipes replaced the previous distribution manifold made of 5-gallon plastic buckets. The large green plastic pipes are pump basins for the system.

owner did agree to let the crew add conduit and fittings for future advanced treatment technology if needed.

As it leaves, the tank water flows by gravity through a Zoeller filter and into two pump basins made of 30-inch-diameter, 6-foot-long plastic pipe. A connection at the bottom allows the basins to share a liquid level. One basin contains a new pump built by Envirotek. The other basin retains the customer's old pump. Most of the time the system will function with the Envirotek equipment and electrically operated valves, all powered by a separate electrical service running to the lot that holds the system. But if there is a power failure — and these happen every few years in this part of the country — the customer needs only flip a switch beneath the control panel to bypass the electrically operated valves and use the old pump, which is powered by the service running to his house across the street.

The pumps feed water through 2-inch pressure lines fitted with orifice shields from Sim/Tech. These lines were placed inside the 4-inch pipe and under the split N-12 pipe, and the entire system is controlled by a panel that Envirotek builds, so Hancock can use a touch screen to program in functions he wants and eliminate components that experience taught him are unreliable.

To complete the earthwork, Hancock's crew used a model 214 JCB loader backhoe with four-wheel drive and a telescoping boom that adds about another 4 feet of reach. For the finish work, and because conditions were very

wet, they rented a compact John Deere utility tractor with a three-point hitch to do the finish grading.

LIMITED DIGGING

Reusing much of the old system saved considerable work. New distribution pipes were threaded through the existing 4-inch pipes and N-12 chambers from the ends of the laterals. The crew made holes in specific areas to install new pressure line feeds, return lines, the new pump basins and check valves.

Hancock's crew installed legs on the grinder pump. A local plumber had not done this, and the pump's teeth were chattering against the bottom of its small tank.

A new inlet fitting was created using a PVC sheet anchored to the tank with a Uniseal grommet, and custom vents were built into the riser lids to relieve pressure when the grinder pump pushes waste into the tank. Hancock fabricated a carbon filter for the vent to limit odors. Similar vents are located throughout the system allowing pressure lines to fill faster. When the pump turns off, water in the flush lines drains back to the basins. Because the original laterals were not installed level, Hancock's crew installed check valves to prevent effluent from settling in one end of a lateral and saturating the soil there.

TEST FIRST, THEN INSTALL

To better ensure the upgraded system would work properly, Hancock built a complete mock-up at his shop, including all the changes in elevation.

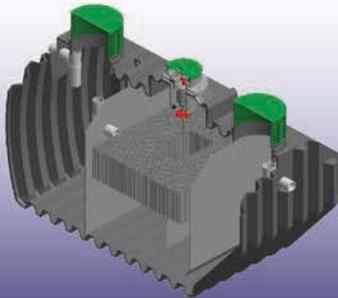
"I have great faith in engineers, but I learned over the years that what I read on paper was not how a system actually performed. After installing and seeing hodgepodge work, and after being an inspector, I realized I had been making a lot of assumptions about how things functioned in the ground."

By testing, he knows whether a pump rated for 50 gpm actually produces 50 gpm under the conditions he plans to use it. Testing allowed his crew to make sure the head heights met minimum requirements when the pump was on. They could time how long it took sections of the laterals to fill and so know how to program pump cycles on the panel.



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“When the owner first approached me, he says, ‘Jon, I’ve had all kinds of plumbers and excavators in here to look at my system. When I learned you were actually a technician, I realized you were the guy I needed to talk to,’” Hancock says.

This customer was not required to fix his system, Hancock says. He could have left it alone, but because he wanted to eliminate odors for his neighbors, and because he wanted to protect the water quality of the nearby lake, he chose to do the responsible thing. The result, according to Hancock, is a well-functioning wastewater system, happy neighbors and the practical use of more of the property. With the odors tamed and the system now almost invisible, the ground above the wastewater system has become a picnic spot for the homeowner’s family and their guests. □

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Riding a Regulations Roller Coaster

Ohio wastewater professionals fight through legislative opposition to advance onsite technology and protect the environment

By Doug Day

The Ohio onsite wastewater industry was stuck in the 1970s for a long time. After several years of work, updated regulations passed in 2007 and breathed new life into the industry. But, unfortunately, the progress was short-lived when advances were quickly rescinded.

Today, the Ohio Onsite Wastewater Association (OOWA) is proceeding cautiously as another set of new rules became effective in January. Association President Karen Mancl is hopeful that the state now has regulations to protect the environment and allow wastewater professionals to use the latest knowledge and technologies.

Mancl, a founding member of OOWA 15 years ago, has served a couple of terms on the board of directors, and in January 2013 became president of the 160-member organization. She is also a professor of food, agricultural and biological engineering at Ohio State University and is its lead researcher in onsite wastewater treatment.

"Some people see management as a cost; we see it as protecting people's investment in their onsite systems. People are really starting to understand that we have to take care of them. We have a lot to look forward to in that and also in implementing new technologies in onsite wastewater treatment."

Karen Mancl

How was OOWA affected by the false start when the 2007 regulations were rescinded?

Mancl: When the rules were moving forward, OOWA membership was taking off. The rules included a continuing education requirement for installers for the first time so people were getting geared up and learning about the new technologies that would be allowed. The certification program for installers and training services were going great guns.

At Ohio State University, we built the University Soil, Environmental, Technology Learning Lab and were packing the house. The building at the learning center had a fire code limit of 40 people, and we were turning them away. We did a lot of field instruction, and you can't teach a group that

Karen Mancl,
president of the Ohio Onsite Wastewater
Association, through www.ohioonsite.org
or 866/843-4429.

OOWA



large, so we divided classes into groups of 10 and had four instructors presenting their material four times.

The bottom dropped out when the rules were rescinded. So did the membership of OOWA and attendance at the learning center. People started dropping classes, didn't renew their memberships; OOWA was in a terrible, terrible situation financially. We lost a lot of money. We tried to keep the learning center active, but the university was losing money so we had to scale back.

It was a very frustrating time. OOWA had to drop our association with NOWRA because we couldn't afford it, and we had to pull back on everything we were doing.

How did this all come about?

Mancl: The original 1977 rules were pretty much state-of-the-art for that time. Individual counties, we have 88 of them, could adopt rules that were stricter, and that's what happened over the years because the state rules were out of date. Essentially, Ohio had 88 sets of rules. Anyone who worked across county lines was faced with very different requirements. It was really burdensome.

The Legislature passed a bill in 2005 to update the 1977 onsite regulations and require statewide uniformity. OOWA was instrumental in getting the legislation passed and had five official representatives on the 40-member State Department of Health advisory committee for the new rules. Several other members were on the committee representing other entities. It was a great opportunity for the industry.

The state always looked to the environmental health community and the university when it came to onsite issues. They might have a few installers on advisory boards, but there was nobody representing the entire industry. Most of our members are installers, and OOWA provides a voice for them. We also have designers, manufacturers, vendors, academics and regulators. We have a few pumpers as well, but they are well represented by the Ohio Waste Haulers Association, and we work well with that group.



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The new rules went into effect Jan. 1, 2007. Unfortunately, there was a legislator in a powerful position who didn't like them who attached a provision in the state budget rescinding the statute and the new rules. The budget was adopted July 1 so all the hard work went away and we reverted back to the 1977 rules.

There was one good thing that remained. The law had provided for a Technical Advisory Committee under the Department of Health and that remained in place. It is appointed by the governor and reviews proposals for new technologies that could not be used under the 1977 rules.

The TAC makes recommendations to the director of health who can issue special device approvals. Since 2007, 13 have been issued covering things like alternative leaching trenches, drip distribution, time-dosed sand filters, low-pressure sand bioreactors, spray irrigation and others. What was exciting for me as a teacher and researcher was that the first one approved in 2007 was mound systems. They were considered an experimental system until then, so now people could use the Ohio State University design manual that we based on research in Wisconsin and Ohio.

At least we had a mechanism to bring new technology forward.

The rest was sent back to square one, so what did you do?

Mancl: About 20 counties had adopted the new rules and kept them. Some went back to what they had before, and there was a group that was kind of in between. At least there was some progress.

We had to get a whole new state statute passed in 2010 and start over with new regulations. OOWA again sat on the advisory committee. The new rules were finally adopted and went into effect Jan. 1, 2015.

Among the provisions are a required site evaluation, vertical separation distances and ways to reduce them, maintenance requirements, bonding for installers, service providers and seepage haulers, structural soundness of tanks and continuing education.

With new rules in place again, we are treading lightly. None of us are ready to jump right in and scale up again. We're looking forward, but we're being very careful. It's an exciting time, but we're nervous about getting burned again. There are still people actively opposing this latest set of new rules.

As a professor and lead researcher in onsite wastewater, what do you see in the future for the industry in Ohio and across the country?

Mancl: These are exciting times, and we have a lot of tools in our toolkit in terms of technologies. We've come a long way. I started in this field in the late '70s and my Ph.D. research at Iowa State was on onsite wastewater management. Some people see management as a cost; we see it as protecting people's investment in their onsite systems. People are really starting to understand that we have to take care of them. We have a lot to look forward to in that and also in implementing new technologies in onsite wastewater treatment here and across the world. □

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Advanced Treatment Units

By Craig Mandli

As the regulations governing septic systems become more stringent, onsite installers are seeing a growing demand for self-contained advanced treatment units. Here are aerobic systems, disinfection products, nitrogen removal systems and recirculating filters to provide a variety of wastewater treatment choices.

AEROBIC SYSTEMS

Clearstream Wastewater Systems

The Clearstream Wastewater Treatment System is an efficient extended aeration sewage treatment plant. This system, through aeration and clarification, provides a proper environment for aerobic bacteria and other microorganisms designed to convert incoming sewage into clear, odorless and organically stable water. Test results taken from applications consistently fall below the U.S. Environmental Protection Agency limits for direct discharge of treated effluent. 800/586-3656; www.clearstreamsystems.com.



Hydro-Action Industries Set-N-Go

The Set-N-Go onsite wastewater treatment unit from Hydro-Action Industries utilizes an activated sludge treatment process that adds oxygen to wastewater where aerobic bacteria metabolize the waste. Then it separates in a clarification chamber without the use of media filters or carbon additives. The three-tank combination operates as a single unit offering pretreatment, aerobic treatment and a pump tank. Systems are available as 72-inch-tall standard and 52-inch-tall low-profile models. They are NSF Standard 40 and 245 Nitrogen Reduction approved with testing results of an average CBOD₅ of 4 mg/L (98.5 percent reduction), TSS 9 mg/L (95.25 percent reduction) and 5.1 mg/L dissolved oxygen. Nitrogen reduction averages less than 10 mg/L TN and 79 percent reduction in total nitrogen removal. 800/370-3749; www.hydro-action.com.



Jet Inc. 1500 Series BAT Media Plant

The 1500 Series BAT Media Plant from Jet Inc. is a natural, organic, chemical-free system that uses natural resources to reduce wastewater to a clear, odorless liquid in 24 hours. Plants are available in seven sizes (500, 600, 750, 800, 1,000, 1,250 and 1,500 gpd), including two plastic (500 and 800 gpd). Plants have been tested to NSF Standard 40 criteria for Class I NSF Listing. In the Biologically Accelerated Treatment process, millions of microorganisms attach themselves to the media. The



aerator supplies the oxygen utilized by the microorganisms to convert waste to colorless, odorless liquid and gas. 800/321-6960; www.jetincorp.com.

Premier Tech Aqua Ecoprocess MBBR

Ecoprocess MBBR wastewater treatment systems from Premier Tech Aqua offer flow rates up to 55,000 gpd. Using Entex Technologies BioPortz media, the system is designed for process reliability and ease of operation, and is suitable for an effluent discharge criteria that must meet at least 20/20 levels in BOD₅ and TSS, and require nitrogen removal. It is available in concrete, steel or rotomolded polyethylene tanks that can be assembled in single reservoirs up to 12,000 gallons. The system can be retrofitted and integrated in multiphase projects. It can be combined with the Ecoprocess Coco Filter polishing unit, a compact, virtually no-maintenance biofiltration process using organic filtering media that treats wastewater without using energy, to reach discharge criteria of below 10/10. 604/346-8199; www.premiertechaqua.com.



Presby Environmental AES System

The Advanced Enviro-Septic (AES) System from Presby Environmental is designed to provide wastewater treatment exceeding the stringent standards of the U.S. and Canadian governments. It does so using an all-natural, passive process that requires no electricity/mechanical devices and no additives, replacement media or special maintenance. It is a multistage effluent treatment system for residential, commercial and community applications. 800/473-5298; www.presbyenvironmental.com.



Quanics Synergy System

The Synergy self-contained mobile wastewater treatment system from Quanics is constructed inside a steel shipping container and includes primary septic treatment, recirculation tank and AeroCell advanced treatment system. Each unit is completely plumbed and wired for easy installation. The current configuration has been designed for arctic conditions and is insulated with wall-mounted heaters. Each is rated to treat and disinfect 2,500 gpd of



domestic strength wastewater. The AeroCell system utilizes an open-cell foam fixed-film media. The Synergy container is mobile for easy shipping or relocation. 877/782-6427; www.quanics.net.

SBR Wastewater Technologies SYBR-AER

The SYBR-AER advanced wastewater treatment system from SBR Wastewater Technologies is based on sequential batch reactor technology, which allows the entire treatment process to happen in a single, locally secured tank. The entire system ships preassembled from the factory and ready for installation. To ensure proper performance, the package includes a preprogrammed control with an internal logic module with battery backup. All components are easily serviceable and utilize quick-release connectors to remove any part for inspection or service. The system is Ansi- and NSF Standard 40-approved and is available in 500, 600, 800, 1,000 and 1,500 gpd systems. 855/391-2448; www.sbrww.com.



SludgeHammer Group S-600

The S-600 aerobic bacterial generator from SludgeHammer Group Limited is certified to NSF/ANSI Standard 40 as an advanced treatment system for residential wastewater. It is engineered for subsurface drip disposal. Other models are listed with IAPMO to restore failed absorption beds. The unit allows introduced microbes to process waste in the septic tank; then the organisms migrate to and remediate clogged leachfields. Complete digestion reduces pumping and creates a healthy, porous biomat. It serves as an alternative to repairing or replacing failed absorption beds. 800/426-3349; www.sludgehammer.net.



DISINFECTION

Salcor 3G UV Wastewater Disinfection Unit

The 3G UV Wastewater Disinfection Unit from Salcor Inc. is designed for use in residential, commercial and municipal applications. It is UL certified NEMA 6P "floodproof," and NSF/Washington State Protocol pathogen six-month tested (with 20 different upstream treatment units). A rating to 9,000 gpd gravity flow makes it a reliable building block for larger water recovery/reuse systems, according to the company. Installed 12-unit parallel/series arrays assembled with ABS pipe fittings are disinfecting systems of more than 100,000 gpd. Gravity flow is equalized without distribution boxes. Identical modular units increase plant reliability and reduce spare parts inventory, facilitating expansion. Each unit has a foul-resistant Teflon lamp covering, two-year lamp, easy installation and minimal annual maintenance. 760/731-0745.



Scienco/FAST SciCHLOR

SciCHLOR sodium hypochlorite generators with multi-pass SciCELL Electro-Chemical Activation technology from Scienco/FAST produce a strong oxidizing solution designed to kill MRSA and *E. coli* organisms



and other harmful pathogens. Connected to an incoming water source (55 to 85 degrees F) and with operating modes of batch, continuous, clean, setup and diagnostic, the system includes brine and chlorine storage tanks, SciCELL unit recirculation pump and control panel. As chlorine is used, water automatically refills the brine tank. If no solution is used, the system shuts down to save power. The unit produces 10, 20, 40 or 60 pounds of chlorine-equivalent solution per day. The 10-pound unit produces about 150 gallons of solution at 8,000 ppm for treating between 800,000 and 900,000 gpd at 1.5 ppm. 866/652-4539; www.sciencofast.com.

PHOSPHORUS REMOVAL SYSTEM

Waterloo EC-P phosphorus removal system

The Waterloo EC-P from Waterloo Biofilter Systems permanently removes phosphorus from residential and commercial wastewater streams using electrochemistry processes. These small units are ideal for both retrofits and new installations at individual homes, and can be used in combination with either advanced treatment units or conventional soil-based septic systems. It is simple to install and operate, and has a smart control panel that is easily configured for the desired level of phosphorus removal. The system requires no chemical addition, does not increase sludge production and uses very little energy. Electrodes typically last for up to two years before requiring replacement. More than 98 percent of phosphorus is removed before entering groundwater supplies. 866/366-4329; www.waterloo-biofilter.com.



NITROGEN REDUCTION SYSTEMS

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. 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. Its biosolids treatment and sludge digestion enable cost-effective treatment with less maintenance. 800/753-3278; www.biomicrobics.com.



Eliminate Commercial C-Series

The Commercial C-Series system from Eliminate is designed to provide reliable treatment results, with specific emphasis on total nitrogen reduction, for high-strength waste applications such as worker camps, RV parks, restaurants, ski and golf resorts, breweries, mines and agricultural operations. It works with local tank manufacturers and contractors to adapt components into locally sourced tanks when possible, minimizing shipping costs and emissions. MetaRocks treatment media are designed to withstand a wide variety of high-strength waste-loading scenarios, particularly where



clogging and odor control are major considerations. The system is fully scalable and may be adapted to suit specific phasing requirements, site constraints and unique demands. 888/406-2289; www.eliminite.com.

Norweco Hydro-Kinetic

The Hydro-Kinetic nitrogen-reducing wastewater treatment system from Norweco uses hydro-kinetic filtration designed to produce effluent results of 2.0 mg/L CBOD, 2.0 mg/L TSS and 7.9 mg/L total nitrogen.



Developed to serve homes and small businesses located beyond city sewer service, the system uses extended aeration and attached growth processes to treat wastewater, and has nitrification-denitrification technology. The system successfully completed back-to-back NSF/ANSI Standard 40 and 245 tests without performing routine maintenance for 12 months. It quietly, efficiently and automatically pretreats, aerates, flow equalizes and filters wastewater, according to the maker. 800/667-9326; www.norweco.com.

Orenco Systems AdvanTex AX20-RTUV

The self-contained AdvanTex AX20-RTUV treatment system from Orenco Systems is designed to treat typical septic tank effluent to better than secondary standards, with nitrogen reduction and ultraviolet disinfection. Its intended application is for homes with up to four bedrooms, and it is suited for small sites with poor soils or those requiring shallow bury. It helps protect surface waters and aquifers and can be an effective solution for areas that have strict discharge limits. 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.

RECIRCULATING FILTERS

Eljen Corporation GSF

The Geotextile Sand Filter advanced wastewater treatment and dispersal system from Eljen Corporation is designed to provide treatment and dispersal in the same footprint, while keeping installations easy and maintenance minimal. Eljen cites independent testing showing its performance is compliant with NSF/ANSI Standard 40 Protocol, and provides advanced treatment of septic tank effluent to better than secondary levels. 800/444-1359; www.eljen.com.



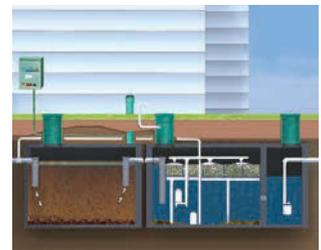
Polylok STEP System

The STEP (Septic Tank Effluent Pump) System from Polylok is designed to draw effluent from the middle layer (clear zone) of the septic tank, filter remaining unwanted solids, then pump the effluent to either a dispersal field or a wastewater treatment system. It installs quickly in a 19- to 23-inch-diameter opening in new or existing concrete or fiberglass tanks. The easy-access dual-compartment design allows the filter cartridge to be removed without pulling the pump or the entire vault. The engineered system includes a polyethylene basin, effluent filter, 1/2 hp high-head turbine effluent pump with 10, 20 (standard) and 30 gpm versions, internal 1 1/4-inch piping and valves, float switches and a control panel. 800/701-3946; www.polylok.com.



SeptiTech STAAR

STAAR filter systems from SeptiTech are designed for a simple, automatic and reliable equalization and clarification process to treat high organic loads. The biological trickling filter maintains low levels of Nitrate-N with all below-grade components that fit in concrete, plastic or fiberglass tanks. Its smart system is designed to recognize situations dealing with peak, low, intermittent or no-flow conditions, allowing the system to go into a sleep mode that dials down activity and eventually shuts all power off until normal flow conditions are detected, leading to lower operating costs and power requirements. It treats 100 to more than 150,000 gpd. 800/318-7967; www.septitech.com. □



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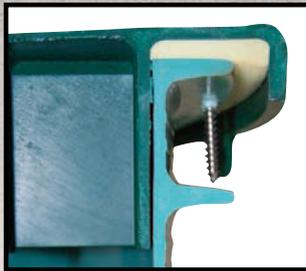
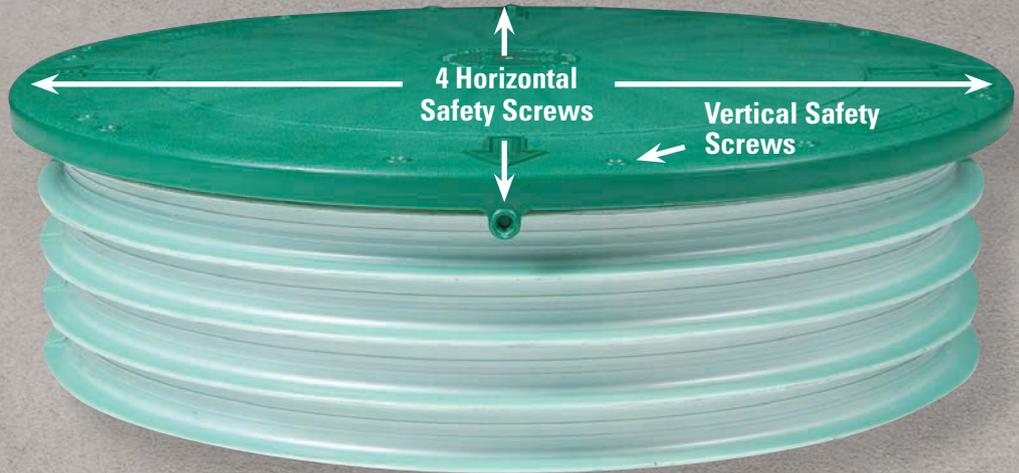
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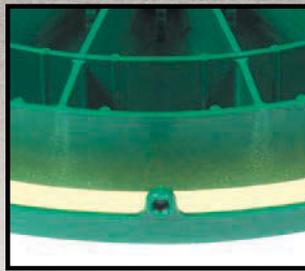
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- Simple to install
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Advanced Treatment Units

By Craig Mandli

System needed to meet stringent standards at remote lodge

Problem: As a result of stringent environmental standards of Manitoba Conservation, the owners of Quesnel Lake Caribou Lodge in Treherne, Manitoba, Canada, needed to upgrade their wastewater system. With no access to a municipal sewer system and no power source available, the system required high efficiency with very low power consumption.

Solution: The first stage of the installation employed the existing ejector system using two Anua Platinum 24 submerged aerated treatment units, along with a 2,000-gallon pump tank. This allowed the use of an ejector for the first season and, by reducing the effluent strength, a temporary license was awarded for that season. The second stage involved erecting a raised mantle portion of the area bed along with 16 Puraflo modules. Allowing less nitrogen and fewer pathogens to enter the environment, the system better protects fish and wildlife.

Result: The two Platinum treatment units reduced the size and quantity of materials required for construction. A sequencing valve ensures the system only pumps to four Puraflo units at a time, reducing cost and complexity. After careful inspection, Manitoba Conservation issued the lodge an environmental license to continue operations. 336/547-9338; www.anuainternational.com.



Wastewater plant meets restrictive environmental standards

Problem: The Bristol Assisted Living facility in Lake Grove, New York, required an advanced onsite wastewater treatment system to meet stringent effluent requirements of Suffolk County on Long Island, and had a short construction deadline of two months.

Solution: The Engel Burman Group and Nelson & Pope Engineers and Surveyors turned to CromaFlow to design and build the wastewater treatment plant for the complex. The 15,000 gpd advanced treatment system consists of three SBR units with denitrification programming, and a sludge-processing unit. The treatment process is controlled by a PLC/HMI control panel with remote operations and monitoring to give the operator greater flexibility. The entire system from date of order to installation and startup was completed in less than six weeks, with Darr Construction handling installation.

Result: This system consistently meets the effluent requirements and total nitrogen requirement of less than 10 mg/L. The advanced control system allows for more efficient system operation and greater ease of use by the operator, Waste Inc., since the data from the system is available online for both the owners and operator to review and monitor. 570/435-5550; www.cromaflowinc.com.



Advanced algal attached-growth technology provides green solution

Problem: The Cincinnati Nature Center in Milford, Ohio, receives over 100,000 visitors per year. In 2011, the facility needed to replace the two aging activated sludge treatment plants with a system that could meet new, more stringent NPDES limits of BOD of 10 mg/L, TSS of 12 mg/L, and NH₃ of 1 mg/L. The system had to be easily expandable to handle increased future flows.



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Solution: The nature center decided to install an **Algaewheel** system from **OneWater**. According to the manufacturer, the advanced algal attached-growth process uses an ecological balance between algae and bacteria to deliver an efficient and robust treatment system that provides a high degree of treatment with minimal power and operator attention.

Result: The nature center reports that the algal system requires only a part-time operator and has reduced energy costs, while continuously handling variable flows. In 2014, the center demonstrated confidence in the system by expanding flow to it by 66 percent without expanding the plant. Effluent limits continue to be met. 317/582-1400; www.onewaterworks.com.

Difficult-to-access subdivision treatment site requires maneuverable commercial Chesapeake Bay standard denitrification system

Problem: During his design of the Shepherd's Cove subdivision, a new housing development along the Potomac River in West Virginia, engineer Jim Hutzell had to find a commercial treatment system capable of handling 6,200 gpd that could meet Chesapeake Bay effluent standards (BOD 5 mg/L; TSS 10 mg/L; and TN 18 mg/L), but was also lightweight, low-profile and maneuverable for placement in a difficult site. Hutzell also wanted a cost-effective technology with a solid track record that used minimal power.



Solution: Hutzell's final design was a cluster of four **Fuji Clean USA** commercial CEN21 denitrification systems, each capable of treating 1,680 gpd. He based his decision on treatment quality, small footprint, profile and weight, low total cost and energy efficiency. The CEN21 produced NSF 40/245 numbers of BOD 5 mg/L, TSS 6 mg/L and TN 10 mg/L, accepting straight septic influent. The dimensions of the CEN21 (15 feet, 4 inches by 6 feet, 6 inches by 7 feet, 3 inches) and weight of 1,543 pounds overcame the site access hurdle. And at 10 cents per kWh, Hutzell calculated a total power cost of \$1.60 per day.

Result: The system was installed and scheduled for commission in March 2015. Each CEN21 unit will be sequentially brought online as flow from the growing housing development mandates. 207/406-2927; www.fujicleanusa.com. □

Water Cannon Honda engine parts

Honda GX engine parts, distributed by Water Cannon, include replacement recoils (available in black and red), mufflers, carburetors and gasket kits. 800/333-9274; www.watercannon.com.



Gateway Safety dual-use goggles

Cyclone dual-use goggles from Gateway Safety feature a polycarbonate lens surrounded by a sturdy vinyl frame. The goggles feature the Whirlwind antifog ventilation system and optional Double-Take inserts provide impact-to-splash protection. 800/822-5347; www.gatewayssafety.com.



Orenco damage-resistant fiberglass lids

Damage-resistant DuraFiber lids from Orenco Systems fit most ribbed PVC and HDPE riser pipes. The 11-pound, 24-inch-diameter non-skid lid (30-inch available) is made of resin-infused, UV-resistant fiberglass fabrics. It has a 20,000-pound breaking strength, flat-style flange for flush-to-grade installation, and cored centering ring for easy alignment and snug fit. Lids are available in standard green and three landscape patterns: grass, river rock and bark. 800/348-9843; www.orenco.com. □



Wieser completes plant expansion

Wieser Form Fabrication completed an 11,000-square-foot expansion of its facility in Menomonie, Wisconsin. The project included a new break-room, offices, updated rest-rooms and the addition of two 10-ton cranes and CNC plasma table. Wieser Brothers of La Crescent, Minnesota, was the general contractor in conjunction with Wieser Concrete Products. □



Extra! Extra!

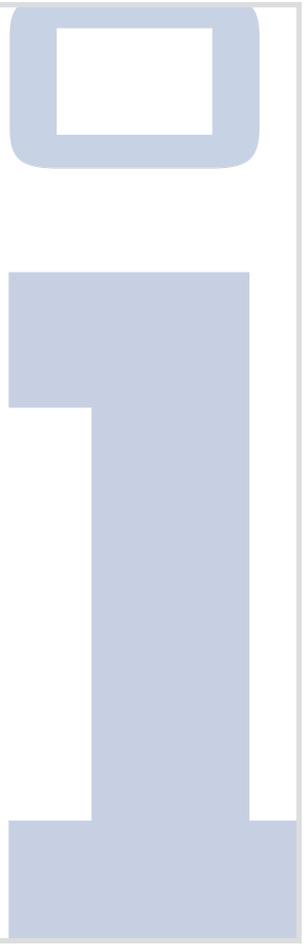
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Maryland

Maryland Onsite Wastewater Professionals Association;
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Massachusetts

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Michigan Onsite Wastewater Recycling Association;
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Michigan Septic Tank Association;
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Ontario Association of Sewage Industry Services;
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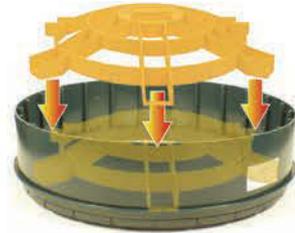


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