

August

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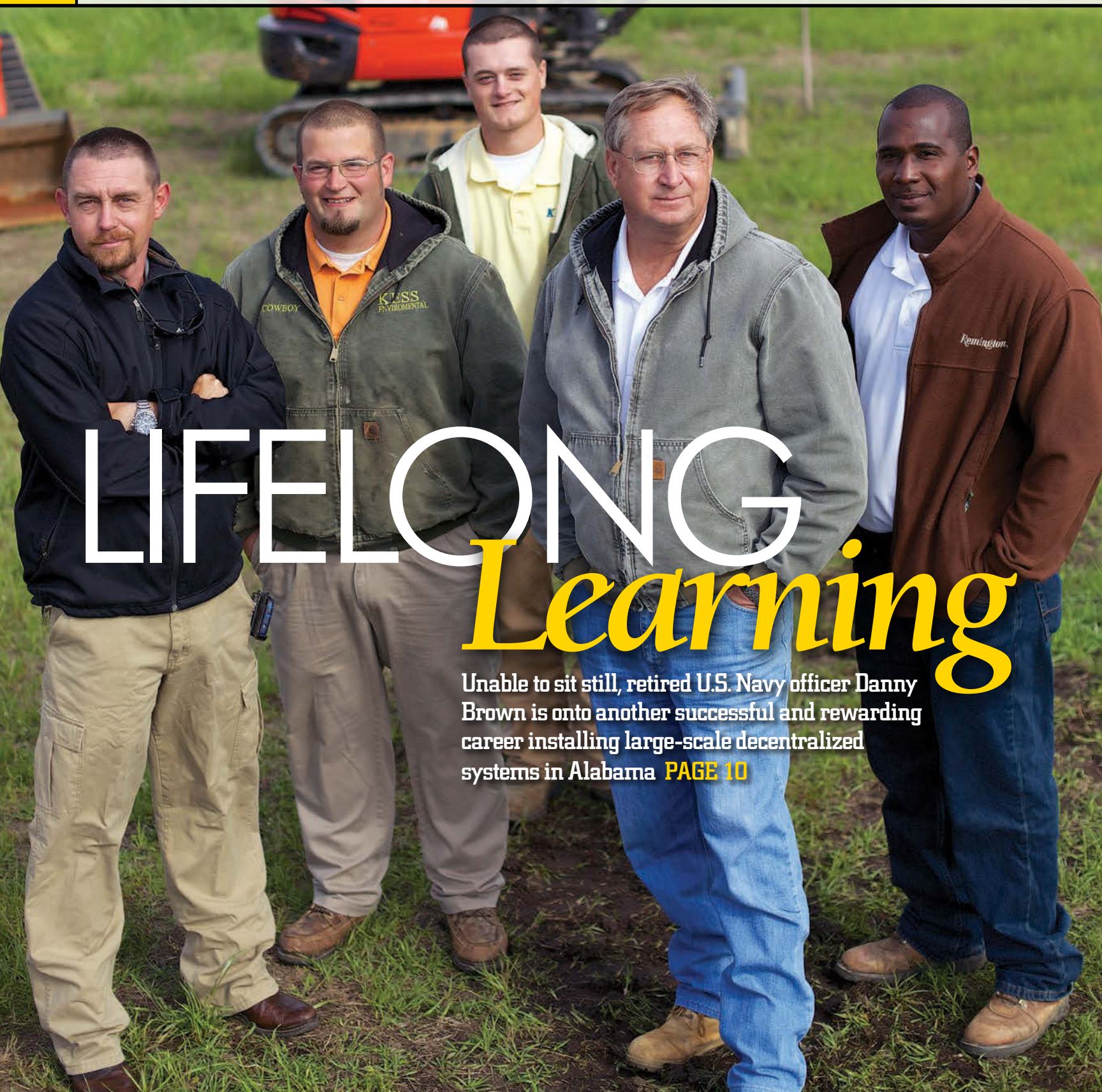
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Winery wastewater  
irrigates grape crop  
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2014



# LIFELONG *Learning*

Unable to sit still, retired U.S. Navy officer Danny Brown is onto another successful and rewarding career installing large-scale decentralized systems in Alabama **PAGE 10**

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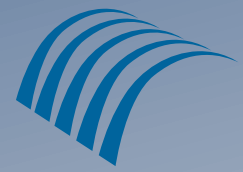


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**ON THE COVER:** Danny Brown (second from right), owner of KESS Environmental Services, is surrounded by key contributors to the Lowdensboro, Ala., installing company. From left are Jonathan Larkin, Matthew Gray, Royce McClellan and Sears Smith. The crew is shown in front of an equipment staging area at a development called The Waters in Pike Road, Ala. (Photo by Jeff and Meggan Haller)

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# Power in the Pixel

With the continuing evolution of the smartphone, you finally have all the capabilities to document your onsite work for future reference

By Jim Kneiszel



I'm going to make a guess about how an important aspect of your onsite system installs has improved dramatically over the past several years: Documentation of the complex process of putting a system together is much easier and better ... and you have the smartphone to thank for that.

Now that you carry a sophisticated mini-computer on your hip every day, it's much easier to show customers or regulators exactly how you connected that drainfield line to the D-box or leveled the septic tank in the hole. Having immediate access to a decent camera and a variety of handy instant-communication tools reduces worry at the work site and your liability months and years down the road in the event that a system fails early.

And at the risk of sounding provocative, I'll say this: If you're still using that aging flip phone rather than upgrading to a feature-rich hand-held device, you're doing your company a disservice. Take it from someone who was a late adopter to this trailblazing small-business technology.

**We enjoy seeing more than the pipes in the ground. We want to show your hard-working crew behind the controls of the equipment, displaying their skills in the field.**

## LATE TO THE GAME

Two years ago, I came kicking and screaming into the age of smartphones. I don't generally think of myself as backward when it comes to technology. I embraced the personal computer long before most because my work required I do so. And over the past decade, I've invested in all of the iDevices, like the iPod, the iPad, the iBook and iMac.

But – and this is difficult to admit as someone who likes to dabble in investments – I didn't understand the appeal of the iPhone when it was introduced. I will forever regret – and be reminded of – selling my small holding of Apple Computer stock before the iPhone sent it rocketing into the stratosphere ... making Apple the richest company in the world.

I've been scratching my head for years over my early disregard of smartphones. How I didn't see the importance of these tools is beyond me. But my own experience has shown my iPhone to be indispensable for many reasons. And I witness how the devices are helping installers every day. How? A picture is worth 1,000 words, as the old saying goes.

If for no other reason, every installer should be carrying a smartphone for its vastly improved photography capabilities. Years ago I would cringe when a contractor mentioned using a cellphone to shoot a photo of something I might want to include in the magazine. Early camera phone images were blurry, grainy and of such poor quality they were useless at showing any details of an install project, to say nothing of producing a photo we could publish and share with readers. Even four to five years ago, these photos provided almost universally poor quality. The cameras on early phones were more of a gimmick than anything.



I shot this photo with my iPhone of some work being done in a local park in my hometown this summer. Photos taken with the latest generation of smartphones can provide quality documentation of your installation work.

But that is no longer true. Phone cameras have improved so dramatically over the past few years, they have rendered the point-and-shoot digital camera nearly obsolete.

### SHOOT, TEXT, DONE

Think of the mental gymnastics you'd have to go through in the past to shoot a photo and transfer it electronically. Going from camera to computer and then sending through email was a challenge most people were ill-equipped to meet. I can recall trying to arrange to receive photos of a wastewater project, and it seemed like designing an advanced system was faster work than sending photos.

Now I'm delighted to say that shooting photos with a phone and getting them to the right destination is a nearly seamless operation. Contractors get fantastic point-and-shoot results, and I can pass photos back and forth for a story almost faster than I can call and explain they're on the way. The images are generally crisp and clear, exposed properly in many lighting situations, and often meet the strict requirements we have for print publication.

I have a qualifier to my praise for smartphone cameras. The images still don't match those taken with a quality digital SLR camera in the hands of a professional photographer ... and they never will. This is why we hire professional shooters to provide photos for our *Contractor Profile* stories and magazine covers. High-end cameras have quality lenses, great low-light and flash performance, and bigger files to show more detail.

But for many purposes – including your project documentation and some of our feature stories – I can now say a smartphone does a great job. I used mine to document a directional boring job when I stopped at a work site last winter. The phone did a great job of capturing the details I needed to show, and the result was a trade publication photo layout shot entirely with my phone.

The list of field tasks you can perform by smartphone is always growing. You want good video of an excavator working in tight quarters? Push a button and it's done. No clipboard and you want to create a voice memo? It's a finger touch away. A machine stops working on the job site? Quickly access your maintenance records to diagnose the problem. You'd like to take instant payment from customers after a repair? Get a credit card reader and improve your cash flow. If you can imagine a need in the field, there's probably an app for that.

### SEND US YOUR PHOTOS

The ease of use and quality performance of today's smartphones makes it a snap to send us photos of your latest challenging install. And we'd love to see them. I'm always on the lookout for our next *System Profile* feature, where we provide a step-by-step glimpse at an interesting onsite project. Because it's not always practical to arrange for a photographer to be on hand for the duration of an install, we typically rely on contractors to provide these images.

Between designers, installers and regulators on the job, we usually have a good variety of photos to work with. The benefit of those involved with the project taking photos is that they know what other *Onsite Installer* readers will want to see. Your keen eye is valuable – we want to document the job the same way you do.

If you want to shoot and send us photos of a recent project, there are a few things to keep in mind. First, we enjoy seeing more than the pipes in the ground. We want to show your hard-working crew behind the controls of the equipment, displaying their skills in the field. We look for a wide range of photos that will document the project from beginning to end. That means capturing everything from the excavator digging trenches to the technician activating the control panel.

If you have more questions about photography or would like to discuss a potential system profile story, please contact me at [editor@onsiteinstaller.com](mailto:editor@onsiteinstaller.com). I'm looking forward to hearing from you!



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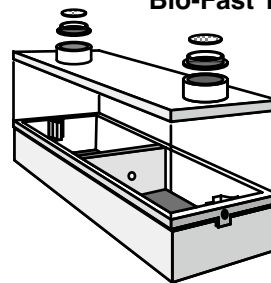
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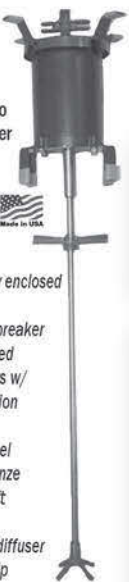


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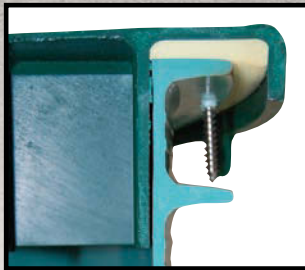
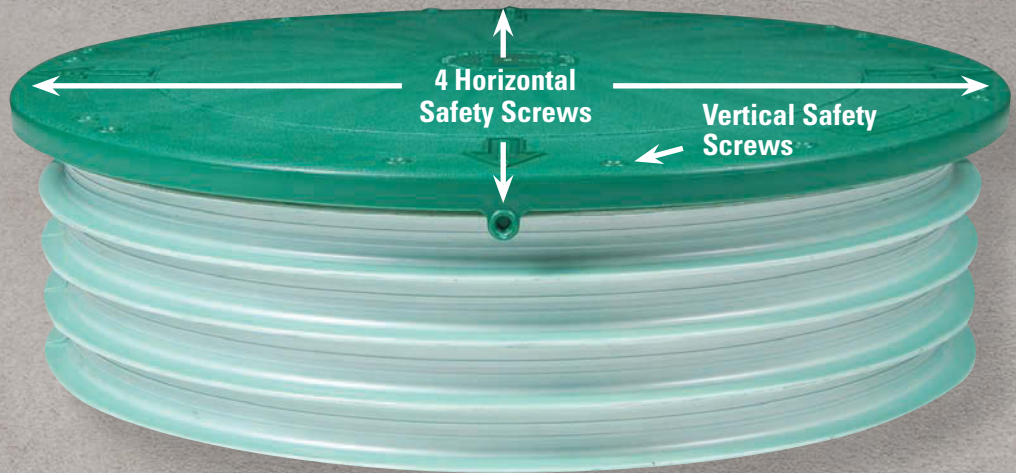
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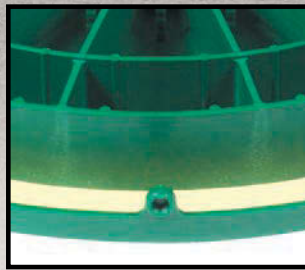
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Danny Brown, left, and Jonathan Larkin are shown with a backdrop of The Waters, a large community development served by KESS Environmental Services. (Photos by Jeff and Meggan Haller)

# LIFELONG Learning

Unable to sit still, retired U.S. Navy officer Danny Brown is onto another successful and rewarding career installing large-scale decentralized systems in Alabama

By Gil Longwell

**D**anny Brown is planning for his third retirement by freely giving away his knowledge. Twice a successful entrepreneur, Brown credits his success to others who have shared their skills and abilities with him.

After retiring from a noteworthy career in the U.S. Navy, where he helped train an astronaut and a space shuttle flight commander, Brown began a new home construction business with his parents and his own family as the first customers. When he could not locate an onsite installer willing to meet his standards, Brown established his first onsite installation business.

“Shortly after retiring from the installation business, former customers approached me. They would not leave me alone. They all wanted me to continue working for them,” says Brown, 59. So he gave up on retirement and formed KESS Environmental Services in Lowdensboro, Ala. From his base 20 miles west of Montgomery and 100 miles south of Birmingham, he serves the entire state, covering a radius of about 400 miles.

### PUSHING FOR QUALITY

Brown admits his profession doesn’t command the respect it deserves. “There is a stigma about working with the systems that manage a much-avoided material,” he explains. “The subject material does not make it OK to cut corners or reduce personal or regulatory standards. I will not lower my price or use inferior components to beat a competitor’s price.

### KESS Environmental Services LLC, Lowdensboro, Ala.



- OWNER:** Danny Brown
- YEARS IN BUSINESS:** 14, KESS was established in 2006
- MARKET AREA:** Alabama
- SERVICES:** Onsite system installation, management, repairs, pumping and inspection
- EMPLOYEES:** 4
- AFFILIATIONS:** Alabama Onsite Wastewater Association

“The regulations set the minimums; however, those minimums do not always meet my standards. For example, I will never use agricultural drainage tile – the black slotted corrugated flexible hose-like material – for distribution laterals.” Brown has encountered the corrugated material in the field, even though it deforms easily during backfill and makes maintaining



Sears Smith removes a cover from an Arkal Filtration Systems filter at a KESS Environmental Services facility for The Waters development.

a grade nearly impossible. Brown uses rigid SDR 35 pipe with 1/2-inch holes at five and seven o'clock.

Shortly after he got into the business, Brown met seasoned installer Dale Mask. "With nothing for him to gain, Dale mentored me. He helped me develop my professionalism and my skills." Like Mask, Brown willingly mentors others in the business – he calls it a "nurturing process" that helps the entire industry.

"I have a responsibility to my industry to improve it by example and by giving away what I have learned," he says, "and release these emerging onsite system professionals to continue their growth."

And growth in professionalism means constant learning through coursework and licensing, he argues.

In the past few years, the regulation of installers in Alabama has become more structured. When regulations started, installers could be grandfathered into any of three license levels. The assumption has been that each higher designation is predicated on raised skill, knowledge and competency levels. But this wasn't actually the case until current regulations went into effect.

"I pushed to require that training and continuing ed programs ensure that the holder of each higher certification brings an expanded set of demonstrated skills to the customer and his job site. This has not always been a popular stance among some installers," Brown says.

## Traveling light

Before the economic downturn of 2008, KESS Environmental Services owned a lot of earth-moving equipment. But that has changed, according to owner Danny Brown.

"In recent years, the market and our work focus has changed from individual single-family homes to the bigger community systems," explains Brown. This change, the cost of a several-hour drive to some job sites, and the need to better manage operating overhead have lead Brown to sell his equipment. "Now, we rent the equipment in the locale where we are working. What we rent is always fully serviced and ready to go."

All of the KESS fleet is less than 5 years old and includes a pair of three-quarter ton pickups, a Kubota KXR rubber tracked excavator, a Kubota ASV 90 tracked loader and a Kubota L5060 front-end loader. Installing tens of thousands of feet of drip tubing per job makes it profitable and appropriate to own a Ditch Witch 5500 vibratory plow.

Besides renting rather than owning equipment, Brown has found another way to manage costs: Material for each job is delivered directly to the job site. This eliminates both the expense of maintaining a storage facility and inventory, and the cost of redelivery from a company stockpile to a job site. These savings can be passed on to the customer or moved to the bottom line.

Sears Smith, left, and Matthew Gray check a suction screen at The Waters in Pike Road, Ala. KESS Environmental Services specializes in maintaining large community wastewater systems designed for as many as 2,500 homes and 2 million gpd flows.

## ADVOCATING FOR NEW TECHNOLOGIES

Brown's experience finding the right system to serve his parents' new home taught him about limited options available to match a site's soil characteristics to a system's capabilities.

"My parents were faced with one option, a raised bed [mound] system which was not the best fit

**"I pushed to require that training and continuing ed programs ensure that the holder of each higher certification brings an expanded set of demonstrated skills to the customer and his job site. This has not always been a popular stance among some installers."**

**Danny Brown**

for their site." For their particular soil, drip irrigation for effluent management was the best alternative. Eventually, working with county regulators and the Alabama Department of Public Health, Brown's goal to obtain the county's approval for drip irrigation was successful. However, this happened only after he installed a raised bed for his parents.

Not a fan of big pipe systems for large new-development neighborhoods, Brown eschews the inter-basin transfers, lack of groundwater recharge and high energy demands that accompany most of these systems. Instead, he prefers to keep the appropriately treated effluent close to its source through the use of drip irrigation as the final stage in the treatment cycle.

"We are installing systems that are designed to eventually serve as many as 2,500 homes," he says. That works out to a 2 million gpd design flow. "Yes, we deliver an effluent clean enough for stream





Jonathan Larkin demonstrates a control panel with Eaton Motor Controllers at a KESS Environmental Services facility for The Waters development.

discharge, but we prefer the immediate benefits of ground water recharge,” he explains.

### **BIG-SYSTEM SPECIALTY**

Brown’s typical big system is not typical in all regions nationwide. Sometimes called a community system, they employ a blend of components owned by both property owners and utilities. These systems can serve townhouses or detached single-family homes, provided each owner has title to sufficient land to contain a solids-separation tank in close proximity to the building. The homeowner owns and has responsibility for interior plumbing and the sewer running to the tank. Beyond that connection, a utility has ownership and maintenance responsibilities.

The customer for these big systems is a corporation sanctioned by the Alabama Public Service Commission. This for-profit corporation performs like a utility in all regards, except the label. These community systems are designed by the customer’s engineer and approved by the appropriate environmental regulator.

“The tanks we install were designed by our customer and incorporate a proprietary effluent filter,” he explains. “This standardization ensures that the owners and service providers have a small and universally applicable set of repair parts to stock and use.

“The client’s designers do their best to let gravity move as much of the effluent as possible through smaller-diameter pipes that are typically 36 to 48 inches below the surface,” says Brown. If there is not enough relief, pumps are used to move the solids-free liquid.

Treatment methods for the collected liquid vary, influenced by built-out design flow, local soil situations and available space. For really big systems,

the designers prefer dual stage lagoons or – as they are called in some areas – waste stabilization ponds. These shallow, man-made impoundments provide passive secondary treatment.

Secondary treatment for fewer than 100 homes is typically achieved through fine aggregate filters that utilize No. 57 or No. 67 washed river-rock-sourced aggregate.

### **WORKS GREAT. WHO PAYS?**

Regardless of the secondary treatment process, the resulting effluent is reintroduced to the soil through 1-inch-diameter Netafim drip irrigation tubing. While the drip field soils dictate linear loading rates, a typical drip zone has about 50,000 linear feet of tubing installed on 5-foot centers.

In addition to groundwater recharge areas, drip fields provide perpetual open space that adds an aesthetic component to the community, a positive benefit that fits Brown’s outlook on natural resource management. “The system that will eventually process 2 million gpd will contribute about 250 acres of green space,” he says.

The large onsite treatment systems Brown installs are often described as innovative and alternate solutions. Likewise, system ownership and maintenance/management, while atypical, are gaining popularity. Not one of the systems KESS has installed has been financed with public dollars or is owned or managed by a governmental unit.

Infrastructure funding is an up-front developer or builder obligation. These costs are recovered through home sales. When completed, each section’s infrastructure is handed off to a government-regulated utility for long-term operation, maintenance and management. The utility bills the homeowner for services delivered.

Owner Danny Brown, second from right, holds a morning tailgate meeting with the crew to talk about the day's workload. The crew includes Jonathan Larkin, Matthew Gray, Royce McClellan and Sears Smith.

**"We are installing systems that are designed to eventually serve as many as 2,500 homes. Yes, we deliver an effluent clean enough for stream discharge, but we prefer the immediate benefits of groundwater recharge."**

**Danny Brown**

"These innovative solutions define the niches in which we have found a comfortable and profitable working environment," Brown says.

**SKILLED HELP, PROFESSIONAL OUTLOOK**

Talented KESS employees are cross-trained for maximum contribution to the company's success, Brown says.

"We are all equipment operators who have gained that distinction by learning and demonstrating our skills in real job site conditions." Brown says he doesn't need to be on site to know the tasks will be handled to his standards.



"Jonathan Larkin, some may say, is over-qualified to install systems because he holds two degrees from Auburn University," says Brown. A forester and horticulturalist with a Level 1 installer's credential, Larkin is set to succeed Brown in an ownership role when the latter retires for the third time. He is the owner in training. The rest of the crew includes crew leader Sears Smith, Matthew Gray and the newest hire, James Cothron.

KESS is a Clearstream and Norweco distributor. That role brings Brown into contact with countless potentially competing installers. "My mentor, Dale Mask, is a Delta distributor. When we met, he saw me as a colleague he could help. That is how I see my so-called competitors too."

Educating employees, subcontractors, suppliers, regulators and customers is essential in Brown's view. No one is immune to or excluded from his drive to bring professionalism and understanding to the industry as a whole.

These approaches illustrate Brown's personal higher standards and philosophies: Simply meeting the regulations is not good enough. Selling products but not fostering professional growth is not good enough. Brown sums it up this way, "My industry deserves the best I can deliver." □

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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](mailto:ander045@umn.edu).

# Do Your Homework

A solid onsite system design starts with an investigation of permit requirements, site limitations and customer usage expectations

By Jim Anderson and David Gustafson

**A** good onsite system design starts with gathering all available information about the site. This usually means a visit to the local health department office. It can also mean a visit to the county assessor's office. The local health or environmental department office is obvious because that is where the plan review and permit will be issued, and where compliance inspections will originate.

Some important information can be obtained at the assessor's office relative to system design and installation. First look for a description of the lot or parcel in terms of size, shape, location and ownership. Identify whether the lot is developed or undeveloped. An undeveloped lot is one where improvements have not been made, which probably means more siting and design options are available. A developed lot, with streets and other amenities – including rural water supply – already in place, indicates the system location may have already been determined by being hemmed in by other lot improvements. If the driveway, house, etc., are already in place, it's possible the area set aside for the system will have been cut or filled.

**We have highlighted how important it is for a service provider to establish a relationship and good communication with the homeowner. To ensure good design work, it is critical to establish anticipated water-use patterns.**

## CHECK RESTRICTIONS

If there is an existing dwelling, the assessor's office will have the most up-to-date information on the number of bedrooms and other pertinent information. This can be compared with the system information provided in the permit from the health department. These numbers should match so the estimated flow for the dwelling reflects what is actually there. The assessor's office will have records on any property restrictions or covenants, including easements, that may not show up in the permit document but could impact the system design for the site.

You may find existing documents relating to onsite systems on the property, including design and permit information, at the health or environment department. You may also find a record of previous problems

with the system. It can be helpful from a design standpoint to identify areas of special attention to avoid similar problems with the new design and installation. Also connected with the permit information will be records on property restrictions. Resolve discrepancies with the assessor information before continuing with design work.

Look for property restrictions, such as whether the property is included in any type of special management zone for onsite systems. This will either restrict the type of system allowed or provide certain credits for designing elements into the system. One example of this is areas where state and local governments identify special zones for the reduction of nitrogen delivered to coastal estuaries. Many western states have such zones along major river systems with coarse-textured alluvial soils or over areas of groundwater aquifers that are a source of drinking water.

This restriction fits with the important *know your risk* part of the design process. Here the risk of elevated nitrogen levels is either a health concern in drinking water or an environmental concern in elevated levels found in estuaries. In these cases, the risks could help define what type of nitrogen reduction strategies can be employed. There may be special financial considerations to encourage use of different technologies to reduce the nitrogen load. These considerations may be at the homeowner level or at the state and local level through state or federal grants and assistance. The other parts of *know the risk* factor into the actual soil and landscape condition on the site itself and the intended use. Is it a residence or another establishment such as a restaurant?

## COMMUNICATION IS KEY

In previous discussions, we have highlighted how important it is for a service provider to establish a relationship and good communication with the homeowner. To ensure good design work, it is critical to establish anticipated water-use patterns. One example brought this fact home to us in a very undesirable manner.

We were designing a demonstration project for a relatively new product. We made the usual assumptions of water use based on the number of bedrooms, people in the house and the size of the house. As we monitored the sewage treatment trenches, it quickly became obvious that one of two things had happened: either we had totally misread the soils or significantly higher amounts of water were being used than we had estimated. We



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installed a water meter and found that water was being used at roughly twice our estimated daily flow. The important message here is that users have a major impact on the system and communication is essential.

Another common example from our area is the impact of seasonal or periodic use. Many residences in our lakeshore areas serve as a second home for the occupants. Homeowners come and go depending on their vacation time and recreational pursuits. This situation does not lend itself to certain technologies such as ATUs, which require consistent loading to function best. So if it is a seasonal residence and additional pretreatment is necessary, an alternative should be pursued.

### FOR MORE INFORMATION

Resources are available to help designers make sure they are asking homeowners the right questions. The one we point to first is the University of Minnesota website (www.septic.umn.edu). There the designer will find a number of helpful assets, including a homeowner survey, which provides a way to ask for and track homeowners' usage patterns. A similar set of forms is available as part of the Consortium of Institutes for Decentralized Wastewater Treatment (CIDWT) operation and maintenance manual. Any of the organizations involved in the CIDWT can provide information on the manual. The National Association of Wastewater Technicians provides that manual for a fee. □

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# Two Precious Commodities

In arid California wine country, a vineyard sought to update its wastewater treatment process and use former dispersal ponds to irrigate valuable grapes

By David Steinkraus

**I**t was a relatively straightforward job, but the land posed challenges. Jordan Vineyard & Winery in Sonoma County, Calif., wanted to redo its wastewater system. Since 1976 the business had operated a combined domestic and process wastewater system, and now it needed an upgrade. The cause was two-part. One part was the age of its original package plant. The other part was the advantage of water reuse.

The package plant was simply at the end of its life, illustrated by the rust streaks on its exterior. “I was in a meeting with the county regulators one day, and the facilities manager said, ‘I’m tired of sending my welders down there in breathing gear to patch the holes in that package plant,’” says Pete Lescure of Lescure Engineers in Sonoma County. He designed the solution for Jordan.

Then there was water reuse. From the beginning, Jordan had been sending process wastewater from its winemaking operation into a pair of ponds a short way down the hill behind the winery building. The package plant discharged its water into the ponds also, but with both types of wastewater mixing there, the winery could not employ that water to irrigate grapevines. With the wastewater flows separated and an upgraded aeration system in the pond, that water is now used for both grapevines and landscaping around the winery building.

## SYSTEM PROFILE

<b>Location:</b>	Healdsburg, Calif.
<b>Facility served:</b>	Jordan Vineyard & Winery
<b>Designer:</b>	Pete Lescure, Lescure Engineers, Santa Rosa, Calif.
<b>Installer:</b>	George Young and Sons
<b>Site conditions:</b>	Soils are sandy loam to sandy clay over massive clay; hydraulic capacity is 0.2 gallons per square foot
<b>Type of system:</b>	AdvanTex units from Orenco Systems with subsurface dispersal in a drip field
<b>Hydraulic capacity:</b>	6,500 gpd

**OPPOSITE PAGE:** The finished installation of secondary treatment equipment at Jordan Vineyard & Winery in Healdsburg, Calif. The rectangular green lids of the four Orenco Systems AdvanTex AX-100 units are at right. To their left are the four circular lids of the 8,000-gallon tank that doses the AdvanTex pods and a nearby drip field. The tall box with the wooden backboard holds an Orenco control panel, while the low green box in the right background contains a fan that provides extra oxygen to the AdvanTex pods. (Photos courtesy of Pete Lescure)

**RIGHT:** These two 10,000-gallon tanks from Fiber Enterprises of Redwood City, Calif., were installed to perform primary treatment and flow equalization for the Jordan Vineyard wastewater system in Healdsburg, Calif.



## TWO STREAMS

Separating the waste streams was easy. A new 1,200-gallon grease interceptor reduced BOD loads from the kitchen and restaurant. Wastewater from kitchen and washrooms was collected in a 6-inch pipe and sent down the hill to a pair of Fiber Enterprises 10,000-gallon tanks buried next to the existing ponds. The first of those two tanks functions as a septic tank to provide initial treatment. From

**"I don't think these lines will ever fail because they're receiving a much higher quality effluent, and they're not fed by gravity, so the soil never really gets saturated. And you're up in the active biological zone."**

Pete Lescure

this tank, water flows into the second, which serves only as an equalization tank for flows that can range from 500 to 6,000 gpd, depending on how many people the winery entertains.

The 10,000-gallon tank will store the total volume from the highest historical three-day flows, while dispensing only 3,500 gpd to treatment and dispersal. This illustrates the value of keeping good records for a commercial facility, otherwise they would have pumped effluent to a second field even further away, Lescure says. Water had to flow out of the equalization tank for secondary treatment, and this is where the project became complicated.


In some states, in the East or Midwest for example, there are only two or a few types of soil, Lescure says. California isn't like that. "The soils in California are quite varied. We've got a lot of volcanics and uplifted marine sediments in Sonoma County. They've got about 700 acres at Jordan, and I swear we explored a couple hundred of them. I had a technician out there for a week digging with a backhoe."

The search for suitable soil began on slopes near


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**BELOW:** Workers from George Young and Sons Construction set a float with Orenco switches into the 4,000-gallon Fiber Enterprises tank that is part of the secondary treatment system at Jordan Vineyard & Winery in Healdsburg, Calif.

**RIGHT:** Jeff Julian sets up the Orenco panel at Jordan Vineyard & Winery. The process was more complicated than usual because there are two panels. One controls an equalization system, and the other, about 2,500 feet away, controls the Orenco AdvanTex treatment system and Geoflow drip dispersal system. The two are linked with a phone line so a problem at the secondary treatment site causes the AdvanTex panel to tell the equalization panel to stop sending water through the system. The phone line also allows the panels to report a problem to the winery office.



the 10,000-gallon tanks and expanded, and expanded, and expanded. At first it looked as if the soil near the building was usable, but that appearance was deceiving because of how vineyards are planted, Lescure says. Before putting in the grapevines, vintners run a tractor across the land with a ripper blade to break up the soil. That can lead you to believe the water will

**“We’ve got a lot of volcanics and uplifted marine sediments in Sonoma County. They’ve got about 700 acres at Jordan, and I swear we explored a couple hundred of them. I had a technician out there for a week digging with a backhoe.”**

**Pete Lescure**

percolate when it is really a jumble of clay and rock, good for vines and full-flavored wines, but not suitable for a wastewater soil absorption field.

### **A DISPERSAL SITE**

When the initial exploration produced no good site, Lescure took a look himself and realized the problem was the hard pan. Then he saw a hillside covered with oak trees, and he knew the search was over because the presence of oaks indicated the presence of good soil. Technicians found a good loam, but it was about 2,500 feet away from the 10,000-gallon tanks near the building. The answer was a force main using 2-inch schedule 40 PVC.

The main cuts through some of the vineyard’s grapevines, but there was

little risk to the plantings because the vine irrigation system deposits water right next to the plant stems. Water trickles straight down, and this draws the roots deep and discourages them from spreading.

The force main ends in a Fiber Enterprises 8,000-gallon tank divided in half with a baffle. The 4,000-gallon segment into which the main discharges is used to dose four Orenco Systems AdvanTex AX-100 units. Each unit is dosed in sequence through a distribution valve. This smaller flow allows the use of smaller pumps, Lescure says. The AdvanTex units are also connected to a large fan that blows extra air into the pods so bacteria have plenty of oxygen for digesting waste.

Water returning from the AdvanTex units is divided. The larger fraction, 80 percent, is recirculated through the 4,000-gallon dosing chamber for the AdvanTex pods. The remaining 20 percent is sent into the other 4,000-gallon half of the tank. From here water is channeled into 6,708 linear feet of Geoflow drip tubing. This also is split into four zones, and a valve controls the dosing. The drip field can take up to 3,500 gpd.

### **DRIP TUBE PLAYS ROLE**

Drip tubing was advantageous. Slopes on the irrigation field varied from 15 to 40 percent, and drip irrigation can be used on land up to about a 50 percent slope, Lescure says. Another advantage was that drip tubing can be installed with a small trencher, which meant minimum disturbance to the roots of the large oaks.

County regulations required an area for 15,598 linear feet of dripline be available as a reserve, but it has not been installed, and Lescure is sure it never will be. “I don’t think these lines will ever fail because they’re receiving a much higher quality effluent, and they’re not fed by gravity, so the soil never really gets saturated. And you’re up in the active biological zone.”

Another reason the driplines remain clean is the back-flush cycle. After



This vintage 1976 package plant was the old domestic wastewater treatment system at Jordan Vineyard & Winery in Healdsburg, Calif. It has now been replaced with best-available technology that provides cleaner effluent and allows the business to use winery process wastewater for irrigation.

a set number of doses, the flow is reversed to push any accumulated solids back into the recirculation chamber. There is enough latent storage capacity in the tanks to do this, Lescure says.

In addition to the force main, workers had to lay a phone line next to it. The duplex Hydromatic SHEF 100 pumps in the 10,000-gallon equalization tank and duplex AdvanTex AX100 pumps in the 8,000-gallon dosing tank are controlled by Orenco panels, but the panels communicate with each other. If there is some malfunction in the dosing tank, its panel can command the panel at the equalization tank to cease sending water through the force main. The phone line also allows the panels to call the winery and alert its office staff that there is a problem in the wastewater system.

### 21st CENTURY SYSTEM

Although the panels can sound an alarm, the system is designed to provide as few problems as possible so winery workers can focus on their primary job. To achieve this Lescure specified duplex pumps in the tanks so the winery business will not be brought to a halt by the failure of a single critical component in the wastewater system.

The only loss caused by the installation was some olive trees that were in the way of the drip irrigation. Fortunately, olive trees are valuable and transplant easily, Lescure says. The winery held a tree sale, and that was the end of that.

After close to 40 years with old technology, Jordan Vineyard & Winery is now pursuing its time-honored craft with a modern wastewater system that cleans its blackwater and frees it to reuse the graywater. For this business in thirsty California, best-available technology expanded the available water supply without pulling a single additional drop from reservoirs or aquifers. □

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# Using Air to Rejuvenate

Septic Services Retro-Air system is designed to breathe new life into aging drainfields or ensure new systems continue to work properly

By Craig Mandli

The Retro-Air Rejuvenator System, shown at the 2014 Pumper & Cleaner Environmental Expo International, is designed to bring life back to failing systems with the potential of saving homeowners from expensive repairs or system replacements. The drainfield rejuvenation system uses the aerobic process to restore failed anaerobic installations, or to prevent failures in newly constructed septic systems, by delivering a constant flow of air to the diffuser, adding dissolved oxygen to the tank.

“This product is designed to prevent the soil in the absorption field from being clogged by buildup of the biomat, which can prevent much more surfacing down the road,” says Dave Flagg, Septic Services Inc. president. “The Retro-Air delivers dissolved oxygen and aerobic bacteria to the absorption field, which will eliminate the biomat over time, keeping the system working correctly.”

If not treated, biomat can build up in the absorption field, clogging pores in the soil and causing sewage to rise to the surface of the ground. If allowed to continue, sewage can back up into the house. The Retro-Air delivers dissolved oxygen and aerobic bacteria to the absorption field. Over time, the aerobic bacteria consume the biomat, allowing the soil to absorb effluent once again.

“The development of this product was a direct result of our customers telling us what they needed,” says Flagg. “We consider it an investment to ensure that the system continues to operate at a high level.”

Retro-Air is designed for 500- to 2,000-gallon tanks, and can be installed in single or multiple compartment septic tanks. The kit is available in four models with aerator pod, airline, diffuser and float assembly, and installation manual.

“We introduced this product to the market for the first time at the 2014 Expo after testing it in various septic systems for three years,” says Flagg. “It passed with flying colors, not only rejuvenating drainfields that were either failing or on the verge of failure but also with new systems to keep destructive biomat from forming.”

Flagg was also pleased with the response to the new product at the Expo. Septic Services employees constantly talked with onsite system installers in attendance about the benefits of installing the new aerator on existing and new systems.

“The Retro-Air garnered a lot of great attention for us, which proved that the product was answering a large need in the industry,” says Flagg. “We



Mike Holdmeyer, sales manager for Septic Services Inc., explains how the company's new Retro-Air Rejuvenator System operates to a family attending the 2014 Pumper & Cleaner Expo. (Photo by Craig Mandli)

had dozens of attendees interested in buying our display model and took multiple orders at the show. The interest exceeded our expectations.”

Flagg says Septic Services Inc. tries to have a new product to unveil at every Expo, and that won't change for the rebranded Water & Wastewater Equipment, Treatment & Transport Show, or WWETT. He says the company is already working on new aeration equipment to bring to the market in 2015.

“The Expo is the perfect place for us to roll out our newest technology,” says Flagg. “You won't find a better audience of customers and potential customers. That's why we come back every year.” 800/536-5564; [www.retro-air.com](http://www.retro-air.com). □

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# The Enforcers

Texas wastewater professionals are passionate about serving the industry through rules for proper onsite system maintenance

By Doug Day

**A**s a charter member, Executive Director Tim Taylor has a wealth of knowledge about the Texas On-Site Wastewater Association (TOWA). Taylor helped form TOWA in 1992 after he and a few colleagues attended one of the first meetings of the National Onsite Wastewater Recycling Association.

After 16 years traveling the country for Consolidated Treatment Systems of Franklin, Ohio, he became the head of TOWA eight years ago. “The association decided we needed an executive director who was from the industry,” says Taylor. Previously, the position was held by an association management company that represented other professional groups.

## What is the biggest onsite wastewater issue in Texas?

**Taylor:** What we would like to see – and it might take several years – is better enforcement. The Legislature is continuously cutting budgets that have hurt enforcement efforts at the Texas Commission on Environmental Quality (TCEQ) and at the county level.

The smaller counties are where you find less stringent requirements that can lead to serious health and environmental problems. More large subdivisions are being built in many rural areas that were used to homes with a lot of acreage. Homes on smaller lots can cause more health risks if their system fails.

## Have you approached the Legislature on the enforcement issue?

**Taylor:** We try to visit with House and Senate members on the committees that govern natural resources while the Legislature is in session during our legislative day in Austin.

Maintenance is one of the biggest things we try to educate them about. They only meet once every two years for a four-month session. There are a lot of issues they see as much more important.

We were able to stop a bill that would have required a \$1 million liability insurance policy on every individual who holds an onsite license in 2010. Companies have insurance, but this bill would have required each of their employees to have an individual policy.

We used to have a good system in Texas that required homeowners to have a maintenance agreement. The Legislature changed the law in 2008 to allow homeowners to maintain their own systems. We are not opposed to that, but we firmly believe they need to be educated and should file the same reports as the maintenance companies.

It was bad for the first few years after the law changed. Since then, many counties have stepped in with their own rules to mandate homeowners

have a maintenance contract or be trained to do it themselves and file the same reports.

## Have you done anything to improve the situation without depending on the Legislature?

**Taylor:** We’re encouraging everyone in the industry to use every contact they have with customers as an educational opportunity. We want to let homeowners know the downsides of not taking care of their system, not only the environmental and public health issues but also the economics.

It’s gotten better with the county rules, and homeowners have become more aware that instead of spending \$300 on maintenance, they may be looking at a \$3,000 repair bill if they fail to have routine maintenance done.

**“Homeowners have become more aware that instead of spending \$300 on maintenance, they may be looking at a \$3,000 repair bill if they fail to have routine maintenance done.”**

**Tim Taylor**

## What is TOWA’s role in educating onsite professionals?

**Taylor:** We are the only approved provider for training needed to get a license for maintenance technicians and maintenance providers. The technician course is held every two months. The advanced provider course is offered four times a year.

License holders need 24 hours of continuing education in the three-year license period. Our annual conference in March was worth 10 credit hours this year. Our speakers must be approved by the TCEQ. This year we had 838 attendees out of about 5,000 licensed individuals in Texas. Members also get two hours of credit for attending local chapter meetings. We have four active chapters and five more in the planning stage.

Our 700 members include installers, service providers, pumpers, manufacturers, suppliers, engineers, designers, registered sanitarians, research and academic professionals, consultants and regulators. In Texas, the onsite regulations deal with systems limited to those under 5,000 gpd and 99 percent of our members do residential and small commercial systems. The larger systems are regulated by another division of TCEQ.



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## How do you work with TCEQ?

**Taylor:** We work closely with the regulators, and I'm proud of the relationship we have. Our board includes regulators, designers, several sanitarians, two professional engineers, pumpers, installers, maintenance providers and site evaluators. Many of us hold multiple licenses. I have a degree in biology, am a registered sanitarian, and have licenses as an installer, site evaluator and maintenance provider.

TOWA is always a member of TCEQ's stakeholders group that makes recommendations on rule changes before the draft goes out for public comment. State law requires all agencies to hold public hearings on rule changes, but TCEQ goes beyond that with the stakeholders group.

In 2010, TOWA worked with TCEQ to change part of our state rules to grandfather 1,100 licensed maintenance providers. It exempted them from a new requirement to take the advanced maintenance provider course. If you include the \$450 cost of the course, travel, food and lodging plus losing two days of work - the savings for those individuals was more than \$1,000. □

Tim Taylor may be reached at 888/398-7188 or [tntaylor1@msn.com](mailto:tntaylor1@msn.com).

## TOWA helps authorities arrest septic scammers

Two people are facing charges in Texas for scamming an elderly couple over septic tank pumping and repairs. It all started when the Texas On-Site Wastewater Association (TOWA) received a report from one of its members that a local pumper had charged an elderly woman \$5,800 to pump her septic system.

Jerry Snyder, chairman of the TOWA Enforcement Committee, looked into the situation. "What the woman was charged was way out of line," says TOWA Executive Director Tim Taylor. "Jerry looked at the system and didn't believe it needed pumping in the first place and didn't think it had been completely pumped."

Snyder contacted an investigator at the Texas Commission on Environmental Quality, but there was not enough evidence to pursue that case. Several months later, however, TOWA became aware of another case and shared its information with a county investigator.

According to KBTX-TV, two suspects went to the door of an elderly couple and offered a free septic inspection. Saying the septic tank had to be pumped, they quoted a price of \$275. They then claimed the system needed repairs and demanded \$2,205 to finish the work, which the victims paid.

The man's family reported the situation to local law enforcement, which had several licensed maintenance providers inspect the system. They determined the couple had been grossly overcharged. Not only had no repair work been done, the scammers actually damaged the system. The victims ended up paying another company \$400 to pump the tank and to repair the damage.

The two suspects, a father and son, have been charged with exploitation of an elderly person. As a third degree felony, the charges carry a prison term of two to 10 years and a fine of up to \$10,000. The investigator also received numerous reports of similar scams from surrounding counties.

# Equipment Trailers 101

So you're in the market for a new hauler to carry your mini-excavator or skid-steer to the job site? Builders and contractors weigh in on specs for the most important trailer components.

By Ed Wodalski

**W**hat do you look for when purchasing an equipment trailer? Durability? Finish? Brakes? Hitch? Perhaps it's the decking or ease of operation? Better yet, what *should* you be looking at before you buy?

Here are some points to consider from those in the know:

## Frame

Can't decide between a gooseneck or a bumper pull trailer? You might start with the frame. "When you're looking to buy a gooseneck flatbed, it's important to look at the I-beam used for the main frame," says Ronnie Enns, general manager for Happy Trailer Sales in Sumner, Texas, manufacturer of PJ brand trailers. "The industry standard is a 12-inch I-beam, but higher-quality trailers will feature a 19-pound-per-inch I-beam versus 16 pounds per inch." Another important consideration is crossmember spacing, he says. "For most trailers, 16-inch centers are

sufficient, but upgrading to 12-inch centers becomes necessary when hauling more weight."

## Axles

The size and type of axle determine the trailer's hauling capacity, or gross vehicle weight rating (GVWR) – the combination of trailer and cargo. "Most gooseneck flatbeds are equipped with tandem 10,000-pound axles and dual wheels; however, 12,000-pound axles are a popular upgrade," Enns says. "The first step in deciding what size axles you need is determining how much weight you will haul."

And make sure the VIN number with the GVWR is clearly visible, says Ed Steinemann, sales coordinator for Felling Trailers in Sauk Centre, Minn. "That's the first thing the DOT is going to look for when you go through a scale. The VIN tag will tell you how much weight you can put on the trailer without overloading it."



To decide what size axles you need, determine how much weight you plan to haul. The combined weight of the trailer and cargo needs to be within the GVWR set by the manufacturer. (Photo courtesy Felling Trailers)



**ABOVE:** A solid foundation is critical. The size of the I-beam used for the main frame and crossmember spacing are important considerations when planning to carry heavy loads. (Photo courtesy Happy Trailer Sales and PJ Trailers)

**RIGHT:** Decking, tiedowns, LED lighting and loading options are features to consider when purchasing your next trailer. (Photo courtesy Felling Trailers)



### Wiring and lights

Another important item is wiring. Steinemann recommends LED lights and an enclosed wiring harness. “If you don’t have enclosed wiring, moisture is going to get in,” he says. That can lead to rust and headaches down the road.

Modern LED lighting also offers numerous advantages over incandescent bulbs, including lifetime service, better illumination and less power draw.

**“The salt and road grime just eats trailers alive. I want to see that it’s powder coated, but even that eventually doesn’t hold up. A lot of our trailers we get rustproofed or undercoated from the manufacturer, or we do it ourselves. That to me is the biggest thing we look for.”**

Dean Flygare

### Finish

Steinemann says preparation, rather than final coating, is the most important consideration when it comes to the trailer’s finish. “What we do is metal-grit blast our steel, which cleans the inside of the pores. Then we wash it and give it two undercoats and three overcoats.” Felling uses Hentzen Coatings. The paint products consist of a two-component urethane technology.

### Durability

Timothy Davis of Branchland, W.Va., puts durability at the top of his list of trailer features. “I always try to look for something heavy-duty, or a little extra heavy-duty than what I want to haul,” says the owner of TR Davis, a septic system installation and excavation company.

“It should be able to handle the load for a long period of time,” he says. The owner of 10-ton, 5-ton and 1-ton trailers also opts for air brakes. “It’s about as dependable a system you can buy.” LED lighting and pintle hitches are two other selling points for Davis, whose equipment fleet includes a John Deere 310E backhoe, 450G dozer, Kubota U45 tracked mini-excavator and tandem-wheel International dump truck.

Currently in the market for a new trailer, Davis says he’s not looking at a particular brand, but he’d like to have something with a tilt deck. “It’s easier on your back,” he says.

Avery Zahn of Worthing, S.D., also puts durability at the top of his list. “Axles are big. That goes with the durability,” says the owner of Infra-Track, a jetting, hydroexcavating and sewer televising company. “Heavy-duty frame, closer channeling – that’s kind of a big deal,” he says, along with heavy-duty axles.

### Rustproofing

Living in Annandale, Minn., Dean Flygare, owner of Flygare Excavating, puts a premium on paint and/or rustproofing. “That seems to be the biggest issue we have with our trailers,” he says. “The salt and road grime just eats trailers alive. I want to see that it’s powder coated, but even that eventually doesn’t hold up. A lot of our trailers we get rustproofed or undercoated from the manufacturer, or we do it ourselves. That to me is the biggest thing we look for. The only other thing would be ramps, depending on the kind of trailer – the ease of loading and unloading.”

### Brakes and hitches

Flygare has a 25-ton, a 30-ton and several skid-loader trailers. “As far as the bigger trailers, air brakes are less maintenance and much more reliable than electric,” he says. “We try to go with air whenever we can.” Flygare also has pintle hitches on all his trailers – both for convenience and security.

“We have the pintle hitches on the back of our dump trucks and use pintle adapters for our pickups and smaller trucks. It simplifies things,” he says. “The other thing is there aren’t a lot of people who have a pintle hook on the back of their pickup that can take off and steal my trailer.”

### Decking

Oak decking is another feature Flygare looks for in the trailers he buys. “We tried rubber lumber just for grip, but it didn’t turn out so good. The trailer was built for lumber, so it didn’t have enough cross support; the rubber was a little more flexible. In between the cross-braces it would flex and pull the bolts,” he says. “If you had a trailer built for that material with extra bracing, it probably would be great, but it didn’t work out in our case.”

Flygare always buys new trailers, primarily for peace of mind. “With the corrosion and rust, even with a new trailer, after a number of years it really eats them up. It just seems best to start with something fresh,” he says. “With a used trailer, you don’t know how it was taken care of or if it was ever rustproofed.” □

# Delaware releases education videos for septic system users

By Doug Day and Sharon Verbeten

A series of three videos is helping educate homeowners about the importance of properly maintaining their septic systems. The divisions of Water and Watershed Stewardship of the Delaware Department of Natural Resources and Environmental Control (DNREC) released the videos online in April. Along with an overview of septic systems using working models, the videos cover types of risks and failures common to septic systems and maintenance tips for homeowners. There is also information about the state's Septic Rehabilitation Loan Program.

In the series, Hilary Valentine, head of Delaware Technical and Community College's Environmental Training Center, takes viewers on a tour of the school's onsite systems training lab to learn about different types of septic systems and details the progression of technology over the years.

The videos are accessible at the DNREC's YouTube channel at [www.youtube.com/user/DelawareDNREC](http://www.youtube.com/user/DelawareDNREC).

## FLORIDA

Two bills that would delay a ban on the land spreading of septage are making their way through the Florida Legislature. Land application was banned by legislation in 2010, effective Jan. 1, 2016. Environmental and conservation groups originally opposed the bills delaying the law but withdrew their objections when they were amended to delay the ban by one year rather than four. The delay will be used to study waste disposal options for pumpers.

Two other bills that would allow building owners to connect their septic systems to the sanitary sewer system are moving through the Legislature without opposition. Under the proposals, septic systems could be connected to sewer systems at less than the full cost of a sewer hookup.

## ALASKA

An Alaska Clean Water Actions grant of \$23,450 will be used to establish local cooperatives to reduce the cost of septic inspection and service. The Mat-Su Resource Conservation & Development Council is working with homeowners, engineers and onsite professionals to promote the concept of sharing reduced costs when one street with several homes on septic systems can be inspected and serviced at the same time. Several companies have expressed interest in offering discounted rates for such a cooperative. The project will include public education to raise awareness of how septic systems can impact water quality and how homeowners can reduce such impacts.

The water-quality grant was one of 13 issued across the state through a partnership between the departments of Environmental Conservation, Fish & Game and Natural Resources.

## WASHINGTON

The owner of a Longview, Wash., septic pumping company has been sentenced to 27 months in prison for illegally dumping more than 2 million gallons of septage into the public sewer system. Ray Caldwell, owner of All-Out Sewer & Drain Service, was also fined \$250,000 for violations of the Clean Water Act, mail fraud and making false statements.

An indictment alleging 25 violations of the Clean Water Act accused Caldwell of cutting a hole into a city sewer pipe behind his building and pumping septic waste from his trucks and a storage tank into the pipe. He was viewed in the act by U.S. Environmental Protection Agency agents staking out the business and was also seen on video seized from the company's outdoor surveillance system.

## NORTH CAROLINA

Due to the growing number of aging septic systems, Durham County Department of Public Health officials want to work with local banks and county commissioners to create a program to subsidize septic repair and replacement. More than 3,000 septic systems in rural Durham are over 30 years old, putting them at risk for failure.

The Public Health Department issues permits for most septic systems, and when it knows of failures sometimes has to seek a court order requiring repairs, which can cost up to \$35,000. In extreme cases, the owners must vacate the property if they can't afford the cost. □



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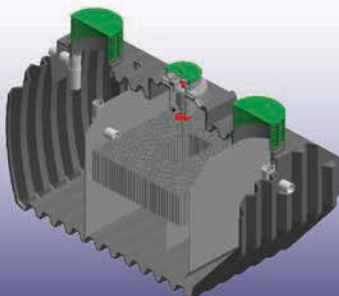


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# Large-Scale and Commercial Treatment Systems

By Craig Mandli

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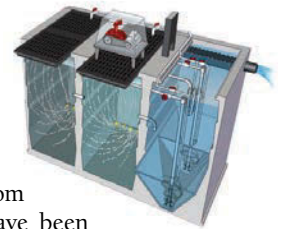
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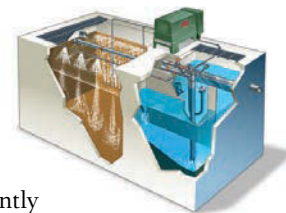
### Commercial wastewater treatment plant

Commercial wastewater treatment plants from Jet Inc. have a modular design, can treat flows from 1,500 to over 300,000 gpd, and allow for phased build-out, making them ideal for commercial developments constructed far from existing wastewater treatment plants. They have been installed in a variety of domestic and international locations, are built with quality components, and are custom designed for each project to fit specific needs. 800/321-6960; [www.jetincorp.com](http://www.jetincorp.com).



### Commercial treatment system

The Modulair package wastewater treatment system from Norweco has capacities ranging from 1,500 to 500,000 gpd, and is pre-engineered to accommodate current and future treatment needs. Plants employ the extended aeration process to quickly and efficiently oxidize organic compounds. It can be easily enlarged or modified and has the flexibility for any treatment requirement, including pretreatment, AFE, ASH, tertiary, disinfection, denitrification and phosphorous removal. Non-clog Evenair diffusers reduce plant maintenance, and the Air-lift surface skimmer simplifies maintenance. Heavy-duty reinforced precast concrete tanks provide durability and long life to each plant. Systems include delivery, tank setting, equipment installation, startup and service. 800/667-9326; [www.norweco.com](http://www.norweco.com).



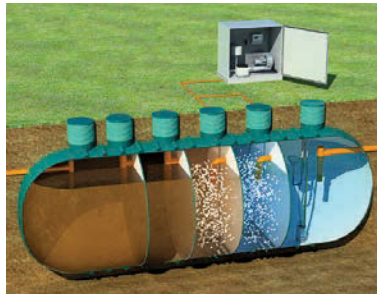
## Containerized wastewater treatment system

AdvanTex AX-Max containerized, fully plumbed, plug-and-play wastewater treatment systems from Orenco Systems are sized for larger commercial and municipal applications. Units come in a variety of configurations, measuring up to 42 by 8.5 feet, and can be installed singly or in multi-unit arrays, either above ground or buried to grade. They use an attached growth treatment method to produce clear, odorless effluent with significant nutrient reduction, suitable for subsurface irrigation or surface discharge after disinfection. One unit can process up to 5,000 gpd of raw sewage or 15,000 gpd of primary-treated effluent. Units reduce nitrogen up to 90 percent, depending on configuration, and provide reliable performance with only a part-time operator. When installed as a two-stage system, the system can virtually eliminate ammonia. Units are easy to ship and set, and have been installed in a variety of soils and climates all over the world. 800/348-9843; [www.orenco.com](http://www.orenco.com).



## Commercial wastewater treatment system

The WSB clean pro commercial wastewater treatment system from RH2O North America is available in a wide range of sizes for precast concrete and fiberglass tanks with flows up to 200,000 gpd. Each system is designed for the requirements of each project, and is



available for new installations, retrofits and upgrades of existing plants. It uses self-cleaning media that never has to be cleaned or replaced. Systems have been used successfully across Canada in high-strength wastewater projects with influent BOD over 2,000 mg/L and producing consistent effluent BOD/TSS of less than 10 mg/L. 519/648-3475; [www.wastewater.ca](http://www.wastewater.ca).

## DISINFECTION

### UV disinfection unit

The 3G UV Unit from Salcor Inc. is proven for residential use and can serve as a reliable building block for larger wastewater disinfection systems. Rated at 9,000 gpd gravity flow, it has a fouling-resistant Teflon lamp covering, two-year lamp warranty, speedy installation, minimal annual maintenance and low energy use. Parallel/series arrays for larger flows are easily assembled with readily available ABS pipe fittings. Gravity flow is equalized without distribution boxes. Identical modular units increase plant reliability, reduce the need for spare parts and facilitate plant expansion when necessary. Systems of up to 100,000 gpd capacity have been installed. 760/731-0745.



### Anaerobic/aerobic filter system

STAAR Systems from SeptiTech treat high organic loads that integrate with other technologies and accessories. Smart controllers recognize situations dealing with peak, low, intermittent or no-flow conditions to either slow, stop or restart the system and include many additional features to further enhance quality and dependability. A dual-purpose recirculation pump sprays wastewater over an unsaturated media filter and draws outside air in through use of venturis. The smart biological trickling filter technology also maintains low levels of Nitrate-N. Systems treat 100 to 150,000 gpd with all below-grade components that fit available concrete, plastic or fiberglass tanks. 800/318-7967; [www.septitech.com](http://www.septitech.com).



### Pressure filter

The STF-100A2 pressure filter from Sim/Tech Filter helps maintain proper and efficient year-round operation of mounds, sand filters and other pressurized distribution systems. The low head loss (0.21 psi) unit mounts on the discharge side of an effluent pump, acting as a last line of defense to prevent plugged holes and reduce effluent TSS. This mounting location also extends the time between servicing. The vortex action created by the pump scrubs the screen and the backflow through the filter after the pump shuts off, washing debris out. A 2-inch filter can handle flow rates up to 83.8 gpm. The filters in the manifold can be designed to handle almost any flow rate or load. Larger 3- and 4-inch filters are also available. The standard screen filters particles to 1/16 inch, and optional socks allow for additional filtration to 600, 190 or 100 micron. 888/999-3290; [www.simtechfilter.com](http://www.simtechfilter.com). □



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# Large-Scale and Commercial Treatment Systems

By Craig Mandli

## System provides treatment for new commercial plaza

**Problem:** When a developer wanted to build a new commercial plaza in Orleans, Mass., adjacent to the town's off-ramp from the Mid-Cape Highway, the Massachusetts Department of Environmental Protection required that a wastewater treatment and disposal facility be installed on site to protect local groundwater. This commercial center generates up to 20,000 gpd of moderate to high-strength wastewater. The system was permitted under Massachusetts' groundwater discharge pollution control regulations requiring the system to meet a standard of less than 10 mg/L total nitrogen.

**Solution:** The project engineer selected a Bioclere™ treatment system from Aquapoint for its nitrification and denitrification performance capability, energy efficiency, ease of operation and small footprint. Units are preceded by a pre-aeration stage to condition the high-strength wastewater and to strip off VOCs, which can impair treatment efficiency if present in high concentrations. Effluent from the plant is discharged through a conventional pressure-dosed drainfield.

**Result:** The system provided the commercial complex development with a flexible and affordable treatment system that has achieved BOD, TSS, TN and NH<sub>3</sub> removal levels of greater than 90 percent, exceeding allowable permit levels. **508/985-9050; [www.aquapoint.com](http://www.aquapoint.com).**



## Leaching chambers installed at beachfront snack bar

**Problem:** Sandy Beach at Lake Morris in Bantam, Conn., was undergoing a renovation, including the installation of a new snack bar with a grease trap, bathrooms and a bath station. Since the existing septic system was outdated from the 1950s, a new innovative system was needed to provide enough storage to accommodate the updates.

**Solution:** Contractors at Green Construction Management LLC consulted with CULTEC Inc. to design and install a Connecticut Department of Energy & Environmental Protection-approved subsurface septic system that would provide increased storage and dispersion of sewage effluent. The contractor installed a 2-inch pipe that pumps approximately 400 feet across the beachfront, where it meets a splitter valve system. The splitter valve separates into four distribution boxes, which then run on top of two 100-foot double rows of CULTEC Contactor 100HD plastic leaching chambers – 54 chambers total. The 2-inch line features 1/4-inch holes every 3 feet that drain into the chambers.

**Result:** This new system design provides efficient handling of the snack bar's increased sewage flow. The municipality reports no issues. **800/428-5832; [www.cultec.com](http://www.cultec.com).**



## Sequencing batch reactor plant installed at Ohio camp

**Problem:** Camp Akita, a 1,200-acre camp located in the Hocking Hills of southeastern Ohio, operates year-round and offers entertainment, food and lodging for groups up to 200 people. In 2013, the camp's directors realized the existing 8,000 gpd precast extended aeration plant built in 1979 would need to be replaced. Since the discharge stream is small and considered an exceptional water body, the Ohio Environmental Protection Agency required a new plant to meet the state's Best Available Demonstrated Control Technology (BADCT).

**Solution:** The camp asked E.P. Ferris and Associates to develop a plan for a new plant. The firm's project engineer, Jay Herskowitz, P.E., evaluated several options, eventually putting the project out to bid. Earthtek Environmental LLC was selected to assist with the design and to provide a Sabre 16,000 gpd package sequencing batch reactor treatment plant. The unit is designed to meet the



stringent BADCT requirements, and can be provided as two separate SBR tanks to handle a large variation between summer and winter flows. It uses buried fiberglass tanks that minimize odors, and is simple to operate and maintain with minimal ongoing expense.

**Result:** The new plant was completed in time to meet the summer demands of the camp and has performed as advertised. **812/528-8784; [www.packageplants.com](http://www.packageplants.com).**

## Cluster treatment system used for recreational site

**Problem:** An engineering firm was tasked with designing a treatment system to protect a Northern California freshwater lake used for recreation and surface irrigation, while providing recreation area visitors flushable toilets and hot-water showers. In addition to BOD-loading, nitrogen reduction and pathogen elimination were primary objectives. Due to proximity of lake-view tent campsites to the sewage treatment system, noise and odors needed to be undetectable.

**Solution:** The firm and the installation service contractor, in consultation with the local Envirocycle USA dealer, developed a plan to use scalable cluster treatment technology that did not require additional trash or dose tanks, as well as Netafim drip dispersal materials to create a sustainable green belt area for recreational use while protecting the water source less than 100 yards away. The system was designed with a rock-styled access hatch to blend in with the natural surroundings.



**Result:** The choice reduced operating costs and increased overall system reliability, while meeting state and local regulatory requirements. Remote monitoring has ensured trouble-free operation. The lake has been protected from nutrient and pathogenic contamination. **888/694-4633; [www.endingsepticpollution.com](http://www.endingsepticpollution.com).**

## Treatment system recharges groundwater and minimizes saltwater intrusion

**Problem:** The coastal community of Los Osos, Calif., had outdated onsite wastewater treatment systems. As population density increased, leachfield systems could not be designed to fit within smaller-sized lots, and existing systems were contributing to nitrogen pollution. As a result, the Regional Water Quality Control Board declared a prohibition zone that included a building moratorium. The community was also experiencing saltwater intrusion as groundwater was pumped to meet agricultural demands.

**Solution:** After a decade of meetings, a decentralized solution was selected featuring final discharge to a community drainfield utilizing 20,000 linear feet of chambers from Infiltrator Systems. Treated effluent pumped up to the leachfield system is distributed through pressurized piping. The trenches are separated into zones, with controls and valves that rotate dosings evenly through each zone. System maintenance and monitoring is optimized through installation of observation ports in each trench.



**Result:** This decentralized solution recharges the groundwater supplies and minimizes saltwater intrusion. The completed large community treatment system has a capacity of 1.6 mgd and includes collection, conveyance, treatment and recycled water reuse. **800/221-4436; [www.infiltratorsystems.com](http://www.infiltratorsystems.com).**

## Shared treatment system installed for neighboring facilities

**Problem:** Major upgrades to the infrastructures of the Mont-Saint-Mathieu Ski and Convention Resort and neighboring Camping KOA Bas-Saint-Laurent led to a four-fold increase in users at the ski resort and three times as many campsites for visitors. Existing septic installations could not support this growth or treat phosphorous levels present in the final discharge into nearby Saint-Mathieu Lake. Permeable soils, mountainous and rocky topography, as well as the proximity of both sites to the sensitive area, would not permit any soil infiltration. A compact and economical onsite solution was needed to treat the wastewater at both sites and handle seasonal peak flows.

**Solution:** With a footprint 90 percent smaller than a conventional disposal field, the Premier Tech Aqua Ecoprocess MBR treatment station covered a total of 2,500 square feet. The building housing the membranes and control panel measured 560 square feet. Each owner assumed construction costs for the treatment station they used exclusively and half of the cost for the components they shared. Operational expenses were allocated depending on each partner's usage.



**Result:** Designed to treat up to 22,000 gpd to meet future development plans for both sites, and supported by an annual maintenance program, the station steadily produces a quality effluent of less than 5 mg/L in CBOD5, less than 10 mg/L in TSS, less than 200 cfu/100 mL in fecal coliforms and less than 0.1 mg/L Ptot. **800/632-6356; [www.premiertechaqua.com](http://www.premiertechaqua.com).**

## Cluster system enables passive community treatment with denitrification

**Problem:** The Blodgett Landing Treatment Plant in southwestern New Hampshire would routinely have parts of its treatment system freeze, hindering operation. The cold weather was also affecting treatment levels and inhibiting the nitrification and denitrification process. The facility had a 34,000-gallon tank that was nearly 50 years old and needed to be replaced. The system was also not large enough to deal with the increased capacity.

**Solution:** The community chose the Enviro-Septic System from Presby Environmental. The passive cluster wastewater treatment system removes up to 99 percent of wastewater contaminants such as BOD, TSS, TN, TKN and fecal coliform. It uses fabrics and fibers to establish multiple bacterial treatment environments that break down and digest wastewater contaminants without use of electricity or additives. The system is designed for cold weather, making it a recommendation for this location. The warm effluent combined with the biological process within the pipe generates enough heat to prevent system freezing.

**Result:** The Blodgett Landing Treatment Plant is designed as a recirculating system with the multilevel configuration, handling flows ranging from 2,500 to 88,000 gpd. "Since it was installed in 2011, the system has consistently exceeded the required effluent treatment levels," says Tim Mulder, Blodgett Landing Treatment Plant manager. **800/473-5298; [www.presbyenvironmental.com](http://www.presbyenvironmental.com).**



## Spray irrigation dispersal system used for casino site

**Problem:** In 2010, the Mississippi Band of Choctaw Indians in Choctaw, Miss., planned to build a casino in Jones County, near Sandersville, Miss. They approached the U.S. Environmental Protection Agency for assistance in determining the best wastewater treatment option. Suggestions included a fixed media filter as part of an onsite decentralized wastewater treatment system.

**Solution:** W. G. Yates & Sons Construction of Philadelphia, Miss., oversaw the project. Quanics assisted in choosing the technology to be used for the 20,000 gpd project. Soil investigations determined a large area near the front of the property would be suitable for a spray irrigation dispersal system. This site would be used in conjunction with the Aerocell fixed media filter. A 40,000-gallon fiberglass septic tank with commercial effluent filter was installed, followed by a 20,000-gallon fiberglass recirculation tank for the treatment modules. Two duplex pump systems at the outlet end dose to four ATS-16-AC modules that make up the treatment component. The wastewater is sprayed over the open-cell foam media and, after treatment, goes through UV disinfection and then to a lift station. The effluent is pumped to a large holding tank, then to a spray irrigation field. As a precaution, a holding pond was also constructed for times of inclement weather.

**Result:** The casino opened just before Christmas 2011. It has operated smoothly since then, according to Gordon Dixon, facility maintenance manager. The Choctaws are planning an addition of a hotel and restaurant on the site in the near future. **877/782-6427; [www.quanics.net](http://www.quanics.net).**



## Large compressor needed for convenience stores and fast food restaurants

**Problem:** Paramount Wastewater Solutions in Temple, Texas, has been looking for a large linear compressor that is quiet and capable of producing greater than 100 pounds of oxygen input per day. The system for one particular convenience store application was a custom 2,500 gpd.

**Solution:** Paramount Wastewater analyzed a demonstration of the DBMX 300 – 101 from Septic Sewage Pumps. It has an output of 10.59 cfm. In this application 1 scfm equates to 0.0173 pounds of oxygen per minute. The pump offers 10.59 cfm, which multiplied by 0.0173 pounds of oxygen per minute equals 0.1832 pounds of oxygen per minute, which multiplied by 1,440 minutes per day equals 263.8 pounds of oxygen per day.

**Result:** Paramount Wastewater has installed the pump at this particular convenience store application, as well as one at a Bush's Chicken fast food restaurant. They are planning to install this compressor at other convenience stores and fast food restaurants as the need arises. **800/292-9087; [www.septicsewagepumps.com](http://www.septicsewagepumps.com).**

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### System removes phosphorus from school wastewater

**Problem:** In 2010 the onsite sewage system at Brisbane Public School in Ontario was upgraded as part of the Ontario Green Schools Pilot Initiative. The system consisted of a Waterloo Biofilter, followed by a WaterNOx biological anoxic filter for enhanced nitrogen removal, and UV disinfection to provide a final effluent suitable for wastewater reuse. As a testing ground for new green technologies, the school sought to further reduce its environmental footprint by removing phosphorus from the wastewater stream.

**Solution:** A Waterloo EC-P phosphorus removal system from Waterloo Biofilter Systems was installed. It uses electrochemical processes to replicate naturally iron-rich "B Horizon" soils using any sand, soil or foam filtration medium. Rather than separate and concentrate phosphorus in the septic tank where it must then be pumped out and treated elsewhere, the system removes phosphorus by precipitating minerals on the filtration medium where they remain stable. It easily retrofits into existing septic or pump tanks, and is suitable for both commercial and individual residential use. Very little energy is used, and the system has no effect on wastewater pH.



**Result:** The final effluent discharged has averaged 0.5 mg/L TP (92 percent removal) since the system was installed. Beneath the disposal bed, the natural environment is receiving less than 0.1 mg/L TP (more than 99 percent removal). **866/366-4329; [www.waterloo-biofilter.com](http://www.waterloo-biofilter.com).** □

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### Gateway Safety bifocal safety glasses

Conqueror MAG bifocal safety glasses by Gateway Safety provide eye protection as well as the ability to view objects up close, including blueprints, schematics, small parts, equipment settings and tools. Available in five diopter strengths from 1.0 to 3.0, the one-piece polycarbonate wraparound lens exceeds ANSI Z87.1+ and CSA Z94.3 standards. Glasses are available in clear and gray (1.5, 2.0 and 2.5 only) lenses. 800/822-5347; [www.gatewayssafety.com](http://www.gatewayssafety.com).



### Water Cannon hot water diesel

The hot water diesel pressure washer from Water Cannon is powered by a Kohler KD 420ES electric start 10 hp engine with 12-volt self-contained electrical system. The 12-volt DC oil-fired burner creates a 118-degree temperature rise. The EZ Series General triplex ceramic plunger pump delivers 4 gpm and 3,200 psi. Attachments include 50-foot hose, trigger gun, wand, chemical injector and quick-connect nozzles. 800/333-9274; [www.watercannon.com](http://www.watercannon.com).

### SJE-Rhombus low-current control switch

The SJE VerticalMaster II LC mechanically activated low-current control switch from SJE-Rhombus is designed for non-potable water and wastewater applications. The switch monitors liquid levels to activate pump control panels and alarm system for applications down to 0.160 mA at 125 VAC. It has an adjustable activation range of 0.75 to 6.5 inches and is available for normally open (high level) operation. The internal switching mechanism features sealed gold cross-point contacts for reliable operation. 888/342-5753; [www.sjerrhombus.com](http://www.sjerrhombus.com).



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The R35Z-9 compact excavator from Hyundai Construction Equipment Americas has an operating weight of 8,050 pounds and is powered by a 26.5 hp Tier 4 certified Yanmar 3TNV88 engine. The excavator has a digging depth of 10 feet 4 inches and bucket capacity of 3.78 cubic feet. 877/509-2254; [www.hceamericas.com](http://www.hceamericas.com). □

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## industrynews

### Grundfos launches newsletter

Grundfos launched its customer newsletter, Grundfos NEWS. The pump manufacturer newsletter includes case studies, technical know-how, market trends and product news.

### Ditch Witch names top dealers

Ditch Witch recognized its top dealers with membership in the 2013 Crescent Club Top 10. Club members include Ditch Witch of Oklahoma & Arkansas, Ditch Witch of Minnesota, Witch Equipment Company, Ditch Witch Central California, Ditch Witch Southwest, Ditch Witch of South Louisiana, Ditch Witch of Virginia, Ditch Witch Sales of Michigan, Brandt Tractor Ltd. and Ditch Witch of North Dakota.

### Anua distributes PekaSys Bubbler

Anua, in partnership with PekaSys, will distribute the Bubbler sequencing batch reactor in North America. The Bubbler, designed for high-level treatment, including total nitrogen reduction, can be used for residential or commercial applications, new construction, repair projects or retrofits. The Bubbler is certified to NSF/ANSI Standard 40 and Standard 245 for new installations.

### Komatsu, NDSCS form training partnership

Komatsu America Corp General Equipment & Supplies and Road Machinery & Supplies Co. formed a diesel technology educational partnership with North Dakota State College of Science. Students will receive training on Komatsu construction equipment and related products, including classroom and hands-on technical instruction at participating Komatsu dealerships. □

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## Colorado

Colorado Professionals in Onsite Wastewater;  
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Iowa Onsite Waste Water Association;  
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## Kansas

Kansas Small Flows Association;  
www.ksfa.org;  
913/594-1472

## Kentucky

Kentucky Onsite Wastewater Association;  
www.kentuckyonsite.org;  
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## Maine

Maine Association Of Site Evaluators;  
www.maine.com

Maine Association of Professional Soil Scientists;  
www.mapss.org

## Maryland

Maryland Onsite Wastewater Professionals Association;  
www.mowpa.org;  
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## Michigan

Michigan Onsite Wastewater Recycling Association;  
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Michigan Septic Tank Association;  
www.msta.biz;  
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## Minnesota

Minnesota Onsite Wastewater Association;  
www.mowa-mn.com;  
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## Missouri

Missouri Smallflows Organization;  
www.mosmallflows.org;  
417/739-4100

## Nebraska

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

## New Hampshire

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

Granite State Designers and Installers Association;  
www.gsdia.org;  
603/228-1231

## New Mexico

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

## North Carolina

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

North Carolina Portable Toilet Group;  
www.ncportabletoiletgroup.org;  
252/249-1097

North Carolina Pumper Group;  
www.ncpumpergroup.org;  
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## Ohio

Ohio Onsite Wastewater Association;  
www.ohioonsite.org;  
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## Oregon

Oregon Onsite Wastewater Association;  
www.o2wa.org;  
541/389-6692



## Pennsylvania

Pennsylvania Association of Sewage Enforcement Officers;  
www.pa-seo.org;  
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Pennsylvania Onsite Wastewater Recycling Association;  
www.powra.org

Pennsylvania Septage Management Association;  
www.psmma.net;  
717/763-7762

## Tennessee

Tennessee Onsite Wastewater Association;  
www.tnonsite.org

## Texas

Texas On-Site Wastewater Association;  
www.txowa.org;  
888/398-7188

## Virginia

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

## Washington

Washington On-Site Sewage Association;  
www.wossa.org;  
253/770-6594

## Wisconsin

Wisconsin Onsite Water Recycling Association;  
www.wowra.com;  
608/441-1436

Wisconsin Liquid Waste Carriers Association;  
www.wlwca.com;  
608/441-1436

## NATIONAL

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

National Onsite Wastewater Recycling Association;  
www.nowra.org;  
800/966-2942

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

## CANADA

### Alberta

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

### British Columbia

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

### Manitoba

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

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

### New Brunswick

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

### Nova Scotia

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

### Ontario

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

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

### Saskatchewan

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

### Canadian Regional

Western Canada Onsite Wastewater Management Association;  
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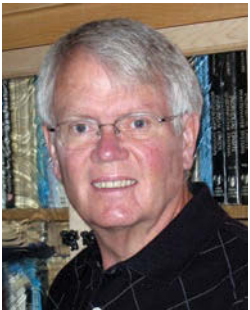
Richard J. Otis, Ph.D., P.E., CEE, is immediate past president of the National Onsite Wastewater Recycling Association. NOWRA represents all aspects of the onsite/decentralized industry. More information can be found by visiting [www.nowra.org](http://www.nowra.org).

# We Have Come a Long Way. Why Don't We Talk About It?

By Richard J. Otis

For years rural homeowners relied on chamber pots, outdoor privies and other rudimentary methods for disposal of human waste. The septic tank was developed in 1930; however, without electric power indoor plumbing for rural homes was not possible. In 1935, the U.S. Rural Electric Administration brought power to rural areas allowing a relatively inexpensive pressurized water system that could pump well water for indoor use.

A suburban housing boom followed World War II and construction outpaced the extension of municipal sewers, creating a high demand for septic systems. As a result, thousands of new homes were built where sewers were unavailable. The Federal Housing Administration (FHA) insured the homes but, unfortunately, 30 percent or more of the septic systems failed within two to three years. Many owners defaulted on their mortgages or simply abandoned their homes, leaving the FHA to take back tracts of homes.



Richard J. Otis, Ph.D., P.E., CEE

It was clear that not enough was known about how septic systems worked. Without adequate rules and sufficient regulatory control, many systems were installed where conditions were not suitable or designs not appropriate. Also, the U.S. Public Health

Service became concerned about exposures to homeowners from diseases such as typhoid fever, dysentery and diarrhea, which were prevalent in much of the country.

In response to the failures, the FHA, through the public health agency, initiated a five-year investigation of septic tank systems. It sought to develop a factual basis for how septic tank systems could be sited, designed, installed and maintained. Volumes of studies were made, culminating with the publishing of the *Manual of Septic Tank Practice* in 1957 (revised in 1969).

The manual cautioned homeowners to maintain a minimum distance of 50 to 100 feet between a well and septic system to avoid well contamination. They also were advised that septic systems should be connected to public sewers when they became available. These recommendations can still be found in local ordinances in many states and counties.

In 1971, the U.S. Environmental Protection Agency (EPA) initiated a series of studies and investigations to conceive, evaluate and develop

satisfactory methods for onsite treatment and dispersal of wastewater. Several universities and institutions also performed studies. Out of this work, the *Onsite Wastewater Treatment and Disposal Systems Design Manual* (Purple Manual) was published in 1980 as a guideline, and it is still used today.

Although septic systems were considered inadequate and a temporary solution until sewers were available, the studies from this work demonstrated that, if constructed and maintained properly, onsite systems can provide reliable and efficient means of wastewater treatment and dispersal at a relatively low cost. As a result, onsite systems gained credibility as a viable wastewater management alternative, providing reliable service and preserving environmental quality.

By the mid-1990s, housing densities were increasing and after years of use, onsite systems were failing. In far too many cases, onsite systems were installed and largely forgotten until they failed. An estimated 10 to 20 percent of these systems malfunctioned each year, causing pollution to the environment and creating a risk to public health.

In 1997, Congress asked the EPA to analyze the costs and benefits of decentralized wastewater treatment alternatives and share plans for implementing effective alternatives. The agency concluded that “adequately managed decentralized wastewater systems are a cost-effective and long-term option for meeting public health and water-quality goals, particularly in less densely populated areas.”

The EPA acknowledged onsite systems are a necessary and permanent part of our infrastructure. Though it doesn't have direct authority to require states to adopt better rules, the agency has published several manuals, developed an active website and provides excellent webinars that provide needed information.

We have come a long way since the 1940s, but there is still much to do. Our industry is poorly understood and largely ignored. If we are to advance, we must reach out to state and county regulators, legislators, manufacturers and, most of all, system owners. We need to listen to and understand each other, including our own biases.

People should be aware of what we do and how it benefits them. The message can be spread through press releases, YouTube, webinars and other means. As an industry, we should take a leadership role and encourage other groups to participate. It's time we make ourselves known and talk about the importance of what we do. If not, how long will our industry last?





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