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OUTBACA

Distracted driving Page 14

Installing trenches and beds Page 24

The latest in ATUs Page 26

1

OUTBA

Outback Porta-Jon tackles challenging site conditions and regs PAGE 6

contents April 2012



COVER STORY

6 Three Peninsulas

By Gil Long well

ON THE COVER: Outback Porta-Jon and owners Steve and Crystal Willson are known among regulators and other installers as problem-solvers, unafraid to take on difficult sites and challenges others avoid. (Photography by Reid Silverman)

12 Rules and Regs: Florida Legislators Propose Changes By Scottie Dayton and Doug Day

14 Breaking Ground: It Only Takes a Second

The slightest bit of inattention while driving can cause a true calamity. It's time to resolve to avoid distractions and stay focused on the job at hand. **By Ted J. Rulseh, Editor**

- 16 Letters to the Editor
- 18 Just Like Nature

An engineered system replicates the cleansing qualities of freshwater streams, meadows, and wetlands in a small business complex in Indiana. **By Scottie Dayton**

20 System Profile: Comforts of Home

A secondary treatment unit with recirculating compartments enables a remote mining camp in British Columbia to use flush toilets rather than latrines. By Scottie Dayton

24 | Basic Training: Beds and Trenches

Proper installation procedures can help ensure a soil treatment area provides effective and long-lasting performance. By Jim Anderson, Ph.D., and David Gustafson, P.E.

- 26 Product Focus: Advanced Treatment Units By Briana Jones
- 28 Case Studies: Advanced Treatment Units By Scottie Dayton
- 30 ATU Directory

34 Expo Review: On Target for Onsite

Vendors at the Pumper & Cleaner Expo offer a variety of products and technologies to improve onsite treatment system performance. By Ted J. Rulseh

38 | Poor People, Poor Soil, Poor Sanitation

An Alabama coalition aims to address severe problems with failing and nonexistent onsite systems in an impoverished region of Alabama. By Doug Day

- 41 Industry News
- 42 Association News News; Calendar of Events; Training & Education

44 Notes from NOWRA: Who's to Blame? To avoid difficult disputes over post-installation issues, get everyone involved in your projects to follow these steps. By Richard Otis, Ph.D., P.E., DEE

45 Delaware Contractor Wins NOWRA Roe-D-Hoe By Ted J. Rulseh



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Seal-R	
BrenLin Company, Inc.	
Clarus Environmental	
Crest Precast, Inc.	
CSI controls	
CSI Controls	
Delta Environmental Produc	cts9
eljen	
Eljen Corporation	15
Fergus Power Pump, Inc	

COMPANY	PAGE
4 <u>GWTC</u>	
GWTC, Inc	
Hedstrom	
Hedstrom Plastics	
Hoot Systems, LLC	13
Infiltrator Systems, Inc	:23
Jet Inc	
NAWT, Inc	41
NETAFIM"	
Netafim USA	
Norweco, Inc	
Norwesco, Inc	7
õ	
3 34 75	

COMPANY PAGE	COMPANY PAGE
4GWTC	Pagoda Vent Company
GWTC, Inc	POLYOK.
Hedstrom'	Polylok/Zabel
Hedstrom Plastics	Presby Environmental, Inc.
Hoot Systems, LLC	Presby Environmental 4
INFILTRATOR'	Rolo Solutions
Infiltrator Systems, Inc	RotoSolutions, Inc
	Salcor Inc.
Jet Inc	Salcor, Inc15
	Septio Services Inc.
NAWT, Inc	Septic Services, Inc
NETAFIM"	Sentronics" Inc.
Netafim USA22	September Inc. 40
Norweco, Inc	ASIM/TECH
Norwesco, Inc	SIM/TECH FILTER, Inc
*	Simple Solutions
OSI	Cimple Colutions IIC 47
Orenco Systems, Inc	Sumple Solutions LLC

APRIL 2012

COMPANY	PAGE
RISIER	
SJE-Rhombus®	
SPI	
SPI - Septic Products, Inc	
Tat Tools	
T&T Tools, Inc	
Septic Vent Concealer	
The Dirty Bird	
The Shaddix Company, Inc.	
A TUFTITE	
Tuf-Tite, Inc	5
Waterloo Biofilter Systems Inc.	
Waterloo Biofilter Systems	, Inc
Wieser Concrete Products,	Inc41
Xerxes Corp.	



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Steve and Crystal Willson, owners of Outback Porta-Jon, have served the Huntingtown area since 2003. (Photography by Reid Silverman)

PENNSULAS

Outback tackles challenging site conditions and strict regulations in the diverse environment and rolling terrain around Chesapeake Bay

By Gil Longwell

utback Porta-Jon is a multi-faceted business that installs onsite systems, pumps, tanks, and rents portable toilets from Huntingtown, Md. Owners Steve and Crystal Willson handle complementary tasks in their third-generation enterprise.

The company's service area lies on three peninsulas, and Steve drives up to 100 miles to do installations, sometimes traveling to the Eastern Shore,

Outback Porta-Jon Inc., Huntingtown, Md.

OWNERS:	Steve and Crystal Willson
FOUNDED:	1961
EMPLOYEES:	4
MARKET AREA:	100-mile radius
SPECIALTIES:	Onsite installations, presale inspections, pumping
WEBSITE:	www.outbackportajon.com

the peninsula between the Chesapeake Bay and the Atlantic Ocean. When he gets to the job site after two or more hours' drive, he may be just 25 straight-line miles from home.

"When I get to a job site, I see friends I have known sometimes since I was a teenager. I feel these relationships. I don't look at what we do as a series of unrelated jobs. Rather, they are parts of many enduring connections my dad or his dad started."

Steve Willson

Together the Willsons have found success in their mostly rural rolling area near Huntingtown, about 45 miles southeast of Washington, D.C. "No matter who answers a customer's phone call, they will always be talking to an owner," says Steve.

The Willsons believe this direct access sets their business apart. In their service area, Steve is known among regulators and other installers as a

(continued)

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Vacuum Truck Memories

Steve Willson's mom often rode with her husband on septic tank pumping rounds. In fact, she did so until the day Steve was born.

"The story goes that dad wanted to stop for coffee, but mom convinced him he could get his coffee after he got her (and me) to the hospital," Willson recalls. "Imagine a vacuum truck pulling up at a hospital ER."

Steve later rode in the truck with his dad and remembers being able to look past a loose-fitting gearshift escutcheon to the top of the transmission. "One day while on a route, dad and I smelled something burning, but we couldn't figure out what it was," he recalls. "I looked down through the escutcheon and saw flames around the transmission. Everyone got out."

The tank-pumping experience was instrumental in breaking the ice when he first met his wife-to-be, Crystal. "I was a waitress at a steakhouse where the Willsons booked a family birthday party for Steve," Crystal says. "Steve saw the last name on my nametag and asked if I lived at a particular address on a particular road. When I said yes, he proceeded to tell me about my dad's septic system."

Working together every day in the family business, the Willsons are never far from a vacuum truck, other machinery, or each other, and they are always exploring ways to build the business for the next generation.

problem-solver, unafraid to take on difficult sites and challenges others seek to avoid.

Nurturing relationships

Steve Willson grew up in his dad's installation and pumping business. Shortly after high school, he started a portable restroom, pumping and installation business. "When dad started to cut back on his hours, I picked up his workload, much like he did with his dad years earlier," Steve recalls.

"When I get to a job site, I see friends I have known sometimes since I was a teenager. I feel these relationships. I don't look at what we do as a series of unrelated jobs. Rather, they are parts of many enduring connections Steve Willson and his team pride themselves on direct, personal contact with customers.

my dad or his dad started. We value and nurture these relationships as friendships. It's all interconnected."

While keeping long-time customers, the company takes a low-key approach to winning new ones. The lettering on the three vacuum trucks promotes all services. Yellow Pages promotions reach three counties, but word of mouth reaches much farther. Crystal is typically the first person callers meet. She also handles accounting and payroll.

Pumping helps feed repair and installation work. "Our vacuum truck operators identify needed repair work, which owners are briefed on," says Steve. "Because our employees are knowledgeable about system repairs, they can present basic information to owners, explaining the significance of the defect discovered."

Water changes everything

When it comes to installations, there's an interplay of regulations, politics and emotions around the largest estuary in North America, where "Save the Bay" signs, bumper stickers and flags are common.

"If a proposed onsite system is within 1,000 feet of the water's edge, specific technologies are required to minimize nitrogen impacts on the bay," explains Steve. Each county may have its own approach to administering onsite system regulations, but each county must satisfy the same statewide regulations. That means different processes in each of the five counties where the company works.

"In these sensitive areas, we are restricted to Hoot, Jet, Norweco and Orenco advanced treatment units that perform denitrification," says Steve. "Management or dispersal of the treated effluent is handled in a variety of traditional ways that take into account the site's water-handling capabilities and the county's preferences."

Even when working a few miles from the Chesapeake Bay or a river, water is a limiting factor in system options. Sites that appear well drained often have major drainage problems with sandy near-surface soils overlying clay that prevents downward water movement. Other sites are truly sandy –

for dozens of feet below the surface. Each condition brings its own challenges, and sometimes opportunities. Soils vary widely from peninsula to peninsula.

Across the service area, the company may install conventional trenches one day, a shallow pressurized distribution bed the next, and pressurized mound the next. If the absorption area is outside the 1,000-foot buffer and the site is suitable for conventional technology, that is the system the county health department will design.

Willson started in the onsite business at an early age, working in his dad's installation and pumping business.



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The right fix

As for repairs, Steve takes the time to understand the site, the existing system and why it failed, and then considers all potential repair options before suggesting a solution. It makes no difference if the problem was discovered by a pumper, during a presale inspection, or by a homeowner who found a squishy spot: The right answer is the only one Steve will offer.

"Not all problems are big problems, but without a thorough investigation, you can't have confidence that your solution is the right solution," says Steve. On one occasion, called to investigate a wet spot in a lawn, Steve felt

"Not all problems are big problems, but without a thorough investigation you can't have confidence that your solution is the right solution."

Steve Willson

obligated to give the homeowner some potential bad news up front. "I told him that if we had to install a new absorption area, it would include an advanced treatment component with a price tag well into five figures," he recalls. "He was astounded. I explained this was because the replacement absorption area encroached a few feet into the 1,000-foot coastal buffer."

Steve got busy and quickly localized the problem to a broken section of Orangeburg pipe. "That gave me good news to share: Only the pipe needed to be replaced, and not the entire system. It was a simple fix, and it was the right fix." By investing time to identify the problem, Steve saved the land-owner significant money and headache. The transaction was the start of a new relationship.

One reason repairs can lead to additional business is that the company leaves job sites well graded and thoroughly seeded. "The quick-buck guys do not take pride in their work and often leave an eyesore for the unhappy customer," says Crystal. "That's not how we do business." Willson cements PVC pipe cement as wife Crystal works on the trench excavation.

The management market

While installations are an important part of the business, system management is gaining importance in the mix. "Mandatory pumping is on its way," says Steve. "Counties are being pushed to take steps to save the bay, and they see periodic tank pumping as the tool to help in that cause."

Steve and Crystal agree that management programs will bring opportunities, but they have a somewhat laid-back attitude about how to capitalize on it. "We will offer management services to landowners when they need to satisfy the various counties' requirements," Steve says. "We will follow that market wave rather than push

it. We'll let the counties drive demand, and we will sell customers their compliance solution."

When the Chesapeake Bay Restoration Program pays to install a repair system, the installation price must include a five-year service contract. After five years, Outback can enter a management contract with the owner. It doesn't matter who installed the system or which technology it uses – all qualified service providers can compete for the business. Steve and his team are constantly expanding their system knowledge so they can perform management work on any technology they encounter.

Management is already a big part of the business. "We have a contract with a county to manage 4,000 individual septic tanks in a single community," says Steve. "The tanks discharge to small-diameter sewers for collection and treatment. We do the tank pumping and repair baffles and similar components as we encounter them."

Crystal adds, "Through another contract, we provide similar services to an entire island where about 500 houses are located. In that case, we do the pumping, and if we identify problems, the county's utility department does the repairs."

Selecting technology

In most new installations and system replacements, customers select the product they will buy, except that in Calvert County, the county is the customer. Because the county uses Bay Restoration funds to pay for the repair, the county selects the technology that the landowner must install and maintain. The health department, through competitive bidding, chose Orenco Systems units for all replacements the county funds.

Atlantic Solutions, an Orenco distributor, won the equipment and installation bid, and Outback is Atlantic's sole installer. "Like Atlantic did with the county, we had to bid for Atlantic Solutions' work," says Steve. "This is a three-year contract, during which we get a fixed fee for every system we install."

The company's price to Atlantic Solutions includes all materials, labor



Ralph Willson (left) and son Steve install an AdvanTex treatment unit from Orenco Systems.

and equipment, except for the Orenco unit, which Atlantic Solutions provides. "Some jobs are a bit tighter than others, but the arrangement has proven profitable for us," Crystal says. They see the future management work as the logical extension of landowner relationships built during installations.

"We will offer management services to landowners when they need to satisfy the various counties' requirements. We will follow that market wave rather than push it." Steve Willson

Well equipped

The locality's diverse terrain and the array of system types require a flexible equipment fleet. The company deploys a variety of machines, including a 2008 John Deere

80C excavator, a 2010 35D John Deere mini excavator, a 2010 John Deere 410J backhoe, and a 2001 260 Bobcat.

Willson uses a 2009 Ford F-350 pickup to tow a 2010 lowboy trailer to move equipment. Equally at ease in the office and in the field, Crystal some-

times works on job sites next to Clifton Tudder and Toby Sealey, both service technicians. Steve is the head installer and operator.

Deploying the right resources, mechanical and human, lets the Willsons continue building systems and relationships that will carry the business into the future. What sets the company apart is talking to customers in a forthright manner and letting them know Outback is there to solve a problem, not sell a job. It is also a business model that binds this husband-and-wife team together.

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Florida Legislators Propose Changes

By Scottie Dayton and Doug Day

Rep. Chris Dorworth introduced legislation that would repeal mandatory five-year septic tank inspections and give local governments the power to regulate them. The bill uses the current statute's mandatory inspections, including who would be allowed to do them, how often they are required, and price caps for each step of the process.

It also makes the measures optional at the discretion of county commissions and allows county health departments to inspect tanks with possible compliance issues. Rep. Marti Coley, who is sponsoring legislation that would repeal the septic tank inspections entirely, was a primary co-sponsor on Dorworth's bill.

Senator Charles Dean filed the Onsite Sewage Treatment and Disposal Systems bill that would transfer onsite permits with the title of the property, provide circumstances when systems are not considered abandoned, assure the system's validity if rules change before final approval of the system, and require an upgrade only if a bedroom is added to a single-family home. If passed, the act would take effect on July 1, 2012.

New Jersey

The state Department of Environmental Protection rewrote legislation passed in 2008 that limits onsite systems and sewers on more than 300,000 acres. Ray Cantor, chief adviser for the DEP, stated that the rules were flawed and could not be implemented.

An overhaul of the solid waste and recycling code by the State Commission of Investigation to combat organized crime infiltration could require pumpers to undergo an extensive criminal background check before obtaining or renewing their licenses.



Rhode Island

Coastal homeowners wishing to extend a wall or add a breezeway will no longer be required to install denitrification units. The state Department of Environmental Management rewrote the rule and suspended the requirement for three years. Only renovations costing 50 percent or more of the assessed value of a home – or a septic system failure – would trigger the requirement to install a denitrification system.

The agency also allowed alternative denitrifying technologies permitted in other states to be used in Rhode Island. A third rule change would allow up to 10 pilot installations of each new nitrogen reduction technology. The agency also plans to re-file legislation requiring onsite upgrades as part of property transfers.

Iowa

About 40 people in Washington County have filed a class action suit against a planned regional wastewater treatment plant. Residents for a Better Richmond contend that the town could comply with state and national laws by buying new septic systems for all 83 homes for less than it is spending on a new lagoon treatment plant.

The Department of Natural Resources has already fined the unincorporated town of Richmond for allowing sewage to be dumped into a ditch and has threatened further action if pollution violations are not addressed. The town offered residents \$1 and free hookups in exchange for easements to use their land for the collection system. Those who did not grant easements would be charged \$6,000 to connect, along with a \$2,000 fee. The suit alleges that that fee is both illegal and unenforceable.

Maryland

Four western counties have formed an advocacy group to lobby for the interests of rural counties in the state. One key bill the group will oppose in 2012 would set restrictions on septic systems. Each county has contributed \$5,000 in seed money for the Maryland Rural Counties Coalition, which has hired two lobbyists. The group is recruiting other rural counties in an effort to have a larger voice on the septic system issue and other matters of concern to rural areas.

Missouri

As many as 50 failing septic systems in the Ozarks of Missouri will be replaced this year by Ozarks Water Watch, the same number as 2011, under a \$1 million grant from the state Department of Natural Resources. The program is targeted for homes in the Upper White River Basin. More information is available at 417/739-5001. An application package is available at www.ozarkswaterwatch.org.



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It Only Takes a Second

The slightest bit of inattention while driving can cause a true calamity. It's time to resolve to avoid distractions and stay focused on the job at hand. By Ted J. Rulseh, Editor



A bout 20 years ago I almost killed my whole family. We were driving the four-lane back home from a vacation in fairly heavy traffic on a Saturday morning. Behind our station wagon I was towing a small boat, filled with suitcases and other gear we couldn't fit into the car.

It all happened in an instant. I diverted my eyes from the road to check the traffic in the rear-view and see how the boat was tracking. It couldn't have been more than two or three seconds. When I looked ahead again, the brake lights of the car in front were glowing red and I was closing in fast.

Thinking my stopping distance would be long with the boat in back, I jerked the wheel left instead of braking and swerved into the left lane. That would have been a safe move – if not for the boat, which didn't want to stop swerving. When it pulled us toward the shoulder, I swung the wheel right. In no time we were fishtailing between the left lane and the ditch while I fought for control.

Distracted driving kills. The DOT says that in 2009 alone, 5,494 people were killed and 448,000 more were injured in distracted driving crashes. Cellphone use was reported in 18 percent of distraction-related fatalities.

I regained it. At the next exit I pulled off, took a good look at my wife and young son and daughter, and got out to make sure the boat was still secure on the trailer. I'm not sure how close my family thought we had come to oblivion; I only know I had to take a break and let the nerves settle before getting back on the road. Never before or since has it been more clear what a little inattention at the wheel can do.

Too much nagging?

It seems these days we get lots of messages about inattentive or distracted driving – largely but not solely related to cellphones and texting. No less than the U.S. Department of Transportation has a website (www. distraction.gov) that aims to combat distracted driving in all its forms. The DOT lists three kinds of distracted driving:

• Manual: Taking your hands off the wheel.

- Visual: Taking your eyes off the road.
- · Cognitive: Taking your mind off driving.

Why all this attention? Because distracted driving kills. The DOT says that in 2009 alone, 5,494 people were killed and 448,000 more were injured in distracted driving crashes. Cellphone use was reported in 18 percent of distraction-related fatalities.

Think about how easy it can be, driving from one work site to another, to be distracted with thoughts of business issues, or to make that cellphone call to a customer or regulator, or to glance down at the phone to read an incoming text. And how much more dangerous is that if you're pulling a trailer with heavy equipment aboard?

Am I immune? No. I've made phone calls while under way. A few times while going down a wide-open freeway I have opened a Web page on my smartphone, to check a sport score or a stock average. I have never texted – *but still*. After my experience, you would think I'd know better than to let my attention drift.

All it takes...

Experience teaches that a lot can happen in that instant when we're not looking where we should be. For example, the DOT says sending a short text message while driving takes your eyes off the road for 4.6 seconds on average. At 55 mph, that's like driving the length of a football field blindfolded.

We might tell ourselves that driving the open freeway is different from being on an urban two-lane highway. And it is -but still. Any number of things could cause a crash on what seems like a clear road. A deep pothole. A deer darting out of the woods. Just plain drifting over toward the shoulder. A patch of ice.

The statistics on distracted driving are sobering. For example, the Virginia Tech Transportation Institute (VTTI) says texting is the most dangerous cellphone-related task done behind the wheel: A truck driver texting is 23.2 times more likely to have a crash than a trucker fully focused on driving. Other studies show:

- Drivers using handheld devices are four times more likely to get into crashes serious enough to cause injury. Using a headset phone is not much safer.
- Using any cellphone while driving delays reactions as much as having a blood alcohol concentration at the legal limit of .08 percent.
- Driving while using a cellphone reduces the amount of brain activity associated with driving by 37 percent.

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It's not that hard

As work and travel season resumes with the end of winter, it's worth remembering the dangers of distracted driving. These days, people in service businesses face huge temptation to "stay connected" and "be productive." Are you or your team members routinely taking or making phone calls while driving? Or, heaven forbid, dealing with text messages while in a work vehicle?

What I tell myself repeatedly is this: If it's important enough to make that call or read that text or check that website, it's important enough to find a safe place and pull over. Does that sound like a good policy to live by? I'm willing to try it if you are.

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letterstotheeditor

Another View on Pump-to-Gravity

In response to your article on pump-to-gravity onsite systems (*Onsite Installer*, December 2011), I have worked for 22 years in the northernmost county in Virginia. I differ 180 degrees with your article. Our experience is quite opposite, and that is interesting because usually that is not the case with articles I read, such as yours.

We have found, and we have done studies, that pump-to-gravity systems are our most reliable systems with the lowest failure rate and a lowmaintenance cost. Pressure systems such as low-pressure distribution and drip systems are high maintenance. Due to orifice plugging and valve clogging in the LPD systems, we have poorer distribution than with the gravity pumps.

I must qualify this with the fact that we design all of our gravity pump systems to pump at least 3 gpm per lateral and 0.4 gallons per foot of trench (3 feet wide). I have inspected many of these systems and right after running the pump I find water at the ends of the lines, especially when the lines are 70 feet or less in length.

So my thought is that we are getting total trench distribution without the larger pump size, design and clogging issues of pressure systems. Also, since most of these systems pump only once per day, it allows the trench to dry out and get oxygen between pump events, thus reducing the biomat. Of course, that also kills off the bugs, so I don't know about the quality of treatment, which probably would not be as good as in a time-dosed situation.

Jerry Franklin Loudoun County, Va.

Failing Systems

In response to your column of failing septic systems ("Failures: How Prevalent?" *Onsite Installer*, February 2012): I have been a septic system inspector licensed in Massachusetts since the first day the Title 5 code came into effect in April 1995.

Since then, I have conducted 1,539 inspections, mostly in the western part of the state. Here we have a lot of mountaintop soils, which are glacially compressed, silty and rocky. We also have our fair share of wetlands. Most of my inspections were also witnessed by a local Board of Health official, as sometimes required by local ordinances.

Title 5 is a severe code and has caused much wailing. It will fail a septic system if any part of the leaching system is ever in groundwater, or if the leachfield backs up as little as an inch of water, as seen in the distribution box. I don't like to fail a septic system, but it sometimes leaves little room for doubt.

Over the years, I have kept a full database, so I can state that 324 systems failed, so that is a 21 percent failure rate.

Tom Leue, R.S. Homestead Engineering Inc. d.b.a. Homestead Inc. Williamsburg, Mass.

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Just Like Nature

An engineered system replicates the cleansing qualities of freshwater streams, meadows, and wetlands in a small business complex in Indiana

By Scottie Dayton

hree solar tanks, a lagoon, and a marsh inside a 28- by 48-foot greenhouse treat wastewater from 50 people in an office building, private studio, and family residence in Albany, Ind. The natural purifying process takes one to two weeks, eliminates sludge, and produces effluent that meets and exceeds permit parameters.

Designed by John Todd at Ocean Arcs International, Woods Hole, Mass., and upgraded by Erin Wilson, Class 4 operator at the Muncie Wastewater Facility, the Solar Aquatics System is licensed by the state as a wastewater treatment plant. The state also mandated that Todd design it with far more capacity (1,750 gpd) than was needed for treatment. Class 1 operator Bill Duell runs the facility.

Over-engineered

Wastewater gravity-flows through 4-inch PVC laterals to a lift station with two alternating Zoeller grinder pumps that send liquid 250 feet to a

"In summer, the loop treats so much ammonia that effluent numbers are almost below my permit levels." Bill Duell

3,200-gallon circular concrete equalization vault. All plumbing is 1.5-inch PVC pipe.

The vault has a welded aluminum lid with trap doors, a convex bottom, 20 feet of hydraulic head, and two Series 151 Zoeller solids-handling pumps. "They were too large for our needs, but I couldn't find anything smaller," says Duell.

The pumps in the vault alternate 15 minutes on and off, sending 29 gpm 10 feet to a distribution box in the greenhouse. The box, made of translucent plastic and holding 78 gallons, allows sunlight to penetrate and begin treating the water.

The influx is too much for the less than 1 gpm flows through the system, so Wilson designed a weir and flume for the distribution box. Water swirls around for 2.5 minutes; then half of it enters the system and the rest returns to the equalization vault.

The system is aerated by a blower cycling 21 minutes on and 24 minutes off. When it activates, a 9-inch fine-bubble diffuser in the distribution box agitates the wastewater into a homogenized mixture, while the recirculation loop continues to expose it to sunlight and air.

Three 650-gallon vertical circular solar tanks, the first element of the system, each have a 9-inch fine-bubble diffuser supplying air at 2 psi. The retention time in each tank is two days. (Photos courtesy of Bill Duell)

A grow lamp hanging over the distribution box burns continually. "It really does affect treatment," says Duell. "In summer, the loop treats so much ammonia that effluent numbers are almost below my permit levels."

Sunny and warm

Leaving the distribution box, liquid flows to the first of three 650-gallon vertical circular solar tanks set in series. The custom-made, double-walled





ABOVE: On the left, native plants continue the treatment cycle in the lagoon, the second element of the system. The solar tanks are to the right. BELOW: Stone and plants mimicking a marsh environment create the third element of the solar aquatic system.



450-pound fiberglass tanks each have a 9-inch fine-bubble diffuser supplying air at 2 psi. The retention time per tank is two days.

Two tanks have a clump of native marsh grass suspended on two rods over the liquid, and one has bulrushes. The long roots function as habitat for bacteria that consume the nutrients, while the plants remove some ammonia.

Liquid gravity-flows through the solar tanks, then travels 30 feet to a 50-gallon radial flow separator that removes most solids. The unit is from the aquaculture industry.

When sludge builds up in the separator, Duell drains most of the liquid back to the equalization vault before scooping out the solids. He lines 10-inch fabric aquatic plant containers with fiberglass window screening and newspaper, then dewaters the solids in them.

When the material reaches the proper consistency, he rubs it through a 1/4-inch mesh screen to form pellets. After they bake dry on a bench covered with black plastic to absorb more solar heat, Duell composts them for use as fertilizer.

More vegetation

From the separator, liquid flows 30 feet to the front of a 30- by 7- by 3.5-foot-deep tank. Water enters this 5,000-gallon "lagoon" by spilling into a vertical 24-inch perforated drain tile with a basket of Bio-Balls (multi-faceted media that provide a large surface to grow ammonia-neutralizing bacteria). "It's also a quiet chamber that traps the last remaining solids," says Duell.

Besides sunlight hitting the lagoon, staggered floating boxes with native plants Duell harvested from creeks and ponds continue the treatment cycle. At the rear of the lagoon, a standpipe pulls water into a 30-foot pipe plumbed to the front of a 15- by 7- by 3.5-foot-deep tank with stone and plants, mimicking a marsh environment. This provides final polish for denitrification and eliminates pathogens.

After entering a UV light tube, liquid passes through a flowmeter and drops into a 100-gallon animal water trough with two 9-inch fine-bubble diffusers. When the blower activates, the aerators raise the dissolved oxygen level to 8 or 9 mg/L. When the blower shuts off, the supercharged liquid maintains incoming oxygen-depleted water at 7.5 mg/L, or 1.5 mg/L above the plant's permit number.

Water discharges into a slotted 12-inch county drain tile. "At our flows, we probably have total absorption within 200 feet, and the liquid never reaches Campbell Creek 1.5 miles away," says Duell.

Water Tight Structures 2 Compartment





Comforts of Home

A secondary treatment unit with recirculating compartments enables a remote mining camp in British Columbia to use flush toilets rather than latrines By Scottle Dayton

old miners at the remote Brucejack 150-man camp north of Stewart, B.C., had to dig latrines by hand. Helicopters air-lifted preassembled timber outhouses from the staging point, Grand Duke, 30 miles and one mountain range away.

Users found that frigid air blew in under the ground seal on the privies. When the hole was full, they backfilled by hand, dug a new pit, and summoned the helicopter to move the outhouse.

"A 40-foot container serves 150 people, but would have to be dragged across the glaciers by a tracked Snow Cat in spring. We opted for two 20-foot containers that could be flown in." Eerik Lilles, PE.

Camp manager Rob Cote consulted with Eerik Lilles, P.E., of Wildernest Systems in Smithers on ways to improve lavatory conditions before the next winter. Lilles saw that most large conventional systems were not feasible. "We couldn't fly in concrete and mix trucks and build something," he says. "Furthermore, the owners didn't want anything permanent or semi-permanent."

Location:	North of Stewart, B.C.			
Facility served:	Brucejack gold mining camp			
Designer/Installer:	Eerik Lilles, P.E., Wildernest Systems, Smithers, B.C.			
Site conditions:	Super-fine silt till, water table at surface			
Type of system:	Recirculating packed bed filter with surface discharge			
Hydraulic capacity:	5,000 gpd			



A heavy-lift helicopter lowers the container with the AdvanTex AX-Mobile treatment system. (Photos courtesy of Wildernest Systems)

Lilles had used AdvanTex AX100 textile treatment modules from Orenco Systems in other designs and knew about the AX-Mobile, a portable, aboveground system using recirculating packed bed filters.

"A 40-foot container serves 150 people but would have to be dragged across the glaciers by a tracked Snow Cat in spring," says Lilles. "We opted for two 20-foot containers that could be flown in." The fully plumbed units enabled workers to use flush toilets instead of pit latrines.

Site conditions

Soils are super-fine silt till with groundwater at the surface. The camp sits at the top of Knipple Glacier, just south of Brucejack Lake. The Pacific

CVCTEM DDOEII E



Ocean moderates winter temperatures to minus 4 degrees F or above. High winds blow massive amounts of snow through the mountain pass.

System components

Lilles used a flow rate of 25 gpd per person to size the 5,000 gpd system. It includes:

- Automatic grease trap
- 90-gallon fiberglass wet well with 1/2 hp, 50 gpm Grundfos duplex 2-inch solids handling pump
- AX-Mobile-20 treatment system in two 20- by 8- by 10-foot insulated fiberglass containers
- Two Hallet-30 UV disinfection systems from UV Pure Technologies

System operation

Wastewater and graywater flow 200 feet through a 4-inch insulated PVC gravity line to the 72-inch wet well. On demand, 50-gallon doses are pumped through a 2-inch insulated pipe to the 7,500-gallon T-Max primary container with insulation embedded in its 4-inch-thick molded fiberglass walls. The container is the septic tank.

After liquid passes through an FT1254 effluent filter, it flows through a 4-inch insulated pipe to the inlet of the three-compartment AX-Mobile container serving as the tank for the treatment system.

As influent enters the 3,000-gallon recirculation-blending chamber, it mixes with filtrate dripping from the hanging textile media. A pump in the recirculation-pump chamber at the opposite end of the inlet draws blended influent through a one-way transfer line, sending 100 gallons per hour to a manifold above the textile media.

Orenco spin nozzles distribute the liquid to the media for further treatment. As it percolates through the textile sheets, microorganisms remove impurities. With each dose, some effluent drips into the 1,500-gallon recirculation-filtrate chamber before dispersal.

A baffle divides the flow between the recirculation-blend and recirculation-filtrate chambers, and a recirculation-return valve controls the liquid levels. No wastewater passes into the second chamber without first flowing through the media. Peak hydraulic retention time is two-and-a-half days.

Effluent in the final clear well averages 60 degrees F. "Hot water from the shower, laundry, and kitchen facilities keeps it from becoming too cold," says Orenco engineer-in-training Ted E. Kulongoski. "Should it fall to 40 degrees or below, we have an optional heating unit."

Before discharge, liquid passes through the UV disinfection unit at the

ABOVE: Camp workers use a 200 LC X-axis Hitachi tracked excavator to backfill around the system. RIGHT: Orenco engineer-in-training Ted E. Kulongoski checks the control panel readouts on his laptop computer. The UV disinfection system is to his right.



rear of the container. Effluent is expected to average 10/10 mg/L BOD and TSS with zero pathogens and runs downhill through an insulated 2-inch line. Camp generators power the system.

Installation

Lilles ordered the components and coordinated trucking them to Grand Duke, a 60-minute drive north of Stewart on a rugged service road. Meanwhile, camp workers leveled the top of a small knoll with a 200 LC X-axis Hitachi tracked excavator, dug the hole for the wet well, and bedded the area with six to eight inches of rock from the site.

When the containers arrived in October, Cote sent a heavy-lift helicopter to carry them over the mountains, a 12-minute journey. "Each module weighs more than 6,000 pounds, and the helicopter's carry capacity was 5,500 pounds," says Kulongoski. "We had to remove about 500 pounds of material and textile before it could lift off."

The pilot lowered the units onto the bedded pad and next to each other, then returned with the extra cargo and components inside a large net slung



beneath the helicopter. While workers buried the wet well – a fiberglass riser with a bottom – at grade next to the T-Max container, Lilles hooked up and tested the components. Kulongoski trained the camp operators in the system's operation and maintenance.

The treatment unit has no control room. The prewired control panel at the back of the container has a touchscreen on the outside of the door, enabling operators to check system performance at a glance. Snow management personnel shovel any accumulation more than 12 inches, keeping everything accessible.

Until the camp was wired for satellite Internet connection, Lilles asked the operators to check the control panel daily for alarms and to take the temperature of the effluent weekly.

Maintenance

Wildernest Systems handles maintenance and monitors the system remotely. The control panel had no problem handling the power outage when the camp turned off the generator once a week to change the oil.

MORE INFO:

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Jim Anderson and David Gustafson are connected with the University of Minnesota onsite wastewater treatment education program. Dave is Extension Onsite Sewage Treatment Educator. Jim is former director of the university's Water Resources Center and is now an emeritus professor, as well as education program coordinator for the National Association of Wastewater Transporters. Readers are welcome to submit questions or article suggestions to Jim and Dave. Write to ander045@umn.edu.

Beds and Trenches

Proper installation procedures can help ensure a soil treatment area provides effective and long-lasting performance By Im Anderson Ph.D. and David Sustation, PE

e have been looking at systems that use gravity to move the effluent. This month we complete this part of the discussion by looking at installing soil treatment trenches or beds.

Most codes we see define trenches and beds. Most recognize trenches as being no more than 36 inches wide and beds as being anything wider. Codes usually specify a maximum bed width. As always, it is important to know the requirement for your state or area. Typical bed widths are 10 to 12 feet.

It is also important to know the requirements for separation from the bottom of the trench or bed to limiting soil condition – bedrock or the water table. For this reason, some states, including our state of Minnesota, have a maximum depth of excavation of 48 inches. This helps ensure that the system is kept shallow and uses the best part of the soil profile for treatment.

Trenches preferred

When we get involved in designing gravity systems, we always use trenches. Trenches allow for better oxygen exchange under and around the system. They also have more infiltrative surface area for the same bottom area, allowing for better treatment. Having trenches also reduces the likelihood that the bottom is compacted or smeared due to traffic during installation.

The bottom of the trench or bed should be excavated level. When a bed is excavated, it is important not to drive over the bottom. If you use a bed, you should excavate by working around the perimeter. Remember: one key to good installation is to keep the soil in its natural condition.



When installing trenches on sloping sites, it is even more critical than usual to identify the elevation of

Mottled soil indicates saturated conditions. Systems need to be installed far enough above such layers to provide proper separation from groundwater.



A trench installed level and on the contour.

any limiting soil condition and to maintain the required separation. If you use a tracked backhoe, you'll need to create a pad from which to work so that you can dig the trench level and on the contour. Check your local requirements for the maximum slope allowable. In most codes, we see a maximum of 15 percent.

Wheeled backhoes can usually be leveled using stabilizers. If the soil is deep enough, you can create a bench on the upslope side of the trench being excavated. You then place the spoil downslope to create a bench to set the equipment on to excavate the next trench. Where the soil is shallow, you may have to use a mini excavator perpendicular to the slope and use the blade to stabilize the machine.

Proper filling

The excavations will be filled to the proper level with the selected media. In the old days, the media was always clean rock, three-fourths to 2.5 inches in size. These days, we have a number of media choices.

The trench media has five functions: distribute effluent, provide water storage area, dissipate energy, insulate, and prevent root penetration. In



A level bed installed using EZflow media from Infiltrator Systems.

general, there is little treatment in the media itself – it serves primarily to maintain the trench form and distribute the effluent. We see proprietary products on the market today that claim to enhance treatment in the media – these are relatively new to the scene.

If you use rock media, take care when placing it so that you do not damage the soil infiltrative surface. In other words, don't simply drop the rock from the bucket of the front-end loader. Work your way around the system and place the rock in smaller increments.

You then place the 4-inch distribution pipe level and cover it to a depth

In general, there is little treatment in the media itself it serves primarily to maintain the trench form and distribute the effluent. We see proprietary products on the market today that claim to enhance treatment in the media — these are relatively new to the scene.

of two inches with rock. A geotextile fabric placed over the top of the trench then prevents fines from filtering through the rock and sealing the soil infiltrative surface. Finally, backfill the system to provide a minimum of six to eight inches of cover.

Media alternatives

Other recognized media include chambers, gravelless pipe, and expanded polystyrene, as well as a few others. Chambers are usually constructed of high-density plastic. There are a number of such products on the market. They generally have a plastic dome with slots or orifices cut in the sides and are open on the bottom.

Gravelless pipe is a corrugated pipe, usually 12 inches in diameter. The corrugations are usually one-half to three-fourths-inch separations. The pipe also has half-inch orifices in the bottom, and they are placed at the four o'clock and eight o'clock positions. The pipe itself is wrapped in a geotextile fabric. The pipe is made to be in direct contact with the soil so that the biomat forms at the pipe/soil interface.

The expanded polystyrene media comes in 10-foot sections with a 4-inch corrugated pipe surrounded by the polystyrene. The material is held together with polyethylene netting. The sections can be placed in various configurations according to manufacturers' instructions.

Common ground

All these media also require level excavation. Chambers are laid in the trench and then the sidewall area is backfilled with soil and stepped in with minimal pressure. The area is then over-backfilled to allow for settling and to ensure that runoff water is diverted from the system.

The gravelless pipe is laid in the trench and backfilled with soil in small increments to ensure that the pipe does not move. The area is then backfilled and crowned for settling and runoff. A similar procedure is used for the polystyrene media.

For all products, check and follow exactly the manufacturers' recommendations for installation. Next month we cover aboveground systems: mounds and at-grades.



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Advanced Treatment Units

By Briana Jones

Second stage nitrification

NitriFAST systems from **Bio-Microbics** provide second stage nitrification when wastewater contains higher than normal nitrogen levels or when effluent requirements for ammonia/total nitrogen require higher levels of nitrification. The system improves the nitrification of a complete biological removal system with the same technology as the company's other FAST systems, which reduce nitrogen levels. Multiple processes



occur simultaneously with integrated fixed-film treatment that provides a high surface-to-volume ratio to maintain strong microbial growth during low, average and peak usage. 800/753-3278; www.biomicrobics.com.

Simple ATUs

Bluewater aerobic treatment units are designed to be simple, strong and efficient. The units have no moving parts and deliver effluent with less than 5 mg/L BOD and 8 mg/L TSS. They are certified and listed as Class I Advanced Treatment Units by NSF, and are self-contained, compact, easy



to transport and quick to install. There are no control panels to program, and no internal vanes or pumps. The entire system can be hooked up in about three hours. The ATUs break down 100 percent of organic waste, leave no odor, and operate 20 times faster than a septic tank, according to the manufacturer. Minimal maintenance is required. 615/663-0500; www. bluewateratu.com.

Sand filter system

The **GSF geotextile** sand filter system from **Eljen Corp.** is comprised of a two-stage Bio-Matt pretreatment process that provides treatment and disposal in the same footprint. Installation is easy, and maintenance in minimal.



The unit complies with the requirements of ANSI/NSF Standard 40 protocol.

Septic tank effluent is filtered through the Bio-Matt fabric while the module's design provides a large surface area for biological treatment. Open-air channels within the module support aerobic bacterial growth on the geotextile fabric interface. Effluent passes through the unit and slowly drips into the specified sand layer that surrounds it. The result is an unsaturated flow zone. 800/444-1359; www.eljen.com.

Cloud-based monitoring

The **Generation VI** product line from **Envirocycle USA** includes the 600, 1,200 and 3,600 gpd treatment systems. New treatment technology and clean manufacturing processes make the units easy to install and transport. Products meet



all three NSF certification requirements. With minimal external connections and no on-site internal plumbing or wiring required, the systems can be installed quickly with minimal training.

EnviroSentry remote monitoring and control cloud-based system with military-level encryption and communication security provides individual real-time treatment unit control, two-way customer messaging, automatic contact billing, three-level service scheduling, paperless field reporting, Android and iPhone app and widget interfaces, and predictive service notification features. 888/694-4633; http://cole.thesepticexperts.com.

Commercial plants

Commercial wastewater treatment plants from **Jet**, **Inc.** are modular to allow for phased buildout and can treat up to 300,000 gpd. The plants use an aerobic digestion process that enables microorganisms to



transform wastewater into a clear, odorless liquid. Assistance with design, engineering, construction, and 24/7 technical support is available. 800/321-6960; www.jetincorp.com.

Advanced oxidation

The **advanced treatment system** from **Koi Environmental** includes a compact, high-efficiency, low-energy cold plasma ozone generator. Generating ozone and then combining the ozone and mixed oxidants with polychromatic UV light provides a level of treatment for a broad range of contaminants.



The system uses advanced oxidation, which involves a saturated oxidative environment for removal of traditional contaminants like settleable solids, dissolved and suspended solids, pathogens, and odors, as well as nontraditional contaminants such as formaldehyde, disinfectants, solvents, pesticides, and hydrocarbons. The low-maintenance modular system requires minimal operator skills. 800/980-9898; www.koienvironmental.com.

Green treatment unit

The **Singulair Green** wastewater treatment unit from **Norweco** treats up to 600 gpd and is ANSI/NSF Standard 40 certified. It uses polyethylene single-tank technology with integral pretreatment, flow equalization and disinfection.



The multidirectional ribbed design is UV

stabilized, durable, leakproof and corrosion resistant. The unit weighs less than 1,000 pounds and is easily installed by two people with a backhoe. The system offers a solution to tank delivery challenges, such as limited site access and steep grades. Structural integrity allows the tank to be buried with up to three feet of fill on top. 800/667-9326; www.norweco.com.

Vacuum technology

VBT (vacuum bubble technology) from **O2 Aeration Technologies** is designed to enhance BOD removal by improving the performance of aerobic bacteria in consuming organic wastes. VBT aerators create bubbles with vacuum rather than pressure. The bubbles are a fraction of the size of bubbles from pressure aerators, so they collapse under the weight of the water and are neutrally buoyant.



The tiny bubble size ensures maximum surface contact with water. Because the bubbles do not race to the

surface, they can last for many minutes and provide high oxygen transfer potential to the effluent. 888/801-1586; www.paulswoyerseptics.com.

Self-contained module

The AdvanTex AX20-RTUV treatment system from **Orenco Systems** is a complete, self-contained module for treating septic tank effluent. A four-in-one design performs recirculation, treatment, discharge, and disinfection in a single unit instead of separate tanks or basins. All interior components on the plug-and-play module are pre-plumbed.



The unit is easy to maintain and access. It can be shallow-buried for use between an existing functional septic tank and a functioning drainfield. It also offers a replacement option for failing systems. The UV unit is protected within the tank, and its electrical ballast is protected inside the control panel. It uses no chemicals, has no moving parts, and needs only annual cleaning, and every-other-year bulb replacement. The unit treats waste to less than 10 mg/L BOD5 and TSS, producing clean, odorless effluent. 800/348-9843; www.orenco.com.

STEP system

The **Polylok STEP** (septic tank effluent pump) system draws effluent from the middle layer (clear zone) of a septic tank, filters the remaining unwanted solids, then pumps the effluent to either a dispersal field or wastewater treatment system. The system installs quickly in a 24-inch-diameter opening in concrete or fiberglass tanks.



The dual-compartment design allows the filter cartridge to be removed without pulling the pump or the entire vault. The system includes a polyethylene basin, effluent filter, 0.5 hp high-head turbine effluent pump (10, 20 and 30 gpm versions available), internal piping, float switches and a control panel. 800/701-3946; www.polylok.com.

Advanced treatment

The Advanced Enviro-Septic (AES) system from **Presby Environmental** is an effective, passive and nonmechanical onsite wastewater treatment system for residential, commercial and community use The system is NSE Class L certified a



use. The system is NSF Class I certified and BNQ certified for secondary and advanced secondary treatment.

It can remove up to 99 percent of wastewater contaminants by establishing multiple bacterial treatment environments throughout the system that break down and digest contaminants that leave the septic tank. The natural process allows the system to discharge highly purified wastewater, preventing soil clogging and groundwater contamination. No electricity or replacement media are required. 800/473-5298; www. presbyenvironmental.com.

3G UV disinfection

The **3G** ultraviolet onsite wastewater disinfection unit (UL and cUL Certified) from **Salcor** features a foulingresistant Teflon lamp covering, quick installation, minimal annual maintenance, and low energy use. The 3G unit is listed by Underwriters Laboratories for USA and Canada (cUL) under Standard 979 for treating onsite effluent. Applications include residential, commercial and municipal. The unit passed 30-day submerged testing and is rated NEMA 6P (flood proof). It can operate in the ground or in a pump tank, eliminating the need for an aboveground control box or panel.



Other features include an alarm circuit, a rugged heavy-

clad conformal-coated circuit board, electrical surge protection, and virtual elimination of electronic noise (EMI). Electronic components are mounted on the underside of the top cover of the electrical enclosure, to avoid condensed liquid collection and provide user-friendly access. 760/731-0745.

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Advanced Treatment Units

By Scottie Dayton

COMBINATION SYSTEM REDUCES FOOTPRINT

Problem

The drainfield had failed on the onsite system serving a three-bedroom home in Juneau, Alaska. The lot was too small for a replacement drainfield, and direct discharge was not an option.

Solution

Sloan Swendsen, co-owner of Juneau Septic Services, installed a Platinum submerged aerated filter for secondary treatment with **Puraflo peat fiber bio-filters from Anua**. The aerated filter has a pump package in the clarifier, eliminating the pump tank and reducing the footprint. The two biofilters, on an inground gravel dispersal bed, further reduced the footprint.

RESULT

Effluent averages 5 mg/L BOD and 5 mg/L TSS with 95 percent fecal coliform reduction and no pathogens. 336/547-9338; www.anua-us.com.

DECENTRALIZED DESIGN BENEFITS A COUNTRY CLUB

Problem

The design engineer for Keene Manor Estates, a country club development in Nicholasville, Ky., needed wastewater treatment options. The initial plan of drainfields in every backyard failed to meet the aesthetic quality sought by the owners.

Solution

The engineer turned to Clarus Environmental to provide decentralized collection using filtered septic tank effluent pumping (STEP) systems, a recirculating gravel filter, and drip distribution that irrigated portions of the golf course. Clarus helped the engineer with force main design, treatment system sizing, and drip field zoning and layout.

RESULT

The system, operational and trouble-free since 2007, led to more consistent, professional, and effective wastewater management. 800/928-7867; www. clarusenvironmental.com.

AEROBIC TREATMENT UNIT SAVES A HOME

Problem

A failed onsite system on lakefront property in Kendallville, Ind., had to be repaired or the county would condemn the home. Poor soil conditions and the small lot ruled out a replacement drainfield.

Solution

Hydro-Action donated an advanced aerobic treatment unit to treat the wastewater and remediate the soil. The county approved the solution, and the failed drainfield was removed.

Result

Effluent sampling averaged 9 mg/L CBOD, 15 mg/L TSS, and 7.1 to 8.3 pH. 800/370-3749; www.hydro-action.com.

PACKAGE PLANT BRINGS A SCHOOL INTO COMPLIANCE

Problem

For more than five years, the 3,700 gpd (design) suspended growth-extended aeration treatment plant at the Brisbane Public School in Erin, Ont., failed to meet effluent limits of 10 mg/L CBOD5, 10 mg/L TSS, 2 mg/L total ammonia nitrogen (TAN), 4 mg/L TKN, and 4 mg/L nitrate.







The use of fiberglass underground tanks for onsite wastewater systems has grown dramatically over the past 10-15 years. Consider some of the many reasons why fiberglass is the preferred choice.

Benefits of Xerxes tanks include:

- One-piece construction No field installation of components or seams that can leak.
- Factory Manufactured No need to form and fabricate a tank in place resulting in fast, easy installation
- Proven Track Record Xerxes tanks have been used for nearly three decades for storage of petroleum products where watertight is the only acceptable design standard.
- Strong Design Standard tanks are designed for burial depth to 7 feet, water table to grade AND an H-20 load rating.

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Solution

Facing fines, the school board turned to Waterloo Biofilter Systems. Waterloo engineers replaced the original system with a Biofilter absorbent filtration unit and WaterNOx nitrogen removal system, both in a 40-foot SC-40 shipping container. Installation was completed during summer vacation, and the plant was ready for the first day of school in 2009.

RESULT

The system attains medians of 6 mg/L CBOD5, 7 mg/L TSS, 0.3 mg/L TAN, 1.6 mg/L TKN, and 4.9 mg/L nitrate. It reduced energy consumption by 78 percent and cut operation and maintenance costs by 46 percent, saving the school \$5,900 per year. 519/856-0757; www.waterloo-biofilter.com.

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installer Acrobic Treatment Units and Other Onsite Treatment Systems Meeting NSF Class I Certification 2012

Manufacturer	Brand	GPD	Released	Description	Distributors In
Anua PO Box 77457 Greensboro, NC 27417 800-787-2356 336-547-9338 Fax: 336-547-8559 info@anua-us.com www.anua-us.com	Platinum	480 to 955	2011	Fully-packaged wastewater treatment system for single-family homes as well as small communities and commercial projects. The key features are the robust treatment, low power consumption and reduced maintenance compared to conventional activated biomass plants.	AK, AL, AZ, DE, GA, IN, MD, MN, NJ, NY, NC, OH, PA, TX, VA, WY and Canada
Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227 800-753-3278 (FAST) 913-422-0707 Fax: 913-422-0808 sales@biomicrobics.com www.biomicrobics.com BIO-MICROBICS See ad on page 11	MicroFAST 0.5, 0.75, 0.9 & 1.5 BioBarrier 0.5, 1.0 & 1.5	500 to 1500	2007	Alternative to conventional septic systems, MicroFAST wastewater treatment systems are ideally suited for use in new construction, renovations, and repair for nitrogen-sensitive areas. Treatment quality allows for reductions in distance to groundwater and field size requirements. This system provides advanced wastewater treatment options over the conventional septic system alternative. Based on environmentally sound and simple scientific principles, this proven system maintains exceptional microbial growth during low, average and peak usage; increases sludge settle-ability and eliminates sludge bulking. All FAST systems utilize a completely submerged fixed film process along with a passive recycle process and have demonstrated the effectiveness at removing nitrogen levels at exceptionally high percentage rates. FAST systems are engineered to fit most treatment capacities between 150 to 160,000 GPD for residential, commercial and even marine applications. NSF/ANSI Std. 245 Nitrogen Reduction.	Most US States, Canada, Mexico and 60+ Countries Worldwide
Clarus Environmental 3649 Cane Run Rd. Louisville, KY 40211 800-928-7867 502-778-2731 Fax: 877-414-4316 wesc@zoeller.com www.clarusenvironmental.com @ CLARUS. EVENDMENTAL Mediate Table of West Mader See ad on page 16	Fusion Series	450 to 800	2006	Fusion Series Treatment Systems combine both anaerobic and aerobic treatment processes in one small tank utiliz- ing plastic media to culture large populations of bacteria to enhance treatment. Treated effluent is recirculated back to the first chamber which reduces total nitrogen through the process of denitrification. Automatic backwashing of the aerobic media and sludge return reduces excess biofilms and accumulated sludges, which are returned to the first chamber for redigestion. One small linear air pump utilizing 60 watts of power controls all treatment, backwash, and sludge return processes.	KY, IN, OH, NY, VA, WV, MD, MI, WI, AR, AL, IA, WA, HI
CLEWER North America, LLC 4454 Bluffton Park Crescent, Ste. 101 Bluffton, SC 29910 877-226-7567 843-338-4966 info@clewerusa.com www.clewerusa.com	800S, 800S-40	400 to 600	2011	CLEWER's patented Rotational Bed Biofilm Reactor treats wastewater to the highest standards in a compact, energy- efficient, affordable package. Highly resistant to toxic upset and hydraulic "wash-out," the CLEWER 800S and 800S-40 models require little maintenance. Easy to install; options include remote monitoring and phosphorus removal.	
Delta Environmental 8263 Florida Blvd. Denham Springs, LA 70726 800-219-9183 225-665-6162 Fax: 225-664-9467 www.deltaenvironmental.com Delta Environmental" See ad on page 9	DF Series Ecopod-N Series	500 to 1500 500 to 1500	1993 2006	The process occurs entirely within the self-contained treatment unit which is comprised of an outer mixing tank and a cone-shaped settling chamber. Raw, unsettled domestic wastewater enters directly into the mixing tank where mixing occurs through an air distribution system. The mixed liquid then enters the settling chamber from the bottom. The settling chamber maintains a quiet condition which allows solids to settle down and re-enter the mixing chamber for more processing. The liquid is hydraulically displaced upward and is discharged as a clear, odorless treated water which meets or exceeds state water quality standards. Wastewater enters a pretreatment/settling tank similar to conventional septic tanks. In this tank, debris and settleable solids settle to the bottom and are decomposed by anaerobic bacteria. The effluent leaves the pretreatment tank and enters the Ecopod-N Fixed Film Wastewater Treatment System reactor tank, where it is introduced to an oxygen-rich ervironment. In this oxygen rich ervironment, a colony of bacteria, called the biomass, develops and is capable of digesting biodegradable waste into carbon dioxide and water.	AL, AK, AZ, BC, BWI, CA, CO, FL, GA, HI, ID, IL, IN, IA, KY, IA, ME, MI, MD, MN, MS, MO, MT, NV, NM, NY, NC, OH, ON, OK, OR, TN, TX, UT, VA, WA, WV, WI

Manufacturer	Brand	GPD	Released	Description	Distributors In
Delta Environmental Continued	Enviro-Aire Series	500 to 1500	2005	The plant achieves treatment by a flow through process. Raw sewage enters a primary chamber, which has a hydrau- lic capacity of 346 gallons, providing a retention time of 16.6 hours. This chamber provides for separation of heavy, easily settled solids as well as floatable materials such as grease. Settleable solids accumulate on the bottom and floatable solids accumulate on the surface. Effluent from the clear layer flows into an aeration/mixing chamber with a 28-hour retention time. An aeration system provides for oxygenation of the primary effluent with the wastewater in the aeration/mixing chamber. Air is introduced by passing from the air pump to the air drop-line located in the chamber. The mixed liquor enters the settling chamber at the bottom and travels upward toward the discharge pipe. The quiet condition allows solids to settle down and re-enter the mixing chamber.	LA, MS, TX, IL
	UU Series	300 10 1300	2001	0 0	
Ecological Tanks, Inc. 2247 Highway 151 N Downsville, LA 71234 800-277-8179 318-644-0397 Fax: 318-644-7257 aquasafe@bayou.com www.etiaquasafe.com	Aqua Safe Aqua Aire	500 to 1500	1995 2002	Aqua Safe treatment plants use an extended aeration activated sludge process. They have an outer mixing tank and center settling chamber (clarifier). Units provide fine air diffusion through four diffusers located quarterly inside the tank. Included in Aqua Safe's patented design of fine air diffusion above the clarifier's plane. Certified to NSF Standard 40 and 245. Rectangular-configured Aqua Aire system comes in many configurations and can be cast with the pretreatment tank, aeration chamber, clarifier, and pump tank in a monolithic unit for easy installation. The system has a diffuser deflector assembly for air entrainment. Fiberglass disks break air stream into smaller bubbles for optimal oxygenation. Certified to NSF Standard 40 and 245.	AL, AK, AZ, CA, FL, GA, HI, IL, IA, KS, LA, MS, MO, NM, NY, OH, OK, PA, SC, TX, VA, WV, WI, BWI
Hoot Systems, LLC 2885 Hwy. 14 E Lake Charles, LA 70607	LA-Hoot	500 to 1000	1986	LA-Hoot is a improved version from the original Hoot Treatment System introduced in 1984. Results are better than 10/10 mg/L on CBOD asd TSS, with more than a 95% reduction of the wastewater influent. Two-year warranty/NSF Standard 40 Certified.	AL, AZ, CA, CO, OK, KS, LA, FL, VA, MD, OH,
888-878-4668 337-474-2804 Fax: 337-477-7904 questions@hootsystems.com www.hootsystems.com	H-Series	500 to 1000	1995	Five-stage, one piece system with a pretreatment tank, aeration chamber, final clarifier, optional disinfection device and a pump tank. Results are better than 5/5 mg/L on CBOD/TSS. A 99% reduction on CBOD and TSS. Three-year warranty/NSF Standard 40 Certified.	MN, WI
See ad on page 13	ANR	450	2007	Adds Biological Nutrient Reduction to the Hoot System. Results of 5.8 mg/L on TN, better than 10/10/10 mg/L on CBOD/TSS and Total Nitrogen. Areas where 10 mg/L is the discharge limit for Total Nitrogen, the federal level for drinking water. Three-year warranty/NSF Standard 40 & 245 Certified.	
Hydro-Action Industries 1919 Jim Neu Dr. Plymouth, IN 46563 574-936-2542 Fax: 574-780-2224 pete@hydro-action.com www.hydro-action.com	Hydro-Action	500 to 1500	1999	Manufacturing a full line of ATUs from the 52-inch-tall, low-profile system to a NPDES UV light disinfection system. The systems work for residential and commercial needs, as well as for cluster systems. Ideal for poor soil quality and remediating failed drainfields.	IL, OH, TX, OK, CA, NV, MN, KS, IA, MO, CO, AR, LA, AL, GA, FL, NC, SC, KY, WV, VA, MD, PA
Jet, Inc. 750 Alpha Dr. Highland Heights, OH 44143 800-321-6960 440-461-2000 Fax: 440-442-9008 email@jetincorp.com www.jetincorp.com www.jetincorp.com See ad on page 37	J-1500 Series	500 to 1500	1993	Jet's residential wastewater treatment plants employ the remarkably efficient JET BAT Process Media which provides the ideal environment for nature's own bacteria to thrive and grow. Great numbers of these living microorganisms attach themselves to this submerged structure to create a "biomass" that rapidly treats wastewater. The JET 700LL Aerator provides the mixing and fresh oxygen the microorganisms require to live while the JET BAT Process Media provides the environment to support the microorganisms that allow natural filtration and biological reduction to take place.	US and International
MST Manufacturing, LLC/ MicroSepTec 23362 Madero, Ste. C Mission Viejo, CA 92691 877-473-7842 949-297-4590 Fax: 949-916-2093 microseptec@microseptec.com www.microseptec.com	EnviroServer	600 to 2500	1998	The EnviroServer ES is a combination of primary treatment, flow equalization, and secondary treatment by both fixed- growth and suspended aerobic processes. The system consists of five chambers in one compact pre-engineered unit. The first chamber is a primary clarifier, the second chamber is the first aeration zone, the third chamber is the second aeration zone, the fourth chamber is the final clarifier, and the fifth chamber is the effluent chamber where an optional pump(s) and disinfection may be installed.	CA, AZ, NV,PA,VA,DC, MD, NJ, DE
Norweco, Inc. 220 Republic St. Norwalk, OH 44857 800-N0RWECO 419-668-4471 Fax: 419-663-5440 email@norweco.com www.norweco.com Www.norweco.com See ad on page 17	Singulair Green, Singulair Green TNT, Singulair 960, Singulair TNT	500 to 1500		Employing the extended aeration process, the Singulair system provides flow equalization, pretreatment, aeration, clarification, tertiary filtration and optional chemical disinfection within a single tank; optional external UV disinfection.	US and Canada

Manufacturer	Brand	GPD	Released	Description	Distributors In
Orenco Systems, Inc. 814 Airway Ave. Sutherlin, OR 97479 800-348-9843 541-459-4449 Fax: 541-459-2884 talton@orenco.com www.orenco.com	Advantex AX20 Series, AdvanTex AXRT Series	500 to 1500	2000	Fiberglass basin filled with engineered textile material that operates in recirculating mode. Packed bed filter that treats domestic strength wastewater to advanced treatment standards, including nitrogen-reduction, while electricity is less than \$2/month. Reliable even with intermittent, seasonal, or peak flows. Little maintenance required.	US, Canada, Mexico, Australia, New Zealand, Europe
Presby Environmental 143 Airport Rd. Whitefield, NH 03598 800-473-5298 603-837-3826 Fax: 603-837-9864 info@presbyeco.com www.presbyenvironmental.com www.presbyenvironmental.com	Advanced Enviro-Septic	450 to 1500		Visit website for further details.	VA, WY, MT, CT, IN, KS, ME, MS, MI, NH, NJ, NY, OH, VT, BC, PQ
Quanics Inc. P0 Box 1520 Crestwood, KY 40014 877-QUANICS 502-992-8239 Fax: 502-992-8249 info@quanics.net www.quanics.net	AeroCell	200 to 100,000	1998	The AeroCell utilizes a patented synthetic open cell foam media for treatment. The media's high porosity, large surface area, and ease of microbial attachment allows for loading rates of up to ten times that of other fixed film systems. The open cell foam media has a 15-year track record for effectively treating wastewater to the highest of standards.	AK, AL, CA, CO, DE, FL, ID, IL, IN, KY, MD, MI, MO, MS, MT, NM, NY, OH, SC, TN, VA, WV, WY
SludgeHammer Group Ltd. 336 S Division Rd. Petoskey, MI 49770 800-426-3349 231-348-5866 www.sludgehammer.net	S-400, S-600	400 to 600	2009	Models S-400 and S-600 are the only NSF certified Advanced Treatment Units that fit directly inside a septic tank and digest solids as well as soluble waste with only 80 watts of power. It is an Aerobic Bacterial Generator for leachfield remediation by IAPMO under IGC180-2003 standard and it is certified by Lloyd's Register under the International Maritime Organization MEPC 55-180 Standard.	Global
Waterloo Biofilter Systems Inc. PO Box 400 Rockwood, ON N0B 2K0 Carada 519-856-0757 Fax: 519-856-0759 info@waterloo-biofilter.com www.waterloo-biofilter.com Waterloo Biofilter.com See ad on page 25	Waterloo Biofilter	300 to 50,000	1994	On-site treatment of residential and commercial sewage wastewaters, fully scaleable from single residence to 50,000 gpd. Small footprint, lowest energy usage, no aerobic sludge. Filter medium has 20 year warranty.	MA, MD, Canada

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47100 - 100 lb unit - 18 units per pallet
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On Target for Onsite

Vendors at the Pumper & Cleaner Expo offer a variety of products and technologies to improve onsite treatment system performance

By Ted J. Rulseh

From entire new aerobic treatment units to accessories like sensors, tank lids and cord organizers, the Pumper & Cleaner Environmental Expo showed attendees the latest inventions for the onsite wastewater treatment industry.

The Expo, held for the first time in Indianapolis (Feb. 27-March 1) offered 501 exhibits and attracted 8,595 attendees representing 3,875 companies in a wide range of water, wastewater, environmental service and gas and oil service industries. Here is a sampling of new products and technologies shown by vendors in the onsite wastewater sector.



New branding for septic service

A Corp/Rooter-Man has introduced the SewerMan national brand for residential septic system and sewer solutions. Services under the new brand include septic system pumping, repair and inspection, sewer jetting, and pipe lining. The new brand com-

plements the company's existing Rooter-Man franchising. The marketing program includes a locally optimized Internet marketing website and exclusive use of a toll-free phone number that rings directly to the franchisee. 978/667-1144; www.rooterman.com.



It helps prevent system overloading, environmental contaminations, permit violations and the costly repairs that can go with them. It works with all major third-party 6000 series mechanical distributing valves. 888/747-7645; www.dynamicmonitors.com.



low annual maintenance. 760/731-0745.



Electronic UV disinfection monitoring

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Valve monitor for

even distribution

ERNAT

The IVM6000-LP Intelligent Valve

Monitor from Dynamic Monitors

confirms even distribution of primary-

treated effluent to all drainfield zones

and provides early detection and

immediate alert for valve malfunctions.

EXPO

A solid-state electronic monitoring, control and alarm device enhances performance of the 3G UV disinfection unit from Salcor. The disinfection units have fouling-resistant Teflon and two-year lamps. They are designed for fast installation and D745



Pumps for varied liquids

Priming-assisted Prime Aire Plus pumps from Gorman-Rupp Co. offer venturi/compressor priming systems along with increased head and flow and enhanced maintenance features. Models in sizes up to 8 inches are suitable for clear liquids and liquids that

contain large solids. Features include externally adjustable running clearances, ductile iron body and impeller, oil-lubricated bearings, and a fuellevel monitoring system. 419/755-1011; www.gormanrupp.com. Device cord organizer

The Cord Corral organizer from Septronics keeps onsite system device cords easily accessible, strapped up, untangled, and out of the way in the tank. The hole in the organizer slips over a 2-inch pipe nipple. 888/565-8908; www.septronicsinc. com.



Efficient, low-maintenance treatment

The Platinum residential wastewater treatment system from Anua provides low power consumption and reduced maintenance. Its only moving part is a small air delivery system that needs very little electricity. It produces high-quality effluent in a small foot-

print and installs below ground, conserving yard space. It operates almost silently and produces no odors. 336/547-9338; www.anua-us.com.



Added support for filters

The multipurpose case adapter from Bear Onsite suits applications that require added support for effluent filters. In grease trap applications, a filter can become heavy as it filters out material. The case adapter allows installers to build support legs using common 2-inch Schedule 40 PVC pipe. These legs slip into the adapter. 901/831-5155; www.bearonsite.com.



Odorless fixed-film intra-tank treatment

Ecopod Series advanced treatment units from Delta Environmental are designed to be simple to install and maintain while effectively reducing nitrogen, BOD and TSS. The odorless fixed-film systems consist of an intratank bioreactor than can be inserted

into average-sized treatment tanks or vaults. Units treat 500 to 1,500 gpd. It is designed especially for single-family homes, cluster systems, and small to medium-sized commercial installations. 800/219-9183; www. deltaenvironmental.com.



Complete septic system treatment

PRO-PUMP TST PLUS (Total System Treatment) from Ecological Laboratories is designed to improve line flow, eliminate drain odor and restore biological action in septic tanks and drainfields with a single monthly

application. It is a microbial formulation that contains no enzymes or surfactants. 800/326-7867; www.propump.com.



Large tank lid for easy access

BrenLin Co. offers a 42-inch circular Seal-R plastic lid for septic tanks. The green, lightweight lids are designed to be durable and install quickly using four stainless steel lag screws that fit preformed holes. The lid allows easy access for servicing. 888/606-1998; www.seal-r.com.



Compact polymer mixing system

The FPP MaxiBlend system from Fergus Power Products is an accurate, compact system for producing a completely made down solution from any type of liquid polymer. Its microprocessor-based controller is designed for precise control of polymer solution



Redesigned compact loader backhoes

Terramite X-Series compact loader backhoes from TerraQuip Construction Products have undergone a complete redesign affecting engines, hydraulics and styling. Units include the T5X with a 25 hp gasoline or diesel engine, 8-foot 6-inch dig depth and

2,000-pound loader lift; the T7X with a 26 hp diesel engine, 9-foot dig depth and 2,100-pound loader lift, and the T9X with a 37.5 hp diesel engine, 10-foot dig depth, and 2,300-pound loader lift. 800/428-3772; www. terramite.com.

Concealer with vent and filter

The Model 107 rock from DekoRRa Products includes an activated charcoal filter and an air vent. It is designed to conceal onsite system features including well pipes up to 18 inches tall, septic system vent pipes up to 20 inches tall, pressure vacuum breakers, and electrical outlets. The

rock is 15 inches long, 14 inches wide and 23 inches high and weighs 6 pounds. 888/635-8585; www.dekorraproducts.com.

cessor-based controller is designed for precise control of polymer solution concentration. A simplified mixing process design limits moving parts and reduces maintenance. An integrated calibration tube provides flooded suction to the polymer pump, eliminating priming issues. 218/736-6772; www.ferguspowerproducts.com.



Engineered fiberglass pretreatment units

Proceptor pretreatment systems from Green Turtle Americas are designed as grease, oil and solids separators and as cost-effective holding tank systems. The distribution tee and elliptical tank create a laminar flow pattern designed not to disrupt grease

and sediment layers. At full rated flow, most units can hold 45 to 50 percent of their volume in fats, oils and grease while delivering high effluent quality. 877/428-8187; www.greenturtletech.com.



Aerobic treatment in lightweight tank

The Singulair Green aerobic treatment unit from Norweco incorporates advanced aerobic treatment in a durable, watertight polyethylene tank. Weighing less than 900 pounds, it is designed for easy installation even on challenging job sites with only a backhoe. Integral support ribs ensure structural integrity while an aeration basin chamber allows bacteria to convert wastes into stable substances. Flow equalization maximizes biological oxidation and ensures 24-hour retention and treatment of all wastewater. **419/668-4471**; www.norweco.com.



Low-profile septic tanks

Available in capacities from 500 to 1,500 gallons, low-profile septic tanks from Norwesco are rotationally molded with no seams. No special backfill or water filling is required during installation, and the units can be installed with six to 36 inches of cover. Tanks can be pumped dry

during pumpouts. Tanks are offered in single- or dual-compartment configurations. Domed lids add structural strength. 800/328-3420; www. norwesco.com.



Vehicle wash and wastewater treatment

PIT BOSS treatment formulation from One Biotechnology is designed to help treat water from vehicle cleaning operations as well as wastewaters containing petroleum and its byproducts, organics, and pollutants from detergents. It is a blend of concentrated live

vegetative, naturally occurring bacteria with metabolically versatile cultures chosen for their ability to degrade petroleum hydrocarbons. 800/951-4246; www.1biotechnology.com.



Reliable digital pump activation

The Pro Series Ultimate Sensor from PHCC provides reliable on-off pump operation by using Triac digital switches proven in high-power applications such as microwave ovens and toasters. In operation, an embedded computer sends a signal down the 3.5-

inch sensor rod. When the water level touches the rod, the signal gets absorbed and modified. When the controller receives the modified signal from the sensor, it powers the digital Triac circuit, activating the pump. 800/991-0466; www.stopflooding.com.



In-field sand tester

The Spec-Check system from Presby Environmental allows onsite system installers to check and verify the quality of sand for mound systems or filters in a few minutes in the field. It includes a set of concentric screens in a cylindrical container, along with simple measuring devices. A simple

series of manual tests allow users to determine the percentage of fines in a sand sample and determine whether the material was delivered as specified. 800/473-5298; www.presbyenvironmental.com.



System programming via laptop

The EZ Series In-Site CL data logging control panel from SJE-Rhombus quickly connects to a laptop computer for system programming, monitoring and reporting. A programming screen lets users establish pumps and sensor settings and control panel parameters.

A daily events screen provides a graphical display of what is happening with the system. A daily flow screen summarizes gallons flowing through the system. 800/342-5753; www.sjerhombus.com.



Water pipe thawing device

The ThawMaster 3000 system from ArcticHeat thaws frozen water pipes without using steam or water. It works on 1/2- to 2-inch pex, poly, PVC, copper and steel pipe. The heating device travels up the line on a push cable (150 feet supplied). The heating element has a Type K

thermocouple. The control panel has a durable frame, carrying handle, and digital temperature readout. The temperature is preset at 130 degrees F at the factory but can be raised or lowered by the user. **800/846-0309; www.** arcticheatltd.com.



Flat lid for septic tanks

Tuf-Tite offers a 20-inch circular heavy-duty multipurpose flat riser lid that fits most commercially available risers. The unit includes a molded-in, permanent gasket made of polyurethane. The cover is secured by eight vertical and two horizontal safety screws. The center is designed to hold

60 pounds of concrete for added safety. The lid can be insulated to R10. 800/382-7009; www.tuf-tite.com.





Screen for pump protection

The 15- by 48-inch pump screen from SIM/TECH FILTER protects pumps with a 1/8-inch perforated polypropylene mesh and comes with a built-in float tree bracket. The unit weighs less than 16 pounds, but the base accepts concrete for extra weight if needed. The mesh provides more that 850 square inches of open area with more than 69,000 1/8-inch round holes. 888/999-3290; www.gag-simtech.com.

Treatment for homes and clusters

The MicroFAST treatment unit from Bio-Microbics (shown in a tank from Infiltrator Systems) processes wastewater from homes, clusters of homes or small communities. A remote-mounted aboveground blower, the system's only moving part, adds air

to the treatment module to facilitate robust circulation of water through the



media's channeled flow path. Fixed-film media provides a high surface-tovolume ratio for microbe growth during low, average or peak usage. 800/753-3278; www.biomicrobics.com.



Treatment for residential/ commercial clusters

AdvanTex AX-Max treatment systems (scale model shown at right) from Orenco Systems accommodate flows to 1 mgd. These modular, fully plumbed units are sized for commercial or residential developments. The

system is built in a lightweight, watertight, insulated fiberglass tank and can be installed singly or in multi-tank arrays. A control room is optional. On domestic wastewater, the system produces effluent with about 5 mg/L CBOD/TSS. The unit can be designed to meet strict nutrient limits or reuse standards. 800/348-9843; www.orenco.com.



Compact, expandable gas monitor

The GX 2012 confined-space multi-gas monitor from RKI Instruments weighs 12.3 ounces. It uses micro-sensor technology to measure oxygen, methane, carbon monoxide and hydrogen sulfide, and a fifth sensor can be added. The detector includes glove-friendly large buttons and high-impact protective rubber covering. It uses an easy-read automatic backlight during alarms and is powered by lithium-ion or alkaline batteries. 800/754-5165; www.rkiinstruments.com.

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Poor People, Poor Soil, Poor Sanitation

An Alabama coalition aims to address severe problems with failing and nonexistent onsite systems in an impoverished region of Alabama By Doug Day

You might think raw sewage running through yards would be a thing of the past in the United States. Yet it is so common in the povertystricken Black Belt region of Alabama that even the United Nations has become involved in an environmental and public health issue endemic to the area for decades.

Compounding the poverty is the rich, dark soil that earned the Black Belt its name in the pre-Civil War era, when it was one of the wealthiest areas of a young country. The fertile clayey soil is great for growing cotton, but doesn't perk well, and so engineered onsite treatment systems are often required.

"These are people who can't afford a conventional septic system, much less an advanced system," says Dave Roll, executive director of the Alabama Onsite Wastewater Association (AOWA).

AOWA has arranged for the installation of more than 100 systems in the last three years for impoverished families. "That doesn't even scratch the surface," says Roll. "We're talking about thousands of people."

Pres Allinder, director of the Alabama Bureau of Environmental Services, says AOWA's efforts have been tremendous. "They get companies to donate chambers and pumps, we donate soils work, installers donate time and equipment, and AOWA uses it as training for continuing education credits," says Allinder.

"You have waste running directly out of houses into ditches and backyards. Kids are playing in those backyards. It gets into streams and the water table and people are drinking it." Charlie King Jr.

Among the poorest

Helping people in such desperate conditions is "heartache and pain," says Charlie King Jr., an onsite installer and owner of King & Rudolph Con-

struction. "There's nothing much you can do but pray, and cut costs every chance you get."

King is also chairman of the Board of Commissioners of Lowndes County, one of 13 counties in the 200-mile-long Black Belt that are among the nation's poorest. Unemployment in the region runs around 20 percent, 30 percent or more of residents live below the poverty line, and 40 to 90 percent of homes have no sewage treatment

Standing pools of raw sewage are common in Lowndes County and the 12 other counties that make up the Black Belt region of Alabama. They are among the poorest counties in the nation; annual per capita income in Lowndes County is just over \$12,000. (Photos courtesy of Catherine Coleman Flowers)



A child's ball sits in a pond of sewage outside a home in the Black Belt region of Alabama. Many homes in the region have no onsite treatment systems, and about half the systems that do exist are failing.

or inadequate septic systems. Of the systems that do exist, about half are failing because of the soil conditions.

"Sanitation is inaccessible for a substantial proportion of Lowndes County residents," says a 2011 U.N. report. But help may be on the way, and installers will be an important part of the solution, as an unknown number of decentralized wastewater systems will be needed – largely low-pressure drip systems.

Rural and remote

Conditions today are deplorable: "You have waste running directly out of houses into ditches and backyards," says King. "Kids are playing in those backyards. It gets into streams and the water table, and people are drinking it. You just can't deal with the issue if you don't have any money."

The U.N. report mentions a 2008 case in which a 27-year-old single mother living in a mobile home with her autistic child needed to replace a failed septic system at a cost of \$6,000 to \$20,000. With an annual income of \$12,000, the woman had no options.

Septic systems often cost more than people's homes. "They're thinking of what it takes to put a roof over their kids' heads and put food on the table," says Allinder. "They're not thinking about how to get rid of sewage. It's a very distant priority."

It was 2003 when the Black Belt's long-standing problem finally gained attention. "An old grandmother who was raising 10 of her grandchildren all by herself didn't have an onsite system and her neighbor complained to us," recalls Allinder. "This was a dangerous situation for her grandkids and everyone around there."

"We have so many people in the Black Belt area and other spots who have no septic or a failing system and no hope for anything better."

Pres Allinder

The state issued a notice of violation. With no money to do anything about it, the woman ignored it, and an arrest warrant was issued. Allinder says warrants are normal, but arrests aren't the goal; the warrants are intended to get people to take the situation seriously and seek assistance. But when this woman got into other legal trouble and didn't show up for a court date, a frustrated judge used the state's warrant to affect her arrest on the unrelated criminal case. "It hit the newspapers that the health department had arrested a grandmother, and it made national news," says Allinder. "We got a huge black eye over it, and it took a long time to make people realize what had actually happened."

Opportunity for change

People and organizations rallied to support the grandmother, and there were several meetings to clear the air. "It was a huge blowup, and then turned out to be one of the best things to happen because it got a lot of the players together," adds Allinder. Soon, 70 people in the county who had been cited by the state got free onsite systems.

The National Center for Neighborhood Enterprises (NCNE) provided much of the funding, arranged short-term loans, solicited donated services and equipment, and began pursuing a federal grant. In 2006, the NCNE's local effort transitioned to the Alabama Center for Rural Enterprise under the leadership of director Catherine Coleman Flowers.

A \$575,000 U.S. EPA grant finally came through in 2010 to develop a master plan to address the raw sewage problem in Lowndes County. With in-kind contributions, the grant is worth \$771,000.

The problem eventually drew the attention of the U.N. independent expert on the Human Right to Water and Sanitation, Catarina de

SETTING THE BAR

The extensive cooperation seen in solving the wastewater management problems in the Black Belt region of Alabama has caught the attention of the U.S. EPA and the United Nations Human Right to Water and Sanitation program.

"The EPA has told us they would like to use our blueprint for other rural communities that are having the same problems," says Catherine Flowers, director of the Alabama Center for Rural Enterprise and rural development manager for the Equal Justice Initiative.

The Black Belt region is not alone. Most states have programs to help low-income people replace failing septic systems. The University of Pittsburgh Institute of Politics estimates that 27,000 properties in southwest Pennsylvania dump sewage on the ground. Thousands are thought to be in similar situations along the U.S.-Mexico border and in remote Alaska villages.

The North Carolina Rural Communities Assistance Project recruits volunteers to install septic systems every summer in the poverty-stricken areas of the southern Appalachia region.

Catarina de Albuquerque, U.N. independent expert on the Human Right to Water and Sanitation, also cited the Appalachian regions of Maryland, Pennsylvania, Virginia and West Virginia as areas without adequate sanitation. "In West Virginia and southern Virginia, as many as two-thirds of homes were discharging raw sewage," she stated in a March 2011 report.

Flowers says sanitation is a public health problem that requires participation of the entire community, not just installers, engineers and other experts. "Part of this has to include outreach and education," she says. "Even if we find the solution, part of proper management is that people have a responsibility to know what they can and cannot do with those systems."

The U.N. has cited the Black Belt project as a best practice that communities around the globe can copy. The U.N. says 2.6 billion people in the world have no access to basic sanitation and 1.5 million children under age 5 die each year from diseases related to poor water and sanitation.

At a U.N. session on the matter in July 2011, Assembly president Joseph Deiss said safe water and sanitation were "fundamental" to achieving goals related to reducing poverty, boosting education and childhood health, and fighting AIDS and other diseases. Albuquerque, who held a hearing in February 2011. Flowers, who is also rural development manager for the Equal Justice Initiative, was one of those to testify. "Soils with better infiltration characteristics are not locally available and must be transported from distant locations more than 30 miles away," she stated. "Several dump truck loads are needed to construct a typical mound."

That led to a summit in November 2011 that brought together experts from across the country. "So many people in the Black Belt area and other spots have no septic systems or failing systems and no hope for anything

"We're doing a house-to-house survey. We'll determine who has a functioning system, who doesn't, and who has raw sewage on the ground."

Catherine Flowers

better," says Allinder. "There is tremendous hope that the grant will be really helpful, and I have full confidence that it will be."

The grant is administered by Flowers. "She's doing a heck of a job," says Allinder. "She's fighting an uphill battle but she's trying hard. She has pretty much dedicated her life to it the last several years."

Now is the time

With funding in hand, several organizations have hit the rural roads of the Black Belt to get a handle on the scope of the economic, environmental, and public health problem. "We're doing a house-to-house survey," says Flowers. "We'll determine who has a functioning system, who doesn't, and who has raw sewage on the ground."

The surveyors are using GPS to plot their findings to help engineers propose solutions, such as locations for cluster systems. Flowers says people have been surprisingly forthcoming. "People are telling us if they have raw sewage on the ground; they've offered to be interviewed and even photographed," she adds. One reason for that cooperation, Flowers says, is that she and the people doing the surveys have family ties to the area and are known in the communities.

The Rural Community Assistance Partnership, which has field offices in all 50 states, is also working with existing water authorities to organize wastewater management entities across the region to provide structure.

It's expected that many neighborhood cluster systems will be needed, along with other options such as individual septic systems and perhaps even composting toilets for remote homes, some of which are 10 miles or more from their nearest neighbors. The next summit is planned for spring 2012 to review the survey findings. At that point, a good estimate of the overall cost should be available so that grants and other funding can be sought.

"We need to be mindful of clean water and the public health risks associated with raw sewage, the kind of diseases that can wipe out a community," adds Flowers. "We need to find a solution that is sustainable and not a band-aid. We would like to become a clearinghouse to share with other communities so they can learn from what we've done. We want to make a difference."





industrynews

ADS opens Michigan facility, agrees to acquisition

Advanced Drainage Systems Inc. opened a manufacturing plant in Clifford, Mich. The facility is the company's second Michigan manufacturing plant and will make HDPE pipe for the region's agricultural and commercial markets. The company also agreed to the acquisition of its septic chamber assets by Infiltrator Systems Inc. As part of the acquisition, ADS has entered into a long-term, nonexclusive distribution agreement with Infiltrator Systems and will continue to market and sell the Arc and BioDiffuser product lines.

Wisconsin review approves peat fiber biofilter

Anua has received approval from the Wisconsin Safety and Buildings Division Plumbing Product Review to use its Puraflo peat fiber biofilter open-bottom modules in conjunction with in-ground and mounded pad effluent dispersal configurations. The system uses peat fiber with high lignin content for long media life. The system is designed to handle 150 gpd and produce effluent with less than 10 mg/L BOD and TSS and less than 5 mg/L ammonia. It is suitable for seasonal or intermittent use and is an alternative for communities seeking sustainable wastewater treatment systems.



Lenzyme offers private labeled brochure

Lenzyme offers a private labeled educational brochure for contractors to hand to their customers, informing them of additional services, such as riser balancing

installation, filters and drainfield biomat balancing.

SJE-Rhombus buyer receives SPSM certification

Randy Jensen, senior buyer for SJE-Rhombus, achieved Senior Professional in Supply Management (SPSM) certification after completing a series of online classes, including purchasing fundamentals, analysis and spreadsheets, contract law, negotiation, best practices and sourcing.



Randy Jensen

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associationnews

Onsite Installer™ invites your state association to post notices and news items in this column. Send contributions to editor@onsiteinstaller.com.

By Scottie Dayton

Soil App for Smartphones

The Soil Web application for iPhone and Android smartphone platforms uses GPS to access the phone's location, then downloads real-time soil survey information anywhere in the lower 48 states. The graphic summary includes links to the descriptions of soil layers and to laboratory data archived at the National Soil Survey Laboratory in Lincoln, Neb. Visit http://websoilsurvey. nrcs.usda.gov.

Educational Conference

The State Onsite Regulators Alliance and Captains of Industry (SORA/ COI) Conference is June 28-30 at the Marriott Marquis and Marina in San Diego, Calif. Held with the National Environmental Health Association Conference, it offers a forum for regulators and industry representatives to discuss wastewater issues and manufacturers to present their products. Educational tracks cover technology, research, environmental health issues, and new federal regulations affecting the onsite industry.

The California Onsite Wastewater Association collaborated with NEHA and the National Association of Wastewater Transporters to include its annual educational conference in the event and to produce more than 15 hours of online educational materials. Visit www.nesc.wvu.edu/sora and www. neha2012aec.org, or www.cowa.org.

Agency Reactivates Advisory Committee

The Arizona Department of Environmental Quality reactivated its Onsite Wastewater Advisory Committee to critique regulations. The department chose these Arizona Onsite Wastewater Recycling Association members: Richard Bartholomew, Bryan Chiordi, Suzanne Ehrlich, Lowell Fagen, Kitt Farrell-Poe, Jake Garrett, Dusty Lewis, Dawn Long, Justin Ramsey, Charles Moses, and Richard Sinclair. Other committee participants were Paul Miller, Stu Spalding, Ed Swanson, and Paul Trotta.

Association Saves Home

Members of the Kansas Small Flows Association helped a family in Pottawattamie County avert the condemnation of the home they purchased without knowing that it had a failed onsite system. KSFA offered to install a new system in exchange for the \$1,500 in state cost-sharing money and used the installation for training.

Charlene Weiss of Weiss Water and Wastewater Consulting and Tod Hettenbach of Kansas Pumping Service conducted the soil profile. KSFA president Mark Sheppard worked with the fundraising chairman to enlist donations. To continue the program, KSFA asked members to contact the board if they knew of families needing assistance with a system repair or replacement. The board of directors is listed at www.ksfa.org.

Tire-Derived Aggregate

As of July 2011, installers in Nova Scotia had access to approved tirederived aggregate for use in drainfields. Waste Water Nova Scotia Society produced a training video last summer on the installation of a raised C2 (mound) disposal field, one with chambers, and another of gravel and pipe.

Measuring Temperatures

The lack of data on sewage temperatures in winter prompted the Ontario Rural Wastewater Centre in Guelph to measure them. The study found that temperatures varied throughout the year, but day-to-day variations were small. Researchers are now studying the affect of insulating the tanks.

Delaware Conference

The Delaware Onsite Wastewater Recycling Association Conference and Exhibition is Oct. 9-10 at the Dover Downs Casino and Conference Center in Dover. Call Niki Glanden at 302/359-2210, Hollis Warren at 302/284-9070, or visit www.dowra.org.

CALENDAR OF EVENTS

April 2-5

NOWRA Technical Education Conference and Fourth Northeast Onsite Wastewater Short Course, Biltmore Hotel, Providence, R.I. 800/966-2942; www.nowra.org.

April 15-17

Ontario Onsite Wastewater Association Conference and Exhibition, Deerhurst Resort, Huntsville. Contact Denis Orendt at 905/372-2722 or dorendt@ yahoo.ca; www.oowa.org.

TRAINING & EDUCATION

Alabama

Licensing classes are the joint effort of the Alabama Onsite Wastewater Association (AOWA) and University of West Alabama (UWA). Courses are at UWA Livingston campus unless stated otherwise:

- May 2-4 Advanced Installer II Class
- May 23-25 Basic Installer Class
- June 21-22 Continuing Education Class, Dothan

The first day of Continuing Education classes is for installers and the second day for pumpers and portable restroom operators. Call the training center at 205/652-3803 or visit www.aowatc.uwa.edu.

Arizona

The University of Arizona Onsite Wastewater Education Program has these classes:

- May 7 Inspecting Pumps and Using Them in Designs for Arizona Onsite Systems, Payson
- May 8 Inspecting Subsurface Drip Dispersal Systems and Using Them in Designs for Arizona Onsite Systems, Payson

Call Kitt Farrell-Poe at 520/621-7221, email kittfp@ag.arizona.edu, or visit www.ag.arizona.edu/waterquality/onsite.

California

The California Onsite Wastewater Association is offering these NAWT classes:

- May 17 Principles of Plan Checking, Sacramento
- June 26 Installation of Onsite Systems (NAWT course), San Diego
- June 28 Outreach (NEHA schedule), San Diego
- Call Kit Rosefield at 530/513-6658 or visit www.cowa.org.

Florida

The Florida Onsite Wastewater Association Training Center is offering these courses with master credit hours in Lake Alfred unless stated otherwise:

- May 9 Advanced Treatment Systems II, Tallahassee
- May 10 Operations and Maintenance B, Jacksonville
- May 14 Master I: Onsite Wastewater Concepts, Mats, Regulation and Application Process
- May 15-16 Master II: Intro to Florida Soils and Site Evaluation
- May 17-18 Master III: Onsite Construction Permits and Inspections
- · June 19 Operations and Maintenance A, Fort Myers
- June 20 Operations and Maintenance B, Fort Lauderdale
- June 21-22 Alabama and Florida Combined Training Sessions, Dothan, Ala.

Contact FOWA at 321/363-1590 or www.fowaonsite.com.

Iowa

The Iowa Onsite Wastewater Association has these courses:

- May 11 Operation and Maintenance Workshop, Creston
- June 14-15 Habitat for Humanity Systems Installs, Waverly

Contact Alice Vinsand at 515/225-1051, execdir@iowwa.com, or visit www.iowwa.com.

Kentucky

The Kentucky Onsite Wastewater Association has six hours of continuing education for certified installers of onsite wastewater disposal systems on June 15 at the Bluegrass Community Technical College in Lawrenceburg. Call 270/401-2301 or visit www.kentuckyonsite.org.

Minnesota

The University of Minnesota Water Resources Center has these classes:

- May 1-4 Service Provider, Mankato
- May 22-24 Basic Onsite System Designs, Farmington
- May 30-June 1 Soils, Grand Rapids
- June 5-6 Inspecting Onsite Systems, St. Cloud
- June 7 Soils Continuing Education, Rushford Village
- June 14 Soils Continuing Education, Detroit Lakes
- June 19-21 Soils, Rochester
- June 27 Soils Continuing Education, St. Cloud
- Call Nick Haig at 800/322-8642 or visit www.septic.umn.edu.

New England

The New England Onsite Wastewater Training Center at the University of Rhode Island in Kingston has these courses:

- May 3 Functional Inspections
- May 10 Innovative and Alternative Technologies
- May 17 All About Series: Sand Media
- May 31 Installing Advanced Onsite Treatment Systems
- May 31 Innovative and Alternative Technology Field Training at Peckham Farm
- June 6 Soil Basics for the Onsite Wastewater Contractor
- June 13 Advanced Soil Morphology
- June 14 Hands-On Component Installation
- June 21 Bottomless Sand Filter Design and Installation
- June 27 Advanced Soil Morphology

Call 401/874-5950 or visit www.uri.edu/ce/wq. For soil courses, call Mark Stolt at 401/874-2915 or email mstolt@uri.edu.

North Carolina

- North Carolina State University has the following courses:
- May 9 Why We Study Soil, Web-based
- May 16 Formation of Soil, Web-based
- May 23 Identification and Classification of Soil, Web-based
- May 30 Physical Properties of Soil Texture, Structure, and Density, Web-based

- June 6 Cycling of Water Through Soil, Web-based
- June 13 Chemistry of Soil, Web-based
- June 20 Role of Soil in Plant Nutrition, Web-based
- June 27 Soil Ecosystem, Web-based
- Call Joni Tanner at 919/513-1678 or visit www.soil.ncsu.edu/training.

Washington State

The Washington On-Site Sewage Association and Washington State Department of Health in cooperation with Washington State University are offering these certification courses at the training center in Puyallup unless stated otherwise:

- May 1-2 O&M Certification for Proprietary Devices
- May 16 Design of High-Strength Waste Systems
- May 22 Electrical Control Panels, Bremerton
- Call WOSSA at 253/770-6594 or visit www.wossa.org.



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ABOUT THE AUTHOR

Richard Otis, Ph.D., P.E., DEE is president of Otis Environmental Consultants, LLC, and president of NOWRA. For more information or to join NOWRA, visit www.nowra.org or call 800/966-2942.

Who's to Blame?

To avoid difficult disputes over post-installation issues, get everyone involved in your projects to follow these steps By Richard Otis, Ph.D., PE., DEE

ne day you receive a call from an upset client because the system that you recently installed is seeping over his backyard. On arrival, you see septic effluent surfacing over the lawn but without doing a full inspection of the tank and drainfield, you aren't able to suggest what the problem might be.

You recall that the site evaluator found the soil to be suitable and that the county approved it. You carefully followed the designer's plans and specifications for the system, which had been approved after the county made some changes.

Before the final covering of the system, the county regulator stopped by and approved the installation. What could have gone wrong? Now the finger-pointing has begun. You realize you are going to be blamed and will be expected to repair the system at your cost.

Is it really your fault? Unfortunately, you might never know. Any one of the parties involved in the siting, designing, permitting, installation, and subsequent use of the new system could be at fault.

During construction, continually update your designer on your progress. He or she needs to be aware of any changes that were made so as to prepare as-builts and certify after construction that the completed system substantially conforms to the design.

Get everyone involved

To avoid such pitfalls, everyone involved with the job – you, your employees, your subcontractors and suppliers – must agree on what their individual roles on the project will be, and understand what you expect from them. These roles and expectations should be put in writing for each group, and you and the responsible person from each group should sign off.

A simple contract works well for this. And don't forget the regulator and the owner. Maintaining good and frequent communication with everyone involved is important to ensuring that you all are on the same page.

This doesn't solve all your problems but it can avoid many of them. Knowing who was responsible for the given tasks should eliminate much of the finger-pointing. This doesn't mean it's easy, though.

Conflicts of interest

For example, many regulators believe that part of their role is to protect consumers from incompetent or unscrupulous practitioners. It is not uncommon for regulators to intervene in the project where they might assume authority for the siting, design, or equipment preferences.

They should not have this authority, because as government employees they cannot accept the responsibility for any consequences of their activities. Though they may be well-meaning, such regulatory intervention can blur the lines between the roles and responsibilities of the owner, designer, and practitioners. That can lead to liabilities for the regulatory authority, and you.

Furthermore, effective enforcement is difficult because the regulator could be faced with writing orders against a system that was effectively sited and designed by him or her. If the local regulator performs the site evaluation, you might be left holding his spade and paying any damages for errors he might have made, because as a state employee he probably has immunity against claims made against him.

It is a significant conflict of interest, and should not be allowed, but unfortunately it often occurs. If you find yourself in this situation, you should carefully review the regulator's report, as you would if you had hired a private site evaluator, and discuss any concerns you might have with the findings from the evaluation.

If anything is changed or if disagreements are not resolved, these should be recorded and initialed in the regulator's report.

Dealing with changes

Similar issues can occur with the system design and final inspection. Your designer will prepare construction documents and send them to the county for review and permitting. However, some regulators will make changes to the design – and again this is a significant conflict of interest and should not occur.

If this happens, be sure your designer reviews any changes made and initials the changes if he or she accepts them. If he doesn't, do not do anything on the project until the designer and the plan reviewer agree. To protect yourself, you need to make sure all parties involved in each phase are aware of any changes, and that all are in agreement in writing of those changes.

During construction, continually update your designer on your prog-

ress. He or she needs to be aware of any changes that were made so as to prepare as-builts and certify after construction that the completed system substantially conforms to the design.

Often, regulators believe they should perform the final inspection, but again, it is a conflict of interest to certify someone else's work, particularly since the regulator is seldom on the site during construction. If the system fails, the owner could sue you because the regulator certified the construction, effectively absolving the designer.

Avoiding the pitfalls

These issues can be sorted out in court, but that costs money and time. It is better to avoid them in the first place by:

- Clearly understanding the scope of authority each party has to perform services before the job begins
- Thoroughly reviewing any reports, evaluations, drawings or other products provided by others
- Not leaving the owner's property until the system has been tested, the owner is taught and understands how it is to be operated, maintained and serviced, and you have left the owner with an appropriate O&M manual, including your contact information.

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Roe-D-Hoe

Delaware Contractor Wins NOWRA Roe-D-Hoe

By Ted J. Rulseh

harles Webb of R. Webb Excavating in Hockessin, Del., won the championship belt and \$1,000 first prize in the NOWRA National Roe-D-Hoe competition at the Pumper & Cleaner Environmental Expo in Indianapolis Feb. 27-March 1.

In the finals, Webb recorded a time of 1:09 combined for the bowling and golf events, edging out second place finisher Mike Smallwood of Smallwood Excavating in Hamilton, Ohio.

The competition was shortened to a single day of qualifying, and the basketball event included in previous years was not included. IHI Compact Excavator Sales provided the electric mini excavator used for the competition. Other event sponsors were Bio-Microbics, Norweco and Jet.



Sponsors and winners of the NOWRA Roe-D-Hoe: From left, Chris Mangin of Jet, Greg Graves of Norweco, Paul Flynn of Bio-Microbics, first place finisher Charles Webb of R. Webb Excavating in Hockessin, Del.; fourth place finisher Mark Schairer of Mark Schairer Excavating in Campbellsport, Wis.; second place finisher Mike Smallwood of Smallwood Excavating in Hamilton, Ohio; fifth place finisher Joe Siewert of Siewert Services in Cheney, Kan.; and third place finisher Ryan Bassett of Bassett Excavating in Knoxville, Iowa. BELOW: Winner Charles Webb completes the Roe-D-Hoe bowling event.



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