August
2008

ONSITE installer™

PROMOTING WASTEWATER TREATMENT QUALITY AND PROFESSIONAL EXCELLENCE www.onsiteinstaller.com

Serving a Community

Biological reactor and fixed-film aeration suit development with 1,495 homes

Page 22

contents

August 2008

Coming Next Month: September 2008

Special Issue: Distribution Equipment and Systems

- Profile: Schuyler County (N.Y.) Watershed Protection Agency
- System Profile: Extended aeration-activated sludge process in South Dakota
- Basic Training: The secrets found in soil color
- Overheard Online: Tracks versus tires for working in drainfields

ONSITE installer

Published monthly by

COLE Publishing Inc.

1720 Maple Lake Dam Rd. • PO Box 220

Three Lakes, WI 54562

In U.S. or Canada call toll-free 800-257-7222

Elsewhere call 715-546-3346

www.onsiteinstaller.com

E-mail: info@onsiteinstaller.com • Fax: 715-546-3786

Office hours: 7:30 a.m.-5 p.m. Central Time, Mon.-Fri.

SUBSCRIPTION INFORMATION:

A one year (12 issue) subscription to *Onsite Installer*™ in the United States or Canada is free to qualified subscribers. A qualified subscriber is any individual or company in the United States or Canada that partakes in the installation, design, maintenance, manufacture, treatment, consulting or sale of onsite wastewater treatment systems or supplies. Non-qualified subscriptions are available at a cost of $60 per year in the United States and $120 per year outside of the United States. To qualify visit www.onsiteinstaller.com/qualify or call 800-257-7222.

CLASSIFIED ADVERTISING:

RATE: $1 per word, per month. Minimum of 20 words or $20. All classified advertising must be PAID IN ADVANCE. DEADLINE: Classifieds must be received by the 17th of the month for insertion in the next month's edition. PHONE-IN ADS ARE NOT ACCEPTED. Ads may be faxed only when charging to MasterCard, VISA or Discover. Please supply all credit card information with faxed ads. Be sure to include your phone number (with area code) in your ad. Make checks payable to COLE Publishing Inc. and mail with classified ad to the address above. CLASSIFIED ADVERTISING APPEARS IN ALL CIRCULATION REGIONS AND ON THE INTERNET. Not responsible for errors beyond first insertion.

DISPLAY ADVERTISING:

Call 800-994-7990, ask for Jeff, Jim, Kim or Winnie. Publisher reserves the right to reject advertising which in its opinion is misleading, unfair or incompatible with the character of the publication.

CIRCULATION:

Circulation averages 23,995 copies per month. This figure includes both U.S. and International distribution.

ADVERTISER index

August 2008

COMPANY	PAGE
Alderon Industries, Inc.	11
Alita Industries, Inc.	24
Anchor Graphics	29
Aqua Tech Systems, LLC	3
Bio-Microbics Inc.	14
BrenLin Company, Inc.	28
BS Design Corp.	28
Clements Associates Inc.	6
Containment Solutions, Inc.	4
Coon Manufacturing	11
Eljen Corporation	24
Fergus Power Products	11
Hoot Systems, Inc.	7
Infiltrator Systems Inc.	19
Jet, Inc.	8
NOWRA	25
Orenco Systems, Inc.	15
Polylok, Inc.	32
Presby Environmental Inc.	9
Salcor, Inc.	29
Septic Products Inc.	21
Septic Services, Inc.	14
Septronics Inc.	3
Shaddix Company (The)	24
Simple Solutions	14
SJE Rhombus Controls	27
SludgeHammer Group Limited	13
T&T Tools Inc.	8
Tuf-Tite, Inc.	5
Wieser Concrete Products Inc.	31
Xerxes Corp.	27

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

Iowa Initiates Pre-Sale Inspections

By Doug Day and Scottie Dayton

Iowa will require septic tank inspections before the sale or transfer of homes starting July 1, 2009. Gov. Chet Culver signed the bill after it was passed by the state senate on Feb. 25. About 20 of the state's 99 counties already require such inspections. Systems that don't pass the inspection must be brought into compliance before the sale is completed. The Iowa Department of Natural Resources will certify inspectors.

Speaking at the Iowa Onsite Waste Water Association annual conference in January, Rich Leopold, director of the Iowa DNR, said suburban subdivisions account for more than half of the state's septic systems. Of the state's 200,000 private onsite septic systems, Leopold said half have permits.

Michigan

The *Traverse City Record-Eagle* newspaper reports that losses at the troubled septage treatment plant there — which partially collapsed about a month after opening in 2005 — could triple with the loss of a key customer.

According to newspaper accounts, CMS Energy paid $454,000 to the facility last year to dispose of contaminated water from an old cement factory. CMS has now received state and federal permits for a new method of disposing of the water and intends to stop using the plant by the end of 2008. However, the permits have been appealed.

Losing CMS as a customer would increase the annual loss at the septage plant from an average of $225,000 per year to more than $675,000 per year beginning in 2009, according to the newspaper. A total loss of $1.3 million is projected through 2011. The plant is receiving about half the septic tank waste that was projected. The $7.8 million plant was crippled in June 2005 when a holding tank collapsed.

Missouri

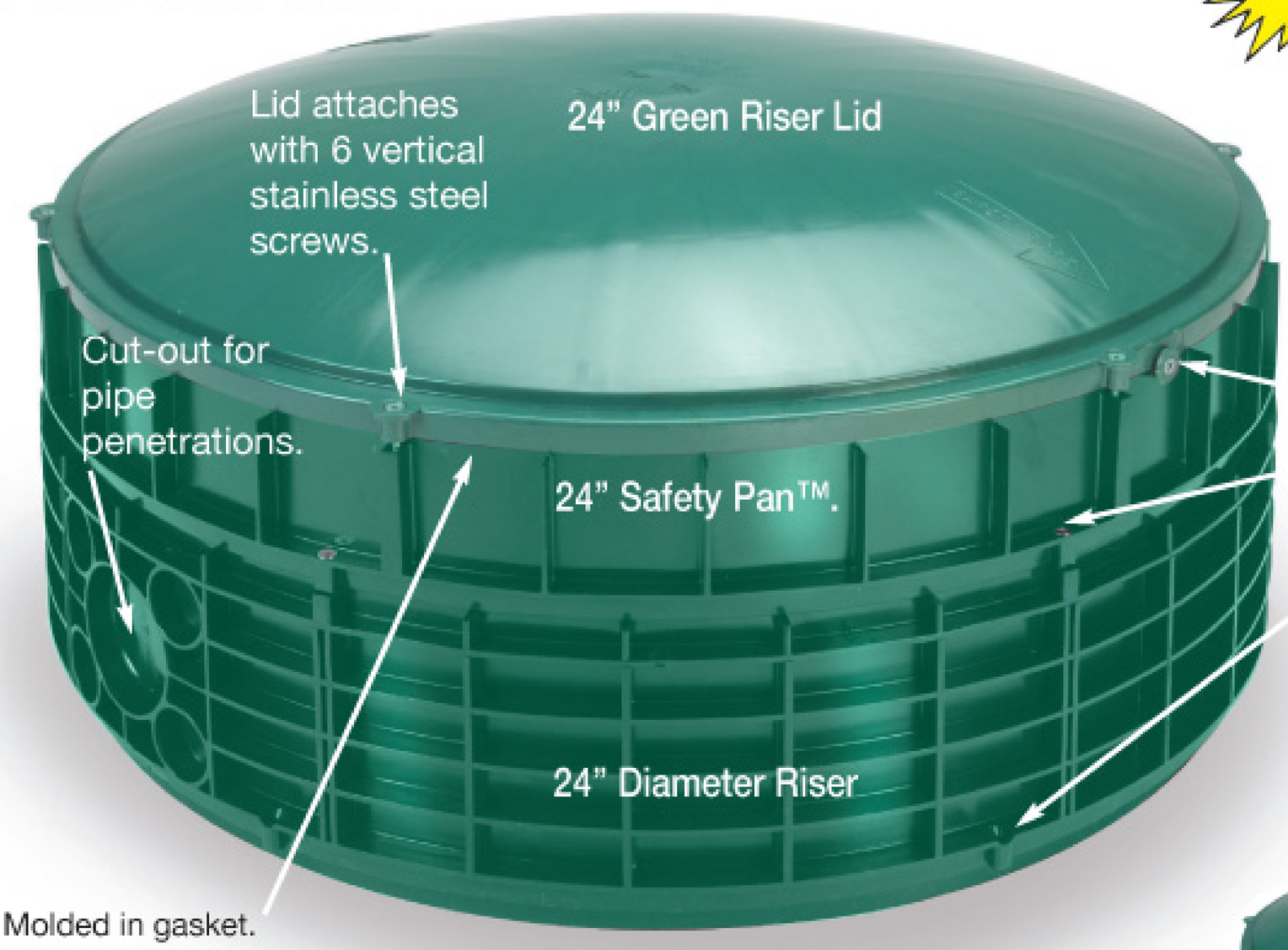
The Department of Health and Senior Services is considering changes to requirements for installers, soil evaluators and percolation testers. The proposed changes include fee increases, a reduction in continuing education requirements for renewed registrations, and new standards of practice. Changes could become effective by the end of September. Visit www.dhss.mo.gov/Onsite. ■

TUF-TITE®

For Samples & Pricing
Call: 800-382-7009

Septic Tank Riser, Lid & Safety Pan™

FREE FREIGHT ON FULL CARTONS!



Available in 12", 16", 20" and 24" diameters.

NEW!

Tank Adapter Ring

New - Horizontal Safety Screw.

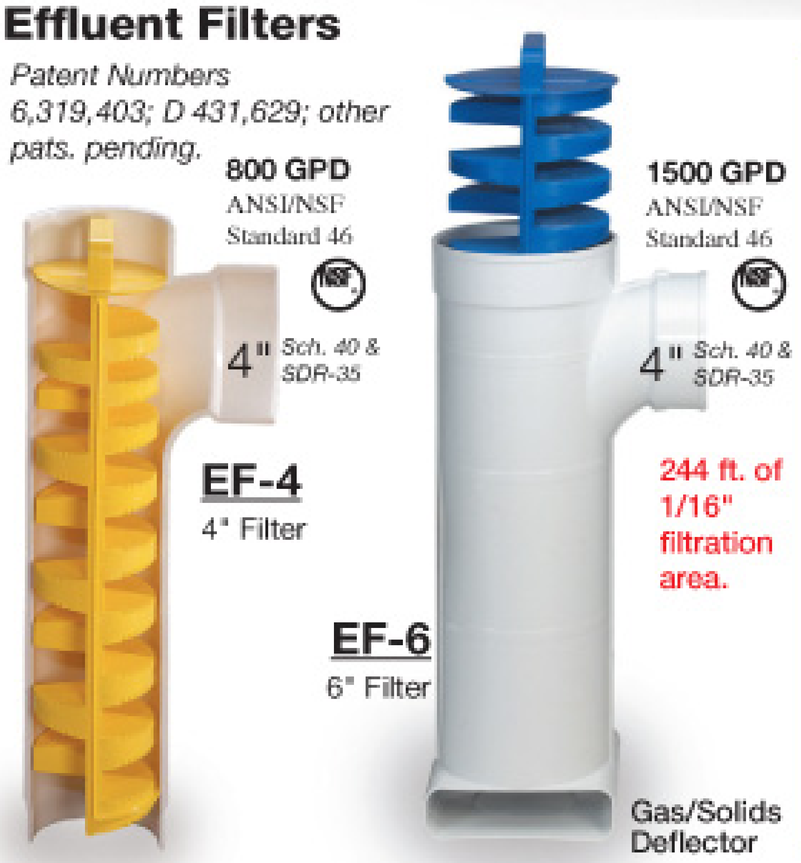
Safety Pan™ to Riser attachment with 6 vertical stainless steel screws.

Riser to Riser attachment with 6 vertical stainless steel screws.

Patent Numbers 5,617,679 & 5,852,901; other pats. pending.

Effluent Filters

Patent Numbers 6,319,403; D 431,629; other pats. pending.



One-Piece Tank Seal

For concrete Septic tanks and D-boxes.
Accepts pipes from 1-1/2" to 4".
Mounts with or without concrete flash.

Free Freight: 32c

Patent No's 4,951,914, 5,624,123 & 5,711,536;

TS-4-RUBBER TANK SEAL
(will hold 10psi)
TS-4PRO TANK SEAL
(will hold 5" vacuum)

Riser Lid

with Molded-in gasket. Available in 12", 16", 20" and 24" diameters.

Concrete Lid w/handle

Safety Pan™

Safety Pan™ available in 16", 20" and 24" diameters.

Riser

For septic tanks. Stackable in 6" increments. Available in 12", 16", 20" and 24" diameters.

Tank Adapter Ring

For mounting riser flush to top of tank when casting-in is not an option.

Tuf-Tite®, Inc. • 500 Capital Drive • Lake Zurich, IL 60047
800-382-7009 • 847-550-1011 • (fax) 847-550-8004 • www.tuf-tite.com

Plastic... Our Business, Not Our Hobby™

MasterCard VISA

Feedback
Onsite Installer™ *welcomes your comments, ideas and suggestions on how we can serve you better. Call 800/257-7222; fax 715/546-3786; or e-mail to editor@onsiteinstaller.com.*

Big Systems

Bigger may not always be better, but for progressive installers it can pay off in a big way to get familiar with clusters and commercial technologies

By Ted J. Rulseh

The headline of this article is actually the name of a business a friend of mine owns. It deals in large-format printers — the kind that produce high-quality, full-color prints, poster-size and larger, used for trade show displays and similar purposes.

He got into the business more than a dozen years ago, back when this kind of printing technology was just coming down in price to the point where companies other than big corporations could afford it.

He struggled at the beginning, so much so that during the first lean year, he and his partner consulted with the companies whose equipment they were selling, asking them what they were doing wrong.

After looking at their practices, the company representatives assured them that they were doing everything right and that things would turn around. A short time later, his partner gave up, and my friend bought him out. And then the business did turn upward. Since then, my friend has done great, and he thanks himself occasionally, not just for taking the leap of faith to get his firm started, but for staying with it.

There's a moral

There's a lesson in here for onsite installers and it has to do with big systems, which are the focus of the cover story and System Profile in this issue of *Onsite Installer*. The lesson is to consider thinking bigger.

There's a growing market for those able to think beyond systems for individual country houses. Consensus is growing that it's often too expensive to extend sewers to rural subdivisions, and so cluster systems are gaining a foothold. There's also a need for large-scale onsite systems for everything from schools, churches and summer camps to restaurants, offices and strip malls.

You might argue: That's beyond my capability. I don't have the training. I can't afford the equipment investment. I can't risk adding the staff. You're right to be concerned — those are known in the business world as barriers to entry.

But these barriers have a plus side: If it's hard for you to get into the large-scale market, it's hard for others, too. That means if you make a move, you won't have every Joe with a backhoe as competition.

Up in class

And isn't that one of the discontents of the single-family market? The fact that as a true professional you have to compete with people who peddle bare-minimum systems (or worse) based on low price?

Enter the world of commercial and cluster systems and you're taking a big step up in class. Because these systems are bigger and often handle higher-strength waste, they face tighter scrutiny from regulators. It's much harder for a designer or installer to cut corners. The rules are enforced, and one thing that means is a level playing field.

It's not a question of who can throw a box and some rocks in the ground for the lowest dollar. It's about who can install a system that effectively protects the environment and do it for the most reasonable price. Winning the job often depends not on the prices of septic tank, piping and gravel but on the caliber of innovation — a cost-effective way to solve a site-specific problem that no one else thought of.

In other words, there's more room, more demand, for ingenuity. And for many people, that's quite satisfying compared to installing cookie-cutter systems.

Enter the world of commercial and cluster systems and you're taking a big step up in class. Because these systems are bigger and often handle higher-strength waste, they face tighter scrutiny from regulators. It's much harder for a designer or installer to cut corners. The rules are enforced, and one thing that means is a level playing field.

What it takes

All right, it's easy for me to preach about making investments and taking risks while sitting comfortably in an office. Moving to bigger systems is a significant step, and it's not for everyone.

On the other hand, as the saying goes, this is not brain surgery. If you know the basics of single-family systems, you also know most fundamentals of large-scale and cluster systems. Wastewater flows the same, pumps and treatment units work the same, and the soil does its absorptive work in large systems just as in those you now design and install. It's just that the puzzles are larger and have more pieces.

Well, maybe it isn't quite that simple. But the point is: If you're looking for new challenges, for a higher-quality sector of the industry, and for greater profit potential, maybe you should be thinking bigger. You know — the way that friend of mine did. ■

HOOT SYSTEMS, LLC.

www.hootsystems.com

Install A Hoot Don't Pollute

Total Nitrogen Below 10 mg/L, No Matter the Influent Strength?

NSF Certified to NSF/ANSI Standard 245

NSF Certified to NSF/ANSI Standard 40

NSF Onsite Monitoring Ready

Now that the manufacturing community has begun to embrace On-Site Nitrogen Reduction, Hoot would like to educate you on what they have done.

In 1999, Hoot began their Nitrogen Reduction work in response to regulatory concerns they identified in Florida. There was a "Key's Standard" that was being largely ignored.

Since then, no less than 10 companies have tried to enter that market, some with as few as 6 samples to "Justify" system performance to below 10 mg/L TN, the level determined necessary to protect the critical springs area's.

Initial research at Baylor University focused on utilizing 4 different configurations of Hoot systems.

Hoot has spent the last 6 years and millions of dollars in Research & Development working to get Total Nitrogen below 10 mg/L. During this time the Nitrogen issue has been marginalized and regarded by some as "less important than making sure a riser is screwed down."

Hoot set out to prove that cost effective Nitrogen Reduction could be achieved, and the technology made available at a price that people could afford.

In 2006, Hoot began 3rd Party NSF testing to "Prove" what was previously discovered through research. Cost effective, efficient Nitrogen Reduction to below 10 mg/L can be achieved.

As result the first (and only) system certified below 10 mg/L was born.

The Hoot-ANR is just one of a series of three treatment systems by Hoot that perform <10 $CBOD_5$ & <10 TSS at the lab and in the field. Additionally, Hoot offers two Nitrogen Reduction Technologies; one utilizing timed recirculation and another that achieves the maximum Nitrogen Reduction, for the most sensitive environments, that reduces Total Nitrogen as far as possible (5.8 mg/L under the Standard 245).

The Hoot-ANR utilizes a "patent pending" process that adds a food grade additive to provide additional carbon necessary to off gas as much Nitrogen as possible. This process is controlled by a controller, not homeowners.

By monitoring flow through the system, it ensures flow proportional dosing to provide reliable performance. Additional set points can be selected by the maintenance provider for a range of influent from of 35 to 75 mg/L TN.

Some recently advertised studies, NOT certifications, have allowed for system performance to be ignored for the first 16 weeks of the study. The NSF Standard 245 allows a maximum of only a 3 week startup. At the end of week 4, the Hoot-ANR achieved a 92% reduction. (2.7 mg/L TN)

When the environment demands this level of treatment and performance, Think Hoot.

If you need this level of performance now, Hoot is looking for local precasters and installers to cover the country.

Hoot Systems, Working Today To Protect Tomorrow's Environment.™

151

2885 Highway 14 East Lake Charles, LA 70607 (888) 878-HOOT www.hootsystems.com

The Enviro-Septic® Wastewater Treatment System is easier to install, lasts longer, works better and costs less than pipe and stone and other conventional systems.

Enviro-Septic® provides unparalleled Installation solutions:

- Less area, excavation and fill
- Extensive scientific testing provides product reliability
- Free technical support services
- Durable and flexible pipe for easy maneuvering
- Virtually maintenance free
- No electrical or mechanical parts

Enviro-Septic® is tested and proven reliable:

- Over 15 years of sucessful field experience
- Nearly 100,000 systems in service in New England alone
- Approved for use in many states
- Significantly more protective of the environment than pipe and stone

The result is a job done fast, a job done right and a satisfied customer. You're on to your next job and with peace of mind. See the difference for yourself! In the states where approved for use, attending a certification course is recommended and may be required.

Sign up for a free one-day training and certification course by calling or going online.

To learn more about Enviro-Septic®, call Presby Environmental, Inc. at (800) 473-5298 or visit www.presbyenvironmental.com

PRESBY ENVIRONMENTAL, INC.
Protecting You and the Environment

226

Jim Anderson and David Gustafson are with the University of Minnesota's widely recognized onsite wastewater treatment education program. Anderson is director of the university's Water Resources Center and Gustafson is the university's extension onsite sewage treatment educator. Readers are welcome to submit questions or article suggestions to them at ander045@umn.edu.

Talking Texture

By understanding the impact of soil texture and drainfield sizing, you can verify design parameters in the field and avoid harmful mistakes

By Jim Anderson, Ph.D., and David Gustafson, P.E.

During the past year, we have taught soils classes in several states. Some states or counties require installers to take a soils identification course in order to get a license or permit to install systems.

Needless to say, at least some installers ask why they need to go through the same soils information as the site evaluator and designer. Our typical response is that as the installer, you are the person the homeowner relates to most closely, and so you will be the first person called or sued if there is a problem.

You need to be able to recognize if there has been a mistake in the site evaluation that could result in a mistake: the wrong type of system, the wrong location or the wrong size.

Aside from landscape and site characteristics, the two most important soil properties to know are soil texture and color. Soil texture is used to determine system size. Soil color helps you ensure that you maintain the proper separation distance for treatment and determine whether the area has been disturbed. Here is a quick primer on soil texture and its relationship to soil absorption system sizing.

How much of each?

Soil texture is the relative proportion of soil particles, by weight, finer than two millimeters in diameter (sand, silt and clay-sized particles). Materials larger than two millimeters are called rock fragments and are removed to determine the texture of the remaining fraction (the material that passes through a number-10 sieve).

Rock fragments are important because they influence water storage, and they dilute the volume of soil that can provide treatment. In some states, when rock fragments exceed 15 percent, the soil-sizing factor is adjusted to reflect this condition.

While most of us recognize sand particles because we can see and feel them, silt and clay-sized particles are different. It is difficult to imagine a particle just 0.002 mm in diameter. If a sand particle were magnified to a size of 10 inches, a silt particle would be about 1 inch in diameter, and a clay particle would be the size of a grain of sugar.

Soil texture classifications are defined according to the distribution of the sand, silt and clay-sized particles (soil separates). The 12 textural classes are often displayed on a textural triangle. The classes in order of increasing proportions of fine particles are:

- Sand
- Loamy sand
- Sandy loam
- Loam
- Silt loam
- Silt
- Sandy clay loam
- Clay loam
- Silty clay loam
- Sandy clay
- Silty clay
- Clay

The sand, loamy sand and sandy loam classes may be further subdivided into coarse, fine and very fine. This all sounds complicated and some people make it that way. But for sizing soil treatment systems, a number of these classes get lumped together into four or five that are easier to distinguish with a little practice.

The relationship between soil texture, percolation rate and soil-sizing factor used in Minnesota, where we are based, is provided in the table as an example.

Soil Characteristics and Required Areas for Sewage Treatment (>3' separation)

percolation rate in minutes per inch (mpi)	common soil texture	square feet per gallon per day	gallons per day per square foot
faster than 0.1*	coarse sand	0.83	1.20
0.1 to 5	medium sand, loamy sand	0.83	1.20
0.1 to 5	fine sand**	1.67	0.60
6 to 15	sandy loam	1.27	0.79
16 to 30	loam	1.67	0.60
31 to 45	silt loam	2.00	0.50
46 to 60	clay loam, silty clay loam, sandy clay loam	2.20	0.45
over 61***	clay, silty clay, sandy clay	4.2	—

*Soil too coarse for sewage treatment; use systems for rapidly permeable soils.
**Soil having 50% or more fine sand plus very fine sand.
***Soil with too high a percentage of clay for installation of a standard in-ground system

The soil table used in Minnesota shows the relationship between soil texture and the factors used to size soil treatment systems.

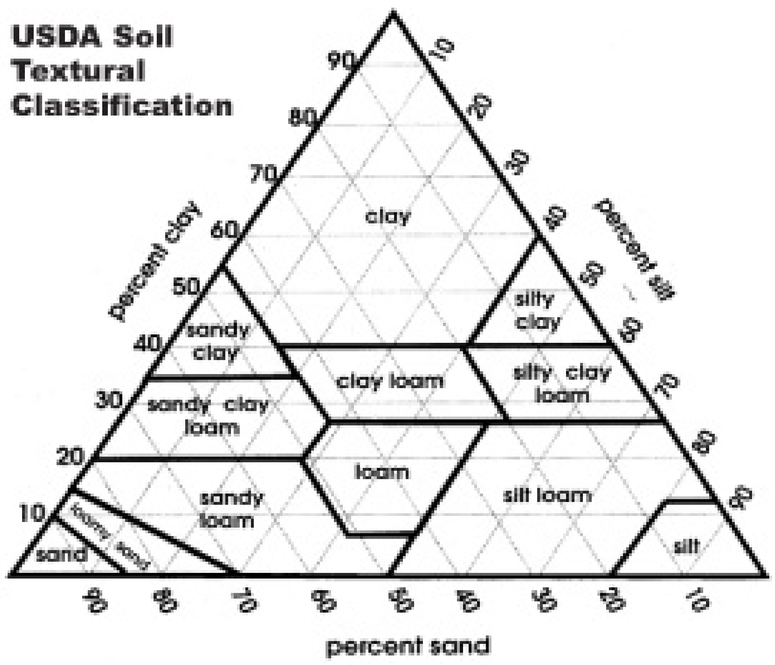
In the field

Texture can be measured in the laboratory by determining the proportion of the various sized particles in a soil sample. This is called mechanical analysis, and the laboratory uses either a hydrometer or pipette procedure. For installers, the issue is how to estimate the texture in the field as a check against the system design.

You make the determination in the field by feeling the soil with the fingers, and sometimes by examining it with a hand lens. This requires a little familiarity and a little practice, but with modest effort you can become competent at estimating texture.

The procedure is to moisten a sample of soil 1- to 2-inches in diameter. There should be just enough moisture so that the consistency is like putty. Too much moisture results in a sticky material that is hard to work.

Press and squeeze the sample between your thumb and forefinger.



Soil Textural Triangle, according to the USDA Classification System.

Press the thumb forward to try and form a ribbon from the soil. Sandy soils will often be loose and feel gritty. Silty soils will feel smooth like flour, and clay soils will be sticky.

The way a wet soil develops a long, continuous ribbon (or doesn't) gives a good idea of the amount of clay present. If the soil sample forms a ribbon (silt loam, loam, clay loam or clay), texture is determined by the length of the ribbon and whether the sample feels smooth or sticky.

Smooth with less than an inch-long ribbon would be silt loam or loam. Sticky with an inch-long ribbon would be clay loam. Sticky with a ribbon longer than 2 inches would be clay.

Case in point

Using the Minnesota sizing example, let's say you are starting to excavate for a system of trenches for a three-bedroom house with an estimated daily sewage flow of 450 gpd. The site evaluator and designer used the sizing factor for a clay loam.

This would mean the size of the system in terms of the amount of trench needed would be about 450 gpd x 2.20 sq. ft./gpd = 990 square feet. With a 3-foot-wide trench, that results in 330 lineal feet of trench.

However during excavation, suppose you notice that the soil seems a lot looser and with a lot less clay than would be present with a clay loam. You conduct the ribbon test and get a ribbon no longer than one-half inch before it breaks apart. This indicates a loam texture.

The amount of trench needed then would be 450 gpd x 1.67 sq. ft./gpd = 751.50, or 750 square feet. That means you need just 250 lineal feet of 3-foot-wide trench. These figures in the Minnesota example would be adjusted for depth of rock under the pipe. But as you can see, they still could make quite a difference.

You would then need to discuss this information with the designer and site evaluator so that everyone would be evaluating the site the same way. Obviously, this example would be more critical if it went the other way and showed the need for a larger system. It is in your best interest to be able to do this analysis in the field. It will make for better systems and fewer call backs in the future. ■

As the installer, you are the person the homeowner relates to most closely, and so you will be the first person called or sued if there is a problem. You need to be able to recognize if there has been a mistake in the site evaluation that could result in a mistake: the wrong type of system, the wrong location or the wrong size.

Machine Matters is designed to help readers get the most from excavators, backhoes, skid-steers and other mechanical equipment through proper maintenance, operation and financial practices. Readers are welcome to submit ideas for this column and can send them to Ted J. Rulseh, editor, by calling 800/257-7222, or e-mailing editor@onsiteinstaller.com.

More From Your Machine

Good operating practices and wise choices of machines and options can help you increase loader backhoe productivity on the jobsite

By Greg Northcutt

Manufacturers design loader backhoes to deliver a certain amount of power and speed for digging, loading and other jobs.

But are you making the most of the performance you paid for? Not if you're relying more on your bucket than on the arm of your machine when digging; or if you're trying to gain more power by operating at full throttle.

These are just two ways in which some owners and operators fail to use their backhoes most efficiently and productively, reports Jeff Aubrey, product manager for loader backhoes at Komatsu. He offers several tips to help you profit from more productive use of your machine.

Leverage your power

Consider digging a trench or excavating a hole. The most power-efficient way to do this is to take full advantage of the backhoe arm's leverage, instead of using the forces generated by the bucket's hydraulic cylinder, to dig into dirt.

"The cylinder arm cycles more hydraulic power than the bucket cylinder," Aubrey says. "Think of moving the arm in an arc through the ground, one layer at a time. As you do so, the bucket fills with dirt. Then, at the end of the stroke, when the bucket is full, curl it up to hold the dirt as you raise the arm."

This practice can also help improve stability of a trench, he adds. "Digging a layer of earth at a time doesn't disturb the surface as much as slamming the bucket's cutting edge too deeply into the ground. As a result, the walls remain a little stronger." Another basic factor in productivity is to keep cutting edges and teeth of buckets sharp. They'll dig faster, using less power, than dull ones.

Because the operator is key to productivity, it is important to consider ergonomic features in the cab. (Photos courtesy of Komatsu)

When using stabilizers, make sure that both the front and rear tires are off the ground. That way, the outriggers and front bucket provide a stable platform.

Throttle back

Operating the engine at full rpm gives you the fastest hydraulic response, along with the most noise, but it doesn't necessarily produce the most power for digging and loading. In Komatsu backhoes, for example, even though the engines have a top speed of 2,200 rpm, the operator's manual recommends running them at about 1,900 rpm.

"Increasing engine speed above 1,900 speeds up flow of the hydraulic fluid," Aubrey says. "However, it does not increase hydraulic power because the pressure of the hydraulic system doesn't change."

In addition to improving fuel economy, operating at lower rpm provides better control for precision work, like craning or digging close to gas lines or other utilities. Depending on operator skill, slower acceleration and deceleration of hydraulic speed can increase productivity by minimizing spillage when swinging a full bucket.

Get comfortable

Improving productivity can also involve basic considerations like operator comfort. Seats can be adjusted in various ways to meet individual operator preferences in seat height, angle of the seat back and position of the armrests.

On Komatsu machines, for instance, operators can alter position of the wrist rests and the angle of the control tower. "By taking the time to set up the machine so that you can operate it comfortably, you can reduce your stress, allowing you to work longer and more productively," Aubrey says.

The choice of which hands control the boom and arm can affect your comfort. Most models let you

select either traditional backhoe or excavator control patterns.

Choose the right size

Most manufacturers offer a wide range of bucket sizes. Selecting one that is too big or too small can waste time and power. The most productive bucket is one that fits the power of your machine with the type of material you're handling. Aubrey suggests using the machine capacity chart in the operator's manual to match the weight of the material, the size of a given bucket, and the lifting capacity of your machine.

It's a similar story in sizing your loader backhoe itself. A big machine won't maneuver as quickly or as easily in tight spaces. At the same time, trying to do more work with a smaller machine than it was designed to handle can waste time and shorten productive life.

Work at the proper height

When using stabilizers, make sure that both the front and rear tires are off the ground. "That way, the outriggers and front bucket provide a stable platform," Aubrey says. "However, if the tires remain on the ground, they can act like a spring to repel the machine and lead to jerky operation that can waste time and cause material to spill."

Control travel speed

Various options can also help boost a loader backhoe's productivity. For example, Komatsu models equipped with the optional Power Shift transmission have a button on the loader control lever that lets you shift between first and second gear without taking your other hand off the steering wheel.

"If you're charging into a pile of dirt, you can press the button to shift on the fly into first gear to provide low-end torque," Aubrey says. "Push the button again, and the transmission shifts up to second gear for running back and forth between the pile of dirt and your truck."

Change attachments fast

Depending on how often you change from one bucket or other attachment to another, an optional quick coupler can increase productivity by eliminating the time spent removing and installing pins when replacing attachments.

Some are operated manually. Others allow you to unhook from one attachment and hook up to another one without leaving the cab of your backhoe. "Quick couplers are really gaining in popularity," Aubrey says.

Eliminate "porpoising"

Many manufacturers offer an option to smooth out the ride when carrying a load in the loader bucket. "Our load stabilization system uses a nitrogen-filled accumulator on the boom lift circuit that acts as a shock absorber," Aubrey says. "By allowing the loaded bucket to float, it keeps the machine from bouncing or 'porpoising' as much so that you can travel faster over rough terrain."

"By taking the time to set up the machine so that you can operate it comfortably, you can reduce your stress, allowing you to work longer and more productively."

— Jeff Aubrey

Save lube time

Most loader backhoes require daily greasing of pins on the backhoe, loader, bucket, outrigger axle pivots and other points. In some cases, Aubrey notes, aftermarket central greasing systems can save valuable time for production work. These systems distribute grease from a reservoir to provide the necessary lubrication, eliminating the need to lubricate each pin individually with a grease gun.

Shop wisely

Here are a few of the features manufacturers offer on their latest loader backhoe models to boost productivity:

- Auto-up stabilizer controls on Case machines raise the stabilizers while swiveling the seat to the loader position for faster turnaround.
- John Deere's optional limited-slip Mechanical Front Wheel Drive delivers 80 percent of available power to the wheel with the best traction.
- The latest New Holland machines have a narrow curved boom that provides best-in-class visibility, increased breakout force and lower transport height.
- On Terex machines, the forward/reverse shifter is positioned on the front console for easy control.
- Volvo machines offer a center-mounted bucket cylinder for a better view of the bucket and rear tilt-up hood and ground-level fluid checks for easier servicing.

Greg Northcutt is a freelance writer based in Port Orchard, Wash. He can be reached by e-mailing this publication at editor@onsiteinstaller.com. ■

Community-Wide

Wastewater Solutions

from Orenco®

For more than 25 years, Orenco Systems®, Inc. has helped communities all over the world find affordable solutions to a variety of wastewater problems.

Orenco's wastewater equipment has been installed in small-to-mid-sized towns, subdivisions, and resorts throughout North America. Also, on a drilling rig in Alaska, wineries in California, hotels in Greece, eco-communities in Australasia, and USAID projects in Central America.

We have a new brochure that profiles 10 of our projects. It's called "Affordable Wastewater Solutions that Fit Your Community."

Call our Engineered Systems Department at 800-348-9843 for your free copy or to get more information about our technologies and services.

See us at weftec the water quality event™ Oct. 18-22 booth #20138

Orenco Systems®
Incorporated
1-800-348-9843
www.orenco.com

Subcontractors Tom Miller and Joe Familetti prepare to start a new tubing run on a Pikeland Construction installation. (Photography by Gil Longwell)

The Big Back Yard

Pikeland Construction finds success with a specialty in large-scale drip dispersal systems for major housing developments and public sector projects

By Gil Longwell

Pikeland Construction Inc.
Kimberton, Pa.

OWNER: Charlie Doley

YEARS IN BUSINESS: 21

MARKET AREA: 200-mile radius

ANNUAL REVENUE: $5 million to $10 million

SPECIALTIES: Large treatment systems and drip dispersal systems

EMPLOYEES: 25

AFFILIATIONS: NOWRA, DOWRA, POWRA

WEB SITE: www.pikeland.us

Charlie Doley has spent most of his adult life working in back yards, installing onsite wastewater treatment systems.

"When I started, we installed traditional subsurface beds for single-family homes," says Doley, owner of Pikeland Construction Inc. in Kimberton, Pa. "Today, the back yards are much bigger and so are the systems." Doley now installs drip irrigation systems that serve entire neighborhoods, schools and other high-volume developments.

The company, with a crew of 25 field and office workers, serves roughly a 200-mile radius that includes big parts of Pennsylvania, New Jersey, Delaware and Maryland. The firm takes a custom approach to each job, carefully considering site conditions.

Doley has created a deep and flexible team, highly focused on the techniques of drip system installation, and augmented by subcontracted labor and machinery.

Tracking with trends

After graduating from Penn State University in 1981, Doley went to work for an onsite installation company managed by his brother-in-law, Chuck Waddy. A short time later their friend Tom Cosgrove started Pikeland Construction, and Doley and Waddy joined him. A few years ago Doley bought the business. Now the three are business collaborators, each working in complementary segments of the onsite system industry.

The company's focus in the 1990s was on building treatment systems for developers and public entities. "These systems were designed to serve as few as 10 homes or as many as several hundred," Doley says. "Some of our systems serve an entire school."

In each case, Pikeland built an advanced treatment plant and subsurface infiltration bed. The approach worked well in the rapidly developing suburban area. When the devel-

Pikeland Construction owner Charlie Doley checks part of the 160,000 linear feet of drip tubing to be installed on one of the company's large-scale systems.

> **"The drip tubing we install is the same product that is used for single-family home systems around the country. Most of the hardware is the same as well."**
>
> — Charlie Doley

oper's system was complete, it was turned over to the municipality to own and operate.

When Doley started, beds of 100 feet by 200 feet were common. At the time, beds were preferred over NPDES-permitted stream-discharge systems because state discharge criteria were strict. As regulators' policies and attitudes toward beds changed, designers looked to new strategies. The next approach that gained favor was spray irrigation.

Pikeland built many spray systems. But in the past few years, municipal officials and developers have shied away from the concept. "Perhaps it is because of the 'ick factor' that emerges when homeowners learn that treated wastewater is coming out of the spray heads in that big, green field," Doley says. "Perhaps it's due to regulators' preferences. Perhaps it is because of the high cost of land."

Drip irrigation

As spray's appeal waned, regulators and designers focused on drip irrigation. "The drip tubing we install is the same product used for single-family home systems," says Doley. "Most of the hardware is the same as well."

The most visible difference between single-family systems and the ones Doley installs is scale. A single-family system may have 2,400 linear feet of tubing in two zones to handle a 600-gpd flow, and the dripfield covers about 5,000 square feet. "Our first community drip system handled a 100,000-gpd design flow directed to a 5-acre drip area," says Doley. "There were 80,000 linear feet of tubing in eight zones."

State regulations differ on pretreatment requirements for drip dispersal. The requirements can also vary depending on whether a local jurisdiction or the state itself issues the permit. Pikeland's community systems are usually permitted by the state under the NPDES program.

The surface of a dripfield is well suited for passive recreation, parks and similar low-impact uses. "People can enjoy the area," says Doley. "Kids can fly kites or play Frisbee and never have to worry about when a drip zone is actively dispersing wastewater." That is not the case with a spray field. Another benefit of drip is that it uses less land for the same daily flow.

When exploring drip systems, Doley went to manufacturers' seminars and toured manufacturers' and suppliers' facilities to do his homework. "Drip is a natural progression in technology," he says. "To move in that direction, we had to be certain we built our business on sound science and reliable supply networks."

Big systems, new challenges

The company relies on American Manufacturing Company Inc. for its drip system components. Each drip job is different, and each has a different site configuration. "When we are on a site, we can't box ourselves in and we can't allow ourselves to be boxed in by other construction trades working on the site," Doley says. "Each system requires site-specific planning, materials staging, and a well thought out construction sequencing plan. Site protection is essential."

Pikeland wants to be the first contractor on the site, where its first task is to surround all dripfields with polyethylene snow fencing to prevent soil compaction by an equipment operator or driver.

Charlie Doley checks the Rain Bird master control for a six-zone system. Pikeland's crew erected the control building atop a 200,000-gallon clean-water storage tank.

Pikeland selects equipment with a ground loading rate of 6.5 psi or less. Once the site is protected, key features like drip zones, manifold races, control systems and tanks are staked out. "When the job is completed, we pull out all of the protective snow fencing," says Doley. "Usually, in a few months, the dripfield looks like it did before we started."

A typical installation begins at

The Public Sector

Municipalities will not build wastewater collection or treatment capacity in anticipation of a developer's needs. When a development is beyond the reach of a municipal sewer system, the developer must provide both collection and treatment.

"If the developer does not construct the entire system in a way that satisfies the municipality, there is no development," says Charlie Doley, owner of Pikeland Construction. On those jobs, Pikeland must satisfy two clients — the developer and the municipality.

Doley sees opportunities in purely public sector work, too. "Municipalities and school district clients always pay their bills," he says. Because of public bidding, these jobs are more competitive and bring in less revenue. "This work is an essential part of our market mix," says Doley. "It helps us keep busy even in times when the housing market is down." By balancing public and private clients, Pikeland has been successful in all markets it serves.

Headers, manifolds, zone valves and individual drip lines for six zones are served from a common trench.

the farthest point from the treatment plant and works back toward it. Tubing is installed first, followed by manifolds, pumps and controls. In the field, however, Doley has learned that "typical" may be quickly set aside because of unique conditions. Crews also know that ideal soil conditions may not be around for days on end.

"Soil conditions across large areas can vary significantly," Doley says. "Naturally damper soils will get priority consideration. As soon as they are dry enough to work, we will do so." All things being equal, smaller constrained sites present the greatest challenges.

"Our systems are really big, and our contractor clients are not interested in cutting corners," Doley says. One system supports a townhouse development where the least expensive units cost $200,000. Another serves high-end houses priced at more than $1 million each.

A system for a development of 660 single-family homes was designed for a 180,000-gpd flow, while a 6,000-gpd system serves 12 to 15 homes. When comparing big systems, Doley talks about the dollars per gpd. "Dripfields range from $5 to $20 per gallon," he says. "The 180,000-gpd system cost about $5 million, and about one-fifth was for the drip component."

Flexible resources

Pikeland has 25 full-time employees. Eight work in the office. There are eight foremen/project managers and eight operators and laborers. Subcontractors play a large role in the projects. It is common for Pikeland to field a crew of five employees, supported by 10 subcontracted workers. Seldom does Pikeland have fewer than two employees on a site; 10 is about the maximum.

The employees are not constrained by job titles. One worker may install drip tubing in the morning and paint a room in a mechanical building at the treatment works in the afternoon. The employees bring a broad skill set to every job. Maximizing use of those skills is a challenge for the foremen. Skill depth and flexibility have enabled Pikeland to keep all its employees busy. In its 21-year history, the company has had only one layoff.

Charlie Doley (left) and Pikeland crew leader Bill Garland inspect tubing lines that were installed last fall before work was halted for wet soil conditions.

"Drip is a natural progression in technology. To move in that direction, we had to be certain we built our business on sound science and reliable supply networks."

— Charlie Doley

Equipment is another resource readily available through subcontractors. "Relying on somebody else to provide modern, well-maintained, task-focused equipment lets us work to our strengths," Doley says. "There is no downtime to worry about, no overhead and no monthly payments." For its size, Pikeland's equipment roster is slim.

There is a fleet of three single-bottom vibratory plows, which includes Case 2004 and 2005 Maxi trenchers and a Ditch Witch 410 SX. A pair of Case 580K backhoes and a pair of Caterpillar backhoes make up the balance of the big machines. With lots of personnel and jobs spread over a 200-mile radius, Pikeland keeps a fleet of 13 assorted pickup trucks busy.

"I have seen multi-bottom tubing plows, but in our soil conditions we find it more feasible to use single-bottom plows," Doley says. "On some jobs, the crew may use as many as three plows, each performing individually. Each tool and each person specifically matches the work assignment."

Niche clientele

Pikeland enjoys a comfortable place in a niche market. "On occasion, we install a single-family system for a friend, but that is not our market place," Doley says. The client list includes major national builders like K. Hovnanian, Realen Homes and Pulte Homes. Local builders who deal solely in the upscale housing market include Hankin Builders and Moser Builders. Public sector projects include the French Creek and Pocopson elementary schools near the company's office.

Pikeland likes to work with clients as early as possible in development planning. Each discipline brings its own unique skills, wisdom and insight to the design table. "We bring the practicality of the installer's perspective," says Doley. "Commercial developers are more open to this collaborative approach, while public sector jobs are less open to our input. Each client works in a different environment. We do our best to fit into each project team."

Doley observes that dripfields are not, strictly speaking, treatment system components since water sent to the drip tubing is clean and ready for reuse. Doley believes the reuse potential has not been fully realized, but "It is coming."

He describes one project at a warehouse near Allentown, where a drip system is being used to introduce stormwater into the soil. There is no treatment works — only a stormwater catch basin and a dripfield. "Getting the water into the water table is important," Doley says. "The big-pipe systems send the water downstream. Drip keeps the water close to its source, or close to where it fell as precipitation, and puts it into the ground for future reuse."

Today, the size of his jobs is different, yet the basics are similar to those of the single-family systems he used to install. At the end of the day, and at the end of every job, Doley is not far from his roots. He is in someone's back yard, helping them treat, manage and benefit from onsite wastewater technology. "It's where I started," he says. "It is where I have found success, and it is where I want to be." ■

MORE INFO:

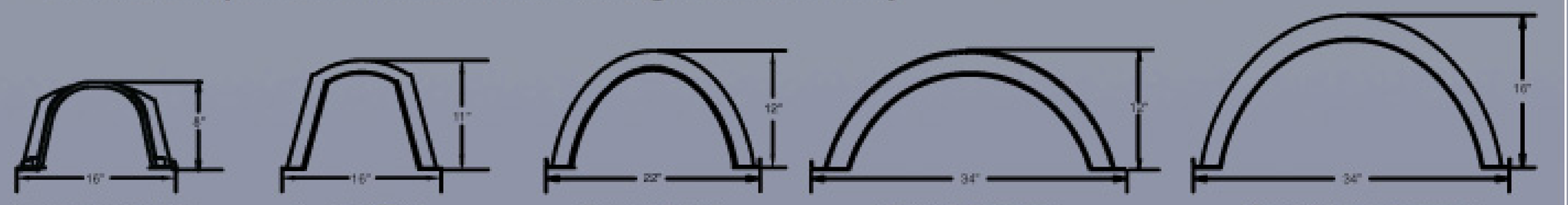
INFILTRATOR® SYSTEMS INC

NEW Quick4® Equalizer® 24 Low Profile Joins the Quick4 Family of Chambers

Infiltrator Systems continues our tradition of innovation with the Quick4 Equalizer 24 Low Profile (LP) Chamber. Designed to provide exceptional strength in trench or bed applications, the chamber's eight inch tall, low profile design makes it ideal for shallow placement applications. The Quick4 Equalizer 24 LP chamber includes an exclusive combination of features not found in any other leachfield chamber.

The Quick4 Equalizer 24 LP Chamber Features and Benefits:

- Eight inch chamber height allows for shallow profile installations with only 4 inches of cover
- Advanced contouring chamber connections swivel 15-degrees, right or left
- Four-foot chambers are easy to handle and quick to install
- Two-inch invert height optimizes shallow configurations
- Simple overlap end cap design allows for easy installation on either end of trench
- Flat end cap construction offers strength and stability



Quick4 EQ24 LP *Quick4 EQ24* *Quick4 EQ36* *Quick4 Standard* *Quick4 High Capacity*

For more information about innovative chamber solutions from Infiltrator Systems, visit our website at www.infiltratorsystems.com or call 866-294-1065.

79

FIRST OF TWO ARTICLES

Regulator Relations

The first step to working positively with inspectors from government onsite agencies is to understand the roles of both installer and regulator

By Gary Barnes, REHS

How familiar is this scenario? You and your crew were out at first light to shoot grades on a new installation. You're short one man and behind schedule. Yesterday, when you stopped by the county onsite regulatory office, the copier was down and could not print the approved plans. Instead, you're digging off the draft.

This worked with the previous regulator — ol' Bob knew people wanted into their new house and that contractors needed to move to the next job. A few more buckets and you'll drop the tank and start cutting trenches. Then you hear the sound of a backhoe bucket tooth snapping. The county truck pulls up, and out steps a new regulator — the one other contractors call Missy Nit-Pick. Looks like your day just went from bad to worse.

Now turn the scenario around. You're an onsite regulator on the way to meet a contractor and deliver the approved plans. You missed him yesterday, and your administrative assistant was unable to print the approved design. That's all right, since there was a major error — the contractor didn't follow the new state law that increased setbacks around the tank.

At the jobsite, you're surprised that digging has begun without an approved design. It sure looks like the tank is too close to the property line. The contractor is yelling at the backhoe operator as you walk up. He's the one other regulators call Loose Cannon. Looks like your day just went from bad to worse.

Seeking better outcomes

This interaction between contractor and regulator has several possible outcomes. The actual result depends upon how well the contractor manages the process and understands the regulations. Here are some practical suggestions for keeping interactions with regulators on the positive side. First, it helps to understand the basic situation.

Why is the regulator here? Simple enough: The regulatory process is mandated by law, be it federal, state or local.

What should I expect from the regulator? You can find insight in the agency's mission statement, which gives focus and direction on how the agency functions. The regulator's business card often includes the mission statement, usually a simple declaration: *The mission of the (agency) is to lead efforts to protect and promote the health of (the community the agency serves).*

Notice that the focus is on the citizens: The regulator is an advocate to protect and promote your customers' health. Equally important is what the mission statement does not include. The regulator is not at your jobsite to become your friend but to verify that you follow the regulations and take reasonable care to install an onsite system to code.

Not all regulatory agencies have the same perspective. Some are based in the Health Department and focus on health concerns. Others are based in the Building Code Department and give prime importance to engineering design specifications.

Why is the regulator such a pain? A common complaint about regulators is that they have an "attitude." As in any profession, there is a range of people skills among regulators. Some are former salesmen, and some are former Marine drill sergeants. Many agencies provide customer relations training for regulators, but many do not.

Regardless, accept that a regulator is not being difficult in verifying compliance and is not a jerk simply for citing verified violations. A plan review and inspection requires challenging questions that may offend if you take them as accusations.

If the regulator asks for the setback distance from the tank to the property line, respond with facts and correct specifications. Do not be offended by the challenge inherent in the question. Remember, the issue is the code. As long as the regulator behaves with professional respect, focus on design requirements and not personalities.

Avoid the temptation to verbally attack the regulator. You may win points with your crew by trumping the regulator in public, but in the long run that is costly. Field inspectors compare notes on contractors and anything less than a calm and professional conversation will be fully discussed back at the office.

Works two ways

It takes a mature person to function on either side of the regulatory fence. The regulatory process grants a great deal of power to the regulators. They are the customers' advocates and have the code book in their pocket. Some immature regulators take this as a license to bully, intimidate, or disrespect the contractor and crew.

Professional regulators are just as disturbed as contractors about horror stories of obnoxious and unfair inspectors — maybe more so. True professionals do not want to be painted with a negative stereotype, and they fully appreciate that a professional contractor is also a customer advocate. And, by definition, professional contractors also have the code book in their pocket.

The unfortunate reality is that most regulators have dealt with contractors who bypass the rules. So if you feel challenged by the regulator, your perception is correct. The professional regulator, while respecting your personal and professional dignity, will challenge your work to verify that it is properly designed and installed.

The key term is verification. Let's apply that to the opening scenario. The contractor is focused on getting the system in at reasonable cost. The former onsite regulator made allowance for the bad copier, and the contractor worked off the draft. But the new regulator sees the same conditions differently: The contractor is installing without an approved design and missed the new setback requirement.

If the contractor has incorporated all requirements there will be no surprises during a plan review or installation inspection. The regulator evaluates, verifies required procedures, documents any failure to

meet the regulations, and takes enforcement action for non-compliance. Contractors should work day in and day out with the regulators' needs and procedures in mind.

Consider how long a regulator is at your jobsite compared to the time you and your crew spend there. Depending upon how much territory a regulator covers, he or she may be available for only a few minutes to evaluate and verify your installation process.

So, who has the ultimate responsibility for a properly designed and installed system? Contractors do. If you are diligent with your own evaluation and verification, there will be no surprises when a regulator walks up and does the same.

Tougher is better

Contractors should appreciate and even demand rigorous regulatory involvement. In the long run, a lackadaisical regulator does no favors. It is better to have an intense plan review and final inspection that catches design errors while they can be corrected than to deal with an upset homeowner with a failed system two months after construction.

And who should decide whether an installation proceeds? The contractor has the final responsibility. If conditions are such that an approved design cannot be installed and corrections fall outside allowed variances, then the contractor must halt operations until the construction can be brought back into compliance.

Have you ever wondered why a regulator decides to cite certain observations as violations? In part, it helps to understand the agency's inspection philosophy. Most regulators are taught to cite major issues and consider the overall severity of minor issues. Not all agencies take this relative approach — instead they consider a single incident as enough to trigger documentation and citation.

This approach, "If it's in the code and I see it, I cite it," is based on the professional responsibility to enforce all mandated regulations. Here, the regulator does not pass judgment on an observation but simply matches observations with the code. In other words, "If it's not important enough to cite, then it shouldn't be in the code, and if it's in the code, then it's important enough to cite."

On the other hand, some agencies take a risk-based approach and require regulators to evaluate the potential of a negative outcome: How critical is this item to the overall function of the system? Instead of a traditional checklist, the regulator uses a "blank sheet" and documents critical observations. Thus, in a risk-based inspection, minor items may not even be documented.

Inspection requirements are usually codified into law, and your regulator may not be at liberty to change them. Many would prefer risk-based inspections but their code does not allow it. Regulators who fail to inspect according to the law leave themselves open to charges of professional neglect and malfeasance.

Regulator skill

The regulator's experience and knowledge will affect the final evaluation. Every contractor has seen the new regulator afflicted with "white knight syndrome," riding in to save the homeowner from the greedy contractor and failing an installation because one leachline is a few inches short of specification.

It is the shame of many agencies that they hire new staff, give them minimal training, then send them out to conduct final evaluations. The new regulator, who may never have set foot on a leachfield, is now conducting inspections. The greater shame is that those inspection results become part of the contractor's performance evaluation and help determine whether that person maintains standing as a licensed contractor.

Even experienced regulators will have an agenda based on what they consider most important and what they are most comfortable inspecting. Your electrical work on dosing pumps may not get much attention if the regulator is unfamiliar with the technology — yet the same official will evaluate trench length on every inspection, since that is readily visible and easy to measure.

After understanding the basics, the next step is knowing how to build and sustain positive relationships with regulators. That is the subject of the second half of this series, to be published in a future issue of *Onsite Installer.*

Gary Barnes, a registered environmental health specialist, has more than 30 years' experience in the onsite industry, from installing systems to writing regulations. As a sanitarian, he has conducted site evaluations, plan reviews, and installation inspections on hundreds of systems. He now works as a consultant in Arizona, helping local agencies establish ordinances and hire and train staff. Reach him at gbarnes6614@msn.com. ■

Serving a Community

A moving-bed biological reactor and submerged fixed-film aeration unit enable contractors to build a community of 1,495 homes

By Scottie Dayton

Six land developers wanted to build separate subdivisions right outside the city limits of Cave Springs, Ark. Initial plans called for each one to handle wastewater in his own subdivision, as the city had no wastewater treatment plant. However, government officials asked the developers to consider one large decentralized system.

Tom Bartlett, owner of Aqua Tech Systems LLC in Fayetteville, Ark., suggested a solution to the lead developer, Brett Hash, owner of Northwest Services LLC in Cave Springs. Bartlett's proposal took more than three years to organize and involved two stages: a 92,400-gpd system called Fairway Valley Phase 1, and a 320,000-gpd system called City of Cave Springs Phase 2.

Fiberglass tanks in the process of installation at the treatment plant site. (Photos courtesy of Aqua Tech Systems LLC)

Fairway Valley, which treats water from 450 homes, became operational in January. It involves septic tank effluent pumping (STEP) tanks, a moving-bed biological reactor, submerged fixed-film aeration unit, and dripfield. Aqua Tech project manager Ken Gregory worked with the engineer to pull together the proprietary collection of equipment needed for the system supplied by Aqua Tech. When fully developed, the community will contain 1,495 homes.

System Profile

Location:	Cave Springs, Ark.
Facility served:	City of Cave Springs
Designer:	Daniel Lazenby, ESI Engineering, Springdale, Ark.
Installers:	Utility Contractors, Wichita, Kan.; Moore Brothers Septic Systems Inc., Lincoln, Ark.
Site conditions:	Sandy loam soil, loading rates of 0.18- to 0.345-gal/sf/day; water table 6 feet below grade
Type of system:	Moving-bed biological reactor, submerged fixed-film aeration unit, and pressure-compensated driplines. All equipment provided by Aqua Tech Systems LLC, Fayetteville, Ark.
Hydraulic capacity:	92,400 gpd

Site conditions

Soils are sandy loam with loading rates of 0.18- to 0.345-gal/sf/day. The water table is 6 feet below grade. The topography is hilly and rocky, with limestone bedrock 4 feet beneath the topsoil. Filled with lakes, streams and caves, the area is home to many endangered species including the Ozark cavefish, gray bats, cave crayfish and bald eagles. A creek runs through the middle of the golf course.

System components

Daniel Lazenby of ESI Engineering in Springdale, Ark., designed the

Fairway Valley system to handle 92,400 gpd. Its major components are:

- 1,250-gallon STEP systems
- 33,000-gallon equalization tank with two 30-gpm pumps and control panel
- Moving-bed biological reactor
- Submerged fixed-film aeration unit
- 15,000-gallon settling tank
- 15,000-gallon sludge-holding tank
- 25,000-gallon dosing tank with four 55-gpm/2-hp and two 85-gpm/3-hp turbine effluent pumps
- 1/2-inch pressure-compensated driplines on 2-foot centers with valves and headworks
- Four custom-designed control panels

System operation

Wastewater gravity-flows into the STEP tank, then is pumped to 2-, 4- or 6-inch force mains. To overcome the harsh terrain, the force mains run to a lift station, which pumps the sewage through a 10-inch interceptor trunk line to the 10- by 53-foot equalization tank. Pumps then send timed doses to the in-ground treatment plant.

"We'll activate the Phase 2 plant when flows exceed the capacity of this system," says Gregory. The second plant has two, 26-foot-diameter clarifiers in parallel after its two reactors.

Aerators in the stainless steel reactor chamber create turbulence that tumbles the sewage. This motion is the moving bed. Bacteria grow on free-floating, 1-inch-round plastic disks with honeycomb interiors that allow adequate scouring velocities and sloughing. "The chamber's pretreatment capabilities knock BOD and TSS down by 50 to 60 percent," says Gregory. "The moving bed also eliminates dead zones."

Electronic zone valves (inside risers) are shown at Dripfield 2.

Bud Moore installs line reducers for the air release valves in the return lines on Dripfield 2.

Effluent gravity-flows to the submerged fixed-film chamber for further clarification. Microorganisms on the media digest more sludge, die and slough off. Fine air diffusers gently mix the liquor, enabling the sludge to settle. A sludge pump on the bottom of the tank moves the minimal sludge to the sludge-holding tank. Recirculation pumps running four minutes every hour send liquid rising from the sludge back to the equalization tank.

Clarified effluent in the fixed-film chamber rises to the top and rolls over a weir into a settling tank. "We need that tank to comply with our septic code, as it reduces the BOD and TSS from 30 mg/l to 15 mg/l," says Gregory. Effluent gravity-flows to the dosing tank, then is pumped to the dripfield headworks. Retention time from entry to exit is four hours.

Dosing varies by field because of different loading rates. The Fairway Valley system (Dripfield 1) — the largest with four zones totaling 100,000 feet of tubing — lies under the golf course driving range. Dripfield 2 for Phase 2 has six zones, is 2,500 feet away from the treatment plant, and serves as part of a fairway.

"The slow occupancy rate means the microorganisms in the treatment plant take longer to establish themselves. However, as long as the effluent comes out less than 15/15 mg/l, the biology will build itself up as the flow increases."

— Ken Gregory

Installation

Bartlett's solution enabled developers to maximize their sites, building three homes per acre instead of 1.5. STEP tanks are installed as homes are built. "The slow occupancy rate means the microorganisms in the treatment plant take longer to establish themselves," says Gregory. "However, as long as the effluent comes out less than 15/15 mg/l, the biology will build itself up as the flow increases."

Utility Contractors in Wichita, Kan., installed the treatment plant and force mains. Moore Brothers Septic Systems Inc. in Lincoln, Ark., installed the drip lines and control panels, solenoid valves and pumps. Engineer Ferdi Fouri of PDC Inc. in Fayetteville oversaw the work.

Supply and return lines with drip tubing are shown installed at Dripfield 1.

The site for the tanks and treatment plant was an 8-foot-deep sunken area from the main parking lot to the clubhouse. After excavating 4 feet to the limestone bedrock, Utility Contractors had the needed depth to set the 10-foot-diameter fiberglass tanks on 12-inch-deep gravel beds. They trenched out and poured the concrete deadmen in place for the tanks, poured the pads for the treatment plant, and installed the reactor and aeration units.

Once the piping was connected, they backfilled with pea gravel to the top of the tanks, mounded dirt around them, cut the 24-inch risers to grade, and secured the lids with inset square-head security screws. Moore Brothers mounted the outdoor NEMA 4X control panels on Unistruct stainless steel frames secured to concrete pedestals on bases. The panels, one for the dripfield and three for the treatment plant, have a touch screen and autodialer. The area was seeded with grass and a privacy fence erected.

Using a backhoe, Moore Brothers dug an 18-inch-deep trench for the 2-inch PVC supply and return lines, laid out the header and return line, drilled the holes, and glued a saddle adapter to those lines every

The completed treatment plant site, with Dripfield 1, zones 1-4, in the background.

two feet. After a surveyor laid out where the first drip line went in each zone, the men buried the tubing 10 inches deep on 2-foot centers.

The tubing has an emitter every two feet. "We wanted the discharge to be level with the roots to irrigate the grass and enhance evapotranspiration or soaking into the ground," says Gregory.

Dripfield 2 had a 4-inch supply line because of the distance traveled. The line also had to cross a 20-foot-wide creek. Moore Brothers put the pipe in a sleeve, then plowed a trench in the creek's gravel bottom beneath the bridge. They ran the control lines for the zone valves through a conduit attached to the underside of the bridge. With the water behind, they used a 2-inch header and return lines.

"Twenty-four-volt DC didn't want to travel 2,500 feet from the control panel, so we used a 120-volt power converter that trips for those zones, then converts back to 24-volt DC," says Gregory. The golf course stayed open during the installation.

Maintenance

The City of Cave Springs hired a full-time Class 3 wastewater operator to conduct 45-minute, twice-weekly inspections. "The Phase 2 plant is huge and requires this level of training," says Gregory.

After getting into the decentralized project, the developers decided not to become maintenance providers. They handed the system to the city as a thank you for letting them build their subdivisions. The system was paid for through a private bond issuance with Northwest Services LLC set up by Aqua Tech Systems LLC. ■

MORE INFO:

248 **Aqua Tech Systems LLC**
479/527-9880
www.aquatechsys.com

101 **Xerxes Corp.**
952/887-1890
www.xerxescorp.com

NOWRA

Presents the 4th Annual

Installer Academy

LAS VEGAS

NEVADA

Mark your calendar!

December 8-10, 2008
Riviera Hotel
Las Vegas, Nevada

4th Annual
INSTALLER ACADEMY
Presented By NOWRA
Las Vegas • Dec. 8–10, 2008

4 promotional opportunities to promote your business to onsite wastewater installers

1. **Exhibit at the tradeshow.** Connect with new buyers at the premier national educational event for installers and other onsite professionals.

2. **Sponsor Conference events**—receptions, breaks, breakfast, luncheon, Roe-D-Hoe awards & equipment.

3. **Demonstration rooms** are limited so call today to reserve yours.

4. **Advertise in the conference program**, which is distributed to all our attendees—giving you great exposure.

For a full Exhibitor/Advertiser Prospectus, please visit
www.nowra.org/exhibitor.html

Questions? Call 831-464-4884 or email info@nowra.org.

NOWRA
National Onsite Wastewater Recycling Association

4 great reasons to attend the Installer Academy

1. **Technical Education.** Basic to advanced training sessions present the skills and procedures for conventional and advanced treatment systems. Earn CEUs while preparing for the NEHA Installer Credential Exam.

2. **NAWT Vacuum Truck Technician Training.** If you own or operate a vacuum truck used to clean septic tanks, aerobic treatment units, holding tanks, or grease traps, this session is for you.

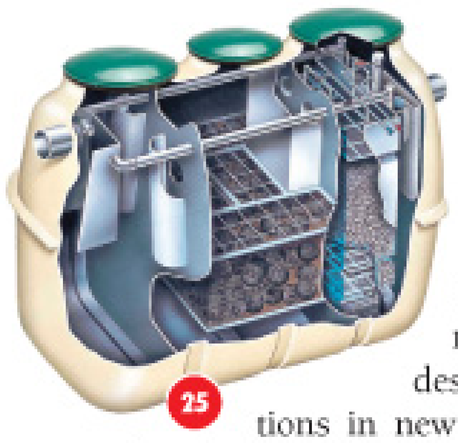
3. **Business Management Sessions.** Learn the latest on ways to better manage your business.

4. **The 2nd Annual NOWRA Roe-D-Hoe.** Have fun competing or just watch as competitors show off their dexterity and finesse with a backhoe.

Online registration begins August 4th at www.nowra.org.

PRODUCT news

August 2008



Zoeller Offers Fusion Series Treatment System

The Fusion Series Treatment System from Zoeller Pump Co. combines anaerobic and aerobic digestion in three-bedroom (ZF450), four-bedroom (ZF600) and five-bedroom (ZF800) units. The drop-in units are designed for residential or commercial applications in new construction or retrofits. No septic tank is required, unless mandated by local regulations. There also is no media to change or remove. **800/928-7867; www.zoeller.com.**

Blue Angel Offers New Line of Effluent Pumps

Blue Angel has expanded its line of High Head Effluent pumps, offering new 3/10 hp, 4/10 hp, 1/2 hp and 1 1/2 hp models. The pumps are designed to handle 3/4-inch solids, flows up to 70 gpm, lift up to 130 feet and feature a heavy-duty mechanical seal, durable cast-iron construction, and upper and lower ball bearings for long life. **888/636-6628; www.blueangelpumps.com.**

Sim/Tech Develops Large Sludge Sampler

The TruCore sludge sampler from Sim/Tech Filter is specifically designed for onsite systems and the core sampling of wastewater and other fluids. The unit enables samples to be taken quickly without creating excessive turbulence. Because there are no restrictions caused by valves, stoppers or flaps, fluid is allowed to flow freely and virtually undisturbed into the sampling tube, creating a true core sample of tank contents. The unit has an inside diameter of 1.65 inches and a capacity per foot of more than 14 ounces. The polycarbonate holding tube is surrounded by a PVC jacket. The outside diameter is 2 inches and measures 8 feet long. Optional extensions are available. The sampler is marked every 6 inches and numbered every foot and comes with case. **888/999-3290; www.simtechfilter.com.**

Gradall Introduces XL 3100 Excavator

The XL 3100 III excavator from Gradall Industries Inc. has a maximum reach at ground level of 27 feet, 5 inches, a maximum digging depth of 19 feet, 8 inches and a 220-degree continuous boom tilt. Powered by a 201 hp (at 2,200 rpm) Detroit OM906 off-highway certified engine, the excavator weighs 39,486 pounds and has a sound-deadening cab, optional tilt-steering system, 9-speed transmission and clutch with hydraulic actuation and double plate. **330/339-2211; www.gradall.com.**

Almetek Creates E-Z Hit Marker Kit

The compact E-Z Hit Marker Kit from Almetek Industries Inc. is designed to mark damage to underground facilities at excavation sites, and save on legal fees and court costs. The kit conforms to Common Ground Alliance Best Practice Documentation standards and comes in a 19- by 4-inch crush-proof storage case. It includes a user's guide and 6-foot, HDPE measure ruler with large number graphics that can be unrolled to lie flat or stand on edge with two anchoring spikes. **800/248-2080; www.almetek.com.**

RIDGID Adds Tool Line for Cutting Stainless Steel

RIDGID has added the Model 35S stainless steel tubing cutter and models 227S/223S inner-outer reamers for stainless steel to its line of tubing cutting and preparation tools. The cutter features the X-CE knob and friction-reducing roller bearings for quicker cuts. It can als used for copper, steel and aluminum tubing. The reamers include integrated measurement tools, while the 227S features 45 cutting edges on the inner core for quick, clean inner reaming and outer deburring or beveling of 1/2-inch to 2-inch copper and stainless steel tubing. The smaller 223S has 36 cutting edges. **800/769-7743; www.ridgid.com.**

Infiltrator Offers Low Profile Chamber

The Quick4 Equalizer 24 low profile chamber from Infiltrator Systems Inc. is designed to provide exceptional strength in trench or bed applications. Measuring 8 inches tall, the 4-foot chambers permit 15-degree turns and allow for shallow installations with 4 inches of cover. They also offer compact nesting for easy storage or shipping. **800/221-4436; www.infiltratorsystems.com.**

Carpenter Introduces AccuPerc Digital Percometer

The AccuPerc digital percometer from the Carpenter Group USA, test and measurement instruments division is designed to quickly and successfully perform digitally accurate soil bed and seepage pit percolation tests. Unlike stick-and-float devices, the sensor always uses the same water column height and water column drop for measurements, increasing accuracy by eliminating head pressure differentials. There's also no equipment to set up, stabilize or tune. Weighing less than 5 pounds, the unit measures 20 inches by 12 inches by 5 inches. **800/605-6871; www.accuperc.com.** ■

MARKETPLACE advertising

ONSITE installer™ classifieds

August 2008

AERATORS

Septic Solutions, Inc. We sell linear and rotary vane air pumps, rebuild kits and repair parts. Gast, HiBlow, Secoh, Alita and more! Check out our online store full of septic products at www.septicsolutions.net or 1-877-925-5132. (IM)

We sell Flagg-Air 340, Secoh, Gast and Medo Linear, FPZ and Gast Regenerative, Thomas and Gast Rotary Vane aerators, rebuild kits and alarms at wholesale prices. Septic Services, Inc. www.septicserv.com. 1-800-536-5564. (IM)

BUCKET MACHINES

Bucket Rig: 1998 Chevy 2-axle propane w/5 spd. 1974 Calweld 150, 42" ringgear, 43' depth. $60,000. 916-991-7809, 916-217-2046. Located in Sacramento, Ca. (PI8)

BUSINESSES

2-Septic tank delivery trucks; 1-ready mix truck; 7-Celico septic tank forms (1000-1500 gallon); misc. drop box, riser forms, lift tank forms. Trucks and loaders in good condition. (In service in 2007) All forms in good or better condition. (Used in 2007) Package price $70,000. 218-829-9678 or 800-829-5755. (I8)

FOR SALE: Sunny South Florida. Full service septic tank business established 20 years. Great potential; great records. Owner retiring. Call Chris 305-297-2171. (PI12)

PORTABLE TOILET BUSINESS located in Albany, NY. 600+ units, 3 service trucks, 2 P&D trucks. 20 years family built business. Excellent growth potential. Call Stanley @ 518-441-7222. (CPTI8)

BLOWERS

We sell Roots & Sutorbilt Rotary Lobe blowers. We also sell linears, regenerative, rotary vane aerators and alarm kits. Septic Services, Inc. www.septicserv.com. 1-800-536-5564. (IM)

DEWATERING

2000 Flo Trend 12-yd. box mounted on 5th wheel trailer with 100 gallon liquid polymer injection system. Also Honda 3" trash pump. Top totally enclosed with 3 hatches. $15,000. 803-385-8681. (I6)

HAND TOOLS

Crust Busters - Portable, lightweight machine guaranteed to mix up septic tanks and grease traps! Save time and money! **www.crustbusters.com,** 1-888-878-2296. (IM)

JET VACS

1986 Ford L-8000 with Cat 3208, Cummins pony motor with 2-stage fan. Extendable boom. Hydroexca-vation package, only 31,770 miles and 2,435 hours. Good truck at great price. $29,500. 406-265-9401. (PI8C9)

MISCELLANEOUS

LBC Mfg. is making aerobic disinfection simple and inexpensive. Adaptable to any wastewater pump tank and the only NSF approved liquid chlorinator on the market. Check us out at www.liquidchlorinator.com. (I7)

PUMPS

Hydromatic, Zoeller, Liberty, ABS, Myers, Grinder and Effluent pumps. Lift station packages and high water alarms are also available. Septic Services, Inc. www.septicserv.com. 1-800-536-5564. (IM)

TRUCKS

SEPTIC TANK SET TRUCK: 1994 Freightliner, Cummins 330E, 20,000 lb. winch, excellent set truck. $37,500 OBO. 903-818-3307. (I01)

It's **EASY** to submit your classified **ONLINE!**
Just go to:

www.onsiteinstaller.com

Fill in the **Online Classified Ad Blank!**

INDUSTRY news

August 2008

Deere Launches Interactive Skid-Steer Site

John Deere Construction & Forestry has launched www.skidsteersmackdown.com, an interactive Web site for skid-steer users that features head-to-head contests between Deere and competitor machines. The site includes video, discussion forum and product information. It also enables users to select a Deere machine they'd like to see compared to other units. The videos — showing tasks with measurable results — can then be rated, commented on and shared with colleagues.

Wastequip Launches Companywide Reorganization

Wastequip Inc. has launched a companywide reorganization designed to make it more efficient and an environmental leader in the waste industry. The Cleveland-based company also has restructured its Steel Group into a newly formed Container Division and created a Technical Products Division for its hoists and compactors. Driven by its focus on LEAN Six Sigma programs, plant managers are being trained in LEAN practices, while several older and less efficient facilities are being closed. ■

ASSOCIATION news

By Scottie Dayton

August 2008

CALENDAR OF EVENTS

Aug. 8-9

Georgia Onsite Wastewater Association Annual Meeting, Unicoi State Park and Lodge, Helen. Call 770/817-4692 or visit www.onsitewastewater.org.

Aug. 22-23

Wisconsin Liquid Waste Carriers Association Summer Convention, Radisson Paper Valley Hotel, Appleton. Call 608/255-2770 or visit www.wlwca.com.

Sept. 10-11

Septage/Grease Trap Waste Treatment Symposium, Holiday Inn at Six Flags, Eureka, Mo. Call 800/236-6298 or visit www.nawt.org.

Oct. 12-14

Virginia Onsite Wastewater Recycling Association Conference and Trade Show, Blacksburg. Call Trapper Davis at 804/966-9190 or visit www.vowra.org.

Oct. 14-15

Delaware Onsite Wastewater Recycling Association Conference and Exhibition, Dover Downs Hotel and Conference Center, Dover. Call Ken Walsh at 302/381-6516 or visit www.dowra.org.

Oct. 23-26

Ontario Association of Sewage Industry Services Conference and Exposition, Best Western Conference Centre, Orillia. Call Don Kelloway at 877/202-0082 or visit www.oasisontario.on.ca.

Nov. 5-9

Portable Sanitation Association International Convention & Trade Show, Hilton Hotel Ocean Beach and Ocean Center Exhibit Hall, Daytona Beach, Fla. Call 800/822-3020 or visit www.psai.org.

Nov. 12-13

North East Residuals & Biosolids Conference & Exhibit, Nashua, N.H. Call Ned Beecher at 603/323-7654 or visit www.newea.org.

Dec. 4-5

Kentucky Onsite Wastewater Association Conference, Sloan Convention Center, Bowling Green. Call 270/715-0043 or visit www.kentuckyonsite.org.

Dec. 8-10

NOWRA Installer Academy, Riviera Hotel, Las Vegas, Nev. Call 800/966-2942 or visit www.nowra.org.

Jan. 8-10

Michigan Onsite Wastewater Recycling Association Conference & Exhibits, Kellogg Hotel & Conference Center, East Lansing. Call Chanin Frank at 989/773-6985, ext. 258, or visit www.mowra.org.

Jan. 13-15

Iowa Onsite Waste Water Association Conference, Polk County Convention Center, Des Moines. Call 515/225-1051 or visit www.iowwa.com.

Jan. 13-15

Michigan Onsite Wastewater Conference, Kellogg Hotel and Conference Center, East Lansing. Many sessions count for required CEU hours. Call Mark Scott at 989/275-5011 or e-mail mscott @i2k.com.

Jan. 19-21

Missouri Smallflows Organization Conference & Exhibition, Holiday Inn Select, Columbia. Call 417/739-4100 or visit www.mosmallflows.org.

Jan 30-31

Wisconsin Liquid Waste Carriers Association and Wisconsin Onsite Water Recycling Association Joint Convention, Marriott West Hotel, Madison. Call 608/255-2770 or visit www.wowra.com.

April 6-9

NOWRA Technical Exhibition and Conference, Midwest Airlines Convention Center, Milwaukee. Call 800/966-2942 or visit www.nowra.org.

TRAINING & EDUCATION

Soil Manual Online

The Wisconsin Department of Commerce *Soil & Site Evaluation Handbook* is online at http://commerce.wi.gov/SBdocs/SB-PowtsManualSoilSite0508.pdf. The manual is a study guide and reference for certified soil testers.

Soils Course

The Wisconsin Department of Commerce's Safety and Buildings Division will hold "Describing Soil Profiles & Recording Site Data" with classroom instruction and field visits of pretreatment and treatment systems, evaluation and maintenance systems on the following dates:

- Sept. 18 – Ag Research Station, Spooner
- Oct. 10 – Northeast Wisconsin Technical College, Marinette

Call Leroy Jansky at 715/726-2544.

National Association of Wastewater Transporters

NAWT has scheduled sessions in the following locations:

- Aug. 6-7 – Operation and Maintenance Training, central California. Call 707/579-4882 or visit www.cowa.org.
- Aug. 26-27 – Inspector Training and Certification, Tucson, Ariz. Call Kitt Farrell-Poe at 928/782-3836 or e-mail kittfp@ag.arizona.edu.
- Sept. 9 – Vacuum Truck Technician Training, Holiday Inn at Six Flags, Eureka, Mo. Call NAWT at 800/236-6298 or visit www.nawt.org.
- Sept. 18-19 – Operation and Maintenance Training, southern California. Call 707/579-4882 or visit www.cowa.org.
- Oct. 14 – NAWT Inspector Recertification Training, Casa Grande, Ariz. Call Kitt Farrell-Poe at 928/782-3836 or e-mail kittfp@ag.arizona.edu.
- Oct. 23-24 – Inspector Training and Certification, central California. Call 707/579-4882 or visit www.cowa.org.
- Nov. 5-6 – Operation and Maintenance Training, northern California.

Call 707/579-4882 or visit www.cowa.org.

Alabama

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

- Aug. 7-8 – Continuing Education, Huntsville
- Sept. 3-5 – Advanced Installer Level 1 Licensing
- Oct. 2-3 – Continuing Education, Gadsden
- Oct. 16-17 – Pumpers Licensing
- Oct. 29-30 – Continuing Education, Mobile

Call Allen Tartt at 205/652-3803 or visit www.aowatc.uwa.edu.

California

Certification courses are sponsored by the California Onsite Wastewater Association and National Association of Wastewater Transporters. Check Web site for locations:

- Aug. 6-7 – Operation and Maintenance Part 2
- Sept. 18-19 – Operation and Maintenance Part 1
- Oct. 8 – Soils
- Oct. 23-24 – Inspector Training and Certification

Call Cliff Trammel at 707/579-4882 or visit www.cowa.org.

Florida

The following courses are at the Florida Onsite Wastewater Association's Training Center in Polk City unless stated otherwise:

- Aug. 7 – Enhanced Nutrient Reduction, Hialeah
- Aug. 18-19 – Master III-Basic Florida Soils
- Aug. 20-21 – Master I-System Design and Function
- Aug. 21-22 – Master II-System Materials and Regulatory Requirements
- Aug. 25 – Aerobic Treatment Units, Part I
- Aug. 26 – Aerobic Treatment Units, Part II
- Aug. 27 – Artificial Media Treatment Technologies

- Aug. 28 – Natural Media Treatment Technologies
- Aug. 29 – What's New at the Training Center?

Contact FOWA at 407/937-2228 or visit www.fowaonsite.com.

Iowa

The Iowa Onsite Wastewater Training Center at Ankeny has the following courses:

- Aug. 21 – At-Grade and Mounts
- Oct. 16 – Media Filters with Installation Demo
- Nov. 20 – Program Management with Rules

Call Annette Adams at 800/362-2127, ext. 6464, or e-mail Dennis Hayworth at dahayworth@dmacc.edu.

Michigan

The Michigan Onsite Wastewater Training and Education Center at MSU Tollgate Center in Novi is offering these courses:

- Aug. 12-13 – Existing Systems Evaluator Training
- Aug. 20 – Pumped Systems Evaluator Training
- Sept. 24-25 – Onsite Wastewater Systems Maintenance
- Oct. 8-9 – Existing Systems Evaluator Training

Call Barb DeLong at 517/355-4720 or visit www.egr.msu.edu/age, then Outreach.

Missouri

The Department of Health and Senior Services is offering the following training professional CEU courses:

- Aug. 19-20 – Troubleshooting and Hydraulics, Clinton
- Aug. 26-27 – Drip Irrigation and Pumps/Panels & Electricity, Springfield
- Sept. 9-10 – Troubleshooting and Hydraulics, Cape Girardeau
- Oct. 7-8 – Troubleshooting and Hydraulics, West Plains
- Oct. 21-22 – Lagoons and Drainfields/Curtain Drains, Camdenton
- Oct. 28-29 – Lagoons and Drainfields/Curtain Drains, Moberly
- Nov. 4-5 – Troubleshooting and Hydraulics, Joplin
- Nov. 17-18 – Drip and Pumps/Panels/Electrical, Liberty

Call Terri at 417/739-4100 or visit www.mosmallflows.org.

Nebraska

The Cooperative Extension at the University of Nebraska is offering these certified courses for CEUs at the following locations:

- Aug. 7 – Soils, Lincoln
- Aug. 21 – Pumper, Lincoln
- Sept. 19 – Basics 102, Holdrege
- Sept. 24 – Extension Pumps & Controls, Scottsbluff
- Sept. 25 – Extension Dosed Systems, Scottsbluff
- Sept. 30 – Basics 102, TBD
- Oct. 15 – Extension Pumps & Controls, Norfolk
- Oct. 16 – Extension Dosed Systems, Norfolk
- Nov. 19 – Extensions Pumps & Controls, Grand Island

Call the Nebraska On-site Waste Water Association at 402/476-0162 or the university at 402/472-9614.

North Carolina

North Carolina Soils and On-Site Wastewater Training Academy is offering the following courses at Raleigh unless stated otherwise:

- Sept. 10-12 – Subsurface Wastewater Operator, Bolivia
- Oct. 1 – Land Application
- Oct. 22 – Dewatering Facility Tour
- Nov. 5-7 – Subsurface Wastewater Operator, Plymouth
- Nov. 18-19 – Onsite Wastewater System Inspector, Plymouth
- Nov. 19 – Land Application

Call 919/515-7154 or visit www.soil.ncsu.edu/training.

Pennsylvania

The Pennsylvania Septage Management Association offers a Basic Onlot Wastewater Treatment System Inspection Certification course on:

- Sept. 17-18 – Williamsport
- Sept. 24-25 – Butler

Call 717/763-7762 or visit www.psma.net.

Rhode Island

The University of Rhode Island's Onsite Wastewater Training Center offers these professional development workshops at its Kingston campus:

- Aug. 7 – Surveying Basics for the Onsite Wastewater Contractor
- Sept. 4 – Conventional Onsite Wastewater Treatment Basics for Installers
- Sept. 10 – Innovative and Alternative Technology Overview
- Sept. 17-18 – Conventional Septic System Inspection
- Oct. 2 – Bottomless Sand Filter Design and Installation
- Oct. 16 – Innovative and Alternative Systems Field Tour
- Nov. 6 – Designer Examination Prep
- Nov. 20 – AutoCALCS: Automated BSF Sizing, Pump Calculations and Support Materials

Call Mark Stolt at 401/874-2915 or visit www.uri.edu/ce/wq.

Virginia

The following courses by the Virginia Center for Onsite Wastewater Training (VCOWT) and Southside Virginia Community College are in Blackstone unless stated otherwise:

- Aug. 5-6 – National O&M Training (VOWRA)
- Aug. 12-13 – Designing with Easy/Fast CAD (VCOWT)
- Sept. 18-19 – Pumps and Controls (VCOWT)
- Oct. 12-15 – A to Z of Onsite Wastewater, Blacksburg (VOWRA)
- Oct. 12-15 – Soils, Blacksburg (VOWRA)
- Oct. 14-15 – Construction Inspection (VCOWT)
- Oct. 23-24 – Understanding Water Movement in Soils (VCOWT)
- Oct. 28-29 – Construction Inspection (VCOWT)
- Nov. 19-20 – Effluent Dispersal Systems (VCOWT)

For VCOWT classes, contact Debbie Campbell at 434/736-2011 or visit www.southside.edu/programs/wastetreat. For VOWRA courses, contact Trapper Davis at 804/966-9190 or visit www.vowra.org. ■

What does a Blue Whale have in common with Zabel?

Filtration!

Polylok, Inc. is proud of its commitment to the environment and to the onsite wastewater industry. We have been providing filtration products since 1959! We have three great technologies to meet all of your residential and commercial needs.

Choose from our Polylok, Zabel and Best filter brands.

Zabel®
A Division of Polylok Inc.

Our filters accept Smart Filter Alarms™ that notify the owner when the filter needs servicing.

See our complete line of Effluent Filters at www.polylok.com

Our patented shut-off ball is available on Zabel and Polylok filters to protect the system when the tank is being serviced.

Shut-off Ball

Use our Extend & Lok™ to easily retrofit our filter into any existing tank.

POLYLOK™ Inc.
Innovations in Precast, Drainage & Wastewater Products

1-800-701-3946

3 Fairfield Blvd, Wallingford, Connecticut 06492
email: sales@polylok.com ● Web site: www.polylok.com

BEST TECHNOLOGY