Volume 6, Issue 1

February 2008

ONSITE ADVOCATE

President's Pen

My how time flies… It does not seem like 9 months since we last met in these pages, but it has been. Things have been hectic and, as we go on about our daily chores, sometimes things get put off. Since our last issue, we have had our 2nd annual TOWA Golf Tournament benefiting Big Brothers/Big Sisters. It was better than the first one and we raised even more money. The details should be inside but kudos to Scott Fellwock and his loyal toady, Darrell Collard. They did a great job and I am really looking forward to this year.

Several important issues have come up this year. We have to decide on our level of participation in the upcoming NOWRA annual meeting to be held in Memphis this year. We originally thought our participation would be such that we would skip our own annual meeting this year. At least that is what we told Scott Fellwock to get him to run for President. Well, it seems NOWRA might be less than supportive of our efforts so there has been discussion about resuming our normal schedule. We need to hear from you about your desire to have a separate meeting or do something in conjunction with NOWRA. Along the same lines, there is serious talk about continuing our affiliation with NOWRA. This is an ongoing topic in the Board meetings and we would love your input. We will have to decide on our affiliation by this spring, so let us know. Whatever we decide about the meeting, our engineer's training was so well received last year, it looks good for the upcoming year. If you attended, or wanted to, and have some suggestions for topics, let us know.

As expected, the new leadership at the top of the State Division of Ground Water Protection has created some ripples on the pond. We welcome changes but we need to be aware so that we can make our voice heard by the decision makers. We anticipate an increase in the level of required training and there is no organization better prepared than TOWA. As the new opportunities come along, we have to be ready to represent our industry. If you have suggestions you feel we could pass on to the Division, let us know. We are here to represent your interests. These changes offer the opportunity for TOWA to reach its potential finally. With the talent we have, along with the desire to move our industry forward, we are poised to become a major player in the progression of our economy for years to come. I invite you to come along. It is tough and requires commitment but the payoff will be great.

Tom Petty
TOWA President

Tom Petty, *President of TOWA*

Tennessee Onsite Wastewater Association

Formed in 1997, the Tennessee Onsite Wastewater Association is a professional organization open to those working to advance and promote the onsite wastewater industry in Tennessee.

2008 TOWA Board of Directors

The ONSITE ADVOCATE is designed semi-annually by Tonia Pass. For more information, please call (615) 585-1157.

Tennessee
Onsite
Wastewater
Association

Formed in 1997, The Tennessee Onsite Wastewater Association (TOWA) is a professional organization open to those working to advance and promote the onsite wastewater industry in Tennessee.

TOWA serves all members of the industry, including installers, manufacturers, field practitioners, suppliers, engineers, soil scientists, distributors, research professionals, educators, consultants and governmental regulatory personnel. We want you to be part of this Association!

Each year, TOWA sponsors an Annual Conference to bring onsite professionals in Tennessee together to discuss issues relevant to the onsite industry in our state. Combining classroom presentations with an Exhibit Hall gives onsite professionals a chance to see and hear about the latest in onsite technologies and products.

What We Do…

- Establish uniform performance standards for design, installation, & servicing of onsite systems;
- Promote the need for regular service & maintenance of onsite systems;
- Communicate information among members as well as to other organizations, agencies & individuals concerned with onsite sewage disposal;
- Collect & disseminate statistics, studies & other facts affecting the onsite industry;
- Educate the general public concerning the value of recycling wastewater, & the need for properly maintained onsite sewage disposal systems;
- Assist in the development of sound ecological practices; and
- Expand the public's awareness of the important economic contributions of onsite systems in Tennessee.

How Can You Join TOWA?

Company:_____

Name:_____ Title:_____

Address:_____

City:_____ St:_____ Zip:_____

Phone: (____)_____-_____ Fax:(____)____-_____

Membership Fees:	Price:
☐ Certified Installers, Licensed Septic Tank Pumpers, Engineers, Soil Scientists, Consultants, & Manufacturers	$ 50
☐ Academicians, Regulators, & Research Professionals	$ 35
☐ Associate & Non-voting Members	$ 35
Total:	_____

Please make checks payable to:
TOWA
P.O. Box 292983
Nashville, TN 37229-2983

TOWA
Working together through the Onsite Wastewater Industry to protect our natural resources in Tennessee

Water Softener Discharges DO Harm Septic Systems — And The Problem is Easy to Solve

Contrary to what some people say, water softener backwash poses a problem, not only to septic tanks and drainfields, but also to advanced treatment systems. When the water softener resin is backwashed two or three times a week, concentrated brine enters the wastewater stream as a slug of 38 to 112 gallons each backwash cycle. This causes two problems. One problem is that the septic tank discharges solids into the drainfield, which can cause the soil to plug and the drainfield to fail. Also, if there is a secondary treatment component, such as a media filter or ATU, it will perform abnormally. The simple solution to these problems is to route backwash brine directly into the drainfield.

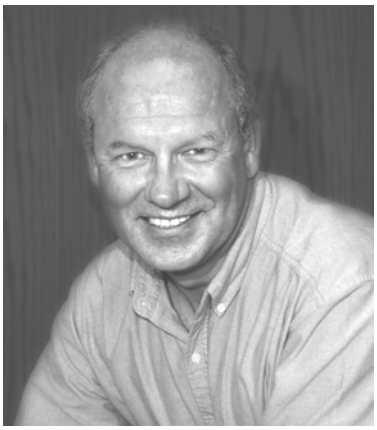
Although research on the effects of softener brine was performed at NSF and the University of Wisconsin, this research did not include septic tanks and did not reflect real-world conditions. The NSF study used complete-mix activated-sludge ATUs, *not* septic tanks. In studies with septic tanks, which are quiescent (not mixed), the high concentration of salt introduced by backwash brine causes stratification in the tank. The salt water dives to the bottom of the tank, and the fresh water rides across the surface of the brine layer. The heavy salt water can actually lift the sludge from the bottom of the tank, washing it into the downstream components. Septic tanks that receive water softener brine have been observed to have no distinct layers of sludge, scum, and clear zone, as they should have in order to perform primary treatment.

The 1978 University of Wisconsin study, which dealt only with the soil dispersal component, *not* septic tanks, did *not* conclude whether or not water softener backwash brine is harmful to septic systems, and the study suggests — at least five times — that additional research is needed. Since that study, researchers have found evidence of both good and bad effects of water softener backwash brine upon soil dispersal systems. However, field observations of side-by-side dispersal systems in a shared mound showed that the trenches receiving the effluent with water softener brine formed a thick, gelatinous slime layer that clogged the infiltrative surface, while the trenches receiving no salt water discharge remained open with a normal microbial clogging layer.

Until conclusive research is performed, the evidence of observation and common sense must be trusted. Sodium concentrations over 3500 mg/L inhibit anaerobic digestion. Chloride concentrations over 180 mg/L also inhibit microbial growth. Over the course of history, all cultures have used salt as a preservative and disinfectant. It simply makes common sense that high concentrations of salt will inhibit the growth of microorganisms used for wastewater treatment. Observation supports this assumption: a field study of 18 wastewater treatment systems in Virginia clearly showed that nitrogen removal was inhibited in systems receiving water softener backwash brine.

For these reasons, just as managers of municipal systems prohibit the discharge of salty wastes into their systems, most of the manufacturers of advanced wastewater treatment systems have clauses in their warranties voiding the warranty if water softener backwash brine is discharged to the treatment system. Homeowners who want to avoid this by rerouting the backwash brine away from the septic tank are often told that it would require cutting of concrete footings and floors at a cost of "thousands of dollars." Yet, in the Virginia field study, five water softener backwash discharges were routed out of the wastewater system for less than $100 per home using simple plumbing components. A pipe from the softener can lead directly to the distribution box or discharge basin. This simple, inexpensive measure prevents septic tank and treatment system failure and keeps the system warranty in effect.

Given the abundant evidence for the harmful effects of brine, and given how easy it is to keep these discharges out of septic systems, it makes sense for regulators to require water softeners to be installed in such a way that they pose no problems for wastewater treatment systems.



Mark Gross, PhD, PE,
Training Manager for Orenco Systems, Inc.

Wastewater Strength

When the words "wastewater" and "strength" are used in the same sentence, we usually think of "strong smelling" wastewater. As a matter of fact, our nose is a good indicator of wastewater strength because high-strength wastewater will tend to be anaerobic (without dissolved oxygen) and have a very strong odor.

From a historic perspective, wastewater strength is a term used to describe the impact of discharging wastewater into surface water. The impact is measured in terms of dissolved oxygen demand. Wastewater is composed of many different organic compounds. Many of these organic compounds can serve as a food source to the naturally-occurring microorganisms that are in surface water (lakes, rivers, or streams). While breaking down the organic compounds, these microorganisms consume oxygen that is dissolved in the water. This oxygen consumption is the "oxygen demand." If dissolved oxygen is consumed faster than it can be replenished by natural aeration, then the dissolved oxygen concentration in the water will fall below the level needed to support aquatic life.

A common measure of oxygen demand is the Five-Day Biochemical Oxygen Demand test (BOD_5). This procedure measures the dissolved oxygen consumed by microorganisms while converting an organic compound into a food source during a five-day period. Wastewater strength is commonly measured by the BOD_5 test. A typical value for raw residential wastewater is 300 mg/L (milligrams of O_2 consumed per liter of wastewater). In other words, a daily wastewater volume of 450 gallons of per day (gpd) with a BOD_5 of 300 mg/L requires 1.1 pounds of O_2 to satisfy the oxygen demand. This may not sound like much, but oxygen is only 21% of the air we breathe. Thus, more than 70 cubic feet of air is needed to get 1.1 pounds of oxygen.

As previously mentioned, raw residential wastewater typically has an oxygen demand of 300 mg/L BOD_5. This strength comes from the urine and fecal matter that comes from our bodies, from food preparation in the kitchen, and from dish washing after the meal. Because many of these organic compounds are in a solid form, the septic tank will remove a significant portion of the oxygen demand via liquid-solid separation. Frequently, we assume that 50% of the BOD_5 is removed in the septic tank. This assumption is only valid for residential strength wastewater and is not valid for commercial or industrial wastewaters.

In order for microorganisms to break down organic compounds, these compounds must be dissolved in the water. "Dissolved" means that you cannot physically separate the compound out of water; the compound is absorbed within the water molecules. This means that the BOD_5 test is only a measure of the dissolved organic compounds. Other measures of wastewater strength are needed to describe the waste components that are only slightly-soluble, or are suspended in wastewater. Fats, Oils, and Grease (FOG) are organic substances that are commonly found in wastewater. Animal fat is the primary source of fats, cooking oils and bathing creams are the primary sources of oils, and grease is typically from petroleum-based soaps. FOG usually separates out of the waste stream while in the septic tank. These products are less dense than water and will tend to float, thus forming the scum layer in the septic tank. It is very important that all septic tanks have a discharge baffle that will prevent the scum layer from moving into the drainfield. FOG is much more difficult for the soil microorganisms to break down and therefore can cause a buildup of these products within the drainfield. We need to be very concerned about the temperature of wastewater that contains FOG, especially the oils. Many oils are easily mixed with water (emulsification), especially in high temperature water. Chemical detergents will dissolve oils and allow them to pass through the septic tank and out into the drainfield. Fats are somewhat easier to control because they will solidify at 80°F and rise to the surface. Because grease is petroleum based, it is considered toxic to the microorganisms and cannot be broken down. However, it will separate out of the wastewater and float to the top.

A third measure of wastewater strength is Total Suspended Solids (TSS). TSS are particles of matter that are suspended in the wastewater. These particulates can be either organic or inorganic. The organic solids can contribute to the oxygen demand because microorganisms will produce enzymes that can dissolve these particles and make the organic compounds available as a food source. Inorganic particles cannot

be broken down and will accumulate in the septic tank or in the drainfield. In septic systems, TSS is largely composed of toilet paper, clothing fibers, and food scraps. While toilet paper is made from wood, and wood is organic, this type of organic compound is very slow to degrade and will tend to accumulate as part of the scum layer. Again, it is very important to have a septic tank discharge baffle to minimize the TSS particles from entering the drainfield. Effluent filters (as part of the baffle) do a great job of holding TSS in the septic tank.

So, what is the big deal with wastewater strength? Most of our systems are going to be residential; and therefore, we will have residential strength wastewater. This statement may not always be true. What if a homeowner does a lot of baking for church or school functions, or what if the residences are extreme water savers? The first case will produce much more BOD_5 because of the cooking oils, butters, and sugars used during baking. The second case will have a higher concentration of BOD_5 because there is not as much dilution water. In both of these cases, if the drainfield was designed based on water usage – then there is a greater possibility of failure. With higher strength wastewaters, both the water usage and organic strength must be accounted for in the system design. Using the example of a three-bedroom home on 60-mpi soil, there will be at least 990 square feet of trench bottom. A recommended organic loading rate for this soil is 0.0005 pounds BOD_5 per day per square foot. So, with 990 square feet, only 0.5 pounds of BOD_5 per day should be applied to the soil. If we make the rough assumption that 50% of the BOD_5 is removed in the septic tank, then 1 pound of BOD_5 per day can be produced by this home. At 450 gallons per day, this mass of BOD_5 would produce a concentration of 266 mg/L of BOD_5. Recall that typical residential strength wastewater is 300 mg/L BOD_5 per day. This demonstrates that for a wastewater stream that is stronger than residential strength should have additional trench bottom area to account for the additional organic loading. For example, a small bakery needs a septic system. The soil is 60 mpi, the water usage is 500 gallons per day, and the BOD_5 concentration is 600 mg/L. Using Tennessee's Subsurface Sewage Disposal regulations, the trench bottom area would be 1,450 square feet based on water usage. The mass of BOD_5 per day will be 2.5 pounds per day. Because this is a bakery, realistically one could only assume that approximately 25% of the BOD_5 will be held in the septic tank. Therefore 1.9 pounds of BOD_5 would be expected to enter the drainfield. On a square-foot basis, this is a loading rate of 0.0013 pounds of BOD_5 per square-foot per day. This is 2.6 times more organic loading than is recommended for this soil type. Thus, 3,800 square feet of trench bottom area would be a more appropriate for this situation.

It is important to realize that wastewater strength and daily water usage are equally important in the sizing of onsite drainfields. We often only use the water usage when determining the area, but we must account for strength when the organic loading is greater than typical residential strength. References for this article include the U.S. EPA's Onsite Wastewater Treatment Systems Manual (EPA/625/R-00/008 Feb 2002) and Chapter 1200-01-06 Tennessee Regulations for Subsurface Sewage Disposal.

John R. Buchanan, Ph.D., P. E.
Associate Professor and Director
Center for Decentralized Wastewater Management
The University of Tennessee

Using Onsite Septic Systems for High Strength Wastewater

THE UNIVERSITY of TENNESSEE
Center for Decentralized Wastewater Management

Eight Professional Development Hours For Engineers and other Wastewater Professionals

March 18, 2008

Saturn UAW Union Hall—Spring Hill, Tennessee

This workshop will focus on the use of onsite wastewater systems to renovate and disperse high strength wastewater. The designer (and the operator) must consider the wastewater source, the system's treatment capability, and the O&M in order to ensure long-term success. This workshop will discuss the evaluation of the source of high strength wastewater and look at various design strategies to consider when designing a treatment system for high strength wastewater. This program was developed by the Consortium of Institutes for Decentralized Wastewater Treatment, a national group of engineering and soil science faculty who work in the area of decentralized wastewater management.

Continuing Education Short Course

Agenda

- **Introduction to high strength wastewater constituents**
- **Hydraulic and constituent loading rates**
- **Capability of various treatment systems**
- **Lunch** *(provided on site) Please indicate on the registration form if you have any dietary restrictions*
- **Design issues**
- **Soil as the final treatment**
- **Effluent distribution**
- **Troubleshooting high strength systems**

Instructor: John R. Buchanan, Ph.D., P. E., Associate Professor and Director of the Center for Decentralized Wastewater Management, Biosystems Engineering & Soil Science Department, The University of Tennessee.

Registration Fees:

The fee for this course is $100. This fee includes lunch and breaks; it includes one year of membership (or membership renewal) in TOWA and in NOWRA (National Onsite Wastewater Recycling Association); and it includes the registration fee to the TOWA Annual Meeting (March 19) at the same location.

Directions to the Short Course:

This course is being conducted at the Saturn UAW Union Hall, 125 Town Center Parkway, Spring Hill, Tennessee. From I-65 South, take Exit 53 (Highway 396 - Saturn Parkway - Spring Hill/Columbia). Go approximately 4.5 miles to Highway 31 - Spring Hill/Columbia exit. This exit will immediately split - take Spring Hill North exit to Highway 31N. Go approximately 0.3 miles on Highway 31N to Stephen P. Yokich Parkway (Town Center Parkway) and turn left (you will see a Food Lion store and McDonalds on this corner). UAW Union Hall is on the left directly behind Food Lion, entrance to banquet hall is to the left of the flags.

For More Information:

Contact John Buchanan at jbuchan7@utk.edu or at (865) 974-7266. Please visit our website at http://onsite.tennessee.edu

Registration Form:

Name:_____

Company or Employer:_____

Title:_____ **Phone Number:**_____

Street Address or Box Number:_____

City, State, Zip:_____

Email Address:_____

Any Dietary Restrictions?_____

Please make checks payable to TOWA. We apologize for being unable to accept credit cards.

Please return registration to:

John Buchanan
Center for Decentralized Wastewater Management
2506 E. J. Chapman Drive
Knoxville, TN 37996-4531
Or by fax at (865) 974-4514

Registration Procedure:

Pre-registration is strongly encouraged – we need to know how much food to order and how many handouts to publish.

This short course is presented in cooperation with the Tennessee Onsite Wastewater Association (TOWA) and The University of Tennessee Center for Decentralized Wastewater Management.

THINK

Protecting the Environment
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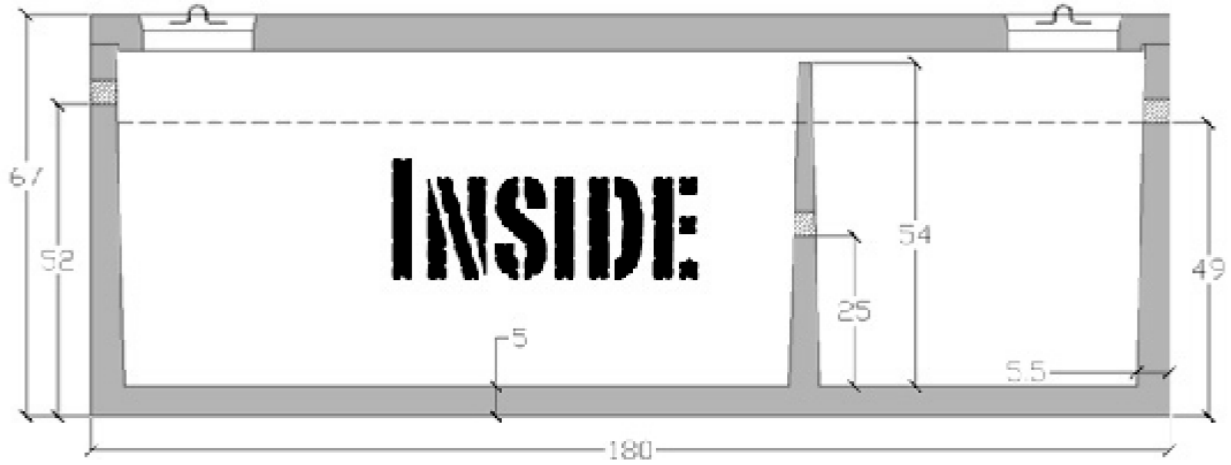
one tank at a time since 1967.



THE TANK

It's all about protecting the ones you love most....

Can you imagine what might happen if your child, grandchild, or pet plays in a yard that is contaminated by seepage from a faulty septic system? The results can be disastrous! Untreated human waste is a primary source of E-Coli - bacteria so deadly that it can cause serious illness or even take the lives of those you love.

You can help ensure a safe environment around your home by insisting on installation of a Barger and Sons watertight septic tank, the highest quality residential septic tank available to homeowners in the East Tennessee area. The quality and structural integrity of a Barger and Sons tank result in the highest possible level of performance and keep raw sewage where it belongs – below ground and away from your loved ones.

Because you care – because we care – a Barger and Sons septic tank is the right answer for your new residential installation!

Why is a Barger and Sons tank so special? Find out why on our website at www.BargerAndSons.com.

NPCA
CERTIFIED PLANT

2007 NPCA Salute to Excellence Pinnacle Award Winner

3rd Annual TOWA/BBBS Golf Scramble

On June 6th of 2008, TOWA will host our annual golf scramble to benefit Big Brothers Big Sisters. The event will be held at The Legacy golf course in Springfield, the same venue as last year. In its two year history, this tournament has raised well in excess of $11,500 for BBBS and we hope to keep it growing. Numerous members of our organization as well as other outside businesses have been instrumental in making the event a success by corporate sponsorship. It would be great to have this number grow as well as the number of golfers expanded to fill the entire course. Please consider one or both of these two options and if you have any questions contact Scott Fellwock @ 615.305.0157 or Darrell Collard @ 615.403.1303. Sign up forms will be coming out in later newsletters and at the conference in March.

Lowell Perry, CEO of big Brothers Big Sisters, stated that "We are so grateful to all the individuals connected with the Tennessee On-Site Wastewater Association for their effort, and for their recognition that we all need to step up and take action to mentor the children in Middle Tennessee.

Thank you all for your continued support and we are looking forward to having a larger crew than ever step up to help take action (as well as having a fun day of golf at the same time!)

Tennessee Onsite Wastewater Association Board Meetings

Board meetings are held every odd month on the second Tuesday. Meetings usually start at 4:00 pm CT and last for two hours. Meeting locations rotate. A call in number is available if you are not able to attend in person.

Upcoming 2008 Board Meetings:

March 19
May 6
July 1
September 2
November 4

Contact Darrell Collard for details or past minutes at: (615) 226-9601 or email: darrell@wmmcclain.com

12TH ANNUAL CONFERENCE AND PRODUCT EXPO 2008

WEDNESDAY- MARCH 19, 2008

UAW Local 1853 Union Hall

125 Town Center Parkway—Spring Hill, Tennessee 37174

Please pass the word to your friends and colleagues!

EXHIBITORS, BOOTHS ARE STILL AVAILABLE. PLEASE CALL SCOTT AT 615-340-5604 FOR INFO.

Registration begins at 8:00 am, Wednesday, March 19 and the technical program will start at 9:00 am.

Conference speakers will have broad appeal to onsite wastewater professionals. Speakers and topics include:

- **Alan Schwendimann**, *Director of Ground Water Protection Division of TDEC*, will discuss the impact of new state regulations.
- **Bob Odette MS, PE** , *Assistant Manager of Municipal Facilities – Water Pollution Control Division of TDEC*, will go over the design and regulation changes regarding drip fields.
- **Dr. Brad Lee PHD**, *Associate Professor of Agronomy- Purdue University*, will discuss the impact of soils on sewage system function.
- **Dr. John Buchanan PE PHD**, *Associate Professor of BioSystems Engineering and Soil Science - University of Tennessee*, will highlight his High Strength Wastewater presentation and also discuss decentralized systems.

→ **A SPECIAL PRE-CONFERENCE MEETING WILL BE HELD ON TUESDAY, MARCH 18. THE TOPIC WILL BE UTILIZING ONSITE SEPTIC SYSTEMS FOR HIGH STRENGTH WASTEWATER.**
ENGINEERS— CONTINUING EDUCATION WILL BE AVAILABLE.

FOR INFORMATION CONTACT: Dr. John Buchanan, P.E. : (865) 974-7266 or jbuchan7@utk.edu.

MEMBERSHIP AND CONFERENCE FEES

Special conference rates apply to all new members! If you are not already a TOWA member, then conference registration includes a one-year TOWA membership.

New Membership Only or Renewal Only	Membership Renewal and Conference Registration
$35 Academicians, regulators, research professionals, associate members	**$50** Academicians, regulators, research professionals, associate members
$50 Installers, pumpers, engineers, soil scientists & others	**$50** New or lapsed past members regardless of category
	$65 Installers, pumpers, engineers, soil scientists & others

ACCOMMODATIONS

The Spring Hill Inn and Suites by Best Western is conveniently located less than 1/2 mile from the UAW Union Hall. The hotel rate is $80.10 + tax if reserved by March 10th. Just mention that you are with TOWA. Call (877) 486-2234 for reservations.

DIRECTIONS

To the UAW Union Hall and the Spring Hill Inn and Suites by Best Western in Spring Hill, TN (from Nashville):

TO THE UAW HALL:

From I-65 South, take Exit 53 (Highway 396 Saturn Parkway Spring Hill/Columbia). Go approximately 4.5 miles to the 3rd exit (Highway 31 Spring Hill/Columbia). This exit will immediately split. Take Spring Hill North exit to Highway 31N. Go approximately 0.3 miles on Highway 31N to the 1st traffic light. Turn left on Stephen P. Yokich Parkway. (You will see a Food Lion store and a McDonald's on this corner.) UAW Union Hall is on the left directly behind Food Lion. Entrance to the banquet hall is to the left of the flags.

TO THE SPRING HILL INN AND SUITES BY BEST WESTERN:

Go an additional 0.3 miles (approximately) on Highway 31N to Kedron Road. (This will be the 2nd traffic light on Highway 31.) Turn left at the traffic light to the second drive on right.

CONFERENCE REGISTRATION AND MEMBERSHIP RENEWAL

Name:_____
First Last

Company:_____

Mailing Address:_____

_____

City: _____

State: _____ Zip Code:_____

Phone: (_____) _____ - _____

Fax: (_____) _____ - _____

E-Mail Address: _____

Name on Badge: _____

Membership Status (*check only one*):

____New ____Renewal ___Lapsed

Category (circle only one):
see on page 10

Academician	Regulator	Research Professional	Associate Member	
Installer	Pumper	Engineer	Soil Scientist	Other

Amount Enclosed: $_____

Checks should be made payable to "TOWA"

Please mail checks to:
TOWA
P.O. Box 292983
Nashville, TN 37229-2983

Tennessee Onsite Wastewater Association
12TH ANNUAL CONFERENCE AND PRODUCT EXPO
March 19, 2008 in Spring Hill, Tennessee
EXHIBITOR REGISTRATION FORM

Name of Company _____

Contact Person _____

Exhibitor Badges* 1) _____

2) _____

Mailing Address _____

City _____ State _____ Zip Code _____

Phone: (_____) _____-_____

Fax: (_____) _____-_____

E-Mail Address: _____

Please make checks payable to "TOWA"
Return completed form and payment to:

TOWA
C/O Scott Fellwock
3291 Freeman Hollow Rd.
Goodlettsville, TN 37072

2008 Conference
Setup and Location Information

UAW Local Union Hall, Spring Hill, TN

Exhibit Hours:

Wednesday March 19, 2008
7:30 AM-9:00 AM (Setup)
9:00 AM -3:30 PM (Technical session)
3:30 PM (Breakdown)

AMOUNT ENCLOSED
$ _____

For more information call Scott Fellwock @ 615.340.5604

EXHIBIT FEES FOR CONFERENCE

Standard booth is 8' X 10' with 6' table, standard electricity and two chairs. *Two conference registrations are included with each company's registration. Please enclose $30 per attendee for additional registrations.

Reserved and paid by March 10, 2008

____ Single booth space $250 ($300 after 3/10)

____ Additional booth $150 ($200 after 3/10)

____ Break sponsor $50

____ Lunch Co-sponsor $150

____ Additional registrants $30

Pump Know-How

A few simple calculations will help you size pumps appropriately and ensure that your onsite systems function reliable, as designed

Installers often work off the designs of others. As educators, we often hear them say, in effect, "I don't need to know that because I can follow the plan – that's the designer's job." Nowhere is this more common than in selecting the right pump for a system.

While a good designer will account for the necessary design elements and will have the "right" answer, everyone installing a system with pumps should understand how that pump was selected. That way, the installer will understand how any changes made during the installation will affect the pump. (And we know that changes happen.) This is all the more critical for installers who also work on repairs and troubleshooting.

Getting the basics

The right pump for the job is determined by the conditions at the site and by the reason for the pump. Every pump has a distinct operating curve based on the amount of water that needs to be delivered (in gallons per minute, or gpm) and the total dynamic head (TDH, in feet) that the pump must overcome to send effluent where it needs to go.

If the pump needs to move septic tank effluent to a drop box at a higher elevation, from which it will flow by gravity to the trenches, that pump needs to deliver at least 10 gpm and no more than 45 gpm at the drop box.

The minimum ensures that the pump will run fast enough to keep ahead of appliance discharges from washing machines and dishwashers. The maximum ensures that effluent has time to flow by gravity out of the drop box to the soil treatment system.

In this flow situation, TDH is determined by adding the elevation difference from the pump to the drop box and calculating the friction loss in the supply pipe to the distribution box. You can then visit the pump supplier and ask what effluent pumps are available that operate within those delivery and hydraulic head requirements.

If the pump will send effluent to a pressure distribution system, you still need to determine the delivery and head requirements, but the process is a bit more complicated. The number and size of the perforations (orifices) in the pressure distribution system will determine the required pump capacity.

The flow required to pressurize the laterals is the volume and pump capacity needed to force effluent evenly out of the orifices. That volume is the amount of liquid needed to fill the laterals and is set by the dose volume to the laterals. The pump capacity is based on the orifice diameter (typically 1/8 to1/4 inch) and the number of orifices in the system.

The second component of this calculation is the minimum pressure delivered at each orifice. The higher the pressure, the more flow is typically needed, but the harder it will be to plug the system. This is critical, because as pump capacity (rate of flow) increases, friction loss becomes greater. Both of these directly affect pump size and cost.

Be careful in designing or changing the pressure distribution system. Be sure to correlate any changes you make in the field to the pump sizing components. Changing the number of orifices, or making them larger (even if by poor drilling practices) will increase the flow and the required pump capacity.

Calculating head

To determine the head requirement, you must calculate or estimate three components. The first (typically largest) is the elevation difference. Here, you simply measure the vertical distance (in feet) from the top of the pump in the pump chamber to the discharge point – the elevation of the discharge laterals.

The second component is the friction loss in the supply pipe and laterals. Friction loss is a function of the size of the pipe and the effluent flow velocity. The smaller the pipe, the more friction loss. The more that flows through the pipe, the more friction loss.

The friction loss in the supply pipe also includes the unions or other fittings that connect to the pressure manifold. You can calculate for the loss for each fitting, or make a rule-of-thumb estimate by adding 25 percent to the friction loss for the pipe.

The third component of friction loss covers losses in other components of the pressure system, such as a splitter valve or other valves. You should add friction loss for the pressure distribution piping – typically calculated at an additional five feet of head if using 2-inch piping. (If the distribution manifold will be smaller, then the friction loss in the distribution mani-

fold may be a little bit greater.)

For instance…

Let's look at a quick and simple example. The pressure distribution laterals for a mound system with a 10- by 40-foot rock bed has about 40 perforations. If each of these perforations is1/4 inch in diameter, you need capacity to deliver 40 gpm to pressurize these orifices. The TDH for the system is determined by measuring:

- The elevation difference from the pump to the pressure distribution system.
- The friction loss in the pipe and fittings.
- Special components in the distribution system.

In the back yard, we measure that the elevation difference is 14 feet. There is 80 feet of 2-inch schedule 40 supply pipe. The friction loss in this pipe, determined from a friction loss table, is about 3 feet per 100 feet. Adding 25 percent for friction loss in the whole pipe would be approximately 3 feet of head.

The final head requirement is the loss in the distribution network and any additional losses in the system. A design value of 5 feet of head is used for typical mound pressure distribution laterals.

The total head requirement for this system is the sum of these pieces:

- 14 feet for the elevation
- 3 feet for the pipe and fittings
- 5 feet for the distribution system

That totals 22 feet of head. The pump required for this system needs to be able to deliver 40 gpm at 22 feet of total dynamic head. If the pump cannot do this, the pressure distribution system will not work as designed. On the other hand, if the pump is sized to do much more, it is probably more expensive then necessary.

Also consider the other non-system related issues in pump selection. Service, warranty and price, for example, may play a role. Choosing the right pump is critical if you want to install systems that work the way they're supposed, enabling long-term performance in treating wastewater.

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