January
2008

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- Basic training: Troubleshooting pumps

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The Race Is On

As the campaign for the presidency gets into full swing, now is a good time to remember that politics is not a spectator sport

By Ted J. Rulseh

By the time you read this, we'll be on the eve of caucuses and primaries for the 2008 presidential election (at least, that's true for those of us in the USA).

Eleven months from now, we'll be gathered around our TV sets watching states light up red or blue on the map as the commentators report the voting results. For me, that's among the most interesting evenings of television there can be.

Still, I'm reminded that citizenship means more than watching with interest as events unfold. It means getting involved. My eighth-grade civics teacher, Sister Jacinta (I went to a Catholic school), said something I never forgot: That those who don't take part in government should forfeit their right to complain about it.

Into the action

Let's face it: Griping about the government is a favorite pastime. We do it over the dinner table, in coffee shops, on street corners, on car trips, just about anyplace where people get together. It's only a relative few of us who quit griping and do something.

The beauty of our system is that an individual can make a difference in many ways. Staying informed and voting — that's fine, but it's only the most basic form of participation. Others include backing a candidate as a volunteer, serving on an appointive board or commission, and running for local office.

These days, candidates are scarce for many municipal, county and school board positions. Look at a list of officials up for election in a given year and you'll find a majority of races are uncontested. In part that's because people feel the incumbent is doing a good job. But it's also because people lack the energy or conviction to run.

For my part, while I could be more active, I have been elected to a school board, served on a plan commission, canvassed for candidates, and once served as a ward captain during an election. Each experience was rewarding in its own way.

These days, candidates are scarce for many municipal, county and school board positions. Look at a list of officials up for election in a given year and you'll find a majority of races are uncontested.

Pen in hand

So in a meaningful way I've taken Sister Jacinta's advice. And she wasn't my only advisor. A college buddy and roommate was a state officer in a political party youth organization. He once brought me up short when, in a dorm room conversation, I complained about how difficult it was for anyone to influence government policy.

I still remember him, puffing on his pipe, leaning back in his chair, and saying, "You know, it's really deceptively simple. If everyone would write their congressman about issues that concerned them, the government would have to be more responsive."

Many years later, that sounds simplistic and a bit naive, but it's not without merit. I do write my state and federal representatives and have been known on occasion to call my alderman or county supervisor to express an opinion. When I do so, it's in my old friend's memory.

For the industry

How about you? Do you complain about the government? Or do you get involved and take action? When you own a business on which the government has an impact, it's all the more important to be a participant — not a spectator.

The onsite industry across the country faces all manner of changes in laws and regulations. Onsite professionals, alone and through their associations, have had a great deal to do with promoting responsible rules in many states. More voices would only make the industry more effective.

And of course there is much to be said for getting active on behalf of your own beliefs, wherever they may fall on the political spectrum.

At every level, our country is built on the principle of self-government. Elihu Root, secretary of state under President Theodore Roosevelt and a U.S. senator from 1909-15, spoke eloquently about the importance of citizen participation.

"Politics is the practical exercise of self-government," he said, "and someone has to attend to it if we are to have self-government. The principal ground of reproach against any American citizen should be that he is not a politician."

Or more simply, to paraphrase Pogo of comic strip fame, "We have met the government, and it is us." ■

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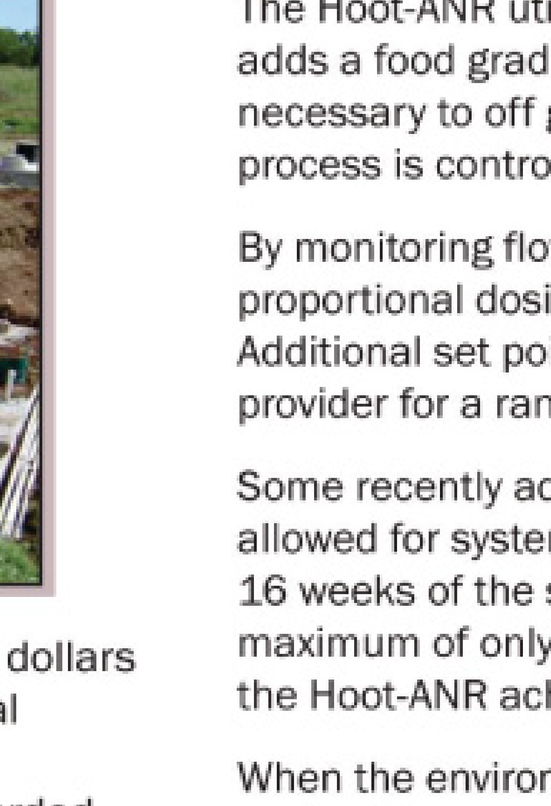

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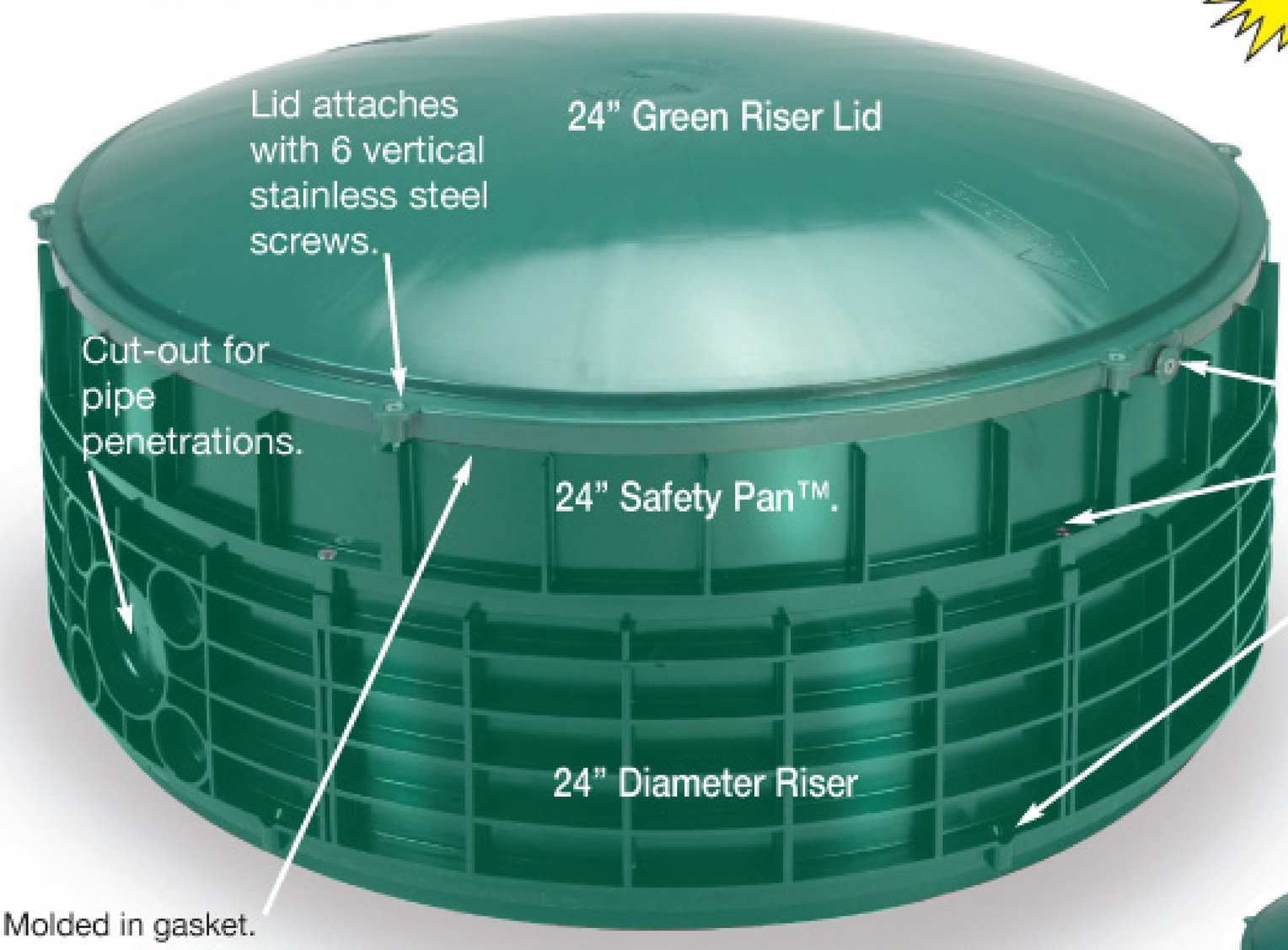

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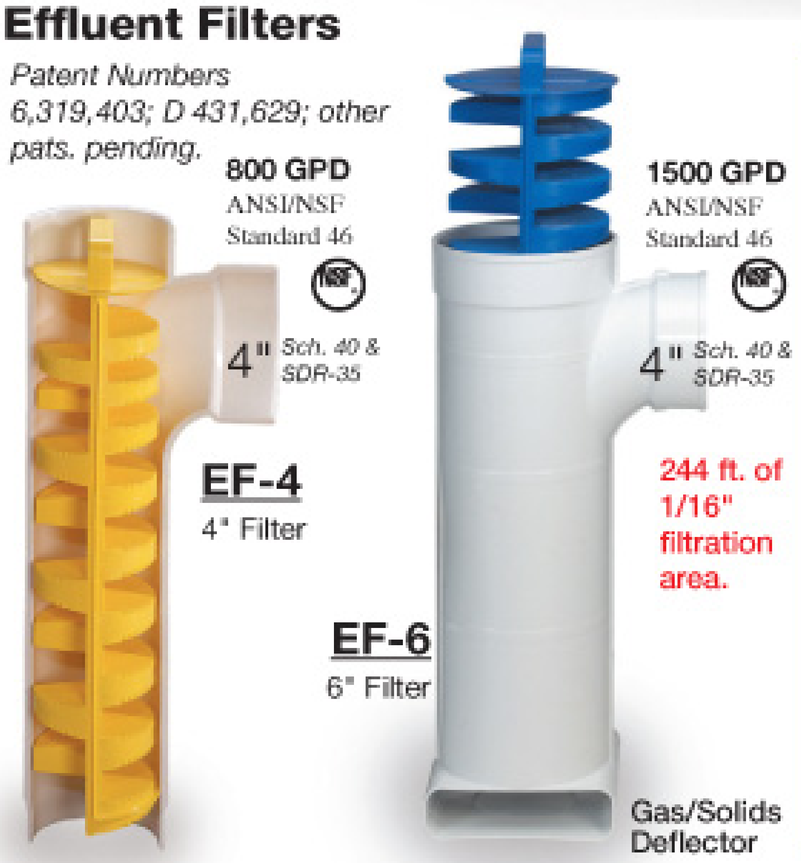

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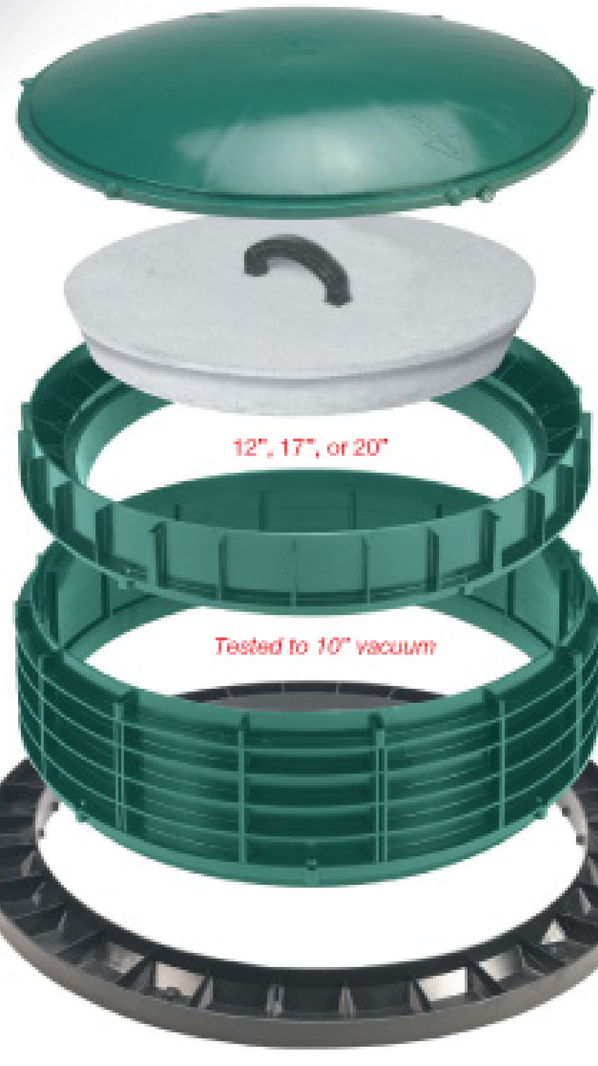

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Jim Anderson and David Gustafson are with the University of Minnesota's widely recognized onsite wastewater treatment education program. Anderson is Director of the university's Water Resources Center and Gustafson is the university's Extension Onsite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

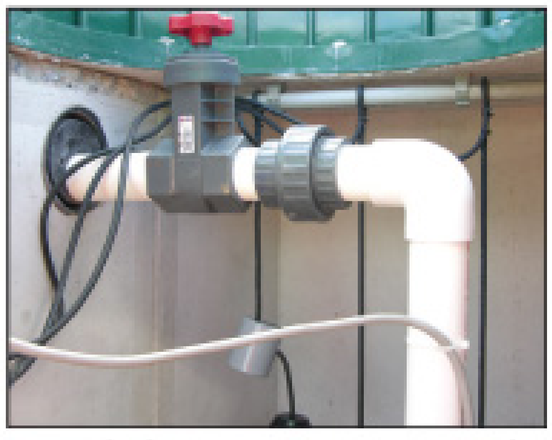
Feeding the Field

Effective pressure distribution of septic tank effluent depends on an understanding of pump and pump tank applications

By Jim Anderson, Ph.D., and David Gustafson, PE

In November we talked about pressure distribution systems having five parts: lateral pipes with small holes, manifold and main connected to the laterals, dosing tank to collect septic tank effluent, pump to pressurize the system, and controls to operate the pump. This month we take a closer look at pump tanks and pumping situations.

The pump tank is placed between the sewage tank and the lateral system. The pump can operate in either on-demand or timed configurations. On-demand pump operation is controlled by float



A quick disconnect in a pump tank is an aid to maintenance.

switches suspended in the pump tank. The pump turns on when enough effluent collects in the tank and turns off when the dose has been delivered.

In timed pumping, a timer controls when the pump turns on and off to deliver a specific amount (or dose) of effluent.

Tank attributes

Pump tank construction and installation requirements are the same as for any other type of sewage tank. The tank must be durable and watertight and must withstand the soil loads that tend to push in on the walls. The environment in the tanks is very corrosive, so no metal parts or fittings should be used. The major difference between a septic tank and a pump tank is that the pump tank is emptied on a daily basis.

Since the tank is emptied every day, anchoring it against flotation is critical in areas with a high seasonal or permanent water table. If the pressure distribution system being pumped to is in a mound treatment system, this is a common situation.

Flotation is not as much of a problem with concrete tanks as with fiberglass or polyethylene, but all tanks should be anchored according to manufacturer specifications. One common method is to use concrete curbs on either side of the tank with ropes or chains across the tank to hold it down when the pump runs or the tank is maintained.

A compartmented tank can help reduce the buoyancy problem. Since one side of the tank is always filled with water, this helps keep the tank from becoming buoyant. However, the strength of the inside wall is critical. Since there will be constant water pressure on one side of the wall, the tank construction

Here is an example of a pump tank installation to deliver septic tank effluent to a recirculating media filter.

should be such that the wall can withstand that pressure when the compartment is emptied.

Add a riser

Pump tanks can be round or rectangular. A riser to the ground surface should provide access to the pump through the maintenance hole. It is important from a maintenance standpoint that the pump, pump controls, and pump discharge line be accessible through the maintenance hole without entering the tank.

The riser cover should be made secure to prevent children or other unauthorized individuals from gaining access to the tank. In the last decade, a number of plastic

Make sure pumps and controls are accessible from the surface for maintenance and repair.

risers and lids have come on the market that require different numbers and kinds of screws that limit access for safety reasons. A chain and padlock still work for tanks with concrete risers and lids. After

you have installed the tank, make sure the tank can be secured.

We recommend that the access be at least 20 inches in the least dimension and preferably 24 inches. Never enter a pump tank or other sewage tank. Any work to replace pump switches or connections should be performed from the outside. Sewage gases produced in the tank can kill a person in a matter of minutes.

For residential applications, we recommend that the pump tank be a minimum of 500 gallons, or 100 percent of the estimated daily sewage flow, whichever is greater. When installing, always check that the pump tank has the capacity to collect and store the amount of effluent you need to pressurize the system and deliver the required dose. Often this will require a larger tank.

Nothing is worse than getting to the point of setting the floats, only to find you do not have enough tank capacity! One item of note: the inlet to a pump tank can be higher than a normal septic tank inlet to provide for additional reserve capacity in the event of a pump failure or malfunction.

Placing pumps

The pump should be set in the tank so that the intake is at least 4 inches above the bottom of the tank to prevent pumping solids from the bottom of the tank. A common way of doing this is to place a 6- to 8-inch concrete block at the bottom of the tank and setting the pump on the block. We actually recommend using two blocks side-by-side, as that makes for easier replacement if you need to pull the pump.

Electrical installations must comply with all laws and ordinances, including the latest codes, rules and regulations of public authorities having jurisdiction, and with the National Electrical Code. Make no electrical connections inside the pump tank. This includes plug-ins, screw type, twisted wire, boxes, relays or any other type of connection that requires movement to connect or operate.

Electrical installations must comply with all laws and ordinances, including the latest codes, rules and regulations of public authorities having jurisdiction, and with the National Electrical Code. Make no electrical connections inside the pump tank.

When connections are made, they should be located in a watertight, corrosion-resistant junction box with watertight, corrosion-resistant fittings and a cover sealed by a gasket. Watertight boxes seal against water coming from any direction.

Individual junction boxes, switch boxes and receptacle boxes designed for outside installation will usually be watertight. They are designed to withstand temporary immersion or spray from any direction. They are made from cast aluminum, zinc-dipped iron, bronze or heavy plastic. They have threaded entries for watertight fittings and covers sealed by gaskets.

One common method to run wires is through sealed conduit. This provides physical, water and corrosion protection. Several kinds of conduit are acceptable for outdoor use. Rigid metal conduit made from aluminum or steel provides equivalent wire protection. However, aluminum should not be used in contact with the soil.

Rigid PVC conduit can be used above ground. High-density polyethylene conduit is suitable for underground installation. Do not use thin-wall (EMT) conduit for underground or outdoor installations. ■

"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.*

Texas Relaxes Regulations

By Scottie Dayton

Last Sept. 1, a new state statute went into effect that relaxes the onsite inspection requirements. It states that rural residents may maintain the systems instead of relying on service companies to inspect them three times a year. Furthermore, residents no longer have to file periodic county reports to prove that the systems are working properly.

Collin County commissioners are debating whether to pass an ordinance requiring rural homeowners to be trained in how to maintain onsite systems and report test results to the county. Some North Texas counties, including Dallas, Denton and Ellis, already have passed local rules that override the state guidelines. Collin County has more than 12,000 onsite systems, while Dallas County has about 700 systems.

The new law resulted from homeowners complaining to legislators that some service companies did shoddy work. Others complained about the $200-a-year maintenance fee. The Texas Commission on Environmental Quality is not making a recommendation on whether counties should enact local inspection requirements.

Wisconsin

A bill introduced in the Senate will prevent county regulators and other government employees with duties related to onsite systems from installing, maintaining, repairing, selling, or designing systems and performing soil tests. The goal is to prevent these employees from competing against the people they regulate.

As of Jan. 1, a tracer wire or an equivalent means of locating is required when installing all nonmetallic sanitary, storm, and water laterals that connect to municipal mains. The suggested installation method is to bury at least 12-gauge, plastic-coated copper wire within 6 inches and directly above the top of the pipe.

The wire should be brought to the surface every 400 feet and protected at those access points. Tracer wire for sanitary sewer is green, storm sewer is brown, potable water is blue, and reuse water is purple. Installers should check with municipalities for local ordinances concerning tracer wire installation.

The state's new budget continues the Private Sewage System Repair and Replacement Grant Program that allocates $3 million annually to low-income residents.

The budget also increases vehicle registration fees for heavy trucks (more than 4 tons) by 30 percent. Before Gov. Jim Doyle signed the budget, Wisconsin Onsite Wastewater Recycling Association executive director Patrick Essie spoke with the governor's staff about how the increases would affect the industry. Current fees of $119.50 (5 tons) to $1,969.50 (40 tons) increased to $155 and to $2,560 on Jan. 1, 2008.

Ohio

The Household Sewage Treatment Study Group, created in a House bill that suspended the state's current onsite rules until July 2009, is rewriting legislation mandating sophisticated and costly onsite systems. Advocates are seeking new rules that protect the environment without causing a financial burden to property owners.

The group will examine the situation throughout 2008, then deliver a report to state leaders at the end of the year. Until then, counties will follow onsite regulations in effect before Jan. 2007, when the more stringent rules took effect.

"There are more than 1,000 cases where onsite rules are causing an economic hardship to landowners," says Tim Grendell, who represents Ohio's 18th Senate District. "In some cases, new systems cost more than the houses they will serve, making people leery to build homes." Ray Saporito, Ashtabula County health commissioner, said he is certain some building permits in the county were not pulled because of uncertainty over septic system regulations. ■

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 to editor@onsiteinstaller.com.

All in the Numbers

Oil analysis can be a valuable tool for fine-tuning maintenance and protecting equipment life. Here's how to get the most from analysis reports.

By Greg Northcutt

A technician draws an oil sample from a truck engine for analysis at a laboratory. Oil analysis is like a blood test for a machine — the results provide a picture of overall health and help diagnose trouble.

The various numbers in an oil analysis report offer valuable information about the mechanical health of your excavator, backhoe or other machines.

"They provide insight into the performance of the oil as well as the internal condition of your equipment," says Ed Kellerman, manager of Oil Analyzers Inc., an independent testing lab operated by Amsoil Inc. However, he admits, the numbers by themselves might be confusing.

If you underst how the report information is derived and what the numbers measure, that can help you avoid confusion — and improve your ability to spot and fix any minor problems before they become major ones.

"No two pieces of equipment wear at the same rate. Many factors, like age of the machine or how it's operated, can affect the amount of wear metals in the oil."

Ed Kellerman
Oil Analyzers Inc.

The reporting process

A number of labs around the country analyze oils from engines, transmissions, hydraulic systems and differentials. Kellerman recommends using ISO-certified labs whose analysts are certified by a recognized organization like the Society of Tribologists and Lubrication Engineers (STLE).

In addition to information about the customer, the machine, the type of oil and when the sample was tested, a typical analysis report lists the types of tests conducted and the results. It also explains any unusual readings and recommends appropriate steps to take in response.

For example, the routine analysis performed by Oil Analyzers evaluates both the physical and chemical properties of the oil using several tests. The report compares the actual test measurements for each property and compares them to average or normal values, which are based on recommended oil drain intervals.

Readings that fall outside the normal range are highlighted by a code: "A" for abnormal or "C" for critical. "An 'A' indicates cause for concern but requires no immediate steps to fix the problem," Kellerman explains. "However, a 'C' reading calls for prompt corrective action to prevent catastrophic failure of the machine. In that case, we call or fax the customer about the problem." The report includes recommended actions to take for each "A" or "C" reading, such as changing the air filter or replacing a gasket.

Chemical properties

One key component of the company's testing process is spectrochemical analysis, done with an inductive coupled plasma (ICP) spectrometer, which detects metal particles in the oil that are smaller than 6 microns. This instrument identifies the type of metal and measures its concentration in parts per million. Some particles are generated by wear of bearings, gears and other components. Some particles are from dirt or other contaminants in the oil. Others are from metals added to the oil by the manufacturer.

In the case of engine oil, the Oil Analyzers' tests can detect 12 different metal oil additives, such as boron, magnesium and zinc, and eight types of wear metals, including copper, lead and tin. The presence of metals and other particles can indicate problems. For example, silicon might indicate that dirt is getting into the system through a leaking seal. A high chromium reading could mean excessive wear of piston rings, while an unusual aluminum level could signal the need to check the condition of a torque converter.

"No two pieces of equipment wear at the same rate," says Kellerman. "Many factors, like age of the machine or how it's operated, can affect the amount of wear metals in the oil."

Physical properties

The other major part of the

Get the Most from Oil Analysis

As good as an oil analysis is in spotting maintenance problems, a whole series of these evaluations is even better, reports Darryn Wallace, a senior technical service specialist with Oil Analyzers Inc.

"An analysis shows the machine's condition at one point in time," he says. "You need to test the oil on a consistent basis to establish trends in the types of wear and the rate at which it is occurring. You can then base maintenance practices on these trends.

"For example, if, after testing several samples over time, there are no drastic spikes or drops in any key measurements, you may be able to extend the time between oil and filter changes to save time and money. Or, the trend in test values may show that you need to shorten these intervals to prevent problems. Also, by knowing more precisely when the oil needs to be drained and the condition of your equipment, you can schedule this or other maintenance when it's convenient for you."

To establish a good baseline for tracking trends, Wallace recommends testing the oil within the first few hours of operating a new machine or after changing the type or brand of oil. The next two samples should also be evaluated after fairly short intervals. "Once trends in the measurements start to develop, you can then figure out a more reasonable interval between tests," he says.

Finally, Wallace notes, specific testing methods can vary from one lab to another. That's why he suggests sticking with one good lab to get a more accurate picture of equipment condition and maintenance needs over time.

testing evaluates any changes in the physical qualities of the oil. "These changes can have a dramatic effect on the oil's ability to protect the component from wear or failure," Kellerman says.

Viscosity. A buildup of certain contaminants can affect the oil's viscosity. Using a viscometer, analysts measure the time it takes for the oil to flow down one side of a U-shaped tube and up the other. Some types of contaminants will thicken the oil, slowing the flow through the tube. Others will thin the oil, speeding up the flow.

Water/antifreeze contamination. A crackle test (a drop of oil placed on a hot plate sizzles or cracks if it contains moisture) is used to test for water contamination. Water in the oil can indicate such problems as condensation, a leaking radiator or transmission oil cooler, defective seals, or a blown head gasket. A chemical test can reveal the presence of glycol and coolant additives, which can corrode engine components and destroy the oil's ability to lubricate.

Fuel dilution. Several tests can be used to detect fuel in the oil. Fuel dilution can reflect several causes, including defective injectors, improper timing, and a leaking fuel pump or lines.

More contaminants. A Fourier Transform Infrared (FTIR) scan can identify several types of contaminants. They include:

- Soot, the result of incomplete combustion from such sources as defective injectors, clogged air filters and problems with intake/exhaust valve guides.
- Solids like dust, gasket material and debris left during the manufacture of components.
- Oxidation of the oil, caused by high operating temperatures or over-extended oil change intervals, which can cause corrosion, increase viscosity and deplete additives.

The FTIR scan can also reveal any abnormal nitration, the result of excessive blow-by, which can increase oil viscosity, cause corrosion and lead to increased wear and poor engine performance.

Total base number (TBN). Engine oils contain base (alkaline) additives to neutralize the acidic by-products of combustion. The oil's ability to neutralize these acids and protect the engine from corrosion is measured by its TBN value. The higher this number, the greater the protection.

"Because oil loses its ability to neutralize acids over its service life, measuring the TBN strength of the oil is very important when extending oil drain intervals," Kellerman says. For non-crankcase lubricants, he adds, measuring the Total Acid Number (TAN) provides a good indication of a lubricant's condition.

If you don't perform oil analysis on your equipment now, maybe you should. If you do, it makes sense to understand the meaning of the tests you're paying for. More information is available at www.oaitesting.com.

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

Allison
Van Wyngarden

Van Wyngarden Joins Vermeer as Distribution Manager

Allison Van Wyngarden, daughter of co-CEO Bob Vermeer, has joined Vermeer Manufacturing Co. as an industrial distribution manager. She comes to the company with a background in financial investment, and a master's degree in business administration.

Hoot Names McQuestion Sales Manager

Brian McQuestion has joined Hoot Systems LLC as Midwest regional manager and national sales manager. A graduate of the University of Wisconsin, he is licensed as a POWTS maintainer with the Wisconsin Department of Commerce and serves as secretary/treasurer of the National Onsite Wastewater Recycling Association. ■

Installing Excellence

The education program at the 2008 Pumper & Cleaner Expo provides ample learning opportunities for installation contractors at all levels

By Ted J. Rulseh

Onsite installers from beginners to experienced and credentialed will find a great deal to learn from the education program at the 2008 Pumper & Cleaner Expo, Feb. 17 to March 1 at the Kentucky Exposition Center in Louisville.

Education Day on Wednesday, Feb. 27, offers two tracks of seminars dedicated to installation and system maintenance contractors. Other seminars on Thursday, Feb. 28, cover a range of topics of interest to onsite practitioners.

Thursday also includes a full-day Certified Onsite Installer Course, sponsored by *Onsite Installer* magazine and presented by Jim Anderson, Ph.D., and David Gustafson, P.E., of the University of Minnesota Onsite Sewage Treatment Program.

Here is a summary of the 2008 Expo education seminar offerings:

Education Day, Feb. 27

The Education Day program includes seminar tracks sponsored by the National Onsite Wastewater Recycling Association (NOWRA) and the National Environmental Health Association.

The NOWRA track covers basic knowledge that underlies the installation of high-performing and lasting onsite systems. Presenters are David Lindbo, Ph.D., associate professor and soil Extension specialist with the Department of Soil Science, North Carolina State University; and John Buchanan, associate professor in the Biosystems Engineering and Soil Science Department at the University of Tennessee. Sessions are:

- **Introduction to the Site Evaluation Process:** An overview of what needs to be done before during and after a field visit. 8 to 9 a.m.
- **Introduction to Soils:** Basic soil science methods and terminology as they relate to onsite systems. 9:30 to 10:30 a.m.
- **Water Movement and Treatment in Soils:** Treatment processes; the flow of water through soil and out of the dispersal media into the soil. 11 a.m. to noon.
- **System Design Related to Soil and Site Conditions:** Design principles including long-term acceptance rate and selection of the right system to suit the site. 1 to 2 p.m.
- **Systems Design Related to Installation:** System layouts and issues related to installation and drainfield protection during construction. 2:30 to 3:30 p.m.
- **Post-Construction Site Evaluation:** Site evaluation for operation and maintenance or time-of-sale inspection. 4 to 5 p.m.

The NEHA track focuses on technical system installation issues and on national credentialing for installers. Sessions are:

- **Point-of-Sale Inspection,** Elizabeth Dietzmann, JD: How to inspect systems to detect trouble before sale or transfer of a property. 8 to 9 a.m.
- **Becoming a Certified Installer, Christl Pokorney:** Overview of the knowledge, skills and training required to pass the Certified Installer of Onsite Wastewater Treatment Systems credential exam. 9:30 to 10:30 a.m.
- **Working With Performance-Based Codes,** Richard Otis Ph.D, P.E.: How performance-based codes work; designing systems to fit them. 11 a.m. to noon.
- **Building Cost-Effective Community Sewage Systems in Subdivisions,** Doug Ebelherr: Case study on a community system in central Illinois. 1 to 2 p.m.
- **Management Guidelines, Model Codes, National Credential and You,** Anthony Smithson, MEH, REHS, director of environmental health, Waukegan County, Ill., 2:30 to 3:30 p.m.

The Education Day program also includes seminars of interest to installers given by the National Precast Concrete Association (NPCA) and the National Association of Wastewater Transporters (NAWT).

The NPCA program, Inches of Mercury and Feet of Bury: Both Make a Difference, will be given from 4 to 5 p.m. by Mike Miller, international sales manager for Press-Seal Gasket Corp. He will discuss the value of vacuum testing and following proper test procedures.

NAWT seminars of special interest to installers are:

- **Responsible Management Entities,** A.R. Rubin: Options to assure sustainable management approaches for onsite systems. 8 to 9 a.m.
- **Experts' Review of ATU Operation and Maintenance,** Bruce Lesikar, Ph.D., Texas A&M University: Tricks of the trade and operational checklists to guide evaluation and assessment of component function. 9:30 to 10:30 a.m.

Thursday, Feb. 28

The Thursday morning program includes these seminars of importance to the installer community:

- **Safety in Excavation,** Gary Hooks, Safety Corporation of America: Training employees in the hazards of excavations. 8 to 9 a.m.
- **Water Softener Effects on Onsite Wastewater Systems,** Mark Gross, Orenco Systems Inc.: How backwash brine from water softeners may affect onsite system performance. 9:30 to 10:30 a.m.

Installer Certification Course

The Certified Onsite Installer Course sponsored by *Onsite Installer* magazine runs from 8 a.m. to 5 p.m. on Thursday, Feb. 28. Jim Anderson and David Gustafson of the University of Minnesota onsite program will train participants on the basics of installing onsite systems. An optional exam will be given afterward.

Those who pass will be recognized as Certified Onsite Installers and will be prepared to move on to continuing education sessions, such as the NEHA national installer credential and the NAWT Certified Inspector Course.

Learn more and register

To find out more about the 2008 Expo, or to register, **visit www.pumpershow.com or call 800/257-7222.** The early registration fee of $40 applies until Jan. 25, 2008. Registration at the door is $60. ■

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February 28 - March 1, 2008
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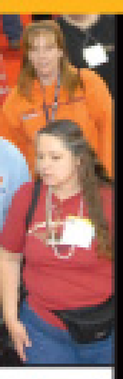
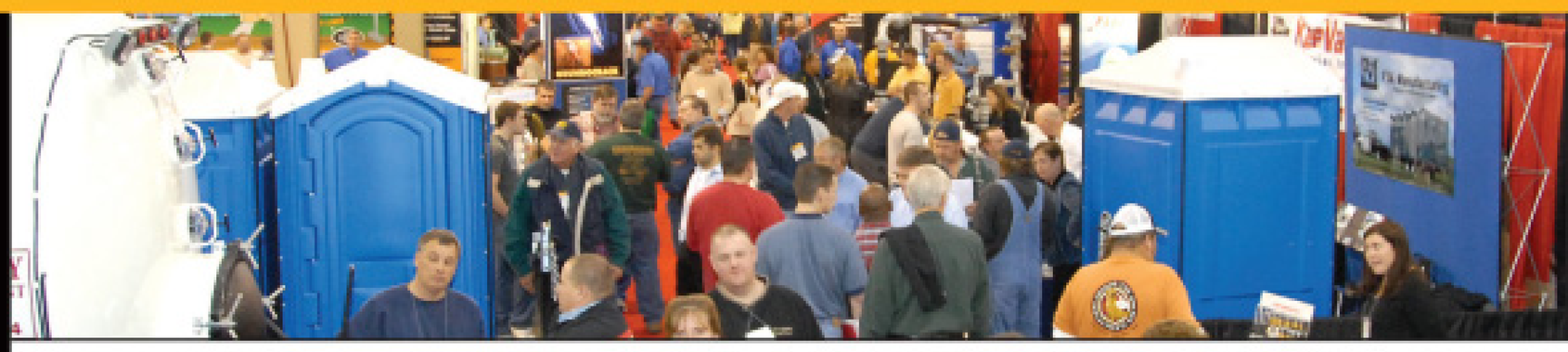




It's all here

Exhibitors provide hands-on look at industry's latest technology.

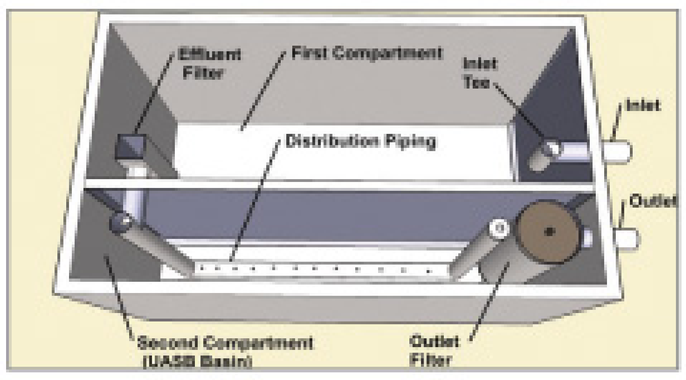
By Ed Wodalski

A new year. A new location. New vendors and thousands of new products promise to make the 2008 Pumper & Cleaner Environmental Expo International in Louisville, Ky., the best ever. And seeing this is the Expo's 28th year – that's saying something. Although with three big days of educational seminars, nationally known entertainer Jeff Foxworthy, chart-topping Big & Rich, and nearly a million-square-feet of exhibition space you might not need much convincing. Still, we realize the one reason you come to the Expo is to get a hands-on look at the industry's latest technology. To help you plan your visit, here is a look at some of the many products you'll want to see.

Septic Treatment Systems, Accessories

Advanced Wastewater Systems

Designed for homes and small systems, the two-compartment Super Septic Tank process uses straight flow through, and requires no electric power or moving parts. Waste enters the first compartment,



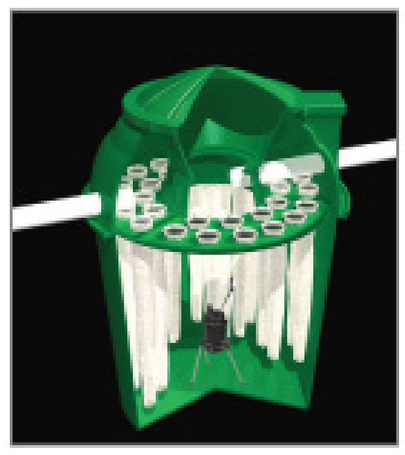
settling the solids and floating the FOG. Wastewater flows through an effluent filter and into a treatment basin in the second compartment, which acts as an upflow anaerobic sludge blanket. The treated water then passes through a proprietary foam filter, removing any remaining solids. 812/926-4282; www.superseptictanks.com; Expo booth 3009.

Infiltrator Systems Inc.

The Aquaworx Remediator restoration system is designed to rejuvenate malfunctioning septic systems with minimal landscape disruption. Inserted into an existing tank, the device utilizes a permanent non-invasive process that promises to restore function in about two weeks. 800/718-2754, www.infiltratorsystems.com; Expo booth 4081.

Consolidated Treatment Systems Inc.

Multi-Flo is a compact, environmentally friendly wastewater treatment system designed to provide the highest level of treatment and disposal through fixed film and growth digestion. Because of its no-bypass, positive-filtration design, the system promises clear, odorless effluent more than 95 percent containment-free. It can be retrofitted to replace failing conventional systems and prevent drainfield damage and costly repairs. The unit features 132-square-feet of fixed-film internal media and an effluent submersible aerator. 937/746-2727, www.consolidatedtreatment.com; Expo booth 9306.

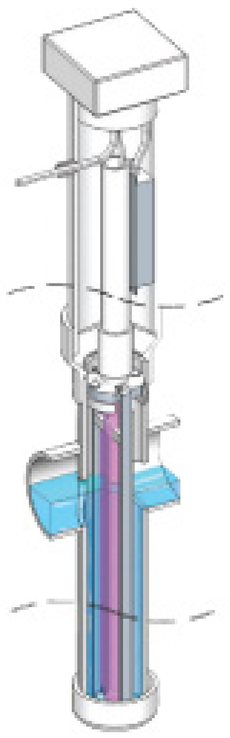


Premier Tech Environment

The Ecoflo biofilter treatment system is designed for the sanitary drainage of decentralized dwellings. Preceded by a septic tank, the chain of treatment includes a biofiltration unit and polishing field. The system promises to produce effluent with concentrations lower than 15 mg/L in TSS and BODs, and 50,000 FCU/100 mL in fecal coliforms. Combined with a 12-inch layer of native soil, the system ensures a reduction

of nutrients and pathogens to groundwater and surface water. The organic filter is engineered to capture the majority of suspended solids and other pollutants, helping to avoid clogging of soil. 800/632-6356, www.premiertechenv.com; Expo booth 4164.

Salcor Inc.

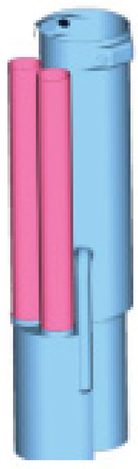


The Model 3G ultraviolet disinfection unit is designed to reduce fecal coliform bacteria levels by 99.9 percent, according to third-party NSF testing. It is rated for 4,320 gpd with TSS less than 30 mg/L, or up to 8,640 gpd if TSS and BOD are less than 10 mg/L. The unit operates on 120-volt, AC power and can be installed in less than 30 minutes. The disinfection chamber is made of UV-resistant plastic and is permanently installed below grade. When the chamber is full, the UV light operates continuously at a temperature range of 105 to 120 degrees F for optimal disinfection. 760/731-0745; Expo booth 13063.

Sim/Tech Filter Inc.

The STF-100A2 pressure filter is designed to keep mounds, sand filters and other pressurized distribution systems operating efficiently, and can also be used as pre-filtration for drip irrigation and biodiesel production. This low-head loss (0.21 psi) filter mounts on the discharge side of the effluent pump, acting as a last line of defense. A single 2-inch filter can handle flow rates up to 83.8 gpm. Larger 3- and 4-inch filters are available. The standard screen filters to 1/16 inch, while optional socks allow for filtration as fine as 100 microns (0.004 inch). 888/999-3290; www.gag-simtech.com; Expo booth 4176.

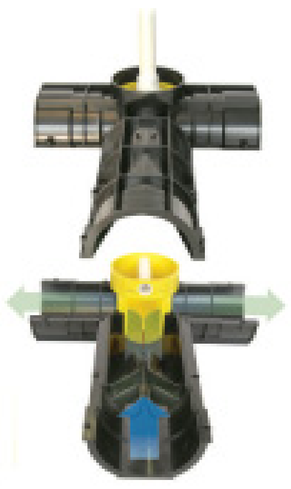
Concentric Enviro Inc.



The 12-inch diameter BioPlex pump filter is available in lengths of 48, 57 and 68 inches; other sizes are optional. Filtration is available in either 1/16 or 1/8 of an inch. The filter cartridge features a large surface area for extended service. Hanging bar handles and float trees with mount are included. Full STEP systems with risers, lids, splice boxes, float assemblies, control and alarm panels, pumps, grommets and discharge assemblies are available. 406/227-6792; Expo booth 18030.

Polylok Inc.

The Flow Controller is a combination flow divider and director that attaches directly to Schedule 40 or Schedule 35 pipe. Engineered for alternating or dividing flows between two separate fields, it can equally split the waste stream or direct all flow to the right or left. 888/765-9565, www.polylok.com; Expo booth 3115.



RotoSolutions

Roto-molded septic tank and grease interceptor lids are made of durable, lightweight polymers for easy handling and transportation. Sold as complete kits, including stainless-steel hardware components, the lids are designed to fit 18-inch or 24-inch I.D. corrugated pipe and can be used with or without the sand-filled option. 800/868-0973, www.rotosolutions.com; Expo booth 63.

Septic Services Inc.

The Flagg-Air 340 aeration unit features a fully enclosed, continuous duty, double-insulated motor with protective cap. The 1/4-hp motor runs at 3,450 rpm. The high-impact, tapered aspirator and suds restrictor are mounted on a 5/8-inch, stainless-steel shaft with corrosion-resistant counter shaft. Galvanized steel brackets with rubber vibration restrictors are designed to reduce noise. The unit has oversized and pre-lubricated bearings. It can replace most other aerators, has a 2-year limited warranty, but does not carry the NSF seal. 800/536-5564, www.septicserv.com; Expo booth 6097.

Pro-Sept

The septic system warranty program is designed for both new and existing septic systems, and promises up to $25,000 toward repair or replacement costs resulting from system malfunction. The initial 3-year plan can be renewed following a tank pump-out, visual inspection and preventive maintenance, if required. 888/354-0677, www.powderhornagency.com; Expo booth 10053.

SludgeHammer Group Ltd.

The SludgeHammer aerobic treatment generator is IAPMO certified and can be installed in either a one- or two-chamber tank. An air-pump oxygenates the effluent, circulating it through the unit and over a coiled lattice of waste-eating microbes at a rate of 25,000 gallons a day. Solids and sludge virtually disappear. 800/426-3349, www.sludgehammer.net; Expo booth 20.

February 28 - March 1, 2008
KENTUCKY EXPOSITION CENTER

Pumps

Liberty Pumps

The Omnivore 2-hp grinder pump with V-Slice Cutter Technology provides 367,000 cuts per minute for superior shredding performance in demanding sewage applications. An open volute design eliminates the cutwater – improving solids flow and reducing potential jamming. Other features include a one-piece cast iron body, quick-disconnect power cord, stainless steel impeller and dual shaft seals. Complete pre-assembled systems are available. 800/543-2550, www.libertypumps.com; Expo booth 9215.

Thompson Pump & Manufacturing Inc.

The compressor-assisted, dry-prime TSC series trash pumps are designed for flows to 1,750 gpm, heads to 172 feet and spherical solids to 3 inches. Ranging from 4 to 6 inches in size, the pumps are made for

sewage bypass or general dewatering and feature the environmentally friendly ENVIROPRIME system, designed to prevent fluids, such as sewage and containments, from entering the venturi and spilling on the ground. The weather-resistant, sound-attenuated Silent Knight canopy enables the pumps to operate at 70 dBa or lower for use in residential areas or near schools or hospitals. 800/767-7310, www.thompsonpump.com; Expo booth 8025.

Orenco Systems Inc.

The ProSTEP pumping package is designed to pump effluent from a septic tank, to a drainfield, secondary treatment or effluent sewer. The package includes the PVU Pump Vault, a PF high-head effluent pump, Biotube effluent filter, float switches, control panel and discharge assembly. The vault can accommodate one or two pumps. Options include electromechanical or programmable logic control panels, telemetry, 50-gpm pumps, simplex or duplex pumping systems and various float arrangements and discharge components. 800/343-9843, www.orenco.com; Expo booth 6115.

Monitoring Systems

Moro USA East

The Accu-Level liquid waste indicator has no internal tank components, so there's nothing to clog. Factor calibrated, the indicator measures from 0-100 percent of tank volume in gallons, and features an additional channel for measuring two-compartment tanks, when used with the complementary pickup unit. 800/383-6304, www.morousaeast.com; Expo booth 6101.

Septronics

TheTS150 and TM2 liquid level alarms are designed for applications that require two inputs for dual monitoring. Alarm applications include sump and sewage, filter and

pump, high level and low level, or one alarm for two units, as in duplex housing. Standard features include automatic alarm reset, green power-on LED, red LED and yellow LED alarms, horn silence, test alarm, and touch-pad operation. 888/565.8908, www.septronicsinc.com; Expo booth 59.

Educational, Marketing

Leaders Resource Network

Services include training and educational workshops, business planning, new business development, customer retention, research survey and collections services, consulting, coaching and peer-to-peer advising along with product and services marketing, strategic plans, brand identity, Web site development, brochures, direct mail, newsletters and more. 574/276-0217, www.leadersresourcenetwork.com; Expo booth 20009.

Cape Cod Biochemical Co.

What Everyone Should Know About Septic Tank Systems is a condensed version of the Cape Cod Biochemical Co.'s industry-standard brochure that explains – in easily understood terms – how proper septic tank operation is upset by many of the home-care products used every day. 800/343-8007, www.septiconline.com; Expo booth 149.

Stamp Works

Magnets of various sizes and thickness can be made in the shape of pump trucks, vans, roll-off trucks, portable restrooms and more – each featuring company name, phone number a brief description of services offered. 800/758-2743; Expo booth 51.

Data Systems

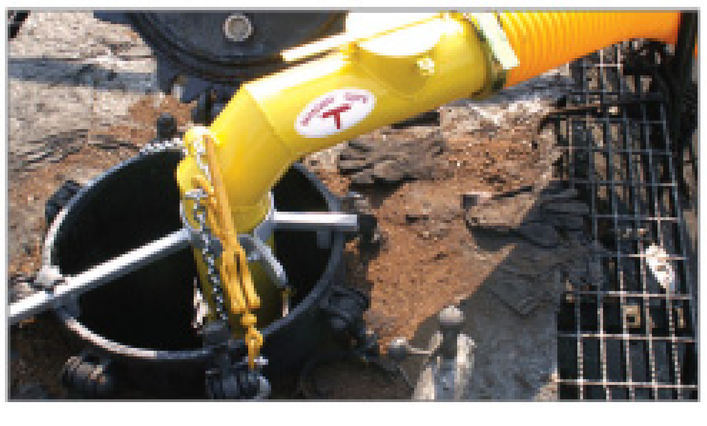
Famhost

The Linkwriter wireless pen enables drivers to transmit paperwork from the jobsite to the office in seconds. Using a digital pen and regular paper printed with a special background, a tiny camera registers the pen's movement. When the user checks "send," data is transmitted through a Bluetooth-enabled phone, wireless laptop, tablet PC or desktop for viewing. Data is stored as both an image and text, enabling inventory to be updated in real-time. 800/658-1676, www.linkwriter.com; Expo booth 4140.

Safety Devices

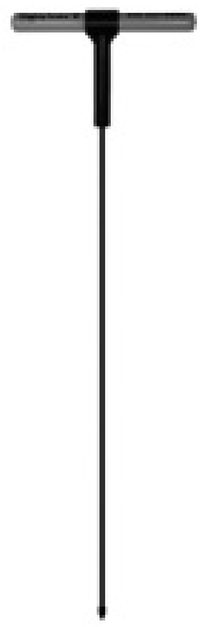
Ace Supply Co.

The Kwikk-Lokk Manway-SAFE-T vacuum interrupter provides vacuum truck operators with an extra margin of safety when working with high-suction hoses. Designed to quickly break vacuum in case of an emergency, the device is available with optional Manhole Manager. 814/899-3644; www.kwikk-lokk.com; Expo booth 7146.



T&T Tools Inc.

The insulated Mighty Probe provides protection against electrical shocks (up to 50,000 volts). The optional Slide Adapter enables the probe to be driven into hard ground. The probes feature a steel shaft with replaceable tip and are available in lengths from 3 to 6 feet in 6-inch increments. 800/521-6893, www.tandttools.com; Expo booth 3099.



Truck Accessories

Cougar Industries Inc.

Completely sealed against dust and water, the Model NHD-110 hydraulic vibrator promotes the flow of material out of the pump truck, ensuring that material is not hauled back to the jobsite. The unit also helps eliminate premature wear and tear on equipment, specifically hydraulic cylinders, brakes, clutch and transmission. Operated from inside the cab, it also reduces the risk of lost time and a potential workman's compensation claim. 800/262-2106, www.cougarindustries.com; Expo booth 3051.

Del Zotto Products

The Hydra-Brute unloader is designed for mounting on single, tandem or tri-axle trucks with bed lengths from 16 to 24 feet. Available in either 14,000- or 20,000-pound capacity, features include wood or "Rumber" decking, double-action hydraulic outriggers with safety load locks, monorail boom and protected DOT-approved lighting. The unit also has hydraulic planetary-powered in-and-out drive with auto shutoff, 20-inch, 3-way remote control, 3-spool multi-pak solenoid valve and hydraulic oil reservoir, including oil level gauge, suction strainer and inline filter. Options include side toolbox, slide rails with ratchets, swing-out design for up to 10-foot wide loads, pintle hitch, electric and air hookups. 218/384-3066; www.delzottoproducts.com; Expo booths 5025, 6025.

SVE Portable Roadway Systems Inc.

The TrakMats ground cover system is engineered to move work vehicles across lawns, golf courses, wet ground, and other soft surfaces without getting stuck or damaging the surface. Made from 100 percent recycled HD polyethylene plastic, the mat's light color stays cooler in summer. Black mats are available when grass protection is not a concern. Mats are manufactured with power cylinders for traction and hand cut-out for easy handling. A variety of sizes are available. 800-762-8267, www.trakmats.com; Expo booth 3031.

Chemicals

Lenzyme Inc.

Septic Scrub is a bacterial formulation that attacks biomat buildup in drainfields. The product consists of sodium carbonate peroxyhydrate and a blend of bacteria designed to re-establish lost bacteria. The blended bacteria also help to break down paper fibers, grease, pectins and other organic substances that may be left in the field. The material is applied to laterals by pouring the powder in and adding water to flush it into the field lines. The material reacts with the biomat and sulfides that build up on the top of the soil bed. This mild reaction causes the biomat to break apart and restore percolation to the soil bed. 800/223-3083; Expo booth 6151.

EXPLORE Louisville 2008

MAKE YOUR MOVE

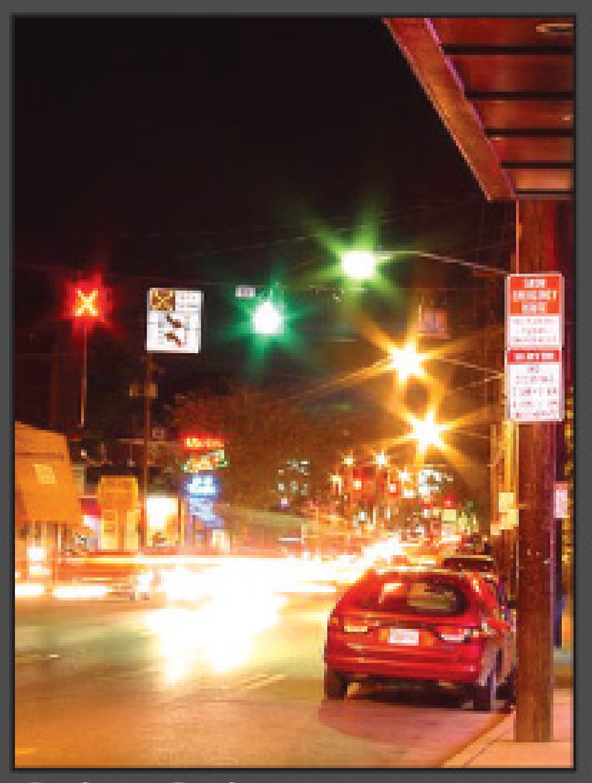
Restaurant Row – A Diner's Delight On Bardstown Road

Just minutes from downtown Louisville, Bardstown Road has been known as "restaurant row." Since the 1980s, the street has been home to an unusual number of eclectic eateries, from four-star fine dining with locally grown ingredients to casual cafes offering world cuisine.

Bardstown Road includes several of the unique, locally owned restaurants called the Louisville Originals. Among the popular stops on "restaurant row" are Tumbleweed Southwest Grille for great steaks, ribs and award-winning Mexican fare; and Cumberland Brews, the city's only true brew pub.

Empress of China features Mandarin, Szechuan, and Hunan dishes. Diners can enjoy live jazz with dinner at Jack Fry's, an upscale American bistro. For sushi, visitors favor Sapporo Japanese Grill & Sushi.

For more world cuisine, there is Seviche, a Latin restaurant; and Asiatique, with delicacies from the Pacific Rim. Many bistros serve fresh American cuisine, and bar-and-grill stops offer regional food. Dining isn't the only attraction on Bardstown: There are galleries, antique stores and boutiques, as well as night life, with a comedy club, foreign films and nightclubs with live music and dancing.



Bardstown Road

DELICACY: Mint Julep

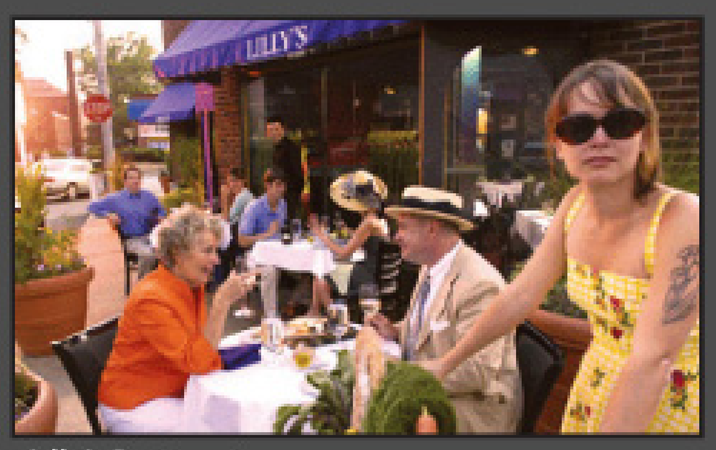
The mint julep is as familiar to Louisville as the Kentucky Derby. This popular bourbon drink is a local tradition, especially at the Derby. It is made with smooth, velvety bourbon, fresh mint leaves, sugar, a dash of water, and crushed ice. In true Southern style, mint juleps are often served ready to sip in frosted silver goblets.

Mint Julep

DINING: Lilly's

A culinary star on Bardstown Road is Lilly's Restaurant, which a reviewer called "the most influential and celebrated Louisville restaurant of the past decade." Lilly's celebrates regional produce – the menu states, "God Bless Our Local Farmers."

Entrees include French-inspired items that use traditional Kentucky ingredients. The menu changes seasonally with offerings such as Kentucky rib pork chop and sweet potato prosciutto hash on fall greens with apple brandy sauce; seared sea scallops and hazelnut acorn squash gratin with sautéed spinach, and duck two ways – seared duck breast with homemade duck sausage on persimmon sage bread pudding. Lilly's has a large wine and bourbon collection and decadent desserts. Visit www.lillyslapeche.com.



Lilly's Restaurant

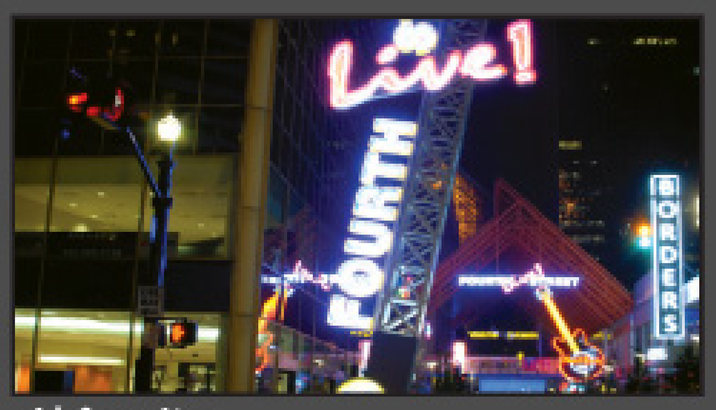
SHOPPING: Frankfort Avenue and F.A.T. Trolley

This historic Frankfort Avenue neighborhood offers upscale consignment shops, vintage clothing, outdoor gear, imported crafts, home furnishings, boutiques, books and antiques, along with art studios and galleries. Coffee shops and wine and bourbon bars provide refreshments. The street also includes more Louisville Originals restaurants.

The F.A.T. Friday Trolley takes visitors to the avenue on the last Friday of each month, running from designated stops. Expo visitors can ride the trolley on Friday, Feb. 29. Visit www.frankfortave.com and www.fatfridayhop.org

ARTS & ENTERTAINMENT: Fourth Street Live

A top Louisville attraction, the Fourth Street Live entertainment district waits a short walk from downtown hotels. It includes national and regional restaurants, stores, nightclubs and live music in an open-air pavilion. Attractions include Lucky Strikes Lanes (an upscale bowling alley), Howl At the Moon (a sing-a-long dueling piano bar), Sully's Restaurant & Saloon (a cozy Irish-inspired pub), Saddle Ridge (rock-n-roll and country music), J. Gumbo's (Cajun food and brews) and Maker's Mark Bourbon House & Lounge (Kentucky bourbon and fine cuisine. Visit www.4thstlive.com.



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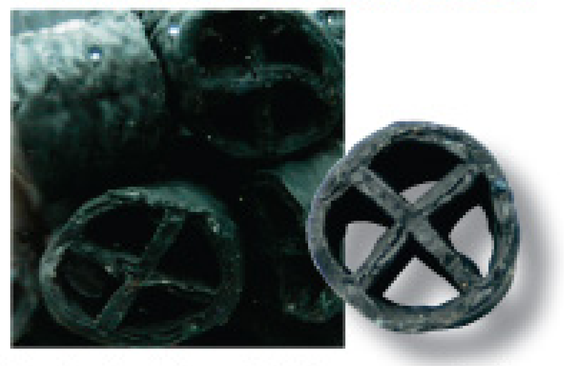

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Robert Kolbusz of Frontier Contracting helps George Miles unload a Delta DF75 treatment tank for installation on a lot in Lake Coeur d'Alene, Idaho. (Photos courtesy George Miles, Cathy Miles and Sean Moore)

No Shortcuts

Advanced Wastewater Engineering specializes in sound solutions for challenging sites in the varied soils of the Idaho panhandle

By Doug Day

Advanced Wastewater Engineering, Athol, Idaho

OWNER: George Miles

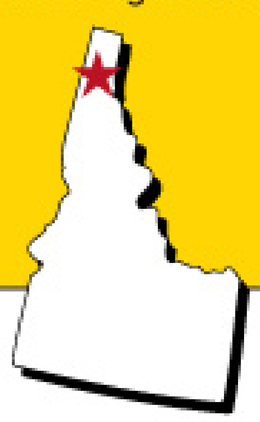
YEARS IN BUSINESS: 3

EMPLOYEES: 2

SPECIALTIES: Septic system engineering and installation

AFFILIATIONS: NOWRA, North Idaho Building Contractors Association

WEB SITE: www.adwwengineering.com



Challenging jobs are an everyday reality for George Miles, owner of Advanced Wastewater Engineering in Athol, Idaho.

"I deal with difficult sites," says Miles, a mechanical engineering graduate of San Francisco State University and a licensed civil engineer. "We go in and figure out ways to make them buildable by adding things such as interceptor drains to mitigate groundwater. These are lots people gave up on years ago."

Miles doesn't take shortcuts just to get a system installed. "Normally, my customers come to me because they want to do the right thing," he says. Sitting on the western side of the Rocky Mountains, Idaho's northern panhandle has a huge variety of soil conditions, from pure sand and gravel all the way to clay and rock. The valleys have high groundwater with heavily fractured rock.

Around Athol, the sand and gravel soil lies over the sole source of drinking water for the region's 450,000 people. According to the State Dept. of Environmental Quality, water moves quickly through the ground — up to 50 feet per day. That's as far as average groundwater moves in an entire year (about 1.5 inches a day).

"You put effluent into the ground and it's going to run right through," Miles says. "Every septic system over this aquifer should be as close to the surface as possible with whatever loamy soil you have so you get some filtration."

After many years in California, Miles had been doing structural engineering in North Idaho when he decided to open his own business three years ago. He quickly found a niche that fit his years of training: There were no companies specializing in onsite systems in his part of Idaho. "Customers had to go to one of the big firms, and then they were put on the back burner as a fill-in job," Miles says.

"I deal with difficult sites. We go in and figure out ways to make them buildable by adding things such as interceptor drains to mitigate groundwater. These are lots people gave up on years ago."

— George Miles

Deploying technology

Today's advanced systems enable Miles to make many lots buildable. He does everything from standard systems to drip irrigation, mounds, capping fill, pretreatment, and pressure distribution. "The drip system is ideal for areas of high groundwater," he says. "You pretreat the effluent and then put it into a drip system."

Advanced Wastewater Engineering also does heavy work related

Matt Watts installs a dosed cap and fill drainfield with Delta DF60 treatment unit at Wolf Lodge in Coeur d'Alene, Idaho.

to construction — road work, excavation and grading, underground utilities, water and sewer extensions, and site evaluation. Many clients are subdivision developers. Miles determines how many houses can be placed in a development and whether to use individual or cluster systems. Such projects account for about half his work. Single sites make up the rest.

He and one employee, plus his secretary/wife, Cathy, do one to three community systems a year, usually ranging from 12 to 25 homes. "We're just finishing a 16-home community septic system in Kingston that took four men 3 1/2 weeks to build," he says.

The company is also working on a development with 30 lots that will have individual or paired systems with two homes on one leachfield. He just received approval for a community system for 14 homes along the St. Joe River.

The seven to 12 individual systems he does every year are mainly complex designs with pressure distribution and pretreatment. Miles says almost anyone can design a system in Idaho unless it is specifically required to be engineered. The state is not as strict as many others, but Miles says it is becoming more so, especially with drip systems.

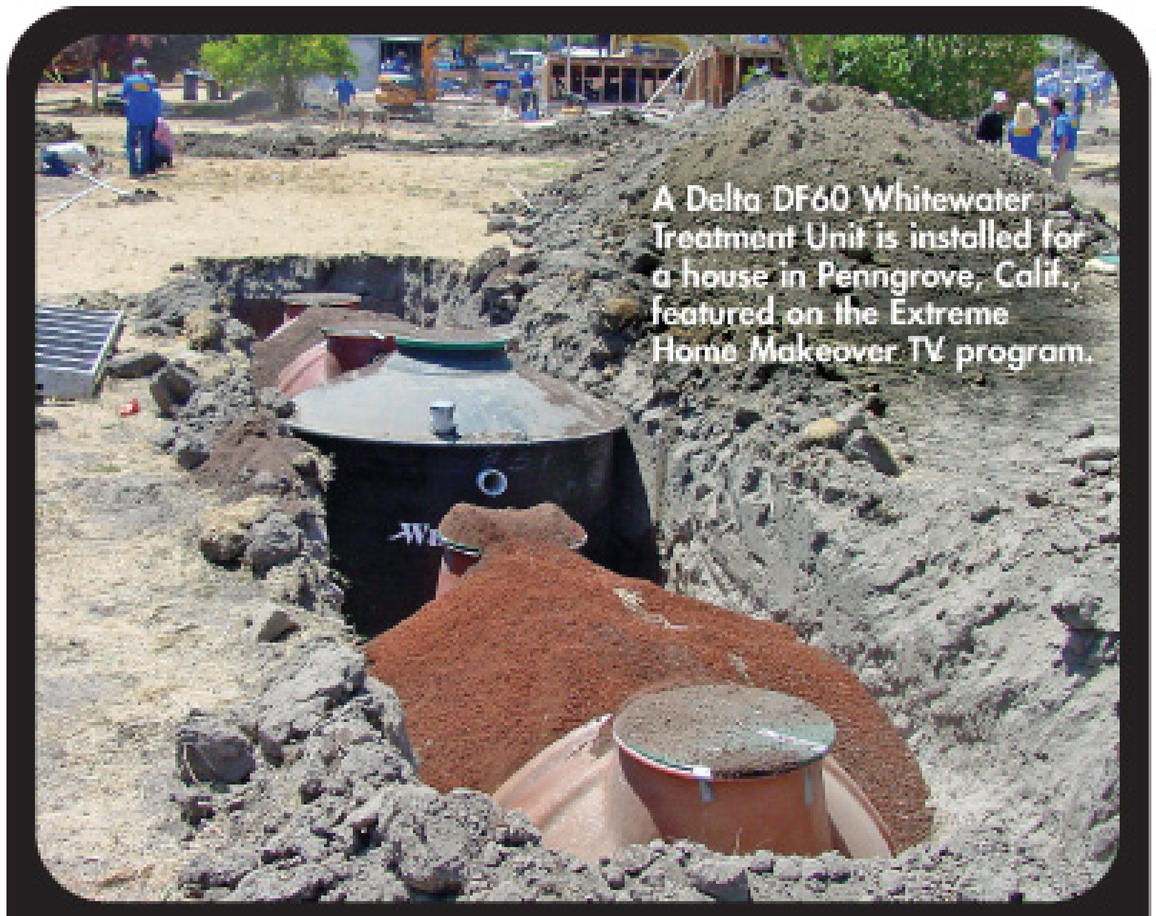
He has had problems with only one of his drip systems. In that case, Miles found the flow from the three-bedroom home was 600 to 700 gpd — nearly twice the design flow. He couldn't account for the high flow until he learned the homeowner had installed a water softener that was flushing two or three times a day. Once the softener was disconnected, the flow settled down to about 400 gpd, and the homeowner decided to leave it that way.

Miles' most challenging job was a winery in California that used a huge amount of water for washing out wine barrels. "It needed 4,000 to 5,000 linear feet for the primary drainage area, and we had to work around the vineyard," he says.

Old West mentality

Idaho values independence, but Miles says that attitude has to change when it comes to onsite systems, and the state realizes that. He recently served on a state committee looking at solutions. Miles expects change to be difficult — people will not like anything that adds to the cost of building or owning a home.

While other states have done away with systems using serial relief lines, for instance, Miles says they are still used in Idaho. "When I bring that up, everybody says we've been doing it for 20 years and it



Going to Extremes

George Miles, owner of Advanced Wastewater Engineering, designed about 40 septic systems a year when he worked for Dimensions 4 Engineering Inc. in California in 2004. His most visible work was for a Delta Whitewater distributor who needed a drip system for a home renovation by the ABC television series Extreme Home Makeover.

The October 2004 episode featured 12-year-old Shelby Pope and her family. Due to Shelby's rare sensitivity to sunlight, the family needed a home that limited entry of sunlight yet didn't feel like a prison.

Extreme Home Makeover built a modern house that gave Shelby more freedom inside and outside. The home had tinted windows, an outdoor pool fully shaded by overhead canopies, shaded decks and entryway, and a fully landscaped yard with plenty of shade trees. The family also got a car with specially tinted windows.

The distributor called Miles for help in designing the septic system. "We ended up designing a drip system with a Delta Whitewater unit," Miles says. "It took a couple of days to do the design and get it approved. We put in 900 square feet of drip field in about 3 1/2 days, with five guys."

The site wasn't much of a challenge. "It was an area with high groundwater with no clay content," Miles says. "We put in an interceptor drain. It went really well. It was a good, fun job. It was a typical job that had to get done in a hurry."

works fine. People don't want to hear why they shouldn't do it. But you don't have the right to impact somebody downhill."

While the state's Technical Guidance Manual lays out the design parameters, that isn't enough, according to Miles. "If you actually try to use that, it won't work right," he says. That's because every system is different, and successful operation only comes from the proper installation of a well-designed system. "So a lot of people come to me and say, 'fix what's broken.'"

One of those was a friend putting in a drainfield with 1/4-inch holes spaced 2 feet on center along three 100-foot laterals hooked up to one manifold. The friend wanted to know what size pump he needed. "I told him he'd need a bigger pump than he wanted to buy," Miles says. "We ended up re-engineering the system."

There is an inherent problem with what he calls plug-and-play design programs because every system has individual nuances. "You have to take into account all the friction loss and whether you're using PVC pipe or high density polyethylene (HDPE) pipe. A lot of people don't know how to do that calculation."

Even if the design is right, the key is still in the installation. With mounds, for example, "You have to avoid packing down the sand, so you can't drive on it with equipment," Miles says. "On the other hand, when you put down the sand, it's fluffy, so you have to wet it to help it settle properly."

While inspecting a mound system from another installer, he saw what happens when a professional fails to do that. "When we did the test of the laterals, I watched the gravel bed start sinking," he says. "It sank down about 2 1/2 inches. It was the funniest thing I'd ever seen in my life."

The installer was confused and asked why it happened. Miles answered the question with one of his own: "Because you didn't build it right?"

Bad systems are the result of poor design, poor installation, and poor regulation, Miles observes. "You look at what people do and it's like, 'You don't understand this, do you? You really don't get this concept.'"

George Miles is shown next to pretreatment unit on a waterfront lot.

"When you leave a site, it should be clean. If it looks like a mess, it is a mess. Referral work is where most of the business comes from, and if your clients aren't happy with the work, you aren't going to be referred, no matter how cheap you do it, even if you're the only guy in town."

— George Miles

Regulation: Not a bad thing

Miles supports stricter licensing for onsite installers. At present, getting a license is too easy, he says. "You have to watch a video before taking the test," he notes. "There should be a more practical way to get these licenses." He supports mandatory classes that show good and bad examples, and a requirement for continuing education.

Lending institutions, he says, are having a positive impact by requiring septic tanks to be pumped and inspected before the sale of a property. That at least forces homeowners to learn something about their septic systems.

As in the rest of the country, uneducated consumers are a problem. An example is a neighbor who called Miles one night because his system was backing up. Miles dug up the tank and pulled off the lid. "It looked like somebody had taken a refrigerator, piled the food up, put a tarp over it, and let it sit for six months," he recalls. "All this broken-down food was floating on the top of the tank."

Miles had a hunch that proved correct: His neighbor had cleaned the refrigerator and put everything through the garbage disposal. That won't happen anymore.

Do it right

While he concentrates on difficult sites, Miles has his focus on operating a professional organization. He hires several sub-contractors, but he is picky about who he uses. His go-to man is Sean Moore of Moore Electrical & Excavation. "We can do an entire drip system, just the two of us, in three days," Miles says.

From Moore, he gets what he demands: high quality and professionalism. "When you leave a site, it should be clean," he says. "If it looks like a mess, it is a mess. Referral work is where most of the business comes from, and if your clients aren't happy with the work, you aren't going to be referred, no matter how cheap you do it, even if you're the only guy in town. If you do a shoddy job, sooner or later somebody's going to come in and take your work away."

Miles' first three years have gone well. "I have a lot of happy clients, though a couple of people are unhappy because I can't get a septic system on their lot," he says. While he could rig a system to please those customers, Miles wouldn't be happy with the results, or with himself.

By refusing shortcuts, Miles is steadily building a bank of satisfied customers — and a solid foundation for his business. ■

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Clearing the FOG

Installers and designers share ideas on dealing with grease in an onsite system treating restaurant kitchen waste

Question:

I am a septic system designer in New Hampshire. We are designing a restaurant system and are looking for ideas on cooling the kitchen waste stream either prior to or within the grease trap, which has a 6,500-gallon capacity. Thank you for your ideas.

Answers:

I read that you should feel the effluent from the grease trap during peak flow, and if it is more than lukewarm, you should add another tank in series.

What about installing a closed-loop cooler in the trap? What I mean is to run several coils of pipe on the floor of the trap. Then run the pipe up through a fan on the surface to remove the heat.

I am also a designer in Vermont and New Hampshire, and have had good results from follow-up testing using a 2- to 3-day retention time in the grease trap. I isolate the kitchen flows from other building flows and use that volume in the calculation. I like to use concrete as a tank material when access is good and, if space is available, use two tanks in series.

If you can get a precaster to make it, try a meander tank. The additional surface area and cooling properties will help a lot. I have not had much success using inside grease-removal technology. Grease issues were easy when we all cooked with lard. With the refined oils, high dishwasher temperatures and detergents that clean so easily, the only reliable solution is time and temperature, which means as much exterior tankage as you can fit onsite.

Here, only the kitchen wastewater (standard safe waste system) goes into the grease trap. The grease trap waste line gets tied into the sanitary waste line. A 6,500-gallon tank should definitely allow sufficient time for the grease to solidify and separate as it does here, and the average fast-food restaurant may have a 1,500-gallon grease trap.

Larger restaurants may have two in sequence such as a 1,000/1,000 or 1,500/1,500, if needed, to allow for cooling and separation. Code-required pumping is performed and manifested every 30 to 120 days, depending on the size of the restaurant and the flow volume. Fryer oil doesn't go into the grease traps. It gets put into 55-gallon barrels outside to be used for processing or biodiesel.

We have not worked on any large restaurants, but we have prepared designs for fast-food places and for banquet halls and churches with kitchens. I know it is important to get the kitchen wastes cool enough for the grease to congeal, and it doesn't cool very well in below-ground tanks. The ground makes a pretty good insulation.

We advise our clients not to put fryer oil down the drain. Newer restaurants have methods of filtering it and reusing it several times. Then they store and haul away the spent oil. But, you still will have a lot of high-strength waste with high FOG, particularly if you have a commercial pass-through dishwasher. It is important first to get the best handle you can on the flow numbers.

We separate the kitchen waste from the cold-water waste stream from the bathrooms. Then we provide several days of residence time in two or more septic tanks in series for just the kitchen wastes, and put a fine-slot effluent filter on the last tank.

The effluent from these tanks is then discharged into the building sewer coming from the bathrooms, which will be predominantly cold water. An additional two or more days of residence time is provided in these tanks for the now-combined flow. We have also installed an effluent filter on the outlet to these tanks, before the effluent goes to a sand filter or soil absorption system.

In another case, we used a recirculating rock filter, along with lots of tankage, to cool and treat the wastewater before a soil absorption system. Both designs seemed to have performed well. ■

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January 2008

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The combined talents of a designer and installer enable a developer to build a new strip mall on prime real estate in central Minnesota

By Scottie Dayton

An architect designed a strip mall in St. Augusta, Minn., but when the developers presented the preliminary plans to installer Steve Voigt of Steve's Excavating Inc. in St. Cloud, he spotted a serious flaw. Only 2,500 square feet was allotted for an onsite system that would treat public restrooms, eight businesses, and a 125-seat restaurant.

Voigt recommended designer Tim Haeg of Watab Inc. in Saint Joseph to save the project. Insufficient room for any onsite system forced the developers to eliminate three stores to create the necessary space. Haeg faced continued site constraints, an artificially lowered water table, only one available drainfield area with proper soils, and the knowledge that if one more store was removed, the developers couldn't afford to build the Delux Business Center.

Haeg's solution involved a grease interceptor, septic tank, flow equalization tank, fixed activated sludge treatment (FAST) unit, dosing tank, and a three-zone drainfield. The system, the largest of its kind in Stearns County, has set precedents for other development projects in the area.

Site conditions

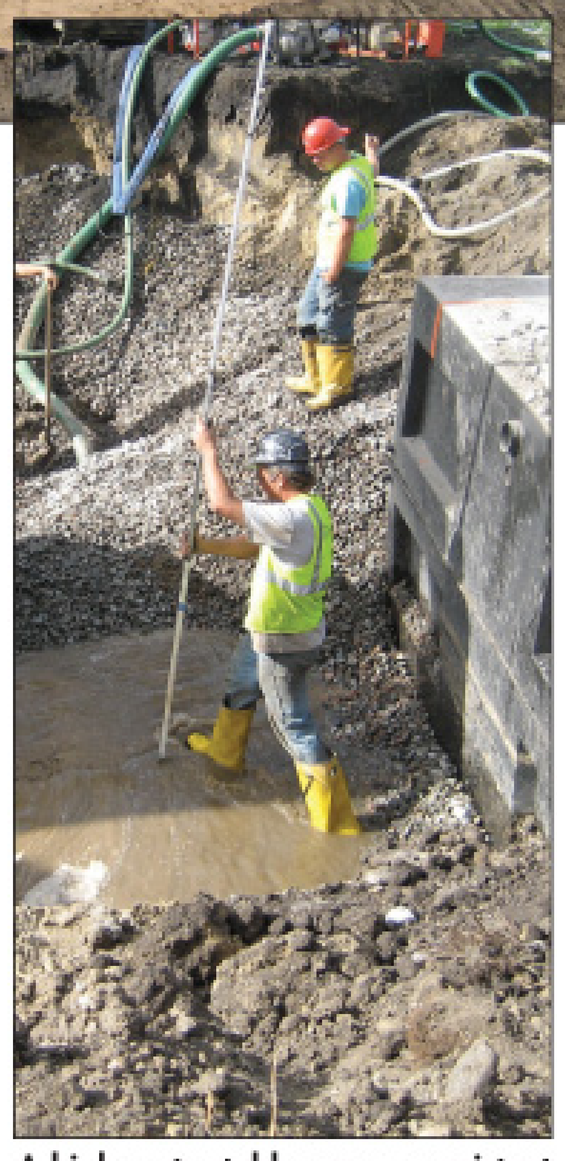
In 1975, a 600-acre area in St. Augusta, a suburb south of St. Cloud, was drained to lower the water table. Later, some commercial lots were established with a filling station and mini-mart at a busy highway intersection. Soils are sandy with a percolation rate of less than one minute per inch. Agricultural fields surround the lot. The rapidly developing area has huge business growth potential.

The 4,662-square-foot drainfield contains 468 Quick4 Standard chambers from Infiltrator Systems Inc., set 65 inches on center in three 1,872-square-foot zones. (Photos courtesy of Tim Haeg, Watab Inc.)

System components

Tim and Greg Haeg and Don Fischer designed the system to handle 5,617 gpd. They oversized it by 25 percent as a safety factor. "The drainfield's three zones allow for a rest and recovery rotation, which probably won't be necessary, since the FAST unit should prevent a biomat from developing," says Tim Haeg.

Although the ATU made it possible to reduce the size of the drainfield, the designers did not do so because local regulations have



A high water table was a consistent challenge on the site.

System Profile

Location:	St. Augusta, Minn.
Facility served:	Delux Business Center
Designers:	Tim and Greg Haeg and Don Fischer, Watab Inc., Saint Joseph, Minn.
Installer:	Steve Voigt, Steve's Excavating Inc., St. Cloud, Minn.
Site conditions:	Sandy soils, percolation rate of less than one minute per inch, water table within 60 inches of grade
Type of system:	9.0 HighStrength FAST aerobic treatment unit, Bio-Microbics Inc., Shawnee, Kan.; Quick4 Standard chamber drainfield, Infiltrator Systems Inc., Old Saybrook, Conn.
Hydraulic capacity:	5,617 gpd

An operator uses a 30-ton Terex crane from Landwehr Construction to set the bottom half of the 12- by 20-foot pretreatment tank with the FAST treatment system in place.

no performance-based reduction credit. Furthermore, with no room for another absorption bed, they couldn't afford a system failure. The system's major components are:

- 5,000-gallon, single-compartment concrete grease interceptor tank. All tanks made by Wieser Concrete Products Inc., Maiden Rock, Wis.
- 6,100-gallon, single-compartment septic tank with dual inlets.
- PL-525 effluent filter from Polylok Inc., Wallingford, Conn.
- 7,700-gallon, single-compartment flow equalization tank with two LE40, 4/10-hp pumps from Liberty Pumps, Bergen, N.Y.
- 9,000-gallon pretreatment tank with 9.0 HighStrength FAST aerobic treatment unit from Bio-Microbics Inc., Shawnee, Kan.
- 2,000-gallon dosing tank with 36-inch square hatches and three LE100, 1-hp, high-head pumps from Liberty Pumps.
- 468 Quick4 Standard chambers from Infiltrator Systems Inc., Old Saybrook, Conn., set 65 inches on center in three, 1,872-square-foot zones.
- 24 valve boxes
- Custom control panel with telemetry from Alderon Industries Inc., Hawley, Minn.

Granite Water Works of Waite Park, Minn., supplied all components except the tanks.

System operation

Waste from the kitchens flows through a 4-inch Schedule 40 PVC pipe to the grease interceptor. Sewage from the stores and three public restrooms flows through a 6-inch Schedule 40 PVC pipe to the septic tank. A 4-inch PVC pipe connects the grease interceptor to the septic tank.

Effluent gravity-flows through a 4-inch line to the equalization tank, where pumps send 400 gallons per cycle to the FAST unit through two 2-inch pipes. The pumps run eight minutes every four hours (Haeg is adjusting the cycles as hydraulic flows stabilize).

The designers chose the FAST system because FOG was an issue. The unit is an economical way to reduce BOD, and it requires little maintenance. Since the site is not required to achieve a specific nitrogen standard, effluent from the ATU gravity-flows through a 4-inch pipe to the dosing tank.

Pumps send 400 gallons every four hours to the drainfield. "Using three pumps instead of two allowed us to reduce their size and the gallons-per-minute requirements," says Tim Haeg. "We also avoided splitter valves, because they can freeze in Minnesota." A backfall of 40 inches drains liquid back to the dosing tank when the pumps stop.

Each pump's 2-inch supply line connects to a manifold feeding one zone of four trenches. A 24-inch dual wall pipe with a shutoff valve on both ends runs down the center of every trench. The valves enable Haeg to program rest and recovery cycles, and use a much smaller area of the drainfield to ward off freezing in winter. The lateral also has a flush valve at each end.

"We're using pressure distribution because the drainfield is elevated above grade, and to achieve even hydraulic loading across the entire absorption bed," says Haeg. "Most important, we use pressure distribution when working with effluent that won't necessarily develop a biomat." Haeg is switching zones quarterly until the mall has operated long enough to establish its water use habits.

Installation

Installation began with the drainfield as the tanks were manufactured. "Working with the site was easier because the water table was lowered, but it was still challenging," says Haeg. "We had to keep in mind that a beaver damming the drainage ditch could raise the water back to its original height."

Unable to guarantee that the water table would remain at 5 feet due to dependence on the ditch, Haeg specified soil corrections to make the site more suitable. Voigt and his 15-man crew removed 4 feet of organic topsoil from the 4,662-square-foot drainfield, replacing it with sand to maintain a consistent soil texture between the distribution media and water table.

An additional 3 feet of sand was placed above grade to create a mound system. Importing the 4,500 cubic yards of material took three-and-a-half days using nine dump trucks hauling 420 loads.

"The drainfield's three zones allow for a rest and recovery rotation, which probably won't be necessary, since the FAST unit should prevent a biomat from developing.

Tim Haeg

Voigt used a low-ground-pressure (LGP) John Deere bulldozer and a Caterpillar bulldozer to push the sand in place. A laser mounted on the latter provided the grade levels.

Haeg specified chambers for the distribution method because they were clean and light enough for the men to carry and assemble on the flat prepared site. "They snapped together, enabling us to install them in one day," says Voigt. The drainfield was backfilled with more sand and covered with the removed topsoil.

Excavating the tank holes was the biggest challenge. The pit for the pretreatment tank was 1 foot below the water table, but the hole for the septic tank was 4 feet below it. Voigt rigged one 4-inch and three 2-inch trash pumps to hold the water at bay. He imported 100 cubic yards of sewer rock to create 12-inch deep stable bases as the pits were dewatered. "We couldn't afford to have any settling because everything was grade minimum," says Voigt.

The grease interceptor tank and dosing tank were delivered and set by Wieser's boom truck. Landwehr Construction of St. Cloud, Minn., set the remaining tanks using a 30-


Manholes were placed over the valves at the centers of the trenches.

> "Working with the site was easier because the water table was lowered, but it was still challenging. We had to keep in mind that a beaver damming the drainage ditch could raise the water back to its original height."
>
> Tim Haeg

ton Terex crane. Property lines and the drainfield restricted the crane's movement, and the weight of the tanks limited its reach. Consequently, the tanks were installed in reverse order, allowing the crane more room to move.

"We set the FAST tank first, so the crane could come close enough to the pit and not tip over," says Voigt. "Setting the deepest tank first would have parked the machine on top of the septic tank." The bottom half of the pretreatment tank with FAST unit weighed 29,000 pounds.

The tops of tanks having less than 3 feet of cover were insulated with two layers of 2-inch foam sheets, each 4-by-8 feet. The 4-inch kitchen waste pipes received the same treatment to prevent liquid from freezing as it passed beneath the plowed parking lot in winter.

"The width of the insulation prevents lateral movement of the frost toward the pipe," says Voigt. "We also staggered the seams when installing the second layer of foam to create a frost break." The three shallow drainfield dosing lines were insulated, too.

Maintenance

Watab Inc. is responsible for maintaining the system. Haeg will inspect the grease interceptor monthly until flows are established, then quarterly thereafter. He also checks the drainfield for ponding and adjusts the pump and control panel settings to match the facility's actual flow. Although not required to sample the effluent in the dosing tank, Haeg does so quarterly to guarantee that the FAST system is producing the required treatment. Once a long-term pattern is established, sampling can occur annually. ■

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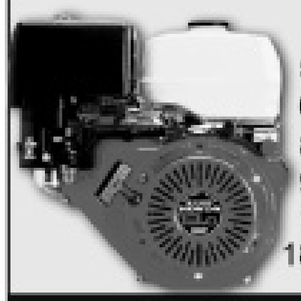

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ASSOCIATION news

By Scottie Dayton

January 2008

Friend of a Friend

The Kentucky Onsite Wastewater Association made sure its membership had the resources, experience, and professionalism needed to lead the state's growing acceptance of onsite systems. Recently, KOWA teamed with the Kentucky Rural Wastewater Association to increase KOWA's visibility to legislators, utilities and communities. KOWA will choose the issues, education and direction the organization wants to take, and the KRWA team will do the legwork.

The association newsletter tells how the organization helped a family whose drainfield was overflowing. The parents have five of their own children and four adopted children and were hosting a foreign exchange student. The onsite system had a 1,000-gallon septic tank with 400 feet of laterals.

Todd LaFollett, registered sanitarian with the Oldham County Health Department, consulted with regulator Wyatt Moody on a repair plan, then on resources, materials, and labor. Greg Ritchie, the KOWA president, said that the association training center had leftover chambers from Advanced Drainage Systems Inc. Installer Greg Thompson, who lived 90 minutes away from the jobsite, learned about the situation and offered his labor and equipment free of charge.

Corporate Membership

The Ohio Onsite Wastewater Association has added corporate memberships for companies that include one key contact person. For $120, companies receive OOWA and NOWRA benefits, and may add employees as associate members for $50 each. Associate members receive only OOWA benefits. Individual memberships at $95 carry OOWA and NOWRA benefits. Call 866/843-4429 or visit www.ohioonsite.org.

OOWA is offering the NEHA Certified Installer of Onsite Wastewater Treatment Systems basic and advanced level exams at its conference on Jan. 15 in Columbus. To take the exams, installers must complete an application form and be approved by NEHA. Download the form at www.neha.org/onsite or call Heidi Shaw at 303/756-9090, ext: 339.

CALENDAR OF EVENTS

Jan. 7-8

Wisconsin Precast Concrete Association Winter Convention, Holiday Inn & Suites, Madison. Call 608/256-7701.

Jan 8-10

Michigan Septic Tank Association Onsite Wastewater Conference. Call 989/773-6985, ext: 258 or visit www.msta.biz.

Jan. 15-17

Ohio Onsite Wastewater Association Conference and Trade Show, Midwest Hotel and Conference Center, Columbus. Call 866/843-4429 or visit www.ohioonsite.org.

Jan. 16-17

Soil Science Society of North Carolina Annual Meeting, Raleigh. Call 919/380-1202 or visit www.carolinaonsite.org.

Jan. 21-22

Pennsylvania Septage Management Association Conference, Holiday Inn, Grantville. Call Jackie at 610/350-0590, press #3 or visit http://psma.net.

Jan. 21-23

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

Jan. 22-23

Iowa Onsite Waste Water Association Conference, Des Moines Airport Holiday Inn. Call 515/225-1051 or visit www.iowwa.com.

Jan. 25-26

Washington On-Site Sewage Association Conference, Vancouver Hilton, Vancouver. Call 253/297-2837 or visit www.wossa.org.

Jan. 25-27

Wisconsin Liquid Waste Carriers Association Winter Convention, Chula Vista Resort, Wisconsin Dells, Wis. Call 608/255-2770 or visit www.wlwca.com.

Jan. 28-30

North Carolina Septic Tank Association Convention, Hickory Metro Convention Center, Hickory. Call Connie Stephens at 336/416-6394 or visit www.ncsta.net.

Feb. 13-14

Nebraska On-Site Waste Water Association Annual Convention and Trade Show, Embassy Suites Hotel, Lincoln. Call Diane Snapp at 402/476-0162.

Feb. 15-16

Wisconsin Onsite Wastewater Recycling Association Convention, Country Springs Hotel, Waukesha. Call 608/256-7757 or visit www.wowra.com.

Feb. 27-March 1

Pumper & Cleaner Environmental Expo International, Kentucky Exposition Center, Louisville, Ky. Education Day Feb. 27; exhibits open Feb. 28-March 1. Call 800/257-7222 or visit www.pumpershow.com.

March 2-4

Ontario Onsite Wastewater Association Conference, Deerhurst Conference Centre, Huntsville. Call 905/372-2722 or visit www.oowa.org.

March 3-5

Minnesota Onsite Wastewater Association Convention, Cragun's Resort, Brainerd. Call 888/810-4178 or visit www.mowa-mn.com.

March 11-13

Northeast Onsite Short Course, Marriott Hotel and Spa, Groton, Conn. Call 978/323-7929 or www.neiwpcc.org.

March 24

Granite State Designers and Installers Association Septic System Conference & Exhibition, Radisson Hotel, Manchester, N.H. Call 603/228-1231 or visit www.gsdia.org.

April 7-10

National Onsite Wastewater Association Conference, Cook Convention Center, Memphis, Tenn. Call 800/966-2942 or visit www.nowra.org.

April 15-17

North Carolina On-Site Wastewater Treatment Conference, North Carolina State University, Raleigh. Call Joni Tanner at 919/515-1678 or visit www.soil.ncsu.edu, then Training, Short Courses and Workshops.

May 12-15

California Onsite Wastewater Association Conference and Exposition, DoubleTree Hotel, Sacramento, Calif. Call 707/579-4882 or visit www.cowa.org.

TRAINING & EDUCATION

Chlorine or Ultraviolet Disinfection?

A case study in *Small Flows* compares a commercial chlorine tablet feeder with an ultraviolet disinfection unit for onsite systems. The systems were operated for nine months using biologically treated septic tank effluent. Both provided comparable results and experienced intermittent problems: the chlorine tablets did not dissolve uniformly and minerals collected on the lamp sleeve, eventually reducing its performance. The article discusses each unit's performance measurements, reliability and constraints, maintenance requirements, and estimated cost of implementation and operation.

Another article gives a rational method for determining design flows for cluster systems. Author Larry Stephens, P.E., discusses what factors to consider in developing a design. He sets forth a methodology for using the demographics of the surrounding community, obtained from the latest census data, to estimate design flow. Download the issue at www.nesc.wvu.edu/nsfc/sfq_2007.htm.

NAWT Training and Certification

The National Association of

Wastewater Transporters Inc. is offering Inspector Training & Certification Jan. 28-29 at the River Palms Resort and Casino in Laughlin, Nev. Call 800/236-6298 or visit www.nawt.org/training.html.

Effluent Pumps for Onsite Systems

The Sump and Sewage Pump Manufacturers Association is presenting "Effluent Pumps for Onsite Wastewater Treatment: Selecting the Right Pump for the Job," a non-credit training program, on March 14 at the Illinois Plumbing Heating Cooling Expo at Drury Lane Conference Center, Oakbrook Terrace, Ill. The program is in its certification stage and will become eligible for CEUs. Call 800/795-7422 or visit www.ilphcc.com.

Florida

Courses are at the Florida Onsite Wastewater Association's Training Center in Polk City unless stated otherwise. An asterisk indicates Master credit hours are available.

- Jan. 3 - *Master IV-Design Considerations & Dosing Systems, Crestview
- Jan. 15 - Management of Decentralized Systems
- Jan. 23-24 - *O&M Service Provider Program I, II, III, Fort Myers
- Feb. 6 - 64E-6 Let's Look at the Code, Hialeah
- Feb. 7 - 64E-6 Let's Look at the Code, Tampa
- Feb. 11 - Artificial Media Treatment Technologies
- Feb. 12 - Natural Media Treatment Technologies
- Feb. 18-19 - *Master III-Basic Florida Soils
- Feb. 20-21 - *Master I-System Design & Function
- Feb. 21-22 - *Master II-System Materials and Regulation Requirement
- March 6 - *Master Contractor Maintenance
- March 11 - Onsite Systems: How Are They Approved?, northeast Florida (TBD)
- March 12 - Onsite Systems: How Are They Approved?, northwest Florida (TBD)
- March 25 - Work Smart, Not Hard, southeast Florida TBD)
- March 26 - Work Smart, Not Hard, southwest Florida (TBD)

Contact FOWA at 407/830-4381 or visit www.fowaonsite.com.

Minnesota

The University of Minnesota Extension has these hands-on workshops:

- Jan. 7-9 – Introduction to Onsite Systems, Alexandria
- Jan. 10-11 – Installing Onsite Systems, Alexandria
- Jan. 15-16 – Installer-Continuing Education, Rochester
- Jan. 16 – Pipelayer Certification, Rochester
- Jan. 23-25 – Designing Onsite Systems, Sauk Centre
- Feb. 5-6 – Design-Continuing Education, Sauk Centre
- Feb. 5-7 – Design and Large System Combo, Continuing Education, Sauk Centre
- Feb. 6-7 – Cluster-Continuing Education, Sauk Centre
- Feb. 11-13 – Pumping/Maintaining, Grand Rapids
- Feb. 14-15 – General-Continuing Education, Detroit Lakes
- Feb. 21-22 – General-Continuing Education, Two Harbors
- March 11-12 – General-Continuing Education, Willmar
- March 14 – Contractor Safety/Pipelayer Certification, Continuing Education, Mankato
- March 25-26 – Pumping/Maintaining-Continuing Education, Brainerd
- March 31-April 1-2 – Introduction To Onsite Systems, Bemidji

Call 800/322-8642 (612/625-9797) or visit www.extension.umn.edu.

Missouri

The following training seminars from the Missouri Smallflows Organization provide CEUs to renew onsite registration with the Missouri Department of Health and Senior Services:

- Jan. 8-9 – Troubleshooting & Hydraulics, St. Louis
- Jan. 15-16 – Operation & Maintenance, Cape Girardeau
- Feb. 19-20 – Operation & Maintenance, Hillsboro

Call 417/739-4100 or e-mail mso@lvbw.net.

North Carolina

North Carolina Soils and On-Site Wastewater Training Academy is offering a Land Application/Residuals (Biosolids) Operator Training School on April 22-24 at North Carolina State University, Raleigh. Call Joni Tanner at 919/515-1678 or visit www.soil.ncsu.edu/training.

Washington State

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

- Jan. 3 – Basics of Maintenance
- Jan. 10 – Basics of Installing, Part 3

Call John Thomas at 253/770-6594 or visit www.wossa.org.

Wisconsin

Wieser Concrete has a 6-hour, general continuing education seminar that provides the necessary credits for installers, sanitarians, designers, and others working in the onsite wastewater treatment field. Seminars will be held:

- Feb. 28 – Portage
- March 6 – Shell Lake
- March 13 – Fond du Lac
- March 20 – Wieser Concrete Maiden Rock Facility
- March 28 – Rhinelander

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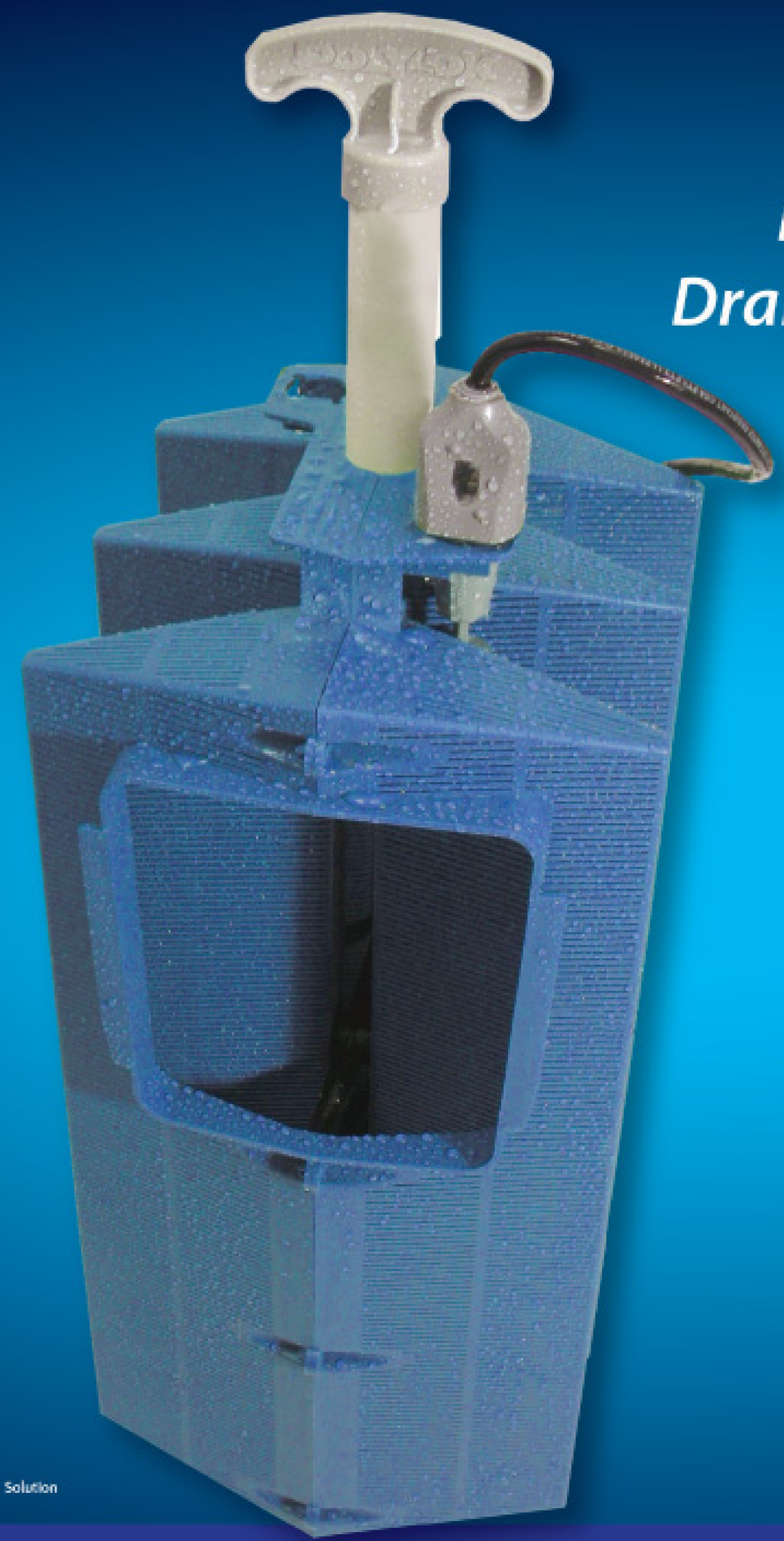

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