ONSITE
WASTEWATER NEWS
ONTARIO ON-SITE WASTEWATER ASSOCIATION NEWSLETTER

InSide

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Visit us at
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Join us at the 4th Annual Ontario Onsite Wastewater Conference and Exhibition

The Ontario Onsite Wastewater Association and the Ontario Rural Wastewater Centre is again hosting the annual conference in Mississauga at the Delta Meadowvale Hotel, March 24 and 25. This year's conference promises to again be loaded with information and contacts important to those active in the Onsite business in Ontario. Presentation topics include new technologies, new and unique applications of old technologies, management of onsite systems and performance and impacts of systems on the environment – just to name a few.

Taking a highly successful idea from the annual NOWRA conference, this year we have added an additional parallel session entitled "A-Z of Onsite." This session covers topics from wastewater chemistry to advanced system design. Whether you are new to the industry or have worked in it for years, there is something here for you to learn. These sessions are all led by people active in the field.

Our keynote speakers this year bring us views from widely differing areas. Dr. Bruce Lesikar of Texas A&M University. He heads up the training centre in Texas, has been active in NOWRA and conducted research on a wide range of onsite issues. He brings the view from Texas. Our second keynote speaker comes from Ontario: Mr. Jim Bradley. He needs no introduction, as he is a Liberal MPP, Environment Critic and former Minister of the Environment (when onsite systems were still the responsibility of the MOE). He brings a unique perspective on the state of our industry and how it impacts on the environment. Finally, we have the Honourable Brian Coburn who is the Associate Minister of Municipal Affairs and Housing, Rural – the ministry currently responsible for small onsite systems in Ontario. We look to him for information on the future plans of the Ministry for the onsite industry.

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The 4th annual conference and exhibition is jointly sponsored by the Ontario Rural Wastewater Centre (ORWC) and the Ontario On-Site Wastewater Association (OOWA). This conference is an opportunity for members of the on-site industry to meet and learn from each other. Leading designers, engineers and researchers from across North America will discuss current issues ranging from new technologies to the future of septage disposal. The exhibit area is a must-see for anyone interested in new products and Technologies.

To register contact:
Office of Open learning, 160 Johnston Hall,
University of Guelph, Guelph, Ontario N1G 2W1 tel: (519)767-5000, fax: (519) 767-1114.
Final date for registration is: Thursday March 20th, 2003.
2002 and 2003 OOWA members receive a substantial discount.

For LOTS more information, look under "events" on the OOWA.ORG website.

Determining Proposed Grades, Part II

In Volume 3 Issue 2 of ONSITE, a description of how to determine the existing grades at the future location of a septic bed was printed. This issue covers how to determine the proposed grades of the bed.

Please note that the grades are exaggerated for simplicity.

Summary of existing grades:

TBM (temporary benchmark) = 100

HI = 100+(Rod Shot at Instrument)

= 100+1.27=101.27

Elev. X_1= HI-Rod Shot at X_1=101.27-0.96=100.31

Elev. X_2= HI-Rod Shot at X_2=101.27-0.83=100.44

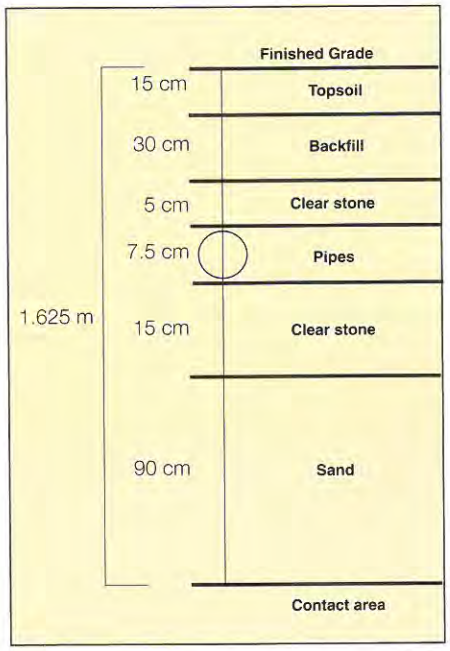
Elev. X_3= HI-Rod Shot at X_3=101.27-0.87=100.40

Elev. X_4= HI-Rod Shot at X_4=101.27-0.82=100.45

Elev. X_5= HI-Rod Shot at X_5=101.27-0.91=100.36

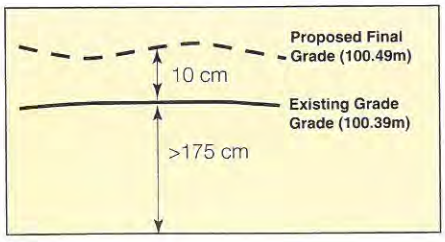
At the proposed bed location, the average existing grade is = 100.39

The typical cross section shows the height of a bed that must be accommodated.



Scenario #1: After excavating the test pits on site, no water or bedrock is discovered within 1.75m of the surface.

average existing grade = 100.39



To shed water, the final grade will be 10 cm above the existing grade. To determine the finished grade of the bed:

average existing grade = 100.39m
+.10m

finished grade = 100.49m

To determine the bottom of the excavation:

finished grade = 100.49m
-1.625m

bottom of excavation = 98.865m

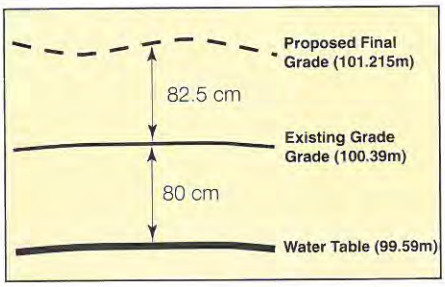
Scenario #2: After excavating the test pits on site, water is discovered within 80 cm beneath the surface. This requires a raised bed design. To determine the final finished grade:

average existing grade = 100.39m
water depth -.80

elevation of H_20 = 99.59m

elevation of H_20 = 99.59m
+1.625

finished grade = 101.215m



Ontario Onsite Wastewater Conference and Exhibition

continued from page 1

Last and not least is our exciting list of exhibitors who have signed up and continue to sign on. As I write this 20 have reserved booth spaces and more are promising to come. The exhibitors give us all a chance to view, first hand, what products and services (new and old) are out there for us all to use.

So, I look forward to seeing you all in March to renew old acquaintances, make new ones and learn more about what's new in the business.

Doug Joy, Conference Co-chair
President of OOWA

Flow Distribution Apparatus

This column was written with technical information and graphics provided by Zabel Environmental Technology.

As the name implies, the main function of distribution boxes and related components is to evenly divide septic effluent between other components of the system. Good practice suggests that some type of splitting mechanism should be part of a system when 1) the bed has more than 8 different runs; 2) there is more than one header, 3) the runs will be at different levels (on a slope), 4) a pump is used to move the effluent to the tile bed or 5) the effluent needs to be divided between treatment units. Additionally, some of these components can be used as a visual inspection point to check the clarity of the effluent from the septic tank and as a convenient clean out section between the tank and tile bed.

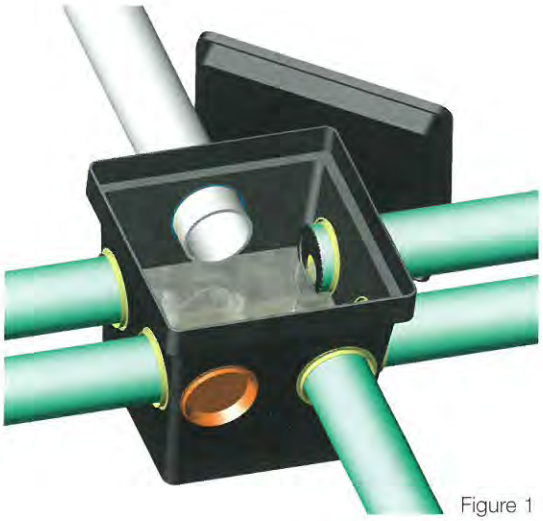


Figure 1

Distribution boxes and Speed Levelers:

Distribution boxes are made of concrete or plastic and have varying designs to accommodate different needs. Typically, the inlet is designed with an elbow joint, a tee-joint or a concrete baffle to create a laminar flow (flat, surge protected) that can be managed by the dividing compartment. Outlets vary from two or more, and evenly proportion out the incoming effluent. See fig.1. Distribution boxes must be installed on a compacted granular base and very carefully leveled. Backfilling must be done with care, as flow will be become uneven if the box is tilted. Frost protection is also required in many installations.

Speed levelers are discs that fit on the inside of the distribution box, over each outlet. If a box cannot be exactly leveled, or has become tilted over time, these devices can be used to even out the distribution of the effluent. See fig 2.

Figure 2

Flow Dividers and Flow Directors

These tee-joints (see fig 3, 4) are designed by Zabel to provide specialized division of effluent. The Flow Director contains a sleeve valve, which permits the control of water flow to alternate locations. The sleeve may be set to send flow to either the left port, right port, or set in the middle for even flow to both ports. The unique design of the sleeve allows the effluent to cross over to the alternate side even if the valve is never switched. They are useful in providing dose/rest cycles for failing lateral fields by alternating between new lines and old lines annually. The Flow Divider provides equal, non-selected routing of effluent to two outlets. A weir in the centre of the tee splits the incoming effluent in half and routes it to two outlets. The advantage of this method is that the leveling of this instrument does not need to be as precise as the distribution box requires, and continues to split the flow very evenly. These dividers are very effective for dividing flow reliably between treatment units.

Figure 3

Figure 4

Development of a Phosphorus Filter for Septic Systems

Submitted by: Chris Kinsley, Anna Crolla and Doug Joy at the Ontario Rural Wastewater Centre

Phosphorus in wastewater is generally not removed by septic systems and can cause eutrophication of lakes and rivers. Properties close to water bodies with sandy or rocky soils are particularly at risk of phosphorus from septic system effluent migrating into lakes and rivers. There are no specific requirements for phosphorus removal from septic systems in the *Ontario Building Code.*

Four adsorptive materials were tested in shaker and column studies: calcite, shale, limestone and slag (a waste product from the steel manufacturing industry). Of the four materials tested, it was determined that slag was the optimum material for removing phosphorus from septic system effluent. Column studies showed slag to have a conservative adsorption capacity of 3.5 g P per kg of slag. Using this value, a filter for a 4 person household with a design life of ten years would require a slag filter of 3.1 m^3 or 5.0 tonnes.

A pilot slag filter system was built at the ORWC testing facility located at Collège d'Alfred of the University of Guelph and is displayed in Figure 1.

The slag filters removed 96% of phosphate from the septic tank effluent to a level of 0.11 mg/L, as displayed in Figure 2. The capacity of slag to precipitate phosphorus from solution is largely due to its high liquid pH, which is consistently greater than pH 10. A peat filter was added after the slag filter to neutralise the pH. The peat filter was effective at reducing the pH from 12 following the second slag filter to 8.1 following the peat filter. The slag filters, due to their high pH, also disinfected the effluent, with E.coli counts reduced from greater than 100,000 counts/100 mL following the septic tank to less than 10 counts/100mL following the slag filters.

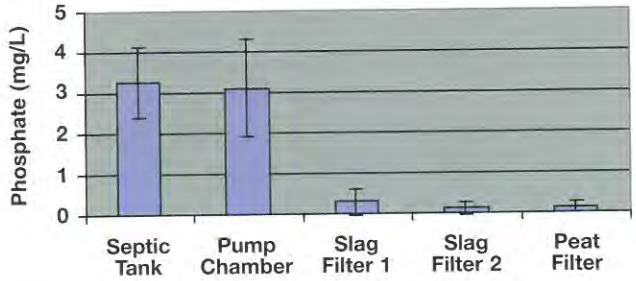
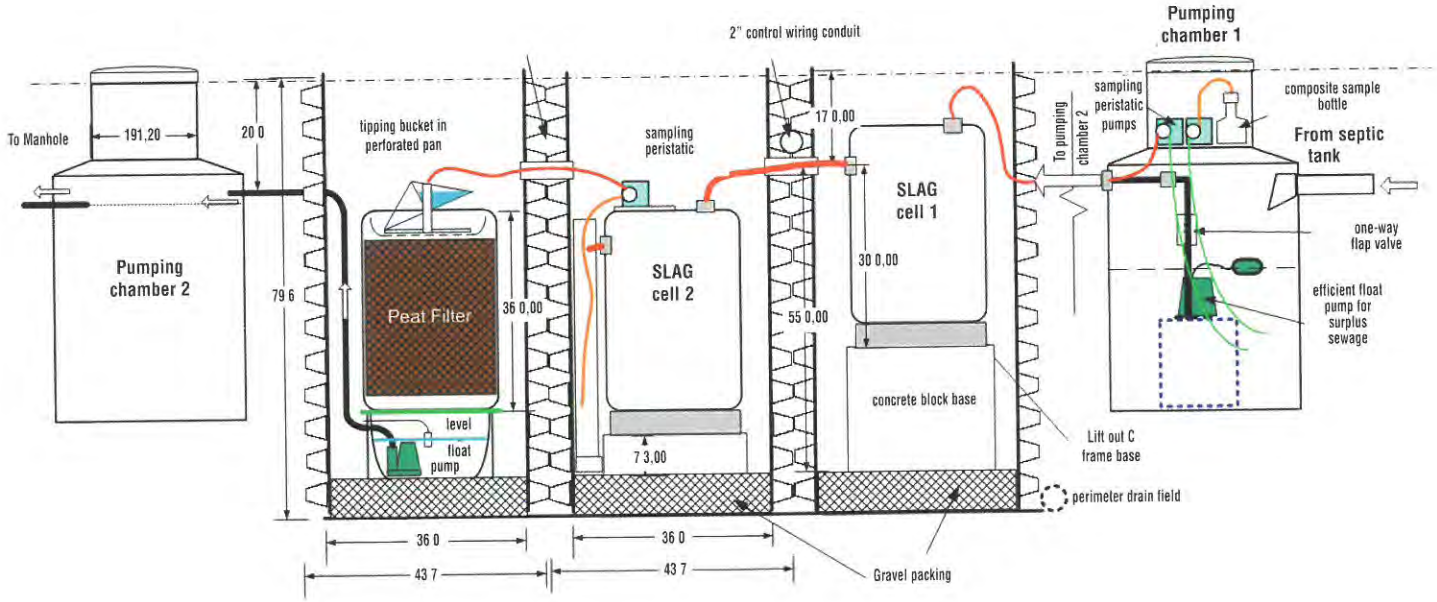


Figure 2. Phosphate Remaining in Pilot Phosphorus Filter System



Cross Section of R&TT Phosphate Reduction Pilot Study
27/1/2002

Figure 1. Pilot System Schematic

Septic System Additives, Part III, the Final Chapter

Perhaps you were lucky (or unlucky) to get the following spam email lately. I got the enclosed email on November 19, 2002.

From: [redacted]
Sent: November 19, 2002 3:50 AM
To: Septic.Field.Owner@smtp1.sentex.ca
Subject: Tips on septic tanks

If your home is served by a septic system, you areable to receive invaluable information on how to eliminate pump outs, how to maintain the system properly and cure problems such as backups, wet spots,
odor, etc. – FOR FREE!

You can do this by checking out our site at:
http://www.[redacted]

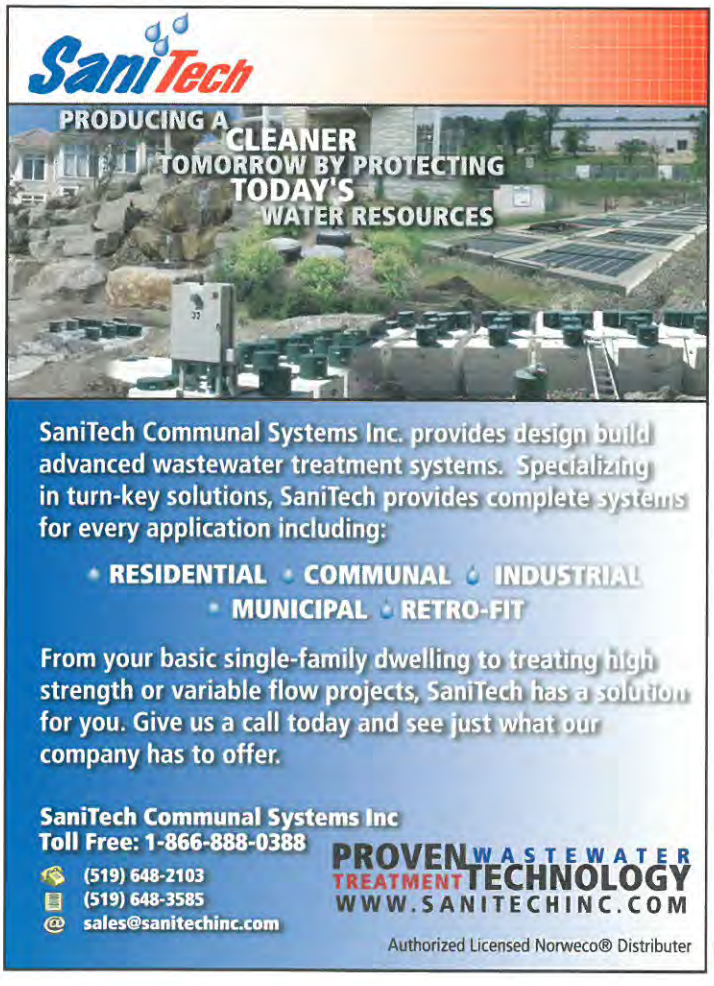
In addition, you will have the opportunity to participate in a free trial program to test the effectiveness of our product,
IN YOUR OWN SYSTEM.

So I logged into the site to see how I could eliminate pump outs on my home septic system. The site had the following information:

Nothing in the world can outperform [redacted] for keeping septic systems non-clogging and free flowing! Safe for the environment, non-poisonous, it totally digests ALL waste solids...completely liquefies materials such as oils, fats, greases, proteins, (meat, fish, milk, blood, gelatin), starches(bread, flour), fruits, vegetables and all papers such as toilet and tissue. The result is a septic system that works as well as the day it was installed. To insure a properly functioning system, there isn't an easier, more effective and economical way to accomplish this than with [redacted]. And - we would like you to know that our product is 100% environmentally safe, and in no way can harm you, your children, pets or your septic system. Be assured that our product is the best that's available on the market today. Made with the strongest enzymes and harmless bacteria, [redacted] is designed to prevent the main causes of trouble in your septic system or cesspool. Today, modern detergents and bleaches destroy the bacteria and enzymes necessary for breaking down and liquefying all waste matter in your septic system. With limited amounts of bacteria and enzymes, the solid matter builds up and blocks your lines and pipes. This causes backups, wet spots and offensive odors. [redacted] is a combination of 4 natural enzymes including amylases, protease, cellulase and lipase and 6 different non-pathogenic, harmless bacteria. These bacteria and enzymes were selected specifically for their ability to digest the common problem-causing organic wastes from humans, animals and plants. "Simply the Most Effective Septic Maintenance Product Available"!

Pretty impressive eh? As you can read to completely eliminate or reduce the frequency of pump outs the advertising hints that all you have to do is add a couple of scoops of [redacted] every so often. All good and well if septic system additives worked that way in real life. But as any responsible sanitarian will tell you there is no need for the additive as no third party data exits to show that it works as advertised. And you can't replace a good preventative maintenance package that includes regular pump outs.

So it might be a long way around allaying the concerns of some of our members, who took the time to write us a letter on March 15, 2002, regarding septic system additives. The letter disagreed with our pamphlet – Onsite System Do's and Don'ts Guide – which stated "don't use special additives that are touted to enhance the performance of your tank or system". Their letter went on say the "This is far too general a statement and is false."



Malfunctioning System – What Went Wrong? A Case Study

In the Fall of 1997, a Class 4 Filter Media onsite sewage system was installed at a 3 bedroom home with a sewage design flow of 1600 litres per day. During the summer of 2002, the owners noticed that the toilets would not flush quickly and there was lush green grass over the septic tank.

A field inspection started with uncovering the septic tank lids. The backfill around the septic tank and over the lids contained black biomat. When the access hatches were removed the scum layer was right to the top of the tank. There was also evidence of undigested sewage floating on top of the scum layer. This condition was also present in the second chamber of the septic tank.

The next step involved using an excavator to remove the backfill material over top of the tile bed. A small trench was dug at the end of the filter media bed and the footer pipe was removed manually. At that point in time, the septic tank drained out the end of each run slowly. As the picture shows, the pipes were completely filled with a sludge like fibrous material with a pinkish colour. A hand shovel was used to dig holes through the crushed stone layer to determine the thickness of the biomat layer. At this point in time, no clogging biomat layer was present.

After interviewing the home owner, it was determined that only 2 adults and one teenager was living in the house. Both adults worked out during the day, and the teenager was in school full time. The occupants also provided the following information on the practices in the home:

Toilet Paper – Cottonelle 2Ply Non-Allergenic
Bath Tub Cleaning – Mr. Clean with Disinfecting Bleach once (1) per week.
Toilet Bowl Cleaning – Lysol Disinfectant Toilet Bowl Cleaner
Washing Machine Soap – Cheer Colourguard & Ultra Tide with Bleach
Dishwashing Soap – Cascade
None of these products were considered uncommon to the average household.

The solution that was implemented was to install an Ecoflo EFT-080 effluent filter in the existing tank after pumping the tank. Also, the distribution pipes were removed and replaced with new pipe. We will wait and see what happens in the future! If you have seen anything similar to this, i.e. pipes fully clogged, a system of similar age (5 years), pinkish coloured sludge; what did your investigation discover? If you have any answers or information, please email: tkdpeng@rideauvalley.on.ca , attention Terry Davidson.

Feature Installation

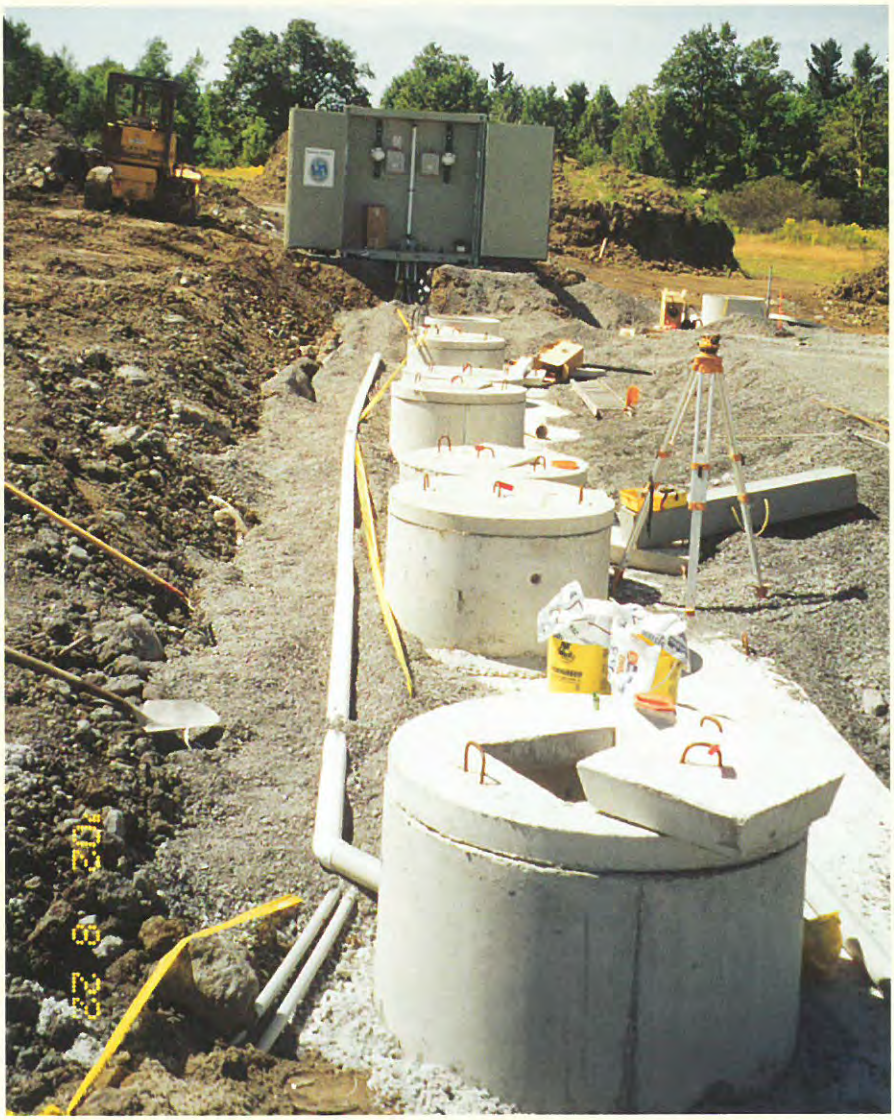
This installation was submitted to ONSITE by Bob Thomson of Valley Sanitation Services in Kemptville, Ontario.

This is a tertiary treatment system using Waterloo Biofilter units, installed in August 2002 at the Summerstown Petro Pass Facility. The design flow of the facility was calculated to be 8,500 litres per day. The first part of the system consists of three 22,500 litre septic tanks installed in a series, followed by a 22,500 litre pump chamber with two Grundfos EF 100 1.0 hp pumps on timed alternating duplex controls. The effluent is pumped to the Waterloo Biofilter shipping container 20 feet in length.

Once treated in the Biofilter, 50% of the effluent is re-circulted by gravity to the first septic tank. The other 50% of the effluent goes to a 22,500 litre pump chamber with two EF 100 1.0 hp pumps on a timed alternating duplex control panel to dose the two beds.

The loading area of each bed consists of an area 45m x 20m x 1.5m of well graded gravely sand, with little or no fines; with a percolation rate of 2 – 8 min/cm. The beds are 5 metres apart and each consists of a stone area 5m x 10m; with 6 runs 3m long; with 1.6m centers; in 250mm of 3/4 inch clear stone.

Area beds being backfilled with tracked vehicle.



Septic tanks in foreground, treatment units behind. Pump chamber back right. Note: gravity recirculation line and risers on all tanks.

Installers Comment

Sean McLaughlin, a C.E.T. student working for Eric Draper Backhoe Service submitted a list of questions he typically hears from homeowners when he is working on a site.

1. **What will happen to the system when we go away for the winter?**
2. **Will additives help?**
3. **How often should a tank be pumped?**
4. **Is a plastic or concrete tank better?**
5. **How long will the septic system last?**
6. **Can you drive the lawn tractor over the bed?**
7. **Will it smell?**
8. **Can I use laundry products that contain bleach?**
9. **Does the chlorine in my water affect the performance of the system?**
10. **What should I do with the water softener backwash?**

Unlike the straightforward inquiries that have clear answers, these questions don't always have an absolute answer. A standard response that may not apply to each specific situation may result in the homeowner making a bad decision based on the information. If homeowners were provided with better information and understood how their septic systems worked, they could draw their own conclusions.

These sorts of questions emphasize the need to educate homeowners about not just the operation and maintenance of their system, but also about how it actually works. Some municipalities and townships or local organizations (like the Ontario Rural Wastewater Centre) offer septic and well workshops for rural homeowners. Installers and designers should be aware of these and recommend them to their clients.

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S-Files

Unexplainable or inexplicable septic sightings

Have you ever wondered how septic systems get onsite? If you are on an island, an innovative installer is needed. Eric Draper Backhoe Service provided us with this picture of their scow and crew who work on the Great Rideau Lake system. The dog just likes to come along for the ride.

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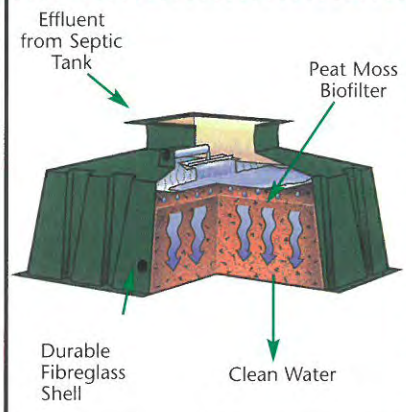

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Did You Know...

You can ask for advise on interpreting *Ontario Building Code* online at:codeinfo@gov.on.ca

Letter to the Editor

Dear Sir,

When I first began working in the field of on-site wastewater management, we, the field staff within the Health Units, were effectively supported by the Ministry of the W\Environment (MOE). The same cannot be said of our current arrangement. We rely on the grapevine for updates. I admit we must make a personal effort to educate and inform ourselves. Doing so is difficult in light of the Ministry of Municipal Affairs and Housing's (MMAH) approach to providing timely and useful information. I know of no easy access point or mechanism to obtain information relating to changes, approved or upcoming, to the *Ontario Building Code*. An effort on the part of MMAH to better inform field staff is, I believe, urgently required. The On-Site Association should stress this fact with the MMAH or take on an even greater role in educating its' membership. I know the industry would benefit from having a more informed regulatory body and private sector membership.

I sincerely hope my letter will encourage others to consider and provide insight into this difficult situation.

Best wishes, Sylvain Diotte
Part VIII Co-ordinator, Eastern Ontario
Health Unit

Rob's World

Crossroads

Onsite sewage treatment systems have significantly evolved since the days of the outhouse. Sewage systems have grown in size and complexity and with them, the requirement for skilled individuals responsible for their design and construction. In an ideal world, such individuals would acquire the skills as quickly as the systems evolved, thereby ensuring a literal onsite sewage system utopia. However, we are constantly reminded that our world is far from ideal. There exists an increasing gap between the technological evolution of the sewage system and the acquisition of the necessary skills to properly design, install, and maintain them.

When secondary treatment units arrived on the scene in the late 1960's, they were heralded as the culmination of technological innovation in the sewage system industry. These treatment units could produce a significantly cleaner effluent than a septic tank, primarily through mechanical processing. As the effluent quality improved, the size of the leaching beds became smaller and smaller. Designers, installers and regulators must have thought that the industry had finally overcome its limitations, and subsequently began installing these new systems in very large numbers. Somewhere along the way, the industry forgot that the treatment units came with a catch: Maintenance. The inventors and manufacturers of these secondary treatment units knew that the pumps, blowers, siphons and gears needed to be properly maintained for the units to continue to produce consistent secondary effluent levels. Alas, over time it seems that the need for such maintenance has been cast into the growing gap between technology and skilled labour, and was quickly forgotten. Without the maintenance essential for the efficient operation of the treatment units, effluent quality will deteriorate to a point at which it bears little difference to septic tank effluent. The leaching beds serving the treatment unit, having been reduced in size, becomes organically overloaded and subsequently began to fail.

To determine precisely who was to blame would be a useless endeavor, as it rests on the sewage system industry as a whole. The industry allowed these systems to be installed and operated without setting proper controls on the implementation of maintenance on each unit. The industry has allowed regulators to approve treatment units in for flows and in locations that the units were not designed for. Consequently, it was the negligence of the entire industry that destroyed the onsite sewage system utopia, and further widened the gap between technology and skill.

Technology continues to evolve over time whether we want it to or not. So it comes as no great surprise that we now have tertiary treatment systems. These systems, much like their secondary treatment counterparts, reflect the pinnacle of onsite sewage treatment. With the advent of these units, our surface and groundwater resources can become safer and in some cases rehabilitated. With these units, we could indeed achieve sewage system utopia ...except for that gap between technology and skills that has not yet been resolved. Yes, our industry has utopian solutions within its grasp, but will let the achievements give way to failure unless the technology-skill gap is resolved.

It would be far too easy to simply end this dialogue with the above paragraph, however the message would be left without clarity and direction. As such, the following are some thoughts on how we as an industry can shrink the technology-skill gap. Below is a summary of the tasks that each member of the industry must complete:

The Manufacturer and Distributor

First, manufacturers must take more responsibility for the products they invent. Distributors must be properly trained in the proper installation and operation of the tertiary treatment units, and the manufacturer must also routinely audit each distributor for compliance. Manufacturers must also take it upon themselves to get involved with the public education and certification of sewage system professionals from installers to engineers.

Distributors must ensure that the installers have the proper training and understanding for their product. The distributor must also ensure that each treatment unit will be maintained and all service agreements will be administered.

The Designer

The designer must understand the limitations of all treatment units and must strive to prepare designs utilizing the best technology for a particular site, and not just the one that is the cheapest for their client. The designer must also ensure that a client completely understands the need for, and costs of, maintaining a treatment unit.

continued on next page

Rob's World

continued from previous page

The Installer

The installer must constantly update their skills. They must continue to learn how new technology works and how this technology is properly implemented. Above all else, the installer must use good workmanship in all aspects of their trade-from installation to maintenance

The Regulator

The regulator must not hide behind the Ontario Building Code. They must constantly update their skills and understand the technology that they are approving.

The regulator must create a database for each treatment unit installed and diligently monitor the effluent quality through maintenance agreement providers. The regulator must also act on all situations where effluent quality results do not meet minimum requirements.

It is clear that the sewage system industry is at a cross-road. Should all members of the sewage system industry complete their respective task, we will reduce the technology-skill gap to a point where a onsite sewage system utopia is achievable. Should any of the members fail to complete their task, the sewage system industry will indeed be forced down a dark path. Someone once stated, "those that do not learn from history are doomed to repeat it." Isn't it time we broke this cycle?

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DEALER ENQUIRIES WELCOMED

From the Editor

There is no question that this issue is coming out a bit late, and with it, registration for the 2003 OOWA membership subscription. Enclosed in this newsletter is your 2003 membership application. If you have already sent your dues in, thank you, if not, please do as soon as possible. If your contact information has not changed since last year, you do not need to fill the entire form out. If you are a new member, or have new info, please fill out the application form. If you require an invoice, please call me at (613) 692-3571 x137. As usual, membership includes perks like this newsletter, a membership with NOWRA and a great discount on the upcoming Ontario Onsite Wastewater Conference in Mississauga. Just tell the registration office you are a member and they will confirm with us. All sorts of exciting things are happening in 2003, the next newsletter will outline what OOWA is working on and how you can get involved in industry issues that matter to you. **This month, Bob Thomson of Valley Sanitation in Ottawa and Sylvain Diotte of the Eastern Ontario District Health Unit each receive ONSITE T-shirts for their contributions to the newsletter. Keep them Coming!

Frequently Asked Questions

Reviewed by Ahmed Sharaf, P.Eng. Building Code Advisor, MMAH and David Cooke, Coordinator, Sewage System Program, KFLA Health Unit

Q▶ Where a pump is required in a trench bed or filter media bed to lift the effluent to the treatment area, must the pump be set to dose a minimum 75% volume of the distribution pipes in less than 15 minutes as per O.B.C. 8.6.1.3.(4), if the length of the distribution pipe is less than 150 metres?

A▶ Yes, 8.6.1.3.(4) of the O.B.C. states that when a pump or a siphon is required, the pump or siphon shall be designed to discharge a dose of at least 75% of the internal volume of the distribution pipe within a period not exceeding 15 minutes. This sentence is a stand along requirement that is applicable when a pump or siphon is required for whatever reason.

Q▶ Does the O.B.C. require all pumps to be alarmed to alert the sewage system user of a malfunctioning pump?

A▶ No, while the general requirements stipulated in Sentence 2.2.1.1.(1), and Sentence 8.9.3.2.(1) of the OBC require all components/equipment installed in a building to perform their intended functions, audible and visual warning devices are explicitly specified as a requirement under the OBC only for treatment units and holding tanks as stipulated in Sentences 8.6.2.2.(3), and 8.8.2.1.(1) of the OBC.

Q▶ Does the O.B.C. stipulate the acceptable depth of cover over a filter media bed?

A▶ Yes. O.B.C. 8.9.3.2.(1) states
(a) the construction of the sewage system remains in accordance with (i) the basis on which the construction and use of the sewage s ystem was approved or required under this Act or predecessor legislation, as the case may be

Therefore, although not stated in the O.B.C., construction specifications and requirements from the *Manual of Policy, Procedures and Guidelines For Onsite Sewage Systems* referring to Ontario Regulation 358 under the *Environmental Protection Act* (predecessor legislation) describes acceptable depths of cover over filter media beds as a ADepth of cover sufficient to prevent freezing - suggest min 0.3m.@

The O.B.C. states under 8.9.3.2(2)
The land in the vicinity of the sewage system shall be maintained in a condition that will not cause damage to, or impair the functioning of, the sewage system.

Too much cover (i.e greater than 0.6m or impervious cover material) will impair the functioning of the filterbed.