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WASTEWATER NEWS
ONTARIO ON-SITE WASTEWATER ASSOCIATION NEWSLETTER

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North America's First 100% Performance-based Onsite Wastewater Regulation Enacted

by Frank Hay

The first Onsite Wastewater Regulation in North America to change from a prescriptive code to a performance-based code was enacted by the Government of British Columbia in Canada in July 2004.

The new Sewerage System Regulation in BC was enacted in July 2004 with an enforcement date of May 31, 2005. The nine month enforcement delay was required to allow all of the industry members to get their formal education and training from the West coast Onsite Wastewater Training Centre (WOWTC) as administered by the BC OnSite Sewage Association (BCOSSA), and to complete the registration process as set down in the regulation.

Professional reliance concepts are used in the new regulation by placing specific duties, responsibilities and accountability on those who provide the goods and services to the public. In addition, for the first time, there are regulatory provisions that require the system's owner or user to be held accountable for the system's operation and maintenance. Operation and maintenance applies to all types of systems — septic tanks, secondary treatment units and tertiary or advanced treatment units.

In exchange for these new duties to the industry and the system's user, the permit process is replaced with a process that requires that the system's planner/designer is to file with the authorities documents of (a) what is being planned or designed, (b) the operation and maintenance requirements by the owner and (c) certification that the system is installed in accordance with the filing document.

The regulation further provides that ONLY authorized persons are to plan, design, install and maintain onsite systems. An authorized person is either a registered practitioner or a professional.

How Did this Regulatory Reform Occur?

Basically, two things working separately simply came together. One of the things was that the new government of the day, elected in 2001, had fiscal responsibility and de-regulation as priorities of its administration.

De-regulation took the form of a new Ministry created to oversee de-regulation in all of the government's ministries. The onsite sewage wastewater industry was regulated through the Ministry of Health's prescriptive-based Sewage Disposal Regulation and permit issuance process.

Fiscal responsibility took the form of in-depth review of costs in relation to achieved health outcomes. The fiscal review of the prescriptive Sewage Disposal Regulation revealed that at least 20 percent of financial and human resources was spent by the local health authorities, whereas the health outcome was barely measurable at 1percent. People were more at a direct risk for disease from food and drinking water than from sewage.

The second thing that was going on was that BCOSSA was operating, since 2000, the West coast Onsite Wastewater Training Centre in partnership with the Royal Roads University in Victoria, BC and BCOSSA was operating a voluntary certification program based on experience, education and references.

Mr. John Rowse, B.A.A., C.P.H.I.C., M.A., Project Manager, Land Use for the Ministry of Health Services was directed to create the regulatory reforms needed under the government's priorities. Mr. Rowse had been

engaged in the regulatory reform issues under the previous government administration using the prescriptive code model. When the new administration was elected the priorities changed and Mr. Rowse was challenged by the government to think "outside the box" on these issues.

After two years, Mr. Rowse created the new Sewerage System Regulation using the performance-based code approach. In BC, this innovative approach is the first of its kind within any Ministry of the Government and is the first of its kind in the onsite wastewater industry in North America to our knowledge.

Mr. Rowse satisfied the government priorities by considering the BCOSSA education and certification program and developing the Regulation that now is enacted.

How Does the Regulation Work ?

There are three types of treatment methods are set down in the regulation:

- Type 1 is a septic tank
- Type 2 is a secondary treatment unit
- Type 3 is treatment unit that meets BOD/TSS of 10 mg/l each and fecal Coliform of 400 CFU/100ml

The regulation requires that only authorized persons perform any function in the onsite system. An "authorized person" is either a registered practitioner or a professional.

A Registered Practitioner is registered with the registration agency and must meet three basic criteria that are:

1. Educational and training as required by BCOSSA at WOWTC.
2. Verification of experience and references
3. Meeting the requirements of the Code of Ethics and professional development.

A registered practitioner may plan for sites with a domestic residential sewage flow of up to 2,400 us gals per day that require a Type 1 or Type 2 Treatment method. A registered practitioner may install and maintain Type 1, 2 or 3. The following are the categories of a registered practitioner: planner; installer; maintenance provider

A Professional may design for sites that require a Type 3 Treatment Method and are for non-residential wastewater flows.

The Planner or Designer will file with the authorities the plan/design complete with the required operation and maintenance plan for the system's owner / user to follow.

The Ministry of Health Services is to publish the *Sewerage Systems Standard Practice Manual* for the Registered Practitioner and Professional to use as a guideline. This Manual is amendable from time to time as determined by a committee established by the Ministry of Health Services that is to include representatives from industry.

Is there Grandfathering ?

The short answer is no. Every existing site assessor/planner, installer and maintenance provider is to meet the educational requirements of BCOSSA and go through the registration process. Those who have successfully completed the WOWTC courses from 2000 to the present will have those courses recognized as meeting the educational requirements.

What is the Role of the Public Health Inspector ?

The role of the public health inspector is likely to be:

1. To receive the filing of the plan with the operating and maintenance plan and ensure that the person filing the document is an authorized person.
2. To respond to health complaints or system malfunctions
3. To issue orders for the repair or replacement of the system.
4. To issue fines under the *Offences Act.*

What Does the Future Hold ?

Being a new program, it is expected that the next few years will consist of watching, monitoring and altering the program and process until the problems are identified and resolved.

From there it is intended that, with a pool of qualified registered practitioners and professionals to service the needs of the industry, local governments can begin to consider onsite wastewater systems as a viable and reliable method of infrastructure for land use planning and development.

Summary

The BCOSSA is excited about what the future can hold for the industry, general public and governments as the performance-based regulation unfolds and reveals the benefits to be gained by all. However, with this opportunity comes the responsibility and management to ensure a raising of the standard to the highest possible level.

Protecting public health, the environment and the drinking water resource is to be paramount in moving forward with a performance-based code using professional reliance and government fiscal responsibility.

Website addresses to view the various agencies and associations working together to meet the goals of the Sewerage System Regulation are: www.bcossa.com; www.royalroads.ca/wowtc; www.owrp.asttbc.org.

Frank Hay, President of BC OnSite Sewage Association
Vice-Chairman Royal Roads University Advisory Board for Onsite Wastewater Management
Chairman of the BC Onsite Wastewater Registration Board
Member of the BC Sewerage System Standard Practice Manual Standing Committee
President of Pinnacle Environmental Technologies Inc.

The Science Corner — Hydraulic Short-Circuiting in Septic Tanks

by Richard Lay, P.Eng., Max Weiss, Kris Pataky, and Craig Jowett, P.Eng.

Designing for Performance

Conventional septic tank construction requires a continuous airspace above the water level specifically for "floating scum storage," and perhaps for "upwelling surge storage" (Baumann 1978). But what does this airspace really do and is it even a good thing? The first septic tank in the mid-1800s (Mouras tank) had no airspace, and it ran into difficulties from accumulated fermentation gases until simple venting of these gases allowed the tank to operate properly. Later designs used long tank configurations with no airspace, just venting, specifically excluding air to promote fermentation. From the mid-1900's onward, standard septic tank design comprises a box tank with openings in the end walls, a flat lid, and an airspace from inlet to outlet.

In his classic 1984 book, *The Septic Tank,* Winneberger questions the use of the airspace, concluding it "might not serve a useful function." He also suggests that the "configuration of septic tanks has long been dictated by simple construction convenience," and "most authorities would welcome improved septic-tank designs, but regulations pre-design tanks as they are," and "unfortunately, minimum standards become maximum practice."

Can we extend Winneberger's sight-line further, look at the standard septic tank, and suggest ways to improve its intended function of (a) separating solids from sewage, and (b) optimizing fermentation and hydrolysis reactions, with easier servicing thrown in to boot?

More Sludge, Less Scum

"Floating scum storage" may sound reasonable, but servicing is easier with less scum and more sludge. Again Winneberger; "it is a common misconception that…lighter solids…rise to surface and form a layer of scum." Rather, scum is related to amount of gases evolved, because sludge particles are carried up by gas bubbles, only to sink again when released.

The airspace actually causes unwelcome moulds to take hold and accelerate trapping of rising sludge, matting them together into a "tough, floating mass," and of course this leathery scum is more difficult to pump out. Being actually denser than water, it can overturn and sink, causing solids to leave the tank.

Capturing Scum & Sludge

The CSA B66 standard specifies a relatively short (1,200 mm) and deep (~1,200 mm), box-like tank (Figure 1, page 10). But is this good design for performance? To remove smaller solids the settling distance should be larger, especially in deeper tanks where differential flow velocities allow higher-velocity plumes to develop. In "box tanks," only the big bits can be removed, whereas a longer, shallower tank captures more and finer sludge particles.

continued on page 9

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Report Says Canada's Coastal Cities Worst Sewage Polluters

Featured in U.S. Water News Online, September 2004

VICTORIA, British Columbia — Canada's coastal cities rank among the world's worst offenders when it comes to spewing billions of gallons of dirty, stinking and dangerous untreated sewage into open waters, says a report released by environmental groups.

Victoria, Montreal, St. John, Halifax, Charlottetown and St. John's continue to use their surrounding waters as large toilet bowls to discharge human waste and toxic chemical cocktails, with little or no sewage treatment, says the report which graded 22 cities across Canada.

The report was compiled by the Sierra Legal Defense Fund on behalf of the Georgia Strait Alliance, the Labor Environmental Alliance Society and the T. Buck Suzuki Foundation.

Calgary, Edmonton and Whistler were issued top marks by the environmental groups for upgrading their sewage systems to full 100 percent tertiary treatment.

Quebec City, Ottawa, Winnipeg, Hamilton, Toronto and Brandon were among other Canadian cities that received improved grades for major improvements to their sewage treatment systems over the past three years.

"The casual assumption that whatever we pour down the drain and flush down the toilet is suitably treated before being released into the environment is false," the report said.

Many of Canada's sewage systems are dumping grounds for all manner of wastes and must be cleaned up, the report said. An Environment Canada spokesman said Ottawa and the provinces are working toward developing a joint wastewater treatment program by 2006.

"All the provinces and territories have agreed to work on that," said Claude Fortin, chief of the municipal wastewater effluent division. "Then we could have those national standards," he said. "We could all agree as to how we should manage this sector."

Environment Canada will regulate the proposed national standards, Fortin said.

The report found Victoria's sewage outfalls discharged 2,920 metric tons of oil and grease, 9 metric tons of copper and 2.5 metric tons of cyanide into the ocean over a two-year period.

Lead, silver, mercury and other potential harmful chemicals were also found in the Victoria discharges.

Tests on effluent from treated sewage in Toronto in 2003 found a soup of chemicals, the study said.

"We're still failing to meet standards that they would have in the United States and Europe," Margot Venton, a spokeswoman for the Sierra Legal Defense Fund, said at a news conference in Victoria.

Montreal, which received an "F" grade, dumps 360 billion liters of raw sewage into the St. Lawrence River annually.

Dawson City, Yukon received an "E" grade because it continues to discharge 1 billion liters of raw sewage annually. But the E is an improvement over its previous F grade because the tiny community is awaiting funding to upgrade its sewage treatment.

Victoria didn't even rank a letter grade due to its decision to continue dumping 34 billion liters of untreated sewage into the ocean each year, the report said.

"It's time something were done about it," said Peter Ronald of the Vancouver Island-based Georgia Strait Alliance.

Killer whales and seals already have high levels of potential deadly compounds like PCBs, he said.

"These toxic chemicals play havoc with sea birds, mammals and other sensitive marine life and ultimately are consumed by humans through the fish and shellfish we eat," the report said.

S-Files
The Truth is Out There

A wandering photographer came across this rare and unusual site. We believe these regulators were experimenting with a new form of "tire repair product" that claimed it would rejuvenate the tire without replacing it (or your money back) — when the tire fell off dropping the van to the ground. (No leaching beds were harmed in this experiment!)

Rob's World

By Robert A. Passmore, B.Eng.

Who's Regulating the Regulators?

Power tends to corrupt, and absolute power corrupts absolutely. Lord Acton 1887

To begin, I am quite pleased that this column is finally getting some much craved feedback from our members. Feedback is feedback — good or bad. I want to hear your feedback since it shows that you care enough about an issue that I have raised and that you are willing to take the time to either write me a letter, pick up the phone, or email me with your opinion.

That having been said, in a follow-up to the last installment, I have received information that suggests that the problem of inconsistent delivery of Part 8 of the *Ontario Building Code* (OBC) is far worse than could have ever been anticipated. Throughout the province on Ontario, Chief Building Officials (CBOs) and inspectors are failing to enforce the fundamentals of Part 8 of the OBC on such items as loading rates for fill based systems, percolation rates that reflect the actual receiving soils, 90 cm vertical separation to high ground water table and rock, horizontal clearance distances to wells, rivers, etc. Unfortunately, the list goes on and on. Designers, installers, distributors and the like bare witness to these events on a regular basis but are powerless to do anything against it for fear of retribution or isolation from these regulators.

Currently, there is absolutely no safeguard in the OBC to identify and deal with "rogue regulators." Furthermore, with Regulation 124 on the horizon, more power will be granted to CBOs, thereby allowing their grip to tighten in their areas of influence. The resulting "tyranny" will eventually lead to greater overall apathy from the onsite wastewater industry and could threaten to dissolve organizations such as the Ontario Onsite Wastewater Association (OOWA). Unfairness breads frustration, frustration breads contempt, and contempt leads to anarchy. To illustrate this point, it is no surprise that an installer who endeavors to follow the OBC would become frustrated when they routinely lose jobs to those who get approval to do work that violates the regulations. As a result the installer, frustrated with the unfairness of the process, may very well start doing work that violates the regulations if for nothing else than to put food on the table.

Regulators have a duty of care to enforce the OBC to protect the public and to ensure that a fair and level "playing field" exists in the onsite wastewater industry. By breaching this duty of care, these individuals are slowly building a time bomb that threatens to eclipse the events of Walkerton. So the question is: who's regulating the regulators?

As many of you know, I seldom criticize actions by others without suggesting ways to correct or change those actions. In keeping with this principle, the following course of actions is proposed. The Ministry of Municipal Affairs and Housing (MMAH) and Ministry of the Environment (MOE) must appoint an "independent provincial auditor" whose duty it would be to systematically audit the approvals and inspections of each and every municipality's Part 8 OBC program. This individual would report directly to the Minister(s) thereby staying at arms length from the internal government bureaucracy.

To lobby the government to appoint a provincial auditor is certainly not a small undertaking. It requires significant amounts of time, energy and numbers. This is where OOWA members must rise to the occasion. I ask each and every member who reads this article to take a few minutes to either call me at (613) 692-0160 x 1106 or email me at robert.passmore@rideauvalley.on.ca and state whether or not you are willing to support the lobby to appoint a provincial auditor or not. As a new year starts, please grant me this wish and respond.

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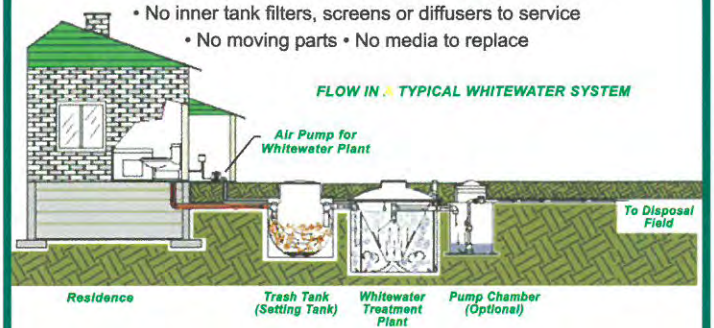

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What Happened Here? The Case of The persistent Pump

By Russ Lanoie taken from *ONSITE INSTALLER*, October 2004 Issue. For subscriptions visit www.onsiteinstaller.com.

Kevin Quint of O.M. Quint & sons of Conway, N.H., was called for the routine inspection and evaluation for a real estate transfer. Kevin learned that the onsite system has been built in 1991 and pumped in 1996. It was obviously a pumped system because the bed was about either feet about the septic tank, and the wiring connection box was located on a nearby fence.

The Problem

As Kevin began to uncover the septic tank, he could hear the ejector pump running. As he dug up the tank cleanout hatch, he heard the pump cycle again, within about three minutes of shutting off the first run.

This cycling continued, and it prompted Kevin to locate and uncover the distribution box to see what was going on there. He found that whatever the pump cycled, it took a while for the effluent to arrive at the D-box, and then only about a gallon would come through before the pump would shut off. The home inspector was in the house and had only enough water to check the plumbing fixtures.

Kevin went back to the pump chamber and quickly discovered the problem. What was it, and had these homeowners been paying abnormally high electric bill for almost ten years because of it?

The Solution

In New Hampshire, we install many pump stations, both to meet setback requirements and to get effluent up and out of the groundwater when constructing a raised (mound) systems.

We are required to install a check valve after the pump in order to keep water from spinning the pump impeller backwards, as it would if it drained back through the line into the tank. Not only does this prevent extra pump wear, but it also eliminates the possibility of the pump starting up while it is spinning backwards. This can happen if enough water enters from the septic tank to turn the pump on while water is still draining back from the discharge line. In order to discourage the water sitting in the pipe line from freezing in our northern climate, we generally drill a 3⁄16 to ¼-inch drainback hole after the check valve. Smaller holes tend to get plugged with debris. It is important to set the pump on/off floats to allow enough differential between on and off for storage of this drain back water along with the volume of effluent that the pump is supposed to send to the drainfield to meet the design criteria.

It should be obvious that if the float is set with too little differential, the water draining back from the pump line may be sufficient to start the pump running again to re-pump that water, even though no more water has been discharged from in the house. That's just what happened here, and it probably had been happening continually since the system was installed.

It seems the installer never considered this possibility and had tethered the pump switch ball only about 1 ½ inches from the ball. Without this drainback hole, this short tether would have resulted in a very short pump cycle, which, thought not good for the pump, would not have caused the problem that Kevin discovered.

Apparently the installer did understand the necessity of draining the pump line to prevent freezing and therefore provided a drainback hole. The result assured very little likelihood of freezing, because the water never sat still in the pump line. It was either being pushed toward the field by the pump or draining back to the sump by gravity.

The Pump was turning on every time the line drained back, even with no water use in the house. Short tethering the float switch (whether intentional or accidental) did not allow the drainback water to be stored in the pump chamber until additional water flowed from the house. Because the pump cycled constantly, I expect that the homeowner had an abnormally high electric bill, but never knowing what to attribute it to.

Lessons Learned

Installers should read, reread and understand the directions that come with the pump and float switch. Don't take things for granted. Someone designed the components to work in a certain manner and provide instructions to help you achieve the design criteria. In a state with a comprehensive permitting process, the designer should provide everything you need to consider when setting up a pump (though you may have to determine the exact float placement based on the manufacturers and designers criteria).

Consider the cross section of the pump chamber. The larger it is, the more water it can store for every inch of differential provided by the float. I just installed new float on a repair job and found very accurate directions for the amount of differential (turn on/turn off) provided by the differential tether lengths with a single float switch.

In a tank with a smaller diameter or cross section area, it may be necessary to use a double float switch to provide

enough differential to meet the pump criteria and allow adequate drainback storage volume.

Also recognize the volume of the discharge line and figure how much water will be returned for a pipe of the prescribed diameter and necessary length. There a whole lot more water in a two-inch line than a 1½ inch line. Although inspectors should be able to recognize an error like the one described here, their job is primarily to see that the environmental factors are met with the system installation. More often than not, they are to busy to check such details. An explanation to the homeowner of how his septic system works, including pump operation, would have caught this error and probably would have saved this homeowner quite a bundle on his electric bill over the several years it took to catch the problem.

Science Corner . . . Continued from page 3

Short Circuiting vs. Laminar Flow Patterns

To optimize separation of solids and to maximize retention time without short-circuiting, the tank design should encourage a well-developed, laminar flow regime. The 'mixing zone', with eddy currents and pressure differentials characteristic of the inlet area, should be dampened as early as possible in the pathway of the sewage.

A tank design with longer, narrower, or shallower aspects (e.g., Figure 2 on page 11) limits the mixing zone to the inlet area, and allows a well-developed, laminar flow regime to develop along the pathway well before the tank outlet. Only "old" water that has completed the fermentation process, and that has settled out entrained sludge particles, will exit the tank. Untreated sewage, or 'new' water, will not circumvent the old water by way of higher-velocity plumes.

Comparative Hydraulic Flow Testing

Hydraulic tests were carried out on four different tanks;

- Tank A: 1800 L Alberta CSA tank, no partition, single compartment,
- Tank B: 4500 L Ontario CSA tank, partition with 2:1 compartments (Figure 1a),
- Tank C: 4500 L Laminar submerged tank, partition with 2:1 sections, and
- Tank D: 4500 L Laminar submerged tank, partition with 1:1 sections (Figure 2a).

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Science Corner . . . Continued from page 9

The "Laminar" design has the inlet and outlet up in the 450 mm risers and a long shallow, narrow submerged tank, with no airspace above the water level, between the risers.

Light expanded clay aggregate (leca) was used as a surrogate or tracer for sludge particles (60 percent float; 40% percent), added to the inlet during pump dosing at a rate of 60 gpm. Volumes of ~5% and ~10% of the capacity of the tank (i.e., 90 and 180 L, 225 and 450 L for the 1,800 and 4,500 L tanks respectively) were added, and the effluent was screened for particles.

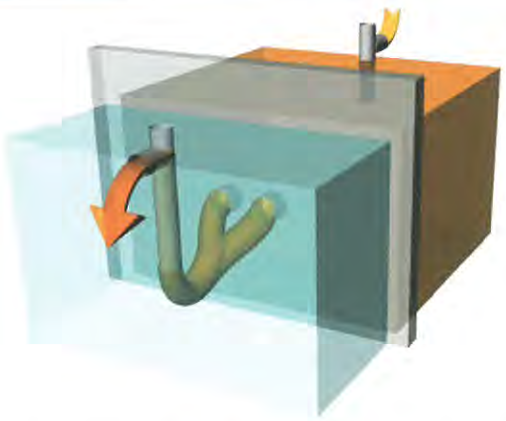

Figure 1. Ontario Tank B during 5 percent and 10 percent volume dosing, showing upwelling into airspace, and the visible "untreated sewage" plume that formed directly between partition and outlet

The small Alberta Tank A fared the worst with no partition wall and only 1200 mm between inlet and outlet. Even doses of 90 L and 180 L (5 percent & 10 percent of tank volume) allow escape of much "untreated sewage."

In the Ontario Tank B, a distinctly visible, higher-velocity plume developed across the short, 790 mm second compartment (Figure 1). This plume emanated from the two partition openings and coalesced into a single plume directed to the outlet baffle, and substantial 'untreated sewage' escaped (Table 1).

For both tanks, the effect of doubling the pumped volume from 5 percent to 10 percent, was to produce more than double the amount of "untreated sewage" short-circuiting through the tank (Table 1).

Laminar Tanks C and D passed no solids through at all, even after flushing with additional water, presumably due to laminar "plug" flow keeping "new" water near the inlet, and allowing only "old" water out. Longer term, stress tests were also carried out on laminar Tank C, including continuous pumping, with only minute traces of solids passing through.

	AB CSA Single Tank A	ON CSA 2:1 Tank B	Laminar 2:1 Tank C	Laminar 1:1 Tank D
5%			–	–
10%			–	–

Table 1. Relative amounts of leca solids ("untreated sewage") passing directly through the tanks

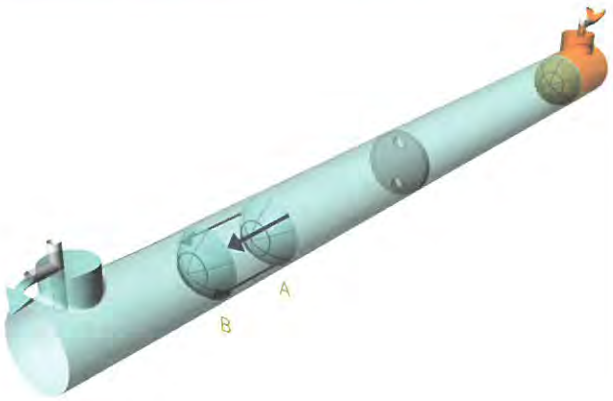

Figure 2. "Laminar" Tank D during 10 percent volume dosing (450 L), with "untreated sewage" contained near inlet, and only "old," treated sewage exiting tank. Parabolic discs depict relative flow velocities over cross-section of tank, and movement of water from disc A to disc B during 10 percent dosing.

Conclusions

When the goal is to capture sludge particles and retain sewage in the septic tank long enough for thorough fermentation, a longer, shallower configuration with no airspace over most of the tank length appears to be preferable to the short, deep, box tank design now prescribed in CSA B66. Sewage volumes pumped to a standard septic tank should be limited to <5 percent of the tank volume to minimize untreated sewage being sent to the leaching bed.

References

- Richard Lay, M.A.Sc., P.Eng., Enermodal Engineering, Kitchener ON
- Max Weiss, Weiss Research, Polson, Montana
- Kris Pataky, Engineering Student, Waterloo Biofilter Systems, Rockwood ON
- Craig Jowett, Ph.D., P.Eng., Waterloo Biofilter Systems, Rockwood ON

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Frequently Asked Questions

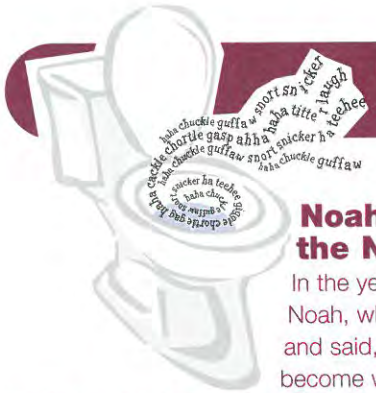
Taken from Branch Opinion, Articles 8.2.1.4 and 8.2.1.6 (January 6, 2000), Clearances for Class 4 and 5 Sewage Systems 1997 OBC Reference: Articles 8.2.1.4. and 8.2.1.6.

Do requirements for clearances of the sewage systems from structures apply to decks or sheds?

Tables 8.2.1.6.A., 8.2.1.6.B. and 8.2.1.6.C. specify the minimum clearance distance for a structure from treatment units, distribution pipes and holding tanks. These distances are 1.5 m, 5 m, and 1.5 m, respectively. The clearance distances shall be generally adhered to as minimum requirements of the Code. However, it is the opinion of the Branch that for the purpose of considering clearance distances, a structure may be viewed in light of its potential impact on the operation and maintenance of the sewage system. Consideration should be given to whether the operation of the sewage system or any component could adversely impact on, or be impacted by the structure.

For example, a sewage system may not require the same clearance distance from a deck or a shed, with no below ground components, that it requires from other buildings provided that the deck or the shed will not likely affect the operation or impede the maintenance of the sewage system or any component. Hence, decisions on the appropriate distance may be approved on a case-by-case basis by the enforcing authority taking into account the above consideration.

The Final Flush



Noah and the New Ark

In the year 2004, The Lord came unto Noah, who was now living in Canada, and said, "Once again, the earth has become wicked and over-populated and I see the end of all flesh before me. Build another Ark and save two of every living thing along with a few good humans." He gave Noah the blueprints, saying, "You have six months to build the Ark before I will start the unending rain for 40 days and 40 nights."

Six months later, the Lord looked down and saw Noah weeping in his yard . . . but no ark.

"Noah", He roared, "I'm about to start the rain! Where is the Ark?"

"Forgive me, Lord," begged Noah. "But things have changed. I needed a building permit. I've been arguing with the inspector about the need for a sprinkler system. My neighbors claim that I've violated the neighborhood zoning laws by building the Ark in my yard and exceeding the height limitations. We had to go to the Development Appeal Board for a decision. Then Transport Canada and the Departments of Highways and Hydro demanded a bond be posted for the future costs of moving power, trolley and other overhead obstructions, to clear the passage for the Ark's move to the sea. I argued that the sea would be coming to us, but they would hear nothing of it. Getting the wood was another problem. There's a ban on cutting local trees in order to save the spotted owl. I tried to convince the environmentalists that I needed the wood to save the owls. But no go! When I started gathering the animals, I got sued by an animal rights group. They insisted that I was confining wild animals against their will. As well, they argued the accommodation was too restrictive and it was cruel and inhumane to put so many animals in a confined space. Then Environment Canada ruled that I couldn't build the Ark until they'd conducted an environmental impact study on your proposed flood. I'm still trying to resolve a complaint with the Human Rights Commission on how many minorities I'm supposed to hire for my building crew. Also, the trades unions say I can't use my sons. They insist I have to hire only Union workers with Ark building experience. To make matters worse, the Canada Customs and Revenue Agency seized all my assets, claiming I'm trying to leave the country illegally with endangered species. So, forgive me, Lord, but it would take at least ten years for me to finish this Ark."

Suddenly the skies cleared, the sun began to shine, and a rainbow stretched across the sky. Noah looked up in wonder and asked, "You mean you're not going to destroy the world?"

"No," said the Lord. "The government beat me to it."

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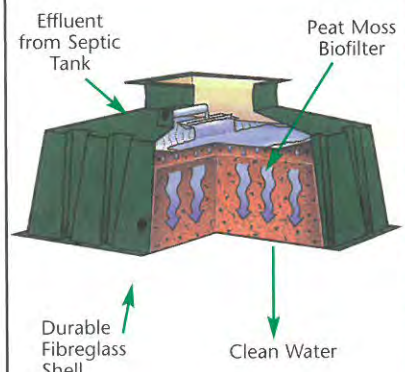

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