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A NEWSLETTER PUBLISHED EXPRESSLY FOR THOSE WORKING IN THE SEWAGE INDUSTRY

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Provincial Government Continues to Ignore Science Regarding Well Setbacks

The provincial government Ministry of Health Services changed to the Sewerage System regulation in June requiring all systems (treatment and distribution) to be 30 meters (100ft) from drinking water wells.

The change to the regulation was done without industry consultation and with no scientific justification. The regulation changes do not protect other water sources besides wells and reduce the Sewerage System Standard Practice Manual (SPM) setbacks to community water wells and high production water wells.

BC Onsite Sewage Association participated in an ROWP meeting in Prince George September 14th 2010 where Director of Public Health Protection Tim Lambert, MLA Pat Bell and MLA John Rustadt committed to reviewing the new setback requirements. As follow up from that meeting BCOSSA sent a letter to Mr. Lambert providing scientific and policy support and recommendations for language changes. BCOSSA's letter sighted the current draft Canadian Standards Association B-65 standard for Design and Installation of Onsite Systems, US EPA Manual and papers by Dr. Richard Otis and Dr. Jerry Tyler .

In response to the BCOSSA letter Mr. Lambert stated "Our approach

strikes a balance between public health protection and flexible options for land owners and risk management" The "flexible options" available is expensive assessment by a profession Hydrogeologist.

BCOSSA has further requested scientific rational from the Ministry of Health to support the change in setbacks from treatment systems that has been traditionally 15 meters (50 ft) to the current 30 meters (100ft).

Within this edition of the Innovator we provide an article on a recently completed study by UBC (Onsite Sewage Systems, Decrease risk of Intestinal Infectious Diseases) which indicates a higher risk of illness from big pipe sewer than from onsite. We will be providing this study to the ministry in support of a review of the setback requirements.

The current regulated setbacks are scientifically unwarranted especially regarding septic tanks and treatment systems, increase the cost of design and installation of systems and provide no additional protection for public health than the traditional setback requirements.

BCOSSA will continue to inform the ministry of the industry's concerns with respect to regulatory issues.

You may view all ministry letters at www.bcossa.com



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15th Annual Conference, Trade Show and General Meeting

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The BC Onsite Sewage Association held its annual conference tradeshow and AGM at the Langley Casino and Convention Centre. The conference and trade show provided an opportunity for members to get together and learn about new techniques and technology within the industry as well as have conversations and share ideas with other Registered Onsite Wastewater Practitioners.

Patrick Lucy the key note speaker spoke to use about the opportunities to use wastewater for improving our ecology, integration into the ecosystem and potentially producing energy.

Dr. Dick Otis and Dr. Raza Shams in their presentations spoke to proper selection of flows for systems and the use of membrane technology for onsite systems. The presentation included proper selection and installation of septic tanks through to the use of technology to reduce nitrogen content in effluent.

The conference portion of the AGM was rounded out by a pumps and control workshop by Don MacRae who provided a comprehensive look at choosing, installing and setting up pumps and control panels.

Thank you to all of our speakers for making this event a success:

Dave Pownall ,Manco Tanks Ltd.

Dr. Richard Otis Otis Environmental Consultants,

Patrick Lucy Aqua-Tex Scientific

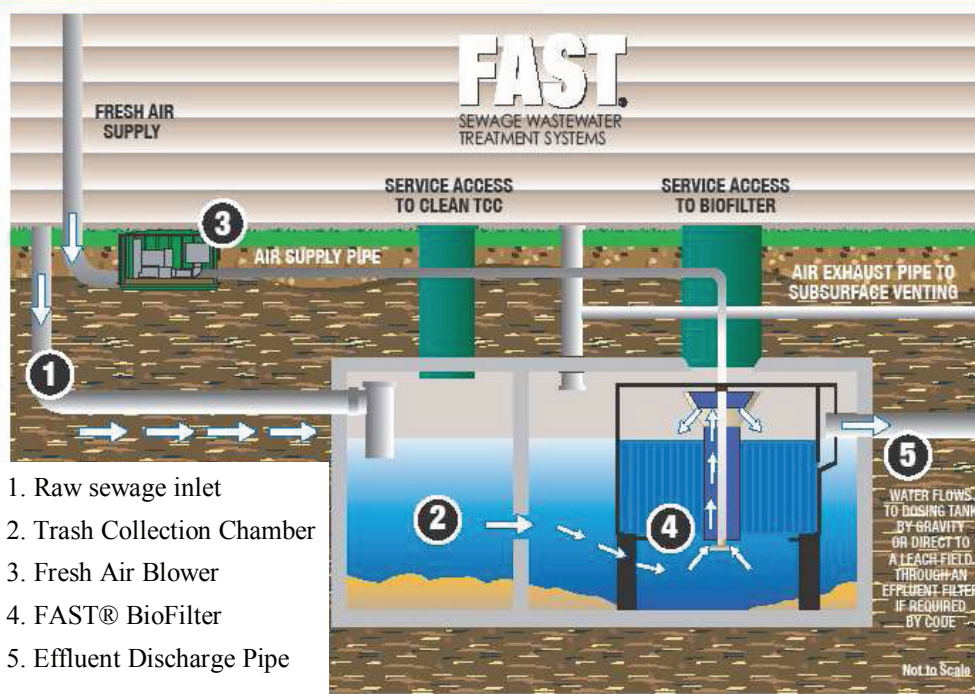
Ian Ralston TRAX Developments Ltd.

Dr. Reza Shams, Biomicrobics Ltd.

Chris Jowett, Waterloo Biofilters Ltd.

Don MacRae, Pump Tech Inc.,

The Annual General Meeting was held on Saturday February 26th. Members brought forward their concerns and recommendations regarding by-law changes, fee changes and discussed issues related to the most recent changes to the Sewerage System regulation. Minutes of the AGM can be found on the BCOSSA website at: www.bcoffa.com. Elections were held for this years Board, the new board of directors are listed on the left.



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Wading Through Language Confusion in the SPM

The Sewerage System regulation provides definitions for treatment and discharge of sewage effluent into soil based discharge areas. The combination of the treatment and then discharge in into properly designed systems utilizing standard practice is to protect the public from potential health outcomes caused by exposure to sewage.

The Sewerage System Standard Practice manual is the primary standard used in BC to achieve proper treatment and discharge of wastewater effluent. The SPM is designed to be a flexible standard that is intended to be updated from time to time (once ever two or three years) to ensure that it is capturing current technologies and techniques and also applies current theoretical models to ensure Practitioners can utilizes the best possible design for each site.

Recently suppliers of wastewater technology have been providing new options for the treatment of effluent that blur the common division for "treatment" as defined by the regulation and "discharge area" as defined by the regulation. These new methods can provide useful options for the Practitioners; however they may also cause some confusion as well.

The Standard Practice manual also blurs this division with respect to sand mound or other sand based distribution techniques.

Practitioners should ask themselves, where does the treatment start and stop, does the discharge area meet proper vertical separation, hydraulic and linear loading rates that will protect public health.

The Practitioner must be cautious as current documentation does not use consistent in language "sewerage system" means a system for treating domestic sewage that uses one or more treatment methods and a discharge area, but does not include a holding tank or a pivvy;

Within the definitions "treatment method" and "discharge area" are treated separately and as individual components of the total. This independence of treatment and discharge area is intentional and allows for the performance of the "treatment method" to be assessed or sampled to

ensure compliance with type 1,2,3 performance standards.

The regulation allows then under section 3 the construction of a system (combination of treatment method and discharge area) that "does not create a health hazard" if designed and installed in accordance with "standard practice". It is fair to state here that it is assumed that "standard practice" will if followed protect public health.

The Public Health Act defines health hazard "health hazard" means

(a) a condition, a thing or an activity that

(i) endangers, or is likely to endanger, public health, or

(ii) interferes, or is likely to interfere, with the suppression of infectious agents or hazardous agents, or

(b) a prescribed condition, thing or activity, including a prescribed condition, thing or activity that

(i) is associated with injury or illness, or

(ii) fails to meet a prescribed standard in relation to health, injury or illness;

The SPM provides variations of description of "treatment method" and "discharge area" that are not clear regarding the regulations separation of the two components. This confusion is especially poignant with respect to section 2.3.4.2 which is within the reference section related to hydraulic loading rate (discharge area) and states in part:

Basal loading rates are based upon Type 2 effluent for these systems, PROVIDED THAT they are designed, installed and maintained to the standards in Part 3 of this manual AND they meet the minimum sand depth standards of Section 2.3.3

One could assume from this statement that "treatment" is the minimum sand depth required over the "native" VS in table 2-5 . Therefore the sand "treatment" could be as little as six inches. Although further clarification is made below the table as follow:

Sand mound sand media depth below bed should:

- have a minimum of 18" (46 cm) of mound sand

below the bed with pressure distribution, dosing design per Section 3.8; and,

- have a minimum of 12" (30.5 cm) with timed (>18 × per day at Daily Design Flow, dosing design per Section 3.8) dosed pressure distribution.

Where soils are sand, gravel or gravelly sand or in other soils where Type 2 10/10 effluent is needed (by site capability tables Section 2.3.6); minimum sand depth should be 24" (61 cm).

If all the instructions are followed as outlined above then the "treatment method" is a combination of the sand media AND effluent distribution with a minimum sand layer of 12 inches. (Note: this is inconsistent with other "treatment method" and "discharge area" VS found in table 2-4).

When TB 5 "combined treatment and dispersal systems" is considered there are significant language discrepancies between the TB, the SSR and the SPM. Although upon careful consideration the intent of the SSR is being met as the term "point of application" within the TB can be interpreted to be the end of the "treatment method" where the "type" of treatment must be obtained. Described within the TB is sample method recommendations which would

supply treatment type information.

However, to provide clarity the TB should be rewritten to ensure the reader plainly understands that the "treatment method", and "dispersal area" should be clearly defined. Additionally, requirements to meet HLR and LLR must also be included as per SPM language.

Conclusion:

The SSR defines system as a combination of treatment method and discharge area that will if constructed in accordance with standard practice prevent health hazards from sewage effluent. The intent of the SPM is to define the design criteria of the "treatment" and "discharge area" components clearly for technical experts. Confusion in wording between the SSR and SPM results in lack of clarity and potential departure for the use of appropriate standards.

Recommendation:

Rewrite the SPM to reflect SSR terminology. Provide clear definitions of end point of treatment and beginning of discharge within the SPM (TB) within systems.

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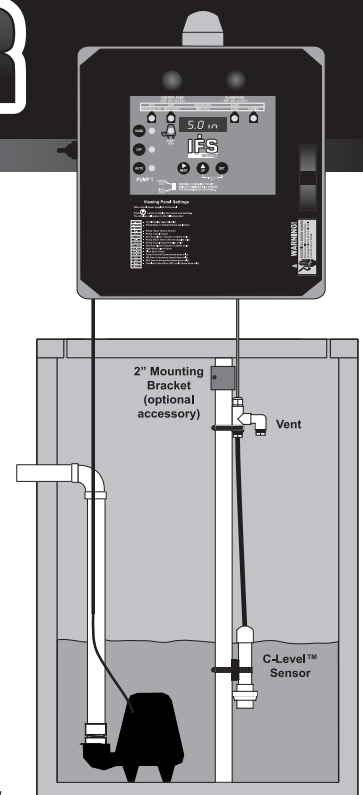
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Onsite Sewage Systems Decrease Risk of Intestinal Infectious Diseases

Reduced risk of enteric disease for families on septic systems and private wells than for those who are connected to public water and public sewer was a conclusion of a study released by Dr. Kay Teschke, School of Population and Public Health and School of Environmental Health, University of British Columbia.

The study was conducted over a period of six years and used medical services plan data to examine physician visits and hospitalizations among 126,499 residents of the Township of Langley. The study team compared the occurrence of enteric disease (i.e. nausea, vomiting, upset stomach etc.) across different sewer and water services and land uses.

The Township of Langley was chosen for the study due to its unique mix of rural and urban development and the mix of community and private water supply. The Township database included 29,458 unique parcels of land. Of the parcels, 30.9% were recorded as private water users only, 66.3% were recorded as municipal water users only, though 69.1% were connected to the municipal water supply at some point during the study period.

At the beginning of the study period, no parcels received chlorinated water while over two-thirds (20,387) did by the end of the study, including municipal and community water supplies with surface and well water sources. About half the parcels (49.4%) had private septic systems only, 48.9% were connected to the municipal sewer system only, and 50.6% were connected to the municipal sewer system sometime during the study period. There was a slight decrease in the number of parcels with an agricultural use code from the beginning of the study (8.1%) to the end (7.0%).

During the study period 7,017 physician visits and 180 hospitalizations for enteric illness were recorded in the MSP data. As is usual in this type of study, the very young and very old had a higher incidence of reported illness. There were also higher rates of illness in the fall and spring as well as for those who lived in neighbourhoods with lower household incomes. Not surprising, those who consumed chlorinated water were less likely to become ill. Incidences of illness were also lower for people who lived with onsite wastewater systems.

There was no clear pattern related to the type of water system and the incidence of illness except that those with wells connected to a small number of properties had the lowest rates whether run by a private community or by the municipality.

Environmental Factors

The main focus of this study was whether environmental variables related to water quality were associated with intestinal infectious diseases. Chlorination was associated with lower physician visit and hospitalization rates (latter not statistically significant). Even the small reduction in risk suggested by this data may have public health importance, since this is one of the dominant methods of water treatment. Although chlorination has been shown to be effective in preventing enteric disease outbreaks, the few reports investigating endemic (consistent background levels within the population) disease have been less clear. Hellard et al. examined a childrens hospital emergency visits before and after chlorination of the Melbourne, Australia water supply but found no change in disease rates. Odoi et al. found no difference in giardiasis rates between areas in Ontario, Canada with and without chlorination.

This study was able to examine numerous types of water systems and sub-classifications of those systems. It was expected that those with private well water would have higher enteric disease rates than those with municipal and community well water as found by others, but this was not the case. Two small municipal well water supplies each serving fewer than 100 homes had physician visit rates that were about half those of the private wells, but other municipal and community well water sources had rates similar to private wells.

Well depth was not associated with differences in endemic disease rates lending support to lack of influence of private well water on disease rates, though it is important to note that wells with known depth were likely to have been correctly constructed to prevent contamination, as well depths were voluntarily reported by professional well drillers.

A survey of a random sample of 1,000 households within the Township was used to collect additional information about area residents. Evidence from it suggests that most Township residents with private wells were well informed about their water systems and conscientious about testing them and correcting problems.

It was expected that those served by municipal surface water supplies would have higher disease rates than those served exclusively by municipal well water systems. There was some evidence of this in the physician visit but not the hospitalization data. Of the 5 systems that had mixed surface and well water, the two with the highest proportions of surface water had the highest physician

visit rates, about 50% higher than those served by most other systems types, including those with smaller proportions of surface water.

Although the relationship between sewage contamination and enteric disease outbreaks are well understood, only two other studies that examined endemic disease risk by sewage system type were identified. Denno et al. found higher rates for Salmonella infection for those with private septic systems. Febriani et al. found no difference in gastrointestinal illness prevalence between those with private and municipal sewage disposal.

It was expected private septic systems might have drain-field to-well contamination that could result in higher disease rates. Instead higher disease rates were observed among those with municipal sewer connections for both physician visits and hospitalizations (the latter not statistically significant). This result was apparent in the initial crude analysis and remained after adjustment for all other factors.

This study examined disease rates for the interaction of sewage and water system types. There was no difference in rates between private and municipal sewage systems for those with private well water, but those with both municipal sewer and municipal water systems whose pipes are likely to run along similar paths, had higher disease rates.

The reasons for the higher disease rates for municipal sewer users remains unclear and should be subject to additional study.

Water lines are required to be separated from sewer lines by 0.5 m vertically (sewer lines below) and 3 m horizontally, where these conditions cannot be met, the water main is to be protected from infiltration by wrapping the pipe joints with petrolatum tape. Although there is no comparable data from the Township, some studies have shown possible modes of contamination despite the care taken when pipes are laid.

Conclusion:

This study shows unexpected results that counter the commonly held belief that onsite sewage systems increase risk of enteric disease. The study underscores the need to compare different system types and indicates that protection of public health through the use of municipal infrastructure may not be guaranteed as previously believed.

View the complete study at: <http://www.biomedcentral.com/content/pdf/1471-2458-10-767.pdf>



health, safety & environmental

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Fate of Fecal Coliform Bacteria ~ Is it the Particle Size or Something Else?

Starting in the 1860s, when the English first used a scientific basis for treating sewage, there have been many advances in the way wastewater has been applied to media to effect treatment. In Lawrence, Massachusetts between 1890 and 1910, many different media sizes and dosing regimes were tried. Through trial and error, several overriding premises were developed that effect bacterial removal in a packed bed filter - treatment media must be dosed with distinct dosing and resting periods in relation to particle size, dosing frequency, and dosing volume.

Until the early 1980's it was thought that the control equipment that was available wasn't reliable enough to successfully regulate the dose volume and frequency on the individual onsite system. Consequently, few secondary treatment systems were available for the single family residential market. The two common secondary treatment systems were mounds and intermittent sand filters (ISF), which used demand dosing. Because demand dosing delivers a known volume of wastewater at irregular intervals, it was necessary to use a small "effective size" sand media to insure a known level of treatment. Larger effective sized media can be as efficient in removing BOD and TSS as smaller sizes, but fecal coliform removal capability is not nearly as good.

As metrics were developed to measure system performance, the presence of fecal coliform bacteria (FC) became widely-used as an indicator organism to determine the potential presence of pathogenic organisms. As a result, regulatory treatment standards were established that use the concentration of FC bacteria as a basis to determine what treatment devices or processes will be required given certain site and/or soil limitations.

The onsite industry has operated on the premise that FC removal below 2,000 to 3,000 FC colonies/100ml can only be achieved with sand or soil based systems, or aerobic treatment units with an additional UV light. The media size of most modern intermittent sand filters (ISF) ranged between 0.15 - 0.3 mm effective size. In the latest version of the USEPA wastewater design manual, reference is made that an intermittent sand filter is the only stand alone technology that

will reduce the fecal coliform level below the 1,000 colonies / 100 ml level. (see excerpt at end of article). The theory has been that the smaller the particle size, the more FC removal could occur.

Modern ISF, RGFs, and mound systems incorporate a pressure distribution network with orifices evenly spaced to achieve uniform application of wastewater over the surface of the sand media in concert with timed dosing. This precise, timed dosing has been shown to enhance the treatment level of any given media. (W.T. Calloway, 1957). To compensate for media with larger particle sizes, one can decrease the dose volume and increase the dosing interval, i.e. smaller more frequent doses.

When larger particle sizes (3 - 5 mm) are used in recirculating gravel filters (RGFs), the media's retention time ability is reduced to the point where FC removal cannot be maintained. Fecal bacteria levels remain above 2,000 - 3,000 / 100ml, minimum. The liquid volume delivered from a pressure lateral to the RGF has an instantaneous dose volume greater than what promotes optimum bacterial removal in the gravel media. Liquid will pass through the gravel at about the rate it is applied. As a result, using an orifice drilled in the side of a pipe to regulate the flow of liquid through the media is very limited. It doesn't matter if the orifice is pointed up or down, is covered with an orifice shield or a chamber, the rate the liquid passes through the media will be too fast to remove FC, substantially.

ISF systems do a good job of removing FC. The media is small enough to create some matrix potential and pull liquid laterally in the sand media. This lateral movement increases the retention time needed for FC removal. With that said, there have been issues with ISFs: their long term viability can be marginalized and the large size can take up valuable room within the site development needed for other uses.

Another option is to incorporate an Aerobic treatment unit (ATU). ATUs can be somewhat inconsistent with respect to organic constituent removal and FC attenuation isn't much better than RGFs. As such, many companies that sell pre-packaged ATUs need to incorporate ultraviolet

disinfection light to meet regulatory requirements for lower FC numbers.

Therefore, the question should be asked, "Is there a product or process that will allow the onsite industry to provide a treatment process that is reasonably priced, compact in size, and meets the regulatory requirement for pathogen removal without the limitations or short comings of an ISF, RGF, or ATUs?" The answer is yes. This article develops the premise that the removal of FC to a very low level can be achieved with a larger particle size gravel media when continuously dosed with drip emitters. It is not necessary to have a distinct on and off cycle, a small media size, or a UV light.

Recently it was demonstrated that media meeting the ASTM C-33 number 8 standard (pea gravel) at a depth of 30" can be used as a treatment media in a RGF and consistently reduce FC levels to below 2 FC / 100 ml, while BOD5 and TSS values range below 10 mg/l, all without additional disinfection devices. The reason for the excellent results rests in the distribution method, which is continuously dosing through drip tubing. The basic design parameters are as follows:

The number and flow rate of the pressure compensating drip emitters are used to regulate the recirculation flow through the filter media. The drip emitters are 0.42 GPH, pressure compensating, Netafim Bioline®, emitters.

- A small dosing pump runs continuously.
- The recirculating filter is designed for 30 U.S. gal/ft²/day, forward flow.
- There are twelve emitters per square foot. Each emitter delivers 10 U.S. gal/day, for a total recirculating flow rate of 120 gal/ft²/day or a 4:1 recirculation ratio at maximum design flow.

In reality, a drip emitter doesn't actually dose liquid "continuously". Rather, the 0.42 GPH Netafim drip emitter delivers approximately 110 drops of liquid per minute. That translates to one drop every 0.55 seconds, or 158,000 drops of water, or "micro-doses" in a 24-hour period. These micro-doses produce a thin film of diluted wastewater over the media particles called a "treatment column". Many treatment columns can exist in each square

foot and still maintain high attenuations; although, the maximum number is not yet known. The results from two demonstration sites suggest that several more treatment columns per square foot can be added to increase either the recirculation rate and/or the forward flow design rate.

The quality of effluent begins to decrease when the recirculation ratio falls below 2:1, but recirculation ratios as low as 1.45:1 have yielded FC levels at 2/100 ml for several days. Therefore, a conservative design parameter could be to space the drip emitters in a 3.5"x 3.5" pattern. This spacing would equate to 12 emitters per square foot. When the design flow rate is calculated at 30 gallons/ft²/day, the resulting minimum recirculation ratio is 4:1, twice the point where treatment could begin to drop off.

Some conclusions: FC removal is a function of retention time, contact with media, and the presence of molecular oxygen. Media size is inconsequential when the flow of the wastewater through a treatment column is kept very low. By reducing the instantaneous dosing rate to a drop, retention and contact time are maximized. The larger particle sizes allow greater air transfer and reduce or eliminate the matrix potential that could spread the flow path over a wider area, thereby forming distinct, vertical treatment columns. The greater number of treatment columns per square foot equates to a greater loading rate.

The process for continuous dosing of a recirculating gravel filter and the corresponding control apparatus are part of intellectual property protected under a US patent. For more information contact Dave Lowe at dave@lowridgetech.com.

Performance of sand and other filters

Twelve innovative treatment technologies were installed to replace failed septic systems in Narragansett Bay watershed, which is both pathogen-and nitrogen-sensitive. The technologies installed consisted of an at-grade recirculating sand filter, single pass sand filters, Maryland-style recirculating sand filters, foam biofilters and a recirculating textile filter. The treatment performance of these systems was monitored over an 18 month period. In the field study, TSS and BOD concentrations were typically less than 5mg/L for all sand filter effluent and less than 20mg/L for both the foam biofilter and textile filter effluents. Single pass sand filters achieved substantial fecal coliform reductions, reaching mean discharge levels ranging from 200 to 520 colonies per 100ml for all 31 observations. The at-grade recirculating sand filter achieved the highest total nitrogen reductions of any technology investigated and consistently met the Rhode Island state nitrogen removal standard (a TN reduction of 50 percent or more and a TN concentration of 19mg/L or less) through the study. *Source Loomis et al.2001.*

Enviro-Septic® and the Standard Practice Manual

SEWERAGE SYSTEM REGULATION

Enviro-Septic® meets and exceeds the definition of a Type 2 Treatment Method as evidenced by two (2) standard setting and testing agencies recognized by the Standards Council of Canada.

NSF International (NSF) and the Bureau d' Normalization de Quebec (BNQ) are Standards Council of Canada recognized agencies. Contact Pinnacle for a copy of the NSF and BNQ listing or reports. These 2 certifications confirm the Type 2 Treatment Method. Adding an additional 300 mm of system sand under the Enviro-Septic® will give a Type 3 Treatment Method.

STANDARD PRACTICE MANUAL & TECHNICAL BULLETIN 5

The (SPM) Standard Practice Manual sets down the requirements for applying a Treatment Method into a variety of site conditions. Technical Bulletin No. 5 (TB5) was issued to provide additional information when considering the use of systems that offer combined treatment and dispersal.

A SPM and TB5 Compliance Report was prepared by a BC Professional Engineering firm. This Compliance Report outlines and sets down that the Enviro-Septic® meets the SPM and TB5 and details how the authorized person is to follow the SPM and TB5. Additionally, the Compliance Report describes how to meet the SPM requirements for sites where pressure distribution is required.

COMPLIANCE REPORT The Enviro-Septic® technology meets the definition in the Regulation for a Type 2 Treatment Method and when applied in accordance with the compliance report, the Enviro-Septic® meets the requirements of the SPM. The compliance review report confirms that

1. Enviro-Septic® technology meets the SPM & TB5
2. The Enviro-Septic® system is suitable for seasonal use applications.
3. To apply the pressure distribution method that to dose-to-D Box by siphon or pump is an acceptable alternative to the pressurization of laterals to achieve immediate even distribution.

STANDARD PRACTICE The BC Sewerage System Regulation defines "standard practice" as a means of constructing and maintaining a sewerage system that will ensure that the sewerage system does not cause, or contribute to, a health hazard. The Regulation allows for authorized persons to use the SPM as a means to ensure that standard practice is achieved. The authorized person is able to use Enviro-Septic® technology in accordance with the Compliance Report and they will have followed the SPM. Therefore the authorized person will meet the definition of "standard practice" pursuant to section 8 (3) of the regulation and to section 1.1.4 of the SPM.

COMPETITOR Ask them for a copy of their SPM & TB5 Compliance Report, accreditation report from NSF or BNQ and their design, installation and maintenance manual. Some of our competitors have these some do not.

ROWPs may not be in compliance to the Regulation when designing for or installing a treatment method Type 2 or 3 that is tested or listed by an agency that is not recognized by the Standards Council of Canada.

Contact Pinnacle for your free copy of the Compliance Report, NSF listing or the BNQ 12 month testing report.



Enviro-Septic® being installed following the hydraulic linear loading rate



Bio-Accelerator™ provides for immediate even distribution throughout the rows. Dose-to-D Box or header provides equal distribution to each row of Enviro-Septic® Pipes. Laterals of Enviro-Septic® pipe are not pressurized and the wastewater flows by gravity throughout the entire row.

Pre-Treatment and Dispersal Type	Minimum Vertical Separation in Native Soil	Minimum as Constructed Vertical Separation	NOTES
Type 2 gravity	36" (91 cm)	36" (91 cm)	Enviro-Septic® installed using gravity flow through D Box or Header into 3" or 4" perforated pipe
Type 2 pressure distribution acceptable alternate as outlined in P. Eng. report	24" (61 cm)	24" (61 cm)	Enviro-Septic® installed using Dose-to-D Box using siphon or pump feeding directly into Enviro-Septic®
Type 2 pressure distribution acceptable alternate as outlined in P. Eng. report	18" (46 cm)	30" (76 cm)	Enviro-Septic® installed using Dose-to-D Box using siphon or pump feeding directly into Enviro-Septic®
Type 3 pressure distribution acceptable alternate as outlined in P. Eng. report	18" (46 cm)	18" (46 cm)	Enviro-Septic® installed using Dose-to-D Box using siphon or pump feeding directly into Enviro-Septic® plus another 300 mm of system sand underneath pipes
Type 3 pressure distribution acceptable alternate as outlined in P. Eng. report	6" (15 cm)	24" (61 cm)	Enviro-Septic® installed using Dose-to-D Box using siphon or pump feeding directly into Enviro-Septic® plus another 300 mm of system sand underneath pipes

No Power No Media Replacement Low Maintenance
 Highest Treatment Performance 1 Day Installation
 Standards Council of Canada recognized Testing

Treatment Performance (from day 1)		
	Influent	Effluent
BOD5	250	< 5
TSS	250	< 5
* Fecal Coliform		< 200 CFU/100 ml

* Type 3 with an additional 300 cm of system sand



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Unlike many other jurisdictions, British Columbia does not have a regulatory body that oversees the approval of wastewater treatment products. Instead, the Public Health Act's Sewerage System Regulation grants authority to authorized persons ("professionals" and "registered onsite wastewater practitioners" – ROWP} to select treatment products and set system design standards. ROWPs are guided by the B.C. Standard Practice Manual; however, the individual authorized person has a great deal of latitude in selecting the Type 2 or Type 3 treatment unit to recommend to his/her clients.

Because of the lack of regulatory oversight in B.C., the professional or practitioner, by default, is relied upon by the public to safe-guard their health and protect the environment. The decisions made by each professional or practitioner collectively impact the onsite wastewater treatment industry as a whole. The integrity of the industry is greatly enhanced when the professional or practitioner employs due-diligence and makes system recommendations based on a cost/benefit analysis that seeks the best long-term solution. Selecting a treatment product based solely on acquisition cost is not likely to serve the interests of the customer or the environment; it is also likely to diminish the public confidence in these practitioners and the onsite industry as a whole. The ROWP puts his/her personal integrity and reputation on the line each time they select a treatment unit; if the system fails prematurely, the ROWP could face personal liability and financial responsibility.

There are many innovative wastewater treatment products that ROWPs can choose to utilize in B.C. However, some of those products have been subjected to extensive third-party testing to quantify their treatment capabilities, while others have not. The Canadian Federal government established the Standards Council of Canada (SCC) to oversee the establishment of testing protocols and standards, including those applicable to the treatment of wastewater. Currently, the SCC has issued accreditation to two agencies—NSF International (NSF) and Bureau d'Normalization du Quebec (BNQ)—empowering them to set wastewater

treatment standards and to establish protocols to be used to test treatment efficacy.

Even experienced regulators and professional engineers cannot tell by looking at a product whether or not it will work as the manufacturer claims it will. In several unfortunate situations, manufacturers were able to obtain approvals in spite of the lack of performance testing, based on little more than anecdotal evidence. Once approved, these products are used primarily based on a price differential. While using these products might seem like a "bargain" for the customer at the time of the sale, if widespread failures ensue and systems only a few years old need to be replaced, the ROWP will be held accountable by both customers and colleagues. In order to avoid such situations, there is a growing trend throughout North America toward requiring performance testing of innovative technologies before they are approved for use. Some B.C. ROWPs, like this author, have chosen proactively to recommend only those products that have obtained certification under SCC-approved testing.

Utilizing treatment technologies that have successfully completed NSF or BNQ testing protocols provides the ROWP with a high level of assurance in the functionality and reliability of the products they recommend. Recommending these treatment units allows practitioners to fulfill their due-diligence obligations, meet the criteria set forth in the Standard Practice manual, and adhere to their industry's code of ethics. Thoughtful and responsible product selection by ROWPs in B.C. will advance the goals of protecting the public and the environment, in addition to enhancing the reputation of the profession. Readers are encouraged to contact the author with any questions about treatment units that are covered under the SCC program. Lists of NSF and BNQ certified wastewater units and detailed information about their test protocols are also available directly from BNQ (www.bnq.qc.ca) and NSF International (www.nsf.org).

The United Nations Millennium Ecosystem Assessment report revealed a disturbing and persistent depletion of the Earth's natural capital and ecosystem services, and a rapid global increase in consumer-based standards of living. Coupled with a shift toward largely urban populations, this has led to unprecedented global pollution. There is now widespread concern amongst the world's scientific community that climate change, believed by many to be a result of rising GHG emissions, is adversely affecting global economies and has the potential for dramatic economic upheaval over the next few decades. There is a small community of scientists that suggests the extensive loss of riparian zones, wetlands and forested landscapes, consequent loss of sequestered carbon and carbon cycling, shifts in energy balance from latent to sensible heat (e.g., urban heat island effect), and other natural stabilizing feedback loops are also critical as regulators of climate change and may be under-estimated in current climate change models. At the same time that Southern Australia endures record heat waves, the snow pack in the Rockies is below normal and agriculture is threatened in many areas by a lack of water. Thus, a relevant question is whether the planet is heating up and drying out, or drying out and heating up?

Water is a finite resource which nature recycles constantly, yet modern cities are designed to use water only once before it is considered "wastewater". High quality, often highly treated and expensive, drinking water is used for everything. If we changed the design of our cities, to conserve and reuse water in a "fit-for-purpose" manner, more water could be left in the ground and in the streams to moderate our climate, and the enormous energy demand for pumping and treatment would be reduced. Recovering heat from sewage, and energy from biosolids and organic waste, would further reduce the energy demand of our cities, reduce GHG emissions, increase local employment and reduce national dependence on foreign energy.

Peak oil, predicted to occur within the next decade, will have a significant effect on the manner, and associated costs, of maintaining and managing urban infrastructure. Three decades of extensive research suggest that a global shift is required in

development and management paradigms for urban centers and that such changes can no longer be made in an incremental fashion. If urban design and management are to become sustainable, then the rate and scale of change must be sufficient to transform the function and structure of urban systems. The principle of industrial ecology, and associated whole system thinking lie at the heart of a new approach developed for managing water, waste systems and energy, within an integrated resource recovery management model. As climatic conditions become less predictable and extreme weather becomes more common and as the world economic crisis reveals how interdependent countries are, we must find adaptive strategies to increase the resilience of our cities to external, disruptive forces.

"Integrated Resource Management" (IRM) is one such adaptive strategy. At its core, it examines how and where water and energy are used and generated, and seeks to co-locate the supply with the demand. This co-location of supply with demand provides a new opportunity to generate revenue. Decentralized tertiary wastewater treatment produces heat, water, nutrients and bio-solids that can be reused rather than discharged into the environment. By capturing "waste" heat energy from sewage, Gotenburg Sweden, for example, has demonstrated that tens of thousands of homes can be heated at reduced cost to the occupants while generating revenue for the utility. Organic kitchen waste that would normally go to the landfill can be redirected to create syngas or biofuels, together with the solids from sewage. These "new" carbon neutral energy sources then displace fossil fuels, saving money and helping communities to meet GHG targets while increasing energy supply flexibility and security.

The achievement of sustainable and healthy urban environments will require designing water and waste systems in accordance with ecological principles of integration and the fundamental notion that nature has no wastes (liabilities), only resources (values). Therefore, the design and planning process must be guided not by accounting for the costs of addressing waste management, but by optimizing the benefits through a Green Valuation strategy. Through IRM, infrastructure is designed in harmony with nature, such that net revenues from recovered resources are

maximized, thereby minimizing costs to taxpayers—rather than minimizing the cost of managing wastes.

This regional-scale model of Integrated Resource Management (IRM) requires decentralized wastewater treatment and energy recovery designed around a business case (not a business plan). While the business case focuses on the role of private sector-based implementation, ecological systems and ecosystem services are priced within the financial model, thus valuing externalities that are usually un-priced. The model integrates water supply, liquid and solid waste systems, energy supply, transportation, land use, and building designs for a whole-systems approach to urban design. Potential benefits from implementing a region-wide IRM framework for sustainable communities include:

- Reducing GHG emissions by 25 percent (to below 1990 Kyoto levels);
- Providing carbon-neutral energy for government operations;
- Improving ecological health of urban watersheds;
- Supporting water conservation and reducing the need to develop new water supplies
- Contributing to electrical energy conservation goals; and

- Reducing taxpayer contribution to new infrastructure.

None of the component parts of IRM are new. Indeed, many of the components are old technology, currently in use around the world. IRM is about combining the components in a new way, with a different purpose. Its goal is to generate revenue and restore ecological systems while converting waste back into resources. Traditional waste management is about disposing of a problem in order to maintain the status quo. The whole IRM system is designed to be zero waste, carbon neutral, ecologically restorative and financially profitable from the sale of energy, metals, and recycled water. Given that the extent of human activities rivals those of natural processes, a healthy ecology can only be based on sound economics, and vice-versa, for the undoing of one is surely the undoing of the other!

About the Author: Wm. Patrick Lucey, the President of Aqua-Tex Scientific Consulting Ltd. and Fidelis Resource Group Inc., is a senior aquatic ecologist with a background in resource management and political science. His specialties are managing water resources so that they add value to development projects, and demonstrating how maintenance and enhancement of ecological function can provide cost savings on infrastructure and result in a healthier environment.

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A Better Way

In days of old when Knights were bold and women weren't particular they lined them up against the wall and.....

About now you're asking yourself, what does this have to do with septic? Well in the old days we dug a hole in the ground, poured in some water, and went to see our local EHO. He/She took out their septic template (they knew all about this stuff because they had taken a three day course at BCIT as part of their training) and told us what we could build.

Now we have a performance based system. Systems are designed to meet the site conditions found instead of a prescribed template. Some things we know to be sure there is proper treatment of the wastewater:

- Minimal treatment happens in saturated soil.
- Unsaturated (aerobic) conditions must be maintained in the soil infiltration area.
- Needs to be a long enough retention time in the soil
- Must be enough vertical separation. A word of caution here. Ground water mounding, when wastewater accumulates at the water table or impervious layer, it will reduce vertical separation.

LTAR. What the hell is that? It is defined as the volume of wastewater that can continuously infiltrate and percolate through the soil per a unit of time. L/M sq./day. In other words, if done correctly HLR (hydraulic loading rate) and LTAR (long term acceptance rate) are the same thing.

Biomat (biological clogging) you know that black/gray sticky, slimy stuff you find in a failed septic field, is the primary cause of reduced soil infiltration. It ranges from 7 to 25 mm thick and takes about a year to get there. As the biomat becomes thicker the rate of infiltration slows down and the waste water begins to build up (pond). Keep adding more waste water and it gets worse. Now we have saturated conditions and don't have enough vertical separation. This makes for lousy treatment (see

above). Eventually it will break out causing a "Health Hazard" and the SHIT will hit the fan and you're in trouble.

So you say lets design these things so they won't form biomat.

No. Biomat can be a good thing. In fact perk soils such as sand it can slow down the rate of infiltration and (see above again) give us enough retention time for proper treatment. Also because biomat has a lower infiltration rate than most soils (the exception being clay) the soils surrounding the infiltration area stays drier, unsaturated, and (see above once again) we get better treatment.

In theory biomat decomposes and renews itself in a continuing cycle if the LTAR is correct. In effect it becomes a natural filter and the system could last forever. If you design with the HLR in the SPM you will be following all these conditions because these loading rates were developed over time by someone much smarter than me. Dr. Jerry Tyler comes to mind.

Other ways to reduce infiltration are high strength wastewater which can cause chemical clogging (there are many books written about this which I will not repeat here just believe it) or TSS (total suspended solids) which will defiantly plug things up.

The main cause that we have control over is mechanical clogging, lousy construction practices, such as smearing, compaction and working the soil when too wet. You know who you are.

Biological clogging can be reduced by dosing pretreated effluent (type 2 or type 3) at the correct HLR. I.E. pumping and/or time dosing.

The HLR tables (LTAR) in the SPM say we can load type 2 at twice the loading rate of type 1 and three times the rate using type 3.

I read somewhere that "malfunction rates for advanced technology systems were twice that of conventional septic systems when maintenance was left to the homeowner".

Think about it. The home owner turns off the blower because he doesn't like the noise or thinks it costs too much to run. The UV lamp is burned out but no one replaces it. The system now produces type 1 effluent at type 2 or type 3 loading rates. Or the basement has been turned into a suite.

All these conditions will result in much higher loading rates than the system was designed for and result in failure.

The better way uses soil characteristics and wastewater quality to ensure proper design and long term performance of septic systems. We spent our own time and money to learn this. If only the Government would hold up their end of the bargain and enforce their own rules on system maintenance. Now my dear lets find us a nice soft feather bed.

Advertisement



For Immediate Release

Bear Onsite, LLC Achieves NSF Standard 46 Certification

Somerville, TN (March 12, 2011) Bear Onsite, LLC is proud to announce that all six of its current effluent filter models, (ML3-910, ML3-916, ML3-925, ML3-932, ML3-948 and ML3-964) have been awarded NSF/ANSI Standard 46 Certification. The ML3 series of effluent filters becomes the first and only filters to date to successfully meet all the requirements of the 2010 Edition of Standard 46. "It's always a special accomplishment to obtain an NSF Certification," Bear Onsite President Theo Terry commented. "I'm very pleased to have been a member of the Zabel Environmental Technology design team which obtained the first Standard 46 certification back in 2000. Now, as President of my own company, Bear Onsite, I'm proud to once again be a front runner in our industry by achieving certification under the new and improved 2010 version of Standard 46."

"In 2000, when the NSF Joint Committee finalized the first set of test methods and criteria for effluent filters, we did our best to anticipate what the marketplace needed in a Standard," stated Tom Bruursema, General Manager of Wastewater Treatment Units at NSF International. "But as effluent filter use and regulations have evolved, the Committee has adjusted the Standard to address the needs of the market with (1) a new particle size test (1/16th or 1/8th of an inch), and (2) a new bypass protection test to address the potential issue of filters popping out of their cases and allowing a by-pass to occur."

Terry has more than 25 years of experience in the onsite wastewater industry, both as a local environmentalist and in the private sector. He has served on several committees at the state and local level, and helped draft the current standards. His expertise in the field of effluent filters has led him to believe that a field performance certification is the next step in determining how long effluent filters actually perform in the field. Terry has requested that NSF establish a Task Group to begin work on this important component. "I realize some Manufacturers do not want to see more certifications, and the cost associated with them, Terry said." "However, I think field certification is an important component to protect homeowners, so that they have actual data to assure them the products they purchase perform in the "real world" and not just meet a minimum regulatory requirement for outlet screens." For more information about septic system products from Bear Onsite, visit www.bearonsite.com or call 1-877-MLFILTERS (653-4583).

