ONSITE
WASTEWATER NEWS
ONTARIO ON-SITE WASTEWATER ASSOCIATION NEWSLETTER

## InSide



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**Technical Review**
Doug Joy

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# May 25 Official Opening of the Ontario Rural Wastewater Centre a Success!

by Chris Kinsley, ORWC

Penny Dutton, Assistant Deputy Minister at the Ontario Ministry of Economic Development and Trade, cut the ribbon May 25th to officially launch the Ontario Rural Wastewater Centre at Collège d'Alfred of the University of Guelph. To help her was Jean-Marc Lalonde (MPP for Glengarry-Prescott-Russell) and Jean-Claude Trottier (Mayor of Alfred-Plantagenet). Sixty people attended the event, including the advisory committee for the Centre, members of the Collège Advisory Committee and many members of the local community curious as to what is happening in their back yard. A tour of the Alfred research wetland, laboratories and new demonstration building was followed by speeches from the dignitaries and a question period for the press.

The Centre, made possible through a $845,000 grant from the Ministry's Strategic Skills Investment Fund, is mandated to carry out training and research in the areas of rural wastewater management. The Centre features research and demonstration sites located in Alfred, Guelph, and Ottawa. The bilingual program involves close collaboration among industry, government and educational stakeholders and offers seminars, courses and co-op programs in addition to research and testing activities.

The Alfred Demonstration Building has an international development focus and will be used by Collège students, consultants and foreign delegations. Their focus will be on how to design, install and maintain appropriate on-site water and wastewater technologies in the developing world. This new facility will enhance the Collège's strong international development program. The ORWC Sites at Guelph and Ottawa primarily provide demonstration and training for the Ontario Onsite Wastewater industry.

The three demonstration sites are now completed and courses are being offered. Come join us for a course and see for yourself!

Official opening of the Ontario Rural Wastewater Centre at Collège d'Alfred.

# Editorial

## Is it time for regular compulsory inspections of on-site systems?

An opinion piece by Doug Joy, Manager, ORWC

On-site systems are a cost-effective, environmentally friendly way of dealing with our wastewater. It's true. Now why on earth would we ever consider compulsory inspections of these wonderful things? Well, I'm going to tell you why.

Under the current regulatory framework in Ontario on-site systems are governed under a prescriptive form of regulation. That is, provided a system is built according to a prescriptive set of rules we assume it will continue to work, unchecked, indefinitely. The only exceptions to this rule are the "alternative" systems, which require a signed maintenance contract at the time of installation. However, alternative systems are not nearly as popular as conventional systems which means the bulk of systems installed in Ontario are assumed to continue to work, unchecked, forever.

What is wrong with this assumption? Well, for starters we know that they don't last forever. Tanks eventually fail, beds clog, pipes get crushed, designs are deficient — a number of things lead to their eventual failure. From a variety of studies, we also know that perhaps as many as 30% of all systems are not only malfunctioning but also actively contributing to ground and surface water contamination. Indeed a recent inspection program taken on by the Township of the Archipelago found that over 60% of systems inspected didn't meet the code!

So we know that systems fail. Like most things we buy, on-site systems eventually break down and need to be repaired or replaced. The problem with failing on-site systems is that we rely on homeowners to recognize when their system isn't working and to do something about it. Given results of the Archipelago inspections this clearly doesn't work. Why not? First, homeowners may not recognize a failure unless it results in breakout at the surface and not all failures are this obvious. Second, many of the homeowners I've spoken to feel that a failure of their sewage system isn't a big problem and simply ignore it. Finally, fixing the problem may be expensive and lets face it, as a homeowner the choice between spending $15,000 on a new car and a new on-site system is not hard to make — the car wins every time!

The current approach clearly doesn't work, so what is an alternative? A systematic, periodic, reinspection of systems that emit substances into the environment — we do it for car exhaust emissions. A similar program for on-site systems would be an obvious answer.

Who would do this? The apparent answer would be a team of inspectors from the Ministry but clearly, the present political environment won't allow this. What is more appropriate is if a group from the private sector undertakes this responsibility. These would be people with the appropriate background to recognize systems which were working and those that were not. Training would definitely be required with some requirement for demonstration of proficiency and licensing. These licensed inspectors could be pumpers, those providing maintenance for systems, home inspectors or perhaps even someone who takes this on as a sole activity.

Who is going to pay? Clearly, the homeowner would have to pay. However, this does not need to be a large expense. Systems would probably only need to be inspected every 3 years and the cost of an inspection would probably be no more than $150 once a suitable network of service providers were in place. This is about the cost of driving a car a kilometer a day!

How would this be administered? Since the regulations are now part of the building code, the local building department would keep the records. The inspection records could be tied to the tax records. A note stating the last inspection date and the date by which the next inspection is required would be included on each tax bill that the homeowner receives. Proof of inspection would need to included with the appropriate property tax payment.

What other changes would this bring about? Regionally, it would result in a better environment. Tanks would be pumped when necessary, which is a simple way of ensuring you get the most out of your bed. Structurally, access risers would likely be required on all systems to avoid the high cost of regularly accessing buried tanks. (Maybe this should be part of the code?) Of course, at least initially, the program may uncover many failed systems that would need to be replaced.

Can this be done? Of course it can. The Township of the Archipelago is showing that if there is a will it can happen. There are people in the field to do it, training is available — all that is required is the will.

The editorial column is a new feature in the OOWA newsletter that reflects the opinion of the writer and not necessarily that of the OOWA. Feel free to submit your own editorial column or reply to this one.

## Frequently Asked Questions — About Sewage Systems and the Building Code

**Q ▸** What options are available to the Building Official for enforcing the BCA and the OBC?

**A ▸** The Building Official has formal and informal options to gain compliance with the BCA, and the OBC:

Before issuing an order the Building Official should consider resolving the situation using persuasion through the following Informal Requests:

- Verbal persuasion either in person or by telephone
- Inspection report given to the builder or left on site
- Correspondence such as a letter forwarded to the offender encouraging voluntary compliance.

Sometimes it may be necessary to issue orders to gain compliance. Following are the type of orders the Building Official could issue to gain compliance:

- Order to Comply - BCA s.12(2); Stop Work Order — BCA s.14
- Order Not to Cover — BCA s.13(1); Order to Uncover- BCA s.13(6)
- Order to Remedy an Unsafe Building — BCA s.15(3); Order Restricting Occupancy of an Unsafe Building — BCA s.15(5)
- Emergency Order — BCA s. 17(1)
- Obtaining a restraining order from the Ontario Court (General Division) — BCA s.38(1)

**Q ▸** When calculating sewage design flows for other occupancies that are not listed in the Ontario Building Code, what procedures do you follow?

**A ▸** Where an occupancy is not listed such as a Golf Course, the highest of metered flow data from at least 3 similar establishments shall be acceptable for determining the sewage design flow OBC 8.2.1.3 (4)

**Q ▸** is it possible to have more than one sewage system on a property?

**A ▸** Yes, it is possible to have numerous sewage systems on a property, provided the total sewage design flow from all systems does not exceed 10 000 litres per day. (Maximum regulated design flow — Part 8 OBC )

# Wetland Treatment of Municipal Wastewater Town of Alfred Pilot Study

By Anna Crolla, ORWC & John Van Gaal, Stantec Consulting Ltd.

On June 28, 2000 the Township of Alfred and Plantagenet launched the official opening of a pilot constructed wetland system for the treatment of the Village of Alfred's municipal wastewater. The event showcased the wetland system in full operation. The festivities included a tour of the wetland, where Jean-Claude Trottier (Mayor of Alfred & Plantagenet), Don Boudria (M.P. Glengarry-Prescott-Russell), Jean-Marc Lalonde (M.P.P.-Glengarry-Prescott-Russell) and Suzanne Lafrance (Councilor — Township of Alfred and Plantagenet) joined in cutting the ribbon to launch the opening of the wetland.

The Village of Alfred is 70 km east of Ottawa, has a total population of approximately 1,200 people and is home to the Collège d'Alfred of the University of Guelph. Alfred's sanitary sewage is currently treated by a two-cell sewage lagoon that discharges to a nearby brook twice a year. The lagoon cells were constructed in the early 70s and have almost surpassed their design capacity. Furthermore, the brook no longer has the assimilative capacity for the existing flows, let alone for any proposed increase. For these reasons, Alfred engaged the services of Stantec Consulting Ltd. and the Collège to undertake an environmental assessment study to look at the use of constructed wetland technology for the treatment of municipal wastewater. This study also included an investigation of two methods of post-wetland polishing: steel slag phosphorus adsorption filters and a vegetative filter strip.

Constructed wetlands consist of channels and basins in which aquatic plants such as cattails and bulrushes are planted. Wastewater

is discharged into the wetland system by either pumping or gravity. Several physical, chemical and biological processes take place in a wetland system that treat the wastewater. On average, wetlands are capable of providing removal rates ranging from 60% to over 95% for many pollutants.

In 1999 construction of the pilot wetland system was completed and full operation and monitoring began in June of this year. The wetland is designed to treat 5% of the flow entering the Alfred municipal lagoon (approximately 20,000 $m^3$ per year). Currently wastewater is directed into the two lagoons, effluent from the first lagoon is then treated by the wetland and then flows through either the slag adsorption filter or the vegetative filter strip before returning to the first lagoon. The Ministry of Environment requires 3–5 years of performance monitoring before they will consider approving continuous discharge of wetland effluent into the nearby brook during the summer months. The Alfred wetland system has been performing well this year, with over 80% biochemical oxygen demand (BOD) removal, over 70% nitrogen removal and over 92% phosphorus removal.

Constructed wetlands are a cost-efficient and environmentally friendly alternative for treating landfill leachate, mine drainage, agricultural wastes, septic tank effluent, food processing waste, municipal sewage, stormwater runoff and many other sources of pollution.

The Alfred pilot wetland study is a partnership between the Township of Alfred and Plantagenet, the Ministry of Environment, Stantec Consulting Ltd., the Ontario Rural Wastewater Centre (Collège d'Alfred site), the Ontario Clean Water Agency, the Agricultural Adaptation Council, and the South Nation Conservation Authority.



## Ontario On-site Wastewater Association — Second Meeting

The second meeting of the Association took place on May 25, 2000 in Alfred. After considering a number of proposals the board of directors approved the new logo for the Association. Committees were established, the newsletter was agreed to be continued and the Association also agreed to co-sponsor next years On-site conference with the Ontario Rural Wastewater Centre.

The association's web site will be up and running shortly and will be linked to the Ontario Rural Wastewater Centre's web site. Previous copies of the newsletter and the membership application form will be downloadable from the new website.

If you have any questions, please contact:

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ONTARIO ONSITE WASTEWATER ASSOCIATION

Taken from a longer article in: SMALL FLOWS — Summer 1999; Vol. 13, No. 3

# NC State Produces Landmark Research on Septic Tank Additives

by M. Caigan McKenzie, NSFC Staff Writer

North Carolina State University has produced landmark research in the form of a master's thesis titled "The Effect of Bacterial Additives on Septic Tank Performance." Gregory H. Clark, currently a consultant at Soil and Environmental Consultants Inc., in Raleigh, North Carolina, wrote the thesis last year while he was a graduate student in North Carolina State University's Soil Science Department. The research was done under the direction of Professor Michael T. Hoover, Ph.D., of the Soil Science Department, with the oversight of professors Marcia Gumpertz (Statistics Department), Arthur Wollum (Soil Science Department), and Phillip Westerman (Biological and Agricultural Engineering Department), with assistance from Chester Cobb, former agricultural research technician.

## Overall Goal and Parameters

Clark's primary goal was to quantify the impact of bacterial additives upon septic tank performance through measurements of sludge depth, scum thickness, total suspended solids (TSS), five-day biochemical oxygen demand ($BOD_5$), and microbial levels within treated and untreated tanks. To achieve his primary goal, Clark:

- monitored and evaluated the effect of bacterial additives on the rate of sludge and scum accumulation in septic tanks,
- assessed the effects of bacterial additives on TSS and $BOD_5$ contents of septic tank effluent, and
- evaluated whether bacterial additives increase microbial levels in treated septic tanks versus untreated septic tanks.

## Bacterial Additives Defined

For his study, Clark defined bacterial additives as additives that may contain bacterial or enzymatic components, or both.

## Methods, Materials, and Design

Clark chose mobile home parks in which to conduct the study so that researchers could access numerous septic systems located in close proximity. Clark's study spanned one year (January 1997 to December 1997) and targeted 48 septic tanks serving homes in two mobile home parks. These 48 septic tanks were chosen from a pool of 80 septic tanks because they were easily accessible, fell within the maintenance range being studied (well-maintained, poorly maintained, or maintained at an intermediate level), and were free of major maintenance problems. The well-maintained septic tanks had been pumped just two to three years before the study began. The poorly maintained septic tanks had rarely if ever been pumped out during their 15 to 20 years of operation. Septic tanks identified as having had an intermediate level of maintenance fell within these two ranges. Twelve of the 48 septic tanks had inlet risers added so that the sludge depth and scum thickness could be measured. Of the remaining 36 septic tanks, 16 had existing risers over the inlet end of the septic tanks and 20 tanks had risers over both the inlet and outlet ends of the septic tanks. Initial readings included sludge depth and scum thickness for all 48 tanks and TSS and $BOD_5$ contents for 20 of the 48 tanks. These initial readings were later used to statistically evaluate the effects of additives after the first two sampling periods. After the tanks were grouped, the three additives and control were randomly assigned within each block. To preserve the integrity of the study, Clark used a single-blind study design. This meant the primary researcher collected and analyzed data without knowing which treatments or controls each tank had received until it was necessary to compare the collected data from the treated tanks to the collected data from the control tanks. In addition, no research funding for the project was either solicited from or accepted by additive manufacturers or distributors. Treatments for the study consisted of three liquid bacterial septic tank additives and a control (no additive). The additives were purchased from a local retail store in the same manner as a consumer would purchase them. Additionally, sub-samples from additive bottles were evaluated during each four-week sampling period to ensure that they contained a viable population of microorganisms.

## Monitoring the Septic Tanks

**Sludge Depth:** Sludge depth was monitored in all 48 tanks once every four weeks. Sludge depth measurements were used to determine if bacterial additives reduced the thickness of the sludge layer in the septic tanks or the rate of sludge accumulation, which in turn would reduce the frequency with which septic tanks needed to be pumped.

**Scum Thickness:** Scum thickness was monitored in all 48 tanks once every four weeks using a scum judge. Scum thickness was measured in as many locations throughout the inlet opening as needed to find a range of scum thickness. These readings were then used to determine an average scum thickness.

**$BOD_5$ Content:** This measurement was done once every four weeks on grab samples collected from the outlet sanitary tee on a subset of 20 tanks that included tanks from each of the three treatment groups and from the control group.

**TSS Content:** This measurement was done once every four weeks on the same tanks that were used to measure the $BOD_5$ content. The purpose of the TSS measurement was to determine if the additive treatments affected the solids exiting the tank.

**Organism Count:** Beginning with the $12^{th}$ week of the study, researchers did a total organism count on all 48 tanks every 12 weeks. When Clark used treatment averages to compare the control and treatments, he found no general pattern and no effect due to use of the additives.

## Conclusions

Clark concluded the following from his research:
o no difference in sludge depth related to treatment between the three additives and the control. The additives tested did not reduce the thickness of sludge depth in the septic tanks nor reduce the rate of sludge accumulation when compared to the control. Clark concluded that the observed differences in sludge depth were related to the initial sludge depth that was present at the beginning of the study. For example, at the beginning of the study, before adding any treatments to the tank, the control had the highest average sludge depth and maintained the highest average sludge depth through out the study.

- Initial scum thickness appeared to be the main factor that controlled the scum thickness. Clark found that the scum thickness initially present before use of the additives was the primary factor controlling scum thickness once the additives were applied to the tanks. He also found that some of the additives reduced the scum levels across all levels of maintenance. Clark, however, points out that his analysis is inconclusive.
- The situation concerning the high scum thickness and low sludge depths and vice versa seems to indicate that use of inlet tees in septic tanks may need to be added to the On-Site Sewage Rules in North Carolina. This will control situations where significant scum accumulations capture incoming solids and prevent them from settling to the bottom of the tank in septic tanks that receive less than ideal maintenance.
- No treatment effect was noticed for TSS. The high variability observed within tanks over the course of the project made it difficult to draw any conclusions about the additive's effect on TSS levels.
- A very limited, transitory treatment effect was noticed for $BOD_5$. Initial $BOD_5$, however, appeared to be the controlling factor on subsequent $BOD_5$ concentrations after the addition of additives to the tanks.
- All additives tested during the study contained live, viable organisms.
- All 48 tanks, including the control tanks, maintained very high populations of organisms over the course of the study.
- The additives tested did not provide any substantial or long-term statistically significant benefits compared to the control (no additive) for the parameters and conditions tested during this research project. It was concluded that this study does not demonstrate any practical value from using bacterial septic tank additives.
- More research is needed under many different circumstances before definitive conclusions can be drawn about the practical benefits of using bacterial additives in septic tanks.

*For more information about Clark's thesis,* The Effect of Bacterial Additives on Septic Tank Performance, *write to North Carolina State University, Department of Soil Science, Box 7619, Raleigh, North Carolina 27695-7619 or telephone Hoover at (914) 515-7305, or e-mail to mike_hoover@ncsu.edu. This article was originally published in* Small Flows, Volume 13, No. 3, 1999.

## ORWC Course List

### Guelph

- Living With Your Septic System — September 23, 2000
- On-Site Wastewater & Water Systems for Real Estate Professional — November 1 and November 29, 2000
- On-Site System Inspection: Field Course — October 27, 2000
- Alternative On-site Wastewater Treatment Systems — November 17, 2000
- Soils 100 — October 13, 2000
- Soils 101 — October 20, 2000

### Baxter

- On-Site Wastewater & Water Systems for Real Estate Professionals — November 15 and November 29, and December 6, 2000
- Alternative On-site Wastewater Treatment Systems — November 22, 2000

### Alfred

- Manure Management with OMAFRA — September 27, 2000 (September 28 rain date)

## Interesting Links

- http://www.inspect-ny.com/septbook.htm
  Septic Information Website
- http://www.casst.com
  Computer Aided Septic System Tracking
- http://www.pumper.com
  Pumper On-Line
- http://www.dnr.state.wi.us/org/water/dwg/prih2o.htm
  Information for Homeowners with Private Wells
- http://www.toiletology.com
  Toiletology 101: The Care & Repair of Toilets
- http://ns.tdg.ca/ontag/oscia/
  Ontario Soil and Crop Improvement Association
- http://www.ec.gc.ca/
  Environment Canada's Green Lane
- http://www.jldr.com/ohindex.shtml#real
  Outhouses of America Tours