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Attn: Frank Hay, ROWP

Dear Sir,

Re: Enviro-Septic® Sewage Wastewater Treatment System
BCOSSA TRC Technical Bulletin Number: TB5 Version: R1
Compliance Review for Type 2 Applications

1.0 INTRODUCTION

As requested by Mr. Frank Hay, ROWP, of Pinnacle Environmental Technologies Inc., Cleartech Consulting Ltd. has completed a compliance review of the Type 2 Enviro-Septic® Sewage Wastewater Treatment System and associated documentation in terms of the requirements of the BC On-Site Sewage Association's (BCOSSA) Technical Review Committee (TRC) Technical Bulletin Number: TB5 Version: R1 (July 2008).

The work was completed as per our numerous discussions and emails of March, 2009. Written authorization to proceed with the work was received by email on March 20, 2009.

This report is a summary of the Enviro-Septic® product, and a review of its use under the requirements of the BC Sewerage System Regulation (SSR) as a Type 2 treatment system, the companion Sewerage System Standard Practice Manual (SPM), the technical review bulletin as described above. This report is not, and should not be construed as, an endorsement of the product under review.

2.0 BCOSSA TECHNICAL BULLETIN NUMBER: TB5 VERSION: R1

The TRC Technical Bulletin Number: TB5 Version: R1 (July 2008) deals with combined sewage treatment and dispersal systems (CTDS's) and provides a brief general guideline for the application of the Standard Practice Manual (SPM) version 2 to these types of systems. The bulletin is general in nature, and is not intended to address specific CTDS systems.

The following report will provide a review of the Enviro-Septic® system and provide comment on the system in terms of its compliance with the bulletin, specifically Section 1 – Application of SPM Standards for Type 2 applications.

3.0 ENVIRO-SEPTIC® SYSTEM

Enviro))Septic® (Enviro-Septic®) is a patented product owned by Presby Environmental Inc. in the USA. DBO Expert Inc. is the Master Canadian Distributor. Pinnacle Environmental Technologies Inc. is the Distributor for Western Canada and Nova Scotia. Based on information provided by Pinnacle Environmental, the Enviro-Septic® system is an "all-in-one non-mechanical" treatment system. The system is comprised of three components as follows:

1. Pre-Tank: This tank is placed before the Enviro-Septic® pipes and specified sand, and is a two-compartment tank arranged similar to a septic tank. The pre-tank is to have a minimum working capacity equal to two days hydraulic retention time of the design daily sewage flow. The manufacturer claims an effluent filter is not required. If an effluent filter is used, it must let the air flow from the Enviro-Septic® system to the Pre-Tank.

2. Pipes and Specified Sand: The number and spacing of the Enviro-Septic® pipes is determined in accordance to local regulations and the manufacturer's design worksheet. Specified sand is placed under (min. 30cm for Type 2), beside (30cm beside pipes, 15cm between pipes), and atop (10cm) the Enviro-Septic® pipes.

3. Venting: Typically the Enviro-Septic® system is vented from the terminal ends of the pipes, to a header, to the pre-tank, and to the building's plumbing vent stack.

4.0 DOCUMENTATION REVIEW

The following documentation was reviewed as a part of preparation of this report:

BCOSSA TRC Technical Bulletin Number: TB5 Version: R1, BCOSSA, July 2008.

Sewerage System Standard Practice Manual: Version 2, BCOSSA, September 2007.

Performance Evaluation Report of Annex A Secondary Treatment System (Class II), BNQ 3680-910/2000-06-16 M1 (2004-09-10) Wastewater Treatment, Stand-Alone Wastewater Treatment Systems for Isolated Dwellings, Bureau de Normalisation du Quebec (BNQ), July 2006.

Reliability and Performance Evaluation Report of Annex B Secondary Treatment System (Class II), BNQ 3680-910/200-06016 M1 (2004-09-10) Wastewater Treatment, Stand-Alone Wastewater Treatment Systems for Isolated Dwellings, Bureau de Normalisation du Quebec (BNQ), February 2007.

A Comparison Between Distribution Devices used to Split On-site Wastewater Effluent Between Percolation Trenches, Laurence Gill, Titiksh Patel, Niall O'Luanaigh, Department of Civil, Structural & Environmental Engineering, University of Dublin, Trinity College. Eleventh Individual and Small Community Sewage Systems Conference Proceedings, 20-24 October 2007, (Warwick, Rhode Island, USA), Publication Date: 20 October 2007, ASABE Publication Number 701P1107

Enviro-Septic® Brochure and Design Worksheet, Pinnacle Environmental Technologies Inc., October 2008.

Phase I Report on the Field Study of Polylok's New Adjustable Equalizer, Donald C. Hoxie, PE, March 1996.

Comparison of Enviro-Septic® and Pressure Distribution, Presby Environmental Inc., March 2009.

Massachusetts Enviro-Septic® Wastewater Treatment System Quick Reference Guide, Presby Environmental Inc., September 2007.

Enviro-Septic® Wastewater Treatment Systems Design and Installation Manual Vermont State Attachment, Presby Environmental Inc. in conjunction with the State of Vermont Agency of Natural Resources – Department of Environmental Conservation, August 2002.

Enviro-Septic® Treatment System – Longitudinal Distribution – Summary of Results of the Stokes Bench Test, Pinnacle Environmental Technologies Inc. and DBO Expert Inc, August 2008.

5.0 COMPLIANCE REVIEW

The following is a review of the Enviro-Septic® system (Type 2) in terms of the technical review bulletin. The information is presented on a section-by-section basis as per the sections of Section 1 – Application of SPM Standards of the technical review bulletin document.

Section 1.2 – Part 1 Standards

1.2.1 Seasonal Dwellings

We have reviewed the independent BNQ test data for the Enviro-Septic® system. This data shows Type 2 effluent quality at the *point of application* (see below) is achieved immediately upon system start-up. Upon review of this data and the requirements of the SPM section 1.2.10, it is our opinion that the Enviro-Septic product is suitable for use in seasonal dwellings for Type 2 applications.

Section 1.3 – Part 2 Standards

1.3.1 Performance Model

Based on our review of the independent test data provided, it is our opinion that the Enviro-Septic® system meet or exceeds Type 2 effluent quality when designed, constructed, used, and maintained as per the manufacturer's recommendations. Effluent sampling ports should be installed at the *point of application* (see below) to allow for regular effluent testing.

1.3.1.1 Point of Application

The *point of application* as defined by the bulletin would be as follows:

Type 2: at a point in the approved "system sand" 30cm below the bottom of the Enviro-Septic® pipe. This is the point where the Type 2 effluent quality will be achieved, where samples should be obtained, and where vertical and horizontal separation requirements are measured/applied as per the SPM.

1.3.2 Daily Design Flow

Daily design flows for Enviro-Septic® system should be as per the requirements of the SPM section 2.2.

1.3.3 Site and Soils Investigation

As with all systems, the Enviro-Septic® system should be designed on a site-specific basis using the results of a complete site assessment as per the requirements of the SPM section 2.3.2

1.3.4 Vertical Separation

As per 1.3.1.1 above, vertical separation requirements should be applied at the *point of application* and should comply with the requirements of section 2.3.3.2 and Table 2-4 of the SPM.

1.3.5 Horizontal Separation

As per 1.3.1.1 above, horizontal separation requirements should be applied at edge of the *point of application* and should comply with the requirements of section 2.3.3.3 and Tables 2-6 and 2-7 of the SPM.

1.3.6 Type of Distribution

SPM sections 2.3.3.2, 2.3.3.3, and 2.3.6 should be used to determine the type of distribution (gravity or pressure) required for each specific system. Where pressure distribution is required, the system should be planned and installed incorporating the recommendations provided in section 6.0 of this report. Provided the system is planned and installed incorporating the recommendations in section 6.0, it is our opinion that the system would meet the intention of pressure distribution, and would be considered an approved equivalent.

1.3.6.1 Type 3 Effluent Separation Standards

n/a

1.3.7 Hydraulic Loading Rates

As per the manufacturer's recommendations, the hydraulic loading rate to the Enviro-Septic® system is 90L per 3.05m pipe section. The loading rate at the *point of application* (see 1.3.1.1 above) should be as per the SPM Table 2.8 for Type 2 effluent.

1.3.7.1 Effective Basal Area

The effective basal area of the Enviro-Septic® system should be determined as per section 3.8 of the SPM.

1.3.7.2 Bed Systems

If the Enviro-Septic® system is to be installed as a bed, no reduction in hydraulic loading rate is required. However, the sizing of the bed must address linear loading rate requirements (see below). To ensure adequate gas exchange and oxygen transport, proper venting of the Enviro-Septic® pipes is required as per the manufacturer's recommendations.

1.3.8 Linear Loading Rate

The linear loading rate (and therefore the length) of the Enviro-Septic® field should be computed as per section 2.3.5 of the SPM.

1.3.9 Site Capability Tables

The site capability tables in the SPM (Tables 2-12 and 2-13) are general in nature, and do not apply specifically to the Enviro-Septic® system. The following three sub-sections provide comment on these tables specific to the Enviro-Septic® system.

1.3.9.1 Level of Treatment

Based on our review of the BNQ test report, where Table 2-12 calls for use of a Type 2 system, the Enviro-Septic® system may be used with the *point of application* being the point in the approved "system sand" 30cm below the bottom of the Enviro-Septic® pipe.

1.3.9.2 Type of Distribution

Where the SPM Table 2-12 calls for gravity distribution, then a conventional distribution box may be used to distribute effluent to the Enviro-Septic® field. Where pressure distribution is required, the system should be planned and installed incorporating the recommendations provided in section 6.0 of this report. Provided the system is planned and installed incorporating the recommendations in section 6.0, it is our opinion that the system would meet the intention of pressure distribution, and would be considered an approved equivalent.

1.3.9.3 Soil Types

Table 2-12 should be used in combination with the results of the site specific soils assessment to determine the type of system required for a given situation.

Section 1.4 – Part 3 Standards

1.4.1 Monitoring for Treatment and Discharge

For Type 2 systems, effluent sampling ports must be installed as per the recommendations of the manufacturer to allow for collection of effluent at the *point of application*. These effluent sampling ports must allow for easy access from grade for sampling of treated effluent for testing as per the requirements of the SPM section 2.4.2 and the Maintenance Plan.

Where the system is designed as a pump-to-distribution box system, flow measurement should be achieved utilizing a pump control panel with a dose counter, pump run time meter, or equivalent method of flow rate monitoring. Where the system is installed without an electronic pump control panel, it is our opinion that flow rate monitoring is likely not feasible.

1.4.2 Minimum Design, Installation, Maintenance and Monitoring Standards

When designing, installing, maintaining and/or monitoring an Enviro-Septic system, all provisions of section 3.3 of the SPM must be met. The planner/designer should utilize the design worksheet provided by the manufacturer and submit all detailed design information as a part of the filing package. Where design, installation, maintenance and/or monitoring questions arise, the manufacturer or supplier should be contacted for clarification.

1.4.2.1 Maintenance and Monitoring

The maintenance and monitoring plan for Enviro-Septic® systems should meet or exceed the standards of section 3.3.3.4 and Table 3-1 of the SPM.

6.0 PRESSURE DISTRIBUTION EQUIVALENCY

Generally, pressure distribution is included as a part of system design to achieve the following two objectives:

1. to control dose volume; and,
2. to ensure even distribution of effluent across the entire disposal field area.

The SPM stipulates that, for all pressure distribution systems, the flow variation between the start and end of an individual lateral should not exceed 10%. Based on our review of the documentation as described in section 4.0 of this report, it is our opinion that the distribution of effluent along the length of an Enviro-Septic® pipe (tested length of 18.3m) would comply with the 10% (max.) variation requirement.

Further, the SPM stipulates that for pressure distribution systems, the flow variation between the proximal and distal points across the entire field should not exceed 15%. Based on our experience and a review of the documentation as described in section 4.0 of this report, it is our opinion that gravity dispersal to a conventional distribution box would not comply with the 15% (max.) flow variation requirement. However, the documentation reviewed indicates that, under certain higher flow conditions, conventional distribution boxes (fitted with flow equalization mechanisms) can meet the 15% (max.) flow variation requirement (i.e. the volumes of effluent distributed to each outlet or lateral are within 15% of each other).

In general, it is recommended that the dose volume to a pressure distribution field be kept as small as possible. This is in order to prevent saturated (i.e. anaerobic) conditions within the disposal field media and receiving environment.

Therefore, in order to achieve both of the above design objectives (and where pressure distribution is needed as per the requirements of the SPM), we recommend installing a separate pump or siphon chamber between the pre-tank and Enviro-Septic® field. The pump or siphon chamber should be set to deliver periodic small doses of effluent to a conventional distribution box fitted with flow equalization mechanisms for distribution into the Enviro-Septic® disposal field laterals.

In the case where installing a separate pump or siphon chamber immediately downstream of the pre-tank is not feasible, we recommend use of a modular siphon device (which can be installed anywhere along the pipe between the pre-tank and distribution box) to deliver effluent to the distribution box. This device should be designed to deliver small doses of effluent (enough to flood the distribution box for at least one minute) periodically to the Enviro-Septic® pipes.

The modular siphon device should be installed, tested, and maintained as per the manufacturer's recommendations. The siphon device should be installed to allow for easy access from grade for cleaning and maintenance.

7.0 CLOSURE

We trust this meets with your immediate requirements. The information gathered and used to derive the conclusions in this report was in part provided by others. If new and more accurate information comes to light, Cleartech should be given the opportunity to review the new information and update the findings and conclusions of this report as may be required.

If you have any questions or require further information, please do not hesitate to contact the undersigned at 604-329-8324.

Yours truly,

CLEARTECH CONSULTING LTD.
per: Craig Regier, P.Eng., ROWP

Reviewed by:
CLEARTECH CONSULTING LTD.
per: Chad Meier, P.Eng.