



## TECHNICAL BULLETIN

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### Advanced Enviro-Septic™ Systems Achieve Even Distribution without Pressure Dosing

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**Abstract:** *Advanced Enviro-Septic™ Systems (AES) do not use pressure distribution. Pumps are used only if necessary to gain elevation to the treatment field. Pressure distribution has the potential to disrupt the settling of solids within the pipe. Testing has confirmed that AES achieves even distribution throughout the system naturally, through the development of a controlled bacterial treatment layer (“biomat”)t and the unique properties of the surrounding System Sand.*

Pressure distribution was developed to solve several issues related to traditional pipe and stone fields (P&S), the first being to provide a more even distribution of wastewater throughout an absorption field. This was accomplished by engineering a low pressure network of small diameter pipes throughout a field with precise small diameter holes drilled at a consistent spacing to control flow rates. By following well-established engineering practices for design, the resulting field will experience an even distribution of effluent. This helps to alleviate any point or area over-loading commonly seen with pipe and stone systems, which can compromise that portion of the field’s ability to disperse the effluent.

Another advantage of pressure distribution is its ability to provide a predictable dosing volume. This allows the soils treating the wastewater to maintain a more or less aerobic environment because the biomat is not allowed to stay in a flooded condition, which could lead to anoxic conditions which are not as efficient in digesting suspended solids. It is critical that the biomat, which develops at the stone-soil interface, not be allowed to clog. Clogging is far more likely when the field stays flooded. Because P&S fields are not usually vented, dosing can have a significant effect on field longevity by simply not overloading the soils’ ability to provide oxygen to the bacteria treating the wastewater. Oxygen is the key to system life and longevity. It stands to reason that even distribution, controlled dosing volumes and field size work together to ensure the soils will have sufficient oxygen to keep this ecosystem working.

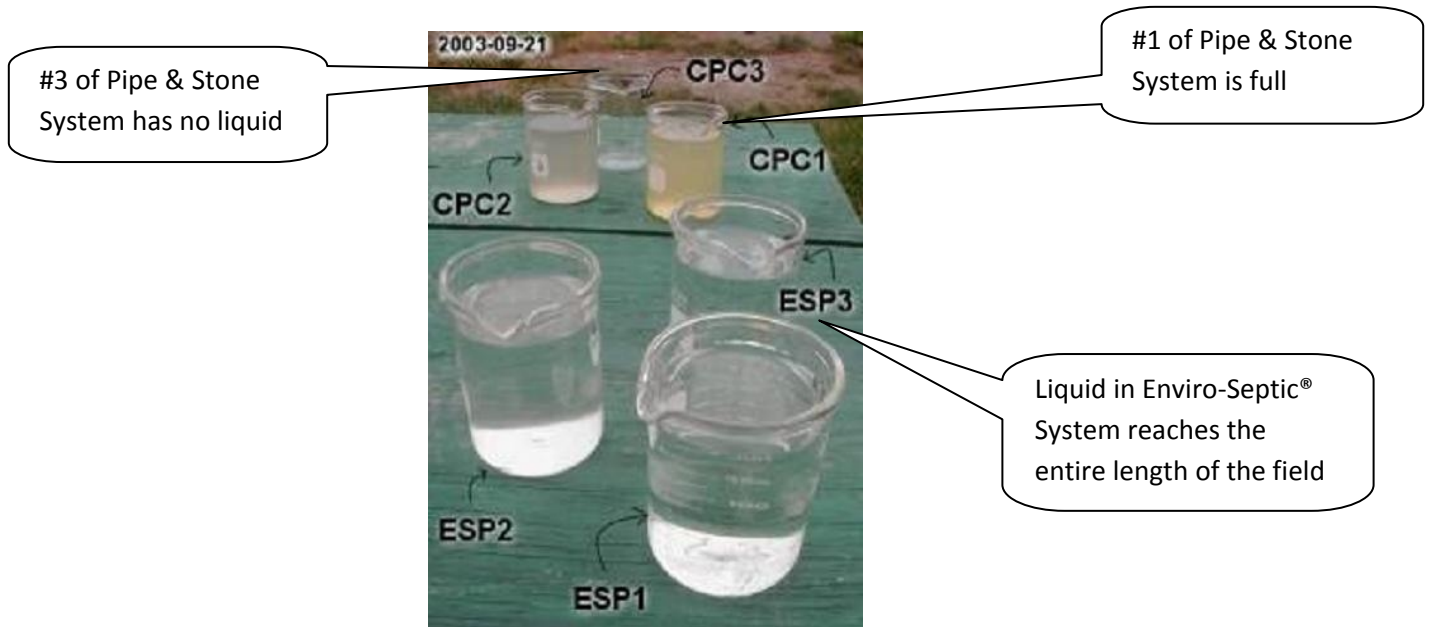
That brings us to how AES achieves the same goals of even distribution and prevention of clogging. First it is important to understand that Advanced Enviro-Septic is a treatment system in itself. The pipe has been designed to work in harmony with the soils and biology to create a sustainable, long-term ecosystem. The pipe’s geometry, Bio-Accelerator fabric, surrounding fiber, geo-textile layer, and the bacteria that form on these surfaces, accomplish both even distribution and a high degree of treatment, which preserves the condition of the surrounding soils and their ability to efficiently disperse liquid.

When the AES System is first put into use, effluent will tend to drain primarily from the holes in the bottom portion of the pipe and near its inlet. Before the bacterial treatment layer (BTL) develops, the effluent is still being subjected to higher levels of treatment than in conventional systems. The fiber and fabric layers act as filters, capturing suspended solids. This will deposit a thin film of material on the inside of the bio-accelerator fabric, which then slows the passing of liquid to the surrounding sand (in much the same way the BTL does once established). As the bacteria begin to thrive, these solids will be processed before they have an opportunity to clog the fabric.

This process is encouraged by the free flow of air through the AES pipes via the venting system. In a matter of days, the BTL forms on the Bio-Accelerator layer and on the inside of the geo-textile fabric. This happens along the entire length of the AES row. The mature BTL (which our testing indicates can fully develop in less than 18 days) is the primary mechanism that provides even distribution across the entire length of each AES row. It does this by offering a slight resistance to liquid passing through the geo-textile fabric (BTL). This resistance allows the liquid level to equalize across the entire length of the field. It also allows bacteria within the pipe enough time to process the suspended solids.

The specified sand directly in contact with the pipes (which we refer to as "System Sand") is also vital to even distribution. The characteristics of System Sand are such that it allows liquid to be wicked away from the tubes and even in sloping systems does not allow water to pond at the bottom of the field. The voids within the System Sand also allow an exchange of gases, which helps to keep the BTL in check by oxygenating the soils surrounding the pipe. The System Sand works to disperse the moisture content of the sand evenly across the entire area of the field.

In the Stoke Canada testing in 2002, samples of leachate were taken below a row of Enviro-Septic<sup>®</sup> (the predecessor product to AES) pipe at 20 foot intervals, after the BTL had fully developed. The same was done for a traditional pipe and stone field. The two fields were being tested at the same time, in the same location and under the same conditions. You can clearly see that the samples taken below the P&S line diminished in volume the further from the d-box the sample was taken. You will notice that the third beaker has no liquid at all (see picture).



Compare that with the three samples taken along the Enviro-Septic<sup>®</sup> row, which shows leachate reaching the far end of the field as seen by the liquid collected by the third beaker. Clearly, the BTL is providing even distribution, which is a vital service in the proper, long-term life of the system.

Because of this unique property, sloping fields are possible with AES providing the same result. The testing confirmed that even distribution is provided. The biology of the system, along with the appropriately sized sand bed surrounding the pipes, provides a very effective means of distributing the highly treated wastewater throughout the soil. Also examine the color of the leachate from Enviro-Septic® compared to pipe and stone; this reflects the fact that Enviro-Septic® is more effective at purifying wastewater.

AES is designed to maintain an aerobic environment via venting and/or the gas diffusion through the soils, which eliminates the need for controlled dosing. Our testing shows that because the surrounding soils are never contaminated and the BTL is always kept in check by an oxygen rich environment, the pipe can operate at up to 5.3 gallons per day per foot of pipe. The mechanism that keeps the biology aerobic is provided by venting and the nature of the surrounding System Sand.

**Summary:** Advanced Enviro-Septic™ accomplishes even distribution through the length of the field by means of a healthy, controlled bacteria treatment layer and the properties of the System Sand to evenly distribute the liquid throughout the absorption area. Because the field is well oxygenated, volume dosing is not required to “rest” the pipe to keep it in an aerobic state. Enviro-Septic technology has been a successful alternative to pressure distribution in New England since 1995 with millions of feet of pipe installed and working as expected. In particular, Massachusetts and Vermont allow the use of Enviro-Septic technology as an acceptable alternative to pressure dosed systems.

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