Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services
John E. Baldacci, Governor Brenda M. Harvey, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel: (207) 287-5689
Fax: (207) 287-3165; TTY: 1-800-606-0215

February 3, 2010

Presby Environmental, Inc.
Attn.: David Presby, Pres.
143 Airport Road
Whitefield, NH 03598

Subject: Product Registration, Advanced Enviro-Septic

Dear Mr. Presby:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine Subsurface Wastewater Disposal Rules (Rules), for code registration, for use in Maine.

The Enviro-Septic consists of a ten foot long, 11 inch diameter (external) plastic pipe with a proprietary arrangement of ridges and interior skimmer protrusions. The pipes are wrapped in non-woven geotextile fabric separated from the pipe by a non-woven plastic mesh.

The Advanced Enviro-Septic superficially resembles the Enviro-Septic, with the addition of layer of "Bio-Accelerator Fabric" (non-woven fabric) installed between the plastic mesh and the exterior fabric. The "Bio-Accelerator Fabric" is aligned between the 4 o'clock and 7 o'clock positions of the pipe. It is our understanding that the Advanced Enviro-Septic will eventually supplant the Enviro-Septic. It is also our understanding that your company specifically does not wish to have the product included in Table B-109 (permitted substitutions) of the Rules.

According to the information you provided, the Advanced Enviro-Septic has been certified by the National Sanitation Foundation (NSF) pursuant to ANSI/NSF Standard 40 for residential wastewater treatment systems, and Canadian BNQ certification. These certifications not withstanding, the Advanced Enviro-Septic is construed as a disposal area under the Rules, and is regulated as such.

On the basis of the information and product sample submitted, the Division has determined that the Advanced Enviro-Septic is acceptable for use in the State of Maine, provided that it is installed, operated, and maintained in conformance with the manufacturer's directions as specified in the *NSF Installation Manual* dated October, 2009 submitted with the registration application, with the following conditions:

1. The Advanced Enviro-Septic sizing is unchanged from the Enviro-Septic, at 5.0 square feet per linear foot.

2. Pursuant to the letter dated 12/09/09 by you, only Authorized Representatives trained by Presby Environmental, Inc. may install the product as an NSF certified product.

3. Pursuant to the letter dated 12/09/09 and a conversation between Division staff and Presby Environmental, Inc. staff, no other product may be substituted for the Advanced Enviro-Septic, including Enviro-Septic, at the request of Presby Environmental, Inc.; although the Advanced Enviro-Septic may be substituted for Enviro-Septic. This does not apply to designs which specify a generic fabric wrapped tube.

4. For a non-NSF certified system installation, Advanced Enviro-Septic will use the *Enviro-Septic and Simple Septic Leaching Systems Design and Installation Manual* in conjunction with the *Enviro-Septic Maine State Attachment*, in accordance with the manufacturer's requirements.

5. Manufacturer literature not withstanding, systems installed on original slopes greater than 20% grade require a variance to the Rules.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of Advanced Enviro-Septic. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products.

If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen, Environmental Specialist IV
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

Jacobsen, James

From: Sean Mcguigan [sean.mcguigan@presbyeco.com]
Sent: Thursday, January 14, 2010 10:53 AM
To: Jacobsen, James
Subject: Minor revisions
Follow Up Flag: Follow up
Flag Status: Red
Attachments: requested changes Maine.doc

Dear Mr. Jacobsen:

We are writing to request a few minor revisions to the Product Registration for Advanced Enviro-Septic™. Our suggested changes have been indicated on the attached copy of your letter dated January 11, 2010.

We are requesting these changes in order to make sure it is clear to installers/designers/customers that Advanced Enviro-Septic is not used exclusively in NSF Certified Systems. In all honesty, NSF Certified Systems will be the exception rather than the rule. The installation manual submitted with our letter of December 9, 2009 is used only for NSF Certified Systems, which have different requirements including an alarm and a sampling device. We expect that Advanced Enviro-Septic will most commonly be used according to the design and installation procedures in our approved Manual and Maine State Attachment for Enviro-Septic. In addition, any designer/installer certified in Maine can design/install Advanced Enviro-Septic; the limitation regarding Authorized Representatives only applies to NSF Certified systems.

We hope this clarifies our reasons for requesting these changes. Please do not hesitate to contact me if you have any questions or need more information.

Sean McGuigan,

Research and Development

Presby Environmental, Inc.
Presby Plastics, Inc.
143 Airport Road
Whitefield, NH 03598
(T) 800-473-5298
sean.mcguigan@presbyeco.com
www.presbyeco.com

This communication is confidential and intended only for the recipient(s). Any other use, dissemination, copying, or disclosure of this communication is prohibited. If you have received this communication in error, please contact us at 800-473-5298. The technical support staff at Presby Environmental, Inc. is committed to providing comprehensive product information and support via telephone, website and email at no cost to our customers. The assistance we are able to provide in this way is based on limited information and therefore should be considered general in nature. Accordingly, Presby Environmental, Inc. disclaims any liability whatsoever in connection with providing technical support.

Maine Center for Disease Control and Prevention
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286 Water Street
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Augusta, Maine 04333-0011
Tel: (207) 287-5689
Fax: (207) 287-3165; TTY: 1-800-606-0215

January 11, 2010

Presby Environmental, Inc.
Attn.: David Presby, Pres.
143 Airport Road
Whitefield, NH 03598

Subject: Product Registration, Advanced Enviro-Septic

Dear Mr. Presby:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine Subsurface Wastewater Disposal Rules (Rules), for code registration, for use in Maine.

The Enviro-Septic consists of a ten foot long, 11 inch diameter (external) plastic pipe with a proprietary arrangement of ridges and interior skimmer protrusions. The pipes are wrapped in non-woven geotextile fabric separated from the pipe by a non-woven plastic mesh.

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According to the information you provided, the Advanced Enviro-Septic has been certified by the National Sanitation Foundation (NSF) pursuant to ANSI/NSF Standard 40 for residential wastewater treatment systems, and Canadian BNQ certification. These certifications not withstanding, the Advanced Enviro-Septic is construed as a disposal area under the Rules, and is regulated as such.

On the basis of the information and product sample submitted, the Division has determined that the Advanced Enviro-Septic is acceptable for use in the State of Maine, provided that it is installed, operated, and maintained in conformance with the manufacturer's directions as specified in the Oct 09 NSF Installation Manual submitted with the registration application, with the following conditions:

1. The Advanced Enviro-Septic sizing is unchanged from the Enviro-Septic, at 5.0 square feet per linear foot.

2. Pursuant to the letter dated 12/09/09 by you, only Authorized Representatives trained by Presby Environmental, Inc. may install the product as a NSF certified system.

3. Pursuant to the letter dated 12/09/09 and a conversation between Division staff and Presby Environmental, Inc. staff, no other product may be substituted for the Advanced Enviro-Septic, including Enviro-Septic, at the request of Presby Environmental, Inc.; although the Advanced Enviro-Septic may be substituted for Enviro-Septic. This does not apply to designs which specify a generic fabric wrapped tube.

4. For a Non- NSF certified system, Advanced Enviro-Septic will use the Enviro-Septic and Simple Septic Leaching Systems Design and installation Manual in conjunction with the Enviro-Septic Maine State Attachment.

5. Manufacturer literature not withstanding, systems installed on original slopes greater than 20% grade require a variance to the Rules.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of Advanced Enviro-Septic. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products.

If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

John Elias Baldacci
Governor

Maine Department of Health and Human Services

Maine Center for Disease Control and Prevention
286 Water Street, 3rd Floor
11 State House Station
Augusta, ME 04333-0011

Brenda M. Harvey,
Acting Commissioner

Dora Anne Mills, MD, MPH
Public Health Director
Maine CDC Director

March 6, 2006

Presby Environmental, Inc.
Attn.: David W. Presby, President
134 Airport Road
Whitefield, NH 03598

Subject: Request for Variance Points, Presby Maze

Dear Mr. Presby:

Thank you for your letter and the information you provided in support of your request that the Division approve 20 First Time System Variance points for use of the Presby Maze when used with Enviro-Septic pipes. The limited information in our file for the Maze's original approval contains BOD_5 and TSS reduction data for two installations, in 1997. Each set in turn consisted of four samples.

According to those data, the average TSS in the effluent from septic tank with a Maze ("Tank B") was 21 mg/l, and the average BOD_5 was 73 mg/l, for a combined figure of 94 mg/l. For "Tank D", the average figures were 30 mg/l TSS, 113 mg/l BOD_5; and 143 mg/l combined. The average of the two combined figures is 118 mg/l.

Under provisions of Table 1900.11 of the Subsurface Wastewater Disposal Rules, 20 variance points are awarded for an effluent strength (when it reaches the disposal area) of 10 mg/l or less combined BOD_5 and TSS. Since the data on file for the Maze demonstrates an effluent strength of 118 mg/l, only 5 variance points can be awarded.

If you wish to pursue a higher point award, you should submit data which demonstrates that the Maze produces a lower strength septic tank effluent than the limited data presently available to us shows.

Please contact me at (207) 287-5695 if you have any questions.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Subsurface Wastewater Program
Division of Environmental Health
e-mail: james.jacobsen@maine.gov

/jaj

Enc.: Page 19-3, CMR 241

cc: Product File

from 1997 MAZE Ale
JAJ

SUMMARY and LOCATION of PRESBY MAZE TANK TESTS

Maze Tank (B) Suspened Solid

Date of Test	Inlet Test #	Inlet mg/L	Outlet Test #	Outlet mg/L	Percentages % Passing	Retained
10/13/97	1	1000	2	24	2.400	97.600
10/28/97	10	3300	11	10	0.303	99.697
11/25/97	1	8600	2	22	0.256	99.744
12/29/97	1	3500	2	28	0.800	99.200

Maze Tank (B) BOD

Date of Test	Inlet Test #	Inlet mg/L	Outlet Test #	Outlet mg/L	Percentages % Passing	Retained
10/13/97	1	2000	2	90	4.500	95.500
10/28/97	10	3000	11	43	1.433	98.567
11/25/97	1	4000	2	48	1.200	98.800
12/29/97	1	600	2	110	18.333	81.667

Maze Tank (D) Suspened Solid

Date of Test	Inlet Test #	Inlet mg/L	Outlet Test #	Outlet mg/L	Percentages % Passing	Retained
10/13/97	4	2700	5	54	2.000	98.000
10/28/97	20	720	21	16	2.222	97.778
11/25/97	3	320	4	23	7.188	92.813
12/29/97	3	2700	4	28	1.037	98.963

Maze Tank (D) BOD

Date of Test	Inlet Test #	Inlet mg/L	Outlet Test #	Outlet mg/L	Percentages % Passing	Retained
10/13/97	4	870	5	110	12.644	87.356
10/28/97	20	560	21	84	15.000	85.000
11/25/97	3	190	4	60	31.579	68.421
12/29/97	3	520	4	200	38.462	61.538

Samples tested by: Eastern Analytical, Inc.
25 Chenell Drive
Concord, N.H. 03301

Presby Corp
603-837-9864

PRESBY ENVIRONMENTAL, INC.

INNOVATIVE SEPTIC TECHNOLOGIES

143 Airport Road Whitefield, NH 03598
Tel: 1-800-473-5298 Fax: (603) 837-9864
www.presbyenvironmental.com

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MAR 02 2006

WASTEWATER & PLUMBING PROGRAM

February 28, 2006

James A. Jacobsen, Environmental Specialist IV
State of Maine Division of Health Engineering
11 State House Station
Augusta, Maine 04333-0011

Subject: Presby Enviro-Septic® and Presby Maze™ Variance Points
Advanced Treatment System
Maine Subsurface Waste Water Disposal Rules 10 CMR 241 Table 1900.11

Dear Mr. Jacobsen:

Presby Environmental, Inc., requests a relative point value of 20 for variances using Presby Maze™ with Enviro-Septic® wastewater treatment systems that are designed and installed in accordance with the Enviro-Septic® Design and Installation Manual and Maine State Attachment and the Presby Maze™ Design and Installation Handbook for the State of Maine. Supportive data was submitted previously.

Please contact us if we may be of assistance in your review of this request.

Sincerely,

David W. Presby
President

PRESBY ENVIRONMENTAL, INC.
INNOVATIVE SEPTIC TECHNOLOGIES

143 Airport Road Whitefield, NH 03598
Tel: 1-800-473-5298 Fax: (603) 837-9864
www.presbyenvironmental.com

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FEB 28 2006
WASTEWATER &
PLUMBING PROGRAM

February 28, 2006

James A. Jacobsen, Environmental Specialist IV
State of Maine Division of Health Engineering
11 State House Station
Augusta, Maine 04333-0011

Subject: Presby Enviro-Septic® and Presby Maze™ Variance Points
Advanced Treatment System
Maine Subsurface Waste Water Disposal Rules 10 CMR 241 Table 1900.11

Dear Mr. Jacobsen:

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Please contact us if we may be of assistance in your review of this request.

Sincerely,

David W. Presby
President

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WASTEWATER & PLUMBING PROGRAM

February 28, 2006

James A. Jacobsen, Environmental Specialist IV
State of Maine Division of Health Engineering
11 State House Station
Augusta, Maine 04333-0011

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Please contact us if we may be of assistance in your review of this request.

Sincerely,

David W. Presby
President

John Elias Baldacci
Governor

Maine Department of Health and Human Services

Maine Center for Disease Control and Prevention
286 Water Street, 3rd Floor
11 State House Station
Augusta, ME 04333-0011

Brenda M. Harvey,
Acting Commissioner

Dora Anne Mills, MD, MPH
Public Health Director
Maine CDC Director

February 7, 2006

Presby Environmental, Inc.
Attn.: David W. Presby, President
134 Airport Road
Whitefield, NH 03598

Subject: Denial, Request for Variance Points, Presby Enviro-Septic

Dear Mr. Presby:

Thank you for your letter and the information you provided in support of your request that the Division approve 20 First Time System Variance points for use of Enviro-Septic pipes. The information you provided demonstrates reductions in BOD_5 and TSS (among other parameters) in disposal area leachate, based upon both a controlled laboratory study and a field study.[1]

The Division has determined that use of Enviro-Septic pipes does not qualify for variance points, pursuant to Chapter 19 of the Subsurface Wastewater Disposal Rules. Specifically, the Division is not persuaded in favor of awarding variance points for any disposal area. In our view, a disposal area is not the same thing as an advanced treatment unit or an effluent polishing filter, and should not be treated as such regardless of whether it is comprised of fabric wrapped pipes, chambers, or stone and pipe beds, etc. The points given in Chapter 19 for wastewater strength, specifically Table 1900.11, are predicated upon treatment tank effluent quality when it arrives at the disposal area, not upon the disposal area's leachate quality.

However, reduction in the strength of disposal area leachate is to be expected from any disposal area.[2] At the risk of stating the obvious, cleansing of the effluent via an established biomat is a broad function of ***any*** onsite sewage disposal system's disposal area.[3, 4] While Enviro-Septic pipes appear to accommodate additional BOD_5 and TSS removal, they none the less comprise a disposal area. On the basis of the foregoing, this office has determined that it is not appropriate to grant variance points for use of a disposal area in an onsite sewage disposal system, regardless of the disposal area's configuration.

Please contact me at (207) 287-5695 if you have any questions.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Subsurface Wastewater Program
Division of Environmental Health
e-mail: james.jacobsen@maine.gov

/jaj
xc: Product File

1. Table 1 and Table 2, report titled "*Treatment of Septic Tank Effluent: Comparison of Enviro-Septic and Conventional Pipe and Stone Leaching Systems*", dated March 1, 2004.
2. Table 3-18, U.S.E.P.A. "*Onsite Wastewater Treatment Systems Manual*", 02/2002.
3. Pages 5 & 6, "*Site Evaluation for Subsurface Wastewater Disposal in Maine*", 04/2001
4. "*In Ground Dispersal of Wastewater Effluent: The Science of Getting Water into the Ground*", Small Flows Quarterly, Spring 2003, Volume 4, Number 2

PRESBY ENVIRONMENTAL, INC.

INNOVATIVE SEPTIC TECHNOLOGIES

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www.presbyenvironmental.com

RECEIVED
FEB 03 2006
WASTEWATER & PLUMBING PROGRAM

January 31, 2006

James A. Jacobsen, Environmental Specialist IV
State of Maine Division of Health Engineering
11 State House Station
Augusta, Maine 04333-0011

Subject: Presby Enviro-Septic® Variance Points, Advanced Treatment System
Maine Subsurface Waste Water Disposal Rules 10 CMR 241 Table 1900.11

Dear Mr. Jacobsen:

Presby Environmental, Inc., requests a relative point value of 20 for variances using Enviro-Septic® wastewater treatment systems that are designed and installed in accordance with the Enviro-Septic® Design and Installation Manual and the Maine State Attachment. I have discussed this with Russ Martin and he is aware and supportive of our request.

Enclosed find a copy of the report, "Treatment of Septic Tank Effluent: Comparison of Enviro-Septic® and Conventional Pipe and Stone Leaching Systems" which documents third party testing in Stoke, Quebec, Canada. Table 2 of the report, page 13, indicates total suspended solids (TSS) and biochemical oxygen demand (BOD) of septic tank effluent into the system averaged 297 mg/L. The leachate from the Enviro-Septic® system contained TSS and BOD total of 4 mg/L, averaged from 30 samples.

The septic tank effluent was above the 240 mg/L wastewater strength for typical domestic strength and the leachate value was below the 10 mg/L threshold for a 20 point value. Please contact us if we may be of assistance in your review of this request.

Sincerely,

David W. Presby
President

Differential Venting and How It Works

In a typical gravity septic system the roof vent is the high vent that draws air through the sand and topsoil cover on the leach field. Differential venting, which requires a low vent and a high vent, replicates this vertical "chimney" effect to pull air through the leaching system. This ensures that adequate oxygen for promoting system efficiency reaches the Enviro-Septic® protected biomat.

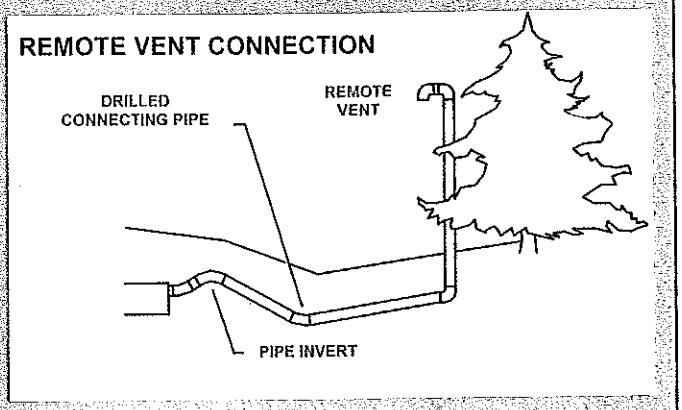
Gravity systems with more than 18" of cover, under paved surfaces, or with Multi-Level™ configuration require only the addition of a low vent, since the roof vent will still function as the high vent. (Some States require low vents in all systems.)

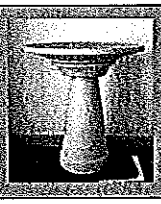
Because pump systems cut off the air flow to the roof vent, a high vent must be installed in the distribution box or velocity reduction chamber. To avoid freezing a distribution box, the low "inlet" vent must always be at the end of the system and not on the distribution box itself.

All differential vent systems must have only one low "inlet" vent at the end of each line, section or basic serial bed and one high "exhaust" vent at the roof or at the distribution box. No other vent or opening may be placed between the high and low vents. The high vent must be at least ten feet above the low vent.

Today's Tip: Remote Venting

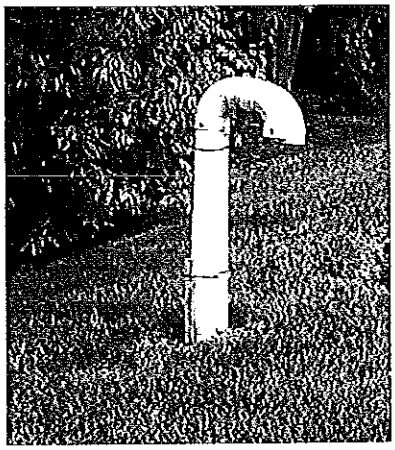
Many people have concerns about unsightly vents. Remote venting is a means of addressing these concerns. The Remote vent location must ensure that condensation does not collect in the connecting pipe and block air passage. The connecting line invert must be above the top of the highest Enviro-Septic® line and, if applicable, above the top of the distribution box. The connecting pipe must slope back towards the system or all low points must be above seasonal high water and drilled to drain into a gravel cavity.





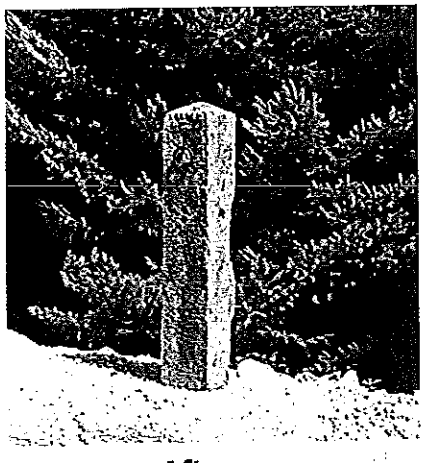
Did You Know?

Low vents and high vents, essential in some Enviro-Septic® systems, can be hidden easily with rocks, trees, windmills, and flagpoles. Presby Environmental also offers birdbaths and granite posts that can fit over low vents to make them less visible.



Before

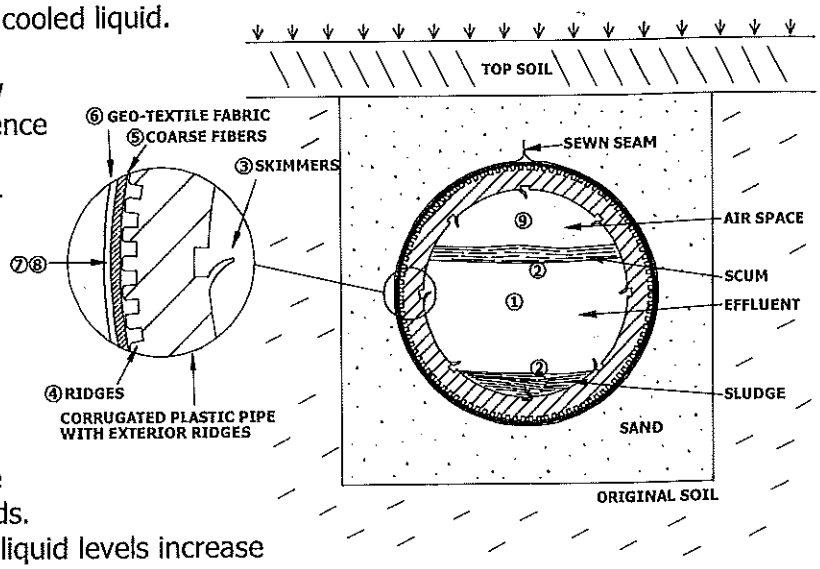
Hiding the low vent with a fiberglass granite post



After

The Science Behind Enviro-Septic®: How Does it Work?

Stage 1: Warm effluent enters the pipe and is cooled to ground level.
Stage 2: Suspended solids separate from the cooled liquid.
Stage 3: Skimmers further capture grease.
Stage 4: Pipe ridges allow the affluent to flow uninterrupted around the circumference of the pipe.
Stage 5: A mat of random course fibers separates more suspended solids from effluent.
Stage 6: Effluent passes into a geo-textile fabric and grows a bacterial filter.
Stage 7: Sand wicks liquid from the geo-textile fabric and enables air to transfer to the bacterial surface.
Stage 8: The fabric and fibers provide a large bacterial surface to break down solids.
Stage 9: An ample air supply and fluctuating liquid levels increase bacterial efficiency.

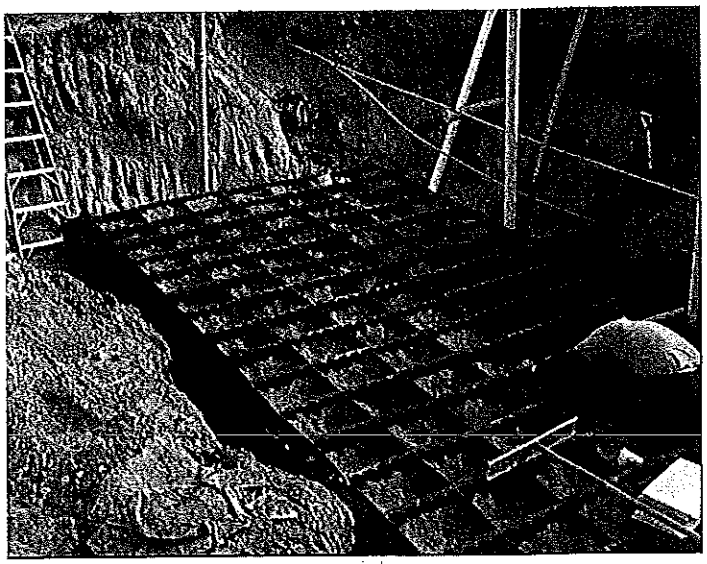


The Enviro-Septic® wastewater treatment system uses natural processes and the physical, chemical, and biological energy within the components to treat wastewater. The effluent level within the system rises and falls with daily water peaks to improve the decomposition process. Solids and grease are contained within the system and are decomposed by aerobic bacteria prior to release. Leachate exits the system with reduced levels of contaminants and solids. Conventional systems distribute the raw untreated effluent to the lowest point in the system where the soil surface soon becomes clogged, cannot accept effluent, and fails.

De-Nyte™ Testing Being Performed in Massachusetts

De-Nyte™ is a product designed to install beneath an Enviro-septic® leaching system and turn unhealthy nitrates into harmless nitrogen gas. De-Nyte™ processes phosphorous, E. coli, nitrogen, and other unwanted substances in the leachate. Earlier results of small scale testing provided results yielding nitrite and nitrate concentrations of 1.14 mg/l in treated wastewater, an amount that is drastically lower than the EPA drinking water standard of 11 mg/l.

Presby Environmental recently installed a full-sized revolutionary De-Nyte™ system at the Massachusetts Alternative Septic System Test Center in Barnstable, Massachusetts. The Center tests effluent before it enters and after it exits the system to determine the completeness of the De-Nyte™ treatment.



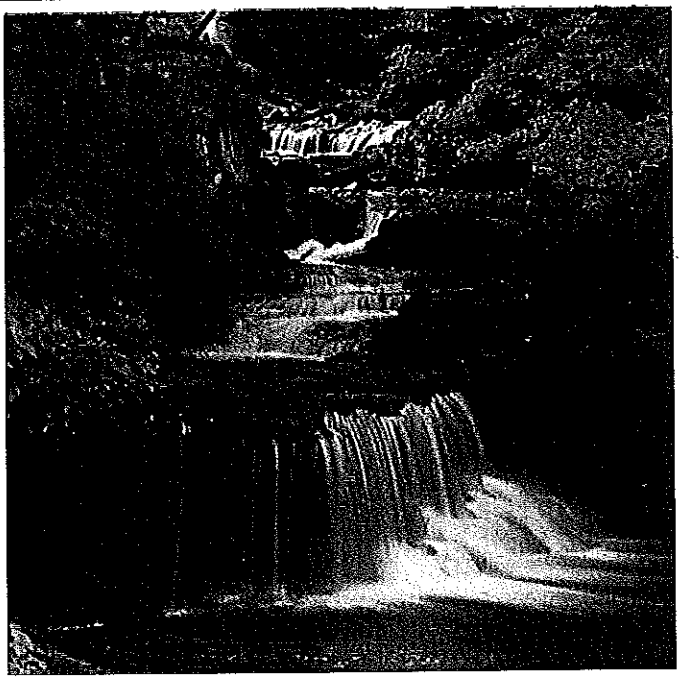
The above photo shows a De-Nyte™ cell array during installation at the Massachusetts Alternative Septic System Test Center in Barnstable, Massachusetts.

System Brings Benefits to Massachusetts Residents

Dare to Compare

Compare these Enviro-Septic® benefits with any other system in the State of Massachusetts.

Billions of dollars saved Statewide, thousands saved on individual systems.
Elimination of pressure distribution with its additional cost and quarterly inspections.
Nearly complete removal of effluent contaminants.
Elimination of sloping terrain constraints.
Flexible system configurations adapt easily to difficult sites.
Installations within 2' of estimated high ground water.
Total reduction in system size up to 40% over conventional systems.
Satisfaction that your system is protecting you and the environment.



The Enviro-Septic® wastewater treatment system recharges and protects our groundwater and requires 40% less area on Massachusetts sites than conventional systems. Multi-Level™ systems that occupy 1/6th the area of conventional systems have been installed in other states. Several prominent restaurant chains have used these systems for years on sites where conventional systems failed within months. As the exceptional performance of our products is realized, more and more Massachusetts residents and their environs will benefit.

Designer and Installation Documents Available

Product documentation is available from Presby Environmental. Comprehensive Enviro-Septic® wastewater treatment system design and installation manuals for the States of Massachusetts and Indiana are also downloadable at **www.presbyenvironmental.com**. All certified individuals will receive these manuals during the certification process. They may also be obtained by calling 1-800-473-5298.

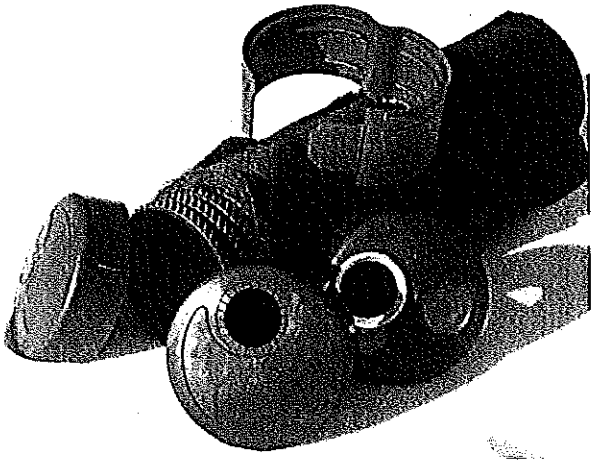
Seeking Enviro-Septic® Dealers

Presby Environmental is now seeking applications for Massachusetts and Indiana dealers. Individuals should be involved in some aspect of the septic system industry, preferably operating their own businesses. Qualified applicants may apply online at **www.presbyenvironmental.com**. Persons not having online access can call 1-800-473-5298.

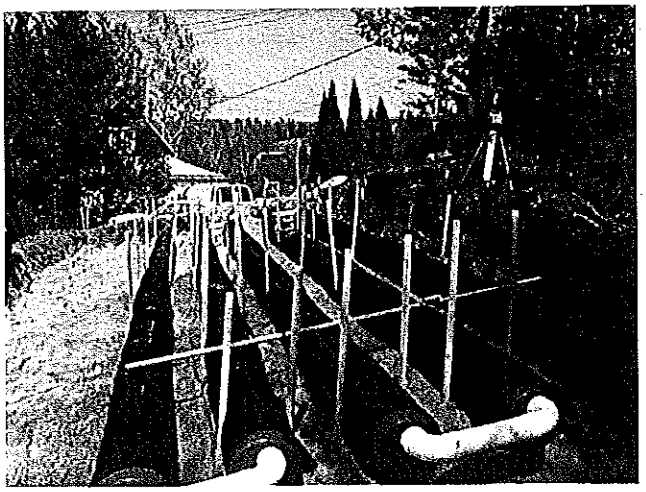
Illinois Launches Pilot Program

Illinois has approved a pilot program for the Enviro-Septic® wastewater treatment system. Numerous systems will be installed and tested for performance and efficiency. A unique aspect of this approval is that Presby Environmental will determine the standards for these installations. Commonly, jurisdictional authorities set up their own design rules and regulations. This trust given by Illinois is in recognition of the uniqueness of Enviro-Septic® and the knowledge and experience its developers have about its treatment process.

Enviro-Septic® Approved by the Indiana State Department of Health



Enviro-Septic® components



Enviro-Septic® on sloping terrain

New Benefits for Indiana Residents!

We thank the staff at the Indiana State Department of Health for their efforts in the development of the "Enviro-Septic® Wastewater Treatment System Indiana Design and Installation Manual for Residential Systems". With their cooperation and contributions this manual will establish new standards for the industry. They recognized the advantages of the Enviro-Septic® process and made suggestions that clearly showed their overall understanding of this product.

Soils in Indiana are challenging, but because of Enviro-Septic's® improved treatment capabilities, systems may be designed and installed in these soils with bed size reductions of 30% to more than 50% that of conventional systems. Also, the ability to construct systems on sloping sites and to use non-conventional system configurations will increase their design and installation alternatives. Indiana residents will enjoy the satisfaction of knowing that they are protecting their health and environment. Mike Market of Rockport, is the sanctioned instructor, distributor, and representative in Indiana.

Enviro-Septic® Certification Courses

Designers, installers and individuals involved in the approval and permitting process are encouraged to enroll in an Enviro-Septic® Certification Course online at **www.presbyenvironmental.com** or by calling Presby Environmental at 1-800-473-5298. Classes are scheduled within each state and provide design and installation requirements for that state. Certification requirements by state are as follows.

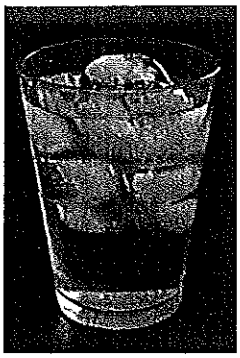
- Indiana: All designers, installers and individuals involved in the permitting process.
- Maine: All designers and installers.
- Massachusetts: All designers and installers
- New Hampshire: All designers and installers of Multi-Level™ systems
- Vermont: All designers and installers

Did you know?

If we were to take the pipe from the 80,000 systems currently in use today and place it end to end, the distance would stretch from East Coast to West Coast and back again!

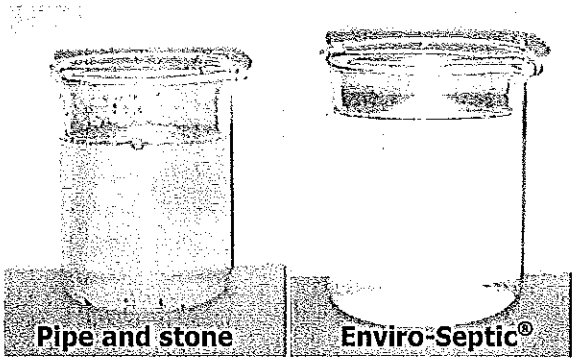
How Clean is the Drinking Water in Your Home or Business?

Septic systems using pipe and stone can discharge large concentrations of fecal coliforms (such as E. coli) that can reach on site well water, jeopardizing your health and the environment. Is your septic system contributing to the problem? Not if you have Enviro-Septic®!



The Enviro-Septic® wastewater treatment system removes 99.2% of E. coli bacteria before it enters the soil. It is proven to treat unhealthy contaminants more effectively than other leaching systems, is smaller in size, and is less expensive.

Samples taken from test site



No other system on the market today can match Enviro-Septic® for dependability, durability, and environmentally friendly design.

PRESBY ENVIRONMENTAL, INC.
INNOVATIVE SEPTIC TECHNOLOGIES

143 Airport Road, Whitefield, NH 03598
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www.presbyenvironmental.com

Protecting You & the Environment

Presby Environmental News

Whitefield, NH

Winter 2005-2006

Who is Presby Environmental?

Presby environmental is a family run and operated company with ties to the septic system business that stretch back to the 1940's. Today it is a thriving corporation specializing in the manufacturing of environmentally safe products used in residential and commercial wastewater treatment.

To meet the demands of its ever growing customer base, Presby Environmental continues to expand its manufacturing capabilities. In 2002 its affiliate, Presby Plastics, opened a new 15,000 square foot plant to produce the components used in the Enviro-Septic® wastewater treatment system. In July of 2005 Presby Plastics completed a new 20,000 square foot addition to this original plant. The new space will house machinery tripling the Enviro-Septic® production capacity and adding new lines for the production of components used in De-Nyte!™, a revolutionary new Presby product designed for denitrifying leachate and used in conjunction with Enviro-Septic® systems.

To centralize its operations, Presby Environmental has also relocated its headquarters from Sugar Hill to a new suite of offices in the Presby Plastics plant in Whitefield.

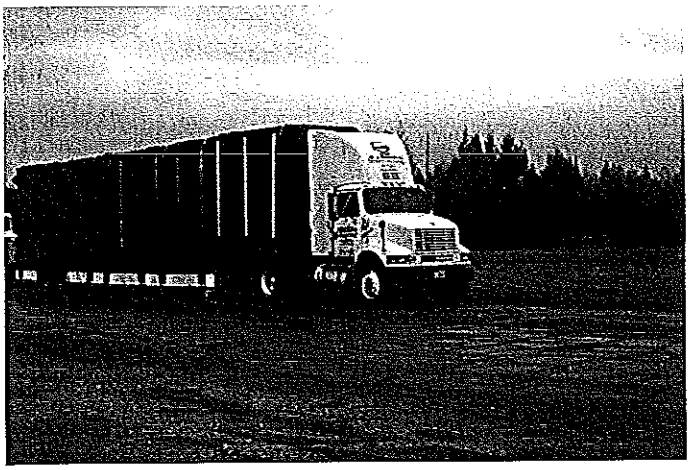
Presby Environmental Welcomes Indiana and Massachusetts

Presby Environmental is pleased to announce that the Enviro-Septic® wastewater treatment system has now been approved for use in Indiana and Massachusetts. These States join ranks with Maine, Vermont, New Hampshire, and the Province of Quebec in allowing their residents to experience the unique advantages provided by this product. Also in the limited approval pipeline are Illinois, a State that has implemented a pilot program, New York, and the Province of Ontario, Canada.

For a number of years, an Enviro-Septic® system has been installed and in use for testing in Indiana. The success of this system, along with extensive cooperation from the Indiana State Department of Health, aided in the approval process. In particular we applaud the efforts of Alan Dunn and Chris Bourke, and their associates.

Similarly, in Massachusetts the Department of Environmental Protection played a key role in the approval process. In this instance we have Glenn Haas, David Ferris, and Steven Corr to thank for their diligence and perseverance.

Both of these States also contributed extensively to the design of new "stand-alone" installation manuals used exclusively in each State.



Treatment of Septic Tank Effluent: Comparison of Enviro-Septic® and Conventional Pipe and Stone Leaching Systems

Research Report March 1, 2004

Joselle Germano-Presby, Ph.D.[1], David W. Presby[1], Denis Boucher[2], Benoit Boucher[2], François R. Côté[2], Helene B. Balkin[3], Robert E. Mooney[4], Aaron B. Margolin, Ph.D. [5]

Summary

Many new technical devices have been devised to improve the function of standard septic systems. The Enviro-Septic® leaching system, manufactured by Presby Environmental, Inc., is purported to surpass conventional leaching systems for wastewater treatment. The purpose of the research projects described herein was to compare the performance of Enviro-Septic® systems to that of conventional pipe and stone leaching systems. Some of the research was carried out in collaboration with the Virology and Waterborne Disease Laboratory, Department of Microbiology, at the University of New Hampshire (UNH), Durham, NH, and with DBO Expert Inc., Magog, Quebec, Canada. The UNH project involved miniature model systems housed inside a laboratory on campus, whereas DBO Expert Inc., utilized larger underground model systems. Analyses of wastewater components, including ammonia, biochemical oxygen demand (BOD), chemical oxygen demand (COD), fecal coliforms (e.g. *E. coli*), nitrate, phosphorus, total Kjeldahl nitrogen (TKN), total suspended solids (TSS), and viral particles were conducted on the septic tank effluent (entering) and the leachate (exiting) of the model systems. The large-scale Enviro-Septic® model system set up by DBO Expert Inc., demonstrated percent removal values for TSS and fecal coliforms that were significantly greater ($P < 0.001$) than those of the conventional pipe and stone model system, suggesting that Enviro-Septic® performs better than conventional systems at filtering out these septic components. Furthermore, Enviro-Septic® in the large-scale models displayed significantly greater percent removal values of COD, BOD, TKN, phosphorus and ammonia ($P < 0.001$) and significantly greater production levels of nitrate ($P < 0.001$), suggesting that it treats wastewater better by promoting a more substantial aerobic microbial ecosystem than conventional systems. These results were consistent with findings from the small-scale systems in the UNH project, where the Enviro-Septic® models displayed significantly greater percent removal values of COD and ammonia ($P < 0.05$) than the pipe and stone models. In a study of wastewater flow through the DBO Expert Inc., model systems, it took approximately six months for septic tank effluent to flow through 60' of Enviro-Septic® pipe, whereas it took more than a year for effluent to flow through 40' of conventional perforated leaching pipe. These results suggested that more of the Enviro-Septic® pipe functions at treating wastewater over time, and that it distributes a more dilute leachate to a greater area of underlying soils than conventional systems.

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[5] Professor, Virology and Waterborne Disease Laboratory, Department of Microbiology, University of New Hampshire

Introduction

Background Information

Residential septic systems are the largest source (by volume) of wastewater disposed to the land (Linsley *et al.*, 1992). Nearly 40% of new homes in the United States use them (Hallahan, 2002). Much attention has been focused on improving the performance of standard systems as their impact on the environment has been addressed. In fact, the U.S. Environmental Protection Agency, National Water Quality Inventory: 1996 Report to Congress (U.S. Environmental Protection Agency, 1998) states, "Improperly constructed and poorly maintained septic systems are believed to cause substantial and widespread nutrient and microbial contamination to ground water."

A standard septic system is defined here as the combination of a septic tank and leach field. The septic tank serves as a temporary holding tank for raw wastewater. It traps much of the solid waste by allowing it to settle. The solid waste must be emptied from the tank periodically as part of routine maintenance of the system. Little dissolved oxygen is available inside the septic tank; its environment is anoxic (anaerobic). Partial decomposition of waste within the tank is accomplished by anaerobic bacteria (bacteria that can tolerate or require the absence of oxygen). This partially treated wastewater then passes out to the leach field and is referred to as septic tank effluent (STE) (Winneberger, 1984).

A leach field typically consists of a series of subsurface perforated pipes arranged horizontally within a rocky or sandy medium. It functions to treat STE and distribute it under the surface to the underlying soils. The pipes and soils act as filters of wastes and allow further chemical breakdown and biodegradation of the STE before it is discharged to the environment. A conventional leach field is defined here as a pipe and stone system constructed of perforated PVC pipe (4" diameter) laid within a bed of crushed stone.

It is a priority of the U.S. Environmental Protection Agency and other environmentalists to improve the performance of standard septic systems and prevent groundwater contamination (U.S. Environmental Protection Agency, 2003). Therefore, many new septic system technologies have been introduced. Most of these innovations operate either inside the septic tank or between the tank and the leach field (Heufelder and Rask, 2001). Enviro-Septic® Leaching Systems by Presby Environmental, Inc., however, take a different approach to improving septic system function.

The unique design of Enviro-Septic® components is purported to enhance the efficiency of wastewater treatment within the leach field (Figure 1). Enviro-Septic® systems consist of corrugated, high-density plastic pipe with a 9.5" interior diameter. Exterior ridges on the peak of each corrugation are thought by Presby Environmental, Inc., to facilitate the flow of effluent around the circumference of the pipe. This, in addition to the large inner surface area and the relative thinness of the plastic, allow effluent to cool quickly within the pipe. Upon cooling, STE separates into its components: scum floats to the top and sludge sinks to the bottom. The liquid component of the STE flows through the pipe perforations, while the scum and sludge are retained within the pipes. Furthermore, plastic "skimmers" extend inwards from each hole. The skimmers are thought by Presby Environmental, Inc., to help capture grease and suspended solids, preventing them from escaping through the perforations. A thick layer of coarse, randomly-oriented plastic fibers surrounds the pipe. This layer serves as an attached culture system providing an extensive surface area on which microbial biofilms can grow. Moreover, a geo-textile fabric surrounds the plastic fiber layer, further supporting the growth of microbial biofilms. Finally, Enviro-Septic® systems are installed in clean medium-coarse sand (washed concrete sand).

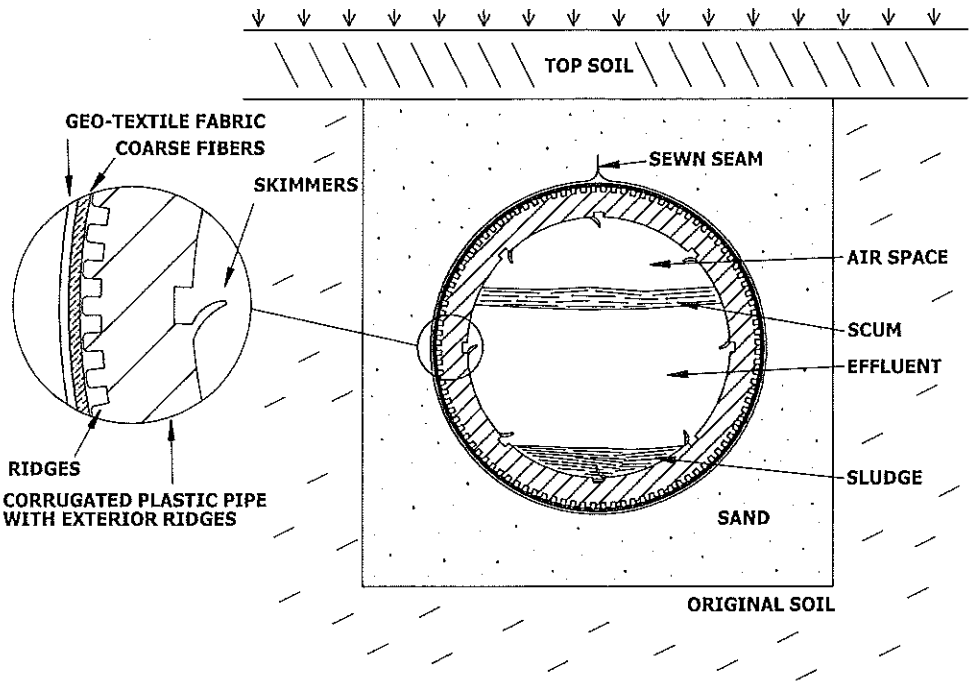


Figure 1. Components of the Enviro-Septic® pipe (from the Enviro-Septic® & Simple-Septic® Leaching Systems Design and Installation Manual, 2003).

Research Projects: Experimental Design

Two individual research projects were designed to compare the performance of Enviro-Septic® leaching systems to conventional pipe and stone leaching systems. Several hypotheses were tested.

- Hypothesis 1: The unique design of Enviro-Septic® pipe and the surrounding sand enable the system to filter total suspended solids, bacteria, and viruses better than conventional systems.

It is desirable to prevent bacteria, viruses, and other components of wastewater from escaping the leach field and contaminating the underlying groundwater. Filtering action can be measured by comparing the amount of these components in the STE to the amount in the leachate (wastewater leaving the leach field) and estimating the percent removal.

- Hypothesis 2: Enviro-Septic® systems accomplish decomposition of wastewater faster and more efficiently than conventional systems by promoting and maintaining a more substantial aerobic microbial ecosystem (microorganisms that require oxygen to live).

Aerobic decomposition works faster and more efficiently to break down natural and synthetic organic substances than anaerobic decomposition (Heufelder and Rask, 2001) (Grady *et al.*, 1999).

- Hypothesis 3: Enviro-Septic® systems distribute wastewater over a larger surface area than conventional systems because more of the system functions at any given time.

It has been observed that in a serially distributed conventional leaching system, only the first line or lines of pipe (and their underlying soils) take most of the burden of wastewater treatment most of the time (Winneberger, 1984). If leachate were to be distributed across a larger surface area,

then it would be discharged to the environment in a more dilute form. This would allow the underlying soils to better filter and treat the wastewater before it enters the water table.

Presby Environmental, Inc., has participated in two individual research projects. The purposes of these were to test the above hypotheses by comparing the performance of Enviro-Septic® to conventional pipe and stone systems under controlled conditions. The first research project was carried out in collaboration with Aaron Margolin, Ph.D., Helene Balkin, and Robert Mooney at the Virology and Waterborne Disease Laboratory, Department of Microbiology, University of New Hampshire (UNH), Durham, NH. It involved small-scale model Enviro-Septic® and pipe and stone systems that were maintained in a UNH laboratory. The experiments of the UNH project were designed to test Hypotheses 1 and 2; they were conducted and completed in 2002.

A second research project is being carried out in collaboration with Denis Boucher, Benoit Boucher, and François R. Côté of DBO Expert Inc., Magog, Quebec, Canada. It involves larger, in-ground models that are more representative of real life systems. These systems were set up in Stoke, Quebec. The experiments were designed to test Hypotheses 1, 2 and 3; they were begun in 2002 and are ongoing.

Testing Hypothesis 1: Hypothesis 1 was tested by comparing the amount of total suspended solids, number of coliform organisms, and number of viral particles detected in the STE and leachate of the model systems. The amount of total suspended solids (TSS) is a direct measure (in mg/L) of solid septic components (dissolved and undissolved).

There are approximately 100 billion microorganisms present in every gram of human feces (Cano and Colomé, 1988). Among the natural flora that inhabit the intestine are the coliform bacteria including *Escherichia* such as *E. coli*. An aerobic leach field supports a wide variety of organisms including aerobic bacteria, rotifers, protozoans, and fungi (Heufelder and Rask, 2001). Bacteria are the smallest of these septic system-dwelling microbes (Fenchel *et al.*, 1998) and are, therefore, the most likely to escape filtration. The amount of bacteria in wastewater is measured by the most probable number of coliform organisms (MPN; presented as number per 100 mL). Some pathogenic (disease-causing) bacteria enter septic systems from residences, and it is especially desirable to prevent these types of bacteria from reaching the water table. There are so many different species of pathogenic bacteria, however, it is not feasible to test for each one individually. Therefore, MPN is often used in wastewater testing as a guideline to indicate the *possible* presence of pathogenic bacteria.

Viruses, some pathogenic, are also present in wastewater. The capacity of a leach field to filter out viruses can be determined by "spiking" a known quantity of viral particles (measured in plaque forming units; PFU) into the STE at a single point in time. The number of PFU in the leachate is then measured for a period of time following the initial spiking. Theoretically, the better the filtering action of the leaching system, the lower the amount of suspended solids, bacteria, and viruses there will be leaving the system.

Testing Hypothesis 2: Hypothesis 2 was tested by comparing levels of TSS, carbon-, nitrogen-, and phosphorous-containing compounds in STE to the levels in leachate. The increase of some and decrease of other particular substances in a septic system would be indicative of aerobic decomposition.

TSS – Total suspended solids were tested because the biodegradation of TSS is carried out, in part, by aerobic microorganisms. A reduction of TSS in the leachate compared with the STE would be consistent with the presence of an aerobic microbial ecosystem in the leaching system.

COD – Chemical oxygen demand is a measure of the amount of oxygen required to stabilize the waste in a sample of wastewater completely. Carbon-containing organic

compounds can be chemically oxidized (broken down) to yield carbon dioxide. This is what is meant by "stabilize." The amount of oxygen required for stabilization is proportional to the amount of carbonaceous compounds in the sample. COD is therefore an indirect measure of the amount of carbon-containing compounds in a sample. One would expect the COD of the leachate to be less than the COD of the STE if carbon-containing compounds are chemically broken down in the leaching system.

BOD – Biochemical oxygen demand is a measure of the amount of oxygen required to stabilize carbonaceous waste biologically (through the metabolic action of aerobic microorganisms). The BOD is therefore another indirect measure of the amount of carbon-containing compounds in a sample. The BOD_5 refers to the amount of oxygen utilized by a sample over a five-day period. Carbonaceous compounds are oxidized to carbon dioxide during aerobic microbial metabolism; therefore a reduction in COD and BOD would be consistent with the presence of an aerobic microbial ecosystem in a leaching system.

TKN and ammonia – Total Kjeldahl nitrogen is the amount of nitrogen contained within organic compounds (such as nucleic acids, amino acids, and urea) and in ammonia (NH_3). Ammonia is a natural bi-product of the breakdown of nitrogen-containing organic compounds during aerobic metabolism.

Nitrate and nitrite – Nitrate (HNO_3) and nitrite (HNO_2) are products of the process of nitrification, which involves the oxidation of ammonia by the following (unbalanced) chemical reactions:

$$NH_3 + O_2 \rightarrow HNO_2 + H_2O \quad (O_2 \text{ is oxygen; } H_2O \text{ is water})$$
$$HNO_2 + O_2 \rightarrow HNO_3 + H_2O$$

The reactions of nitrification are carried out by aerobic bacterial species of *Nitrosomonas* and *Nitrobacter*, natural occupants of septic systems. Theoretically, as aerobic microbial metabolism proceeds, amounts of ammonia and TKN decrease, while levels of nitrate increase.

Phosphorus – Phosphorus is a constituent of wastewater that is contained in organic compounds such as sugar phosphates, phospholipids and nucleotides, and in inorganic compounds such as polyphosphates (used in synthetic detergents) and orthophosphates. Phosphorus and nitrogen are the nutrients responsible for eutrophication (massive growth of algae in lakes). Therefore it is desirable to prevent their release into the environment.

Testing Hypothesis 3: Hypothesis 3 was tested by the DBO Expert Inc., research project. The model leaching systems were set up in Stoke, Quebec, such that leachate was collected from separate sections of each system. This enabled researchers to monitor when wastewater reached various sections of the systems, and hence when sections of each system were operational.

Materials and Methods

Research Project 1: UNH

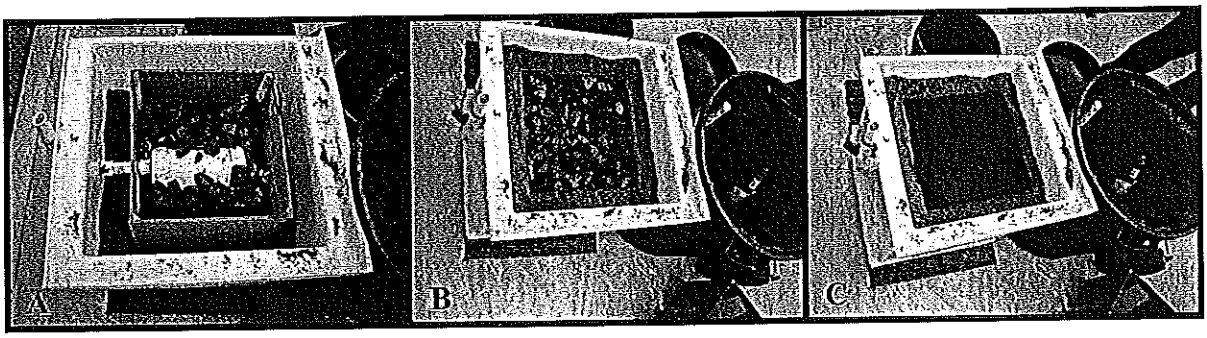
Two model Enviro-Septic® systems (deemed ES 1 and ES 2) and two model conventional pipe and stone leaching systems (deemed P&S 3 and P&S 4) were assembled (Figure 2). Each model was housed in a square 18" × 18" × 18" polypropylene container fitted with PVC pipe (1" diameter) and an injection port in the center of one side. Each container contained 3" of washed concrete sand at the bottom.

For the P&S systems, an 8" length of Standard Pipe Schedule 20 (4" diameter) distribution line was positioned horizontally in the center of the square container, attached to the 1" PVC pipe at one end, and capped at the other end. Clean washed 1-1.5" crushed stone was distributed around the distribution line as follows: 6" underneath, 4" on either side along its

length, 2" on each capped end and 2" on top. This distribution line/stone unit occupied a total of one cubic foot in the center of the square container. A black polypropylene fabric was placed over the distribution line/stone unit (to prevent sand from falling into the void spaces of the stone), and the remainder of the square container was filled with washed concrete sand.

For the ES systems, a 12" length of Enviro-Septic® pipe, capped at one end, was positioned horizontally in the center of the square container and attached to the 1" PVC pipe. The pipe was then surrounded by washed concrete sand.

Assembling the pipe and stone model system



Assembling the Enviro-Septic® model system

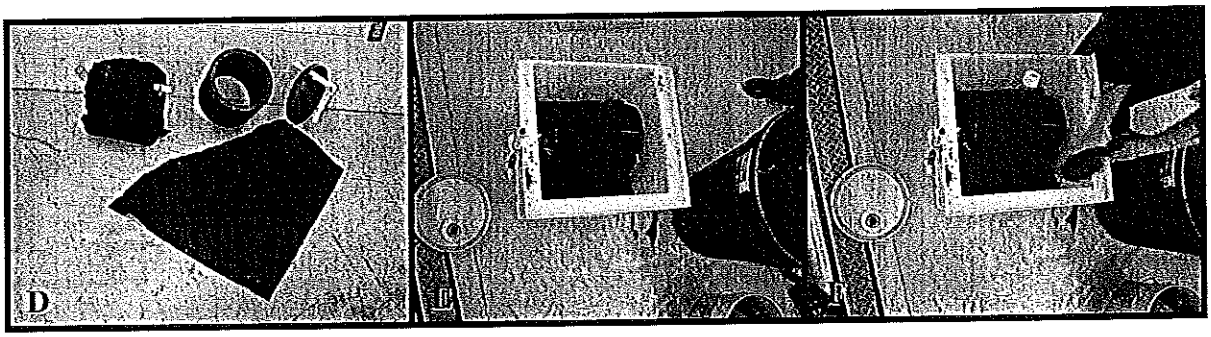


Figure 2. Assembly of the model leaching systems used in the UNH research project. A) An 8" length of distribution line is surrounded by a cubic foot of washed stone atop 3" of washed concrete sand in a square container. B) The stone is surrounded by sand. C) A piece of fabric prevented sand from falling into the spaces between the stones. D) The components of the 12" length of Enviro-Septic® pipe and how they were assembled. The clear tubes were put in place to enable viewing the inside of the system. E) The Enviro-Septic® pipe was placed atop 3" of washed concrete sand in a square container and F) surrounded by sand.

A 1.5 quart chamber was mounted above each model unit and attached to the 1" PVC pipe. A timer-controlled diaphragm pump delivered STE to each of the chambers from a common holding tank. The bottom of each model system was equipped with a plastic screen and grid to enable the systems to drain. Drains were emptied into four individual recovery tanks via silicon tubing. The systems were housed in a temperature-controlled room in Rudman Hall on the campus of UNH and maintained at 18°C (Figure 3).

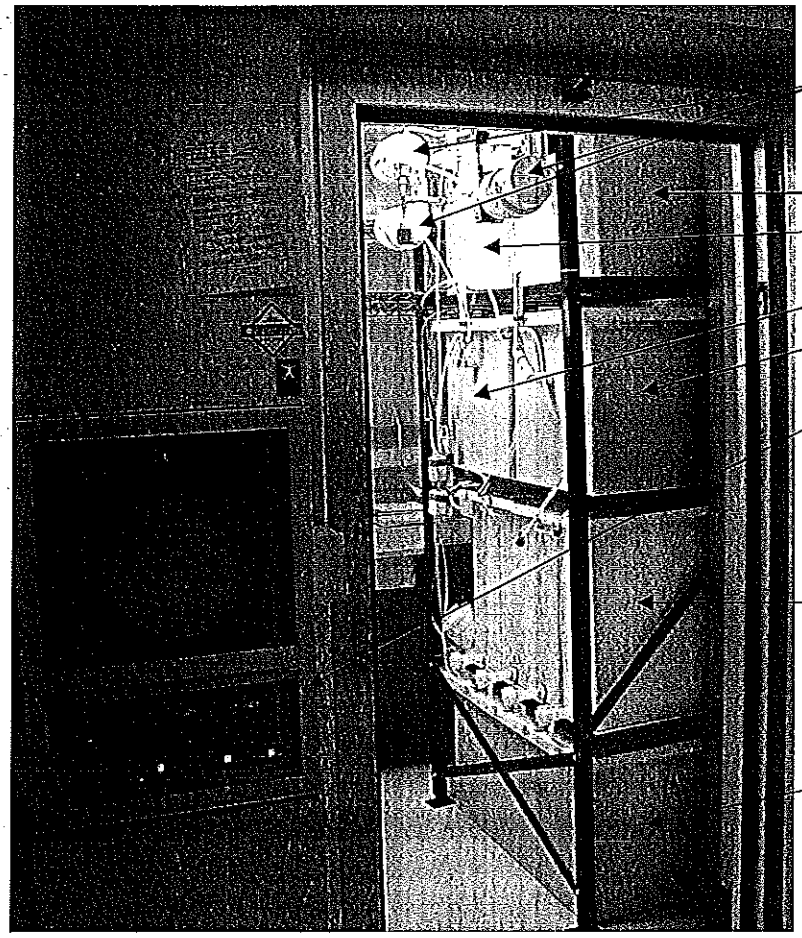


Figure 3. Model leaching systems were housed in a temperature-controlled room in Rudman Hall on the campus of UNH.

Septic tank effluent was supplied on a weekly basis from a residence in Sugar Hill, NH. Upon every new STE delivery, the old STE remaining in the holding tank was discarded and replaced with fresh STE. One and a half quarts of STE were pumped to each model system from the holding tank four times a day: 7:00 am, 8:00 am, 4:00 pm and 5:00 pm. The systems were fed for a period of at least two months before sample testing was begun. Samples of STE and leachate were collected weekly at the time of STE delivery. Once the STE in the holding tank was replaced with fresh STE, an additional pumping cycle was carried out. The STE sample was taken directly from the pump, and the leachate samples were taken directly from the model system drains immediately following this pump cycle.

Samples were transported on ice to Eastern Analytical, Inc., Concord, NH, where they were analyzed for ammonia, BOD, COD, nitrate, nitrite, TKN, and TSS. Tests for ammonia, BOD, COD, and TKN were begun after nine weeks of STE feeding and carried out for 22 weeks. Tests for TSS were begun after 14 weeks of STE feeding and carried out for 18 weeks. Tests for nitrate and nitrite were begun after 19 weeks of STE feeding and carried out for 12 weeks. Samples were also analyzed for fecal coliforms following ten weeks of STE feeding, for a total of 21 weeks. For the first 14 weeks of bacterial testing, MPN of fecal coliforms was determined by the Virology and Waterborne Disease Laboratory, UNH. For the final seven weeks, testing for *E. coli* was performed by Eastern Analytical, Inc. A Student's *t* test (NIST/SEMATECH e-Handbook of Statistical Methods, 2004) was done to assess statistical significance of the results.

After 28 weeks of feeding STE into the systems, known quantities of MS-2 virus (a bacteriophage or virus whose host is a bacterium) and poliovirus were "spiked" into the systems via their injection ports. The amounts of these viruses in the leachate were analyzed for 14 days following the initial spike. Virus spiking and enumeration were conducted by the Virology and Waterborne Disease Laboratory, UNH.

Research Project 2: DBO Expert Inc.

Installation of the Model Leaching Systems: A model Enviro-Septic® system and a model conventional pipe and stone leaching system were installed underground in Stoke, Quebec, Canada (Figures 4 and 5). Two trenches, 60' long by 3.5' wide, were dug side by side and encased in plywood. One trench would house the Enviro-Septic® system, while the other would house the conventional system. The bottom of each trench was divided lengthwise into three 20'sections. The first and second sections were 4.5' deep, while the third section was 5' deep (Figure 4A). The plywood trenches were made water-tight with an impermeable membrane liner (Soprema Inc., Wadsworth, OH; Figure 4B). An additional plastic canvas (yellow) was placed at the bottom of each trench in order to protect the membrane liner (Figure 4B). Perforated PVC pipes, 3" in diameter, were installed to drain the bottom of each trench section (Figures 4B and 4C). Eight inches of ¾" crushed stone were placed at the bottom of each trench. Then, 4" of ¼" crushed stone were laid over the larger stone in order to prevent sand from clogging the drainage pipes (Figure 4D). Clean medium-coarse sand (6" over sections 1 and 2, 12" over section 3) was then placed over the crushed stone so that the top of the sand was level over all three sections (Figure 4E, Figure 5). The properties of the sand were as follows: nominal diameter D10 $\approx$ 0.36 mm, coefficient of uniformity $\approx$ 4.8. At this point, the two trenches were identical to each other.

For the conventional pipe and stone system, a 6" layer of ¾" crushed stone was laid over the sand. A single 60' length of standard 4" diameter perforated PVC pipe was installed and surrounded by another 6" layer of ¾" crushed stone (Figure 4F, Figure 5). For the Enviro-Septic® system, six 10' lengths of Enviro-Septic® pipe were installed in one continuous line within a 16" layer of sand (Figure 4G, Figure 5). The remaining top portion of each trench was backfilled, and grass was planted atop the trenches.

The trench sections were deemed ESP 1, ESP 2, and ESP 3 for the first, second and third 20' of the Enviro-Septic® system and CPC 1, CPC 2, and CPC 3 likewise for the conventional system (Figure 4D). Leachate from each trench section was drained to a separate drainage receptacle located approximately 5' from the ends of the trenches (Figure 4H). Here, the leachate volume was monitored continually, and samples were taken for comparative analysis. Leachate in the drainage receptacles was then pumped to the Stoke municipal sewage treatment area located just downhill from the test site.

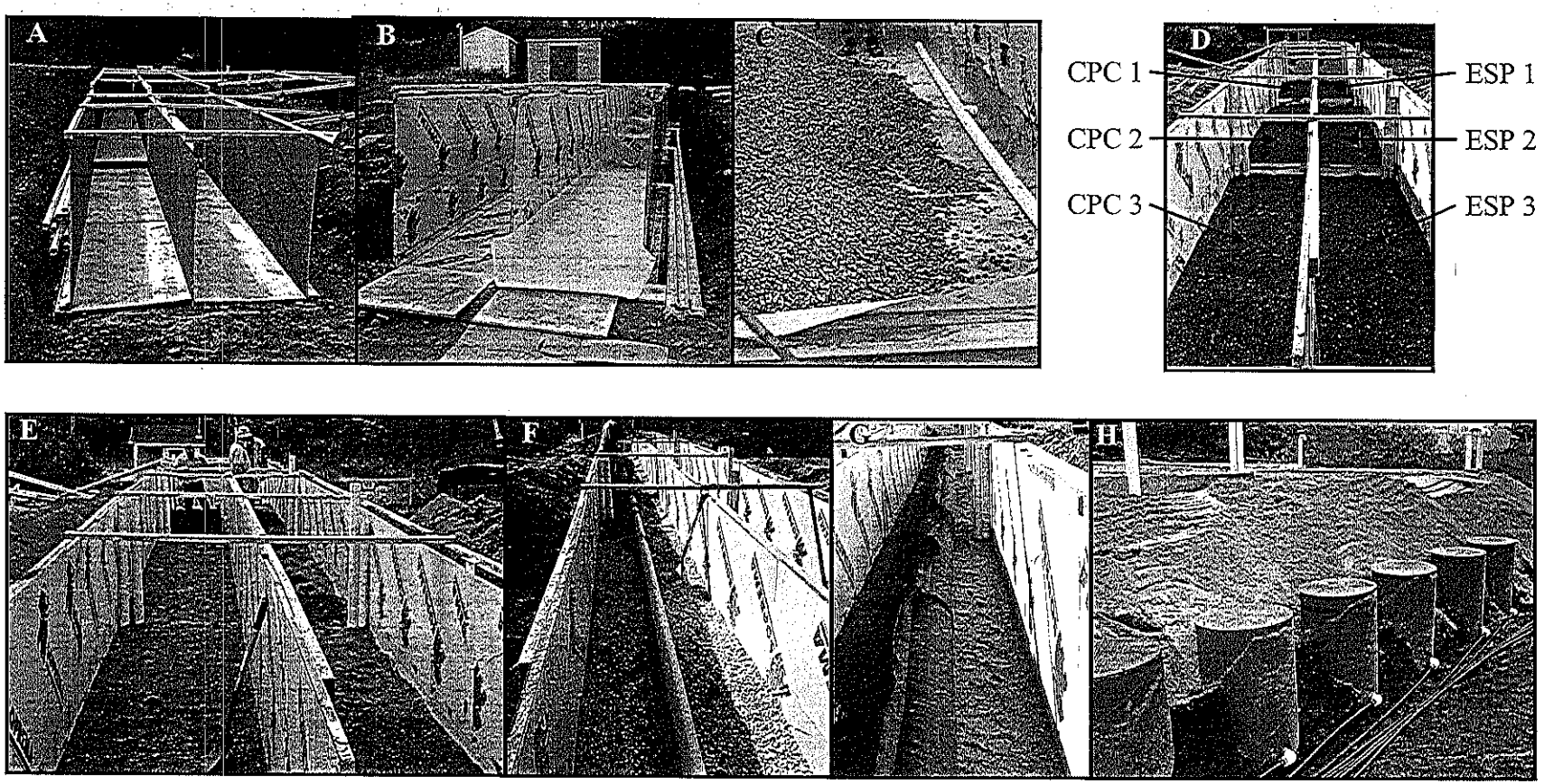


Figure 4. Installing model Enviro-Septic® and conventional pipe and stone leaching systems in Stoke, Quebec. A) Plywood-encased trenches, 60' long × 3.5' wide, were divided lengthwise into three sections. Note the final 20' sections are 6" deeper than the first two 20' sections. B) A waterproof membrane and plastic canvas were applied to both trenches, and drain pipes attached to each section. C) Stone and 3" perforated PVC pipe allowed leachate to drain from the bottom of each trench section. D) The same amount of stone covered each section's bottom. The sections, deemed CPC 1, 2 and 3, and ESP 1, 2 and 3, can be seen here. E) A layer of clean medium-coarse sand covered the stone. The two trenches are identical at this point. F) For the conventional model system, a 60' length of standard 4" perforated PVC pipe was installed in crushed stone. G) In the other trench, sixty feet of Enviro-Septic® pipe were installed within a layer of sand. H) Leachate from each trench section drained to a separate drainage receptacle (green cylinders), where its volume was continually measured, and samples were taken for comparative analysis. Leachate in the drainage receptacles was then pumped (via black hoses) to the Stoke municipal sewage treatment area located just downhill from the test site.

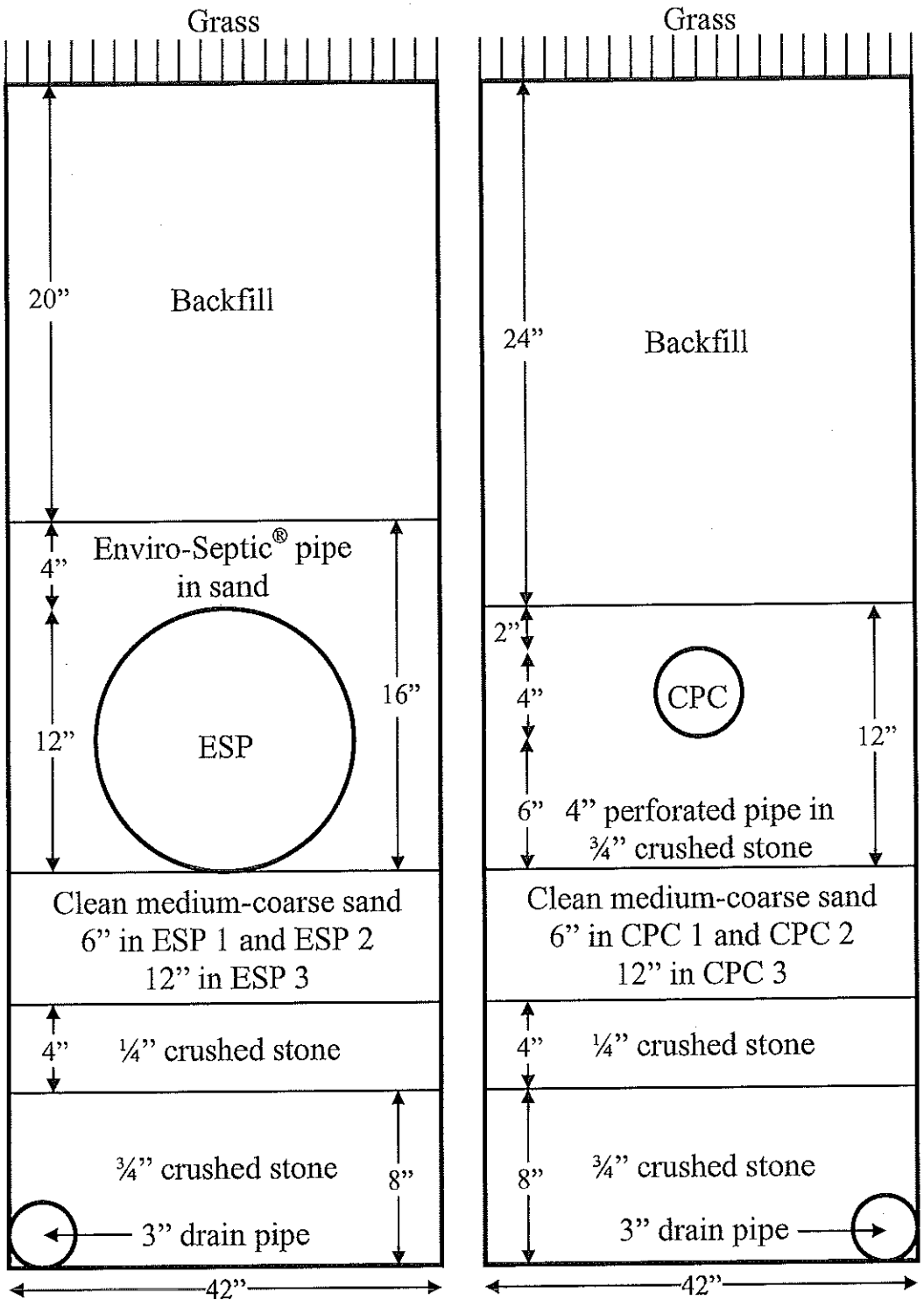


Figure 5. Diagram showing layers of materials and relative locations of drainage and leaching pipes as they were installed in each trench. The box on the left represents the Enviro-Septic® model system; the box on the right represents the conventional pipe and stone model system. Diagram is not to scale.

Loading Septic Tank Effluent into the Model Systems: Sewage from the town of Stoke's sewer was fed into a 6868 gal (26 m^3) septic tank on the test site. Effluent from this large tank was gravity fed to a small 264 gal (1 m^3) waiting tank. Whenever the waiting tank was full, the overflow STE was gravity fed to the Stoke municipal sewage treatment area. Different amounts of STE were pumped to the feeding tank from the waiting tank several times a day. A schedule was set up such that STE was pumped to the feeding tank three times daily: 233 gal (880 L) in the morning, 166 gal (630 L) midday, and 267 gal (1010 L) in the evening. These volumes were chosen because they mimic a ratio of 35%:25%:40% that is typical of residential usage (NSF International, 1999).

When the feeding tank was filled with the set volume, the STE was then gravity fed to a distribution box with equalizers. The STE, however, was not fed to the distribution box all at once. Instead, the draining of the feeding tank was controlled in a manner such that different amounts of STE were released to the distribution box a time, over the course of about an hour. This was done in order to mimic the way a septic tank would receive wastewater from a typical household.

This loading schedule was carried out every day for 171 days, from October 2002 to March 2003. During this time, the volumes of STE leaving the feeding tank were monitored daily to make sure that the pumping/loading system was operating properly. It was determined that an average of 240 gal (908 L), 178 gal (673 L), and 273 gal (1035 L) were actually being delivered to the distribution box in the morning, midday, and in the evening, respectively. This was considered acceptable since the actual volumes were never below the preset volumes. After this 171-day period, an additional pumping of 267 gal (1010 L) to the feeding tank and its subsequent draining to the distribution box was carried out each night.

Once at the distribution box, the STE was divided equally among four model leaching systems at the test site (the ESP and CPC systems described here, plus two other systems). Therefore, following March 2003, the ESP system and the CPC system were *each* fed 58 gal (220 L) in the morning, 42 gal (158 L) midday, 67 gal (253 L) in the evening, and 67 gal (253 L) at night. In other words, a minimum of 933 total gallons per day were divided among the four model systems at the test site. Therefore, the conventional and the Enviro-Septic® model systems *each* received a minimum of 233 gal (880 L) per day.

Comparative Analysis of Leachate to Septic Tank Effluent: Leachate leaving each 20' section of each model test system was fed to an individual drainage receptacle. The volume of leachate reaching each drainage receptacle was measured daily. Samples of STE (from the feeding tank) and leachate (from the drainage receptacles) were collected bi-weekly to monthly (May 14, May 28, June 3, July 9, July 29, Aug 27, September 29, November 4, November 18, and December 16, 2003). These samples were analyzed for ammonia, BOD, COD, fecal coliforms, nitrate, nitrite, total phosphorus, TKN, and TSS by Biolab Division Thetford, Robertsonville, Quebec. Statistical averages and standard deviations were estimated using samples collected from *all* functioning sections of the ESP and CPC systems. A Student's *t* test was performed in order to assess the statistical significance of the results.

Results and Discussion

Research Project 1: UNH

Test	Average concentration of STE or leachate		Number of samples	% Removal
TSS	STE	300 mg/L	18[6]	
	ES	8 mg/L	35	98%
	P&S	10 mg/L	36	97%
MPN *E. coli*	STE	126,000 per 100 mL	9	
	ES	2,100 per 100 mL	18	98%
	P&S	5,100 per 100 mL	18	96%
MPN Fecal Coliforms	STE	185,264 per 100 mL	12	
	ES	10,000 per 100 mL	24	94%
	P&S	14,000 per 100 mL	24	92%
COD	STE	450 mg/L	21	
	ES	51 mg/L*[7]	43	89%
	P&S	59 mg/L	44	87%
BOD	STE	240 mg/L	21	
	ES	43 mg/L	41	82%
	P&S	48 mg/L	42	80%
TKN	STE	75 mg/L	21	
	ES	8 mg/L	43	89%
	P&S	11 mg/L	44	86%
Ammonia	STE	61 mg/L	21	
	ES	7 mg/L*	43	88%
	P&S	10 mg/L	44	83%
Nitrate	STE	0.5 mg/L	12	
	ES	54 mg/L	24	NA[8,9]
	P&S	52 mg/L	24	

Table 1. Summary of septic component analysis results from Research Project 1 conducted at the University of New Hampshire.

[6] The same STE was distributed to each of two ES models and each of two P&S model systems, therefore the number of samples of STE differs from the number of samples of leachate by a factor of two.

[7] * The difference between ES and P&S leachate values is statistically significant at the 95% confidence level ($P < 0.05$).

[8] NA: Not applicable

[9] Levels of nitrate are expected to rise as a result of aerobic microbial metabolism, therefore percent removal is not applicable.

Test	Average concentrations of STE / leachate		Number of samples	% Removal
TSS	STE	125 mg/L	10[10]	
	ES	2 mg/L***[11]	30	98%
	P&S	25 mg/L	22	80%
MPN Fecal Coliforms	STE	3,091,000 per 100 mL	10	
	ES	2,300 per 100 mL***	30	>99%
	P&S	190,000 per 100 mL	22	94%
COD	STE	441 mg/L	10	
	ES	9 mg/L***	30	98%
	P&S	87 mg/L	22	80%
BOD	STE	172 mg/L	10	
	ES	2 mg/L***	30	99%
	P&S	21 mg/L	22	88%
TKN	STE	45 mg/L	10	
	ES	2 mg/L***	30	95%
	P&S	26 mg/L	20	42%
Ammonia	STE	27 mg/L	10	
	ES	1 mg/L***	30	96%
	P&S	17 mg/L	20	30%
Phosphorus	STE	5 mg/L	10	
	ES	1 mg/L***	30	74%
	P&S	2 mg/L	20	59%
Nitrate	STE	0.1 mg/L	9	
	ES	23 mg/L***	27	NA[12]
	P&S	5 mg/L	20	

Table 2. Summary of septic component analysis results from Research Project 2 conducted in Stoke, Quebec by DBO Expert Inc.

[10] The same STE was distributed to the ESP and CPC model systems, while leachate was collected the three different sections individually. This is why the number of samples of STE differs from the number of samples of leachate. The number of ESP leachate samples varies from the number of CPC samples because until November 2003, wastewater had reached all three ESP sections, but had only reached the first and second CPC sections.

[11] *** The difference between ESP and CPC values is statistically significant at the 99.9% confidence level ($P < 0.001$).

[12] NA: Not applicable

Septic Component Analyses

Results of the septic component analyses from Research Projects 1 and 2 are presented in Tables 1 and 2. The raw data from Research Project 2 are included in Appendix 1. In both projects, the Enviro-Septic® model systems demonstrated greater TSS removal than the conventional systems. In the UNH project, the difference in TSS removal between the systems was small. An average of 8 mg/L TSS exited the ES systems (98% removal), whereas an average of 10 mg/L TSS exited the P&S systems (97% removal). In the large-scale systems of the DBO Expert Inc., project however, ESP leachate contained over ten times less TSS than the CPC leachate (ESP 2 mg/L, 98% removal; CPC 25 mg/L, 80% removal). The difference in leachate clarity between the two systems is visually evident (Figure 6). This difference between the ESP and CPC systems is statistically significant at the 99.9% confidence level ($P < 0.001$); i.e. the probability of the difference being by chance is less than 0.001.

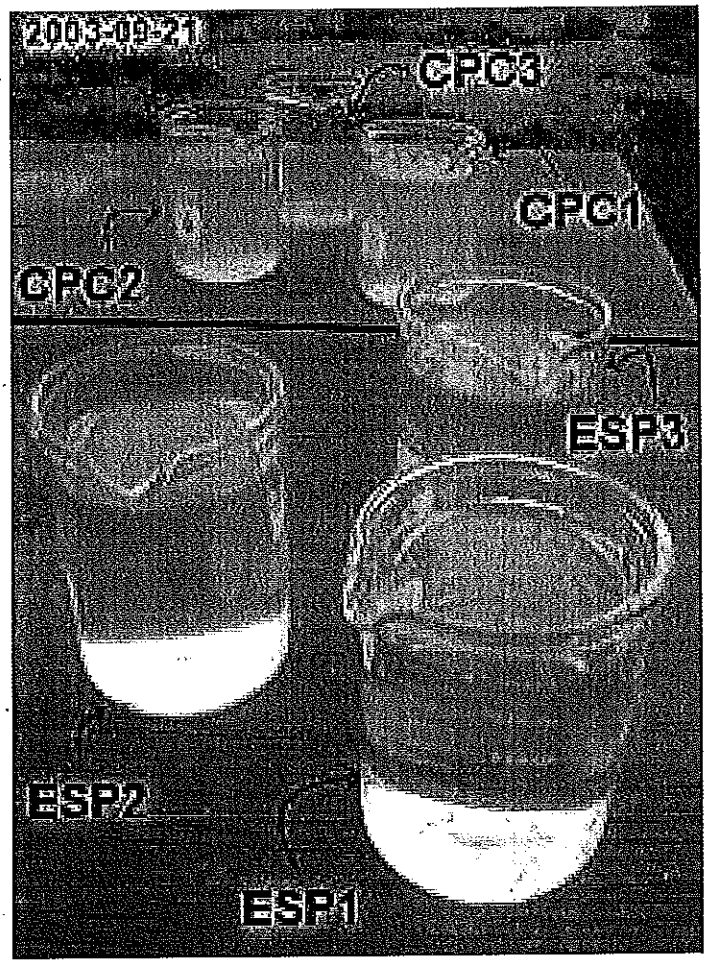


Figure 6. Photograph showing leachate samples from the three different sections of each model leaching system in Stoke, Quebec. The leachate coming out of the Enviro-Septic® system looks clear to the naked eye, whereas the leachate exiting the conventional pipe and stone system is brown in color and cloudy. The beaker labeled CPC 3 is empty because STE had not reached the third 20' section of the conventional system at the time this photograph was taken.

Enviro-Septic® removed fecal coliforms from STE better than pipe and stone systems. Throughout the UNH test, ES leachate contained an average of 10,000 MPN fecal coliforms per 100 mL (94% removal), whereas P&S leachate contained an average of 14,000 MPN per 100 mL (92% removal). This difference is small, but in the DBO Expert Inc., test, the difference is dramatic. Of the average 3 million MPN per 100 mL in the STE, only an average of 2,300 MPN per 100 mL remained in the ESP leachate (>99% removal), compared to 190,000 MPN per 100 mL remaining in the CPC leachate (94% removal). This constitutes a difference of almost two orders of magnitude and is statistically significant ($P < 0.001$). The TSS and fecal coliform results suggest that Enviro-Septic® leaching systems perform significantly better than conventional systems at filtering suspended solids and bacteria from STE, hence supporting Hypothesis 1.

In both research projects, the Enviro-Septic® systems demonstrated greater COD and BOD reduction (Tables 1 and 2) than the conventional systems. In the UNH tests, ES leachate had an average of 51 mg/L COD, whereas P&S leachate had 59 mg/L ($P < 0.05$). In the DBO Expert Inc., results, the COD difference is ten-fold (ESP 9 mg/L, 98% removal; CPC 87 mg/L, 80% removal; $P < 0.001$). The BOD results are similar. The difference between ES and P&S is small in the UNH results, but it is ten-fold in the DBO Expert Inc., tests (ESP 2 mg/L, 99% removal; CPC 21 mg/L, 88% removal; $P < 0.001$).

Results for nitrogen-containing compounds are also significant, with Enviro-Septic® facilitating the decomposition of organic nitrogen compounds and promoting nitrification more than conventional systems. In the DBO Expert Inc., results (Table 2), ESP leachate contained ten times less TKN than CPC leachate (ESP 2 mg/L, 95% removal; CPC 26 mg/L, 42% removal; $P < 0.001$). For ammonia, leachate from the UNH ES systems contained 7 mg/L (88% removal), whereas P&S leachate contained 10 mg/L (83% removal). While this difference is significant at the 95% confidence level ($P < 0.05$), the difference in ammonia values between the DBO Expert Inc., ESP and CPC results are much more pronounced (ESP 1 mg/L, 96% removal; CPC 17 mg/L, 30% removal; $P < 0.001$). The dramatic disappearance of ammonia suggests a high rate of nitrification in the Enviro-Septic® systems. Since nitrate is a product of nitrification, its levels increase dramatically in the Enviro-Septic® systems. While slightly more nitrate was present in the UNH ES system leachate than the P&S leachate (ES 54 mg/L; P&S 52 mg/L), much more was present in the DBO Expert Inc., ESP leachate (ESP 23 mg/L; CPC 5 mg/L; $P < 0.001$). Levels of nitrite in the STE and leachate of the model systems from both research projects were very low (approaching the limits of detection; data not shown), therefore no conclusions were drawn from them.

Finally, Enviro-Septic® systems were more effective at removing phosphorus-containing compounds from STE than conventional systems. From the DBO Expert Inc., results, ESP displayed a 74% removal of phosphorus, compared to a 59% removal by the CPC system ($P < 0.001$).

A decrease in leachate levels of TSS, COD, BOD, TKN, phosphorus, and ammonia, in addition to an increase in nitrate levels, indicate the presence of aerobic microbial metabolism. Such a dramatic decrease of these septic components by the Enviro-Septic® leaching systems suggests that the magnitude of the aerobic microbial ecosystem is extensive. Therefore, these results support Hypothesis 2, that Enviro-Septic® systems accomplish decomposition of wastewater faster and more efficiently than conventional pipe and stone systems by promoting and maintaining a more substantial aerobic microbial ecosystem. Although the Enviro-Septic® systems out-performed conventional systems with respect to all the septic compounds analyzed in both the UNH and DBO Expert Inc., tests, the results from DBO Expert Inc., were much more dramatic. This is likely because the model systems in Stoke, Quebec, are larger and, therefore, better representative models of real-life systems.

Aerobic Microbial Biofilms and System Treatment Capacity

The role of the perforated pipe in a conventional leaching system is basically to distribute the wastewater to the underlying soils. Although the stone bed offers some surface area upon which waste-treating microbes can grow, it too functions primarily to distribute wastewater. Therefore in a conventional system, the majority of wastewater treatment likely takes place in the sand and native soils below the system. Enviro-Septic® systems are different. The primary function of Enviro-Septic® pipe is to provide an ideal environment for the growth of aerobic microbes, which are highly efficient at treating waste. It accomplishes this by providing extensive surface area for microbial biofilms, and by allowing air, and hence oxygen, to penetrate the system. Sewage treatment plants across the nation employ a similar technology by using attached culture systems to support microbial biofilms and supplying oxygen to them. Since the aerobic microbes grow within the pipe, this is where the majority of wastewater treatment likely takes place. The fact that there was no statically significant increase in wastewater treatment (with respect to all tested parameters except phosphorus) in the section of the DBO Expert Inc., ESP model system with twelve inches of sand compared to the sections with six inches of sand (data not shown) further supports the theory that most of the wastewater treatment happens within the Enviro-Septic® pipe, and not in the soils below it.

In New England, each state provides specific guidelines for septic system design and installation. For example, the allowable loading rate of a system (gallons of wastewater per square foot of soil footprint per day; gal/ft^2/day) is dependent upon 1) the percolation rate (minutes per inch; min/in) of a site's native soils and on 2) the design flow (gallons per day), which is the amount of wastewater that can be expected to be discharged to the system by the facility on site. A designer can determine the necessary size of an individual leach field once the allowable loading rate is established. For conventional stone bed leaching systems, the State of Vermont allows a maximum loading rate of 1.2 gal/ft^2/day in soils with a percolation rate of 4 min/in, but only 0.31 gal/ft^2/day in soils with a percolation rate of 60 min/in (Vermont Agency of Natural Resources, 2002). In New Hampshire, loading rates of 0.71 and 0.20 gal/ft^2/day are allowable for 4 and 60 min/in soils, respectively, for a two-bedroom residence (New Hampshire Department of Environmental Services, 1999). The State of Massachusetts would allow a loading rate of 0.74 gal/ft^2/day for Class I soils with a percolation rate of 4 min/in (Massachusetts Department of Environmental Protection, 1996).

Since Enviro-Septic® systems do not primarily rely on the underlying soils to treat wastewater like pipe and stone bed leaching systems do, it does not make sense to define their allowable loading rates in terms of gallons per square foot of soil footprint per day. Instead, the loading rate could be expressed by dividing gallons per day by the surface area of the microbial biofilms supported by the pipe. In order to determine the biofilm surface area, sensors were installed in the model systems at the Stoke, Quebec test site to determine the levels of liquid inside of them. Over the course of one year, the model ESP system reached a steady state such that the STE remained at a depth at or below four inches inside the pipe. Therefore, a microbial biofilm existed on the bottom 17 inches of the inside circumference of the pipe. Since the system is sixty feet in length, the biofilm surface area is 85 ft^2, and the biofilm loading rate is 2.7 gal/ft^2/day.

A biofilm loading rate of 2.7 gal/ft^2/day is over twice the maximum allowable rate for stone bed leaching systems in Vermont, and it is nearly four times greater than New Hampshire's and Massachusetts' allowable loading rates for stone bed leaching systems in permeable soils. Moreover, Enviro-Septic® systems could function at an even higher biofilm loading rate because the maximum depth that liquid can reach inside Enviro-Septic® pipe is eight inches. Therefore,

it could theoretically support a 35% larger microbial biofilm that could treat an 80% greater load volume than the model system in Stoke, Quebec.

In New Hampshire, the minimum required center-to-center pipe spacing for an Enviro-Septic® system is only 1.5 feet (slope must be 0-10% and percolation rate 1-10 min/in; Enviro-Septic® & Simple-Septic® Leaching Systems Design and Installation Manual, 2003). The ability to space pipes only six inches apart allows for a smaller soil footprint. This is possible because the Enviro-Septic® pipe carries out the majority of the treatment, and the role of the underlying soils is basically to carry the treated wastewater away. Furthermore, soils beneath an Enviro-Septic® system are less burdened than those under a conventional system because treated wastewater is more easily distributed than untreated wastewater.

UNH Virus Tests

For the virus tests conducted at UNH, the STE used to spike the systems contained 2.0-3.8 million PFU/mL live MS-2 viral particles and 200,000-410,000 PFU/mL live poliovirus particles. Over a 14-day period, the rate at which these particles were discharged from the systems steadily declined. By the final day of the test, the concentration of MS-2 in the leachate was approximately 0.005% of the initial STE concentration, and the concentration of poliovirus in the leachate was approximately 0.0006% of the initial STE concentration. The rate at which both types of virus escaped from the leaching systems was essentially the same for both ES and P&S (Figure 7). Therefore it can be concluded that Enviro-Septic® leaching systems perform as well as conventional systems at filtering viruses from STE.

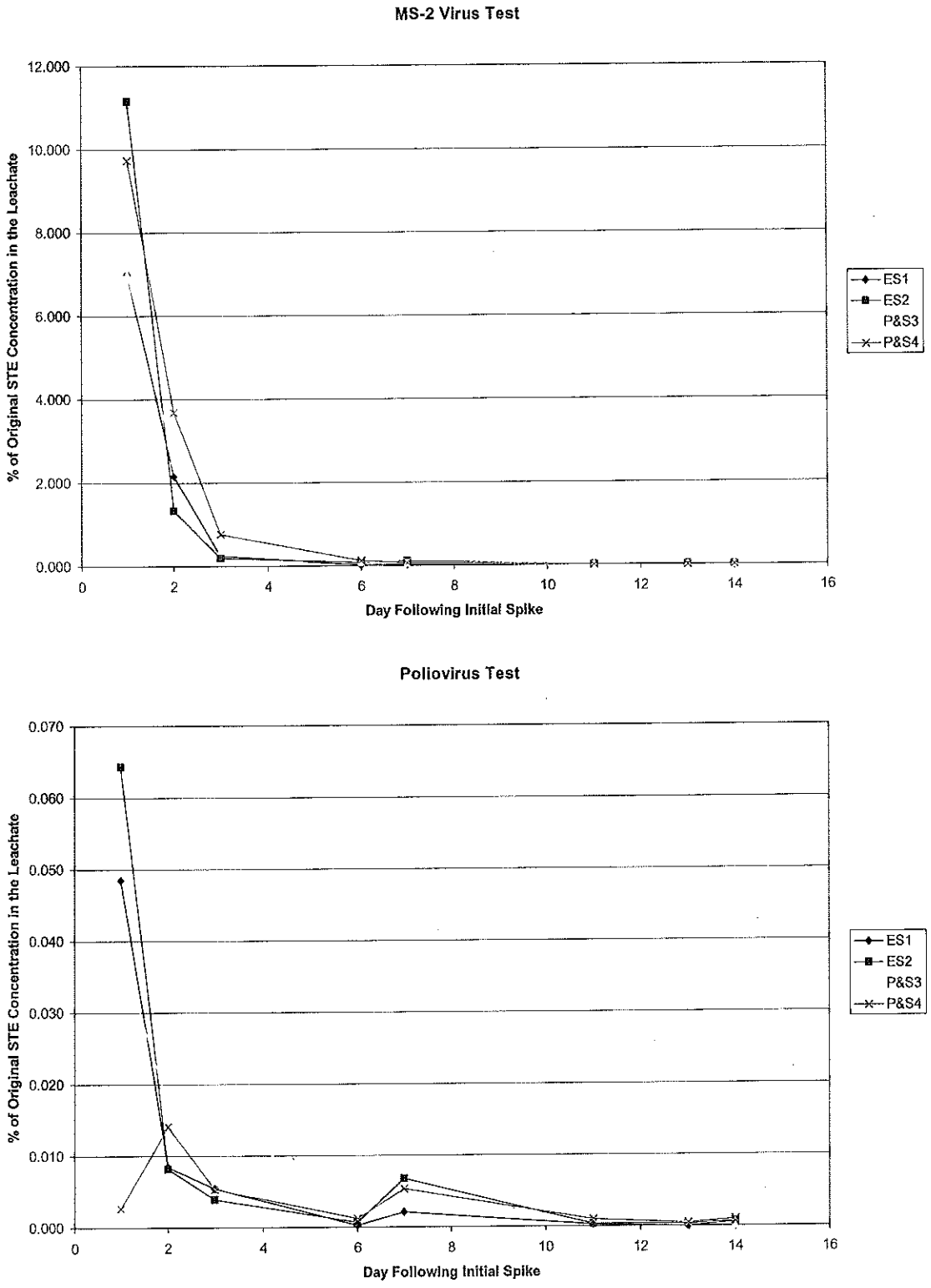


Figure 7. Results of the virus tests. Leachate virus concentrations are presented in terms of percent of the virus concentration in the original spiked STE. There is no significant difference between the ES and P&S systems for filtering viruses from wastewater.

Research Project 2: DBO Expert Inc., Wastewater Flow Tests

The progress of system function, i.e. the extent of flow of STE through the leaching pipes, has been monitored by DBO Expert Inc., since delivery of STE into the model systems began in October 2002. It was possible to determine when and how much STE reached the second and third 20' lengths of pipe because the bottom of each of the systems' sections were drained individually. The results of this experiment are presented in Figure 8. The data from the ESP system indicate the STE started flowing into the second section of the Enviro-Septic® pipe by Week 6, and that it reached the third section of the system by Week 17. By Week 30, the volumes of STE being treated by the three different sections began to equalize. Interestingly in the conventional system, it took about 36 weeks for STE to reach the second section of pipe and the third section remained non-functional for over a year.

These results support Hypothesis 3, that Enviro-Septic® systems distribute wastewater better, i.e. over a larger surface area, than conventional systems. The improved wastewater distribution of Enviro-Septic® systems may be due to their pipes' design, but it may also be due in part to the medium (sand) in which they are installed. It is probable that sand takes greater advantage of the surface tension of water and hence exhibits greater wicking action than the crushed stone in conventional pipe and stone systems. Since more of the Enviro-Septic® pipe is functioning at any given time, this means that there are more microbial biofilms treating the waste at a time. Furthermore, if Enviro-Septic® leaching systems distribute wastewater over a larger area, then more of the underlying soils are sharing the burden of further treating and distributing it as it percolates through them. This in turn would prevent any one area of the underlying soils from becoming saturated (and hence, less efficient), and may extend the lifetime of the leach field.

Final comments

The results of the experiments described above clearly demonstrate that the Enviro-Septic® leaching system performs as well as conventional pipe and stone systems in all tested aspects of wastewater treatment, and significantly better than conventional systems in most areas of treatment. This can be primarily attributed to the design of the Enviro-Septic® system, which supports aerobic microbial growth, and to the use of sand as a surrounding medium.

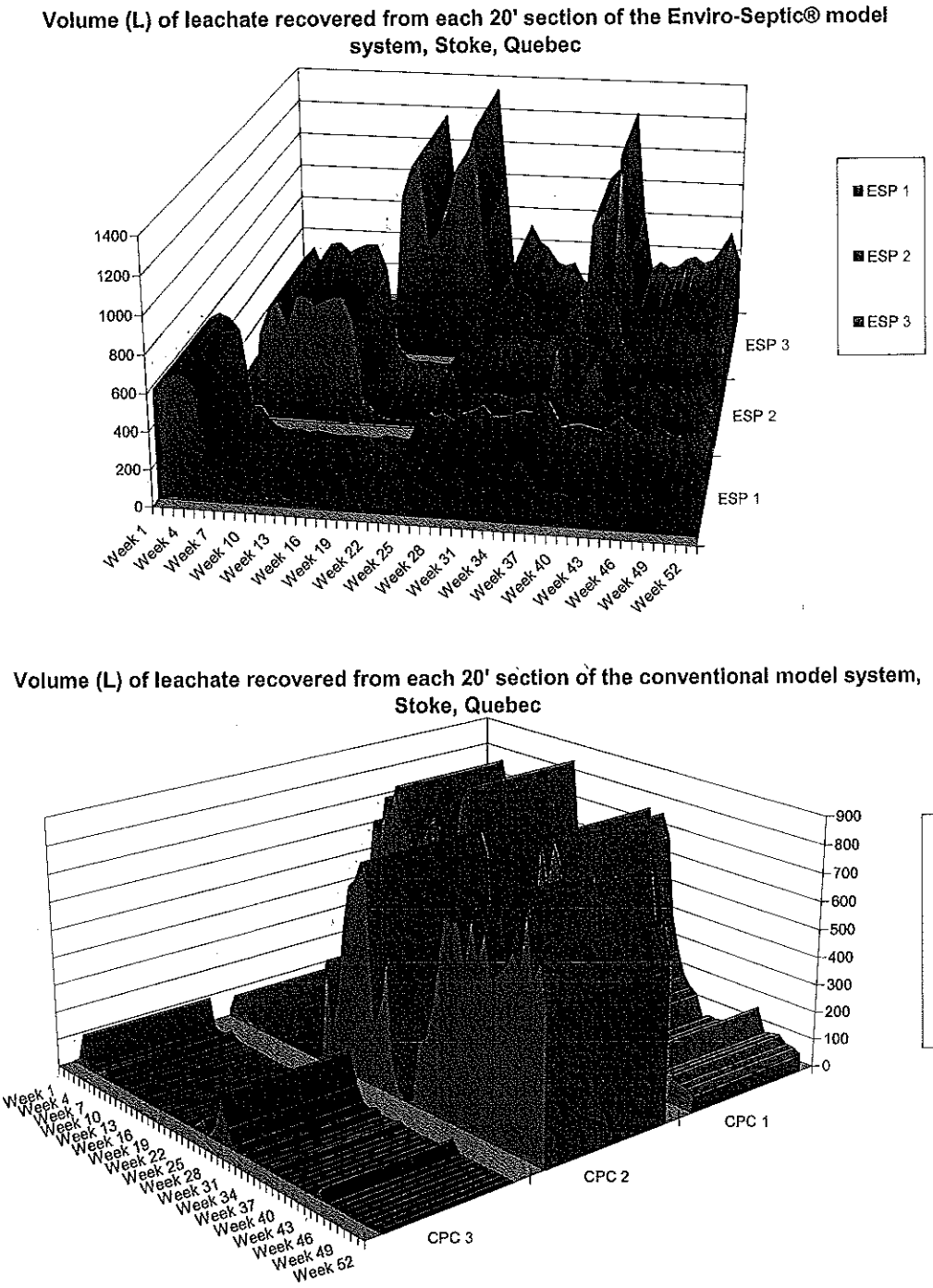


Figure 8. Volumes of leachate that reached the various sections of each model system in Stoke, Quebec, over one year. ESP 1, 2, and 3 refer to the first, second and third 20' lengths of the Enviro-Septic® model system, respectively, while CPC 1, 2, and 3 refer to the first, second, and third 20' lengths of the conventional pipe and stone system, respectively. The volumes include rainwater that infiltrated the systems.

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Appendix 1. Raw data from DBO Expert Inc., wastewater component analyses and estimated statistical results.

TSS (mg/L)	5/14/03	5/28/03	6/3/03	7/9/03	7/29/03	8/27/03	9/29/03	11/4/03	11/18/03	12/16/03	n	AVE	SD	%red	d.f.	t 99.9%	difference	t test 99.9%
STE	67	74	70	112	144	173	131	118	207	151	10	124.70	46.32					
CPC1	7	8	9	45	60	91	20	2	3	40	22	25.14	23.11	79.84	50	3.26	22.84	11.27
CPC2	7	15	9	25	17	34	54	27	15	9								*Signif
CPC3									51	5								
ESP1	1	1	2	1	1	2	2	5	7	3	30	2.30	1.51	98.16				
ESP2	2	2	4	1	2	1	1	1	1	3								
ESP3	3	3	4	2	3	1	1	1	3	5			ave SD					
													12.31					
Ammonia	(mg/L)										n	AVE	SD	%red	d.f.	t 99.9%	difference	t test 99.9%
STE	15	21	14	23	27	31	29	36	35	36	10	26.70	8.23					
CPC1	4.9	14	2.8	19	30	33	38	39			20	18.64	10.87	30.19	48	3.27	17.65	5.85
CPC2	0.5	13	9.6	19	18	11	24	16	15	15								*Signif
CPC3									25	26								
ESP1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	30	0.99	1.53	96.30				
ESP2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.9								
ESP3	2.3	0.5	0.5	1	1.4	0.5	0.5	0.5	3.8	8.2			ave SD					
													6.20					
TKN	(mg/L)										n	AVE	SD	%red	d.f.	t 99.9%	difference	t test 99.9%
STE	26	31	29	36	39	45	47	67	81	51	10	45.20	17.48					
CPC1	13	20	12	24	33	41	50	56			20	26.40	14.04	41.60	48	3.27	24.35	7.95
CPC2	0.9	18	14	26	22	12	33	24	30	22								*Signif
CPC3									47	30								
ESP1	0.9	0.9	0.9	0.9	0.9	1.5	0.9	0.9	0.9	0.9	30	2.05	2.81	95.47				
ESP2	0.9	0.9	0.9	0.9	0.9	1.8	0.9	0.9	0.9	1.6								
ESP3	5.4	1.1	0.9	5	3	0.9	1	0.9	11	12			ave SD					
													8.42					
BOD5	(mg/L)										n	AVE	SD	%red	d.f.	t 99.9%	difference	t test 99.9%
STE	98	152	47	211	205	275	190	168	203	172	10	172.10	63.26					
CPC1	8	17	8	57	7	98	4	2	5	4	22	21.36	24.61	87.59	50	3.26	19.10	11.73
CPC2	2	27	12	33	15	14	16	16	19	18								*Signif
CPC3									75	13								
ESP1	2	2	2	2	2	2	2	2	2	2	30	2.27	1.01	98.68				
ESP2	2	2	2	2	2	2	2	2	2	2								
ESP3	2	2	2	2	2	2	2	2	6	6			ave SD					
													12.81					

COD	(mg/L)										n	AVE	SD	%red	d.f.	t 99.9%	difference	t test 99.9%
STE	213	432	270	448	518	691	541	391	478	431	10	441.30	134.89					
CPC1	18	166	17	154	64	207	121	30	46	37	22	86.77	60.71	80.34	50	3.26	78.24	32.14
CPC2	3	142	46	96	90	92	144	41	63	69								*Signif
CPC3									207	56								
ESP1	3	3	3	3	6	6	3	6	17	6	30	8.53	9.51	98.07				
ESP2	3	3	6	3	3	17	3	3	29	6								
ESP3	6	3	6	19	3	6	17	6	46	12			ave SD					
													35.11					
Phosphorus	(mg/L)										n	AVE	SD	%red	d.f.	t 99.9%	difference	t test 99.9%
STE	3.6	4.3	3.8	5.4	5.8	6.1	6.2	5.4	5.8	5.6	10	5.20	0.95					
CPC1	1.8	2.9	2.1	0.3	1.7	3.1	0.4	0.3			20	2.15	1.07	58.75	48	3.27	0.82	0.72
CPC2	0.3	2.8	2.5	3.4	2.7	2.8	4	2.7	2.4	1.9								*Signif
CPC3									2.4	2.4								
ESP1	1.1	1.1	1.2	1.7	1.8	1.8	1.4	1.9	1.4	1.9	30	1.32	0.45	74.55				
ESP2	0.9	0.8	0.8	1.7	1.7	1.4	1.8	1.9	1.2	1.5								
ESP3	0.8	0.5	0.4	0.7	1.3	0.9	1.2	1.4	1.7	1.8			ave SD					
													0.76					
Coliforms	(MPN per 100 mL)										n	AVE	SD	%red	d.f.	t 99.9%	difference	t test 99.9%
STE	2600000	2400000	2100000	520000	16000000	1800000	1600000	1600000	1800000	490000	10	3091000	4588605					
CPC1	320000	400000	150000	100000	260000	370000	340	230	1100	40	22	189669	264295	93.86	50	3.26	187410	123083.76
CPC2	9	1100000	170000	550000	54000	4900	4100	37000	160000	51000								*Signif
CPC3									430000	10000								
ESP1	120	2800	390	21000	160	36	36	18	9	120	30	2259	4641	99.93				
ESP2	140	4100	730	180	250	130	2000	150	480	200								
ESP3	99	9	1500	12000	1800	18	90	2900	11000	5300			ave SD					
													134468					
Nitrate	(mg/L)										n	AVE	SD		d.f.	t 99.9%	difference	t test 99.9%
STE	0.05	0.05	0.05	0.05	0.05		0.05	0.18	0.1	0.05	9	0.07	0.04					
CPC1	8.9	4.7	6.8	0.05	0.05		0.05	0.05	0.05	0.05	20	5.28	6.30		45	3.28	18.02	6.44
CPC2	24	4.3	5.3	0.38	4.3		8.5	8.7	12	15								*Signif
CPC3									0.11	2.3								
ESP1	24	25	20	16	16		28	15	23	26	27	23.30	7.00					
ESP2	29	25	26	21	17		28	15	27	17								
ESP3	30	45	33	25	15		27	17	25	14			ave SD					
													6.65					

Jacobsen, James

From: Jacobsen, James
Sent: Monday, February 06, 2006 2:52 PM
To: Martin, Russell
Subject: Presby enviro-septics

Russ,

I've been looking over the materials Dave Presby sent us about his Enviro-Septic (ES) pipes. As you may recall, he wants us to grant 20 points for First Time System Variances. He does not actually invoke Table 1900.11, which is the only current occurrence of a 20 point allowance based upon wastewater strength (treatment tank ***effluent***, specifically). He based his request upon the quality of ***leachate*** collected after passing out of the pipes, into the surrounding sand.

In one of two studies he submitted the results for, a laboratory study, the ES pipes reduced BOD5 to 43 mg/l and the stone bed to 48 mg/l, both starting from 240 mg/l. The other, a field test, reduced the BOD5 from 172 mg/l to 2 mg/l and 21 mg/l for the ES pipes and the stone beds, respectively. Other parameters tested similarly.

Based upon information in the USEPA "Design Manual", several studies I Googled today, and plain old common sense, one would expect that pretty much any disposal area would reduce the strength of the wastewater after a biomat is established, since cleansing is one of their major functions. As I see it, the big questions really are, by how much and how quickly?

In any event, I don't see any justification for awarding variance points for ***any*** particular disposal area device. To my mind, a disposal area is not the same thing as an ATU or an effluent polishing filter (BK 2000, etc.), and should not be treated as such regardless of whether it's pipes, In-Drains, chambers, or stone & pipe.

On top of that, if we give ES pipes 20 points, it will open Pandora's box. Do we give Infiltrators 15? Stone beds 10, or 5? In-Drains 30? On what basis will we decide who gets what?

I'm strongly leaning toward saying "no" to this, in a fairly detailed document. I'd appreciate some feedback.

Jim

James A. Jacobsen, Environmental Specialist IV
Department of Health and Human Services
Division of Environmental Health
Subsurface Wastewater Program
286 Water Street, Augusta, ME 04333

Phone: 207-287-5695 Fax: 207-287-3165
http://www.maine.gov/dhhs/eng/plumb

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Maine Center for Disease Control and Prevention
An Office of the Department of Health and Human Services

John E. Baldacci, Governor Brenda M. Harvey, Commissioner

Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
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Augusta, Maine 04333-0011
Tel: (207) 287-5689
Fax: (207) 287-3165; TTY: 1-800-606-0215

January 11, 2010

Presby Environmental, Inc.
Attn.: David Presby, Pres.
143 Airport Road
Whitefield, NH 03598

Subject: Product Registration, Advanced Enviro-Septic

Dear Mr. Presby:

The Division of Environmental Health has completed a review of a registration application for your company's product. This information was submitted pursuant to Section 1802 of the Maine Subsurface Wastewater Disposal Rules (Rules), for code registration, for use in Maine.

The Enviro-Septic consists of a ten foot long, 11 inch diameter (external) plastic pipe with a proprietary arrangement of ridges and interior skimmer protrusions. The pipes are wrapped in non-woven geotextile fabric separated from the pipe by a non-woven plastic mesh.

The Advanced Enviro-Septic superficially resembles the Enviro-Septic, with the addition of layer of "Bio-Accelerator Fabric" (non-woven fabric) installed between the plastic mesh and the exterior fabric. The "Bio-Accelerator Fabric" is aligned between the 4 o'clock and 7 o'clock positions of the pipe. It is our understanding that the Advanced Enviro-Septic will eventually supplant the Enviro-Septic. It is also our understanding that your company specifically does not wish to have the product included in Table B-109 (permitted substitutions) of the Rules.

According to the information you provided, the Advanced Enviro-Septic has been certified by the National Sanitation Foundation (NSF) pursuant to ANSI/NSF Standard 40 for residential wastewater treatment systems, and Canadian BNQ certification. These certifications not withstanding, the Advanced Enviro-Septic is construed as a disposal area under the Rules, and is regulated as such.

On the basis of the information and product sample submitted, the Division has determined that the Advanced Enviro-Septic is acceptable for use in the State of Maine, provided that it is installed, operated, and maintained in conformance with the manufacturer's directions as specified in the undated installation manual submitted with the registration application, with the following conditions:

1. The Advanced Enviro-Septic sizing is unchanged from the Enviro-Septic, at 5.0 square feet per linear foot.

2. Pursuant to the letter dated 12/09/09 by you, only Authorized Representatives trained by Presby Environmental, Inc. may install the product.

3. Pursuant to the letter dated 12/09/09 and a conversation between Division staff and Presby Environmental, Inc. staff, no other product may be substituted for the Advanced Enviro-Septic, including Enviro-Septic, at the request of Presby Environmental, Inc.; although the Advanced Enviro-Septic may be substituted for Enviro-Septic. This does not apply to designs which specify a generic fabric wrapped tube.

4. Manufacturer literature not withstanding, systems installed on original slopes greater than 20% grade require a variance to the Rules.

Because installation and owner maintenance has a significant effect on the working order of onsite sewage disposal systems, including their components, the Division makes no representation or guarantee as to the efficiency and/or operation of Advanced Enviro-Septic. Further, registration of this product for use in the State of Maine does not represent Division preference or recommendation for this product over similar or competing products.

If you have any questions please feel free to contact me at (207) 287-5695.

Sincerely,

James A. Jacobsen

James A. Jacobsen, Environmental Specialist IV
Division of Environmental Health
Drinking Water Program
Subsurface Wastewater Unit
e-mail: james.jacobsen@state.me.us

/jaj

xc: Product File

PRESBY ENVIRONMENTAL, INC.
Protecting You and the Environment

143 Airport Rd., Whitefield, NH 03598
Tel: 1-800-473-5298 Fax: (603) 837-9864
www.presbyenvironmental.com info@presbyeco.com

December 9, 2009

Mr. James A. Jacobsen
State of Maine
Environmental Specialist IV
Subsurface Wastewater Program
Division of Environmental Health
286 Water Street, 3rd Floor
Augusta, ME 04333

"no equivalent"

RECEIVED
DEC 14 2009
WASTEWATER & PLUMBING PROGRAM

Re: Advanced Enviro-Septic™ Treatment System:
Request for Approval per Enviro-Septic® Approval and use in
NSF Standard 40 Class I Certified Systems

Dear Mr. Jacobson:

I am writing to request the State's approval for use of our new Advanced Enviro-Septic™ product in accordance with the terms of our existing approval for Enviro-Septic®. The design criteria and installation procedures will remain the same for both products, other than noting that in Advanced Enviro-Septic™, the newly added Bio-Accelerator™ (white geo-textile layer) is oriented on the pipe bottom (see enclosed product sample). After an approval is granted, we will prepare a mailer to introduce the new product and describe its capabilities and features in detail; this would be distributed industry-wide in Maine. As the enclosed documentation shows, Advanced Enviro-Septic® enhances treatment, allowing us to provide the option of an "upgraded" product choice to our customers. Our intention is to offer both products in the State of Maine; we are requesting that Advanced Enviro-Septic™ be acceptable for use in plans for Enviro-Septic® systems (but not vice versa).

This letter is also to introduce Advanced Enviro-Septic® technology's recent certification for use in an NSF Standard 40 Class I System. Please note that in order to use the product in a *certified* NSF 40 system, there are numerous requirements to be met, as discussed in more detail in the enclosed documentation. NSF 40 Certified Systems may only be installed by Authorized Representatives trained by the manufacturer.

We hope that you will find that this documentation provides sufficient information for you to evaluate our request for using our "next generation" product in addition to Enviro-Septic® in the State of Maine. In the event that you require any additional information, please do not hesitate to contact me or Sean McGuigan, and we will immediately provide you whatever additional documentation is required.

I wanted to take this opportunity to thank you for your assistance and guidance as we move forward with newer and more advanced products. I look forward to working together with you again as we proceed with this modification of our approval.

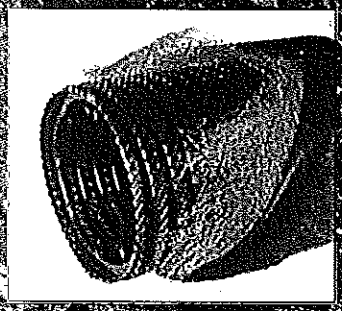
Sincerely,

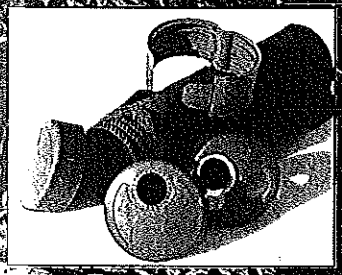
David W. Presby, President
Presby Environmental, Inc.

Presby Environmental, Inc.

Innovative Septic Technologies

The Enviro-Septic® Wastewater Treatment System





Protecting You and the E[illegible]nme[illegible]

PRESBY ENVIRONMENTAL, I[illegible]
INNOVATIVE SEPTIC TECHNOLOGIE[illegible]

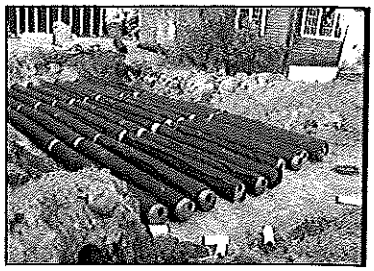
143 Airport Road, Whitefield, NH 03598
Tel: 1-800-473-5298 Fax: (603) 837-9864
www.presbyenvironmental.com

The Enviro-Septic® Wastewater Treatment System

The Enviro-Septic® Difference

Enviro-Septic® is a leaching system like no other. This uniquely designed product creates a protected eco-system for aerobic bacteria to thrive. These bacteria digest septic system contaminants before liquid is released into the surrounding soils. Other systems rely on the surrounding soil for treatment, allowing unhealthy contaminants to pass into the soil and groundwater. Using natural processes, Enviro-Septic® needs no pumps, filters, electricity, additives, or special maintenance.

Enviro-Septic® is a third party tested multi-stage effluent treatment system for residential and commercial use. It is designed to work with, rather than destroy, our natural environment. Enviro-Septic® is created, manufactured, and distributed by Presby Environmental, Inc., of Whitefield, New Hampshire.

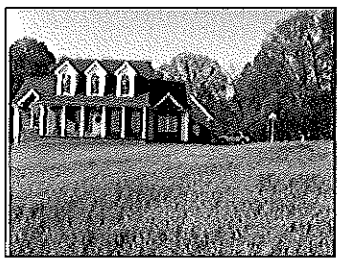


Advantages over Conventional Systems

Compared to conventional systems, the Enviro-Septic® system

- requires less area and fill.
- lasts longer.
- costs up to 50% less.
- installs more quickly.
- proves environmentally safer through third party testing.
- installs on terrain sloping up to 25%.
- uses recycled plastics.
- adapts well to difficult sites.
- can be designed in a variety of different system shapes.
- can be designed for a single home, commercial, or community system.

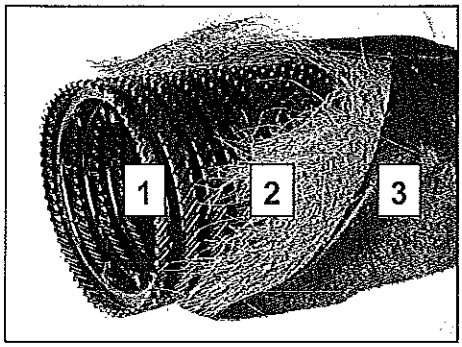
How Enviro-Septic® Benefits You



In some states, the Enviro-Septic® system may be installed closer to the high water table than other systems. This advantage often reduces, or completely eliminates, unsightly mounds on your property. In addition, Enviro-Septic® has proven to be so effective that it can be granted waivers or variances to be placed closer to ponds, lakes, and other environmentally sensitive areas. Enviro-Septic® has the capability to be installed sloping up to 25% to match the existing terrain, allowing you to eliminate expensive retaining walls and/or large amounts of fill. As a result, sloping systems blend into the natural contours of the site. Enviro-Septic's® ability to adapt well to site constraints gives you the comfort of having the yard you've always dreamed of along with superior wastewater treatment that's *protecting you and the environment.*

Innovative Enviro-Septic®

System Components



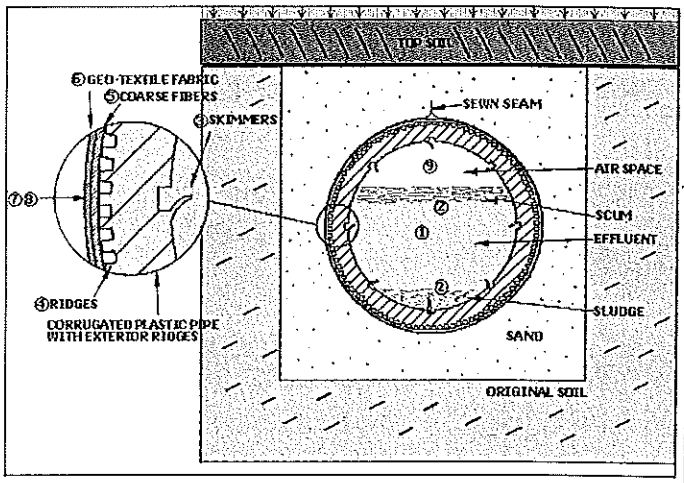
1. Each Enviro-Septic® pipe is 10' long and made from high density plastic that has been corrugated and perforated. A series of ridges on the peak of each corrugation and skimmers protruding on the interior completes this unique pipe.
2. Surrounding each pipe is a mat of randomly oriented, course plastic fibers that aids in the treatment of harmful contaminants.
3. Covering this mat is a special, non-woven, geo-textile plastic fabric stitched into place.

Snap-lock couplings, offset adapters, and end caps are used for the system assembly.

Readily available and easily worked gravelly coarse sand, (ASTM standard C-33 concrete sand), is used to surround the pipe to a minimum distance of six inches.

How it Works

The nine stages of the effluent treatment process



Stage 1: Warm effluent enters the pipe and is cooled to ground temperature.

Stage 2: Suspended solids separate from the cooled liquid effluent.

Stage 3: Skimmers further capture grease and suspended solids from the exiting effluent.

Stage 4: Pipe ridges allow the effluent to flow uninterrupted around the circumference of the pipe and aid in cooling.

Stage 5: A mat of random, coarse fibers separates more suspended solids from the effluent.

Stage 6: Effluent passes into the geo-textile fabric and grows a protected bacterial surface.

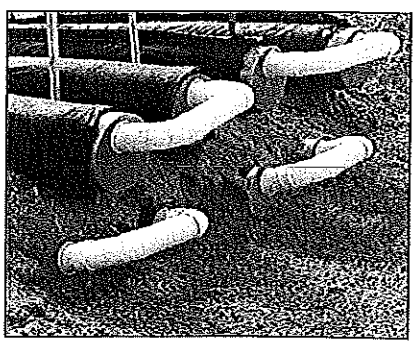
Stage 7: Sand wicks liquid from the geo-textile fabric and enables air to transfer to the bacterial surface.

Stage 8: The fabric and fibers provide a large bacterial surface to break down solids.

Stage 9: An ample air supply and fluctuating liquid levels increase bacterial efficiency.

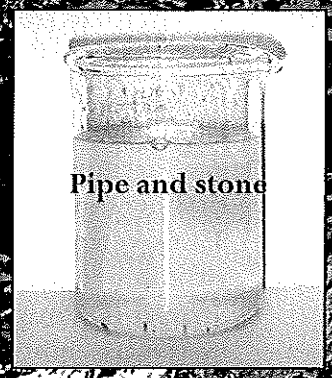
Multi-Level™ Installations

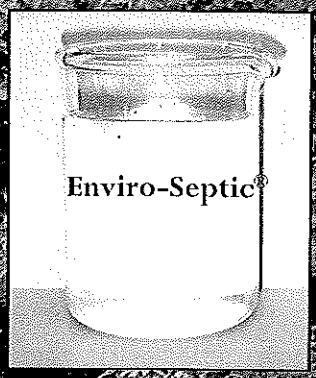
Multi-Level™ is a patented method that consists of one, or more, Enviro-Septic® systems on top of another. This design allows for double the bacterial surface area and treatment capability within a footprint up to 1/6th the size of a conventional system. Where approved for use, this system can overcome site constraints that will restrict the installation of other systems. The Multi-Level™ system has been installed in fast food restaurants for years and has proven to be effective because of its ability to treat high strength wastewater with ease.



Enviro-Septic® Third Party Testing

At Presby Environmental, Inc., we are dedicated to providing you with products that are protecting you and the environment. We continually test our Enviro-Septic® system to prove that we are providing you the best passive treatment system, on the market today. Independent testing by the University of New Hampshire, Environment E.S.A Inc., of Canada, and the Bureau of Normalization of Quebec, Canada, comparing Enviro-Septic® with pipe and stone systems, proved conclusively that Enviro-Septic® significantly outperforms pipe and stone installations. Just look at the difference in these leachate samples and test results.





Tested Item	Effluent Concentrate	After Pipe and Stone	After Enviro-Septic®
TSS	125 mg/L	25 mg/L	2 mg/L
MPN Fecal Coliforms	3,091,000 per 100 mL	190,000 per 100 mL	2,300 per 100 mL
BOD	172 mg/L	21 mg/L	2 mg/L

The data above show the test results obtained by Environment E.S.A, Inc. You can access the complete test result data on our website at www.presbyenvironmental.com.

Rejuvenation and Expansion

In the rare event that Enviro-Septic® malfunctions due to misuse or abuse, Enviro-Septic® systems may be rejuvenated easily and inexpensively. Enviro-Septic® is the only system capable of being easily rejuvenated in as little as 72 hours without costly removal or replacement. Enviro-Septic® may also be easily expanded in cases where households or businesses have grown. These capabilities mean that you can save money, save time, and gain peace of mind in knowing that Enviro-Septic® can adapt to meet your needs.

How to Obtain Our Products and Services

At Presby Environmental, Inc. we do not sell direct. If you are interested in obtaining an Enviro-Septic® system, contact our offices at (800)-473-5298 or visit our website www.presbyenvironmental.com for a list of dealers in your area. If you are interested in installing an Enviro-Septic® system, you can contact our offices for a list of certified designers or installers that can help custom fit an Enviro-Septic® to your property.

Website: www.presbyenvironmental.com Email: info@presbyenviro... 837-9864

PRESBY ENVIRONMENTAL, INC.
INNOVATIVE SEPTIC TECHNOLOGIES

143 Airport Road, Whitefield, NH 03598
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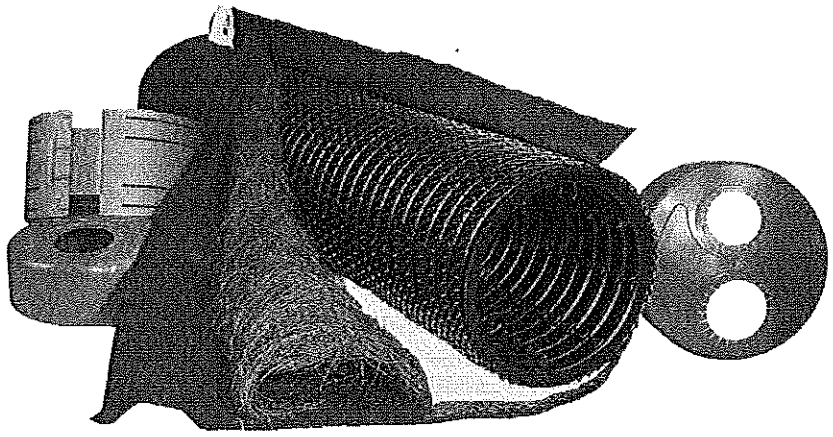
www.presbyenvironmental.com

Advanced Enviro-Septic™ Treatment System

Installation Manual

NSF/ANSI Standard 40 Class I Certified

Single Point Discharge (SPD) and Combined Treatment and Dispersal (CTD) Models



Presby Environmental, Inc.
The Next Generation of Wastewater Treatment

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Tel: 800-473-5298 Fax: (603) 837-9864
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info@presbyeco.com

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The information in this manual is subject to change without notice. We make a continual effort to improve our Manuals in order to ensure they are as complete, accurate and helpful as possible. Please confirm that this is the most recent and up-to-date version of this Manual by contacting us at (800) 473-5298 or visiting our website, www.presbyenvironmental.com

Your questions, suggestions and comments are welcome. Please contact us at:

Presby Environmental, Inc.
143 Airport Road
Whitefield, NH 03598
Phone: 1-800-473-5298 Fax: (603) 837-9864
Website: www.presbyenvironmental.com

IMPORTANT NOTICE: This Manual is intended ONLY for use in installing Presby Environmental's Advanced Enviro-Septic™ Treatment System. The use of this Manual with any other product is prohibited. The processes and design criteria contained herein are based solely on our experience with and testing of Advanced Enviro-Septic™. Substitution of any other large diameter gravelless pipe will result in compromised treatment of wastewater and other adverse effects and will void NSF Certification.

Advanced Enviro-Septic™ U.S. Patent Nos. 6,461,078; 5,954,451; 5,606,786; 6,899,359; 6,792,977 and 7,270,532 with other patents pending. Canadian Patent Nos. 2,300,535; 2,185,087; 2,187,126 with other patents pending.

Enviro-Septic® is a registered trademark of Presby Environmental Inc.
© October 2009 Presby Environmental, Inc. All rights reserved.

Data Plate/Service Label to be installed on electrical control box and near the high water alarm:

Advanced Enviro-Septic™ Treatment System
Service Data Plate
NSF Standard 40 Class I Certified

Manufacturer: **Presby Environmental, Inc.**
143 Airport Road, Whitefield NH 03598
(800) 473-5298 Info@presbyeco.com
www.presbyenvironmental.com

Model Number: _____ Date of Installation: _____
Serial Number: _____
Rated Hydraulic Capacity: _____ Gallons per Day

Manufacturer's Authorized Representative:
Name_____
Address _____
_____
Telephone _____

To Obtain Service or Parts: Contact the Manufacturer's Representative above or Presby Environmental, Inc.

Advanced Enviro-Septic™ Treatment System

NSF/ANSI Standard-40 Class I Certified

Installation Manual – First Edition

Including Start-Up Instructions, Maintenance Schedule and Inspection/Sampling Procedures for Authorized Representatives

TABLE OF CONTENTS

Single Point Discharge Model Numbers:
SPD450, SPD600, SPD750, SPD900, SPD1050, SPD1200, SPD1350 and SPD1500

Combined Treatment & Dispersal (bottomless) Model Numbers:
CTD450, CTD600, CTD750, CTD900, CTD1050, CTD1200, CTD1350 and CTD1500

Advanced Enviro-Septic™ Treatment System
Single Point Discharge (SPD) and Combined Treatment & Dispersal (CTD) Models
NSF/ANSI Standard-40 Class I Certified Installation Manual

Section A, Introduction

What is Advanced Enviro-Septic™?

- An innovative onsite wastewater treatment system.
- Passive, non-mechanical, does not use pressure distribution.
- Tested and proven to exceed NSF Standard-40 Class I effluent quality requirements.
- SPD model (single point discharge) which is contained within an impermeable geo-membrane.
- CTD (combined treatment and dispersal) model which is bottomless.
- Accommodates residential daily design flows from 450 gallons per day (gpd) to 1,500 gpd.
- Primary system component is a large diameter perforated pipe that is installed in a bed of specified System Sand.
- Designed to treat residential wastewater that has received primary treatment in a septic tank.

How Does Advanced Enviro-Septic™ work?

The Advanced Enviro-Septic™ Treatment System creates a self-sustaining, self-regulating biological ecosystem that is highly effective at purifying effluent. The bacterial population within the system adjusts as it is exposed to cycling aerobic and anaerobic (wet and dry) conditions. The multi-stage biomat that forms within the system is responsible for treating the wastewater and regulating the rate at which fluid moves through the system. Slowing down the liquid enables the bacteria (both aerobic and anaerobic) the time it needs to digest the waste materials (suspended solids) in the effluent. The aerobic bacteria digest the biomat, enhancing its permeability and preventing it from clogging. The result is a healthy, multi-stage biomat that is not subject to clogging and provides passive, effective, long-term wastewater treatment.

Why is Advanced Enviro-Septic™ Better?

The Advanced Enviro-Septic™ Treatment System retains solids in its pipe and provides multiple protected bacterial surfaces to treat effluent. The continual cycling of effluent (the rising and falling of liquid inside the pipe) and ample supply of oxygen enhances bacterial activity. Our systems excel because they achieve superior treatment, are more efficient, last longer, and have minimal environmental impact.

System Advantages

- Provides superior treatment
- Exceeds NSF-40 Class I effluent quality requirements
- Cost-effective to construct and operate
- Hydraulic capacities from 450 gpd to 1500 gpd
- Combined Treatment and Dispersal (CTD) Models for suitable soils
- Single Point Discharge (SPD) Models for lots without suitable soils
- Quicker and easier to install
- Enhanced function and longevity
- Superior track record of reliability
- Made using recycled plastic

NSF-40 Class I Certification

All systems using the Advanced Enviro-Septic™ Treatment System must be installed by a manufacturer's Authorized Representative in compliance with the procedures and specifications described in this Manual in order to comply with NSF Certification requirements and Presby Environmental, Inc. (PEI) requirements. All installations must also comply with applicable state and/or local rules.

Certification Required

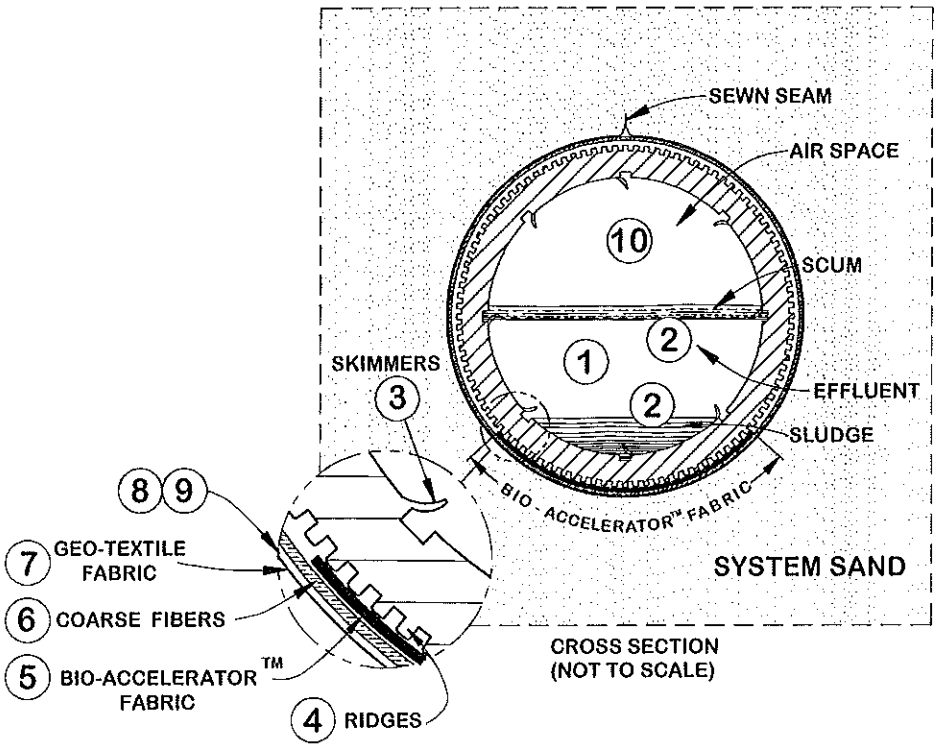
- The Advanced Enviro-Septic™ Treatment System is installed and serviced during the first two (2) years only by manufacturer-trained and certified Authorized Representatives.
- If you are interested in becoming an Authorized Representative, please contact us for more information about our training and certification programs.
- If you would like to be put in touch with an Authorized Representative in your area, we will be happy to refer you to one, please call us at (800) 473-5298 or visit our website at www.presbyenvironmental.com.

Technical Support

Presby Environmental, Inc. provides technical support to all individuals using our products or involved in the permitting process. For any questions about our products or the information contained in this Manual, please contact us at (800) 473-5298 or via email to info@presbyeco.com.

ADVANCED ENVIRO-SEPTIC™ WASTEWATER TREATMENT SYSTEM

TEN STEPS OF WASTEWATER TREATMENT: ADVANCED ENVIRO-SEPTIC™TREATS EFFLUENT MORE EFFICIENTLY TO PROVIDE LONGER SYSTEM LIFE AND TO PROTECT THE ENVIRONMENT.



STAGE 1: WARM EFFLUENT ENTERS THE PIPE AND IS COOLED TO GROUND TEMPERATURE.

STAGE 2: SUSPENDED SOLIDS SEPARATE FROM THE COOLED LIQUID EFFLUENT.

STAGE 3: SKIMMERS FURTHER CAPTURE GREASE AND SUSPENDED SOLIDS FROM THE EXITING EFFLUENT.

STAGE 4: PIPE RIDGES ALLOW THE EFFLUENT TO FLOW UNINTERRUPTED AROUND THE CIRCUMFERENCE OF THE PIPE AND AID IN COOLING.

STAGE 5: BIO-ACCELERATOR™ FABRIC SCREENS ADDITIONAL SOLIDS FROM THE EFFLUENT AND DEVELOPS A BIOMAT WHICH PROVIDES TREATMENT AND ENSURES ACCELERATED BIOMAT DEVELOPMENT.

STAGE 6: A MAT OF COARSE RANDOM FIBERS SEPARATES MORE SUSPENDED SOLIDS FROM THE EFFLUENT.

STAGE 7: EFFLUENT PASSES INTO THE GEO-TEXTILE FABRICS AND GROWS A PROTECTED BACTERIAL SURFACE.

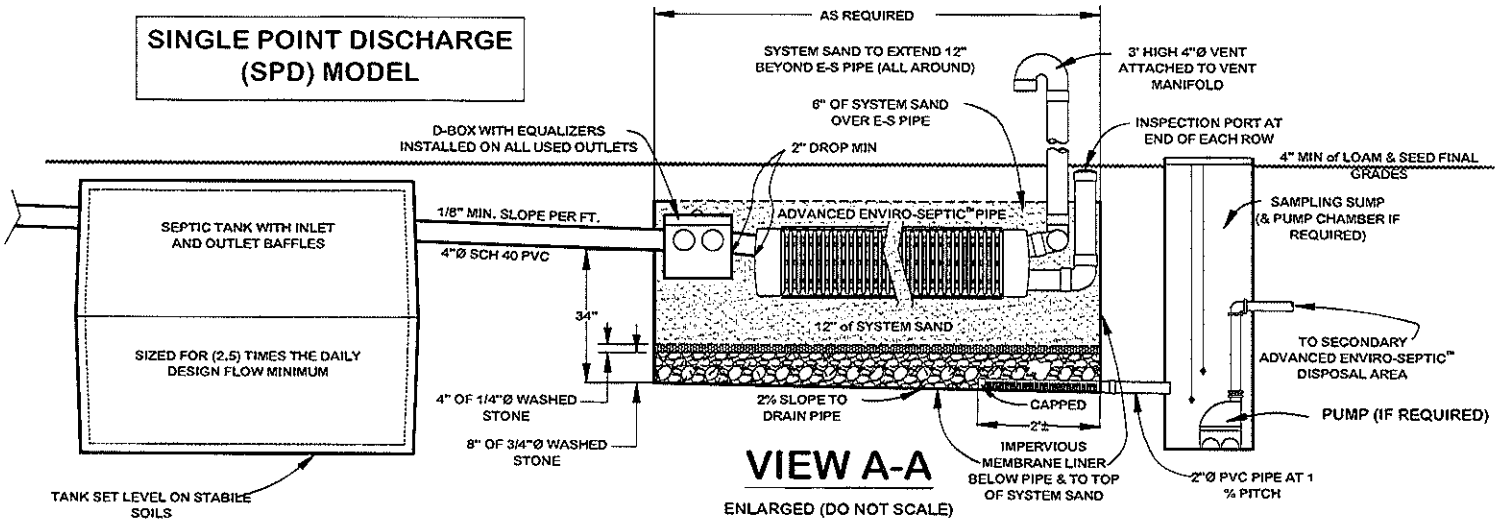
STAGE 8: SAND WICKS LIQUID FROM THE GEO-TEXTILE FABRICS AND ENABLES AIR TO TRANSFER TO THE BACTERIAL SURFACE.

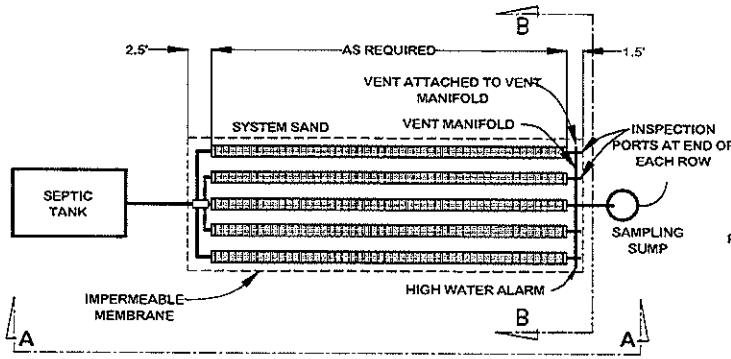
STAGE 9: THE FABRICS AND FIBERS PROVIDE A LARGE BACTERIAL SURFACE TO BREAK DOWN SOLIDS.

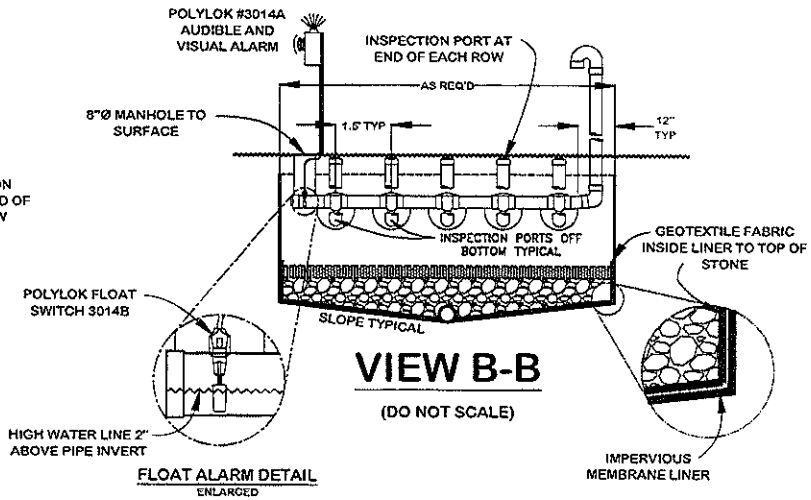
STAGE 10: AN AMPLE AIR SUPPLY AND FLUCTUATING LIQUID LEVELS INCREASE BACTERIAL EFFICIENCY.

ADVANCED ENVIRO-SEPTIC™ WASTEWATER TREATMENT SYSTEM

SINGLE POINT DISCHARGE (SPD) MODEL

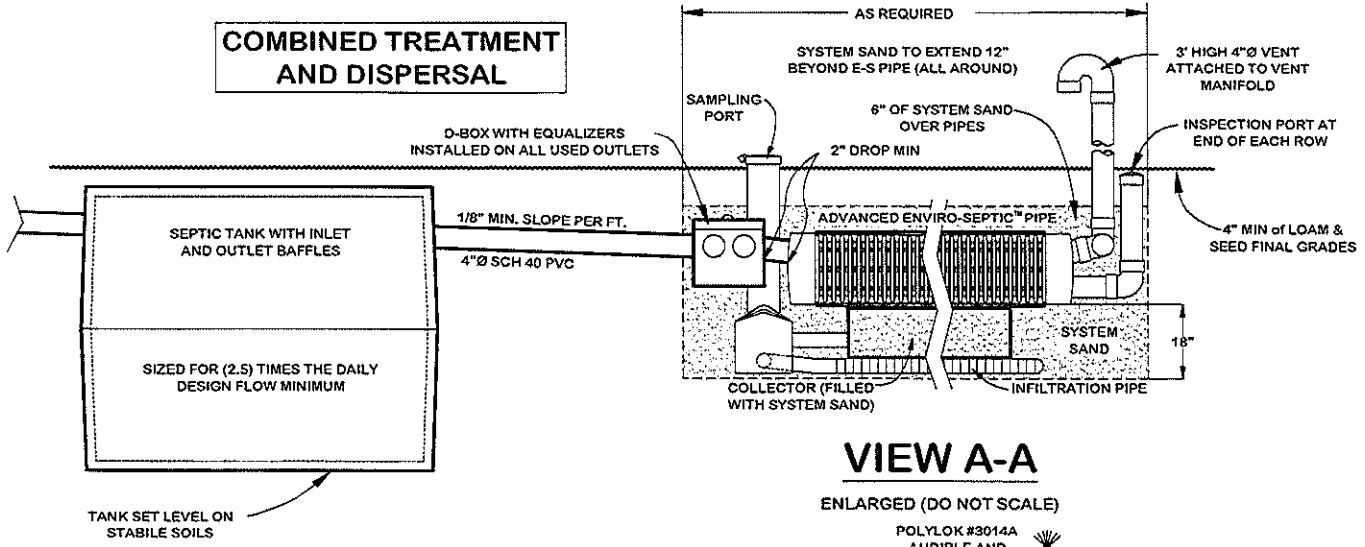






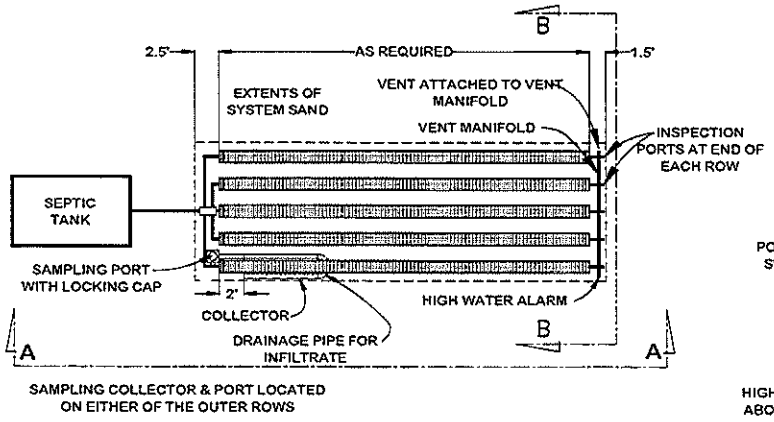
ADVANCED ENVIRO-SEPTIC™ WASTEWATER TREATMENT SYSTEM

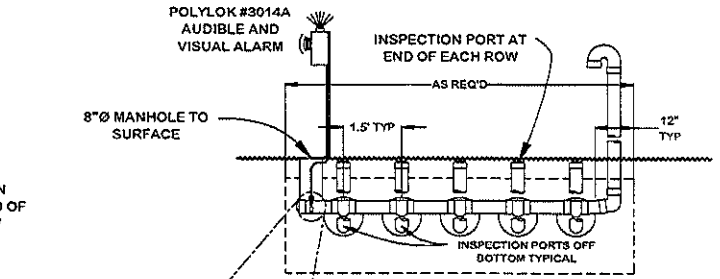
COMBINED TREATMENT AND DISPERSAL



VIEW A-A

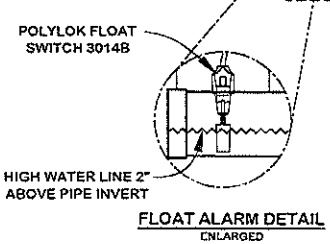
ENLARGED (DO NOT SCALE)





VIEW B-B

(DO NOT SCALE)

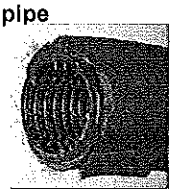


FLOAT ALARM DETAIL
ENLARGED

Section B

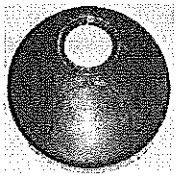
Advanced Enviro-Septic™ System Components

Advanced Enviro-Septic™ pipe



- Plastic pipe made using recycled material
- 10 ft. sections (can be cut to any length)
- Ridged and perforated with skimmer tabs on interior
- Partially covered with Bio-Accelerator™ geo-textile fabric layer
- Proper orientation of the pipe is with the Bio-Accelerator™ on the bottom, with its centerline at the 6 o'clock position
- Surrounded by a mat of randomly-oriented plastic fibers
- Surrounded by a non-woven geo-textile fabric stitched in place
- Finished product has an exterior diameter of 12 in.
- Flexible enough to bend up to 90°

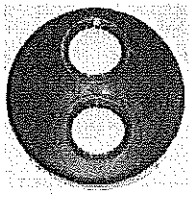
Offset adapter



An offset adapter is a plastic fitting with a 12 in. diameter and a hole designed to accept a 4 in. PVC pipe. The hole is to be in the twelve o'clock position and is used to insert PVC pipes in order to connect each row of the system to a d-box outlet.

Note: The hole in the offset adapter will accommodate Schedule 20 to 40 PVC.

Double offset adapter

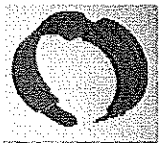


A double offset adapter is a plastic fitting with a 12 in. diameter and two holes designed to accept 4 in. PVC pipe vent manifolds and inspection ports.

The two 4 in. holes are to be aligned in the 12 o'clock and 6 o'clock positions. The hole in the 12 o'clock position is for installation of the vent manifold, and the hole in the 6 o'clock position is for installation of inspection ports.

Note: The holes in the double offset adapter will accommodate Schedule 20 to 40 PVC.

Coupling



A coupling is a plastic fitting used to create a connection between two pieces of Advanced Enviro-Septic™ pipe. The coupling features a snap-together locking device and ridges that are designed to fit over the ridges of the Advanced Enviro-Septic™ pipe, creating a quick and easy way to join pipe sections together easily and securely. No tools or hardware are required to secure the couplings.

Advanced Enviro-Septic™ System Components, continued

Septic Tank

- The Advanced Enviro-Septic™ System is designed to treat effluent that has received "primary treatment" in a standard septic tank.
- Septic tanks used with the Advanced Enviro-Septic™ NSF-40 Certified System must meet the standards set forth in BNQ Standard NQ-3680-905 or ASTM C1227. NSF requires supporting documentation of structural integrity.
- Septic tanks used with the Advanced Enviro-Septic™ System must be fitted with inlet and outlet baffles in order to retain solids in the septic tank and to prevent them from entering the Advanced Enviro-Septic™ System.
- The access ports for septic tanks used with the Advanced Enviro-Septic™ System are required to have a secure locking mechanism, or require a special tool for access, or the weight of the cover must be more than 65 lbs.
- Effluent filters are not recommended by Presby Environmental, Inc. due to their tendency to clog, which cuts off the oxygen supply that is essential to the functioning of the Advanced Enviro-Septic™ system.
- If you are required to use an effluent filter in a gravity fed system due to state or local requirements, the effluent filter selected must allow the free passage of air to ensure the proper functioning of the system.
- Minimum septic tank sizes are based on hydraulic capacity of the model selected in gallons per day (gpd) per the table below. These sizes are based on providing approximately 2.5 days retention time in the septic tank.
- In selecting the size of the pretreatment tank, always round up to the closest standard capacity tank. It is acceptable to utilize more than one tank (in serial) provided their combined capacity meets the minimum requirements.

MINIMUM SEPTIC TANK CAPACITY – 2.5 x Hydraulic Capacity
Pretreatment Tank Sizing for use with the Advanced Enviro-Septic™ System

Advanced Enviro-Septic™ Model Nos.	Daily Design Flow (GPD)	Minimum Septic Tank Nominal Capacity (US Gallons)
450-SDP & CTD	450	1,125
600-SDP & CTD	600	1,500
750-SDP & CTD	750	1,875
900-SDP & CTD	900	2,250
1050-SDP & CTD	1,050	2,625
1200-SDP & CTD	1,200	3,000
1350-SDP & CTD	1,350	3,375
1500-SDP & CTD	1,500	3,750

Note: Septic Tanks used with the Advanced Enviro-Septic™ NSF-40 Certified System must meet the standards set forth in BNQ Standard NQ-3680-905 or ASTM C1227. NSF requires supporting documentation of compliance with these standards and confirmation of the structural integrity of the septic tank.

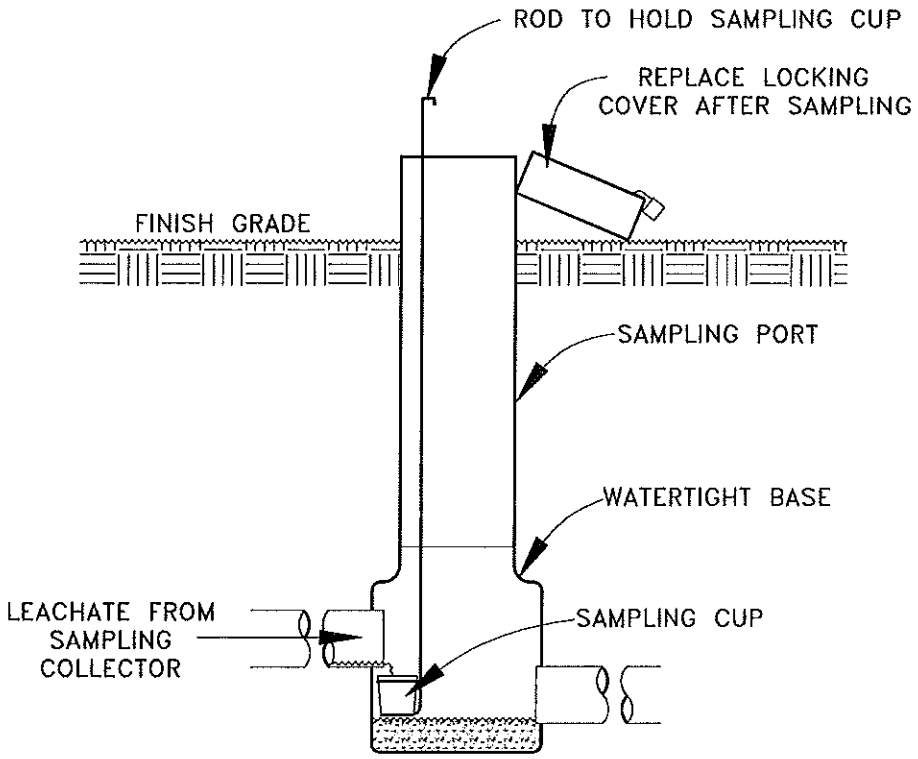
Advanced Enviro-Septic™ System Components, continued

Polylok High Water Audio/ Visual Alarm

A Polylok / SJE-Rhombus Audio/Visual Alarm System (Parts # 3014A and 3014B) is a required and included system component. The alarm will be activated in the event of high water (more than 10 in.) within the pipes. The visual alarm can be seen from 50 ft. and the audible alarm is 82 decibels (can be heard from a distance of 50 ft.). Schematics and wiring instructions for the alarm are attached as Appendix C.

Sampling Device

A plastic, two-piece sample collection device will be included with each CTD Model system. The device is installed under one Advanced Enviro-Septic™ pipe to enable the collection of effluent samples produced by the system for the purposes of analysis and inspection. It is accessed by a locking cap accessible from above-grade. See Appendix D, Sampling Device Installation & Use.



Advanced Enviro-Septic™ System Components, continued

System Sand

The System Sand that surrounds the Advanced Enviro-Septic™ pipes is an essential component of the system. System Sand must be coarse to very coarse, clean, granular sand, free of organic matter. It must meet ASTM C-33 specifications for "concrete sand" and contain less than 2% fines (materials passing a #200 sieve). The Authorized Representative is required to obtain and retain a copy of a sieve analysis or particle size distribution report for each system confirming that the specified sand was utilized in construction.

System Sand is placed a minimum of 12 in. (SPD Models) or 18 in. (CTD Models) below all Advanced Enviro-Septic™ pipes, a minimum of 6 in. above the pipes, a minimum of 6 in. between pipe rows, and a minimum of 1 ft. horizontally around the perimeter of the Advanced Enviro-Septic™ pipes.

PVC Connections

PVC plastic pipe is used to connect the septic tank to the d-box, the d-box to the pipe inlets, and the venting and vent manifold to the pipe ends, as well as to construct inspection ports. The offset adapters and double offset adapters accept 4 in. Schedule 20-40 PVC pipe. The line from the septic tank to the d-box and the high vent stack (if required) must be constructed of the more heavy-duty Schedule 40 PVC, sewer and drain pipe (Schedule 20 PVC) can be used for the remaining connections.

Geo-Textile Membrane ("liner") SPD Models ONLY

All Advanced Enviro-Septic™ Single Point Discharge (SPD) models are installed within a customized geo-textile membrane constructed of GSE UltraFlex, a high quality, linear low density polyethylene (LLDPE) which is impermeable, flexible, puncture resistant and non-biodegradable. The geo-textile membrane is an included component in all SPD models and sized as follows:

Model Number	Width	Length
SPD-450	12 ft.	37 ft.
SPD-600	12 ft.	47 ft.
SPD-750	12 ft.	57 ft.
SPD-900	12 ft.	67 ft.
SPD-1050	13 ft.	77 ft.
SPD-1200	15 ft.	77 ft.
SPD-1350	15 ft.	87 ft.
SPD-1500	15 ft.	87 ft.

Component Handling, Offloading & Storage

- Keep mud, grease, oil, etc. away from all components.
- Avoid dragging pipe through wet or muddy areas.
- Store pipe on high and dry areas to prevent surface water and soil from entering the pipes or contaminating the fabric prior to installation.
- The outer fabric of the Advanced Enviro-Septic™ pipe is ultra-violet stabilized; however, this protection breaks down after a period of time in direct sunlight. To prevent damage to the fabric, cover the pipe with an opaque tarp or store under cover.
- Do not pull or drag pipe by the fabric.

Section C
System Component Assembly
Combined Treatment and Dispersal (CTD Models)

Combined Treatment and Dispersal (Model CTD)

The Combined Treatment and Dispersal Model (CTD) is an Advanced Enviro-Septic™ Treatment System which is "bottomless," providing for subsurface infiltration of treated wastewater. This model is used for sites that have suitable soils for a Combined Treatment and Dispersal (CTD) Model. All systems must also comply with state and/or local rules.

Table A, Sizing and Dimensions
Advanced Enviro-Septic™ CTD Models – Combined Treatment and Dispersal

Model Number	Design Daily Flow	Row Length	Number of Rows	Sand Bed Width "A"	Sand Bed Length "B"	Sand Bed Area
CTD-450	450	30 ft.	7	12 ft.	32 ft.	384 sq.ft.
CTD-600	600	40 ft.	7	12 ft.	42 ft.	504 sq.ft.
CTD-750	750	50 ft.	7	12 ft.	52 ft.	624 sq.ft.
CTD-900	900	60 ft.	7	12 ft.	62 ft.	744 sq.ft.
CTD-1050	1050	70 ft.	7	12 ft.	72 ft.	864 sq.ft.
CTD-1200	1200	70 ft.	8	13.5 ft.	72 ft.	972 sq.ft.
CTD-1350	1350	80 ft. *	8 *	13.5 ft.*	82 ft.*	1,107 sq.ft.
CTD-1500	1500	80 ft. *	8 *	13.5 ft.*	82 ft.*	1,107 sq. ft.

* CTD 1350 and CTD 1500 utilize the same amount of pipe due to the necessity of making rows equal in length. The 1350 gpd Model contains more pipe than required as a result.

Table B, Component Kit Contents, CTD Models

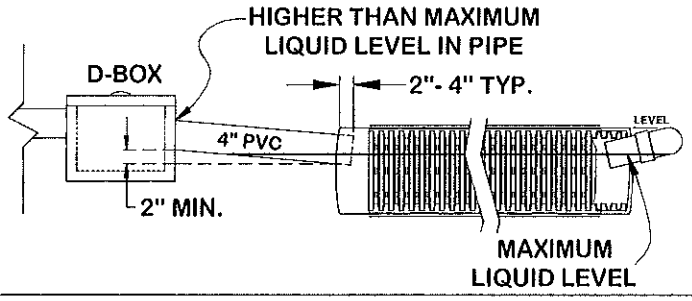
Model Number	Advanced Enviro-Septic™ Pipes	Couplings	Off-Set Adapters	Double Off-Set Adapters
CTD-450	21	14	7	7
CTD-600	28	21	7	7
CTD-750	35	28	7	7
CTD-900	42	35	7	7
CTD-1050	49	42	7	7
CTD-1200	56	49	8	8
CTD-1350	64*	56*	8*	8*
CTD-1500	64*	56*	8*	8*

Note: All kits will also contain one (1) Polylok high water alarm, one (1) sampling device and two (2) Data Plates/Service Labels.

* CTD 1350 and CTD 1500 utilize the same amount of pipe due to the necessity of making rows equal in length. The 1350 gpd Model contains more pipe than required as a result.

Step-by-Step Installation Instructions, CTD Models:

State Specific Installation Criteria, Suitable Soils and Sizing	Per State and/or Local Rules and/or product approvals for subsurface wastewater infiltrative systems with documented secondary treatment results (per EPA guidelines).
System Sand Specifications	ASTM-C-33 Sand with no more than 2% passing through a #200 sieve. The Authorized Representative is required to maintain records of a sieve analysis confirming sand used meets specifications for every system installed. Note: It is important to the proper functioning of the system that the correct grade of System Sand is used.
Overall Dimensions of the System Sand Bed	• 18 in. of System Sand below the Advanced Enviro-Septic™ pipe; • 12 in. beyond the outermost edge of Advanced Enviro-Septic™ pipes; • 6 in. of System Sand above the Advanced Enviro-Septic™ pipe; and, • 6 in. of System Sand between pipe rows
Install Sample Collection Device	The Sampling Device is installed under the first pipe in either of the outermost rows. Refer to Sampling Device Installation & Use Instructions, Appendix D. Install Sampling Device as instructed before installing system.
Install System Sand	After proper installation of the Sampling Device, continue to install System Sand until it reaches a total depth of 18 in. The CTD model requires 6 in. more System Sand beneath the Advanced Enviro-Septic™ system in order to provide space for the installation of the Sampling Device.
Assemble pipes and components	• Using couplings, connect 10 ft. sections of Advanced Enviro-Septic™ pipe together to form required row lengths and the number of rows from Table A. (Note: Proper alignment is with Bio-Accelerator™ layer on bottom with its centerline in the 6 o'clock position.) • Install offset adaptors on the end of each row closest to the d-box, with the 4 in. opening in the 12 o'clock position. • Install double-offset adaptors on the end of each row farthest from the d-box, with the 4 in. openings in the 12 and 6 o'clock positions.
Install Advanced Enviro-Septic™ rows	Install assembled rows on top of 18 in. layer of System Sand so that they are: • 12 in. from all edges of the System Sand bed. • Approximately parallel (to within +/- 1 in.) and level (to within +/- 1/2 in.); • Spaced 6 in. apart (1.5 ft. center-to-center spacing); and, • Proper pipe alignment is with Bio-Accelerator™ layer on bottom with centerline in 6 o'clock position.
Install System Sand	• Install some System Sand around rows. • Walk between rows to fill any voids beneath the rows with System Sand. • Confirm that rows are laid level; if not level, add or remove System Sand as needed to level rows.
Install d-box	• Confirm that d-box is installed level and that it rests on a stable base. • The outlet from the d-box is to be at least 2 in. above the inlets of the Advanced Enviro-Septic™ rows. • Install and adjust equalizers in d-box outlets being used. • Cap or mortar unused openings in d-box.

Install connection from septic tank to d-box	Install 4 in. Schedule 40 PVC pipe from septic tank to d-box. This connecting pipe must slope at least 1% (1/8 in. per foot) from the septic tank to the d-box.
Connect rows to d-box	• Use 4 in. Schedule 20-40 PVC to connect each Advanced Enviro-Septic™ row to a d-box outlet. • The PVC extends at least 2 in. and not more than 4 in. into the row through the offset adaptor. See illustration below. • The 4 in. diameter opening in the offset adaptor is to be in the 12 o'clock position. • The outlet from the d-box is to be at least 2 inches above the inlets of the Advanced Enviro-Septic™ rows (see illustration below). • Install System Sand beneath and around PVC to stabilize. 
Install vent manifold, vent stack and inspection ports, connect to rows	• Install vent manifold constructed with 4 in. Schedule 20-40 PVC pipe through the double-offset adaptors on end of rows furthest from the d-box. • The two 4 in. diameter openings in the double-offset adaptors are to be in the 6 and 12 o'clock positions. • Install vent manifold to all rows using the 4 in. diameter openings that are in the 12 o'clock position. • Install inspection ports at the end of each row using the 4 in. diameter openings that are in the 6 o'clock position. • Inspection ports' height to be within 3 in. of final grade. • Inspection ports to be capped and watertight. • Attach pipe extension to end of vent manifold for installation of high water alarm. • Attach low vent stack to vent manifold. Low vent to be of sufficient height so that its inlet is a minimum of 3 ft. above final grade. Refer to Section E, Venting Requirements, p. 30. • Install System Sand beneath and around vent manifold and connections for stabilization.

Install high water alarm float and Polylok Audible and Visual Alarm	• Note: Licensed electrician to perform installation of high water alarm. • Attach alarm control box to stable post 3 ft. above final grade (or, attach control box to side of building in visible location.) • Drill 1 in. diameter hole in top of PVC pipe extension and snap float into place. • Wire float to alarm's electrical control box. • Run 110 Volt power to alarm per manufacturer's instructions and local electrical codes. • Install System Sand to top of vent manifold. • Cover float alarm with 8 in. diameter manhole. • Continue to backfill with System Sand to within 4 in. of surface. Refer to Wiring Schematics, Appendix C, and Diagram 11, p. 29. High Water Alarm to be installed only by licensed electrician and in compliance with the National Electrical Code, ANSI/NFPA 70 and manufacturer's instructions.
Cover rows with System Sand	Install additional System Sand over entire system until it is a minimum of 6 in. above the top of the rows.
Backfill with topsoil	• Place a minimum of 4 in. /maximum of 18 in. of topsoil capable of sustaining plant growth on top of System Sand. • Do not install any barrier materials between System Sand and topsoil. • Final grading to be such that surface waters are directed away from the area of the system. • Shallow rooted vegetation (grass, wildflowers, etc.) to be planted immediately to prevent erosion.

Section D
System Component Assembly
Single Discharge Point (SDP Models)

Single Point Discharge Model (SPD)

The Single-Point Discharge Model is an Advanced Enviro-Septic™ Treatment System which is entirely contained within an impermeable geo-membrane liner. This model is especially useful for sites that do not have suitable soils for a Combined Treatment and Dispersal (CTD) Model. The treated effluent that exits the system is collected and then gravity-fed or pumped to an Advanced Enviro-Septic™ dispersal system.

Table C, Sizing and Dimensions
Advanced Enviro-Septic™ SPD Models – Single Point Discharge

Model Number	Design Daily Flow	Row Length	Number of Rows	Liner Width "A"	Liner Length "B"	Excavation Width "C"	Excavation Length "D"	Excavation Depth "E"	Excavation Depth "F"
SPD-450	450	30 ft.	7	12 ft.	37 ft.	14 ft.	39 ft.	51 inches	61 inches
SPD-600	600	40 ft.	7	12 ft.	47 ft.	14 ft.	49 ft.	51 inches	63 inches
SPD-750	750	50 ft.	7	12 ft.	57 ft.	14 ft.	59 ft.	51 inches	65 inches
SPD-900	900	60 ft.	7	12 ft.	67 ft.	14 ft.	69 ft.	51 inches	68 inches
SPD-1050	1050	70 ft.	7	13 ft.	77 ft.	15 ft.	79 ft.	51 inches	70 inches
SPD-1200	1200	70 ft.	8	15 ft.	77 ft.	17 ft.	79 ft.	51 inches	70 inches
SPD-1350	1350	80 ft. *	8 *	15 ft. *	87 ft. *	17 ft. *	89 ft. *	51 inches*	72 inches*
SPD-1500	1500	80 ft. *	8 *	15 ft. *	87 ft. *	17 ft. *	89 ft. *	51 inches*	72 inches*

* SPD 1350 and SPD 1500 utilize the same amount of pipe due to the necessity of making rows equal in length. The 1350 gpd Model contains more pipe than required as a result.

Table D, Component Kit Contents, SPD Models

Model Number	Advanced Enviro-Septic™ Pipes	Couplings	Off-Set Adapters	Double Off-Set Adapters
SPD-450	21	14	7	7
SPD-600	28	21	7	7
SPD-750	35	28	7	7
SPD-900	42	35	7	7
SPD-1050	49	42	7	7
SPD-1200	56	49	8	8
SPD-1350	64	56	8	8
SPD-1500	64	56	8	8

Note: All kits will also contain one (1) geo-membrane liner, one (1) Polylok high water alarm, and two (2) Data Plates.

Step-by-Step Installation Instructions, SPD Models:

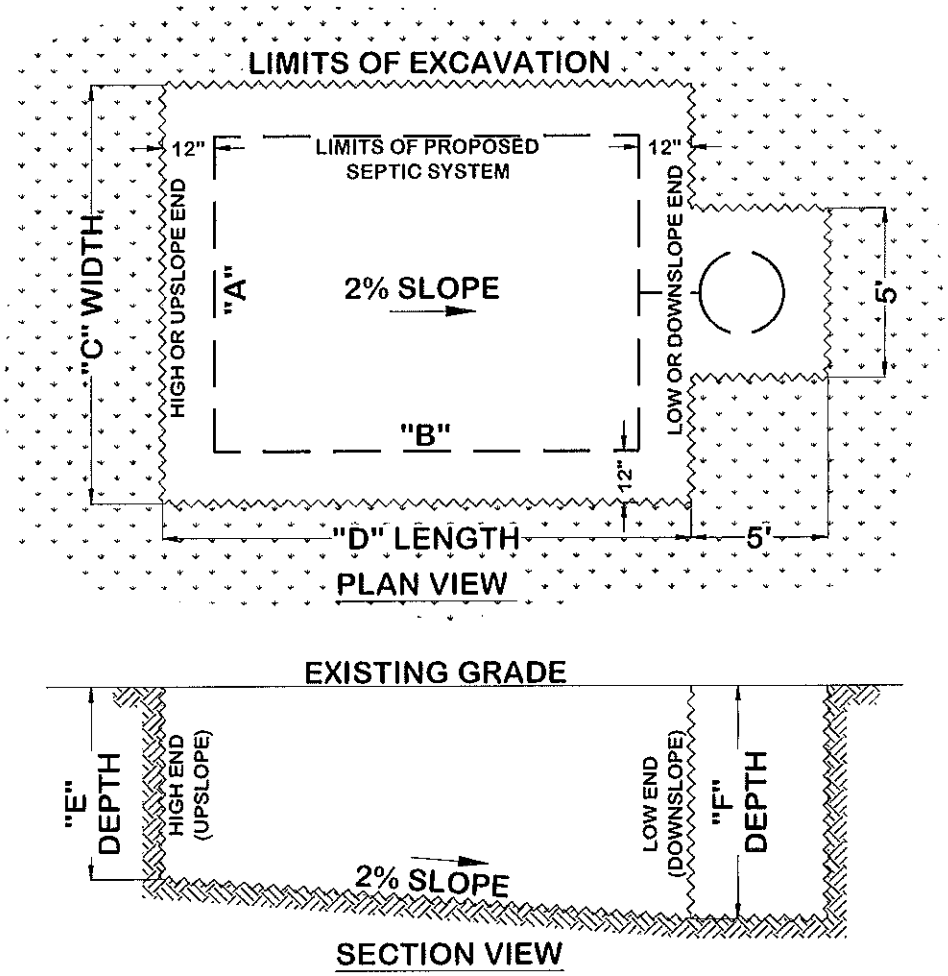
Excavation Procedures	• Excavate site to dimensions specified in Table C, System Sizing & Dimensions, p. 14. • Excavation area varies depending on the size/treatment capacity of the system. • Excavated area extends 12 in. beyond the limits of the proposed system. • Bottom of excavation will be sloped 2% toward the drain/sump end of system. See Table C, p. 14 and Diagram 1, p. 19.
Install sand beneath liner	Install clean sand fill (no stones over ¼ in.) to a depth of 3 in. to create a smooth protective layer between naturally occurring soil and geo-membrane liner.
Grade/Slope Sand Fill	Grade sand fill so that it slopes ¼ in. per foot towards the center line of the system as shown in Diagram 2, p. 20.
Install Liner	• Place compressed geo-membrane liner in the center of the excavated hole. • Position geo-membrane liner so that 2 in. diameter outlet is positioned toward the sump end of the system and the 4 in. diameter inlet is positioned toward the outlet from the septic tank. • Pull and stretch to expand compressed geo-membrane liner horizontally so that its bottom is fully extended (smooth) and its edges are approximately 1 ft. from sides of excavated hole. See Diagram 3, p. 21.
Install geo-textile protective layer	Install 16 oz. protective geo-textile fabric on top of geo-membrane liner
Install 3/4 in. Washed Stone in corners	Slowly raise geo-membrane liner sides and protective geo-textile fabric and place ¾ in. washed stone in each of the four inside corners of the geo-membrane liner to hold in place. See Diagram 4, p. 22.
Backfill with clean sand fill on outside of geo-membrane liner	Install clean sand fill (no stones over ¼ in.) outside the geo-membrane liner on all four corners to hold geo-membrane liner in place. See Diagram 4, p. 22.
Install Drain outlet pipe and connect to Sump	• Install sump per manufacturer's instructions and in compliance with National Electrical Code. • Connect geo-membrane liner drain outlet to the sump using 2 in. diameter Schedule 40 PVC pipe. • Drain outlet pipe should slope ¼ in. per foot toward sump. • Backfill around sump with clean sand fill (no stones over ¾ in.). See Diagram 5, p. 23.

Alternate filling ¾ in. stone inside, sand fill outside	• Alternate between placing ¾ in. stone along inside bottom edges of geo-membrane liner and clean sand fill on the outside perimeter of geo-membrane liner to secure its position. • While adding stone and backfilling, gently pull up on sides of geo-membrane liner and protective geo-textile fabric to fully extend and avoid bunching up. • Continue process until a minimum of 8 in. of ¾ in. stone is placed on the bottom surface of the geo-membrane liner (measure depth of stone on the "high" or "up-slope" end of the system and grade stone level.) • Install sand fill on the outside of the geo-membrane liner until it is approximately the same depth as stone. See Diagram 6, p. 24.
Install 1/4 in. Washed Stone	• Alternate between adding ¼ in. washed stone on the inside of the geo-membrane liner and clean sand fill on the outside of the geo-membrane liner. • Continue to gently extend sides of geo-membrane liner upward throughout process of installing stone and backfilling with sand fill. • Continue to add ¼ in. washed stone to a depth of 4 in.; top of stone layer is to be level. See Diagram 6, p. 24.
System Sand Specifications	ASTM-C-33 Sand with no more than 2% passing through a #200 sieve. The Authorized Representative is required to maintain records of a sieve analysis confirming sand used meets specifications for every system installed. Note: It is important to the proper functioning of the system that the correct grade of System Sand is used.
Install System Sand	• Install 12 in. of System Sand on top of the 4 in. layer of ¼ in. stone • Continue to gently pull geo-membrane liner and protective geo-textile fabric upwards while backfilling with clean sand fill on outside of geo-membrane liner. • Protective geo-textile fabric to extend a minimum of 2 in. above stone. See Diagram 6, p. 24.
Assemble pipes and components	• Using couplings, connect 10 ft. sections of Advanced Enviro-Septic™ pipe together to form required row lengths from Table C. (Note: Proper alignment is with Bio-Accelerator™ layer on bottom with midpoint in 6 o'clock position.) • Install offset adaptors on the "high" or "upslope" end of each row with the 4 in. opening in the 12 o'clock position. • Install double-offset adaptors on the "low" or "downslope" end of each row with the 4 in. openings in the 12 and 6 o'clock positions; • Note that "pipe row lengths" are always 7 ft. less than "Liner Lengths." See Diagram 8, p. 26.
Install Advanced	Install assembled rows on top of 12 in. layer of System Sand so that they are:

Enviro-Septic™ rows	• 60 in. from the "high" or "upslope" end of the geo-membrane liner; • 24 in. from the "low" or "downslope" end of geo-membrane liner; • 12 in. from the two "long" sides of the geo-membrane liner that run parallel to the rows; • Level to within +/- 1/2 in. and parallel to within +/- 1 in.; • Spaced 6 in. apart (1.5 ft. center-to-center spacing); and • Proper pipe alignment is with Bio-Accelerator™ layer on bottom with midpoint in 6 o'clock position.
Install System Sand	• Install System Sand around rows. Refer to System Sand Specs on p. 9 for required sand quality. • Walk between rows to fill any voids beneath the rows with System Sand. • Continue to add System Sand until it is covering the bottom one-half of all rows, leaving the "low" or "downslope" end open to accept inspection ports and vent manifold. • Confirm that rows are laid level; if not level, add or remove System Sand as needed to level rows. See Diagram 8, p. 26.
Install d-box	• Install d-box with flow equalizers on top of System Sand and inside the geo-membrane liner on the "high" end. • Locate d-box in line with the 4 in. diameter inlet hole and in line with the connecting pipe to the septic tank. • Confirm that d-box is installed level and that it rests on a stable base. • The outlet from the d-box is to be at least 2 in. above the inlets of the Advanced Enviro-Septic™ rows. • Unused d-box outlets to be capped or mortared. See Diagram 9, p. 27.
Install connection from septic tank to d-box	Install 4 in. Schedule 40 PVC pipe from septic tank to d-box. This connecting pipe must slope at least 1% (1/8 in. per foot) from the septic tank to the d-box.
Connect rows to d-box	• Use 4 in. Schedule 20-40 PVC to connect each Advanced Enviro-Septic™ row to a d-box outlet as shown in Diagram 9, p. 27. • The PVC is to extend at least 2 in. and not more than 4 in. into the row through the offset adaptor and angled downward toward the bottom on the pipe. (See effluent line connection detail, Diagram 8, p. 26) • The 4 in. diameter opening in the offset adaptor is to be in the 12 o'clock position. • Install System Sand beneath and around PVC to stabilize.

Install vent manifold. vent stack and inspection ports, connect to rows	• Install vent manifold constructed with 4 in. sewer and drain pipe through the double-offset adaptors on the "low" or "downslope" end of all rows. • The two 4 in. diameter openings in the double-offset adaptors are to be in the 6 and 12 o'clock positions. • Install vent stack to vent manifold using the 4 in. diameter openings that are in the 12 o'clock position as shown in Diagram 10, p. 28. • Install inspection ports at the end of each row using the 4 in. diameter openings that are in the 6 o'clock position. • Inspection ports' cap to be 3 in. or less from final grade. • Inspection port to be capped and watertight. • Attach pipe extension to end of vent manifold for installation of high water alarm. • Vent stack to be of sufficient height so that its inlet is a minimum of 3 ft. above final grade. • Install System Sand beneath and around vent manifold and connections for stabilization. See Diagram 10, p. 28.
Install high water level alarm float and Polylok #3014A Audible and Visual Alarm	• Note: Licensed electrician to perform installation of high water alarm. • Attach alarm control box to stable post 3 ft. above final grade (or, attach control box to side of building in visible location). • Drill 1 in. diameter hole in top of PVC pipe extension and snap float into place. • Wire float to alarm control box. • Run 110 Volt power to alarm per manufacturer's instructions and local electrical codes. • Install System Sand to top of vent manifold. • Cover float alarm with 8 in. diameter manhole. • Continue to backfill with System Sand to within 4 in. of surface. See Diagram 11, p. 29. Refer to Wiring Schematics, Appendix C. High Water Alarm to be installed only by licensed electrician and in compliance with the National Electrical Code, ANSI/NFPA 70 and manufacturer's instructions.
Cover rows with System Sand	Install additional System Sand over entire system until it is a minimum of 6 in. above the top of the rows.
Fold Geo-membrane liner	Fold edges of geo-membrane liner in toward center of the system
Backfill with topsoil	• Place a minimum of 4 in. /maximum of 18 in. of topsoil capable of sustaining plant growth on top of System Sand. • Final grading to be such that surface waters are directed away from the area of the system. • Shallow rooted vegetation (grass, wildflowers, etc.) to be planted immediately to prevent erosion.
Connect outlet from sump to Advanced Enviro-Septic™ dispersal system	Install connection from sump to dispersal system.

NOTE:
EXCAVATE SOIL TO DIMENSIONS NOTED IN TABLE "A".



EXCAVATION DETAIL

Diagram 1

NOTE:
INSTALL CLEAN SAND FILL WITH NO STONES OVER 1/4" IN BOTTOM OF EXCAVATED HOLE AND SLOPE TOWARD CENTER LINE AS SHOWN.

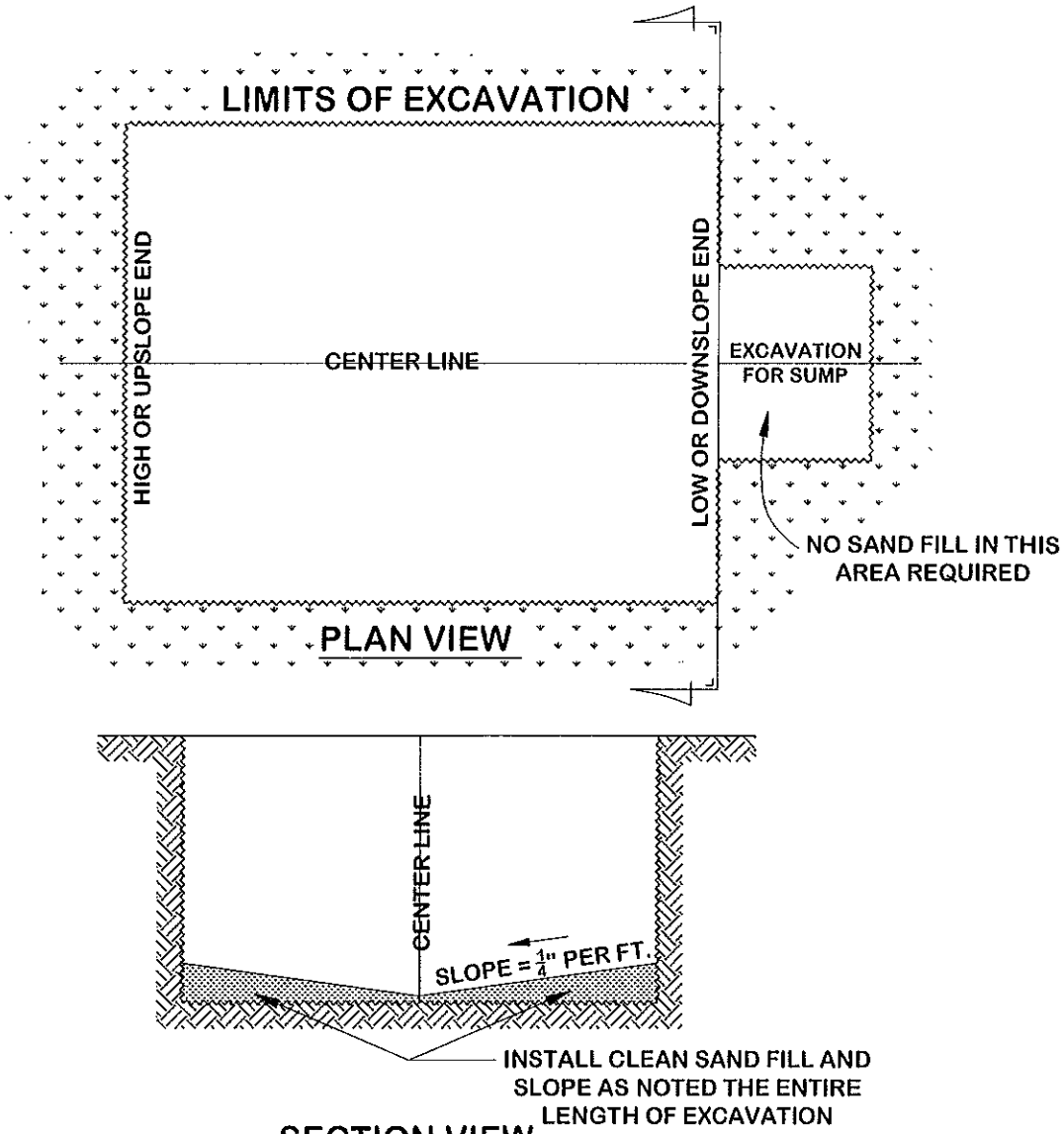
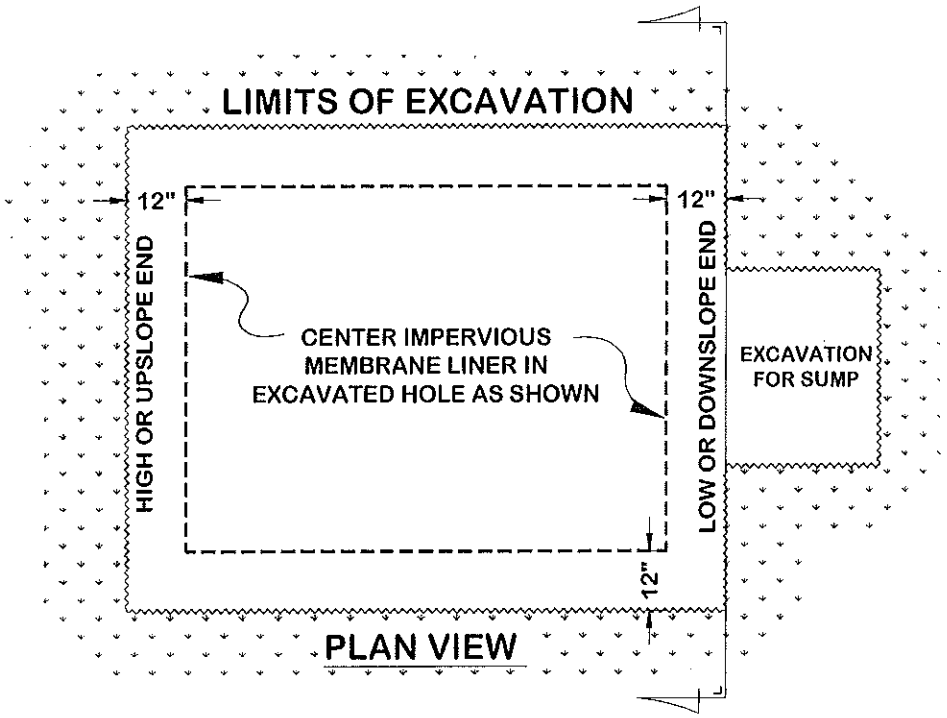
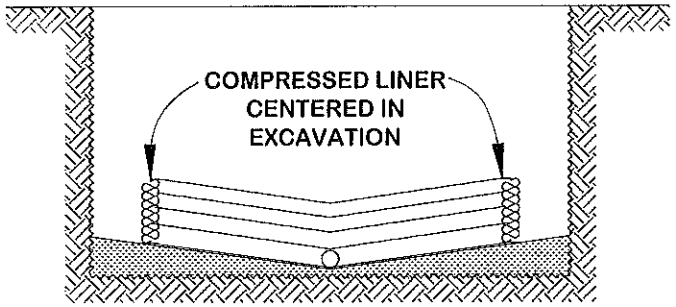


Diagram 2

NOTE:
INSTALL IMPERVIOUS MEMBRANE LINER IN EXCAVATED HOLE AS SHOWN WITH 4" DIAMETER INLET TO THE HIGH OR UPSLOPE END AND THE 2" DIAMETER OUTLET TO THE LOW OR DOWNSLOPE END.

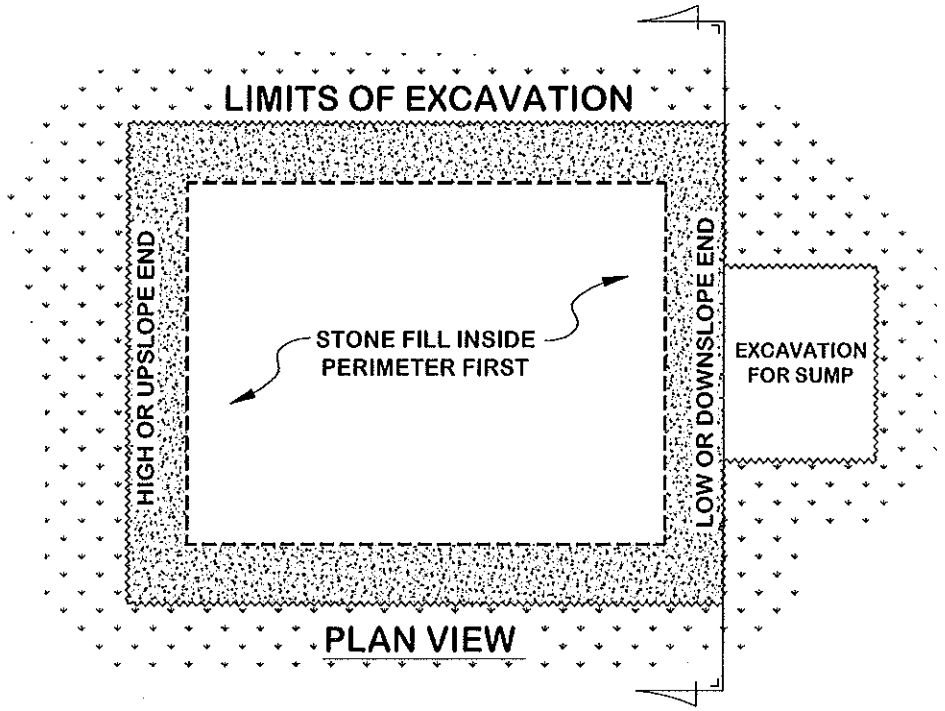


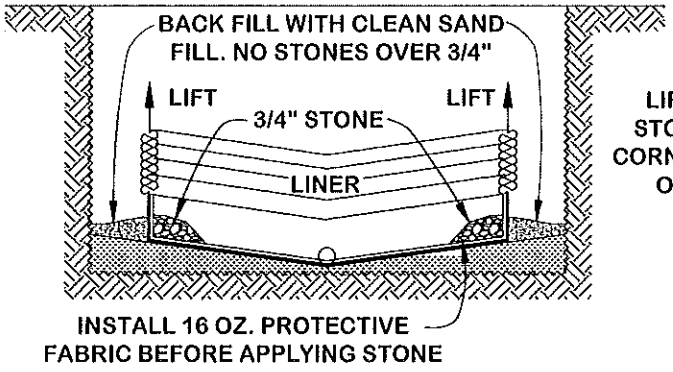


SECTION VIEW
(ROTATED FOR CLARITY)

Diagram 3

NOTE:
SLOWLY LIFT IMPERVIOUS MEMBRANE LINER AND FILL INSIDE CORNERS WITH 3/4" STONE AND BACK FILL OUTSIDE OF LINE WITH CLEAN SAND FILL (NO STONES OVER 3/4"). CONTINUE PROCEDURE UNTIL ENTIRE PERIMETER IS HELD IN PLACE. CONTINUE TO FILL WITH STONE TO 8" DEPTH (MEASURED ON HIGH END).





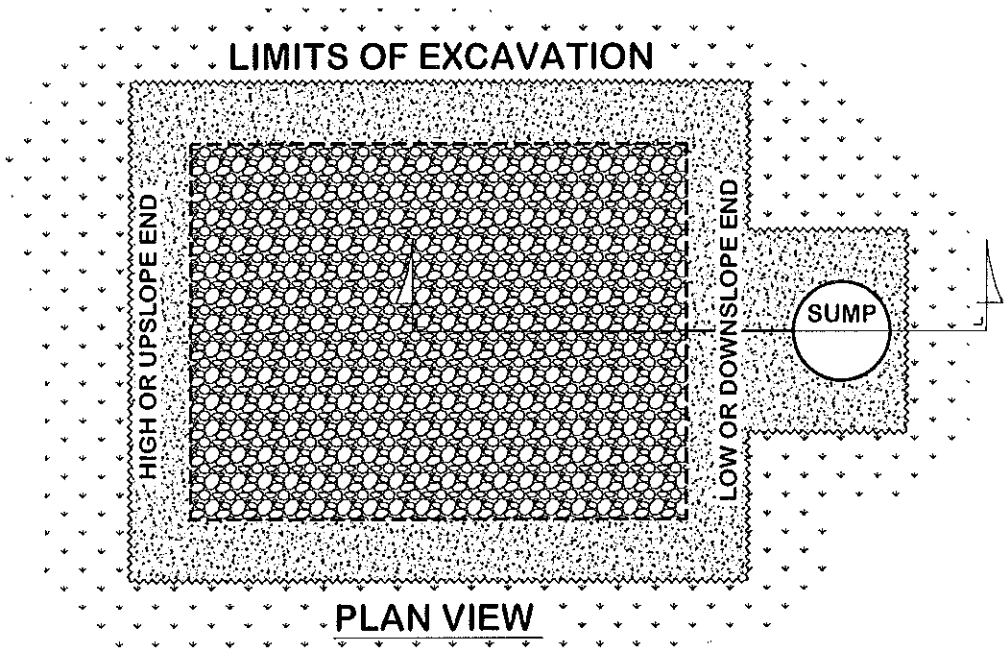
LIFT LINER AND INSTALL STONE FILL ON ALL INSIDE CORNERS. INSTALL SAND FILL ON OUTSIDE OF LINER.

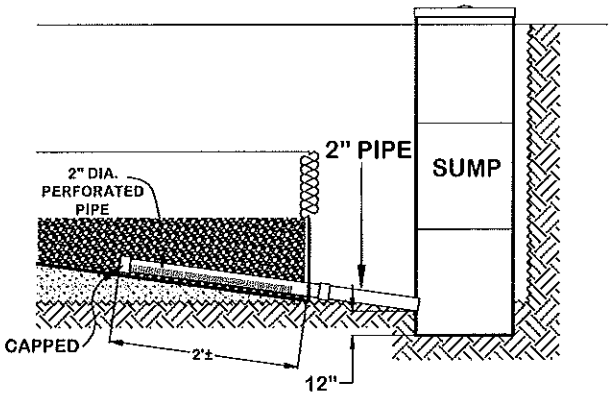
SECTION VIEW

(ROTATED FOR CLARITY)

Diagram 4

NOTE:
INSTALL INSPECTION SUMP AND ATTACH 2" DIAMETER SCHEDULE 40 PVC TO IMPERVIOUS MEMBRANE LINER OUTLET. PIPE TO EXTEND 2' INSIDE LINER. THE PORTION OF THE PIPE INSIDE THE LINER SHALL BE PERFORATED. ORIENT PERFERATIONS DOWNWARD. BACK FILL SUMP WITH CLEAN SAND FILL (NO STONES OVER 3/4").

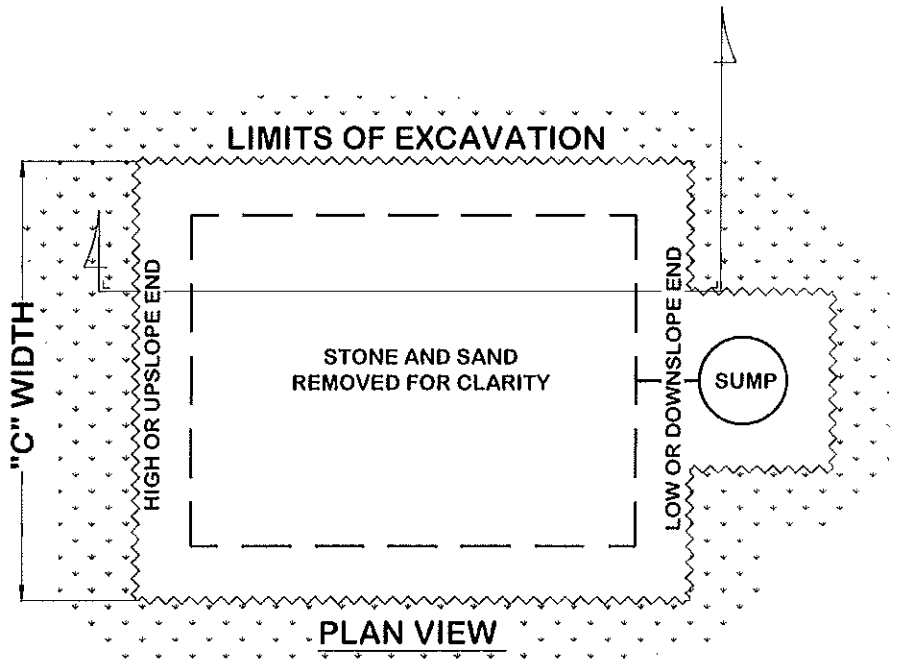




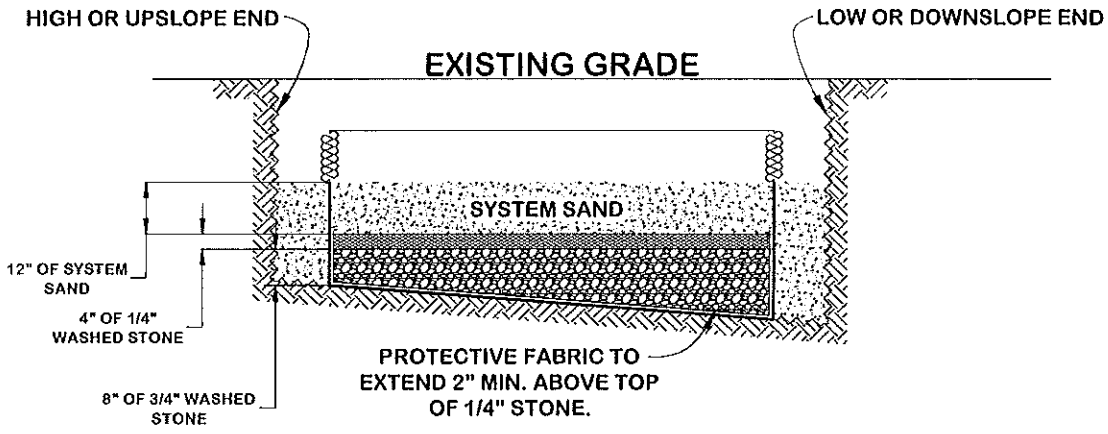
SECTION VIEW

Diagram 5

NOTE:
CONTINUE THE PROCESS OF LIFTING THE IMPERVIOUS MEMBRANE LINER AND FILLING (INSIDE AND OUT) UNTIL THE LINER HAS BEEN FILLED TO 24" (MEASURED ON THE HIGH END) WITH THE MATERIALS NOTED BELOW.



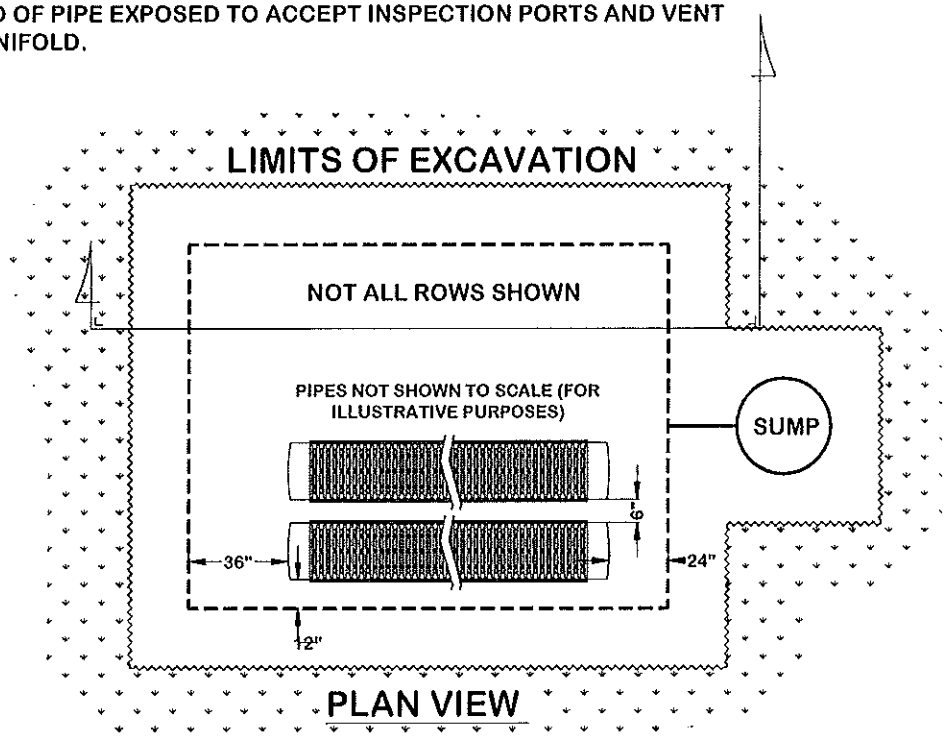
PLAN VIEW



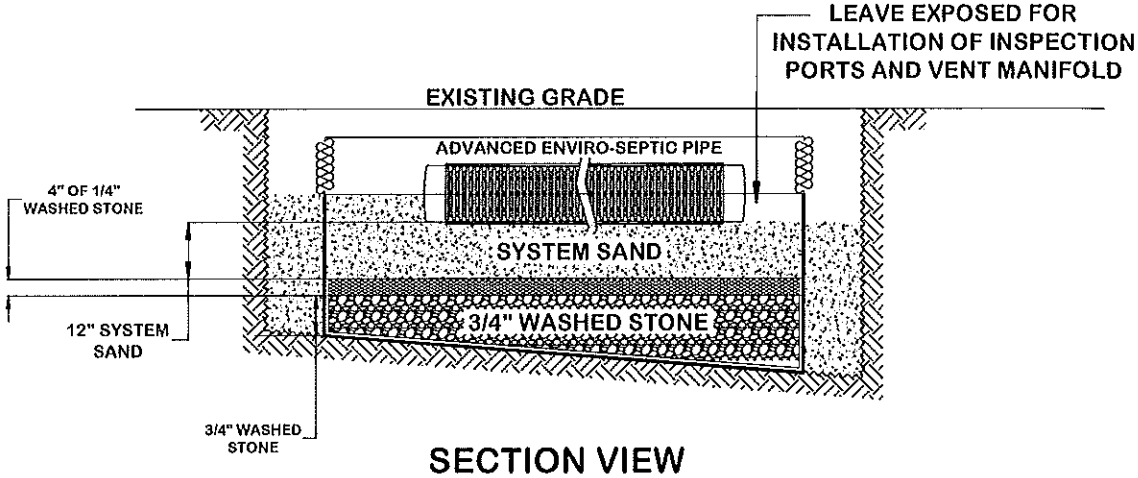
SECTION VIEW

Diagram 6

NOTE:
PLACE ADVANCED ENVIRO-SEPTIC PIPE AS SHOWN UNTIL ALL ROWS NEEDED ARE PLACED THEN SURROUND WITH SYSTEM SAND. WALK BETWEEN ROWS TO REMOVE SAND VOIDS UNDER THE PIPE. CONTINUE TO FILL WITH SYSTEM SAND UNTIL HALF THE PIPE IS COVERED. LEAVE FAR END OF PIPE EXPOSED TO ACCEPT INSPECTION PORTS AND VENT MANIFOLD.



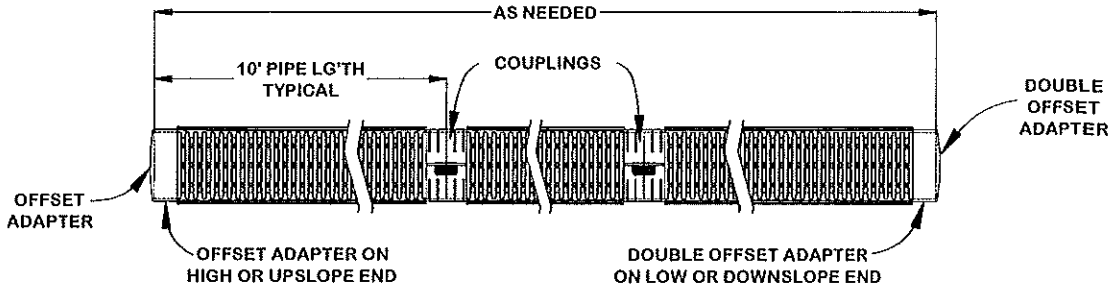
PLAN VIEW

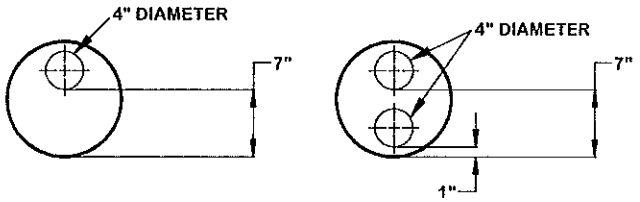


SECTION VIEW

Diagram 7

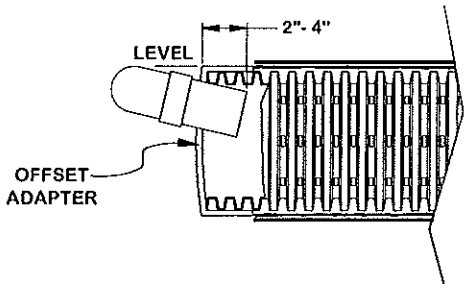
NOTE:
ASSEMBLE ADVANCED ENVIRO-SEPTIC PIPES USING COUPLINGS TO JOIN INDIVIDUAL 10' LENGTHS. ATTACH ONE OFFSET ADAPTER ON THE HIGH OR UPSLOPE END OF ASSEMBLED PIPE AND ONE DOUBLE OFFSET ADAPTER ON THE LOW OR DOWNSLOPE END. INSERT EFFLUENT LINES FROM DISTRIBUTION BOX AS SHOWN IN EFFLUENT LINE CONNECTION DETAIL BELOW.





OFFSET ADAPTER (ENLARGED)

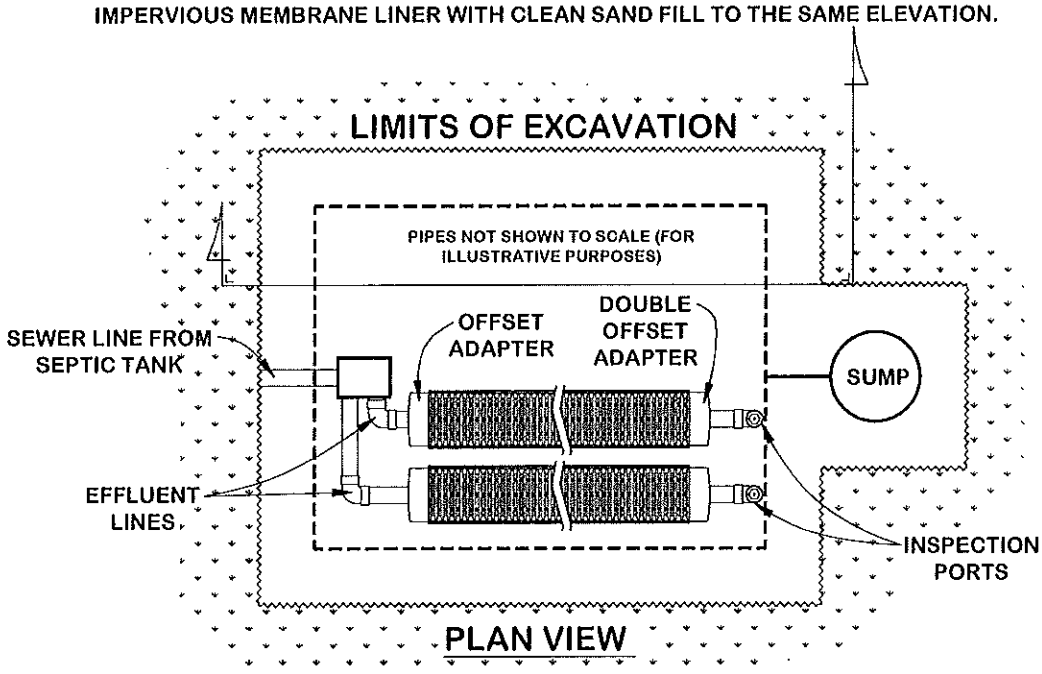
DOUBLE OFFSET ADAPTER (ENLARGED)

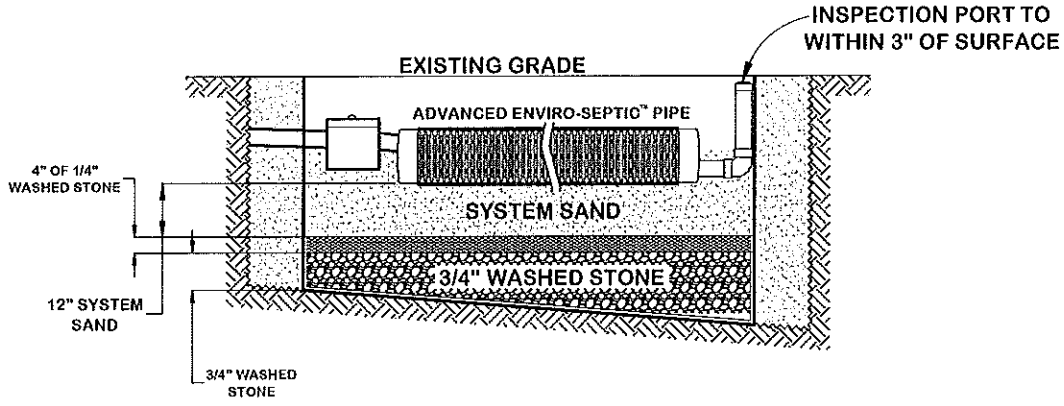


EFFLUENT LINE CONNECTION DETAIL
(NOT TO SCALE)

Diagram 8

NOTE:
INSTALL CONCRETE DISTRIBUTION BOX AND ATTACH 4" DIAMETER PVC SEWER & DRAIN EFFLUENT LINES AS NEEDED. MINIMUM DROP FROM D-BOX OUTLET TO ADVANCED ENVIRO-SEPTIC™ INLET IS 2". INSTALL 4" DIAMETER INSPECTION PORTS TO LOWER OPENING IN DOUBLE OFFSET ADAPTER AT THE END OF EACH LINE. PLACE SYSTEM SAND AROUND AND OVER INSPECTION PORT. BACK FILL IMPERVIOUS MEMBRANE LINER WITH CLEAN SAND FILL TO THE SAME ELEVATION.

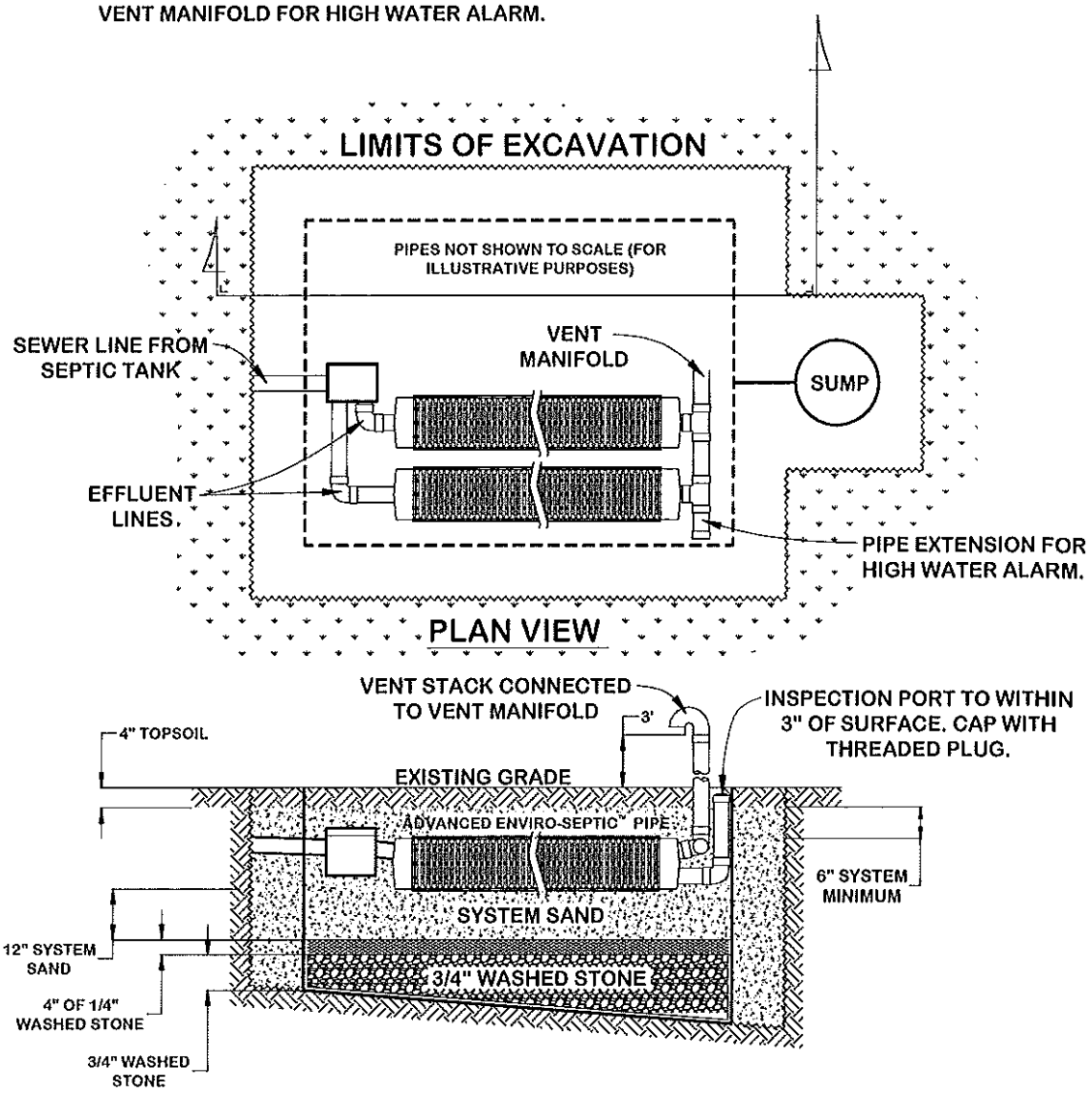




SECTION VIEW

Diagram 9

NOTE:
INSTALL 4" DIAMETER SEWER & DRAIN PIPE FOR VENT MANIFOLD. ATTACH MANIFOLD TO TOP (12 O'CLOCK) OPENING OF THE DOUBLE OFFSET ADAPTER. CONNECT THE VENT MANIFOLD TO THE VENT STACK WHICH EXTENDS TO 3' ABOVE FINAL GRADE. ATTACH PIPE EXTENSION TO END OF VENT MANIFOLD FOR HIGH WATER ALARM.



SECTION VIEW

Diagram 10

NOTE:
TO INSTALL ALARM FLOAT, DRILL 1" DIAMETER HOLE IN TOP OF PVC PIPE EXTENSION AND SNAP FLOAT INTO PLACE. WIRE FLOAT TO ALARM CONTROL BOX. RUN 110V POWER TO ALARM PER MANUFACTURER'S INSTRUCTION AND LOCAL ELECTRICAL CODE. AFTER FLOAT ALARM IS INSTALLED, FILL INSIDE OF IMPERVIOUS MEMBRANE LINER WITH SYSTEM SAND TO TOP OF VENT MANIFOLD. COVER FLOAT ALARM WITH 8" DIAMETER MANHOLE AND CONTINUE TO FILL INSIDE AND OUTSIDE OF LINER TO WITHIN 4" OF SURFACE. APPLY 4" OF TOPSOIL AND SEED TO COMPLETE CONSTRUCTION.

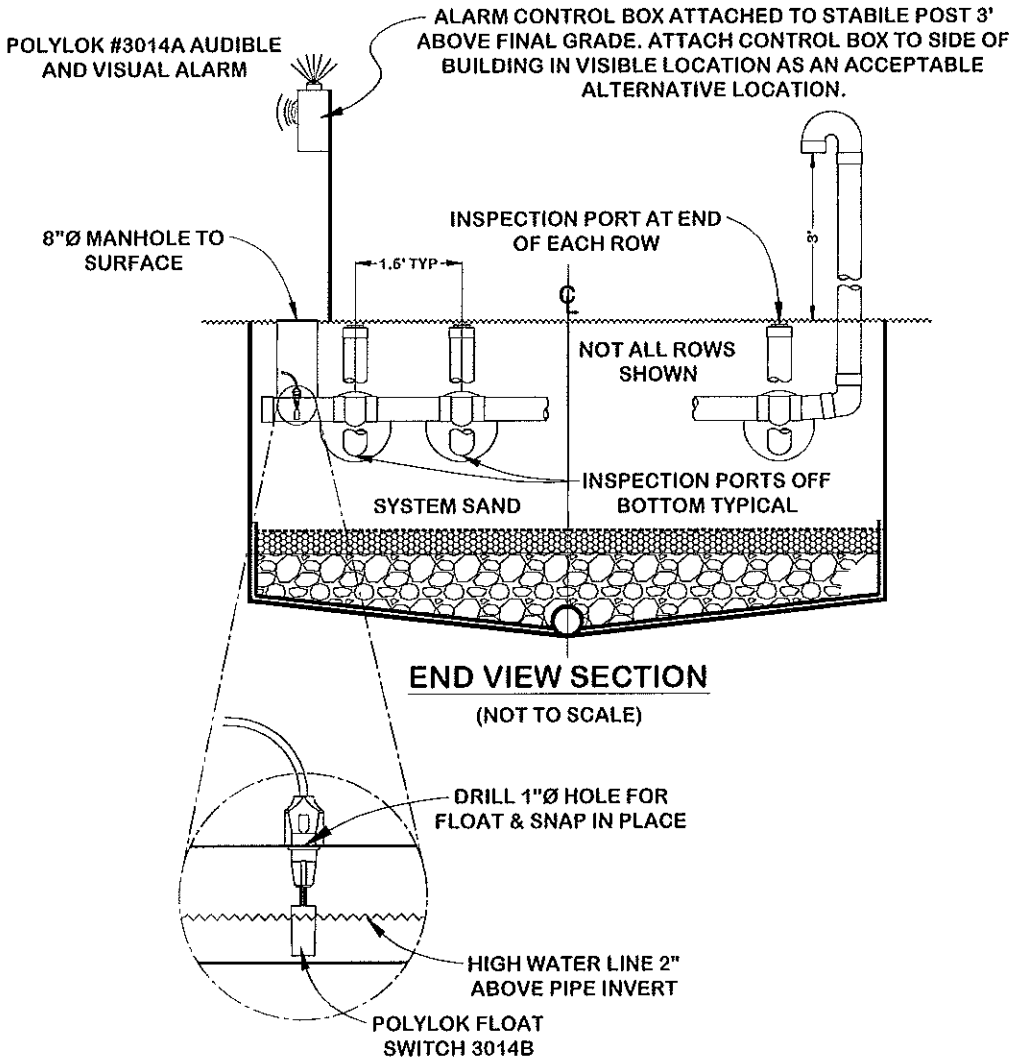


Diagram 11

Section E
Venting Requirements

Venting is required

- Adequate ventilation is **essential** to the proper functioning of the Advanced Enviro-Septic™ System.
- Vent openings must be located to ensure the unobstructed flow of air through the entire Advanced Enviro-Septic™ system.
- The low vent inlet must be a minimum of 3 ft. above final grade.

High and Low vents required

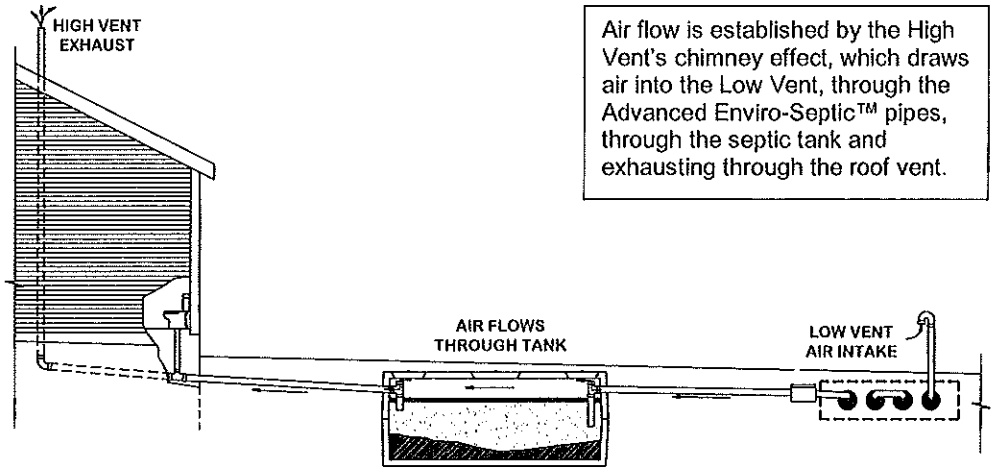
- High and low vents are **required** for **all** systems.
- The roof (house) vent is the "high vent" in gravity systems.
- 4 in. diameter low vent is required for all systems.
- The diameter of the vent manifold must match the vent stack diameter.

Differential Venting

- Differential venting is the use of high and low vents in a system.
- High and low vent openings must be separated by a minimum of 10 vertical ft.
- The high and low vents should be of the same capacity.
- Roof vent diameter must be a minimum of 3 in., 4 in. diameter is recommended. If the roof vent is less than 3 in., an additional high vent is recommended.
- Sch. 40 PVC or equivalent should be used for high vents (if used).
- Vents extending more than 3 ft. above grade must be anchored.

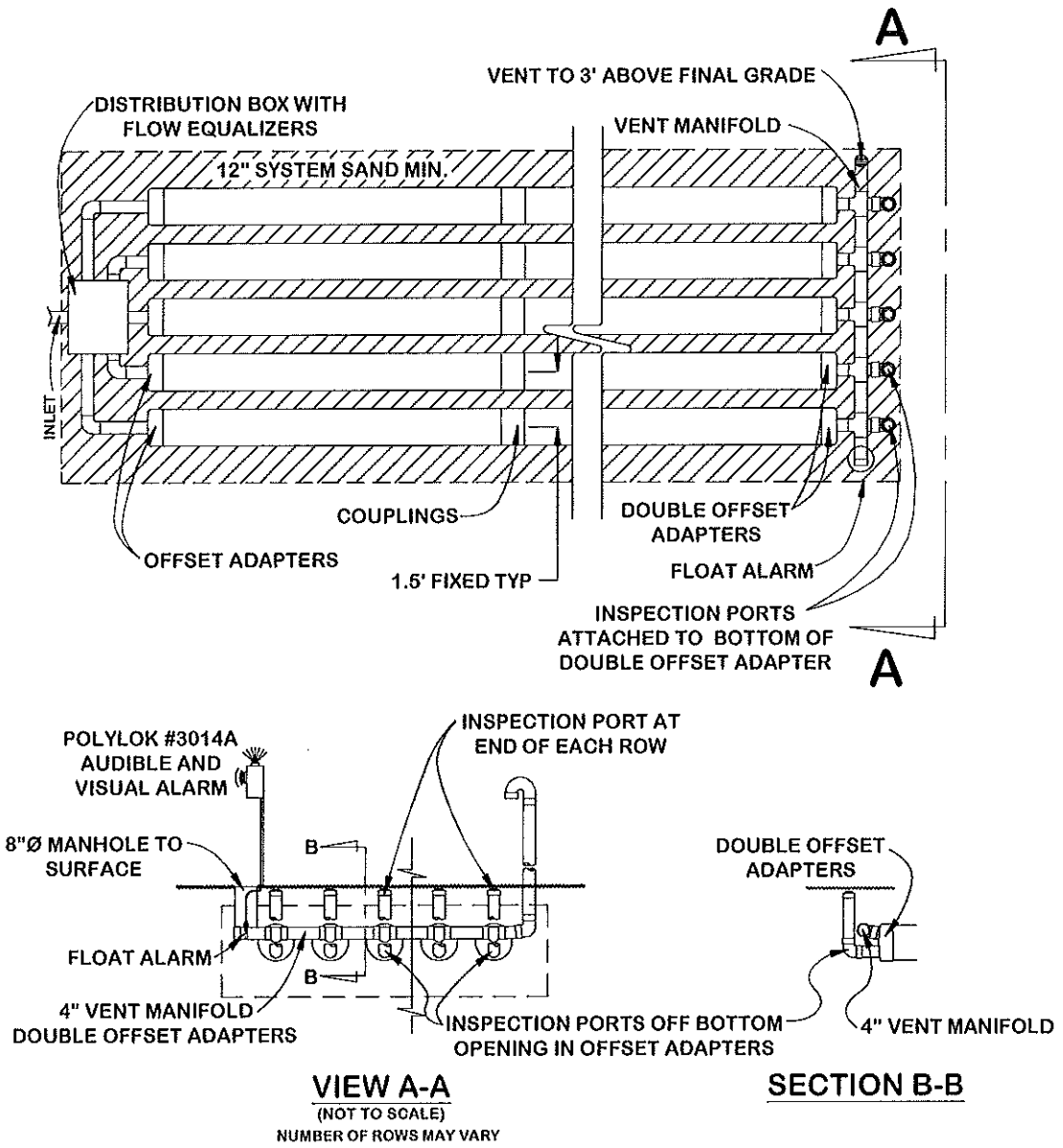
Vent Locations

- A low vent manifold is installed through the hole in the 6 o'clock position in the offset adapter at the end of each row.
- A vent manifold may be used to connect the ends of multiple rows.
- **The house (roof) vent functions as the high vent** as long as there are no restrictions or other vents between the low vent and the house (roof) vent.



Air flow is established by the High Vent's chimney effect, which draws air into the Low Vent, through the Advanced Enviro-Septic™ pipes, through the septic tank and exhausting through the roof vent.

Vent Manifolds A vent manifold may be incorporated to connect the ends of a number of rows of Advanced Enviro-Septic™ pipe to a single vent opening. See diagram below.



Section F
Start-Up Procedures

Connect septic tank	After proper assembly of components and completion of proper backfilling, grading and seeding, connect the residence's wastewater discharge pipe to the septic tank.
Install & Test High Water Alarm	The Authorized Representative will contract with a licensed electrician to install the high water alarm in compliance with the National Electrical Code (ANSI/NFPA 70) and the manufacturer's instructions. Refer to Wiring Schematics, Appendix C. To test the high water alarm, raise float vertically approximately 1 in. to activate alarm. Confirm alarm is visually and audibly detectable from a distance of 50 ft. Alarm is designed to activate if water level inside pipes exceeds 10 in. in depth.
Complete Data Plate/Service Labels & affix	Complete the required information on the 2 (two) Data Plates/Service Labels provided, including the Authorized Representative's contact information, Model Number, Serial Number, the date of installation and the rated hydraulic capacity in gallons per day. Permanently affix the Data Plate to the electrical control box and near the visual high water alarm. Also complete the reproduced Data Plate/ Service Label in the Owner's Manual (inside front cover).

Advanced Enviro-Septic™ Treatment System Service Data Plate
NSF Standard 40 Class I Certified

Manufacturer: **Presby Environmental, Inc.**

143 Airport Road, Whitefield NH 03598
(800) 473-5298 info@presbyeco.com
www.presbyenvironmental.com

Model Number: _____ Date of Installation: _____
Serial Number: _____
Rated Hydraulic Capacity: _____ Gallons per Day

Manufacturer's Authorized Representative:
Name_____
Address _____
_____
Telephone _____

To Obtain Service or Parts: Contact the Manufacturer's Representative above or Presby Environmental, Inc.

Begin Using Plumbing System	Advanced Enviro-Septic™ does not require any "starter" bacteria, additives or chemicals. Simply by beginning to use the home's plumbing system, the system will begin to develop its multi-stage biomat.
Provide System Owner with the following documentation	• A copy of the Owner's Manual, Operating and Maintenance Instructions • On the inside front cover of the Owner's Manual, fill in the blanks in the Data Plate information as on actual Data Plate, including Serial Number. • A copy of the completed System Installation form • A copy of the completed Installation Checklist • Any documentation for components (manuals, warranties, etc.) • A copy of the approved plan, permit or other documentation from local approving authorities (if plan is not available, sketch system location on p. 17 of Owner's Manual). • A sieve analysis confirming use of correct System Sand in the system. • Documentation of septic tank structural integrity. • A key or combination to the locking Sampling Device or Sump's cap.
Return Required Documentation to PEI	Provide Presby Environmental with a copy of all completed paperwork. Refer to Authorized Representative's Manual, p. 7 for documentation requirements. Mail to: 143 Airport Rd., Whitefield, NH 03598. Also provide any documentation required by local approving authority, if required.

Section G
Maintenance Schedule

Initial Two-Year Service Policy

- The initial two year service policy is included in the purchase of an Advanced Enviro-Septic™ Treatment System. See p. 21 in Authorized Representative's manual.
- This consists of four (4) system inspections, one every 6 months following the date of installation.
- Electrical, mechanical and other components are inspected, adjusted and serviced (if necessary).
- An effluent sample will be obtained and visually inspected for color, turbidity and scum overflow and an olfactory assessment of odor.
- Owner to be notified in writing of any improper system operations that cannot be remedied at the time of inspection, and an estimated date of correction.
- An extended service policy is available for purchase after the initial two years.
- Refer to Sampling Device Installation and Use instructions, Appendix D.
- Refer to Inspection Report Form, Appendix E.

System maintenance/ pumping of the septic tank

- Inspect the septic tank at least once every two years under normal usage.
- Pump the tank when surface scum and bottom sludge occupy one-fourth or more of the liquid depth of the tank.
- If a garbage disposal is used, the septic tank will likely require more frequent pumping.
- After pumping, inspect the septic tank for integrity to ensure that no groundwater is entering it. Also check the integrity of the tank inlet and outlet baffles and clean and/or repair if needed.
- Inspect the system to ensure that vents are in place and free of obstructions.
- Effluent filters are not recommended because of their tendency to clog and cut off oxygen to the system. If a filter is used, the filter selected must allow oxygen to flow freely throughout the system. Filters require regular maintenance and cleaning; follow filter manufacturer's maintenance instructions and inspect filters frequently.
- If a plastic septic tank is used, and pumping is being performed at a time of year (typically spring) when the ground water table is high enough to exert hydrostatic pressure against the tank, measures should be taken to prevent the tank from "floating." One method of preventing floating is to fill the septic tank with water immediately after pumping, and the weight of the water will hold the tank in place. During construction, weights, straps, concrete slabs or anchors can be installed to hold the plastic septic tank in place and prevent floating. Follow tank manufacturers' instructions when installing "anti-flotation" anchors.

Distribution box ("d-box")

- Remove any accumulated solids from the d-box.
- Check for level and adjust if necessary.
- Adjust flow equalizers as needed.
- Re-seal any access ports opened during servicing.

Maintenance Schedule, Continued

Alarm	• Test the High Water Alarm at least annually. • Lift the float approximately 1 vertical inch to activate alarm. • Confirm that both the audible and visual alarms are functioning properly (discernable from a distance of 50 ft.). • Return float to original position (located so as to activate if water level within pipes exceeds 10 in.).
Venting	• Confirm all vents are in place • Ensure that vent openings are unobstructed by leaves, animal activity, etc. • Install screen over vent opening to prevent animal activity.
Treatment field	• No trees or deep rooted vegetation to be planted within 10 ft. • No heavy motorized or foot traffic • No added hydraulic load to treatment field (i.e., no ground or surface water, irrigation systems, gutter systems, floor drains, sump pumps, etc. discharging in area of treatment field) • Final grading above system crowned to divert surface water away from treatment field • No gardens for human consumption • Check for any odor or surface ponding • Confirm vents are in place
Repair or Replacement Parts	Authorized Representatives are to maintain a supply of replacement parts and to provide emergency service within 48 hours of request. Only Authorized Representatives may service the system during the first two (2) years.

Section H
Inspection & Sampling Procedures

Safety Precautions	• Perform inspection procedures and collect all samples taking care to prevent contact with effluent. • Use proper safety equipment, including gloves and eye protection. • Use care and make sure to clean thoroughly any tools or equipment used. • Refer to Sampling Device Installation and Use instructions, Appendix D. • Refer to Inspection Report Form, Appendix E.
System Owner Interview	• Confirm septic tank pumping schedule is being followed • Inquire about any unusual or problematic issues experienced (fixtures backing up or sluggish, high water alarm incidents, odor, etc.) • Confirm that system owner has been provided with an Operating Manual. • Review use and care recommendations with system owner.
Visually Inspect Treatment Field	• Confirm no ponding/surfacing of effluent on ground surface • Confirm no offensive odor detectable in the system area • Confirm treatment field is not being subjected to hydraulic loading from surface or ground water flows, irrigation systems, gutter systems, floor drains, etc. • Confirm no trees or plants within 10 ft. of treatment field • Instruct system owner to perform visual inspection of the treatment field once per month.
Mechanical Inspection	• Inspect, adjust and/or service the High Water Alarm as needed. Any electrical service required is to be performed by a licensed electrician. • Test to confirm proper operation by raising float 1 in. vertically, which will activate alarm. • Confirm audible and visual alarms discernable from a distance of 50 ft. • Return float to original position (so as to activate if water level within pipes exceeds 10 in.).
Septic Tank Inspection	• Inspect accumulated solids in septic tank, pump tank if necessary. • Inspect tank for structural integrity, confirm no infiltration or exfiltration. • Inspect baffles and confirm they are in place and unobstructed. • Inspect d-box and remove any accumulated solids. • Check d-box for level; adjust flow equalizers if needed. • Clean and maintain effluent filter (if used). • Perform draft test to assess ventilation if necessary. • Inspect connecting PVC lines for proper connections.
Assess Water Level in pipes via Inspection Ports	• Expose inspection ports and observe water level inside pipes. • When system is operating as expected the liquid level inside the pipes will be from 0 to 10 in. deep and will fluctuate based on water usage. • Confirm equal distribution by comparing water levels in each row.

Inspection and Sampling Procedures, Continued

Step-by-Step Sampling Instructions	• Label clean plastic sample bottle with site address, owner's name, time and date of collection. • Remove cover from sampling device (CTD Models) or sump (SPD Models). • Do not remove cap from sample bottle until ready to use; do not touch or allow contaminants to contact the rim or mouth of the bottle. If there is any possibility that the sample has been contaminated, discard and obtain a new sample. • Place disposable collection cup attached to rod below sampling device's inlet (CTD Models) or base of sump (SPD Models) and allow treated effluent to fill the cup. In the case of low or no flow from the inlet pipe of Sampling Device, collect sample from treated effluent collected in the base of the sampling device. • Remove collection cup from sampling device or sump and pour collected effluent sample into labeled sample bottle. • Immediately re-cap the sample bottle and pack in ice for transport (if applicable). • Follow chain of custody procedures (if submitting for laboratory analysis).
Visual Inspection of Effluent Sample	• Visual inspection of effluent sample to be performed on-site immediately after obtaining sample. • Assess color – There should be no visible color (refer to APHA's *Standard Methods for the Examination of Water and Wastewater*.) • Assess turbidity – There should be no visible suspended particles or sediment. • Assess scum overflow – There should be no oily film or foaming. • Make detailed notes documenting visual inspection of sample for the file, including date, time, name and address of person performing assessment.
Olfactory Assessment of Odor	• Olfactory assessment for odor to be performed on-site immediately after obtaining sample. • The sample should not produce an offensive odor (refer to APHA's *Standard Methods for the Examination of Water and Wastewater*.) • Make detailed notes documenting olfactory assessment for odor for the file, including date, time, name and address of person performing assessment.
Assess Water Level in pipes via Inspection Ports	• Expose inspection ports and observe water level inside pipes. • When system is operating as expected, the liquid level inside the pipes will be 0 – 10 in. in depth and will fluctuate in relation to water usage. • Confirm equal distribution by comparing water levels in each row.
Inspection Report Requirements	• Copy of report to be provided to system owner, Presby Environmental, and state/local approving authority (if required). • Notify system owner in writing of any improper system operations discovered which could not be remedied at the time of inspection, including an estimated date of correction.

Appendix A

Advanced Enviro-Septic™ (AES) Treatment System Installation Checklist (NSF 40 Class I) Presby Environmental, Inc.

Owner(s):	Model Number: AES-TS
Property Address:	Serial Number:
Phone:	Date of Installation:

√	INSTALLATION REQUIREMENTS	COMMENTS:
	Review Operating Manual with System Owner	Confirm understanding of proper use and maintenance of system; sketch system location or attach plan to Owner's Manual; provide Owner's Manual to owner
	Confirm proper operation of high water alarm	Visual and audio alarms detectable from 50 ft., set so as to activate if water level in pipes exceeds 10 in.
	Confirm correct System Sand used in installation	Obtain sieve analysis – ASTM C-33 with less than 2% passing #200 sieve
	Confirm correct amount of System Sand installed	12 in.(SPD) or 18 in. (CTD) below system, 12 in. beyond edges of pipe, 6 in. between rows, 6 in. above pipes
	Offset adapters installed properly	Hole in 12 o'clock position
	Connecting PVC installed properly	Extends into pipe 2 to 4 in. and angled downward
	Pipe alignment is correct	Approximately parallel (w/in +/- 1 in.) Level (w/in +/- ½ in.) Bio-Accelerator™ centered on bottom
	D-box installed properly	Min. 2 in. drop from d-box to AES pipes, level, flow-equalizers in place and adjusted, unused outlets capped, access port sealed
	Septic Tank installed properly	Inlet and outlet baffles required, all access covers securely sealed. Proper documentation obtained re: structural integrity of septic tank. Inlet and outlet of septic tank above SHWT.
	Septic Tank connection to the d-box	Must slope at least 1% (1/8 in. per ft.)
	Vent manifold properly installed	Using hole in double offset adapters on end of each row that is in the 12 o'clock position. Confirm w/ draft test.
	Inspection ports properly installed	Using hole in double offset adapters on end of each row that is in the 6 o'clock position, to within 3 in. of final grade, watertight caps in place
	Sampling Device (CTD) or Sump (SPD) properly installed	Sampling Device beneath first AES pipe on either outermost row; Sump connected to outlet of geo-membrane liner and to dispersal mechanism

√	INSTALLATION REQUIREMENTS	COMMENTS:
	Pipe extension installed to end of vent manifold	For High Water Alarm float
	Vent stack inlet	Minimum of 3 ft. above final grade
	High Water Alarm installed and working properly	Installed by licensed electrician, in compliance with Nat'l. Electric Code
	Final grading completed	Min. 4 in. topsoil, immediately mulch and seed. Crown to direct water away from system
	Complete Data Plate/Service label and install	On electrical control box and near High Water Alarm
	Schedule inspection by local approving authority	If required, varies by State/County
	Schedule first included inspection	6 months from date of installation
	Documentation completed, distributed and retained	Provide documentation to homeowner and PEI; Authorized Rep. to retain all records for expected life of system (see below)
	Confirm that locking cap of Sampling Device (CTD) or Sump (SPD) is secure	Provide System Owner with key or combination for locking cap

Completed by : _____ Signature: _____
(print) PEI Authorized Representative

Authorized Rep ID #: _____

DOCUMENTATION DISTRIBUTION REQUIRED:			
REQUIRED DOCUMENT	PROVIDE TO SYSTEM OWNER	PROVIDE TO PRESBY ENVIRONMENTAL	RETAIN IN AUTHORIZED REP.'S FILES
Owner's Manual	X		
Instructions, warranties, etc. for included components	X		X
Completed Installation Checklist	X	X	X
Completed System Installation Form	X	X	X
Plan, Permit or other documentation from local approving authority	X	X	X
Sieve Analysis confirming System Sand specs. met	X	X	X
Documentation of Septic Tank's structural integrity	X	X	X

Appendix B, System Installation Form

For each installation, Authorized Advanced Enviro-Septic™ Representatives must complete this form and provide a copies to the system owner, Presby Environmental, and state or local approving authorities (if required). Retain original for your records and fax or mail a copy of this form to:

Presby Environmental, Inc.
143 Airport Road
Whitefield, NH 03598
Fax: (603) 837-9864

Authorized Representative's Name:		Authorized Representative's Telephone Number:	
Company Name:			
Street Address:			
City:		State:	Zip:
System Owner:		System Owner's Telephone Number:	
Site Street Address:			
City:		State:	Zip:
Model Number:	Hydraulic Capacity (in gpd)	Serial Number:	
Date Installation completed:			
State and/or Local Permit Number:		Installer PEI Certification Number:	
Comments:			

This form may also be completed online at
presbyenvironmental.com /system installation form.

Appendix C
High Water Alarm Wiring Schematics

POLYLOK™ FILTER ALARM SYSTEM

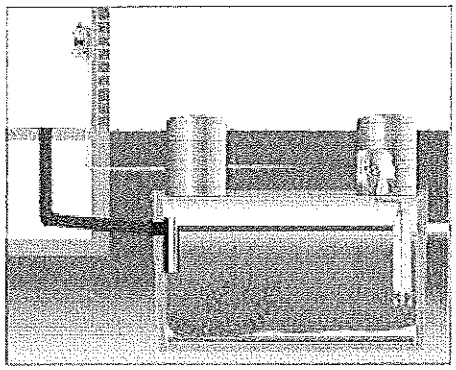
Effluent filter, control switch, and indoor/outdoor alarm panel designed to extend the life of the effluent treatment system in most onsite septic systems.

APPLICATIONS

The Polylok™ filter alarm panel and switch provides a visual/audio alarm to alert the home or business owner that the septic tank filter needs cleaning. This is an ongoing maintenance program on the septic system. It is the responsibility of the owner to call a service company for cleaning service.

The Polylok™ filter alarm switch activates when the filter cartridge is near capacity on solids that have built up through the filtering process. The filter alarm switch sends a signal to the alarm panel activating the septic tank alarm. The owner will need to call for immediate service.

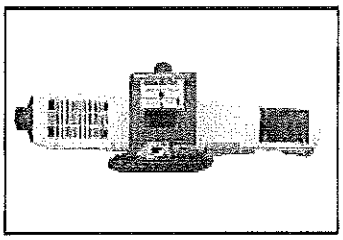
The system should be installed by a licensed, insured septic service company. The filter alarm switch is inserted into the top of the Polylok™ filter cartridge and the alarm wires are connected to the alarm panel wiring. All wiring is to conform to NEC wiring, state or local codes.



Typical Polylok™ Filter Alarm System Installation

FEATURES

- Complete package includes standard VRS control switch with 10 feet (3 meters) of cable, indoor/outdoor alarm panel, and an effluent filter
- Alarm panel features manual alarm test switch and horn silence switch
- Alarm horn rated 82 decibels at 10 feet (3 meters)
- Direct interface of control switch and effluent filter insures proper placement of switch
- Three-year limited warranty



SPECIFICATIONS

Alarm Panel:
Enclosure: 6.5 x 4.5 x 3.0 inch (16.51 x 11.43 x 7.62 cm), indoor/outdoor, weatherproof, thermoplastic
Horn: 82 decibels at 10 feet (3 meters)
Electrical: 120 VAC, 50/60Hz, 7 watts max. (alarm condition)

Control Switch:
VRS control switch with magnetically-activated reed switch
Control Differential: .375 inches (1 cm)
Maximum Angle from Vertical: 5°
Cable: 10 feet (3 meters), flexible 18 gauge, 2 conductor SJOW (UL,CSA), water-resistant (CPE)
Housing and Float: 1.60 inch diameter x 6.7 inch long (4.06 cm x 17.01 cm), high impact, corrosion resistant PVC for use in sewage and non-potable water up to 120°F (50°C)

Electrical:
250 mAmps, 12-125 VAC, 50/60 Hz
500 mAmps, 6-12 VDC

POLYLOK™ Inc.

173 Church Street Yalesville, CT 06492
Phone: (877) 765 9555 Fax: (203) 284 6514
sales@polylok.com http://www.polylok.com

Filter Alarm system installation instructions

ELECTRICAL SHOCK HAZARD
Disconnect power before installing or servicing this product. A qualified service person must install and service this product according to applicable electrical and plumbing codes.

⚠WARNING EXPLOSION OR FIRE HAZARD
Do not use this product with flammable liquids. Do not install in hazardous locations as defined by National Electrical Code, ANSI/NFPA 70.

Failure to follow these precautions could result in serious injury or death.
Keep these instructions with warranty after installation.

Install in accordance with National Electric Code, ANSI/NFPA 70 to prevent moisture from entering or accumulating within boxes, conduit bodies, fittings, float housing, or cable.

INSTALL ALARM AND CONTROL SWITCH

1. Determine mounting location for alarm panel. Position so side instruction label is visible and readable.
2. Mount alarm box using existing holes in back of box. To ensure a watertight seal, use screws and sealing washers included with alarm.
3. Determine "conduit-in" locations on alarm (see Figure A).
4. Drill holes for conduit entry, taking care not to damage bosses inside alarm box.
5. Attach conduit. Use liquid-tight connectors if installing outdoors.
6. Bring control switch cable through conduit and attach to terminal block 1 (TB1) positions 3 and 4 (see Figure A). Leave adequate cable for filter removal. **Note:** Cable is not suitable for direct burial.
7. Attach input power conductors to TB1 positions 1 (line 1) and 2 (neutral), and ground wire to ground termination post (see Figure A).
8. Attach alarm box cover using the four pre-installed screws.
9. Turn on power.

TEST SYSTEM

1. Check installation by moving control switch float upward. The system should indicate an alarm condition.
2. Push test/normal/silence switch to silence horn (beacon should remain illuminated).

INSERT SWITCH INTO FILTER

1. Guide switch through receiving hole in filter as shown in Figure B.
2. Align keys on switch housing to match with slots in filter handle.
3. Slide housing into handle, press down firmly on switch housing and turn clockwise (approximately 90°) until switch snaps into place. Filter handle and switch housing insure proper location of switch.

INSTALL FILTER

1. Slide filter into Polylok™ housing until filter is fully engaged.
2. Reset test/normal/silence switch to normal (center) position.

Figure A

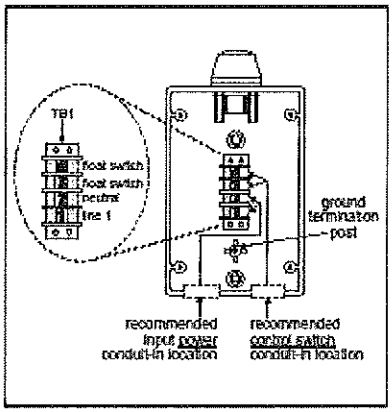
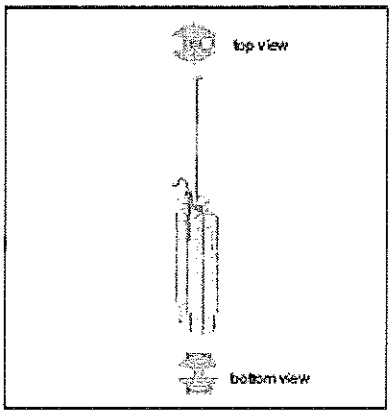


Figure B



POLYLOK™ Inc.
173 Thorpe Street Yalesville CT 06492
Phone (877) 765-6565 Fax (203) 284-8314
sales@polylok.com http://www.polylok.com

Inst. Sheet PN 10123 0A

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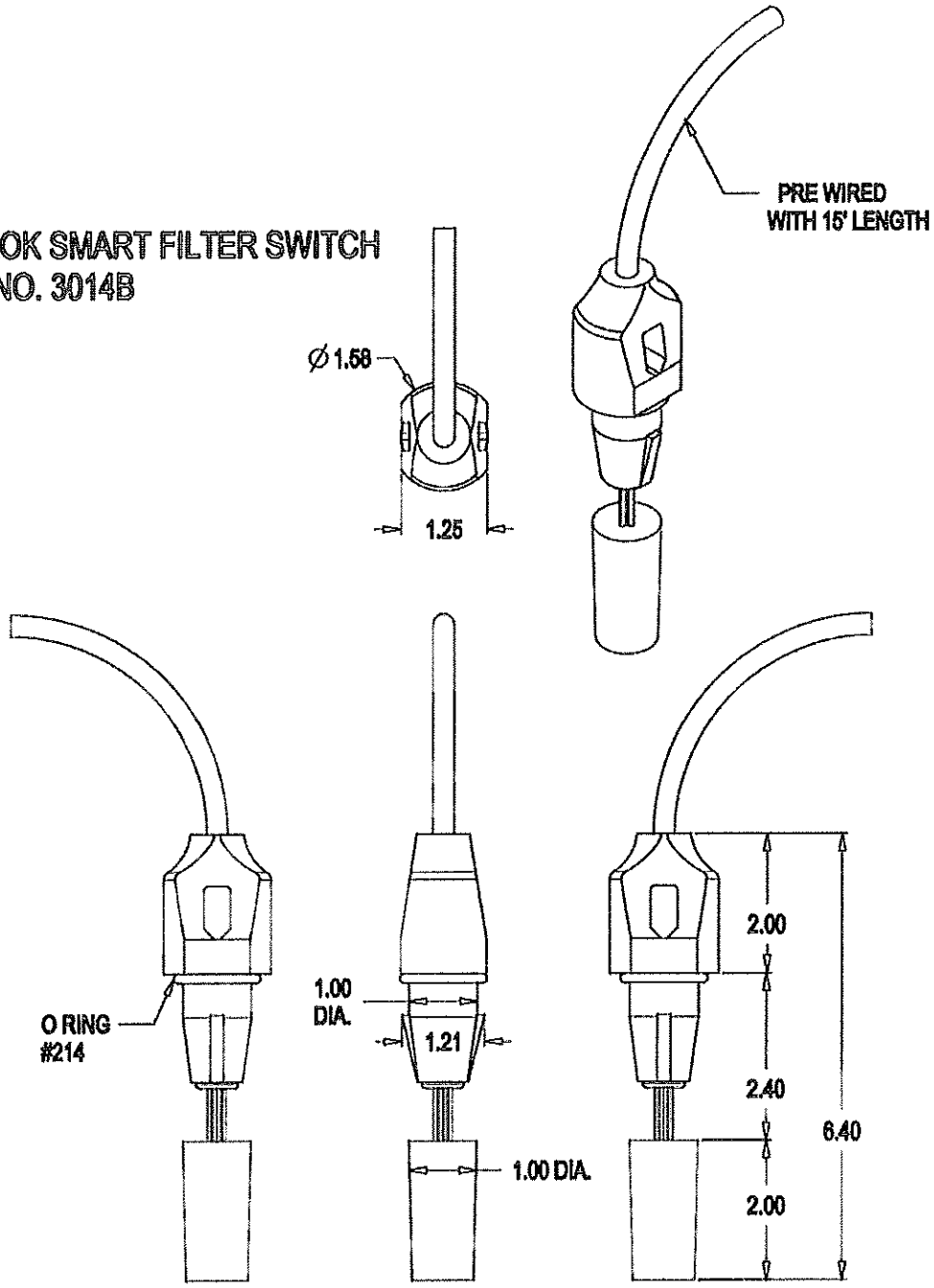
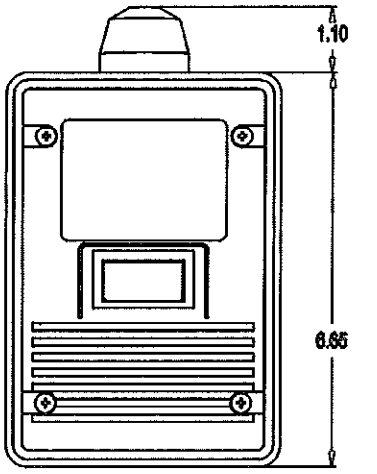
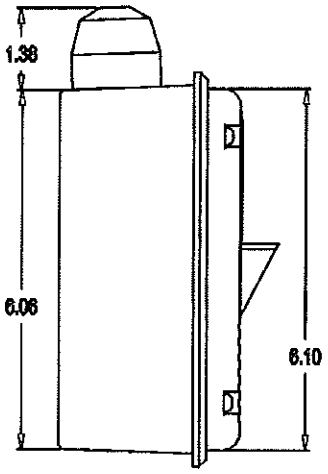
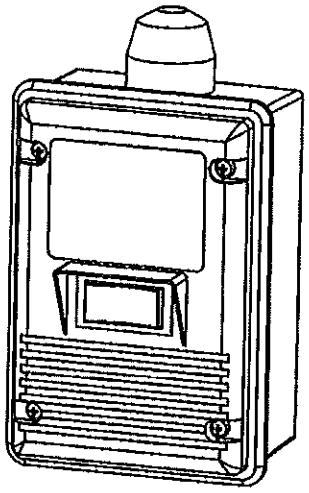
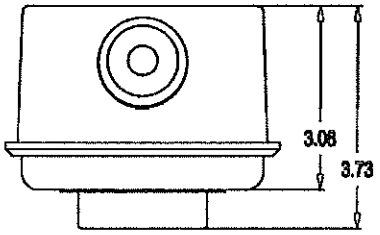
POLYLOK SMART FILTER SWITCH
PART NO. 3014B











POLYLOK

FILTER ALARM PANEL
PART NO. 3014A

POLYLOK / SJE-RHOMBUS
VISUAL/AUDIO ALARM SYSTEM
FOR USE WITH NSF-40 CERTIFIED ENVIRO-SEPTIC® WASTEWATER TREATMENT SYSTEM

Manufacturer: SJE-Rhombus Distributor: Polylok Part #: 3014A and 3014B

Motor Component Specifications

Description	Make	Model #	Electrical Certifications	Voltages	AC/DC Hz	Phase	FLA	Time	AMB	Encl	SF	Therm Prot.
			NO MOTOR									

Contactors / Transformers / Timers Component Specifications

Description	Make	Model #	Electrical Certifications	Coil Voltages	Coil AC/DC	Coil ohms	Contact Voltages	Contact Amps	Action
			NO CONTACTORS/TRANSFORMERS/TIMERS						

Switches, Buzzers, Lights Component Specifications

Description	Make	Model #	Electrical Certifications	Voltages	Amps	Action
Filter Alarm Panel	SJE-Rhombus/Polylok	Part no. 3014A	UL	120 VAC 7 watts	250/500 mAmps	Visual Alarm (visible from 50') Audible Alarm (82 decibels)
Smart Filter Switch (VRS control switch with magnetically activated reed switch)	SJE-Rhombus/Polylok	Part no. 3014B	UL	12-125VAC	250/500 mAmps	Monitors water levels

Enclosures Specifications

Description	Make	Model #	Electrical Certifications	Overall Dimensions	Interior Dimensions	Material	Type
Alarm Panel Enclosures	SJE-Rhombus /Polylok	p/o Part No. 3014A		6.5" x 4.5" x3.0"		Thermo-plastic	Indoor/Outdoor Weatherproof
Float Switch Housing	SJE-Rhombus /Polylok	p/o Part No. 3014B		1.6" diameter 6.7" long			High impact, corrosion resistant PVC for use w/ sewage

Wiring Component Specifications

Description	Make	Model #	Electrical Certifications	Size	Stranding	Type	Temp	Voltage	Multi cond	# Cond
Cable (10 ft. long) (flexible, water-resistant)	SJE-Rhombus/ Polylok	p/o Part No. 3014B	UL, CSA, CPE	18 Gauge					Yes	2 Conductor SJOW

NOTE: ALL WIRING TO BE IN ACCORDANCE WITH NATIONAL & LOCAL ELECTRICAL CODES AND ANSI/NFPA 70 TO PREVENT MOISTURE FROM ENTERING OR ACCUMULATING. REFER TO FIGURE A IN INSTALLATION INSTRUCTIONS FOR WIRING SCHEMATIC.

Miscellaneous Component Specifications

Description	Make	Model #	Electrical Certifications							
		NO MISCELLANEOUS COMPONENTS								

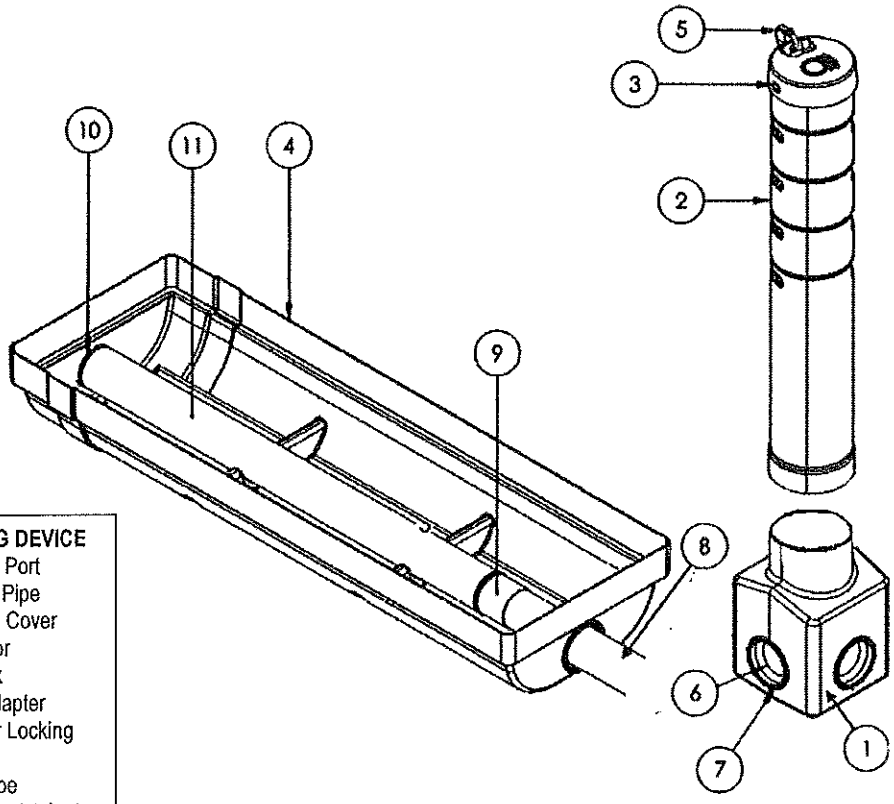
Appendix D
Advanced Enviro-Septic™ Treatment System
(NSF Standard 40 Class I Certified)
Sampling Device Installation and Use Instructions

NSF-40 Class I Certified Systems

All NSF-40 Class I Certified Advanced Enviro-Septic™ Wastewater Treatment Systems are subject to periodic sampling of treated effluent during the first two (2) years after installation. Samples of treated effluent in CTD (Combined Treatment & Dispersal Models) are obtained via the Sampling Device, which is an included component. Only a manufacturer's Authorized Representative may install an Advanced Enviro-Septic™ System; these instructions are to be used in conjunction with the Installation Manual and the Authorized Representative's Manual.

Sampling Device

The Sampling Device consists of two major elements, the Collector and the Sampling Port. The Sampling Port consists of a detachable base and an adjustable (trim to fit) riser which snap together. See schematic below.



SAMPLING DEVICE

1 Sample Port
2 Access Pipe
3 Locking Cover
4 Collector
5 Padlock
6 Pipe Adapter
7 Adapter Locking Ring
8 PVC Pipe
9 Fitting and Adapter
10 End Cap
11 Collector pipe

Sampling Device Installation and Use Instructions, continued

Collector

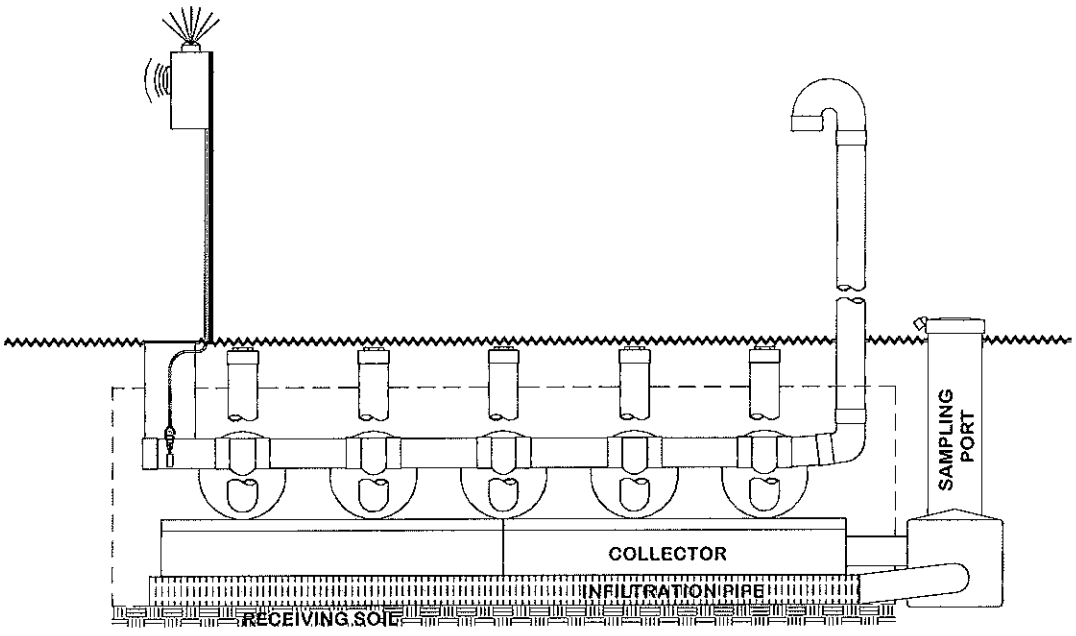
The Collector is a plastic trough which is installed perpendicular to the rows of Advanced Enviro-Septic™ pipe in order to collect a representative sample of treated effluent. The Collector is centered at the mid-point of the first pipe in each row (closest to the d-box). After installation, it is covered with System Sand. The collector pipe is covered by a fabric filter to prevent the infiltration of System Sand.

Sampling Port

After treated wastewater collects in the Collector, it is routed towards the Sampling Port through PVC piping. The Sampling Port access pipe can be cut-to-size as needed so that the locking cover is accessible above final grade. By removing the locking cover, a sample of treated effluent can be obtained from the base of the sampling port. Any treated effluent not removed for sampling purposes is released back into the System Sand via the Infiltration Pipe attached to one of the two outlets in the base of the Sampling Port (these two holes are lower than the hole that is used to connect the Collector to the Sampling Port).

Infiltration Pipe

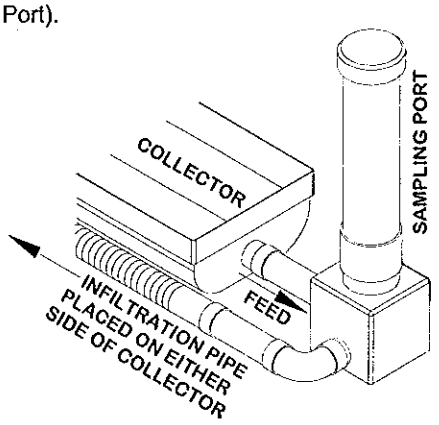
The Infiltration Pipe consists of a 4 in. diameter perforated drainage pipe that is covered by a fabric filter to prevent the infiltration of System Sand into the pipe. This pipe attaches to the Sampling Port base through one of the two lower holes in the base of the Sampling Port. The Infiltration Pipe is encased in the 4 in. of System Sand beneath the Collector.



Sampling Device Installation and Use Instructions, continued

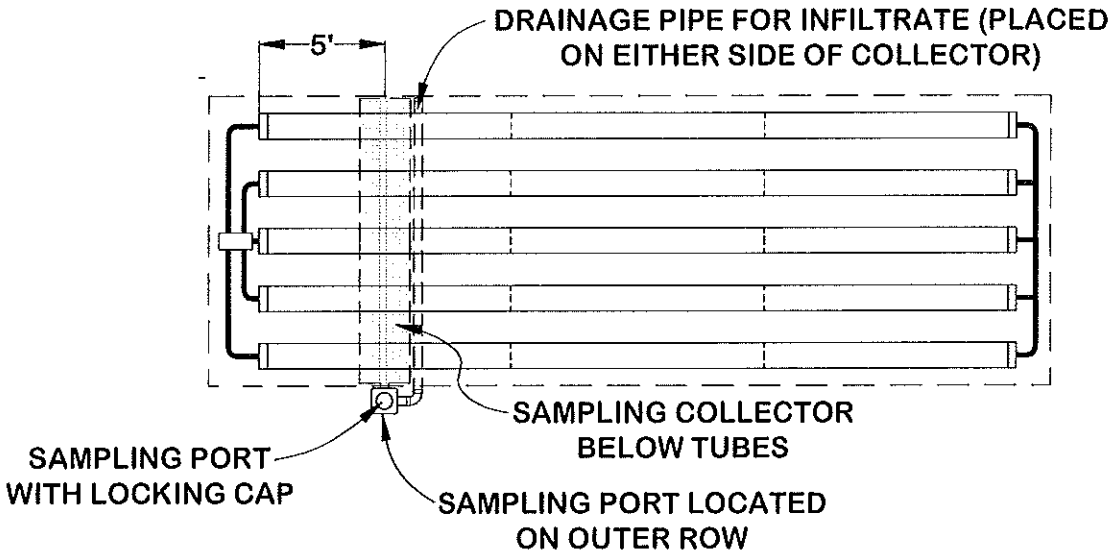
Assembly

The Sampling Device is constructed so that the Collector and the Sampling Port are detachable for ease of installation. These two parts are connected with 4 in. PVC pipe which exits the Collector and makes a 90 degree turn before connecting to the inlet of the sampling port base as shown below (the inlet is the higher hole on the base of the Sampling Port).



Proper Location of the Sampling Device

The Sampling Device is installed perpendicular to the rows of pipe with its center aligned with the midpoint of the first section of Advanced Enviro-Septic™ pipe in each row (the first section of pipe is the one closest to the d-box) as shown below. The Sampling Port is offset from the Collector such that the riser is positioned so it extends upward along the outer edge of the Advanced Enviro-Septic™ pipe as shown below.



Sampling Device Installation and Use Instructions, continued

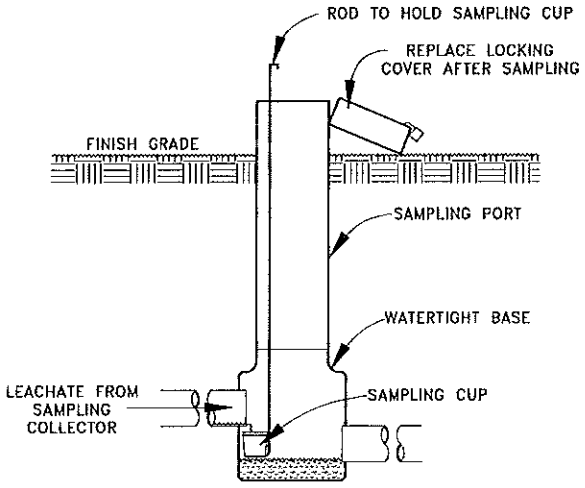
Installation Instructions

- Place the base of the sampling port prior to installation of System Sand so that the Collector will be perpendicular to the rows of pipe and aligned with where the midpoint of the first Advanced Enviro-Septic™ pipe in each row will be (see detail on previous page).
- Base of Sampling Port sits 4 in. lower than bottom of Collector and is off-set so that riser extends upwardly along the outside edge of Advanced Enviro-Septic™ pipe.
- Excavate an area 4 in. deep, 2.5 ft. wide and the width of the particular system (from beyond outermost edge of pipe in first row to beyond outermost edge of pipe in the last row) in the area where the Sampling Device will be located.
- Properly position base of sampling port and the infiltration pipe.
- Install 4 in. of System Sand, filling the excavated area described above and covering the infiltration pipe and holding it in place.
- Install Collector and connect to base of Sampling Port with 4 in. PVC pipe with a 90 degree bend.
- Install Infiltration Pipe so that each end connects into an outlet in base of Sampling Port (the two lower holes in base).
- Install System Sand in and around Sampling Device to hold it in place.
- Continue installing System Sand until it reaches 12 in. depth (measured from bottom of Collector).
- Continue with installation of Advanced Enviro-Septic™ Treatment System (refer to Installation Manual).
- Install cover material (minimum 4 in., maximum 18 in.). (Refer to Installation Manual).
- Trim the riser of the sampling port so that the top is approximately 6 in. above final grade.
- Install cap and padlock. Provide System Owner with key or combination to padlock.

Sampling Device Installation and Use Instructions, continued

Sampling Procedures

- These procedures are to be performed only by a trained technician.
- Use proper safety equipment, including gloves and eye protection.
- Remove padlock and locking cover from riser of Sampling Port.
- Insert the sampling rod with attached cup and lower it to the level of the inlet in the base of the watertight sampling port (where the PVC pipe connects from the Collector into the base of the Sampling Port. Refer to illustration below.)
- Leave in place until a sufficient amount of treated effluent has been obtained.
- If there is insufficient flow to obtain a sample at the inlet, lower the cup deeper and obtain a sample from the well at the base of the sampling port.
- When obtaining samples, use care not to touch collection cup against the side walls or bottom of the sampling port to prevent contamination.
- Immediately perform visual and olfactory assessment of collected sample. (Refer to the Authorized Representative's Manual for instructions regarding the analysis of the collected sample.)
- Reinstall cap, re-seal and re-lock.
- Thoroughly wash hands and any equipment used.



Appendix E

Advanced Enviro-Septic™ Treatment System
Inspection Report Form (NSF 40 Class I)
Presby Environmental, Inc.

Owner(s): Property Address: Phone:	Model Number: AES-TS Serial Number: Date of Installation: Date of Inspection:

√	INSPECTION REQUIREMENTS	COMMENTS:		PASS / FAIL
	System Owner Interview	Confirm understanding of proper use and maintenance of system; interview owner about any problems, issues experienced		
	Confirm proper operation of high water alarm	Visual and audio alarms detectable from 50 ft.		
	Confirm Data Plate/Service Labels are in place	On electric control box and near high water alarm		
	Treatment Field		No ponding or surfacing of effluent	
			No offensive odor	
			No external hydraulic loading	
			No trees or deep-rooted vegetation w/in 10 ft. of system	
			Vent stack in place and intact	
			Assess water level in pipes and even distribution via Inspection Ports	
	Septic Tank and Distribution Box		Assess need for pumping, have pumped if necessary	
			Assess structural integrity of tank, risers, etc.	
			Confirm inlet and outlet baffles are in place and remove any solids	
			Inspect d-box, remove solids, adjust flow equalizers and check for level	
			Reinstall and reseal all access covers securely	
	Obtain and Evaluate treated effluent sample		Visually inspect for color (no color should be detected)	
			Visually inspect for turbidity (no sediment or suspended solids)	
			Visually inspect for oily film or foam (no oily film or foam)	
			Olfactory assessment of odor (no offensive odor)	
	Schedule next inspection	6 months, 12 months, 18 months and 24 months after installation (included Two-Year Service plan.)		Date of Next Inspection:

			/ /
√	**REPAIRS OR SERVICE REQUIRED THAT COULD NOT BE COMPLETED DURING INSPECTION (IF ANY)**	**STATE DATE REPAIRS EXPECTED TO BE COMPLETED:**	**DATE REPAIRS COMPLETED**

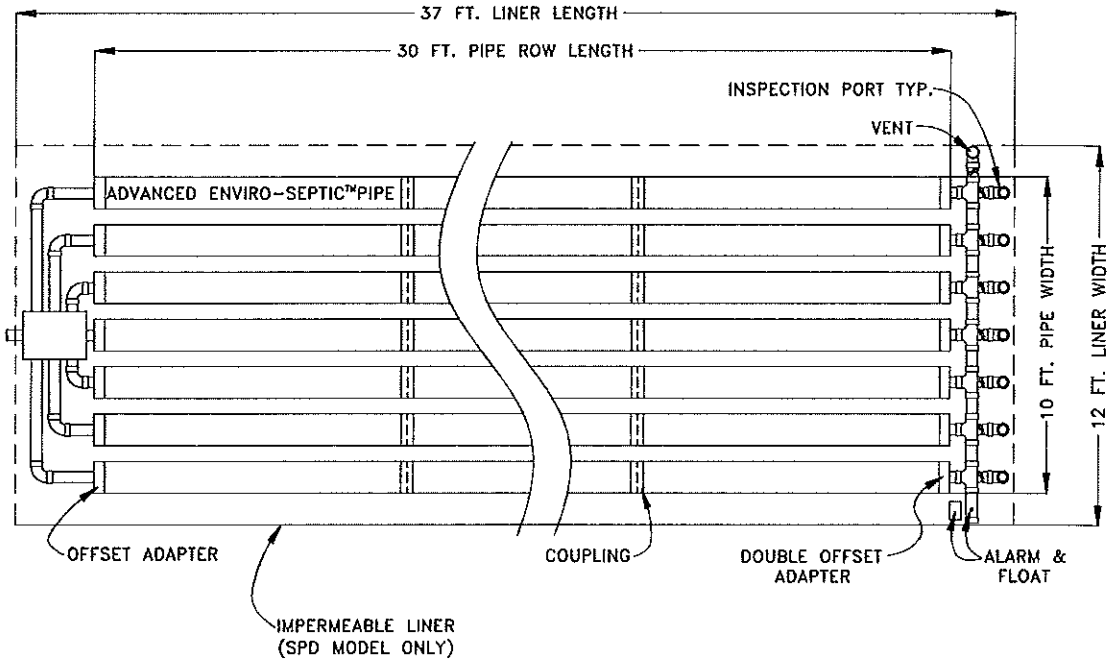
Completed by : _____ Signature: _____
(print) PEI Authorized Representative

Authorized Rep ID #: _____

NOTE: SYSTEM OWNER AND PEI TO RECEIVE A COPY OF COMPLETED INSPECTION REPORT
AUTHORIZED REPRESENTATIVE TO MAINTAIN ALL INSPECTION REPORTS

Appendix F

Model 450 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



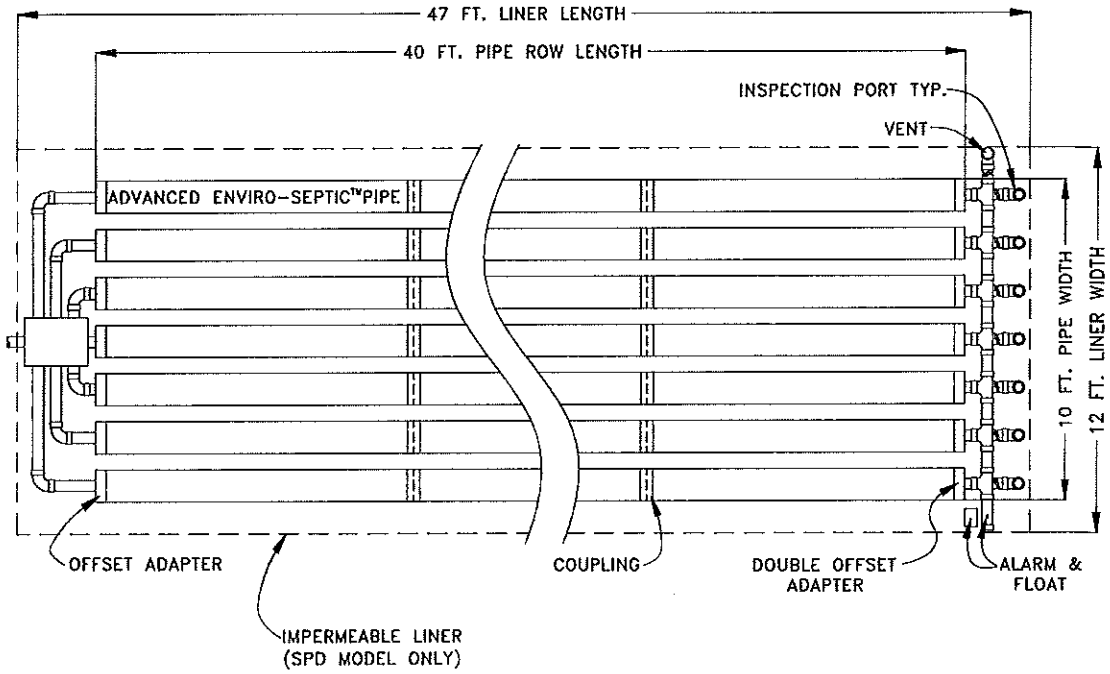
QTY	DESCRIPTION
210 FT.	ADVANCED ENVIRO-SEPTIC™PIPE
14	COUPLINGS
7	OFFSET ADAPTERS (DISTRIBUTION BOX END)
7	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

13	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
7	4 INCH PVC PLASTIC TEES
40± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 1,125 GAL. MIN.
7	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Appendix F

Model 600 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



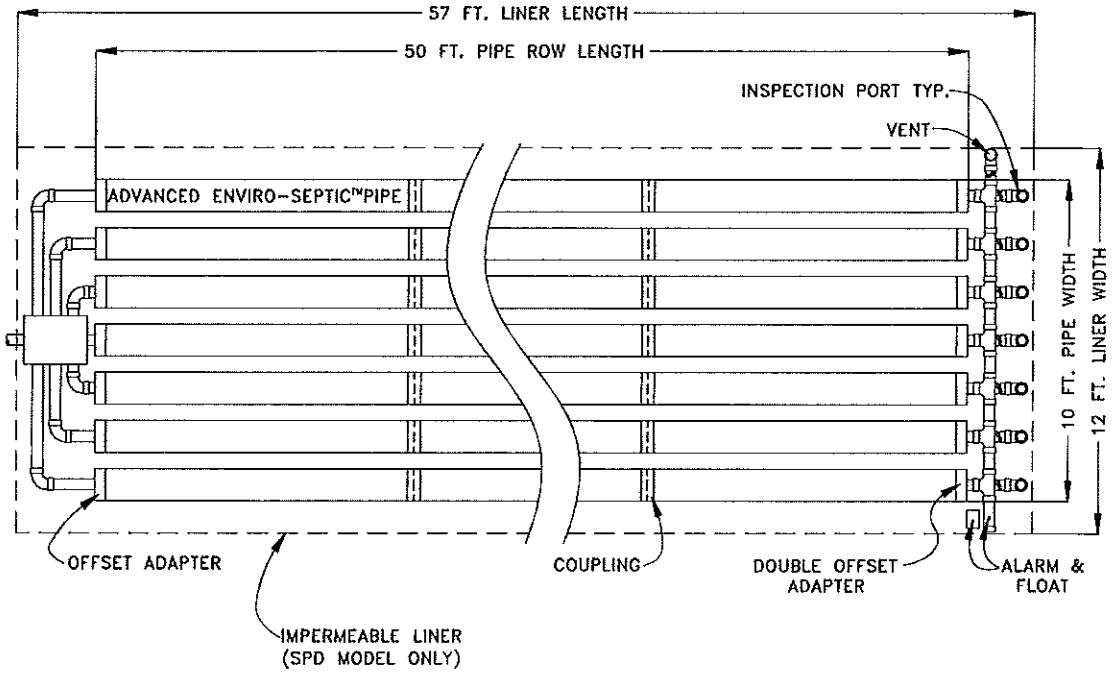
QTY	DESCRIPTION
280 FT.	ADVANCED ENVIRO-SEPTIC™PIPE
21	COUPLINGS
7	OFFSET ADAPTERS (DISTRIBUTION BOX END)
7	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

13	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
7	4 INCH PVC PLASTIC TEES
40± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 1,500 GAL. MIN.
7	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Appendix F

Model 750 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



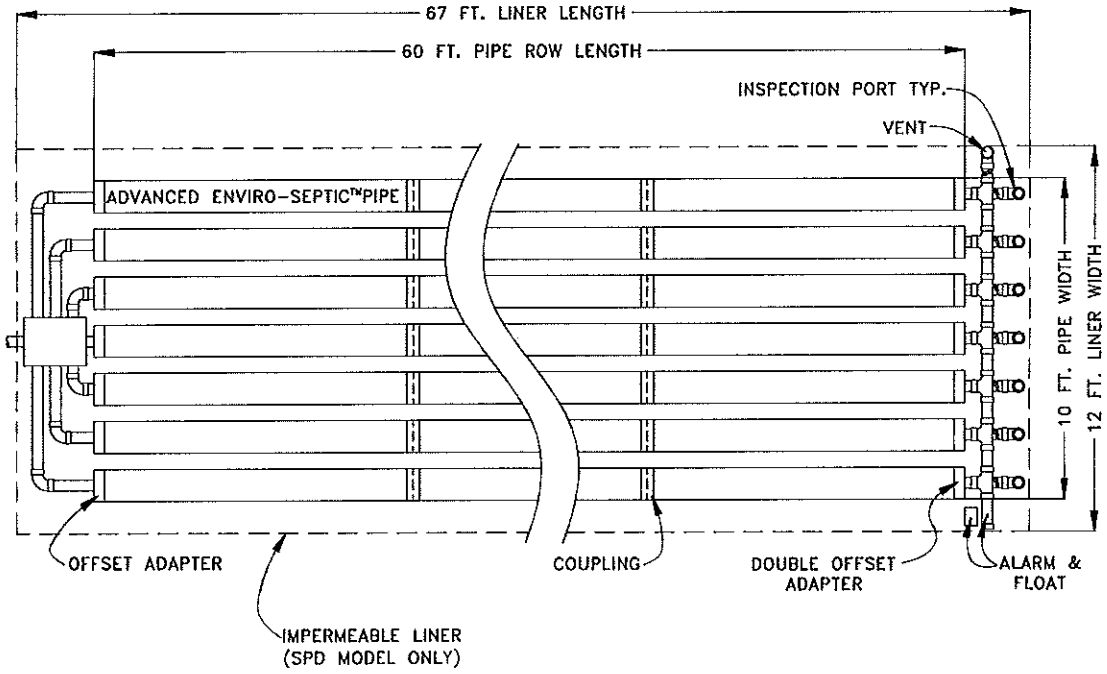
QTY	DESCRIPTION
350 FT.	ADVANCED ENVIRO-SEPTIC™PIPE
28	COUPLINGS
7	OFFSET ADAPTERS (DISTRIBUTION BOX END)
7	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

13	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
7	4 INCH PVC PLASTIC TEES
40± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 1,875 GAL. MIN.
7	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Appendix F

Model 900 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



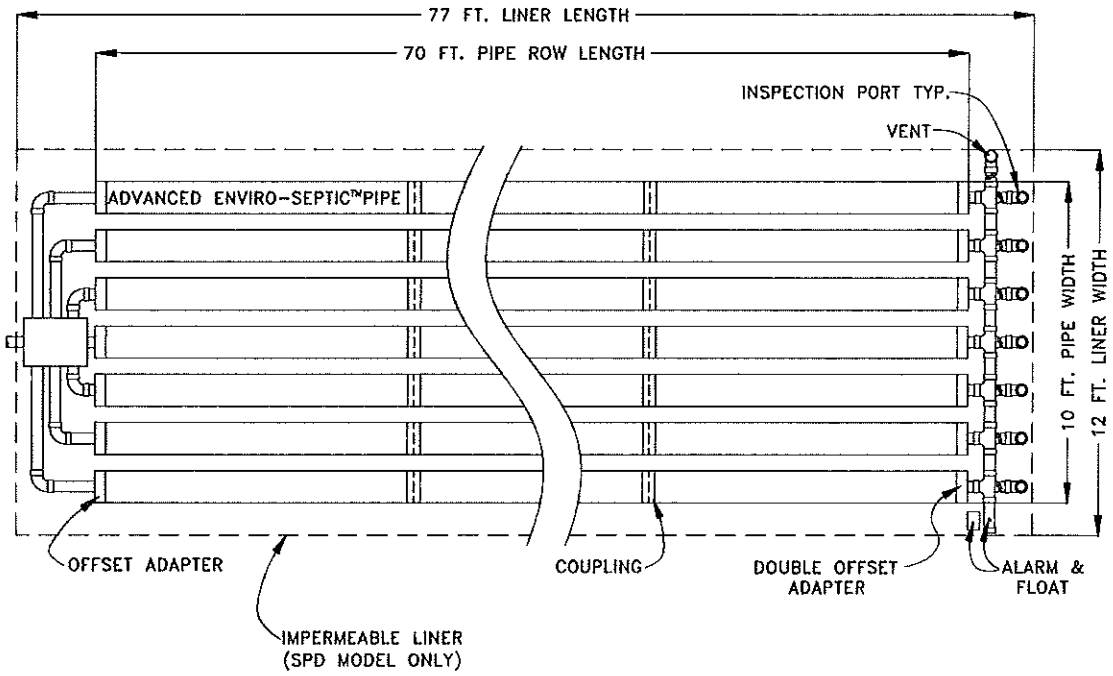
QTY	DESCRIPTION
420 FT.	ADVANCED ENVIRO-SEPTIC™ PIPE
35	COUPLINGS
7	OFFSET ADAPTERS (DISTRIBUTION BOX END)
7	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

13	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
7	4 INCH PVC PLASTIC TEES
40± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 2,250 GAL. MIN.
7	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Appendix F

Model 1050 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



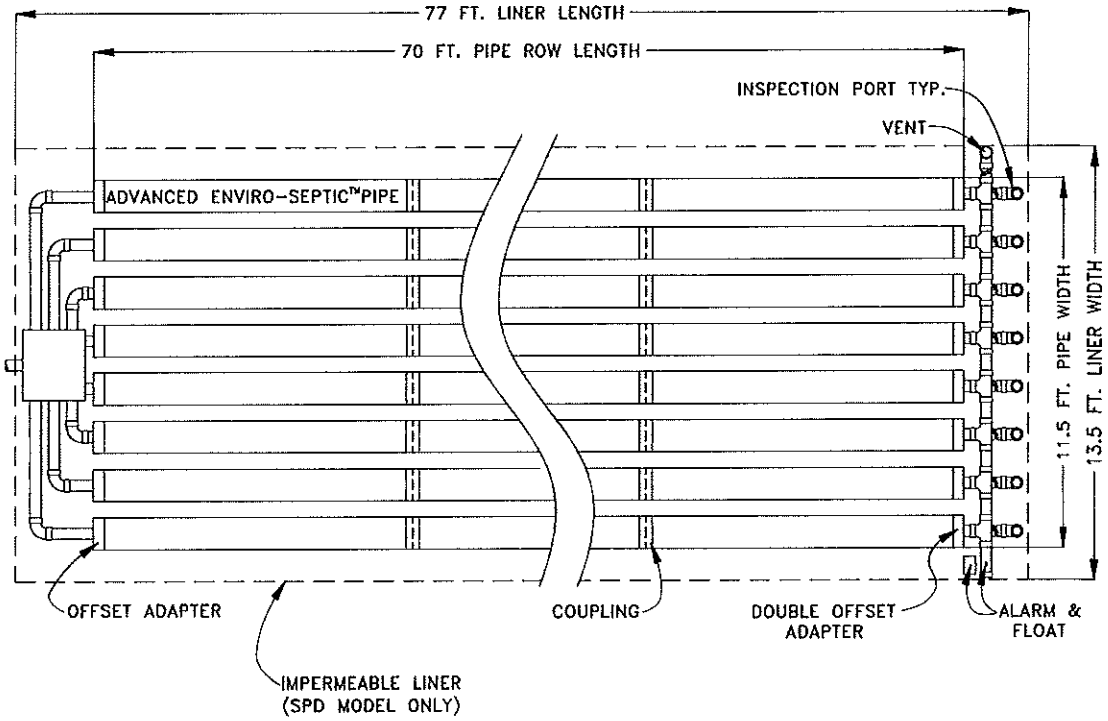
QTY	DESCRIPTION
490 FT.	ADVANCED ENVIRO-SEPTIC™PIPE
42	COUPLINGS
7	OFFSET ADAPTERS (DISTRIBUTION BOX END)
7	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

13	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
7	4 INCH PVC PLASTIC TEES
40± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 2,625 GAL. MIN.
7	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Appendix F

Model 1200 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



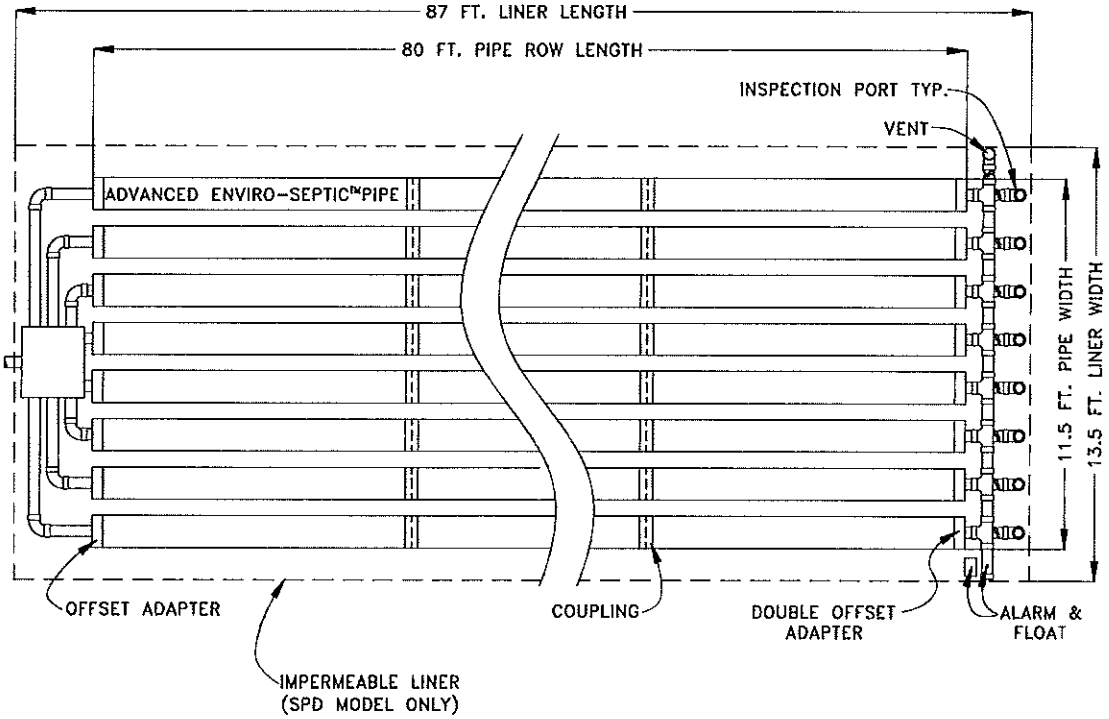
QTY	DESCRIPTION
560 FT.	ADVANCED ENVIRO-SEPTIC™PIPE
48	COUPLINGS
8	OFFSET ADAPTERS (DISTRIBUTION BOX END)
8	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

15	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
8	4 INCH PVC PLASTIC TEES
60± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 3,000 GAL. MIN.
8	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Appendix F

Model 1350 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



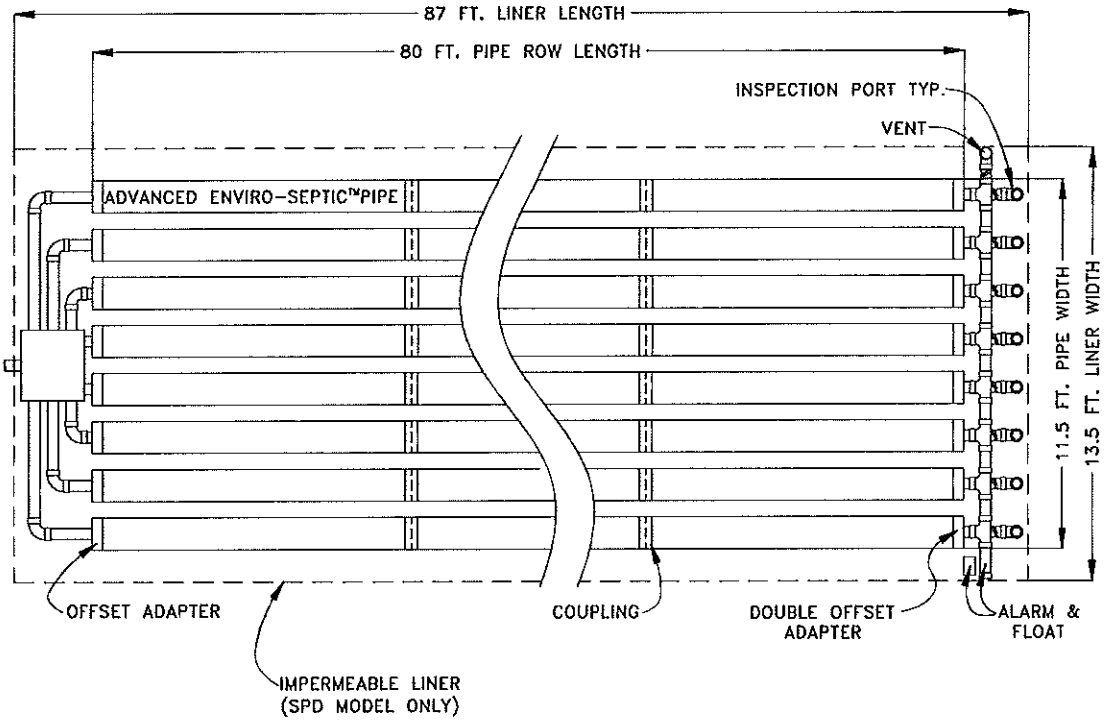
QTY	DESCRIPTION
640 FT.	ADVANCED ENVIRO-SEPTIC™ PIPE
56	COUPLINGS
8	OFFSET ADAPTERS (DISTRIBUTION BOX END)
8	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

15	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
8	4 INCH PVC PLASTIC TEES
60± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 3,375 GAL. MIN.
8	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Appendix F

Model 1500 SPD & CTD
Single point discharge (SPD)
Combined treatment & disposal (CTD)



QTY	DESCRIPTION
640 FT.	ADVANCED ENVIRO-SEPTIC™ PIPE
56	COUPLINGS
8	OFFSET ADAPTERS (DISTRIBUTION BOX END)
8	DOUBLE OFFSET ADAPTERS
1	IMPERMEABLE LINER (SPD MODEL ONLY)
1	POLYLOK ALARM AND FLOAT (MODEL #3014A)

ITEMS NOT INCLUDED IN KIT

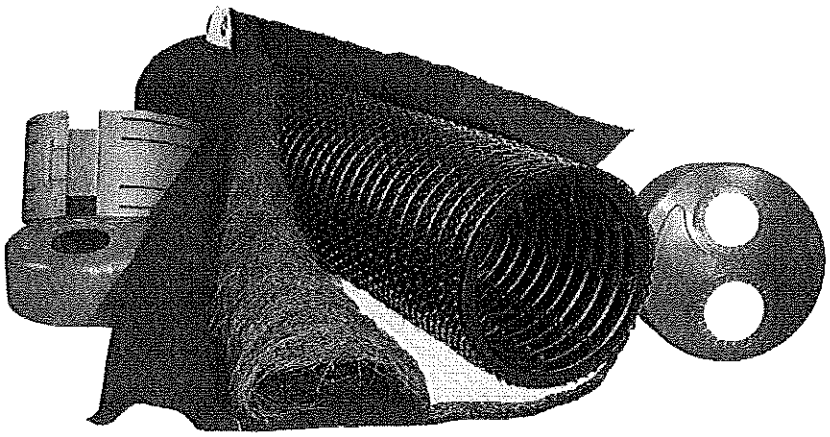
15	4 INCH 90 DEGREE PVC PLASTIC ELBOWS
8	4 INCH PVC PLASTIC TEES
60± FT.	4 INCH PVC PLASTIC PIPE
1	7 OUTLET DISTRIBUTION BOX
1	SEPTIC TANK 3,750 GAL. MIN.
8	THREADED PVC PLASTIC CAPS
5 FT.	4 INCH SCH. 40 PVC PLASTIC FOR VENT STACK
2	4 INCH SCH. 40 90 DEG. ELBOWS FOR VENT STACK

Advanced Enviro-Septic™ Treatment System

Owner's Manual

NSF/ANSI Standard 40 Class I Certified

Single Point Discharge (SPD) and Combined Treatment and Dispersal (CTD) Models



Presby Environmental, Inc.
The Next Generation of Wastewater Treatment

143 Airport Rd., Whitefield, NH 03598
Tel: 800-473-5298 Fax: (603) 837-9864
presbyenvironmental.com
info@presbyeco.com

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Dear System Owner:

Congratulations! You made a wise investment and an environmentally-responsible decision by selecting a state-of-the-art Advanced Enviro-Septic™ Treatment System. This system requires virtually no maintenance on the part of the homeowner; however, a basic understanding of how the system functions and what is needed to keep it in good working order will help ensure the reliable, trouble-free operation of your system, protecting your investment, your health and your environment.

This manual will familiarize you with simple steps to maximize the functioning of your system and prevent problems, as well as providing instructions for routine maintenance, inspection, troubleshooting and repair. Having accurate records will greatly assist your service provider in maintaining and evaluating your system. We encourage you to utilize the System Information and Maintenance Record section (found in the back of this manual) to record important information about your system and its maintenance history for ease of future reference.

If you ever have questions or need technical assistance of any kind, please contact us by phone at (800) 473-5298 or via email to info@presbyeco.com, or visit our website at www.presbyenvironmental.com.

Sincerely,

David W. Presby

President, Presby Environmental, Inc.
Inventor of Advanced Enviro-Septic™

Single Point Discharge Model Numbers:
SPD450, SPD600, SPD750, SPD900, SPD1050, SPD1200, SPD1350 and SPD1500

Combined Treatment & Dispersal (bottomless) Model Numbers:
CTD450, CTD600, CTD750, CTD900, CTD1050, CTD1200, CTD1350 and CTD1500

Advanced Enviro-Septic™ U.S. Patent Nos. 6,461,078; 5,954,451; 5,606,786; 6,899,359; 6,792,977 and 7,270,532, with other patents pending.
Canadian Patent Nos. 2,359,255; 2,365,453; 2,300,535; 2,185,087; 2,415,194; and 2,187,126 with other patents pending.
Enviro-Septic® is a registered trademark of Presby Environmental, Inc.
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Data Plate/Service Label as shown below can be found on the Electrical Control Box and near the High Water Alarm. Authorized Representative to complete the form below for ease of future reference.
Contact the Manufacturer's Authorized Representative identified on the Data Plate/Service Label or Presby Environmental, Inc. for service, inspection, parts or repairs:

Advanced Enviro-Septic™ Treatment System Service Data Plate
NSF Standard 40 Class I Certified

Manufacturer: **Presby Environmental, Inc.**
143 Airport Road
Whitefield, NH 03598
(800) 473-5298

Model Number: _____ Date of Installation: _____
Serial Number: _____
Rated Hydraulic Capacity: _____ Gallons per Day

Manufacturer's Authorized Representative:
Name_____
Address _____
_____
Telephone _____

To Obtain Service or Parts: Contact the Manufacturer's Representative above or Presby Environmental, Inc.

Introduction

Advanced Enviro-Septic™ Treatment System, Tested and Listed Under NSF/ANSI Standard 40, Class I: The Advanced Enviro-Septic™ Treatment System has been vigorously tested in compliance with NSF International's Standard-40 protocols and achieved treatment results that exceed NSF's Class I requirements. Advanced Enviro-Septic™ is distributed in the United States exclusively by Presby Environmental, Inc. ("PEI") and its Authorized Representatives.

Design Basis Data:

The Advanced Enviro-Septic™ Treatment System is designed to treat residential effluent that has received primary treatment in a septic tank. Expected characteristics of the effluent leaving the septic tank and entering the system are: 30 day average BOD_5 between 100 and 300 mg/L. and 30-day average TSS between 100 and 350 mg/L. In compliance with NSF Standard 40 Class I criteria, the expected quality of the effluent after treatment by Advanced Enviro-Septic™ is:

$CBOD_5$ 30 day average less than 25 mg/L., 7 day average less than 40 mg/L.
Total Suspended Solids (TSS) 30 day average less than 30 mg/L., 7 day average less than 45 mg/L.
pH range 6.0 to 9.0

Wastewater treated by the Advanced Enviro-Septic™ Treatment System is expected to be colorless, and no offensive odor, oily film, or foam should be detectable in a representative sample of treated effluent. Testing confirmed 96% removal of $CBOD_5$ and 98% removal of Total Suspended Solids (TSS).

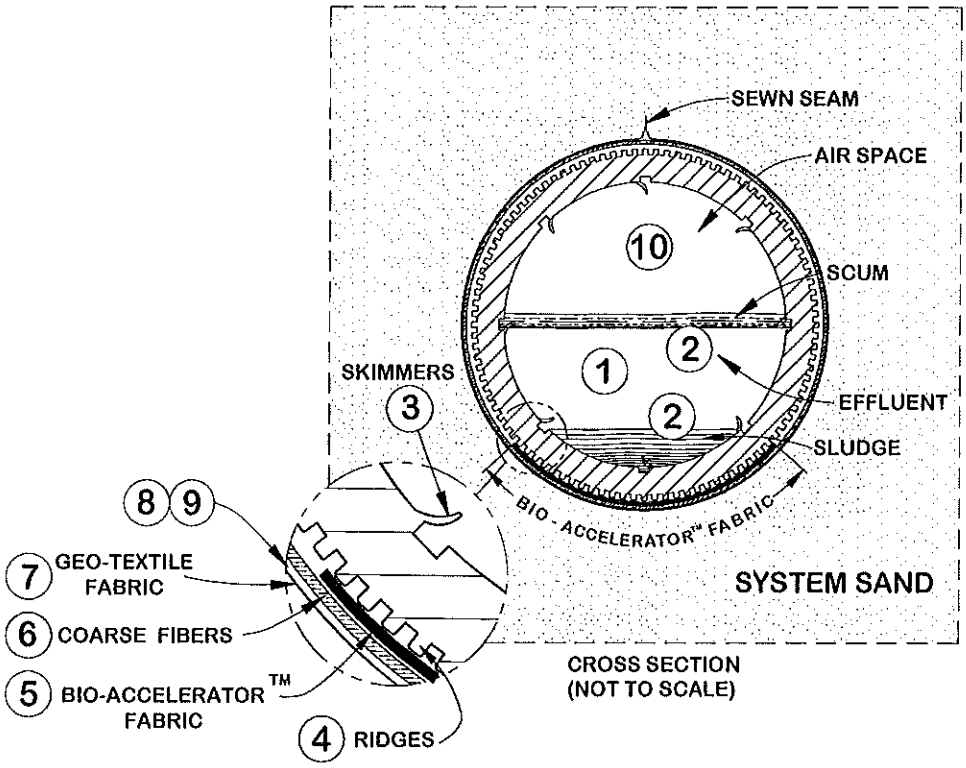
The amount of Advanced Enviro-Septic™ pipe used for each model is determined based on a loading rate of 9 Liters per day per foot of pipe (=2.4 gallons per day per foot of pipe). Our various models utilize loading rates from 2.10 to 2.34 gallons per day per foot of pipe. This loading rate provides for exceptional treatment and long-term system effectiveness. There is no need to ever remove accumulated solids from within the system; this small amount of organic matter is continually processed by bacterial activity inside the pipes due to sustained aerobic conditions. A minimal accumulation of non-biodegradable solids within the pipe is to be expected and does not adversely affect the system's performance. There is no media, filter, etc. to replace in the Advanced Enviro-Septic™ system; components are made from extremely durable, non-biodegradable plastic. The septic tank will require periodic removal of accumulated solids (see pp. 8-9 for recommended septic tank maintenance) and the electrical/mechanical devices included in the constructed system will also require periodic inspection and/or adjustment.

How does Advanced Enviro-Septic™ work?

The system consists of a high-density plastic pipe which is ridged and perforated with skimmer tabs extending inwardly from each perforation. A layer of geo-textile fabric (Bio-Accelerator™) partially surrounds the bottom of the pipe. A mat of coarse, randomly oriented plastic fibers surrounds the outside of the pipe, and another layer of geo-textile fabric surrounds the circumference and is stitched in place. The finished product is 12 in. in diameter. The multi-stage biomat develops on the protected receiving surfaces and provides optimal conditions for the bacterial processes that purify the wastewater. The patented Advanced Enviro-Septic™ pipe cools the liquid, separating and retaining the solids and grease inside the pipes. Perforations allow the liquid to pass through the pipes, while skimmer tabs retain solids within the pipe. Next the wastewater passes through the Bio-Accelerator™ geo-textile layer, then through the mat of fibers and finally through the outer layer of geo-textile fabric. The Advanced Enviro-Septic™ pipes are surrounded by a bed of specified System Sand, which facilitates the process by wicking the treated liquid out of the pipes and ensuring that the system receives sufficient oxygen to support a healthy population of bacteria. The treated wastewater percolates through the System Sand and is then collected for dispersal (SPD "single point discharge" Models) or released into the underlying soil (CTD "combined treatment and dispersal" [bottomless] Models).

ADVANCED ENVIRO-SEPTIC™ WASTEWATER TREATMENT SYSTEM

TEN STEPS OF WASTEWATER TREATMENT: ADVANCED ENVIRO-SEPTIC™TREATS EFFLUENT MORE EFFICIENTLY TO PROVIDE LONGER SYSTEM LIFE AND TO PROTECT THE ENVIRONMENT.



STAGE 1: WARM EFFLUENT ENTERS THE PIPE AND IS COOLED TO GROUND TEMPERATURE.

STAGE 2: SUSPENDED SOLIDS SEPARATE FROM THE COOLED LIQUID EFFLUENT.

STAGE 3: SKIMMERS FURTHER CAPTURE GREASE AND SUSPENDED SOLIDS FROM THE EXITING EFFLUENT.

STAGE 4: PIPE RIDGES ALLOW THE EFFLUENT TO FLOW UNINTERRUPTED AROUND THE CIRCUMFERENCE OF THE PIPE AND AID IN COOLING.

STAGE 5: BIO-ACCELERATOR™ FABRIC SCREENS ADDITIONAL SOLIDS FROM THE EFFLUENT AND DEVELOPS A BIOMAT WHICH PROVIDES TREATMENT AND ENSURES ACCELERATED BIOMAT DEVELOPMENT.

STAGE 6: A MAT OF COARSE RANDOM FIBERS SEPARATES MORE SUSPENDED SOLIDS FROM THE EFFLUENT.

STAGE 7: EFFLUENT PASSES INTO THE GEO-TEXTILE FABRICS AND GROWS A PROTECTED BACTERIAL SURFACE.

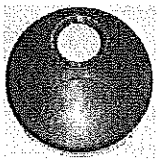
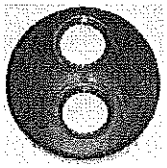
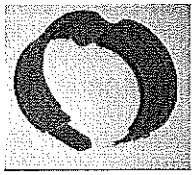
STAGE 8: SAND WICKS LIQUID FROM THE GEO-TEXTILE FABRICS AND ENABLES AIR TO TRANSFER TO THE BACTERIAL SURFACE.

STAGE 9: THE FABRICS AND FIBERS PROVIDE A LARGE BACTERIAL SURFACE TO BREAK DOWN SOLIDS.

STAGE 10: AN AMPLE AIR SUPPLY AND FLUCTUATING LIQUID LEVELS INCREASE BACTERIAL EFFICIENCY.

Advanced Enviro-Septic™ Components:

The primary Advanced Enviro-Septic™ components shown below are non-biodegradable, lightweight and extremely durable. Because of its superior treatment capabilities, the absorption area required for an Advanced Enviro-Septic™ system is a fraction of the size of what would be required for a traditional "pipe and stone" or "aggregate" leaching field. Advanced Enviro-Septic™, when used as intended, requires no maintenance by the homeowner other than scheduling the periodic pumping of the septic tank and minimal mechanical adjustments (if necessary) and inspections.

Advanced Enviro-Septic™ pipe		Advanced Enviro-Septic™ pipe is a ridged, perforated plastic pipe 10 ft. long, partially covered with Bio-Accelerator™ fabric, surrounded by a layer of randomly-oriented plastic fibers and wrapped with a non-woven geo-textile fabric. The finished product is 12 in. in diameter. The pipe is made using post-consumer recycled plastic. Proper alignment is with the Bio-Accelerator geo-textile fabric with its centerline in the 6 o'clock position.
Offset adapter		An offset adapter is an end cap with a 4 in. hole designed to accept a 4 in. inlet pipe on the end of the row closest to the d-box. The proper alignment of the offset adapter is with the hole in the 12 o'clock position.
Double offset adapter		A double offset adapter is used at the end of each row furthest from the d-box. The two 4 in. holes are used to connect the vent manifold and inspection ports to the pipes. Proper alignment is with the holes in the 12 o'clock and 6 o'clock positions; the top hole is used to connect the vent manifold, and the bottom hole is for installation of inspection ports.
Coupling		A coupling is used to connect two pipe lengths together to form rows. It features a snap-together locking tab that requires no tools or hardware.

Other Components

- Septic Tank and Distribution Box
- High Water Alarm
- Sampling Device
- System Sand
- Geo-Textile Membrane (SPD Models Only)
- Schedule 20 – 40 PVC Piping

Use and Care of Your Advanced Enviro-Septic™ Treatment System:

Start-Up Procedures:

The start-up procedure is quite simple—begin using your plumbing system. Advanced Enviro-Septic™ does not require any "starter" bacteria, additives or chemicals. Simply using the home's plumbing system will enable the system to begin to develop its bacteria populations and multi-stage biomat.

Importance of Water Conservation:

Systems are usually sized based on the quantity of daily flow that will be generated by the structure, which is usually calculated based on the number of bedrooms. Therefore, be aware of situations (additional occupants, addition of fixtures, etc.) which result in increased water usage, since this will require more frequent septic tank pumping. If the amount of wastewater entering is regularly more than the system is designed for, wastewater can back up into the house or the yard, creating a health hazard and a nuisance. Choosing the correct size system considering actual water usage is advisable.

A common sense approach to water conservation will maximize your system's effectiveness. A few suggestions for ways to minimize water consumption:

- Don't wash all your laundry on the same day, since this could potentially "flood" the system and interfere with the settling of solids. A single load of wash in a typical machine can use up to 62 gallons of water. Instead, distribute the wash loads throughout the week.
- Run your washing machine and dishwasher only when they have full loads.
- Careful selection of appliances and fixtures that use less water is another way to minimize the demands placed on your Advanced Enviro-Septic™ system. Look for the terms "Energy Star" or "high-efficiency" in the product's description. For example, an "Energy Star" washing machine uses one-half as much water as a traditional model.
- When you consider that 25-30% of total household wastewater is attributable to toilet use, it is easy to see that replacing a traditional toilet (5-7 gallons per flush) with a high efficiency toilet (1.6 gallons per flush) can conserve a considerable amount of water.
- Installing aeration devices on faucets and showerheads greatly reduces the amount of water used. A "low flow" showerhead reduces the water used in a ten minute shower from 50 gallons to 25 gallons. Multiply this by the number of showers per day, and the water conservation is significant.
- Leaks and drips within the plumbing system can waste a significant amount of water. Leaking fixtures could create a hydraulic overload for your wastewater treatment system and should be repaired immediately.

TIP: *An excellent resource for learning more about water conservation is available from the Environmental Protection Agency at www.epa.gov/owm/water-efficiency/index.htm*

What not to flush:

As described above, how often your septic tank needs to be pumped is dependant on the amount of solids that accumulate in the tank; minimizing solids (such as paper products and other waste) will reduce the frequency of septic tank pumping. In general, if an item isn't biodegradable, you should dispose of it in the trash rather than in your wastewater treatment system. Use toilet paper, etc., that states it is "septic safe."

Garbage Disposals:

The use of a garbage disposal (also called a "garbage grinder") creates a **tremendous** increase in the amount of solids in wastewater, resulting in the need for more frequent pumping (one to two years sooner than if no garbage disposal is used). While some of the kitchen waste from a garbage disposal will be broken down by bacterial action, some accumulates over time and will eventually have to be pumped out.

Hot Tubs:

Hot tubs use a tremendous amount of water, and some states require increases in the design flow of systems that include hot tubs. If the hot tub drains into the wastewater treatment system, the sudden influx of water stirs up the solids in the septic tank. In addition, the chemical additives sometimes used to disinfect the water in hot tubs are detrimental to the bacteria that are essential to the treatment process. Consult with your Authorized Representative about an alternate means of dispersal. If a hot tub does discharge into the wastewater treatment system, this additional hydraulic loading must be included when selecting the size model to be installed for a particular residence (add 150 gpd hydraulic capacity, select next model size up).

Water Softeners and Water Purifiers:

Water purification systems and water softeners pump hundreds of gallons of water into the septic tank, causing agitation of solids and excess flow to the system if it is not designed to handle this additional hydraulic loading. Consult with your Authorized Representative to pursue alternative means to disperse the discharges from these appliances if possible. Also consult state regulations, since some states prohibit backwash from these appliances from being discharged into a wastewater treatment system. If a water softener or purifier does discharge into the wastewater treatment system, this discharge must be included when calculating the hydraulic capacity in order to select the appropriate model.

Other substances detrimental to wastewater treatment systems:

A wastewater treatment system is a living collection of bacterial organisms, and the introduction of toxins and chemicals can kill the bacteria that are essential to the treatment process. If it is impossible to avoid the use of any of the following substances, use care to introduce them a little at a time so their concentration is diluted and the system can neutralize them gradually.

Cleaning Products: The wastewater treatment system's bacteria should recover quickly after small amounts of household cleaning products enter the system, but using excessive amounts of such substances constitutes system abuse. Some cleaning products are less toxic to your system than others. If the product states "Danger" or "Poison" on its label, it is highly hazardous, "Warning" indicates it is moderately hazardous, and "Caution" indicates the product is slightly hazardous. If possible, utilize liquid detergents that have little or no phosphates, that are "low-sudsing" or which are biodegradable. There are many cleaning products on the market today that utilize natural ingredients, such as citrus, instead of caustic chemicals. With all cleaning products, use the minimum amount necessary, which is often less than the amount the manufacturer recommends.

Cleaning products especially harmful to bacteria, use only in moderation:

- bleach
- chlorine
- ammonia
- anti-bacterial soaps
- disinfectants

Medications: Some people dispose of medications by flushing them down the toilet. Certain medications, particularly antibiotics, can have adverse effects on the wastewater treatment system's bacteria. Dispose of medications in the trash and not in your wastewater treatment system.

Chemicals and Toxic Substances: The following substances are harmful to the bacterial organisms in your wastewater treatment system and introducing them constitutes system abuse. These substances can not only have an adverse effect on your system, they can also result in groundwater contamination. Check with your local sanitation department for proper disposal procedures for:

- Fertilizers
- Root killers or other products with copper sulfate
- Poisons or pesticides
- Drain cleaners
- Oven cleaners or other lye-based products
- Degreasers
- Photographic processing chemicals
- Petroleum products of any kind
- Latex paint, oil paint, stains, thinners and solvents
- Antifreeze
- Chlorinated water from swimming pools or hot tubs

Grease and Cooking Oil: Grease may harden in the septic tank's scum layer and result in a blockage of the inlet or outlet. Whenever possible, it is preferable to dispose of waste grease and oil in the trash.

Care of system during periods of intermittent or non-use: The Advanced Enviro-Septic™ system does not require any special maintenance before, during or after periods of non-use. While the multi-stage biomat may partially "die off" while not in use, it will quickly "re-grow" once the system is put back into operation. Screens can be installed in vent inlets to prevent animals from nesting in the vent stack.

Use of Septic "Additives": The use of additives is not recommended by Presby Environmental, Inc. Products that claim to "boost" bacteria populations or "speed up" digestion of solids are not needed and may even be detrimental to a wastewater treatment system. The system does not require any such additives, chemicals or bacteria.

Maintenance Procedures and Schedule

Obtaining Service or Parts:

Only a Presby Environmental, Inc. Authorized Representative can install an Advanced Enviro-Septic™ Treatment System and provide included service during the initial 2-year period. If you do not know who installed your system, refer to the Data Plate/Service Label (on the electrical control box and near the high water alarm) which will include the Authorized Representative's name and contact information. Our Authorized Representatives also maintain a supply of replacement parts. For referral to an Authorized Representative in your area, contact us at (800) 473-5298, visit our website, www.presbyenvironmental.com, or send an email to info@presbyeco.com.

Initial Two Year Service Policy:

Four routine inspections (one every six months) are provided under the Initial Service Policy which is included in the purchase price of an Advanced Enviro-Septic™ system (see p. 20). These inspections and service are provided by our Authorized Representatives only. During these inspections, a visual and olfactory assessment of the treated effluent will be conducted and all components will be inspected, adjusted and serviced (if necessary). The system owner will be notified in writing of any improper system operations that cannot be remedied at the time of inspection. Please note that an extended service policy is available for purchase; contact Presby Environmental for more details.

Routine Inspection and Pumping Frequency after Initial Two Years:

Since it is difficult to predict with precision how often a particular system's tank will require pumping, Presby Environmental, Inc., recommends that a service professional inspect the system at least once every two years, **even if there are no indications of a problem**, in order to access the need for tank pumping and to confirm that the system's components are in good working order. See details below regarding the procedures included in performing a routine inspection.

Periodic Pumping of the Septic Tank:

The Advanced Enviro-Septic™Treatment System requires virtually no maintenance other than the need to remove the accumulated solids from the attached septic tank. Solid waste accumulates in the tank over time and eventually needs to be removed. Pumping is required approximately every 2 to 5 years for a typical residence with a properly sized system; however, there are many factors which determine how often a particular system's septic tank needs to be emptied, including:

- The number of occupants;
- The amount of wastewater generated;
- The volume of solids in the waste;
- The size of the septic tank.

(Refer to Use & Care, p. 4 for information about how to conserve water and minimize the accumulation of solids in your septic tank.)

As a general rule, the septic tank should be pumped when the surface scum and bottom sludge occupy one-fourth or more of the septic tank's liquid depth. If a plastic septic tank is used, and pumping is being performed at a time of year (typically spring) when the ground water table is high enough to exert hydrostatic pressure against the tank, measures should be taken to prevent the tank from "floating." One method of preventing floating is to fill the septic tank with water immediately after pumping, and the weight of the water will hold the tank in place. Presby Environmental recommends assessing the need for septic tank pumping once every two years.

Use of Additives:

There are a variety of additives on the market which claim to breakdown sludge or boost the bacteria population so that the septic tank will need to be pumped less frequently. These claims are largely unsupported, and therefore Presby Environmental, Inc. does not recommend the use of septic system additives of any kind. The bacteria needed for effective treatment are naturally present in wastewater and there is no need to use any chemicals, enzymes, yeast, cleaners, solvents or other additives with an Advanced Enviro-Septic™ System. Some of these "treatments" can actually have a detrimental effect on the system, and some states have even banned their use.

Maintenance Procedures and Schedule (to be performed by an Authorized Representative or trained service provider:

Initial Two-Year Service Policy	• The Initial Two-Year Service Policy is included in the purchase of an Advanced Enviro-Septic™ Treatment System. See p. 20. • This consists of four (4) system inspections by the Authorized Representative, one every 6 months following the date of installation. • Electrical, mechanical and other components are inspected, adjusted and serviced if necessary. • An effluent sample will be obtained and visually inspected for color, turbidity, oil, foam and scum overflow; an olfactory assessment of odor is also performed. • Owner will be notified in writing of any improper system operations that cannot be remedied at the time of inspection, and an estimated date of correction. • An extended service policy is available for purchase after the initial two years; contact PEI or your Authorized Representative for more information and pricing.
System maintenance/ Pumping of the Septic Tank	• Inspect the septic tank at least once every two years under normal usage and assess the need for pumping. Pump the tank when surface scum and bottom sludge occupy one-fourth or more of the liquid depth of the tank. • If a garbage disposal is used, the septic tank will likely require more frequent pumping. • After pumping, inspect the septic tank for integrity to ensure that no groundwater is entering it. Also check for evidence of leaking fixtures (water entering tank when no water is being used in the residence). • Check the integrity of the tank inlet and outlet baffles and clean, repair or replace if necessary. • Effluent filters are not recommended because of their tendency to clog and cut off oxygen to the system. If a filter is required due to state or local regulations, the filter selected must allow oxygen to flow freely. Follow filter manufacturer's maintenance instructions and inspect and clean filters frequently.
Distribution Box	• Remove any accumulated solids from the d-box. • Check for level and adjust if necessary. • Adjust flow equalizers as needed. • Re-seal any access covers removed during servicing.

Maintenance Procedures and Schedule, Continued

Alarm	• Test the High Water Alarm at least annually. • Lift the float approximately 1 vertical inch to activate alarm. • Confirm that both the audible and visual alarms are functioning properly (discernable from a distance of 50 ft.). • Return float to original position.
Venting	• Confirm all vents are in place. • Ensure that vent openings are unobstructed by leaves, animal activity, etc. • Install screen over vent opening to prevent animal activity. • Perform draft test if necessary.
Treatment Field	• No trees or deep rooted vegetation to be planted within 10 ft. • No heavy motorized or foot traffic. • No added hydraulic load to treatment field (i.e., no ground or surface water, irrigation systems, gutter systems, floor drains, sump pumps, etc. discharging in area of treatment field). • Final grading above system diverts surface water away from treatment field. • No gardens for human consumption. • Check for any odor or surface ponding.

Inspection & Sampling Procedures

Routine Inspection of System:

Note: These procedures are to be performed by properly trained technicians with appropriate safety equipment. During the first two years of system operation, these services are provided by Authorized Representatives only as part of the included Initial Two-Year Service Policy. See p. 20.

Evaluate the integrity of the septic tank and its components (connecting pipes, inlet and outlet baffles, lids and risers, distribution box, filters, pumps, etc.): It is especially important that your service provider confirms the structural integrity of the septic tank and all seals; if the tank is not watertight, water can leak both in and out of it.

Inspect vents: The service provider should also verify that the vents are in place and free of obstructions, since the flow of air to the Advanced Enviro-Septic™ system is crucial to its functioning. A "draft test" may be conducted to confirm that vents are functioning properly. DO NOT remove the vent, as this will shut off the oxygen to the Advanced Enviro-Septic™ System and could result in system malfunction. Refer to our website, www.presbyenvironmental.com for some ingenious ways to conceal unsightly vents.

Sample and analyze the treated wastewater: Routine maintenance during the initial two-year period includes obtaining a sample of the treated wastewater for visual and olfactory analysis by the inspector. In addition, analysis by a laboratory may be performed to confirm that the liquid being discharged into the ground has been sufficiently purified. State regulations vary and sampling and analysis after the initial two-year period may or may not be required for your system. See Inspection and Sampling Procedures, below, for more detail.

NOTE: Refer to the back of this manual for a System Information and Maintenance section where you can keep a record of your system's routine maintenance, inspections and service.

General Safety Considerations:

- Septic tanks contain toxic gases including methane; exposure to these fumes can be fatal within minutes and the gases are highly explosive. Only a trained professional with the proper gear and equipment should attempt to service a septic tank.
- Effluent can contain dangerous viral and bacterial hazards; care should be taken to avoid any contact with effluent. If contact is unavoidable, wash immediately and thoroughly with anti-bacterial soap.
- Secure excavated areas and exposed tank covers, and do not leave an exposed tank unattended. Falling into a septic tank is likely to be fatal, and extreme care should be taken at all times.

Step-by-Step Inspection and Sampling Procedures:

Safety Precautions	• Perform inspection procedures and collect all samples taking care to prevent contact with effluent; only a properly trained professional should perform these procedures. • Use proper safety equipment, including gloves and eye protection. • Use care and make sure to clean thoroughly any tools or equipment used.
System Owner Interview	• Confirm septic tank pumping schedule is being followed. • Inquire about any unusual or problematic issues experienced (fixtures backing up or sluggish, high water alarm incidents, odor, etc.) • Confirm that system owner has reviewed the Operating Manual. • Review use and care recommendations with system owner. • System owner to perform visual inspection of the treatment field (as set forth below) on a monthly basis.
Inspection of Treatment Field **TO BE PERFORMED BY OWNER ON A MONTHLY BASIS**	• Confirm no ponding/surfacing of effluent on ground surface. • Confirm no offensive odor detectable in the system area. • Confirm treatment field is not being subjected to hydraulic loading from surface or ground water flows, irrigation systems, gutter systems, floor drains, etc. • Confirm no trees or plants within 10 ft. of treatment field. • Confirm system vents are in place and unobstructed, repair/replace if needed. • Observe water level within pipes via the Inspection Port. When the system is operating as expected, the liquid within the pipes will range from 0 to 10 in. depth and will fluctuate based on water use.
Mechanical Inspection	• Inspect, adjust and/or service the High Water Alarm as needed. • Activate alarm by lifting float approximately 1 vertical inch. • Confirm proper operation: visual alarm and audio alarm to be detectable from a distance of up to 50 ft. • Inspect, adjust and/or service the Sump (SPD models only).
Septic Tank Inspection	• Inspect accumulated solids in tank and assess need for pumping; pump if required. • Inspect tank for structural integrity. • Inspect baffles and confirm they are clean and in place. • Inspect d-box and remove solids, adjust flow equalizers and check for level.

Step-by-Step Inspection & Sampling Procedures, Continued

Sample Handling Guidelines	• Label sample bottle with site address, owner's name, time and date of collection. • Remove cap from sampling device access port (CTD Models) or sump (SPD Models) and extract effluent sample. Replace locking cap on access port. • Do not remove cap from sample bottle until ready to use; do not touch or allow contaminants to contact the rim or mouth of the bottle. If there is any possibility that the sample has been contaminated, discard and obtain a new sample. • Fill the bottle with effluent sample leaving ample air space (at least an inch) to facilitate mixing (if submitting for lab analysis). • Immediately re-cap the sample bottle and pack in ice for transport (if submitting sample for lab analysis). • Follow lab's sample handling instructions and chain of custody procedures. • Carefully wash hands and all tools after obtaining effluent sample.
Visual Inspection of Effluent Sample	• Visual inspection of effluent sample to be performed on-site immediately after obtaining sample. • Assess color – There should be no discernable color. • Assess turbidity – There should be no visible suspended particles or sediment. • Assess scum overflow – There should be no oily film or foaming. • Make detailed notes documenting visual inspection of sample for the file, including date, time, name and address of person performing assessment, and detailed notes of observations.
Olfactory Assessment of Odor	• Olfactory assessment for odor to be performed on-site immediately after obtaining sample. • The sample should not produce an offensive odor. • Make detailed notes documenting olfactory assessment for odor for the file, including date, time, name and address of person(s) performing assessment, and detailed notes of observations.
Inspection/ Sampling Report Requirements	• Copy of report to be provided to system owner, Presby Environmental, and state/local approving authority (if required). Authorized Representative to maintain original with other system documentation. • System owner to be notified in writing of any improper system operations discovered which could not be remedied at the time of inspection, including an estimated date of correction.
Repair or Replacement Parts	• Contact the Authorized Representative identified on the Data Plate/Service Label for any necessary repairs or replacements parts. • Emergency service is available within 48 hours of request. • If you have any difficulty reaching the Authorized Rep., please call Presby Environmental, Inc. directly at (800) 473-5298 for assistance. • Only Authorized Reps. may service the system during its initial two years in operation. See included Two-Year Service Policy, p. 20. • Authorized Representative maintains a supply of replacement parts and can assist you with Warranty claims.

Causes & Indicators of System Malfunction

What is "system malfunction"?

The term "system malfunction" refers to any situation in which the system has stopped operating as expected. One of the unique advantages of the Advanced Enviro-Septic™ Treatment System is that in many cases it is possible to restore the system to proper functioning through the process of "Rejuvenation," which returns the system's bacteria to an aerobic state.

What can cause system malfunction?

- Continuous volume of wastewater in excess of design flow.
- System flooded with excessive volumes of wastewater which agitates sludge in the septic tank and sends solids into the Advanced Enviro-Septic™ system.
- System flooded by hydraulic overload from surface or ground water.
- Lack of oxygen due to vent obstructions, plumbing problems, etc.
- Failure to periodically pump the septic tank.
- System components clogged by excessive amounts of grease.
- Excessive use of chemicals, medications, toxic substances, cleaning products, etc.
- Excessive volume of solids and/or non-biodegradable materials in the wastewater.
- Damage to or leaks in any of the system components.

What are the symptoms of system malfunction?

- A foul odor in the absorption area.
- Ponding or surfacing of wastewater at the ground surface.
- Backing up of wastewater inside the structure (sluggish drains or toilets slow to flush).
- Activation of the high water alarm.

Contact your service provider identified on the Data Plate/Service Label attached to the electrical control box and near the high water alarm IMMEDIATELY if you observe symptoms of system malfunction. Emergency Service is available within 48 hours of request.

You may also call Presby Environmental, Inc. directly at 800-473-5298 and we will provide technical assistance and trouble-shooting. No matter what the problem may be, the sooner it is addressed the easier it will be to correct or repair.

ADVANCED ENVIRO-SEPTIC™ SYSTEM MALFUNCTION TROUBLESHOOTING GUIDE		
Problem	**Possible Cause(s)**	**Action to take**
High Water Alarm activated	System malfunction, hydraulic overload or mechanical malfunction	Restrict water use as much as possible and contact Authorized Rep.
Wastewater backup into plumbing fixtures (sluggish drains or slow flushing toilets)	Sewage line to septic tank clogged	Contact your service provider. Use a plumbing "snake" to remove the clog. Do not use caustic chemical drain cleaners.
	Sewage line damaged or invaded by roots	Contact service provider to replace sewage line from house to septic tank
	Too many accumulated solids in the septic tank	Contact service provider; have septic tank pumped
	Damaged or missing inlet or outlet baffles	Contact service provider to repair/replace baffle(s)
	D-Box plugged	Contact service provider to clean out D-Box
	D-Box out of level	Contact service provider to adjust flow equalizers
	Connecting pipe from septic tank to Advanced Enviro-Septic™ system damaged or invaded by roots	Contact service provider to replace connecting pipe (reminder: plant no trees or deep rooted vegetation within 10 ft. of the system)
Foul odor detected	System overload or malfunction	Restrict water use as much as possible and contact Authorized Representative
	Ventilation malfunction	
Ponding or pooling of wastewater on ground surface	System overload or malfunction	Restrict water use as much as possible and contact Authorized Representative
No draft through venting system	Vents damaged, missing or plugged; improper plumbing configurations	Contact Authorized Rep. to repair/replace vents as needed
Visual Inspection of Treated Effluent Sample	Color, sediment, suspended solids, foam or oil detected	Contact PEI for technical assistance
Olfactory Analysis of Treated Effluent Sample	Foul or objectionable odor detected	Contact PEI for technical assistance

Rejuvenation & Repair

What is the difference between "aerobic" and "anaerobic" bacteria?

The bacterial processes that provide treatment of wastewater are performed most effectively by "aerobic" bacteria (bacteria that require oxygen). When a system malfunctions, it is most often due to a lack of oxygen, which results in the bacteria being converted to an "anaerobic" state (bacteria that exist without oxygen). These anaerobic bacteria are severely limited in their ability to effectively treat the contaminants in wastewater, and their waste products produce a thick, slimy "biomat" that clogs the system. When the system has become anaerobic, the System Sand around the pipes normally turns a blackish color. In an Advanced Enviro-Septic™ system, this can be corrected through a quick and simple procedure known as "Rejuvenation."

What is "Rejuvenation"?

"Rejuvenation" is a procedure for returning the system's bacteria to its intended aerobic state. This feature is unique to the Advanced Enviro-Septic™ System, and could save thousands of dollars compared to the expense of replacing a failed system. The procedure is relatively simple and takes only a few days. Consult your Authorized Representative or Presby Environmental, Inc. for more details.

NOTE: While preparing to perform the rejuvenation procedure, it is helpful to have your septic tank pumped since this will provide a few day's worth of wastewater storage.

Procedures for Rejuvenation (to be performed only by Authorized Representatives):

Step 1: Determine and correct the problem causing the anaerobic conditions. (See preceding section of this manual for possible causes of system malfunction.)

Step 2: Excavate the end of all lines furthest from the d-box and remove the double offset adapter(s) in order to drain the system.

Step 3: Safeguard the open excavation and guarantee passage of air through the system. If possible, attempt to perform procedure when it is not precipitating.

Step 4: Allow all lines to dry for a minimum of 72 hours. When the system has successfully been converted back to an aerobic state, the System Sand will return to nearly its original color.

Step 5: Reassemble the system to its original design configuration.

Components Reusable and Replaceable:

Advanced Enviro-Septic™ components are non-biodegradable and highly durable. If any components are discovered to be damaged, the individual component can be replaced easily. All parts snap together or are joined by couplings; there are no tools or hardware required. Our Authorized Representatives maintain a supply of replacement parts.

System Information & Maintenance Records

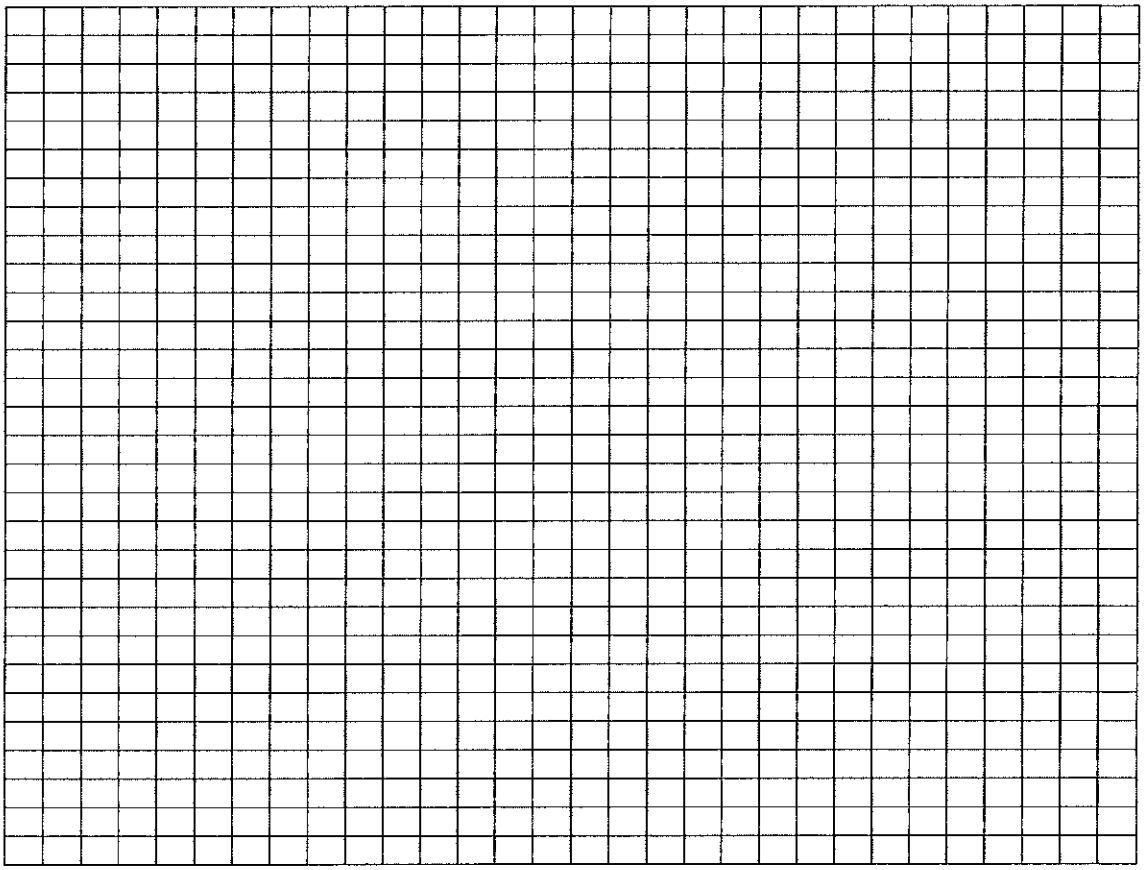
Date of Installation	
Model Number (Refer to Data Plate/Service Label)	
Copy of Plan available?	Yes No Note: If "No" sketch plan on next page
Authorized Rep. Name & Company (Refer to Data Plate/Service Label)	
Address & Telephone (Refer to Data Plate/Service Label)	

Site Information:

Owner(s)	
Street Address	
Town / State	
Map/Lot	
Municipal Contact Name & Telephone	
Permit Number	
Water Supply	Public Private
If private, Well Info.	
Proximities to bodies of water, wetlands, etc.	

Diagram System Location:

Indicate location of structure, septic tank & access hatch, absorption area, vents, wells, restrictive features (pavement, swimming pools, foundations, surface water, property lines, etc.)



System Maintenance and Service Record		
DATE:	**PERFORMED BY:**	**DESCRIPTION OF SERVICE:**
		Six-month Inspection
		Twelve-month Inspection
		Eighteen-month Inspection
		Twenty-four month Inspection

ADVANCED ENVIRO-SEPTIC™ TREATMENT SYSTEM
LIMITED WARRANTY

Presby Environmental, Inc. ("manufacturer") warrants the parts in each Advanced Enviro-Septic™ Treatment System to be free from defects in materials and workmanship for a period of two (2) years from the date of installation when used to treat residential wastewater from a single family dwelling only. The manufacturer's sole obligation under this Warranty is to repair or replace any component that shows evidence of defects, provided said component has been paid for and is returned through an Authorized Representative, transportation prepaid. The system owner ("warrantee") is required to give written notice specifying the nature of the claimed defect to the authorized representative indicated on the system Data Plate/Service Label and to the manufacturer at the following address:

Presby Environmental, Inc.
Warranty Department
143 Airport Road
Whitefield, NH 03598

Written notice of claimed defect must be postmarked within two (2) years of the date of initial system installation. This warranty is a Limited Warranty and no claim of any nature shall be made against manufacturer unless and until the owner, or his legal representative, notifies manufacturer in writing of the defect complained of and delivers the product and/or defective parts, freight prepaid, to the manufacturer's Authorized Representative.

No warranty is made as to the adequacy of work performed by third-parties. The warranty does not cover treatment systems that have been damaged due to flooding by external means, or that have been disassembled by unauthorized persons, improperly installed, subjected to external damage or damage due to altered or improper wiring or overload protection, or for any failure to obtain required permits or authorization to build. This Limited Warranty applies only to the components manufactured and/or supplied by Presby Environmental, Inc. and does not include any portion of the household plumbing, drainage system, electrical wiring, septic tank, pump tank or other components or accessories. System components supplied by the manufacturer but manufactured by others are warranted to be free of defects in materials and workmanship for a period of two (2) years from the date of installation. In no event shall manufacturer be responsible for delay or damages of any kind or character resulting from, or caused directly or indirectly by, defective components or materials manufactured by others, and the manufacturer's sole obligation is repair or replacement of defective components.

This Limited Warranty extends to the "owner" of the product and is transferable during the first two (2) years after date of installation. As used herein, "owner" is defined as the purchaser of the system or the subsequent owner during the first two (2) years after the system's initial installation. It is the original owner's obligation to make known to the subsequent owner(s) the terms and conditions of this Limited Warranty, and it is the new owner's obligation to contact the Authorized Representative or Manufacturer in order to provide documentation of change of ownership.

Manufacturer reserves the right to revise, change, or modify the construction and design of its wastewater treatment system, or any component or parts thereof, without incurring any obligation to make such changes or modifications to systems previously sold. Manufacturer also reserves the right, in making replacements of component parts under this warranty, to furnish a component part which, in its judgment, is equivalent to the part replaced.

Under no circumstances will the manufacturer be responsible to the Warrantee for any other incidental or consequential damages, including but not limited to lost profits, lost income, labor changes, delays in production and/or idle production, which damages are caused by a defect in material and/or workmanship in its product or parts. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty is expressly in lieu of any other express or implied warranty, including any warranty of merchantability or fitness for a particular purpose. There is no informal dispute resolution available under this Limited Warranty. This warranty gives you special legal rights and you may have other rights, which vary from state to state.

INITIAL TWO-YEAR SERVICE POLICY

All Advanced Enviro-Septic™ Treatment Systems with NSF Class I Certification include a two-year initial service contract which is included in the system's purchase price.

Only a Presby Environmental, Inc. Authorized Representative may provide system inspection, sampling, service and repair during the first two years after installation.

The Initial Two-Year Service Policy includes:

- Four routine inspections (one every six months)
- A visual analysis of a sample of treated effluent to assess color, turbidity, oil, and foam
- An olfactory assessment of the treated effluent for offensive odor
- All components will be inspected, adjusted and serviced.

The system owner will be notified in writing of any improper system operations that cannot be remedied at the time of inspection.

Emergency service calls are available within 48 hours of system owner's request for assistance.

The Authorized Representative will have a supply of replacement parts available for installation in the event that a component requires off-site repairs.

An extended service policy is available for purchase; contact Presby Environmental for more details.

Refer to the Data Plate / Service Label which contains the name, address and telephone number of the Authorized Representative who installed the system. If a System Owner is unable to reach the Authorized Representative, call Presby Environmental, Inc. at (800) 473-5298 for further assistance.

PRESBY ENVIRONMENTAL, INC.
800-473-5298 www.presbyenvironmental.com

TECHNICAL BULLETIN

Advanced Enviro-Septic™ Receives NSF International/ANSI Standard 40 Class I Certification

Presby Environmental, Inc.'s flagship product, the Advanced Enviro-Septic™ Treatment System ("AES"), has received Certification under NSF International/ANSI's Standard 40 for Wastewater Treatment Devices. Advanced Enviro-Septic™ CTD is the **first and only** NSF-40 Class I certified system that is passive, provides combined treatment and dispersal, and never requires replacement media. The simplicity of the AES system makes it much more cost-effective to construct and maintain than complicated "black box" systems and advanced treatment units (ATUs). AES is also BNQ Certified for Secondary and Advanced Secondary Treatment.

What is NSF? NSF International (also known as "The Public Health and Safety Company™") is an independent, non-profit organization recognized throughout the world as a leader in standards development and product certification. Their mission is to protect and improve human health on a global scale by certifying food, water and consumer products. To learn more about NSF and their certification programs, visit www.nsf.org. NSF is accredited by the American National Standards Institute (ANSI).

What is NSF-40? NSF International/ANSI Standard 40 sets performance standards for onsite wastewater treatment devices for residential systems with hydraulic capacities from 400 to 1500 gallons per day. In order to receive Standard 40 Class I certification, systems are tested for a minimum of six months following NSF's protocol; the system must achieve the following effluent quality (EPA "secondary treatment" criteria):

- *30-day average CBOD5 less than 25 mg/L*
- *30-day average Total Suspended Solids less than 30 mg/L*
- *pH between 6.0 and 9.0*
- *No color, offensive odor, oily film or foam detectable*

The systems that usually obtain NSF-40 Class I Certification are expensive, complicated mechanical devices.

What are the results of Advanced Enviro-Septic™ testing? Ongoing testing of the Advanced Enviro-Septic™ System has proven that it not only meets but far exceeds the effluent quality standards of NSF-40's Class I Certification, BNQ's Secondary and Advanced Secondary Treatment Certifications and the US EPA Tertiary Treatment guidelines. During the most recent testing of the product at the BNQ in Quebec, Canada, the effluent treated by Advanced Enviro-Septic™ averaged <2 mg/L of CBOD5 and <2 mg/L TSS, in addition to achieving significant removal of fecal coliforms.

Results of Performance Testing by BNQ 04/06/08 to 10/04/08				
Parameter Measured	EPA Tertiary Treatment Guidelines	NSF-40 Class I (EPA Secondary)	BNQ Advanced Secondary	**Advanced Enviro-Septic® Test Results**
CBOD5 (mg/L)	10	< 25	< 15	**<2**
TSS (mg/L)	10	< 30	< 15	**<2**
Fecal Coliforms (CFU/100 mL)	1,000	n/a	50,000	**218**

What is the difference between NSF-40 and BNQ Testing Protocols? While NSF requires six (6) months of testing, BNQ requires a full twelve (12) months of testing in order to ensure that systems function as expected during all four seasons. Annex A of BNQ testing corresponds to the six (6) months of NSF testing. Our system's testing was performed by the BNQ in Quebec, Canada. All testing protocols were in conformity with NSF's requirements, and Advanced Enviro-Septic™ not only met but far exceeded the effluent quality required by Standard 40.

What is the difference between Enviro-Septic® and Advanced Enviro-Septic™? Advanced Enviro-Septic™ is the "next generation" of our Enviro-Septic® product, which has been used with superior results since 1995. While new to the US market, Advanced Enviro-Septic® has a track-record of reliable performance for many years throughout Canada, where it has achieved BNQ certification for both Secondary and Advanced Secondary treatment (see BNQ Certificate Number 890, www.bnq.qc.ca). AES includes an additional layer of geotextile fabric running along the bottom of the pipe; this added fabric provides several functional improvements.

What is the difference between the SPD and CTD models? There are two AES models that have received NSF-40 certification—our SPD ("Single Point Discharge") model and our CTD ("Combined Treatment & Dispersal") model. The SPD model is installed completely within an impermeable geo-membrane, and all effluent is collected and then sent to a dispersal field. The CTD model is installed without a bottom, allowing treated effluent to be safely dispersed into the underlying soils below the system. The AES CTD model is the first of its kind to achieve NSF-40 Class I certification; it provides both treatment and dispersal using non-mechanical processes and never needs replacement media.

What is different about an NSF-40 Certified Installation?

All NSF certified installations include the first two years of maintenance, four inspections/sampling of effluent and a two-year Manufacturer's Warranty. Products installed in an NSF Certified System will bear the NSF Mark similar to this:

Is certification required to install an NSF Certified System? Yes. An NSF Certified Advanced Enviro-Septic™ System can only be installed or serviced in the first two years of operation by an Authorized Representative who has been thoroughly trained by the manufacturer. However, pending state approval, designers/installers already trained/certified by Presby Environmental, Inc. in the use of our Enviro-Septic® product will be authorized to design/install non-NSF certified systems using the Advanced Enviro-Septic® product per Enviro-Septic® design/installation criteria.

Interested in learning more about becoming an Authorized Representative? We are always seeking experienced professionals who are interested in becoming Authorized Representatives in order to keep up with consumer demand for the Advanced Enviro-Septic™ System. Contact us for more information.

Prepared by,

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TEST RESULTS – BNQ ANNEX A & B – 2007- 2008

Product Tested:	**Advanced Enviro-Septic™ Wastewater Treatment System (AES)**
Product Description:	AES is an entirely passive, non-mechanical aerobic on-site wastewater system that provides combined treatment and dispersal using natural bacterial processes. AES has been thoroughly tested and proven to remove over 98% of the contaminants in wastewater that has received primary treatment in a septic tank. It is suitable for residential, commercial and community applications.
Developed, Manufactured and Distributed by:	Presby Environmental, Inc. 143 Airport Road, Whitefield, NH (USA) 03598 (603) 837-3826 www.presbyenvironmental.com email: info@presbyeco.com
Canadian Distributor:	DBO Expert, Inc., Quebec, Canada
Test Protocol(s):	BNQ NQ 3680-910 & 360-915 (Class III) NSF International/ANSI Standard 40 (Class I)
Test Location:	Bureau de Normalisation du Quebec ("BNQ") 17263 Chemin de la Grand Ligne, Lac St. Charles, Quebec, CA
Certifications Obtained:	BNQ Class II & Class III (Secondary Treatment & Advanced Secondary Treatment, Certificate No. 890 (www.bnq.qc.ca/en/index.html) NSF International/ANSI Standard 40 Certification (Class I) (www.nsf.org)
Test Summary:	Annex A (09/23/07 to 03/15/08) consists of six (6) months of performance evaluation. Annex B (04/06/08 to 10/04/08) is an additional six (6) months of performance and reliability evaluation. ("Annex A" testing corresponds to NSF-40 testing.) A full-sized Advanced Enviro-Septic™ System (hydraulic capacity of 1,350 liters per day) consisting of 150 ft. of pipe was tested for a full year at a loading rate of 9 liters per day per foot. Effluent received primary treatment in a septic tank (3.4 cubic meter capacity) and was not temperature controlled.

ANNEX A RESULTS SUMMARY 09/23/07 to 03/15/08

Parameter Measured	Average	Range	BNQ Class III Standard	NSF-40 Class I Standard
pH	7.6	7.0 to 8.2	n/a	6.0 to 9.0
CBOD5	2 mg/L	<2 to 5 mg/L	<15 mg/L	<25 mg/L
TSS	2 mg/L	<2 to 5 mg/L	<15 mg/L	<30 mg/L
Fecal Coliforms	2,900 CFU/100 mL	7 to 90,000 CFU/100 mL	<50,000 CFU/100 mL	n/a
Color	None	<1 color unit	n/a	None
Odor	None	"Non-offensive"	n/a	Non-Offensive
Oily Film/Foam	None	Not visually detected	n/a	Not visually detected
Noise	None*	None*	n/a	< 60 dbA

* Tested system was entirely passive—no mechanical or electrical devices used

ANNEX B RESULTS SUMMARY 04/06/08 to 10/04/08

Parameter Measured	Average	Range	BNQ Class III Standard	NSF-40 Class I Standard
pH	7.5	7.1 to 8.0	n/a	6.0 to 9.0
CBOD5	<2 mg/L	<2 mg/L continuously	<15 mg/L	<25 mg/L
TSS	<2 mg/L	<2 to 4 mg/L	<15 mg/L	<30 mg/L
Fecal Coliforms	218 CFU/100 mL	<2 to 30,000 CFU/100mL	<50,000 CFU/100 mL	n/a