

# *Rhode Island Department of Environmental Management*

To: Interested Parties

Date: July 2009, List Corrected 9/9/09

Subject: **Alternative or Experimental Onsite Wastewater Treatment System (OWTS) Technologies**

Attached herewith is the official “List” of Approved Alternative / Experimental (A/E) Technologies for onsite wastewater treatment. These technologies have been approved pursuant to RIDEM OWTS Rules. The technologies have been reviewed and accepted by a nine member Technical Review Committee composed of representatives of local government, the University of Rhode Island, CRMC, environmental organizations, and the private sector.

Immediately following this cover is a brief summary of the A/E technology application process and a fact sheet entitled "Guidance to OWTS Designers" that provides additional information and specifies responsibility for designers who are contemplating the use of an approved A/E technology.

Should you have any question or need further information, please contact Deb Knauss of the OWTS Program Office at [deb.knauss@dem.ri.gov](mailto:deb.knauss@dem.ri.gov) or 401-222-4700 x 7612.

# *Rhode Island Department of Environmental Management*

April 2009

## **ALTERNATIVE/EXPERIMENTAL ONSITE WASTEWATER TREATMENT SYSTEMS (OWTS) TECHNOLOGY PROGRAM**

Onsite Wastewater Treatment System Rules, provide the basis for approval of Alternative/Experimental (A/E) Technologies in Rhode Island. A/E systems are designed as alternatives to conventional OWTS or parts of a conventional system. A conventional system is a traditional OWTS with a septic tank, pump chamber with pump or siphon (if needed), distribution box and a standard leachfield with gravity distribution. An Alternative/Experimental System or Technology is an OWTS that does not meet the location, design or construction requirements of a conventional system, but has been demonstrated through field testing, calculations and other engineering evaluations to provide the same degree (or better) of environmental and public health protection.

There are three different categories of A/E technologies: alternative systems, system components, and experimental systems.

**Alternative Systems** - This category has two classes of certification: Class I and Class II.

- A **Class I** certification is issued to technologies that have been shown to have at least four (4) consecutive years of performance data per installation for no fewer than ten (10) installations, collected no less frequently than quarterly, which clearly demonstrate that all applicable standards have been met. A Class I system must also have been approved for at least four (4) consecutive years in Rhode Island with no fewer than ten installations or at least four (4) consecutive years in at least three (3) other jurisdictions, with no fewer than ten (10) installations in each jurisdiction. Class I certifications do not require renewal.
- A **Class II** certification is issued to technologies that have at least two (2) consecutive years of performance data per installation for no fewer than ten installations, with data collected no less frequently than quarterly that demonstrates that Department standards have been met, have demonstrated a theory or applied research, and the applicant demonstrates that the technology has been approved and utilized successfully for at least two (2) consecutive years in Rhode Island or at least two (2) consecutive years in another jurisdiction with no fewer than ten (10) installations in each jurisdiction. Class II certifications require bi-annual renewal.

**System Components** - This category also has two classes of certification: Class I and Class II.

- A **Class I** system component certification is issued for a component when the applicant documents that applicable manufacturer's and material standards are met; the applicant provides at least two (2) consecutive years of performance data for no fewer than ten (10) installations that demonstrates Department standards are met, if applicable; and the applicant demonstrates that the component has been approved and utilized successfully for at least two (2) consecutive years in Rhode Island or at least two (2) years in at least three (3) other jurisdictions for no fewer than ten (10) installations in each jurisdiction.
- A **Class II** system component certification is issued for a component when the applicant documents that applicable manufacturer's and material standards are met; the applicant provides at least one (1) year of performance data for no fewer than ten (10) installations that demonstrates Department standards are met, if applicable; the applicant demonstrates that the component has been approved and utilized successfully for at least one (1) year in Rhode Island or at least one (1) other jurisdictions for no fewer than ten (10) installations in each jurisdiction.

**Experimental Systems** - This category is designed to allow innovative systems, that have been demonstrated to work in practice or theory, to be installed on a limited basis as they are further tested and studied.

Experimental use is approved when:

1. The applicant demonstrates that the technology will work in practice and in theory;
2. Provides for three (3) to ten (10) proposed installations, a suitable area at each location for the installation of an OWTS permitted under the OWTS Rules, or a Class One A/E OWTS Technology;
3. The applicant proposing the Experimental Technology, the property owner(s) and subsequent purchaser(s) submit a signed statement to the Director agreeing to abandon the Experimental Technology and install an OWTS permitted under these Rules, or a Department approved Class One A/E OWTS Technology if the Experimental OWTS fails to perform as designed; and
4. The applicant submits documentation securing a bond or other form of financial security acceptable to the Director, to replace the entire OWTS in the event it fails to perform as designed.

### **Review and Approval Process**

For a technology or component to be approved for use in the state of Rhode Island, the Vendor of that technology must submit an application package to the Department's A/E Technology Program for review. The application package is reviewed by Department staff for completeness. Completed applications are forwarded to the Department's OWTS Technical Review Committee (TRC). The TRC is made up of members from the Department, Coastal Resource Management Council, local Universities, OWTS design and installation firms, local municipalities, and environmental organizations. The TRC reviews all A/E applications and makes recommendations to the Department based on their findings. The Department then issues the final approval or denial.

An approval is documented in the form of a Certification signed by the Chief of Groundwater and Wetlands Protection in the Office of Water Resources. The Certification lists any design, maintenance or installation requirements or restrictions placed on the technology and it also indicates the general requirements and any sampling and reporting requirements associated with the technology.

After a technology is approval is certified by the Department, the Vendor must submit a Design and Installation Manual for review. When the technology's Design and Installation Manual is approved the technology is then placed on the Department's List of Approved Innovative/Alternative Technologies. Once an A/E technology is on the list then individual applications to design, construct, alter, or install these technologies may be submitted to the Department. Please note that an A/E technology is not approved for use under the program until placed on the list. Individual OWTS applications submitted to the Department proposing a technology not yet listed as of the date of receipt of the application must be submitted through the variance process.

# GUIDANCE TO OWTS DESIGNERS

## Rhode Island Alternative/Experimental OWTS Technology Program

The purpose of this section is to provide guidance on the design, installation and use of the approved technologies under the Rhode Island A/E OWTS Technology Program. By following this guidance, designers will help promote the acceptance and beneficial use of A/E technologies in Rhode Island and expedite the approval process for individual applications.

A/E technologies generally offer improved performance over conventional technologies by using one or a combination of innovative designs, patented products, alternative materials, filtration processes, recirculation systems, pumps, or other electromechanical devices. The primary application for these technologies is at existing home sites on substandard lots having failing or otherwise inadequate OWTSs, and at other sensitive or difficult sites. A/E technologies often require special design and maintenance considerations, and some may involve significant additional design, installation or operational cost.

### Certification

The certification letter issued by the Department for each A/E technology is the primary source of information concerning the terms and requirements guiding the use of the technology under the A/E program. The certification includes the design requirements, design exceptions, special operation and maintenance requirements, and obligations of the vendor. Copies of the certifications are available from the vendor.

**Important:** Please note that the certification represents only that the Department has accepted the technology for listing on the List of Approved A/E Technologies in accordance with its Rules. It is not an endorsement of the technology, nor is it a recognition of any claim other than that which is specifically stated in the certification letter.

### Authority to Design

Please note that technology certifications specify the license classes which are authorized to submit to the Department design applications incorporating any of these approved A/E OWTS technologies. These classes are listed with the technology summaries provided herein as “Authority to Design”.

### Designer Responsibility to Inform Purchasers and Users

Conventional OWTS systems are relatively well understood by the general public. Most people know about basic septic system components, their limited operation and maintenance requirements, and have a rough idea of costs. A/E technologies, on the other hand, vary considerably from these familiar standards. As a practical matter, the Department will not be able to inform the public adequately about the many different A/E technologies. Accordingly, this responsibility will fall upon the vendors of the technologies and, more particularly, upon designers who elect to use or recommend these technologies to their clients.

Begin by making sure you obtain from the vendor the complete details of the technology, including its design and installation details, operational and maintenance requirements, applicability to the siting or design problem you are attempting to address, and all costs. Next, give your client a complete copy of the certification for the technology issued to the vendor and ask your client to read it. The certification contains many special provisions of which users or purchasers should be apprised. The certification requires that the vendor provide any purchaser of the system with a copy of the Department’s approval prior to the sale of the system. Take time to familiarize the client with all relevant details of the technology. These details may include: appearance or aesthetic aspects, such as above ground tanks, vents or other components; manhole covers; motors; pumps; electrical panel boxes; energy requirements; periodic maintenance needs; costs including design, installation, operating and maintenance costs; noise; and odors, if any. The expected service life of the equipment and

overall system should also be addressed. Finally, the advantages and disadvantages of each technology being considered should be fully explained.

## Design

Manuals: Each A/E technology is required to have a Design and Installation Manual. The manuals are produced by the manufacturer or vendor and should be obtained directly from them. The contact name, address and telephone number of the vendor is given on the A/E technology list. The manuals are intended to supply all of the required information to enable design and installation of the A/E system. The manuals also include a copy of the Department's certification letter. Vendors must ensure proper training to help acquaint you with their technologies and answer questions. Some vendors offer specific design and installation services. Some offer services as part of the cost of supplying the product; others may offer additional services on a fee for service basis.

Leachfield Size Reduction: Certain A/E technologies have been approved with an allowance for a reduction in leachfield size. However, for new building construction, the designer proposing a reduced leachfield area must demonstrate that sufficient land area is available to permit installation of a full size leachfield; this should be shown on the plan as an extension of the proposed leachfield area. The additional area must be clearly labeled as the "reserve area", so that it is clear that no construction will take place in this area. The full size leachfield shall meet all OWTS regulatory requirements. In welled areas, a separate "alternate area" shall also be shown as required by the rules and be equal to 100% leachfield sizing. Please note that in most cases the leachfield size reduction may only be applied to conventional leachfield types contained in the rules. The size reduction ordinarily does not apply to the Eljen In-Drain system because this system is considered an A/E technology. Sizing for Eljens should comply with the requirement in the certification.

Electrical: Electrical components and wiring must comply with applicable state and local codes. Power interrupt alarms, where required, generally must be placed on the exterior of the building. The Department will allow interior placement at commercial buildings where access to the interior is readily available during normal business hours.

Operational Requirements: All mechanical treatment systems require electrical power. One or more controllers are normally supplied. Hours of operation are sometimes adjustable and must be reviewed as part of the design process. Operational controls must be set so as to optimize treatment and ensure compliance with the operational efficiencies stipulated by the terms of the certification.

Eljen In-Drains: The A/E certification for this technology supercedes the conditional approval issued by the Department on July 18, 1995 for use on repair applications. Please read the certification carefully and note any and all changes or additions. You should take special note that the septic tank on Eljen systems must be equipped with an outlet effluent filter. Also, the Eljen leachfield system may be used with a single trench line. Normally, two trench lines are required for the minimum trench design according to state Rules.

Effluent Filters: Several effluent filters have been approved for use. Please note that a manhole to grade is required over the outlet port above the effluent filter to facilitate maintenance of the filter.

## Variances

Designs incorporating A/E technologies must comply with all other applicable OWTS standards. Where these standards cannot be met, a variance application must be filed in order that the Department properly assess the impacts of the variance request on the operation of the system and on the environment. The fee for the specially engineered system will not be assessed if the only engineered feature is the approved A/E technology.

## Nitrogen-Reducing Treatment Systems

Technologies currently recognized as capable of significantly reducing nitrogen levels in residential wastewater are RUCK, Bio-Microbics FAST, Advantex AX, Amphidrome, Nitrex and the RSF as provided in the Guidance for the Design and use of Sand Filters in Critical Resource Areas. The Department may impose additional monitoring requirements for any nitrogen-reducing system design that is not covered under an A/E approval.

Non-Endorsement

The Department of Environmental Management certification under the A/E program does not represent an endorsement by the agency of any system or technology. A representation by any person, vendor or designer that the Department endorses any A/E technology is strictly prohibited.

## List of Approved Alternative/Experimental OWTS

July 28, 2009, Corrected 9-9-09

### LEACHFIELD SYSTEMS

**Technology Name:** [Bottomless Sand Filter](#)

**Vendor Information:** Generic

**Certification:** Guidelines for the Design and Installation of BSFs - November 2001

**Technology Type:** Alternative Leachfield

**Authority to Design:** CI-II & III Licensed Designers

**Description:** An equal or superior leachfield for pretreated effluent which is applied under pressure to a 2' bed of specified sand media. The effluent is pumped to and distributed by SCH 40 PVC or equivalent surrounded by a minimum of 6" of peastone. Wastewater trickles down in unsaturated thin-film flow through sand media in a time dosed mode. After treatment the effluent is disposed directly under the sand filter. The technology is targeted for single family sized systems where soil and site conditions exist that make the use of conventional or shallow narrow drain fields impractical or not economical.

**Technology Name:** [Cultec Contactor Chambers Models 75, 100, 125 & Field Drain Panels \(C-1, C-2, C-3 & C-4\)](#)

**Vendor Information:** Cultec, Inc.  
878 Federal Road  
Brookfield, CT 06804  
(800) 4-CULTEC

**Certification:** Component Technology - Class I Component

**Technology Type:** Alternative Leachfield Component

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The System consists of high-density polyethylene arch-shaped chambers that have holes along the sidewall of the lower portion of the units. Three models of Contactor Chambers (models 175, 100 and 125) and four Field Drain Panel configurations (C-1, C-2, C-3, C-4) have been approved. The system is installed with 1 ft. of stone beneath the chambers and additional stone filling the sidewall space between the trench wall and the chamber. Trench width and depth varies with the model of the system, see the RIDEM issued Cultec Certification for more details. These chambers shall be sized based on DEM's approval and designed in accordance with DEM Rules for shallow concrete chambers (flow diffusers) Rule 34.2.

**Technology Name:** [Eljen In-Drain, Type B](#)

**Vendor Information:** Eljen Corporation  
James Donlin  
15 Westwood Road  
Storrs, CT 06268  
(800) 444-1359

**Certification:** Alternative System or Technology - Class II

**Technology Type:** Alternative Leachfield

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The Eljen In-Drain is designed to replace the gravel/stone media of a conventional trench leachfield. In-Drains are constructed of a cusped plastic core that is completely enveloped by a geotextile fabric that is folded accordion style over and under the plastic core. Each In-Drain unit is 3 feet wide, 4 feet long, and 7 inches high, and is designed to be installed in a trench with a minimum of 6 inches of concrete sand bedding beneath and along the sidewalls of the units. Eljen In-Drains have been assigned the following sizing criteria: one linear foot of In-Drain is equivalent to 7 square feet of required leachfield area.

**Technology Name:** [Infiltrator Chambers](#)

Double-Wide Standard Infiltrator Chambers  
Double-Wide High Capacity Infiltrator Chambers

**Vendor Information:** Infiltrator Systems  
Judd Efinger  
4 Business Park Road  
P.O. Box 768  
Old Saybrook, CT 06475  
(800) 221-4436

**Certification:** Component Technology - Class I

**Technology Type:** Alternative Leachfield Component

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The Infiltrator Chambers are arch-shaped high density polyethylene chambers with a nominal width of 2.83 ft. and a length of 6.25 ft. with a ¼ inch high horizontal slots along the sidewall on the lower half of the units. The Standard Chamber is 12 inches high and the High Capacity Chamber is 16 inches high. The system is installed in a 6 ft. wide trench with 1 ft. of stone beneath the chambers and additional stone filling the sidewall space between the trench wall and the chamber. These chambers shall be sized based on DEM's approval and designed in accordance with DEM Rules for shallow concrete chambers (flow diffusers) Rule 34.2.

**Technology Name:** [Infiltrators \(Stoneless Trench Configuration\)](#)  
Equalizer 24 Chambers, Standard Sidewinder Chambers  
Equalizer 36 Chambers, High Capacity Infiltrator Chambers  
Standard infiltrator Chambers, High Capacity Sidewinder Chambers  
Quick 4 Standard Chamber

**Vendor Information** Infiltrator Systems  
6 Business Park Road  
P.O. Box 6768  
Old Saybrook, CT 06475  
(800) 221-4436

**Certification** Component Technology – Class I

**Technology Type** Alternative leachfield component

**Authority to Design:** CI-I, II & III Licensed Designers

**Description :** The component is an arch shaped Polyolefin injection molded chamber with louvered side slots installed in a trench configuration. It is sized on a 1.72 multiplier of the open bottom area with a maximum of 4.0 SF/LF for any unit. No stone is used in this Installation and trenches are required to be interconnected.

**Technology Name:** [Pressurized Shallow-Narrow Drainfield](#)

Generic

**Certification:** Guidance for the Design and Use of Sand filters in Critical Resource Areas April 10, 2000, (“Sand Filter Guidance Document” or “SFGD”) as amended.

**Technology Type:** Alternative Leachfield

**Authority to Design:** CI-II & III Licensed Designers

**Description:** Pre-treated effluent of at least 30/30 TSS/BOD is applied under pressure through distribution laterals of 1 to 1 ¼ inch Schedule 40, pressure rated PVC pipe, installed 8-12 inches below existing and finish grades. The distribution pipe is covered with a dome-like structure made of 12 inch diameter PVC pipe (or approved equivalent) cut lengthwise; this dome and the pressure-distribution pipe are supported by one (1) inch diameter Schedule 40 PVC support pipes, which also act as a spreader device for the dome, and provide a greater bearing surface for the dome. Schedule 40 PVC or equivalent sweep elbows (turnups) at the distal end of each drainfield lateral facilitate maintenance and inspection.

## SYSTEM COMPONENTS

### A. EFFLUENT FILTERS

**Technology Name:** [GAG SIM/TECH Filter](#)

**Vendor Information:** Gary Koteskey, President  
SIM/TECH Filter  
06598 Horton Bay North Rd  
Boyne City, MI 49712  
616-582-7327

**Certification:** Component Technology - Class I

**Technology Type:** Pump effluent filter for use with pressure distribution system

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The SIM/TECH filter is 3 inches in diameter, 18 inches in length, made of schedule 40PVC (or ABS) and stainless steel containing 1/16 inch holes with a total open area of 69.52 sq. in. (41%). It is placed on the discharge side of a pump and lessens clogging of small diameter holes of pressure distribution piping.

**Technology Name:** [OSI Effluent Screens, Screened Pump Vaults and Biotube Pump Vaults](#)

**Filters:** F, FE, FT, and FTI Series

**Screened Vaults:** OSI200, SV1500

**Biotube Pump Vaults:** [PVU Series \(replaces SVT Series\)](#)

[PVU57-1819, PVU57-2419, PVU68-1819, PVU68-2425](#)

**Vendor Information:** Orenco Systems, Inc. (OSI)  
Eric Ball, VP Product Development  
Terry Bounds, Executive VP  
814 Airway Avenue  
Sutherlin, OR 97479-9012  
(514) 459-4449  
www.orenco.com

**Regional Contacts:**  
Richard Pezza  
Wastewater Technologies, Inc  
80 Kilvert Street  
Warwick, RI 02886  
401-737-7810

Robert Johnson  
Atlantic solutions  
2417 East Main Rd.  
Portsmouth, RI 02871  
401-293-0176

**Certifications:** Component Technology - Class I

**Technology Type:** Effluent Screen and Pump Vault Filter

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** OSI effluent screens are constructed of reinforced cylinders of 1/8-in. mesh polyethylene with a fiberglass base; they are used in effluent dosing tanks to minimize the solids leaving the tank. OSI screened pump vaults are designed for use with conventional low-head style effluent and sewage pumps; they are installed at the outlet end of a single or double compartment septic tank. The screened vault minimizes entry of solids to the pump. OSI Biotube pump vaults are installed at the outlet end of a single or double compartment septic tank or separate dosing tanks in effluent pumping systems. Pump vaults house a Biotube effluent filter that minimizes solids carryover to following components in the system. Pump vaults are 12 in. in diameter, and accommodate one pump (simplex) or two pumps (duplex).

**Technology Name:** [Polylok PL-122 Effluent Filter](#)

**Vendor Information:** Polylok, Inc.  
173 Church Street  
Yalesville, CT 06492  
(800) 234-3119

**Certification:** Component Technology - Class I

**Technology Type:** Effluent Filter

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The Polylok PL-122 is a wastewater effluent filter designed for installation at the outlet of a septic tank to minimize solids from passing to the drain field. The PL-122 contains 122 linear feet of 1/16<sup>th</sup>-inch slots and is equipped with a Buoyant shut off ball that stops the flow of unfiltered effluent when the filter is removed for maintenance. This filter is modular, allowing the user to increase the filtration area by snapping two or more filters together.

**Technology Name:** [Zabel A-1800, A-100, A-300 Residential and Commercial Wastewater Filters](#)

**Vendor Information:** Zabel Environmental Technology  
10409 Watterson Trail  
Jefferson, KY 40299  
(800) 221-5742

**Certification:** Component Technology - Class I

**Technology Type:** Effluent Filter

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The Zabel filters are PVC wastewater effluent filters designed to be installed at the outlet of a septic tank to prevent solids from passing to the drain field.

**Technology Name:** [Zoeller Effluent Filters](#)

**Vendor Information:** Zoeller Pump Co.  
3469 Cane Run Road  
Louisville, KY 40211  
(800) 928 7867

**Certification:** Component Technology Class I

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The technologies includes a mode series of pumps in screened Vaults designed for installation at the outlet of a septic tank to prevent solids passing to the leachfield. There is also approval for a commercial septic tank effluent filter to prevent solids carryover.

## **B. DISTRIBUTION COMPONENTS**

**Technology Name:** [Polylok PL- Dipper Box](#)

**Vendor Information:** Polylok, Inc.  
173 Church Street  
Yalesville, CT 06492  
(800) 234-3119

**Certification:** Component Technology - Class II

**Technology Type:** Distribution Box

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The Polylok Dipper Box is a leachfield dosing mechanism designed on the pivot and balance principal. The Dipper Box is comprised of a specially designed concrete distribution box with dipper tray assembly. The dipper storage tray gradually collects effluent from the septic tank. When it has retained 1.5 gallons of effluent it automatically discharges effluent equally to each leachfield trench.

**Technology Name:** [Zoeller Tru-Flow D-Box](#)

**Vendor Information:** Zoeller Pump Co.  
P.O. Box 16347  
Louisville, KY 40256-0347

**Certification:** Component technology – Class II

**Technology Type:** Distribution Box

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The unit is comprised of a diverter basin and a diverter assembly to evenly split flow to five outlet lines by adjusting a bubble level and adjustment screw in the event of uneven settling.

**ALTERNATIVE SYSTEMS**

**A. ADVANCED TREATMENT SYSTEMS**

**Technology Name:** [AdvanTex AX20, AX100 \(Mode 1 Configuration\)](#)

**Vendor Information:**

Orenco Systems Inc. (OSI)  
Eric Ball, VP Product Development  
Terry Bounds, Executive VP  
814 Airway Avenue  
Sutherlin, OR 97479-9012  
(514) 459-4449  
www.orencos.com

**Regional Contacts:**

Richard Pezza  
80 Kilvert Street  
Wastewater Technologies, Inc.  
Warwick, RI 02886  
(401) 737-7810

Robert Johnson  
Atlantic Solutions  
2417 East Main Road  
Portsmouth, RI 02871  
(401) 293-0176

**Certification:** Alternative System or Technology - Class I

**Technology Type:** Advanced Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** A prepackaged packed bed filter that significantly reduces BOD and TSS inside a waterproof container installed after a two compartment tank prior to discharge to a leachfield which may be reduced in size by 50%. When configured in Mode 3, this system is acknowledged as an approved nitrogen reducing system.

**Technology Name:** [Amphidrome®](#)

See Nitrogen Reduction Treatment Systems

**Technology Name:** [Bioclere](#)

See Nitrogen Reduction Treatment Systems

**Technology Name:** [Biocycle 525](#)

**Vendor Information:** Biocycle, Inc.  
61 Pilsudski Street  
P.O. Box 29496  
Providence, RI 02909  
(401) 944-4000

**Certification:** Alternative System or Technology - Class II

**Technology Type:** Aerobic Wastewater Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The Biocycle system is an aerobic wastewater treatment system which is designed based on activated sludge and extended aeration principles. It utilizes a three-stage treatment process which includes an anaerobic and aerobic treatment, followed by clarification. The system also incorporates an automatic sludge return via venturi from the clarifier to the primary chamber. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>) and total suspended solids (TSS) in the effluent. Based on these reductions, the Department has allowed for a 40% reduction in leachfield size.

**Technology Name:** [FAST \(Single Home and Modular\)](#)

**Vendor Information:** Bio-Microbics, Inc.  
Robert Rebori  
8271 Melrose Drive  
Lenexa, KS 66412  
(913) 492-0707

**Regional Contact:**  
Jim Dunlap, J&R Engineering  
534 New State Highway  
Raynham, MA 02767  
(508) 823-9566

**Certification:** Alternative System or Technology - Class I

**Technology Type:** Aerobic Wastewater Treatment System – TSS & BOD Reduction

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The FAST (Fixed Activated Sludge Treatment) system is an aerobic wastewater treatment system that utilizes an aerobic fixed film process that is a combination of the conventional trickling filter and activated sludge processes. The FAST system is designed to be installed within a two-compartment tank where the first compartment provides a primary settling zone for incoming sewage and the second houses the actual FAST system. The system contains submerged media that provide surfaces for microbial growth. Aeration and circulation are provided by a blower that pumps air into a draft tube that extends down the center of the tank. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), and total nitrogen in the effluent. Based on these reductions, the Department has allowed for a 45% reduction in leachfield size.

**Technology Name:** [Cromaglass SBR](#)

**Vendor Information:** Cromaglass Corporation  
2902 N. Reach Road  
P.O. Box 3215  
Williamsport, PA. 17701

**Certification:** Alternative system or Technology-Class II

**Technology Type:** Sequencing batch reactor

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The sequencing batch reactor (SBR) process is a sequential suspended growth (activated sludge) process in which all the major steps occur in the same tank in a continuous flow. The three-compartment tank provides for solids retention, aeration and sludge storage, and clarification and sludge return. Pumps are used for aeration, mixing, sludge return, and discharge to a leachfield. Based on the reduction of BOD and TSS a 45% reduction is allowed in leachfield size.

**Technology Name:** [Norweco Singulair](#)

**Vendor Information:** Seigmund Environmental Services, Inc.  
Laszlo and Hollister Siegmund  
49 Pavilion Avenue  
Providence, RI 02905  
(401) 785-0130

**Certification:** Alternative System or Technology - Class II

**Technology Type:** Aerobic Wastewater Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The Singulair Wastewater Treatment System utilizes primary treatment (settling), mechanical aeration, clarification and flow equalization to achieve treatment. The effluent passes from a primary settling chamber to an aeration (with oxygen) chamber through a transfer port. An aspirator at the bottom of a shaft disperses air radially into the aeration chamber as fine bubbles, providing oxygen for the biomass and vertical mixing of the chamber contents. The effluent in the aeration chamber then passes through to the clarification chamber for final settling of solids. All clarified wastewater passes through an effluent filter as it exits the system and is then gravity fed to the leachfield. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>) and total suspended solids (TSS) in the effluent. Based on these reductions, the Department has allowed for a 35% reduction in leachfield size.

**Technology Name:** [SeptiTech M series](#)

**Vendor Information:** SeptiTech Inc.  
220 Lewiston Road  
Gray, Maine 04039  
(207) 657-5252

**Certification:** Alternative System or Technology Class II

**Technology Type:** Recirculating Biological Trickling Filter

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The mixed liquor process repeatedly passes the effluent over water repellant Styrofoam beads which entrains the Microbes in the wastewater as it flows through the media. It is designed to be installed after a Septic tank a second tank houses the system. The Department has allowed a 50% reduction in conventional leachfield size.

**Technology Name:** [Single Pass Sand Filter](#)

**Vendor Information:** Generic

**Certification:** Guidelines for the Design and Use of Sand Filters – April 2000

**Technology Type:** Advanced Treatment System

**Authority to Design:** CI-III Licensed Designers

**Description:** Wastewater, having received primary treatment in a septic tank or equivalent unit, is pressure dosed to a bed of specified sand media. Wastewater applications to the filter surface are controlled by both a programmable timer and float switch. Wastewater is dispersed over the sand filter surface in a PVC pipe distribution network surrounded in pea stone. Wastewater trickles down in unsaturated thin film-flow through the sand media, where biological treatment occurs. The treated wastewater (sand filter effluent) is collected in an underdrain at the bottom of the filter and discharged by pressure to a shallow - narrow drainfield, where additional treatment occurs. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>), and total suspended solids (TSS). Ammonia and pathogens reductions may also be achieved. The technology is targeted for use in critical resource areas and is intended to be used with shallow pressurized drainfields.

**Technology Name:** [Puraflo® Peat Biofilter](#)

**Vendor Information:** Greg O'Donnell  
Bord na Mona Environmental Products US, Inc.  
P.O. Box 77457  
Greensboro, NC 27417  
800-PURAFLO

**Certification:** Alternative System or Technology - Class II

**Technology Type:** Advanced Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The Puraflo is a modular pre-engineered biofiltration system that utilizes natural peat fiber as a biofilm media. Among the processes occurring are filtration, absorption, adsorption, ion exchange, and microbial assimilation. Primarily used in single pass mode. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>), and total suspended solids (TSS). Ammonia and pathogens reductions may also be achieved. The technology is targeted for use in critical resource areas and may be used with shallow pressurized drainfields.

**Technology Name:** [RUCK](#)

See Nitrogen Reduction Treatment Systems

## **B. NITROGEN REMOVAL SYSTEMS**

**Technology Name:** [AdvanTex AX20, AX100 \(Mode 3 Configuration\)](#)

**Vendor Information:**

Orenco Systems Inc. (OSI)  
Eric Ball, VP Product Development  
Terry Bounds, Executive VP  
Sam Carter, Regulatory Relations Coordinator

814 Airway Avenue  
Sutherlin, OR 97479-9012  
(514) 459-4449  
www.orencos.com

**Regional Contacts:**

Richard Pezza  
80 Kilvert Street  
Wastewater Technologies, Inc.  
Warwick, RI 02886  
(401) 737-7810

Robert Johnson  
Atlantic Solutions  
2417 East Main Road  
Portsmouth, RI 02871  
(401) 293-0176

**Certification:** Alternative System or Technology - Class II

**Technology Type:** Advanced Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** A prepackaged packed bed filter that significantly reduces nitrogen, BOD and TSS inside a waterproof container installed after a two-compartment tank prior to discharge to a leachfield which may be reduced in size by 50%.

**Technology Name:** Amphidrome®

**Vendor Information:** F. R. Mahoney & Associates, Inc. **Contact:**  
273 Weymouth Street Keith Dobey  
Rockland, MA 02370 Tel: (781) 982-9300, Ext. 37  
Fax: (781) 982-1056

**Certification:** Alternative System or Technology – Class II

**Technology Type:** Nitrogen Reducing Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The Amphidrome® system uses a submerged attached growth bioreactor process operating in a batch mode.

The Amphidrome® system utilizes two tanks and one submerged attached growth bioreactor, called the Amphidrome® reactor. The first tank, the anoxic/equalization tank, is where the raw wastewater enters the system. The tank has an equalization section, a settling zone, and a sludge storage section. It serves as a primary clarifier before the Amphidrome® reactor.

This Amphidrome® reactor consists of the following four items: underdrain, support gravel, filter media, and backwash trough. The underdrain, constructed of stainless steel, is located at the bottom of the reactor. It provides support for the media and even distribution of air and water into the reactor. The underdrain has a manifold and laterals to distribute the air evenly over the entire filter bottom. The design allows for both the air and water to be delivered simultaneously--or separately--via individual pathways to the bottom of the reactor. As the air flows up through the media, the bubbles are sheared by the sand, producing finer bubbles as they rise through the filter. On top of the underdrain is 18” (five layers) of four different sizes of gravel. Above the gravel is a deep bed of coarse, round silica sand media. The media functions as filter, significantly reducing suspended solids and provides the surface area for which an attached growth biomass can be maintained. The Department allows a 50% reduction in conventional and approved AE “component technology” leachfield size with this System.

**Technology Name:** Bioclere

**Vendor Information:** AWT Environmental, Inc.  
Chuck Resevick  
241 DuChaime Blvd.  
New Bedford, MA 02745  
(508) 998-7577 Extension 12

**Certification:** Alternative System or Technology - Class II

**Technology Type:** Nitrogen Reducing Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The Bioclere system is essentially a modified trickling filter positioned over a clarifier. Effluent from the septic tank enters Bioclere and is pumped up to the top of the insulated unit where it is evenly distributed over the surface of the filter media. Biochemical oxidation takes place as the water trickles through the filter and over the biological film that grows on the surface of the filter media. Oxygen is supplied to the system through a small axial fan located in the top of the housing. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>) and total suspended solids (TSS) in the effluent. Based on these reductions, the Department has allowed for a 45% reduction in leachfield size.

**Technology Name:** [FAST \(Single Home and Modular\)](#)

<b>Vendor Information:</b>	Bio-Microbics, Inc. Robert Rebori 8271 Melrose Drive Lenexa, KS 66412 (913) 492-0707	<b>Regional Contact:</b> Jim Dunlap, J&R Engineering 534 New State Highway Raynham, MA 02767 (508) 823-9566
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**Certification:** Alternative System or Technology - Class II

**Technology Type:** Nitrogen-reducing and Aerobic Wastewater Treatment System

**Authority to Design:** CI-II & III Licensed Designers

**Description:** The FAST (Fixed Activated Sludge Treatment) system is an aerobic wastewater treatment system that utilizes an aerobic fixed film process that is a combination of the conventional trickling filter and activated sludge processes. The FAST system is designed to be installed within a two-compartment tank where the first compartment provides a primary settling zone for incoming sewage and the second houses the actual FAST system. The system contains submerged media that provide surfaces for microbial growth. Aeration and circulation are provided by a blower that pumps air into a draft tube that extends down the center of the tank. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), and total nitrogen in the effluent. Based on these reductions, the Department has allowed for a 45% reduction in leachfield size.

**Technology Name:** [Nitrex™](#)

<b>Vendor Information:</b>	Lombardo Associates, Inc. 49 Edge Hill Road Newton, MA 02467	<b>Contact:</b> Pio Lombardo, PE Tel: (617) 964-2924 Fax: (617) 332-5477 E-mail: pio@LombardoAssociates.com
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**Certification:** Alternative System or Technology – Class II

**Technology Type:** Nitrogen Reducing Treatment System ≤TN 10 mg/L

**Authority to Design:** CI-II & III Licensed Designers

**Description:**

The Nitrex™ Filter performs a treatment step as part of a multi-component onsite wastewater treatment system. The Nitrex™ Filter is preceded by a nitrifying advanced pretreatment system designed to convert organic nitrogen and/or ammonium to nitrate, prior to the Nitrex™ Filter performing the denitrification step. Any advanced treatment system used in conjunction with a Nitrex™ Filter must also be a Department approved A/E Technology and must be approved by the Vendor for use with the Nitrex™ Filter. The term “Nitrex™ Filter” shall mean the media-filled tank and associated components and controls produced by the Vendor to cause denitrification. The term Nitrex™ Filter System shall mean the Nitrex™ Filter and the advanced pretreatment system.

The Nitrex™ Filter provides a carbon source in the form of wood media for heterotrophic bacteria operating in an anerobic environment to reduce the nitrate to nitrogen gas. Nitrified effluent is piped into the bottom of the Nitrex™ Filter and moves vertically through the media under a slight pressure head caused by gravity or pressure; the denitrified effluent is then discharged to a drainfield.

The pretreatment system used in advance of the Nitrex™ Filter must be designed, installed, operated and maintained in accordance with the terms of the certification issued by the Department for use of that system.

The Department allows reduction of leachfield area for conventional and approved AE “component technology” leachfields, as assigned to the pre-treatment system specified for use with the Nitrex™ filter.

**Technology Name:** [Recirculating Sand Filter](#)

**Vendor Information:** Generic

**Certification:** Guidelines for the Design and Use of Sand Filters – April 2000

**Technology Type:** Nitrogen Reducing Treatment System

**Authority to Design:** CI-III Licensed Designers

**Description:** Wastewater, having received primary treatment in a septic tank or equivalent unit, flows by gravity to a recirculation (mixing) tank. In doses controlled by both a programmable timer and float switch, the mixed fresh wastewater and partially treated filter effluent is applied to a bed of coarse sand (fine gravel) media. This mixed wastewater is dispersed over the filter surface in a PVC distribution network surrounded in pea stone. Wastewater trickles down through the sand media, where biological treatment occurs. The treated effluent is collected in an underdrain at the bottom of the filter and discharged back to the recirculation tank. There most of it mixes with incoming wastewater, a small amount gets discharged to the drainfield, and the cycle begins again. Typically, a buoyant-ball check valve is used to control discharge and recirculation. Treated wastewater is discharged to a drainfield for additional treatment. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>), total suspended solids (TSS), and total nitrogen in the effluent. The technology is targeted for use in critical resource areas and is intended to be used with shallow pressurized drainfields.

**Technology Name:** [RUCK](#)

**Vendor Information:** Mr. Joseph Frisella  
Frisella Engineering  
23 Arnold Street  
Wakefield, RI 02879-3796  
(401) 783-5949

**Certification:** Alternative System or Technology - Class II

**Technology Type:** Nitrogen-Reducing Treatment System

**Authority to Design:** CI-III Licensed Designers

**Description:** The System is designed as a nitrogen-reducing OWTS. A household's blackwater (toilet & kitchen sink wastewater) is plumbed separately from the greywater (all other wastewater, i.e. shower, laundry & bathroom sink). The blackwater enters a blackwater septic tank followed by a buried, aerobic sand filter. The greywater is plumbed to a greywater septic tank. The nitrified blackwater from the sand filter either is pumped or flows into the greywater septic tank for the denitrification process which occurs under anaerobic conditions with the greywater serving as a carbon source. This system is a single pass-through system. The system is capable of significantly reducing biological oxygen demand (BOD<sub>5</sub>) total suspended solids (TSS) and total nitrogen (TN) in the effluent. Based on these reductions, the Department has allowed for a 30% reduction in leachfield size.

## C. LEACHFIELD RENOVATION

**Technology Name:** [White Knight™ Microbial Inoculator/Generator Models WK-40 and WK-78](#)

**Vendor Information:** Robert Silva, President  
Knight Treatment Systems, Inc.  
281 County Route 51A  
Oswego, NY 13126  
Tel: 800-560-2454  
Fax: 315-343-6114  
[www.knighttreatmentsystems.com](http://www.knighttreatmentsystems.com)

**Certification:** Alternative System or Technology – Class II

**Technology Type:** Microbial Inoculator/Generator Leachfield Renovation

**Authority to Design:** CI-I, II & III Licensed Designers

**Description:** The White Knight™ Microbial Inoculator/Generator (White Knight™) is contained within a HDPE cylinder, designed to be installed into a septic tank, continuously inoculating the tank with non-pathogenic IOS-500™ bacterial cultures. An air pump provides fine bubble aeration and circulation within the System bringing the bacteria into contact with fixed film substrate and the suspended organic compounds in the septic tank. The IOS-500™ bacteria released by the System digest organic wastes in the septic tank and in the leachfield.

White Knight™ is approved for renovation of Onsite Wastewater Treatment Systems (OWTS) that are organically clogged resulting in hydraulic failure, as follows.

1. a) In the Salt Pond and Narrow River Critical Resource Areas White Knight™ may be used only if the leachfield was properly sized in accordance with the Regulations in effect at the time the permit was approved, as evidenced by the approved permit. If the leachfield did not meet the requirements of the Regulations in effect at the time the permit was approved, or if there is no permit available for the subject system, the site is not eligible for use of White Knight™.

1. b) In all other areas of the State an approved permit, or system analysis performed by a Class II or III OWTS designer documenting that the system is suitable for use, is required.

2. Statewide, in addition to the two sets of requirements cited above, candidate site eligibility is determined based on system size, type and condition. The site evaluation must confirm that the system failure is due to organic clogging in the leachfield.

White Knight™ may also be installed in a properly functioning OWTS as well as a new OWTS, by application for new construction.