OSTDS
It's not just septic tanks anymore

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Executive Director
Florida Onsite Wastewater Association (FOWA)

It’s time to discuss onsite solutions

- Septic tanks were never designed to treat nitrogen

Available technologies

- Proprietary Aerobic Treatment Technologies (ATUs)
  - This includes media filters
- Performance Based Treatment Systems (PBTS)
- Innovative Systems
- Passive Nitrogen Study Technologies

Proprietary Aerobic Treatment Technologies (ATUs)

- **Standard 40: Residential Wastewater Treatment Systems**
- **Standard 245: Wastewater treatment systems**

Who is NSF?
Consensus Standards:
Key to Success – Stakeholder Involvement

NSF/ANSI Standards are developed and overseen by the NSF Wastewater Treatment Technology Joint Committee, which is comprised of volunteer members.

Food, Water, Air, Environment

NSF®

End Users, Educators, User Groups

EPA, FDA, County, State, Local

NSF Standard 40 Testing & Certification

Testing & Certification Process

- Application/engineering review - 1-3 months
- Test unit installation at test facility - 1-3 days
- Test administration - 6 months
- Test data analyzed by program office & engineering - 4-6 weeks
- Issuance of the Wastewater Technology Report

Testing & Certification Process

- Completion of all product literature, data plate & documentation requirements
- Audit of manufacturing facility completed
- Certification & listing
- Removal of test unit from test facility
- Continued or on-going certification

Test Administration

Test Schedule:

- Overall length is 26 consecutive weeks
- Dosing:
  - Initial Dosing – 1/3 wastewater & 2/3 makeup water
  - Design Loading = 16 weeks
    - Systems dosed 7 days/week
  - Stress Loading = 7.5 weeks (52 days)
  - Final Design Loading = 2.5 weeks (18 days)

Test Administration

- Design Loading of Wastewater (100% ± 10% of rated capacity)
  - 6:00 am to 9:00 am; 35% (500 = 175 gallons
  - 11:00 am to 2:00 pm; 25% (= 125 Gal.)
  - 5:00 pm to 8:00 pm; 40% (= 200 Gal.)
  - Total of 100 doses over 24 hours, divided equally among three dosing periods
  - 500 gpd; 100 x 5 gallons

Test Administration

Stress Loading:

- **Four non-ideal conditions each separated by 7 days of design loading:**
  - **Wash-day Stress – 3 wash days in a 5-day period (3 wash cycles and 6 rinse).**
  - **Working Parent Stress – Dosed 40%/60% + one wash load.**
  - **Power/equipment Failure Stress – off for 48 hours.**
  - **Vacation Stress – No dosing for 9 days.**

Test Administration

Sample Collection:

- 5 days/week during design loading
- Influent samples are flow-proportional 24-hour composites – during periods of system dosing
- Effluent samples are flow-proportional and during system discharge.

Data Collection:

- In-situ monitoring of pH, temperature & DO.

Evaluation Criteria

Influent Wastewater Characteristics:

- BOD_5 = 100 mg/L - 300 mg/L
- TSS = 100 mg/L - 350 mg/L
- pH = 6 – 9
- Temperature = less than 30°C

Effluent Criteria (Class 1; 30-day average):

- $CBOD_5$ = 25 mg/L
- TSS = 30 mg/L
- Color, Odor, Oily Film & Foam (MBAs) – 3 times during test
- pH = 6 – 9
- Temperature = no criteria
- DO = no criteria

Evaluation Criteria

- Operated in accordance with manufacturer's instruction.

Other Considerations:

- No service or maintenance during entire six month test.
- All test data reported.
- No allowance for discard of any data, except if test facility fails to provide an acceptable test.
- Catastrophic site problems addressed
- Electrical or mechanical defects during testing

Additional Certification Requirements

Product Literature:

- Owner's manual.
- Installation manual.
- Operation and maintenance manual.
- Troubleshooting and repair manual.

NSF/ANSI Standard 245 Nitrogen Reduction

Standard 245: Any residential system with a treatment capacity of 400-1500 gpd; Nitrogen reduction.

- **Must also meet the requirements of Standard 40 effluent.**

ETV Nutrient Reduction

Only a verification process

- **Systems can be adjusted daily**

Nitrogen Testing

Testing Aspect	*NSF/ANSI 245*	*ETV Nutrient Reduction*
Duration of testing	6 months; up to 37 weeks total	1 year
System start-up	Up to 3 weeks	Up to 8 weeks
Influent requirements	Average required over course of test: CBOD5 100 – 300 mg/L TSS 100 – 350 mg/L TKN 35 – 70 mg/L Alkalinity >120 mg/L Temperature 10°C - 30°C Allows chemical addition to adjust influent – sodium bicarbonate for alkalinity; urea and methanol at a C:N ratio of not less than 5:1 for TKN.	Only suggested ranges: CBOD5 100 – 450 mg/L TSS 100 – 500 mg/L TKN 25 – 70 mg/L Phosphorus 3 – 20 mg/L Alkalinity >60 mg/L Temperature 10°C – 30°C Allows chemical addition to adjust influent – sodium bicarbonate for alkalinity.

Nitrogen Testing

Testing Aspect	*NSF/ANSI 245*	*ETV Nutrient Reduction*
Temperature impacts (temperatures below 10°C impact process bacteria)	Allows for suspension of Nitrogen sampling when temperature drops below 10°C, with extension of sampling to obtain a minimum of 55 valid sample sets	No allowance, test runs 1 year and all data is reported
Maintenance during testing	None – same as NSF/ANSI 40	Maintenance allowed, but documented and reported in final report
Stress Sequences	4 - wash day, working parent, equipment/power failure, vacation	5 - wash day, working parent, equipment/power failure, low loading, vacation

Nitrogen Testing

Testing Aspect	*NSF/ANSI 245*	*ETV Nutrient Reduction*
Sampling	3 times/week during design loading (weeks 1–16 and weeks 24½–26); 2 times during the week following each stress test	Minimum 1 time/month; same as NSF/ANSI 40 during stress sequence; also for 5 consecutive days at end of test
Acceptance criteria	For pass/fail, only samples collected during design loading periods (samples during stress sequence reported, but not included in the pass/fail criteria calculation). Average of all effluent samples may not exceed: CBOD5 25 mg/L TSS 30 mg/L TKN <50% of average of all influent pH 6.0 – 9.0 SU	None; all data is reported

Innovative Process

Application by FL PE

- Monitoring protocol designed to validate the system
- Compelling evidence that system will perform
- Intent is to reclassify system

Used to bring new technology to state or change approval status

Innovative System Reclassification

Following the installation and monitoring of systems allowed by innovative system permit (cont.)

- Rationale for the proposed type of classification
- Proposed monitoring protocol
- A sample manual addressing the siting, design, installation, inspection, operation, maintenance, and abandonment

Data provided by manufacturers from 2016 NSF JC Meeting

Please see manufacturer's websites for additional details.

Bio-Microbics, Inc.

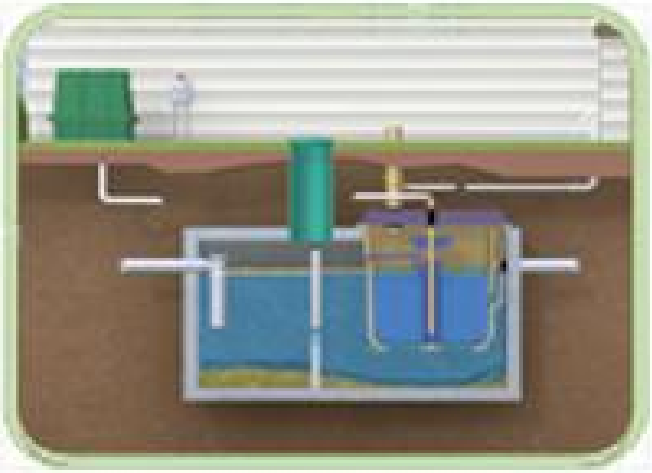
NSF/ANSI 245

Wastewater Treatment Systems - Nitrogen Reduction

- BioBarrier® MBR 0.5-N 500
- BioBarrier® MBR 1.0-N 1000
- BioBarrier® MBR 1.5-N 1500
- MicroFast 0.5[1] 500
- MicroFast 0.625 625
- MicroFast 0.75[2] 750
- MicroFast 0.9[3] 900
- MicroFast 1.5[4] 1500

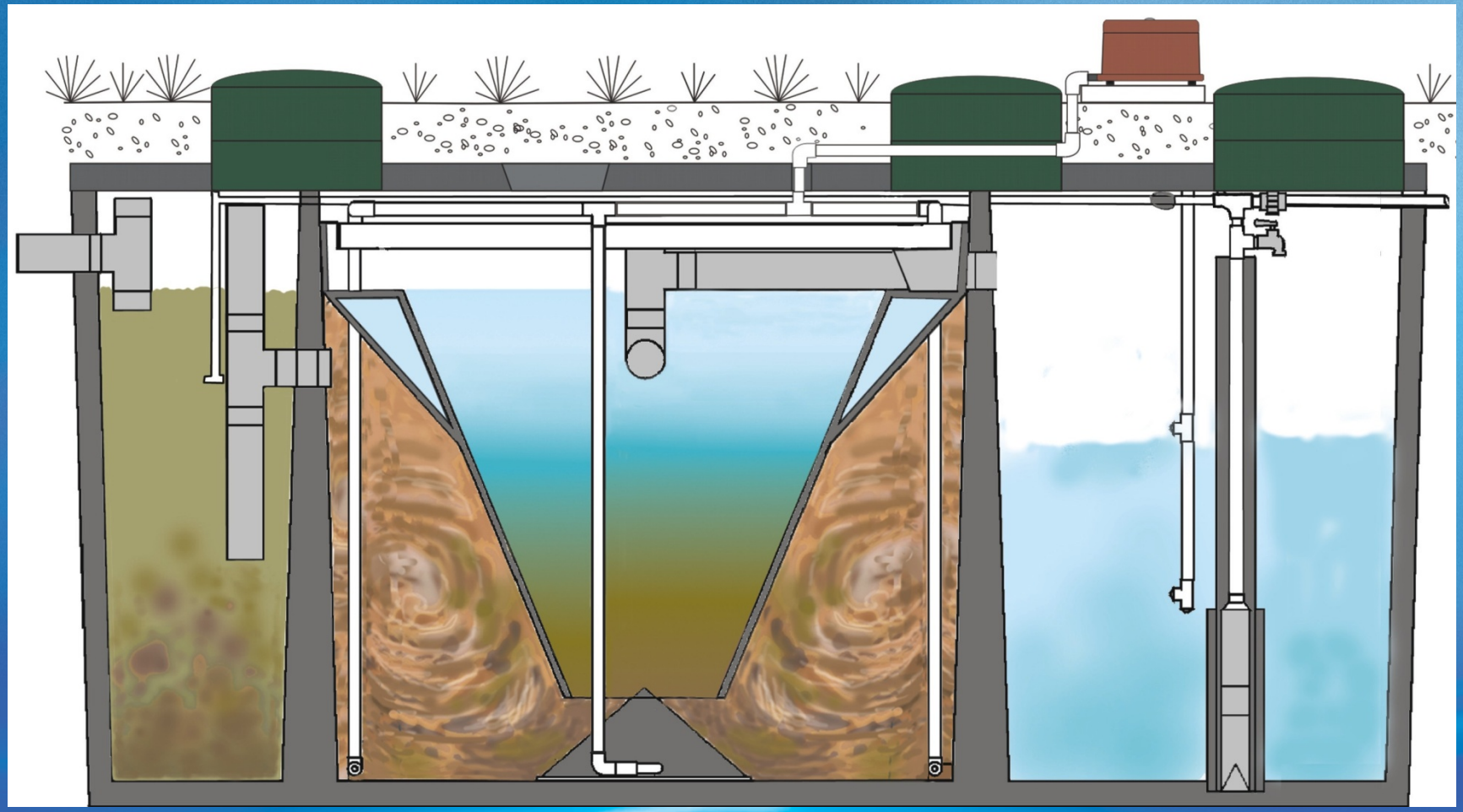
BioBarrier® Membrane Bioreactor

- NSF/ANSI Standard 40, Class 1 Certified (BioBarrier® 0.5, 1.0, & 1.5)
- NSF/ANSI Standard 245 (Nitrogen Reduction) Certified (BioBarrier® 0.5, 1.0, & 1.5)
- NSF/ANSI Standard 350, Class R (Water Reuse) Certified (BioBarrier® 0.5, 1.0, & 1.5 – FIRST system to achieve this Standard!)



HOOT SYSTEMS, LLC.
www.hootsystems.com
Install A Hoot Don't Pollute

Hoot BNR



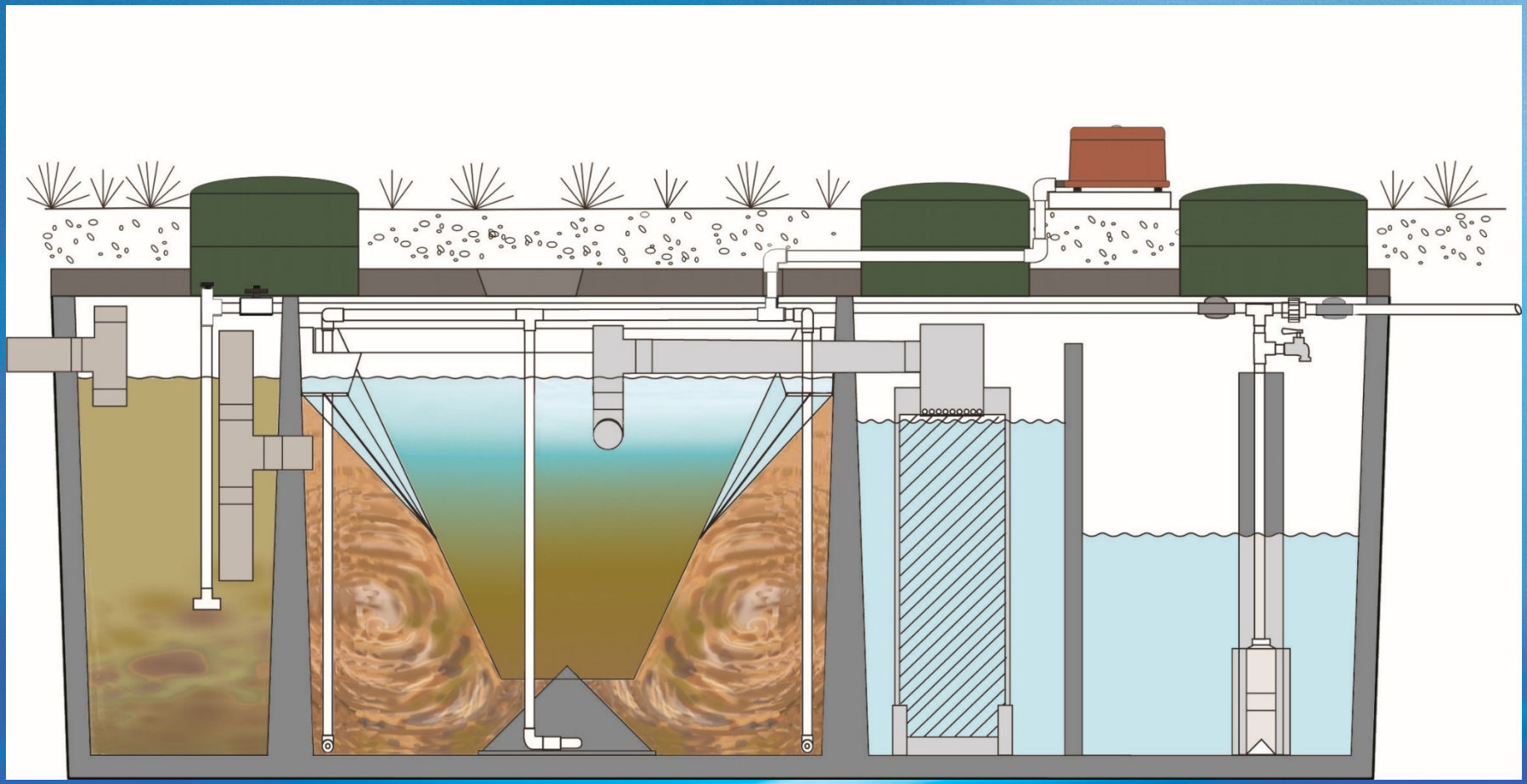
Hoot Systems, working today to protect tomorrow's environment.

History of the BNR

- BNR - Biological/Basic Nitrogen Reduction
- Tested in 1999, Introduced in 2001
- Thousands of installations in Florida
- Standard 40 Since 2001,
- Similar Model (Hoot-NR) is Std. 245
- Adds Total Nitrogen Reduction <60%
- Field Verification by Maryland Department of the Environment (MDE) of 62%.

HOOT SYSTEMS, LLC.
www.hootsystems.com
Install A Hoot Don't Pollute

Hoot ANR - RTS



Hoot Systems, working today to protect tomorrow's environment.

History of the Hoot ANR

- ANR – Advanced Nitrogen Reduction
- Research Began in 2001, Certified in 2007
- NSF Standard 40 & 245 Certified
- For BOD_5, TSS, TN & Fecal Reduction
- The only system in certification conditions to get below 10 mg/l, FDWS

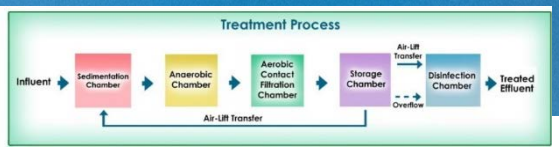
Hoot Systems H-450ANR – Electrical Monitoring

NSF has completed a review of the Hoot Model H-450ANR treatment system for the average electrical consumption. The Hoot ANR system was monitored for electrical consumption during an extended period beyond the Standard 40/245 performance evaluation. There were no modifications made to the tested system during the 2nd six months of performance evaluation. During the 163 days of operation, the system used a total of 343 kW of electricity, averaging a daily electrical consumption of 2.1 kW per day.

Treatment Process Overview

Fuji Clean's "contact filtration" treatment consists of a controlled, circuitous flow train through anaerobic and aerobic chambers and in direct contact with assorted proprietary fixed film medias on which biological digestion of organic matter occurs. Media is also designed and positioned to provide mechanical filtration of process wastewater.

The system includes two air lift pumps (see diagram below) The Recirculating Airlift Pump returns process water and sludge from the aerobic zone to the sedimentation chamber, recirculating 2-4 times inflow per day for CE models and 4-6 times inflow for CEN (enhanced denitrification) models. The Effluent Airlift Pump is designed to help equalize flow and discharge treated effluent.



Two Air Lift Pumps. One Recirculating Air Lift pump sending process water and solids back to Chamber 1, and one Effluent Air Lift Pump for measured discharge of treated effluent. (See airlift pump info below).

Sludge Transfer (Recirculating air lift pumpback) See airlift pump info below.

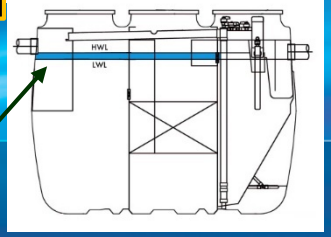
Chamber 1. Sedimentation Chamber (separates solids and greases)

Chamber 2. Anaerobic Contact Filtration Chamber (spherical-skeleton filter media) organic matter decomposition by micro-organisms, suspended solids captured and nitrates are denitrified

Chamber 3. Aerobic Contact Filtration Chamber (both board and cylindrical hollow mesh media) oxygen rich zone for aerobic microbe digestion activity, solids filtration and nitrification of ammoniac nitrogens to nitrates

Airlift Pumps. This generic illustration shows the mechanics of the "airlift pumps" used in this system, which are not mechanical pumps. They are simple pipe conduits through which pressurized air (from blower) is introduced at the bottom and by fluid pressure, water is carried up the pipe by ascending bubbles.

Built-in flow equalization. During treatment, water level fluctuates between high and low water levels



FujiClean USA LLC
Toward Clean Water...

NSF
Certified to
NSF/ANSI Standards 40 & 245

NSF/ANSI Data Summary

Fuji Clean USA Model CE5
NSF/ANSI 40 Data
450-gpd, straight septic, no septic tank.

BOD/CBOD (mg/l)		TSS (mg/l)		Nutrients					
				Total Nitrogen (1 sample/week)			Total Phosphorus (1 sample/week)		
Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	% Removal	Influent (Avg)	Effluent (Avg)	% Removal
152	**11**	259	**13**	24	**10**	62%	9	**7**	22%

Fuji Clean USA Model CEN5
NSF/ANSI 40/245 Data
450-gpd, straight septic, no septic tank.

BOD/CBOD (mg/l)		TSS (mg/l)		Total Nitrogen		Fecal Coliform (w/ UV) Total Colonies /100 mL
Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	Influent (Avg)	Effluent (Avg)	Effluent (Geomean)
190	**5**	305	**6**	40	**10**	**70**

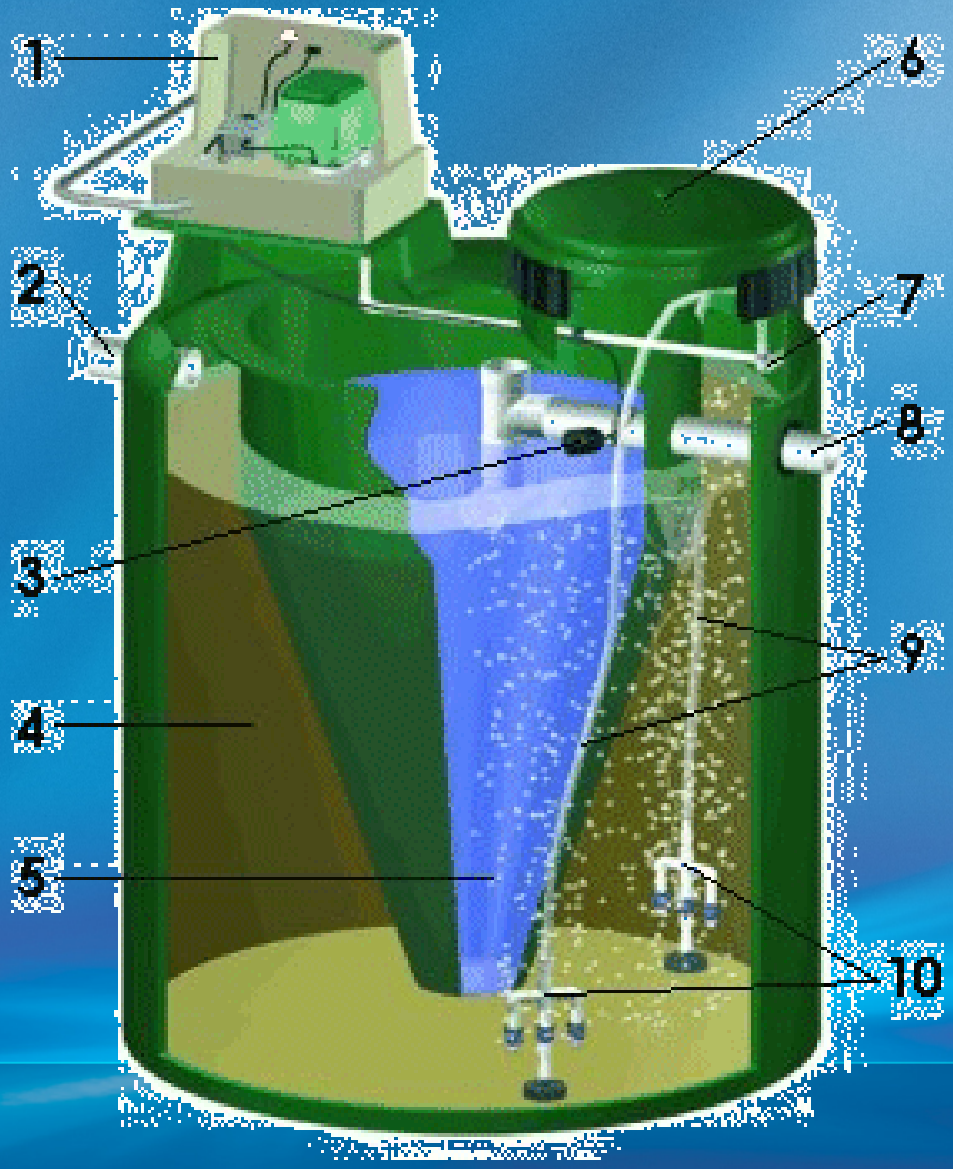
ATU/PBTS Units Approved in Florida

Hoot *
Nyadic
Multiflo
HydroAction
Norweco*
Clearstream
CajunAire
Delta Whitewater
Aero-Tech
AquaKlear

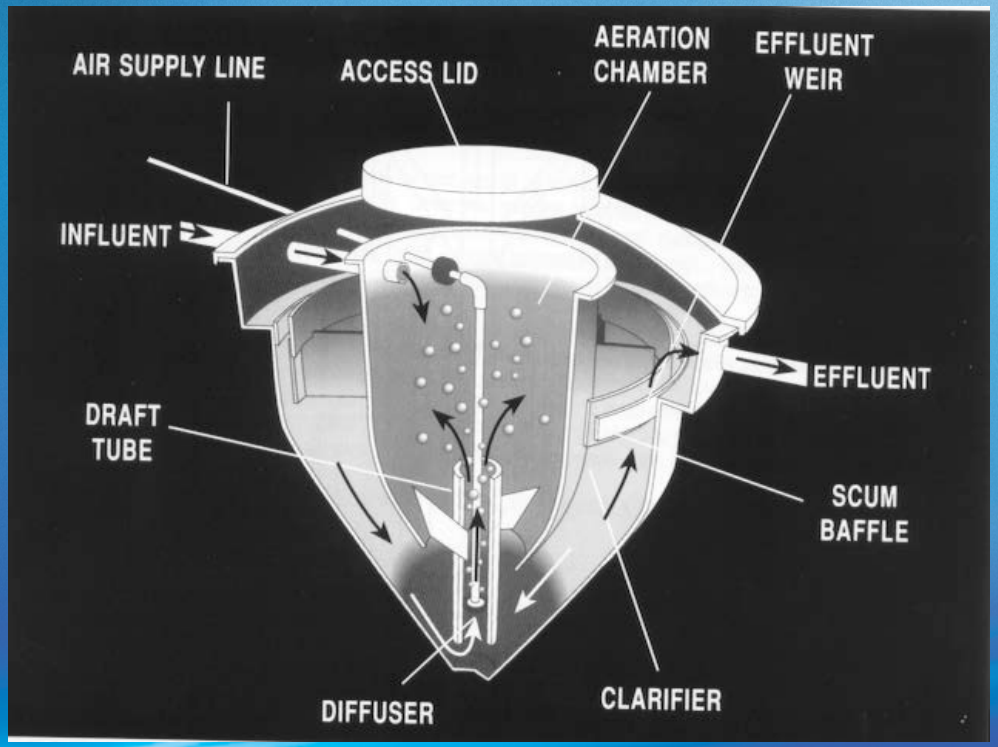
Mighty Mac
Bionest – fixed film
Aqua Safe
SCAT
Aqua Aire
American Wastewater
FAST – fixed film*
Jet – fixed film
Fuji Clean – fixed film

* System can be designed as PBTS by FL PE
Click on name to visit manufacturer's site

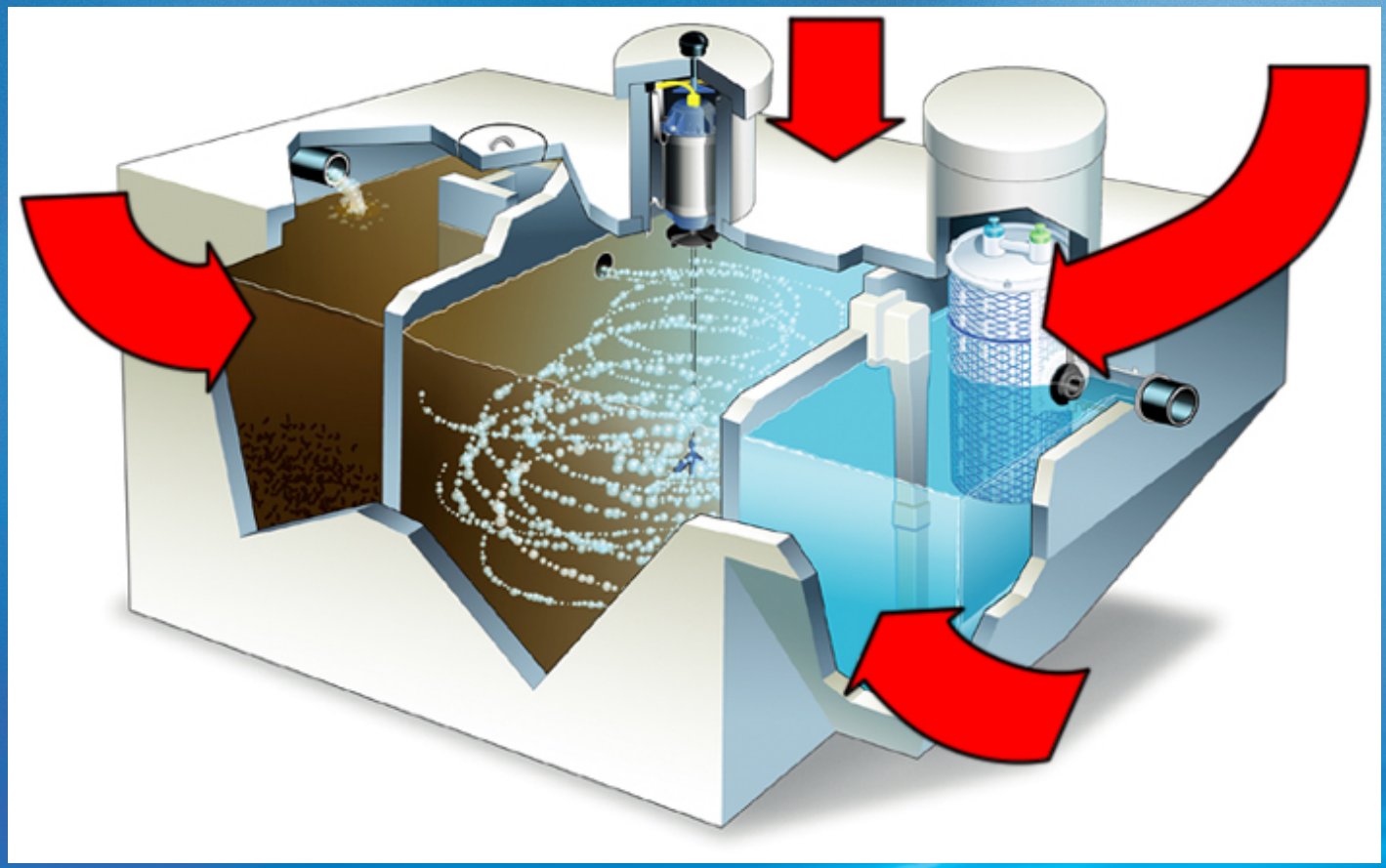
Hydro Action



Consolidated – Multiflo & Nyadic

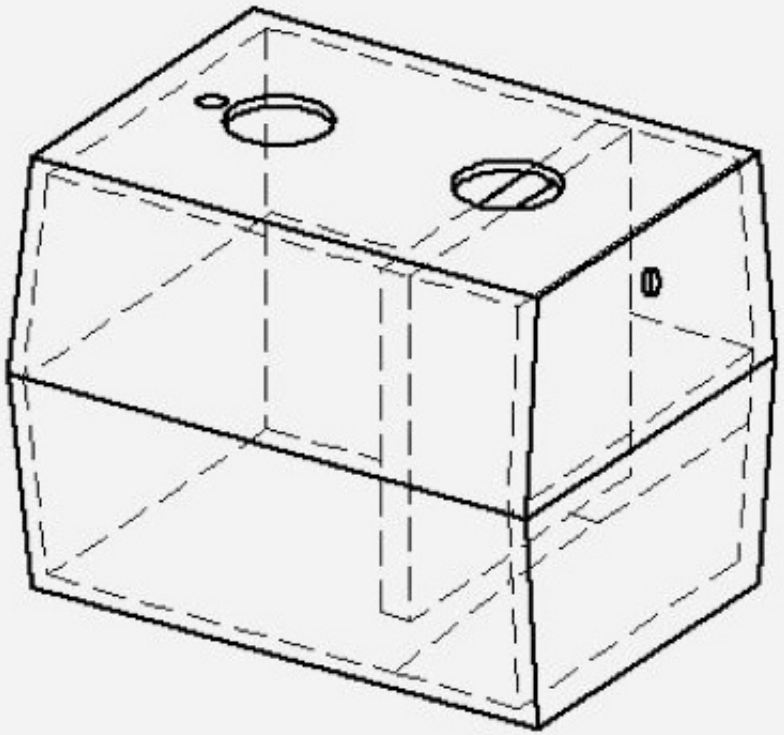


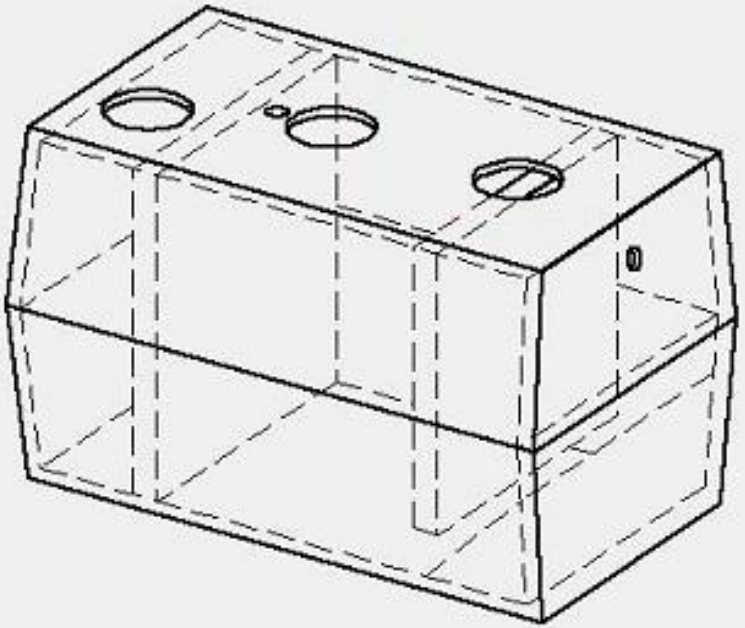
Norweco



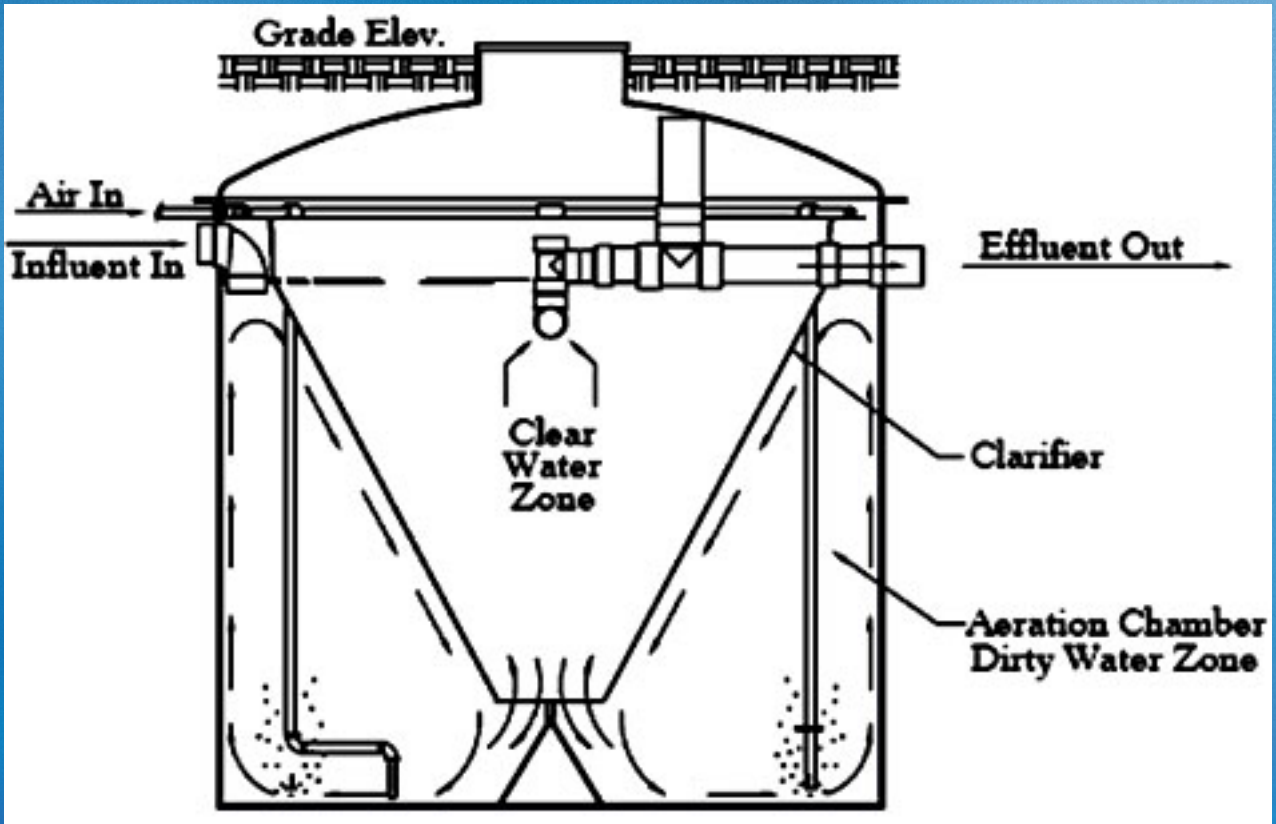
Clearstream

Cajun Aire





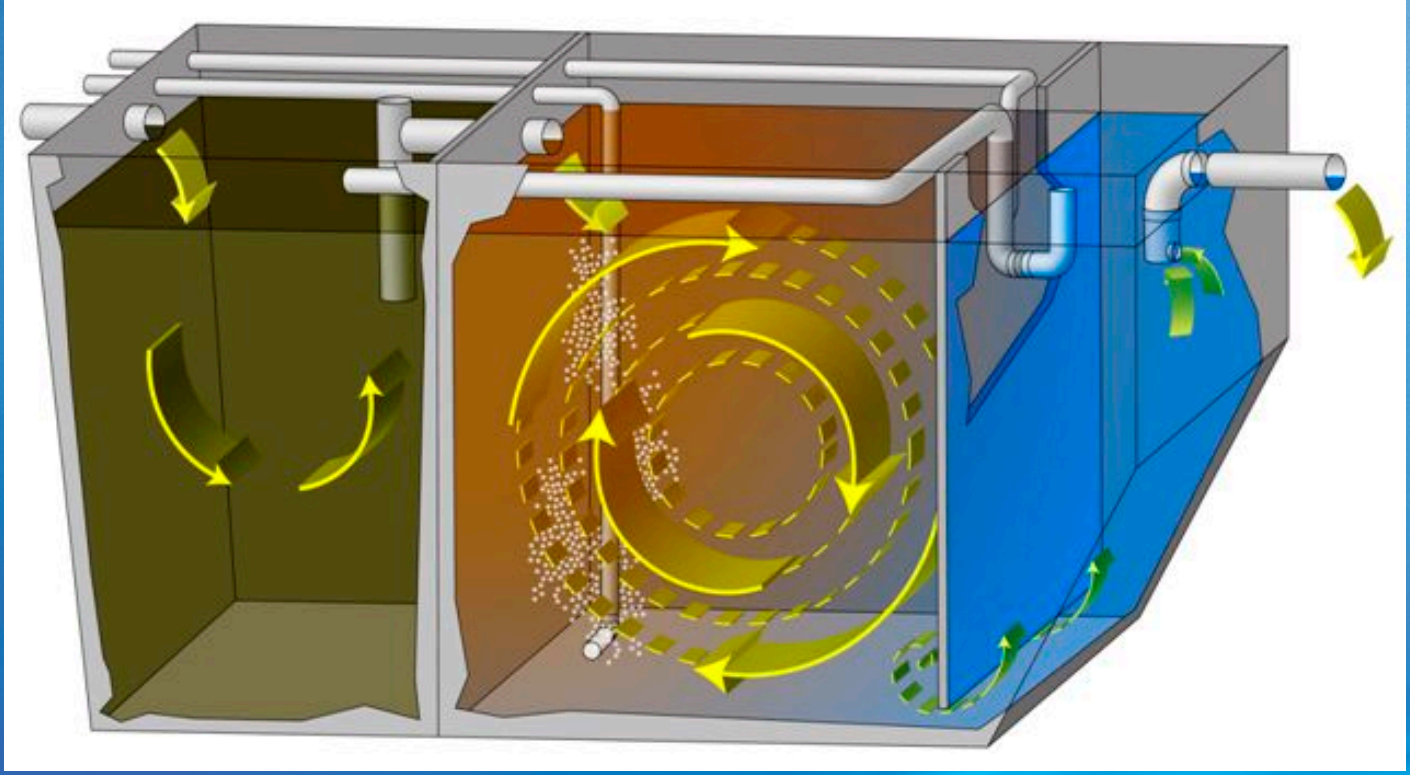
Delta Whitewater



AeroTech


AERO-TECH
Aerobic Treatment Units
Fiberglass Tank
Designed For Superior Strength,
Corrosion Resistance,
and Lighter Weight
NSF

AquaKlear



Mighty Mac

H2O MILLENIA

H2O MILLENIA BAJA

MIGHTY MAC

HOME WASTEWATER TREATMENT PLANTS

Our Aerobic technology processes residential wastewater so pure and odorless, that it can be used for spray, drip or subsurface irrigation, or surface discharge to a drain swale.

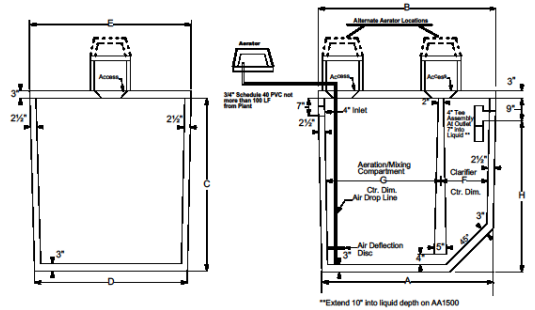
NSF

Certified under NSF International /ANSI Standard 40, Class I

Bionest

Ecological Tanks -Aqua Aire & Aqua Safe

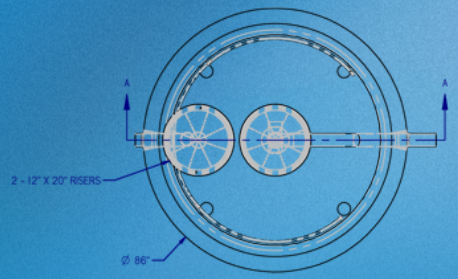
AquaAire Sewage Treatment System
Models AA500,600,750, 800,1000, 1200, 1500 In One Piece Tank with Lid

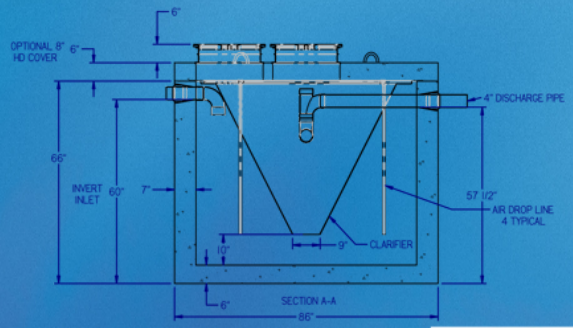


Schedule

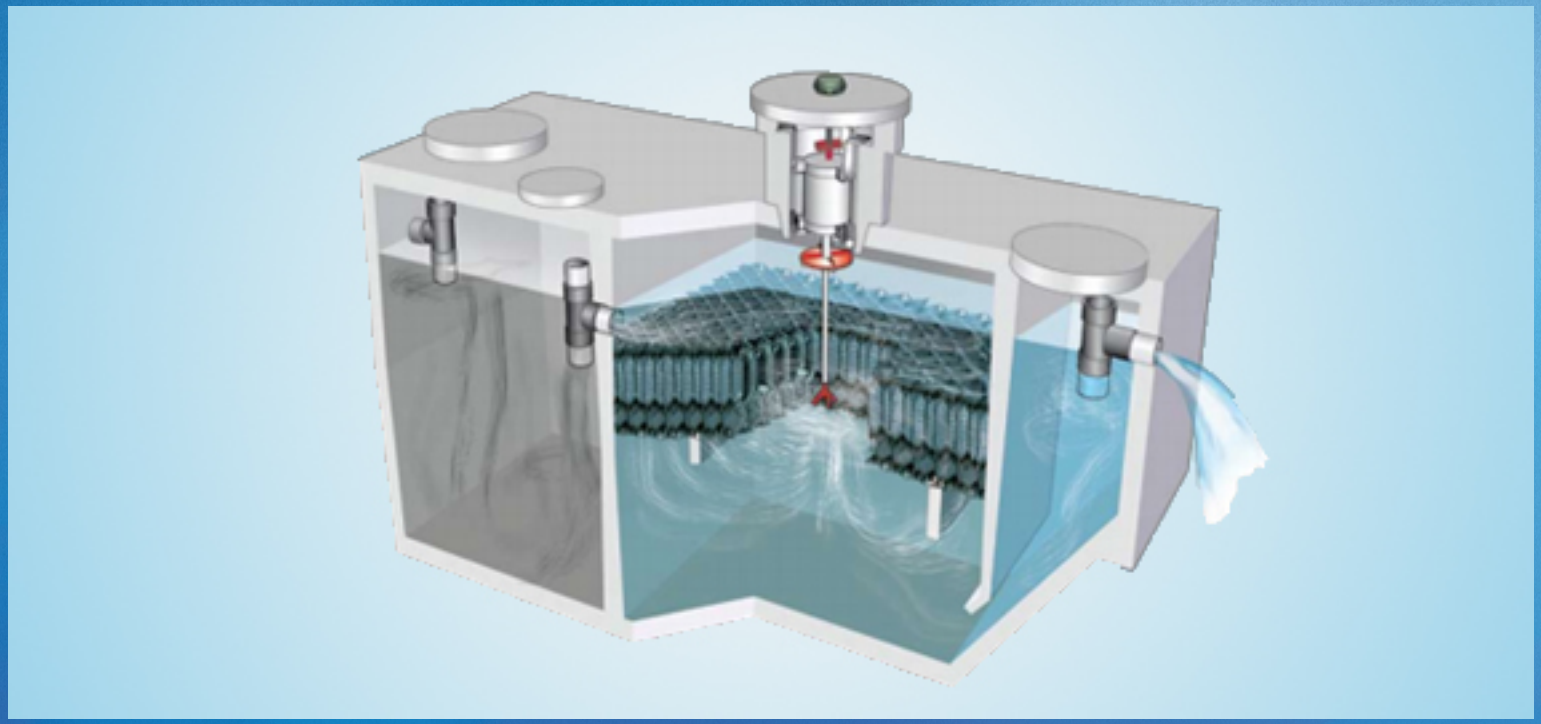
Designation	Trtmt Capacity	BOD Loading	Total Volume	Aeration Volume	Clarifier Volume	A	B	C	D	E	F	G	H
AA500	500GPD	1.25	748	560	188	88	71	64	60	63	18¾	45½	55
AA600	600GPD	1.50	857	642	215	77½	80½	64	60	63	21¾	52½	55
AA750	750GPD	1.85	1076	801	275	95½	96½	64	60	63	29¼	64¾	55
AA1000	1000GPD	2.50	1420	1063	357	111	114	64	71	74	35¾	71½	55
AA1500	1500GPD	3.75	2216	1699	517	131	134	74	71	74	37¾	89¾	65
AA800	800GPD	2.0	1155	858	297	111	114	64	71	74	36¾	71¾	55
AA1200	1200GPD	3.0	1751	1300	451	131	134	74	71	74	37¾	89¾	65

Ecological Tanks, Inc. 04/2003





Jet

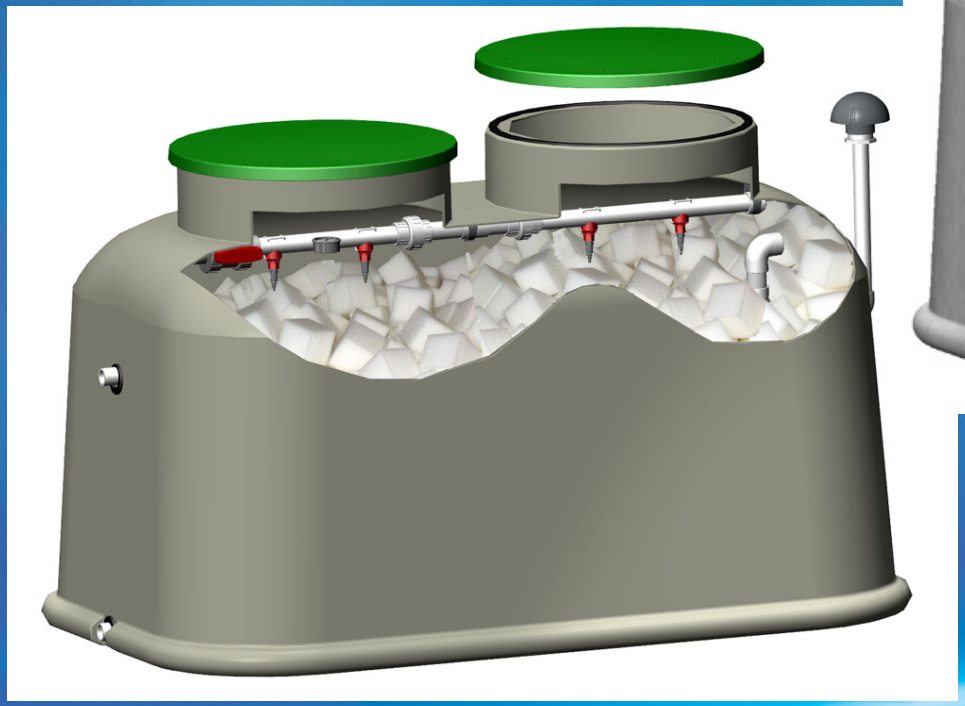


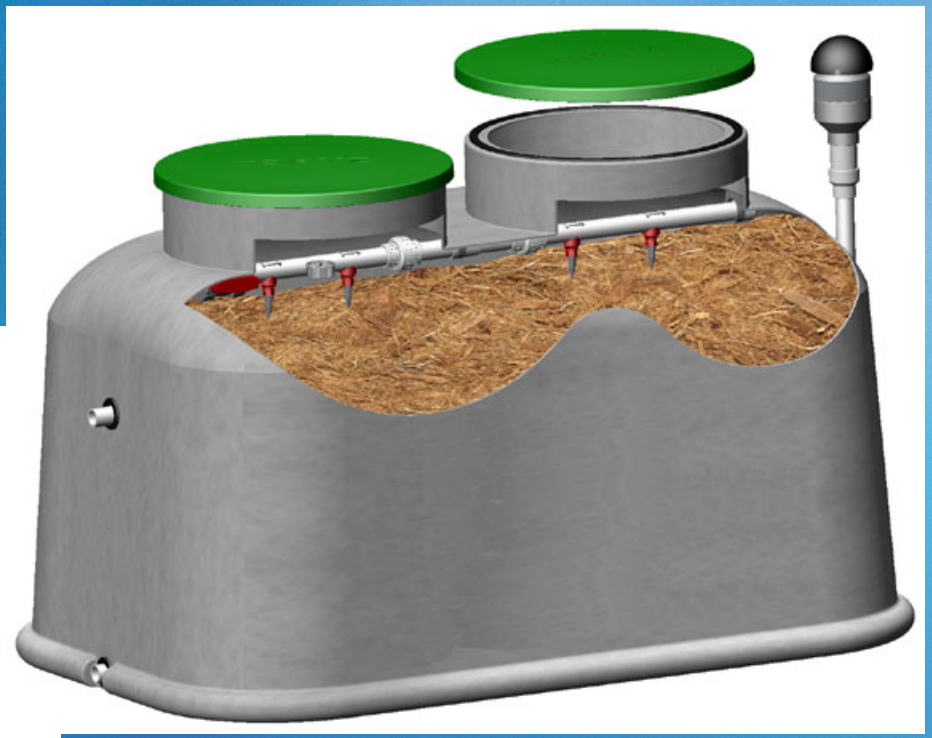
Media Units Approved in Florida

- Unsaturated - natural
  - Quanics – coconut coir*
  - Ecoflo
  - Ecopure*
  - Puraflo
- Unsaturated - artificial
  - Advantex*
  - Earthtek
  - Quanics – foam*

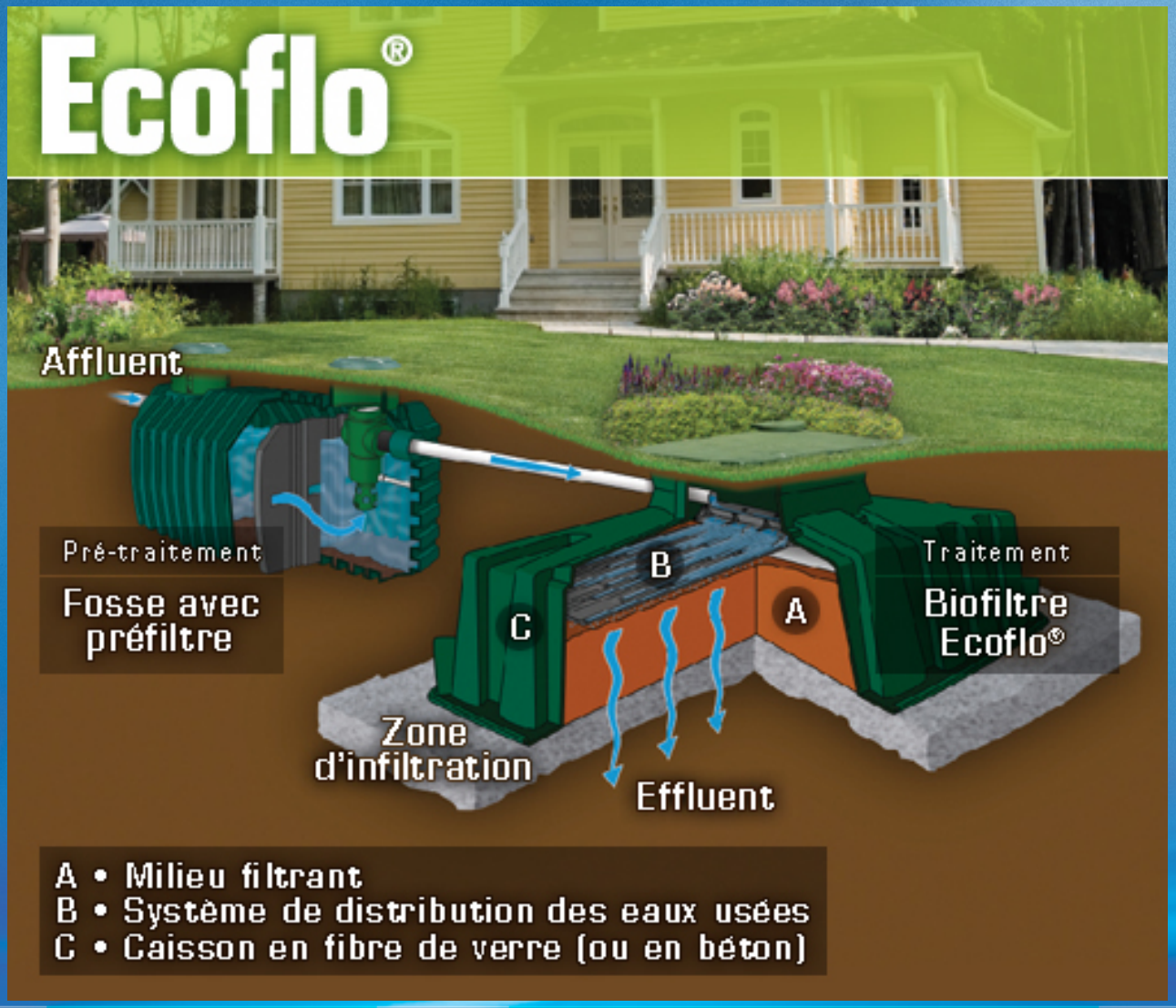
* System can be designed as PBTS by FL PE
Click on name to visit manufacturer's site

Quanics – Aerocell & BioCoir

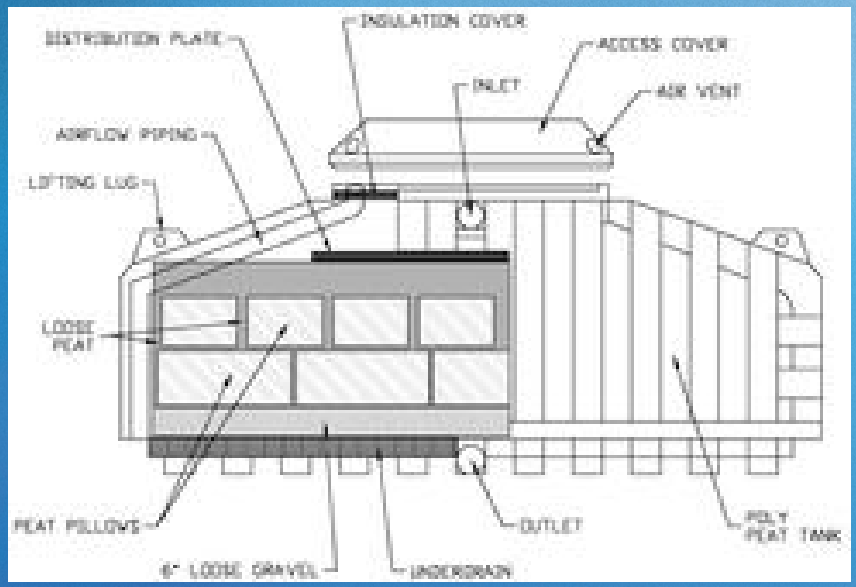




Ecoflo

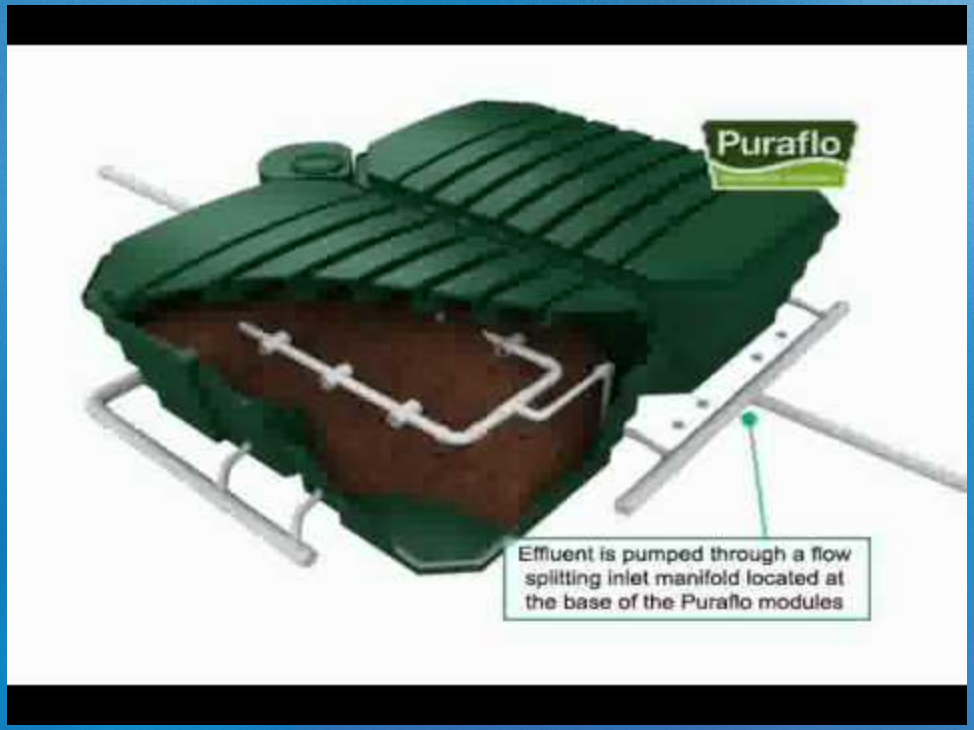

Ecoflo®
Affluent
Pré-traitement
Fosse avec préfiltre
B
C
A
Traitement
Biofiltre Ecoflo®
Zone d'infiltration
Effluent
A • Milieu filtrant
B • Système de distribution des eaux usées
C • Caisson en fibre de verre (ou en béton)

Ecopure


DISTRIBUTION PLATE
INSULATION COVER
ACCESS COVER
INLET
AIR VENT
AIRFLOW PIPING
LIFTING LUG
LOOSE PEAT
PEAT PILLOWS
6" LOOSE GRAVEL
UNDERDRAIN
OUTLET
POLY PEAT TANK

Advantex

Puraflo


Puraflo
Effluent is pumped through a flow splitting inlet manifold located at the base of the Puraflo modules

Dispersal Options

- Low Pressure Piping (LPP)
- Drip Irrigation

Gives us the opportunity to build “treatment trains” for water reuse with additional uptake of nitrogen

Benefits of OSTDS

- Individualized
  - Single family
  - Decentralized
- Groundwater recharge
- Limited Collection/Transport Piping
  - Less opportunity for contamination
  - $$$ savings

Where do we go from here?

- Determine acceptable TN loading rate for area
- Determine “best fit” technology
  - Use – fulltime, seasonal, rental
  - Footprint
  - “Cradle to Grave” cost

Questions/Comments

- I would like to suggest manufacturers be invited to present specifics of technologies at upcoming meeting(s).
- Or a fieldtrip to the FOWA Training Center to gain “hands-on” experience of various technologies.