

Operation & Maintenance Onsite systems DO work

Bob Johnson

Atlantic Solutions, LTD., VP

Tiverton, Rhode Island

What we know

Onsite Wastewater Treatment Systems are

- Cost-effective and long-term.

Adequately managed decentralized wastewater systems are a cost-effective and long-term option for meeting public health and water quality goals ... particularly in less densely populated areas.

-- Executive Summary, Response to Congress
US Environmental Protection Agency, 1997

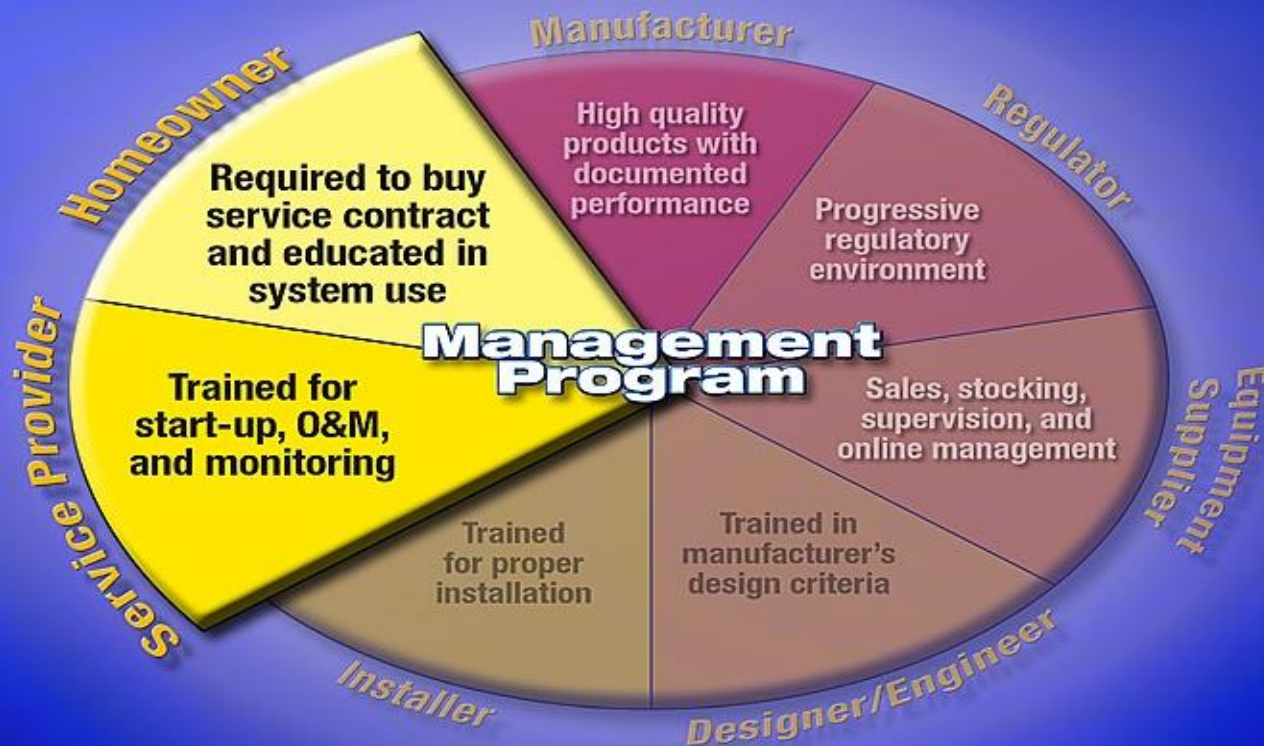
- Regulations are strengthening

MADEP proposed BANRT

- Management is essential

Beyond just regulations, ongoing management requires all stakeholders be involved to insure success

Participation of both Service Providers and Homeowners is essential to achieving long term success



The Service Provider, Evolution of

- Acknowledged as a critical component in the industry
- Regulatory support and regulations have increased
- Training program quality has improved
- System users have accepted them as a necessary trade
- Mandatory management programs have increased success

Owner Education is Key

“Our findings show that most failed systems result from lack of consumer information or owner neglect.”

-- EPA National Small Flows Clearinghouse

H O M E O W N E R D O S A N D D O N ' T S

Preventive Maintenance for Homes with Onsite Wastewater Treatment Systems

There are a number of dos and don'ts that will help ensure a long life and minimal maintenance for onsite systems. As a general rule, nothing should be disposed into any wastewater system that hasn't first been ingested, other than toilet tissue, mild detergents, and wash water. Here are some additional guidelines:

D O S A N D D O N ' T S F O R I N S I D E T H E H O U S E



DONT flush dangerous and damaging substances into your wastewater treatment system. (Please refer to the "Substitutes for Household Hazardous Waste," on page 5) Specifically, do not flush . . .

- Flammable or toxic products
- Household cleaners, especially floor wax and rug cleaners
- Chlorine bleach, chlorides, and pool or spa products
- Pesticides, herbicides, or agricultural chemicals or fertilizers
- Water softener backwash
- Excessive amounts of bath or body oils



DONT use special additives that are touted to enhance the performance of your tank or system. Additives can cause major damage to your drainfield and other areas in the collection system. The natural microorganisms that grow in your system generate their own enzymes that are sufficient for breaking down and digesting nutrients in the wastewater.



DO use your trash can to dispose of substances that cause maintenance problems and/or increase the need for septage pumping. Dispose of the following with your trash:

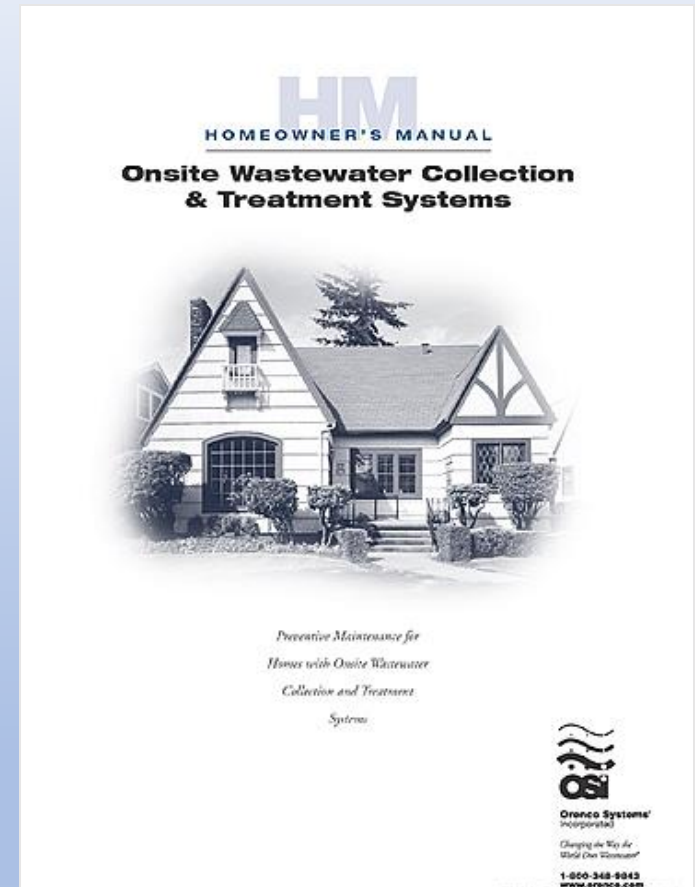
- Egg shells, kitty litter, coffee grounds, tea bags, cigarette butts
- Paper towels, newspapers, sanitary napkins, diapers
- Cooking grease
- Rags, large amounts of hair



DO collect grease in a container and dispose with your trash. And avoid using garbage disposals excessively. Compost scraps or dispose with your trash, also. Food byproducts accelerate the need for septage pumping and increase maintenance.

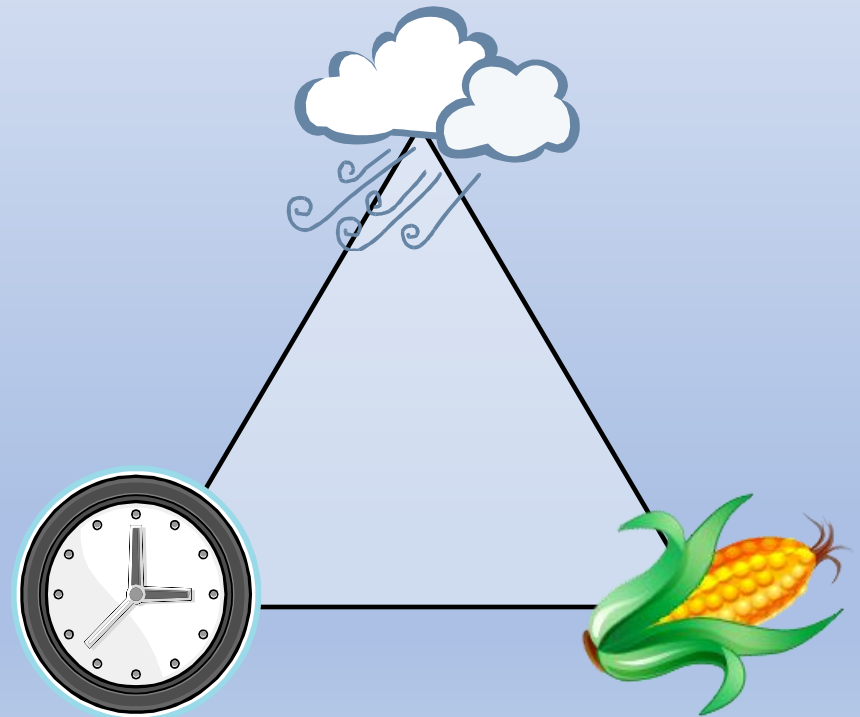
Who educates Homeowners

- ALL stakeholders
 - Regulators – Rules and Requirements
 - Designers – What is proposed
 - Supplier – What is installed
 - Service Provider – ongoing requirements
- Homeowners are responsible for ...
 - Maintaining a service contract
 - Understanding Owner's Manual
 - Practicing wise system use
 - Notifying service provider of any atypical performance issues (e.g., odor, funny pumping or gurgling sounds)



Service Provider Education Must Include ...

- Basic wastewater treatment
 - Food
 - Air
 - Time
- Design standards
 - Quantity (flow)
 - Quality (concentration)



SP Training Must Include ...

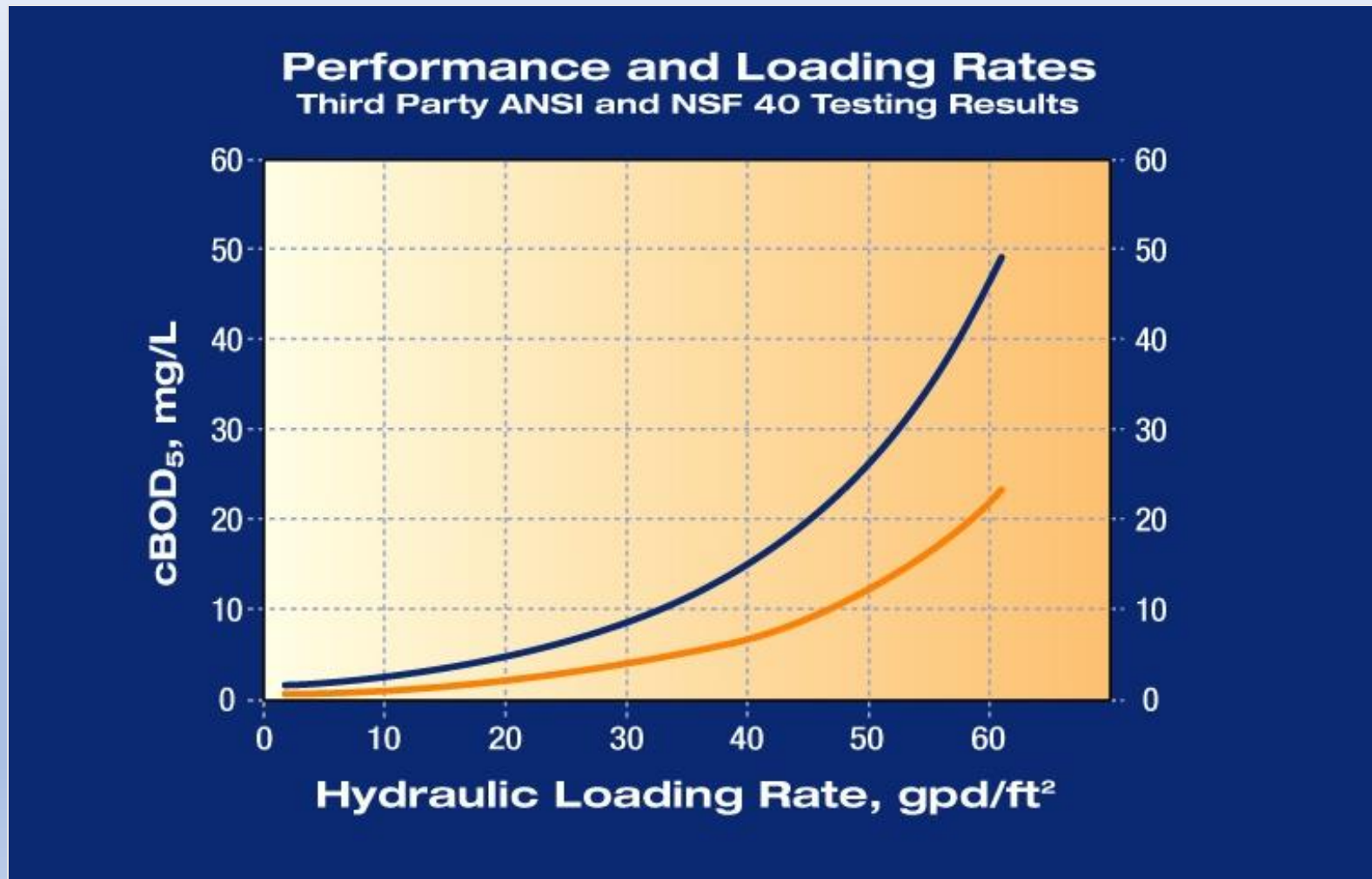
- Fundamentals of wastewater constituents

	Average <i>mg/L</i>	Weekly Peak <i>mg/L</i>	Rarely Exceed <i>mg/L</i>
BOD ₅	150	200	300
TSS	40	60	150
TKN	65	75	150
G&O	20	25	25

SP Training Must Include ...

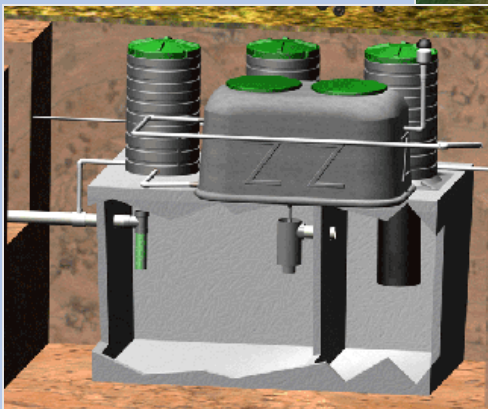
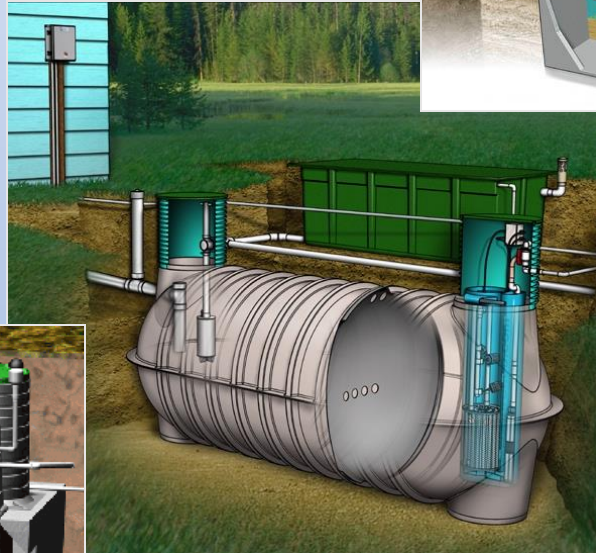
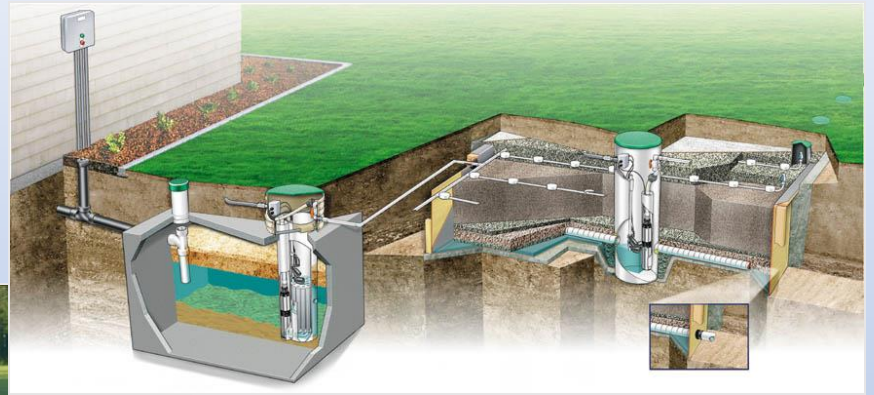
- Basic understanding of wastewater strengths and limits
 - Residential vs. Commercial influent characteristics
 - Regulatory permit limits
 - Average vs. Not to exceed
 - Constituents affecting treatment efficiencies
 - Alkalinity
 - Temperature
 - Non sanitary discharges that necessitate further consideration
 - Water softeners
 - Cleansers
 - Toxic chemicals
 - Pharmaceuticals
- Process control
 - Operational controls available to adjust for better performance

Loading Rates Affect Performance

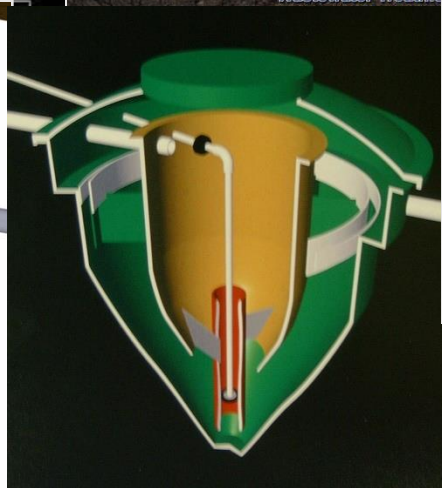
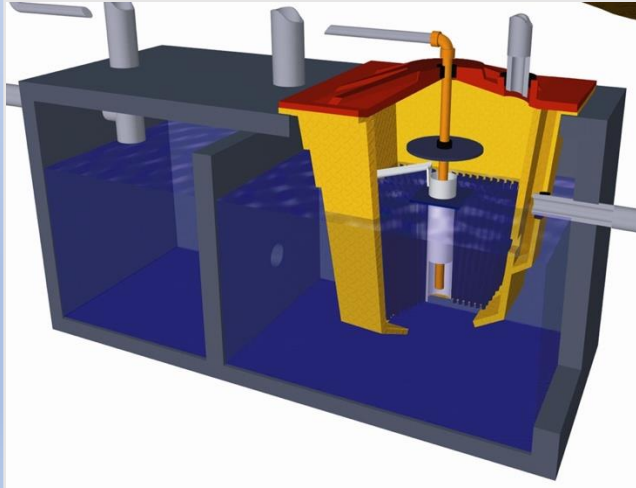
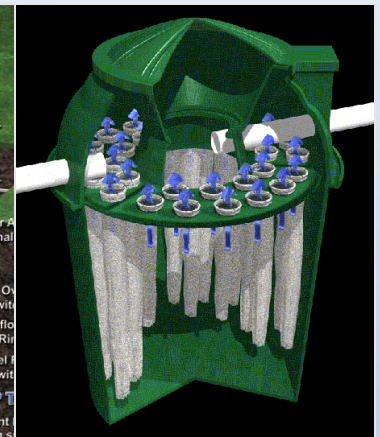
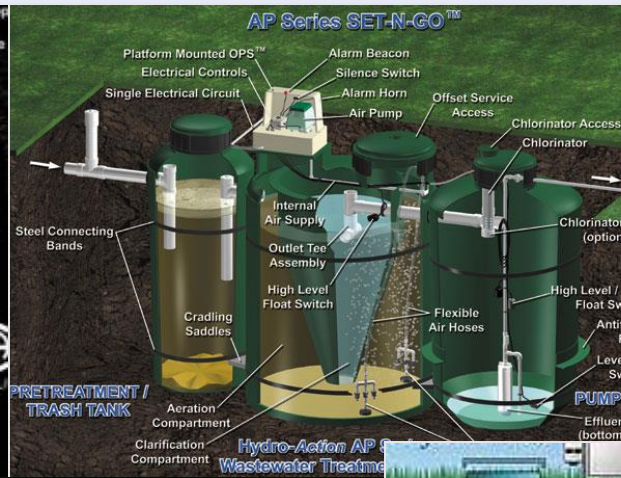
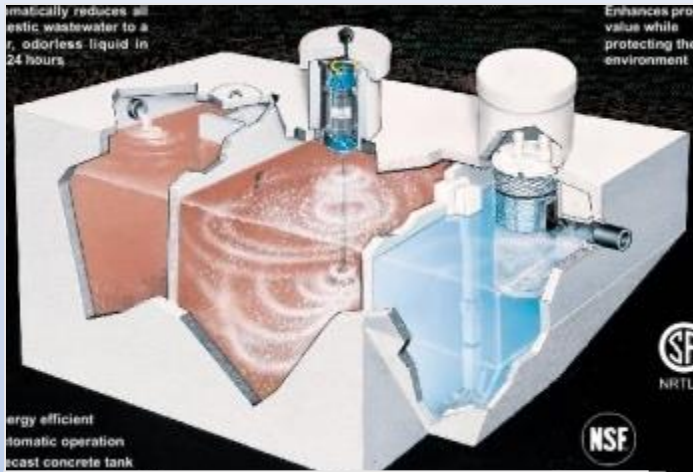


Packed Bed Filters

- Sand filters
- Synthetic media filters
- Peat filters



Suspended Growth Systems




Service Provider's O&M Responsibilities...

- Attend manufacturer training for installation, operation, and maintenance
- Supervise system start-up
- Obtain signed service agreement
- Education owner on system responsibilities
 - What's covered in contract
 - Frequencies of service and reporting
 - When to call with concerns, ALWAYS



Service Provider's O&M Responsibilities...

- Service Provider must retain information on each site...
 - Address
 - System make and model number
 - Installation date
 - Start-up date
 - Design flow
 - Designer name
 - Permit requirements
- Service Provider must retain schematics on each site, including ...
 - System configuration, as designed
 - System configuration, as built

Record of System Facts	
(Record in Pencil)	Property Address _____ Dealer Name _____
	Property Owner Name(s) _____ Dealer Phone _____
	Property Owner Phone _____ Engineer Name _____
	Property Owner E-Mail _____ Engineer Phone _____
	Start-Up Date _____ Installer Name _____
	AdvanTex™ Model # _____ Installer Phone _____
	Control Panel Model # _____ Service Provider Name _____
	Float Model #(s) _____ Service Provider Phone _____
	Pump(s) Model #(s) _____ Regulatory Authority _____
	Pump(s) Design Specifications: _____ Permit # (if applicable) _____ _____ gpm _____ gpm
	Design Flow _____ Contact Name _____
	Tank(s) Size(s) _____ Contact Phone _____
	Recirc Ratio (start-up) _____
	Recirc Timer Settings _____
	Discharge Timer Settings (when applicable) _____
Initial Squirt Height _____	
Dispensal Method _____	
 Oreco Systems™ Incorporated Changing the Way the World Does Wastewater® 1-800-348-6843 www.oreco.com	
Distributed by: _____	
AIM-OM-ATX Rev. 1.0, 11/00 © Oreco Systems® Inc.	

Cost-Effective Operation & Maintenance

- Cost effective O&M is possible
 - O&M can be labor intensive
 - Efficiencies O&M procedures reduce labor
 - Proactive routine O&M reduces costly additional service calls.
 - Unnecessary lab tests can be costly
 - Barnstable County testing currently averages \$250 - \$300 per event
 - System accessibility reduces labor costs
 - Service Provider to discuss access needs with owner
 - Accessible unit will receive proper service routinely

Maintenance Checklist		AFO-OM-1 Rev. 2.1, 8/02 © Orenco Systems [®] , Inc.
AdvanTex[®] Treatment Systems		
<small>While regional regulations may vary, Orenco Systems requires that the following inspection and maintenance activities be performed, by a qualified provider, on all AdvanTex[®] Treatment Systems sold. All activities are to be performed three-to-six months after system start-up, and an annual field-service inspection, including sampling, is to be scheduled in late spring or in early summer. For AXN systems, there is to be a minimum of four inspections during the first two years, and then annual inspections thereafter. Copies of inspection and maintenance reports and additional comments/documentation are to be forwarded to the AdvanTex[®] Dealer, or if no Dealer, to Orenco Systems, 814 Airway Avenue, Sutherlin, OR 97475.</small>		
Maintenance Activity	Activity Check-Off/Notes	
A) Inspect Control/Alarm Panel		
1) Check pump operations in manual mode	<input type="checkbox"/> _____	
2) Check/record pump amperage and voltage	<input type="checkbox"/> _____	
3) Check timer settings	<input type="checkbox"/> _____	
4) Record elapsed time meter and counter readings if applicable	<input type="checkbox"/> _____	
5) Confirm operation of audible and visual alarms	<input type="checkbox"/> _____	
B) Inspect/Test Pumping System		
1) Verify no leaks in riser	<input type="checkbox"/> _____	
2) Inspect splice box for moisture and secure connections	<input type="checkbox"/> _____	
3) Verify condition of and correct operation of all floats	<input type="checkbox"/> _____	
4) Verify neat wrap of float cords	<input type="checkbox"/> _____	
5) Pull pump; and clean intake screen if necessary	<input type="checkbox"/> _____	
6) Visually inspect recirculating splitter valve and liquid level	<input type="checkbox"/> _____	
C) Inspect Effluent Filters/Pump Screens		
1) Clean as needed	<input type="checkbox"/> _____	
2) Visually inspect and comment on biomat growth	<input type="checkbox"/> _____	
D) Inspect Processing Tank		
1) Verify no inlet flow	<input type="checkbox"/> _____	
2) Inspect liquid depth, odor, scum color, effluent characteristics	<input type="checkbox"/> _____	
3) Measure sludge and scum; recommend tank pumping, if necessary	<input type="checkbox"/> _____	
E) Inspect AdvanTex[®] Filter		
1) Inspect for ponding; assess character and color of biomat	<input type="checkbox"/> _____	
2) Check squirt height	<input type="checkbox"/> _____	
3) Verify proper orifice position, equal spray under orifices, no dogged orifices	<input type="checkbox"/> _____	
4) Check for odors; adjust recirculating time if necessary	<input type="checkbox"/> _____	
5) Clean and flush manifold (if necessary)	<input type="checkbox"/> _____	
6) Re-check squirt height	<input type="checkbox"/> _____	
7) Inspect fan intake vent and clean as necessary (AdvanTex [®] -HX only)	<input type="checkbox"/> _____	
F) Miscellaneous		
1) Exercise all iron, metal, and mechanical valves	<input type="checkbox"/> _____	
2) Return valves, control panel to proper settings	<input type="checkbox"/> _____	
3) Submit required documentation	<input type="checkbox"/> _____	

Cost-Effective O&M Includes ...

- Prepared Service Provider
 - Have right tools for the system, some are manufacturer specific
 - Service vehicle stocked with reasonable spare parts
 - All replacement parts should be OEM to meet specifications of the original design
 - Homeowners don't want to pay travel time to pickup routine replacement parts
 - Know the manufacturers required procedures for the system you are servicing

22	ADVANTEX™ O&M MANUAL
Tools, Equipment, and Spare Parts List	
<p>Many of the recommended maintenance and troubleshooting procedures require specialized tools, equipment, and spare parts. At a minimum, we recommend you keep the following items on hand:</p>	
<p>Tools and Equipment</p> <p>anemometer (call for information)</p> <p>beakers or bottles</p> <p>camera (preferably digital)</p> <p>calculator</p> <p>channel lock pliers—6" and 12"</p> <p>crimping tool—10 to 22 AWG</p> <p>drill (cordless with spare batteries, charger)</p> <p>drill bit set—1/16" to 1/2"</p> <p>electrical tester (voltage and amperage)</p> <p>extension cord</p> <p>flashlight</p> <p>funnel</p> <p>hacksaw</p> <p>hammer</p> <p>heat gun (torch)</p> <p>hole saw (vari-bite: 3/4" and 1-3/8")</p> <p>hose with nozzle</p> <p>pencil</p> <p>Mirror on a Stick (available from Prototek)</p> <p>pressure gauge (0 to 100 psi, 0 to 200 psi)</p> <p>back-pack pressure washer (portable)</p> <p>screwdriver set (straight blade and phillips)</p> <p>shovel</p> <p>SMOG device</p> <p>SMUG device</p> <p>snake (building sewer)</p> <p>squirt-height gauge</p> <p>stir sticks</p>	<p>tape measure</p> <p>watch or stopwatch</p> <p>wire strippers</p> <p>wrench (24" pipe wrench)</p> <p>wrench (lid bolt)</p> <p>30 gal. garbage can</p> <p>30 gal. garbage bags</p> <p>Spare Parts</p> <p>control panel parts:</p> <p>— breakers</p> <p>— contactors</p> <p>— elapsed time meters</p> <p>— event counters</p> <p>fuses</p> <p>epoxy</p> <p>floats</p> <p>heat shrink tubing</p> <p>insulated butt connectors</p> <p>king connectors</p> <p>lid bolts</p> <p>PVC fittings (3/4" to 2")</p> <p>PVC glue/primer</p> <p>PVC pipe (3/4" to 2")</p> <p>wire nuts</p> <p>Hygiene and Clean-Up</p> <p>bleach/water solution</p> <p>hand cleanser</p> <p>paper towels</p> <p>protective clothing</p> <p>rubber gloves</p> <p>towels and rags</p> <p>Miscellaneous</p> <p>Patience and good humor!</p>

Cost-Effective O&M Includes ...

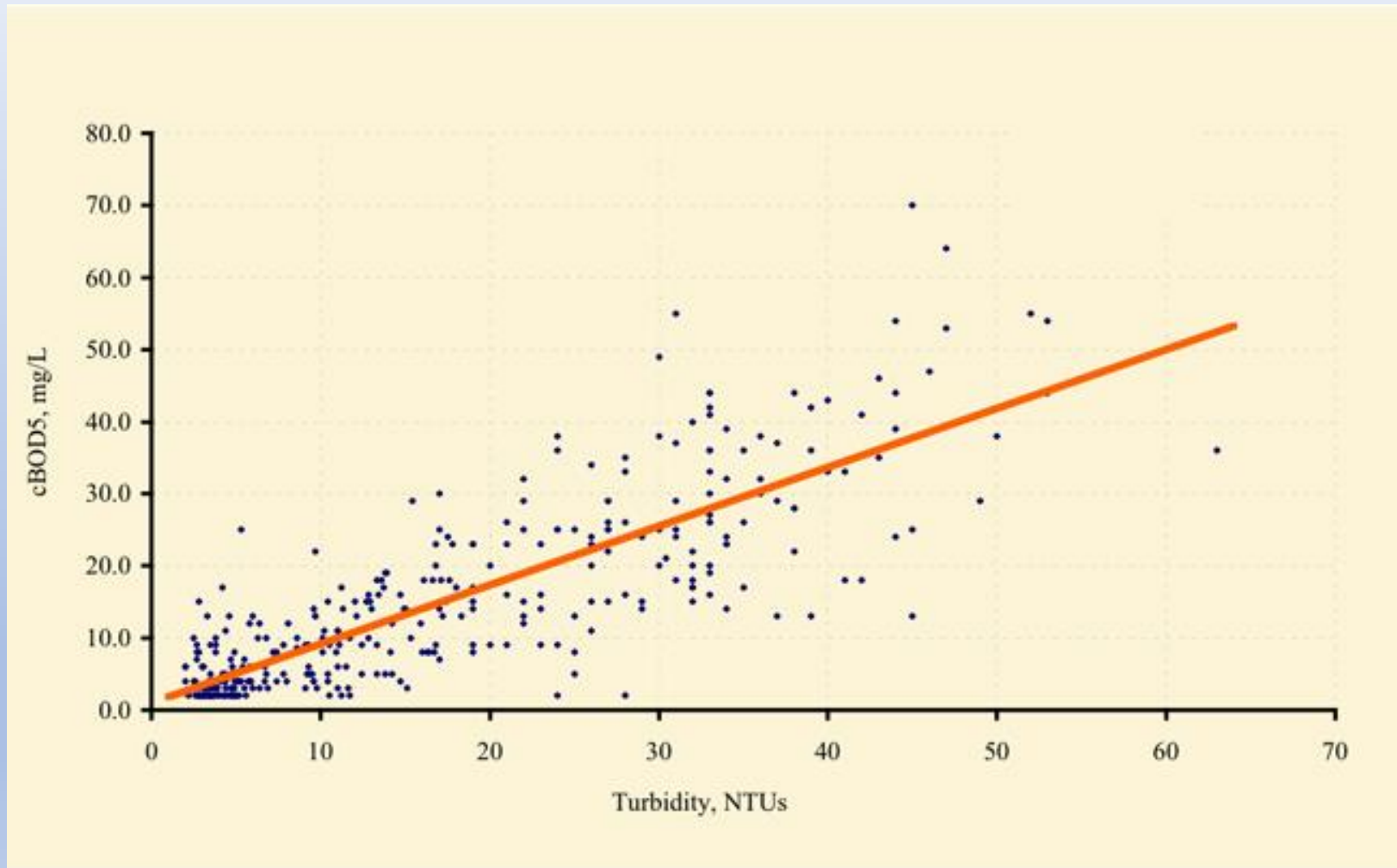
- Understanding that every “effect” has a “cause”
- When troubleshooting, Service Providers must ask ...
 - What’s the flow?
 - Typical for usage
 - Within design parameters
 - What are the wastewater strength characteristics
 - Excessive fats, oil and grease
 - Household chemicals
 - Low flow fixtures
 - How’s the equipment performing
 - Worn? Corroded? Stuck? Broken? Clogged?
 - Does it smell right?
- Cost effective to spend \$400 pumping the tank? without exploring the real cause!

Cost-Effective O&M Includes ...

- Assessing treatment performance
 - Use field samples as indicator
 - Odor – offensive (rotten eggs) can indicate low DO
 - Visual – Turbidity
 - Colormetric – Dissolved Oxygen
 - Meter – pH
 - Test Strips - alkalinity



Relationship Between Turbidity and cBOD



Lab Tests May Be Needed

- If field tests suggest a problem, and troubleshooting fails to find the cause, then sampling and lab tests MAY be warranted:

Parameter	Methodology	Typical Values
Turbidity	Field	5 to 40 NTUs
BOD ₅	Grab	5 to 25 mg/L
TSS	Grab	5 to 30 mg/L
TN	Grab	15 to 30 mg/L
DO	Field	2-6 ±
pH	Field	6-8 ±

Proper Equipment

- Portable turbidity meters
- Dissolved oxygen test kit
- Field pH meter
- Additional equipment for nitrogen testing



YOU Can Help SPs Successful Operations

- Regulators: Mandate & Enforce service contracts for onsite systems
- Educators: Create cost-effective Service Provider trainings
- Equipment Suppliers: Provide Service Providers with adequate access to equipment
- Manufacturers: Improve and provide reliable equipment and configurations
- Service Providers: Learn and practice proper cost-effective O&M procedures

Questions?

Bjohnson@atlanticsolutionsltd.com