Current Test Center Efforts

- Research and Development
- ETV Nitrogen Testing
- Phosphorus Removal Technologies
- Virus Research
- Standard Treatment Testing
- Seasonal –Intermittent Use Research

The opinions expressed herein are not necessarily those of the Massachusetts Department of Environmental Protection, the United States Environmental Protection Agency or the Barnstable County Department of Health and the Environment, neither does the mention of any product or procedure constitute an endorsement of such by those agencies.

Review

Why Would Anyone Use Alternative Septic Systems?

- To allow a smaller leachfield or reduced distance to groundwater in repair situations (DEP Remedial Approval).
- To achieve reductions in certain contaminants using systems with some track record (DEP Provisional or General Use Approval)
- To try to remove selected contaminants using more experimental technologies (DEP Piloting Approval)

Achieving the Treatment Necessary to Allow for Leachfield Reduction is Relatively Easy

The Quest to Remove Nitrogen from Wastewater

Nitrogen Removal Process Summary

Nitrogen from Wastewater (Primarily Urea)

Usually occurs in septic tank

Ammonium

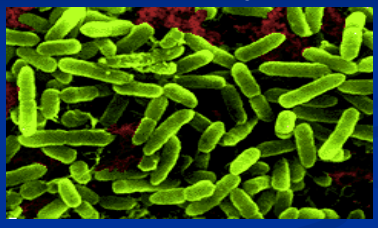
Usually occurs beneath leachfield

Nitrite & Nitrate

Nitrogen Gas

Only occurs in anoxic conditions

NITROGEN TRANSFORMATIONS IN WASTEWATER ARE MEDIATED PRIMARILY BY BACTERIA



It's all about ENERGY!

RSF Recirculating Sand Filters

From House

Septic Tank

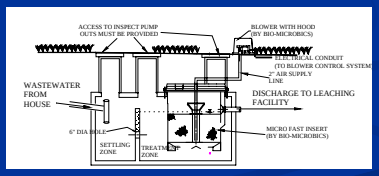
Pump Chamber

Recirculating Sand Filter

Generally expect TN~ 20-25 mg/l, but there are possibilities for higher removal rates with design modifications and oversight.

MicroFAST®

ETI



Generally <19mg/l TN, provided that the sludge level is regularly monitored. Excursions related to sludge buildup

Bioclere

ETV

From House

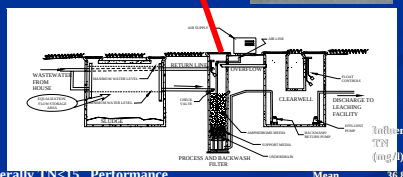
Septic Tank

Discharge

Recycle line

	Effluent (TN mg/l)	Influent (TN mg/l)
Mean	15.6	37.9
Median	13.5	38.0
Count	52	82

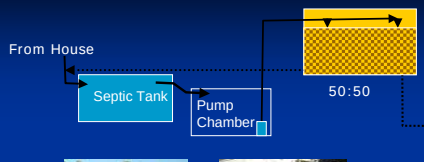
Amphidrome®



	Influent TN (mg/l)	Effluent TN (mg/l)
Mean	36.8	15.0
Median	37.0	14.3
Count	60	53

Generally TN<15. Performance excursions related to sludge buildup in primary tank

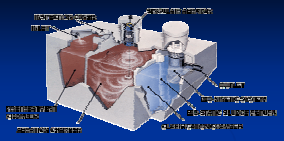
Waterloo Biofilter

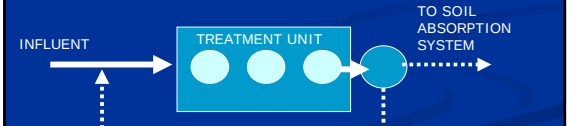


Generally TN~15-17 mg/l TN. Excursions related to short circuiting.

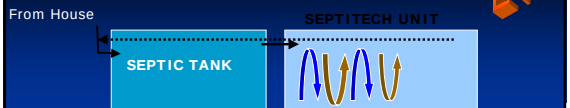
	Influent TN (mg/l)	Effluent TN (mg/l)
Mean	37.5	15.4
Median	38.0	12.9
Count	103	87

Norweco Singulair



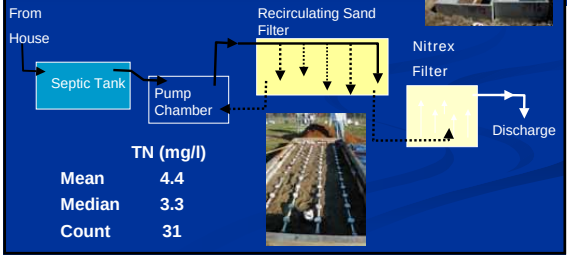


SEPTITECH

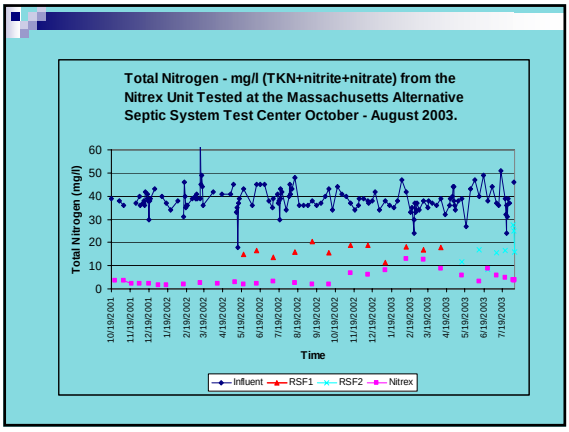


	Influent TN (mg/l)	Effluent TN (mg/l)
Mean	38.0	13.8
Median	38.0	13.8
Count	98	57

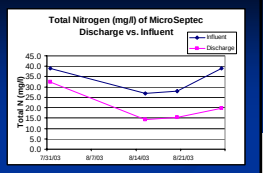
Nitrex



TN (mg/l)	
Mean	4.4
Median	3.3
Count	31

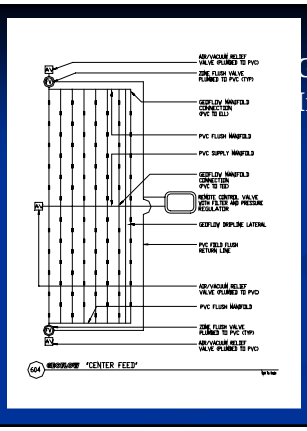


MicroSeptec



Drip Irrigation

Geoflow® Drip Irrigation ETI



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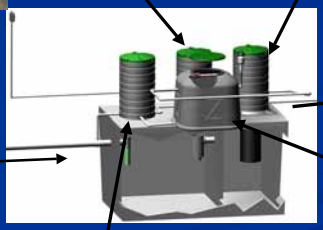
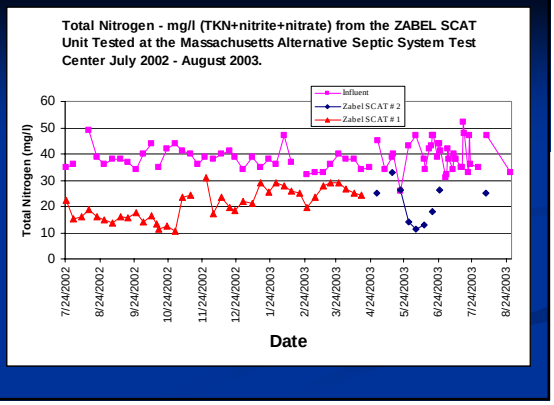
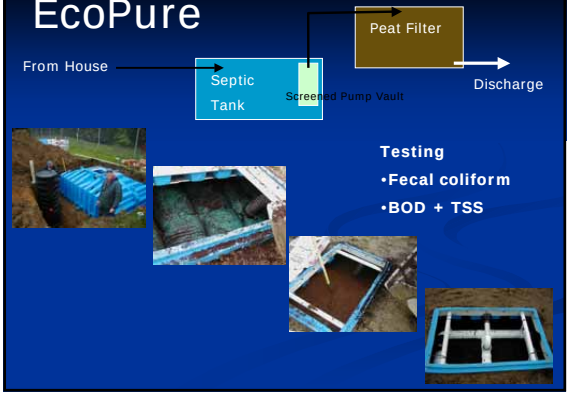




EcoPure



ReCip

From House

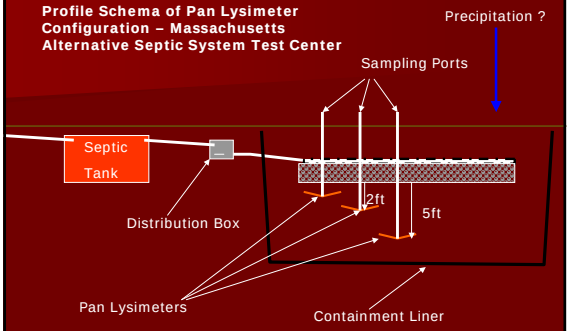
Microbial Enhancements

Difficulties with verifying performance for certain constituents – Notably Nitrogen!

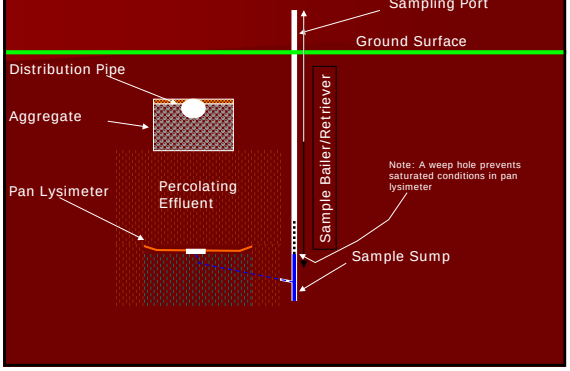
OAR

Microbiological Enhancement of the Treatment Process

Profile Schema of Pan Lysimeter Configuration – Massachusetts Alternative Septic System Test Center



End View Schema of Pan Lysimeter Configuration – Massachusetts Alternative Septic System Test Center



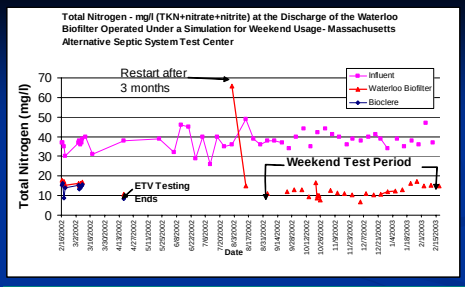
How many more ?

Design Consideration for Innovative / Alternative Systems

-the golden rule-

- Design for accessibility!!!
- Picture yourself maintaining the system.
- Picture yourself taking a sample from the system.
- Be the sampler – grasshopper.
- Event timers and counters!

What about Seasonal applications ?

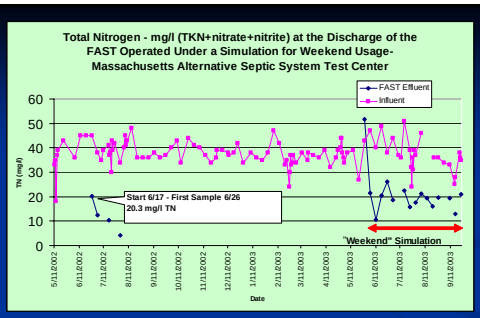


Test Protocol

Monday A.M –Thursday P.M. System Off

Friday A.M – Monday 7:00 A.M System On

Composite Sampler set Sunday 7:00 A.M.- Monday 7:00 A.M.



Test Protocol

Wednesday A.M. –Monday A.M. System Off

Monday A.M. – Wednesday 7:00 A.M. System On

Composite Sampler set Tuesday 7:00 A.M.- Wednesday A.M.

Enhancing Bacterial Removal From Treated Effluent from a Waterloo Biofilter Using Soil

Discharge Pipe

6" AGGREGATE

10" of Sandy Loam

Perc Rate est. 8 min/in

Bacterial indicators nearly completely removed. 2-log removal of viruses.