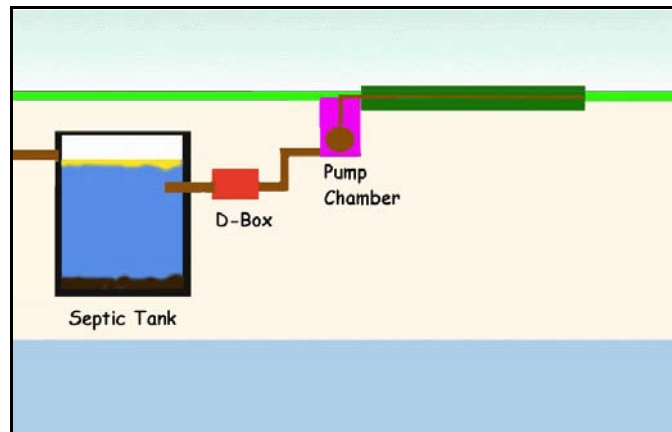


Massachusetts Alternative Septic System Test Center Technology Fact Sheet - *Interim Findings*

Geoflow Wasteflow Drip Line with Rootguard

The Massachusetts Alternative Septic System Test Center is a collaborative project of the Buzzards Bay Project National Estuary Program, Massachusetts Office of Coastal Zone Management, Massachusetts Department of Environmental Protection, Barnstable County Department of Health and the Environment, and UMass Dartmouth School for Marine Science and Technology. The Test Center was established in recognition of the need in Massachusetts for cost-effective wastewater disposal systems suitable for sites with limited space, poor soils, high groundwater elevations, or where advanced pollutant removal is required. Its mission is twofold. First, to evaluate the performance and operation costs of new and innovative wastewater disposal technologies in a carefully controlled and unbiased manner, and provide this information to regulators and consumers. Second, to assist vendors in getting their technologies more quickly approved for use in Massachusetts, and at a lesser cost.

Technology Name: Wasteflow Drip Line with Rootguard.
Technology Type: Subsurface drip disposal of septic tank effluent or wastewater.
Manufacturer: Geoflow Inc.
307-0 W. Tremont Avenue
Charlotte NC 28203
(704) 347-3476
Contact: Suzanne Dill
Company Website: www.geoflow.com
Performance & Permitting info at MA DEP and BCHED Websites:
www.state.ma.us/dep/brp/www/t5pubs.htm#it
www.barnstablecountyhealth.org/AlternativeWebpage/
Testing Objectives: Nitrogen removal capability.
Testing Period: Results shown for 3/00 to 2/01, testing is ongoing.
Test Loadings: System loading was 330 gpd, (in 15 doses AM/PM), SAS was 0.74 gallons per sq. ft per day.



Generalized design of Geoflow Wasteflow Drip Line.



Drip Lines shown during installation.

Siting Considerations and Installation Notes

As configured at the Test Center, the GeoFlow System consists of a septic tank, pump chamber and drip irrigation soil absorption system. It is critical that all effluent distribution lines are self-draining. All valve boxes and risers for pressure relief valves should be insulated against cold and easily accessible. High level of installation oversight by manufacturer or distributor is recommended. Recommend avoiding installation in areas where vehicle loads are even occasionally possible. Effluent tee filter should be installed in the septic tank. The only above ground component is an electrical control panel with audible and visual alarm. The electrical panel contains programmable logic controllers (PLC) for control and sequencing of backflushing and dosing. Lush lawn requires additional mowing, or alternative vegetation can be considered. Possibly suitable for high groundwater elevation or shallow bedrock sites.

Actual and Manufacturer's Estimated Costs (3-bedroom home) and Labor Non-Title 5 Components: \$1,000. (manufacturer's claim).

Components + Installation: \$2,000 more than conventional (claim).

Electrical: \$62 per year actual (local rates, KWh= 565).

O&M: Quarterly inspection of motors, air flow, effluent and sludge. A service contract is required in Massachusetts (Approximately \$400 per year minimum, but varies). Septic tank pumping averages \$60 per year.

Other Costs: Quarterly effluent quality monitoring is required for some permits (\$300 or more annually). Design and permitting costs vary with site.

Replacement: Pumps (\$300) have one-year manufacturers warranty, dripline claimed to have 30 year lifetime.

Theory of Operation

This technology uses the biological activity in the upper soil layer to achieve a stabilization of the wastewater at least comparable to a standard soil absorption system. It is presumed that the wastewater has some of the nutrients removed by plant uptake. Some water is undoubtedly evapotranspired by the overlying grasses.

Permitting and Use in Massachusetts (*as of June 2001*)

Certification for General Use: No approval in this category. **Remedial Use Approval:** No approval in this category. **Provisional Use Approval:** No approval in this category. **Piloting Approval:** currently under review for approval, several systems have been installed on a site-specific pilot basis. All installations in Massachusetts include I/A pretreatment, including disinfection in advance of the drip irrigation component.



Operation and Maintenance Issues

[This information will be included in the final report findings.]

Explanation of the Graphs

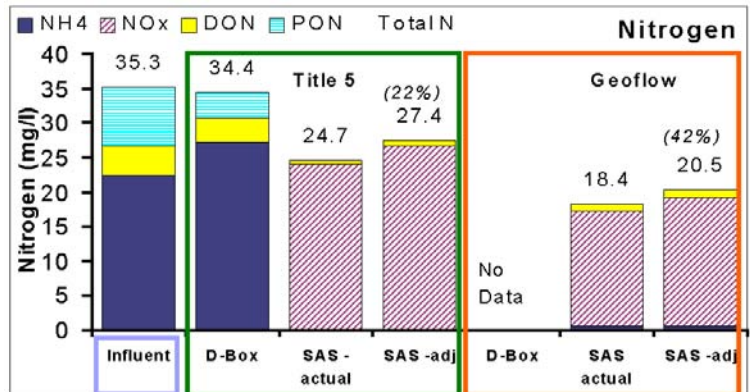
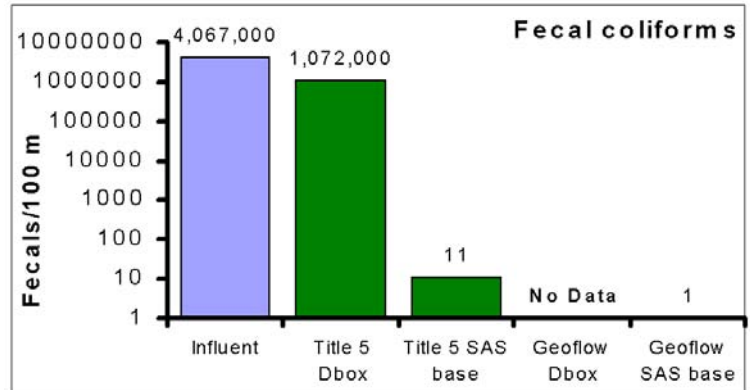
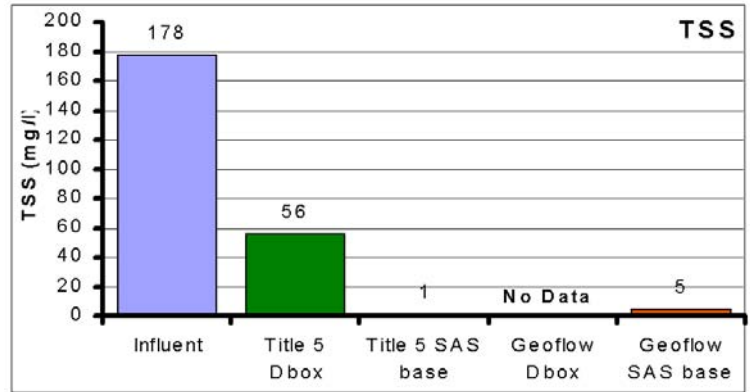
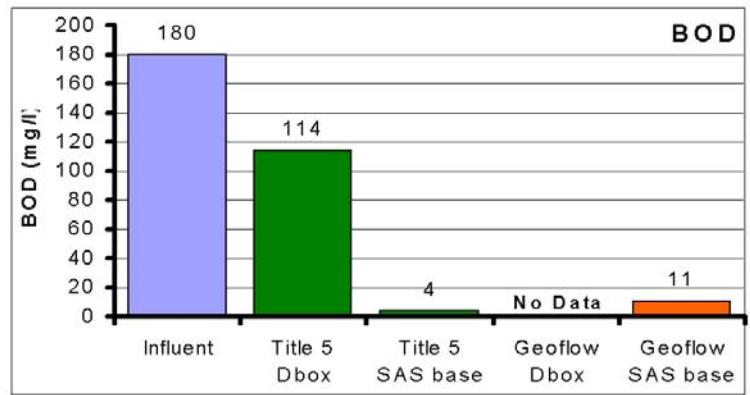
The graphs to the right show the mean of three replicates for each parameter over the testing period, compared to Title 5 performance and influent measured in parallel samples during the same period. Fecal coliform results are expressed as geometric means. In the nitrogen graph, NH₄ represents ammonia, NO_x represents nitrate + nitrite, DON is dissolved organic nitrogen, and PON is particulate organic nitrogen. Total nitrogen is the sum of these four parameters.

Soil absorption system samples include wastewater disposal system effluent and precipitation. The recharge of precipitation to groundwater is estimated to be between 8 percent-16 percent of effluent discharge based on local rainfall, estimated groundwater recharge rates, SAS size and dosage rates. For all technologies, an interim dilution rate of 10 percent was employed based on precipitation and theoretical and measured dosage rates at the Test Center. The results for nitrogen removal include this estimated dilution factor (note bars labeled "SAS adj.") Results shown for BOD, TSS, and fecal coliforms were not adjusted for dilution by precipitation, because the adjustment was negligible in evaluating overall performance. This interim approach, is being compared to specific conductivity, chlorides, and bromide tracer to better refine this estimate, and develop system specific dilution factors. **Thus, the "SAS adjusted" values reported here for nitrogen discharge to groundwater should be considered preliminary.**

Summary of Interim Findings

Geoflow is an SAS technology. BOD and TSS concentrations at the base of the SAS for this technology and the Title 5 system are similar. This technology provides additional nitrogen removal capability beyond a conventional Title 5 system, but does not meet a regulatory standard of 19 mg/l TN to allow for use in nitrogen sensitive areas. This technology could be considered for use with nitrogen removal to achieve higher nitrogen removal rates. This system was not tested at the Test Center for seasonal or intermittent use or for high hydraulic loading conditions.

The Technical Review Committee does not recommend adoption of nitrogen loading ratings for this technology until the two-year testing period is complete. Differences in nitrogen removal among technologies tested are not necessarily significant. Nitrogen removal performance may vary with soil types and other site differences. The Buzzards Bay Project will recommend nitrogen loading rates for this technology for planning purposes and watershed loading evaluations at a later date.



Funding for the Massachusetts Septic System Test Center was provided by the US EPA, through Cooperative Agreements x991657 and x981007, the Massachusetts Department of Environmental Protection (319-99-01, 319-00-02), Massachusetts Office of Coastal Zone Management, Massachusetts Environmental Trust, Barnstable County Department of Health and Environment, UMass Dartmouth SMAST, and other organizations. Other information on this initiative can be found at www.buzzardsbay.org. These fact sheets were reviewed by a multi-agency work group. The views or opinions expressed are not necessarily those of the Commonwealth of Massachusetts, the US EPA, or any of the funding organizations and agencies. The information presented here represents the technical findings of the Massachusetts Septic System Test Center after at least one year of system testing. Manufacturer claims of cost and longevity, warranties, or stated costs have not been verified. Modifications to system designs from those tested, or installation under other soil or climate conditions may result in different system performance. This fact sheet was prepared and printed by the Buzzards Bay Project.



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