

# RESEARCH SUMMARY

## Aquaworx Remediator™ Aerobic Bacterial Generator: Studies Show Improvements in Drainfield Hydraulic Performance

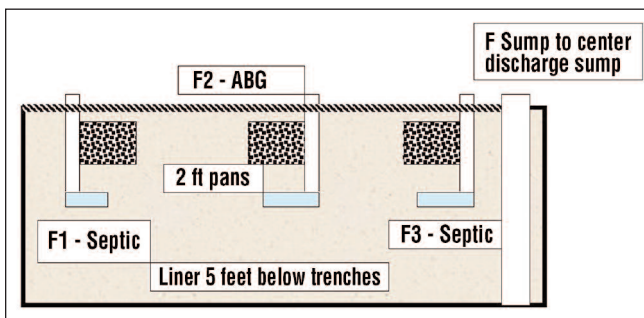
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The Aerobic Bacterial Generator (ABG<sup>1</sup>) technology has undergone performance testing to assess its ability to improve absorptive capacity in drainfields characterized by excessive biomat clogging. Performance tests conducted on the ABG demonstrate improved hydraulic capacity, as well as reductions in water quality concentrations such as biological oxygen demand (BOD<sub>5</sub>), and total suspended solids (TSS).

### Massachusetts' Alternative Septic System Test Center Field Study<sup>2</sup>

Performance testing conducted at the Massachusetts Alternative Septic System Test Center (MASSTC) located in Buzzards Bay, MA demonstrated that an ABG can increase wastewater absorption rates by three to five times for mature onsite wastewater trenches previously loaded with septic tank effluent. ABG units were installed in two separate septic tanks and tested on existing septic systems with established biological growth (Figure 1). Both systems were monitored for hydraulic performance and wastewater quality parameters.

Figure 1: MASSTC test trench cross section

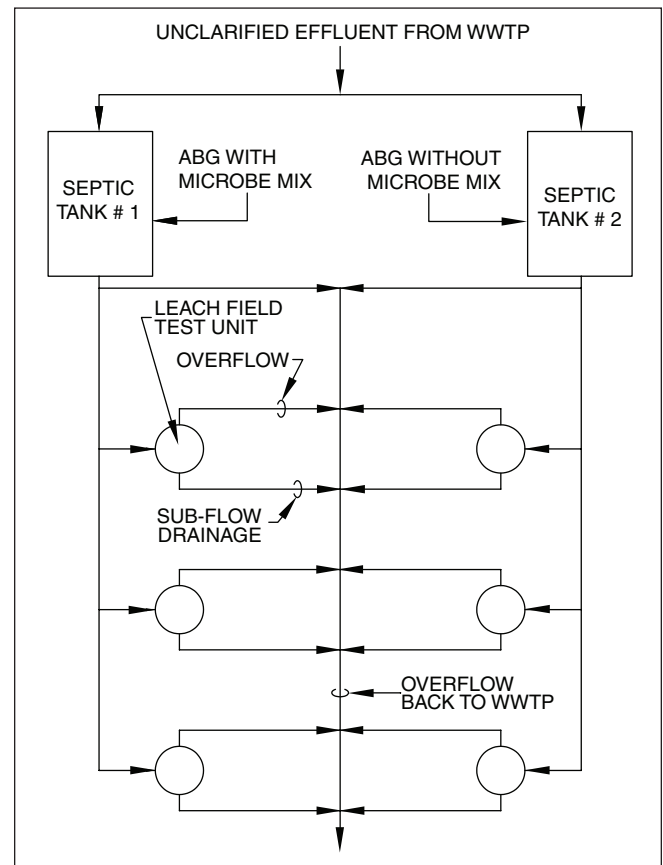


Results concluded improvements in hydraulic performance for mature systems, potentially extending the life of aging septic systems. Lysimeter testing revealed that pathogen reduction was consistent with that found for effluent after having passed through 2 feet of unsaturated sand. Even though water quality parameter concentration reductions were not a primary objective, chemical BOD<sub>5</sub> and TSS concentrations were reduced by 99% and 96%, respectively, after effluent flowed through 2 feet of unsaturated soil.

### University of California at Davis Laboratory Study<sup>3</sup>

A UC Davis study demonstrated that an onsite system's hydraulic performance was enhanced through the use of ABG technology. For this study, two 1,200-gallon septic tanks received a split stream of wastewater. A network of leachfield test cells received effluent from the septic tanks. Initially, effluent was discharged through the test cells until flow was reduced to an average of 1.0 gpd/ft<sup>2</sup> due to biomat clogging. Each septic tank was subsequently aerated with an ABG unit, and one of the tanks was inoculated with a proprietary cultured microbial mix (Figure 2). The control in the study was not inoculated with microbes. Results of the study revealed that the test cells served by the ABG unit with the cultured microbial inoculant had twice the flow rate as the test cells loaded with effluent from the control septic tank. The conclusion was that the increased flow was a result of a reduction in biological clogging due to the cultured microbe mix addition combined with aeration.

Figure 2: Plan view showing septic tanks and test cells



## University of Minnesota Field Study<sup>4</sup>

A University of Minnesota field study found that ABG technology was capable of reducing BOD<sub>5</sub> levels more than four fold. The University of Minnesota conducted a study of five devices installed to treat milk house waste. The units included four advanced aerobic pretreatment devices and one ABG unit. The ABG system reduced BOD<sub>5</sub> levels from an average of 754 mg/l to an average of 174 mg/l. Similarly, TSS levels were reduced by a factor of more than two, from an average of 303 mg/l to an average of 142 mg/l. While reduction in levels of BOD<sub>5</sub> and TSS are not necessary for properly functioning ABG units, the study indicates that the use of ABG technology will not result in the discharge of higher strength septic tank effluent into drainfields.

**Table 1:** Percentage reduction in effluent concentrations after ABG treatment.

Parameter	Average effluent data after septic tank	Average effluent data after ABG	Reduction (%)
BOD <sub>5</sub> <sup>1</sup> (mg/L)	754	174	77
COD <sup>2</sup> (mg/L)	1116	301	73
TSS <sup>3</sup> (mg/L)	303	142	53
FOG <sup>4</sup> (mg/L)	135	3	98
pH	7	7.5	---
Total Phosphorus (mg/L)	42	30	29
Ammonia (mg/L)	24	16	31
TKN <sup>5</sup> (mg/L)	39	37	7
Nitrite+Nitrate (mg/L)	0.3	2.6	---

1 Biological Oxygen Demand  
 2 Carbonaceous Oxygen Demand  
 3 Total Suspended Solids  
 4 Fats, Oils and Grease  
 5 Total Kjeldahl Nitrogen

## What is an Aquaworx Remediator?

The Aquaworx Remediator is an Aerobic Bacterial Generator; the unit is a 12-inch diameter, 36-inch high airlift column and contains a cusped plastic surface above a fine bubble diffuser. The cusped plastic provides a surface for aerobic bacteria colonization. Air supplied to the diffuser from a pump located at the ground surface passes over the cusped plastic to provide a source of dissolved oxygen.

## What is an Aerobic Bacterial Generator (ABG)?

An ABG generates active pathogen-free facultative bacteria that are contained in the effluent leaving the septic tank. The aerobic bacteria have a positive, remediating effect in the drainfield by reducing accumulated biomat and other organic solids.

## Does the Aquaworx Remediator improve hydraulic conditions for systems failing due to excessive biomat formation?

Results from tests at MAASTC and the University of California at Davis demonstrated that effluent absorption rates increased from 2 to 5 times as a result of ABG technology use.

## Does the Aquaworx Remediator improve wastewater quality?

Results from the University of Minnesota study are as follows:

- BOD<sub>5</sub> reduction – 77%
- TSS reduction – 53%

## Is the Aquaworx Remediator an ATU?

Many states have approved ABG technology as an ATU however, at this time Aquaworx is marketing the Remediator as a drainfield maintenance and performance enhancement tool, rather than as a pretreatment device.

## When is installation of an Aquaworx Remediator appropriate?

Key factors to be considered in assessing the suitability for installation of an Aquaworx Remediator:

- Proper drainfield function for at least 2 years
- Adequate separation between the bottom of drainfield and any limiting condition
- Drainfield should be utilized within its design hydraulic capacity

1 The Aquaworx Remediator™ is a re-branded version of the Pirana-Aerobic Bacterial Generator (ABG), with the design, construction, and operation being equivalent between the two products. Aquaworx™/Infiltrator® Systems Inc. is licensed to market the Pirana technology by Pirana Systems of Occidental, California.

2 Proceedings of the Tenth National Symposium on Individual and Small Community Sewage Systems, Sacramento, CA, March 2004.

3 Results collected by University of California at Davis using the following International Association of Plumbing and Mechanical Officials testing protocol: Interim Guide Criteria for Aerobic Bacterial Generator for Insert into Septic Tanks, Grease Trap Interceptors and Grease Traps, IAPMO IGC 180-2003, July 2003.

4 Evaluation of Aerobic Treatment Units in Treating High Strength Waste from Daily Milk Houses, Christopherson, S.H., et al, Water Resource Center, University of Minnesota.



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