

Longevity Testing of the H₂OnDemand Water Filtration System

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Introduction

The ability of the H₂OnDemand Water Filtration System to remove a variety of human pathogens has previously been evaluated (see report BB05-01). In this test, the aim was to evaluate the useful life of the filter system. We tested the effects of prolonged usage on the ability of the H₂OnDemand Water Filtration System to remove bacteria while still easily passing water. The performance of the three identical units was measured using standard methods (SM 9215*) to count bacteria in water samples collected using the filters after 100 and 200 liters (26 and 52 gallons) were passed through them. Statistical analysis (ANOVA) of bacterial counts indicated that passage of 100 liters of water did not significantly effect the performance of the filter as compared to controls (counts were not higher than controls). Bacterial counts were significantly higher in samples collected after 200 liters of water were passed through the filters as compared to the control (Table 1). We conclude that the effective life of a H₂OnDemand Water Filtration System is at least 100 liters, but less than 200 liters.

A vacuum pump was used to pass water through the filters, but a mouth drawn suction device (Picture 1) was used to collect samples for bacterial counts in order to evaluate whether water could still be easily drawn through the filter by mouth as it is intended to be used. After 200 liters no noticeable difficulty in drawing water through any of the units was observed.

*Standard Methods for the Examination of Water and Wastewater, 20th edition.

Methods

Test Water: Water from Rattlesnake Creek (Missoula, MT), was used for the test water. Rattlesnake Creek flows out of the Rattlesnake Wilderness Area north of Missoula to its confluence with the Clark Fork River in the city of Missoula. Water was collected near the confluence. Samples of this water were archived and are available upon request. The water is considered representative of a normal water used by recreationalists.

Conditioning water: 20 liters of test water were used to condition each filter unit before a sample for comparison was collected that is considered the control sample for each filter.

Test Protocol: A vacuum pump was used to draw water through the filters. After 20 L, 100 L, and 200 L the filter units were disconnected from the vacuum and a mouth drawn suction apparatus (Picture 1) was used to draw water through the filter to collect samples.

Bacterial cell counts: Standard method 9215 was used to count heterotrophic bacteria present in water samples using R2A agar plates (SM 9215.6c). 100 µl of sample water were plated. Plates were incubated for 3 days at 25°C before counting. Plate counts were performed under a magnifying glass.



Results and Conclusions

Bacterial counts were compared statistically using Analysis of Variance (ANOVA, SPSS v.10). The statistical method determines whether there is a significant difference between two or more sets of numbers. A “*P*” value (in table 1) indicates the probability that the two sets of numbers are not significantly different. A *P*-value of less than 0.05 indicates that samples are significantly different. We compared the bacterial counts from the control samples to the counts from the samples collected after water was drawn through the filter system. The *P*-values indicate that the bacteria counts collected after 100 liters were drawn through the filters are not different from the control, but the counts for samples collected after 200 liters were higher.

Table 1. Bacterial counts and statistical comparison of water samples collected using a Microshield® Safe Water System units after passage of 100 and 200 liters of water.

	Unit 1 cells/mL	Unit 2 cells/mL	Unit 3 cells/mL	Average cells/mL	S.D.	<i>P</i>
Control	5.8E+02	1.2E+03	8.2E+02	8.7E+02	3.1E+02	
100 L	6.0E+02	1.8E+03	7.4E+02	1.1E+03	6.8E+02	0.68
200 L	1.8E+03	1.9E+03	1.6E+03	1.8E+03	1.4E+02	0.01

- No difficulty in drawing water through the filters by the mouth drawn suction device was noticed at any of the sampling points.
- Natural waters contain large numbers of very small bacteria (less than 3 μm) that would be expected to easily pass through a functioning filter system, thus the presence of bacteria in the filtered water systems is not a cause for concern.