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## **Laboratory evaluation of the performance of an Aquafilter Membrane Filtration Unit.**

### **Aim**

To evaluate the filtration efficiency of an Aquafilter Membrane Filtration Unit using a water sample contaminated with *Escherichia coli*.

### **Method**

A 10 L sample of ¼ strength Ringers solution at 22 C was contaminated with *E. coli*, from a batch grown culture in nutrient broth, to give a final concentration of more than  $10^9$  cell per 100 ml. This was subjected to filtration through an Aquafilter hand-pumped membrane filtration unit and samples of filtrate collected after at least 6 L of filtrate had been produced. Duplicate samples of filtrate and duplicate samples of the unfiltered contaminated water were subjected to serial dilutions and counted by the Membrane Filtration Method using membrane lauryl sulphate broth medium, and incubated for 18h at 44C before counting.

### **Results**

Table 1 shows that counts of *E. coli* in the contaminated water were extremely high, more than  $10^9$  per 100 ml, a concentration which is far greater than that of many contaminated surface waters ( $10^4$  to  $10^6$  /100 ml, personal communication of the author).

After filtration, neither of the filtered samples showed any evidence of *E. coli*, giving a minimum removal efficiency of 9-log removal.

### **Conclusion**

On the evidence of the tests conducted on this Aquafilter unit, the high removal efficiency of *E. coli* indicates that the filter should be capable of removing very substantial quantities of pathogenic microorganisms present in untreated water supplies.

Table 1. Enumeration of *E. coli* in contaminated water before and after filtration through an Aquafilter membrane filter unit.

| <b><i>Contaminated Water</i></b>                    | <b><i>AFC6</i></b>          | <b><i>AFC5</i></b> | <b><i>AFC4</i></b> | <b><i>AFC3</i></b> | <b><i>AFC1</i></b> | <b><i>AFC2</i></b> |
|---|-----------------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| <b>Sample Dilution</b>                              | 10 <sup>-8</sup>            | 10 <sup>-8</sup>   | 10 <sup>-7</sup>   | 10 <sup>-7</sup>   | 10 <sup>-6</sup>   | 10 <sup>-6</sup>   |
| <b>CFU on plate</b>                                 | 8                           | 8                  | 101                | 109                | >201               | >201               |
| <b>E-Coli<br/>CFU/ 100ml</b>                        | 8.00E+08                    | 8.00E+08           | 1.01E+09           | 1.09E+09           | TNTC               | TNTC               |
| <b>Contaminated Water<br/>Average<br/>CFU/100ml</b> | 8.00E+08                    |                    | <b>1.05E+09</b>    |                    | TNTC               |                    |
| <b><i>Filtrate<br/>(treated water)</i></b>          |                             |                    |                    |                    |                    |                    |
|   | <b><i>AF1</i></b>           | <b><i>AF2</i></b>  |                    |                    |                    |                    |
| <b>Sample Dilution</b>                              | 10 <sup>0</sup>             | 10 <sup>0</sup>    |                    |                    |                    |                    |
| <b>CFU on plate</b>                                 | 0                           | 0                  |                    |                    |                    |                    |
| <b>E-Coli<br/>CFU/ 100ml</b>                        | < 1                         | <1                 |                    |                    |                    |                    |
| <b>Filtrate<br/>Average<br/>CFU/100nl</b>           | <1                          |                    |                    |                    |                    |                    |
| <b><i>Removal Efficiency</i></b>                    |                             |                    |                    |                    |                    |                    |
|   | <b><i>Log Reduction</i></b> |                    |                    |                    |                    |                    |
| <b>Compare (AFC3 , AFC4)<br/>with (AF1, AF2)</b>    | <b>&gt;9 Log Removal</b>    |                    |                    |                    |                    |                    |

TNTC = too numerous to count

CFU = colony forming units

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