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Drinking Water Engineering and Science Discussions

Interactive comment on "Correlations between total cell concentration, total adenosinetri-phosphate concentration and heterotrophic plate counts during microbial monitoring of drinking water" *by* E. Siebel et al.

E. Siebel et al.

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1. REVIEWER'S COMMENT: The two new methods show good correlation, and therefore the authors recommend to use these in a complementary way. The conventional HPC method only shows a very small fraction of the total number of bacteria in the water. This raises the question how results of the new methods, showing much higher cell numbers, should be interpreted in terms of the drinking water guidelines? Are historical data (100 years is mentioned in the paper) useless, or should the HPC method be continued to be carried out as well?

AUTHORS' COMMENTS: These are indeed key questions. This most simple answer

is that much more comparative data are needed which cover as many different types of water and treatment scenarios before new guidelines can be established or old methods are discarded. What we have observed so far is that for non-chlorinated drinking water the following general values are observed: - Total cell concentrations (TCC) are typically between 1 - 3 x 10ˆ5 cells/mL in tap water produced from surface water - TCC are typically between 0.5 - 2 x 10ˆ5 cells/mL in tap water produced from groundwater - TCC are typically between 0.5 - 3 x 10ˆ5 cells/mL in bottled drinking water

The most logic opinion would be to use both TCC and conventional HPC in a complimentary manner for the time being. It is also important to note that TCC would provide incomplete information in cases where disinfection (e.g. chlorine residuals) is used. Hence, the combination with viability parameters such as ATP analysis becomes more important.

2. REVIEWER'S COMMENT: What is the effect of cell cycle and growth rate on ATP level per cell? Which fraction of ATP originates from intact cells, and which fraction is dissolved in the bulk water?

AUTHORS' COMMENTS: Growth rate has indeed an important impact on ATP levels in bacterial cells. For example, when cells from a natural microbial community are grown in batch, the cellular ATP level peaks at early exponential phase at levels about 3X higher than the stationary phase values. This is in fact not an increase in the cellular ATP concentration as such, but rather correlates with increased cell biovolume (larger cells contain more ATP). Hence, a logic use of ATP would probably be to correlate it to active biovolume in a sample. It should be noted though that bacteria in tap water samples are probably in a semi-starvation stage, more similar to stationary phase cells. For the tap water samples in this study, the free ATP from the water can be neglected ($<$ 5%).

Interactive comment on Drink. Water Eng. Sci. Discuss., 1, 71, 2008.