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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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The critical comments and suggestions by the reviewer are appreciated. Below are the answers to the specific issues that were raised.

(1) Limitations of the study

It is clear that this study has focused only on a limited sampling environment (one non-chlorinated water supply), but a broad sampling set (200 samples, different taps and days). This should, however, in our opinion rather be viewed as an advantage in this specific case. One should take into account that nearly no clear data exist

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on the use and interpretation of ATP and total cell concentrations for microbiological analysis of drinking water in general, and in distribution network samples in particular. We believe that it would be naïve to hope that a complete understanding, interpretation and impact on hygienic parameters can be achieved through a single study, but that an comprehensive analysis of a specific situation (without too many external factors) would provide a first view on the use of these methods as alternative parameters to conventional HPC measurements. However, we agree that this should be made clear to the reader. We have amended the manuscript to include a specific paragraph on the limitations of the study, and how the results should be interpreted relative to that.

(2) Range of bacterial concentrations

To argue that the range of microbial concentrations is too narrow is in our opinion not correct. The study focused specifically on the use of ATP and TCC in drinking water analysis. For drinking water, the range of bacteria (total cell concentrations) would typically be 10,000 - 1,000,000 cells/mL (e.g., Hammes et al., 2008; Hoefel et al., 2003). The range covered in the present study is 30,000 - 600,000 cells/mL, which can be considered as representative of non-chlorinated tap water and bottled drinking water. However, it is noted that for the extrapolation of these results to environments other than drinking water (e.g., surface water, wastewater effluent or groundwater), further measurements would be required.

(3) Would alternative plating methods provide different results ?

Reviewer 2 suggests the use of alternative plating methods (specifically R2A agar according to Reasoner & Geldreich (1985)). It is fair to argue that this might give different answers/correlations. However, while plating on R2A agar often gives slightly higher values than PCA agar, it still represents a cultivation environment totally foreign to natural bacteria in drinking water. Since the purpose of this study was to challenge conventional HPC measurements, it made sense to use the standard method as locally (Switzerland). It should also be noted that in one of the few recent papers on this

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topic, Delahaye et al. (2003) compared ATP data with R2A plating data, and also found only weak correlations in the data (as is also mentioned in the original manuscript).

(4) How should these methods be used ?

Similar to conventional HPC, both the ATP and TCC methods are indicators of the general microbial quality of drinking water, and are not indicators of hygienic quality. Hence, the application would be to assess regrowth in distribution systems, or monitor systems for seasonal changes or changes caused by adaptations to the system (installation of new pipes etc.). The application of the methods on treatment plant level has been discussed previously (Hammes et al., 2008). We have amended the manuscript (specifically conclusion) to make this point clear.

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