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Drink. Water Eng. Sci., 1, 1-6, 2008

www.drink-water-eng-sci.net/1/1/2008/

doi: 10.5194/dwes-1-1-2008

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Correlations between total cell concentration, total adenosine tri-phosphate concentration and heterotrophic plate counts during microbial monitoring of drinking water

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Abstract. The general microbial quality of drinking water is normally monitored by heterotrophic plate counts (HPC). This method has been used for more than 100 years and is recommended in drinking water guidelines. However, the HPC method is handicapped because it is time-consuming and restricted to culturable bacteria. Recently, rapid and accurate detection methods have emerged, such as adenosine tri-phosphate (ATP) measurements to assess microbial activity in drinking water, and flow cytometry (FCM) to determine the total cell concentration (TCC). It is necessary and important for drinking water quality control to understand the relationships among the conventional and new methods. In the current study, all three methods were applied to 200 drinking water samples obtained from two local buildings connected to the same distribution system. Samples were taken both on normal working days and weekends, and the correlations between the different microbiological parameters were determined. TCC in the samples ranged from $0.37\text{--}5.61 \times 10^5$ cells/ml, and two clusters, the so-called high (HNA) and low (LNA) nucleic acid bacterial groups, were clearly distinguished. The results showed that the rapid determination methods (i.e., FCM and ATP) correlated well ($R^2=0.69$), but only a weak correlation ($R^2=0.31$) was observed between the rapid methods and conventional HPC data. With respect to drinking water monitoring, both FCM and ATP measurements were confirmed to be useful and complimentary parameters for rapid assessing of drinking water microbial quality.

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Citation: Siebel, E., Wang, Y., Egli, T., and Hammes, F.: Correlations between total cell concentration, total adenosine tri-phosphate concentration and heterotrophic plate counts during microbial monitoring of drinking water, Drink. Water Eng. Sci., 1, 1-6, doi: 10.5194/dwes-1-1-2008, 2008. [Bibtex](#) [EndNote](#) [Reference Manager](#) [XML](#)

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