

A New Rapid Method for Process Control and Determination of Water Biostability in a “State of the Art” Surface Water Treatment Plant.

Morten Miller, PhD, Mycometer AS., Frank Jacobsen, PhD, Grontmij | Carl Bro., Tanja Nielsen, M.Sc., Grontmij | Carl Bro.

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Controlling production processes is the prerequisite for producing high quality drinking water from surface waters. Daily process and quality control is dependent on technologies that allow for rapid and reliable monitoring of raw water quality changes and water treatment processes. Bactiquant is a new rapid method that quantifies bacterial presence in water samples. The method is based on fluorometric detection of a specific enzyme activity present in viable and non viable bacteria. The Bactiquant is a bulk method that concentrates bacteria from large volumes of water on a filter membrane allowing for a low analysis time (5-15 minutes) and also enables quantification of planctonic bacteria as well as bacteria located on particles.

Treatment processes and water biostability was monitored using Bactiquant in a Surface Water Treatment Plant during three periods in May, August and December 2009. All steps in the water treatment processes were monitored, including raw water intake, flocculation, sand filtration, ozonization, GAC filtration, UV treatment and chlorination. Data were handled using software that facilitates the use of Statistical Process Control for tracking changes and setting limits for out of specification results. In a parallel study the Bactiquant method was used to determine water biostability by monitoring bacterial growth in water samples over a period of five days. Nonlinear regression analysis of growth data allowed a categorization of biostability at different stages during the treatment process. The data showed that Bactiquant can be used to establish reliable and robust baselines ($CV < 8\%$) for individual treatment steps and detect changes from those expected based on the principles of Statistical Process Control. Also the data showed a clear effect of flocculation, filtrations, ozonization and chlorination on water biostability as compared to that of the original source water ($p < 0.001$). The study demonstrated the utility of Bactiquant as a versatile management tool in process control providing a new and comprehensive parameter for evaluating Water Treatment Plant performance.

