



## Investigation of *Legionella* proliferation in a hospital sanitary water network using rapid biological mapping and HACCP methodology

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Biological mapping of hospital water networks is an efficient method for identifying critical points for biofilm formation and *Legionella* proliferation in water networks. The use of the HACCP approach to risk assessment aims to identify points where proliferation of both Legionellae and *Pseudomonas aeruginosa* occur in the installation. Biological mapping using rapid analytical tools allows immediate implementation of corrective or preventive actions together with validation of the efficiency of disinfection immediately, without waiting for long-term culture results.

A hospital near Paris was found to have *Legionella* contamination throughout the water network. Biological mapping of the installation was performed using quantitative ATP-metry (QGA™ kits, Aqua-tools, France). *Legionella* contamination was confirmed using the AFNOR NF T 90-431 standard method. The new generation of bioluminescence tests allows precise quantification of all living microorganisms in water samples and biofilms, through intracellular ATP which is present only in viable microorganisms; both culturable and non culturable. A major advantage of using the QGA kit for investigations of water contamination is the ability to produce results in only 3 minutes. A biological investigation of a water network can be completed in 2 hours with immediate on site interpretation of results.

A hospital was investigated which has four separate buildings all supplied with hot water from the same production unit. Biological mapping with the QGA kit was performed on the production unit and in 3 different buildings. The quality of the makeup water was good (less than 0.45 pgATP/ml or equivalent to approximately 450 microorganisms/ml). Significant microbial contamination (up to 80pgATP/ml or 80 000 Equivalent microorganisms/ml) was detected after the softeners and at the terminal points of the network – showers and taps. *Legionella* presence was later confirmed with concentrations reaching 3 500 CFU/L in the shower heads. An immediate chlorination of the entire water network was implemented (1 mg/l) followed by thermal and chemical disinfection at the terminal points. A further mapping exercise was carried out and showed a 10-50 fold reduction in viable microbial flora. This was confirmed by negative *Legionella* culture results.

The study describes the methodology used for efficient and methodical biological mapping of hospital water networks using innovative real-time quantitative ATP-metry.



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and improve environmental conformity.