

Effect of early biofilm formation on water quality during commissioning of new PE (polyethylene pipes) at Mosevangen, Aarhus, Denmark

T.L. Skovhus, D.A. Søborg & Francisca S. Braga, VIA University College*

B. Højris, GRUNDFOS Holding A/S**

K.L. Hansen & K. Brinkmann, Aarhus Vand A/S***

Biofilm is considered beneficial in the non-chlorinated Danish drinking water distribution systems as it increases the microbiological stability of the water. During commissioning of new pipes in the distribution network, biofilm will start to develop on the new pipe wall being influenced by numerous factors, such as the water quality, pipe material, flow velocity and existence of biofilm upstream. At this early stage of biofilm formation, before a mature biofilm is reached, the development of biofilm may negatively impact the water quality. However, this short-term effect of biofilm during the commissioning phase of newly installed pipe sections remains poorly understood.

In this study, measurements of microbiological water quality parameters (HPC, ATP, qPCR, etc.), upstream and downstream of a newly commissioned PE pipe, showed a clear effect of early biofilm formation on the water quality. In general, high bacterial counts (HPC 22°C = 870 CFU/mL) but a low microbiological diversity (Shannon index 2,3) was observed during the first 10 days of pipe commissioning. After approx. 20 days, the bacterial counts and the diversity approached the same levels as the upstream samples (HPC well below the drinking water criterion of 200 CFU/mL and a Shannon Index of approx. 5). Optimizing the commissioning procedures will therefore be of benefit to the utility and the consumers. Further, it highlights the importance of obtaining and maintaining a stable, natural biofilm in the pipes of the non-chlorinated system, improving the water quality for the consumers.

More studies in this area are carried out in the newly funded MUDP project (Functional PE pipes with beneficial biofilm for decomposition of material monomers in the drinking water system), where we will investigate if the biofilm constitute a natural barrier for some monomers from PE pipes and if the biofilm can degrade these compounds. A brief overview of the new project will be presented.

Keywords: Biofilms, Drinking water distribution systems, Polyethylene pipes, Commissioning Guidelines

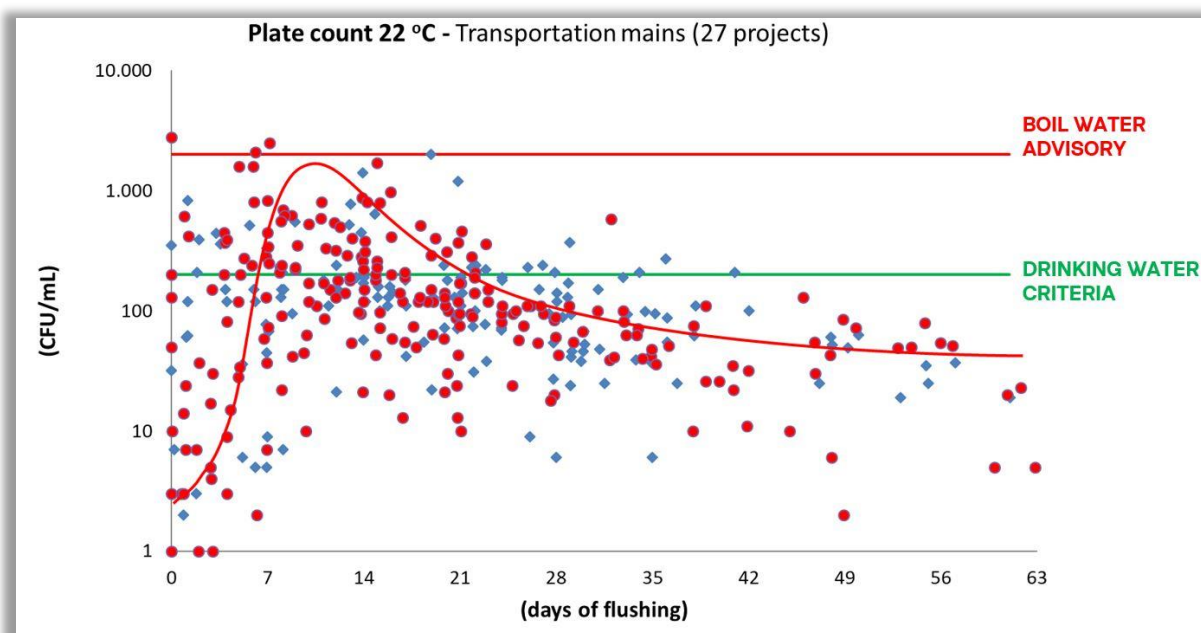


Figure: HPC at 22°C from previous measurements from Aarhus Vand, where it is possible to observe a peak between day 7 and 20.

* tols@via.dk, dans@via.dk & fbra@via.dk: Banegaardsgade 2, 8700, Horsens, Denmark

** bhoejris@grundfos.com: Poul Due Jensens Vej 7, 8850, Bjerringbro, Denmark

*** KLH@aarhusvand.dk & KBK@aarhusvand.dk: Gunnar Clausens Vej 34, 8260 Viby J, Denmark