



## Collaborative effect of secondary chlorination and organic matter content on biological safety in secondary water supply system

Wei Bian, Jun Li\*, Baihang Zhao, Shuyan Zhang

Key Laboratory of Beijing for Water Quality Science and Water Environment Recovery Engineering, Beijing University of Technology, Beijing 100124, China, Tel. +008613611249208; email: bjutlijun@126.com (J. Li), Tel. +008615811418433; email: yangzhoubw@163.com (W. Bian), Tel. +008615801529198; email: 1017023099@qq.com (B. Zhao), Tel. +8615810948288; email: bjzhangshy@126.com (S. Zhang)

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### ABSTRACT

Biofilm in secondary water supply system (SWSS) may reduce the biological safety of tap water. This study focused on the collaborative effect of secondary chlorination and organic matter content on the regrowth of biofilm bacteria and the diversity of microbial community in lab scale SWSS. Several biofilms cultivated in the same condition were used for secondary chlorination under different organic matter content and chlorination dose conditions. Bacteria regrowth yield under the highest organic matter content and the lowest free residual chlorine (FRC) condition was 2.84–3.11 times of that under the lowest organic matter content and the highest FRC condition. The collaborative effect ratio of organic matter content increase (per 1.00 mg/L) and secondary chlorination decrease (per 0.10 mg/L as Cl<sub>2</sub>) was 0.99. Metagenomic sequencing was used to analyze the biofilm microbial community diversity in this experiment. *Proteobacteria*, *Bacteroidetes*, *Actinobacteria* and *Firmicutes* were the four major phyla of biofilm microbial communities. *Proteobacteria* presented significant increase after secondary chlorination in both high and low organic matter contents. The phylum *Bacteroidetes* was found to be dominant in beakers with high organic matter content while *Actinobacteria* was the most in beakers with low organic matter content. *Firmicutes* could almost be controlled by secondary chlorination with the dose more than 0.10 mg/L as Cl<sub>2</sub>.

*Keywords:* Secondary chlorination; Organic matter content; Biofilm; Microbial community diversity; Biological safety

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\* Corresponding author.