Diversity of nitrifying bacteria in full-scale chloraminated distribution systems

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Abstract

Chloramination for secondary disinfection of drinking water often promotes the growth of nitrifying bacteria in the distribution system...
due to the ammonia introduced by chloramine formation and decay. This study involved the application of molecular biology techniques to explore the types of ammonia-oxidizing bacteria (AOB) and nitrite-oxidizing bacteria (NOB) present in several full-scale chloraminated systems. The results of AOB community characterization indicated the ubiquitous detection of representatives from the *Nitrosomonas* genus, with *Nitrosospira* constituting a negligible or small fraction of the AOB community in all but one sample. Cloning and sequencing demonstrated the presence of AOB representatives within the *Nitrosomonas oligotropha* cluster, a phylogenetic subgroup of AOB from which isolates demonstrate a high affinity for ammonia. For the NOB communities, *Nitrosospira* were detected in most of the samples, while *Nitrobacter* were only detected in a few samples. These results provide insight into the types of AOB responsible for nitrification episodes in full-scale chloraminated systems, which should help direct future studies aimed at characterizing relevant AOB growth and inactivation properties. Furthermore, the detection of NOB in most of the samples suggests a need to evaluate the contribution of biological nitrite oxidation relative to chemical oxidation in these systems.

**Author Keywords:** Ammonia-oxidizing bacteria; Chloramination; Nitrification;Nitrite-oxidizing bacteria; *Nitrosomonas oligotropha*; *Nitrospira*

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