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Microbial community structures and their associations with storage tank sediments in drinking water distribution systems of the United States

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Drinking water (DW) storage reservoirs accumulate sediments that allow microbial communities to establish, proliferate and seed downstream distribution system pipes and biofilms. There is a potential health concern if environmental pathogens are a constituent of these sediment microbes. However, documentations on sediment-derived microbial communities and their relationships to the physical characteristics of DW storage tanks are rare. This study characterized microbial communities in drinking water storage tank sediments collected from the United States to provide insight into possible links to opportunistic pathogens and physical parameters in distribution systems. We analyzed microbial community structures via MiSeq sequencing on 46 samples from eleven drinking water storage tanks located in nine states across the USA. *Rhodocyclaceae, Pseudomonas, Rheinheimera* and *Mycobacterium* were dominant taxa and presented in most of the samples, while *Burkholderiales, Sphingomonadaceae, Stenotrophomonas* and *Geothri* were dominant only in a few samples. Opportunistic pathogens like Legionella seemed to co-occurred with certain bacterial groups. A number of (~5) distinctly distributed community structures were classified among the different storage tanks. There were significant associations of community structures with the types of percentage of clay, silt and sand, total exchange capacity, TOC and TOM, and even metals. Overall, the physical characteristics of sediments appeared to impact on microbial community structures, warranting further investigation of relationships between mineral elements or corrosions with microbial community structures, and even pathogens.

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