

Disinfection and removal of human pathogenic bacteria in arctic waste stabilization ponds - DTU Orbit (09/11/2017)

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Wastewater stabilization ponds (WSPs) are commonly used to treat municipal wastewater in Arctic Canada. The biological treatment in the WSPs is strongly influenced by climatic conditions. Currently, there is limited information about the removal of fecal and pathogenic bacteria during the short cool summer treatment season. With relevance to public health, the objectives of this paper were to determine if treatment in arctic WSPs resulted in the disinfection (i.e., removal of fecal indicator bacteria, *Escherichia coli*) and removal of selected human bacterial pathogens from the treated effluent. The treatment performance, with focus on microbial removal, was assessed for the one-cell WSP in Pond Inlet (Nunavut [NU]) and two-cell WSP in Clyde River (NU) over three consecutive (2012–2014) summer treatment seasons (late June–early September). The WSPs provided a primary disinfection treatment of the wastewater with a 2–3 Log removal of generic indicator *E. coli*. The bacterial pathogens *Salmonella* spp., pathogenic *E. coli*, and *Listeria monocytogenes*, but not *Campylobacter* spp. and *Helicobacter pylori*, were detected in the untreated and treated wastewater, indicating that human pathogens were not reliably removed. Seasonal and annual variations in temperature significantly ($p < 0.05$) affected the disinfection efficiency. Improved disinfection and pathogen removal was observed for the two-cell system in Clyde River as compared to the one-cell system in Pond Inlet. A quantitative microbial risk assessment should be performed to determine if the release of low levels of human pathogens into the arctic environment poses a human health risk.

General information

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Organisations: National Food Institute, Research Group for Analytical and Predictive Microbiology, Dalhousie University

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