

## Antibiotic resistance genes in municipal wastewater treatment systems and receiving waters in Arctic Canada - DTU Orbit (09/11/2017)

### Antibiotic resistance genes in municipal wastewater treatment systems and receiving waters in Arctic Canada

Domestic wastewater discharges may adversely impact arctic ecosystems and local indigenous people, who rely on being able to hunt and harvest food from their local environment. Therefore, there is a need to develop efficient wastewater treatment plants (WWTPs), which can be operated in remote communities under extreme climatic conditions. WWTPs have been identified as reservoirs of antibiotic resistance genes (ARGs). The objective of this work was to quantify the presence of nine different ARG markers (*int1*, *sul1*, *sul2*, *tet(O)*, *erm(B)*, *mecA*, *blaCTX-M*, *blaTEM*, and *qnr(S)*) in two passive systems (waste stabilization ponds [WSPs]) and one mechanical filtration plant operating in two smaller and one large community, respectively, in Nunavut, Canada. Measurement of water quality parameters (carbonaceous oxygen demand, ammonia, total suspended solids, *Escherichia coli* and total coliforms) showed that the WWTPs provided only primary treatment. Low levels of the ARGs (2 log copies/mL) were observed in the effluent, demonstrating that bacteria residing in three northern WWTPs harbour ARGs conferring resistance to multiple clinically-relevant classes of antibiotics. Our results indicate that long-term storage in WSPs benefitted removal of organic material and some ARGs. However, one WSP system showed evidence of the enrichment of *sul1*, *sul2*, *mecA*, *tet(O)* and *qnr(S)*. Further research is needed to fully understand if these ARG releases pose a risk to human health, especially in the context of traditional hunting and fishing activities.

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