Comparative investigation of airborne culturable microorganisms in sewage treatment plants

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Summary

The present study investigated emissions and immissions of airborne microorganisms (mesophilic bacteria, Escherichia coli, molds, Aspergillus fumigatus, thermophilic actinomycetes/bacilli) in sewage treatment plants. For the aerobiological investigations three sewage treatment facilities with an activated-sludge process, capacities between 2000 and 28000 PE and different cleaning steps were selected.
The measurements of microorganism emission were conducted in the area of the intake (screen), in the area of biological treatment (activated sludge tank) and at a distance of 10 m from the activated sludge tanks. In order to determine the immission, additional measurements were conducted leeward of the plant at a distance of 200 m. Samples were taken using four parallel six-stage Andersen © 1 AFCM volumetric samplers. In the area of the intake counts for bacteria were 7.4x102 CFU/m3 (median), for thermophilic actinomycetes 1.8x101 CFU/m3, for thermophilic bacilli 7.1x101 CFU/m3, for molds 2.4x103 CFU/m3 and for Aspergillus fumigatus 1.8x101 CFU/m3. Only isolated airborne coliform recoveries, i.e. E. coli, were detected. In the area of the activated sludge tank, in the adjoining area (10 m) and in the vicinity of the plants (200 m), the counts for all microorganism groups investigated corresponded to natural conditions.
The results show that the counts of culturable aerogenic microorganisms in and in the immediate surrounding of the sewage plants investigated are low. Although the possibility of an infection through inhalation cannot be ruled out, the direct contact with sewage is much more critical.

Key words: bioaerosols, sewage-treatment plants, aerogenic microorganisms, emission, immission

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