

Bacteriological Pollution of the Atmospheric Air at the Municipal and Dairy Wastewater Treatment Plant Area and in Its Surroundings – Ewa Korzeniewska, Zofia Filipkowska, Anna Gotkowska-Płachta, Wojciech Janczukowicz, Bartosz Rutkowski

Summary

Microbiological studies were carried out of atmospheric air sampled on the area and in the surroundings of a mechanical and biological wastewater treatment plant (WTP) treating municipal sewage. The capacity of the wastewater treatment plant, which also received some wastewater from the dairy industry, was $ca\ 3 \cdot 10^3\ m^3 \cdot d^{-1}$. Counts of heterotrophic psychrophilic, psychrotrophic and mesophilic bacteria as well as some physiological groups of microorganisms which belong to *Enterobacteriaceae* family, *Staphylococcus* and *Enterococcus* genera, *Pseudomonas fluorescens* and *P. aeruginosa* species, hemolysing bacteria and actinomycetes were analyzed. Air samples were collected in summer, autumn, winter and spring seasons simultaneously by the sedimentation and impact methods at 6 sites located on the area of the WTP and at 5 sites situated in its surroundings. The background was established depending on the direction of wind, always on the windward side in relation to the location of the WTP. In addition, temperature and air humidity as well as wind speed and direction at each sampling sites were observed. Statistically significant differences were found in studied groups of microorganisms counts between air samples collected in different seasons of the year (with the exception of psychrophilic bacteria and by the two different methods (with the exception of psychrophilic bacteria) and microorganisms which belong to *Enterobacteriaceae* family). The highest mean counts of the microorganisms were usually determined in air samples collected by the sedimentation method, especially during the autumn (with the exception of actinomycetes, which are the most numerous in spring), the lowest ones in winter and/or in summer. No statistically significant differences were observed in counts of the analyzed groups of microorganisms in air sampled at particular sites (with the exception of *Enterobacteriaceae* bacteria isolated on Chromocult medium). However, higher counts of these microorganisms were typically found in the air sampled in the area of the WTP, particularly near the grit chamber, phosphorus removal tank, nitrification and denitrification chambers and secondary settling tank. According to the Polish Standards used for evaluation of atmospheric air pollution, the air sampled in the area of wastewater treatment plant and in its surroundings was classified as only slightly and sporadically strongly polluted. It was mainly in the spring and autumn seasons that the air was strongly polluted with psychrophilic and mesophilic bacteria. No increased emission of the analyzed groups of microorganisms, including faecal bacteria was determined in the air samples collected outside the WTP.