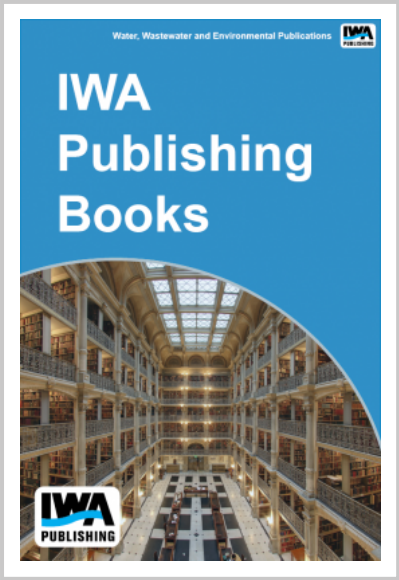
Pathogen Risk Indicators for Wastewater and Biosolids



Direct analysis of potable water for pathogenic micro-organisms has generally been avoided by water suppliers because pathogens are frequently present intermittently and in low numbers. Direct analysis for pathogens would require concentration of large sample volumes and more complex analytical procedures both of which are expensive and currently considered not to be more protective of public health than using appropriate pathogen index organisms or surrogates. Human feces contain about 1012 bacteria per gram, hence Escherichia coli is always present in high numbers in domestic wastewater (around 109 cfu/g) and can be detected relatively cheaply by culture methods. Hence, E. coli has become the chosen indicator for fecal pollution of water. While E. coli is a valuable warning indicator in potable water supplies, its value in domestic wastewater and biosolids applications is reduced because the source water and sludge is always fecally polluted. Instead, an indicator more clearly linked to pathogen presence, an index organism, is required. An index organism is defined as a group or species indicative of pathogen presence, such as E. coli as an index organism for Salmonella. An approach is to find indicators which are removed or inactivated similarly to pathogens by wastewater and biosolids treatment processes. Such process indicators, called model organisms or surrogates, are defined as a group of organisms that demonstrate the efficacy of a process). When coupled with data collected over time on the numbers of pathogens in the matrix prior to treatment, can indicate the risk attached to using treated water. As climate change continues to place stress on water resources, communities are increasingly looking to recycled water as a supplementary water source. Hence identification of process indicators for recycled water is becoming imperative so that recycled water can be used appropriately so as to minimize risks. As pathogen reduction in primary and secondary wastewater treatment processes is not as great as in tertiary and disinfection treatment processes, the latter treatment processes have been the focus of this study. Similarly, as disposal of biosolids to landfill sites becomes increasing costly and inorganic fertilizer feedstocks decline, the beneficial use of biosolids is becoming more important. Identification of process indicators for biosolids will encourage these beneficial uses as the risk to human health can be better assessed.

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