CLOSTRIDIUM PERFRINGENS

General description
Clostridium spp. are Gram-positive, anaerobic, sulfite-reducing bacilli. They produce spores that are exceptionally resistant to unfavourable conditions in water environments, including UV irradiation, temperature and pH extremes, and disinfection processes, such as chlorination. The characteristic species of the genus, C. perfringens, is a member of the normal intestinal flora of 13–35% of humans and other warmblooded animals. Other species are not exclusively of faecal origin. Like E. coli, C. perfringens does not multiply in most water environments and is a highly specific indicator of faecal pollution.

Indicator value
In view of the exceptional resistance of C. perfringens spores to disinfection processes and other unfavourable environmental conditions, C. perfringens has been proposed as an index of enteric viruses and protozoa in treated drinking-water supplies. In addition, C. perfringens can serve as an index of faecal pollution that took place previously and hence indicate sources liable to intermittent contamination. Clostridium perfringens is not recommended for routine monitoring, as the exceptionally long survival times of its spores are likely to far exceed those of enteric pathogens, including viruses and protozoa. Clostridium perfringens spores are smaller than protozoan (oo)cysts and may be useful indicators of the effectiveness of filtration processes. Low numbers in some source waters suggest that use of C. perfringens spores for this purpose may be limited to validation of processes rather than routine monitoring.

Source and occurrence
Clostridium perfringens and its spores are virtually always present in sewage. The organism does not multiply in water environments. Clostridium perfringens is present more often and in higher numbers in the faeces of some animals, such as dogs, than in the faeces of humans and less often in the faeces of many other warm-blooded animals. The numbers excreted in faeces are normally substantially lower than those of E. coli.

Application in practice
Vegetative cells and spores of C. perfringens are usually detected by membrane filtration techniques in which membranes are incubated on selective media under strict anaerobic conditions. These detection techniques are not as simple and inexpensive as those for other indicators, such as E. coli and intestinal enterococci.

Significance in drinking-water
The presence of C. perfringens in drinking-water can be an index of intermittent faecal contamination. Potential sources of contamination should be investigated. Filtration processes designed to remove enteric viruses or protozoa should also remove C. perfringens. Detection in water immediately after treatment should lead to investigation of filtration plant performance.

Selected bibliography
