Microbiological Quality

Introduction

A primary goal of drinking water treatment is to remove microbiological contamination and thereby reduce the risk of illness from pathogenic microorganisms. However, achieving a zero risk of waterborne illness is virtually impossible. Instead, water purveyors attempt to reduce the risks of illness to levels deemed acceptable by public health authorities, by applying a multiple-barrier approach to the presence of pathogenic microorganisms. This approach includes the protection of source water, the use of appropriate and consistently effective treatment, a well-maintained distribution system, routine verification of drinking water quality and public education.

Monitoring water for all pathogens that could be present is not technically or economically feasible. Instead, faecal indicator bacteria are used to verify the microbiological safety of drinking water. The presence of faecal indicators, such as *Escherichia coli*, in a drinking water supply suggests that enteric pathogenic microorganisms could also be present. The absence of faecal indicators, on the other hand, while denoting the absence of enteric bacteria, is no guarantee that enteric viruses and protozoa are absent. Although these microorganisms cannot grow in water, many can survive longer in water, are more resistant to disinfection and are more infectious than most pathogenic bacteria. While most jurisdictions around the world are focusing on *E. coli*, some continue to use total coliform or thermotolerant coliform bacteria to verify safety. It should be noted that because many members of these groups can colonize distribution systems, their presence in distribution systems does not necessarily indicate a threat to public health. Nevertheless, the presence of total coliform bacteria in water leaving a treatment plant indicates a serious breach in treatment and requires immediate action.

The use of indicator organisms is only one component in the multiple-barrier approach to ensuring microbiologically safe drinking water. Adequate treatment to remove or inactivate the pathogens is the primary means used to ensure against their presence in drinking water. A treatment system that provides effective filtration and disinfection and maintains an adequate disinfection residual should minimize the presence of pathogenic microorganisms and the risks of related waterborne diseases. Where feasible, a watershed or well-head protection program should be the first line of defence against the presence of pathogenic microorganisms.

Barring system-specific exemptions, all supplies should be disinfected. In addition, minimum treatment of all supplies derived from surface water sources and groundwater impacted by surface waters should include coagulation, sedimentation and filtration, or equivalent technologies.

If the safety of a drinking water supply is compromised to the extent that it presents a threat to public health, the authorities responsible for the safety of the affected supply should have protocols in place for issuing and rescinding boil water advisories. In the event that a supply causes an outbreak, the responsible authorities should have a contingency plan in place to quickly and effectively minimize the extent of illness.

For the purpose of the documents related to the microbiological quality of drinking water (bacteriological quality, protozoa, turbidity, boil water advisories), the use of the phrase "boil water advisory" is taken to mean advice given to the public by the appropriate agencies to boil their water, regardless of whether this advice is precautionary or in response to an outbreak.