

# FACT sheet



## OUR CATCHMENT - E.coli

Microbiological quality, in relation to water, generally refers to whether or not a waterway contains disease causing (pathogenic) organisms. For example, water of good microbiological quality that is safe to drink is one that is free of 'disease causing' organisms and generally, one in which an absence of indicator bacteria has been demonstrated. Conversely, water of poor microbiological quality is one where indicator bacteria have been detected and/or the presence of 'disease causing' organisms has been demonstrated or suspected.

Sometimes, waters are classified as having good or poor microbiological quality on the basis of total bacteria and not upon the specific presence of disease causing, or even indicator, bacteria. For such waters, high numbers of total bacteria would be indicative of poor hygienic conditions, poor cleanliness and consequent poor microbiological quality.

### What are the sources of microbiological contamination in water?

The sources of microbiological contamination in water are numerous and include the following:

- agricultural and rural run-off
- sewage treatment plant discharges
- urban stormwater
- native animals and birds
- septic sillage
- discharges from abattoirs



### Is water normally free of micro-organisms?

No, but not all micro-organisms cause illness in humans. A variety of micro-organisms occur naturally in water. Likewise, many foods contain micro-organisms, some of which are added in food production (for example in cheeses), which are generally not the cause of illness in humans. Water supplies that have been disinfected will have greatly reduced numbers of micro-organisms and should contain no pathogenic organisms.

### Can the microbiological quality of water be determined by its appearance?

No, the physical appearance of water gives no indication as to its microbiological quality. Consequently, consumers may not be aware of any potential health risk when drinking clear-looking water. Conversely, the presence of some colour or turbidity does not indicate that water is microbiologically unsatisfactory.

### How is microbiological quality measured?

Microbiological quality is generally measured by testing water for bacteria which are indicators of the presence of faecal pollution. It follows that water intended for human consumption should contain none of these bacteria. In the great majority of cases, monitoring for indicator bacteria provides a great factor of safety because of their large numbers in polluted waters.



## What are indicator organisms?

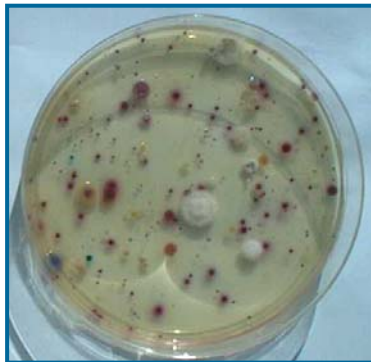
Indicator organisms are bacteria whose presence in water gives a simple and meaningful indication that faecal contamination has occurred. Such organisms are always present in high numbers in the faeces of humans (and other warm blooded animals and birds).

The major indicator organisms of faecal pollution include *Escherichia coli* (*E.coli*). When indicator bacteria are detected in water, their presence indicates that excrement from birds, animals or humans has recently polluted the water and that all types of pathogens (bacteria, viruses, protozoans and parasites) may also be present.

## What is *E.coli*?

*E.coli* is a member of the coliform group of bacteria which grow naturally in the intestines of birds, humans and other warm blooded animals. It is the predominant coliform in fresh faeces and so its presence in water is indicative of recent faecal contamination. It is found in sewage and all natural waters and soils that are subject to recent faecal contamination, whether from humans, agriculture, or wild animals and birds.

*E.coli* is the most specific indicator of faecal contamination. The presence of *E.coli* in drinking water should never be ignored. The *E.coli* count does not differentiate



between bacteria of bird, animal or human origin but, as animals and birds can act as carriers of human intestinal pathogens, the presence of *E.coli* should always be considered to have sanitary significance - it indicates that there may be a health risk.

## Testing for *E.coli*

To evaluate whether drinking water is free of faecal contamination, samples of water are routinely examined for the presence of *E.coli*. Identification of *E.coli* involves a test called



Colilert® assay for the presence of the enzyme  $\beta$ -glucuronidase. These give rapid results (within 24 hours) and are simple to perform.

## Are *E.coli* pathogenic, and if so, what diseases do they cause?

A few strains of *E.coli* are pathogenic in their own right with a number responsible for diarrhoeal symptoms. Some strains of *E.coli* have been responsible for several food-borne and water-borne outbreaks of disease, with loss of life primarily among senior citizens and young children. Fortunately such occurrences are rare.

Despite some strains of *E.coli* being pathogenic, both pathogenic and non pathogenic strains are equally significant as indicators of faecal contamination. The main reason for conducting the *E.coli* test is to indicate that treatment has been effective. Consequently, when *E.coli* is detected in drinking water it could be expected that disease causing organisms may also be present.

## Why are *E.coli* and coliforms favoured as indicator organisms?

While the criteria for the ideal faecal indicator are not all met by any one organism, many of them are fulfilled by *E.coli*. *E.coli* is the indicator of first choice when resources for microbiological examination are limited. The retention of coliforms in guidelines and standards as an indicator organism is primarily associated with their ease of detection and associated sensitivity.

## For further information

Please visit the Goulburn Valley Water website: [www.gvwater.vic.gov.au](http://www.gvwater.vic.gov.au)

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