

Information Sheet *E coli*

Background

Microbiological quality, in relation to drinking water, generally refers to whether or not water contains disease causing (pathogenic) organisms.

The sources of microbiological contamination in surface waters are many-fold and include the following:

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

Pathogens are organisms capable of causing disease in animals, including humans. These disease-causing organisms are of four common types: bacteria, viruses, protozoa and helminths. Ear, eye and respiratory infections and gastric upsets are often associated with water-borne pathogens.

Routine testing of water supplies for specific pathogens is not usually performed due to the complexity of testing, associated cost, and in some instances, the lack of reliability of methods of concentration and detection.

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.

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*), the thermotolerant and other coliform bacteria, the faecal streptococci, and spores of sulphite reducing bacteria. 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.

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.

E.coli is the most specific indicator of faecal contamination. The presence of *E.coli* in a 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, i.e. indicate that there may be a health risk.

Testing for Coliforms and E coli

A recently developed test called Colilert® assays for the presence of the enzyme β-glucuronidase. This test gives rapid results (within 24 hours) and is simple to perform.

While the criteria for the ideal faecal indicator are not all met by any one organism, many of them are fulfilled by *E coli* and to a lesser extent by the thermotolerant coliform bacteria. *E.coli* is the indicator of first choice when resources for microbiological examination are limited.

Rating Scale

	E coli Number	Possible Location
Very, Very Clean Water	10 organisms per 100 ml	Pristine mountain stream or lake
Clean Water	100 orgs per 100 ml	Upper mountain of non-polluted stream
Moderate Water	1,000 orgs per 100 ml	Lowland river with agricultural or treated sewage contribution (Up to 5,000 following rain)
Agricultural Dam with Cattle Pollution	Up to 10,000 orgs per 100 ml	
Septic Tank Effluent	100,000 orgs per 100 ml	
Raw Sewage	1,000,000 to 10,000,000 orgs per 100 ml	