Pathogens

Australian Water Quality Centre

Analysis for:
Campylobacter (C.jejuni, C.coli)
Salmonella
Sulfite Reducing
Clostridia/C.perfingens

Limit of Reporting:
Campylobacter spp. - <4/L
Salmonella spp. - presence/absence
Sulfite Reducing Clostridia – 1 /100mL

Sampling Requirements:

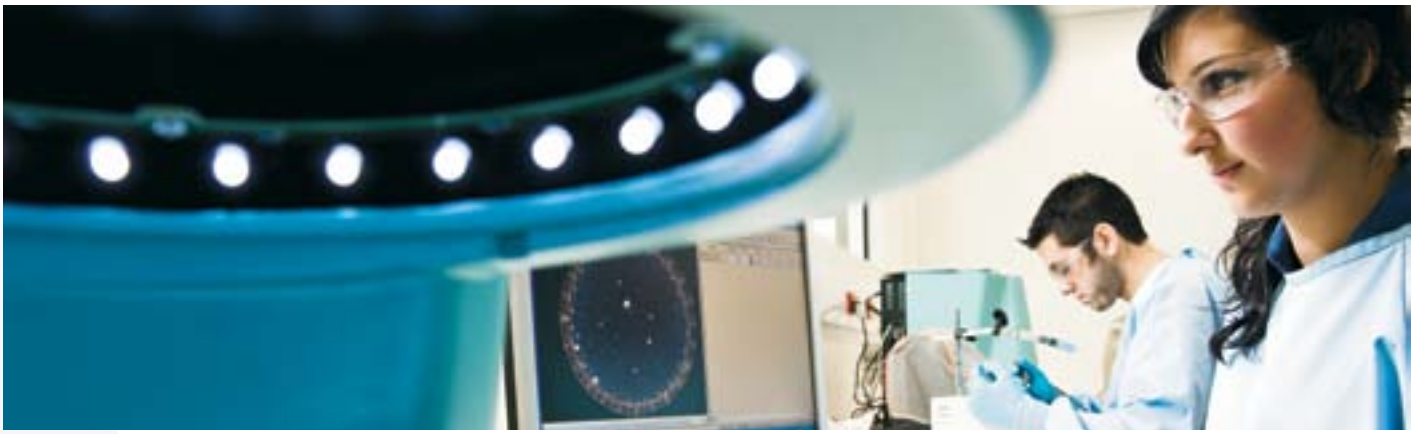
- Sterile 600 mL PET bottle, Thiosulphate dosed
- Air gap essential – Campylobacter and Salmonella
- No air gap required – Sulfite Reducing Clostridia
- Transport & Store at 4˚C
- Process within 6 hrs of collection up to max 24hrs (AS/NZS 2031:2001)

Pathogens – Campylobacter, Salmonella and Sulfite Reducing Clostridia (including Clostridium perfringens).

The AWQC provides a range of NATA accredited analyses catering for pathogen testing, including Campylobacter, Salmonella and Sulfite Reducing Clostridia (including Clostridium perfringens).

Campylobacter spp. are transmitted by the oral route and cause gastrointestinal illness. Thermophilic campylobacters are present in raw sewage. There occurrence in surface waters is dependent on rainfall, water temperature and the presence of wild birds.

Salmonella spp. are widely distributed in the environment and gain entry into water systems through faecal contamination from live stock, native animals, drainage waters and incompletely treated waste discharges. Faecal contamination of water is the main cause of waterborne outbreaks of salmonellosis.



Sulfite Reducing Clostridia (including Clostridium perfringens) are present in the faeces of humans and other mammals, in wastewater and in soil. As these organisms may form endospores, which allow the bacteria to survive in almost any habitat, SRC counts are a useful indicator of past pollution in ground water, estuarine and ocean environments.

Clostridium perfringens may cause wound and surgical infections, which may lead to gas gangrene.

Methodology

Isolation of thermophilic Campylobacter spp. is achieved by concentration of the organisms on a membrane filter, inoculating into an enrichment broth and subculture onto a selective solid agar media (AS/NZS 4276.19-2001). The differentiation between Campylobacter jejuni and Campylobacter coli is undertaken using a hydrolysis test.

The presence of Salmonella in water can be determined by concentration followed by culturing on selective media (AS/NZS 4276.14-1995). Serotyping of species is available.

The enumeration of Sulfite Reducing Clostridia is achieved by membrane filtration and confirmation steps involving selective media (AS/NZS 4276.17-2000). The AWQC developed an alternative rapid method for the identification of C.perfringens using an alternative selective fluorogenic broth. This rapid method has improved sensitivity and specificity for confirming C.perfringens.

Importance of Analysis

Campylobacters have been associated with a few water related outbreaks worldwide. The main sources were found to be unchlorinated surface water and faecal contamination of water storage reservoirs by wild birds. Contamination of drinking water reservoirs by excrement of water fowl should be controlled, particularly if Campylobacter contamination is suspected. Hygienic precautions should be improved in case the water is distributed without disinfection, or disinfection is interrupted.

Campylobacter spp, like other bacterial pathogens, survive well at low temperatures, and can survive for several weeks in cold groundwater or unchlorinated tap water. The presence of thermophilic Campylobacter organisms in piped water supplies, whether treated or untreated, suggests a serious fault in the design or management of the system.

Salmonella has been isolated from a number of source waters in Australia and occasionally from reticulated waters. Salmonella was associated with contamination of a reservoir and a distribution system in Alamosa, Colorado in 2008.

Most illnesses resulting from Salmonella infection are derived from contaminated foodstuffs, e.g. poultry and livestock. Waterborne Salmonella spp play only a minor role in causing disease.

The presence or absence of Sulfite Reducing Clostridia is commonly used to evaluate the sanitary quality of water, sediment and animal samples. The advantage of using C.perfringens as an indicator is that they do not replicate

in natural waters due to their strict growth requirements. They are extremely resistant to disinfection processes and environmental stresses as most of the populations form spores. Under unfavourable conditions Clostridia can survive for a long time as spores in lake water and sediment.

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