Watercheck™

A Presence/Absence 24-hour test for Coliforms and E. coli

Table of Contents

1.0 INTRODUCTION

1.1 Background

1.1.1 Bacterial Indicators

Bacterial indicators are monitored in drinking water to assess the presence and level of fecal contamination and thus determine the potential for disease. Total Coliforms and Escherichia coli (*E. coli*) are widely used in regulatory assessments of drinking water. *E. Coli* is present in extremely large numbers in the feces of all mammals, does not multiply appreciably in the environment outside of its host and is easy and inexpensive to culture and enumerate. For this reason, *E. Coli* is recognized internationally as the main indicator of fecal pollution in drinking water (WHO, 2000).

1.1.2 Health Implications

The most common health implication from drinking bacterially contaminated water is gastrointestinal illness including diarrhea. Although gastrointestinal illness is usually non-life threatening in normal healthy adults, the risk of death increases among vulnerable groups such as infants, the elderly and individuals with suppressed immune systems.

1.1.3 Drinking Water Standard

The maximum acceptable concentration (MAC) of *E. coli* and Total Coliforms in public, semi-public, and private drinking water systems is zero per 100 mL.

1.2 Overview

The WaterCheck™ test kit is a screening tool to detect fecal contamination in drinking water. The test simultaneously determines the Presence or Absence of Coliform and *E. coli* bacteria, indicative of fecal pollution. WaterCheck™ is an EPA based test and is sensitive enough to meet national drinking water standards, detecting the presence of a single colony forming unit (cfu) per 100 mL of water.

1.3 Principle

The WaterCheck™ is a Defined Substrate Technology (DST) utilizing the proven nutrient indicators X-Gal and MUG to detect viable Coliforms and *E. coli* bacteria. The WaterCheck™ media contains inducers and substrates which react with the specific enzyme indicative of Coliforms (beta-D-galactosidase) and *E. coli* (beta-D-glucoronidase) to provide colour change to blue/green. If the water sample is contaminated with just a single cfu, a visible blue-green colour will develop.

The kit also contains a tablet of sodium thiosulphate that will "neutralize" any residual chlorine or other oxidant that may be present in treated water which would inhibit the growth of bacteria in the water sample.

1.4 Applications

1.4.1 Private Drinking Water Supplies

In rural areas, most people rely on private water supplies such as wells or adjacent surface waters in lakes and rivers. Privately owned water supplies for individuals are not regulated by the government. Unlike consumers of municipal water, residents with wells or those extracting water from adjacent lakes or rivers are responsible for making sure their water supply is safe to drink.

Most surface waters and many shallow dug wells can be expected to be contaminated with coliform bacteria and should be treated prior to use as drinking water. Deep drilled wells with proper wellhead protection and an adequate treatment system should be free of coliforms and *E. coli* bacteria but should be tested regularly to ensure the system is operating optimally.

1.4.2 Testing Drinking Water in Developing Countries

Our bacterial testing kits offer a solution to the challenges of water testing initiatives in developing countries. Our technology enables remote towns and villages to test their water independently, thus taking control of their own community safety.

1.5 Testing Schedule

Regular testing is important to ensure safe drinking water, identify existing problems and determine the effectiveness of a treatment system. The quality of a water source may change over time, even suddenly. Changes can go unnoticed as the water may look, smell, and taste the same.

Health authorities suggest home owners test their water at least twice per year. However, testing your well on a regular basis is the best way to ensure safe drinking water. Probably the most important time to check your well is in the spring when rain and snowmelt cause runoff conditions. You should also have your well tested if:

- There are known problems with well water in your area
- You have experienced problems near your well (i.e., flooding, land disturbances, and nearby waste disposal sites)
- You replace or repair any part of your well system
- You or a family member has experienced a recurring gastro-intestinal illness
- You are pregnant, or have a child less than six months old living in your household

- Your well is next to a septic tank, and it is questionable if the septic tank is set back far enough from your well
- Your well is next to an area where livestock are kept
- Your well does not meet current building codes
- You have noticed an increased amount of turbidity in your water

1.6 Benefits of WaterCheck™

Rapid

- Simultaneous detection of Coliforms and *E. coli* in 24 hours (when incubated at 35-37°C).
- No preparation required. Kit is provided as a sterilized bag, which is ready to use.
- Water sample collection, mixing, incubation and observation are all done in the same bag.

Convenient and User-friendly

- Can be used by inexperienced/non-technical persons.
- Simple do-it-yourself, at home test. Can also be used in off-site, remote areas.
- Ready to use. No media preparation.
- Distinct colour change easy to interpret.

Accurate

- Detects a single viable Coliform or *E. coli* per 100 mL sample.
- Literature suggests DST methods are more accurate than Standard Methods (Hernandez *et al.,* 1991, Manafi, 1996 and Neidhardt *et al.,* 1995).

Cost Effective

- Probably the most economical Presence/Absence bacterial test kit on the market.
- Long shelf-life of up to 3 years.

2.0 WATERCHECK™ PROCEDURE

1) Tear perforated strip and open bag by pulling white tabs. Fill bag with water up to the fill line (approximately 100mL). Do not touch the inside of the bag. If testing tap water, run tap for 10 seconds before filling bag.

2) Remove excess air and roll bag four or five times around wire strip. Bend wires to seal.

3) Remove divider clip. Mix powder into water until completely dissolved (10 to 30 seconds).

4) Place bag out of children's reach and let sit for two to three days depending on the incubation temperature, as shown on the chart below (longer-term incubation). Or for a more rapid and reliable test response, place in an incubator set at a temperature anywhere between 35°C - 37°C (short-term incubation) for 24 hours (recommended).

Incubation Temperature	Incubation Time
35-37°C	24 hours
30-35°C	36 hours
25-30°C	48 hours
20-25°C	60 hours

Some of our customers place their sealed WaterCheck™ bag containing sample water on top of their refrigerator, near the back, as warm air rises from the heat exchanger at the rear of the refrigerator (approximately 25°C).

2.1 Longer-Term Incubation

If the WaterCheck™ test kit is incubated at a lower temperature than 35°C, then the length of time for a positive reaction, i.e., development of blue-green colour, increases. The lower the incubation temperature, the greater the chances that a "false positive" reaction resulting from non-target bacteria may develop. For this reason, the shorter incubation periods at temperatures of 30-37°C are recommended for greatest reliability.

2.2 Short – Term Incubation (Recommended)

The growth media contained in the WaterCheck™ kit has been specifically designed for the preferential growth of coliforms when incubated at an optimum temperature of 35°C to 37° C for 24 hours. At this temperature, in this growth media, coliforms will preferentially outgrow other bacterial species that may be present in the water.

If you are using the Hova-bator Incubator supplied by Bluewater Biosciences, please see http://www.bluewaterbiosciences.com/products_coliplate_hova.htmL for instructions.

Note: It is possible to make your own incubator with a cardboard box lined with aluminum paper, and the use of a 40W bulb and a thermometer. Instructions are available online and are also on our website at: http://www.bluewaterbiosciences.com/media.html.

3.0 INTERPRETATION OF RESULTS

1) After appropriate incubation time OBSERVE COLOUR:

YELLOW: No Coliforms or *E. coli* detected.

BLUE/GREEN: Coliforms and potentially *E. coli* detected. **Water may be unsafe to drink. Water should be boiled or chlorinated before drinking. Contact your local Health Authority.** NOTE: Coliform bacteria often originate from non-sewage sources and do not necessarily, but may, imply a health hazard.

1)Negative Test Result. No Coliforms or *E. coli* detected.

2)Positive Test Result. Coliforms and potentially *E. coli* detected.

2) The WaterCheck™ test kit can also be used to confirm the Presence or Absence of ***E. coli*** if a longwave (350-400nm) UV fluorescent light is available (available through Bluewater Biosciences please see: http://www.bluewaterbiosciences.com/products_accessories.html).

As noted above, a blue/green colour indicates the presence of Coliform bacteria. If *E. coli* is present, the blue/green water sample will fluoresce (glow) when exposed to the UV light in a dark room. **The presence of *E. coli* is a STRONG indicator of water contamination by sewage.**

4.0 HANDLING WATERCHECK™ TEST KITS

4.1 Handling

The bacterial strains detected with WaterCheck™ are not toxic or pathogenic, and are not a risk to human health. However care should be taken when handling WaterCheck™ test kits. Hands should be thoroughly washed after handling exposed WaterCheck™.

If accidental ingestion occurs, watch for symptoms of stomach pain and contact your physician for treatment of drinking polluted water.

Should accidental spillage occur, clean the area with disinfecting solution.

4.2 Storage

WaterCheck™ should be stored in the sealed packaging provided, in dry conditions, in temperatures ranging from 2 – 30 °C and away from light. In humid climates, it's recommended that WateCheck™ kits are stored in a refrigerator.

4.3 WaterCheck™ Disposal

Dispose of the contents by emptying into a toilet and place plastic bag into garbage.

Note: the sample will have an organic odour, this is normal, and is the scent of the growth media after incubation.

5.0 REFERENCES

World Health Organization (WHO). 2000. Guidelines for Drinking Water Quality: 1 – Recommendations. 2nd edition, Geneva.

Hernandez, J.F., J.M. Guibert, J.M. Delattre, C. Oger, C. Charriere, B. Hughes, R. Serceau and F. Sinegre. 1991. Miniaturized Fluorogenic Assays for Enumeration of *E. coli* and Enterococci in Marine Water. Water Science and Technology. 24: 137-141.

Manafi, M. 1996. Fluorogenic and chromogenic enzyme substrates in culture media and identification tests. International Journal of Food Microbiology. 31:45-58.

Neidhart, S., G. Havemeister, C. Holler and K.O. Gundermann. 1995. Evaluation of MUG-supplemented media for the detection of *E. coli* in recreational water surveillance. Zentralblatt fur Hygine und Umweltmedizin. 198:152-164.

Distributed by

111 Malcolm Rd, Guelph, ON N1K 1A8
PH: (519) 822-1886 FX: (519) 763-6580
email: sales@wyckomaruv.com
www.wyckomaruv.com