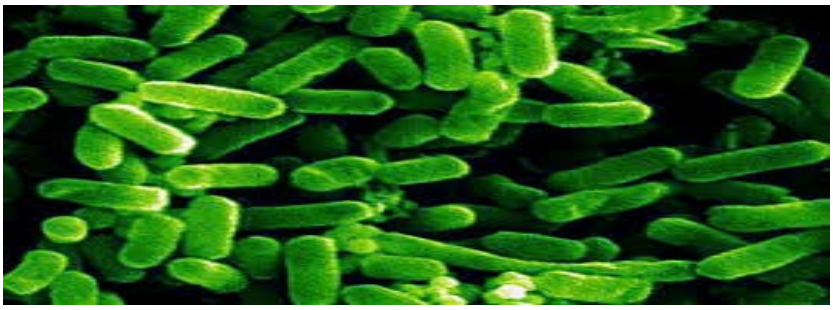
ASSURED BIO LABS

September 2013 Newsletter

September 2013 - About E-Coli



The Five Ws of Coliform Testing:

What are coliforms?

Specifically, coliforms are Gram-negative, non-spore forming, rods that have the ability to ferment lactose, producing an acid and gas at 35°- 37°C. This subset includes the likes of: Escherichia, Klebsiella, Serratia, Citrobacter, and Enterobacter.

Where are coliforms found?

Everywhere. Coliforms are a subset of bacteria that may be found in every environment. They have the ability to grow in water and soils, but most commonly are concentrated in the guts of warm blooded animals. For this reason some are often called fecal bacteria. In essence, anywhere we may go, they will be.

Who should test for coliforms?

Everyone may at some point in time find it necessary to test for the presence of coliform bacteria. The most common instance of testing is in

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Assured Bio Labs Will Be Observing This Upcoming Holiday:

- Thanksgiving: November 28-29.

Meet Our Newest Employees!

Marcus Reed recently joined the team at Assure

food and water microbiology. These organisms are a common kitchen contaminant and have proven to be problematic in food manufacture. One strain, E. coli O157:H7, often makes the national news as a food born pathogen responsible for death and disease in young children who have consumed undercooked meat. Even though coliforms are naturally associated with the presence of mammals, it is not recommended to have them present in potable water. Coliform testing is also used in the industrial hygiene and restoration industry. Coliform testing allows one to assess the impact of flood waters and sewage backups. It also aides in the maintenance of pools, spas, and water features which harbor bacteria and enable aerosolization.

Why is coliform testing significant?

Even though many coliforms do not cause disease and are part of our natural flora, they are often used to determine the presence of more dangerous organisms. This would include Salmonella, Shigella, Giardia, Ascaris, and Hepatitis- to name a few. All of which are fecal pollutants, just like coliforms. Many laboratories do not commonly test for these organisms due to personnel safety concerns. It is common for coliforms to infer presence of these more dangerous microbes. The thought process is that since these serious pathogens would only constitute a small portion of the organisms present in fecal contamination, that they would likely be present (in low dosages) when coliforms are detected.

When should coliforms be tested for?

Most states recommend well water to be tested annually for coliforms. Those using water provided through a utilities board may rest assured in the board's microbiology department assessing the biological loads present

Bio as a Laboratory Technician. He is from Rockwood, TN. His collegiate career college at Roane State Community college where he earned an associates of science in biology. After transferring to the University of Tennessee at Knoxville, Marcus earned a bachelors of science majoring in biochemistry, cellular and molecular biology. Outside of work, he is an avid Tennessee Volunteer football and basketball fan. Marcus also enjoys playing guitar and golfs at his leisure. His other interests are video games and cinema.

Kelsey Warmbrod is a senior at Oak Ridge High School interested in pursuing a degree in microbiology. She is an intern at Assured Bio in hopes of gaining hands-on experience in a laboratory and learning more about microbiology prior to entering college. Her project this fall centers around bacterial transformation. Kelsey also works as a lifeguard part-time. She has the honor of being a member of the Oak Ridge Youth Advisory

in drinking water at the source, however, conditions downstream from a utility board's source may affect the potability of water. It is recommended that properties suffering from black water flooding conditions undergo coliform testing prior to and at the completion of property restoration. Insurance companies often utilize the front end testing in order to determine the areas that should be covered by an insurance claim. On the back end of a black water restoration project, the post sampling may be used as a post remediation verification to illustrate the completion of work by examining the reduction of the bacterial load. As water features increase in popularity, expect to see state issued regulations put into place. (This has already occurred in Texas.) Standing water is a breeding ground for bacteria such as E. coli. Pools, spas, ponds, waterfalls, and all of the beautiful water features that we come into contact with are a potential source of illness. Each should undergo routine treatment and maintenance. Monthly monitoring is recommended.

For more information on drinking water regulations and well water maintenance check out:

http://www.state.tn.us/environment/dws/waterwel.shtml

http://water.epa.gov/lawsregs/rulesregs/sdwa/currentregulations.cfm

Water Collection

The first step in water sampling is knowing what you are looking for and where you should be looking to find it. Knowing what you are looking for can help you narrow down a good location to collect a sample. When testing for water potability, a sample can be collected from any faucet that is being used on site. The second step in collecting a water sample is keeping everything clean. Sterility is key. Remember, coliforms are

Board. When she is not in school or at the lab, Kelsey enjoys spending free time swimming and baking.

bacteria and therefore invisible to the naked eye. The sample collection bottle should be sterile prior to use and steps should be taken to not introduce bacteria into the collection bottle. This may be achieved by wearing gloves and utilizing alcohol wipes to clean any point where bacteria may come into contact with the sample during its collection. The third and possibly the most crucial step is keeping any coliform bacteria collected in the sample alive and stable during transit. To do this, the sample should be kept in a cool, dry environment, such as a refrigerator, when stored. Ideal transport would have the sample arriving at the lab within 6 hours of collection, however that scenario is often impossible. To circumvent, the water sample may be shipped overnight in a cooler with cool packs.

A Coliform Sample Collection Protocol

1. A faucet should be selected to collect the sample.
2. Remove all of the filters, aerators, or screens from the faucet.
3. Turn on the water and run for a minimum of five minutes. This ensures that no stagnant water will be tested. Turn the water off.
4. The faucet you have selected should be flame sterilized using a butane lighter for 15 seconds (Hold the flame far enough away so it does not discolor the metal). If you do not have a butane lighter or the faucet is plastic, an alcohol wipe may be used.
5. Turn the water back on and let it run for 1 minute. Remove the cap from the sterile collection bottle. DO NOT SET THE CAP DOWN OR TOUCH THE INSIDE OF THE CAP. Fill the bottle up to either a designated fill line or to the bottles shoulder to ensure the sample volume is appropriate.
6. Re-cap the bottle, label the bottle, and seal the bottle. Electrical tape may be used to seal the cap onto the bottle.
7. Complete the Chain of Custody.
8. Deliver the sample to the laboratory or ship the sample within 6 hours.
9. When shipping, use the overnight option. Remember to use cold packs!

E. Coli Bacteria Solve Sudoku Puzzle, Programmed By University Of Tokyo Students

The Huffington Post

New Scientist has the latest scoop on E. coli, but don't worry -- there's no deadly food scare this time. Instead, the notorious bacteria are now solving sudoku puzzles, thanks to some ingenious "programming" from a group of University of Tokyo students.

The team realized that by designing a circuit for the E. coli to follow, it would have a good chance of solving sudoku thanks to the simple set of rules. Using a four-by-four grid, 16 types of the bacteria were assigned a unique genetic identity, and each had the ability to express four different colors to reflect the numerical value of its location.

Various bacteria were given a preset color, just as sudoku puzzles start with some numbers revealed in order to solve the missing digits. They then passed this information through viruses to the unsolved bacteria, which were designed to only accept the data from their same row, column, or grid. Because the genetic information encoded prohibited the receiving bacteria from transforming into the same color as the transmitting bacteria, by process of elimination the puzzle was solved.

According to New Scientist, the project's team leader, Ryo Taniuchi, claims the process can be expanded to use 81 types of E. coli bacteria to solve an entire nine-by-nine grid sudoku puzzle.

As MNN reports, this isn't the first time the infamous bacteria have been able to solve puzzles. In 2008, scientists managed to turn E. coli into simple computers to solve the "burnt pancake problem." In an interview with NPR at the time, Dr. Karmella Haynes even joked about E. coli eventually solving sudoku problems.

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