Eastex Environmental Laboratory

August 2016 Newsletter

The Headache of E.coli!

Escherichia coli (E.coli) bacteria is the topic of much concern in the water industry in recent years. There tend to be misunderstandings about E.coli mostly due to media coverage on the food and beverage industry.

What is it, where does it come from and how did it get in the water? E.coli bacteria is a single celled organism that is found in the digestive system of humans and animals. It can only be seen with the aid of a powerful microscope. The bacteria is essential as it aids in digesting food and processing waste. There are multiple strains of E.coli, and most are not harmful to humans. However, a few strains can cause serious negative health affects in humans and should be taken seriously. In the water industry E.coli testing is primarily used to monitor water quality and as an indicator of the possible presence of other more harmful microbes such as Cryptosporidium, Giardia, or Norovirus. Any E.coli in water comes from some source of feces contamination. This may get into the water by direct sewer contamination through spills, leaking septic systems, livestock/pet waste, birds, wildlife, and run off from rainfall. Once exposed to this run off, soil can be contaminated with E.coli and be a possible source of the bacteria for later release. Higher rates of flowing water tend to have higher E.coli counts as they carry more sediment and potentially more fecal runoff.

Did you fail a lead and copper sample? Do you have corrosive water? The State has new requirements if you are a PWS over 50000, a new PWS or if your results are over action levels. You are required to do Corrosion tests. Contact Eastex to find out more.

How does it live? Most E.coli bacteria thrive in warm, moist, dark environments but it can survive for extended times in water if there is an adequate food source. It cannot live on dry surfaces nor in the air, and is not transferred by breath or by casual contact. The best way to minimize any growth is to keep the areas of concern clean and dry if possible. Clear any sediment, algae, or solid deposits in water. Ensure the water is free flowing without "bypass" areas.

E.coli regulations In 1986, the EPA established E.coli criteria in recreation waterways based on a correlation between their occurrence and reports of gastrointestinal illnesses. In 2000 the National Beach Act adopted Enterococci as an indicator of bacteria levels in saltwater. Also in 2000 Texas specified E.coli and Enterococci to be the indicator organism for water quality standard for contact recreation waters. The Clean Water Act passed by Congress and enforced by EPA requires a listing of impaired waters called the 303(d) list. This identifies water ways that the state must develop TMDL (Total Maximum Daily Load) plans to address water quality concerns in the stream segment. Between the listing of impaired streams and the water recreation criteria already set, the EPA decided in 2007 to require bacteria limits for all State and Federal wastewater permits to demonstrate disinfection. Prior to this decision disinfection was assumed based on a minimum chlorine contact time and residual which was specified in the permit and in the Texas Administrative Code (TAC) 30 TAC 309. The TCEQ and EPA reached an agreement that all wastewater permits will receive E.coli on permits beginning January 2010 as they have their

FEATURED

Lead and Copper Reduced Cycle Ends

Sep 30th 2016

Please make sure your sites are approved.

Always check the accuracy of system ID on every form and report. Make copies of all forms and reports.

Make sure you log in to Drinking Water Watch to make sure your report is submitted.

Once the cycle ends, TCEQ will not permit any allowances, and you will get a violation.

Call Eastex Lab, if you need assistance navigating the TCEQ website.

Deadlines are closer than they appear!

- Sludge DMR Reporting by Sep 30 2016 but check your permit - older permits may have Sep 1 deadline.
- Lead and Copper Reduced Cycle ends Sep 30 2016
- Lead and Copper 6M2 Cycle ends Dec 31 2016
- Effective Dec 21, 2016 **DMR** must be submitted via NetDMR

MUST READ NOW

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permits renewed. The effluent limitations are set in the TAC as a monthly average of 126 cfu/100ml for E.coli and 35 cfu/100ml for Enterococcus. The frequency of the monitoring relies on the capacity of the facility, disinfection used, and compliance history. Depending on these factors monitoring can vary from daily to quarterly. More stringent monthly averages can be in effect if required by a permit or a TMDL for a watershed is approved.

Treatment The two primary techniques used to disinfect are chlorination and UV. Regardless of the technique used several factors need to be monitored to ensure that bacteria are removed.

Water Quality is the first thing to check if bacteria results are high. Adjustments to the plants wasting or return rates may be needed if the water is turbid or solid portions are leaving the plant. Solids have significantly higher bacteria counts than clear effluent and interfere with the disinfectant. Chlorine will be wasted reacting with the solids instead of bacteria and UV light will be blocked by solids, turbid water or algae allowing the bacteria to pass through unharmed.

Disinfectant time This is typically a set value but can vary due to storm water, seasonal changes or plant settings. TCEQ requires a 20 minute contact time and suggest 30 minutes chlorine contact time for effective bacteria kill rates. This is 30 minutes at peak flow from the chlorine contact to the final discharge. When the facility gets abnormal flow this creates a hydraulic load on the plant that will reduce the effectiveness of the disinfectant technique. Some designs may need added baffling to help ensure the water gets the necessary chlorine contact time to be effective. For UV treatment, ensure that there are enough properly functioning bulbs in place to handle the bacteria load. Increased flow will reduce the exposure time of the bacteria to UV and cause elevated counts.

Disinfectant quantity Maintaining a proper chlorine residual or UV light exposure is the main way to ensure killing the bacteria. When water quality or disinfectant time drops the disinfectant quantity has to be increased to offset it. For example: If the facility has poor water quality due to solids in the effluent or the disinfectant time is less than the 30 minutes suggested by TCEQ due to storm water runoff or poor design, then the chlorine residual or UV intensity will need to increase to compensate. With UV you will see a drop in quantity or intensity due to the ageing of the bulbs and/or due to dirty sleeves on the bulbs. Dirty sleeves block the UV effectively reducing the amount of exposure available and inhibiting disinfection. Sleeves should be inspected and cleaned anywhere from weekly to monthly depending on water quality.

Sampling Since bacteria thrive in certain environments, where you sample is the main factor in avoiding sample contamination. The water should be sampled directly into the collection vessel and not transferred from another container unless it is absolutely necessary. Take care to avoid sediment or plant life while sampling the water. Eastex has performed several comparative studies on E. Coli and Enterococcus sampling techniques to determine the impact of sampling conditions. Please go to our website for more information on this. Contamination by the sampler is difficult for E.coli contrasted to Total Coliform. Total Coliform, required for drinking water, is a broad check of many types of bacteria some of which are on your hands and mouth; it originates from multiple sources. This type of sampling requires proper sterilization of the site and surroundings and no contact by the sampler. When sampling waters for E.coli or Enterococcus care should be used in handling the container but contamination from the sampler is rare if standard hand washing or alcohol gel is used prior to sampling since E.coli originates in feces.

No doubt that E.coli is making an impact on public health awareness in many industries, and how you operate your facility on a day to day basis. Staying diligent to monitor the facility settings will go a long way in disinfection but stay aware of those factors out of your control that can cause those E.coli headaches to flare up. Stay in close contact with your lab regarding the specific permit requirements you are trying to meet and take advantage of the ability to average down bacteria counts with a geometric average.

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Interesting Facts

The full name of *E. coli* is *Escherichia coli*. Escherichia is named after Theodor Escherich, a German pediatrician who discovered it in 1885. Coli means "from the colon" and is used because it is commonly found in the colon of mammals (including humans).

E. coli are promiscuous and can exchange genes with other strains or even other bacteria (via bacteriophage or bacterial virus, conjugation or naked uptake of DNA) and can lead to acquisition of new virulent traits. This was the case in *E. coli* O104:H4 outbreak in Germany in 2011. In this outbreak a less harmful strain acquired genes for production of Shiga toxin from a STEC leading to ~3900 infections and 53 deaths.

E.coli can survive more than 100 days in water.

Our Mission: Participate in the protection of the environment and public health by delivering reliable, quality analytical data and environmental compliance services in a friendly, personal, professional manner while growing our employees in experience and skill.