

IDEXX Water

Hello,

Thank you for the opportunity to submit comments on SEPA# 201802244, Ecology's proposed update to fresh and marine water quality standards (Chapter 173-201A WAC), attached is a written comment letter for your consideration.

Best regards,

Jody Frymire
Regulatory Affairs Associate II
IDEXX Water

Ms. Becca Conklin
Washington State Department of Ecology
PO Box 47600
Olympia, WA 98504-7600

Document: 201802244 -Washington Department of Ecology

May 7, 2018

Dear Ms. Becca Conklin,

IDEXX commends the State of Washington Department of Ecology (Ecology) on proposing to update the water quality standards for surface waters by including new bacterial indicators of fecal contamination and associated numerical criteria for water contact recreational use. At this time, IDEXX would like to request Ecology to consider the following supportive and editorial comments.

1. Recommend and support changes to the bacteria criteria for fresh and marine, extraordinary primary, primary, and secondary contact waters, changing from fecal coliforms to either *E. coli* or enterococci as listed within WAC 173-201A-200 Table 200(2)(b) and WAC 173-201A-210 Table 210(3)(b).

Rational: *E. coli* and enterococci are more protective indicators of fecal contamination versus fecal coliforms.

Fecal coliform bacteria are commonly identified as being thermotolerant bacteria (able to grow at 44.5°C) [1]. Thermotolerant bacteria consists of *E. coli*, *Klebsiella*, *Enterobacter*, and *Citrobacter* species [1,2]. When testing for fecal coliforms, the population of the bacteria present can affect the fecal coliform results, for example: *Klebsiella*, *Enterobacter*, & *Citrobacter* species are false-positive indicators of fecal contamination as they are from nonfecal origin [2]. It has been found, up to 15% of *Klebsiella* (nonfecal origin) are thermotolerant and up to 10% of *E. coli* are not thermotolerant, thus potentially causing an error rate of 25% when testing for fecal coliforms [3]. *E. coli* is the only bacteria of the coliform bacteria group that comes from the intestinal tract and found to be more specific to the detection of fecal contamination, so much so, that *E. coli* is the definitive indicator of fecal contamination in US drinking water regulations [3,4] and is the recommended bacterial indicator for fecal contamination in recreational fresh water, as part of the 2012 US EPA Recreational Water Quality Criteria recommendations [5].

Within marine waters, studies show enterococci as compared to other fecal contamination indicators, have a higher survival rate and enterococci show a direct association with risk of swimmer's illness [6,7]. The European Union (EU), uses enterococci as an indicator of fecal contamination for recreational waters, as well as in drinking water, and additionally enterococci are part of the US EPA 2012 Recreational Water Quality Criteria and included by the World Health Organization as recommended bacteria indicator for fecal contamination for recreational water [5,7].

2. Suggest to edit units associated with bacteria indicators currently “colonies/100mL” included within WAC 173-201A-200 Table 200(2)(b) and WAC 173-201A-210 Table 210(3)(b) to instead read “counts/100 mL;” which would be relevant to both CFU and MPN units.

Rational: The unit describes the method the lab uses for bacterial detection, for example the test result would be assigned either as most probable number (MPN) per 100mL or colony forming units (CFU) per 100mL, depending on what approved test method was used [8]. The term “colonies,” is typically associated with the term CFU. The US EPA approves the use of different analytical methods, with results expressed in either MPN or CFU units [9]. To enter an MPN value in a column called “CFU” or “colonies” would be using the incorrect unit. CFU and MPN are both estimates for the concentration of viable target bacteria within a water sample.

3. Suggest to edit the definition for “*E. coli*” as written within WAC 173-201A-020.

Current language:

“*E. coli*” or “*Escherichia coli*” is an aerobic and facultative gram negative nonspore forming rod shaped bacterium that can grow at 44.5 degrees Celsius that is ortho-nitrophenyl-B-D-galactopyranoside (ONPG) positive and Methylumbelliferyl glucuronide (MUG) positive.

Suggested language:

“*E. coli*” or “*Escherichia coli*” is an aerobic and facultative gram negative nonspore forming rod shaped bacterium that that is ortho-nitrophenyl-B-D-galactopyranoside (ONPG) positive and Methylumbelliferyl glucuronide (MUG) positive and is a species specific to fecal material from humans and other warm-blooded animals.

Rational: While thermotolerant *E. coli* can grow at 44.5 degrees Celsius, typical *E. coli* grow at 35 degrees Celsius. By listing a temperature in the definition, it suggests the only analytical methods that use the defined temperature would be valid. Listed within the EPA 40 CFR Part 136.3, under the approved biological methods for *E. coli*, scientifically valid methods, like EPA Method 1604, detect *E. coli* at 35 degrees Celsius [9,10]. To only reference *E. coli* that can grow in 44.5 degrees Celsius, does not seem to be inclusive to the other EPA approved methods. Also, adding the additional information clarifies the bacteria is used as an indicator of fecal contamination within water.

4. Suggest to edit the definition for “*Enterococci*” as written within WAC 173-201A-020.

Current language:

“*Enterococci*” refers to a subgroup of fecal streptococci that includes *S. faecalis*, *S. faecium*, *S. gallinarum*, and *S. avium*. The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10°C and 45°C.

Suggested language:

“*Enterococci*” refers to a subgroup of fecal streptococci that includes *S. faecalis*, *S. faecium*, *S. gallinarum*, and *S. avium*. An indicator of fecal pollution in water, commonly found in fecal material from humans and other warm-blooded animals.

Rational: This sentence “The enterococci are differentiated from other streptococci by their ability to grow in 6.5% sodium chloride, at pH 9.6, and at 10°C and 45°C,” leaves out important details that provide information on the analytical methods used, for example: the reference to 6.5% sodium chloride is on bile esculin agar and the reference to temperature is on brain-heart infusion. To avoid confusion, recommendation is to either add the 05022018

additional information or take the sentence entirely. [11]. Additionally, for further definition clarification, recommendation is to add the bacteria is used as an indicator of fecal contamination within water.

IDEXX appreciates the opportunity to provide this supportive comment as well as the editorial comments and hopes Ecology will consider these suggested edits as an additional way to strengthen the water quality standards for surface waters. We look forward to the next steps in the Triennial Review process.

Respectfully submitted,



Jody Frymire
Regulatory Affairs Associate, Water

One IDEXX Drive
Westbrook, Maine 04092 USA
idexx.com/water
jody-frymire@idexx.com
Tel/Fax: +1 207 556 4840
Mobile +1 207 239 1563

References

1. Warden, Paul; DeSarno, Monique; Volk, Sarah; and Eldred, Bradley. Analytical Services. Evaluation of Colilert-18 for Detection and Enumeration of Fecal Coliform Bacteria in Wastewater Using the U.S. Environmental Protection Agency Alternative Test Procedure Protocol. *Microbiological Methods, Journal of AOAC International*. Volume 94, Number 5: 2011
2. Doyle, Michael. Erickson, Mary. Closing the Door on the Fecal Coliform Assay. *Microbe*, Volume 1, Number 4, page 162: 2006
3. Allen, Martin; Edberg, Stephen; Clancy, Jennifer; Hruday, Steve. Drinking water microbial myths. *Critical Reviews in Microbiology*; ISSN: 1040-841X (print), 1549-7828 (electronic): 2013:
<http://informahealthcare.com/mb>
4. Cummings, Dennis. The Fecal Coliform Test Method Compared to Specific Tests for *Escherichia coli*. IDEXX:
<https://www.idexx.com/resource-library/water/water-reg-article9B.pdf>
5. US Environmental Protection Agency. Recreational Water Quality Criteria. Office of Water 820-F-12-058.
<https://www.epa.gov/sites/production/files/2015-10/documents/rwqc2012.pdf>
6. Hussain M, Rasool SA, MT Khan, A Wajid. "Enterococci vs coliform as a possible fecal contamination indicator. Baseline data for Karachi." *Pak J Pharm Science*. 20(2): 107-111; 2007:
<https://www.ncbi.nlm.nih.gov/pubmed/17416563>

7. Boehm, Alexandria and Sassoubre, Lauren. Enterococci as Indicators of Environmental Fecal Contamination. *Enterococci: From Commensals to Leading Causes of Drug Resistant Infection*. 2014: <https://www.ncbi.nlm.nih.gov/books/NBK190421/>
8. Gronewold AD, Wolpert RL. 2008. Modeling the relationship between most probable number (MPN) and colony-forming unit (CFU) estimates of fecal coliform concentration. *Water Res.* 42(13):3327-3334
9. US Environmental Protection Agency. 40 CFR Part 136. Guidelines Establishing Test Procedures for the Analysis of Pollutants. 1977
10. US Environmental Protection Agency. Method 1604: Total Coliforms and *Escherichia coli* in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium) (September 2002). EPA-821-R-02-024. https://www.epa.gov/sites/production/files/2015-08/documents/method_1604_2002.pdf
11. Method 9230, American Public Health Association (APHA) (2017) Standard Methods for Examination of Water and Wastewater, 23rd edn. American Public Health Association, Washington DC