

# Rulemaking Docket 58-0102-1802

## Summary of the Basis for Revisions to Idaho's Recreational Water Quality Criteria

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### Background

The Idaho Department of Environmental Quality (DEQ) has proposed updates to its criteria for protection of recreational uses. The proposed updates incorporate the US Environmental Protection Agency (EPA) 2012 recommendation for recreational water quality criteria (EPA 2012).

In accordance with §304(a) of the Clean Water Act (CWA), EPA is required to develop criteria for human pathogens that are protective of human health in recreational waters based on the most up-to-date scientific knowledge. EPA's most recent §304(a) recommendation for recreational waters was published in 2012 (EPA 2012). In 2018, EPA published a review of the scientific basis for the 2012 recommendation and determined that further revision was not necessary (EPA 2018).

DEQ identified addressing EPA's 2012 §304(a) recommended criteria as a high priority in Idaho's 2017 Triennial Review of Water Quality Standards (DEQ 2017). In addition, addressing the EPA 2012 §304(a) recommendation complies with federal requirements for states to consider EPA-recommended §304(a) criteria (40 CFR 131.20).

### Overview of the EPA 2012 §304(a) Recommended Criteria

EPA's 2012 §304(a) recommended criteria use *Escherichia coli* (*E. coli*) and enterococci as fecal indicator bacteria (FIB) for potential fecal contamination and pathogen exposure. The recommended criteria include the three elements of numeric criteria—magnitude, duration, and frequency—and consist of both a geometric mean and a statistical threshold value (STV).

For culturable bacteria, such as *E. coli* and enterococci, concentrations are commonly expressed as either colony-forming units (CFU)/100 milliliters (mL) or most probable number (MPN)/100 mL, depending on the analytical method used. These units are equivalent and are both EPA-approved units for analysis of FIB for CWA purposes. Therefore, for clarity, DEQ refers to the concentration of FIB as counts/100 mL.

The criteria are based on the relationship between the concentrations of FIB and rates of illness reported by swimmers. EPA provides two estimated illness rates that would be considered protective of recreational use: 36 or 32 illnesses per 1,000 users. Selection of an illness rate is a risk-management decision that should be made by states (Table 1).

**Table 1. EPA's 2012 recommended recreational water quality criteria based on two illness rates: 36/1,000 users and 32/1,000 users.**

Indicator	EPA 2012 Recommended Criteria (counts/100 mL)			
	36 Illnesses/ 1,000 Users		32 Illnesses/ 1,000 Users	
	Geometric Mean	STV	Geometric Mean	STV
<i>E. coli</i>	126	410	100	320
Enterococci	35	130	30	110

The recommended criteria magnitude are for a geometric mean concentration of FIB that corresponds to the 50th percentile of FIB concentrations associated with the selected illness rate and an STV concentration of FIB that corresponds to the 90th percentile of FIB concentrations associated with the selected illness rate. The magnitude, duration, and frequency of EPA's recommended criteria for *E. coli* and enterococci that correspond to an illness rate of 36/1,000 users is presented in Table 2.

**Table 2. Magnitude, duration, and frequency for *E. coli* and enterococci criteria that correspond to an illness rate of 36/1,000 users.**

	<i>E. coli</i>		Enterococci	
	Geometric Mean	STV	Geometric Mean	STV
Magnitude (counts/100 mL)	126	410	35	130
Duration (days)	30	30	30	30
Frequency	—	10%	—	10%

## Statistical Threshold Value (STV)

The STV was derived based on the 90th percentile of the expected distribution of FIB concentrations associated with the corresponding geometric mean. For example, it would be expected that at any given location, concentrations of *E. coli* would exceed 410 counts/100 mL less than 10% of the time without a corresponding exceedance of the 30-day geometric mean of 126 counts/100 mL (Table 2). Conversely, an exceedance of the STV at a frequency greater than 10% would have a greater probability of a corresponding exceedance of the geometric mean.

The STV magnitude and frequency are linked. For example, in EPA's final recommended criteria, they selected an STV magnitude that corresponded to the 90th percentile of the water quality distribution associated with the geometric mean criterion and a corresponding excursion frequency of 10%.

Earlier drafts of the 2012 EPA recommended criteria based the STV on the 75th percentile of the expected distribution with a maximum excursion frequency of 25%. If Idaho proposed to deviate from the 2012 EPA guidance, we would need to select an STV magnitude that corresponded to the selected frequency. For an excursion frequency of 25%, the appropriate corresponding percentile would be the 75th percentile. For *E. coli*, the 75th percentile concentration would be 235 counts/100 mL, as opposed to the recommended 90th percentile concentration of 410 counts/100mL.

## Proposed Rule

Idaho's use categories for designation of recreational use refer to primary contact recreation (PCR) and secondary contact recreation (SCR). A list of characteristic activities distinguishes the two subcategories of recreational use, based on the likelihood of ingesting water. This distinction relates only to exposure to bacteria and dates back to 1999 when Idaho had fecal coliform as a FIB. At that time, there were two distinctly different criteria values for the two recreational use subcategories. In practice, PCR would include all the activities associated with secondary contact recreation, in addition to activities (such as swimming) that would include full immersion and a higher likelihood of incidental ingestion of water.

The current criterion is a geometric mean concentration of 126 counts/100 mL for *E. coli* regardless of this distinction, with different single sample maximum (SSM) thresholds that trigger additional monitoring to calculate a geometric mean. While the SSM values are different for PCR or SCR, the SSM is not a criterion. Instead, the SSM values only provide a threshold concentration that, if exceeded, requires additional monitoring to calculate a geometric mean for comparison to the criterion.

DEQ is proposing to adopt EPA's 2012 recommended criteria at the 36/1,000 user risk level for both *E. coli* and enterococci. The proposed revision includes designation of a 30-day duration component as well as adoption of the recommended STV magnitude and frequency for both indicators.

In addition, DEQ's proposed rule includes language specifying that either indicator (*E. coli* or enterococci) are sufficient for determining compliance with the FIB criteria, and that the geometric mean must be based on a minimum of 5 samples collected every 3 to 7 days over a 30-day period.

The proposed rule retains the distinction between PCR and SCR uses. However, SSM thresholds for additional monitoring are removed and instead replaced with STV criteria with a 10% frequency component.

## ***E. coli* in Idaho**

Based on readily available data, DEQ has calculated 332 geometric means of *E. coli* concentrations statewide. Of these 332 geometric means, 258 had at least one sample with *E. coli* concentrations greater than 406 counts/100 mL, which is nearly equivalent to the EPA recommended STV of 410 counts/100 mL when using most probable number (MPN) analysis.

Of these 258 sites, 231 (89.5%) had geometric mean concentrations that exceeded the criterion of 126 counts/100 mL. These results indicate a 10.5% false positive error rate based on using a single exceedance of the STV concentration alone. In other words, if a decision on criteria compliance was based solely on a single sample exceeding the STV value, we would expect that 10.5% of our determinations of criteria exceedance would be incorrect. These false positive errors are also referred to as Type I errors.

Of the 74 geometric means where the proposed STV concentration was never exceeded by a single sample, 12 had geometric mean concentrations that exceeded the 126 counts/100 mL criterion—a 16% false negative error rate. In other words, if a decision on criteria compliance was based solely on a single sample *not* exceeding the STV value, we would expect that 16% of our determinations of criteria compliance would be incorrect and that the 30-day geometric mean would be exceeded. These false negative errors are known as Type II errors.

This analysis indicates that the vast majority (nearly 90%) of data sets where a single sample exceeds the STV concentration would likewise have an exceedance of the geometric mean criteria, confirming that the basis of the STV used in deriving EPA's recommended STV criterion is applicable to Idaho.

However, the proposed criteria does not adopt the STV as an instantaneous criterion but rather as a magnitude that is not to be exceeded more than 10% of the time in a 30-day period. In other words, we would not be basing criteria compliance decisions on single sample results. Additional monitoring to determine the frequency of STV concentration exceedances should further reduce Type I errors.

## Reporting Requirements for Permitted Dischargers

A search of the EPA Integrated Compliance Information System (ICIS) database shows 136 permitted dischargers in Idaho having effluent limits based on either the PCR or SCR SSMs of 406 or 576 counts/100 mL, respectively. When discharge monitoring results indicate an exceedance of these values, the discharger is required to notify EPA or DEQ within 24 hours of the exceedance and collect additional samples to demonstrate compliance with the geometric mean criterion of 126 counts/100 mL.

Currently, of the 136 permits with limits based on SSM values, 115 have limits based on the PCR value of 406 counts/100 mL; 21 have limits based on the SCR value of 576 counts/100 mL.

## Summary

DEQ is proposing to revise Idaho recreational water quality criteria. These revisions would add enterococci criteria as an additional fecal indicator and replace SSM thresholds for additional monitoring with STV criteria. The addition of enterococci as an indicator will position Idaho to take advantage of future advances in technology related to extended holding times for enterococci. The STV concentration for both indicators is based on the 90th percentile of the distribution of concentrations associated with the respective geometric mean criterion and therefore has a corresponding excursion frequency of 10% of valid samples collected over a 30-

day period. Available data confirm the STV criteria are valid for Idaho based on the likelihood that the geometric mean criterion would be exceeded if the STV criterion is exceeded.

The proposed rule language makes clear that either *E. coli* or enterococci would be considered appropriate for assessing recreational use support; dischargers and others do not need to monitor for both indicators and can choose which indicator to monitor to determine compliance with the FIB criterion. The rule language also stipulates the minimum sample requirements for comparison to the geometric mean criterion.

Adoption of the proposed revisions would ensure that Idaho is meeting the CWA requirement to adopt scientifically defensible criteria to support recreation, meet the priority identified in the triennial review, and meet federal requirements in 40 CFR 131.20.

## References

- DEQ (Idaho Department of Environmental Quality). 2017. *2017 Triennial Review of Idaho Water Quality Standards*. Boise, ID: DEQ.
- EPA (US Environmental Protection Agency). 2012. *Recreational Water Quality Criteria*. Washington, DC: EPA, Office of Water. 820-F-12-058.
- EPA (US Environmental Protection Agency). 2018. *2017 Five-Year Review of the 2012 Recreational Water Quality Criteria*. Washington, DC: EPA, Office of Water. 823-R-18-001.
- CFR (Code of Federal Regulations). 2015. "State Review and Revision of Water Quality Standards." 40 CFR 131.20.