

# Water Quality Standards Triennial Review— Issue Paper #3

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## Recreational Use and Criteria

### Current Rules

#### Surface Water Use Designations (IDAPA 58.01.02.100)

##### *02. Recreation:*

- a. Primary contact recreation (PCR): water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to, those used for swimming, water skiing, or skin diving.*
- b. Secondary contact recreation (SCR): water quality appropriate for recreational uses on or about the water and which are not included in the primary contact category. These activities may include fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur.*

#### **Numeric Criteria for Toxic Substances for Waters Designated for Aquatic Life, Recreation, or Domestic Water Supply Use (IDAPA 58.01.02.210)**

*01. Criteria for Toxic Substances. The criteria of Section 210 apply to surface waters of the state as follows.*

- a. Columns B1 and B2 of the following table apply to waters designated for aquatic life use.*
- b. Column C2 of the following table applies to waters designated for primary or secondary contact recreation use.*
- c. Column C1 of the following table applies to waters designated for domestic water supply use.*

## Surface Water Quality Criteria for Recreation Use Designations (IDAPA 58.01.02.251)

*01. E. Coli Bacteria. Waters designated for recreation are not to contain E.coli bacteria, used as indicators of human pathogens, in concentrations exceeding:*

- a. Geometric Mean Criterion. Waters designated for primary or secondary contact recreation are not to contain E. coli bacteria in concentrations exceeding a geometric mean of one hundred twenty-six (126) E. coli organisms per one hundred (100) ml based on a minimum of five (5) samples taken every three (3) to seven (7) days over a thirty (30) day period.*
- b. Use of Single Sample Values. A water sample exceeding the E. coli single sample maximums below indicates likely exceedance of the geometric mean criterion, but is not alone a violation of water quality standards. If a single sample exceeds the maximums set forth in Subsections 251.01.b.i., 251.01.b.ii., and 251.01.b.iii., then additional samples must be taken as specified in Subsection 251.01.c.:*
  - i. For waters designated as secondary contact recreation, a single sample maximum of five hundred seventy-six (576) E. coli organisms per one hundred (100) ml; or*
  - ii. For waters designated as primary contact recreation, a single sample maximum of four hundred six (406) E. coli organisms per one hundred (100) ml; or*
  - iii. For areas within waters designated for primary contact recreation that are additionally specified as public swimming beaches, a single sample maximum of two hundred thirty-five (235) E. coli organisms per one hundred (100) ml. Single sample counts above this value should be used in considering beach closures.*
- c. Additional Sampling. When a single sample maximum, as set forth in Subsections 251.01.b.i., 251.01.b.ii., and 251.01.b.iii., is exceeded, additional samples should be taken to assess compliance with the geometric mean E. coli criteria in Subsection 251.01.a. Sufficient additional samples should be taken by the Department to calculate a geometric mean in accordance with Subsection 251.01.a. This provision does not require additional ambient monitoring responsibilities for dischargers.*

## Overview

Recreational use protection is based on (1) *bacteria criteria*, which protect humans from sickness due to possible exposure to pathogens, indicated by the presence of certain fecal indicator bacteria in higher than acceptable concentrations, and (2) *toxic substance criteria*, which are based on possible adverse health effects due to greater than acceptable exposure to toxic substances from consumption of fish or other organisms that live in water and take up contaminants into their tissue.

Idaho's use categories for designation of recreational use still refer to primary and secondary contact recreation. A list of characteristic activities is provided to distinguish the two subcategories of recreational use, which are 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 an indicator of fecal contamination. At that time, there were two distinctly different criteria values for the two recreational use subcategories. In practice, primary contact recreation 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.

Since there is no difference in the geometric mean bacteria criteria or the toxics criteria applicable to primary and secondary contact recreation uses, as discussed below, there seems to be no value in maintaining a distinction between primary and secondary contact recreation.

## Bacteria Criteria

In 2000, DEQ adopted EPA's 1986 recommended *E. coli* criterion as our single criterion. That criterion is a geometric mean of 126 colony-forming units (cfu) per 100 milliliters (mL) based on 5 samples taken in a 30-day period, as stated in the rule language above. This criterion applies regardless of whether a water body is assessed for primary or secondary contact recreation (i.e., irrespective of the likelihood of ingesting water during recreational activity).

DEQ does still look at single sample values. EPA's 1986 bacteria criteria recommendations included use of single sample maximums (SSMs). These SSMs were derived from upper confidence limits for single sample results in the data set that was used to calculate the 5-sample geometric means that were then related to reported rates of gastrointestinal illness. EPA advised that states could adopt and use the SSMs as indicators of different probabilities that the geometric mean criterion would be exceeded if a full 5-sample set of data was obtained (EPA 1986). The SSM values (used to indicate probabilities of the geometric mean exceeding the criterion based on one sample) could be used to reflect different risk tolerances based on likelihood of human exposure.

The most important thing to know about the 1986 criterion is that it was the geometric mean, not the SSM, which was statistically correlated with rates of illness. The SSM is associated with the probability that the geometric mean, *in the data set the criterion was developed from*, would exceed the criterion. EPA's guidance document cautions: "These single sample maximum levels should be recalculated for individual areas if significant differences in log standard deviations occur." Thus, Idaho was cautious in adopting SSMs and adopted them only as trigger values for

additional sampling to confirm an actual exceedance of the geometric mean criterion, not as actionable criteria by themselves.

EPA revised its recommended bacteria criteria in late 2012 (EPA 2012). The geometric mean criterion for *E. coli* remains as the fundamental criterion for fresh waters. However, EPA recast the SSMs as statistical threshold values (STVs), more faithfully reflecting their statistical basis. Similar to an SSM, a single STV exceedance would not alone result in a criterion violation. However, a frequency of STV exceedances greater than 10% of the 30-day sampling interval would represent a criterion exceedance, even if the geometric mean criterion is not exceeded. This approach makes more sense statistically than the previous SSMs but also requires frequent sampling to make a practical difference.

## Comparison of Idaho Bacteria Criteria with EPA’s 2012 §304(a) Recommended Criteria

Idaho’s current criteria are expressed only as geometric means, with SSM “trigger values” that initiate additional sampling. The criteria only use *E. coli* as an indicator of fecal contamination and are based on an illness rate of 36 illnesses per 1,000 primary recreational users.

In contrast, EPA’s 2012 recommended recreational water quality criteria consist of both a geometric mean and an STV, include criteria for both *E. coli* and enterococci as indicators of fecal contamination in fresh waters, and provide two illness rates for consideration, with either rate considered protective of primary contact recreation.

The following table illustrates the differences between Idaho’s current criteria and EPA’s 2012 recommended criteria.

Indicator	Current Idaho Criteria (cfu/100 mL)			EPA 2012 Recommended Criteria (cfu/100 mL)			
				Illness Rate of 36/1,000 Users		Illness Rate of 32/1,000 Users	
	Geometric Mean	SSM <sup>a</sup>		Geometric Mean	STV <sup>a,b</sup>	Geometric Mean	STV <sup>a,b</sup>
<i>E. coli</i>	126	Secondary Contact	576	126	410	100	320
		Primary Contact	406				
		Public Swimming Beach	235				
Enterococci	—	—		35	130	30	110

<sup>a</sup> The single sample maximum values (SSM) and the statistical threshold values (STV) are *not* criteria, and exceedance of an SSM or STV alone is not considered a criterion violation. Rather, these are considered “trigger values” that initiate additional sampling.

<sup>b</sup> Greater than 10% frequency of exceedance of the STV in a 30-day period would be a violation even if the geometric mean criterion wasn’t violated over the same period.

## Toxics Criteria

Often overlooked when evaluating recreational use support are the human health criteria for toxic substances that are also applicable to this use. These criteria make no distinction in likelihood of water ingestion but rather are based on exposure to toxic substances through the possibility of consuming fish and other aquatic organisms living in the water. However, because we still have the holdover of a split recreational use, primary or secondary contact, there is sometimes confusion and debate as to which subcategory of recreational use the toxic substance criteria apply. Practically speaking, it makes no difference which subcategory we say is impaired because the same toxics criteria apply to both recreational use subcategories.

## Summary

Since there is no difference in the geometric mean bacteria criteria or the toxics criteria applicable to primary and secondary contact recreation uses, there seems to be no value in maintaining a distinction between primary and secondary contact recreation. Collapsing the use to just recreation could save some confusion and debate and simplify future monitoring and assessment. DEQ could still apply SSMs or STVs to indicate the need to advise the public as to the safety of swimming at designated public swimming beaches. Monitoring protocols can specify that summer sampling is what is relevant to waterborne recreational activities.

Idaho will consider EPA's 2012 bacteria recommendations when we move forward with updates to our criteria to protect recreational use.

## References

- EPA (US Environmental Protection Agency). 1986. Ambient Aquatic Life Water Quality Criteria for Bacteria – 1986. Washington, DC: EPA, Office of Water. EPA440/5-84-002. 24 pp.
- EPA (US Environmental Protection Agency). 2012. Recreational Water Quality Criteria. Washington, DC: EPA, Office of Water. Washington, DC. 820-F-12-058. 68 pp.