



Water Quality Standard Revised Bacteria Criteria

INFO SHEET

Background

The Virginia State Water Control Board recently adopted nationally recommended bacteria criteria published by the U.S. Environmental Protection Agency (EPA). Periodically, EPA reviews all its recommended water quality criteria to reflect the best available science. The criteria rely on the latest research and science, including studies that show a link between illness and fecal contamination in recreational waters. They are based on two bacterial indicators of fecal contamination: *E. coli* and enterococci. *E. coli* is the indicator for freshwater systems and enterococci is the indicator for saltwater. They are the same indicator organisms used for the bacteria criteria Virginia adopted in the early 2000s.

The revised criteria are designed to protect primary contact recreation – including swimming, surfing, water skiing, tubing and water play by children – and similar water contact activities where a high degree of prolonged bodily contact with the water, immersion and ingestion are likely.

Bacteria Monitoring Objective

DEQ provides the public with a big picture view of Virginia's waterways, including bacteria pollution. DEQ's bacteria monitoring program is designed to determine the general health of the commonwealth's streams and to identify recreational waters with too much bacteria. Once these waters are identified, DEQ works to determine and address pollution sources through clean-up studies and implementation plans. The Virginia Department of Health (VDH) conducts its own bacteria monitoring and, in rare cases, uses DEQ data to determine whether or not to issue public swimming advisories. **DEQ's bacteria monitoring program does not provide a real-time indication of swimming conditions for the public.**

Revised Criteria

| Freshwater (<i>E.coli</i>) | | | | Saltwater (Enterococci) | | | |
|---|-----|---|-----|---|-----|---|-----|
| Old Criteria (counts/100 ml) | | Revised Criteria (counts/100 ml) | | Old Criteria (counts/100 ml) | | Revised Criteria (counts/100 ml) | |
| Monthly Geometric Mean (never to be exceeded) | 126 | 90-Day Geometric Mean (never to be exceeded) | 126 | Monthly Geometric Mean (never to be exceeded) | 35 | 90-Day Geometric Mean (never to be exceeded) | 35 |
| Not to be exceeded more than 10% of the time over a 6-year period | 235 | Not to be exceeded more than 10% of the time over a 90-day period | 410 | Not to be exceeded more than 10% of the time over a 6-year period | 104 | Not to be exceeded more than 10% of the time over a 90-day period | 130 |

The revised criteria contain three components:

1. *Magnitude*: A number of culturable colony counts of either the bacteria *E. coli* or enterococci.
2. *Duration*: A duration of 90-days as an averaging period.
3. *Frequency*: An allowable exceedance rate of no more than 10 percent of samples allowed to be greater than a Statistical Threshold Value (STV) and no exceedances of the geometric mean (GM), which is a measure of central tendency.

The magnitude of *E.coli* or *enterococci* is evaluated by both the GM and the STV for the bacteria samples. **Both the GM and the STV must be assessed to determine that a waterbody is meeting water quality standards for the recreational designated use.**

The STV is applied to account for normal variability in water samples. Its use prevents a waterway from incorrectly being classified as posing an excessive risk to swimmers when it is likely just exhibiting a level of variability deemed acceptable under the GM criterion. Given the normal variability of bacteria in surface waters, about one half of the samples is expected to be above the mean value. But, as long as values higher than the STV occur less than 10% of the time, this is deemed acceptable.

Old vs. New

The new criteria provides a more comprehensive approach to assessing bacteria in Virginia's waterways. While the STV is higher than the single sample maximum value applied in the old criteria, this does not mean that the new standard is less stringent. Since now both the GM and STV criteria must be met, some waters previously designated as meeting water quality standards may be impaired under the new criteria. Additionally, the assessment window has shifted from a six-year to 90-day period. While this window has narrowed, the frequency of sampling has increased, and is focused on the recreational season when illness and infection are more likely.

This higher sampling frequency captures short-term fluctuations in bacteria concentrations, which better reflect impacts to recreation. Alternatively, there may be some cases where the frequency, duration and magnitude of exceedances of the bacteria criteria result in a stream previously listed as impaired being removed from the impaired waters list.

In short, the structure of the new criteria provides additional assurances that it is **more** protective of human health.

Adapting to the New Monitoring Process

More frequent monitoring (i.e., approximately weekly over a 90-day period) is necessary to implement the updated standard. In 2019, the agency began conducting a pilot study at selected stations to determine the resources needed to collect weekly bacteria samples versus the monthly samples previously required. Among the many conclusions of this study, it was clear that DEQ does not have the resources to conduct high-frequency (HF) monitoring at the same number of sites as were previously monitored. As a result, the number of waters assessed for bacteria levels will go down. However, the level of detail in the evaluation of these waters will increase. Additionally, the study concluded that low-frequency (LF) data collected monthly or bimonthly can be used to evaluate water quality progress and, ultimately, help DEQ prioritize sites for HF monitoring.

Selecting HF Sites

HF bacteria monitoring cannot be performed everywhere. As a result, DEQ prioritized known recreational waters with public access in the pilot study to efficiently allocate resources. During the pilot, the agency also continued to monitor waters with watershed cleanup plans to determine progress with meeting pollution reduction targets.

Currently, DEQ's HF network does not include waters that require a boat for sampling due to associated resource constraints. Instead, DEQ relies on VDH beach data (estuaries) and Department of Conservation and Recreation beach data (lakes) – both taken at wadeable depths – for assessment determinations. DEQ will continue to evaluate options for collecting data in estuaries and lakes that require a boat.

DEQ has also developed a draft Bacteria Monitoring Strategy, which combines routine monthly or bimonthly monitoring with HF monitoring to provide the public with a big picture view of bacteria pollution. The HF bacteria monitoring network will be added to the agency's Annual Monitoring Plan in 2022. Staff will continue to solicit feedback from the public each year on site selection.

HF vs. LF Sites

As resources allow, regional staff may recommend that additional sites be added to the **HF network**. Site selection should be prioritized based on the following criteria:

- The potential for people to fully immerse themselves in a waterbody
- Areas where restoration work suggests that waters may be meeting the bacteria standard

Additional criteria for consideration:

- Waters that previously met the bacteria standard to ensure that this is still the case
- Waters where volunteer monitoring data indicates the need for follow-up monitoring in response to water quality improvements or high bacteria concentrations
- Public interest
- Environmental justice considerations, such as areas with vulnerable communities
- Waters that are close to meeting the bacteria standard

For **LF sites**, bacteria data is collected on a monthly or bimonthly basis at more than 800 monitoring stations per year as part of DEQ's Ambient, Trend, TMDL, Implementation and Chesapeake Bay monitoring networks. Monthly or bimonthly data supports watershed modeling efforts, allows staff to calculate long-term trends and is useful for tracking water quality improvements following implementation efforts.

Impacts to Volunteer Monitoring groups and DEQ's use of the data they collect

All groups with Level III certification for bacteria monitoring should continue to use their approved monitoring method. However, it is recommended that Volunteer Monitoring groups evaluate their monitoring objectives and their intended data use to see if changes to their monitoring schedules (i.e., frequency) need to be made. Recently the Volunteer Monitoring Methods Manual was updated to help monitoring groups understand how their bacteria data can be used by the agency in assessments. Chapter 8 includes updated information on suggested bacteria monitoring frequencies for data collected for assessment purposes. For other data uses such as evaluating restoration progress, it is

recommended that Volunteer Monitoring groups reach out to DEQ to see if their monitoring methods continue to meet the data's intended use.

Effects on Water Quality Assessments

In order for a water to be assessed as fully supporting the recreational designated use, both the GM and STV must be assessed. DEQ has updated the assessment process to reflect the revised bacteria standards. The assessment process can be found under Part IV Rule 3 of the [2022 Water Quality Assessment Guidance Manual](#). More frequent monitoring will be necessary to assess waters for the updated standard. Since this high frequency bacteria monitoring cannot be performed everywhere, DEQ will focus resources on recreational waters. About 50 publicly-accessible recreation sites across the state will be visited every year for high frequency monitoring. As a result, the number of waters assessed for bacteria levels will go down. However, the level of detail in the evaluation of these waters will increase.

Effects on Total Maximum Daily Loads (TMDLs) and Implementation Plans

All future TMDLs and TMDL Implementation Plans developed to clean-up bacteria pollution will have to meet these revised criteria. Existing bacteria TMDLs and TMDL Implementation Plans will continue to be implemented and evaluated based on water quality monitoring, however they will not be revised unless specific circumstances call for it.

Impacts on permit compliance

The revised bacteria criteria do not have any impact on permit compliance. Previously compliance was measured on geometric mean concentrations. Since the geometric mean criterion has not changed in this criteria revision, the process for permittees to collect data and submit it for compliance has not changed. For more information see [9VAC25-260-170.A.2](#).