

Fact Sheet: Alternative Methods Calculator Tool

Summary

The Alternative Methods Calculator Tool (AltCalc Tool) is an Excel-based tool that can be used to determine whether an alternative microbial water quality method can be used to replace an EPA approved method when deriving site-specific alternative recreational water quality criteria (RWQC). The AltCalc Tool should be used in conjunction with EPA's [Site-Specific Alternative Recreational Criteria Technical Support Materials for Alternative Indicators and Methods](#) (Alternative Methods TSM; 2014, EPA-820-R-14-011). Specifically, the AltCalc Tool is used to calculate the index of agreement (IA) and Pearson's correlation coefficient squared (R-squared) for microbial water quality datasets from two different methods; these values are used to assess whether the alternative method is appropriate for replacing using an existing method.

Background

EPA's 2012 Recreational Water Quality Criteria (820-F-12-058) includes a discussion of tools for developing alternative criteria, including utilization of alternative indicators and methods. EPA's Alternative Methods TSM helps state and local authorities who are developing site-specific alternative criteria using new methods for fecal indicator detection or enumeration that EPA has not validated and issued. New methods or indicators might provide improvements over existing methods with regards to speed, sensitivity, specificity, lower cost, ease of use, and method performance for utilization of microbial indicators in site-specific alternative criteria to replace EPA's recommended national RWQC methods. The TSM describes how an EPA-approved method (referred to as method 1) can

be compared to an alternative method (referred to as method 2) in order to determine if method 2 can be used to replace method 1. Method 1 includes any of the following:

- EPA Method 1600 for enterococci
- EPA Method 1603 for *Escherichia coli* (*E. coli*)
- EPA Method 1611 for *Enterococcus* spp.
- Any "equivalent" method to those listed above, as determined by the Alternate Test Procedure (ATP) program
- Future methods that EPA recommends for CWA §304(a) ambient water quality criteria

The Alternative Methods TSM outlines the scientific information that is needed before an alternative indicator/method, or Method 2, can replace the use of an EPA recommended or approved method on a site-specific basis. The third step in the Alternative Methods TSM requires users to compare the two indicator/methods (Method 1 and 2) using the statistical calculation of IA and R-squared for paired datasets. Appendix E in the Alternative Methods TSM outlines how to perform these calculations. After data are entered into the AltCalc Tool, these calculations are performed automatically based on equations built into the tool.

What data do users provide?

Users provide microbial water quality data from the site for which site-specific alternative criteria are to be derived. For each water sample, two methods are tested, an EPA approved method and the new alternative method. At least 30 paired data points that are within the limits of quantification are needed to perform the comparison in the AltCalc Tool.

What calculations does the AltCalc Tool perform?

Water quality data are input into the AltCalc Tool which then performs the statistical comparison between the resulting data from the two water quality methods in order to determine whether an alternative method can be used for site-specific alternative criteria.

The AltCalc Tool calculates IA and R-squared:

- The IA describes the model fit between the output and the input data. It can vary between 0 and 1, with 1 being a perfect fit. If IA is \geq to 0.7, the site-specific criteria values for the new indicator/method can be the same numerical criteria values as for the EPA indicator/method. If IA does not indicate good agreement (i.e., IA < 0.7), TSM users can use the R-squared between the two methods to determine whether the indicators are correlated.
- R-squared is a statistical measure of how close the data are to the fitted regression line. It can vary between 0 and 1, with 1 being perfect correlation. If the alternative indicator/method correlates with the EPA method, based on the R-squared value (R-squared > 0.6), users can derive new criteria values using the process described in the Alternative Methods TSM.

The resulting information is used to determine whether the two methods produce a consistent and predictable relationship. If so, then users may replace the EPA-approved water quality method with an alternative method.

Where can I find more information?

Access the AltCalc Tool at:

<https://www.epa.gov/system/files/other-files/2021-11/site-specific-alt-calculator-tool.xlsm>

View EPA's Alternative Methods TSM at:

<https://www.epa.gov/sites/default/files/2015-11/documents/sitespecific-alternative-recreational-indicators-methods.pdf>

For technical support using the AltCalc Tool, email Shamima Akhter at: akhter.shamima@epa.gov
