



Designation: D2777 – 21

Standard Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water¹

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1. Scope

1.1 This practice establishes uniform standards for estimating and expressing the precision and bias of applicable test methods for Committee D19 on Water. Statements of precision and bias in test methods are required by the Form and Style for ASTM Standards, “Section A21. Precision and Bias (Mandatory).” In principle, all test methods are covered by this practice. However, the variability equations provided in this standard are applicable only to test methods that yield continuous function values.

1.2 Except as specified in 1.4, 1.5, and 1.6, this practice requires the task group proposing a new test method to carry out a collaborative study from which statements for precision (overall and single-operator standard-deviation estimates) and bias can be developed. This practice provides general guidance to task groups in planning and conducting such determinations of precision and bias.

1.3 This practice requires that a task group making a substantive revision to a test method also perform a limited-scale collaborative study (known as a — comparability study) to evaluate the effect of the revision on the precision and bias statement. This practice provides guidance to task groups for conducting such limited-scale collaborative studies. Examples of substantive modifications may include, but are not limited to, changes in mandatory or allowable instrumentation, reagents, reaction times, etc.

1.3.1 Changes to applicable water matrices in the Scope of a method may constitute a substantive modification under this provision. Only matrices that have been evaluated in an approved collaborative study may be listed in the Scope of a method. It is recognized that the term “matrix” is generally vague. Terms specifying matrix types can cover significantly different chemical constituents, unless the matrix is synthesized to be of a standardized makeup. Substitute Wastewater (Practice D5905) is one such defined matrix. For purposes of

this practice, the importance of this requirement is to assist the user of a D19 standard in determining the applicability of the method to their samples. Evaluated matrices should be described with as much detail as possible to minimize misapplication.

1.3.2 A method’s concentration-range extension that is deemed to merit additional collaborative testing (even without a method modification that would otherwise be considered substantive) shall require a full collaborative study, as described in 7.1 through 7.5, but only at concentrations representative of the extended range. Note that such a collaborative study could involve as little as a single concentration study in a single reproducible matrix.

1.3.3 Whether a revision to a test method includes substantive modification shall be determined by consensus of the Committee.

1.4 If a full-scale collaborative study is not technically feasible, because of the nature of the test method or instability of samples, the most complete collaborative study that is technically feasible shall be conducted to provide the best possible limited basis for estimating the overall and single-operator standard deviations. In some situations, an intermediate collaborative study as described in Guide D7847 may provide an appropriate approach. It is recognized that there may be circumstances when even a limited collaborative study is not feasible. Any collaborative study plan that does not meet all the requirements spelled out in this practice will require a review and recommendation by the Results Advisor and an approval by the D19 Technical Operations Section of the Executive Subcommittee.

1.4.1 Examples of acceptable studies are the local-area intermediate studies conducted by Subcommittee D19.24 on microbiological methods because of inherent sample perishability. Such intermediate collaborative studies meet the same degrees of freedom and participant requirements as full collaborative studies. They involve six or more completely independent local-area analysts who can begin analysis of uniform samples at an agreed upon time. Guide D7847 can provide guidance to the task group, the Results Advisor, and the Technical Operations Section of the Executive Subcommittee of Committee D19 on the appropriate design of an

¹ This practice is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.02 on Quality Systems, Specification, and Statistics.

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