

Water quality — Enumeration of micro-organisms in water samples — Guidance on the estimation of variation of results with particular reference to the contribution of uncertainty of measurement

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Committees responsible for this Draft for Development

The preparation of this Draft for Development was entrusted by Technical Committee EH/3, Water quality, to Subcommittee EH/3/4, Microbiological methods, upon which the following bodies were represented:

- Association of Consulting Scientists
- Centre for Research into Environment and Health
- Department of the Environment, Transport and the Regions — Water and Land Directorate
- Environment Agency
- Health and Safety Executive
- Health Protection Agency
- Society for Applied Microbiology
- Water Management Society
- Water UK
- Co-opted members

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Foreword

This Draft for Development has been prepared by Subcommittee EH/3/4.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because the method described is new and is being developed to deal with a requirement specified in BS EN ISO/IEC 17025:2000. It should be applied on this provisional basis, so that information and experience of its practical application can be obtained.

A review of this Draft for Development will be carried out not later than 2 years after its publication. Notification of the start of the review period, with a request for submission of comments from users of this Draft for Development, will be made in an announcement in the appropriate issue of *Update Standards*.

According to the replies received, the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action is to be taken.

Observations which it is felt should receive attention before the official call for comments will be welcomed.

These should be sent to the Secretary of BSI Technical Committee EH/3 at British Standards House, 389 Chiswick High Road, London W4 4AL.

Users of this Draft for Development are encouraged to send comments as soon as possible.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 15 and a back cover.

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Introduction

BS EN ISO/IEC 17025:2000, 5.4.6.2 specifies that “Testing laboratories shall have and shall apply procedures for estimating uncertainty of measurement”. This is difficult to apply to water microbiology because the distribution and behaviour of microbial cells in water is not uniform. The purpose of the present document is to provide practical guidance on how to interpret and implement these requirements within the context of a water microbiology laboratory. It is intended to form an adjunct to the revised edition of ISO 8199 which is currently in preparation.

1 Scope

This Draft for Development gives guidance on interpretation of the requirements specified in BS EN ISO/IEC 17025:2000 with regard to the uncertainty of measurement in microbial counts in water samples. It gives guidance on the estimation of variation in results between replicate sub-samples, which will include that due to uncertainty of measurement, in order to assess whether the variation due to uncertainty of measurement has been controlled in accordance with the requirements specified in BS EN ISO/IEC 17025:2000. It is applicable to examination of sub-samples as part of a quality assurance system. It is applicable to samples of all types of water.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS EN ISO/IEC 17025:2000, *General requirements for the competence of testing and calibration laboratories*.

DD ENV ISO/TR 13843:2001, *Water quality — Guidance on validation of microbiological methods*.

3 Terms and definitions

For the purposes of this Draft for Development, the following terms and definitions apply.

3.1

accuracy

sum of trueness plus precision

NOTE This equates to the degree of conformity between the result of a measurement and the true value of the measurand.

3.2

bias

systematic errors associated with the methods used

NOTE These errors include those due to dilution, population selection, and calibration.

3.3

precision

closeness of agreement between independent test results obtained under stipulated conditions

NOTE Precision does not relate to the true value or the specified value. It is usually expressed in terms of imprecision and computed as a standard deviation of the test results.

[DD ENV ISO/TR 13843:2001, 2.25]

3.4

imprecision

random errors incurred in applying the methods together with random variation in the test material

3.5

limit of detection

lowest number of micro-organisms that need to be present in the test portion of water examined for their presence to be detected by a particular microbiological test

NOTE Limit of detection should not be confused with limit of determination which is the lowest average number of micro-organisms in a body of water that would result in a 95 % probability of giving a positive result when a representative test portion is examined by a particular microbiological test.

3.6

measurand

specific quantity that is subjected to measurement

3.7

repeatability

closeness of the agreement between the results of successive measurements of the same measurand carried out under the same conditions of measurement within a short period of time

NOTE 1 Modified from *International vocabulary of basic and general terms in metrology*, 1993 [1].

NOTE 2 Conditions of measurement include, the method of analysis; the analyst; the measurement instrument and the conditions under which it is used; and the location.

NOTE 3 Within a short period of time is normally considered to be within one hour.

3.8

reproducibility

closeness of the agreement between the results of measurements of the same measurand carried out under different conditions of measurement

NOTE 1 Modified from *International vocabulary of basic and general terms in metrology*, 1993 [1].

NOTE 2 Conditions of measurement include, the method of analysis; the analyst; the measurement instrument and the conditions under which it is used, the location and the time.

3.9

reference culture

culture of a micro-organism obtained from a recognized national culture collection

3.10

reference material

material containing a defined population of micro-organisms from one or more reference cultures in numbers expected to fall within a defined range for use in the assessment of a measurement method

3.11

certified reference material

reference material accompanied by a certificate stating the expected microbial count with an associated confidence interval

3.12

uncertainty of measurement

UM

parameter associated with the result of a measurement, that characterizes the dispersion of the values that can reasonably be attributed to the measurand [*Guide to the expression of uncertainty in measurement*, 1995 [2]].

3.13

validation

process providing evidence that a method is capable of serving its intended purpose in detecting or quantifying a specific microbe or microbial group with the required level of precision and accuracy

NOTE Modified from DD ENV ISO/TR 13843:2001, 4.2.1.