



Standard Guide for Demonstrating and Assessing Whether a Chemical Analytical Measurement System Provides Analytical Results Consistent with Their Intended Use¹

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1. Scope

1.1 This guide describes an approach for demonstrating the quality of analytical chemical measurement results from the application of a measurement system (that is, method or sequence of methods) to the analysis of environmental samples of soil, water, air, or waste. The purpose of such measurements can include demonstrating compliance with a regulatory limit, determining whether a site is contaminated above some specified level, or determining treatment process efficacy.

1.2 This guide describes a procedure that can be used to assess a measurement system used to generate analytical results for a specific purpose. Users and reviewers of the analytical results can determine, with a known level of confidence, if they meet the quality requirements and are suitable for the intended use.

1.3 This protocol does not address the general components of laboratory quality systems necessary to ensure the overall quality of laboratory operations. For such systems, the user is referred to International Standards Organization (ISO) Standard 17025 or the National Environmental Laboratory Accreditation Conference (NELAC) laboratory accreditation standards.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D 4687 Guide for General Planning of Waste Sampling
D 5283 Practice for Generation of Environmental Data
Related to Waste Management Activities: Quality Assur-

ance and Quality Control Planning and Implementation
D 5792 Practice for Generation of Environmental Data
Related to Waste Management Activities: Development of
Data Quality Objectives
D 5956 Guide for Sampling Strategies for Heterogeneous
Wastes
D 6044 Guide for Representative Sampling for Manage-
ment of Waste and Contaminated Media
D 6233 Guide for Data Assessment for Environmental
Waste Management Activities
D 6250 Practice for Derivation of Decision Point and Con-
fidence Limit for Statistical Testing of Mean Concentration
in Waste Management Decisions
D 6311 Guide for Generation of Environmental Data Re-
lated to Waste Management Activities: Selection and
Optimization of Sampling Design
D 6582 Guide for Ranked Set Sampling: Efficient Estima-
tion of a Mean Concentration in Environmental Sampling
D 6597 Practice for Assessment of Attaining Clean Up
Level for Site Closure

2.2 Other Documents:

*Guidelines for Evaluating and Expressing Uncertainty of
NIST Measurement Results*, National Institute of Standard
Technology Technical Note 1297, 1994³
ISO/IEC 17025:1999 General Requirements for the Com-
petence of Testing and Calibration Laboratories⁴
Quantifying Uncertainty in Analytical Measurement,
EURACHEM/ CITAC Guide, second edition, 2000

3. Terminology

3.1 Definitions:

3.1.1 *action level (AL)*—the level above or below which
will lead to the adoption of one of two alternative actions.

3.1.2 *analyte*—the constituent to be measured.

3.1.3 *bias*—the difference between the value determined
using the measurement protocol in question and the true value;
operationally the difference between the expected mean of the

¹ This guide is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01 on Sampling and Monitoring.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 3460, Gaithersburg, MD 20899-3460.

⁴ Available from the American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.