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Standard Guide for Quality Planning and Field Implementation of a Water Quality Measurement Program¹

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1. Scope

1.1 This guide covers planning and implementation of the sampling aspects of environmental data generation activities. Environmental data generation efforts are comprised of four parts: (1) establishment of data quality objectives (DQOs); (2) design of field sampling and measurement strategies and specification of laboratory analyses and data acceptance criteria; (3) implementation of sampling and analysis strategies; and (4) data quality assessment.

1.2 This guide defines the criteria that must be considered to ensure the quality of the field aspects of environmental data and sample generation activities.

1.3 DQOs should be adopted prior to the application of this guide. The data generated in accordance with this guide are subject to a final assessment to determine whether the DQOs were met. For example, many screening activities do not require all of the quality assurance (QA) and quality control (QC) steps found in this guide to generate data adequate to meet the project needs. The extent to which all of the requirements must be met remains a matter of technical judgement as it relates to the established DQOs.

1.4 This guide presents extensive management requirements designed to ensure high-quality samples and data. The words “must,” “shall,” “may,” and “should” have been selected carefully to reflect the importance placed on many of the statements made in this guide.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

D596 Guide for Reporting Results of Analysis of Water

D1129 Terminology Relating to Water

D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

D3370 Practices for Sampling Water from Closed Conduits

D3856 Guide for Management Systems in Laboratories Engaged in Analysis of Water

D4210 Practice for Intralaboratory Quality Control Procedures and a Discussion on Reporting Low-Level Data (Withdrawn 2002)³

D4447 Guide for Disposal of Laboratory Chemicals and Samples

D4448 Guide for Sampling Ground-Water Monitoring Wells

D4840 Guide for Sample Chain-of-Custody Procedures

D4841 Practice for Estimation of Holding Time for Water Samples Containing Organic and Inorganic Constituents

D5172 Guide for Documenting the Standard Operating Procedures Used for the Analysis of Water

D5283 Practice for Generation of Environmental Data Related to Waste Management Activities: Quality Assurance and Quality Control Planning and Implementation

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E178 Practice for Dealing With Outlying Observations

E1187 Terminology Relating to Conformity Assessment (Withdrawn 2006)³

2.2 U.S. Environmental Protection Agency Documents:⁴

QAMS-004/80 Guidelines and Specifications for Preparing Quality Assurance Program Plans, Office of Monitoring

¹ This guide 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. Technical Resources, and Statistical Methods.

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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 The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from DLA Document Services, Building 4/D, 700 Robbins Ave., Philadelphia, PA 19111-5094, <http://quicksearch.dla.mil>.

Systems and Quality Assurance, Sept. 20, 1980 (NTIS No. PB83219667/LL)

QAMS-005/80 Interm Guidelines and Specifications for Preparing Quality Assurance Project Plans, Office of Monitoring Systems and Quality Assurance, Dec. 29, 1980 (NTIS No. PB83170514/LL)

QAMS-500/80 Development of Data Quality Objectives, Description of Stages I and II, July 16, 1986

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this standard, refer to Terminologies **D1129** and **E1187**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *background sample, n*—a sample taken from a location on or proximate to the site of interest. This sample is taken to document baseline or historical information.

3.2.2 *collocated samples, n*—independent samples collected as close as possible to the same point in space and time and intended to be identical.

3.2.3 *data quality objectives (DQOs), n*—statements on the level of uncertainty that a decision maker is willing to accept in the results derived from environmental data (see QAMS-500/80).

3.2.4 *material blank, n*—a sample composed of construction materials such as those used in well installation. Well development, pump and flow testing, and slurry wall construction. Examples of these materials are bentonite, sand, drilling fluids, and source and purge water. This blank documents the contamination resulting from usage of the construction materials.

3.2.5 *quality assurance program plan (QAPP), n*—an orderly assemblage of management policies, objectives, principles, and general procedures by which an organization involved in environmental data generation activities outlines how it intends to produce data of known quality.

3.2.6 *quality assurance project plan (QAPjP), n*—an orderly assemblage of detailed procedures designed to produce data of sufficient quality to meet the DQOs for a specific data collection activity.

4. Summary of Guide

4.1 This guide describes the criteria and activities for organizations involved in obtaining water samples and generating field data in terms of human and physical resources and QC procedures and documentation requirements depending on the DQOs or agreed upon project plan.

5. Significance and Use

5.1 Environmental data are often required for making regulatory and programmatic decisions. These data must be of known quality commensurate with their intended use.

5.2 Certain minimal criteria must be met by the field organizations in order to meet the objectives of the water monitoring activities.

5.3 This guide defines the criteria for organizations taking water samples and generating environmental data and identifies other activities that may be required based on the DQOs.

5.4 This guide emphasizes the importance of communication among those involved in establishing the DQOs, planning, and implementing the sampling and analysis aspects of environmental data generation activities, and assessing data quality.

6. Project Specification

6.1 *Overall Project Objectives*—The overall objectives of the project must be defined prior to the start of any field and laboratory activities.

6.2 *Data Quality Objectives*—DQOs for the data generation activity should be defined prior to the initiation of field and laboratory work, and they must be compatible with project objectives. It is desirable that the field and laboratory organizations be aware of the DQOs so that the personnel conducting the work are able to make informed decisions during the course of the project.

6.3 *Project Plan*—The project plan should be designed to meet the project objectives and DQOs. The project plan should define the following:

6.3.1 *Specific Project Objectives*—The objectives of the field and laboratory work must be defined clearly, define specific objectives for the sampling location, and describe the intended uses for the data. The project objective may need to be reviewed as information is gathered. Any changes in the project objective affecting field and laboratory activities should be communicated to the field and laboratory personnel.

6.3.2 *Background Information*—Any background information that could affect meeting the project objective or DQOs should be provided. For example, the identification of any regulatory programs governing data collection and analysis and the reason for conducting the sample collection work should be included in the background information.

6.3.3 Project management shall have individuals designated as having responsibility and authority for the following: (1) developing project documents that implement the DQOs; (2) selecting field and laboratory organizations to conduct the work; (3) coordinating communication among the field and laboratory organizations and government agencies, as required; and (4) reviewing and assessing the final data.

6.3.4 Sampling requirements shall be specified, including sampling locations, equipment and procedures, and sample preservation and handling.

6.3.5 Analytical requirements shall be specified, including the analytical procedures, analyte list, required detection limits, and required precision and bias values. Regulatory requirements and DQOs shall be considered when developing the specifications.

NOTE 1—The above does not imply that the specified analytical requirements can be met.

6.3.6 The QA and QC requirements shall address both field and laboratory activities. The means for controlling false positives and false negatives shall be specified.

6.3.6.1 The types and frequency of field QC samples to be collected, including field blanks, duplicates, and spikes, trip