



Standard Guide for Conceptualization and Characterization of Groundwater Systems¹

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1. Scope

1.1 This guide covers an integrated, stepwise method for the qualitative conceptualization and quantitative characterization of groundwater flow systems, including the unsaturated zone, for natural or human-induced behavior or changes.

1.2 This guide may be used at any scale of investigation, including site-specific, subregional, and regional applications.

1.3 This guide describes an iterative process for developing multiple working hypotheses for characterizing groundwater flow systems. This process aims at reducing uncertainty with respect to conceptual models, observation, interpretation, and analysis in terms of hypothesis and refinement of the most likely conceptual model of the groundwater flow system. The process is also aimed at reducing the range of realistic values for parameters identified during the characterization process. This guide does not address the quantitative uncertainty associated with specific methods of hydrogeologic and groundwater system characterization and quantification, for example, the effects of well construction on water-level measurement.

1.4 This guide addresses the general procedure, types of data needed, and references that enable the investigator to complete the process of analysis and interpretation of each data type with respect to geohydrologic processes and hydrogeologic framework. This guide recommends the groups of data and analysis to be used during each step of the conceptualization process.

1.5 This guide does not address the specific methods for characterizing hydrogeologic and groundwater system properties.

1.6 This guide does not address model selection, design, or attribution for use in the process of groundwater flow system characterization and quantification. This guide does not address the process of model schematization, including the

simplification of hydrologic systems and the representation of hydrogeologic parameters in models.

1.7 This guide does not address special considerations required for characterization of karst and fractured rock terrain. In such hydrogeologic settings, refer to Quinlan (1)² and Guide D5717 for additional guidance.

1.8 This guide does not address special considerations regarding the source, fate, and movement of chemicals in the subsurface.

1.9 *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 limitations prior to use.*

1.10 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this guide may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved through the ASTM consensus process.*

2. Referenced Documents

2.1 ASTM Standards:³

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D5254 Practice for Minimum Set of Data Elements to Identify a Ground-Water Site

D5408 Guide for Set of Data Elements to Describe a Groundwater Site; Part One—Additional Identification Descriptors

¹ This guide is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Groundwater and Vadose Zone Investigations.

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² The boldface numbers in parentheses refer to a list of references at the end of this standard.

³ 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.