



Standard Guide for Selecting a Ground-Water Modeling Code¹

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1. Scope

1.1 This guide covers a systematic approach to the determination of the requirements for and the selection of computer codes used in a ground-water modeling project. Due to the complex nature of fluid flow and biotic and chemical transport in the subsurface, many different ground-water modeling codes exist, each having specific capabilities and limitations. Furthermore, a wide variety of situations may be encountered in projects where ground-water models are used. Determining the most appropriate code for a particular application requires a thorough analysis of the problem at hand and the required and available resources, as well as detailed description of the functionality of candidate codes.

1.2 The code selection process described in this guide consists of systematic analysis of project requirements and careful evaluation of the match between project needs and the capabilities of candidate codes. Insufficiently documented capabilities of candidate codes may require additional analysis of code functionality as part of the code selection process. Fig. 1 is provided to assist with the determination of project needs in terms of code capabilities, and, if necessary, to determine code capabilities.

1.3 This guide is one of a series of guides on ground-water modeling codes and their applications, such as Guides D 5447, D 5490, D 5609, D 5610, D 5611, D 5718, and D 6025.

1.4 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This guide cannot replace education or experience and should be used in conjunction with professional judgement. Not all aspects of this guide may be applicable in all circumstances. This guide 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 guide 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.*

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 and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:²

D 653 Terminology Relating to Soil, Rock, and Contained Fluids

D 5447 Guide for Application of a Ground-Water Flow Model to a Site-Specific Problem³

D 5490 Guide for Comparing Ground-Water Flow Model Simulations to Site-Specific Information

D 5609 Guide for Defining Boundary Conditions in Ground-Water Flow Modeling

D 5610 Guide for Defining Initial Conditions in Ground-Water Flow Modeling

D 5611 Guide for Conducting a Sensitivity Analysis for a Ground-Water Flow Model Application

D 5718 Guide for Documenting a Ground-Water Flow Model Application

D 6025 Guide for Developing and Evaluating Ground-Water Modeling Codes

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *analytical model*—in ground-water modeling, a model that uses closed form solutions to the governing equations applicable to ground-water flow and transport processes.

3.1.2 *code selection*—the process of choosing the appropriate computer code, algorithm, or other analysis technique capable of simulating those characteristics of the physical system required to fulfill the modeling project's objective(s).

3.1.3 *computer code (computer program)*—assembly of numerical techniques, bookkeeping, and control language that represents the model from acceptance of input data and instructions to delivery of output.

3.1.4 *conceptual model*—an interpretation or working description of the characteristics and dynamics of the physical system.

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 Ground Water and Vadose Zone Investigations.

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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 Withdrawn.

