



Standard Guide for Documenting a Ground-Water Flow Model Application¹

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1. Scope

1.1 This guide covers suggested components to be included in documenting and archival of numerical ground-water flow model applications. Model documentation includes a written and graphical presentation of model assumptions and objectives, the conceptual model, code description, model construction, model calibration, predictive simulations, and conclusions. Model archival refers to a file or set of files (in both written and digital format) that contains logs of significant model simulations (that is, calibration, sensitivity and prediction simulations), supplemental calculations, model documentation, a copy of the model source code(s) or executable file(s) used, or both, and input and output data sets for significant model simulations.

1.2 This guide presents the major steps in preparing the documentation and archival for a ground-water flow model application. Additional information on ground-water model documentation can be found in EPA-500-B-92-006.²

1.3 This guide is specifically written for saturated, isothermal, ground-water flow model applications. The elements presented for documentation and archival are relevant and applicable to a wide range of modeled processes (in and out of the realm of ground-water flow) and can be tailored for those applications.

1.4 This guide is not intended to be all inclusive. Each model application is unique and may require supplementary documentation and archival.

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.*

1.6 *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:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids³

D 5447 Guide for Application of a Ground-Water Flow Model to a Site-Specific Problem⁴

D 5490 Guide for Comparing Ground-Water Flow Model Simulations to Site-Specific Information⁴

D 5609 Guide for Defining Boundary Conditions in Ground-Water Flow Modeling⁴

D 5610 Guide for Defining Initial Conditions in Ground-Water Flow Modeling⁴

D 5611 Guide for Conducting a Sensitivity Analysis for a Ground-Water Flow Model Application⁴

E 978 Practice for Evaluating Environmental Fate Models of Chemicals⁵

3. Terminology

3.1 Definitions:

3.1.1 *application verification*—using a set of parameter values and boundary conditions from a calibrated model to approximate acceptably a second set of field data measured under similar hydrologic conditions.

3.1.1.1 *Discussion*—Application verification is to be distinguished from code verification, which refers to software testing, comparison to analytical solutions, and comparison with other similar codes to demonstrate that the code represents its mathematical foundation.

3.1.2 *boundary condition*—a mathematical expression of a state of the physical system which constrains the equations of the mathematical model.

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 Investigations.

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² *Ground-Water Modeling Compendium*, USEPA, Office of Solid Waste and Emergency Response, EPA-500-B-92-006, NTIS No. PB93207504. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC, 20402.

³ *Annual Book of ASTM Standards*, Vol 04.08.

⁴ *Annual Book of ASTM Standards*, Vol 04.09.

⁵ *Annual Book of ASTM Standards*, Vol 11.04.