



Standard Practice for Prediction of the Long-Term Behavior of Materials, Including Waste Forms, Used in Engineered Barrier Systems (EBS) for Geological Disposal of High-Level Radioactive Waste¹

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1. Scope

1.1 This practice covers steps for the development of methods to aid in the prediction of the long-term behavior of materials, such as “engineered barrier” system (EBS) materials and waste forms, used in the geologic disposal of high-level nuclear waste in the U.S. Government disposal site.

1.1.1 These steps include problem definition, testing, modeling, and confirmation.

1.1.2 The predictions are based on models derived from interpretation of data obtained from tests and appropriate analogs.

1.1.3 These tests may include but are not limited to the following:

1.1.3.1 Attribute tests,

1.1.3.2 Characterization tests,

1.1.3.3 Accelerated tests,

1.1.3.4 Service condition tests,

1.1.3.5 Analog tests, and

1.1.3.6 Confirmation tests.

1.1.4 Tests performed on analog materials.

1.2 The purpose of this practice is to provide information to serve as part of the basis for performance assessment of a geologic repository.

1.3 This practice does not cover other methods of making predictions such as use of expert judgment.

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 limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

E 177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods²

E 178 Practice for Dealing with Outlying Observations²

¹ This practice is under the jurisdiction of ASTM Committee C-26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.13 on Repository Waste Package Materials Testing.

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² *Annual Book of ASTM Standards*, Vol 14.02.

E 583 Practice for Systematizing the Development of (ASTM) Voluntary Consensus Standards for the Solution of Nuclear and Other Complex Problems³

2.2 ANSI Standard:⁴

ANSI Nuclear Quality Assurance for Waste Management
ANSI/ASME NQR-1 Quality Assurance Program Requirements for Nuclear Facilities

2.3 U.S. Government Documents:

DOE/RW-0333P, Rev. 7, Quality Assurance Requirements and Description, USDOE OCRWM, Oct. 1995

Code of Federal Regulations, Title 10, Part 60, Disposal of High-Level Radioactive Wastes in Geologic Repositories, U.S. Nuclear Regulatory Commission, January 1997⁵

Code of Federal Regulations Title 40, Part 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes⁵

Materials Characterization Center Guidelines for Accuracy and Precision of Test Data. In *Nuclear Waste Materials Handbook-Volume on Test Methods*. U.S. Department of Energy, DOE/TIC-11400⁶

Public Law 97-425, Nuclear Waste Policy Act of 1982, as amended⁷

NUREG-0856, Final Technical Position on Documentation of Computer Codes for High-Level Waste Management (1983)⁶

3. Terminology

3.1 Definitions:

3.1.1 Definitions used in this practice are existing ASTM definitions,⁸ when applicable.

3.1.1.1 Definitions of some terms “specific to this practice” are based on the referenced Code of Federal Regulations, 10

³ *Annual Book of ASTM Standards*, Vol 12.02.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁵ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁶ Available from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

⁷ In “United States Statutes at Large,” available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20002.

⁸ See *Compilation of ASTM Standard Definitions*, available from ASTM Headquarters, 100 Barr Harbor Drive, West Conshohocken, PA 19428.