



Standard Guide for Development, Verification, Validation, and Documentation of Simulated High-Level Tank Waste¹

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1. Scope

1.1 Intent:

1.1.1 The intent of this guideline is to provide general considerations for the development, verification, validation, and documentation of high-level waste (HLW) tank simulants. Due to the expense and hazards associated with obtaining and working with actual wastes, especially radioactive wastes, simulants are used in a wide variety of applications including process and equipment development and testing, equipment acceptance testing, and plant commissioning. This standard guide facilitates a consistent methodology for development, preparation, verification, validation, and documentation of waste simulants.

1.2 This guideline provides direction on (1) defining simulant use, (2) defining simulant-design requirements, (3) developing a simulant preparation procedure, (4) verifying and validating that the simulant meets design requirements, and (5) documenting simulant-development activities and simulant preparation procedures.

1.3 Applicability:

1.3.1 This guide is intended for persons and organizations tasked with developing HLW simulants to mimic certain characteristics and properties of actual wastes. The process for simulant development, verification, validation, and documentation is shown schematically in Fig. 1. Specific approval requirements for the simulants developed under this guideline are not provided. This topic is left to the performing organization.

1.3.2 While this guide is directed at HLW simulants, much of the guidance may also be applicable to other aqueous based solutions and slurries.

1.3.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 User Caveats:

1.4.1 This guideline is not a substitute for sound chemistry and chemical engineering skills, proven practices and experience. It is not intended to be prescriptive but rather to provide considerations for the development and use of waste simulants.

1.4.2 *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

C1109 Practice for Analysis of Aqueous Leachates from Nuclear Waste Materials Using Inductively Coupled Plasma-Atomic Emission Spectroscopy

C1111 Test Method for Determining Elements in Waste Streams by Inductively Coupled Plasma-Atomic Emission Spectroscopy

C1752 Guide for Measuring Physical and Rheological Properties of Radioactive Solutions, Slurries, and Sludges

D4129 Test Method for Total and Organic Carbon in Water by High Temperature Oxidation and by Coulometric Detection

2.2 Environmental Protection Agency SW-846 Methods:

Method 3010A Acid digestion of Aqueous Samples and Extracts for total metals for Analysis by FLAA or ICP Spectroscopy

Method 3050B Acid Digestion of Sediments, Sludges and Soils

Method 3051A Microwave Assisted Acid Digestion of Sediments, Sludges and Soils

Method 3052 Microwave Assisted Acid Digestion of Siliceous and Organically Based Matrices

Method 6010C Inductively Coupled Plasma-Atomic Emission Spectrometry

Method 6020A Inductively Coupled Plasma-Mass Spectrometry

¹ This specification is under the jurisdiction of ASTM Committee C26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.13 on Spent Fuel and High Level Waste.

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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.