Designation: D6517 – 18

Standard Guide for Field Preservation of Ground Water Samples[1]

This standard is issued under the fixed designation D6517; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This guide covers methods for field preservation of ground water samples from the point of sampling through receipt at the laboratory. Laboratory preservation methods are not described in this guide. Purging and sampling techniques are not addressed in this standard but are addressed in Guides D6564/D6564M, D6634/D6634M, D7929, and Practice D6771.

1.2 Ground water samples are subject to chemical, physical, and biological change relative to in situ conditions at the ground surfaces due to exposure to ambient conditions during sample collection. Physical and chemical preservation of samples minimize further changes in sample chemistry that can occur from the moment the ground water sample is retrieved, to the time it is removed from the sample container for extraction or analysis.

1.3 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 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.*

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

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D3694 Practices for Preparation of Sample Containers and for Preservation of Organic Constituents

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D4840 Guide for Sample Chain-of-Custody Procedures

D5903 Guide for Planning and Preparing for a Groundwater Sampling Event

D6089 Guide for Documenting a Groundwater Sampling Event

D6564/D6564M Guide for Field Filtration of Groundwater Samples

D6634/D6634M Guide for Selection of Purging and Sampling Devices for Groundwater Monitoring Wells

D6771 Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations

D7929 Guide for Selection of Passive Techniques for Sampling Groundwater Monitoring Wells

2.2 *Other Documents:*

Standard Methods for the Examination of Water and Wastewater, 20th ed., 1999[3]

International Air Transport Association Dangerous Goods Regulations[4]

[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] 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] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

***A Summary of Changes section appears at the end of this standard**

U.S. EPA, Office of Solid Waste, SW-846, 3rd ed. (with updates)
U.S. EPA, Title 40, Code of Federal Regulations, Part 136 with updates
U.S. DOT, Title 49, Code of Federal Regulations, Part 172 with updates

3. Terminology

3.1 *Definitions*—For definitions of common technical terms in this standard, refer to Terminology D653.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *chemical preservation, n—in ground water sampling*, the addition of acidic, alkaline or biologically toxic compounds, or combination thereof, to a ground water sample to prevent changes in chemical properties of the sample that may occur after collection.

3.2.2 *holding time, n—in ground water sampling*, the maximum amount of time that may transpire from the moment a sample container is filled to the time the sample is extracted or analyzed. Holding times are parameter-specific, variable in length, and defined by laboratory analytical methods.

3.2.3 *temperature blank, n—in ground water sampling*, a quality control sample that is transported with samples and is used by the laboratory performing sample analyses to verify that temperature-sensitive samples have been adequately cooled for shipment to and arrival at the laboratory.

3.2.3.1 *Discussion*—Forms of temperature blank include: (*1*) using a commercially prepared, fluid-filled bottle containing a permanently fixed, calibrated, and certified thermometer, the temperature of which is read directly by the laboratory; (*2*) submission of a designated sample container filled with water (for example, ground water, distilled water, or deionized water) that is opened by the laboratory and immediately measured for temperature of the water using a calibrated and certified thermometer; or (*3*) submission of a designated container filled with water (for example, ground water, distilled water, or deionized water) on which the laboratory uses a remote infrared temperature sensor to measure the temperature. Regardless of the method used, the measured temperatures are compared against the required temperature for each sample in conjunction with a previously defined window of acceptable variance from this required temperature as documented in the sampling and analysis plan.

4. Significance and Use

4.1 Ground water samples are subject to chemical, physical, and biological change relative to in- situ conditions at the ground surfaces as a result of exposure to ambient conditions during sample collection (for example, pressure, temperature, ultraviolet radiation, atmospheric oxygen, and contaminants) **(1)** **(2)**.[5] Physical and chemical preservation of samples minimize further changes in sample chemistry that can occur from the moment the ground water sample is retrieved, to the time it is removed from the sample container for extraction or analysis, or both. Measures also should be taken to preserve the physical integrity of the sample container.

4.2 The need for sample preservation for specific analytes should be defined prior to the sampling event and documented in the site-specific sampling and analysis plan in accordance with Guide D5903. The decision to preserve a sample should be made on a parameter-specific basis as defined by individual analytical methods.

4.3 This guide includes examples from government documents in the United States. When work is in other countries or regions, the local governing or regulating agencies should be consulted.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

5. Timing and Purpose of Ground Water Sample Preservation

5.1 Ground water samples should be preserved in the field at the time of sample collection using physical means to prevent sample container breakage or temperature increases, and chemical means to minimize changes in ground water sample chemistry prior to laboratory analysis.

6. Ground Water Sample Preservation Procedures

6.1 Ground water sample preservation procedures are grouped into two general categories: (*1*) physical preservation and (*2*) chemical preservation. Preservation procedures should address the following details on a parameter-specific basis: sample container design and construction, protection from ultraviolet light, temperature control, chemical addition, and pH control measures **(2)**.

6.1.1 *Physical Preservation of Ground Water Samples*—Physical ground water sample preservation methods include: (*1*) use of appropriate sample collection containers for each parameter being analyzed, (*2*) use of appropriate packing of sample containers for shipment to prevent sample container breakage and potential cross-contamination of samples during shipment, and (*3*) temperature control.

6.1.1.1 *Sample Container Selection*—Proper selection of containers for ground water sample collection is an important means of protecting the integrity of the sample. Specifications on container design, including shape, volume, gas tightness, materials of construction, and use of cap liners, are defined for specific parameters or suites of parameters (for example, amber glass containers protect photosensitive analytes such as (PCBs) from chemical alteration). Specifications for sample container selection are documented in parameter-specific analytical methods (for example, ASTM, U.S. EPA SW846, AWWA Standard Methods) as well as in state and local regulatory guidelines on ground water sample collection and preservation. The type of sample containers to be used in a sampling event should be determined during sampling event planning in

[5] The boldface numbers in parentheses refer to the list of references at the end of this standard.