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Standard Guide for Purging Methods for Wells Used for Ground Water Quality Investigations[1]

This standard is issued under the fixed designation D6452; 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 purging wells used for ground water quality investigations and monitoring programs. These methods could be used for other types of programs but are not addressed in this guide.

1.2 This guide applies only to wells sampled at the wellhead.

1.3 *This standard describes seven methods (A-G) for the selection of purging methods.*

Method A—Fixed Volume Purging,

Method B—Purging Based on Stabilization of Indicator Parameters,

Method C—Purging Based on Stabilization of Target Analytes,

Method D—Purging Based on Fixed Volume Combined with Indicator Parameter Stabilization,

Method E—Low Flow/Low Volume (Minimal Drawdown) Purging,

Method F—Well Evacuation Purging, and

Method G—Use of Packers in Purging.

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 guide 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

D5088 Practice for Decontamination of Field Equipment Used at Waste Sites

D5092/D5092M Practice for Design and Installation of Groundwater Monitoring Wells

D5521/D5521M Guide for Development of Groundwater Monitoring Wells in Granular Aquifers

D6089 Guide for Documenting a Groundwater Sampling Event

D6771 Practice for Low-Flow Purging and Sampling Used for Groundwater Monitoring

3. Terminology

3.1 *Definitions:*

3.1.1 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 *fixed volume purging, n—in ground water sampling*, removing a specified number of well volumes to achieve purging.

3.2.2 *flow-through cell (purging), n—in ground water sampling*, a vessel that allows purge water to pass over sensors for continuous measurement of indicator parameters.

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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.

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

3.2.3 *grab sampling device, n—in ground water sampling*, a bailer or similar device that removes an aliquot of water from the well with each insertion and removal from the well.

3.2.4 *low yield well, n—in ground water sampling*, a well that does not produce sufficient water such that the objectives of purging and sampling cannot be achieved without first removing most or nearly all water from the well.

3.2.5 *packer (purging), n—in ground water sampling—in monitoring wells*, a transient or dedicated device placed in a well that isolates or seals a portion of the well, well annulus, or borehole at a specific level.

3.2.6 *purging, n—in ground water sampling*, the practice of removing water from a well prior to sampling.

3.2.7 *stabilization, n—in ground water sampling*, a condition occurring when changes in indicator parameters and operational parameter values are maintained within a specified range over a selected number of consecutive readings and it appears the readings will continue to remain within that specified range during subsequent readings.

3.2.7.1 *Discussion*—The interval between readings is chosen for either a given time period or volume of water removed.

3.2.8 *stagnant water, n—in ground water sampling*, the water contained in a well above the screened interval or formation inflows (for uncased wells) between sampling events that may have interacted with materials or the headspace in the well, or both, and thus may be different from ambient ground water conditions.

3.2.8.1 *Discussion*—Water within the screened area or formation inflows are generally reflective of the ambient ground water conditions.

3.2.9 *well intake, n—in ground water sampling*, the area in a screened well or open bore well where formation water enters.

3.2.10 *well volume, n—in ground water sampling*, the quantity of water contained in the casing and the screen for a screened well, or in the open borehole and casing in an unscreened well. For an unscreened well, this volume may also be referred to as a borehole volume.

3.2.10.1 *Discussion*—Regulations or guidance documents may contain other definitions of well volume and should be consulted.

4. Significance and Use

4.1 Purging is done for a variety of reasons and the purging method may depend on the hydrogeologic setting, condition of the well, or the contaminants of interest and well production rates. well hydrological conditions, condition of the well, or the contaminants of interest, and well production rates. This guide presents an approach for selecting an appropriate purging method if purging is to be performed., Water above the screened interval or open borehole may not accurately reflect ambient ground water chemistry.

NOTE 1—Some sampling methods, such as passive sampling, do not require the practice of purging prior to sample collection (**1**,**2**).[3]

4.2 There are various methods for purging. Each purging method may have a different volume of influence within the aquifer or screened interval. Therefore, a sample collected after purging by any one method is not necessarily equivalent to samples collected after purging by the other methods. The selection of the appropriate method will be dependent on several factors, which should be defined during the development of the sampling and analysis plan. This guide describes the methods available and defines the circumstances under which each method may be appropriate.

5. Criteria and Considerations for Selecting an Appropriate Purging Method

5.1 *Regulations or Other Guidance*—Determine if any local or national regulations or guidance exist pertaining to purging monitoring wells. Purging may be addressed as part of a broader regulation or guidance document on field investigations or ground water monitoring.

5.2 *Historical Data*—Review of historical data can provide the user with information about the chemical and physical behavior of the ground water at the sampling point during purging and details regarding past purging practices.

5.3 *Well Design (Practice D5092/D5092M)*—The design of the well should be considered when selecting an appropriate purging method. Refer to Section 7 for how specific well design details affect the selection of purging methods.

5.4 *Well Development (Guide D5521/D5521M)*—Well development is part of the well construction or maintenance process and not part of a purging and sampling event. Information on well development can be found in Guide D5521/D5521M.

NOTE 2—Improper or inadequate well development can affect the suitability of the well for use in the sampling program.

5.5 *Hydraulics of the Well*—Selection of a purging method should include an assessment of well-specific hydraulic conditions, which are directly related to formation transmissivity and well design, construction, development, and maintenance. Well and formation hydraulics (the 3-dimensional distribution of head) influence the rate at which water flows through or enters the well intake under laminar flow conditions. Purging strategies are commonly categorized as being suitable for high-yield wells or low-yield wells.

NOTE 3—Wells in Karst areas present challenges, such as when wells are linked into subsidiary conduit systems. In some cases, the purging and sampling may not reliably characterize the aquifer (**3**), (**4**).

5.6 *Purge Water Management*—Manage purge water in accordance with the site-specific waste management provisions of the sampling and analysis plan. It may be preferable to select a purging method to minimize the purge volume, especially when purge water must be containerized. (See Note 1.)

5.7 *Physical Condition of the Wells*—The physical condition of a well may affect the purging method by limiting the choice

[3] The boldface numbers given in parentheses refer to a list of references at the end of the text.