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Standard Guide for Selection and Documentation of Existing Wells for Use in Environmental Site Characterization and Monitoring¹

This standard is issued under the fixed designation D5980; 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 the use of existing wells for environmental site characterization and monitoring. It covers the following major topics: criteria for determining the suitability of existing wells for hydrogeologic characterization and groundwater quality monitoring, types of data needed to document the suitability of an existing well, and the relative advantages and disadvantages of existing large- and small-capacity wells.

1.2 This guide should be used in conjunction with Guide [D5730](#), that provides a general approach for environmental site investigations.

1.3 This guide does not specifically address design and construction of new monitoring or supply wells. Refer to Practices [D5092/D5092M](#) and [D5787](#).

1.4 This guide does not specifically address groundwater sampling procedures. Refer to Guide [D5903](#).

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *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.*

1.7 *This guide offers an organized collection of information or a series of options and does not recommend a specific course of action. This guide 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 guide 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 guide 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.

1.8 *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 Pertinent guides addressing specific information necessary to utilize existing wells for hydrologic and water-quality data for environmental site characterization. A comprehensive list of guides, standards, methods, practices, and terminology is contained in Guide [D5730](#). Other guidance documents covering procedures for environmental site investigations with specific objectives or in particular geographic settings may be available from federal, state, and other agencies or organizations. The appropriate agency or organization should be contacted to determine the availability and most current edition of such documents.

2.2 ASTM Standards:²

[D653 Terminology Relating to Soil, Rock, and Contained Fluids](#)

[D5092/D5092M Practice for Design and Installation of Groundwater Monitoring Wells](#)

[D5254/D5254M Practice for Minimum Set of Data Elements to Identify a Groundwater Site \(Withdrawn 2019\)³](#)

[D5408 Guide for Set of Data Elements to Describe a Groundwater Site; Part One—Additional Identification Descriptors \(Withdrawn 2019\)³](#)

[D5409/D5409M Guide for Set of Data Elements to Describe a Groundwater Site; Part Two—Physical Descriptors \(Withdrawn 2019\)³](#)

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 The last approved version of this historical standard is referenced on www.astm.org.

- D5410** Guide for Set of Data Elements to Describe a Groundwater Site; Part Three—Usage Descriptors (Withdrawn 2016)³
- D5521/D5521M** Guide for Development of Groundwater Monitoring Wells in Granular Aquifers
- D5730** Guide for Site Characterization for Environmental Purposes With Emphasis on Soil, Rock, the Vadose Zone and Groundwater (Withdrawn 2013)³
- D5753** Guide for Planning and Conducting Geotechnical Borehole Geophysical Logging
- D5787** Practice for Monitoring Well Protection At or Near Land Surface
- D5903** Guide for Planning and Preparing for a Groundwater Sampling Event
- D5979** Guide for Conceptualization and Characterization of Groundwater Systems

3. Terminology

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

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *supply (production) well, n*—well primarily installed for public supply, irrigation, and industrial use. Supply wells may be used as an observation well.

4. Significance and Use

4.1 This guide describes a general approach for the use of existing wells in environmental investigations with a primary focus on the subsurface and major factors affecting the surface and subsurface environment.

4.2 Existing wells represent a valuable source of information for subsurface environmental investigations. Specific uses of existing wells include:

4.2.1 Well driller logs provide information on subsurface lithology and major water-bearing units in an area. Existing wells can also offer access for downhole geophysical logging for stratigraphic and aquifer interpretations. Examples include natural gamma logs in cased wells and an entire suite of methods in uncased bedrock wells (see Guide **D5753**). This information can assist in developing the preliminary conceptual model of the site.

4.2.2 Well tests using existing wells may provide information on the hydrologic characteristics of an aquifer.

4.2.3 Monitoring of water levels in existing wells, provided that they are cased in the aquifer of interest, allow development of potentiometric maps and interpretations of groundwater flow directions and gradients.

4.2.4 Existing wells are the primary means by which regional drinking water quality is evaluated and monitored.

4.2.5 Existing wells may assist in the mapping of contaminant plumes, and in ongoing monitoring of groundwater quality changes at the site-specific level.

4.3 Data from existing wells should only be used when characteristics of the well have been sufficiently documented to determine that they satisfy criteria for the purpose for which the data are to be used.

5. General Considerations in Selection and Use of Existing Wells

5.1 Selection and use of existing wells should take place in the context of a conceptual framework consisting of a description of the system, including, as necessary, physical and cultural characteristics, such as climate, hydrology, ecology, physiography, population, water use and land use, and hypotheses about processes of interest that occur within that system. A step-wise approach for conceptualization and characterization is a direct approach to develop the framework for Hydrologic Systems as described in Kolm (**1**)⁴, (see Guide **D5979**). Conceptualization of hydrologic and regional groundwater quality systems can be formulated using the methods outlined in Alley (**2**). The framework is reviewed and refined by an iterative process of data collection and analysis, testing hypotheses with data collected, and identifying data needs to further revise the framework. Refinement must be made within the limits established by the accuracy, precision, and completeness of the data. Methods for data collection are selected that will provide data appropriate for testing hypotheses which evaluate the conceptual framework.

5.2 Well design and installation can greatly affect the quality of groundwater monitoring. Such effects apply both to existing wells and to wells specifically installed for a purpose. The effects of well design and installation, therefore, need to be considered regardless of whether existing wells are selected or if wells are specifically installed for a specific purpose. The most common feature of an existing well that may render it unsuitable for water level measurement or water-quality monitoring is that the well is completed in multiple hydrogeologic units causing water levels and water-quality parameters to reflect a mixing of multiple hydrogeologic units. Such data cannot be reliably compared with data from wells completed in the individual hydrogeologic units.

5.3 Major steps in the selection of existing wells for environmental investigations include: developing specific criteria for evaluating the suitability of existing wells in relation to the objectives of the investigations (see Section 6), conducting an inventory of existing wells in the area of interest (see **8.1**), documenting the characteristics of the wells identified in the inventory that are relevant to the selection criteria (see **8.2**), and identification of wells that satisfy the selection criteria (see Section 9).

6. Well-Selection Criteria

6.1 Assessing the suitability of existing wells for hydrological and groundwater quality studies requires development of specific well-selection criteria. The criteria are based on considerations of project objectives by defining the problem to be solved, the conceptual framework, and data-collection requirements.

6.2 *Specific Well-Selection Criteria*—Specific criteria will depend on the objectives of the investigation. The following general criteria will apply to most situations:

⁴ The boldface numbers in parentheses refer to the list of references at the end of this standard.