Designation: D5978/D5978M – 16 (Reapproved 2024)

Standard Guide for Maintenance and Rehabilitation of Groundwater Monitoring Wells[1]

This standard is issued under the fixed designation D5978/D5978M; 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.

INTRODUCTION

This guide for maintenance and rehabilitation promotes procedures appropriate to groundwater monitoring wells installed to evaluate the extent and nature of contamination, progress of remediation, and for long-term monitoring of either water quality or water level.

1. Scope

1.1 This guide covers an approach to selecting and implementing a well maintenance and rehabilitation program for groundwater monitoring wells. It provides information on symptoms of problems or deficiencies that indicate the need for maintenance and rehabilitation. It is limited to monitoring wells, that are designed and operated to provide access to, representative water samples from, and information about the hydraulic properties of the saturated subsurface while minimizing impact on the monitored zone. Some methods described herein may apply to other types of wells although the range of maintenance and rehabilitation treatment methods suitable for monitoring wells is more restricted than for other types of wells. Monitoring wells include their associated pumps and surface equipment.

1.2 This guide is affected by governmental regulations and by site specific geological, hydrogeological, geochemical, climatological, and biological conditions.

1.3 *Units*—The values stated in either inch-pound units or SI units presented in brackets are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.4 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026, unless superseded by this standard.

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 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.*

1.7 *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

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

D4044/D4044M Test Method for (Field Procedure) for Instantaneous Change in Head (Slug) Tests for Determining

[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.

Hydraulic Properties of Aquifers (Withdrawn 2024)[3]
D4412 Test Methods for Sulfate-Reducing Bacteria in Water and Water-Formed Deposits
D4448 Guide for Sampling Ground-Water Monitoring Wells
D4750 Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well) (Withdrawn 2010)[3]
D5088 Practice for Decontamination of Field Equipment Used at Waste Sites
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]
D5299/D5299M Guide for Decommissioning of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities
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]
D5410 Guide for Set of Data Elements to Describe a Groundwater Site;Part Three—Usage Descriptors (Withdrawn 2016)[3]
D5472/D5472M Practice for Determining Specific Capacity and Estimating Transmissivity at the Control Well
D5474 Guide for Selection of Data Elements for Groundwater Investigations (Withdrawn 2021)[3]
D5521/D5521M Guide for Development of Groundwater Monitoring Wells in Granular Aquifers
D5753 Guide for Planning and Conducting Geotechnical Borehole Geophysical Logging
D6026 Practice for Using Significant Digits and Data Records in Geotechnical Data

2.1.1 In addition, ASTM Volume 11.01 on Water (I) and Volume 11.02 on Water (II) contain numerous test methods and standards that may be of value to the user of this guide.

D7726 Guide for The Use of Various Turbidimeter Technologies for Measurement of Turbidity in Water

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 *well development, n*—actions taken during the installation and start-up of a well for the purpose of mitigating or correcting damage done to the adjacent geologic formations and filter materials that might affect the well's ability to produce representative samples.

3.2.2 *well maintenance, n*—any action that is taken for the purpose of maintaining well performance (see Discussion) and extending the life of the well to provide samples that are representative of the groundwater surrounding it.

3.2.2.1 *Discussion*—Maintenance includes both physical actions taken at the well and the documentation of those actions and all operating data in order to provide benchmarks for comparisons at later times. Desired level of well performance can vary depending on the design objectives.

3.2.3 *well preventive maintenance, n*—any well maintenance action that is initiated for the purpose of meeting some preestablished rule or schedule that applies while well performance is still within preestablished ranges.

3.2.4 *well reconstructive maintenance, n*—any preventive or rehabilitative well maintenance action involving the replacement of a major component (for example, pump, surface protection).

3.2.5 *well redevelopment, n*—any preventive or rehabilitative well maintenance action, taken after start-up, for the purpose of mitigating or correcting deterioration of the filter pack or adjacent geologic formations, or both, due to the well's presence and operation over time, usually involving physical development procedures, applied in reaction to deterioration.

3.2.6 *well rehabilitation, n*—for the purposes of this guide, synonymous with well rehabilitative or restorative maintenance.

3.2.7 *well rehabilitative or restorative maintenance, n*—any well maintenance action that is initiated for the purpose of correcting well performance that has moved outside of preestablished ranges.

4. Significance and Use

4.1 The process of operating any engineered system, such as monitoring wells, includes active maintenance to prevent, mitigate, or reverse deterioration. Lack of or improper maintenance can lead to well performance deficiencies (physical problems) or sample quality degradation (chemical problems). These problems are intrinsic to monitoring wells, which are often left idle for long periods of time (as long as a year), installed in non-aquifer materials, and installed to evaluate contamination that can cause locally anomalous hydrogeochemical conditions. The typical solutions for these physical and chemical problems that would be applied by owners and operators of water supply, dewatering, recharge, and other wells may not be appropriate for monitoring wells because of the need to minimize their impact on the conditions that monitoring wells were installed to evaluate.

4.2 This guide covers actions and procedures, but is not an encyclopedic guide to well maintenance. Well maintenance planning and execution is highly site and well specific.

4.3 The design of maintenance and rehabilitation programs and the identification of the need for rehabilitation should be based on objective observation and testing, and by individuals knowledgeable and experienced in well maintenance and rehabilitation. Users of this guide are encouraged to consult the references provided.

4.4 For additional information see Test Methods D4412, D5472/D5472M, D7726 and Guides D4448, D5254/D5254M, D5521/D5521M, D5409/D5409M, D5410 and D5474.

NOTE 1—The quality of the result produced by this standard is

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