Designation: D8006 – 24

Standard Guide for Sampling and Analysis of Residential and Commercial Water Supply Wells in Areas of Exploration and Production (E&P) Operations[1]

This standard is issued under the fixed designation D8006; 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 presents a methodology for obtaining representative groundwater samples from domestic or commercial water wells that are in proximity to oil and gas exploration and production (E&P) operations. E&P operations include, but are not necessarily limited to, site preparation, drilling, completion, and well stimulation (including hydraulic fracturing), and production activities. The goal is to obtain representative groundwater samples from domestic or commercial water wells that can be used to identify the baseline groundwater quality and any subsequent changes that may be identified. While this guide focuses on baseline sampling in conjunction with oil and gas E&P activities, the principles and practices recommended for health and safety are based on well-established methods that have been in use for many years in other industrial situations. This guide recommends sampling and analytical testing procedures that can identify various chemical species present including metals, dissolved gases (such as methane and radon), hydrocarbons (and other organic compounds), radioactivity, as well as overall water quality.

1.2 This guide provides information on typical residential and commercial water supply well systems and guidance on developing and implementing a sampling program, including determining sampling locations, suggested purging techniques, selection of potential analyses and laboratory certifications, data management, and integrity. It also includes guidance on personal safety. The information included pertains to baseline sampling before beginning any activities that could present potential risks to local aquifers, periodic sampling during and after such work, and ongoing monitoring relating to known or potential groundwater constituents in the area. This guide does not address policy issues related to frequency or timing of sampling or sampling distances from the wellhead. In addition, it does not address reporting limits, sample preservation, holding times, laboratory quality control, regulatory action levels, or interpretation of analytical results.

1.3 These guidelines are not intended to replace or supersede regulatory requirements and technical methodology or guidance nor are these guidelines intended for inclusion by reference in regulations. Instances where this guide is in conflict with statutory or regulatory requirements, practitioners shall defer to the latter. These guidelines are intended to assist in developing sampling programs to meet project goals and objectives. However, site-specific conditions, regulatory requirements, site-specific health and safety issues, technical manuals and directives, and program data quality objectives should be evaluated and consulted along with the information contained in this guide for each individual site and sampling program.

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 Users are responsible for investigating and identifying all the legal and regulatory requirements that are applicable for the location where the sampling is being performed.

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 international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

[1] This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.26 on Hydraulic Fracturing.

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

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]

D511 Test Methods for Calcium and Magnesium In Water
D512 Test Methods for Chloride Ion In Water
D516 Test Method for Sulfate Ion in Water
D653 Terminology Relating to Soil, Rock, and Contained Fluids
D858 Test Methods for Manganese in Water
D888 Test Methods for Dissolved Oxygen in Water
D1067 Test Methods for Acidity or Alkalinity of Water
D1068 Test Methods for Iron in Water
D1125 Test Methods for Electrical Conductivity and Resistivity of Water
D1246 Test Method for Bromide Ion in Water
D1293 Test Methods for pH of Water
D1687 Test Methods for Chromium in Water
D1976 Test Method for Elements in Water by Inductively-Coupled Plasma Atomic Emission Spectroscopy
D2330 Test Method for Methylene Blue Active Substances
D2908 Practice for Measuring Volatile Organic Matter in Water by Aqueous-Injection Gas Chromatography
D2972 Test Methods for Arsenic in Water
D3082 Test Method for Boron in Water
D3223 Test Method for Total Mercury in Water
D3557 Test Methods for Cadmium in Water
D3559 Test Methods for Lead in Water (Withdrawn 2024)[3]
D3648 Practices for the Measurement of Radioactivity
D3859 Test Methods for Selenium in Water
D3920 Test Method for Strontium in Water
D4191 Test Method for Sodium in Water by Atomic Absorption Spectrophotometry
D4192 Test Method for Potassium in Water by Atomic Absorption Spectrophotometry
D4327 Test Method for Anions in Water by Suppressed Ion Chromatography
D4382 Test Method for Barium in Water, Atomic Absorption Spectrophotometry, Graphite Furnace
D4658 Test Method for Sulfide Ion in Water (Withdrawn 2024)[3]
D5072 Test Method for Radon in Drinking Water
D5673 Test Method for Elements in Water by Inductively Coupled Plasma—Mass Spectrometry
D5907 Test Methods for Filterable Matter (Total Dissolved Solids) and Nonfilterable Matter (Total Suspended Solids) in Water
D5980 Guide for Selection and Documentation of Existing Wells for Use in Environmental Site Characterization and Monitoring
D7315 Test Method for Determination of Turbidity Above 1 Turbidity Unit (TU) in Static Mode
D7678 Test Method for Total Oil and Grease (TOG) and Total Petroleum Hydrocarbons (TPH) in Water and Wastewater with Solvent Extraction using Mid-IR Laser Spectroscopy
D8028 Test Method for Measurement of Dissolved Gases Methane, Ethane, Ethylene, and Propane by Static Headspace Sampling and Flame Ionization Detection (GC/FID)

2.2 *EPA Standards:*[4]

EPA 160.1 Total Dissolved Solids (TDS)
EPA 300.0 Determination of Inorganic Anions by Ion Chromatography
EPA 300.1 Determination of Inorganic Anions in Drinking Water by Ion Chromatography
EPA 310.1 Ortho-Phosphorus, Dissolved Automated, Ascorbic Acid
EPA 310.2 Alkalinity (Colorimetric, Automated, Methyl Orange)
EPA 325.1 Chloride (Colorimetric, Automated Ferricyanide AAI)
EPA 425.1 Methylene Blue Active Substances (MBAS)
EPA 900.0 Gross Alpha and Beta Activity in Water, Official Name: Gross Alpha and Gross Beta Radioactivity in Drinking Water
EPA 903.1 Radium-226 in Drinking Water, Official Name: Radium-226 in Drinking Water (Radon Emanation Technique)
EPA 908.0 Uranium in Drinking Water—Radiochemical Method
EPA 906.0 Tritium in Drinking Water EPA 908.0 Uranium in Drinking Water-Radiochemical Method
EPA 9030B Acid-Soluble and Acid-Insoluble Sulfides: Distillation
EPA 9034 Titrimetric Procedure for Acid-Soluble and Acid-Insoluble Sulfides
EPA 9056A Determination of Inorganic Anions by Ion Chromatography
RSKSOP-175 Sample Preparation and Calculations for Dissolved Gas Analysis in Water Samples Using a GC Headspace Equilibration Technique (Advisory)
SW846 8015D Nonhalogenated Organics Using GC/FID
SW846 8260C Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)
SW846 8270D Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)
SW846 6010D Inductively Coupled Plasma-Atomic Emission Spectrometry
SW846 6020B Inductively Coupled Plasma-Mass Spectrometry
SW846 7470A Mercury in Liquid Waste (Manual Cold-Vapor Technique)

[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.

[4] Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, http://www.epa.gov.