

General Introduction for the “National Field Manual for the Collection of Water-Quality Data”

Chapter 0 of
Section A, National Field Manual for the Collection of Water-Quality Data
Book 9, Handbooks for Water-Resources Investigations



Techniques and Methods 9–A0
Version 1.1, June 2018

Cover: Collection of isokinetic samples for water quality with a D-96 3-liter bag sampler.
Photograph by Stanley Skrobialowski, U.S. Geological Survey.

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**U.S. Department of the Interior
U.S. Geological Survey**

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Foreword

The Water Mission Area of the U.S. Geological Survey (USGS) provides reliable, impartial, and timely information to understand and manage the Nation's water resources. Inherent in this mission is the responsibility to collect data that accurately describe the physical, chemical, and biological attributes of water systems. These data are used for environmental and resource assessments by the USGS, other government agencies, scientific organizations, and the general public. Reliable and quality-assured data are essential to the credibility and impartiality of water-resources appraisals carried out by the USGS. The development and use of the "National Field Manual for the Collection of Water-Quality Data" (NFM) achieves consistency in USGS scientific methods and procedures and documents them with citable technical references. USGS field personnel use this manual to ensure that the water data they collect are of the highest quality required to fulfill our mission.

Don Cline
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General Introduction for the “National Field Manual for the Collection of Water-Quality Data”

By U.S. Geological Survey

Background

As part of its mission, the U.S. Geological Survey (USGS) collects data to assess the quality of our Nation’s water resources. A high degree of reliability and standardization of these data are paramount to fulfilling this mission. Documentation of nationally accepted methods used by USGS personnel serves to maintain consistency and technical quality in data-collection activities. “The National Field Manual for the Collection of Water-Quality Data” (NFM) provides documented guidelines and protocols for USGS field personnel who collect water-quality data. The NFM provides detailed, comprehensive, and citable procedures for monitoring the quality of surface water and groundwater. Topics in the NFM include (1) methods and protocols for sampling water resources, (2) methods for processing samples for analysis of water quality, (3) methods for measuring field parameters, and (4) specialized procedures, such as sampling water for low levels of mercury and organic wastewater chemicals, measuring biological indicators, and sampling bottom sediment for chemistry. Personnel who collect water-quality data for national USGS programs and projects, including projects supported by USGS cooperative programs, are mandated to use protocols provided in the NFM per USGS Office of Water Quality Technical Memorandum 2002.13 (U.S. Geological Survey, 2002). Formal training, for example, as provided in the USGS class, “Field Water-Quality Methods for Groundwater and Surface Water,” and field apprenticeships supplement the guidance provided in the NFM and ensure that the data collected are high quality, accurate, and scientifically defensible.

The USGS “National Field Manual for the Collection of Water-Quality Data” (NFM) provides detailed, comprehensive, and citable procedures for monitoring the quality of surface water and groundwater. Formal training and field apprenticeships supplement the information provided in the NFM.

As used in the NFM, the terms “**required**” and “**recommended**” have the USGS-specific meanings described below:

The terms “**require**,” “**required**,” and “**requirements**” in reference to USGS protocols indicate that USGS Water Mission Area policy has been established on the basis of research or consensus of the technical staff and has been reviewed by water-quality specialists and other professionals having the appropriate expertise. Technical memorandums and other documents that define USGS Water Mission Area policy are cited in the NFM. USGS field personnel are instructed to use required equipment and procedures as described in the NFM. Departure from or modifications to stipulated requirements, if necessary for accomplishing specific data-quality requirements or study objectives, must be independently quality assured and documented per USGS Office of Water Quality Technical Memorandum 2002.13 (U.S. Geological Survey, 2002).

The terms “**recommend**,” “**recommended**,” and “**recommendation**” indicate that, on the basis of research or consensus, there are several acceptable alternatives to those procedures and equipment selections described in the NFM. Relevant technical memorandums and publications pertinent to such recommendations are cited in the NFM to the extent that such documents are available. Specific requirements, data-quality objectives, or other constraints of a project may affect the choice of recommended equipment or procedures. Selection from among the recommended alternatives should be based on referenced research and sound field judgment, and reasons for the selection must be documented. Departures from or modifications to the recommended procedures must be independently quality assured and documented per USGS Office of Water Quality Technical Memorandum 2002.13 (U.S. Geological Survey, 2002).

Transition to a New Series

Before 2017, NFM chapters were released in the USGS Techniques of Water-Resources Investigations (TWRI) series. Effective in 2018, new and revised NFM chapters are being released in the USGS Techniques and Methods series, which was established in 2003 to replace the TWRI series. The change in the series classification does not affect the content or format of the NFM.

Purpose and Scope

The NFM is written for USGS personnel who collect water-quality data in order to (1) establish and communicate scientifically sound methods and procedures, (2) provide methods that minimize data bias and result in data that are reproducible within defined limits of variability, (3) encourage consistent use of field methods for the purpose of producing nationally comparable data, and (4) provide citable documentation for USGS water-quality data-collection protocols. The purpose of the NFM is to provide consistent, accurate, and quality-assured procedures for the collection of water-quality data. The procedures presented in the NFM also are relevant to any organization or researcher collecting water-resources data.

The NFM is section A of book 9 in the USGS Techniques and Methods series and consists of individual chapters and subchapters, numbered A0 (this introductory chapter), A1 through A8, and A10. Chapter A9, “Safety in Field Activities,” has been superseded by the USGS handbook on “Safety and Health for Field Operations” (U.S. Geological Survey, 2014) and no longer appears in the NFM series.

In chapters and subchapters, sections of the NFM are referred to by the abbreviation “NFM” followed by the chapter or subchapter and section number. For example, “NFM A1 section 1.2” refers to section 1.2 in chapter A1 of the NFM, which is section A of book 9, “Handbooks for Water-Resources Investigations” in the TWRI series (prior to 2017) and the Techniques and Methods series (beginning in 2018).

Chapters of the “National Field Manual for the Collection of Water-Quality Data”

The authoritative current versions of chapters of the NFM are published in the USGS Publications Warehouse, which can be searched at <https://pubs.er.usgs.gov>. The chapters are also served on the USGS NFM home page at <https://water.usgs.gov/owq/FieldManual/index.html>.

Topics for each chapter are listed below:

- A0—General Introduction for the “National Field Manual for the Collection of Water-Quality Data”
- A1—Preparations for Water Sampling
- A2—Selection of Equipment for Water Sampling
- A3—Cleaning of Equipment for Water Sampling
- A4—Collection of Water Samples
- A5—Processing of Water Samples
- A6—Field Measurements
 - A6.0—General Guidelines for Field-Measured Water-Quality Properties
 - A6.1—Temperature
 - A6.2—Dissolved Oxygen
 - A6.3—Specific Electrical Conductance
 - A6.4—pH
 - A6.5—Reduction/Oxidation Potential (Electrode Method)
 - A6.6—Alkalinity and Acid-Neutralizing Capacity
 - A6.7—Turbidity
 - A6.8—Use of Multiparameter Instruments for Routine Field Measurements
- A7—Biological Indicators
 - A7.0—Five-Day Biochemical Oxygen Demand
 - A7.1—Fecal Indicator Bacteria
 - A7.2—Fecal Indicator Viruses
 - A7.3—Protozoan Pathogens
 - A7.4—Algal Biomass Indicators
 - A7.5—Cyanobacteria in Lakes and Reservoirs: Toxin and Taste-and-Odor Sampling Guidelines
- A8—Bottom-Material Samples
- A9—[Superseded by the USGS handbook on “Safety and Health for Field Operations” (U.S. Geological Survey, 2014)]
- A10—Lakes and Reservoirs: Guidelines for Study Design and Sampling

Revision Process

The NFM has evolved as a dynamic document, whereby each chapter is reviewed regularly and revised periodically to update procedures, incorporate technical advances, and address additional emerging topics of relevance to water-quality field studies. The NFM home page provides access to the latest version of each chapter and has links to previous versions and a master file of comments and errata; see <https://water.usgs.gov/owq/FieldManual/index.html>. Chapters of the NFM are issued in electronic format only. Comments, questions, and suggestions related to the NFM should be addressed to nfm-owq@usgs.gov.

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References Cited

U.S. Geological Survey, 2002, Water-quality field methods/national field manual for the collection of water-quality data: U.S. Geological Survey Office of Water Quality Technical Memorandum 2002.13, accessed September 25, 2017, at <https://water.usgs.gov/admin/memo/QW/qw02.13.html>.

U.S. Geological Survey, 2014, Safety and health for field operations: U.S. Geological Survey Manual, handbook 445–3–H, 336 p., accessed September 25, 2017, at <https://www2.usgs.gov/usgs-manual/handbook/hb/445-3-h.pdf>.

