



Chapter A5. PROCESSING OF WATER SAMPLES

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ABSTRACT

The *National Field Manual for the Collection of Water-Quality Data (National Field Manual)* describes protocols and provides guidelines for U.S. Geological Survey (USGS) personnel who collect data used to assess the quality of the Nation's surface-water and ground-water resources. This chapter addresses methods to be used in processing water samples to be analyzed for inorganic and organic chemical substances, including the bottling of composite, pumped, and bailed samples and subsamples; sample filtration; solid-phase extraction for pesticide analyses; sample preservation; and sample handling and shipping.

Each chapter of the *National Field Manual* is published separately and revised periodically. Newly published and revised chapters will be announced on the USGS Home Page on the World Wide Web under "New Publications of the U.S. Geological Survey." The URL for this page is <<http://water.usgs.gov/lookup/get?newpubs>>.

INTRODUCTION

As part of its mission, the U.S. Geological Survey (USGS) collects the data needed to assess the quality of our Nation's water resources. The *National Field Manual for the Collection of Water-Quality Data (National Field Manual)* describes protocols (required and recommended procedures) and provides guidelines for USGS personnel who collect those data on surface-water and ground-water resources. Chapter A5 describes methods to be used in processing water samples to be analyzed for inorganic and organic chemical substances, including the bottling of composite,

pumped, and bailed samples and subsamples; sample filtration; solid-phase extraction; sample preservation; and sample handling and shipping. **Formal training and field apprenticeship are necessary in order to implement correctly the procedures described in this manual.**

The *National Field Manual* is Section A of Book 9 of the USGS publication series "Techniques of Water-Resources Investigations" (TWRI) and consists of individually published chapters designed to be used in conjunction with each other. A list of TWRI publications is included at the end of this report. Chapter numbers are preceded by an "A" to indicate that the report is part of the *National Field Manual*. Other chapters of the *National Field Manual* are referred to in the text by the abbreviation "NFM" and the specific chapter number (or chapter and section number). For example, NFM 6 refers to chapter A6 on "Field Measurements" and NFM 6.4 refers to the section in Chapter A6 on field measurement of pH.

The procedures described in this chapter represent protocols that are applicable to most USGS studies involving the collection of water-quality data. Modification of required and recommended procedures to fulfill study objectives or to enhance data quality must be documented and published along with the data and data interpretation.

PURPOSE AND SCOPE

The *National Field Manual* is targeted specifically toward field personnel in order to (1) establish and communicate scientifically sound methods and procedures, (2) encourage consistency in the use of field methods for the purpose of producing nationally comparable data, (3) provide methods that minimize data bias and, when properly applied, result in data that are reproducible within acceptable limits of variability, and (4) provide citable documentation for USGS water-quality data-collection protocols.

The purpose of this chapter on processing water samples is to provide field personnel and other interested parties with a description of the required and recommended procedures routinely used in USGS studies to composite, subsample, filter, preserve, and ship surface-water and ground-water samples to the USGS National Water Quality Laboratory (NWQL) for analysis. The sample processing procedures presented can be applied to the majority of samples that are analyzed routinely by NWQL for inorganic constituents and organic compounds. Samples that require special analysis or samples that are to be sent to other laboratories for analysis might require different processing procedures, the protocols for which are beyond the scope of this chapter.

REQUIREMENTS AND RECOMMENDATIONS

As used in the *National Field Manual*, the terms **required** and **recommended** have USGS-specific meanings.

Required (require, required, or requirements) pertains to USGS protocols and indicates that USGS Office of Water Quality policy has been established on the basis of research and (or) consensus of the technical staff and have been reviewed by water-quality specialists and selected District¹ or other professional personnel, as appropriate. Technical memorandums or other internal documents that define the policy pertinent to such requirements are referenced in this chapter. Personnel are instructed to use required equipment or procedures as described herein. Departure from or modifications to the stipulated requirements that might be necessary to accomplishing specific data-quality requirements² or study objectives must be based on referenced research and good field judgment, and be quality assured and documented.

¹District refers to an office of the USGS, Water Resources Division, located in any of the States or territories of the United States.

²As used in this report, data-quality requirements are that subset of data-quality objectives pertaining to the analytical detection level for concentrations of target analytes and the allowable variability that fulfill study objectives.

Recommended (recommend, recommended, recommendation) pertains to USGS protocols and indicates that USGS Office of Water Quality policy recognizes that one or several alternatives to a given equipment selection or procedure are acceptable on the basis of research and (or) consensus. Specific data-quality requirements, study objectives, or other constraints might affect the choice of recommended equipment or procedures. Selection from among the recommended alternatives must be based on referenced research and good field judgment. Reasons for the selection should be documented. Departure from or modifications to recommended procedures must be quality assured and documented.

FIELD MANUAL REVIEW AND REVISION

Chapters of the *National Field Manual* will be reviewed, revised, and reissued periodically to correct any errors, incorporate technical advances, and address additional topics. Comments or corrections can be sent to NFM-QW, USGS, 412 National Center, Reston, VA 20192 (or direct electronic mail to nfm-owq@usgs.gov). Information regarding the status and any errata of this or other chapters can be found at the beginning of the electronic version of each chapter, located in the Publications section of the following Web site: <http://water.usgs.gov/lookup/get?owq>.

Newly published and revised chapters will be announced on the USGS Home Page on the World Wide Web under "New Publications of the U.S. Geological Survey," at <http://water.usgs.gov/lookup/get?newpubs>.

ACKNOWLEDGMENTS

The information included in this chapter of the *National Field Manual* is based on existing manuals, various reference documents, and a broad spectrum of colleague expertise. In addition to the references provided, important source materials include USGS handbooks, manuals, and technical memorandums. The editors and authors wish to acknowledge the following individuals in the USGS who developed the field and training manuals that provided the foundation for information on the collection and processing of water samples: M.E. Dorsey, T.K. Edwards, W.B. Garrett, W.J. Gibbons, R.T. Kirkland, L.R. Kister, J.R. Knapton, C.E. Lamb, R.F. Middelburg, J. Rawson, L.R. Shelton, M.A. Sylvester, and F.C. Wells.

The technical content of this report was enhanced by expertise from H.D. Ardourel, B.A. Bernard, R.W. Brenton, A.D. Bumgartner, M.R. Burkhardt, R.W. Carmody, B.F. Connor, T.B. Coplen, II, K.K. Fitzgerald, D.S. Francy, J.R. Garbarino, S.R. Glodt, J.A. Kammer, V.J. Kelly, J.W. LaBaugh, S.L. Lane, W.D. Lanier, A.H. Mullin, C.J. Patton, L.N. Plummer, D.L. Rose, S.K. Sando, M.P. Schroeder, C.A. Silcox, A.H. Welch, W.R. White, and D.S. Wydoski. Valuable editorial assistance was provided by I.M. Collies, C.M. Eberle, B.B. Palcsak, and Chester Zenone. Production assistance from C.T. Mendelsohn, A.M. Weaver, and L.E. Menoyo was instrumental in maintaining the quality of this report.

The editors and authors wish to pay tribute to R.W. Lee and S.W. McKenzie, who provided final technical review, and who contributed significantly to the accuracy, quality, and usability of this report. Special thanks go to T.L. Miller, whose encouragement and faith in this project was instrumental to its achievement, and to D.A. Rickert and J.R. Ward for providing the support needed to produce a national field manual for water-quality studies.