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Quality Assurance in Environmental Monitoring

Sampling and Sample Preatreatment

Edited by Philippe Quevauviller



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PREFACE

This book treats different aspects of quality assurance (QA) and quality control (QC) for environmental monitoring, with particular emphasis on sampling and sample pretreatment.

QA and QC for environmental monitoring are major features of the 90s as illustrated by the multiplication of QA guidelines, norms, accreditation systems and the number of books which have recently been published on this topic. QA is a crucial aspect of achieving accurate results in chemical analysis. In the case of environmental analysis, it is increasingly recognized that the major risks of error in environmental monitoring do not occur in the laboratory but rather during operations performed in the field (sampling) or prior to the analysis (sampling, storage, and sample pre-treatment). This book focuses on aspects of QA related to the sample collection, storage and pre-treatment of various environmental matrices (water, sediment, soil and plant) for different contaminants (trace elements, nutrients, organic compounds).

The number of analyses performed every year to monitor the quality of the environment is constantly increasing. The data produced are used to evaluate contamination trends ("trend monitoring") and to verify that the quality requirements of EC directives are respected. The results may also be used for modeling and research activities (e.g. studies of biogeochemical pathways). Accurate measurements are the basis of monitoring activities. A lack of quality means that the results are not comparable from one laboratory to another and, hence, the above mentioned purposes cannot be achieved. Consequently, measures to evaluate and guarantee the quality of a laboratory's performance were established, involving quality assurance rules and guidelines, accreditation systems and the production and use of certified reference materials. This resulted in a considerable improvement in the quality of environmental analysis at the laboratory level. However, these rules are hardly applicable to all the operations carried out before the laboratory work, i.e. sampling, sample pre-treatment (e.g. drying, stabilization, grinding etc.) which, however, represent the core of the monitoring data. It is clear that a lack of QA in field work renders the analytical data meaningless. The aim of this book is to discuss the precautions necessary to ensure good quality assurance from sampling to sample pre-treatment, based on the experience. Typical sources of pitfalls and recommendation on how to avoid these are discussed with special emphasis on the monitoring of inorganic and organic contaminants in environmental matrices.

The book is organized into ten chapters covering various aspects of environmental monitoring. The first chapter gives an overview of QA and QC principles as applied to environmental monitoring, along with regulatory aspects. The second chapter deals with sampling strategies in environmental monitoring of biological specimens. QA and QC for surface water sampling are detailed in the third chapter, and are developed with respect to

nutrients in sea water in the fourth chapter. QA of sampling of sediment, particularly of marine origin, is dealt with in the fifth chapter, and a focus is given in the sixth chapter on organic compounds in various marine matrices, including sea water, sediments and biota. The seventh chapter describes QA of sampling and pretreatment for the monitoring of trace metals in soils, whereas these aspects (also in relation to trace metal determinations) are focusing on aquatic biota in the eighth chapter. QA of biomonitoring (sampling and storage of plant materials) is described in the ninth chapter. Finally, the tenth chapter proposes a holistic structure for quality management, with particular emphasis on marine environmental monitoring.

This book has been written by experienced practitioners. By its nature, it aims to serve as a practical reference for environmental chemists (and postgraduate students) who need a wide overview of sampling, storage and pretreatment techniques, along with the precautions to be undertaken to ensure good QC of the data produced in the frame of environmental monitoring studies. The critical discussions of the methods, and of the risks of errors that may occur prior to the laboratory work, makes it unique in this respect.

The editor gratefully acknowledges the authors for their time and motivation in preparing their contributions, without which this volume would not have been possible.

Brussels
July 1995

Ph. Quevauviller

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