

Quality Assurance for Environmental Measurements

Taylor/Stanley
editors

STP 867



QUALITY ASSURANCE FOR ENVIRONMENTAL MEASUREMENTS

A symposium
sponsored by
ASTM Committee D-19
on Water and Committee D-22 on
Sampling and Analysis of
Atmospheres
Boulder, Colo., 8–12 Aug. 1983

ASTM SPECIAL TECHNICAL PUBLICATION 867
J. K. Taylor, National Bureau of Standards,
and T. W. Stanley, Environmental Protection
Agency, editors

ASTM Publication Code Number (PCN)
04-867000-16



1916 Race Street, Philadelphia, Pa. 19103

Library of Congress Cataloging in Publication Data

Quality assurance for environmental measurements.

(ASTM special technical publication; 867)

Proceedings of the Conference on Quality Assurance for Environmental Measurements, held Aug. 8–12, 1983, Boulder, Colo.

Includes bibliographies and index.

“ASTM publication code number (PCN) 04-867000-16.”

1. Pollution—United States—Measurement—Congresses.
2. Quality assurance—Congresses. I. Taylor, John K. (John Keenan), 1912– . II. Stanley, T. W. (Thomas W.)
- III. American Society for Testing and Materials. Committee D-19 on Water. IV. ASTM Committee D-22 on Sampling and Analysis of Atmospheres. V. Conference on Quality Assurance for Environmental Measurements 1983: Boulder, Colo. VI. Series.

TD193.Q35 1985 628.5'028'7 85-6074

ISBN 0-8031-0224-0

Copyright © by AMERICAN SOCIETY FOR TESTING AND MATERIALS 1985
Library of Congress Catalog Card Number: 85-6074

NOTE

The Society is not responsible, as a body,
for the statements and opinions
advanced in this publication.

Printed in Baltimore, Md.

June 1985

Second Printing, October 1987

Third Printing, Philadelphia, PA

January 1994

Foreword

The Conference on Quality Assurance for Environmental Measurements was held in Boulder, Colorado, on 8–12 August 1983. The conference was sponsored by ASTM Committee D-19 on Water and Committee D-22 on Sampling and Analysis of Atmospheres. The Environmental Protection Agency and the National Bureau of Standards were co-sponsors.

J. K. Taylor, National Bureau of Standards, and T. W. Stanley, Environmental Protection Agency, served as symposium chairmen and have edited this publication.

Related ASTM Publications

Statistics in the Environmental Sciences, STP 845 (1984), 04-845000-16

Sampling and Analysis of Rain, STP 823 (1984), 04-823000-17

Toxic Materials in Atmosphere: Sampling and Analysis, STP 786 (1982),
04-786000-17

Air Quality Meteorology and Atmospheric Ozone, STP 653 (1978),
04-653000-17

Definitions for Asbestos and Other Health-Related Silicates, STP 834 (1984),
04-834000-17

A Note of Appreciation to Reviewers

The quality of the papers that appear in this publication reflects not only the obvious efforts of the authors but also the unheralded, though essential, work of the reviewers. On behalf of ASTM we acknowledge with appreciation their dedication to high professional standards and their sacrifice of time and effort.

ASTM Committee on Publications

ASTM Editorial Staff

Janet R. Schroeder
Kathleen A. Greene
Helen M. Hoersch
Helen P. Mahy
Allan S. Kleinberg
Susan L. Gebremedhin
David D. Jones

Contents

Introduction	1
---------------------	----------

GENERAL TOPICS

What is Quality Assurance?—J. K. TAYLOR	5
--	----------

The U.S. Environmental Protection Agency's Quality Assurance Program—T. W. STANLEY AND S. S. VERNER	12
--	-----------

DATA QUALITY ASSESSMENT

Statistical Aspects of Designs for Studying Sources of Contamination—W. S. LIGGETT	22
---	-----------

Determination of Measurement Data Quality and Establishment of Achievable Goals for Environmental Measurements— W. J. MITCHELL, F. F. MCELROY, AND R. C. RHODES	41
--	-----------

Quality Assurance Project Plans: A Key to Effective Cooperative Monitoring Programs—M. W. BROSSMAN, T. J. HOOGHEEM, AND R. C. SPLINTER	53
---	-----------

AMBIENT AIR MEASUREMENTS

Quality Assurance Aspects of Environmental (Aerometric) Data Management—R. C. BEEBE, A. S. MCDANIEL, AND D. W. CLEMENT	65
---	-----------

An Evaluation of Results from Collocated Ambient High-Volume Samplers—T. W. FRITTS AND M. R. HANSON	76
--	-----------

Internal Consistency Checks as Part of a Data Validation Process for Chemical Constituents in Ambient Particulate Samples— S. H. CADLE	89
---	-----------

AMBIENT WATER MEASUREMENTS

Certification of Local Laboratories Analyzing Drinking Water in Nonprimacy States—J. J. HILLMAN	103
--	------------

Quality Assurance of U.S. Geological Survey Water-Quality Field Measurements—D. E. ERDMANN AND J. D. THOMAS	110
An Analytical Method and Quality Control Program for Studies of Currently Used Pesticides in Surface Waters—J. W. KRAMER AND D. B. BAKER	116
Quality Assurance for Microbiological Analyses of Water—R. H. BORDNER	133

SOURCE MEASUREMENTS

Steps to Valid Particle Size Data from Emissions Sources—J. D. MCCAIN, L. G. FELIX, AND W. E. FARTHING	147
Quality Assurance Practices for the Collaborative Testing of Method 6B—F. E. BUTLER, J. E. KNOLL, M. R. MIDGETT, AND T. WAGNER	160
An Industry View of Quality Assurance for Manual Source Sampling—V. J. BRISINI	169
Establishing Destruction Efficiency for Hazardous Waste Incinerators—B. N. COLBY AND J. E. PICKER	173

DISCHARGE MONITORING

Overview of the National Discharge Monitoring Report (DMR) Quality Assurance (QA) Program—G. R. POLVI, Y. S. TO, AND E. C. LIM	189
Quality Assurance as an Element of Wisconsin's NPDES Program—M. J. KOPECKY AND L. VOGEN	200
Development of Statistics and Limits for DMR-QA Studies, and Summary of Experience in DMR-QA Study 2—P. W. BRITTON	206
Pulp and Paper Industry Experience with NPDES Quality Assurance Requirements—R. P. FISHER	216
Monsanto Analytical Testing Program for NPDES Discharge Self-Monitoring—T. J. HOOGHHEEM AND L. A. WOODS	237

Discharge Monitoring Report Quality Assurance Results and Follow-Up by Region VIII U.S. Environmental Protection Agency—C. L. CAMPBELL AND J. J. HILLMAN	242
---	-----

SPECIAL TOPICS

Quality Assurance of Meteorological Measurements—T. J. LOCKHART	253
Quality Assurance Considerations in Conducting the Ames Test—L. R. WILLIAMS	260
Quality Assurance in Acid Precipitation Measurements—S. CAMPBELL AND H. SCOTT	272
Quality Assurance for Personal Exposure Monitoring—R. W. HANDY, H. L. CRIST, AND T. W. STANLEY	284
Quality Assurance for Human Exposure Studies—L. T. HACKWORTH, R. C. JORDAN, D. H. SMITH, AND J. N. HOWARD	297
New Biological Reference Materials—<i>In Vivo</i> Incorporated Toxic Metals in Water Hyacinth Tissues—J. R. AUSTIN, S. J. SIMON, L. R. WILLIAMS, AND W. F. BECKERT	305

REFERENCE MATERIALS

The Use of Natural Waters as U.S. Geological Survey Reference Samples—V. J. JANZER	319
The Marine Analytical Chemistry Standards Program of the National Research Council of Canada—S. S. BERMAN, J. W. McLAREN, AND W. D. JAMIESON	334
The Role of NBS Standard Reference Materials in Quality Assurance of Environmental Measurements—R. ALVAREZ	346
Reference Materials and Intercomparison Samples Available from the Environmental Monitoring Systems Laboratory – Las Vegas—E. J. KANTOR AND P. R. LASKA	360
Development and Distribution of Reference Materials for Ambient Air Measurements—W. J. MITCHELL AND J. C. PUZAK	370

Reference Samples for Water-Related Programs in the U.S. Environmental Protection Agency—J. A. WINTER	378
--	------------

QUALITY ASSURANCE MANAGEMENT

Establishing an Environmental Quality Assurance Program— L. M. EGGENBERGER	391
---	------------

Interlaboratory Quality Assurance Aspects of the International Joint Commission's Great Lakes Monitoring Programs— K. I. ASPILA, R. E. WHITE, AND J. L. CLARK	407
--	------------

SUMMARY

Summary	425
----------------	------------

Author Index	435
---------------------	------------

Subject Index	437
----------------------	------------

