A. Robertson

QUALITY ASSURANCE PROGRAM FOR MARINE ENVIRONMENTAL QUALITY MEASUREMENTS

PROGRAM DESCRIPTION
FY 1985

February 1985

OCEAN ASSESSMENTS DIVISION
OFFICE OF OCEANOGRAPHY AND MARINE ASSESSMENT
NATIONAL OCEAN SERVICE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

QUALITY ASSURANCE PROGRAM FOR MARINE ENVIRONMENTAL QUALITY MEASUREMENTS

INTRODUCTION

The National Oceanic and Atmospheric Administration (NOAA) sponsors research and monitoring activities that deal with the environmental quality of estuarine and marine environments and of the Great Lakes.

Many of these activities collect data for the purpose of: (1) detecting changes in environmental quality which may adversely affect human health or marine resources; or (2) improving understanding relationships between human activities and environmental processes. These data are used for environmental quality and natural resource assessments and their interpretations often influence management decisions.

It is important, that an objective mechanism exit for determining the degree of confidence associated with these data. During FY 83, the Administrator instructed NOAA organizational units that make marine environmental quality measurements to design and implement a coordinated Quality Assurance (QA) Program that will allow an objective evaluation of the confidence level associated with environmental quality data and will enhance comparability among data sets. The QA Program receives guidance from a Steering Committee composed of senior NOAA officials and is implemented by the NOAA QA Coordination Office which is located within the Ocean Assessments Division of the National Ocean Service.

INITIAL ACTIVITIES

Five types of marine environmental measurements were initially evaluated for QA protocols (Table 1). All NOAA-supported scientists working in these fields were asked to submit to the QA Program a written description of their methods and quality assurance practices for environmental sample collection, transportation, storage, in-lab processing, analysis and data reduction. To insure consistency in these responses, an outline of the information requested was distributed to participating scientists.

Small working groups of technical specialists were brought together to review this information and to recommend actions NOAA might take to improve the QA aspects of the studies it sponsors. The chairmen of these working groups are listed in Table 2. The working groups prepared written critiques of existing QA practices within NOAA and submitted recommendations for specific actions to correct deficiencies in current QA practices and to provide a continuing mechanism for evaluating the confidence level associated with environmental

Table 1. Measurement Types

- Toxic Organic Chemicals (including extractable organics, e.g. polynuclear aromatic hydrocarbons, and polychlorinated biphenyls, and volatile organic compounds, e.g., benzene and dry cleaning solvents)
- Toxic Trace Metals
- Inorganic Nutrients (e.g., nitrate, nitrite, and phosphate)
- Human Pathogens (e.g., viruses, protozoa, and bacteria)
- Biological Rate Measurements (e.g., determinations of ^{14}C uptake)

Table 2. Chairmen of the Quality Assurance Workshops

Toxic Organic Chemicals:
Dr. William D. MacLeod
National Marine Fisheries Service
National Analytical Facility
Seattle, WA

Toxic Trace Metals:
Dr. Peter Hanson
National Marine Fisheries Service
Beaufort Laboratory
Beaufort, NC

Inorganic Nutrients:
Dr. Wayne Gardner
Office of Oceanic and Atmospheric Research
Great Lakes Environmental Research Laboratory
Ann Arbor, MI

Human Pathogens:
Dr. Melvin Eklund
National Marine Fisheries Service
Utilization Research Division
Seattle, WA

Biological Rate Measurements:
Dr. James Thomas
National Marine Fisheries Service
Sandy Hook Laboratory
Highlands, NJ

data (Eklund, 1984; Gardner, 1984; Hanson, 1984; MacLeod, 1984; Thomas, 1984).

NEWSLETTER

The QA program publishes a newsletter that currently is distributed to a mailing list of over 700 individuals. This newsletter has a flexible format and informal style.

Its function is: to announce intercomparison exercises and summarize their results; to announce meetings, available reports, and available reference materials; to summarize improvements in sample collection and analysis protocols; and to serve as a forum for contributed comments on quality assurance. The newsletter also includes information about the NOAA National Status and Trends Program, a long-term monitoring program, that incorporates the latest methods from the Quality Assurance Program.

PEER REVIEW

The critiques and proposals of the five working groups were reviewed by a Peer Review Group composed of non-NOAA scientists (Table 3). The Peer Review Group made the following recommendations to the NOAA Administrator:

1) Define the QA program organization and develop an implementation plan;

2) Require a QA plan as part of all internal and external programs that involve new field measurements of environmental quality;

3) Require QA audits of all laboratories making the measurements;

4) Require reports of measured data to include a separate QA section;

5) Conduct education and training activities;

6) Appoint a QA officer in each laboratory;

7) Establish technical committees for key types of measurements; and

8) Conduct regular peer review of NOAA's QA activities.

The preceding recommendations were made in the context of NOAA-wide measurement programs, including atmospheric, living resource, and oceanographic measurements. The QA Steering Committee felt that the Peer Review Group recommendations were too ambitious for immediate implementation on the scale proposed and agreed instead to a scaled-down QA

Table 3. Members of the Quality Assurance Program Peer Review Group Convened in June 1984

Mr. Martin Brossman	Environmental Protection Agency Office of Water Regulations and Standards
Dr. Rita Colwell	University of Maryland Department of Microbiology
Dr. Ronald Hites	Indiana University School of Public and Environmental Affairs
Dr. William Horwitz	Food and Drug Administration Bureau of Foods
Dr. Larry Keith	Radian Corporation
Dr. Larry Pomeroy	University of Georgia Institute of Ecology
Dr. John Taylor	National Bureau of Standards Center for Analytical Chemistry
Dr. Graham Topping	Department of Agriculture and Fisheries for Scotland, Marine Laboratory
Dr. Jack Uthe	Halifax Fisheries Laboratory Canadian Fisheries and Oceans

Program that could be implemented in early 1985, and that could grow as greater needs became apparent. The Steering Committee further agreed that an effective QA effort is most necessary for environmental quality monitoring and assessment programs, such as the National Status and Trends (S&T) Program conducted by the Ocean Assessments Division of the National Ocean Service. NOAA then decided that the initial objectives of the QA Program will be to document and improve the quality of data collected in association with the S&T Program and thereby set a standard for QA in other NOAA-sponsored measurement programs.

FUTURE ACTIVITIES

Leadership of the NOAA QA Program will continue to reside in the National Ocean Service, Office of Oceanography and Marine Assessment, Ocean Assessments Division, Coastal and Estuarine Assessment Branch. The QA Program will be administered as an integral part of the S&T Program and will focus on the following types of measurements:

- toxic organic chemicals in sediments, tissues, and the water column;
- toxic trace metals in sediments, tissues, and the water column;
- water quality parameters (e.g., chlorophyll, inorganic nutrients, and dissolved oxygen in the water column); and
- visible and histological pathologies in marine fishes, shellfish, and crustacea.

As recommended by the Peer Review Group, the QA Program will continue three activities that have proven especially valuable:

- publication of a quarterly newsletter (included now as part of the newly established newsletter for the S&T Program);
- formation of a technical working group for each of the types of measurements described above, conduct of at least one meeting annually of each working group, and preparation of appropriate guidelines or manuals by members of the working groups; and
- preparation of appropriate reference materials and conduct of interlaboratory comparison exercises for each measurement type.

All laboratories participating in the S&T Program will be required to adhere to requirements, guidelines, and procedures defined by the NOAA QA Program. Laboratories supported by other NOAA programs that conduct field measurements of the type described above also will be required to adhere to the QA Program. Each NOAA Line Office will identify these laboratories and take the necessary steps to bring them into compliance with the QA Program.

Laboratories not sponsored by NOAA may request to participate in the QA Program. Such requests will be honored whenever possible.

NOAA's QA efforts will be coordinated and, where appropriate, integrated with those of other Federal agencies and international organizations. Working relationships have been established with the National Bureau of Standards, the National Science Foundation, the Environmental Protection Agency, and the Minerals Management Service regarding joint conduct of QA activities. Internationally, the National Research Council of Canada, the National Swedish Environment Protection Board, and the appropriate committees or groups within the International Council for the Exploration of the Sea (ICES) and the Intergovernmental Oceanographic Commission (IOC) are now interacting with NOAA on QA activities. These ties will be strengthened as NOAA continues to develop its QA efforts.

The QA Peer Review Group will be reconvened in about one year to review progress and provide additional guidance. Composition of the group will be unchanged so that a consistent, accurate assessment can be made of NOAA's progress in implementing their recommendations.

REFERENCES

Eklund, M. (Chairman). 1984. Summary of Technical Working Group on Human Pathogens. January 1984.

Gardner, W. S. (Chairman). 1984. Methodology and Quality Assurance for Nutrient Measurements by NOAA: Current Status and Recommendations for the Future. A Report Resulting From a Technical Working Group Meeting in Miami, Florida, December 8–9, 1983.

Hanson, P. (Chairman). 1984. NOAA Trace Metals Workshop on Quality Assurance for Marine Environmental Measurements. Report of the Trace Metals Working Group. November 30 – December 2, 1983.

MacLeod, W. D. (Chairman). 1984. Report to the Quality Assurance Program for Marine Environmental Measurements by the Working Group for Toxic Organic Chemicals. January 1984.

Thomas, J. (Chairman). 1983. Biological Rate Measurements Working Group Reports to the NOAA Quality Assurance Program. 5–7 December, 1983.

For additional copies of this report or further information, contact

Coordinator, NOAA Quality Assurance Program
NOAA, Mail Code N/OMA32
Rockville, MD 20852

(301) 443–8698