PREPARING QUALITY ASSURANCE PROJECT PLANS (QAPPs)

FOR STREAM TEAMS AND VOLUNTEER MONITORING PROJECTS

April 28, 2000

Kansas Department of Health and Environment
Bureau of Water
Nonpoint Source Section

Approvals:

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Quality Assurance Officer, Nonpoint Source Section	Date
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Chief, Nonpoint Source Section	Date
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Director, Bureau of Water	Date
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PURPOSE

The purpose of this document is to provide generalized guidance to stream teams and volunteer monitoring projects for preparation of Quality Assurance Project Plans (QAPPs). This document is intended define the purpose/contents of a QAPP and provide a detailed description of required QAPP elements.

DEFINITION

A QAPP is a written document that outlines the procedures a monitoring project will use to ensure that samples, data, and subsequent reports are of high enough quality to meet project objectives. The EPA requires all EPA funded monitoring programs have an approved QAPP before sampling begins. EPA funding administered through the Kansas Department of Health and Environment (KDHE), Bureau of Water, Nonpoint Source Section, is subject to this requirement. This funding includes Section 319 Grants, Stream Steward Mini-grants, and Clean Water Neighbor Mini-grants. To ensure that project objectives are met, even non-EPA funded projects should develop a QAPP. This is especially true if the project data is intended for inclusion in any State or Federal database.

What does a QAPP do?

The QAPP should address some basic Quality Assurance/Quality Control (QA/QC) elements including: precision; accuracy; representativeness; completeness; and comparability. By reading the QAPP, any project member or interested party should be able to answer the following questions about the monitoring project:

- Who are involved in the project and what do they do?
- Why is the sampling needed?
- What are the proposed sampling activities?
- Are there any special training requirements or safety issues?
- Where will the samples be collected and why?
- Are the samples representative of actual site conditions?
- Exactly how will the samples be collected, transported, and analyzed?
- How will the data be validated and stored?
- What will be data be used for?
- Will the data be used for decision making, or will the data be used for education only?
- How will the data be reported and who is the target audience?

By developing a QAPP and answering the above questions, monitoring projects will avoid collecting “useless” data that does not represent actual site conditions or does not meet project objectives.

QAPP ELEMENTS

According to the EPA, there are 24 distinct elements which can be included in a QAPP. The following is a summary and interpretation of each of the 24 elements listed in the EPA’s *The Volunteer Monitor’s Guide To Quality Assurance Project Plans, EPA 841-B-96-003, September 1996.*.

Title and Approval Page

All QAPPs should have a title and approval page. This page should include the title of the project, sponsoring group, funding sources (if applicable), and date. This page should also include signature blanks for all applicable reviewers.

Table of Contents

Depending on the size and content of the QAPP, a table of contents may be desired. The table of contents should include section headings, page numbers, figures, and attachments.

Distribution List

The distribution list should include the names and contact information for all groups or individuals who receive the QAPP and subsequent revisions.

Project/Task Organization

This element should include the names, duties, and responsibilities of all parties and/or groups involved in the monitoring project. This should also include the eventual data users (i.e. the city council, school board, county commission, etc.).

Problem Definition/Background

This element should state the problem that the monitoring project is trying to solve and should answer the questions: "Why is monitoring needed?" and "What decisions will be made based on our data?" This should include background information including previous studies. While writing this section of the QAPP, a monitoring group may realize that there is enough existing data to meet their project objectives. A review of existing data may include a search of EPA's STORET database, which includes data collected by KDHE's Bureau of Environmental Field Services. Also, local Universities, high school stream teams, and other volunteer monitoring groups should be contacted to verify if previous sampling data exits.

This element should also answer the questions "What will be data be used for?" and "Who is the target audience?" By answering these questions in the QAPP, a monitoring project team can avoid generating piles of data that nobody uses. It is important to note that if a project's objective is to provide data for decision making or monetary expenditures, more extensive quality control may be required. Conversely, if the project is intended to generate data for educational purposes only, a lesser degree of quality control may be adequate.

Project/Task Description

This element should include a general description of what sampling activities will occur and where they will take place. This should only be an overview of proposed sampling activities. A more detailed description of sampling activities and methods should be included in later portions of the QAPP.

Data Quality Objectives For Measurement Data

This element should describe how good your data has to be to meet project objectives. This may include a description of the basic QA/QC concepts (precision, accuracy, representativeness, completeness, and comparability) and describe the quantitative goals for data quality objectives (DQOs).

- **Precision** is the degree of agreement among repeated measurements of the same characteristic. Precision is usually measured by calculating the standard deviation between duplicate samples collected in the same place at the same time. A DQO for precision may state that "the standard deviation among duplicate samples shall not exceed + or - 10%."

- **Accuracy** measures how close your results are to a true or expected value. Accuracy is usually measured in the laboratory by analyzing a sample "spiked" with a known concentration. This is used to judge how accurate the laboratory method is for detecting a specific contaminant or parameter. A DQO for accuracy may state that the analytical measurement for spiked samples must be at least 80% of the known concentration.

- **Representativeness** is the extent to which measurements actually represent the true environmental condition or population at the time of sample collection. This should answer the question "Are the samples representative of actual site conditions?" The location and number of samples collected have the greatest affect on a monitoring project's representativeness. For example: one water sample collected in a lake near a pipe discharge point may not be

representative of the water quality of the entire lake.

- **Completeness** is the difference between the planned or proposed amount of samples and/or data and the actual amount collected. A DQO for completeness may state that "90% of the proposed samples must be collected to meet project objectives."

- **Comparability** is the extent to which data can be compared between sample locations or periods of time within the project, or between projects. To ensure project comparability, standardized sampling methods, analytical methods, units of reporting, and site selection should be used. This will ensure that data from one phase of the project can be directly compared to another phase.

Training Requirements/Certification

This element should describe what training or certification is required for a project member to be able to complete a given task. For example: a sampling technician may be required to attend a training class on the operation of an automated sampling system; or a laboratory must be certified to analyze samples for a given parameter or contaminant. This should also include a description of who is going to provide the training and when.

Documentation and Records

This element should describe how field and laboratory information is recorded. This may include the use of standardized data recording forms. A copy of all standardized forms should be attached to the QAPP for reference and replication. If field log books are to be used, a standardized format for data entry should be developed to avoid the omission of important data and transcription errors.

Sampling Methods Requirements

This element should answer the questions, "Where will the samples be collected and why?" and "Exactly how will the samples be collected and analyzed?" This element should include proposed sample types (i.e. grab, composite, etc.), sample location selection rationale, equipment and containers used, labeling requirements, analytical requirements, sample preservation, and holding times. Much of this information may already exist as Standard Operating Procedures or "SOPs". There are many generic SOPs that can be obtained from local, State, or Federal monitoring programs that may be referenced and attached to the QAPP. This element of the QAPP may simply state that "sampling methods are included as Attachment X." SOPs for stream chemistry monitoring, biological monitoring, and lake monitoring are available from KDHE's Nonpoint Source Section upon request.

Sample Handling and Custody Requirements

This element pertains to projects that require samples to be transported from the field to a laboratory or offsite facility for storage, analysis, or identification. This element should describe sample labeling, storage, preservation, holding times, chain-of-custody requirements, shipping, and sample disposal. Sample labeling should (at a minimum) include: sample identification name or number; date of collection; analytical parameters; and sampler name.

Analytical Methods Requirements

This element should discuss all analytical methods and equipment needed for analysis of each parameter, either in the field or laboratory. Existing SOPs for the operation and use of field test kits or sampling equipment should be referenced and attached to the QAPP. If the samples are to be shipped to a formal laboratory for confirmatory analysis, the proposed analytical method should be listed for each parameter of concern.

Quality Control Requirements

This element should discuss the number and types of quality control samples (i.e. field duplicates, temperature

blanks, spiked samples, etc.) to be collected in the field and the laboratory. Biological monitoring programs should also discuss applicable quality control checks including: reference collections; replicate sample collection; and cross checks by other team members and/or professional biologists..

Instrument/Equipment Testing, Inspection, and Maintenance Requirements

This element should discuss all field and laboratory equipment to be used and maintenance requirements. This should also include equipment manufacturer contact information for maintenance and operation questions that may arise during the project.

Instrument Calibration and Frequency

This element should discuss how and when the field and laboratory equipment should be calibrated. This should also include a discussion of what kinds of standards will be used during equipment calibration. All existing equipment calibration SOPs should be referenced and attached to the QAPP.

Inspection and Acceptance Requirements For Supplies

This element should describe the procedure for inspection and acceptance requirements for all new and used supplies and equipment. Imperfections in sampling equipment or sample containers can allow samples to become lost or contaminated. Additionally, all new and used equipment should be cleaned to prevent cross-contamination of samples.

Data Acquisition Requirements

This element should discuss any types of data not obtained through the project's monitoring activities. This may include aerial photos, existing water quality data, reports from other monitoring groups, etc.

Data Management

This element should answer the question "How will the data be validated and stored?" This should include accuracy checks on data forms, database entry requirements/computer storage, and storage of hard copies.

Assessments and Response Actions

This element should discuss any planned performance evaluations for laboratory and field activities. This may include data quality audits for laboratories and field audits. This element should also include a discussion of the intended response actions if a problem is identified (i.e. more training, additional QA/QC requirements, etc.).

Reports

This element should answer the question, "How will the data be reported and who is the target audience?" This should include the proposed report content, distribution, and reporting frequency.

Data Review, Validation, and Verification Requirements

This element should include a brief discussion of who will review the data and make decisions regarding data quality.

Validation and Verification Methods

This element should include a discussion of the methods used to validate the data including: cross checking field data sheets with lab printouts; looking for data gaps; checking calculations; looking for outliers; etc.

Reconciliation With Data Quality Objectives

This element should include a discussion of how the precision, accuracy, completeness, representativeness, and comparability will be calculated or verified. This should also include a discussion of actions to be taken if data does not meet established DQOs.

TAILORING QAPP ELEMENTS TO SPECIFIC PROJECTS

It is important to note that not all QAPPs will contain the same elements. Some projects require a more or less extensive QAPP, depending on project objectives. For example: a project that is intended to gather biological monitoring data for public information and education would probably not require the same QAPP elements as a project that is gathering stream chemistry data for decision making or planning purposes. For simpler projects, a QAPP may be only a few pages in length; whereas a more detailed project may require a more lengthy QAPP with many attachments.

RESOURCES

Both EPA and KDHE have staff available to provide information on QA/QC concepts and QAPP generation. KDHE Nonpoint Source Section projects that require a QAPP should be submitted to Rob Beilfuss of the Nonpoint Source Section for routing and approval. Mr. Beilfuss can be reached at (785) 296-5535. EPA Region 7 quality assurance staff can be reached at (913) 551-7209. Copies of approved QAPPs and SOPs are available from EPA and KDHE upon request.

REFERENCE DOCUMENTS

The Volunteer Monitor's Guide to Quality Assurance Project Plans, U.S. EPA, Document Number: 841-B-96-003, September 1996.

EPA Requirements For Quality Assurance Project Plans For Environmental Data Operations (R-5), U.S. EPA, 1999.

Guidance For Quality Assurance Project Plans (G-5), U.S. EPA, 1999.