Quality Assurance Plan
for
Environmental Laboratory Analysis

Facility NAME
Quality Assurance Program

Date

Version 0

Quality Assurance Plan

TITLE: The title of the QAP must be distinguishing and describe the intent/purpose of the document.

Prepared By: Name of Agency/Organization developing QAP
Address
Phone/Email

Prepared For: Name of Agency/Organization
Address
Phone/Email

Date: date QAP is prepared

Revision Date: date QAP is revised – also update the 'revision history page'

Revision No.: consecutive number of QAP, starting with 0.0 as the initial document

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Quality Assurance Plan
For << Project Name >>

Signatures: An official QAP must include signatures of all relevant personnel. - insert additional reviewers or authors as necessary – examples may include laboratory personnel, data reviewers, etc.

Name / QAP Author, Organization	Date
Name / Project Manager/Supervisor, Organization	Date
Name / Project Quality Assurance Officer, Organization	Date
Name / Other, Organization Organization	Date
Name / Other, Organization Organization	Date

(Footer should reflect the document control information, as outlined in the footer below)

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Revision and Annual Review History

This page documents the annual review and the revisions over time to the QAP. The most recent iteration should be listed in the first row, with consecutive versions following. Signatures may be required for revised documents.

Date of Revision or Annual Review	Page(s)/Section(s) Revised	Revision Explanation

Table Of Contents

List of Tables

Table 2.
Quality Control Checks

QC Check	Information Provided
Blanks	
bottle blank	cleanliness of sample bottles
field blank	transport, storage and field handling bias
reagent blank	contaminated reagent
reinstate or equipment blank	contaminated equipment
method blank	response to a laboratory analytical system
Spikes	
matrix spike	analytical (preparation + analysis) bias
matrix spike replicate	analytical bias and precision
analysis matrix spike	instrument bias
surrogate spike	analytical bias
Calibration Check Samples	
zero check	calibration drift and memory effect
span check	calibration drift and memory effect
mid-range check	calibration drift and memory effect
Replicates, splits, etc.	
field collocated samples	sampling + measurement precision
field replicates	precision of all steps after acquisition
field splits	shipping + interlaboratory precision
laboratory splits	interlaboratory precision
laboratory replicates	analytical precision
analysis replicates	instrument precision

1. Introduction

The Quality Assurance Plan (QAP) establishes the planning, implementation, documentation and assessment of environmental analytical testing procedures. This document has been prepared in accordance with EPA's *Quality Standard for Environmental Data Collection, Production, and Use by External Organizations* (2106-S-02.0) **(1)**.

The scope of this QAP is State the Scope of this QAP. Methodologies utilized for analysis must be EPA approved (40 CFR 136) **(2)**. Quality control parameters specified in 40 CFR 136.7 are also addressed.

This document shall be used in conjunction with a standard operating procedure (SOP) which will provide specific method only information and criteria. This QAP and related SOP(s) must be used for all analysis of non-potable water for KPDES compliance sample analysis within the Commonwealth of Kentucky.

2. QAP Elements for the Collection of Data by Direct Measurement

2.1 Overview of QAP Elements for the Collection of Data by Direct Measurement

2.2 Project Management

2.2.1 Title, Version and Approval/Sign-Off

This QAP is reviewed annually and if substantive revisions to the document are made then the version number is updated. Substantive revisions are documented on the revision history page. The approval/signature page must be signed and dated with each updated version.

2.2.2 Document Format and Table of Contents

This QAP utilizes the format established by the Environmental Protection Agency (EPA) in the document titled Guidance on *Quality Assurance Project Plans*, CIO 2106-G-05 QAPP Final Draft 2012 **(3)**. The table of contents is located in the front of this document.

2.2.3 Distribution List

The distribution list contains the titles of key personnel who should receive a copy of the approved QAP in either a hard copy or electronic format, as well as any subsequent revisions. The list of key personnel is located in Section 2.2.4 of this document.

2.2.4 Project Organization and Schedule

The following key personnel are responsible for analysis of environmental samples as they pertain to this QAP. A brief description of their duties, or roles, is provided. Other duties may also apply or multiple duties assigned to an individual.

> Project Manager is the responsible official for this project overseeing overall project operations and budget, as well as tasking personnel with work required to complete this project. The project manager communicates project needs to all applicable personnel.
>
> Quality Assurance Manager is responsible for reviewing and approving the QA Plan. The QA Manager may provide technical input on analytical methodologies and data review. The QA Manager must ensure that the project quality objective (Data Quality Objectives) and measurement performance criteria are met. The QA Manager is responsible for ensuring that all field technicians receive any specific training requirements or certification.
>
> Technician(s) is responsible for all field related activities including the analysis of environmental samples, including but not limited to:

- Instrument care and daily maintenance, including corrective actions
- Instrument calibration in accordance with appropriate methods or manufacturer's instructions
- Analysis and proper documentation of applicable environmental samples
- Analysis and proper documentation of all applicable quality control samples
- Proper maintenance of log book(s)

Provide a concise organization chart indicating the relationships and lines of communication among all project participants. Include other data users who are outside of the organization generating the data for whom the data is intended.

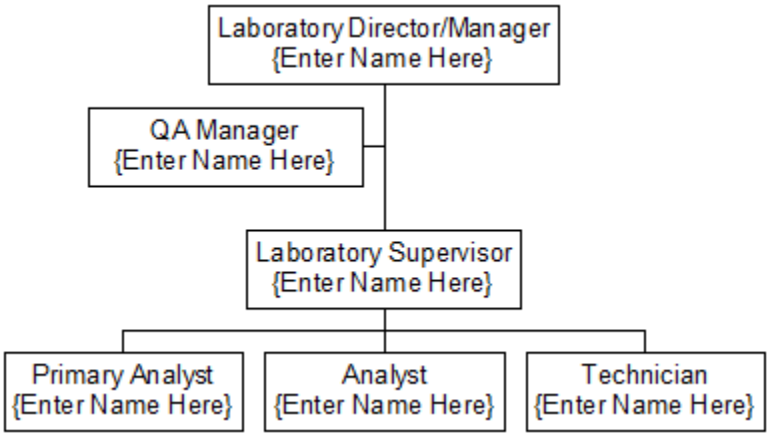
BELOW ARE EXAMPLES FOR YOUR USE. CHOOSE WHICHEVER EXAMPLE WORKS BEST FOR YOUR ORGANIZATION, OR USE YOUR OWN CHART (Delete highlighted areas after completion).

Example. Laboratory Organization Chart
(One person may have more than one title and associated role/responsibility)

Title	Reports To	Role / Responsibility
Laboratory Director/Manager	President	
Laboratory Supervisor	Laboratory Director/Manager	
QA Manager	President	
Primary Analyst	Laboratory Supervisor	
Analyst	Laboratory Supervisor	
Technician	Laboratory Supervisor	
Technician	Laboratory Supervisor	

Example. Laboratory Organization Chart
(One person may have more than one title and associated role/responsibility)

The Energy and Environment Cabinet consists of the potential Laboratory Director, QA Manager, Laboratory Supervisor, and Primary Analyst, Analyst, and Technician.



In reference to the organization chart above, the following chart will explain who is on the organization chart, including name and position.

2.2.5 Project Background, Overview and Intended Use of Data

Insert a brief paragraph describing the background of the specific activities that this QAP pertains to. Provide sufficient information for the user to understand the intent of the activities, key personnel, analysis, frequency of testing, and reporting requirements.

Analytical results from analyses will be used as for the purposes of Kentucky Division of Water KPDES permit compliance.

2.2.6 Data/Project Quality Objective and Measurement Performance Criteria

Data quality objectives (DQOs) for all activities associated with this QAP must be established to meet the requirements of the KPDES permit(s).

Discuss the quality objectives for the project and the performance criteria to achieve those objectives. The use of a systematic planning process to define quality objectives and performance criteria is required. The DQO Process involves the following steps:

1. State the Problem
2. Identify the Decision
3. Identify Inputs to the Decision
4. Define the Study Boundaries
5. Develop a Decision Rule
6. Specify Limits on Decision Errors
7. Optimize the Design for Obtaining Data

Data Quality Objectives are qualitative and quantitative statements that:

- Clarify the intended use of the data
- Define the type of data needed to support the decision
- Identify the conditions under which the data should be collected
- Specify tolerable limits on the probability of making a decision error due to uncertainty in the data.

2.2.7 Special Training Requirements and Certification

Personnel performing analysis should be properly trained for the particular task and instrument(s) that they utilize for those activities. Indicate how training is to be provided and documented.

2.2.8 Documentation and Records Requirements

Personnel will utilize a notebook/bench sheet and indelible ink to document all relevant observations and information related to laboratory activities.

DATA MAY ALSO BE KEPT ELECTRONICALLY.

INCLUDE THE APPLICABLE FIELD OBSERVATION INFORMATION BELOW

Field observations include the following:

- Date, location, time of sampling, name, organization and phone number of the sampler, and analyses required
- Sample type (grab or composite)
- Date of receipt of the sample at the laboratory
- Container size, container type, preservation, hold time, and condition upon receipt
- Results of field measurements such as pH and DO
- Transportation or delivery means of the sample

All applicable field documents will be stored INSERT WHERE HERE for a period of five (5) years or until the next on-site audit.

Specify or reference all applicable requirements for the final disposition of records and documents, including location and length of retention period.

2.3 Data Acquisition

The scope of this QAP is limited to the analysis of environmental samples from using EPA approved methods and instrumentation (as specified in 40 CFR 136). This QAP applies to the following analysis parameters:

- List specific parameters

2.3.1 Sample Collection Procedure, Experimentation Design and Sampling Tasks

This section is not applicable for Kentucky Wastewater Laboratory Certification.

2.3.2 Sampling Procedures and Requirements

This section is not applicable for Kentucky Wastewater Laboratory Certification.

2.3.3 Sample Handling, Custody Procedures and Documentation

All sampling handling, chain of custody procedures and documentation meet the requirements established in Kentucky's Wastewater Laboratory Certification Manual **(4)**.

2.3.4 Analytical Methods Requirements and Task Description

This QAP applies to the following analytical methods:

- List methods here.

Any analytical method for compliance purposes must be EPA approved as per 40 CFR 136.

2.3.5 Quality Control Requirements

EPA has specified twelve critical quality assurance quality control elements that must be addressed within this QAP. Specify the QA/QC elements for each methods and acceptance criteria.

2.3.6 Instrument/Equipment Testing, Calibration and Maintenance Requirements, Supplies and Consumables

Specify all calibration & maintenance requirements as well as the quality requirements for all supplies and consumables.

2.3.7 Data Management Requirements

Measurements and pertinent information are recorded in a notebook/bench sheet. The notebook/bench sheet contains all information related to laboratory activities including:

- List all data that must be recorded.

Notebooks/bench sheets are maintained for a minimum of five (5) years. Completed notebooks/bench sheets are stored INSERT NOTEBOOK/BENCH SHEET STORAGE LOCATION HERE

2.4 Assessments

If not applicable, insert "Not Applicable" to each section that does not apply.

2.4.1 Technical Systems Assessments

If project-specific needs are minimal, noting accreditation to an appropriate technical system standard may be sufficient; note that if any project-specific needs are more stringent that the standards, then project-specific assessments should be conducted.

2.4.2 Performance Audits of Measurement and Analytical Systems

Document plans and acceptance criteria for split samples and proficiency testing (PT)samples, if appropriate.

2.4.3 Surveillance of Operations

State when surveillance will occur (under what conditions or by set timeframe), how it will be conducted, how feedback will be provided and incorporated, and if surveillance leads to a temporary or permanent work stoppage, address how that will be handled.

2.4.4 Audits of Data Quality

Define the schedule (based on timeframe or triggering events) and scope for audits of data quality.

2.4.5 Qualitative and Quantitative Comparisons to Acceptance Criteria

Include statement encouraging project team members to alert management if they sense anything isn't going right as planned.

2.4.6 Interim Assessments of Data Quality

State how comparisons to qualitative and quantitative measurement quality objectives will be evaluated; describe other criteria (e.g., publication in a peer-reviewed journal) that might be important for the project.

2.4.7 Evaluation of Unconventional Measurements

If no unconventional measurement methods will be/were used, just state that here.

2.4.8 Evaluation of unconventional Monitoring Projects

If no unconventional measurement methods will be/were used, just state that here.

2.5 Review, Evaluation of Usability and Reporting Requirements

2.5.1 Data Verification and Validation Targets and Methods

Provide a standard data verification and validation method or procedure that has been reviewed to ensure it meets project needs.

2.5.2 Quantitative and Qualitative Evaluations of Usability

State who will be part of the evaluation of data usability, how it will be conducted and documented.

2.5.3 Potential Limitations on Data Interpretation

Describe what actions will be taken if project data are deemed unusable for their intended project purpose.

2.5.4 Reconciliation with Project Requirements

Clearly state how the data verification, validation, and usability results will be used to determine if project requirements have been met; describe how the five steps (listed below) of the Data Quality Assessment (DQA) process will be conducted.

- A review of the project‘s objectives to assure that they are still applicable and review the sampling design and data collection documentation for consistency with the project objectives noting any potential discrepancies;
- A preliminary data review of QA reports (when possible) for the validation of data, calculation of basic statistics, and generation of graphs of the data to probe the structure of the data and to identify patterns, relationships, or potential anomalies;
- Selection of the appropriate statistical procedures for summarizing and analyzing the data, including treatment of censored values (non-detects), based on the review of the performance and acceptance criteria associated with the projects objectives, the sampling design, and the preliminary data review, and identification of the key underlying assumptions associated with the statistical tests;
- Verification that those underlying assumptions most likely hold, or whether departures could be acceptable, given the actual data and other information about the study; and
- Determination of conclusions from the data by performing the calculations pertinent to the statistical test, and documentation of the conclusions to be drawn as a result of these calculations. If the design is to be used again, there should be an evaluation of the performance of the sampling design.

2.5.5 Reports to Management

Define schedule and content for reports to management.

3. General References

Documents referenced in this QAP are listed below and referenced in parenthesis. (e.g. **(5)**)

THE FIRST FIVE (5) REFERENCES INCLUDED BELOW HAVE ALREADY BEEN CITED WITHIN THIS DOCUMENT. Provide all additional citations that you have referenced in the QAP, formatted in standard scientific format. SOPs and other supporting documentation should be included on external media (such as CD), or as appendices to the QAP. IF ADDITIONAL DOCUMENTS DO NOT NEED TO BE REFERENCED IN THIS QAP, SIMPLY DELETE THIS PARAGRAPH.

1. EPA Final Draft. *Quality Standard For Environmental Data Collection, Production, and Use By Non-EPA (External) Organizations (EPA CIO 2106-S-02.0).* Office of Environmental Information.

2. 40 CFR Part 136 On-line Version (e-CFR) Website; http://www.ecfr.gov.

3. EPA 2012. *Guidance on the Quality Assurance Project Plans*, CIO Guidance 2106-G-05 QAPP, Office of Environmental Information, U.S. Environmental Protection Agency.

4. Commonwealth of Kentucky Wastewater Laboratory Certification Manual (June 2013).

5. ANSI / ASQC S2-1995 Introduction to Attribute Sampling, American Society for Quality, 1995.

4. Useful References

401 KAR 5:320. Wastewater Laboratory Certification Program.

EPA 2002b. *Environmental Data Verification and Validation*, EPA QA/G-8, Office of Environmental Information, U.S. Environmental Protection Agency.

EPA 2006. *Data Quality Assessment: Statistical Methods for Practitioners*, EPA QA/G-9S, Office of Environmental Information, U.S. Environmental Protection Agency.

EPA 2009. *Guidance on the Development, Evaluation, and Application of Environmental Models*. EPA/100/K-09/003, Council for Regulatory Environmental Modeling, U.S. Environmental Protection Agency.

Table 1.
Data Quality Indicators (EPA 2002)

DQI	Definition	Example Determination Methodologies	QC Samples
Precision	Reproducibility Measure of agreement among repeated measurements of the same property under identical or near identical conditions. Usually calculated as a range or as the standard deviation.	Use the same analytical instrument to make the same measurement. Split samples in the field, submit to same circumstances of handling, preservation and analysis. Use the same method to make repeated measurements of the same sample within a single laboratory, or use two labs to analyze identical samples with same method.	Field duplicates, laboratory duplicates, matrix spike duplicates, analytical replicates, surrogates
Accuracy	Correctness Measure of overall agreement between measurements to a known value.	Use a different method under the same conditions. Analyze a reference material to which a material of known concentration has been added. Usually expressed as percent recovery or percent bias.	PT samples, matrix spikes, laboratory control samples, equipment blanks
Bias	Systematic or persistent distortion of a measurement process that causes errors in direction.	Use reference materials or analyze spiked samples.	Field spikes, matrix spikes
Representa-tiveness	'the degree to which data accurately and precisely represent an environmental condition' (ANSI/ASQC 1995) (5).	Evaluate whether measurements are made and physical samples collected in a way that the resulting data reflect the environment or condition being studied.	None
Compara-bility	Expresses the measure of confidence that one data set can be compared to another and can be combined for the decision.	Compare the following: sample collection, sample handling, sample preparation, sample analytical procedures, holding times, stability issues, and QA protocols. Describes confidence (expressed qualitatively or quantitatively).	Split samples – with PT samples
Complete-ness	A measure of the amount of valid data needed to be obtained from a measurement system.	Compare number of valid samples completed with those established by the project's DQOs or performance criteria.	All
Sensitivity	Capability of a method to discriminate between measurement responses representing different levels of the variable of interest.	Determine the minimum concentration or attribute that can be measured by a method (method detection limit) by an instrument (instrument detection limit) or by a laboratory (quantitation limit).	lab fortified blanks, method detection limit study, initial calibration standards at quantitative limit