Quality assurance project plan (QAPP) template

This document is prepared based on the criteria set in the 2023 U.S. Environmental Protection Agency (EPA) Quality Assurance Project Plan Standard [EPA IT/IM Directive: Quality Assurance Project Plan Standard, Directive # CIO 2105-S-02.0](https://www.epa.gov/system/files/documents/2024-04/quality_assurance_project_plan_standard.pdf). It is intended as a tool to aid in the preparation of QAPPs provided to the Minnesota Pollution Control Agency (MPCA). Additional requirements and guidelines can be found in the MPCA QAPP Guidance document ([Minnesota Pollution Control Agency Quality Assurance Project Plan Guidance (state.mn.us)](https://www.pca.state.mn.us/sites/default/files/p-eao2-13.pdf)). It is not required to use this template in the development of a QAPP, however unless documented within relevant programmatic EPA documents, any QAPP submitted for MPCA work must follow the 2023 EPA QAPP standard.

Within this document are descriptions of what is necessary for the different elements of a QAPP. Every element must be present in the finalized QAPP. If an element is not relevant for the work to be performed, write within the element “Not applicable to the scope of the project”. However, this template was developed for QAPPs that include field activities, laboratory analysis, existing information/secondary data, and environmental technology. To provide guidance to all QAPP types, this document contains unofficial “sub-elements”. Specifically, sub-elements B2.1, B2.2, B2.3, and B2.4 may not be applicable for every QAPP utilizing this template. If that is the case, remove the specific sub-elements that don’t apply.

This first page of any QAPP must be the title page. When developing a QAPP, make sure to remove this introductory page by highlighting all text on the first page and click on the “Delete” key. Once the QAPP is updated and ready for review, update the Table of Contents by going to “References” in the Microsoft Word toolbar and selecting “Update Table” in the “Table of Contents” section. If there are questions regarding development of a QAPP, contact [qa.questions.mpca@state.mn.us](mailto:qa.questions.mpca@state.mn.us) for more information.

|  |  |
| --- | --- |
| QAPP short title: |  |
| Revision no: |  |
| Date: |  |

**Quality Assurance Project Plan**

|  |  |
| --- | --- |
| Project name: | Click to enter project name |
| **Grant number:** | Click to enter grant number |
| **Period of Applicability:** | **Begin date:** Click to enter a date **End date:** Click to enter a date |
| **Prepared by:** | Click to enter name of preparer |
| **Position:** | Click to enter preparer’s position |
| **Agency:**  **Address**  **City, ST Zip** | Click to enter Agency name  Click to enter Street address  Click to enter City, ST, Zip |
| **Prepared for:** | Click to enter name or organization |
| **Prepared for:** |  |
| **Agency:**  **Address**  **City, ST Zip** | Click to enter Agency name  Click to enter Street address  Click to enter City, ST, Zip |
| **Date of Preparation:** | Click to select date |

Section A: Project management and information/data quality objectives

Element A.2 Approval page

*Notes:*

1. *For QAPPs requiring EPA funding, the signatures included within this template are the minimum necessary for QAPP implementation. The MPCA quality assurance signatory may be either a qualified designated member of the section and/or unit, or it can be a member of the MPCA Environmental Data Quality Unit. However, as designated in Element A.9, the QAPP must document how the Quality Assurance Officer/Coordinator(s) can act independently from the rest of the project staff. For QAPPs that are self-approved, the quality assurance signatory must be a member of the MPCA Data Quality Unit. If third party organizations are participating in the QAPP, appropriate members of their staff such as project managers and quality assurance staff should sign off on the QAPP. This is to document that the objectives designated in the QAPP are agreed to.*
2. *Electronic signatures are an acceptable form of signature.*

Section A.2.1: Minnesota Pollution Control (MPCA) approvals

|  |  |  |
| --- | --- | --- |
|  |  | Insert date |
| Insert project manager name |  | Date |
| Insert title |  |  |
| Insert Section name |  |  |
| Insert Division name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |
|  |  | Insert date |
| Insert quality assurance representative name |  | Date |
| Quality assurance coordinator |  |  |
| Insert Section name |  |  |
| Insert Division name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |
|  |  | Insert date |
| Insert supervisor name |  | Date |
| Supervisor |  |  |
| Insert Section name |  |  |
| Insert Division name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |
|  |  | Insert date |
| Insert manager name (if needed) |  | Date |
| Manager |  |  |
| Insert Section name |  |  |
| Insert Division name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |

Section A.2.2 U.S. Environmental Protection Agency (EPA) approvals (if needed)

|  |  |  |
| --- | --- | --- |
|  |  | Insert date |
| Insert project officer name |  | Date |
| Insert title |  |  |
| U.S. Environmental Protection Agency |  |  |
| Insert email (if using DocuSign or similar product) |  |  |
|  |  | Insert date |
| Insert quality assurance representative name |  | Date |
| Quality assurance coordinator |  |  |
| U.S. Environmental Protection Agency |  |  |
| Insert email (if using DocuSign or similar product) |  |  |

Section A.2.3 Third party signatures (contractors/laboratories)

|  |  |  |
| --- | --- | --- |
|  |  | Insert date |
| Insert project manager name |  | Date |
| Insert title |  |  |
| Insert company name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |
|  |  | Insert date |
| Insert quality assurance representative name |  | Date |
| Quality Assurance Officer or other title |  |  |
| Insert company name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |
|  |  | Insert date |
| Insert project manager name |  | Date |
| Insert title |  |  |
| Insert laboratory name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |
|  |  | Insert date |
| Insert quality assurance representative name |  | Date |
| Quality Assurance Officer or other title |  |  |
| Insert laboratory name |  |  |
| Insert email (if using DocuSign or similar product) |  |  |

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Element A.4: Project purpose, problem definition and background

*Notes:*

1. *Section A addresses the project management aspects of the QAPP. This includes the project history and the roles and responsibilities for project staff members.*
2. *QAPPs must identify and address any quality assurance (QA) planning documents that are relevant to the project. This can include a reference to the MPCA’s Quality Management Plan or any relevant guidance documents.*
3. *Add page breaks between each element*

Document or add references to any applicable background information (include links in a references appendix), plans, and/or reports to provide any historical, scientific, and regulatory perspective for the project.

This element is where the purpose of the project’s work is documented. This can include the sample collection, sample analysis, data assessment, usability determination and report generation. Include the problem(s) to be addressed and/or the question(s) to be answered.

Within this element document all environmental decisions that are going to be made and the level of information required to ensure that the decisions are made from environmental information of known quality. Identify the type, quantity, and quality of information needed for its intended use and describe the acceptance and performance criteria.

If applicable to the project also include the identification of the applicable regulatory programs and standards, conceptual site model(s), and/or a discussion that links the results of the environmental information operations to possible actions. “**Environmental information operations**” is a term developed by the EPA to encompass the work covered within a QAPP. This project work typically would include field activities, laboratory analysis, data analysis, or implementation of environmental technology. Within this template, environmental information operations is designated as “project work".

Element A.5: Project task descriptions

This element will contain the project tasks and the schedule for the accomplishment of the tasks. Make sure to include the description of the work being performed, and/or the products that will be produced.

**Example of a project task description:**

***A.5.1: Task 1: Quality Assurance Project Plan development***

*Development Period: click to insert date through click to insert date.*

*MPCA uses data which has been quality assured and quality controlled (QA/QC) and entered in the EQuIS database. The primary task of this project is click to enter task(s). The procedures and approaches for completing the collection of this water quality data are described in this QAPP. The QAPP includes information on the following topic areas:*

* *Distribution lists*
* *Project organization and responsibilities of each party*
* *Project description (i.e., objectives, scope, analytical samples, intended data usage, technical reports)*
* *Quality assurance objectives and criteria (blanks, duplicates, spikes, etc.)*
* *Field sampling training specifications*
* *Record keeping procedures*
* *Sample collection procedures (i.e., procedures, custody, analytical methods, quality control, instrumentation, field equipment/inspection/maintenance)*
* *Laboratory testing procedures*
* *Data management*
* *Assessment and oversight*
* *Data validation and usability*
* *References*

*All QA documentation prepared for the project, including the QAPP, are considered non-proprietary, and the MPCA will make all materials available to the public upon request. Under no circumstances will the MPCA perform work that involves the collection/gathering, generation, evaluation, analysis, or use of environmental data until the QAPP has been finalized and approved via signature (physical or electronic) due to EPA policy requiring an approved QAPP.*

*Deliverables for task 1:*

*Click to insert date through Click to insert date*

* *1.1: Finalized QAPP*

*Note:*

*It is acceptable to include the project tasks and schedule as a table.*

Element A.6: Information/data quality objectives and performance/acceptance criteria

Within this element, describe the project’s information/data quality objectives, the performance and/or acceptance criteria necessary to achieve said objectives, and the indicators to be used. Make sure to include the performance and acceptance criteria for laboratory analytical methods. Include all matrices, analytes, analyte groups, and concentration levels.

“PARCCS” (precision, accuracy, representative, comparative, completeness, sensitivity) are typical Data Quality Indicators (DQIs), but if there are other relevant DQIs to be utilized for the project, identify them, and describe them within this element. PARCCS are listed below as defined within the 2023 EPA QAPP Standard along with their calculations. It is acceptable to add these descriptions into a QAPP noting that there may be quality assurance samples found within this document that are not applicable for all QAPPs. General overall acceptance criteria for Precision, and Accuracy can be found in guidance documents located on the MPCA Science and Data Webpage [(Science and data | Minnesota Pollution Control Agency (state.mn.us)](https://www.pca.state.mn.us/about-mpca/science-and-data):

**Precision:** The measure of agreement among repeated measurements of the same property under identical, or substantially similar, conditions.

Where possible, laboratory precision is measured through the collection and analysis of duplicate samples. Precision can also be determined between the results of a laboratory sample/duplicate, matrix spike (MS)/ matrix spike duplicate (MSD) or between a laboratory control sample (LCS)/laboratory control sample duplicate (LCSD) pair. The relative percent difference (RPD) between the known sample result and the duplicate sample result is calculated according to the following equation:

**Accuracy (Bias):** Measure of the overall agreement of a measurement to a known value.

The accuracy of the analysis is gauged through the analysis of surrogate spikes, MS, MSD, and LCS. Surrogate compounds are added, as applicable, to every sample prior to extraction and analysis. The percent recovery is determined by comparing the spiked sample concentration to the environmental (un-spiked) sample concentration. The equation for determining percent recovery is as follows where %R is percent recovery; SSR is the observed spiked sample concentration; SR is the sample concentration; and, SA is the spike added:

**Representativeness:** The measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

**Comparability:** the measure of confidence that two or more data sets can contribute to a common analysis.

**Completeness:** The amount of valid data obtained from a measurement system, expressed as a percentage of the number of valid measurements that should have been collected (i.e., measurements that were planned to be collected). MPCA requires a completeness of at least 90% for a laboratory report to be considered acceptable.

Completeness (%) = ((Number of Valid Results)/(Number of Total Results))X100

**Sensitivity:** The capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest.

Element A.7: Distribution list

In this element, include a distribution list that includes all individuals who are going to be receiving copies of the approved version of this QAPP and any following revisions. The distribution list must include:

* EPA Project office (If EPA approval is necessary)
* EPA Quality assurance officer (If EPA approval is necessary)
* MPCA Project manager(s)
* MPCA Quality assurance staff
* Laboratory project management staff
* Laboratory quality assurance staff

In addition, it is recommended that any project staff have access to the final document in case it is needed for future reference in performing their duties related to the project. See the table below as a potential format for a distribution list.

**Example of Distribution List**

Table 1 Distribution list

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Email | Organization | Title |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

*Note:*

1. *There must be a designee from the organization responsible for conducting the project work who maintains the original version and all revisions of the QAPP. This would be reflected in the Project organization element of the QAPP. This would typically be the project manager within the MPCA.*
2. *The distribution list must include a member of the MPCA Environmental Data Quality Unit. This can include the unit supervisor or any applicable quality assurance coordinator. It is important for members of the MPCA Environmental Data Quality Unit to receive QAPPs. That way if there is an internal/external audit/assessment/evaluation performed, they are aware of any relevant project requirements.*

Element A.8: Project organization

Identify the individuals and organizations participating in the project and describe their roles and responsibilities within the scope of the project. The required roles and responsibilities that need to be addressed:

* Project staff who has the approval authority for the QAPP
* The senior manager for the organization conducting the project work. This staff member is an individual who typically provides resources such as knowledgeable personnel, funding, materials, supplies, and time.
* Project manager for the organization conducting the project work.
* The quality assurance officer/coordinator for the organization performing the project work. The QAPP will describe the oversight authority for the Quality Assurance staff responsibilities for planning, documenting, coordinating, and assessing the effectiveness of the QAPP.
* The responsibilities of the individual responsible for maintaining the QAPP. This can be included within either the project manager section, or the QA staff section.
* Any additional project staff and/or quality assurance staff members.
* If the EPA is the organization performing the project work, the project responsibilities of any MPCA project staff and/or quality assurance staff.
* The responsibilities of any third-party contractors, subcontractors, sub-grantees, or laboratories

**Example from a project doing field activities and laboratory analysis:**

*This quality assurance project plan (QAPP) describes the quality system that the MPCA will implement to effectively plan throughout this project and ensure the quality of results generated, distributed, or used. This project will provide technical support to the MPCA insert purpose(s). Insert lab name shall prepare level II PDF laboratory data packets, and upload final data collected to MPCA’s Environmental Quality Information System (EQuIS).*

*The primary personnel responsible for implementation of this project are the Minnesota Pollution Control Agency project manager, and quality assurance coordinator. Their duties are outlined briefly in this section along with other staff integral in the execution of the project.*

*The MPCA project manager (PM) will provide senior-level oversight as needed and is responsible for MPCA’s technical performance; managing oversight and conduct of project activities including allocation of resources to specific tasks; ensuring that quality procedures are incorporated into all aspects of the project; developing, conducting, and/or overseeing QA plans as necessary; ensuring that any corrective actions are implemented; operating project activities within the documented and approved Quality Assurance Project Plan; and ensuring that all products delivered are of a specified type, quantity, and quality. The MPCA PM is also responsible for the circulation, review, and overall management of this QAPP.*

*The MPCA Crew Leader(s) will oversee field sampling activities. They will ensure all samples are collected in accordance with the requirements of the field sampling Standard Operating Procedures (SOP), relevant guidance documents, and this QAPP. They will follow proper sample handling and custody procedures and ensure prompt and safe delivery of the samples to the analytical laboratory.*

*The MPCA QA coordinator (QAC) is responsible for overseeing the project’s quality system, monitoring, and facilitating QA activities on tasks, and helping the MPCA PM and field crews understand and comply with EPA and MPCA QA requirements. For each relevant task and/or deliverable for this project, the project QAC is supported by other MPCA QACs, the MPCA’s Environmental Data Quality Unit supervisor, and as needed, the Environmental Data Quality Section Manager, who will assist in the implementation of the MPCA quality system. The QAC is also responsible for the review of the data generated for this project as needed.*

*The Project QAC is responsible for assisting the project staff in planning, documenting, and implementing the QA requirements for this project. Working with the project staff, and in consultation with the MPCA Data Quality Unit, the QAC will help ensure that required or recommended protocols are followed; that data are reviewed, validated, and reported according to MPCA criteria; and that QC assessments are performed. The QAC will report quality issues to the project staff and the MPCA’s Environmental Data Quality Unit, as needed.*

*The insert lab staff titles will manage the PFAS analysis and serve as the primary point of contact for laboratory analysis activities. They will oversee the preparation and delivery of the necessary field sampling supplies from the St. Paul laboratory location. The insert supervisor will oversee sample receipt, inspection, logging, and test assignment.*

*The insert lab QA Officer will review the QAPP and oversee its implementation. They will work with laboratory QA and technical staff to ensure QC activities and quality assessments are conducted during sample preparation and analysis. The insert lab QA Officer will communicate QC deficiencies, and oversee any necessary corrective action investigation, remedy selection, implementation, and verification in collaboration with the insert supervisor(s), where appropriate. They will work closely with the insert applicable lab staff to ensure implementation of the approved QAPP, conduct internal and project-specific QA reviews, and provide input into QA status during sample analysis.*

*The insert laboratory staff will perform sample analyses in accordance with the laboratory-specific quality system requirements and the detailed SOPs for their respective areas of expertise. They will implement the necessary QC activities, analyses, and assessments to ensure development of data of known and documented quality. They will conduct reviews for their colleagues in their performance areas, resolve any minor deficiencies or inconsistencies in the sample analyses or results, or escalate quality issues through the quality management system as necessary to optimize performance. They will conduct specific corrective action investigation, or implementation and verification, in accordance with the laboratory’s quality assurance manual.*

*Additionally, QC functions will be carried out by other technical staff and monitored by the MPCA PM, who will work with the MPCA’s quality assurance staff to oversee this plan and implement quality improvements. Other technical staff will include persons with expertise in industrial processes and air pollution engineering, technical reviewers, database specialists, quality auditors, and technical editors. The MPCA PM will ensure that technical staff do not review work in a QA capacity for which they were a primary or contributing author.* ***Figure A Project Organizational Chart*** *presents the project’s organizational chart.*

*Notes:*

1. *If possible, avoid using the names of the staff responsible for the work being done in the QAPP and only use job titles. That way if there is staff turnover within the project, it doesn’t need to be revised.*
2. *Indicate within this section the individual(s) who will be responsible for, (1) the circulation of the QAPP to the distribution list and signatories, (2) the annual review of the QAPP, and (3) the overall management of the QAPP.*

Element A.9 Project quality assurance manager independence

It is important to document how quality assurance acts outside of the rest of an organization’s operations. It must be documented how the quality assurance staff can act independently of the rest of the project staff to act in an objective sense in relation to the rest of the project. Within the overall structure of the MPCA, the Environmental Data Quality Manager reports directly to the Division Director, who according to the MPCA’s Quality Management Plan, acts as the Quality Assurance Director. However, noting that some units within the agency have designated quality assurance staff, make sure that the lines of reporting/communications for the QAPP are clear.

**Example language for when the QA representative is from the MPCA Environmental Data Quality Unit:**

*The MPCA QAC is employed by the MPCA’s Environmental Analysis & Outcomes (EAO) Division Environmental Data Quality Section, which is in a separate (insert Division or Section) from MPCA’s (insert Division or Section. The Manager of the Data Quality Section reports directly to the EAO Division Director, who according to the MPCA’s QMP, acts as the MPCA Quality Assurance Director.”*

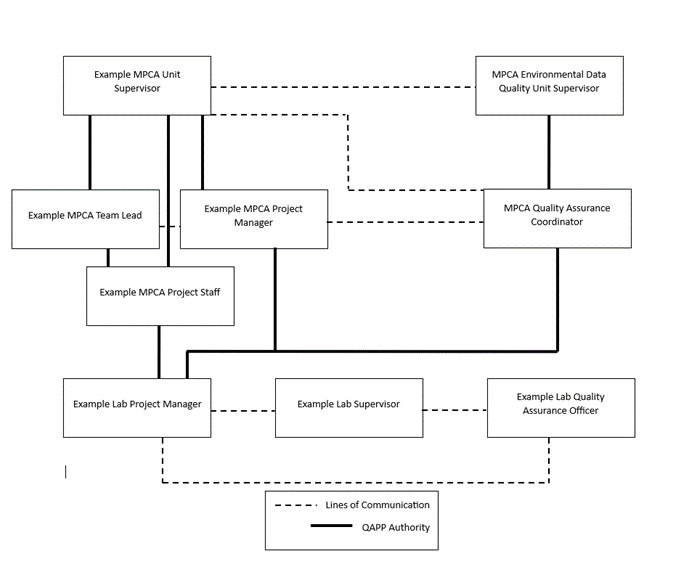
Element A.10 Project organization chart and communications

The project organizational chart is needed to give a visual representation to both the lines of authority and communication between and within organizations performing work for the QAPP. The Organization charts must include:

* The name of the organization conducting the project work (MPCA/Third Party).
* All contractors, subcontractors, sub-grantees, and their laboratories and the reporting relationship to the organization performing the project work.
* The individual in the senior manager role.
* The project manager for the organization conducting the project work.
* The project quality assurance staff officer for the organization conducting the project work.
* Titles and roles of operations and quality individuals within the organization conducting the project work.
* If the EPA is the organization conducting the project work, include project and quality assurance staff for the MPCA.

Lines of communication and communication mechanisms will be determined during the planning of the project and documented within the QAPP.

**Example Org Chart for a project where the MPCA is working directly with a laboratory to provide data from field collection and sample analysis:**



*Notes:*

1. *Procedures such as the timing of communications need to also be included within the QAPP to ensure that project staff understand the processes and the roles and responsibilities of those processes when communication occurs. Some example procedures would be (1) the samples didn’t meet the laboratory criteria for sample receipt, (2), lab report generation, (3) initiating corrective actions.*
2. *Describe or cite standard procedures for communication to include QAPP non-conformances, potential process improvements, and general communication between all organizations operating under the QAPP.*
3. *Document communication procedures to EPA as needed to include elevating potential discrepancies and any non-conformances.*

Element A.11: Personnel training/certifications

This element will include the identity of any individuals or processes that ensure that the personnel performing the project work are qualified, trained, and appropriately experienced. Also include how the individual trainings are documented. If there are any additional specialized trainings or certifications required to successfully participate in the work being done within the project, identify and describe them within this section. If there are specialized trainings required, describe how it will be provided, how the necessary skills will be ensured, and the system for documenting the records.

*Note:*

1. *An example of this would be any trainings done for new employees for field sampling, or the test-out performed by Compliance and Enforcement staff.*
2. *Laboratory training and certification is defined by the Minnesota Department of Health Environmental Laboratory Accreditation Program (MNELAP) or, ISO/IEC 17025 for the Minnesota Department of Health Laboratory. Laboratories are responsible for training staff and maintaining records.*

Element A.12: Documents and records

Identify documents and records that will be produced for projects that involve project work. Within this element, include the management of documents and records including the QAPP. Within the element describe the MPCA’s document retention schedule and policy and information on where documents will be stored.

*Note:*

*It is important to be familiar with the MPCA’s procedure for the preparation, review, approval, issuance, revision, and archiving of documents.*

Section B: Implementing environmental information operations

*Notes:*

1. *Section B of the QAPP describes the implementation of necessary QA/QC requirements and other technical activities to ensure that the data generated using this QAPP will satisfy the information/data quality objectives and performance/acceptance criteria in the Group A4 and A6 elements.*
2. *While it is acceptable to include citations to supporting documents for the QAPP such as SOPs instead of including them as an appendix, QAPP managers must be prepared to have the cited documents available upon request from regulatory agencies such as the MPCA and/or EPA. If citations are used, links to the documents included in a references section can aid in the retrievability of the supporting documents.*

Element B.1: Identification of project environmental information operations

Within this element, describe in detail the project work (sampling, data collection, analysis) that will be conducted for the project. Make sure to state how the operations will satisfy the project purpose and the information/data quality objectives and performance acceptance criteria in the A4 and A6 Elements.

Element B.2: Methods for environmental information acquisition

This element’s purpose is to identify and describe the methods and procedures for acquiring environmental information throughout the project.

This includes:

* Collection
* Production
* Evaluation
* Design
* Construction
* Operation
* Or application of environmental technology.

*Note:*

*When documenting the different procedures, methods, holding times, analytes, etc. it is acceptable to document the information within a table instead of listing them off.*

Any Methods that are included within the QAPP must be identified by any number/identifier, version/revision date, and regulatory citation (Example: EPA 351.2 Rev. 2 1993).

This element is the space for identifying, describing, or referencing Standard Operating Procedures (SOPs) used in the acquisition of environmental data. Include the name, number, and version/revision of the SOP. Any SOPs relevant to the project work must be readily available to applicable project staff if not included in the QAPP within this section or as an appendix. This can include SOPs for manual integration, data review, dishwashing, etc. The QAPP must also document whomever is responsible for maintaining and updating applicable SOPs.

B2.1 Field activities environmental measurements

If the project includes field work, be sure to describe or reference the descriptions of the procedures for all activities. This can include information derived from tools, instruments, observational results, investigations, and sample collection procedures. This section is also intended to document maximum holding times for sample extraction and/or sample analysis, selection, and preparation of sample containers, sample volumes, methods of preservation, and procedures for sample handling and custody.

B2.2 Laboratory analyses

If the project includes laboratory analyses, as noted above, the QAPP must identify the analytical methods by number/identifier, version/revision date, and regulatory citation. If a laboratory method allows the user to select from various options, then the method citations should state exactly the selection of option(s). The QAPP must also include or reference SOPs that address situations where a non-compliance or failure in the analysis of samples occurs. This must include who is responsible for the corrective action, and how to determine the effectiveness.

Within this element, also include the specified turnaround time for data package receipt. This includes both PDF lab reports and any electronic data deliverables (EDDs). This is also a section to emphasize that any EDDs provided must be in the format lab\_mn.

*Note:*

*If there are unusual matrices for the samples and non-standard and/or modified methods are utilized for this project, appropriate method performance study information will be required to confirm the performance of the method for the matrices used for the project. If there are no previous studies documented, they must be developed over the course of the project and included as part of the results.*

B2.3 Existing information/secondary data QAPPs

For environmental information complied or obtained from existing sources such as databases, software applications, decision support tools, websites, existing literature, etc., the QAPP must describe the information to be obtained, how the collection will occur, and what the use of this information will be with criteria for acceptance and evaluation. If this information is going to be combined with new environmental information, the criteria to ensure compatibility must be described.

B2.4 Environmental technology QAPPs

Any project work involving environmental technology must identify whether the technology is being used for pollution prevention, contamination containment, storage, or remediation. Also include the physical parameters or process collected using environmental technologies as well as the specific systems, devices, and their components applicable to both hardware and methods or techniques that measure and or remove pollutants or contaminates and prevent them from entering the environment.

Element B.3: Integrity of environmental information

This element’s purpose is to describe or cite the procedures in place for ensuring the integrity of the project work. For field sampling include procedures and requirements for sample tracking and custody including, but not limited to:

* Field logs
* Packaging
* Transport, and/or shipment from the field to the lab
* Laboratory sample storage

Reference or include examples of sample labels and chain of custody (COC) forms/sample custody logs within this section. Including those items as an appendix is also acceptable. Within this section also include the laboratories to be used. This can be set up by listing a primary lab to do the work, with back up laboratories included so that project deadlines may be met. Include the processes for ensuring that the laboratory maintains current accreditation for the analytes and matrices applicable to the scope of this project.

**Example language for a QAPP containing MPCA field activities, laboratory analysis:**

*A member of the MPCA field crews will ensure that the water chemistry samples are properly labeled, preserved, and documented on COC forms. They will organize the sample containers appropriately and double check the labels, ensuring that all identification is correct and legible.*

*A separate member of the MPCA field crew will check the electronic field form, field logbook entries, and COC forms and ensure that any missing information is added, or erroneous information is corrected at the end of each field visit. The review will include the following steps:*

1. *Prior to packing, ensure bottle labels exactly match information on the COC.*
2. *Ensure the correct EQuIS Project ID has been added to the form. Only one COC can be used per EQuIS Project ID (i.e., PRJ07081, PRJ07082).*
3. *Include the correct stream ID, site ID, date, and time.*
4. *Duplicate samples are recorded in their own sample row.*
5. *Document preservative use.*
6. *Sign and date COC when possession of samples have been transferred.*

*The samples will be received by members of the insert laboratory sample receiving staff. The receiving process will include checking for sample temperature, sample container integrity and confirming the information listed on the COC matches what is on the sample bottles. They will sign the COC as received with a date/time and transfer relevant information to a sample condition upon receipt form. After receipt, staff will log the samples into the Laboratory Information Management System to assign laboratory specific sample IDs and to transfer information on COC and Sample condition Upon Receipt form. Insert applicable COC reviewer will check the COC/ Sample Condition Upon Receipt form against what was entered into the laboratory information management system (LIMS) to ensure the information on the forms matches what is in the LIMS. If there was any problem with sample receipt, the applicable staff will contact the MPCA PM to discuss possible resampling and/or next steps.*

*If it is determined that the laboratory will need to subcontract out samples due to instrument problems, or laboratory capacity, the insert lab PM will contact the MPCA PM to alert them immediately. The laboratory used as a subcontractor must be approved by both the MPCA PM and QAC in writing and be accredited by MNELAP for a method that can achieve the RLS and data quality objectives documented within this elements A.6 and B.4.*

Element B.4: Quality control

Within this element, the QAPP must identify and describe any QC activities needed for project work to meet project environmental information/data quality objectives and performance/acceptance criteria. Describe or cite the frequency of each QC activity, acceptance criteria, corrective actions, and how the effectiveness of the corrective actions will be determined. Include descriptions or references to the procedures to be used to calculate applicable statistics.

The samples used for quality control are going to vary by method, analytes, and technology. Typical QC samples can include:

* Blanks: Aliquot of Reagent Water
* Laboratory control sample: Aliquot of Reagent Water containing a known concentration of the analyte of interest used to measure accuracy.
* Matrix Spike: A sample prepared, taken through all sample preparation and analytical steps of the procedure unless otherwise noted in a referenced method, by adding a known amount of concentration of the analyte of interest to a specified amount of sample for which an independent test result of target analyte concentration is available. Also used to measure accuracy.
* Duplicates: A replicate of a sample used to measure precision. Often a matrix spike duplicate will be utilized.
* Internal Standard: A known amount of standard added to a test portion of a sample as a reference for evaluating and controlling the precision and bias of the applied analytical method.
* Surrogate: Analytes added to a sample at a known concentration to determine extraction efficiency.

The frequency of analysis and acceptance criteria for these standards may be found within the specified reference method, but for methods that do not document the criteria, reference the MPCA Laboratory Quality Control and Data Policy ([Laboratory Quality Control and Data Policy (state.mn.us)](https://www.pca.state.mn.us/sites/default/files/p-eao2-09a.pdf)). It can also be described in a table and referenced as an appendix (Example Appendix 2).

Also described or referenced within this section would be the sensitivity of the instruments used for analysis. This would include the reporting limits for all instrumentation.

For QAPPs that include field sampling, measurements, and laboratory analysis, the QC will include but is not limited to the samples listed above. For QAPPs utilizing existing data, QC activities include the use of systematic review, independent secondary review of studies in the open literature, and QC of constructed databases or spreadsheets. For project work using models or modeling, activities include model calibration and model validation.

Element B.5: Instrument/equipment calibration, testing, inspection, and maintenance

*Note:*

*While it is acceptable to include references to SOPs documenting calibration, testing, inspection, and maintenance procedures instead of describing them or including them as an appendix, QAPP managers must be prepared to have the cited documents available upon request from regulatory agencies such as the MPCA and/or EPA. It may be useful to state the timeline of availability.*

Within B.5, describe or cite all procedures to be followed to ensure that any equipment and/or instrumentation used for the project are available for use and are in proper working order. This includes field sampling equipment and laboratory instrumentation. Include descriptions or references for the procedures for how calibrations will be performed, accepted, documented, and traceable to the applicable piece of equipment/instrumentation.

Include descriptions or references about how instruments and equipment are tested, inspected, and maintained. Also include information about the availability of critical spare parts identified in the operating manual or specifications of applicable instruments or equipment.

Element B.6: Inspection/acceptance of supplies and consumables

This element is designated to include the procedures for how supplies and services are inspected and/or accepted and who is responsible for this activity. As in other elements, references to supporting documents are acceptable. Be sure to also include how the practices designated will be verified in adherence to the QAPP. Make sure to include how any traceability related to the supplies will be maintained. Supplies typically would include:

* Spare parts
* Standards
* Sample bottles
* Calibration gauges
* Reagents
* Hoses
* Deionized water
* Potable water
* Electronic data storage media

If there is a possibility for more parties to be involved in the project, such as contractors, sub-contractors (including laboratories), subgrantees, document within this section how these parties will be selected and the decision making that will be done in finalizing that decision. Designate who is responsible for making that decision and what the requirements are for finalizing the decision. For example, if a laboratory designated within this QAPP is experiencing capacity issues or instrument performance, they will need to consider the subcontracted lab’s ability to:

* Match the reporting requirements designated within the QAPP.
* Meet the acceptance criteria for the data quality indicators designated within the QAPP.
* Meet the reporting limits designated within the QAPP.
* Meet the method required holding times.
* Meet the turn-around-times designated within the QAPP.

Beyond performing project work, it may be necessary for another party to help develop documents that would be relevant to the work done within the QAPP. Include within the QAPP when these decisions may need to be made, and who is responsible for making these decisions. These can include, but are not limited to:

* Guidance documents
* SOPs
* Work plans

**Example from a QAPP where the MPCA is working Directly with a laboratory for water samples:**

*Supplies and consumables are those items necessary to support the sampling and analytical operation, including sample containers and equipment, powder-less nitrile gloves, and decontamination supplies. Insert lab will order and store all supplies and consumables needed for analysis, as well as provide sample bottles, labels, and COC forms to MPCA for sampling. Upon delivery of supplies, insert lab staff will ensure that the type and quantities of supplies received are consistent with what was ordered and with what is indicated on the packing list and invoice for the material. The insert lab QA manual or specific SOPs dictate the requirements for inspection and documentation of supplies and consumables. Insert lab staff will contact the supplier immediately if they find any discrepancies.*

*While preparing for sampling, MPCA field staff will acquire and inspect equipment, supplies, and materials that will be used in obtaining the samples and field measurements. Insert lab will not use sample containers containing visible traces of water in the collection samples. Other materials must also meet specific requirements as indicated by the manufacturer. If the MPCA Field Crew Leader has any concerns about the sample bottles or other materials provided by insert lab, they will request clarification from insert lab on whether replacement materials should be provided and used. The MPCA Field Crew Leader will document any discussions with insert lab and associated outcomes (e.g., whether replacement bottles were used) in the field logbook.*

*The MPCA utilizes the State of Minnesota’s master* ***Sampling and Laboratory Analysis Services - Environmental Contract*** *(*[*S-792(5) (mn.gov)*](https://osp.admin.mn.gov/sites/osp/files/pdf/s-792(5).pdf)*). To be included on the contract laboratories must submit their analytic methods, reporting limits, SOPs, Scope of Accreditation, Quality Assurance Manual, etc. and also submit their ability to match the required, highly desired, and desired capabilities to designated agency subject matter experts for scoring. Scorers are free of any conflicts of interest with those laboratories.*

*If it is determined that the insert lab needs to subcontract out the work designated within this QAPP, they will use the contract to help decide the laboratory to subcontract the work to. Considerations that will be used in the decision will include but not limited to:*

* *Laboratory capacity*
* *Shipping*
* *Methods to be utilized*
* *Instrument sensitivity*
* *Promised turn-around-times*
* *Ability to follow reporting formats and requirements*
* *Data quality indicator acceptance criteria*

Element B.7: Environmental information management

This element’s purpose is to describe or reference the environmental information management process for the project. This would include tracing the path of the information from its generation to its final use or storage. Describe or reference the standard record-keeping procedures, the document control system, and the approach used for information storage and retrieval.

This element is also used to describe or reference the methodology for preventing loss of information during data entry, reduction, and reporting. Also use it to describe how data entry to databases, forms, reports, and databases may be performed. If there are checklists or forms used, include them as an appendix.

There also must be descriptions or references to the procedures to process, compile, and analyze the information. An example would be addressing environmental information generated as part of the project as well as information from other sources.

It is required that the QAPP describe or reference any required computer hardware/software and address any specific performance requirements. An example would be the submittal of electronic data deliverables to the MPCA. They must be in the lab\_mn format. Include the procedures to demonstrate acceptability of the hardware/software configuration required. Within this element, document programmatic requirements for the lab\_mn EDD submittal and describe who will be receiving the PDFs. The individual shall be included in any relevant project COCs.

Section C: Assessment, response actions and oversight

*Notes:*

1. *Section C is to address internal or external assessments that ensure the planned project activities in the QAPP are implemented. These should be conducted throughout the course of the project to ensure that usable environmental information is obtained. Any response actions must address findings, corrective actions, and non-conformances identified from the assessments.*
2. *The oversight activities ensure that response actions and reporting mechanisms are in place to capture the project status and document any QA issues that arise during implementation of the project and through the assessments that are conducted throughout the project.*

Element C.1: Assessments and response actions

This element’s purpose is to address the activities for assessing the effectiveness of the implementation process of the project and any associated QA and QC activities. The assessments are conducted both during and after the project work identified in the Section B elements.

Section C.1.1: Assessments

The intent of assessments is to act as an evaluation process used to measure the performance or effectiveness of a system and its corresponding elements. Another use for assessments is using them as investigative tools where problems may be suspected. Assessment activities are required in a QAPP.

Identify within the document the number, frequency, and types of planned assessments that will be performed. Also identify those who will be performing the assessments. Typical assessment activities include, but are not limited to:

* Audits
* Performance evaluations
* Management reviews
* Peer reviews
* Inspections
* Surveillances/readiness reviews
* Competency assessment
* Pre-award assessment of proposal
* Technical assessment
* Peer consultations
* Product reviews
* Data inspection
* Software testing
* Pre-dissemination reviews

Include how assessment findings, non-conformances, and corrective actions will be documented so management and the organization responsible for the data are alerted when they occur.

Section C.1.2 Response actions

Describe how response actions associated with assessment findings, non-conformances, and corrective actions will be developed, documented, and tracked to ensure completion. The response actions include, but are not limited to:

* Formal memos
* Notifications addressing findings
* Corrective actions
* Timelines for follow-up assessments

Element C.2: Oversight and reports to management

Within this element include individuals responsible for oversight activities. Include any oversight activities that ensure that response actions and reporting mechanisms are present and can capture the status of the project and any QA problems that happen during project implementation and through assessments.

Also include any reports to management relating to the project. Describe:

* The content of the reports.
* The individual responsible for the reports.
* How the reports will be transmitted.
* Who will be receiving the report.

Include project managers, project quality assurance staff, and if applicable, the EPA organization sponsoring the work in the distribution list.

Section D: Environmental information review and usability determination

*Note:*

*Section D addresses the activities associated with the review of the environmental information and the determination of whether it meets the established information /data quality objectives, performance/acceptance criteria, and its usability for its intended purpose.*

Element D.1: Environmental information review

Prior to writing this element of the QAPP, make sure to review these three key definitions from the 2023 EPA QAPP Standard.

1. Data verification: The process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements.
2. Data validation: An analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set.
3. Data quality assessment is the scientific and statistical evaluation of data to determine if the data obtained from project work are of the right type, quality, and quantity to support their intended use.

This element is used to describe/cite the procedures for the information and/or data verification and information and/or data validation. Include descriptions or citations of the data quality assessment activities that will occur after the project work phase of the project is completed. Include how the activities documented in A6 will be utilized in the review process.

Element D.2: Useability determination

This element documents the tools used to determine usability of the data produced by the QAPP. Describe the justifications for the usability of the data and the processes that go into the decision. Describe how this determination will be documented and who will be responsible for deciding on the usability.

(Example) Element D.3: References

U.S. EPA Contract Laboratory Program, January 2010, *National Functional Guidelines for Inorganic Superfund Data Review*, EPA 540-R-10-011, OSWER 9240.1-51, Office of Superfund Remediation and Technology Innovation.

1. Minnesota Pollution Control Agency, 2022, *Laboratory Quality Control and Data Policy*, p-eao2-09a.
2. Minnesota Department of Admin Sampling and Laboratory Analysis Services – Environmental Contract. Contract Release: S-792(5) August 1, 2022
3. Quality Assurance Project Plan Standard Directive No: CIO 2105-S-02.0 [EPA IT/IM Directive: Quality Assurance Project Plan Standard, Directive # CIO 2105-S-02.0](https://www.epa.gov/system/files/documents/2024-04/quality_assurance_project_plan_standard.pdf)

(Example) Appendix 1 Table of acronyms

<insert list of Acronyms> (not required but helpful)

CA Corrective Action

COC Chain of Custody

CFR Code of Federal Register

%D Percent Difference

DQO Data Quality Objectives

EAO MPCA Environmental Analysis and Outcomes Division

EPA Environmental Protection Agency

IND MPCA Industrial Division

LIMS Laboratory Information Management System

LUST Leaking Underground Storage Tank

MPCA Minnesota Pollution Control Agency

MS/MSD Matrix Spike/Matrix Spike Duplicate

MUN MPCA Municipal Division

PT Proficiency Test (sample)

PM Project Manager

QAC Quality Assurance Coordinator

QAO Quality Assurance Officer

QAM Quality Assurance Manual

QAPP Quality Assurance Project Plan

QAPrP Quality Assurance Program Plan

QA/QC Quality Assurance/Quality Control

REM MPCA Remediation Division

RMAD MPCA Resource Management and Assistance

RSD Relative Standard Deviation

RPD Relative Percent Difference

SAP Sampling and Analysis Plan

SOP Standard Operating Procedure

SRF Sample Receipt Form

WS MPCA Watershed Division

(Example) Appendix 2 Quality control requirements:

The following minimum quality control requirements apply unless otherwise specified in the determinative reference method.

Organic analyses:

| **QC requirement** | **Specification and frequency** | **Acceptance criteria** |
| --- | --- | --- |
| Calibration | Five levels, one must correspond to a sample concentration at or below the reporting limit. | When each calibration standard is calculated as an unknown using the calibration curve, the lowest level standard must be within ±40% of the true value. All other points must be within  ±20% of the true value |
| Method Reporting Limit (MRL) | Verified with calibration or at least monthly | ±40% of the true value |
| Calibration Verification Standard (CVS) | Mid-point calibration standard analyzed at the beginning of the analytical sequence and after per method  specifications | ±20% of the true value |
| Internal Standard | When performing internal standard calibration, internal standards are added at the same concentration to all QC and  samples | Must be within -50% to +200% of the mid- point standard in the calibration curve and not drift beyond 30 seconds of the mid-point  retention time |
| Method Blanks (MB) | Prepared and analyzed with each batch of 20 samples or less | Less than the reporting limit |
| Laboratory Control  Sample (LCS) | Prepared and analyzed with each batch  of 20 samples or less | VOC: 70 – 130%  SVOC: 50 – 150% |
| Lab Control Sample/Lab Control Sample Duplicate  (LCS/LCSD) | As specified by the method or if there is not enough volume to analyze an MS/MSD | RPD ≤ 20% |
| Matrix Spike/Matrix Spike Duplicate (MS/MSD) | Prepare and analyze one MS/MSD pair with each batch | VOC: 70 – 130%  SVOC: 50 – 150%  RPD ≤ 20% |
| Surrogate | When applicable, surrogates are added  to all QC and samples prior to extraction | VOC: 70 – 130%  SVOC: 50 – 150% |

**Metal analyses:**

| **QC requirement** | **Specification and frequency** | **Acceptance criteria** |
| --- | --- | --- |
| Calibration | Method criteria or a minimum of a calibration blank and three non-zero standards Frequency? | When each calibration standard is calculated as an unknown using the calibration curve, the lowest level standard must be within ±40% of the true value. All other points must be within  ±20% of the true value |
| Method Reporting Limit (MRL) | Verified with calibration or at least monthly | ±40% of the true value |
| Calibration Verification Standard  (CVS) | After initial calibration and thereafter following method criteria | Follow method criteria  ± 10% of the true value |
| Internal Standard | When performing internal standard calibration, internal standards are added at the same concentration to all QC and  samples | Follow method criteria |
| Method Blanks (MB) | Prepared and analyzed with each batch of 20 samples or less | Less than the reporting limit |
| Laboratory Control Sample (LCS) | Mid-point standard prepared and  analyzed with each batch of 20 samples or less | Follow method criteria |
| Lab Control Sample/Lab Control Sample Duplicate  (LCS/LCSD) | As specified by the method | Follow method criteria RPD ≤ 20% |
| Matrix Spike/Matrix Spike Duplicate  (MS/MSD) | Prepare and analyze with each batch of 20 or less or as specified by the method | Follow method criteria RPD ≤ 20% |

Inorganic analysis

| **QC requirement** | **Specification and frequency** | **Acceptance criteria** |
| --- | --- | --- |
| Calibration | Method criteria or a minimum of a calibration blank and three non-zero standards Frequency? | When each calibration standard is calculated as an unknown using the calibration curve, the lowest level standard must be within ±40% of the true value. All other points must follow  method specification |
| Method Reporting Limit (MRL) | Verified with calibration or at least monthly | ±40% of the true value |
| Calibration Verification Standard  (CVS) | After initial calibration and thereafter following method criteria | Follow method criteria  ± 10% of the true value |
| Internal Standard | When performing internal standard calibration, internal standards are added at the same concentration to all QC and  samples | Follow method criteria |
| Method Blanks (MB) | Prepared and analyzed with each batch of 20 samples or less | Less than the reporting limit |
| Laboratory Control Sample (LCS) | As specified by the method | Follow method criteria RPD ≤ 20% |
| Lab Control Sample/Lab Control Sample Duplicate  (LCS/LCSD) | As specified by the method | Follow method criteria  ± 20% of the true value RPD ≤ 20% |
| Matrix Spike/Matrix Spike Duplicate  (MS/MSD) | Prepare and analyze with each batch of 20 or less or as specified by the method | Follow method criteria  ± 20% of the true value  RPD ≤ 20% |

(Example) Appendix 3 MPCA Chain-of Custody

