**Sample & Analysis plan**

SAMPLING & ANALYSIS PLAN

Volunteer Water Quality Monitoring:

Descriptive Project Title Here

Approved from \_\_\_\_\_\_ to \_\_\_\_\_\_\_

Prepared by:

LOGO

Approval Signatures:

,Project Manager Date

,Project QA Officer Date

Suzanne Flint, DEP QA Officer Date

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#### HOW TO USE THIS TEMPLATE

A Sampling and Analysis Plan (SAP) outlines project-specific plans and procedures for sample collection, sample analyses, and data validation and management. This SAP template is intended to serve organizations participating in the Massachusetts Department of Environmental Protection’s (MassDEP) Water Quality Monitoring Grant Program with the goal of increasing the amount of bacteria data available for MassDEP’s use in the assessment of primary and secondary contact recreation activities in surface waters of the Commonwealth. This template is designed to be used in conjunction with MassDEP’s Bacterial Monitoring General QAPP which documents the general QA procedures used to ensure that the data are of sufficient quality to meet the project needs. The General QAPP is at: <https://www.mass.gov/guides/water-quality-monitoring-for-volunteers>.

Organizations electing to adopt and follow the General QAPP must prepare and submit an SAP which describes the specifics of their monitoring project. The approved SAP must clearly describe specific differences where applicable in comparison to the adopted General QAPP. In some cases, there may be project-specific differences that must be documented for each section/element of the General QAPP. In other cases, the differences may be minor. For example, the goals of individual monitoring projects may be different from DEP’s goals and should be identified in each organization’s Sampling and Analysis Plan (SAP).

Individual organizations using this SAP template (and adopting the General QAPP) must follow these steps:

1. Carefully review the General QAPP for its contents and to ensure that your program can meet its requirements. If your project varies from these requirements or uses methods not covered by this General QAPP, you may submit a full project QAPP.
2. Complete and sign the “Bacterial Monitoring General QAPP Adoption Form” in Appendix 1 of the QAPP.
3. Complete this Sampling and Analysis Plan (SAP) with your program details.
4. Submit your QAPP package for review and approval before the start of sampling. The QAPP package should include:
   1. General QAPP Adoption Form
   2. Project SAP (from this template)
   3. all associated field and lab Standard Operating Procedures (SOPs)
   4. example project forms (bottle label, Chain of Custody, field forms, lab forms)

Please note: recipients of Monitoring Grants must have the QAPP Adoption From and an approved SAP signed by the grantee and the appropriate MassDEP agency representatives *before* proceeding with project implementation.

Additional guidance on developing projects, quality assurance, and writing a full QAPP is available:

* MassDEP <https://www.mass.gov/guides/water-quality-monitoring-for-volunteers>
* Massachusetts Water Watch Partnership: <https://www.umass.edu/mwwp/resources/qa.html>
* EPA Citizen Science: <https://www.epa.gov/citizen-science/quality-assurance-handbook-and-guidance-documents-citizen-science-projects>

Planning/Timing: In general, program planning (including QAPP adoption and development of the Sampling and Analysis Plan) should begin approximately five to six months before the anticipated start of field work. QAPPs and SAPs must be approved before the start of sampling (MassDEP can generally review a QAPP/SAP submission within 30 days, but please allow additional time for revisions.)

**Acknowledgements**

This SAP template was prepared in support of bacterial monitoring projects funded by grants from MassDEP’s Water Quality Monitoring Grant Program, Reviewers of the QAPP included Richard Chase and Megan Selby, Massachusetts Department of Environmental Protection (MassDEP). Prepared by:Suzanne Flint, MassDEP.

Key:

#### Editable sections

#### *Italics* = example content (to be removed by user)

#### GROUP A: PROJECT/TASK ORGANIZATION

A3. Distribution List

Include a list of all the individuals, their organizations, and contact information (physical address and email) who will receive a copy of the plan. *Modify* the table below.

Table : Distribution List

|  |  |  |
| --- | --- | --- |
| Name & Organization | Address | Email Contact |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

A4. Project Organization

Review the General QAPP Section A4. Provide a list of the key project personnel and roles (*modify the table below*):

Table : Project Organization

| **Name(s)** | **Project Title/Responsibility** |
| --- | --- |
|  | **Project Manager** – Oversees all aspects of project that incorporate the monitoring program including: fiscal management, project objectives, data uses, reporting, program changes, etc. |
|  | **Technical Advisory Committee** – Program oversight and advice. |
|  | **Monitoring Program Coordinator** – Volunteer recruitment and training, coordination with Technical Advisory Committee (as applicable). Adopts the General QAPP and develops the Program SAP. Manages data, conducts initial QA/QC, and produces final monitoring report. |
|  | **Lab Coordinator** – Oversees laboratory analysis and QC and/or arranges with contract lab(s) to perform analyses according to QAPP. Ensures correct analysis and QC procedures are used, holding times are met, and adequate documentation is provided. |
|  | **Field Coordinator**– Responsible for training and supervising volunteers in field work; ensures field forms are properly filled out, samples and forms are transported to laboratories as needed; and works with project coordinators and QA Officer to ensure QA compliance. |
|  | **Data Management Coordinator (if separate from Monitoring Program Coordinator)** – Maintains the data systems for the program, performs/oversees data entry, and checks entries for accuracy against field and lab forms. |
|  | **Project QA Officer** – Ensures that all project QA/QC procedures are followed. ***Note****:* Because of a *potential conflict of interest*, this person should not fill the roles of Monitoring Program Coordinator, Field or Lab Coordinator. However, this person may be involved in writing the QAPP. |
|  | **Volunteers** – Conduct sampling, perform field analyses, and assist in laboratory analyses and/or data entry. |
|  | **Contract Analytical Lab Manager(s)/Director(s)** -Responsible for analytical procedures performed under contract (or other arrangement) with monitoring organization. |
| Meghan Selby | **MassDEP Water Quality Planning Grant Coordinator**– Oversees grant administration and ensures reporting requirements are met. |
| Suzanne Flint | **MassDEP Quality Assurance Officer**– Reads QA reports, reviews the Project SAPs, confers with program QA officer on ***quality control*** issues that arise during a monitoring program. |
| Richard Chase | **MassDEP Technical Reviewer**– Reviews and approves General Bacterial Monitoring QAPP. |

A5. Purpose Statement/Problem Definition/Background

Review the General QAPP Section A5. Clearly state your purpose of the monitoring project. For example: *The purpose of this project is to characterize baseline water quality conditions for bacteria (E. coli) in the Our River watershed during the summer season.*

Identify how your data will be used and by whom. For example: *the data will be used by the Our River Watershed Council to prioritize basins where restoration activities should occur. The MassDEP WPP may use the data to assess whether the Our River is meeting water quality criteria to protect beneficial uses.*

Give a brief description of your watershed and any important background information that is relevant to this plan (previous monitoring, known sources of pollution, etc.), including the assessment sections that would be sampled (e.g. as described in The Proposed Massachusetts Year 2016 draft Integrated List of Waters).

A6. Project Task/Description

Review the General QAPP Section A6. Give a very brief outline of what you will be doing (more detailed descriptions will be in later sections): what will be sampled, where samples will be collected, by whom, kind of samples, which analysis methods will be used, who will do the analysis, conditions to be sampled, how data will be analyzed and reported, and how data will be submitted.

For Example:

*“The Our River Watershed Association volunteers will collect bacterial data to characterize baseline conditions. Samples will be collected at major landscape changes and at the mouths of 4 major tributaries at a total of 15 sites. Grab samples for E. coli will be collected weekly from June 1 to Sept 30 and will be analyzed by our volunteers using Colilert (SM 9223B) in our organization’s lab/office. Results will be compared between locations and against MA water quality criteria. Quality control samples will be collected and analyzed as specified in the Bacterial Monitoring General QAPP to assess the quality of the data generated. Results will be compared with Massachusetts water quality standards for Class B waters and reported to our membership. Final data will be submitted to DEP via MassDEP’s data portal.”*

Provide a timetable for the project (*modify the table below with project-specific tasks and timing*). Indicate whether this is an ongoing / multiyear project.

Table : Project Timetable

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Activity | J | F | M | A | M | J | J | A | S | O | N | D |
| Develop monitoring objectives and study design with Technical Advisory Committee |  |  |  |  |  |  |  |  |  |  |  |  |
| Review the Bacterial Monitoring General QAPP |  |  |  |  |  |  |  |  |  |  |  |  |
| Develop project-specific SAP |  |  |  |  |  |  |  |  |  |  |  |  |
| Submit QAPP Adoption Form, SAP, and SOPs to Mass DEP for approval |  |  |  |  |  |  |  |  |  |  |  |  |
| Equipment inventory, purchase, inspection, and testing |  |  |  |  |  |  |  |  |  |  |  |  |
| Field training for samplers |  |  |  |  |  |  |  |  |  |  |  |  |
| Lab training sessions (in-house analyses) |  |  |  |  |  |  |  |  |  |  |  |  |
| Conduct sampling surveys |  |  |  |  |  |  |  |  |  |  |  |  |
| Data entry |  |  |  |  |  |  |  |  |  |  |  |  |
| Data review and validation |  |  |  |  |  |  |  |  |  |  |  |  |
| Field audit(s) |  |  |  |  |  |  |  |  |  |  |  |  |
| Lab audit(s) |  |  |  |  |  |  |  |  |  |  |  |  |
| Assess and interpret findings |  |  |  |  |  |  |  |  |  |  |  |  |
| Report results and findings |  |  |  |  |  |  |  |  |  |  |  |  |
| Submit final data to MassDEP or upload to WQX |  |  |  |  |  |  |  |  |  |  |  |  |

A7. Data Quality Objectives (DQOs)

Review the General QAPP Section A7. Typical quality control (QC) samples and the DQOs for *accuracy* and *precision* specified in the General QAPP are listed in Table 4. DQOs for *completeness* and *comparability* are listed in the General QAPP.

Use checkboxes (left column) to confirm the QC samples, frequency of QC sampling, and DQOs your project will be using. (See more description in the General QAPP <https://www.mass.gov/guides/water-quality-monitoring-for-volunteers>).

Table : QC Sample Types and Data Quality Objectives (DQOs)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Using | QC Type | Description | Indicates | Frequency | DQOs for E. coli, enterococci, fecal coliform |
|  | Field Blank | A “clean” sterile sample, produced in the field, used to detect contamination during the sampling process (sampling, transport, and lab analysis). Take sterile water into the field and transfer it to a sample bottle under field conditions. | Accuracy | 10% of samples or once per sampling event (whichever is more frequent). | Blanks show no colonies |
|  | Equipment or rinse blank | Field equipment blanks are necessary if water samples are collected in another sampling device and transferred into the sample container. A field equipment blank uses sterile water rinsed through the sampling devices to detect cross-contamination between sites. | Accuracy | 10% of samples or once per sampling event (whichever is more frequent). | Blanks show no colonies |
|  | Known samples | For bacterial testing, known samples (e.g. *E. coli* and *Pseudomonas aeruginosa* as positive and negative controls) can be purchased and analyzed alongside field samples. (See manufacturer’s instructions.) | Accuracy | once per new batch of reagents for in-house analysis; once per lab analysis batch | Negative controls show no colonies,positive controls show colonies |
|  | Split sample | Sample that is divided equally into two or more sample containers and analyzed. E.g. a 290-ml sample is split into two 120-ml samples in the lab and analyzed as separate samples. Splitting can be done in the field (field split) or in the lab (lab split). Field splits can be sent to separate labs to assess inter-lab precision. | Lab precision | 10% of laboratory samples. | For log10 transformed splits:  <30% RPD (<50 CFU/ 100mls)  <20% RPD (50-500 CFU)  <10 % RPD (500-5000 CFU)  < 5% RPD (>5000 CFU) |
|  | Field duplicate sample | Two samples taken at the same time (one immediately after the other), at the same site, and analyzed by the same lab using the same methods. Duplicates can be used to detect both the natural variability in the environment and that caused by field sampling methods. | Field precision | 10% of samples or once per sampling event (whichever is more frequent). | For log10 transformed duplicates:  <30%RPD (<50 CFU/ 100mls)  <20% RPD (50-500 CFU)  <10 % RPD (500-5000 CFU)  < 5% RPD (>5000 CFU) |

For *representativeness* define what conditions your sampling will be characterizing: ambient, runoff, morning, summer, etc.

A8. Training Requirements and Certification

Review the General QAPP Section A8. Describe the training requirements for volunteers, including who will be conducting the training and their qualifications.

A9. Documentation and Records

Define where documents and records relevant to your project will be kept and for how long (*modify* the table below with project-specific documents).

Table : Documents and Records

| IN USE | Document Name / Description | Storage Location | Storage Time |
| --- | --- | --- | --- |
|  | **General Bacterial Sampling Quality Assurance Project Plan (QAPP)** QAPP project description and assurance procedures. | MassDEP files (copy to organization) | Indefinite |
|  | **Bacterial Monitoring General QAPP Adoption Form** (signed) | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (copy to MassDEP) | \_\_ years |
|  | **Sampling Analysis Plan-** specific sampling information for each organization’s activities. | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (copy to MassDEP) | \_\_ years |
|  | **Water Quality Monitoring Guidebook**- Methods manual for volunteers detailing field methods |  | \_\_ years |
|  | **Training Records** |  | \_\_ years |
|  | **Equipment Notebooks -** records of quality control checks, calibrations and maintenance. |  | \_\_ years |
|  | **Field Data Sheets -** Field forms containing sampling meta data and raw field data. |  | \_\_ years |
|  | **Chain of Custody Records** accompanies samples from collection to laboratories. Sample collectors, all individuals who take custody of the samples, and laboratory intake sign COC forms. Includes: sample ID, date, time, type of sample, cooler temp, and sampler’s names. |  | \_\_ years |
|  | **Sample Labels** for all sample containers, include: the site name, date, time, location, analyte(s), and sampler’s name. |  | \_\_ years |
|  | **Database** Record all sampling data in a single easily retrievable electronic location |  | \_\_ years |
|  | **Final Reports and QC Summary Reports –** Summarizing project data and findings.Summarizing all QC data available for a project during the dates relevant to the data submittal. |  | \_\_ years |
|  | **External Data** submitted to MassDEP by organization for review, reformatting and upload into External Database | MassDEP files | Indefinite |

#### GROUP B: DATA GENERATION AND ACQUISITION

B1. Sampling Process Design

Review the General QAPP Section B1. Define the logic for your sampling plan including how you are selecting the intended sampling sites. Bacterial samples should be collected bi-weekly (every other week) during the contact season (June 1st to September 30th (preferred) or April 1st to October 15th). Any specific environmental conditions, ambient, summer base flow, runoff events, etc. needed to answer the organization’s specific monitoring objectives should be identified.

Include:

* the *logic* for selecting the sampling design (locations, sampling time, frequency)
* a list of monitoring locations including: site ID, site name, water body, short description, and GPS coordinates (*modify* the table below and delete the example)
* map of the sampling locations (include in appendices)
* photographs of sampling sites are recommended (include in appendices)
* identify the total number of sites
* what parameters will be measured at each site
* when (time of year/day, environmental conditions, etc.)
* address safety precautions (review general precautions in General QAPP)

Enter project sampling sites in Table 6

Table : Sampling Sites

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Waterbody | Site Description | Town | Site # | Latitude | Longitude |
| *Example:*  *Concord River* | *Rogers Street bridge* | *Lowell* | *CND-009* | *42.63595037* | *-71.30148697* |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

B2. Sampling Method Requirements

Review the General QAPP Section B2. If your project is using a contract lab, consult with the laboratory coordinator for their methods, sample container/size requirements, and hold times. Include laboratory and field sampling SOPs in the appendices.

How will you collect samples? Check all that apply and attach SOPs:

|  |  |
| --- | --- |
| Using | Sampling Method |
|  | Wading (preferred) |
|  | Pole Sampling |
|  | Basket Sampler |

Table 7 highlights field sampling specifications that should be contained in project-specific SOPs in greater detail.

Table : Sample Collection Methods

| **Sample Type/ Device** | **Parameter(s)** | **Container Type(s) and Preparation** | **Minimum Sample Quantity** | **Sample Preservation** | **Maximum Holding Time** |
| --- | --- | --- | --- | --- | --- |
| * Manual grab sample * “Pole” sample * Basket sample | * *E. coli* bacteria * Enterococci * Fecal coliform | * 120-ml sterile bottle (new-sealed or autoclave-sealed) | 120 ml per analyte | * Sodium thiosulfate if chlorine residual suspected * Refrigerate on ice to <4oC | * Transport to lab within six hours * Analyze within 8 hours of collection |

If there are any differences in sample collection containers, holding times or preservation for your project specify the differences:

B3. Sample Handling and Custody Procedures

Review the sample handling and custody procedures in the General QAPP Section B3. Check all that will apply:

|  |  |
| --- | --- |
| Using | Procedure |
|  | Using pre-labeled bottles |
|  | Using Chain of Custody Forms |
|  | Samples are transported on ice (<4°C) |
|  | Temperature blanks used in cooler |

How will samples be transported to the laboratory? By whom?

B4. Analytical Methods Requirements

Review the General QAPP section B4. Attach the laboratory SOPs for each analysis in the appendices. (If you will be using different methods than those listed below you will need to write a full QAPP.)

Check the methods that apply:

Table : Bacterial Analysis Methods and MDLs

| **Using** | **Parameter and Method #** | **MDL\*** | **Special Considerations** |
| --- | --- | --- | --- |
|  | *E. coli* - EPA 1603 (Modified mTEC) | 1 CFU/ 100 mL | preferred indicator for fresh waters |
|  | *E. coli* – SM 9213-D (mTEC) | 1 CFU/100 mL |
|  | *E. coli* – SM 9223-B (enzyme substrate, Colilert) | 1 MPN/100 mL. |
|  | Enterococci - EPA 1600 (Membrane Filtration) | 1 CFU/ 100mL | preferred indicator for marine and brackish waters |
|  | Enterococci - SM 9230-B, C | <10 MPN/100 mL |
|  | Enterococci - ASTM D6503-99 (enzyme substrate) | 1 MPN/100 mL |
|  | Enterococci - SM 9223-B (Enterolert) | 1 MPN/100 mL |
|  | Fecal coliform – SM 9221-C, E | <10 MPN/100 mL | preferred indicator for shellfishing areas |
|  | Fecal coliform – SM 9222-D | < 10 CFU/100 mL |

\* MDLs from <https://www.nemi.gov/home/>. MDLs may vary from those proposed in the General QAPP. Consult your laboratory and list any differences here.

B5. Quality Control Requirements

Quality control samples, frequency of QC sampling and data quality objectives (DQOs) have been addressed in Table 4: QC Sample Types and Data Quality Objectives (DQOs) above.

Review the General QAPP Section B5 for other quality control requirements.

Check all that apply:

|  |  |
| --- | --- |
| Using | Quality Control Requirements |
|  | Field audits will be conducted for each sampling team annually. |
|  | Field manuals or SOPs are attached in appendices of this SAP (manuals/SOPs include directions for taking QC samples). |
|  | Field QC samples are submitted “blind” to the lab |
|  | Reports from contract lab(s) include results for lab duplicates, knowns, and lab blanks |
|  | Incubator temperatures at the start and end of bacterial incubations are recorded. |
|  | IDEXX Colilert reagents will be tested with IDEXX Quanti-Cult culture at the start and end of the monitoring year. |
|  | Data will be assessed by calculating: relative percent differences (RPD) between field duplicates, RPDs between lab duplicates, assessing positive and negative controls, assessing field and lab blanks results, and percent completeness. |

Note: because of the relatively high natural variability of bacterial data, Relative Percent Difference (RPD) is usually calculated as the absolute value of the difference in *log base 10* result between the two duplicates divided by the mean of the duplicates ×100:

=ABS(LOG10(A)-LOG10(B))/AVERAGE(LOG10(A),LOG10(B))\*100

Where A = original result, B = duplicate or split result

**Corrective Actions**: Describe what you will do if quality control results show a sampling problem. (E.g. retest, contact the manufacturer, retrain volunteers, qualify or censor data.)

.

B6, B7, and B8. Instrument/Equipment and Supply Inspection, Calibration and Frequency

Review section B6, B7, and B8 in the General QAPP. Check all that apply in the tables below and modify as needed. Specify who will be responsible for equipment and supply inspection and maintenance

Table : Instrument/Equipment Inspection and Testing Procedures

| **Using** | **Equipment** | **Inspection Frequency** | **Individual Responsible** | **Type Inspection** | **Action** |
| --- | --- | --- | --- | --- | --- |
|  | Autoclave (bacterial analysis) | Weekly |  | Inspect and clean as needed. Spore check is run with a batch to ensure the autoclave is reaching proper temperature and pressure | Clean, lubricate surfaces; maintain water surfaces according to user’s manual. |
|  | Sample prep equipment (e.g., sealer for Colilert® bacteria method) | Prior to each sampling |  | Visual inspection, clean, and maintain according to manufacturer’s recommendations. | Take apart and clean |
|  | Incubator (bacteria analysis) | Prior to each sampling |  | Check temperature with max/min electronic thermometer (traceable to NIST) | Spare batteries, electrolyte |
|  | NIST Traceable Thermometer | Annually |  | Check thermometer reading at 0°C and room temperature against another thermometer | Send for certified re-calibration when >0.5°C difference |
|  | Life Preservers (PFDs) | Before each use |  | Visual for integrity | Keep spares |
|  | Cooler | Before each sampling date |  | Cleanness | Replace |
|  | Waders | Before each sampling date and whenever leaving a body of water |  | Visual inspection for damage, presence of plant or animal material on waders | Patch or replace |

Review Section B8 of the General QAPP, check all that apply and indicate the individual responsible.

Table :Typical Supplies Inspection, Acceptance Procedures

| **Using** | **Supplies** | **Inspection Frequency** | **Type of Inspection** | **Person(s) Responsible** | **Available Parts** | **Maintenance** |
| --- | --- | --- | --- | --- | --- | --- |
|  | IDEXX reagents | With each new batch | Visual inspection of quantity and expiration date |  | Spare, fresh reagents | Storage according to manufacturer’s recommendations. Annual replacement at beginning of sampling season |
|  | Quanti-Tray | Before each laboratory batch | Visual inspection for damage and cleanliness |  | Spare trays | NA |
|  | Sterile water | Before each use | Visual inspection for cleanliness |  | Spare water | NA |
|  | Field and Lab sample sheets | Before each sampling date | Visual |  | Additional copies | NA |
|  | Sample Bottles | Before each sampling date | Integrity, cleanness, verified sterility and seal |  | One set of spare bottles | NA |
|  | First aid kit/field kits | Before each sampling date | Visual for integrity, adequate number/amount of all items |  | Extras all supplies | Replace supplies as needed. |

Describe any project-specific changes to Sections B6-8:

B9. Data Acquisition Requirements

Review the Data Acquisition Requirements Section B9 of General QAPP for any data from other projects and reference the section if you agree to follow these procedures. Identify any other data sources that will be used in this project and how the quality of that data will be assessed.

B10. Data Management

Review the Data Management section B10 of the General QAPP and reference the section below if you agree with to follow the procedures.

Include the following and information to document your internal data management:

* Trace the path of your data from recording the information in the field to its analysis and presentation.
* How will you data be stored? (Field sheets, electronically)
* Identify who is responsible for the data for each step going from field to data storage.
* Include a description, example or reference of the electronic format of your data including metadata (data about site location and date).
* Include a list or reference a list of the data fields that will be stored in your data.
* How will data be checked for completeness, reasonableness, transcription errors and calculation errors?
* Where will electronic data be stored and backed up?
* What type of computer hardware and software will be used to store and manage data?
* Clearly state how data submitted to MassDEP will be formatted, what supporting documentation will be included and when it will be submitted.
* What software will be used to analyze the data?

#### 

#### GROUP C: ASSESSMENT AND OVERSIGHT

C1. Assessment and Response Actions

Review the Assessment and Response Actions section C1 of the General QAPP. Check all that apply (*modify* Table 11 as needed):

Table : Planned Assessments

|  |  |  |  |
| --- | --- | --- | --- |
| **Using** | **Assessment Type** | **Frequency** | **Person(s) Responsible** |
|  | Project surveillance | Ongoing | Monitoring Coordinator |
|  | Field audit of volunteers | Annually or more frequently if needed | Monitoring Coordinator |
|  | Laboratory Technical systems | Annually | Laboratory Coordinator |
|  | Laboratory Performance Evaluation | Annually | Monitoring Coordinator |
|  | Data Verification and Validation | Ongoing & Annually | Monitoring Coordinator |
|  | Data Quality Assessment | Annually | Project QA Officer |

If you have other assessment and response actions, please describe the additions or changes.

C2. Reports

Review the General QAPP Section C2. Identify how the results of quality control tests and other project assessments will be reported including to whom the information will be reported and when. Check all that apply and *modify* Table 12 as needed check all that are needed.

Fully QC-checked data to be submitted to MassDEP should be emailed to [WQData.submit@mass.gov](mailto:WQData.submit@mass.gov). Instruction and templates for data submittals are available at <https://www.mass.gov/guides/external-data-submittals-to-the-watershed-planning-program>. Alternatively, fully QC-ed data may be submitted to MassDEP by uploading to the EPA National Water Quality Portal (WQX) and sending email notification to MassDEP [WQData.Submit@mass.gov](mailto:WQData.Submit@mass.gov).

Table : Reports

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Using** | **Type of Report** | **Frequency** | **Delivery Date** | **Person(s) Responsible** | **Report Recipient** |
|  | Preliminary data | As needed by project | As needed | Monitoring Coordinator | General Public |
|  | QC reports | Annually | Annually | Monitoring Coordinator | QA Officer, and available upon request |
|  | Final report | Annually, on completion of data collection & reviews | Annually | Monitoring Coordinator or Project Manager | MassDEP, general public, towns, other funders |
|  | Electronic Data Delivery via DEP’s Data Portal | Annually | Annually | Monitoring Coordinator or Project Manager | MassDEP |
|  | Electronic Data Delivery via EPA’s WQP/WQX | Annually | Annually | Monitoring Coordinator or Project Manager | MassDEP/ EPA |

#### GROUP D: DATA VALIDATION AND USABILITY

D1: Data Review, Validation, and Verification

Review the Data Review, Validation and Verification section D1 of General QAPP and reference it below if you agree with to follow the procedures. If you have other assessment needs, please describe your additions or changes.

D2. Validation and Verification Methods

Review the Validation and Verification section D2 of the General QAPP and reference it if you agree to follow these procedures. If you have other assessment needs please describe your additions or changes to the QAPP section D2 by answering the following questions:

* Who will review field data sheets and how and when will they do it?
* Who will review data entered into the database and how and when will they do it?
* Where applicable, who will review laboratory results and how and when will they do it?
* Who will determine the data quality levels for data? How and when will they do it?

Check all that apply and *modify* table as needed.

Table : Data Verification/Validation Process

| **Using** | **Input** | **Action** | **Responsible Parties** | **Corrective action, if needed** |
| --- | --- | --- | --- | --- |
|  | Field Forms | Check bottle labels just prior to sampling, to ensure correct labeling. At time of sampling, record data, sign field sheets. Fill out, sign chain of custody (COC) forms for any samples going to lab. | Field sampler | Correct label or change container. Coordinate with sampler on missing/unclear information. Correct and initial field sheets. |
|  | Raw Field Data | Initial data check: Upon receipt of field sheets, check for reasonableness to expected range, completeness, accuracy, and legibility. | Field or Monitoring Coordinator | Confer with field sampler(s) immediately or within 24 hours. Resample if feasible; otherwise, flag suspect data. |
|  | Sample Documentation | Check COCs for completeness/correctness: Upon receipt of samples and COC forms, check to see that the number and condition of samples correspond to the information on COC forms. | Lab Coordinator, Field or Monitoring Coordinator | Confer with field/monitoring coordinator. Contact field samplers as needed to locate missing samples, data records. In case of missing/spoiled samples or data records, authorize resembling as needed and feasible. If re-sampling is not feasible, flag all suspect data. |
|  | Lab Data | Initial lab data review: Upon completion of laboratory analyses, fill out lab sheets, including data on QC tests. Review for reasonableness to expected range, completeness. | Lab Coordinator | Re-analyze if possible. If not, confer with monitoring coordinator. Flag all suspect data. |
|  | Lab Data | Initial lab data review: review lab reports for completeness and legibility. | Monitoring/Data Mgt. Coordinator | Confer with lab coordinator. |
|  | Preliminary Data | Data verification: Upon completion of data entry, print out raw data. Compare with field/lab sheets for accuracy. Data entry personnel may review their own work, but a different person should perform the final accuracy comparison. | Monitoring/Data Mgt. Coordinator | Correct entered data; document corrections. |
|  | Verified Data | Data validation: perform QC calculations (individual sample runs and season-total compilations), run statistical analyses, and/or prepare graphical summaries of data. Check for agreement with QC objectives. | Monitoring/Data Mgt. Coordinator. Technical Advisory Committee. | Confer with QA Officer. Flag or discard suspect data. Decide upon any restrictions in use of data with respect to original data use goals; indicate the data affected and to describe data use restrictions. |
|  | Validated Data | Check for agreement with QC objectives. Recheck data and statistical analyses for reasonableness, errors, other problems. | QA Officer | Confer with Monitoring Coordinator and/or Technical Advisory Committee to address specific problems. Review QAPP and SAP if needed. |
|  | Final Data | Report final data as appropriate for project. | Project Manager; Monitoring Coordinator | Confer with Project QA Officer and/or Technical Advisory Committee |
|  | Final Data | Submit data to MassDEP. Include QC data and report in data submittal; review for formatting consistency with submittal templates and completeness. | Project Manager; Monitoring Coordinator | Confer with MassDEP QA Officer for major project changes. |
|  | All Data and Documents | Back up all data and documents (online backup system or off-site backups), and ensure that systems are working | Project Manager, Monitoring Coordinator | Fix or replace backup system. |

Specify the Data Qualifiers used to indicate QC non-compliance issues (e.g. ## for censored data, Q for qualified data, \*\* for missing data, P for provisional data) and how qualifiers will be recorded with the data:

D3. Reconciliation with Data Quality Objectives

Review the Reconciliation with Data Quality Objectives section D3 of the General QAPP and reference it below if you agree to follow these procedures. If you have other needs, please describe your additions or changes to the QAPP section D3 by answering the following questions:

* Define what you will do with data that falls outside of the target precision and accuracy from your data quality objectives in the context of answering your monitoring question (may include the process/who will decide what to do).
* How will you compare the completeness, representativeness and comparability of your actual data to those outlined in your data quality objectives?
* Who will decide what type of actions can be taken with the data once it is compared to the data quality objectives?
* How will data quality be communicated to data users?

APPENDICES

Include:

Map of project area including sampling sites

Field Sampling Manual or individual field SOPs

SOPs for all laboratory analyses

Project-specific examples of:

Bottle Labels

Field Forms

Volunteer Training Record

Laboratory Forms (if analyzing in-house)

Chain of Custody Form

List Project Appendices: