Attachment K

EPA Region 3 Quality Assurance Project Plan (QAPP) Template

Region 3 Quality Assurance Project Plan (QAPP) Template

Template Instructions

This template is intended to aid in the writing of QAPPs in accordance with the EPA QAPP Standard (effective July 18, 2023). The Standard should still be reviewed since every project is different. The level of detail of a QAPP should be based on a graded approach. Using this template does not guarantee first round approval but helps streamline the process for author and quality reviewer.

On the title page and throughout the rest of the document, change "Project" to "Program" if the QA document is a Quality Assurance Program Plan (QAPrP) instead of a QAPP. Change the logo on the title page as required.

TEXT

Text included in the template is intended to be edited and customized for quality assurance project plans for EPA and non-EPA organizations. The text has been written to indicate what changes or additions need to be made. EPA-specific requirements and requirements only for non-EPA organizations are denoted by foot notes.

EXAMPLES OF LOGO, TABLES, FIGURES, & ATTACHMENTS

Are provided as examples and should be modified/deleted as necessary.

TABLES & FIGURES

Tables and Figures are numbered by section and sequence order to facilitate their addition or deletion, i.e., *Table/Figure Section#–Sequence* in that section e.g., Table A2-1, A2-2, A2-3, B3-1.

DEFINITIONS

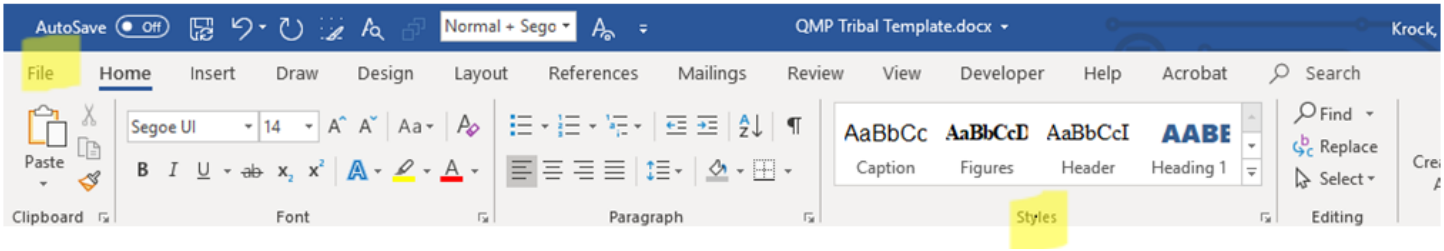
Are defined in Comments.

DELETE

Delete instructional text, comments, etc. before finalizing QAPP.

STYLES

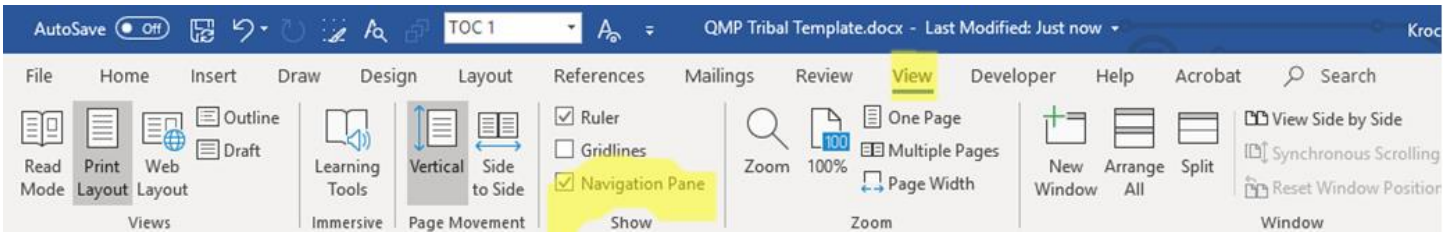
Are used for titles of sections, tables, and figures which allows for the Table of Contents to be automatically updated. Follow the table below to ensure each section level has the correct style.



Style	Example Section Level
Heading 2	A, B, C, D
Heading 3	A1, A2, A4… and Attachment Titles
Heading 4	Sub Section, e.g., Background, Other QA Documents
Caption	# and Title of Tables
Caption	# and Title of Figures
(Calibri Font)	Main body

NAVIGATION

Turn on the Navigation Pane to easily move through this document. View check box for ***Navigation Pane***



A Program Management and Information/Data Quality Objectives

A1. Title Page

U.S. Environmental Protection Agency, Region 3
Division:
Branch:

Quality Assurance Project Plan
Title

Effective Date: **Month ##, 202#**

Effective Date	Month ##, 202#
Period of Applicability	Month ##, 202#- Month ##, 202#
Revision/version control information	

A2. Approval Page

Concurrence

Project/Operations Manager

Name: Organization:	Signature: Date:

Author (if different than Project Manager)

Name: Organization:	Signature: Date:

Senior Manager

Name: Organization:	Signature: 01Date:

Project Quality Assurance Manager

Name: Organization:	Signature: Date:

EPA Designated Project Manager[1]

Name: Organization:	Signature: Date:

Approval

EPA Region 3 Delegated Approving Official[2]

Name: Organization:	Signature: Date:

.

[1] Only needed for entities external to EPA. May include, but not limited to Project Officer (PO), Contracting Officer Representative (COR) Program Specialist Site Assessment Managers (SAM), Remedial Project Managers (RPM) On-Scene Coordinators (OSC).

[2] Note: This approval action represents EPA's determination that the document(s) under review comply with applicable requirements of the EPA Region 3 Quality Management Plan and other applicable requirements in EPA quality regulations and policies. This approval action does not represent EPA's verification of the accuracy or completeness of document(s) under review, and is not intended to constitute EPA direction of work by contractors, grantees or subgrantees, or other non-EPA parties.

A3. Table of Contents, Document Format, and Document Control

Document Format

This Quality Assurance Project Plan (QAPP) was developed in accordance with the U.S. EPA Quality Assurance Project Plan Standard. The order of the elements in this QAPP follows the Standard, as seen in the Table of Contents. The QAPP is also in accordance with the U.S. EPA Region 3 Quality Management Plan, DCN R3QMP001-20200601.

Document Control

This table shows changes to this controlled document over time.

Add rows as you have different versions. DCN###.0 is the original and will have no changes. If there is new version you would add a row and input DCN###.1 and then what modifications were done, e.g., Added X, Changed Y, Removed Z.

Table 1 QAPP Versions

DCN Version	Changes	Effective Date
Region 3 Quality Assurance Project Plan (QAPP) Template	N/A- Original Document	08/18/2023

Table of Contents

List of Tables

List of Figures

A4. Project Purpose, Problem Definition, and Background

Purpose and Problem Definition

- Describe the purpose of the project's environmental information operations (e.g., source of project request, monitoring, use of existing data)[3]
- Define the problem(s) to be addressed and question(s) to be answered.
- Identify the environmental decision(s) that need to be made.
- Discuss how the results of the environmental information operations link to possible actions.

Background

- Describe or cite background information from a historic, scientific, or regulatory perspective, e.g., applicable regulatory programs and standards.

Other QA Documents[4][5]

- List any other QA documents that are related, i.e., QAPP for other portion of work by EPA Office of Research & Development (ORD), state, other agency, etc.
- Include Standard Operating Procedures (SOPs) if relevant.

[3] Environmental Information includes data and information that describe environmental processes or conditions. Examples include, but are not limited to:

- direct measurements of environmental parameters or processes.
- analytical testing results of environmental conditions (e.g., geophysical or hydrological conditions).
- information on physical parameters or processes collected using environmental technologies.
- calculations or analyses of environmental information.
- information provided by models
- information compiled or obtained from databases, software applications, decision support tools, websites, existing literature, and other sources.
- development of environmental software, tools, models, methods, applications
- design, construction, and operation or application of environmental technology.
- Non-EPA Organizations: Include organization's Quality Management Plan (QMP) and other relevant documents.
- EPA-specific: Leave in below table: R3 QMP and for field work, R3 Field SOPs.

- Other quality assurance documents that may be related to this project are listed in Table A4-1.The table is an example and not a complete list. Remove or add relevant documents as necessary.

Table A4-1 . Other QA Planning Documents that have Relevant Requirements

Document Title	Directive #, DCN, or Revision	Effective Date	Pertinence to this QAPP
SOP			SOP to be followed during sampling
ORD QAPP			QAPP for second phase of work
U.S. EPA Quality Assurance Project Plan Standard		July 18, 2023	QAPP developed in accordance with
U.S. EPA Records Management Policy	CIO 2155.5	June 9, 2020	Records managed in accordance with
U.S. EPA Region 3 Quality Management Plan	R3QMP001-20200601	June 1, 2020	QAPP developed in accordance with
U.S. EPA Region 3 Standard Operating Procedure: Personnel and Training	R3FAP001-02072017	February 7, 2017	Field SOP to be followed
U.S. EPA Region 3 Standard Operating Procedure: Document Control	R3FAP002-02072017	February 7, 2017	Field SOP to be followed.
U.S. EPA Region 3 Standard Operating Procedure: Records Management	R3FAP003-02072017	February 7, 2017	Field SOP to be followed.

Document Title	Directive #, DCN, or Revision	Effective Date	Pertinence to this QAPP
U.S. EPA Region 3 Standard Operating Procedure: Sampling and Environmental Data Management	R3FAP004-02072017	February 7, 2017	Field SOP to be followed.
U.S. EPA Region 3 Standard Operating Procedure: Field Documentation	R3FAP005-02072017	February 7, 2017	Field SOP to be followed.
U.S. EPA Region 3 Standard Operating Procedure: Field Equipment	R3FAP006-02072017	February 7, 2017	Field SOP to be followed.
Sample Submission Procedures for the U.S. EPA Region 3. U.S. Environmental Protection Agency, Region 3, Laboratory Services and Applied Science, Laboratory Services Branch: Fort Meade, MD.	Revision 15	August 22, 2019	Lab SOP to be followed.
U.S. EPA Region 3 Laboratory, Ft. Meade, Maryland Analytical Request Form Instructions (ARF 2.1)	Version: 04/01/2021	April 1, 2021	Lab SOP to be followed.

A5. Project Task Description

- Include
  - all project tasks/ work to be performed.
  - schedule for accomplishing the tasks.
  - products to be produced.
- If relevant, identify any known time constraints (e.g., project completion deadlines, unchangeable deadlines for particular phases, seasonality issues that influence when you want to collect data).

Table A5-1. Task Schedule and Products

Task	Schedule	Product
Planning	Month Day, 2024 – Month Day, 2024	QAPP
Testing equipment, preparing supplies and safety plan		Readiness Review, Field Work Control Plan
Field Sampling of X		Data
Processing of Samples		Data
Reviewing & Compiling existing data		Data
Analyzing of Laboratory Samples		Data
Running Data Analysis		Data
Drafting Report		Draft report with review comments
Finalizing Report		Final Report
Completing all documentation and records activities		Final Project Record Package

A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

This element describes quality specifications at two levels:

1) at the level of the decision or study question (Quality Objectives)
2) at the level of the information/data used to support the decision or study question (Performance/Acceptance Criteria).

Data Quality Objectives

Describe the project's information/data quality objectives [how "good" the data (data quality) need to be to support the scientific conclusions and/or decisions for your project], e.g., determine the level of sensitivity you must achieve to assess whether samples meet regulatory criteria or the project's action limits.

Identify how the data will be used to support the project's objectives.

- What *TYPE* of data are needed?
- *WHO* will use the data?
- *WHAT* will the data be used for? For example, data collected will be used to:
  - compare with
    - previous sampling or analytical efforts
    - a regulatory standard
    - historical studies
  - create a geospatial map and database or decision tool from existing data
  - develop a model that performs accurately and precisely to satisfy regulatory or scientific objectives.
    - accurately characterize an environment, e.g., waterbody, soil, local air quality, biological assemblage, contaminated site, etc.
    - ascertain if there is a threat to public health or the environment.
    - locate and identify potential sources of contamination to formulate remediation, treatment, or disposal options., or verify attainment of clean-up goals.
  - HOW MUCH data are needed?

The data areas are *TYPE* X, Y, and Z. *WHO* will use the data to *WHAT*. *HOW MUCH DATA* are needed. Organization recognizes the importance of ensuring that data are of sufficient quality to meet the needs of the project. Organization is committed to collecting primary data and obtaining existing data of the highest quality possible within the constraints of project resources. All data used for analysis will be reviewed first using the quality procedures outlined in this QAPP. The involved Laboratories will follow their internal quality procedures and perform all necessary quality assurance as required for each parameter's method. QAQC data will be reviewed and reported in the final report and will be considered in data analysis as appropriate.

Performance and Acceptance Criteria

Provide performance[6] and acceptance[7] criteria to achieve those quality objectives.

Performance Criteria

The performance criteria that the data will need to achieve to minimize the possibility of either making erroneous conclusions or failing to keep uncertainty in estimates to within acceptable levels based on the quality objectives include:

Field and lab quality requirements- as discussed throughout this QAPP
Detection limits- Table X: Parameters and Methods shows that the detection limits meet or are below the applicable regulatory limits for this project (Table X: Regulatory Limit).
Data Quality Indicators, as outlined below.

Acceptance Criteria

Existing data to be collected for this project, their intended uses, and their limitations/acceptance criteria are described in Table A6-1. When appropriate, data will be uploaded or manually entered into the project database using the same quality protocols described for primary data.

Table A6-1. Existing Data

Existing Data Type	Source	Intended Use	Limitations/ Acceptance Criteria
Hydrological data	USGS Website- Water Data for the Nation https://waterdata.usgs.gov/nwi	To provide hydrological data for a site if needed	USGS's website notes on the stream gage's page when data are provisional and subject to revision until they have been thoroughly reviewed and received final approval. USGS's website also may indicate data quality for periods of time or certain parameters in the site's "Remarks". Data users should note in metadata upon data submission if the data is marked as provisional or has other QA notes on the USGS website. Additional follow-up to the

[6] Performance criteria address the adequacy of information that is to be collected for the project. These criteria often apply to new information collected for a specific use.

[7] Acceptance criteria address the adequacy of existing information proposed for inclusion in the project. These criteria often apply to information drawn from existing sources.

Existing Data Type	Source	Intended Use	Limitations/ Acceptance Criteria
			website should occur to determine if there are any status changes to the data.

Data Quality Indicators

Data quality indicators (DQIs) are important in determining total measurement and sampling uncertainty, and thus assist in determining if performance (and acceptance) criteria were met for quality objectives. The DQIs are precision, accuracy, representativeness, comparability, completeness, and sensitivity.

For ALL data areas/parameters: Address the 6 data quality indicators (DQIs)- Precision, Accuracy/Bias, Representativeness, Comparability, Completeness, and Sensitivity.

Precision[8]

- Field and Lab duplicates (e.g., 1 duplicate/20 samples or duplicates of 10% samples (and at least one per sampling event))

The site will be sampled in duplicate during the project for water chemistry, biological sampling and continuous sensors (where possible) at a rate of 1 duplicate/20 samples (and at least one per sampling event). The precision for equipment is listed as resolution in Table A6-2. The Laboratory will follow quality control processes (e.g., duplicates) as required for the individual analyses by their quality system. See section B4, QC Statistics, for the formula of relative percent difference (RPD).

Accuracy (Bias)[9]

- Field blank (1 blank/matrix/day or 1 blank/20 samples/matrix, whichever is more frequent)
- Rinsate/Equipment Blank (1 blank/matrix/day or 1 blank/20 samples/matrix, whichever is more frequent) if relevant.
- Accuracy of any data collection equipment, e.g., temperature sensors will have a minimum accuracy of ±0.5°C

[8] Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions.

[9] Accuracy (Bias) is a measure of the overall agreement of a measurement to a known value.

- Percent recovery is an assessment of the accuracy of laboratory analytical methods (see section B4, QC Statistics).

Field blanks will be collected for water quality samples at a rate of 1 blank/matrix/day or 1 blank/20 samples/matrix, whichever is more frequent. These blanks will contain pure water and the appropriate preservatives (e.g., nitric acid, sulfuric acid, or none). The Laboratory will follow quality control processes (e.g., spikes, blanks) as required for the individual analyses by their quality system. The Laboratory will calculate percent recovery as an assessment of the accuracy of laboratory analytical methods (see section B4, QC Statistics).

Representativeness[10]

- sample design and collection represent site conditions, e.g., sample location, container rinsing/sterility.
- ensuring that a temperature blank sample is in each cooler of samples that has a temperature requirement associated with its preservation (see Table B2-1)

Sample design and procedures identified in the QAPP were chosen to optimize the potential for obtaining samples that reflect the true state of the environment, within practical limits. Deployed equipment will be placed using best professional judgment to ensure the recorded data will represent site conditions at the desired depths and location. The water quality and biological samples will be taken at the prescribed locations in the protocol to ensure they represent the site. The general water quality containers and sampling apparatus will be rinsed 3 times with site water prior to collecting the samples unless noted otherwise in the protocol.

Comparability

Ensure data are in correct units and comparable methods, e.g., nutrients as nitrate or total nitrogen, dissolved vs. total.

Discuss any variables that may affect variability, e.g., timeframe, season, weather, different equipment, etc.

All data from historical studies, recorded from the field meter, and received from the laboratory will be checked to ensure they are in common units. A record of the laboratory methods used will be kept for each parameter to ensure comparability across space and time. All biological samples will be collected and processed using the prescribed protocols. Any deviations will be noted and considered during data analysis.

[10] Representativeness is defined as 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.

Completeness[11]

How much data is required to meet Quality Objectives, e.g., what % of data do you need to have to evaluate results for your purpose?

Optionally may include samples will be checked for completeness by assuring they are preserved appropriately and met holding times (can reference laboratory parameters table in latter section), labeled properly, and shipment coolers include Temperature Blanks (1/cooler).

At this time, no sampling locations have been deemed more critical to the overall project goal than any other. All samples will be properly labeled with the parameter, station, time, sampler, type (e.g., grab sample), and any preservative used. All sample containers will be filled fully and preserved appropriately according to the methods. All water quality samples will be preserved and/or chilled/frozen according to their method. Temperature blanks will be shipped in each cooler of samples that has a temperature requirement associated with its preservation so they can be tested upon laboratory receipt to ensure the temperature is =/<6º C. Samples will be shipped in sufficient time for the laboratory to process them before the holding times expire. Any notes will be made if a sample cannot be taken due to weather or other unforeseen circumstances.

Due to a variety of situations, all samples scheduled to be collected might not be (e.g., a storm may prohibit sampling, etc.) or the data from the samples cannot be used (e.g., sample bottles were broken in transit, sample holding times were grossly exceeded, etc.). The completeness goal is 90% for each analytical parameter and field measurement type (see section B4, QC Statistics, for the formula). If the completeness goal is not met, the Project Manager and QAM will decide next steps, and sampling or analysis will be conducted again if necessary and possible.

Sensitivity[12]

- Ensure the method detection limits/reporting limits are sufficient for Quality Objectives (e.g., detection limits are lower than the regulatory standards being looked at for the project)
  - Lab samples- can reference parameters table that has detection limits in latter section.
  - Equipment- may include resolution (e.g., 1 µS/cm) and range (e.g., 0 to 10,000 µS/cm).

[11]Completeness is a measure of 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).

[12] Sensitivity is the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest. The term "detection limit" is closely related to sensitivity and is often used synonymously.

The standard R3 LSASD Laboratory's method detection limits/reporting limits are sufficient for this project as found in their *Sample Submission Procedures for the Laboratory and Technical Services Branch (LTSB) Laboratory Section*, Revision 16; June 8, 2022.

The equipment used also meets the required limits for the project's environmental conditions and regulatory requirements as seen in Table A6-2.

Optional

This table is an example. Modify contents as relevant.

Table A6-2. Equipment Specifications

Equipment	Conductivity Range	Conductivity Accuracy	Conductivity Resolution	Temperature Range	Temperature Accuracy	Temperature Resolution
Equipment X	0-100,000 µS/cm	±0.5% of reading + 1 µS/cm	1 µS/cm	-5°C to 60°C	0.1°C	0.1°C
Equipment Y						

A7. Distribution List

Include all individuals and their organization affiliation who shall receive copies of the approved QAPP and any subsequent revisions.

- Project / Operations Manager
- Quality Assurance Manager
- Other personnel involved in environmental information and quality operations for the project, as well as contractors, subcontractors and grantees in key operations and quality roles, if applicable.

The following individuals in Table A7-1 will receive a copy of this QAPP and any subsequent revisions. A complete copy of the original version and all revisions of the QAPP shall be maintained in the organization's files by the Project Manager and made available to approval authorities upon request. The project roles listed in Table A7-1 are detailed in Section A8.

Table A7-1. QAPP Distribution List and Project Roles

Name	Project Role	Organizational Affiliation
	Senior Manager	
	Delegated Approving Official	
	Project/Operations Manager	
	Scientist	
	Scientist	
	Quality Assurance Manager (QAM)	
	Contractor	
	Contractor	
	Laboratory Sample Coordinator	
	Principal Data User	

A8. Project Organization

For every role listed in Table A7-1, describe responsibilities. Roles that must be included are:

- The approval authority for the QAPP=EPA Region 3 Delegated Approving Official (DAO)
- Senior manager having authority for the organization/group conducting the environmental information operations.
- Project Manager
- Project QAM
  - Individual responsible for maintaining the QAPP, which may be a role listed under QAM or Project Manager instead.
- Operations and quality staff conducting or supporting project operations (e.g., field scientists, laboratory sample coordinator)
- All contractors, subcontractors, or sub-grantees supporting project operations.

- Internal or external principal environmental information or data users

Each staff member is individually and ultimately responsible for understanding and adhering to the quality and operation procedures they perform, and for the quality of the data they collect or produce. The responsibilities of personnel involved in project implementation are enumerated below.

The Senior Manager, who has leadership authority for the project, will be responsible for the following activities:

- Oversee resource allocation.
- Review and internally approve the QAPP and any other relevant documentation (e.g., health and safety plan)

The Delegated Approving Official (DAO) has the responsibility to:

  - Be knowledgeable of EPA requirements for QAPPs and other equivalent QA documents.
  - Follow the quality document review process outlined in the US EPA Region 3 Quality Management Plan (QMP)Acquire DAO certification as outlined in the QMP.
  - Not approve QA documents they authored or prepared, or for projects/programs they manage.

The Project Manager(s) will:

- Conduct outreach with potential participants, data users, and stakeholders.
- Ensure all project personnel are properly trained and/or have the skills to fulfill assigned project tasks.
- Submit Analytical Request Form (ARF) to Laboratory Sample Coordinator.
- Conduct a readiness review prior to any data collection step, including completing any relevant health and safety plans and acquiring collection permits or other permissions as applicable, and ensuring all equipment and supplies are sufficient.
- Oversee participation, data collection, and data analysis tasks, ensuring all protocols and this QAPP are followed during sampling and other operations.
- Authorize all changes or deviations in the operation of the project, including management and implementation of any corrective actions.
- Issue reports as applicable, including preparing a summary of any data quality issues.
- Retain project records according to applicable Agency policy.
- Review and approve QAPP and any other relevant documentation.
- Distribute final QAPP and any subsequent revisions.
- Maintain and amend this QAPP as necessary and notify QAM.

The Scientists will be responsible for:

- Reading and being very familiar with this QAPP and the related standard operating procedure(s) (SOPs) or methods for any operation they perform.
- Ensuring they are properly trained and/or have the skills to fulfill assigned task.
- Identifying and reporting to the Project Manager any emerging/unanticipated problems, data anomalies, or other project/data issues.
- Annotating the related SOPs for any activity they perform if necessary and permanent changes arise or authoring new SOPs if a gap exists.
- Recording, entering, verifying, and validating data as outlined in this QAPP.
- Maintaining data and retaining project records in conjunction with the project manager and in accordance with applicable Agency policy.

The Quality Assurance Manager (QAM) will be responsible for the following activities:

- Reviewing QAPP
- Assessing effectiveness of the QAPP.
- Discussing any corrective actions or other quality issues with Project Manager and any relevant staff as applicable.
- As necessary, discussing quality-related issues with their organization's senior manager, even if outside of their direct supervisory chain.

The Principal Data User will need to:

- Communicate early in the project with Senior or Project management about any specific needs and objectives.
- Read reports or other documentation to understand any quality concerns, e.g, any limitations to data use, flags on lab data, etc., before using information/data.

A9. Project Quality Assurance Manager Independence[13]

Describe how the Project QAM's independence is ensured. The Project QAM is not required to be independent of senior management who are nominally, but not functionally, involved in operations.

The Project QAM shall be independent of environmental information operations. This independence will be ensured by the QAM not participating in any environmental information collection activities outside of their role of quality oversight, e.g., the QAM will not collect data but can conduct assessments in the field. The Project QAM is not required to be independent of senior management who are nominally, but not functionally, involved in operations. The Project Manager

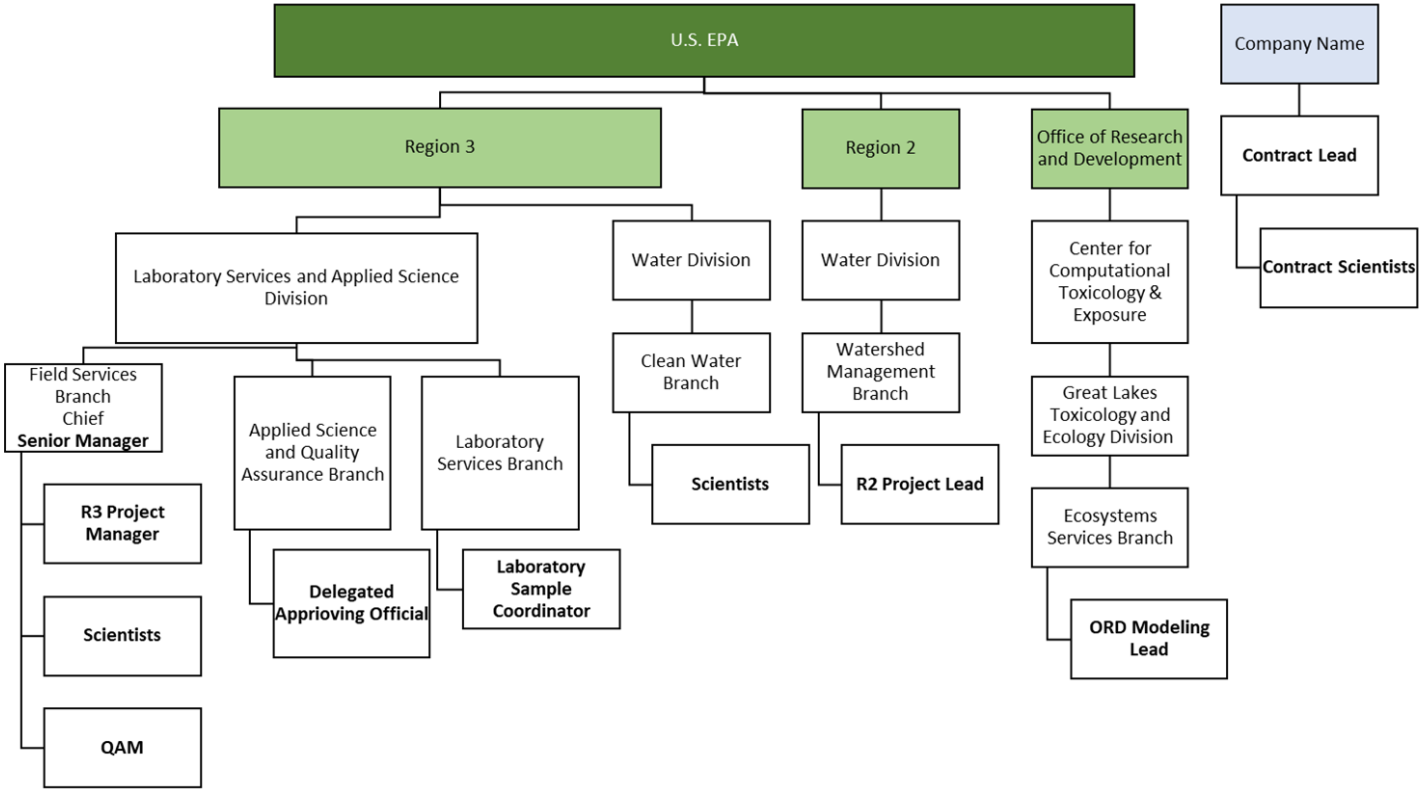
[13] Non-EPA Organizations: The two functions, QA and operations, must remain independent; however, in small organizations outside of EPA and EPA contractors (e.g., small tribal departments), these two functions may be combined with approval from the EPA R3 QAM.

or designee will not have authority to sign QAPPs for the QAM or designee, nor will the QAM or designee have authority to sign QAPPs for the Project Manager or designee.

A10. Project Organization Chart and Communications Project Organization Chart

Show all organizations responsible and involved in the project. Modify chart as necessary. Lines of authority are shown in the organization chart. Lines of authority are shown in the organizational chart. Project roles are bolded black.

Figure A10-1. Project Organization Chart



Communication[14]

To ensure that users of the QAPP understand the processes and responsibilities when communication is necessary:

- Discuss lines of communication and timing.
- Can do optional table also. Example below.
- Describe or cite the standard procedures for communications to include elevating discrepancies and QAPP non-conformances; process improvements; and seeking concurrence and approvals between project personnel, and/or between contractors.

Project communication is detailed in Table A10-1. Region 2 will communicate with the contractor, but the Region3 Project Manager will communicate with all other leads and personnel involved in operations. EPA project personnel will have access to the project's Microsoft Teams site. As soon as they are aware and within one business day, all project personnel will raise discrepancies, QAPP non-conformances, and process improvements to the Project Manager. After consulting with the QAM and Senior Manager if needed, the Project Manager gives final approval on any changes, notifies the affected members of the project team, and saves relevant documentation in the project folder.

Table A10-1. Communication Pathways

Communication Driver	Responsible Entity	Procedure (timing, pathway, etc.)
Manage field project phase	R3 Project Manager	The R3 Project Manager will inform the scientists about all field activities and any other pertinent project information.
Manage modeling project phase	ORD Project Lead	The ORD Project Manager will inform the modeling scientists about all modeling activities and any other pertinent project information.
Report contractor activities to EPA Project Manager	Contractor's Lead	All materials and information about the project will be forwarded to the EPA Project Manager. At a minimum, regular updates will be given once a month.
Reporting Lab Data Quality Issues	Lab Point of Contact	The lab will communicate any issues in the data report.

[14]Non-EPA Organizations: Shall also describe communication procedures to EPA to include elevating discrepancies and QAPP non-conformances.

Communication Driver	Responsible Entity	Procedure (timing, pathway, etc.)
Issues encountered in field or with data analysis	Scientists	Scientists will communicate any issues or deviations from the QAPP to the Project Manager within one business day of that activity.
Corrective actions for field`1 activities and data analysis	R3 Project Manager and QAM	The R3 Project Manager, in coordination with the QAM, will determine the need for corrective action for field and analytical issues and communicate those to affected staff as soon as possible.

The Region 3 Project Manager will be the communications champion for any communications outside of the project team. Landowners will be contacted by phone, then mail, if necessary, to seek approval to access their property. A one-pager on the project will be developed for landowners or public that approach field personnel wanting more information. It may contain:

1) Who to contact for more information?
2) Why is EPA doing this project?
3) What is the goal of the project?
4) How does this project help EPA meet its mission to protect public health and the environment?
5) Who will be involved and/or impacted by the research (Federal Agencies, Community Groups, Local Government) and how will this research inform their decision making?
6) If applicable, what is a specific key messages for targeted group(s)?

A collector's permit will be obtained from Agency, which also is considered notification to the State/entity of sampling in that area.

If public health issues/impacts are anticipated or detected for this project, answers to the following questions optionally may be included in this section to help all personnel understand the process if asked:

- What are the potential issues/impacts?
- What entities will be notified (public, federal, state, tribal, etc.)?
- Who will be responsible for notifying and coordinating with the entities?
- Who specifically will be notified in the entity?

A11. Personnel Training/Certification[15]

- Identify the individual responsible for ensuring personnel conducting operations are qualified, trained, and experienced.
- List any specialized training or certifications needed by personnel to successfully participate in the operations. Training may include on-the-job training as well as training on internal procedures.
  - how the training will be provided
  - how the necessary skills will be assured.
- procedure and responsible individual to document training records and skill evaluation
- Do not state a specific persons' educational background (e.g., Jane Doe has a PhD); detail what training and/or experience is needed for the person in that project role to perform the task(s) properly, e.g., .certification for Annual EPA Method 9 (Smoke School), biological taxonomic identification, etc.

The Project Manager is responsible for ensuring that all scientists involved with data generation have the necessary training to successfully complete their tasks and functions. The Project Manager will document attendance at any training sessions. An experience sampler, as determined by X, will be present during all sampling. All project members must be familiar with the protocols. Any unknown procedures will be reviewed in the office and/or field prior to sampling.

Optional:

Can include a table with the specific trainings.

Table A11-1. Trainings

Project Function	Training Title / Description	Delivery Method	Training Date or Frequency	Trainer	Trainees

[15] • EPA-specific: For field activities, reference all Personnel and Training requirements identified in the current version of the EPA Quality Assurance Field Activities Procedure (QAFAP). Example language: For the field activities, all Personnel and Training requirements identified in the current version of the EPA Quality Assurance Field Activities Procedure (QAFAP) will be followed. This information is also in the most current version of EPA Region 3's Standard Operating Procedure (SOP) Personnel and Training [2017, DCN # R3FAP001-02072017].

A12. Documents and Records[16]

- Itemize the information and records that will be part of the project.
- Describe or reference the management of the documents and records, including the QAPP [Note: Management of project information/data is covered in B7 Environmental Information Management.]
- Include or reference all applicable requirements for the final disposition of records and documents, including location and length of retention period.

Project-Specific Documents and Records

Project records will be managed in accordance with the current EPA policies. The Project Manager will be responsible for saving electronic files on the shared drive to ensure they are automatically backed up. Hard copy records will be filed in location and scanned to be saved electronically in the project folder. Documents and records will include, but not limited to:

Modify as needed.

1) QAPP (including amendments and revisions) and documentation of any deviations from QAPP.
2) Training records
3) Sampling permit
4) Landowner permission documentation
5) Field forms
6) Photos
7) Final sample results
8) Data analyses
9) Assessment results, corrective action(s), and any quality issues
10) Reports
11) Receipts for purchasing supplies/equipment.
12) Equipment calibration and maintenance logs
13) Biological taxonomic identification sheets

QAPP Preparation and Distribution

This QAPP conforms to the format described in the U.S. Environmental Protection Agency publication Quality Assurance Project Plan Standard [Directive No: CIO 2105-S-02.0]. The QAPP shall always govern the operation of the project and must be accessible during operations.

[16] EPA-specific: For field activities, include or reference all Document Control and Records Management requirements identified in the current version of the EPA QAFAP.

Each responsible party listed in Table A7-1 shall adhere to the procedural requirements of the QAPP and ensure that subordinate personnel do likewise.

This QAPP shall be reviewed at least annually to ensure that the project will achieve all intended purposes. In addition, it is expected that ongoing and perhaps unexpected changes may need to be made to the project. Project Managers, QA Staff and other applicable personnel in Table A7-1 shall participate in the review of the QAPP. The Project Manager(s) shall authorize all changes or deviations in the operation of the project. The review and any revisions will be documented. If significant changes need to be made, the QAPP will be sent to the DAO again for approval. Examples of significant revisions include changes in:

1) the scope of the project resulting in new or revised objectives
2) implementation such as how information will be collected, produced, evaluated, or used
3) the design, construction, operation, or application of environmental technology
4) the statement of work or workplan for extramural agreements
5) expiration of the QAPP
6) the organization's mission or structure, such as in the delegation status of QAPPs
7) performance criteria as to how results will be assessed for acceptance.

The Project Manager will document the effective date of all changes made in the QAPP and distribute revised versions to all individuals listed in Table A7-1.

Field Documentation

To thoroughly document field activities, dedicated bound logbooks (or electronic equivalents), checklists, forms, electronic devices and/or other field documentation methods must be used for field data collection including, but not limited to, sampling, measurements, and observations.

This section below is EPA-specific but external entities can also choose to follow or may be instructed to follow by the respective EPA program.

For field operations, all document control and records management requirements identified in the current version of the EPA QAFAP will be followed. This information is also in the most current versions of EPA Region 3's Standard Operating Procedures (SOPs*) Document Control* [2017, DCN # R3FAP002-02072017], *Records Management* [2017, DCN # R3FAP003-02072017], and *Field Documentation* [2017, DCN # R3FAP005-02072017].

The following requirements are included in these SOPs and apply to all field documentation:

1) For project-generated documentation (e.g., QAPP, field forms), the project 's unique identifier (number(s) and/or name) and sequential page numbers, incorporating both the current page number and the total number of pages (e.g., "page x of y"), must be on each page.
2) Field documentation shall include:
   a) Name and location of project
   b) Team members present.

c) Dates and time of field work
d) Measurement/sampling identification and collection method.
e) Calibration information if applicable.
f) Maps/sketches if relevant
g) Conditions that may adversely impact the quality of measurements/samples, if applicable (for example, rain, wind, smoke, dust, extreme temperatures, etc.)

3) Unless prohibited by environmental conditions, pens with permanent ink must be used to record all data. When environmental conditions or preservatives such as ethanol do not make it feasible to use permanent ink, entries should be made using a non-smear pencil. Pencil entries should be made permanent as soon as possible after the original entry, e.g., through photocopying, imaging, or equivalent means, and shall be added to the project file.
4) Data or other information that has been entered incorrectly must be corrected by drawing a single line through the incorrect entry and initialing and dating the correction. Under no circumstances should the incorrect material be erased, made illegible, or obscured so that it cannot be read.

Storage

While the project is underway, project information will be stored in a central filing cabinet at organization location, and on the organization's secure computer network, according to the organization's data management plan/standard policy. Upon completion of the project, paper records and electronic media (e.g., CDs) will be retained for x years at organization location. Electronic records will be stored for x years on the organization's main computer network and at a secure off-site location. Details of the records schedule, as outlined in EPA Records policy, is shown in Table A12-1.

Table A12-1. Records Schedule and Disposition

Modify table as necessary.

Record Type and Closure	Schedule	Items	Disposal
Project Records Close when activity, project, or topic is complete	1035 Title: Environmental Programs and Projects	**Item a -Historically significant,** e.g., assess ongoing threats to human health and the environment, document significant actions, contribute new and advanced technologies/methodologies that have continuing value beyond EPA's use. **Item b- Ongoing Operational Value**	**Item a:** Permanent, Transfer to the National Archives 15 years after file closure. **Item b**- Destroy 20 years after file closure.

Record Type and Closure	Schedule	Items	Disposal
		not required for the history of project but have operational value throughout the life of the project, e.g., scientific research project files, methodology, QAPPs, raw data, laboratory notebooks, correspondence, data collection media, interim and final reports, quality assurance assessments. **Item c- Routine**, e.g., SOPs, sampling and analytical data files **Item d- Short-term** not considered essential for ongoing management of the project, e.g., drafts of interim progress reports; equipment notebooks or logs for calibration, maintenance, and inspection	**Item c-** Destroy 10 years after file closure. **Item d**- Destroy 5 years after file closure.
Enforcement Support Close when activity, project, or <u>case</u> is complete.	1044 Title: Compliance and Enforcement	**Item a**- Historically significant, e.g., Environmental Impact Statements, Development and enforcement of standards by states **Item b**- Long-term **Item c**- routine, e.g., credentials, action files **Item d-** short term, e.g., field notebooks	**Item a**- Permanent, Transfer to the National Archives 15 years after file closure. **Item b**- Destroy 20 years after file closure. **Item c**- Destroy 10 years after file closure. **Item d**- Destroy 5 years after file closure.

Record Type and Closure	Schedule	Items	Disposal
Equipment/ Supplies Purchases (Close after completion or when no longer needed); OR Contracts (Close when activity or contract completed/ terminated)	1004 Title: Acquisitions and contracts	Item b- Routine acquisitions and contracts, e.g., contract management, acquisition of goods or services, receipts Item d- Purchase card logs and supporting documentation	Item b- Destroy 6 years after file closure. Item d- *Destroy 3 years after file closure.*

B Implementing Environmental Operations

In the Group B Section, if the Standard Operating Procedures (SOPs) and/or referenced materials are well documented and readily available to all key personnel, citations may be adequate; however, because weblinks may change over time, one current, controlled version of the referenced documents (such as pdf) should be placed in the project file and made available for routine referencing when needed.

B1.Identification of Project Environmental Information Operations[17]

Describe what operations will be conducted for the project (NOT 'How'- that is described in section B2).

- how they will satisfy the project purpose, and the quality objectives already outlined
- Sample locations
  - optional map
  - optional table of site/sample IDs with lat/longs
  - if sample locations are not known in advance, discuss how the sites will be chosen in the field.
- frequency of sampling at each location
- matrices to be sampled.
- environmental parameters of interest in each matrix
- any design assumptions or what to do if sampling becomes inaccessible (e.g., no sampling for x number of days after storm event, defined as "X" inches of rain after "Y" number of dry days)
- any phases, seasonality, etc.

Optional Table

Table B1-1. Sampling Components

Component/Matrix	Parameter(s)	# of Samples or Measurements	Frequency	Equipment
Sediment Characterization	Grain Size, Density, and TOC	100	At each site every month	Ponar Sampler

[17] EPA-specific: Field operations will be conducted in accordance with U.S. EPA Region 3 Standard Operating Procedures: Sampling and Environmental Data Management, DCN R3FAP004-02072017 and if applicable, Field Inspections and Investigations, DCN R3FAP007-02072017.

Component/Matrix	Parameter(s)	# of Samples or Measurements	Frequency	Equipment
Surface Water Grab Samples	Nitrogen, Phosphorous, and Chlorophyll a	100	At each site every month	Bottleware
In situ Water Quality	Temperature, pH, Dissolved Oxygen, Conductivity, Total Suspended Solids	30 measurements per parameter	At each site every month	YSI Meter
Water Light Penetration	Light Penetration Water Depth	30	At each site every month	Secchi Disk [The same individual will read the secchi disc to reduce error.]
Water Depth	Bathymetry	10	Once at start of project's field activities	Echosounder and GIS
Water Depth	Bathymetry	30	Once at start of project's field activities	Vexilar portable depth finder
Water Depth	Bathymetry	30	Once at start of project's field activities	Boat depth finder
Geospatial	outfall locations, shoreline types, and the surrounding land use	NA	Once before start of field activities	GIS layers

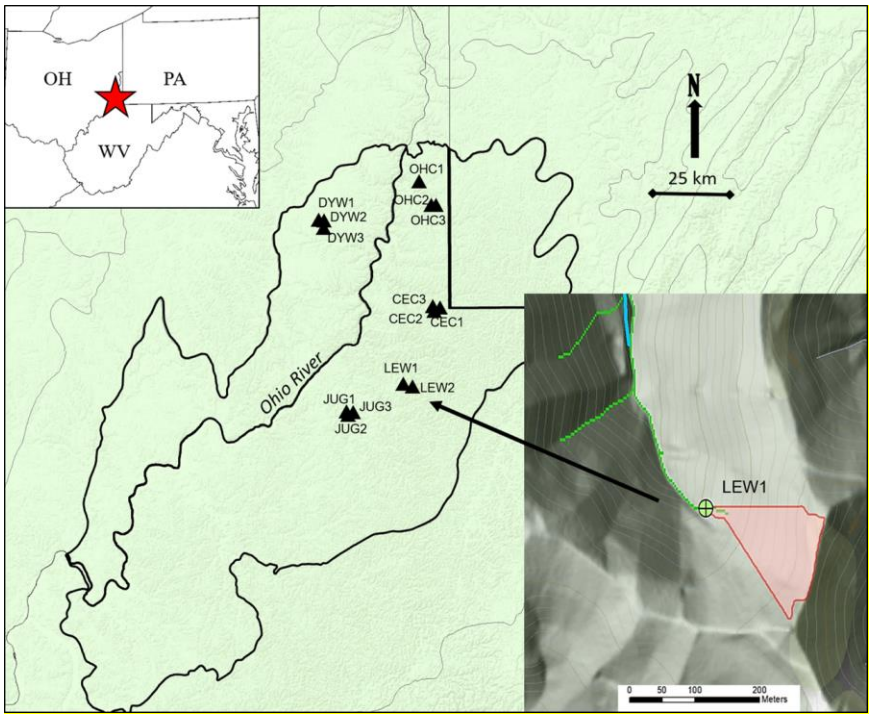
Component/Matrix	Parameter(s)	# of Samples or Measurements	Frequency	Equipment
Geospatial	Distance from shore	20	Once at start of project's field activities	Rangefinder and/or GIS

Table B1-2. Site Information 1

Site ID	Site Name, Description	Site Type	Latitude	Longitude

Map of site locations with one site enlarged to show example of stream drainage area in red.

Figure B1-1. Map of Sites



B2.Methods for Environmental Information Acquisition

Explain how primary data will be collected, processed, and analyzed by identifying data collection procedures and methods for EACH operation/matrix/parameter including as applicable, but not limited to

- Field Activities Environmental Measurements, derived from tools, instruments, observational results, investigations, and sample collection. Describe sampling methods as applicable, including:
  - Specific procedures
  - Sequencing of samples
  - Sample containers, volumes, preservation and holding times (see Table B2-1))
  - How samples are to be homogenized, composited, split, or filtered
  - Equipment and support facilities needed and preparation steps
  - Decontamination and disposal of waste by-products
- Laboratory Analyses, (see Table B2-1)
  - Analytical methods by number/identifier, version/revision date and regulatory citation (if applicable)
    - Laboratory data package turnaround time needed, if important to schedule.
  - For non-standard method applications, appropriate method performance study information is needed. If previous performance studies are not available, they shall be developed during the project and included as part of the project results.
  - Existing Information

- Collection process for Existing Information as seen in Table A6-1.
  - If the information is to be combined with new environmental information, describe the criteria to ensure compatibility.
- Environmental Technology[18]
  - Identify whether the technology is primarily for pollution prevention, contamination containment, storage, or remediation.
  - Describe the physical parameters or processes 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 contaminants and/or prevent them from entering the environment.

Reference SOPs as applicable with hyperlink or put in attachments. SOPs shall be available to personnel conducting the environmental information operations. Include:

- version/revision date of the SOP
- any modifications from the standard SOPs
- the specific option or equipment being used if the SOP has multiple selections.

[18] Environmental Technology includes systems, devices and their components applicable to both hardware and methods or techniques that measure and/or remove pollutants or contaminants and/or prevent them from entering the environment. Examples include but are not limited to:

• Pollution prevention: measurement, monitoring, reduction, control, and/or treatment processes, such as wet scrubbers (air), granulated activated carbon unit (water), filtration (air, water).

• Contamination: containment to prevent further movement of the contaminants, such as capping, and solidification or vitrification, and biological treatment.

• Storage containers, methods, or facilities, such as drums, tanks, and ponds or lagoons.

• Remediation processes and their components, and/or technologies, such as soil washing (soil), pump and treatment, soil vapor extraction (soil), land farming and other bioremediation processes

Table B2-1. Water Quality Parameters[19]

Parameter	Quantitation Limit	Method	Holding Time	Min. Volume	Container Type[20]	Preservative[21]
Boron	50 µg/L	200.7 Metals; ICP-AES	6 months	200 mL	Plastic	pH <2 HNO_3
Calcium	500 µg/L	200.7 Metals; ICP-AES	6 months	200 mL	Plastic	pH <2 HNO_3
Iron	100 µg/L	200.7 Metals; ICP-AES	6 months	200 mL	Plastic	pH <2 HNO_3
Potassium	2000 µg/L	200.7 Metals; ICP-AES	6 months	200 mL	Plastic	pH <2 HNO_3
Magnesium	500 µg/L	200.7 Metals; ICP-AES	6 months	200 mL	Plastic	pH <2 HNO_3
Sodium	1000 µg/L	200.7 Metals; ICP-AES	6 months	200 mL	Plastic	pH <2 HNO_3
Manganese	2 µg/L	200.8 Metals; ICP-MS	6 months	200 mL	Glass or plastic	pH 2 HNO_3
Copper	30 µg/L	200.8 Metals; ICP-MS	6 months	200 mL	Glass or plastic	pH 2 HNO_3
Aluminum	1 µg/L	200.8 Metals; ICP-MS	6 months	200 mL	Glass or plastic	pH 2 HNO_3
Lead	1 µg/L	200.8 Metals; ICP-MS	6 months	200 mL	Glass or plastic	pH 2 HNO_3

[19] Containers needed per each sampling site (or for duplicate or blank):

- 1 500 mL plastic container – metals (both AES and MS) (pH<2 HNO3)
- 1 500 mL plastic container – anions (28 days) (cool, ≤ 6º C)
- 1 250- or 500-mL plastic container – anions (48 hrs.)- NO2, NO3, OP (cool, ≤ 6º C)
- 1 250- or 500-mL plastic container – anions (filtered)- soluble OP (filtered after collection & placed in another dry container, cool, ≤ 6º C)
- 1 L plastic container- TP, TN, NH3-N (pH<2 H2SO4, cool, ≤ 6º C)

[20] Plastic is Polyethylene)

[21] Do not allow to be frozen.

Parameter	Quantitation Limit	Method	Holding Time	Min. Volume	Container Type[20]	Preservative[21]
Zinc	2 µg/L	200.8 Metals; ICP-MS	6 months	200 mL	Glass or plastic	pH 2 HNO_3
Sulfate	0.25 mg/L	300.0 Anions by Ion Chromatography (IC)	28 Days	400 L	Glass or Plastic	Cool <6°C
Chloride	0.5 mg/L	300.0 Anions by Ion Chromatography (IC)	28 Days	400 L	Glass or Plastic	Cool <6°C
Fluoride	0.1 mg/L	300.0 Anions by Ion Chromatography (IC)	28 Days	400 L	Glass or Plastic	Cool <6°C
Bromide	0.5 mg/L	300.0 Anions by Ion Chromatography (IC)	28 Days	400 L	Glass or Plastic	Cool <6°C
Nitrite-N (NO_2)	0.05 mg/L	300.0 Anions by IC	48 hours	200 mL	Glass or Plastic	Cool <6°C
Nitrate-N (NO_3)	0.15 mg/L	300.0 Anions by IC	48 hours	200 mL	Glass or Plastic	Cool <6°C
Orthophosphate (OP)	0.25 mg/L	300.0 Anions by IC	48 hours	200 mL	Glass or Plastic	Cool <6°C
Soluble Orthophosphate	0.25 mg/L	300.0 - Anions by IC; Filtered in field with 0.45 µm filter	48 hours	200mL	Glass or Plastic	Cool <6°C
Total Nitrogen (TN) - digested	1 mg/L	353.2	28 Days	500 mL	Glass or Plastic	pH<6 H_2SO_4, Cool <6°C
Total Phosphorous (TP)	0.05 mg/L	365.4	28 Days	200 mL	Glass or Plastic	pH<2 H_2SO_4, Cool <6°C
Ammonia-Nitrogen (NH_3-N)	0.01 mg/L	SM 4500-NH_3 BH	28 Days	200mL	Glass or Plastic	pH<2 H_2SO_4, Cool <6°C

B3.Integrity of Environmental Information

Describe or cite procedures and requirements to ensure the integrity of the operations, such as sample handling and custody, to include but not limited to:

- field documentation
- packaging
- transport and/or shipment from the site
- storage at the laboratory
- sample labels example
- Chain of Custody (COC) forms example
- shipping protocols
- if laboratory involvement:
  - identify each laboratory to be used as well as the laboratory's current accreditation and/or certification for the applicable analytes and matrices.

Information/Data/Sample Handling

Unbound checklists and forms must remain in control of the operations lead, transferred to the Project Manager, and kept in the project file upon return from the field. Hard copy records will be scanned to be saved electronically in the project folder. See section *A12. Documents and Records* for additional information on field documentation handling.

Original digital images will not be modified. A photo log will be kept of all digital images with:

1) Description of what is in the image, including orientation, if appropriate.
2) Date and time taken.
3) Name of the photographer.

For sample tags, as shown in Attachment 2, the following information must be included using permanent non-erasable ink:

1) Project number
2) Unique identification or station number
3) Identification of sampler
4) Date and time of sample collection
5) Sample designation as grab or composite
6) Sample designation as preserved or unpreserved and identification of the preservative
7) The parameter to be analyzed.

The Chain of Custody (COC) documentation, as shown in Attachment 3, must include:

1) Site name that is recorded on the Laboratory Analytical Request Form (Project Name)
2) Analytical Request number (Project Number)
3) Sampler's name/signature
4) Sample ID (Station Number)

5) Date and Time of collection (recorded in 24-hour clock time)
6) Type of sample (grab or composite)
7) Sample description (Station Location)
8) Accurate number of containers
9) Parameters requested.
10) Preservation of sample
11) Sample tag/label numbers
12) Sample remarks (i.e., filtered for dissolved components, or if it is a field duplicate)
13) Date, Time and Signatures for sample receipt and transfer

Sample Transportation

Samples will be shipped via UPS overnight to the U.S. EPA Region 3 Laboratory in Fort Meade, MD following Sample Submission Procedures for the Laboratory and Technical Services Branch (LTSB) Laboratory Section, (most current version).

The steps to ship samples are to:

1) Select a sturdy cooler in good condition.
2) Complete the Chain of Custody, 1 per cooler. Retain a copy.
3) Complete a Hazard and Risk Exposure Data Sheet (Attachment 4) and attach to the OUTSIDE of each shipping container so that it is available for review by the laboratory before opening any coolers.
4) Line the cooler with a large heavy-duty plastic bag and put some ice in the bottom.
5) Place another large heavy-duty plastic bag in the cooler and place samples in there, ensuring samples are properly and securely placed.
    a) Be sure the lids on all bottles are tight (will not leak).
    b) Put electrical tape around lids if applicable.
    c) Ensure samples in the cooler are listed on the corresponding COC.
    d) Check each sample tag/label is secured to each container since they might loosen and fall off if the containers get cold or wet.
    e) Wrap any glass containers in bubble wrap and pack to minimize breakage.
6) Add a temperature blank (sample or small bottle with water) in each cooler. Ensure it is marked as temperature blank.
7) Seal the sample bag (compressing any air out) with a zip tie.
8) Add more ice on top of samples and then seal ice bag with a zip tie, ensuring melted ice water will not leak out.
    a) The loaded cooler must not be heavier than 50 pounds to allow for safe handling. Separate samples into multiple coolers if needed to keep the weight under 50 pounds.
    b) Ensure that the ice is fresh before shipment and use adequate amounts of ice to ensure samples will remain cold for up to 36 hours.
9) Place the COC Record and a return cooler label into a sealed plastic Ziploc bag and tape the bag to the inner side of the cooler lid.

10) Close the cooler and affix a signed custody seal to the lid.
11) Complete/print a priority overnight shipping label with all required info.
    a) Retain a copy of the tracking number.
12) Place the shipping label on top of the cooler and securely tape, with packing tape, the top of the cooler shut, ensuring tape goes over the custody seal and the shipping label to prevent it from falling off.
13) Ensure the package is shipped before the overnight deadline.
14) Notify the LTSB Sample Scheduling Coordinator as soon as possible when (1) samples have been shipped, (2) a scheduled shipment has been changed/canceled, or (3) there are changes in the number or types of samples.

Laboratory Certification/Accreditation

All laboratory water samples will be analyzed by the EPA Region 3 Laboratory at the Environmental Science Center, Fort Meade, MD (Region 3, Laboratory Services and Applied Science Division, Laboratory & Technical Services Branch). The EPA Region 3 Laboratory Sample Submission Process will be followed when submitting samples, which will help ensure field and laboratory aspects of the sampling are linked to produce reliable data of known quality. Analytical services provided by the R3 Lab are documented in their Laboratory Quality Manual. This manual describes the Laboratory's quality procedures, which are ISO 17025 accredited by A2LA accreditation body. The Laboratory also holds Drinking Water certification from the EPA Office of Water (Cincinnati) in inorganics, organics, and microbiology.

B4.Quality Control

Describe

- Quality Control (QC) activities needed for each operation to meet quality objectives and performance/acceptance criteria. Can be done in optional Table, see Table B4-1.
  - frequency of each QC activity
  - actions to be taken when problems occur.
  - responsible individual(s) for corrective actions and how this should be documented (e.g., lost samples, broken equipment, inaccessible sampling locations, etc.)
- Procedures to be used to calculate applicable statistics (e.g., precision and bias).
- For field and lab, possibly also the use of blanks, duplicates, matrix spikes, laboratory control samples, and surrogates.
- For existing data, possibly also the use of systematic review, independent secondary review of studies in the open literature, and QC of constructed databases or spreadsheets.
- For using models or modeling, possibly also model calibration, and model validation (sensitivity analyses).

QC Activities

Field datasheets are reviewed on site before departure to ensure no missing and/or questionable data. The Field Activities Review Checklist, Attachment 5, will be used by the Project Manager or QAM to ensure field data were collected appropriately and completely. Data transference is routinely checked and validated by scientists. Data entered into the computer will be routinely checked against the original data sheets with 100% verification. Errors caught during cross-checking will be flagged and corrected, to the extent possible, in consultation with data collection scientists. Data analysis will be checked to ensure it was conducted correctly. Other specific QC activities are described in Table B4-1.

The involved Laboratories will follow their internal quality procedures, e.g., duplicates, spikes, blanks, and perform all necessary quality assurance as required for each parameter's method. Laboratory quality data will be reviewed (see Attachment 6 for checklist) as part of the data package, considered in data analysis, and reported in the final report as appropriate.

Optional

Table B4-1. QC Activities

Operation	QC Activity	Frequency	Actions to Be Taken if Problems	Responsible Individual(s)	Communication Route

QC Statistics

Following the DQIs outlined in Section A6, the following QC statistics will be calculated.

Table B4-2. QC Statistics

Calculation	Formula	Abbreviations
Duplicate Precision	RPD = $\frac{(D_L-D_S)}{(D_L+D_S)/2} \times 100$	RPD = relative percent difference between duplicate determinations D_L and D_S = results for the duplicate values with D_L = larger of two observed values D_S = smaller of two observed values

Calculation	Formula	Abbreviations
Completeness	%C = V x 100 N	%C=percent completeness V =number of measurements judged valid N=target number of measurements necessary to achieve a specific statistical level of confidence in decision making
Laboratory Control Samples (accuracy)	% R = M x 100 T	%R=percent recovery M=measured concentration T=true spiked concentration
Laboratory Matrix Spike (accuracy)	% R = (S-U) x 100 T	%R=percent recovery S=measured concentration of spiked sample U=measured concentration of unspiked sample T=true spiked concentration

B5.Instrument/Equipment Calibration, Testing, Inspection, and Maintenance[22]

Detail

- Ensure that the instruments/equipment are available and in working order when needed.
- Ensure that calibration will be conducted, documented, and be traceable to the instrument.
- Availability of critical spare parts

Except for the laboratory, the project manager is responsible for ensuring instruments and equipment used for taking and handling samples are to be inspected, maintained, and cleaned according to manufacturer's recommendations. Extra batteries, chargers, and other critical spare parts will be packed for field activities. The laboratory will maintain their equipment according to their SOPs.

[22]EPA-specific: Equipment will be managed as outlined in the most current version of EPA Region 3's SOP Field Equipment [2017, DCN # R3FAP006-02072017]

Calibration of the field meter will be done the same week it will be used in the field and before the sampling occurs using appropriate standards. The dissolved oxygen probe will be calibrated on the day it is used and at the site to properly represent conditions due to changes in barometric pressure. Calibration standards will be traced using the manufacturer, the lot number, and the expiration date in the field logbook for the meter and the chemical inventory and management notebook. Continuous sensors will be compared to calibrated equipment if they can't be discreetly calibrated.

After sampling, equipment will be cleaned of aquatic plants, animals, and mud before leaving the site. On return to the office, all equipment will be rinsed and dried for 5 days before use again. If there is a need for a shorter turnaround, the equipment will be cleaned with a 10% bleach solution (1 part bleach per 9 parts water) for a minimum exposure time of 10 minutes and then dried for 48 hours.

Optional

Table B5-1. Equipment Maintenance and Calibration

Parameter, Instrument	Maintenance Schedule & Activity	Calibration Schedule & Activity	Calibration Criteria	Corrective Action	Person(s) Responsible
Temperature Sensor. Brand Multimeter, ID#0000	As needed and according to manufacturer's manual	Annual check of endpoints of desired temperature range (0° to 40°C) against a NIST thermometer.	±0.5°C of true value at both endpoints	Remove from use if doesn't pass criteria.	Project Manager or Designee
pH Sensor. Brand Multimeter, ID#0000	As needed and according to manufacturer's manual	Initial: two-point calibration bracketing expected field sample range (using 7.0 and either 4.0 or 10.0 pH buffer, depending on field conditions). Post-sampling each day: one-point check with 7.0 pH buffer	Initial: two-point calibration done electronically; one-point check (using 7.0 pH buffer) ± 0.1 pH units of true value. Post: ±0.5 pH units of true value of 7.0 pH buffer.	Recalibrate. Qualify Data	Project Manager or Designee

B6.Inspection/Acceptance of Supplies and Services

Describe

- how supplies and services[23] are inspected and accepted
- the individual(s) responsible for inspection and acceptance

Attachment 1 is an example of a Field Equipment and Supplies checklist that could be used.

All sample bottles will be inspected by the Project Manager or designee to ensure they are free of any contaminants. The Project Manager will use a checklist (see attachment 1) to ensure all items are available during sampling.

Contractor services will be reviewed as outlined in the Statement of Work for Contract #00000.

B7.Environmental Information Management

Detail

- Data management scheme, from generation (e.g., how will data be recorded in field), processing, compilation, and then final storage.
- How data will be analyzed (e.g., statistical methods, comparison to existing data)
- Mechanism for detecting and correcting errors and for preventing loss of information during data entry and reporting.
- Individuals responsible for elements of the data management scheme
- Any required computer hardware/software and any requirements for configuration
- Include examples of any checklists and forms.

Upon return to the office, the datasheets are scanned and submitted to the Project Manager by the scientists weekly and inspected. Hard copies of the original data sheets are kept on file in the Project Manager's office. Data generated by the Laboratory is sent via email to the Project Manager. As needed, the Project Manager will provide the field and/or laboratory data to the scientists for digital data entry.

Microsoft Access is used to record and organize all data. Once all data are entered, the Program Manager inspects the data for accuracy and corrects any errors, cross checking with calibration and QC logs to confirm successful sampling and data management.

---

[23] Supplies may include but are not limited to spare parts for instruments/equipment, standard materials and solutions, sample bottles, calibration gases, reagents, hoses, deionized water, potable water, and electronic data storage media.

Services provided by vendors to include, but not limited to contractors, sub-contractors, and sub-grantees may include document development, performing environmental information operations.

All data entry and error correction activities are recorded in a set of documents prior to and immediately after any data management activity. Queries have been set up within Access to facilitate the analysis of data without risking any alteration to the master dataset. These queries will be used to compare the current data to historical existing data from the sites.

C Assessment, Response Actions, and Oversight

C1. Assessments and Response Actions

- Discuss how you plan to ensure that the project will be conducted as described in the QAPP.
- Describe the assessment activities (can reference section B4, Table B4-1):[24]
  - timeframe/frequency
  - person responsible
  - type, may include but not limited to:
    - audits, performance evaluations, management reviews, peer reviews, inspections, surveillances, readiness reviews (including competency assessment, pre-award assessment of proposal, or technical assessment), peer consultations, product reviews (e.g., data inspection, software testing, pre-dissemination reviews, or review of contractor deliverables).
- Identify who will be responsible for stop work orders, corrective actions, and follow up.
- Address how assessment findings, non-conformances, and corrective actions will be documented and communicated and by whom.

During the project, the Project Manager and QAM will assess the project's activities to ensure that the QAPP is being implemented as planned. The purpose is to help to ensure that everything is on track and serves to minimize learning about critical deviations toward the end of the project when it may be too late to remedy the situation.

The Project Manager will conduct a Readiness Review prior to each major primary data collection step and take corrective action (if any is necessary). Collection of primary data will not begin until the Project Manager certifies readiness. The Project Manager will meet regularly with project implementation staff to identify emerging/unanticipated problems and be responsible for stop work orders, corrective actions, and follow-up.

At least once annually, the QAM will assess the sample collection methodologies, field measurement procedures, and record keeping to ensure activities are being conducted as planned (and as documented in this QAPP). Any deviations that are noted will be corrected immediately to ensure all subsequent samples and field measurements collected are valid. If the deviations are associated with technical changes and/or improvements made to the procedures, the QAM will verify that the changes have been documented by the Project Manager and addressed in an amendment to this QAPP.

Optional

[24] Assessment is the evaluation process used to measure the performance or effectiveness of a system and its elements. Assessments may also be used as an investigative tool where problems may be suspected.

Table C1-1. Assessments

Type	Frequency	Project Phase(s)	Person(s) Responsible	Assessed Staff

C2. Oversight and Reports to Management[25]

- Describe the oversight activities that ensure that mechanisms are in place to capture the project status and any QA issues that arise.
- Identify reports (e.g., readiness review email memos, progress reports, final report, sampling permit report to state agency).

Documentation for assessment activities, corrective actions, etc. will be kept in the electronic project folder. Two kinds of reports will be prepared: progress reports, and final report. Progress reports will note the status of project activities, identify any QA problems encountered, and explain how they were handled. The final report will analyze and interpret data, present observations, draw conclusions, identify data gaps, and describe any limitations in the way the results should be interpreted. Reports that will be produced are outlined in Table C2-1.

Optional

Table C2-1. Reports

Type	Frequency	Timeframe	Transmission Route	Preparer(s)	Recipient(s)
Readiness Review Memo	Periodic	Before each major data collection step	Email	Project Manager	Scientists, QAM
Quarterly Progress Reports	Every 4 months	4 months after start date and ongoing	Email	Project Manager	All Project Personnel

[25] Non-EPA Organizations: Distribution shall include the Project Operations Manager, the Project QAM of the organization conducting the work, and the EPA organization sponsoring the work.

Type	Frequency	Timeframe	Transmission Route	Preparer(s)	Recipient(s)
Final Report	Once	At conclusion of project	PDF sent through email	Project Manager	Distribution List as seen in Table A7-1

D Environmental Information Review and Useability Determination

D1. Environmental Information Review

Describe

- information/data verification[26] and validation[27] activities to ensure that data meet requirements specified in this QAPP and relevant SOPs.
- any data quality assessment[28] activities. See Attachments 5 &6. Some other possible questions when reviewing data:
  - Were the DQIs met?
  - Is the quality of the data consistent across data?
  - Does the data meet the data quality objectives?
  - Integrity…is data compromised via corruption/falsification?
  - Were methods followed?
- responsible person and documentation of these activities.

During information/data review, verification, and validation, staff will be guided by the data quality criteria listed in A6 as well as any additional criteria discussed in B3-B7. All onsite analytical data will be reviewed against QAPP requirements. The Project Manager, scientists, and relevant staff will:

1) Ensure that all sampling and analytical methods or SOPs were followed.
2) Establish that all method required QC samples were run and met required limits.
3) Establish that all QAPP required QC samples were run and met required limits.

The Project Manager and QAM will review each laboratory data package's narrative report and summary tables to see whether the laboratory "flagged" any sample results based on poor or questionable data quality or exceedances of the laboratory's QC criteria.

Trained project staff will check for data anomalies (e.g., missing data, data that fall outside the range of the expected or plausible based on industry averages, non-standard environmental aspects/indicators, incorrect/non-standard units, incorrect reporting years, incorrect normalizing factors or bases of normalization, incorrect calculations, conversions, etc.). When possible, checking for data anomalies will be automated as part of the electronic data entry process. Data anomalies will be flagged and corrected, to the extent possible, in consultation with data collection

[26]Data Verification is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements.

[27] Data Quality Assessment is the scientific and statistical evaluation of data to determine if the data obtained from environmental information operations are of the right type, quality, and quantity to support their intended use.

staff and project manager(s). When data used for analysis are incomplete, the potential impact of their incompleteness on the analysis will be described in relevant reports.

If at any point during review, the Project Manager identifies a problem (e.g., the use of substandard data when higher-quality data are available, a faulty algorithm, a mismatch between a data set and the question it is meant to answer), the Project Manager, scientists and any relevant staff will discuss corrective action. If necessary, the Project Manager will issue a stop-work order until a solution is agreed upon. The Project Manager will implement corrective action. If the solution involves changes in project design, the Project Manager will amend the QAPP as necessary, pass it through quality review if necessary, and then re-distribute it to the Distribution List.

D2. Useability Determination

Describe or reference the process that will be used to determine whether the environmental information is useable, including:

- documentation
- individual(s) responsible
- communication of determination

Once all the data from the field and laboratory have been reviewed, the Project Manager and QAM will make an overall assessment concerning the final usability of the data (and any limitations on its use) in meeting the project's needs. Some steps of this assessment will include, but not necessarily be limited to:

1) Discussions with Scientists.
2) Review of deviations from the QAPP or associated SOPs to determine whether these deviations may have impacted data quality (and determining whether any impacts are widespread or single incidents, related to a few random samples or a batch of samples, and/or affecting a single or multiple analyses).
3) Evaluation of the field and laboratory results and QC information.
4) Review of any other external information which might influence the results, such as off-site activities in the vicinity, meteorological conditions (such as storm events proceeding sampling), etc.
5) Evaluation of whether the completeness goals defined have been met.
6) Examination of any assumptions made when the study was planned, if those assumptions were met, and, if not, how the project's conclusions are affected.

The final project report will contain an evaluation of the certainty of project results prepared by the Project Manager. For each conclusion reached by the project (i.e., each determination that an anticipated outcome has or has not been achieved, and the basis for each decision made or recommended by project authorities), this evaluation will describe, in narrative form: the quality of data and the methodologies used to inform the conclusion, the subsequent confidence in the conclusion, and the validity of generalizing results beyond the project.

References

See Table A4-1.

Attachments are Examples only and can be deleted/modified.

Attachment 1: Field Equipment and Supplies Checklist

Overall

- ☐ Waterproofed sheets
- ☐ Field clipboards
- ☐ Pencils, Ballpoint pens, & Permanent Markers
- ☐ GPS with extra batteries
- ☐ Digital camera with extra battery
- ☐ iPad
- ☐ Scientific Collecting Permit
- ☐ Site ID list
- ☐ QAPP
- ☐ Safety Plan
- ☐ Maps
- ☐ Flagging
- ☐ Compass
- ☐ Landowners contact info.

Habitat Assessment

- ☐ Thalweg poles
- ☐ Clinometer
- ☐ Densiometer
- ☐ Rangefinder
- ☐ Measuring tapes
- ☐ Gravelometers
- ☐ Collapsible shovel
- ☐ Collapsible rake

Macroinvertebrate Sampling

- ☐ D-frame net
- ☐ Sieve bucker
- ☐ Regular bucker
- ☐ Sampling bottles with caps
- ☐ Ethanol
- ☐ Forceps
- ☐ Labels
- ☐ Pencil and Permanent Marker

In Situ Water Chemistry

- ☐ Field Meter, & charger, manual, backup
- ☐ Calibration standards, waste container, and notebook

Grab Water Chemistry

- ☐ Wet ice
- ☐ Dry ice
- ☐ 50 1L bottles
- ☐ 25 500mL Bottles
- ☐ 3 Amber 2L bottles
- ☐ Blank DI water
- ☐ Nitrile gloves
- ☐ Nitric acid
- ☐ Sulfuric acid
- ☐ Safety glasses
- ☐ Acid waste container(s)
- ☐ Fine permanent marker
- ☐ Sample Labels
- ☐ Tape strips
- ☐ Filtering Supplies
    1. Capsule filters
    2. 45 µm filters
    3. Filter pump and backup
    4. Apparatus and stoppers
    5. Filter cup
    6. Tubing
    7. 12 Clean forceps
    8. Distilled water squirt bottle and refill water
    9. Graduated cylinder

Shipping

- ☐ Wet Ice
- ☐ Dry Ice
- ☐ Dry Ice shipping box & hazard label
- ☐ 2 large bags per cooler (outer for wet ice and inner for samples)
- ☐ Zip ties
- ☐ UPS Shipping bills and clear sleeves
- ☐ COC sheets and Ziploc bags
- ☐ Ballpoint pen
- ☐ ESC Environmental hazard sheet and clear sleeves
- ☐ Custody seal for coolers
- ☐ Packaging tape
- ☐ Scissors

Attachment 2: Sample Tags

Printable label format

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab-500mL Sampler:_____
Analyses: Preservative:
☒**ANIONS** ☒None (wet ice only)

Date (YYYY/MM/DD):_____Time: _____

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab-1L Sampler:_____
Analyses: Preservative:
☒**ALKALINITY** ☒None (wet ice only)

Date (YYYY/MM/DD):_____Time:_____

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab Sampler: _____
Analyses: Preservative:
☒ **CHLOROPHYLL A** ☒Frozen on Dry Ice
☒ Filtered, volume: mL

Date (YYYY/MM/DD):_____Time: _____

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab 1L Sampler: _____
Analyses: Preservative:
☒**TKN, NH_4, TPO** ☒**H_2SO_4**

Date (YYYY/MM/DD):_____Time:_____

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab-1L Sampler:_____
Analyses: Preservative:
☒**METALS, HARDNESS** ☒ HNO_3

Date (YYYY/MM/DD):_____Time:_____

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab-500mL Sampler:_____
Analyses: Preservative:
☒**TOC/DOC** ☒H_2SO_4

Date (YYYY/MM/DD):_____Time: _____

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab-1L Sampler:_____
Analyses: Preservative:
☒**TSS 1 of 2** ☒None (wet ice only)

Date (YYYY/MM/DD): _____Time: _____

Project Code: **# or Name**
Station No.: **SITEID**
Location or Site Name:_____
Designate: ☒ Grab-1L Sampler:_____
Analyses: Preservative:
☒**TSS 2 of 2** ☒None (wet ice only)

Date (YYYY/MM/DD):_____Time:_____

Attachment 3: Hazard and Risk Exposure Data Sheet

To be attached to outside of sample coolers being transported to Region 3's Laboratory in Ft. Meade, MD

Hazard and Risk Exposure Data Sheet

Region 3, Laboratory and Technical Services Branch
Ft Meade, Maryland
HAZARD AND RISK-EXPOSURE DATA SHEET
LEVELS OF PERSONAL PROTECTION DURING SAMPLING

BACKGROUND

Under the authority Section 104 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) of 1980, Section 311 of the Clean Water Act, and Subtitle I of the Resource Conservation and Recovery Act (RCRA), EPA has been delegated the responsibility to undertake response actions with respect to the release or potential release of oil, petroleum, or hazardous substances that pose a substantial threat to human health or welfare, or the environment.

GENERAL

This form is to be used when collecting Environmental Samples (i.e. streams, farm ponds, wells, soils etc.) and for Hazardous Sample (i.e. drums, storage tanks, lagoons, leachates, hazardous waste sites). This information is intended for use as a guide for the safe handling of these laboratory samples in accordance with EPA and OSHA regulations. The sample classification(s) and levels of personal protection used by the sampler in all situations will enable the analyst to be better aware of potential exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done.

DEGREE OF PROTECTION

____ Level A: Highest level of respiratory, skin, and eye protection needed. Fully encapsulated suit, respirator self-contained (Tank type).

____ Level B: Highest level of respiratory protection but lesser level of skin protection needed. Chemical suit, respirator self-contained (Tank type).

____ Level C: Lesser level of respiratory protection than Level B. Skin protection criteria are similar to Level B. Chemical suit, canister respirator/cartridge

____ Level D: Work uniform without any respirator or skin hazards. Lab coat, gloves etc.

CLASSIFIED FIELD SAMPLES

Environmental Hazardous Comb. (Env. & Haz.) Radioactive

Site Name:_____Sampling Date: _____

Station No._____

Field pH:_____
(Must be taken prior to submission of aqueous samples)

Sampler:_____Work Phone Number:_____

Personal observations at time of sampling (surroundings):
Sample collection observations (physical sample, odors etc.):

Attachment 4: Field Activities Review Checklist

Reviewer's Name (print): _____Reviewer's Project Role:_____

Reviewer's Signature: _____Date of Review: ___/____/_____

Mark each action "Yes," "No," or "NA" (not applicable), and comment as appropriate.

Review Answer	Review Action	Comment(s)
	All required field information was recorded, and in ink (if pencil, scanned as soon as returned to the office).	
	Field measurement data were recorded in the appropriate logbooks(s) or forms.	
	Deviations from SOPs, along with any pertinent verbal approval authorizations and dates, were documented.	
	Samples that may be affected by deviations from SOPs were flagged appropriately.	
	Field measurement calibration standards were not expired and were in the correct concentrations.	
	Field calibrations were performed, and results were within manufacturer-specified limits for all parameters.	
	Field measurement QC samples were within the QAPP-specified limits for all parameters.	
	Samples were collected at the correct sites.	
	The correct number of samples for each type of analysis and the correct volume was collected.	
	Certified clean sample containers, appropriate for the intended analysis, were used.	
	Requested/required field quality control (QC) samples (blanks and duplicates) were collected, and at the correct frequency.	

Review Answer	Review Action	Comment(s)
	Samples were preserved with the correct chemicals, if required.	
	Samples were stored and/or shipped at the proper temperature.	
	Chain-of-custody documents were completed properly.	
	Custody seals were applied and intact when relinquishing custody of the samples.	
	Sample holding times were not exceeded during field operations.	

Attachment 5: Laboratory Data Package Review Checklist

Reviewer's Name (print):_____Reviewer's Project Role:_____

Reviewer's Signature:_____Date of Review:____/____/_____

Mark each action "Yes," "No," or "NA" (not applicable), and comment as appropriate.

Review Answer	Review Action	Comment(s)
	Final data package includes chain-of-custody forms.	
	Chain-of-custody forms were properly completed and signed by everyone involved in transporting the samples.	
	Laboratory records indicate sample custody seals were intact upon receipt.	
	Samples arrived at the laboratory at the proper temperature.	
	All requested analyses were performed and were documented in the analytical report.	
	Analyses were performed according to the methods specified in the approved QAPP.	
	Holding times for extraction and analysis were not exceeded.	
	Method detection and/or quantitation limits were included in the report, and reported results were within these limits.	
	A narrative summarizing the analyses and describing any analysis problems was included in the final report.	
	Data qualifiers and flags were explained in the report.	

Review Answer	Review Action	Comment(s)
	Method (laboratory) blank results were included for all analyses, at the appropriate frequency, and showed no laboratory contamination.	
	Matrix spike data were included for all pertinent analyses, and results were within QAPP, or laboratory defined criteria.	
	Laboratory Control Sample data were included for all analyses, and results were within QAPP, or laboratory defined criteria.	
	Laboratory Duplicate data were included for all analyses, and results were within QAPP, or laboratory defined criteria.	
	Field blanks do not contain analytes of interest or interfering compounds and included for all pertinent analyses.	
	Field Duplicates are within QAPP-defined criteria and included for all analyses.	