Instructions for Using the Clean Rivers Program Quality Assurance Project Plan Shell Document

The attached shell document was developed for use by Clean Rivers Program Basin Planning Agencies in preparing Quality Assurance Project Plans (QAPPs) covering fiscal years 2018 and 2019. Instructions for preparation of the QAPPs are provided throughout the document.

This QAPP shell does not apply to and should not be used for data collection for federally funded programs or projects. A standalone QAPP should be developed and approved by the appropriate TCEQ staff.

The shell language is to be used by Basin Planning Agencies in their QAPPs only to the extent that the language accurately and completely depicts Basin Planning Agency organizational structures, project responsibilities, project background, and project requirements, activities, and procedures. Italicized text in the shell provides instructions or information to QAPP preparers and should be deleted from the QAPP before submission to TCEQ. Highlighted text indicates titles or other language that must be replaced (e.g., name and address of the Basin Planning Agency, name of Basin Planning Agency Project Manager, etc.).

The [***Clean Rivers Program Guidance and Reference Guide***](https://www.tceq.texas.gov/waterquality/clean-rivers/guidance/index.html) provides additional information concerning QAPP preparation and submission. Questions concerning QAPP requirements may be directed to TCEQ Clean Rivers Program Project Managers and the TCEQ Quality Assurance Specialist.

Quality Assurance Project Plan

Basin Planning Agency

Address

City, Texas Zip Code

Clean Rivers Program

Water Quality Planning Division

Texas Commission on Environmental Quality

P.O. Box 13087, MC 234

Austin, Texas 78711-3087

Effective Period: FY 2018 to FY 2019

**Questions concerning this QAPP should be directed to:**

**Name (Basin Planning Agency Representative)**

**Title**

**Address**

**City, Texas Zip Code**

**(XXX) XXX-XXXX**

**email@address**

# A1 Approval Page

## Texas Commission on Environmental Quality

### Water Quality Planning Division

 Kyle Girten, Manager Date Sarah Eagle, Work Leader Date

Water Quality Monitoring and Assessment Clean Rivers Program

Section

Kelly Rodibaugh Date Name Date

Project Quality Assurance Specialist Project Manager

Clean Rivers Program Clean Rivers Program

Cathy Anderson, Team Leader Date

Data Management and Analysis

### Monitoring Division

Sharon Coleman Date Daniel R. Burke Date

Lead CRP Quality Assurance Specialist Lead CRP Quality Assurance Specialist

## Basin Planning Agency

Name Date

Basin Planning Agency Project Manager

Name Date

Basin Planning Agency Quality Assurance Officer

## Laboratory

Name Date

Laboratory Manager

Name Date

Laboratory Quality Assurance Officer

The Basin Planning Agency will secure written documentation from each sub-tier project participant (e.g., subcontractors, subparticipants, or other units of government) stating the organization’s awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan. Alternatively, additional signature blocks for sub-tier participants may be added to section A1. Signatures in section A1 will eliminate the need for adherence letter maintenance. The Basin Planning Agency will maintain this documentation as part of the project’s quality assurance records, and will ensure the documentation is available for review. See sample letter in Attachment 1 of this document.

Sub-tier participants (e.g., subcontractors, subparticipants, or other units of government) will sign the QAPP, indicating the organization’s awareness of, and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan. Signatures in section A1 will eliminate the need for adherence letters to be maintained.

# A2 Table of Contents

[A1 Approval Page 3](#_Toc346012395)

[A2 Table of Contents 5](#_Toc346012401)

[List of Acronyms 6](#_Toc346012402)

[A3 Distribution List 7](#_Toc346012403)

[A4 PROJECT/TASK ORGANIZATION 8](#_Toc346012404)

[Figure A4.1. Organization Chart - Lines of Communication 10](#_Toc346012409)

[A5 Problem Definition/Background 11](#_Toc346012410)

[A6 Project/Task Description 11](#_Toc346012411)

[A7 Quality Objectives and Criteria 12](#_Toc346012414)

[A8 Special Training/Certification 14](#_Toc346012415)

[A9 Documents and Records 14](#_Toc346012416)

[Table A9.1 Project Documents and Records 15](#_Toc346012417)

[B1 Sampling Process Design 17](#_Toc346012418)

[B2 Sampling Methods 17](#_Toc346012419)

[Table B2.1 Sample Storage, Preservation and Handling Requirements 17](#_Toc346012421)

[B3 Sample Handling and Custody 19](#_Toc346012427)

[B4 Analytical Methods 20](#_Toc346012432)

[B5 Quality Control 21](#_Toc346012435)

[B6 Instrument/Equipment Testing, Inspection, and Maintenance 25](#_Toc346012439)

[B7 Instrument Calibration and Frequency 25](#_Toc346012440)

[B8 Inspection/Acceptance of Supplies and Consumables 26](#_Toc346012441)

[B9 Acquired Data 26](#_Toc346012442)

[B10 Data Management 26](#_Toc346012443)

[C1 Assessments and Response Actions 27](#_Toc346012449)

[Table C1.1 Assessments and Response Requirements 27](#_Toc346012450)

[Figure C1.1 Corrective Action Process for Deficiencies 29](#_Toc346012453)

[C2 Reports to Management 30](#_Toc346012454)

[Table C2.1 QA Management Reports 30](#_Toc346012455)

[D1 Data Review, Verification, and Validation 31](#_Toc346012459)

[D2 Verification and Validation Methods 31](#_Toc346012460)

[Table D2.1: Data Review Tasks 32](#_Toc346012461)

[D3 Reconciliation with User Requirements 33](#_Toc346012462)

[Appendix A: Measurement Performance Specifications (Table A7.1) 34](#_Toc346012463)

[Appendix B: Task 3 Work Plan & Sampling Process Design and Monitoring Schedule (Plan) 36](#_Toc346012464)

[Appendix C: Station Location Maps 40](#_Toc346012470)

[Appendix D: Field Data Sheets 42](#_Toc346012472)

[Appendix E: Chain of Custody Forms 43](#_Toc346012473)

[Appendix F: Data Review Checklist and Summary 44](#_Toc346012474)

# List of Acronyms

AWRL

BMP

CAP

CE

COC

CRP

DMRG

DM&A

EPA

FY

GIS

GPS

LCS

LCSD

LIMS

LOD

LOQ

MT

NELAP

QA

QM

QAO

QAPP

QAS

QC

QMP

SE

SLOC

SOP

SWQM

SWQMIS

TMDL

TCEQ

TNI

TSWQS

VOA

XXXXAmbient Water Reporting Limit

Best Management Practices

Corrective Action Plan

Collecting Entity

Chain of Custody

Clean Rivers Program

Surface Water Quality Monitoring Data Management Reference Guide, December 2016, or most recent version

Data Management and Analysis

United States Environmental Protection Agency

Fiscal Year

Geographical Information System

Global Positioning System

Laboratory Control Sample

Laboratory Control Sample Duplicate

Laboratory Information Management System

Limit of Detection

Limit of Quantitation

Monitoring Type

National Environmental Lab Accreditation Program

Quality Assurance

Quality Manual

Quality Assurance Officer

Quality Assurance Project Plan

Quality Assurance Specialist

Quality Control

Quality Management Plan

Submitting Entity

Station Location

Standard Operating Procedure

Surface Water Quality Monitoring

Surface Water Quality Monitoring Information System

Total Maximum Daily Load

Texas Commission on Environmental Quality

The NELAC Institute

Texas Surface Water Quality Standards

Volatile Organic Analytes

Acronyms for River Authority and Subparticipants

# A3 Distribution List

Texas Commission on Environmental Quality

P.O. Box 13087

Austin, Texas 78711-3087

Name, Project Manager

Clean Rivers Program

MC-234

(512) 239-XXXX

Daniel R. Burke

Lead CRP Quality Assurance Specialist

MC-165

(512) 239-0011

Cathy Anderson

Team Leader, Data Management and Analysis

MC-234

(512) 239-1805

Basin Planning Agency

Street

City, Texas Zip

Name, Project Manager

(XXX) XXX-XXXXName, Quality Assurance Officer

(XXX) XXX-XXXX

Laboratory

Street

City, Texas Zip

Name, Manager

(XXX) XXX-XXXXName, Quality Assurance Officer

(XXX) XXX-XXXX

The Basin Planning Agency will provide copies of this project plan and any amendments or appendices of this plan to each person on this list and to each sub-tier project participant, e.g., subcontractors, subparticipant, or other units of government. The Basin Planning Agency will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project’s quality assurance records, and will ensure the documentation is available for review.

# A4 PROJECT/TASK ORGANIZATION

## Description of Responsibilities

### TCEQ

#### Sarah Eagle

#### CRP Work Leader

Responsible for Texas Commission on Environmental Quality (TCEQ) activities supporting the development and implementation of the Texas Clean Rivers Program (CRP). Responsible for verifying that the TCEQ Quality Management Plan (QMP) is followed by CRP staff. Supervises TCEQ CRP staff. Reviews and responds to any deficiencies, corrective actions, or findings related to the area of responsibility. Oversees the development of Quality Assurance (QA) guidance for the CRP. Reviews and approves all QA audits, corrective actions, reviews, reports, work plans, contracts, QAPPs, and TCEQ Quality Management Plan. Enforces corrective action, as required, where QA protocols are not met. Ensures CRP personnel are fully trained.

#### Daniel R. Burke

#### CRP Lead Quality Assurance Specialist

Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Assists program and project manager in developing and implementing quality system. Serves on planning team for CRP special projects. Coordinates the review and approval of CRP QAPPs. Prepares and distributes annual audit plans. Conducts monitoring systems audits of Planning Agencies. Concurs with and monitors implementation of corrective actions. Conveys QA problems to appropriate management. Recommends that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Ensures maintenance of QAPPs and audit records for the CRP.

#### Name

#### CRP Project Manager

Responsible for the development, implementation, and maintenance of CRP contracts. Tracks, reviews, and approves deliverables. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Assists CRP Lead QA Specialist in conducting Basin Planning Agency audits. Verifies QAPPs are being followed by contractors and that projects are producing data of known quality. Coordinates project planning with the Basin Planning Agency Project Manager. Reviews and approves data and reports produced by contractors. Notifies QA Specialists of circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Develops, enforces, and monitors corrective action measures to ensure contractors meet deadlines and scheduled commitments.

#### Cathy Anderson

#### Team Leader, Data Management and Analysis (DM&A) Team

Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Ensures DM&A staff perform data management-related tasks, including coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval; ensuring that data are reported following instructions in the Surface Water Quality Monitoring Data Management Reference Guide, December 2016, or most current version (DMRG); running automated data validation checks in Surface Water Quality Monitoring Information System (SWQMIS) and coordinating data verification and error correction with CRP Project Managers; generating SWQMIS summary reports to assist CRP Project Managers' data review; identifying data anomalies and inconsistencies; providing training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures; reviewing QAPPs for valid stream monitoring stations, validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s); developing and maintaining data management-related standard operating procedures (SOPs) for CRP data management; and coordinating and processing data correction requests.

#### Peter Bohls

#### CRP Data Manager, DM&A Team

Responsible for coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval. Ensures that data are reported following instructions in the DMRG. Runs automated data validation checks in SWQMIS and coordinates data verification and error correction with CRP Project Managers. Generates SWQMIS summary reports to assist CRP Project Managers’ data review. Identifies data anomalies and inconsistencies. Provides training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures. Reviews QAPPs for valid stream monitoring stations. Checks validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s). Develops and maintains data management-related SOPs for CRP data management. Coordinates and processes data correction requests. Participates in the development, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).

#### Kelly Rodibaugh

#### CRP Project Quality Assurance Specialist

Serves as liaison between CRP management and TCEQ QA management. Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Serves on planning team for CRP special projects and reviews QAPPs in coordination with other CRP staff. Coordinates documentation and implementation of corrective action for the CRP.

### BASIN PLANNING AGENCY

#### Name

#### Basin Planning Agency Project Manager

Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by basin planning agency participants and that projects are producing data of known quality. Ensures that subparticipants are qualified to perform contracted work. Ensures CRP project managers and/or QA Specialists are notified of deficiencies and corrective actions, and that issues are resolved. Responsible for validating that data collected are acceptable for reporting to the TCEQ.

#### Name

#### Basin Planning Agency Quality Assurance Officer

Responsible for coordinating the implementation of the QA program. Responsible for writing and maintaining the QAPP and monitoring its implementation. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues. Notifies the Basin Planning Agency Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Coordinates and maintains records of data verification and validation. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings. Ensures that field staff is properly trained and that training records are maintained.

#### Name

#### Basin Planning Agency Data Manager

Responsible for ensuring that field data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Maintains quality-assured data on Basin Planning Agency internet sites.

Other key participants (e.g., contractors/participants, field sampling supervisors, laboratories) must be listed and the project duties of each should be summarized.

## Project Organization Chart

### Figure A4.1. Organization Chart - Lines of Communication

Basin Planning Agency

Project Manager

Basin Planning Agency

Laboratory

Manager

Basin Planning Agency

Field Sampling Staff

Basin Planning Agency

Data Manager

Basin Planning Agency

QAO

Basin Planning Agency

Laboratory

QAO

Daniel R. Burke

TCEQ Lead QA

Specialist

------------------

Kelly Rodibaugh

TCEQ Project

QA Specialist

Sarah Eagle

TCEQ CRP

Work Leader

Name

TCEQ CRP Project Manager

Peter Bohls

TCEQ CRP Data Manager

Cathy Anderson

TCEQ DM&A

Team Leader

Lines of Management

Lines of Communication

#

# A5 Problem Definition/Background

In 1991, the Texas Legislature passed the Texas Clean River Act (Senate Bill 818) in response to growing concerns that water resource issues were not being pursued in an integrated, systematic manner. The act requires that ongoing water quality assessments be conducted for each river basin in Texas, an approach that integrates water quality issues within the watershed. The CRP legislation mandates that each river authority (or local governing entity) shall submit quality-assured data collected in the river basin to the commission. Quality-assured data in the context of the legislation means data that comply with TCEQ rules for surface water quality monitoring (SWQM) programs, including rules governing the methods under which water samples are collected and analyzed and data from those samples are assessed and maintained. This QAPP addresses the program developed between the Basin Planning Agency and the TCEQ to carry out the activities mandated by the legislation. The QAPP was developed and will be implemented in accordance with provisions of the TCEQ Quality Management Plan, January 2016 or most recent version (QMP).

The purpose of this QAPP is to clearly delineate Basin Planning Agency QA policy, management structure, and procedures which will be used to implement the QA requirements necessary to verify and validate the surface water quality data collected. The QAPP is reviewed by the TCEQ to help ensure that data generated for the purposes described above are scientifically valid and legally defensible. This process will ensure that data collected under this QAPP and submitted to SWQMIS have been collected and managed in a way that guarantees its reliability and therefore can be used in water quality assessments, total maximum daily load (TMDL) development, establishing water quality standards, making permit decisions and used by other programs deemed appropriate by the TCEQ. Project results will be used to support the achievement of CRP objectives, as contained in the Clean Rivers Program Guidance and Reference Guide FY 2018 -2019.

Summarize specific historical information that directly shapes the monitoring program described in this QAPP for the period of coverage.

# A6 Project/Task Description

Summarize the work to be performed and the schedule for implementation. In some cases, project/task descriptions are laid out in detail in contractual/subcontractual work plans. If the work plan addresses the following information, in detail, then the contractual/subcontractual workplan should be attached and referenced. For assistance in describing work to be performed see Task 3 of the Clean Rivers Program Guidance and Reference Guide for types of monitoring.

See Appendix B for the project-related work plan tasks and schedule of deliverables for a description of work defined in this QAPP. ***Attach work plan tasks pertaining to this QAPP.***

See Appendix B for sampling design and monitoring pertaining to this QAPP.

## Amendments to the QAPP

Revisions to the QAPP may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods. Requests for amendments will be directed from the Basin Planning Agency Project Manager to the CRP Project Manager electronically. The Basin Planning Agency will submit a completed QAPP Amendment document, including a justification of the amendment, a table of changes, and all pages, sections or attachments affected by the amendment. Amendments are effective immediately upon approval by the Basin Planning Agency Project Manager, the Basin Planning Agency QAO, the CRP Project Manager, the CRP Lead QA Specialist, the CRP Project QA Specialist, and additional parties affected by the amendment. Amendments are not retroactive. No work shall be implemented without an approved QAPP or amendment prior to the start of work. Any activities under this contract that commence prior to the approval of the governing QA document constitute a deficiency and are subject to corrective action as described in section C1 of this QAPP. Any deviation or deficiency from this QAPP which occurs after the execution of this QAPP should be addressed through a Corrective Action Plan (CAP). An Amendment may be a component of a CAP to prevent future recurrence of a deviation. Amendments will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the Basin Planning Agency Project Manager. The Basin Planning Agency will secure an adherence letter from each sub-tier project participant (e.g., subcontractors, sub-participant, or other units of government) affected by the amendment stating the organization’s awareness of and commitment to requirements contained in each amendment to the QAPP. The Basin Planning Agency will maintain this documentation as part of the project’s QA records, and ensure that the documentation is available for review.

## Special Project Appendices

Projects requiring QAPP appendices will be planned in consultation with the Basin Planning Agency and the TCEQ Project Manager and TCEQ technical staff. Appendices will be written in an abbreviated format and will reference the Basin QAPP where appropriate. Appendices will be approved by the Basin Planning Agency Project Manager, the Basin Planning Agency QAO, the Laboratory (as applicable), and the CRP Project Manager, the CRP Project QA Specialist, the CRP Lead QA Specialist and other TCEQ personnel, as appropriate. Copies of approved QAPP appendices will be distributed by the Basin Planning Agency to project participants before data collection activities commence. The Basin Planning Agency will secure written documentation from each sub-tier project participant (e.g., subcontractors, subparticipants, other units of government) stating the organization’s awareness of and commitment to requirements contained in each special project appendix to the QAPP. The Basin Planning Agency will maintain this documentation as part of the project’s QA records, and ensure that the documentation is available for review.

# A7 Quality Objectives and Criteria

The purpose of routine water quality monitoring is to collect surface water quality data that can be used to characterize water quality conditions, identify significant long-term water quality trends, support water quality standards development, support the permitting process, and conduct water quality assessments in accordance with TCEQ’s [Guidance for Assessing and Reporting Surface Water Quality in Texas, June 2015](https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014_guidance.pdf) or most recent version (https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/14txir/2014\_guidance.pdf). These water quality data, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

Systematic watershed monitoring is defined as sampling that is planned for a short duration (1 to 2 years), and is designed to; screen waters that would not normally be included in the routine monitoring program, investigate areas of potential concern, and investigate possible sources of water quality impairments or concerns. Due to the limitations regarding these data (e.g., not temporally representative, limited number of samples, biological sampling does not meet the specimen vouchering requirements), the data will be used to determine whether any locations have values exceeding the TCEQ’s water quality criteria and/or screening levels (or in some cases values elevated above normal). The Basin Planning Agency will use this information to determine future monitoring priorities. These water quality data and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

The measurement performance specifications to support the project purpose for a minimum data set are specified in Appendix A: Table A7.1 and in the text following.

#### Ambient Water Reporting Limits (AWRLs)

The AWRL establishes the reporting specification at or below which data for a parameter must be reported to be compared with freshwater screening criteria. The AWRLs specified in Appendix A, Table A7.1 are the program-defined reporting specifications for each analyte and yield data acceptable for the TCEQ’s water quality assessment. A [full listing of AWRLs](https://www.tceq.texas.gov/assets/public/waterquality/crp/QA/awrlmaster.pdf) can be found at <http://www.tceq.state.tx.us/assets/public/waterquality/crp/QA/awrlmaster.pdf> .

The limit of quantitation (LOQ) is the minimum level, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence by the laboratory analyzing the sample. Analytical results shall be reported down to the laboratory’s LOQ (i.e., the laboratory’s LOQ for a given parameter is its reporting limit).

The following requirements must be met in order to report results to the CRP:

* The laboratory’s LOQ for each analyte must be at or below the AWRL as a matter of routine practice
* The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check sample for each analytical batch of CRP samples analyzed.
* Control limits for LOQ check samples are found in Appendix A.
* Note: Exceptions can, and have been made for unique water bodies, basins, and laboratories to raise the LOQ above the AWRL. Discuss these instances with your CRP Project Manager. Bullets can be added here to enumerate any instances where the LOQ will be greater than the AWRL.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria are provided in Section B5.

#### Precision

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. It is a measure of agreement among replicate measurements of the same property, under prescribed similar conditions, and is an indication of random error.

Laboratory precision is assessed by comparing replicate analyses of laboratory control samples (LCS) in the sample matrix (e.g. deionized water, sand, commercially available tissue) or sample/duplicate pairs in the case of bacterial analysis. Precision results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for precision are defined in Appendix A.

#### Bias

Bias is a statistical measurement of correctness and includes multiple components of systematic error. A measurement is considered unbiased when the value reported does not differ from the true value. Bias is determined through the analysis of LCS and LOQ Check Samples prepared with verified and known amounts of all target analytes in the sample matrix (e.g. deionized water, sand, commercially available tissue) and by calculating percent recovery. Results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for bias are specified in Appendix A.

#### Representativeness

Site selection, the appropriate sampling regime, the sampling of all pertinent media according to TCEQ SOPs, and use of only approved analytical methods will assure that the measurement data represents the conditions at the site. Routine data collected under CRP for water quality assessment are considered to be spatially and temporally representative of routine water quality conditions. Water Quality data are collected on a routine frequency and are separated by approximately even time intervals. At a minimum, samples are collected over at least two seasons (to include inter-seasonal variation) and over two years (to include inter-year variation) and include some data collected during an index period (March 15- October 15). Although data may be collected during varying regimes of weather and flow, the data sets will not be biased toward unusual conditions of flow, runoff, or season. The goal for meeting total representation of the water body will be tempered by the potential funding for complete representativeness.

#### Comparability

Confidence in the comparability of routine data sets for this project and for water quality assessments is based on the commitment of project staff to use only approved sampling and analysis methods and QA/QC protocols in accordance with quality system requirements and as described in this QAPP and in TCEQ SOPs. Comparability is also guaranteed by reporting data in standard units, by using accepted rules for rounding figures, and by reporting data in a standard format as specified in the Data Management Plan Section B10.

#### Completeness

The completeness of the data is basically a relationship of how much of the data are available for use compared to the total potential data. Ideally, 100% of the data should be available. However, the possibility of unavailable data due to accidents, insufficient sample volume, broken or lost samples, etc. is to be expected. Therefore, it will be a general goal of the project(s) that 90% data completion is achieved.

# A8 Special Training/Certification

Before new field personnel independently conduct field work (Who?) trains him/her in proper instrument calibration, field sampling techniques, and field analysis procedures. The QA officer (or designee) will document the successful field demonstration. The QA Officer (or designee) will retain documentation of training and the successful field demonstration in the employee’s personnel file (or other designated location, and will be available during monitoring systems audits.

The requirements for Global Positioning System (GPS) certification are located in Section B10, Data Management.

Contractors and subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in section The NELAC Institute Standard (2009) Volume 1, Module 2, Section 4.5.5 (concerning Subcontracting of Environmental Tests).

# A9 Documents and Records

The documents and records that describe, specify, report, or certify activities are listed. The list below is limited to documents and records that may be requested for review during a monitoring systems audit. Add other types of project documents and records as appropriate.

### Table A9.1 Project Documents and Records

|  |  |  |  |
| --- | --- | --- | --- |
| Document/Record | Location | Retention (yrs) | Format |
| QAPPs, amendments and appendices | Basin Planning Agency |  | (Specify all media, e.g., paper, electronic, etc.) |
| Field SOPs | Basin Planning Agency |  | (Specify) |
| Laboratory Quality Manuals | Basin Planning Agency/ Laboratory(ies) |  | (Specify) |
| Laboratory SOPs | Basin Planning Agency/ Laboratory(ies) |  | (Specify) |
| QAPP distribution documentation | Basin Planning Agency |  | (Specify) |
| Field staff training records | Basin Planning Agency |  | (Specify) |
| Field equipment calibration/maintenance logs | Basin Planning Agency |  | (Specify) |
| Field instrument printouts | Basin Planning Agency |  | (Specify) |
| Field notebooks or data sheets | Basin Planning Agency |  | (Specify) |
| Chain of custody records | Basin Planning Agency |  | (Specify) |
| Laboratory calibration records | Laboratory |  | (Specify) |
| Laboratory instrument printouts | Laboratory |  | (Specify) |
| Laboratory data reports/results | Basin Planning Agency/ Laboratory |  | (Specify) |
| Laboratory equipment maintenance logs | Laboratory |  | (Specify) |
| Corrective Action Documentation | Basin Planning Agency/ Laboratory |  | (Specify) |

#### Laboratory Test Reports

Test/data reports from the laboratory must document the test results clearly and accurately. Routine data reports should be consistent with the TNI Standard (2009), Volume 1, Module 2, Section 5.10 and include the information necessary for the interpretation and validation of data. The requirements for reporting data and the procedures are provided.

Note: The TNI Standard provides for some flexibility in regard to the elements required in a test report. From the CRP perspective, it is important that data are reported unambiguously, are accurate, and that the necessary information for the review, verification, validation, and interpretation of data are included. Because of the large number and varying types of procedures that have been worked out among the CRP partners, a test report format is not provided in this shell document. Please detail exactly what information and data are included in a test report. If reports are only generated upon request, please state this explicitly. At the very minimum, test reports (regardless of whether they are hard copy or electronic) should include the following:

Sample results

Units of measurement

Sample matrix

Dry weight or wet weight (as applicable)

Station information

Date and time of collection

Sample depth

Holding time for E. coli

LOQ and limit of detection (LOD) (formerly referred to as the reporting limit and the method detection limit, respectively), and qualification of results outside the working range (if applicable)

Certification of NELAP compliance

The information in test reports should be consistent with the information that is needed to prepare data submittals to TCEQ.

Otherwise, reports should be consistent with the TNI Standards and should include any additional information critical to the review, verification, validation, and interpretation of data. This should be based on the process that has been worked out with the Basin Planning Agency and is documented in Section D1 and D2 of this document.

Please provide the laboratory’s process for reporting data under CRP or attach relevant portions of the laboratory’s SOP or quality manual.

#### Electronic Data

Data will be submitted electronically to the TCEQ in the Event/Result file format described in the most current version of the [DMRG](https://www.tceq.texas.gov/waterquality/data-management/dmrg_index.html), which can be found at https://www.tceq.texas.gov/waterquality/data-management/dmrg\_index.html. A completed Data Review Checklist and Data Summary (see Appendix F) will be submitted with each data submittal.

# B1 Sampling Process Design

See Appendix B for sampling process design information and monitoring tables associated with data collected under this QAPP.

# B2 Sampling Methods

## Field Sampling Procedures

Field sampling will be conducted in accordance with the latest versions of the TCEQ Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2012.(RG-415) and Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416), collectively referred to as “SWQM Procedures”. Updates to SWQM Procedures are posted to the Surface Water Quality Monitoring Procedures website (<https://www.tceq.texas.gov/waterquality/monitoring/swqm_guides.html> ), and shall be incorporated into the Basin Planning Agency’s procedures, QAPP, SOPs, etc., within 60 days of any final published update. Additional aspects outlined in Section B below reflect specific requirements for sampling under CRP and/or provide additional clarification.

### Table B2.1 Sample Storage, Preservation and Handling Requirements

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Parameter | Matrix | Container | Preservation | Sample Volume | Holding Time |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

E.coli samples should always be processed as soon as possible and incubated no later than 8 hours from time of collection. When transport conditions necessitate sample incubation after 8 hours from time of collection, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.

Example:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Sample Volume** | **Holding Time** | **Matrix** | **Container\*** | **Preservation\*\*** |
| TSS | 400 ml | 7 days |  | New Plastic or New Cubitainer | Cool to 6oC, dark |
| Alkalinity | 100 ml | 14 days |
| Sulfate | 100 ml | 28 days |
| Chloride | 100 ml | 28 days |
| Nitrate and Nitrite (N) | 150 ml | 48 hrs |
| Ammonia | 150 ml | 28 days | New Plastic or New Cubitainer | 1-2 ml conc. H2SO4 to pH <2 and cool to 6oC, dark |
| Total Phosphorus | 150 ml | 28 days |
| TKN | 200 ml | 28 days |
| TOC | 100 ml | 28 days |
| Chlorophyll *a*/ Pheophytin | 1000 ml | ≤ 48 hrs Unfiltered24 days Filtered | New Amber Glass | Dark and ice before filtration; Dark and frozen after filtration |
| *E. coli* | 200 ml | 6 hours + | Plastic(sterile) | Cool to 6oC, dark sample container with sodium thiosulfate powder |
| Total Hardness | 250 ml | 48 hours | New Plastic or New Cubitainer | Cool to 6oC, dark |
| Magnesium | 500 ml | 180 days | New Plastic or New Cubitainer | 1-2 ml 1+1 HNO3 to pH<2 and cool to 6oC |
| Calcium |  |  |

+ E.coli samples should always be processed as soon as possible and incubated no later than 8 hours from time of collection. When transport conditions necessitate sample incubation after 8 hours from time of collection, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.

## Sample Containers

Certificates from sample container manufacturers are maintained in a notebook by the Basin Planning Agency or by the laboratory (please specify). Note: describe below where each variety of container will be obtained. The bulleted format is provided to reduce confusion. Be sure to include Basin Planning Agencies with multiple sub participants who obtain containers independently.

Sample containers used for conventional parameters are purchased pre-cleaned and are disposable.

* The preferred bacteriological sample containers are the 120 and 290 mL bottles from IDEXX.
* Brown polyethylene bottles are recommended for chlorophyll-a sampling.
* The sample containers for metals are new, certified glass or plastic bottles; or glass or plastic bottles cleaned and documented according to EPA method 1669.
* Sample containers for organics are purchased pre-cleaned and certified.

Pre-cleaned sample containers are commercially available, are convenient to use, and may have preservatives pre-added. A way to handle acid safely in the field is by use of commercially available acid preservation ampules. The methods do allow some variability in sample containers used. Please consult applicable methods to ensure sample containers and preservation are appropriate for the analytes being examined and the method being utilized.

If bottles are re-used, then bottle washing/autoclaving procedures must be described in this section, or the SOP referenced. Note that good laboratory practices dictate that bottle washing procedures should provide for a tracking system and some type of QC check to assure that no contamination results from the washing procedure. The location and retention schedule for these documents should also be described.

## Processes to Prevent Contamination

Procedures outlined in SWQM Procedures outline the necessary steps to prevent contamination of samples. These include: direct collection into sample containers, when possible; use of certified containers for organics; and clean sampling techniques for metals. Field QC samples (identified in Section B5) are collected to verify that contamination has not occurred.

## Documentation of Field Sampling Activities

Field sampling activities are documented on field data sheets (or actual name of the documents used to record field data) as presented in Appendix D. Flow worksheets, aquatic life use monitoring checklists, habitat assessment forms, field biological assessment forms, and records of bacteriological analyses (if applicable) are part of the field data record. Parameters which are preferred by the SWQM and Water Quality Standards Programs are highlighted in the shell A7 document. The following will be recorded for all visits:

Station ID

Sampling Date

Location

Sampling Depth

Sampling Time

Sample Collector’s name and signature

Values for all field parameters collected

Notes containing detailed observational data not captured by field parameters, including;

Water appearance

Weather

Biological activity

Recreational activity

Unusual odors

Pertinent observations related to water quality or stream uses

Watershed or instream activities

Specific sample information

Missing parameters

### Recording Data

For the purposes of this section and subsequent sections, all field and laboratory personnel follow the basic rules for recording information as documented below:

* Write legibly, in indelible ink
* Changes are made by crossing out original entries with a single line strike-out, entering the changes, and initialing and dating the corrections.
* Close-out incomplete pages with an initialed and dated diagonal line.

## Sampling Method Requirements or Sampling Process Design Deficiencies, and Corrective Action

Examples of sampling method requirements or sample design deficiencies include but are not limited to such things as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately, contamination of a sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any deviations from the QAPP, SWQM Procedures, or appropriate sampling procedures may invalidate data, and require documented corrective action. Corrective action may include for samples to be discarded and re-collected. It is the responsibility of the Basin Planning Agency Project Manager, in consultation with the Basin Planning Agency QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in the project progress reports and by completion of a CAP.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

# B3 Sample Handling and Custody

## Sample Tracking

Proper sample handling and custody procedures ensure the custody and integrity of samples beginning at the time of sampling and continuing through transport, sample receipt, preparation, and analysis.

A sample is in custody if it is in actual physical possession or in a secured area that is restricted to authorized personnel. The Chain of Custody (COC) form is a record that documents the possession of the samples from the time of collection to receipt in the laboratory. The following information concerning the sample is recorded on the COC form (See Appendix E). The following list of items matches the COC form in Appendix E. All COC forms to be used in the project should be included in Appendix E for the TCEQ’s review.

Date and time of collection

Site identification

Sample matrix

Number of containers

Preservative used

Was the sample filtered

Analyses required

Name of collector

Custody transfer signatures and dates and time of transfer

Bill of lading, if applicable

## Sample Labeling

Samples from the field are labeled on the container, or on a label; with an indelible marker. Label information includes:

Site identification

Date and time of collection

Preservative added, if applicable

Indication of field-filtration for metals, as applicable

Sample type (i.e., analyses) to be performed

## Sample Handling

## Sample Tracking Procedure Deficiencies and Corrective Action

All deficiencies associated with COC procedures, as described in this QAPP, are immediately reported to the Basin Planning Agency Project Manager. These include such items as delays in transfer resulting in holding time violations; violations of sample preservation requirements; incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc. The Basin Planning Agency Project Manager in consultation with the Basin Planning Agency QAO will determine if the procedural violation may have compromised the validity of the resulting data. Any failures that have reasonable potential to compromise data validity will invalidate data and the sampling event should be repeated. The resolution of the situation will be reported to the TCEQ CRP Project Manager in the project progress report. CAPs will be prepared by the Lead Organization QAO and submitted to TCEQ CRP Project Manager along with project progress report.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

# B4 Analytical Methods

The analytical methods, associated matrices, and performing laboratories are listed in Appendix A. The authority for analysis methodologies under CRP is derived from the 30 Tex. Admin. Code ch. 307, in that data generally are generated for comparison to those standards and/or criteria. The Texas Surface Water Quality Standards state “Procedures for laboratory analysis must be in accordance with the most recently published edition of the book entitled Standard Methods for the Examination of Water and Wastewater, the TCEQ Surface Water Quality Monitoring Procedures as amended, 40 CFR 136, or other reliable procedures acceptable to the TCEQ, and in accordance with chapter 25 of this title.”

Laboratories collecting data under this QAPP must be NELAP-accredited in accordance with 30 TAC Chapter 25. Copies of laboratory QMs and SOPs are available for review by the TCEQ.

## Standards Traceability

All standards used in the field and laboratory are traceable to certified reference materials. Standards preparation is fully documented and maintained in a standards log book. Each documentation includes information concerning the standard identification, starting materials, including concentration, amount used and lot number; date prepared, expiration date and preparer’s initials/signature. The reagent bottle is labeled in a way that will trace the reagent back to preparation.

## Analytical Method Deficiencies and Corrective Actions

Deficiencies in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, quality control samples outside QAPP defined limits, etc. In many cases, the field technician or lab analyst will be able to correct the problem. If the problem is resolvable by the field technician or lab analyst, then they will document the problem on the field data sheet or laboratory record and complete the analysis. If the problem is not resolvable, then it is conveyed to the Basin Planning Agency Laboratory Supervisor, who will make the determination and notify the Basin Planning Agency QAO. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TCEQ. The nature and disposition of the problem is reported on the data report which is sent to the Basin Planning Agency Manager. The Lead Organization Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

The TCEQ has determined that analyses associated with the qualifier codes (e.g., “holding time exceedance”, “sample received unpreserved”, “estimated value”) may have unacceptable measurement uncertainty associated with them. This will immediately disqualify analyses from submittal to SWQMIS. Therefore, data with these types of problems should not be reported to the TCEQ. Additionally, any data collected or analyzed by means other than those stated in the QAPP, or data suspect for any reason should not be submitted for loading and storage in SWQMIS. However, when data is lost, its absence will be described in the data summary report submitted with the corresponding data set, and a corrective action plan (as described in section C1) may be necessary.

# B5 Quality Control

## Sampling Quality Control Requirements and Acceptability Criteria

The minimum field QC requirements, and program-specific laboratory QC requirements, are outlined in SWQM Procedures. Specific requirements are outlined below. Field QC sample results are submitted with the laboratory data report (see Section A9.).

Field blank

 Field blanks are required for total metals-in-water samples when collected without sample equipment (i.e., as grab samples). For other types of samples, they are optional. A field blank is prepared in the field by filling a clean container with pure deionized water and appropriate preservative, if any, for the specific sampling activity being undertaken. Field blanks are used to assess contamination from field sources, such as airborne materials, containers, or preservatives. The frequency requirement for field blanks for total metals-in-water samples is specified in the SWQM Procedures.

The analysis of field blanks should yield values lower than the LOQ. When target analyte concentrations are high, blank values should be lower than 5% of the lowest value of the batch.

Field blanks are associated with batches of field samples. In the event of a field blank failure for one or more target analytes, all applicable data associated with the field batch may need to be qualified as not meeting project QC requirements, and these qualified data will not be reported to the TCEQ. These data include all samples collected on that day during that sample run and should not be confused with the laboratory analytical batch.

Field equipment blank

Field equipment blanks are required for metals-in-water samples when collected using sampling equipment. Field equipment blank is a sample of analyte-free media which has been used to rinse common sampling equipment to check the effectiveness of decontamination procedures. It is collected in the same type of container as the environmental sample, preserved in the same manner and analyzed for the same parameter.

The analysis of field equipment blanks should yield values lower than the LOQ, or, when target analyte concentrations are very high, blank values must be less than 5% of the lowest value of the batch, or corrective action will be implemented.

Field equipment blanks are associated with batches of field samples. In the event of a field equipment blank failure for one or more target analytes, all applicable data associated with the field batch may need to be qualified as not meeting project QC requirements, and these qualified data will not be reported to the TCEQ. These data include all samples collected on that day during that sample run and should not be confused with the laboratory analytical batch.

Trip blank

Trip blanks are required for volatile organic analyses (VOA) only. VOA trip blanks are samples prepared in the laboratory with laboratory pure water and preserved as required. A trip blank is submitted with each ice chest of VOA samples submitted to the laboratory. They are transported to the sampling site, handled like an environmental sample, and returned to the laboratory for analysis. Trip blanks are not opened in the field. Their purpose is to check contamination of the sample through leaching of the septum. The analysis of trip blank should yield values less than the LOQ. When target analyte concentrations are very high, blank values should be less than 5% of the lowest value of the batch, or corrective action will be implemented.

## Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Batch

A batch is defined as environmental samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAP-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 25 hours. An analytical batch is composed of prepared environmental samples (extract, digestates, or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

Method Specific QC requirements

QC samples, other than those specified later this section, are run (e.g., sample duplicates, surrogates, internal standards, continuing calibration samples, interference check samples, positive control, negative control, and media blank) as specified in the methods and in SWQM Procedures. The requirements for these samples, their acceptance criteria or instructions for establishing criteria, and corrective actions are method-specific.

Detailed laboratory QC requirements and corrective action procedures are contained within the individual laboratory quality manuals (QMs). The minimum requirements that all participants abide by are stated below.

Comparison Counting

For routine bacteriological samples, repeat counts on one or more positive samples are required, at least monthly. If possible, compare counts with an analyst who also performs the analysis. Replicate counts by the same analyst should agree within 5 percent, and those between analysts should agree within 10 percent. Record the results.

Limit of Quantitation (LOQ)

The laboratory will analyze a calibration standard (if applicable) at the LOQ published in Appendix A, Table A7, on each day calibrations are performed. In addition, an LOQ check sample will be analyzed with each analytical batch. Calibrations including the standard at the LOQ listed in Appendix A, 7.1 will meet the calibration requirements of the analytical method or corrective action will be implemented.

LOQ Sediment and Tissue Samples – When considering LOQs for solid samples and how they apply to results, two aspects of the analysis are considered: (1) the LOQ of the sample, based on the real-world in which moisture content and interferences affect the result and (2) the LOQ in the QAPP which is a value less than or equal to the AWRL based on an idealized sample with zero % moisture.

The LOQ for a solid sample is based on the lowest non-zero calibration standard (as are those for water samples), the moisture content of the solid sample, and any sample concentration or dilution factors resulting from sample preparation or clean-up.

To establish solid-phase LOQs to be listed in Appendix A, Table A7.1 of the QAPP, the laboratory will adjust the concentration of the lowest non-zero calibration standard for the amount of sample extracted, the final extract volume, and moisture content (assumed to be zero % moisture). Each calculated LOQ will be less than or equal to the AWRL on the dry-weight basis to satisfy the AWRL requirement for sediment and tissue analyses. When data are reviewed for consistency with the QAPP, they are evaluated based on this requirement. Results may not appear to meet the AWRL requirement due to high moisture content, high concentrations of non-target analytes necessitating sample dilution, etc. These sample results will be submitted to the TCEQ with an explanation on the data summary as to why results do not appear to meet the AWRL requirement.

LOQ Check Sample

An LOQ check sample consists of a sample matrix (e.g., deionized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is used to establish intra-laboratory bias to assess the performance of the measurement system at the lower limits of analysis. The LOQ check sample is spiked into the sample matrix at a level less than or equal to the LOQ published in Appendix A, Table A7, for each analyte for each analytical batch of CRP samples run. If it is determined that samples have exceeded the high range of the calibration curve, samples should be diluted or run on another curve. For diluted or high concentration samples run on batches with calibration curves that do not include the LOQ published in Appendix A, Table A7, a check sample will be run at the low end of the calibration curve.

The LOQ check sample is carried through the complete preparation and analytical process. LOQ Check Samples are run at a rate of one per analytical batch.

The percent recovery of the LOQ check sample is calculated using the following equation in which %R is percent recovery, SR is the sample result, and SA is the reference concentration for the check sample:

$$\%R= ^{S\_{R}}/\_{S\_{A}}×100$$

Measurement performance specifications are used to determine the acceptability of LOQ Check Sample analyses as specified in Appendix A Table A7.1.

Laboratory Control Sample (LCS)

An LCS consists of a sample matrix (e.g., deionized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. It is used to establish intra-laboratory bias to assess the performance of the measurement system. The LCS is spiked into the sample matrix at a level less than or near the midpoint of the calibration for each analyte. In cases of test methods with very long lists of analytes, LCSs are prepared with all the target analytes and not just a representative number, except in cases of organic analytes with multipeak responses.

The LCS is carried through the complete preparation and analytical process. LCSs are run at a rate of one per preparation batch.

Results of LCSs are calculated by percent recovery (%R), which is defined as 100 times the measured concentration, divided by the true concentration of the spiked sample.

The following formula is used to calculate percent recovery, where %R is percent recovery; SR is the measured result; and SA is the true result:

$$\%R= ^{S\_{R}}/\_{S\_{A}}×100$$

Measurement performance specifications are used to determine the acceptability of LCS analyses as specified in Appendix A Table A7.1.

Laboratory Duplicates

A laboratory duplicate is an aliquot taken from the same container as an original sample under laboratory conditions and processed and analyzed independently. A laboratory duplicate is prepared in the laboratory by splitting aliquots of a sample, LCS, or matrix spike. Both samples are carried through the entire preparation and analytical process. Laboratory duplicates are used to assess precision and are performed at a rate of one per preparation batch.

For most parameters except bacteria, precision is evaluated using the relative percent difference (RPD) between duplicate LCS results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X1 and X2, the RPD is calculated from the following equation: (If other formulas apply, adjust appropriately.)

$$RPD = \frac{\left|X\_{1}-X\_{2}\right|}{\left(\frac{X\_{1}+X\_{2}}{2}\right)}×100$$

For bacteriological parameters, precision is evaluated using the results from laboratory duplicates. Bacteriological duplicates are analyzed on a 10% frequency (or once per preparation batch, whichever is more frequent). Sufficient volume should be collected to analyze laboratory duplicates from the same sample container.

The base-10 logarithms of the results from the original sample and its duplicate are calculated. The absolute value of the difference between the two base-10 logarithms is calculated and compared to the precision criterion in Appendix A, Table A7.1.

If the precision criterion is exceeded, the data are not acceptable for use under this project and are not reported to TCEQ. Results from all samples associated with that failed duplicate (usually a maximum of 10 samples) are considered to have excessive analytical variability and are qualified as not meeting project QC requirements.

The precision criterion in Appendix A, Table A7.1 for bacteriological duplicates applies only to samples with concentrations > 10 MPN.

Laboratory equipment blank

Laboratory equipment blanks are prepared at the laboratory where collection materials for metals sampling equipment are cleaned between uses. These blanks document that the materials provided by the laboratory are free of contamination. The QC check is performed before the metals sampling equipment is sent to the field. The analysis of laboratory equipment blanks should yield values less than the LOQ. If the result is not less than the LOQ, the equipment should not be used.

Matrix spike (MS) – Matrix spikes are prepared by adding a known quantity of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available.

Matrix spikes indicate the effect of the sample on the precision and accuracy of the results generated using the selected method. Matrix-specific QC samples indicate the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. The information from these controls is sample/matrix specific and would not normally be used to determine the validity of the entire batch.The frequency of matrix spikes is specified by the analytical method, or a minimum of one per preparation batch, whichever is greater. To the extent possible, matrix spikes prepared and analyzed over the course of the project should be performed on samples from different sites.

The components to be spiked shall be as specified by the mandated analytical method. The results from matrix spikes are primarily designed to assess the validity of analytical results in a given matrix, and are expressed as percent recovery (%R).

The percent recovery of the matrix spike is calculated using the following equation, where %R is percent recovery, SSR is the concentration measured in the matrix spike, SR is the concentration in the parent sample, and SA is the concentration of analyte that was added:

$$\%R= \frac{S\_{SR}-S\_{R}}{S\_{A}}×100$$

Matrix spike recoveries are compared to the acceptance criteria published in the mandated test method. If the matrix spike results are outside established criteria, the data for the analyte that failed in the parent sample is not acceptable for use under this project and will not be reported to TCEQ. The result from the parent sample associated with that failed matrix spike will be considered to have excessive analytical variability and will be qualified by the laboratory as not meeting project QC requirements. Depending on the similarities in composition of the samples in the batch, the Basin Planning Agency may consider excluding all of the results in the batch related to the analyte that failed recovery.

Alternate language:

Matrix spike recoveries are compared to the same acceptance criteria established for the associated LCS recoveries, rather than the matrix spike recoveries published in the mandated test method. The EPA 1993 methods (i.e. ammonia-nitrogen, ion chromatography, TKN) that establish matrix spike recovery acceptance criteria are based on recoveries from drinking water that has very low interferences and variability and do not represent the matrices sampled in the CRP. If the matrix spike results are outside laboratory-established criteria, there will be a review of all other associated quality control data in that batch. If all of quality control data in the associated batch passes, it will be the decision of the laboratory QAO or Basin Planning Agency Project Manager to report the data for the analyte that failed in the parent sample to TCEQ or to determine that the result from the parent sample associated with that failed matrix spike is considered to have excessive analytical variability and does not meet project QC requirements. Depending on the similarities in composition of the samples in the batch, the Basin Planning Agency may consider excluding all of the results in the batch related to the analyte that failed recovery.

Method blank

A method blank is a sample of matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as the samples through all steps of the analytical procedures, and in which no target analytes or interferences are present at concentrations that impact the analytical results for sample analyses. The method blanks are performed at a rate of once per preparation batch. The method blank is used to document contamination from the analytical process. The analysis of method blanks should yield values less than the LOQ. For very high-level analyses, the blank value should be less than 5% of the lowest value of the batch, or corrective action will be implemented. Samples associated with a contaminated blank shall be evaluated as to the best corrective action for the samples (e.g. reprocessing, data qualifying codes). In all cases the corrective action must be documented.

The method blank shall be analyzed at a minimum of one per preparation batch. In those instances for which no separate preparation method is used (e.g., VOA) the batch shall be defined as environmental samples that are analyzed together with the same method and personnel, using the same lots of reagents, not to exceed the analysis of 20 environmental samples.

## Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the Lead Organization Project Manager, in consultation with the Lead Organization QAO. In that differences in sample results are used to assess the entire sampling process, including environmental variability, the arbitrary rejection of results based on pre-determined limits is not practical. Therefore, the professional judgment of the Basin Planning Agency Project Manager and QAO will be relied upon in evaluating results. Rejecting sample results based on wide variability is a possibility. Field blanks for trace elements and trace organics are scrutinized very closely. Field blank values exceeding the acceptability criteria will automatically invalidate the sample. Notations of blank contamination are noted in the quarterly report and the final QC Report. Equipment blanks for metals analysis are also scrutinized very closely.

Laboratory measurement quality control failures are evaluated by the laboratory staff. The disposition of such failures and the nature and disposition of the problem is reported to the Basin Planning Agency Laboratory QAO. The Laboratory QAO will discuss with the Basin Planning Agency Project Manager. If applicable, the Basin Planning Agency Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

The definition of and process for handling deficiencies and corrective action are defined in Section C1.

# B6 Instrument/Equipment Testing, Inspection, and Maintenance

All sampling equipment testing and maintenance requirements are detailed in the SWQM Procedures. Sampling equipment is inspected and tested upon receipt and is assured appropriate for use. Equipment records are kept on all field equipment and a supply of critical spare parts is maintained.

All laboratory tools, gauges, instrument, and equipment testing and maintenance requirements are contained within laboratory QM(s).

# B7 Instrument Calibration and Frequency

Field equipment calibration requirements are contained in the SWQM Procedures. Post-calibration error limits and the disposition resulting from error are adhered to. Data collected from field instruments that do not meet the post-calibration error limits specified in the SWQM Procedures will not be submitted for inclusion into SWQMIS.

Detailed laboratory calibrations are contained within the QM(s).

# B8 Inspection/Acceptance of Supplies and Consumables

No special requirements for acceptance are specified for field sampling supplies and consumables. Reference to the laboratory QM may be appropriate for laboratory-related supplies and consumables.

# B9 Acquired Data

This QAPP does not include the use of routine data acquired from external sources.

Only data collected directly under this QAPP is submitted to the SWQMIS database.

Non-directly measured data, secondary data, or acquired data involves the use of data collected under another project, and collected with a different intended use than this project. The acquired data still meets the quality requirements of this project, and is defined below. The following data source(s) will be used for this project:

USGS gage station data will be used throughout this project to aid in determining gage height and flow. Rigorous QA checks are completed on gage data by the USGS and the data are approved by the USGS and permanently stored at the USGS. This data will be submitted to the TCEQ under parameter code 00061 Flow, Instantaneous or parameter code 74069 Flow Estimate depending on the proximity of the monitoring station to the USGS gage station.

Reservoir stage data are collected every day from the Unites States Geological Survey (USGS), International Boundary and Water Commission (IBWC), and the Unites States Army Corps of Engineers (USACE) websites. These data are preliminary and subject to revision. The Texas Water Development Board (TWDB) derives reservoir storage (in acre-feet) from these stage data (elevation in feet above mean sea level), by using the latest rating curve datasets available. These data are published at the TWDB website at <http://waterdatafortexas.org/reservoirs/statewide>. The web application uses real time gaged observations 7 AM reading each day (or closest reading available) from 119 major reservoirs to approximate daily storage for each reservoir, as well as daily total storage for water planning regions, river basins and the state of Texas. These instantaneous data are updated to mean daily data for all previous days. These data will be submitted to the TCEQ under parameter code 00052 Reservoir Stage and parameter code 00053 Reservoir Percent Full.

Insert additional sources of non-direct measurements as needed.

# B10 Data Management

## Data Management Process

Describe the data management process, tracing the path of the data from their generation through their transmittal to the TCEQ and their storage. A flowchart is recommended. All data to be stored in the SWQMIS will be submitted in the format specified in the DMRG.

Data Dictionary

Terminology and field descriptions are included in the 2016 DMRG, or most recent version. A table outlining the entities that will be used when submitting data under this QAPP is included below for the purpose of verifying which entity codes are included in this QAPP.

|  |  |  |  |
| --- | --- | --- | --- |
| Name of Entity | Tag Prefix | Submitting Entity | Collecting Entity |
| Ex. Texas A&M Univ. Corpus Christi, Center for Coastal Studies | A | AM | AM |

## Data Errors and Loss

Discuss the control mechanisms for detecting and correcting errors and for preventing loss of data during data reduction (mathematical operations), data reporting, and data entry to forms, reports, and databases. Provide examples of forms or checklists to be used in Appendix E. Refer to QAPP Appendices as appropriate for Field and Laboratory Data Sheets, the Data Summary, etc.

## Record Keeping and Data Storage

Describe the standard record keeping procedures, document control system, and the approach used for data storage and retrieval on electronic media.

## Data Handling, Hardware, and Software Requirements

Identify and describe all data handling equipment and procedures to process, compile, and analyze the data. Include any required computer hardware and software and address any specific performance requirements for the hardware/software configuration used. Describe the procedures that will be followed to demonstrate acceptability of the hardware/software configuration required.

## Information Resource Management Requirements

Describe the process for assuring that applicable information resource management requirements are satisfied. Please reference the processes used to assure information management specifications will be met. These information management specifications include TCEQ as well as each grantee’s internal information management controls. The TCEQ has the following data specification requirements: the DMRG, GIS Policy (TCEQ OPP 8.11) and GPS Policy (TCEQ OPP 8.12). Note that GPS certification is not required for positional data that will be used for photo interpolation in the station location request process.

Data will be managed in accordance with the TCEQ DMRG, and applicable Basin Planning Agency information resource management policies.

GPS equipment may be used as a component of the information required by the Station Location (SLOC) request process for creating the certified positional data that will ultimately be entered into SWQMIS database. Positional data obtained by CRP grantees using a GPS will follow the TCEQ’s OPP 8.11 and 8.12 policy regarding the collection and management of positional data. All positional data entered into SWQMIS will be collected by a GPS certified individual with an agency approved GPS device to ensure that the agency receives reliable and accurate positional data. Certification can be obtained in any of three ways: completing a TCEQ training class, completing a suitable training class offered by an outside vendor, or by providing documentation of sufficient GPS expertise and experience. Contractors must agree to adhere to relevant TCEQ policies when entering GPS-collected data.

In lieu of entering certified GPS coordinates, positional data may be acquired with a GPS and verified with photo interpolation using a certified source, such as Google Earth or Google Maps. The verified coordinates and map interface can then be used to develop a new SLOC.

# C1 Assessments and Response Actions

The following table presents the types of assessments and response actions for data collection activities applicable to the QAPP.

### Table C1.1 Assessments and Response Requirements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Assessment Activity | ApproximateSchedule | Responsible Party | Scope | ResponseRequirements |
| Status MonitoringOversight, etc. | Continuous | Basin Planning Agency | Monitoring of the project status and records to ensure requirements are being fulfilled | Report to TCEQ in Quarterly Report |
| Monitoring Systems Auditof Basin Planning Agency  | Dates to be determinedby TCEQ CRP | TCEQ | Field sampling, handling and measurement; facility review; and data management as they relate to CRP | 30 days to respond in writing to the TCEQ to address corrective actions |
| Monitoring Systems Auditof ProgramSubparticipants | Include schedule for completing all subparticipant audits before the expiration of the QAPP | Basin Planning Agency | Field sampling, handling and measurement; facility review; and data management as they relate to CRP | 30 days to respond in writing to the Basin Planning Agency. PA will report problems to TCEQ in Progress Report. |
| Laboratory Inspection | Dates to be determined by TCEQ | TCEQ Laboratory Inspector | Analytical and quality control procedures employed at the laboratory and the contract laboratory | 30 days to respond in writing to the TCEQ to address corrective actions |

## Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, *SWQM Procedures*, SOPs, or the DMRG. Deficiencies may invalidate resulting data and require corrective action. Repeated deficiencies should initiate a CAP. Corrective action for deficiencies may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff, are communicated to Lead Organization Project Manager (or other appropriate staff), and should be subject to periodic review so their responses can be uniform, and their frequency tracked. It is the responsibility of the Lead Organization Project Manager, in consultation with the Lead Organization QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in the project progress reports and by completion of a CAP.

## Corrective Action

CAPs should:

* Identify the problem, nonconformity, or undesirable situation
* Identify immediate remedial actions if possible
* Identify the underlying cause(s) of the problem
* Identify whether the problem is likely to recur, or occur in other areas
* Evaluate the need for corrective action
* Use problem-solving techniques to verify causes, determine solution, and develop an action plan
* Identify personnel responsible for action
* Establish timelines and provide a schedule
* Document the corrective action

To facilitate the process a flow chart has been developed (see figure C1.1: Corrective Action Process for Deficiencies).

### Figure C1.1 Corrective Action Process for Deficiencies



Status of CAPs will be included with quarterly progress reports. In addition, significant conditions which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data will be reported to the TCEQ immediately.

The Basin Planning Agency Project Manager is responsible for implementing corrective actions and tracking deficiencies and corrective actions in a pre-CAP log. Records of audit findings and corrective actions are maintained by the Basin Planning Agency Project Manager. Audit reports and corrective action documentation will be submitted to the TCEQ with the Progress Report.

If audit findings and corrective actions cannot be resolved, then the authority and responsibility for terminating work are specified in the TCEQ QMP and in agreements in contracts between participating organizations.

# C2 Reports to Management

### Table C2.1 QA Management Reports

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Type of Report | Frequency (daily, weekly, monthly, quarterly, etc.) | Projected Delivery Date(s) | Person(s) Responsible for Report Preparation | Report Recipients |
|  |  |  |  |  |
|  |  |  |  |  |

## Reports to Basin Planning Agency Project Management

A number of Basin Planning Agencies have processes in place to report project status, results of oversight activities, deficiencies, corrective action reports, and significant QA issues to management. They may or may not be written reports. Please list and describe as appropriate. Also include the schedule for submission.

## Reports to TCEQ Project Management

All reports detailed in this section are contract deliverables and are transferred to the TCEQ in accordance with contract requirements.

Progress Report

Summarizes the Basin Planning Agency’s activities for each task; reports monitoring status, problems, delays, deficiencies, status of open CAPs, and documentation for completed CAPs; and outlines the status of each task’s deliverables.

Monitoring Systems Audit Report and Response

Following any audit performed by the Basin Planning Agency, a report of findings, recommendations and response is sent to the TCEQ in the quarterly progress report.

Data Summary

Contains basic identifying information about the data set and comments regarding inconsistencies and errors identified during data verification and validation steps or problems with data collection efforts (e.g. Deficiencies).

## Reports by TCEQ Project Management

Contractor Evaluation

The Basin Planning Agency participates in a Contractor Evaluation by the TCEQ annually for compliance with administrative and programmatic standards. Results of the evaluation are submitted to the TCEQ Financial Administration Division, Procurement and Contracts Section.

# D1 Data Review, Verification, and Validation

All field and laboratory data will be reviewed and verified for integrity and continuity, reasonableness, and conformance to project requirements, and then validated against the project objectives and measurement performance specifications which are listed in Section A7. Only those data which are supported by appropriate quality control data and meet the measurement performance specifications defined for this project will be considered acceptable, and will be reported to the TCEQ for entry into SWQMIS.

# D2 Verification and Validation Methods

Much of the information previously listed in other elements will be discussed here for the series of final checks on the data that will be conducted. The data may be reviewed to verify how it was: recorded or formatted; transformed (e.g., log values, calculations of replicate measurements, dry weight to wet weight values); reduced (e.g., calculation of sample concentrations from peak areas), transferred (e.g., software); analyzed (e.g., using the organization’s Laboratory Information Management System [LIMS]); and qualified.

The methods to be used or processes to be followed can be identified as SOPs, if available, or described in the text. For example, indicate what data validation software will be used, if any. Responsible parties performing these functions should have been identified earlier in the plan (Element A4, Project/Task Organization); if not, identify them here. Describe the process to show how errors will be handled and this information given to the data users. Include necessary forms and checklists in Appendix E for TCEQ’s review.

All field and laboratory data will be reviewed, verified and validated to ensure they conform to project specifications and meet the conditions of end use as described in Section A7 of this document.

Data review, verification, and validation will be performed using self-assessments and peer and management review as appropriate to the project task. The data review tasks to be performed by field and laboratory staff is listed in the first two columns of Table D2.1, respectively. Potential errors are identified by examination of documentation and by manual, examination of corollary or unreasonable data, or computer-assisted. If a question arises or an error is identified, the manager of the task responsible for generating the data is contacted to resolve the issue. Issues which can be corrected are corrected and documented. If an issue cannot be corrected, the task manager consults with the higher level project management to establish the appropriate course of action, or the data associated with the issue are rejected and not reported to the TCEQ for storage in SWQMIS. Field and laboratory reviews, verifications, and validations are documented.

After the field and laboratory data are reviewed, another level of review is performed once the data are combined into a data set. This review step as specified in Table D2.1 is performed by the Basin Planning Agency Data Manager and QAO. Data review, verification, and validation tasks to be performed on the data set include, but are not limited to, the confirmation of laboratory and field data review, evaluation of field QC results, additional evaluation of anomalies and outliers, analysis of sampling and analytical gaps, and confirmation that all parameters and sampling sites are included in the QAPP.

The Data Review Checklist (See Appendix F) covers three main types of review: data format and structure, data quality review, and documentation review. The Data Review Checklist is transferred with the water quality data submitted to the TCEQ to ensure that the review process is being performed.

Another element of the data validation process is consideration of any findings identified during the monitoring systems audit conducted by the TCEQ CRP Lead Quality Assurance Specialist. Any issues requiring corrective action must be addressed, and the potential impact of these issues on previously collected data will be assessed. After the data are reviewed and documented, the Basin Planning Agency Project Manager validates that the data meet the data quality objectives of the project and are suitable for reporting to TCEQ.

If any requirements or specifications of the CRP are not met, based on any part of the data review, the responsible party should document the nonconforming activities and submit the information to the Basin Planning Agency Data Manager with the data in the Data Summary (See Appendix F). All failed QC checks, missing samples, missing analytes, missing parameters, and suspect results should be discussed in the Data Summary.

Table D2.1: Data Review Tasks

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Data to be Verified | FieldTask | LaboratoryTask | QA Task | Lead Organization Data Manager Task |
| Sample documentation complete; samples labeled, sites identified |  |  |  |  |
| Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures Manual |  |  |  |  |
| Standards and reagents traceable |  |  |  |  |
| Chain of custody complete/acceptable |  |  |  |  |
| NELAP Accreditation is current |  |  |  |  |
| Sample preservation and handling acceptable |  |  |  |  |
| Holding times not exceeded |  |  |  |  |
| Collection, preparation, and analysis consistent with SOPs and QAPP |  |  |  |  |
| Field documentation (e.g., biological, stream habitat) complete |  |  |  |  |
| Instrument calibration data complete |  |  |  |  |
| QC samples analyzed at required frequency |  |  |  |  |
| QC results meet performance and program specifications |  |  |  |  |
| Analytical sensitivity (LOQ/AWRL) consistent with QAPP |  |  |  |  |
| Results, calculations, transcriptions checked |  |  |  |  |
| Laboratory bench-level review performed |  |  |  |  |
| All laboratory samples analyzed for all scheduled parameters |  |  |  |  |
| Corollary data agree |  |  |  |  |
| Nonconforming activities documented |  |  |  |  |
| Outliers confirmed and documented; reasonableness check performed |  |  |  |  |
| Dates formatted correctly |  |  |  |  |
| Depth reported correctly and in correct units |  |  |  |  |
| TAG IDs correct |  |  |  |  |
| TCEQ Station ID number assigned |  |  |  |  |
| Valid parameter codes |  |  |  |  |
| Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly |  |  |  |  |
| Time based on 24-hour clock |  |  |  |  |
| Check for transcription errors |  |  |  |  |
| Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule) |  |  |  |  |
| Field instrument pre- and post-calibration results within limits |  |  |  |  |
| 10% of data manually reviewed |  |  |  |  |

# D3 Reconciliation with User Requirements

Data produced in this project, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Data which do not meet requirements will not be submitted to SWQMIS nor will be considered appropriate for any of the uses noted in Section A5.

# Appendix A: Measurement Performance Specifications (Table A7.1)

Measurement performance specifications define the data quality needed to satisfy project objectives. To this end, measurement performance specifications are qualitative and quantitative statements that:

* clarify the intended use of the data
* define the type of data needed to support the end use
* identify the conditions under which the data should be collected

Appendix A of the QAPP addresses measurement performance specifications, including:

* analytical methodologies
* AWRLs
* limits of quantitation
* bias limits for LCSs
* precision limits for LCSDs
* completeness goals
* qualitative statements regarding representativeness and comparability

The items identified above need to be considered for each type of monitoring activity. The CRP emphasizes that data should be collected to address multiple objectives, if possible, thereby maximizing the expenditure of resources. Caution should be applied when attempting to collect data for multiple purposes because measurement performance specifications may vary according to the purpose. For example, limits of quantitation may differ for data used to assess standards attainment and for trend analysis. When planning projects, first priority should be given to the main use of the project data and the data quality needed to support that use, then secondary goals should be considered.

Table A7.1 should be modified to reflect actual parameters, methods, etc. employed by the Basin Planning Agency and its participants. Procedures for laboratory analysis must be in accordance with the most recently published edition of Standard Methods for the Examination of Water and Wastewater, 40 CFR 136, or otherwise approved independently. Only data collected that have a valid TCEQ parameter code assigned in Table A7.1 are stored in SWQMIS. Any parameters listed in Table A7.1 that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

Based on a general review of available information regarding achievable recoveries of additional parameters, use the following bias limits (percent recovery of the LCS and LOQ Check Sample) in Table A7.1: metals-in solid samples (i.e., sediment and tissue) 60-140%; organics-in-water samples 65-135%; organics-in-solid samples (i.e., sediment and tissue) 40-160%. There may be poor performing analytes within these groups that do not perform well with specific methods and usually recover poorly. Before these compounds are included in the list of analytes to be submitted to the TCEQ, the Basin Planning Agency should discuss the situation with the TCEQ and we will discuss if they are project specific analytes of concern, if low recoveries are acceptable or alternative methods should be run.

Table A7.1 - Measurement Performance Specifications

Please use Excel Spreadsheet.

# Appendix B: Task 3 Work Plan & Sampling Process Design and Monitoring Schedule (Plan)

## Appendix B Sampling Process Design and Monitoring Schedule (plan)

The following language and table can be used to meet the requirements of this section. In addition to the table, reference maps should be included. The table is provided as an example only. However, consistency with the TCEQ format and general categories when filling in the monitoring table is mandatory.

### Sample Design Rationale FY 2018

The sample design is based on the legislative intent of CRP. Under the legislation, the Basin Planning Agencies have been tasked with providing data to characterize water quality conditions in support of the Texas Water Quality Integrated Report, and to identify significant long-term water quality trends. Based on Steering Committee input, achievable water quality objectives and priorities and the identification of water quality issues are used to develop work plans which are in accord with available resources. As part of the Steering Committee process, the Basin Planning Agency coordinates closely with the TCEQ and other participants to ensure a comprehensive water monitoring strategy within the watershed. A discussion of past or ongoing water quality issues should be provided here to justify the monitoring schedule. Specify changes in sites and sampling frequency; why parameters or sites were added or dropped; issues you were unable to address at the time; future monitoring recommendations; and any information you wish to capture about the process that will help make future decisions or help you document current decisions.

##### *Example 🖉*

*The following changes or additions have been made to the monitoring schedule. These changes have come about because of concerns or requests of steering committee members or monitoring entities.*

* *The Guadalupe River at Dupont site will be discontinued at the present location and a new site that is downstream and out of the mixing zone of the Dupont discharges will be found for 2010.*
* *A new site on Peach Creek will be added bimonthly in 2010 (site no. 17935, Peach Creek at FM 397.). Data at this site was collected during the Peach Creek TMDL. The site will be monitored in 2010 and beyond to identify any changes in the water quality that may be a result of the implementation of best management practices (BMPs) in the watershed.*
* *The UGRA weekly monitoring of E. coli will no longer be funded by CRP. The TCEQ has sufficient data for assessment purposes and does not need the bacterial data at this frequency any longer. UGRA will evaluate their ability to continue monitoring at these sites for their own use and use by their constituents.*
* *The metals in the water sample that was to be collected in 2009 at the Dupont site will be moved to Geronimo Creek. Metals in sediment in Geronimo Creek will be added to the 2010 schedule.*
* *Organics in sediment, specifically those organics associated with urban environments (TPH and BTEX), will be analyzed at the San Marcos River at IH 35 location.*
* *Background radiological data will be collected on Coleto Creek in advance of in-situ mining in Goliad County in 2010.*

##### *End Example 🖉*

### Site Selection Criteria

This data collection effort involves monitoring routine water quality, using procedures that are consistent with the TCEQ SWQM program, for the purpose of data submission into the SWQMIS database maintained by the TCEQ. To this end, some general guidelines are followed when selecting sampling sites, as outlined below, and discussed thoroughly in SWQM Procedures, Volumes I and II. Overall consideration is given to accessibility and safety. All monitoring activities have been developed in coordination with the CRP Steering Committee and with the TCEQ. The site selection criteria set forth here may not apply to all programs. The site selection criteria specified are those the TCEQ would like considered in order to produce data which is complementary to that collected by the state and which may be used in assessments, etc. Other criteria may be considered and should be described.

1. Locate stream sites so that samples can be safely collected from the centroid of flow. Centroid is defined as the midpoint of that portion of stream width which contains 50 percent of the total flow. If multiple potential sites on a stream segment are appropriate for monitoring, choose one that would best represent the water body, and not a site that displays unusual conditions or contaminant source(s). Avoid backwater areas or eddies when selecting a stream site.
2. At a minimum for reservoirs, locate sites near the dam (reservoirs) and in the major arms. Larger reservoirs might also include stations in the middle and upper (riverine) areas. Select sites that best represent the water body by avoiding coves and back water areas. A single monitoring site is considered representative of 25 percent of the total reservoir acres, but not more than 5,120 acres.
3. Routine monitoring sites are selected to maximize stream coverage or basin coverage. Very long segments may require more stations. As a rule of thumb, stream segments between 25 and 50 miles long require two stations, and longer than 50 miles require three or more depending on the existence of areas with significantly different sources of contamination or potential water quality concerns. Major hydrological features, such as the confluence of a major tributary or an instream dam, may also limit the spatial extent of an assessment based on one station.
4. Because historical water quality data can be very useful in assessing use attainment or impairment, it may be best to use sites that are on current or past monitoring schedules.
5. All classified segments (including reservoirs) should have at least one routine monitoring site that adequately characterizes the water body, and monitoring should be coordinated with the TCEQ or other qualified monitoring entities reporting routine data to TCEQ.
6. Routine monitoring sites may be selected to bracket sources of pollution, influence of tributaries, changes in land uses, and hydrological modifications.
7. Sites should be accessible. When possible, stream sites should have a USGS or IBWC stream flow gauge. If not, it should be possible to conduct flow measurement during routine visits.

### Monitoring Sites for FY 2018

Monitoring Tables for FY 2018 are presented on the following page. Monitoring tables are in the appendix, so that only the tables will need to be modified annually (unless other program changes are made in the 2nd year). This appendix must be re-submitted annually.

The sample design for SWQM is shown in Table B1.1 below. Terminology and field descriptions are included in the DMRG. Please use the schedule download feature at [http://cms.lcra.org](http://cms.lcra.org/) to populate this table. Please use the list of Monitoring Type Codes provided in the DMRG. The A7 table is built with tabs to match headings in the CMS, so the parameters performed when any heading is marked are clearly defined. If the parameters for a site will vary from the A7 table, include this in the comments section. TCEQ Surface Water Quality Monitoring Procedures volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data, 2005 (RG‑416), outlines voucher requirements for benthic and nekton sampling.

Table B1.1 Sample Design and Schedule, FY 2018

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site Description | Station ID | Waterbody ID | Region | SE | CE | MT | 24 hr DO | AqHab | Benthics | Nekton | Metal Water | Organic Water | Metal Sed | Organic Sed | Conv | Amb Tox Water | Amb Tox Sed | Bacteria | Flow | Fish Tissue | Field | Comments |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

# Appendix C: Station Location Maps

### Station Location Maps

Maps of stations monitored by the Basin Planning Agency are provided below. The maps were generated by the Basin Planning Agency. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the [INSERT CONTACT HERE] at [INSERT PHONE NUMBER HERE].

# Appendix D: Field Data Sheets

# Appendix E: Chain of Custody Forms

# Appendix F: Data Review Checklist and Summary Shells

## Data Review Checklist

This checklist is to be used by the Planning Agency and other entities handling the monitoring data in order to review data before submitting to the TCEQ. This table may not contain all of the data review tasks being conducted.

|  |  |
| --- | --- |
| **Data Format and Structure** | Y, N, or N/A |
| Are there any duplicate Tag Id numbers in the Events file? |  |
| Do the Tag prefixes correctly represent the entity providing the data? |  |
| Have any Tag Id numbers been used in previous data submissions? |  |
| Are Tag IDs associated with a valid SLOC? |  |
| Are sampling Dates in the correct format, MM/DD/YYYY with leading zeros? |  |
| Are sampling Times based on the 24 hr clock (e.g. 09:04) with leading zeros? |  |
| Is the Comments field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)? |  |
| Are Submitting Entity, Collecting Entity, and Monitoring Type codes used correctly? |  |
| Do sampling dates in the Results file match those in the Events file for each Tag Id? |  |
| Are values represented by a valid parameter code with the correct units? |  |
| Are there any duplicate parameter codes for the same Tag Id? |  |
| Are there any invalid symbols in the Greater Than/Less Than (GT/LT) field? |  |
| Are there any Tag Ids in the Results file that are not in the Events file or vice versa? |  |
| **Data Quality Review** | Y, N, or N/A |
| Are “less-than” values reported at the LOQ? If no, explain in Data Summary. |  |
| Have the outliers been verified and a "1" placed in the Verify\_flg field? |  |
| Have checks on correctness of analysis or data reasonableness been performed?e.g., Is ortho-phosphorus less than total phosphorus?Are dissolved metal concentrations less than or equal to total metals?Is the minimum 24 hour DO less than the maximum 24 hour DO?Do the values appear to be consistent with what is expected for site? |  |
| Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets? |  |
| Are all parameter codes in the data set listed in the QAPP? |  |
| Are all stations in the data set listed in the QAPP? |  |
| **Documentation Review** | Y, N, or N/A |
| Are blank results acceptable as specified in the QAPP? |  |
| Were control charts used to determine the acceptability of lab duplicates (if applicable)? |  |
| Was documentation of any unusual occurrences that may affect water quality included in the Event file’s Comments field? |  |
| Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain in Data Summary.  |  |
| Were there any failures in field and/or laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain in Data Summary. |  |
| Was the laboratory’s NELAP Accreditation current for analysis conducted? |  |

###

### Data Summary

#### Data Set Information

Data Source:

Date Submitted:

Tag\_id Range:

Date Range:

□ I certify that all data in this data set meets the requirements specified in Texas Water Code Chapter 5, Subchapter R (TWC §5.801 et seq) and Title 30 Texas Administrative Code Chapter 25, Subchapters A & B.

□ This data set has been reviewed using the criteria in the Data Review Checklist.

Planning Agency Data Manager: Date:

Please explain in the table below any data discrepancies discovered during data review including:

* Inconsistencies with LOQs
* Failures in sampling methods and/or laboratory procedures that resulted in data that could not be reported to the TCEQ (indicate items for which the Corrective Action Process has been initiated and send *Corrective Action Status Report* with the applicable Progress Report).

Dataset \_\_\_ contains data from FY\_\_ QAPP Submitting Entity code \_\_ and collecting entity \_\_. This is field and lab data that was collected by the (collecting entity). Analyses were performed by the (lab name). The following tables explain discrepancies or missing data as well as calculated data loss.

**Discrepancies or missing data for the listed tag ID:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tag ID** | **Station ID** | **Date** | **Parameters** | **Type of Problem** | **Comment/PreCAPs/CAPs** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**Data Loss**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Missing Data points out of Total** | **Percent Data Loss for this Dataset** | **Parameter** | **Missing Data points out of Total** | **Percent Data Loss for this Dataset** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

# ATTACHMENT 1 Example Letter to Document Adherence to the QAPP

TO: (name)

(organization)

FROM: (name)

(organization)

RE: Basin Planning Agency Fiscal Year 2018-19 CRP QAPP

Please sign and return this form by (date) to:

(address)

I acknowledge receipt of the “QAPP Title, Revision Date”. I understand the document(s) describe quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria. My signature on this document signifies that I have read and approved the document contents pertaining to my program. Furthermore, I will ensure that all staff members participating in CRP activities will be required to familiarize themselves with the document contents and adhere to them as well.

Name Date

Copies of the signed forms should be sent by the Basin Planning Agency to the TCEQ CRP Project Manager within 60 days of TCEQ approval of the QAPP.