Quality Assurance Project Plan for Surface Water Quality Monitoring Program, Water Quality Standards Program, and Water Quality Assessment Program

Prepared by
Texas Commission on Environmental Quality (TCEQ)
Water Quality Planning Division

TCEQ PG-3
Revised April 2024

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY • PO BOX 13087 • AUSTIN, TX 78711-3087

Contents

A1 Title Page

Project Title

Quality Assurance Project Plan for the Surface Water Quality Monitoring Program, Water Quality Standards Program, and Water Quality Assessment Program

Project Information

Grant Title: FY2024 Performance Partnership Grant (PPG): Section 106, Surface Water Quality Monitoring Program

EPA Grant No. I –99662724

QTRAK No. 24-210

Revision Information

Revision 21, April 2024

Effective Date

Effective: April 30, 2024 - April 30, 2026.

Organization

Texas Commission on Environmental Quality

Effective Date

Effective: April 30, 2024 - April 30, 2026.

A2 Approval Pages

TCEQ

Office of Water (OW)

Water Quality Planning Division (WQPD)

Project Quality Assurance Specialist
Surface Water Quality Monitoring Program
Monitoring and Assessment Section

Robin Cypher — Date: 04/02/2024

Team Leader
Surface Water Quality Monitoring Program
Monitoring and Assessment Section

Andrew Sullivan — Date: 04/03/2024

Team Leader
Water Quality Standards and
Clean Rivers Program
Monitoring and Assessment Section

Sarah Whitley — Date: 04/03/2024

Project Quality Assurance Specialist
Water Quality Standards Program
Monitoring and Assessment Section

Eloy Montero-Hernandez — Date: 04/05/2024

Team Leader
Data Management and Analysis Team
Monitoring and Assessment Section

Cathy Anderson — Date: 04/03/2024

Manager
Monitoring and Assessment Section

Jason Godeaux — Date: 04/03/2024

Quality Assurance Officer
TCEQ Sugar Land Laboratory Section

Gabriel Jarero — Date: 04/03/2024

Manager
TCEQ Sugar Land Laboratory Section

Jake Alaniz — Date: 04/03/2024

Water Quality Division (WQD)

Grant Coordinator 106 Surface Water PPG	Randy Baylor Randy Baylor	04/03/204 Date
Project Quality Assurance Specialist and Receiving Water Assessment Coordinator Standards Implementation Team Water Quality Assessment Section	Brad Caston C. Brad Caston	4/9/2024 Date
Team Leader Standards Implementation Team Water Quality Assessment Section	Peter Schaefer Peter Schaefer	4/10/2024 Date
Manager Water Quality Assessment Section	Gregg Easley Gregg Easley	04/10/2024 Date

Office of Compliance and Enforcement (OCE)

Monitoring Division

Surface Water Quality Monitoring Program Quality Assurance Specialist Quality Assurance Team	Jason Natho	04/17/2024 Date
TCEQ Quality Assurance Manager Quality Assurance Team	D. Jody Koehler	04/17/2024 Date

Program Support and Environmental Assistance Division (PSEAD)

Deputy Director PSEAD	Melissa Keller for Andy Gardner Andy Gardner	04/12/2024 Date

Field Operations

Area Director Central Texas Area	Joel Anderson	04/15/2024 Date
Area Director Coastal and East Texas Area	David Van Soest	04/15/2024 Date
Area Director North Central and West Texas Area	Randy J. Ammons Randy J. Ammons	4/16/2024 Date
Area Director Border and Permian Basin Area	David A. Ramirez David A. Ramirez	April 16, 2024 Date

Lower Colorado River Authority (LCRA)

Quality Manager LCRA Environmental Laboratory Services	Angel Mata	04/04/2024 Date
Laboratory Manager LCRA Environmental Laboratory Services	Dale Jurecka	4/04/24 Date

U.S. Environmental Protection Agency (EPA)

U.S. EPA 106 Project Officer State and Tribal Programs Section Assistance Programs Branch	TERESITA MENDIOLA Digitally signed by TERESITA MENDIOLA Date: 2024.04.19 14:54:15 -05'00' Teresita S. Mendiola	Date
Chief State and Tribal Programs Section U.S. EPA Region 6	NELLY SMITH Digitally signed by NELLY SMITH Date: 2024.04.19 15:06:19 -05'00' Nelly Smith	Date
Region 6 Quality Assurance Manager Laboratory Services & Applied Science Division	ELIZABETH WARREN Digitally signed by ELIZABETH WARREN Date: 2024.04.19 15:43:50 -05'00' Christy Warren	Date

The Surface Water Quality Monitoring (SWQM) Program, Water Quality Standards (WQS) Program, and Water Quality Assessment (WQA) Section will secure written documentation in the form of a signed letter of adherence (Attachment 1) from other project participants as needed—subcontractors, other units of government, contract laboratories, stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or revisions of this plan. The SWQM Project Quality Assurance (QA) Specialist will maintain this documentation as part of the project's quality assurance records.

A3 Table of Contents, Document Format, and Document Control

Tables

Figures

List of Abbreviations

ALA	aquatic life assessment
ALM	aquatic life monitoring
ALU	aquatic life use
ASTM	American Society for Testing and Materials
AWRL	ambient water reporting limits
BMP	best management practice
BOD	biochemical oxygen demand
CAS	Chemical Abstracts Service
CBOD	carbonaceous biochemical oxygen demand
˚C	degrees Celsius/centigrade
cfs	cubic feet per second
cfu/100 mL	colony forming units per 100 milliliters
CMS	coordinated monitoring schedule
COD	chemical oxygen demand
CRP	Clean Rivers Program
CWA	Clean Water Act
CWQMN	Continuous Water Quality Monitoring Network
DCR	data correction request
DM&A	Data Management and Analysis
DMRG	Data Management Reference Guide
DO	dissolved oxygen
DOC	dissolved organic carbon
DQO	data quality objective
EPA	U. S. Environmental Protection Agency
FDE	field data entry
FY	fiscal year
GPS	Global Positioning System
HACH	Hach Company
IBWC	(United States) International Boundary and Water Commission
ID	identification number
IS	intensive survey
LCRA	Lower Colorado River Authority
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
LIMS	laboratory information management system
LOD	limit of detection
LOQ	limit of quantitation
M&A	Monitoring & Assessment Section
mg/kg	milligrams/kilogram
mg/L	milligrams/liter
mL	milliliter
MPN	most probable number
NA	not applicable
NDMC	National Drought Mitigation Center
NELAP	National Environmental Laboratory Accreditation Program
ng	nanogram
NPS	non-point source
NTU	nephelometric turbidity units
OCE	Office of Compliance and Enforcement

OW	Office of Water
PAH	polycyclic (or polynuclear) aromatic hydrocarbon
pg	picogram
PPG	performance partnership grant
PSEAD	Program Support and Environmental Assistance Division
ppt	parts per thousand
QA	quality assurance
QAP	quality assurance plan
QAPP	quality assurance project plan
QC	quality control
QMP	quality management plan
QO	quality objective
RFA	request for analysis
RPD	relative percent difference
RUAA	recreational use attainability analysis
RWA	receiving water assessment
SM	Standard Methods
SOP	standard operating procedure
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TDS	total dissolved solids
TMDL	total maximum daily load
TNI	The NELAC Institute
TNRIS	Texas Natural Resource Information System
TOC	total organic carbon
TSA	technical systems audit
TSS	total suspended solids
TSWQS	Texas Surface Water Quality Standards
TWC	Texas Water Code
TWDB	Texas Water Development Board
UAA	use attainability analysis
μg/L	micrograms/liter
μS/cm	microSiemens/centimeter
USGS	United States Geological Survey
VOA	volatile organic analysis
VSS	volatile suspended solids
WQA	Water Quality Assessment Program
WQD	Water Quality Division
WQPD	Water Quality Planning Division
WQS	Water Quality Standards

A4 Project Purpose, Problem Definition, and Background

The TCEQ SWQM, WQS and WQA programs provide for an integrated assessment and evaluation of physical, chemical, and biological characteristics of aquatic systems in relation to human health concerns, ecological condition, and designated uses. SWQM, WQS and WQA data provide a basis for the establishment of effective TCEQ management policies that promote the protection, restoration, and wise use of Texas surface-water resources.

Primary statutory authority for the SWQM Program is provided under Section 26.127 of the Texas Water Code[1] (TWC), which states, "The executive director has the responsibility for establishing a water quality sampling and monitoring program for the state. All other state agencies engaged in water quality or water pollution control activities shall coordinate those activities with the Commission." The SWQM Program is strongly influenced by Sections 104(b), 106, 205(j), 303(d), 305(b), 314, 319, and 604(b) of the Federal Clean Water Act (CWA) of 1987 and is largely funded by a CWA Section 106 cooperative grant agreement with EPA Region 6.

The SWQM Program coordinates the collection of routine surface water quality data from a statewide monitoring network, including the collection of physicochemical, biological, and hydrological data at varying frequencies. Basic components of the SWQM Program include a routine monitoring network, continuous monitoring network, biological monitoring, and special studies. Water quality data obtained through these components are stored in SWQMIS. The monitoring results may be used by TCEQ to characterize existing conditions, evaluate spatial and temporal trends, develop water quality standards, determine water quality standards compliance, identify emerging problems, and evaluate the effectiveness of water quality control (QC) programs. In addition to routine monitoring, non-routine sampling is conducted with specific objectives for several other programs. These are outlined in Section A5 of this QAPP.

The WQS Program is responsible for the development of the *Texas Surface Water Quality Standards*[2] (TSWQS) in accordance with the CWA and TWC, Section 26.023, which states, "The commission by rule shall set water quality standards for the water in the state and may amend the standards from time to time. The commission has the sole and exclusive authority to set water quality standards for all water in the state. The commission shall consider the existence and effects of nonpoint source pollution, toxic materials, and nutrient loading in developing water quality standards and related waste load models for water quality. The commission shall develop standards based on all quality assured data obtained by the commission, including the local watershed and river basin database described by Section 26.0135(c)(2)." The WQS Program is strongly influenced by Sections 101, 303, 305 (b), 307 of the CWA of 1987 and is partially funded by a CWA Section 106 cooperative grant agreement with EPA Region 6.

[1] https://statutes.capitol.texas.gov/Docs/WA/htm/WA.26.htm
[2] https://www.tceq.texas.gov/waterquality/standards

Projects managed by the WQS Program address developing water quality standards, including determination of statewide and site-specific designated uses and criteria for the protection of human health and the environment, use attainability studies, and other special studies related to water quality standards development. Studies addressing water quality standards development can include sampling of water chemistry, aquatic biota, and hydrologic conditions.

The WQA Program is responsible for implementation of the TSWQS in accordance with the CWA and TWC. Projects managed by the program address determination of site-specific uses and criteria for the protection of human health and the environment, implementation procedures for the TSWQS, and other special studies related to water quality standards implementation. Studies addressing site-specific uses and criteria can include sampling of water chemistry, aquatic biota, and hydrologic conditions.

The SWQM, WQS, and WQA programs encompass a full range of activities required to obtain, manage, store, assess, share, and report water quality information to other TCEQ teams, agency management, other agencies and institutions, local governments, and the public. The SWQM, WQS, and WQA programs comply with the quality system described in TCEQ's Quality Management Plan [3](QMP). This QAPP is peer reviewed within TCEQ to ensure that data generated for the purposes described above are scientifically valid and legally defensible. This process will ensure that all data submitted to the SWQMIS database under this QAPP have been collected and analyzed in a way that ensures the data are of known quality.

[3] https://www.tceq.texas.gov/agency/qa/qmp

A5 Project Task Description

Surface Water Quality Sampling Tasks

TCEQ collects surface water quality data as an integrated evaluation of physical, chemical, and biological characteristics of aquatic systems in relation to human-health concerns, ecological conditions, and designated uses. To balance the needs of multiple programs, monitoring tasks may be divided into routine monitoring, special study monitoring, permit support monitoring, systematic monitoring, , statistically based monitoring, and continuous water quality monitoring. All tasks employ similar sampling procedures and will be referred to throughout this document collectively as water quality monitoring. Table A5.1 summarizes monitoring tasks and general objectives associated with each category.

Unless otherwise specified, the project/task description details for monitoring outlined below may be found in the most recent version of the *SWQM Procedures Manual, Volume 1: Physical and Chemical Monitoring Methods*[4] (RG-415) (SWQM Procedures, Vol. 1) and the *SWQM Procedures Manual, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data*[5] (RG-416) (SWQM Procedures, Vol. 2).

Routine Monitoring

TCEQ conducts routine monitoring in streams, reservoirs, and estuaries across Texas, as well as the Gulf of Mexico. The purpose of routine monitoring is to collect, store, and make available the surface water quality and biological/habitat data which TCEQ requires to carry out its assigned functions. Routine monitoring is generally scheduled over several years (minimum of two years) with approximately the same interval of time between sampling events. Field measurements, routine water chemistry (which may include nutrients, chlorophyll a, alkalinity, chloride, fluoride, sulfate, and dissolved and suspended solids), bacteria, and flow measurements are collected and analyzed. Other routine monitoring activities that may be performed at varied frequencies include toxics (metals or organics) in water, 24 hr field measurements, sediment sampling, ecoregion monitoring, aquatic life monitoring (ALM), and seagrass monitoring.

An ALM is conducted at routine monitoring sites to provide baseline data on environmental conditions or to confirm support of presumed aquatic life use (ALU) and criteria. Biological, habitat, field, and flow data are collected following prescribed protocols. Routine water chemistry and 24 hr dissolved oxygen (DO) monitoring are optional but recommended. Detailed requirements for an ALM are provided in the SWQM Procedures, Vol. 2.

Additionally, TCEQ has worked with academic, government, and nonprofit representatives to develop a seagrass monitoring plan to proactively detect changes in the seagrass ecosystem condition. Seagrass monitoring incorporates a tiered sampling approach coupled with probabilistic selection of permanent sampling sites. Routine

[4] https://www.tceq.texas.gov/publications/rg/rg-415
[5] https://www.tceq.texas.gov/publications/rg/rg-416

monitoring of physicochemical, water quality, and seagrass condition parameters in Texas' bays may be used to identify stressors to seagrass beds including increased coastal development, sediment and nutrient runoff, and physical disturbance.

Table A5.1 Monitoring Categories and General Objectives

Monitoring Category	General Objective
Routine Monitoring	-ALM* -Identify water quality trends -Monitor for use attainment -Seagrass monitoring
Special Study Monitoring*	-TMDL project support -UAA project support -RUAA project support** -Independent 24 hr DO, sediment, or toxics in water studies -Fish tissue study -Ambient toxicity -BMP effectiveness monitoring -NPS pollution identification and characterization monitoring -Sampling and assessment procedure development -Other independent studies
Permit Support Monitoring*	-RWA -IS
Systematic Monitoring*	-Impairment characterization -Ecoregion-specific background data -Trend analysis -ALA -Pollutant source determination -Point source control effectiveness -BMP effectiveness verification
Statistically Based Monitoring	-Probabilistic monitoring -National Fish Tissue Survey
Continuous Water Quality Monitoring	-Provide an intensive data record for specific projects

*Requires SWQM, WQS, and WQA QAP[6]

**Requires RUAA QAP[7]

Routine monitoring is performed by sample collectors located at 15 of the 16 TCEQ regional offices across the state (Figure A5.1) and the TCEQ central office. Data are collected from sites listed on the annual SWQM Coordinated Monitoring Schedule[8] (CMS). The CMS also includes the general parameter groups to be monitored, as well as the monitoring frequency for each site. The schedule is revised annually to account for changes in water quality and agency priorities. The schedule covers the period from September 1st to August 31st of each fiscal year (FY).

[6] https://www.tceq.texas.gov/waterquality/monitoring/swqm_guides.html
[7] https://www.tceq.texas.gov/waterquality/standards/ruaas/index
[8] https://cms.lcra.org/

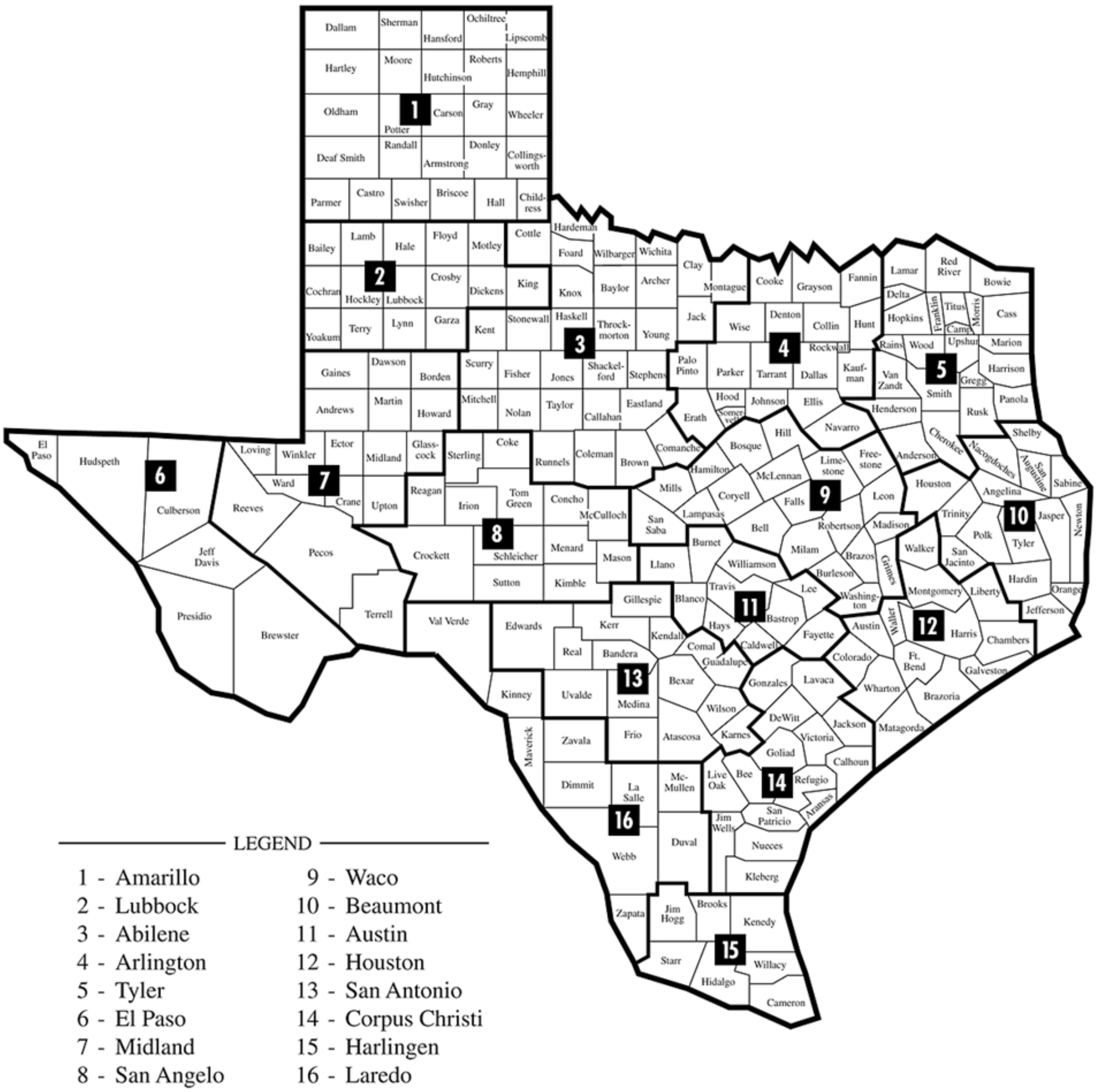

Figure A5.1 Map of TCEQ Areas and Regions

Special Study Monitoring

Special study monitoring may be performed to better characterize non-attainment of water quality standards, evaluate existing water quality criterion, assist in the development of water quality standards, assess the contributions of nonpoint sources, or address stakeholder concerns. Special study monitoring is primarily conducted over a period of at least two years at or near sites where routine sampling has identified an impairment or concern. Special study monitoring may include UAAs, recreational use attainability analysis (RUAAs), TMDL project support, sediment, and fish tissue sampling (one time or multi-year), independent 24-hr DO studies, ambient toxicity sampling, effectiveness monitoring of best management practices (BMP), and nonpoint source (NPS) pollution identification and characterization monitoring. Special study monitoring is also used to develop new or revised sampling and assessment procedures, to describe impacts of habitat modification on water quality, and to describe water quality in intermittent streams and unclassified streams.

UAAs are conducted to determine if existing designated uses and criteria are appropriate and, if not, develop designated-use and/or criteria adjustment information. Chemical, biological, field, flow, and habitat data are collected following prescribed protocols. Detailed requirements for UAAs are provided in the SWQM Procedures, Vol. 2.

Details for conducting RUAAs are described in the Procedures for a Comprehensive RUAA and Basic RUAA Survey[9] (latest revision).

Permit Support Monitoring

Permit support monitoring may be conducted to directly support the development or modification of a wastewater discharge permit action. Permit support monitoring includes RWAs and intensive surveys (IS).

An RWA may be conducted to determine appropriate ALU and criteria for unclassified water bodies receiving permitted discharges. Biological and habitat information are collected following prescribed protocols. Routine water chemistry and 24 hr DO monitoring are optional but recommended. Detailed requirements for RWAs are provided in the SWQM Procedures, Vol. 2.

An IS may be conducted to evaluate loading from wastewater discharges. Hydraulic and water quality information are collected under low-flow conditions. General requirements for ISs are provided in the SWQM Procedures, Vol. 1.

Systematic Monitoring

Systematic monitoring is similar to routine monitoring but with a shorter duration (less than five years). Systematic monitoring may be conducted to identify water quality improvements or concerns or gather more information that would not normally be evaluated in the routine monitoring program. This type of monitoring may include aquatic life assessments (ALAs), impairment characterizations, ecoregion specific background data development, trend analysis, pollutant sources identification, and determination of BMP effectiveness or point source control effectiveness.

An ALA may be conducted to confirm support of a presumed ALU and criteria for unclassified water bodies not included in Appendix D of the TSWQS and identify the appropriate ALU and dissolved oxygen criteria. Chemical, biological, field, flow, and habitat information are collected following prescribed protocols. Detailed requirements for ALAs are provided in the SWQM Procedures, Vol. 2.

Statistically Based Monitoring

Though statistically based monitoring has not been historically employed by the SWQM program, recent participation in EPA national monitoring studies has provided TCEQ

[9] https://www.tceq.texas.gov/waterquality/standards/ruaas/index#procedures

with a foundation upon which to potentially integrate a more randomized monitoring approach into the existing state monitoring program.

Continuous Water Quality Monitoring

Data and monitoring under the Continuous Water Quality Monitoring Network[10] (CWQMN) is covered in a separate QAPP submitted by the SWQM Program biennially to EPA for approval. Project specific details and requirements for new CWQMN projects are documented in separate project plans which become addenda to the CWQMN QAPP each year.

Quality Assurance Plans

The project manager will prepare a QAP as outlined in the QAP Shell[11] for all ALM, special study, permit support, and systematic monitoring tasks. The QAPs will be written as addenda to the SWQM QAPP[12] and will document project specific data operations (including a general project description, measurement and data acquisition tasks, roles and responsibilities, and time frame and deliverables). Project activities may not be initiated until an approved QAP is distributed to project personnel. Approved QAPs will remain on file in the respective program's central office QA files as either hard copy or electronic copy. Routine monitoring activities are covered under this QAPP. Approved QAPPs and QAPs will be provided to DM&A for upload into the SWQMIS database.

For RUAAs the project manager will provide an RUAA QAP shell to the performing party as an addendum to the SWQM QAPP. The performing party will prepare the RUAA QAP, and the final documentation will remain on file in the respective program's central office QA files as either hard copy or electronic file.

TCEQ will provide EPA with a semi-annual tracking table of all QAPs in August and February. At any time, EPA may request a QAP to be sent to the EPA Region 6 office for review. Table A5.2 contains the various products produced by the SWQM, WQS, and WQA Programs.

Revisions

The QAPP is revised biennially, and it is reviewed in the interim year as part of the required annual certification process. If the QAPP is current and valid, a certification letter is submitted at least 30 days prior to the QAPP approval anniversary to the SWQM Program QA Specialist, the TCEQ QA Manager, and the EPA Project Officer indicating completion of the review. Minor administrative changes will be documented and included in the annual certification. All other changes (e.g., the non-substantive or more significant changes) must be documented and approved via amendments before the annual certification is completed. Approved amendments will be submitted with the certification letter. For the biennial revision, all changes (amendments and non-substantive changes) will be included in the QAPP and submitted to EPA for approval.

---

[10] https://www.tceq.texas.gov/waterquality/monitoring/swqm_realtime.html
[11] https://www.tceq.texas.gov/waterquality/monitoring/swqm_guides.html
[12] https://www.tceq.texas.gov/waterquality/monitoring/swqm_guides.html

Amendments

Amendments may be necessary to reflect changes in project organization, tasks, schedules, objectives, and methods, or to address deficiencies, improve operational efficiency, and accommodate unique or unanticipated circumstances.

When the need for an amendment has been identified, the SWQM Project QA Specialist will prepare a justification and detail of the changes and provide it to the SWQM, WQS, and WQA Program Managers (or their designees) and the SWQM Program QA Specialist for review. The Program Managers (or their designees), the SWQM Program QA Specialist, and the TCEQ Quality Assurance Manager (or designee) must document their approval of the amendment either electronically or in writing.

The SWQM Project QA Specialist will present the changes to the EPA Region 6 project officer. If EPA determines the changes to be non-substantive, the amendment becomes effective immediately upon EPA's approval and is distributed to personnel listed in Section A7. If EPA determines the amendment to be substantive, the SWQM Project QA Specialist will submit a formal amendment for approval.

Once approved, all changes will remain in effect until the next QAPP revision.

The SWQM Monitoring Strategy

The SWQM Program has prepared the Texas Surface Water Quality Monitoring and Assessment Strategy[13], (SWQM Strategy), describing how the agency plans and implements monitoring. The SWQM Strategy describes how it meets or plans to meet the 10 basic elements of a state water monitoring program. This document serves as a tool to help EPA and Texas determine whether the state monitoring program meets the requirements of the CWA Section 106(e)(1).

The strategy discusses monitoring objectives, monitoring design, core and supplemental water quality indicators, quality assurance, data management, data analysis and assessment, reporting, programmatic evaluation, and general support and infrastructure planning. The SWQM Procedures, Vol. 1 specifies methods for selecting appropriate monitoring sites, parameters and frequency for the monitoring categories described in Table A5.1. This design is used in the preparation of the annual CMS. Details of the monitoring program such as probabilistic sampling design, biological assessment tool development, biological monitoring, and trend analysis are included in the SWQM Strategy.

Table A5.2 SWQM, WQS, and WQA Products

Product Name	Number of Copies	Recipient(s)	Performance Criteria
SWQM Monitoring Strategy – revised every 5 years and as needed in the interim	1	EPA - Region VI	EPA Region VI Guidance for State Monitoring Programs

[13] https://www.tceq.texas.gov/waterquality/monitoring

Product Name	Number of Copies	Recipient(s)	Performance Criteria
Biennial SWQM, WQS, and WQA QAPP	1	EPA - Region VI	Quality Assurance Project Plan Standard (CIO 2105-S-02.0, formerly QA/R-5 Document)
QAPs	1	TCEQ – Programs' Project QA Specialist	None
305(b) Assessment Database for Texas - Annual Update	1	EPA - Headquarters	EPA 305(b) Assessment Database System Format Specifications
Annual Coordinated Routine Monitoring Schedule	1	EPA - Region VI	None
Annual QA Report	1	TCEQ QA Manager and then compiled for final agency memorandum to EPA - Region VI	CIO 2105.0 (formerly EPA Order 5360.1A2)[14]
Annual Technical Systems Audit memos	variable	TCEQ Regional Directors	Standardized memo shell following Agency OPP 18.09
WQA RWA Quarterly Contribution to Strategic Performance Measures (number of surface water assessments)	1	Legislative Budget Board and TCEQ WQD	None
WQA RWA Reports (as needed)	2	EPA - Region VI	None
WQS UAA Reports (as needed)	1	EPA - Region VI	None
106 Grant Semi-Annual Progress Reports for SWQM, WQS, and WQA	2	EPA - Region VI	EPA Dialogue Table

[14] https://19january2017snapshot.epa.gov/sites/production/files/2015-09/documents/epa_order_cio_21050.pdf

Work Schedule

A schedule of tasks is found in Table A5.3.

Table A5.3 Work Schedule

Tasks	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
SWQM	*	*	*	*	*	*	*	*	*	*	*	*
Program Coordination	*	*	*	*	*	*	*	*	*	*	*	*
Semi-Annual Progress Report	*						*					
SWQM Annual Workshop[1]	*	*	*									
Submit QAPP (CIO 2105-S-02.0, (formerly QA/R-5) to EPA							*					
TSAs of regional offices	*	*	*	*	*	*	*	*	*	*	*	*

1 The SWQM Annual Workshop is generally held during the first quarter of the fiscal year.

A6 Information / Data Quality Objectives and Performance / Acceptance Criteria

Any project undertaken by TCEQ will employ only methods and techniques that have been determined to produce measurement data of known and verifiable quality to meet the overall objectives of the SWQM, WQS, and WQA programs. Adherence to the procedures defined in this QAPP will ensure program data quality objectives (DQOs) are met. The measurement performance specifications required to meet DQOs are summarized below and in Appendix A, Tables A6.1 – A6.5. A QAP will be prepared for projects requiring DQOs, parameters, laboratory methods, field methods and other information different from that described in this QAPP.

The DQOs outlined in this QAPP are consistent with the requirements for providing data that can be used to:

- Characterize existing conditions
- Evaluate spatial and temporal trends
- Develop water quality standards
- Determine water quality standards compliance
- Identify emerging problems
- Evaluate the effectiveness of water control programs

The methods of assessment and screening levels used in the data analysis are outlined in the most current version of TCEQ's *Guidance for Assessing and Reporting Surface Water Quality*[15] (SFR-127) in Texas. The methods of standards development and analyses used to develop criteria are maintained by the WQS Program.

Reporting Limits

A reporting limit is that concentration or quantity of a target variable (e.g., target analyte) below which data are not reported. The ambient water reporting limit (AWRL) values for analytes of interest are specified in Tables A6.1 – A6.3. These values represent the highest concentration or quantity of a target variable that can be used as a reporting limit by the laboratory unless laboratory capabilities prohibit attaining an AWRL. AWRLs are program-defined and achieving them allows data to be evaluated against established freshwater criteria. The AWRLs in Appendix A, Tables A6.1 – A6.3 must be achieved to yield data acceptable for TCEQ water quality assessments.

The limit of quantitation (LOQ) is the lowest concentration or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. 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).

15 https://www.tceq.texas.gov/downloads/water-quality/assessment/integrated-report-2022/2022-guidance.pdf

The following requirements must be met to report results under this QAPP:

- The laboratory's LOQ for each analyte must be equal to or less than the AWRL as a matter of routine practice. Exceptions are identified in Appendix A.
- The laboratory must demonstrate its ability to quantitate at the LOQ for each analyte by analyzing an LOQ check sample with each analytical batch of samples (see Section B4). Control limits for LOQ check samples are found in Appendix A.

Laboratory measurement QC requirements and acceptability criteria are provided in Section B4. A process is currently under development to qualify data prior to entry into SWQMIS for those parameters in which a laboratory cannot achieve the AWRL (i.e., the laboratory's LOQ is greater than the AWRL).

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.

Field splits are used to assess the variability of sample handling, preservation, and storage, and are prepared by splitting samples in the field. Control limits for field splits are defined in Section B4.

Laboratory precision is assessed by comparing replicate analyses of laboratory control samples (LCS) in the sample matrix (e.g., laboratory grade water, sand, commercially available tissue). In the case of bacteriological analysis, laboratory precision is assessed by comparing results from duplicate samples. In evaluating analytical performance, the program-defined control limits for precision specified in Appendix A will be used.

Bias

Bias is a statistical measurement of correctness and includes components of systematic error. A measurement is considered unbiased when the value reported does not differ from the true value.

Field blanks assess potential bias from the combined processes of sample handling, processing, and laboratory analysis. A field blank is prepared in the field by filling a clean container with deionized water and appropriate preservative, if any, using the same techniques as the specific sampling activity being undertaken. A field equipment blank is a sample of analyte-free media that has been used to rinse common sampling equipment to detect potential bias introduced through the use of the sampling apparatus. Control limits for field blanks and field equipment blanks are defined in Section B4.

Laboratory bias is determined through the analysis of LCS and LOQ check samples prepared in the sample matrix (e.g., laboratory grade water, sand, commercially available tissue) using verified and known amounts of all target analytes and by then calculating percent recovery of those analytes. Results are compared to control limits and used during evaluation of analytical performance. Program-defined control limits for bias are specified in Appendix A.

Representativeness

Site selection, the appropriate sampling regime, the sampling of all pertinent media according to SWQM Procedures, Vols. 1 and 2, and use of only approved analytical methods will assure that the measurement data represent the conditions at the site. Routine data collected under the SWQM Procedures, Vols. 1 and 2 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.

Probabilistic Sampling

TCEQ has been participating in EPA national monitoring studies under various EPA QAPPs. These studies have provided TCEQ with a foundation upon which to potentially integrate a more randomized monitoring approach into the existing state monitoring program. When TCEQ develops its own probabilistic study, it will be incorporated into this QAPP or a separate QAPP will be developed that will contain quality criteria specific to the study. Probabilistic study designs are discussed in more detail in the SWQM Strategy referenced in Section A5.

Comparability

Confidence in the comparability of data produced by and for TCEQ is based on the commitment of project staff and contracted laboratories to use only approved sampling and analysis methods and QA/QC protocols in accordance with quality system requirements and as described in this QAPP, SWQM Procedures, Volume 1 and 2, and in TCEQ SOPs. Comparability is also guaranteed by reporting data in standard units, by using accepted rules for significant figures, and by reporting data in standard format as specified in Section B7.

Completeness

The completeness of data is a relationship of how much of the data are available for use compared to the total potential data. Ideally, 100 percent of the data should be available. However, the possibility of data becoming unavailable due to laboratory error, insufficient sample volume, or samples broken in shipping must be expected. Also, unexpected situations may arise where field conditions do not allow for 100 percent data completeness. Therefore, it will be a general goal to achieve 90 percent data completeness.

A7 Distribution List

A final copy of this quality assurance project plan (QAPP) is to be received and retained by:

U.S. Environmental Protection Agency Region 6
1201 Elm Street, Suite 500, WQ-AS
Dallas, Texas 75270-2102

Teresita S. Mendiola, Project Officer, State and Tribal Programs Section
Nelly Smith, Section Chief, State and Tribal Programs Section

Texas Commission on Environmental Quality - Central Office
P. O. Box 13087
Austin, Texas 78711-3087

D. Jody Koehler, Monitoring Division
Jason Natho, Monitoring Division
Robin Cypher, Water Quality Planning Division
Andrew Sullivan, Water Quality Planning Division
Sarah Whitley, Water Quality Planning Division
Eloy Montero-Hernandez, Water Quality Planning Division
Cathy Anderson, Water Quality Planning Division
Randy Baylor, Water Quality Division
Peter Schaefer, Water Quality Division
C. Brad Caston, Water Quality Division
Gregg Easley, Water Quality Division
Andy Gardner, OCE PSEAD
Renae DiGuardi, OCE PSEAD
Alyssa Pantuso, OCE PSEAD
Gabriel Jarero, TCEQ Sugar Land Laboratory, Water Quality Planning Division
Jake Alaniz, TCEQ Sugar Land Laboratory, Water Quality Planning Division

Texas Commission on Environmental Quality, Regional Offices

Each Regional Water Section Manager

U.S. Geological Survey
Texas Water Science Center
1505 Ferguson Lane
Austin, TX 78754-4733

Michael Canova, Quality Assurance Officer

Lower Colorado River Authority
Environmental Laboratory Services
3505 Montopolis Drive
Austin, TX 78744

Dale Jurecka, Laboratory Manager

A8 Project Organization

The SWQM Program and the WQS Program function within the Monitoring & Assessment (M&A) Section of the Water Quality Planning Division (WQPD). The Water Quality Assessment (WQA) Program functions under the Water Quality Division (WQD). Both divisions are under the Office of Water of the Texas Commission on Environmental Quality (TCEQ).

The SWQM Program coordinates statewide water quality monitoring with the Field Support Team of the Program Support Section under the Office of Compliance and Enforcement (OCE). Monitoring is conducted throughout the state by SWQM personnel in 15 TCEQ regional offices as well as central office staff. The SWQM Program also coordinates with the WQS and WQA Programs on special projects to characterize surface waters of the state. The SWQM Team in the central office also manages the Continuous Water Quality Monitoring Network (CWQMN) with assistance from the Monitoring Division and staff in the regional offices.

The TCEQ QA Team functions within the Laboratory and Quality Assurance Section of the Monitoring Division of the OCE. The TCEQ's QA program is organizationally independent of operational programs and provides QA oversight for this program.

Figure A10.1 outlines the project organization for the TCEQ SWQM, WQS, and WQA Programs. A brief description of job responsibilities for key participants in the SWQM, WQS, and WQA Programs and OCE is provided below.

Responsibilities Of Key Project Personnel

Teresita Mendiola
EPA 106 Project Officer
Responsible for managing the project for EPA. Reviews project progress and reviews and approves applicable QAPPs and QAPP amendments. Provides EPA-assigned QTRAK# to TCEQ for SWQM, WQS, and WQA QAPPs.

Randy Baylor
106 Performance Partnership Grant (PPG) Grant Coordinator
Responsible for administration and coordination of TCEQ 106 PPG grant activities on this project, and compiles status reports noting activities performed. Provides end-of-year report to EPA.

Jason Godeaux
Monitoring and Assessment Section Manager
Responsible for oversight of the implementation of the QAPPs, directs the day-to-day management of the section.

The executive director, deputy directors, division directors, and the QA manager have delegated authority to develop and implement program-related quality systems. The program manager is responsible for ensuring that environmental activities are performed in accordance with applicable plans and procedures, work performance is measured against specifications, and appropriate management oversight and inspection is accomplished. Program managers are also responsible for improving systems relating to specific programs as well as ensuring deficient items and services are evaluated and controlled (i.e., inadvertent use or adverse impact on other items and services is prevented), root cause(s) of deficiencies are determined, and corrective actions are planned, implemented, and verified in a timely manner.

Andrew Sullivan
SWQM Program Manager
Team Lead
Responsible for managing TCEQ's ongoing SWQM activities and achieving project-related tasks and objectives. Maintains a thorough knowledge of program work activities, commitments, deliverables, and time frames. Develops necessary lines of communication and good working relationships between the lead division staff and personnel of other divisions and organizations participating in a program. Selects SWQM personnel as water body project managers for specific SWQM Program water quality studies. Monitors the effectiveness of the overall program quality system. Provides feedback to supervisory and administrative personnel as necessary regarding the performance of grant and water body project managers. Advises upper management when program timetables, tasks, and coordination procedures are not being met. Elevates problems and issues requiring resolution to the lead Section Manager or designee(s), for disposition, when appropriate. Executes contracts and intergovernmental agreements. Determines acceptability of measurement data process.

D. Jody Koehler
TCEQ QA Manager
Responsible for coordinating development and implementation of TCEQ's QA program. Provides oversight and guidance for the TCEQ's QA program. Responsible for the development and maintenance of the TCEQ Quality Management Plan (QMP). Responsible for ensuring program/project QAPPs using federal funding are reviewed and approved to conform to TCEQ and EPA requirements as detailed in the TCEQ QMP.

Jason Natho
SWQM, WQS, and WQA Programs QA Specialist, Monitoring Division
Participates in the development, approval, implementation, and maintenance of written QA and technical documents (e.g., standard operating procedures [SOPs], QAPPs, quality assurance plans [QAPs]). Assists the SWQM Program Manager in developing and implementing quality systems. Participates in the preparation of quality reports. Recommends to division directors and project managers, and through them to deputy directors, that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Concurs with proposed corrective actions and verifications. Receives and maintains assessment records. Monitors the implementation of corrective actions. Identifies positive and adverse trends in program quality systems. Reports on the status of corrective actions. Provides technical expertise and/or consultation on quality services. Assesses the effectiveness of program quality systems.

Robin Cypher
SWQM Project QA Specialist
Participates in the development, approval, implementation, maintenance, and retention of written QA and technical documents (e.g., SOPs, QAPPs, QAPs). Assists the SWQM

Program Manager in developing and implementing quality systems. Participates in the preparation of quality reports. Determines conformance with program quality system requirements. Assists SWQM Program QA Specialist in determining the lead assessor for assessments. Recommends to division directors and project managers and through them to deputy directors, that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Concurs with proposed corrective actions and verifications. Receives and maintains assessment records. Monitors the implementation of corrective actions. Identifies positive and adverse trends in program quality systems. Reports on the status of corrective actions. Prepares and distributes annual assessment plans. Provides technical expertise and/or consultation on quality services. Assesses the effectiveness of program quality systems. Prepares and forwards an annual QA report to the QA manager. Coordinates quality and technical training.

Sarah Whitley
WQS and CRP Program
Team Lead
Responsible for managing the TCEQ WQS Program water quality activities and achieving project-related tasks and objectives. Maintains a thorough knowledge of the WQS Program work activities, commitments, deliverables, and time frames. Selects WQS personnel as water body project managers for specific WQS Program water quality studies. Develops necessary lines of communication and good working relationships between the WQS Program and personnel of other divisions and organizations participating in a program. Monitors the effectiveness of the overall program quality system. Provides feedback to supervisory and administrative personnel as necessary regarding the performance of grant and water body project managers. Advises upper management when WQS Program timetables, tasks, and coordination procedures are not being met. Elevates problems and issues requiring resolution to the Section Manager, or designee(s), for disposition, when appropriate. Executes contracts and intergovernmental agreements. Determines acceptability of measurement data collected by the WQS Program.

Eloy Montero-Hernandez
Site-Specific Coordinator
Responsible for coordinating site-specific standards development for the WQS Program. Determines the need for a use-attainability analysis (UAA) and assigns task to SWQM, WQS or WQA programs. Coordinates with the receiving water assessment (RWA) Coordinator and maintains all completed RWA and UAA documents that are submitted by water body project managers.

Eloy Montero-Hernandez
WQS Project QA Specialist
Responsible for QA and quality control (QC) tasks for the WQS Program. Participates in the development, approval, implementation, maintenance, and retention of written QA and technical documents (e.g., SOPs, QAPPs, QAPs). Assists the WQS Team Leader and project managers with development and implementation of quality systems. Participates in the preparation of quality reports. Determines conformance with program quality system requirements. Recommends to division directors and project managers and through them to deputy directors that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental

protection. Coordinates the identification, disposition, and reporting to WQS Project Manager and Program Manager of nonconforming items and activities. Concurs with proposed corrective actions and verifications. Monitors the implementation of corrective actions. Identifies positive and adverse trends in program quality systems. Reports on the status of corrective actions. Assesses the effectiveness of program quality systems. Provides technical expertise and/or consultation on quality services. Coordinates quality and technical training. Coordinates with SWQM Program QA Specialist. Prepares and forwards an annual QA report to the QA manager.

Gregg Easley
WQA Program Manager
Responsible for the oversight of WQA projects. Responsible for ensuring that environmental activities are performed in accordance with applicable plans and procedures, work performance is measured against specifications, and appropriate management oversight and inspection is accomplished. Also responsible for improving systems relating to specific programs as well as ensuring deficient items and services are evaluated and controlled (i.e., inadvertent use or adverse impact on other items and services is prevented), root cause(s) of deficiencies and non-conformances are determined, and corrective actions are planned, implemented, and verified in a timely manner.

Peter Schaefer
Standards Implementation Team Leader
Responsible for managing the TCEQ's Standards Implementation Team's water quality activities and achieving project-related tasks and objectives. Maintains a thorough knowledge of the program's work activities, commitments, deliverables, and time frames. Selects personnel as water body project managers for specific water quality studies. Develops necessary lines of communication and good working relationships between the program and personnel of other divisions and organizations participating in a program. Monitors the effectiveness of the overall program quality system. Provides feedback to supervisory and administrative personnel as necessary regarding the performance of grant and water body project managers. Advises upper management when program timetables, tasks, and coordination procedures are not being met. Elevates problems and issues requiring resolution to the lead division director, or designee(s), for disposition, when appropriate. Executes contracts and intergovernmental agreements. Determines acceptability of measurement data collected by the WQA Program.

C. Brad Caston
Project Quality Assurance Specialist and RWA Coordinator
Responsible for coordinating RWAs for the WQA Program. Requests RWAs to be conducted. Assigns RWAs to the WQA or SWQM Programs. Coordinates with the Site-Specific Coordinator. Responsible for QA and QC tasks for the WQA Program. Participates in the development, approval, implementation, maintenance, and retention of written QA and technical documents (e.g., SOPs, QAPPs, QAPs). Assists the WQA Project Manager in developing and implementing quality systems. Participates in the preparation of quality reports. Determines conformance with program quality system requirements. Recommends to division directors and project managers, and through them to deputy directors, that work be stopped in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Coordinates the

identification, disposition, and reporting to WQA Project Manager and Program Manager of nonconforming items and activities. Concurs with proposed corrective actions and verifications. Monitors the implementation of corrective actions. Identifies positive and adverse trends in program quality systems. Reports on the status of corrective actions. Assesses the effectiveness of program quality systems. Provides technical expertise and/or consultation on quality services. Coordinates quality and technical training. Coordinates with SWQM Program QA Specialist. Prepares and forwards an annual QA report to the QA manager.

TCEQ WQA Program Staff
Responsible for performing sample collection and data processing duties in accordance with SWQM SOPs, quality objectives (QOs), SWQM Data Management Reference Guide (SWQM DMRG), and this QAPP, reporting to the WQA Program Manager, or designee, any deviation from SOPs, QOs, or this QAPP, maintaining proper documentation of sampling events, sample preservation, sample shipment, and field procedures. The WQA Project Manager will assign a WQA Program water quality study to WQA Program personnel. The WQA Program staff member assigned the project will be the water body project manager for that work and will oversee all work of other personnel involved in the project.

Cathy Anderson
Data Management and Analysis (DM&A) Team Leader
Responsible for ensuring the following data management tasks are carried out by staff: Reviews QAPPs for valid stream monitoring stations, parameters, submitting entity, collecting entity, and monitoring type codes. Serves as the division customer service data management representative for the TCEQ Project Manager. Provides training to TCEQ Project Managers to ensure that data will be submitted following instructions in the most recent version of the SWQM DMRG. Ensures data are reported following the SWQM DMRG. Analyzes Surface Water Quality Monitoring Information System (SWQMIS) data to identify level 1 data validation inconsistencies and reporting findings to appropriate project managers. Reviews, verifies, and/or validates data from CWQMN projects. Reviews raw data reports for the field QC samples along with associated samples to determine measurement validity. Provides data management support to project managers, including data verification/validation, analysis, and corrections. Revises and publishes the SWQM DMRG with periodic updates as needed. Surveys SWQMIS to monitor submittal for scheduled sampling data. Reviews SWQMIS data to ensure their association with a project in the database. Ensures that the appropriate QA documents are associated with the projects in SWQMIS.

Jake Alaniz
Laboratory Manager, TCEQ Sugar Land Laboratory Section
Responsible for the operation of the TCEQ Sugar Land Laboratory. Leads, plans, and coordinates the functional activities of the laboratory and interactions with other sections and divisions in TCEQ, and other agencies and laboratories. Defines roles and responsibilities of laboratory personnel. Ensures the most efficient use of laboratory personnel, facilities, and resources. Oversees all activities generating analytical data. Oversees adherence to the Laboratory QA Plan and specific SOPs, ensures proper documentation, and enforces corrective actions as required.

Gabriel Jarero
Quality Assurance Officer, TCEQ Sugar Land Laboratory Section
Responsible for maintenance of the Quality System. Approves QA documents. Provides required training on QA topics and monitors data integrity. Maintains general knowledge of the analytical methods and QA/QC procedures performed by the laboratory. Periodically reviews data, procedures, and documentation. Conducts internal audits. Ensures internal and external audit findings and corrective actions are completed within required time frames.

Alyssa Pantuso
Water Program Liaison, OCE Program Support Section
Responsible for coordinating OCE regional office SWQM activities. Acts as liaison with agency program staff to develop and distribute procedures and guidance to regional office SWQM staff.

TCEQ SWQM, WQS, and WQA Program staff (refers to both regional and central office personnel, also referred to in this document as “data collectors” or “collectors.”)

SWQM, WQS, and WQA Program staff is responsible for performing sample collection and data processing duties in accordance with respective program SOPs, QOs, SWQM DMRG, and this QAPP, reporting to the Program Manager, or designee, any deviation from SOPs or QOs, maintaining proper documentation of sampling events, sample preservation, sample shipment, and field procedures.

Central or regional office personnel will oversee all work of other personnel involved in routine monitoring, special study monitoring, permit support monitoring, systematic monitoring, or statistically-based monitoring projects conducted for TCEQ. In addition, central office staff from SWQM, WQS, and WQA Programs is responsible for conducting technical systems audits (TSAs) of staff and contractors providing data to the respective programs as outlined in Section C1 of this document.

Contract Laboratory Management
Supervises all aspects and functions of the respective analyses, ensuring adequate documentation occurs, and verifying the quality of analytical data. Ensures use of approved analytical procedures. Ensures adherence to this QAPP and to any relevant laboratory QA documents. Ensures internal laboratory audits are conducted and findings addressed. Coordinates with program manager, or designee, and QA specialist in establishing analytical requirements, reports deviations from QOs, and assists in implementing corrective action.

Contract Laboratory Staff
Responsible for performing analyses and data processing duties according to guidelines included in this QAPP and their laboratory QA manual, policies, and procedures. Responsible for implementing and maintaining internal QC and for notifying the laboratory supervisor of anomalous or erroneous analytical results. Responsible for documenting use of SOPs and calibration of laboratory equipment.

A9 Project QA Program Independence

TCEQ's Quality Management Plan (QMP) documents and describes the organizational arrangements, processes, procedures, and requirements of TCEQ's Quality Assurance (QA) program.

Quality Assurance Organization

TCEQ uses a semi-decentralized QA program, relying on one organizational unit to coordinate development and implementation of the agency-wide program and certain program quality systems, and relying on offices, divisions, and individual programs to implement other QA programs. The Monitoring Division, within the OCE, serves as the QA coordinating division for TCEQ.

TCEQ's QA program is organizationally independent of operational programs and activities within the agency and has sufficient access and authority to coordinate the development and implementation of the agency's quality system. The Monitoring Division QA staff have access to all work areas and sufficient authority and organizational freedom to identify, initiate, and facilitate solutions to quality problems and to verify the implementation of solutions to problems.

Designated lead QA staff are detailed in Appendix D of TCEQ's QMP for each program under TCEQ's Quality System. These staff have access to related work areas and sufficient authority and organizational freedom to identify, initiate, recommend, and provide solutions to quality problems and to verify the implementation of solutions to problems.

With delegation from TCEQ's executive management, the TCEQ QA Manager has responsibility for oversight of the agency's QA program and its operations. Issues and questions regarding the agency QA program and its operations may be raised by agency QA staff, agency staff, and agency management to the TCEQ QA Manager.

. The TCEQ QA Manager and SWQM Program QA Specialist are independent from data operations conducted under this QAPP. No individual from SWQM, WQS, or WQA management may sign this QAPP for the TCEQ QA Manager and SWQM Program QA Specialist. Additionally, the TCEQ QA Manager and SWQM Program QA Specialist may not sign for SWQM, WQS, or WQA management.

A10 Project Organizational Chart and Communications

Figure A10.1 outlines the project organization for the TCEQ SWQM, WQS, and WQA Programs. A description of job responsibilities and names of key participants is in Section A8.

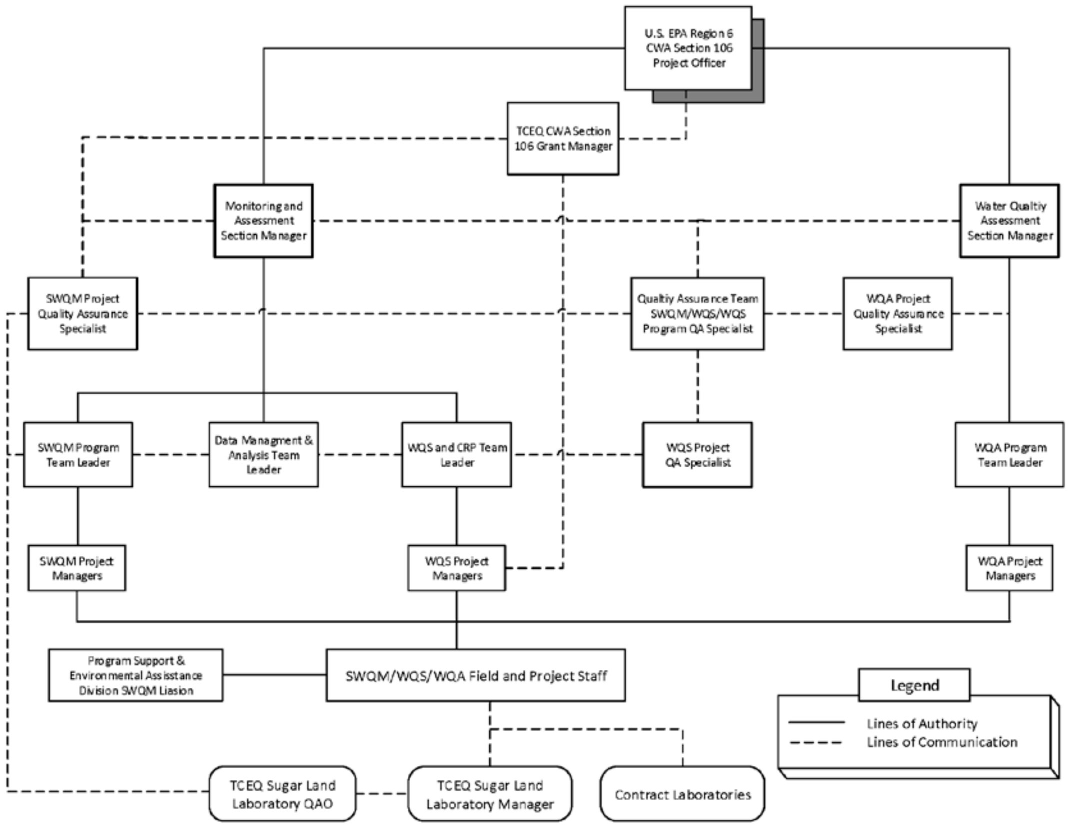

Figure A10.1 Project Organizational Chart

A11 Personnel Training/Certification

Work conducted for this project is covered under a documented quality management system. Personnel conducting work associated with this project are deemed qualified to perform their work through educational credentials, specific job/task training, required demonstrations of caompetency, and internal and external assessments. Laboratories are NELAP-accredited as required. Records of educational credentials, training, demonstrations of competency, assessments, and corrective actions are retained by project management and are available for review.

Training on SWQM Procedures, including field methods for sampling, use and care of sampling equipment, safety, quality assurance, etc., is provided by the SWQM Program for all SWQM, WQS, and WQA Program personnel, and Clean Rivers Program (CRP) participants. Training is provided on an individual basis by experienced SWQM Program staff for new regional office, SWQM, WQS, or WQA staff, or any monitoring entity on a request basis. Training may also occur at set statewide training events, at the annual SWQM Workshop, and at the annual OCE Regional Office SWQM Training.

Contractors and subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in The NELAC Institute[16] (TNI) Volume 1ppendix Module 2, Section 4.5.

[16] https://nelac-institute.org/

A12 Documents and Records

The documents and records that describe, specify, report, or certify activities are listed in Table A12.1. All documents or records may be retained in either hard copy or electronic form.

Table A12.1 Project Documents and Records

Document/Record	Location	Retention Time (minimum)
QAPPs, QAPs, amendments, annual certifications, and appendices	Central office	10 years
Special Project* Files (includes data reports, summary reports, final reports)	Regional and central offices	5 years**
Field SOPs	SWQM Program - central office	SOPs remain in effect until updated or revised
Laboratory quality manuals, SOPs, and equipment maintenance logs	TCEQ Sugar Land laboratory Contract laboratories	10 years 5 years
Laboratory data packages including calibration records, instrument printouts, and QC results	TCEQ Sugar Land laboratory Contract laboratories	10 years 5 years
Field staff training records	SWQM, WQS, and WQA Program central office will maintain a central training file for employees. OCE also maintains training records	3 years (minimum)
Field equipment calibration/maintenance logs	Regional and central offices	5 years
Field instrument printouts	Regional and central offices	5 years
Field notebooks or data sheets	Regional and central offices	5 years
Request for Analysis forms (RFAs)/Chain of Custody records	Regional and central offices	5 years
Technical Systems Audit records and corrective action documentation	Central office	10 years

*Special projects include any monitoring projects requiring a QAP

**RWA and UAA final reports are kept permanently in the respective program's central office

Final reports of RWAs and UAAs are unpublished documents that are permanently kept in the WQA and WQS respective program's central office files. The RWA Coordinator will receive completed RWA documents from the water body project manager. The Site-Specific Coordinator will receive completed UAA documents from the water body project manager. Copies of RWAs, that are used to support a UAA that establish uses or criteria lower than presumed uses or criteria, will be sent to the WQS Program and EPA Region 6. Copies of RWAs that support Texas Pollutant Discharge Elimination System permit reviews and originals of RWAs that support presumed uses and criteria are also kept on file in the WQA Program in the central office. Copies of final reports for other special studies are maintained by either the regional office or the program in the central office that generated the report.

Documentation for analytical data is kept on file at the laboratories. Laboratory records must be retained in accordance with the current TNI Standards. Records must be available upon request and are reviewed during audits by TCEQ. These records include the analyst's comments on the condition of the sample and progress of the analysis, raw data, instrument printouts, and results of calibration and QC checks. Analytical results are reported back to the collector upon completion of analyses and validation of results. These results include a comment field for reporting a description of difficulties encountered during analysis including preservation problems, interferences, and analytical difficulties. Similarly, the collector provides comments about the sample set in SWQMIS that describe the sampling event in ways that will help the end data user, including time of day, field conditions, water appearance, recent runoff, and unusual physical or biological conditions.

Laboratory Data Reports

Analytical reports from the TCEQ Sugar Land Laboratory and contract laboratories must document the test results clearly and accurately. Routine data reports should be consistent with the current TNI Standard and must include the information necessary for the interpretation and validation of data. The minimum requirements for reporting data are provided below.

- title of report and unique identifiers on each page
- name and address of the laboratory
- name and address of the client
- analyst name/initials
- a clear identification of the sample(s) analyzed
- identification of samples that did not meet QA requirements and why (e.g., holding times exceeded)
- date and time of sample receipt
- analytical date
- identification of method used
- SWQMIIS parameter code and description
- sample results
- units of measure
- sample matrix
- dry weight or wet weight (as applicable)
- station information
- date and time of sample collection
- sample depth
- field split results (as applicable)
- bacteria holding time for SM 9223B or IDEXX method (*Escherichia coli*)
- clearly identified subcontract laboratory results (as applicable)
- a name and title of person accepting responsibility for the report

- project-specific QC results to include field split results (as applicable); equipment, trip, and field blank results (as applicable); and reporting limit confirmation (% recovery)
- information on QC failures or deviations from requirements that may affect the quality of results or is necessary for verification and validation of data
- 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)

Quality Assurance Documents

Quality assurance documents for the SWQM, WQS, and WQA Programs are maintained by the Project QA Specialist within each program. Copies of approved QAPs are distributed to the project managers. The SWQM Project QA Specialist is responsible for the distribution of copies of the annual approved SWQM, WQS, and WQA QAPP to all Water Section Managers in the regional offices as well as to all individuals on the Distribution List in Section A7. If data will be stored in SWQMIS, the Project Manager will provide applicable QA documents (QAPPs, QAPs, amendments, etc.) to DM&A staff to be loaded in the Projects module of SWQMIS.

Records of TSAs conducted by the SWQM, WQS, and WQA programs are maintained in the QA files by the respective programs. These records include completed TCEQ SWQM TSA evaluation forms, TSA memos to the auditee indicating the status of the audit, and for the SWQM Program, response memos from the Water Section Managers in the regional offices.

The final disposition of all QA documents discussed in this section is consistent with agency record-keeping procedures as outlined in TCEQs Quality Management Plan (QMP). See Table A12.1 for a detailed schedule for disposition of data records.

B1 Identification of Project Environmental Information Operations

The TCEQ SWQM, WQS and WQA Programs provide for an integrated assessment and evaluation of physical, chemical, and biological characteristics of aquatic systems in relation to human health concerns, ecological condition, and designated uses. SWQM, WQS and WQA data provide a basis for the establishment of effective TCEQ management policies that promote the assessment, protection, restoration, and wise use of Texas surface-water resources. Sampling and analytical procedures for the SWQM, WQS, and WQA Programs are detailed in the SWQM Procedures, Vols. 1 and 2 and in Sections B2 and B3 of this QAPP.

Routine monitoring stations are sampled on a quarterly basis, but alternative frequencies are also used. Routine sampling typically includes field measurements, routine water chemistry and bacteriological analysis. Additional parameter groups may include toxic substances in water, sediment, or fish tissue, toxicity testing of water and sediment, and nekton and/or macrobenthic community structure and habitat assessment. Routine sampling performed by SWQM and CRP follows the CMS developed for the fiscal year. The CMS process is discussed in Section A5. The CMS contains the specific sampling frequency, monitoring types, and parameters discussed below.

Field Measurements, Routine Water Chemistry, Sediment Samples, Biological, and Bacteriological Analyses

Sampling which is common to all sites for routine monitoring includes field measurements (DO, specific conductance/salinity, pH, and temperature), flow, Secchi disk or tube measurements, routine water chemistry, and bacteria. The objectives of monitoring these parameters are to assess compliance with TSWQS, determine impacts of point and nonpoint sources, and detect and describe spatial and temporal changes. The monitoring of field measurements also provides complementary information necessary for evaluating chemical and biological data.

Instantaneous flow measurements are made at most stream sites concurrently with the collection of water samples. In some cases, stream flow is obtained at the time of sampling from a United States Geological Survey (USGS) gage[17] if one is located within a quarter mile of the sampling station, and it can be shown that no contributions to or reduction in flow occurs between the gauge and the sampling station. Establishing a correlative flow relationship between the USGS gage and the flow at the sampling station would satisfy this requirement. Stream flow data from flow gauges operated by the United States International Boundary Water Commission (IBWC) on the Rio

[17] https://waterdata.usgs.gov/tx/nwis/rt

Grande[18] or the Lower Colorado River Authority[19] (LCRA) in the Colorado River Basin may also be used with the same requirements.

TCEQ routinely monitors Escherichia coli (E. coli) and enterococcus bacteria as indicators of human pathogen densities to assess support of the recreational use of water bodies.

Organic substances (pesticides, semi-volatile compounds, and volatile compounds) and metals are monitored in water, sediment, and fish tissue at selected sites. The SWQM Program focuses toxic substances monitoring on those sites deemed to have a likelihood of being affected by anthropogenic sources and selects sample stations based on factors such as:

- Sites near dischargers that have shown receiving water or effluent toxicity
- Sites that have shown recurring surface water and/or sediment toxicity
- Sites near large industrial or domestic discharges
- Areas that receive high nonpoint source loads
- Areas with exceptional recreational uses
- Sites near hazardous waste facilities
- Sites downstream of major metropolitan areas
- Areas adjacent to Superfund sites
- Sites which exhibit biological impairment

Toxic substances in water, sediment, and fish tissue may be monitored at these sites to evaluate compliance with applicable water quality standards, to determine their prevalence and magnitude, and to detect and describe spatial and temporal changes. Some compounds, such as dioxins, are not often monitored due to the prohibitive expense of analysis. Other compounds, such as tributyltin, perchlorate, or atrazine, are unlikely to occur outside of specific geographic areas of the state, so samples may not be collected statewide for these analytes. The list of core parameters for all sample types, including organics, is found in the SWQM DMRG[20], (most recent version).

The results of monitoring sediment chemistry may be used to evaluate the condition of the benthic habitat, determine point and nonpoint source impacts, and to monitor rates of recovery following establishment of pollution controls or improved wastewater treatment. In addition to monitoring toxic chemical contaminants in sediments, conventional parameters in sediment are also measured. Conventional parameters include percent solids, for determination of water content; sediment grain size, for availability of contaminants and habitat availability; and total organic carbon, for bioavailability of organic contaminants that adsorb to particulates. Chapter 6 of the SWQM Procedures, Vol. 1 provides details on collecting sediment samples.

The results of monitoring fish tissue chemistry may be used to evaluate the risk to human health, ecosystem health and risk to predators, long term trends of bioaccumulative contaminants, and to establish background conditions of contaminants in aquatic organisms. Whole fish samples are analyzed for all these

[18] https://ibwc.gov/Water_Data/rtdata.htm
[19] https://hydromet.lcra.org/
[20] https://www.tceq.texas.gov/waterquality/data-management/dmrg_index.html

purposes. Risks to consumers are assessed using edible tissue samples. Chapter 7 of the SWQM Procedures, Vol. 1 provides details on collecting fish tissue samples.

Ambient toxicity tests are a direct measurement of toxic conditions in the environment. Sensitive test organisms are exposed to water or sediment collected from a water body and the lethal (causing death) or sub-lethal (interfering with growth or reproduction) effects are determined by examining the organisms after several days. Ambient toxicity tests can indicate a toxic condition that is not evident from the chemical tests available for environmental samples. Only a limited number of toxic compounds can be measured at the low levels that are often toxic, and several compounds may interact or provide an additive toxic effect. These conditions are revealed by ambient toxicity tests. Water and sediment toxicity are not routinely monitored.

Fish and benthic macroinvertebrates are useful in assessing water quality for a variety of reasons, including their sensitivities to low-level disturbances and their functioning as continuous monitors. Monitoring of resident biota increases the possibility of detecting episodic spills and dumping of pollutants, wastewater treatment plant malfunctions, toxic nonpoint source pollution, or other effects that periodic chemical sampling is unlikely to detect. Perturbations of the physical habitat such as sedimentation from storm water runoff, dredging, channelization, and erosion may also be detected through biological monitoring in combination with physical habitat assessment.

In addition to biological work done as part of special studies, UAA, ALA, ALM, and RWA projects, biological monitoring may also be conducted in water bodies that have DO concerns, have been identified as exceeding the toxic criteria, or have limited biological data sets indicating nonsupport of the use. The objective of monitoring fish and benthic macroinvertebrate communities is to detect and describe spatial and temporal changes in the structure and function of these communities. These results may be used to assess impacts of point and nonpoint sources, assess the biological community condition, determine the appropriate ALU, monitor rates of recovery following implementation of improved wastewater treatment controls, and provide an indication of potential adverse conditions. Details of TCEQ’s biological monitoring are found in the SWQM Procedures, Vol. 2.

Seagrass monitoring incorporates a tiered sampling approach coupled with probabilistic selection of permanent sampling sites. Monitoring generally occurs in the late summer through early fall during peak biomass but may be extended if conditions are favorable for growth. Sampling can include seagrass morphometric measurements, field measurements (including Secchi depth and photosynthetically-active radiation), routine water chemistry, and sediment (total organic carbon and grain size). Project planning and field activities will be coordinated by the TCEQ SWQM Program. Participants in field collection activities may include staff from TCEQ Region offices and other state agencies, water quality monitoring programs, and academic institutions. Sample sites are listed on the TCEQ CMS which is updated annually.

Other target analytes may be added to the SWQM Program as information needs arise. Training and monitoring protocols will be completed as these other tests are added, as will appropriate amendments to the QAPP.

B2 Methods for Environmental Information Acquisition

Field Activities Environmental Measurements

Sample collection procedures, including any implementation requirements, specific performance requirements for the method, any necessary support facilities, and preparation of sampling equipment are described in the SWQM Procedures, Vols. 1 and 2 or as addenda between revisions. Addenda and updates to the SWQM Procedures are available on the SWQM webpage[21].

The selection and preparation of sample containers and equipment, sample volumes, vouchering, preservation methods, maximum holding times to sample extraction and/or analysis, as well as requirements for documentation of field sampling activities are described in the SWQM Procedures, Vols. 1 and 2.

Standardized forms[22] for reporting flow, ALU monitoring checklists, habitat assessment forms, field biological assessment forms, and records of bacteriological analyses (if applicable) are part of the field data record.

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:

- Loose-leaf field notes and field forms may be recorded legibly in indelible ink (preferred) or pencil with no erasures, modifications, write-overs, or multi-line cross-outs.
- Bound field notes and forms and in-house field and lab records (multiprobe calibration logs, bench logs, etc.,) must be recorded in indelible ink with no modifications, write-overs or multi-line cross-outs.
- Errors are to be corrected with a single line-through followed by initials and a date.
- Incomplete pages must be closed out with an initialed and dated diagonal line.

Deficiencies and Corrective Action Related to Sampling Requirements

Deficiencies are any deviation from procedures defined in the QAPP, SWQM Procedures Manual, SOPs, or SWQM DMRG, or other applicable documents. Examples of sampling method requirements or sample design deficiencies include information such as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately, contamination of the sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any

[21] https://www.tceq.texas.gov/waterquality/monitoring/swqm_manualupdate.html
[22] https://www.tceq.texas.gov/waterquality/monitoring/swqm_forms-n-quality.html

deviations from the QAPP and appropriate sampling procedures may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected.

The sample collector has primary responsibility for responding to failures in the sampling or measurement systems. If field sampling requirements are not met, the collector will report the problem in the comment section of the field notes and will make independent judgments about whether or not a deficiency constitutes a nonconformance. The data collector, working with the respective program's Project QA Specialist and DM&A staff as needed, will exercise best professional judgment to determine if data associated with deficiencies will be submitted to SWQMIS. Actions will be taken to replace or repair broken equipment prior to the next field use. Data collected using equipment known (or discovered) to be faulty will not be entered into the SWQMIS database. If data are entered prior to the discovery of the fault, the subject data will be qualified appropriately by submitting a Data Correction Request (DCR) Form[23] to the DM&A staff.

Station Location Request

Data submitted to SWQMIS must be associated with a monitoring station. If a new station is needed, a Station Location (SLOC) Request is submitted following procedures described in Chapter 3 of the DMRG. Positional data may be acquired with Global Positioning System (GPS) equipment 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. Positional data acquired through the use of Global Positioning System (GPS) equipment should follow TCEQ's OPP 8.11[24] policy regarding the collection and management of positional data.

Laboratory Analyses

The preferred analytical methods, associated matrices, and performing laboratories are listed in Appendix A. The authority for analysis methodologies under the SWQM Program is derived from the TSWQS in Title 30, Texas Administrative Code, (30 TAC) Sections 307.1 - 307.10 in that data generally are generated for comparison to those standards and/or criteria. The TSWQS state that "Procedures for laboratory analysis will be in accordance with the most recently published edition of Standard Methods for the Examination of Water and Wastewater, the latest version of the TCEQ Surface Water Quality Monitoring Procedures, 40 Code of Federal Regulations Part 136, or other reliable procedures acceptable to the Agency."

Laboratories producing analytical data under this QAPP are NELAP-accredited for the appropriate methods, matrices, and parameters in accordance with the requirements of 30 TAC Chapter 25. Copies of laboratory quality manuals and standard operating procedures are available for review by TCEQ.

23 https://www.tceq.texas.gov/waterquality/data-management/wdma_forms.html
24 https://www.tceq.texas.gov/gis/docs/08-11_opp.html/view

The laboratory supervisor has primary responsibility for responding to a failure of analytical systems. Solutions that are consistent with the measurement objectives will be reached in consultation with the TCEQ project manager.

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 logbook. 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 allow tracing the reagent back to preparation.

Corrective Action Related to Analytical Methods

Failures in laboratory measurement systems involve, but are not limited to, such things as instrument malfunctions, failures in calibration, failure of LCS recovery and/or LCS/LCSD precision, and blank contamination. These problems are generally apparent at the beginning of the run before the analysis of samples occurs. When such issues arise, the problem must be investigated, and resolution attempted. If the problem is resolved, the analyst documents the problem in his/her laboratory record, takes any applicable corrective action (as defined by the reference analytical method, laboratory SOP, laboratory quality manual, etc.) and resumes analysis. If the problem cannot be resolved immediately, the supervisor is notified. The analyst and supervisor make appropriate corrective actions, document the problem and its resolution, and continue the analysis of samples.

Laboratory data falling into either category below is qualified by the laboratory and reported to SWQMIS.

- The percent recovery of the LCS or LCSD is not within SWQM QOs. Samples will be rerun if within holding time (except chlorophyll a).
- The RPD of LCS/LCSD is not within SWQM QOs. Samples will be rerun if within holding time (except chlorophyll a).

Current qualifier codes to be used for SWQM samples are located in Appendix E of the most recent version of the SWQM DMRG.

Existing Information

Non-Direct Measurements

Water quality data from sources other than the monitoring program are used in the program for characterizing and interpreting water quality conditions in Texas. Monitoring programs generating data that are acquired by TCEQ must be supported by a TCEQ or EPA approved QAPP or, in the case of data generated by the USGS, by an equivalent quality management system which has been approved by the SWQM Program. Any environmental testing laboratory that provides data which will be acquired for use by this project must be NELAP-accredited per 30 TAC Chapter 25. The data are transmitted in electronic format and are inspected in their raw form using automated data editing procedures and water quality experts before data reduction, interpretation, and assessment is undertaken. Acquired data meeting quality requirements for inclusion in the SWQMIS database must be coded to accurately represent the collecting and submitting agencies. Further guidelines are available in the SWQM DMRG (most recent version).

SWQM delivers acceptable acquired data sets to the DM&A staff in electronic format as specified in the SWQM DMRG. DM&A staff produce a SWQMIS-generated data summary identifying duplicate or “double-reported” data, invalid station ID numbers, parameter codes, tag prefixes, entity codes, monitoring type codes, and values falling outside the parameter-specific screening ranges set by SWQM (i.e., outliers). Any problems or inconsistencies identified during this review will be communicated to the data submitter via SWQM personnel and must be resolved before the data are loaded into SWQMIS.

Non-direct water quality and/or flow data are obtained from the following sources:

- The USGS provides water quality and flow data from the water quality database in its Austin office. TCEQ has determined the USGS water quality data meet the DQOs required for the purpose of assessment by the SWQM Program.
- River authorities and municipalities under the direction of the TCEQ CRP - water quality and flow data submitted by the CRP project manager to DM&A to be loaded to the SWQMIS database.
- Entities under the direction of the TCEQ TMDL Program - water quality and flow data, submitted by the TMDL project manager to DM&A to be loaded to the SWQMIS database.
- Consultant data sets for special projects.
- Entities under the direction of the TCEQ NPS Program - water quality and flow data, submitted by the NPS project manager to DM&A to be loaded to the SWQMIS database.
- Texas Water Development Board (TWDB) - Reservoir stage data are collected every day from the USGS, IBWC, and United States Army Corps of Engineers (USACE) websites. These data are preliminary and subject to revision. The 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 on the TWDB website[25].

  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 and 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. This data will be submitted to TCEQ under parameter code 00052 Reservoir Stage and parameter code 00053 Reservoir Percent Full. These data are furnished to TCEQ as requested.

The intended uses of all acquired water quality data are the same as listed in Section A6.

[25] https://www.waterdatafortexas.org/reservoirs/statewide

Submittal of Verified Non-Measurement Data

Data acquired by SWQM from non-direct measurement sources (e.g., data collected under other TCEQ- or EPA- approved QAPPs, historical data, databases, etc.) must be verified for use in the SWQM Program. To verify non-direct measurement data, the data contributor/collector will consider and describe the following elements of data collection:

1. The type and source of the data.
2. The intended use of the data - *Identify the original purpose of the data collection and describe the QAPP (if applicable) under which the data were collected under.*
3. The acceptance criteria for the use of the data in the project - *Describe the quality objectives.*
4. Any limitations on the use of the data - *Include limitations associated with the data and how these may impact their use relative to the project objectives.*
5. The procedures for verifying the data.
6. The description or citation of various elements of data collection should include information such as:
    - sampling locations, dates, and times
    - sampling procedures
    - sample preservation and holding times
    - chain-of-custody procedures
    - sample preparation and analysis
    - equipment maintenance and calibration procedures
    - laboratory analyst training and capability

The data contributor/collector must compare these elements with the requirements contained within this QAPP and determine whether data (or parts of data) meet all of the applicable acceptance criteria for new data.

Recreational Use Attainability Analysis Data

RUAA data may be acquired from external agencies such as Texas AgriLife and the Texas State Soil and Water Conservation Board. These RUAAs are performed using the procedures developed by the TCEQ WQS Group but are covered by individual quality documents at their respective agencies and are not funded by TCEQ. The WQS Group is responsible for ensuring that acquired RUAA data conforms to TCEQ standards set forth in the document entitled Procedures for a Comprehensive RUAA and Basic RUAA Survey[26].

This conformity is ensured by comparing the acquired RUAA data to TCEQ standards using a WQS Standard Operating Procedure (SOP) entitled Process to Review Recreational Use Attainability Analyses. Results of the review are documented by use of the RUAA Report Review Checklist in the SOP. Checklists will remain on file in the WQS central office QA files.

[26] https://www.tceq.texas.gov/waterquality/standards/ruaas

Geospatial Data

Geospatial data available from various local, regional, state, and federal organizations may be used for cartographic purposes. Maps developed for reports will be for illustrative purposes. Geospatial data utilized in maps may include land use, precipitation, soil type, ecoregion, TCEQ monitoring location, TCEQ permitted outfall, gage location, city/county/state boundary, stream hydrology, reservoir, drought, road, watershed, municipal separate storm sewer system, urbanized area, basin, railroad, recreational area, area landmark, aerial photography, and park information may be used to develop informative maps of the study area. Data used in the development of report maps will be retrieved from known reliable sources such as USGS, Texas Natural Resource Information System (TNRIS), TCEQ, U.S. Census Bureau, Councils of Governments, and local governments.

Drought monitoring geospatial data will be used to characterize routine water quality monitoring data. Drought monitor datasets will be acquired from the National Drought Mitigation Center (NDMC) as common vector data format shapefiles. These shapefiles depict areas of the United States that are experiencing drought. The areas are derived based on a variety of inputs, including climate indices, numerical models and the input of regional and local experts around the country. The shapefile is prepared through a partnership consisting of the U.S. Department of Agriculture (Joint Agricultural Weather Facility and National Water and Climate Center), the National Weather Service's Climate Prediction Center, National Climatic Data Center, and the NDMC at the University of Nebraska Lincoln.

The publishing of geospatial data by various organizations implies that the data is of known quality and has been subject to review and approval by the publishing organization. Geospatial data is accepted for use in this project based on established procedures followed by the data source. There are no known limitations in the data. Geospatial data will be cited in reports.

Other data of known quality compiled and published by other entities may also be used in preparing project reports. This may include long-term precipitation, drought indices, census, ecoregion, and stream flow data. Sources of data may include U.S. Department of Agriculture, National Oceanographic and Atmospheric Administration, NDMC, USGS, National Weather Service, U.S. Census Bureau, Texas Parks and Wildlife Department, and others. Data collected by these entities have been verified and validated according to the requirements of the respective programs prior to their use in this project. Data compilations created for this project will be visually screened for errors. Data will be cited in reports.

B3 Integrity of Environmental Information

Proper sample handling procedures for water, sediment and tissue samples are discussed in Chapters 5, 6, and 7 of the SWQM Procedures, Vol. 1, respectively. Sample handling of biological samples is discussed in the SWQM Procedures, Vol. 2.

Water, sediment, and tissue samples collected by the SWQM, WQS, and WQA Programs are submitted to the TCEQ laboratory or contract laboratory with a Request for Analysis (RFA) form. The RFA form (Figures B3.1 and B3.2) is a printable electronic form that is created in the SWQMIS database by system users. Each RFA is generated with a unique RFA tag number to allow tracking ambient samples and associated field QC samples (as required per the SWQM Procedures, Vol. 1) submitted for analysis. Procedures for creating and preparing RFA forms are described in the Surface Water Quality Monitoring Information System Users Guide (March 2012, or most recent version). The data collector has the primary responsibility to assure that all pertinent information is recorded correctly and completely. When shipping samples, ensure that the guidelines of 40 CFR Part 134[27] Table II are followed, and when shipping to TCEQ SLL, the Sample Collection Guide[28] may be utilized as a summary of 40 CFR Part 134 Table II.

If both water and sediment samples are collected, separate RFA forms for the water samples and sediment samples must be submitted. Routine water chemistry and metals in water analyses must also be submitted using separate RFA forms.

At a minimum, sample containers are labeled with the RFA tag number, station location or Station ID, date and time of sample collection, and sample type. The preservation method must be included on the sample container (e.g., sulfuric acid, ice, etc.) other required sample information (acid or base preservation, field filtering, etc.) is described by sample type in the SWQM Procedures, Vols. 1 and 2.

Samples are placed on ice in an ice chest for transport to the lab. If samples are to be shipped by commercial carrier, samples and ice are put in a large plastic bag in an ice chest to prevent the ice chest from potentially leaking during transport to the laboratory. The ice chest should be filled with ice. RFA forms are placed in a plastic bag and taped to the inside of the ice chest lid. Ice chests are sealed with tape before shipping, and it is assumed that samples in tape-sealed ice chests are secure whether being transported by staff vehicle, common carrier, or commercial package delivery. The receiving laboratory has a sample custodian who examines the samples for correct documentation, proper preservation, temperature, and holding times.

[27] https://www.ecfr.gov/current/title-40/chapter-I/subchapter-D/part-136

[28] https://tceq.sharepoint.com/sites/ow/planning/hl/Shared%20Documents/Sample_Collection_Guide_rev%2008.pdf

Laboratories will follow sample custody procedures outlined in their laboratory quality manuals. These manuals are on file with the respective laboratories and reviewed by the TCEQ QA Team before or during laboratory audits.

Deficiencies and Corrective Action Related to Sample Handling and Custody

Deficiencies are any deviation from procedures defined in the QAPP, SWQM Procedures Manuals, SOPs, or SWQM DMRG, or other applicable documents. Examples of deficiencies in chain-of-custody procedures include, but are not limited to, 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. Any failures that have reasonable potential to compromise data validity will invalidate data and it may be necessary to repeat the sampling event.

Samples with deficiencies such as incomplete documentation or signatures may be processed for analysis with the deficiencies noted, but samples affected by failures such as hold time exceedances, broken samples, preservation errors, etc., should not be processed for analysis by the laboratory. Data problem resolution is discussed in detail in Section B7 of this document. No data that is known to be problematic due to sample handling or custody failures will be entered into the SWQMIS database. If data are entered prior to the discovery of the fault, the subject data will be qualified appropriately by submitting a DCR Form to DM&A staff.

RFA TAG #

Texas Commission on Environmental Quality

SURFACE WATER QUALITY MONITORING PROGRAM

Region ________ Generator's e-mail ID ______________________________ LAB# __________

LAB ____ PCA __________

Station ID __ __ __ __ __ ________ Collector ______________________________

Description ____

Identify the type of sample using the submitting and collecting entity, and monitoring type codes provided at right.		List RFA numbers and Monitoring Type Codes of all associated samples.
________ Submitting Entity ________ Collecting Entity ________ Monitoring Type	Collecting Entity FO Field Operations; ST Standards Team SQ SWQM CO Team; TM TMDL CO Team SI Standards Implementation Monitoring Type - Sample Codes BE Biased Event BF Biased Flow BS Biased Season RT Routine / Baseline Monitoring Type - QC Codes FS Field Split; FB Field Blank EB Equipment Blank; TB Trip Blank	RFA # __________ MTC______ RFA# __________ MTC______

GRAB SAMPLE:	COMPOSITE SAMPLE: for water, sediment and tissue composite samples
Date ___ / ___ ___ (mm dd yy) End Time ________ (hh mm) End Depth________ meters	Start Date ___ / ___ / ___ (mm dd yy) Start Time ________ hrs; Start Depth ______ meters End Date ___ / ___ / ___ (mm dd yy) End Time ________ hrs; End Depth ______ meters Composite Category: ______ T=Time; S=Space; B=Both; F=Flow Weight Composite Type ("#" number of grabs): ______

LAB INFORMATION: Specific Conductance ________ Field pH ________ No. containers ________ Bacteria Bottle Lot # ________

HAZARDS OR SPECIAL INSTRUCTIONS ______________________________________

REQUEST WATER, SEDIMENT, & TISSUE ON SEPARATE FORMS (Run only tests circled)

NOTE: IF USING OTHER THAN TCEQ LAB, CONSULT WITH LAB FOR VOLUME AND CONTAINER REQUIREMENTS

CHEMICALS IN WATER

ROUTINE CHEMICAL:

- 1 L, iced -
Total Alkalinity
Chloride
TSS
VSS
Sulfate
Fluoride

- 1 L, iced -
Chlorophyll a

- 600 mL, H_2SO_4, < pH 2, iced -
Ammonia
Total Phosphorus
TOC
TKN
Nitrate + Nitrite

MISCELLANEOUS CHEMICAL:

- 100 mL, iced, $Na_2S_2O_3$ (must be in a sterile, separate container) -
Fecal Coliform
E.Coli
Dilution (Check one): None____ 10 mL____ 1 mL____
Enterococci

- 4 L, iced -
BOD

- 110 mL, H_2SO_4, iced -
COD - may be analysed from routine preserved sample

- 1 L, NaOH >pH 12, 0.2g ascorbic acid, iced (alert lab) -
Cyanide

- 1 L, glass; HCL pH<2, iced -
Oil and Grease

- 200 mL, iced -
TDS (lab measurement)

- 50 mL, field filtered -
Orthophosphate - P

RECEIVED BY LAB: initials ______ Date ______ Time ______ Cooler Temp: ______ pH checked? yes / no

Notes: ____

TCEQ LPS Form 0220M8 (Rev. 02/03/2012)

Figure B3.1 SWQM Program Request for Analysis Form (Front)

NOTE: IF USING OTHER THAN TCEQ LAB, CONSULT WITH LAB FOR VOLUME AND CONTAINER REQUIREMENTS

METALS IN WATER

ROUTINE METALS:
Dissolved

SDM bottle (unacidified) #________

Aluminum
Arsenic
Cadmium
Calcium
Chromium
Copper
Iron
Lead
Magnesium
Manganese
Nickel
Potassium
Silver
Sodium
Zinc

Mercury - Total # ________
(low level) SHG bottle (unacidified)

Selenium - Total # ________
STM bottle (unacidified)

TOTAL METALS:

Aluminum
Arsenic
Cadmium
Calcium
Chromium
Copper
Iron
Lead
Magnesium
Manganese
Nickel
Potassium
Silver
Sodium
Zinc

MISCELLANEOUS METALS:
Total or Dissolved

Antimony
Barium
Beryllium
Cobalt
Dissolved Mercury
Dissolved Selenium
Hardness (CaCO3)
Molybdenum
Strontium
Titanium
Thallium
Tin
Vanadium

Chromium hex (dissolved) - 500mL, iced
(must be in a separate container)
Notify all labs in advance

____
____
____

SEDIMENT

TOTAL METALS:
- 500g, iced -
(1-pint glass or plastic, w/Teflon-lined lid)

Aluminum
Arsenic
Barium
Cadmium
Chromium
Copper
Iron
Lead
Manganese
Mercury
Nickel
Selenium
Silver
Zinc

CONVENTIONALS FOR METALS
- 500g, iced -
(1-pint glass or plastic, w/Teflon-lined lid)

Percent Total Solids
Total Organic Carbon
Sediment Grain Size

VOLATILE ORGANICS:
- 500g, no headspace, iced -
(1-pint glass w/Teflon-lined lid)

Pesticides

Semivolatiles, low level

Conventionals for Organics
- 500g, iced -
(1-pint glass or plastic, w/Teflon-lined lid)

Percent Total Solids
Total Organic Carbon
Sediment Grain Size

OTHER

____
____
____
____
____
____
____

ORGANICS IN WATER

Organophosphorus Pesticides, Low level:	Organochlorine Pesticides, Low level:	Chlorinated Herbicides, Low level:	Volatiles, Low level: including MTBE	Semivolatiles, Low level:
- 1 L, iced - (solvent rinsed glass w/Teflon lined lid)	- 1 L, iced - (solvent rinsed glass w/Teflon lined lid)	- 1 L, iced - (solvent rinsed glass w/Teflon lined lid)	- Three VOA vials, iced. - (add 2 - 4 drops HCl) no headspace	- 1 L, iced - (glass solvent rinsed w/Teflon lined lid)
________	________	________	________	________
________	________	________	________	________
________	________	________	________	________

TISSUE

Whole fish or fillet Species ________ EPA Species Code ________ # of individuals ________

METALS:
- 300g, preferably fresh, stored on ice, freeze if holding more than four days

Arsenic
Cadmium
Chromium
Copper
Lead
Mercury
Selenium

____

PESTICIDES:
Low level and Percent Lipids
- Same 300g sample -

____

SEMIVOLATILE ORGANICS:
Low level
- Same 300g sample -

____

TCEQ LPS Form 0220M9 (Rev. 02-03-2012)

Date/Time Field ________

Figure B3.2 SWQM Program Request for Analysis Form (Back)

B4 Quality Control

Procedures to verify the quality of measurements are performed at various stages of data collection. Standard, documented procedures will be used for all measurements and activities. Reasons for the use of nonstandard procedures will be clearly documented in the field notes and in the final laboratory results report.

Laboratory QC Requirements and Acceptability Criteria

Detailed laboratory QC requirements and corrective action procedures are contained within the individual laboratory quality manuals. The minimum requirements for all participants are stated below. Results from laboratory QC samples are submitted with the laboratory data report.

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 National Environmental Laboratory Accreditation Program (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 24 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 requirements (e.g., sample duplicates, surrogates, internal standards, continuing calibration samples, interference check samples, positive control, negative control, and media blank) other than those specified later this section, are to be adhered to as specified in the methods. 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. The minimum requirements that all participants abide by are stated below.

Limit of Quantitation (LOQ)

The laboratory will analyze a calibration standard (where applicable) at the LOQ concentration each day calibrations are performed. In addition, an LOQ check sample will be analyzed with each analytical batch. All calibrations must meet the requirements of the analytical method or corrective action shall be implemented.

LOQ in 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 matrix 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 the solid matrix LOQs listed in Appendix A, Tables A6.1 – A6.3, 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.

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 the working range of analysis. The LOQ check sample matrix is spiked at a concentration less than or equal to the LOQ for each analyte for each batch of samples analyzed. If it is determined that samples have exceeded the working range, samples should be diluted or run at a higher range. The working range of an instrumental method is established by the calibration curve. For samples run on batches with calibration curves that do not include the LOQ published in Appendix A, Tables A6.1 –A6.3, 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:

$$\%R = {}^{S_R}/_{S_A} \times 100$$

Measurement performance specifications are used to determine the acceptability of LOQ check sample analyses as specified in Appendix A.

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. An LCS is used to establish intra-laboratory bias to assess the performance of the measurement system. The concentration of the LCS is less than or near the mid-point of the calibration curve for each analyte. The LCS must be spiked with all the target analytes being measured, 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.

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

$$\%R = {S_R}/{S_A} \times 100$$

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

Laboratory Duplicates

A laboratory duplicate consists of an additional aliquot of a sample from the same container as the original sample, which is then subjected to the same preparation and analysis steps as the original sample. A laboratory control sample duplicate (LCSD) is prepared by spiking a second aliquot of analyte-free matrix. Both samples are carried through the entire preparation and analytical process. LCSDs are used to assess precision and are performed at a rate of one per preparation batch.

For most parameters, precision is evaluated using the relative percent difference (RPD) between the LCS and LCSD results. For any pair of results, X1 and X2, the RPD is calculated using the following equation:

$$RPD = \frac{|X_1 - X_2|}{\left(\frac{X_1 + X_2}{2}\right)} \times 100$$

For bacteriological parameters, precision is evaluated using the results from laboratory duplicates. Bacteriological duplicate analyses are performed on samples from the sample bottle on a 10% basis.

The base-10 logarithms of the result from the original sample and the result from its duplicate will be calculated. The absolute value of the difference between the two logarithms will be calculated, and that difference will be compared to the precision criterion in Appendix A.

$$|\,\text{Log A} - \text{Log B}\,| = \text{Log Range}$$

If the difference in logarithms is greater than the precision criterion, all samples associated with that failed duplicate (usually a maximum of 10 samples) will be considered to have excessive analytical variability and will be qualified as not meeting project QC requirements.

The precision criterion in Appendix A for bacteriological duplicates applies only to samples with concentrations > 10 MPN/100mL. Field splits will not be collected for bacteriological analyses.

Matrix Spike

Matrix spikes are prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used to determine any effects the sample-specific matrix may have on the analytical system's performance.

Matrix spikes indicate the effect of the sample on the precision and accuracy of the results generated using the selected method. 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, S_{SR} is the result from the spiked sample concentration, S_R is the result from the unspiked sample, and S_A is concentration of the spike added:

$$\%R = \frac{S_{SR} - S_R}{S_A} \times 100$$

Matrix spike recoveries are compared to the acceptance criteria as published in the mandated test method. For matrix spike results outside established criteria, the data for the analyte that failed in the parent sample is not acceptable for use under this project. 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. Corrective action shall be documented, and the data reported with appropriate data qualifying codes.

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. The method blanks are prepared and analyzed at a rate of one per preparation batch. The method blank is used to document that the analytical process is free of contamination. The concentration of each analyte of interest in a method blank should be less than the corresponding LOQ.

When target analyte concentrations in field samples are high, method blank results for the analytes of interest should be less than 5% of the lowest concentration found in the batch. Samples associated with a contaminated blank shall be evaluated as to the best corrective action for the samples (e.g., reprocessing or data qualifying codes). In all cases the corrective action must be documented.

In those instances, for which no separate preparation method is used (example: volatiles in water) 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.

Field QC Requirements and Acceptability Criteria

A summary of field QC samples is provided in Table B4.1. The minimum field QC requirements are outlined in the SWQM Procedures Volume 1. QC data requirements are to be followed and tracked by each collector by logging the field QC samples and tracking which other field samples are associated with each QC sample. DM&A staff reviews the results of field QC samples. If data are identified that need to be qualified, DM&A will take corrective action as described in section B7 of this QAPP.

Field Blank

Field blanks are required for total metals-in-water samples collected as grab samples. A field blank is prepared in the field by filling a clean sampling container with deionized water and appropriate preservative. Field blanks are used to evaluate potential contamination from field sources such as airborne materials, containers, and preservatives.

The concentrations of each analyte of interest in field blanks should be less than the applicable LOQ. Field blank results for analytes of interest should be less than 5% of the lowest concentration found in the batch.

Field blanks are associated with batches of field samples. In the event of a field blank failure, any target analytes in the ambient sample associated with the field blank should be qualified as not meeting project QC requirements.

Field Equipment Blank

Field equipment blanks are required for metals-in-water samples when such samples are collected using sampling equipment but may be optional for other sample types (Table B4.1). A field equipment blank consists of an aliquot of analyte-free media that has been used to rinse common sampling equipment. Field equipment blanks are used to evaluate the effectiveness of equipment decontamination procedures. Field equipment blanks must be collected in the same type of container as the associated environmental samples, preserved in the same manner and analyzed for the same parameters.

The concentrations of each analyte of interest in field equipment blanks should be less than the applicable LOQ. Field equipment blank results for analytes of interest must be less than 5% of the lowest concentration found in the batch.

For all samples collected using metals kits provided by the TCEQ Sugar Land Laboratory, any target analytes in the ambient sample associated with the field equipment blank should be qualified as not meeting project QC requirements in the event of an equipment blank failure.

Field Split

A field split is a single sample subdivided by field staff immediately following collection according to procedures specified in the SWQM Procedures Manual vol. 1 and submitted to the laboratory as two separately identified samples. Split samples are preserved, handled, shipped, and analyzed identically and are used to assess variability in all of these processes.

Field split samples are not required as part of the routine SWQM Program, but if needed, may be inserted into the sample regime. The frequency is determined by the needs of the project.

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 < 5% of the lowest value of the batch, or corrective action will be implemented.

Field (Environmental) Duplicate

A field or environmental duplicate is a second sample from the same location, collected in immediate succession to the original, using the same techniques and equipment. Field duplicate samples are sealed, handled, stored, shipped, and analyzed in the same manner as the original sample. Field duplicates are not required as part of the routine SWQM Program, but may be inserted into the sample collection, if needed.

If field duplicates are collected, the recommended minimum frequency is one with every 10th sample. If fewer than 10 samples are collected in a month, submit one set of field duplicates for that month.

Replicate Samples

Replicate sediment samples are not required as part of the routine SWQM Program, but if needed, may be inserted into the sample regime. The frequency is determined by the needs of the project.

Table B4.1 Summary of Field QC Samples

QC Sample Type	Parameter (Group)	Minimum Frequency	Purpose	Required	Submit to SWQMIS
Equipment Blank (EB)*	Metals in water (dissolved)	1 per sample run or 1 per 10 samples if > 10 samples collected in one run. TCEQ lab metals kits – collect 1 per sample*	Check for contamination from sampling equipment, supplies	Yes	Yes

QC Sample Type	Parameter (Group)	Minimum Frequency	Purpose	Required	Submit to SWQMIS
Field Blank (FB)	Total metals in water (when collected directly from a water body), total mercury	1 per sample run or 1 per 10 samples if > 10 samples collected in one run. TCEQ lab metals kits – collect 1 per sample*	Check for contamination from sample collection, preservation, handling, shipping	Yes	Yes
Trip Blank (TB)	Volatile organics in water	One per ice chest containing VOA samples	Check for sample contamination	Yes	Yes
Field (environmental) Duplicate	Water (organics, metals, routine chemistry)	1 per 10 samples or 1 per month (< 10 samples)	Environmental variability	Optional	Optional
Field Splits (FS)	Routine water chemistry, organics, metals	1 per 10 samples or 1 per month (< 10 samples)	Check for consistency of preservation, handling, shipping	Optional	Optional
Equipment Blank (EB)	Water (organics, routine water chemistry)	1 per sample run or 1 per 10 (> 10 samples collected in one run)	Check for contamination from sampling equipment, supplies	Optional	Optional
Field Blank (FB)	Water (organics, metals, routine chemistry)	1 per 10 samples or 1 per month (< 10 samples)	Check for contamination from sample collection, preservation, handling, shipping	Optional	Optional
Replicate	Sediment	Determined by project needs	Environmental variability	Project Specific	Optional

*If a sample kit prepared by the TCEQ Sugar Land Laboratory is used, a blank is required for each type of metals sample: an equipment blank must be prepared for each dissolved metals sample; field blanks must be prepared for total metals and/or total mercury samples.

B5 Instruments/Equipment Calibration, Testing, Inspection, and Maintenance

To minimize downtime of measurement systems, all field sampling and laboratory equipment must be maintained in working condition. Backup equipment and/or commonly needed spare parts will be available so that if any piece of equipment fails during use, repairs or replacement can be made as quickly as possible, and the measurements resumed.

Before any water sample collection begins, availability of proper equipment should be verified. This includes sampling equipment, safety equipment, and field measurement equipment (with calibration standards). It should be verified that all collectors involved in field activities have been trained to properly use the equipment. Training for data collectors is discussed in Section A11.

Calibration

Calibration requirements for field equipment are contained in the TCEQ SWQM Procedures, Vol. 1. Data from field equipment not meeting calibration and post-calibration error limit requirements are not entered into the SWQMIS database.

Detailed information on the calibration of laboratory instruments is contained in the laboratory quality manual(s) and/or SOPs.

Testing, Inspection, and Maintenance

Field Equipment

All field equipment that has a manufacturer's recommended schedule of maintenance will receive preventive maintenance according to that schedule unless otherwise described in the SWQM Procedures Vols. 1 and 2. Equipment that does not include a manufacturer's maintenance schedule or a schedule outlined in a TCEQ SOP should be verified that it is in working condition at least annually and especially prior to being taken into the field. Available spare parts should include things such as batteries, replacement sensors, and multiprobe replacement parts. After use in the field, all equipment is re-evaluated for maintenance needs. All electronic equipment with the capability of downloading and storing data should be checked as needed for any firmware updates.

Sampling equipment is inspected and tested upon initial receipt to ensure that is it appropriate for use. Acceptance criteria and procedures for resolution of deficiencies are contained in the TCEQ Guide for Administrative Procedures Manual and in the SWQM Procedures Vols. 1 and 2.

Laboratory Equipment

Testing and maintenance requirements for laboratory equipment are contained in the laboratory QA manuals or in maintenance documents provided by the manufacturer. Due to the cost of some laboratory equipment, back up capability may not be possible.

However, spares of all commonly needed parts will be available for rapid maintenance on failed equipment.

A separate logbook will be maintained for each piece of equipment. All preventive or corrective maintenance will be documented. A history of maintenance performed as required by TNI Standards will be available for inspection during a systems audit.

List of Critical Equipment/Spare Parts

A complete list of all critical equipment and spare parts which must be maintained to ensure quality data collection in the field at all times is provided in the SWQM Procedures, Vol. 1.

All necessary forms, calibration logbooks, procedures manuals, equipment manuals, and identification manuals for biological specimens will be kept on hand by all OCE SWQM, WQS, and WQA Program personnel. The SWQM Program in the central office will maintain a limited supply of calibration logbooks and procedures manuals. It is the responsibility of the sample collector to notify the central office of their need for appropriate documents in a timely manner to ensure receipt prior to the sampling event. SWQM Program documents (forms, QAPP, guidance documents, and calibration log sheets) are available on the SWQM website[29].

[29] https://www.tceq.texas.gov/waterquality/monitoring

B6 Inspection / Acceptance of Supplies and Services

The procurement of supplies, equipment, and services is controlled to ensure that specifications are met for the high quality and reliability required for each field and laboratory function. Specifications for all equipment and material used by central office or OCE SWQM and WQA personnel are outlined in the SWQM Procedures Vols. 1 and 2. Equipment and materials are purchased by each regional office and by the central office SWQM, WQS, and WQA programs.

Upon arrival of materials or equipment, a designated employee receives and signs for the materials. The program staff that initiated the order is responsible for inspecting and verifying equipment and supplies upon receipt. Items are reviewed to verify that the shipment is complete, and the items are then delivered to the proper location. All chemicals are dated upon receipt. All supplies are stored appropriately and given appropriate disposal upon expiration date.

Reference the laboratory quality manual for appropriate laboratory-related supplies and consumables.

B7 Environmental Information Management

TCEQ SWQM data are stored in SWQMIS, an Oracle database. This database was established in 2006 to store the data necessary to describe the water quality of Texas streams, reservoirs, and estuaries. The SWQMIS database contains physicochemical and biological data collected by TCEQ, contributing river authorities, cities, and other state and federal agencies since 1967.

Background

TCEQ personnel enter field data and notes using the SWQMIS web-based user interface. These personnel are usually OCE SWQM staff but may also include staff from other TCEQ divisions. These TCEQ staff will be referenced throughout this discussion as the *data collector* or *collector*. *Data*, as defined in this section, include data from routine monitoring activities as well as field and routine chemistry data from special studies, ALAs, ALMs, RWAs, and UAAs. If the data management processes differ from what is outlined in the Guidance for Surface Water Quality Investigators[30] (May 2013 or most recent version), those processes will be outlined in a QAP for that project. Data from work performed under this this QAPP is entered into SWQMIS unless otherwise stated in some other QA document.

Field data or any data already in final reportable form (such as DO, pH, temperature, and specific conductance) are entered into SWQMIS as pre-production data and sent electronically to the central office for update by DM&A staff. Field data collected as part of routine monitoring are entered into SWQMIS within 45 days of the sampling event. Data deliverables (field, laboratory, final reports) that are part of a special project requiring a QAP will be described in a timeline in the QAP. Sample results from the TCEQ Sugar Land Laboratory and contract laboratories are entered into the applicable Laboratory Information Management System (LIMS) and are then sent electronically to DM&A staff for loading into the SWQMIS production database. The data collector receives an electronic copy of the final lab report and may also receive the original hardcopy RFA. Any samples deemed questionable by DM&A during their review of field QC samples (splits and blanks) are flagged appropriately in SWQMIS. All data reported to SWQMIS undergo both manual and automated verification and validation as described in the following sections.

Only those data reported with valid TCEQ parameter codes (see Appendix A or applicable QAPs) are stored in SWQMIS.

Field Data Recording and Verification

Field data that are to be added to the SWQMIS production database undergo the following QC checks and are subject to the procedures described in Chapter 12 of the Guidance for Surface Water Quality Investigators.

[30] https://tceq.sharepoint.com/sites/oce/psead/pss/FOD/SWQMDirective/swqm-guid-inv.pdf

1. The data collector enters field data directly into the SWQMIS database. As the data collector enters data, they confirm that the station ID number, date, time, and depth of collection are valid and that the station ID number and the station description both represent the same sampling location. Any field data that do not meet instrument post-calibrations requirements will not be entered into SWQMIS.
2. As field data are keyed into the pre-production area of SWQMIS, a series of onscreen prompts check for invalid data entry and warns of results that are outside of specified ranges. The system checks entered values for outliers and indicates if outlying data must be verified or corrected before the system will allow the data to be saved. The data are therefore marked ‘Confirmed’ and ‘Valid’ by the collector.
3. After data are entered into SWQMIS they are manually screened by DM&A staff for errors, reasonableness, and completeness of metadata and measurement values. The DM&A staff will return (via SWQMIS) any questionable data elements for verification to the data collector. All issues identified by DM&A must be resolved before the data are updated in SWQMIS. Once data have been updated to ‘Production’ status in SWQMIS, measurement data to be added, corrected, or qualified must be processed by submitting a DCR to DM&A staff.

Laboratory Data Recording and Verification

Laboratory services are provided by the TCEQ Sugar Land Laboratory or contract laboratories. Laboratories are provided a list of required analytes and the correct parameter codes, units of measure and reporting limits for all analytical results reported to the SWQM Program. The contract laboratories may use either TCEQ’s Lab Report, which is provided to them, or they may use their own version, if the analytes are reported in the specified order and with the correct reporting limits, units of measure, and parameter codes and in accordance with Section A12 of this QAPP.

The data from the TCEQ Sugar Land Laboratory and contract laboratories are validated according to the procedures outlined in each laboratory’s SOP and/or quality manual. The laboratory verifies data by checking that the received samples met preservation and hold-time requirements; checking all of the calculations for accuracy; checking that all of the required tests, including QC, have been completed; checking that the analyst has checked the QC; checking that the QC is “in control,” and, if not, that some investigation has been made as to why; checking data entered manually against instrument printouts; checking that all of the steps of the SOP have been completed correctly; and checking sample demographics (e.g., that the final report matches laboratory records). The laboratory manager, or designee, validates the analytical data by comparing the various QC results to applicable acceptance limits and by recalculating a random selection of the results produced by each analyst submitting data.

TCEQ’s Sugar Land Laboratory and contract laboratories enter results in their LIMS and submit the data in an electronic format to DM&A using the format specified in the SWQM DMRG.

The data are manually screened by DM&A staff for errors in electronic transmission and metadata completeness. As laboratory data are loaded into SWQMIS, an automated review of the results is performed on the data for measurements that fall outside the minimum and maximum value ranges set by the SWQM Program. Measurements that fall outside these ranges are identified by the system as outlier values that need to be reviewed. DM&A staff return the result with the outliers to the data collector for review. After review, the data collector deems the outliers as either valid or questionable and inserts a comment, then returns the data back to DM&A. The data collector reviews outliers based on collection information or existing historical data for the monitoring station or waterbody segment and not on laboratory information.

Analytical QC results and associated sample data are reviewed by DM&A staff. If QC results do not meet specifications described in Section B4, DM&A will consult with the laboratory. Sample data may be qualified by DM&A or laboratory staff as required and an amended lab report will be provided to DM&A. The data collector will be notified by DM&A if data are qualified as a result of this review.

Any errors identified by the TCEQ Sugar Land Laboratory after the final lab report is prepared and released are documented in amended reports (corrected final lab reports) and reported to DM&A in an electronic format. Amended reports are considered conclusive and do not require supplemental documentation such as submission of DCRs. Upon receiving an amended report, DM&A will verify the digital data received from the laboratory against the data in the amended report. If necessary, an amended digital data deliverable will be sent from the laboratory to DM&A,

Non-Reporting of Laboratory Data

There are situations when samples are not to be analyzed by the laboratory and therefore no data will be reported to the TCEQ SWQM Program. Examples of such situations include things such as samples received warmer than allowable (>6 °C), samples received after expiration of the holding time for a given parameter, samples not properly preserved, samples collected in an improper container, and samples that could not be analyzed within the holding time due to instrument failure.

Completeness of Field and Laboratory Data

SWQM central office staff review at least one sample set of RFAs and final lab reports from laboratories under this QAPP at the time of the TSA, along with that period's field data. During the audit process, SWQM central office staff will confirm data completeness and report findings in the TSA report. The OCE is responsible for correcting any noncompliance regarding field data noted in the TSA report. Failure to correct the noncompliance or to meet QA protocols may result in the data from that office being flagged as inappropriate for stream assessments. Once reviewed, the batch of sample data is returned to the regional office to be returned to the project files.

Data Transformation and Transmittal

Even when accepted protocols are followed in collecting and analyzing environmental samples, a potential for loss of data quality arises in the manipulation and reporting of the data. Certain procedures reduce the chance of data handling errors. These procedures include the use of the LIMS system for reporting of the laboratory's analytical results and the use of forms by the laboratories which are in final format regarding units and parameter codes.

Figure B7.1 shows a flowchart of SWQM data into the SWQMIS database.

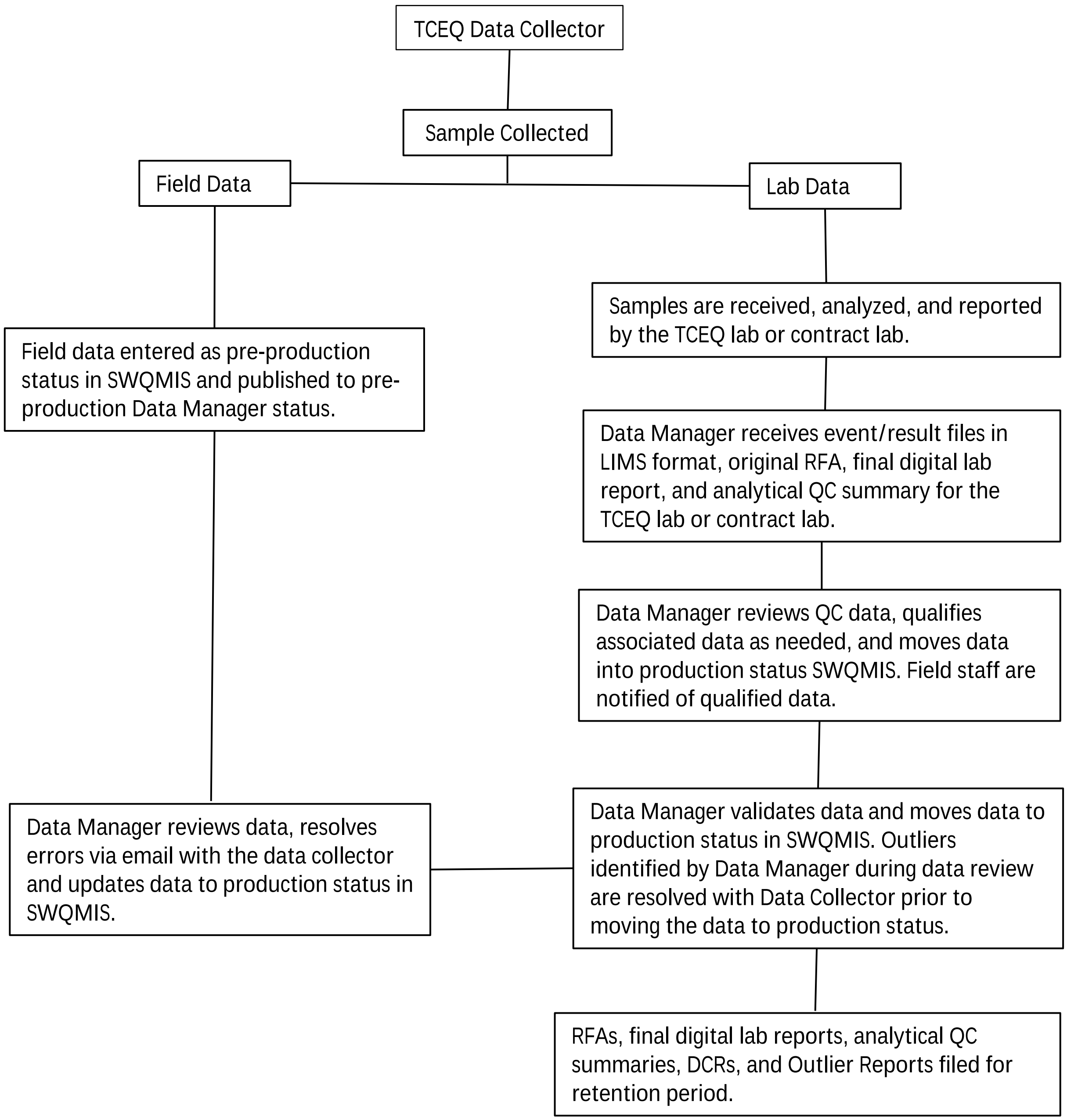

Figure B7.1 Flow Chart of SWQM Data into SWQMIS.

C1 Assessments and Response Actions

The use of approved equipment and approved methods when collecting must be confirmed by periodic verification that the equipment and methods are, being employed properly. The verification is accomplished by performing TSAs and laboratory assessments. The audits or assessments will be conducted by a person independent of the actual duties of either the data collector or laboratory management. This person will be familiar with the field sampling requirements of the program or laboratory QA, as appropriate. In the case of TSAs, the auditors are chosen by the SWQM, WQS, or WQA Program Manager, or designee, and for laboratory assessments, Monitoring Division management chooses the NELAP Assessor. The TCEQ Sugar Land Laboratory is assessed by the State of Louisiana, which issues the primary NELAP accreditation for the TCEQ laboratory.

Technical System Audits

Before any investigation for the water quality monitoring program begins, the availability of proper equipment will be verified by the data collector. Proper equipment includes sampling equipment, safety equipment, field measurement equipment, and the related and calibration standards. It will also be verified by the data collector that all personnel involved in field activities have received training and are able to properly use the equipment and follow established procedures. All training records will be maintained in employee files in the regional and central offices. The application of procedures and equipment will be verified during the regularly scheduled TSA. The SWQM Program is responsible for auditing individual OCE SWQM personnel and various contractors who provide water quality data to TCEQ. The WQS and WQA Programs will be responsible for conducting TSAs on contractors providing data to their respective programs. The determination of how frequently a region or contractor will be audited will be based on an assessment of the entity’s data collection program using the following information:

- previous performance in audits (findings), the magnitude of those findings, and how they were corrected
- recent changes in management if any
- tenure of monitoring staff performing field activities
- participation of monitoring staff in recent training
- amount of data generated by the Region or contractor/cooperator
- complexity of the monitoring performed, e.g., types of parameters, special studies, etc.
- concerns expressed by other program areas or data users, and requests by management for audits

The SWQM Program will visit OCE regional SWQM staff at least every other year, except for very large programs in which case half of the monitoring staff may be audited in alternate years. Staff will be observed during an actual field investigation to verify that equipment and procedures are being properly applied. Details of the TSA are outlined in the SWQM Procedures, Vols. 1 and 2.

Each TSA will be followed up by the program staff responsible for conducting the review. A verbal and written assessment of the TSA findings is conducted with the water quality monitoring personnel. The verbal review is conducted immediately after the TSA prior to leaving the regional office from which the audit was conducted. The verbal assessment is conducted in the presence of the staff member's immediate supervisor and the Water Section Manager (if possible). If a verbal assessment at the office is not possible due to travel constraints, etc., the auditor will provide an assessment by e-mail to the audited staff, with copies to the staff member's immediate supervisor and the Water Section Manager within five business days of the audit. The following topics are discussed during the verbal assessment: (a) materials and procedures checked during the TSA, (b) suggested and/or necessary changes in sampling or measurement procedures, and (c) actions needed to correct deficiencies. Corrective actions agreed to during the verbal review are implemented immediately following the verbal review.

An interoffice memorandum is sent from the person on the SWQM Team that conducted the TSA to the regional director of the appropriate office, with copies to the person audited and their supervisor. The memo shall be sent to the regional director within 30 business days following the TSA and will provide the following information: (a) description of sampling materials and procedures checked during the TSA, (b) the actions needed to correct water quality deficiencies, (c) proposed action(s) based on changes in sampling programs, and (d) actions to correct or qualify data.

Regional directors are responsible for seeing that all letters, memos or verbal assessments citing deficiencies in the regional monitoring program are addressed and that corrective action is implemented. Within 30 days of written or verbal notification of deficiencies, the regional director or designee shall forward to the SWQM Project Manager and the auditor a response that outlines the corrective action(s) to be taken and the timeline for implementation. If it is determined that the quality of the data may have been compromised, a thorough review is performed by central office and region staff and questionable data are flagged in the database. No data are deleted from the database; data are either corrected or qualified.

The next TSA includes a review to verify that required corrective actions were initiated and continued since the previous TSA. If corrective actions are not taken, the SWQM Team may stop accepting surface water quality data from that office, effective the date of the TSA, until corrective actions are completed. Records of the TSAs and memos describing performance by OCE SWQM personnel and training activities are reviewed by the SWQM Project and Program QA Specialists, and by TCEQ management.

TSAs are planned and conducted in accordance with TCEQ Operating Policies and Procedures[31], Section 18.09.01 and 18.09.02, respectively. The Project QA Specialist maintains a current list of planned TSAs. Deficiencies are identified and corrective actions implemented in accordance with the TCEQ Quality Management Plan (Section 15d). The Project QA Specialist maintains a current list of corrective actions.

[31]https://tceq.sharepoint.com/sites/OAS/procedures/Pages/opp.aspx - Available upon request.

Laboratory Assessments

Laboratories performing analysis of samples collected under this QAPP are routinely audited by their primary NELAP accrediting body to evaluate the laboratory's compliance with the current TNI Standard.

Laboratory Assessment Responses

Any deficiencies found during the laboratory assessments are documented in a report of findings, which is sent to the laboratory management. The laboratory management is then responsible for making any corrective action needed and for reporting those to the accrediting body. Follow-up inspections may be used to confirm that deficiencies have been addressed. Whenever the procedures and guidelines established in this project plan do not meet the specified levels of data quality or are not successful, corrective action is required. The responsibility to see that the required corrections are made will be with the laboratory manager. Each manager may also initiate corrective action.

Findings which require corrective action include but are not limited to:

- equipment failure
- excursions from precision and accuracy control limits
- samples arriving at the laboratory with sample integrity in doubt
- samples lost in transit or in laboratory accidents
- failure to achieve acceptable results when analyzing performance evaluation samples
- reporting data in wrong units
- calculating data by wrong formula

Most corrective action can be some combination of the following: repair or replacement of faulty equipment; re-analysis of samples and standards; checking reagents for proper strength; or contacting data collector or project QA Specialist for advice. A formal corrective action program that would cover all possible problems is difficult to establish. Unique problems which cannot be corrected by the procedures listed above will require corrective actions defined when the need arises. A record of corrective actions is maintained by the laboratory manager or designee.

C2 Oversight and Reports to Management

Oversight responsibilities and activities for key personnel are described in Section A8.

Project-related deliverables and reports are listed in Table A5.2 “SWQM Products” in Section A5.

D1 Environmental Information Review

Data are validated against data quality requirements in Section A6 or, in the case of acquired data, the requirements as stated in Section B2. Data which do not meet these requirements are qualified before entry into SWQMIS. Any data discovered to be questionable after it has been moved to a production status in SWQMIS must be qualified or corrected following the DCR procedure documented in the most recent version of the SWQM DMRG. The data collector, Laboratory Manager, and/or SWQM, WQS, WQA, or DM&A staff, as appropriate, initiate corrections or qualifications and the DM&A Data Manager authorizes all corrections or qualifications of data. Table D1.1 provides details on the roles and responsibilities of various staff in the data verification process. Details of the data review, validation, and verification processes are detailed in Section B7 of this document.

Qualified data are excluded from use in the Texas Water Quality Integrated Report.

Table D1.1 Verification Process

Data to be Verified	Field Task	Laboratory Task	TCEQ Data Manager Task
Sample documentation complete; samples labeled; sites identified	Y	Y	
Field QC samples collected for all analytes as prescribed in TCEQ SWQM Procedures	Y		
Standards and reagents traceable	Y	Y	
Chain of custody complete/acceptable	Y	Y	
Sample preservation and handling acceptable	Y	Y	
Holding times not exceeded	Y	Y	
Collection, preparation, and analysis consistent with SOPs and QAPP	Y	Y	Y
Field documentation (e.g., biological, stream habitat, observations) complete	Y		Y
Instrument calibration data complete	Y	Y	
Field data entered into SWQMIS are checked for outliers and data completeness	Y		Y
QC samples analyzed at required frequency	Y	Y	
QC results meet performance and program specifications	Y	Y	Y
Analytical sensitivity (LOQs/AWRLs) and QC consistent with QAPP		Y	Y
Results, calculations, transcriptions checked	Y	Y	
Laboratory bench-level review performed		Y	
All laboratory samples analyzed for scheduled parameters		Y	
Corollary data agree	Y	Y	Y

Data to be Verified	Field Task	Laboratory Task	TCEQ Data Manager Task
Nonconforming activities documented	Y	Y	Y
Outliers confirmed and documented; reasonableness check performed	Y		Y
Dates formatted correctly		Y	Y
Depth reported correctly	Y	Y	Y
TAG IDs correct		Y	Y
TCEQ Station ID number assigned	Y	Y	Y
Valid parameter codes	Y	Y	Y
Submitting Entity, Collecting Entity, and Monitoring Type	Y	Y	Y
Time based on 24-hour clock	Y	Y	Y
Check for transcription errors	Y	Y	Y
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the CMS)	Y		
Field instrument calibration and post-calibration results within acceptance limits	Y		Y
Data review checklist completed and attached with data package			Y
Field QC acceptable (e.g., field splits and trip, field and equipment blanks)			Y
10% of field data manually reviewed			Y

SWQM Data Validation

All field and laboratory data are reviewed, verified, and validated to ensure they conform to project specifications and meet the conditions of end use as described in Section A6 of this document. All data reported for the SWQM Program are subject to checks for errors in transcription, calculation, and computer input as described in Section B7 of this document.

Field data are initially screened by automated checks in SWQMIS. The data collector is immediately alerted about outlier values and prompted to verify them. If a question arises during verification and loading of field data, the DM&A Data Manager returns the data to the collector for correction or verification.

If an outlier or question arises during verification and loading of laboratory data, the data manager contacts the collector via e-mail for review and verification. The data collector verifies the data or information in the comments section of the sample in the SWQMIS database. Corrections initiated by the data collector after data are loaded into production SWQMIS are documented using the DCR process described in the SWQM DMRG. Any corrections from the TCEQ Sugar Land Laboratory are documented on amended final lab reports.

If the data collector is reassigned or is no longer employed by TCEQ, the responsibility for these data falls to their immediate supervisor. The supervisor notifies the Data Manager of the change in personnel. The supervisor (or designee) will continue the DCR process until alternate staff are assigned.

The DM&A Data Manager follows the most current standard operating procedures for both data verification and loading into Field Data Entry (FDE) and processing DCRs. All laboratory data forms must be accurate and complete. Any changes to the data forms are noted, initialed, and dated on the form. Any actions taken as a result of the data review are also be noted by the data collector on the data sheet. Refer to Section B7 of this document for additional discussion of data problem resolutions.

Data Managers verify field data reporting for all TCEQ Region offices every 6 months by checking field records in SWQMIS against the field notes taken at the time of sampling. At minimum, ten percent of the field records for each of the previous two quarters are reviewed. Discrepancies in the data record or other data-related deficiencies are corrected immediately via a DCR described in the SWQM DMRG and/or by contacting the appropriate field collector. The results of this manual verification are documented in the Data Management Section of the TSA.

D2 Useability Determination

Data produced for this project and data collected by other organizations meeting requirements specified in Section B2 (e.g., USGS, CRP contractors, etc.), may be used by TCEQ for water quality assessments, TMDL development, establishing water quality standards, and permit decisions. Data quality is reconciled with project objectives following the data management procedures outlined in Section B7 and using the assessment and response actions outlined in Section C1.

Data which do not meet project objectives or project QC requirements will be qualified as not meeting project specifications.

Appendix A Measurement Performance Specifications

Tables A6.1 – A6.5

Table A6.1 Measurement Performance Specifications – Field and TCEQ Sugar Land Lab

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
	Field and 24 hour Dissolved Oxygen Parameters										
NA	# DO measurements during 24-Hrs	# meas.	water	TCEQ SOP V1	89858	NA	NA	NA	NA	NA	Field
NA	# pH measurements during 24-Hrs.	# meas.	water	TCEQ SOP V1	00223	NA	NA	NA	NA	NA	Field
NA	# salinity measurement during 24-Hrs	# meas.	water	TCEQ SOP V1	00220	NA	NA	NA	NA	NA	Field
NA	# Specific Conductance measurements during 24-Hrs.	# meas.	water	TCEQ SOP V1	00222	NA	NA	NA	NA	NA	Field
NA	# water temp measurements during 24-Hrs.	# meas.	water	TCEQ SOP V1	00221	NA	NA	NA	NA	NA	Field
NA	% pool coverage in 500 m reach	%	water	TCEQ SOP V2	89870	NA	NA	NA	NA	NA	Field
NA	24-Hr avg water temperature	Celsius	water	TCEQ SOP V1	00209	NA	NA	NA	NA	NA	Field
NA	24-Hr Avg. Specific Conductance	µS/cm	water	TCEQ SOP V1	00212	NA	NA	NA	NA	NA	Field
NA	24-Hr DO avg	mg/L	water	TCEQ SOP V1	89857	NA	NA	NA	NA	NA	Field
NA	24-Hr max pH		water	TCEQ SOP V1	00215	NA	NA	NA	NA	NA	Field
NA	24-Hr max salinity	ppt	water	TCEQ SOP V1	00217	NA	NA	NA	NA	NA	Field
NA	24-Hr max specific conductance	µS/cm	water	TCEQ SOP V1	00213	NA	NA	NA	NA	NA	Field
NA	24-Hr max water temperature	Celsius	water	TCEQ SOP V1	00210	NA	NA	NA	NA	NA	Field

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
NA	24-Hr min pH	Standard units	water	TCEQ SOP V1	00216	NA	NA	NA	NA	NA	Field
NA	24-Hr min salinity	ppt	water	TCEQ SOP V1	00219	NA	NA	NA	NA	NA	Field
NA	24-Hr min specific conductance	µS/cm	water	TCEQ SOP V1	00214	NA	NA	NA	NA	NA	Field
NA	24-Hr min water temperature	Celsius	water	TCEQ SOP V1	00211	NA	NA	NA	NA	NA	Field
NA	24-Hr salinity avg	ppt	water	TCEQ SOP V1	00218	NA	NA	NA	NA	NA	Field
NA	Chlorine residual	mg/L	water	SM 4500-Cl G and TCEQ SOP, V1	50060	0.1	NA	NA	NA	NA	Field
NA	Days since last significant rainfall	days	NA	TCEQ SOP V1	72053	NA	NA	NA	NA	NA	Field
NA	DO	mg/L	water	ASTM D888-09(C) and TCEQ SOP V1	00300	NA	NA	NA	NA	NA	Field
NA	Flow	cfs	water	TCEQ SOP V1	00061	NA	NA	NA	NA	NA	Field
NA	Flow estimate	cfs	water	TCEQ SOP V1	74069	NA	NA	NA	NA	NA	Field
NA	Flow measurement method	1-gage, 2-electric, 3-mechanical, 4-weir/ flume, 5-doppler	water	TCEQ SOP V1	89835	NA	NA	NA	NA	NA	Field
NA	Flow severity	1-no flow, 2-low, 3- normal, 4-flood, 5-high, 6-dry	water	TCEQ SOP V1	01351	NA	NA	NA	NA	NA	Field
NA	Max daily DO	mg/L	water	TCEQ SOP V1	89856	NA	NA	NA	NA	NA	Field

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
NA	Maximum pool depth	meters	water	TCEQ SOP V2	89865	NA	NA	NA	NA	NA	Field
NA	Maximum pool width	meters	water	TCEQ SOP V2	89864	NA	NA	NA	NA	NA	Field
NA	Min daily DO	mg/L	water	TCEQ SOP V1	89855	NA	NA	NA	NA	NA	Field
NA	pH	Standard Units	water	SM 4500H$^+$B and TCEQ SOP V1	00400	NA	NA	NA	NA	NA	Field
NA	Pool length	meters	water	TCEQ SOP V2	89869	NA	NA	NA	NA	NA	Field
NA	Reservoir access not possible	1 - if reporting	NA	TCEQ Drought Guidance	00051	NA	NA	NA	NA	NA	Field
NA	Reservoir percent full	% reservoir capacity	water	TWDB	00053	NA	NA	NA	NA	NA	Field
NA	Reservoir stage[1]	Feet above MSL	water	TWDB	00052	NA	NA	NA	NA	NA	Field
NA	Salinity	ppt, marine only	water	SM 2520 and TCEQ SOP, V1	00480	NA	NA	NA	NA	NA	Field
NA	Secchi depth	meters	water	TCEQ SOP V1	00078	NA	NA	NA	NA	NA	Field
NA	Specific conductance	µS/cm	water	SM 2510B and TCEQ SOP, V1	00094	NA	NA	NA	NA	NA	Field
NA	Total water depth	meters	water	TCEQ SOP V2	82903	NA	NA	NA	NA	NA	Field
NA	Water temperature	˚C	water	SM 2550 B and TCEQ SOP V1	00010	NA	NA	NA	NA	NA	Field
	Routine Water Chemistry and Bacteriological Parameters										
NA	Alkalinity, Total	mg/L	water	SM 2320B	00410	20	10	20	80-120	70-130	TCEQ

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7664-41-7	Ammonia-Nitrogen	mg/L	water	EPA 350.1	00610	0.1	0.05	20	70-130	70-130	TCEQ
16887-00-6	Chloride	mg/L	water	EPA 300.0	00940	5	5	20	80-120	70-130	TCEQ
479-61-8	Chlorophyll a - fluorometic method	µg/L	water	EPA 445.0[2]	70953	3	0.2	20	80-120	NA	TCEQ
NA	E. Coli[3]	MPN/ 100 mL	water	Colilert-18[4]	31699	1	1	0.5[5]	NA	NA	TCEQ
NA	E. Coli[3]	MPN/ 100 mL	water	Colilert	31699	1	1	0.5[5]	NA	NA	TCEQ
NA	E. Coli, holding time IDEXX Colilert	hours	water	NA	31704	NA	NA	NA	NA	NA	TCEQ
NA	Enterococcus	MPN/ 100 mL	water	Enterolert	31701	10	10	0.5[5]	NA	NA	TCEQ
16984-48-8	Fluoride	mg/L	water	EPA 300.0	00951	0.5	0.25	20	80-120	70-130	TCEQ
NA	Nitrate/nitrite-N	mg/L	water	EPA 353.2 w/ cadmium reduct	00630	0.05	0.04	20	80-120	70-130	TCEQ
14797-55-8	Nitrate-N	mg/L	water	EPA 353.2 w/ cadmium reduct	00620	0.05	0.02	20	80-120	70-130	TCEQ
14797-65-0	Nitrite-N	mg/L	water	EPA 353.2	00615	0.05	0.02	20	80-120	70-130	TCEQ
14808-79-8	Sulfate	mg/L	water	EPA 300.0	00945	5	5	20	80-120	70-130	TCEQ
NA	TOC (nonpurgeable organic carbon)	mg/L	water	SM 5310B	00680	2	1	20	80-120	70-130	TCEQ
7727-37-9	Total Kjeldahl N	mg/L	water	EPA 351.2	00625	0.2	0.2	20	80-120	70-130	TCEQ
7723-14-0	Total phosphorous-P	mg/L	water	EPA 365.1	00665	0.06	0.02	20	80-120	70-130	TCEQ
NA	TSS (Residue nonfilterable)	mg/L	water	SM 2540D	00530	5	5	20	80-120	NA	TCEQ
NA	VSS (Residue-volatile nonfilterable)	mg/L	water	SM 2540E	00535	5	5	20	80-120	NA	TCEQ

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
	Miscellaneous Inorganics in Water										
NA	Biochemical Oxygen Demand, 5 day (BOD)	mg/L	water	HACH 10360	00310	2	NA	NA	NA	NA	TCEQ
24959-67-9	Bromide	mg/L	water	EPA 300.0	71870	NA	0.5	20	80-120	70-130	TCEQ
NA	Carbonaceous Biochemical Oxygen Demand, 5 day (CBOD)	mg/L	water	HACH 10360	00314	2	NA	NA	NA	NA	TCEQ
NA	Chemical Oxygen Demand (COD)	mg/L	water	HACH 8000	00335	10	10	20	80-120	70-130	TCEQ
14265-44-2	O-Phosphate-P (field filt <15 min)	mg/L	water	EPA 365.1	00671	0.04	0.04	20	80-120	70-130	TCEQ
NA	TDS (Residue-filterable)	mg/L	water	SM 2540C	70300	10	10	20	80-120	NA	TCEQ
	Routine Metals in Water										
7429-90-5	Aluminum, dis.	µg/L	water	EPA 200.7	01106	200	100	20	80-120	70-130	TCEQ
7440-38-2	Arsenic, dis.	µg/L	water	EPA 200.8	01000	5	2.5	20	80-120	70-130	TCEQ
7440-43-9	Cadmium, dis.	µg/L	water	EPA 200.8	01025	0.1 where hardness <50 mg/L; 0.3 where hardness ≥ 50 mg/L	0.1	20	80-120	70-130	TCEQ
7440-70-2	Calcium, dis.	mg/L	water	EPA 200.7	00915	0.5	0.4	20	80-120	70-130	TCEQ
7440-47-3	Chromium, dis.	µg/L	water	EPA 200.7	01030	10	4	20	80-120	70-130	TCEQ
7440-50-8	Copper, dis.	µg/L	water	EPA 200.8	01040	1.0 where hardness <50 mg/L; 3.0 where hardness ≥50 mg/L	0.4	20	80-120	70-130	TCEQ

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7439-89-6	Iron, dis.	µg/L	water	EPA 200.7	01046	300	10	20	80-120	70-130	TCEQ
7439-92-0	Lead, dis.	µg/L	water	EPA 200.8	01049	0.1 where hardness <85 mg/L; 1.0 where hardness ≥85 mg/L	0.05	20	80-120	70-130	TCEQ
7439-95-4	Magnesium, dis.	mg/L	water	EPA 200.7	00925	0.5	0.4	20	80-120	70-130	TCEQ
7439-96-5	Manganese, dis.	µg/L	water	EPA 200.7	01056	50	1	20	80-120	70-130	TCEQ
7439-97-6	Mercury, total (low-level)	µg/L	water	EPA 1631 E	71960	0.006	0.001	20	80-120	70-130	TCEQ
7440-02-0	Nickel, dis.	µg/L	water	EPA 200.7	01065	10	5	20	80-120	70-130	TCEQ
7440-09-7	Potassium, dis.	mg/L	water	EPA 200.7	00935	200	0.5	20	80-120	70-130	TCEQ
7782-49-2	Selenium, total	µg/L	water	EPA 200.8	01147	2	0.5	20	80-120	70-130	TCEQ
7440-22-4	Silver, dis.	µg/L	water	EPA 200.8	01075	0.5	0.4	20	80-120	70-130	TCEQ
7440-23-5	Sodium, dis.	mg/L	water	EPA 200.7	00930	500	0.1	20	80-120	70-130	TCEQ
7440-66-6	Zinc, dis.	µg/L	water	EPA 200.7	01090	5	10	20	80-120	70-130	TCEQ
	Miscellaneous Metals, Dissolved and Total in Water										
7429-90-5	Aluminum, total	µg/L	water	EPA 200.7	01105	200	100	20	80-120	70-130	TCEQ
7440-36-0	Antimony, dis.	µg/L	water	EPA 200.8	01095	0.08	1	20	80-120	70-130	TCEQ
7440-36-0	Antimony, total	µg/L	water	EPA 200.8	01097	0.08	1	20	80-120	70-130	TCEQ
7440-38-2	Arsenic, total	µg/L	water	EPA 200.8	01002	5	2.5	20	80-120	70-130	TCEQ
7440-39-3	Barium, dis.	µg/L	water	EPA 200.7	01005	1000	1	20	80-120	70-130	TCEQ

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7440-39-3	Barium, total	µg/L	water	EPA 200.7	01007	1000	1	20	80-120	70-130	TCEQ
7440-41-7	Beryllium, dis.	µg/L	water	EPA 200.8	01010	2	0.05	20	80-120	70-130	TCEQ
7440-41-7	Beryllium, total	µg/L	water	EPA 200.8	01012	2	0.05	20	80-120	70-130	TCEQ
7440-43-9	Cadmium, total	µg/L	water	EPA 200.8	01027	0.1 where hardness <50 mg/L; 0.3 where hardness ≥50 mg/L	0.1	20	80-120	70-130	TCEQ
7440-70-2	Calcium, total	mg/L	water	EPA 200.7	00916	0.5	0.4	20	80-120	70-130	TCEQ
18540-29-9	Chromium VI, dis.	µg/L	water	SM 3500-Cr B	01220	6	5	20	80-120	70-130	TCEQ
7440-47-3	Chromium, total	µg/L	water	EPA 200.7	01034	10	4	20	80-120	70-130	TCEQ
7440-48-4	Cobalt, dis.	µg/L	water	EPA 200.8	01035	0.75	0.05	20	80-120	70-130	TCEQ
7440-48-4	Cobalt, total	µg/L	water	EPA 200.8	01037	0.75	0.05	20	80-120	70-130	TCEQ
7440-50-8	Copper, total	µg/L	water	EPA 200.8	01042	1.0 where hardness <50 mg/L; 3.0 where hardness ≥50 mg/L	0.4	20	80-120	70-130	TCEQ
7439-89-6	Iron, total	µg/L	water	EPA 200.7	01045	300	10	20	80-120	70-130	TCEQ
7439-92-1	Lead, total	µg/L	water	EPA 200.8	01051	0.1 where hardness <85 mg/L; 1.0 where hardness ≥85 mg/L	0.05	20	80-120	70-130	TCEQ
7439-95-4	Magnesium, total	mg/L	water	EPA 200.7	00927	0.5	0.4	20	80-120	70-130	TCEQ
7439-96-5	Manganese, total	µg/L	water	EPA 200.7	01055	50	1	20	80-120	70-130	TCEQ
7439-97-6	Mercury, dis.	µg/L	water	EPA 245.1	71959	0.006	0.5	20	80-120	70-130	TCEQ

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7439-98-7	Molybdenum, dis.	µg/L	water	EPA 200.7	01060	35	20	20	80-120	70-130	TCEQ
7439-98-7	Molybdenum, total	µg/L	water	EPA 200.7	01062	35	20	20	80-120	70-130	TCEQ
7440-02-0	Nickel, total	µg/L	water	EPA 200.7	01067	10	5	20	80-120	70-130	TCEQ
7440-09-7	Potassium, total	mg/L	water	EPA 200.7	00937	200	0.5	20	80-120	70-130	TCEQ
7782-49-2	Selenium, dis.	µg/L	water	EPA 200.8	01145	2	0.5	20	80-120	70-130	TCEQ
7440-22-4	Silver, total	µg/L	water	EPA 200.8	01077	0.5	0.4	20	80-120	70-130	TCEQ
7440-23-5	Sodium, total	mg/L	water	EPA 200.7	00929	500	0.1	20	80-120	70-130	TCEQ
7440-24-6	Strontium, dis.	µg/L	water	EPA 200.7	01080	0.75	0.4	20	80-120	70-130	TCEQ
7440-28-0	Thallium, dis.	µg/L	water	EPA 200.8	01057	1	0.05	20	80-120	70-130	TCEQ
7440-28-0	Thallium, total	µg/L	water	EPA 200.8	01059	1	0.05	20	80-120	70-130	TCEQ
7440-31-5	Tin, dis.	µg/L	water	EPA 200.7	01100	NA	10	20	80-120	70-130	TCEQ
7440-31-5	Tin, total	µg/L	water	EPA 200.7	01102	NA	10	20	80-120	70-130	TCEQ
7440-32-6	Titanium, dis.	µg/L	water	EPA 200.7	01150	1	2	20	80-120	70-130	TCEQ
7440-32-6	Titanium, total	µg/L	water	EPA 200.7	01152	1	2	20	80-120	70-130	TCEQ
7440-62-2	Vanadium, dis.	µg/L	water	EPA 200.8	01085	0.01	0.05	20	80-120	70-130	TCEQ
7440-66-6	Zinc, total	µg/L	water	EPA 200.7	01092	5	10	20	80-120	70-130	TCEQ
NA	Hardness, total (as CaCO3)	mg/L	water	SM 2340B	82394	5	1	20	80-120	70-130	TCEQ

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
	Conventionals in Sediment										
	Grain Size Analysis - clay	% dry wt.	sediment	HLAB 160 EPA 600/2-78-054[6]	82009	NA	NA	20	NA	NA	TCEQ
	Grain Size Analysis - gravel	% dry wt.	sediment		80256	NA	NA	20	NA	NA	TCEQ
	Grain Size Analysis - sand	% dry wt.	sediment		89991	NA	NA	20	NA	NA	TCEQ
	Grain Size Analysis - silt	% dry wt.	sediment		82008	NA	NA	20	NA	NA	TCEQ
	Percent Total Solids, dry weight	%	sediment	SM 2540G	81373	NA	0.5	NA	NA	NA	TCEQ
	TOC (Total Organic Carbon)	mg/kg	sediment	EPA 9060	81951	1500	2000	20	80-120	75-125	TCEQ
	Metals in Sediment										
7429-90-5	Aluminum	mg/kg	sediment	EPA 200.7	01108	NA	50	30	70-130	60-140	TCEQ
7440-36-0	Antimony	mg/kg	sediment	EPA 200.7	01098	12.5	1	30	70-130	60-140	TCEQ
7440-38-2	Arsenic	mg/kg	sediment	EPA 200.7	01003	16.5	4.4	30	70-130	60-140	TCEQ
7440-39-3	Barium	mg/kg	sediment	EPA 200.7	01008	NA	0.6	30	70-130	60-140	TCEQ
7440-43-9	Cadmium	mg/kg	sediment	EPA 200.7	01028	2.49	0.6	30	70-130	60-140	TCEQ
7440-47-3	Chromium	mg/kg	sediment	EPA 200.7	01029	55.5	4	30	70-130	60-140	TCEQ
7440-50-8	Copper	mg/kg	sediment	EPA 200.7	01043	74.5	0.8	30	70-130	60-140	TCEQ
7439-89-6	Iron	mg/kg	sediment	EPA 200.7	01170	20000	50	30	70-130	60-140	TCEQ
7439-92-1	Lead	mg/kg	sediment	EPA 200.7	01052	64	3.8	30	70-130	60-140	TCEQ

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7439-96-5	Manganese	mg/kg	sediment	EPA 200.7	01053	550	0.2	30	70-130	60-140	TCEQ
7439-97-6	Mercury	mg/kg	sediment	EPA 245.5	71921	0.355	0.225	30	70-130	60-140	TCEQ
7440-02-0	Nickel	mg/kg	sediment	EPA 200.7	01068	24.3	0.5	30	70-130	60-140	TCEQ
7782-49-2	Selenium	mg/kg	sediment	EPA 200.7	01148	NA	2	30	70-130	60-140	TCEQ
7440-22-4	Silver	mg/kg	sediment	EPA 200.7	01078	1.1	0.5	30	70-130	60-140	TCEQ
7440-66-6	Zinc	mg/kg	sediment	EPA 200.7	01093	205	4	30	70-130	60-140	TCEQ

1 Reporting to be consistent with TCEQ's Interim Guidance for Routine Surface Water Quality Monitoring During Extended Drought[32], Feb. 2022.

2 Analysis of chlorophyll-a samples by the TCEQ Sugar Land Laboratory will be performed by a method modification contained in TCEQ SOP - HLAB 158.

3 E. coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended, and samples must be processed as soon as possible and within 30 hours.

4 Samples with specific conductance >3,000 µS/cm should be analyzed with a minimum 1:10 dilution with an adjusted LOQ of 10.

5 Precision is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.

6 TCEQ Sugar Land Laboratory Standard Operating Procedure HLAB160. The principal reference for HLAB 160 is EPA 600/2-78-054.

32 https://www.tceq.texas.gov/downloads/water-quality/monitoring/procedures/interim-drought-guidance.pdf

Table A6.2 Measurement Performance Specifications – Lower Colorado River Authority Laboratory (LCRA)

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
	Routine Water Chemistry and Bacteriological Parameters										
NA	Alkalinity, Total	mg/L	water	SM 2320B	00410	20	20	20	80-120	70-130	LCRA
7664-41-7	Ammonia-Nitrogen	mg/L	water	EPA 350.1	00610	0.1	0.02	20	80-120	70-130	LCRA
16887-00-6	Chloride	mg/L	water	EPA 300.0	00940	5	5	20	80-120	70-130	LCRA
7782-50-5	Chlorine residual	mg/L	water	SM 4500-Cl G	50060	0.1	0.1	NA	80-120	70-130	LCRA*
479-61-8	Chlorophyll a -fluorometric method	µg/L	water	EPA 445.0	70953	3	2	20[1]	80-120	NA	LCRA
NA	E. Coli[2]	MPN/ 100 mL	water	Colilert	31699	1	1	0.5[3]	NA	NA	LCRA
NA	E. Coli[2]	MPN/ 100 mL	water	Colilert-18[4]	31699	1	1	0.5[3]	NA	NA	LCRA
NA	E. Coli[2]	MPN/ 100 mL	water	SM 9223B	31699	1	1	0.5[3]	NA	NA	LCRA
NA	E. Coli, holding time IDEXX Colilert	hours	water	NA	31704	NA	NA	NA	NA	NA	LCRA
NA	Enterococcus	MPN/ 100 mL	water	Enterolert	31701	10	10	0.5[3]	NA	NA	LCRA
NA	Enterococcus	MPN/ 100 mL	water	ASTM D-6503	31701	10	10	0.5[3]	NA	NA	LCRA
NA	Fecal Coliform	cfu/ 100 mL	water	SM 9222D	31616	1	1	0.5[3]	NA	NA	LCRA*
16984-48-8	Fluoride	mg/L	water	EPA 300.0	00951	0.5	0.5	20	80-120	70-130	LCRA
NA	Nitrate/nitrite-N	mg/L	water	SM 4500-NO3-H	00630	0.05	0.02	20	80-120	70-130	LCRA
14797-55-8	Nitrate-N	mg/L	water	EPA 300.0	00620	0.05	0.02	20	80-120	70-130	LCRA

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
14797-65-0	Nitrite-N	mg/L	water	EPA 300.0	00615	0.05	0.02	20	80-120	70-130	LCRA
14808-79-8	Sulfate	mg/L	water	EPA 300.0	00945	5	5	20	80-120	70-130	LCRA
NA	TOC (nonpurgeable organic carbon)	mg/L	water	SM 5310C	00680	2	0.5	20	80-120	70-130	LCRA
7727-37-9	Total Kjeldahl N	mg/L	water	EPA 351.2	00625	0.2	0.2	20	80-120	70-130	LCRA
7723-14-0	Total phosphorous-P	mg/L	water	EPA 365.4	00665	0.06	0.02	20	80-120	70-130	LCRA
NA	TSS (Residue nonfilterable)	mg/L	water	SM 2540D	00530	5	1	20[1]	80-120	NA	LCRA
NA	VSS (Residue-volatile nonfilterable)	mg/L	water	EPA 160.4	00535	5	1	20[1]	80-120	NA	LCRA
	Miscellaneous Inorganics in water										
NA	Biochemical Oxygen Demand, 5 day (BOD)	mg/L	water	SM 5210B	00310	2	2	NA	70-130	NA	LCRA*
NA	Carbonaceous Biochemical Oxygen Demand (CBOD)	mg/L	water	SM 5210B	00314	2	2	NA	70-130	NA	LCRA*
NA	Chemical Oxygen Demand (COD)	mg/L	water	EPA 410.4	00335	10	10	20	80-120	70-130	LCRA
NA	Dissolved Organic Carbon (DOC)	mg/L	water	SM 5310C	00681	2	0.5	20	80-120	70-130	LCRA
14265-44-2	O-Phosphate-P (field filt <15 min)	mg/L	water	EPA 300.0	00671	0.04	0.04	20	80-120	70-130	LCRA
14265-44-2	O-Phosphate-P (filt >15 min)	mg/L	water	EPA 300.0	70507	0.04	0.04	20	80-120	70-130	LCRA
603-17-8	Pheophytin a – fluorometic method	µg/L	water	EPA 445.0	32213	3	2	NA	NA	NA	LCRA
NA	TDS (Residue-filterable)	mg/L	water	SM 2540C	70300	10	10	20[1]	80-120	NA	LCRA
NA	Turbidity, lab	NTU	water	SM 2130 B	82079	0.5	0.5	20	80-120	NA	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
	Routine Metals in Water										
7429-90-5	Aluminum, dis.	µg/L	water	EPA 200.7	01106	200	50	20	80-120	70-130	LCRA
7440-38-2	Arsenic, dis.	µg/L	water	EPA 200.8	01000	5	2	20	80-120	70-130	LCRA
7440-43-9	Cadmium, dis.	µg/L	water	EPA 200.8	01025	0.1 where hardness <50 mg/L; 0.3 where hardness ≥50 mg/L	0.3	20	80-120	70-130	LCRA
7440-70-2	Calcium, dis.	mg/L	water	EPA 200.7	00915	0.5	0.2	20	80-120	70-130	LCRA
7440-47-3	Chromium, dis.	µg/L	water	EPA 200.8	01030	10	1	20	80-120	70-130	LCRA
7440-50-8	Copper, dis.	µg/L	water	EPA 200.8	01040	1.0 where hardness <50 mg/L; 3.0 where hardness ≥50 mg/L	1	20	80-120	70-130	LCRA
7439-89-6	Iron, dis.	µg/L	water	EPA 200.7	01046	300	50	20	80-120	70-130	LCRA
7439-92-0	Lead, dis.	µg/L	water	EPA 200.8	01049	0.1 where hardness <85 mg/L; 1.0 where hardness ≥85 mg/L	1	20	80-120	70-130	LCRA
7439-95-4	Magnesium, dis.	mg/L	water	EPA 200.7	00925	0.5	0.2	20	80-120	70-130	LCRA
7439-96-5	Manganese, dis.	µg/L	water	EPA 200.8	01056	50	1	20	80-120	70-130	LCRA
7439-97-6	Mercury, total (low-level)	µg/L	water	EPA 1631	71900	0.006	0.005	20	80-120	70-130	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7440-02-0	Nickel, dis.	µg/L	water	EPA 200.8	01065	10	1	20	80-120	70-130	LCRA
7440-09-7	Potassium, dis.	mg/L	water	EPA 200.7	00935	200	0.2	20	80-120	70-130	LCRA
7782-49-2	Selenium, total	µg/L	water	EPA 200.8	01147	2	2	20	80-120	70-130	LCRA
7440-22-4	Silver, dis.	µg/L	water	EPA 200.8	01075	0.5	0.5	20	80-120	70-130	LCRA
7440-23-5	Sodium, dis.	mg/L	water	EPA 200.7	00930	500	0.2	20	80-120	70-130	LCRA
7440-66-6	Zinc, dis.	µg/L	water	EPA 200.8	01090	5	5	20	80-120	70-130	LCRA
NA	Hardness, dis. (as CaCO3)	mg/L	water	SM 2340B	46570	5	1.32	20	80-120	7-130	LCRA
	Miscellaneous Metals, Dissolved and Total										
7429-90-5	Aluminum, total	µg/L	water	EPA 200.7	01105	200	50	20	80-120	70-130	LCRA
7440-36-0	Antimony, dis.	µg/L	water	EPA 200.8	01095	0.08	1	20	80-120	70-130	LCRA
7440-36-0	Antimony, total	µg/L	water	EPA 200.8	01097	0.08	1	20	80-120	70-130	LCRA
7440-38-2	Arsenic, total	µg/L	water	EPA 200.8	01002	5	2	20	80-120	70-130	LCRA
7440-39-3	Barium, dis.	µg/L	water	EPA 200.8	01005	1000	1	20	80-120	70-130	LCRA
7440-39-3	Barium, total	µg/L	water	EPA 200.8	01007	1000	1	20	80-120	70-130	LCRA
7440-41-7	Beryllium, dis.	µg/L	water	EPA 200.8	01010	2	1	20	80-120	70-130	LCRA
7440-41-7	Beryllium, total	µg/L	water	EPA 200.8	01012	2	1	20	80-120	70-130	LCRA

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7440-43-9	Cadmium, total	µg/L	water	EPA 200.8	01027	0.1 where hardness<50 mg/L; 0.3 where hardness≥50 mg/L	0.3	20	80-120	70-130	LCRA
7440-70-2	Calcium, total	mg/L	water	EPA 200.7	00916	0.5	0.2	20	80-120	70-130	LCRA
18540-29-9	Chromium VI, dis.	µg/L	water	SM 3500-Cr D	01220	6	10	20	80-120	70-130	LCRA*
7440-47-3	Chromium, total	µg/L	water	EPA 200.8	01034	10	2	20	80-120	70-130	LCRA
7440-48-4	Cobalt, dis.	µg/L	water	EPA 200.8	01035	0.75	1	20	80-120	70-130	LCRA
7440-48-4	Cobalt, total	µg/L	water	EPA 200.8	01037	0.75	1	20	80-120	70-130	LCRA
7440-50-8	Copper, total	µg/L	water	EPA 200.8	01042	1.0 where hardness <50 mg/L; 3.0 where hardness ≥50 mg/L	2	20	80-120	70-130	LCRA
7439-89-6	Iron, total	µg/L	water	EPA 200.7	01045	300	50	20	80-120	70-130	LCRA
7439-92-1	Lead, total	µg/L	water	EPA 200.8	01051	0.1 where hardness <85 mg/L; 1.0 where hardness ≥85 mg/L	1	20	80-120	70-130	LCRA
7439-95-4	Magnesium, total	mg/L	water	EPA 200.7	00927	0.5	0.2	20	80-120	70-130	LCRA
7439-96-5	Manganese, total	µg/L	water	EPA 200.8	01055	50	1	20	80-120	70-130	LCRA
7439-97-6	Mercury, dis.	µg/L	water	EPA 245.1	71890	0.006	0.2	20	80-120	70-130	LCRA

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7439-98-7	Molybdenum, dis.	µg/L	water	EPA 200.8	01060	35	1	20	80-120	70-130	LCRA
7439-98-7	Molybdenum, total	µg/L	water	EPA 200.8	01062	35	50	20	80-120	70-130	LCRA
7440-02-0	Nickel, total	µg/L	water	EPA 200.8	01067	10	2	20	80-120	70-130	LCRA
7440-09-7	Potassium, total	mg/L	water	EPA 200.7	00937	200	2	20	80-120	70-130	LCRA
7782-49-2	Selenium, dis.	µg/L	water	EPA 200.8	01145	2	2	20	80-120	70-130	LCRA
7440-22-4	Silver, total	µg/L	water	EPA 200.8	01077	0.5	0.5	20	80-120	70-130	LCRA
7440-23-5	Sodium, total	mg/L	water	EPA 200.7	00929	500	0.2	20	80-120	70-130	LCRA
7440-24-6	Strontium, dis.	µg/L	water	EPA 200.7	01080	0.75	10	20	80-120	70-130	LCRA
7440-28-0	Thallium, dis.	µg/L	water	EPA 200.8	01057	1	1	20	80-120	70-130	LCRA
7440-28-0	Thallium, total	µg/L	water	EPA 200.8	01059	1	1	20	80-120	70-130	LCRA
7440-31-5	Tin, total	µg/L	water	EPA 200.7	01102	NA	50	20	80-120	70-130	LCRA
7440-32-6	Titanium, dis.	µg/L	water	EPA 200.8	01150	1	1	20	80-120	70-130	LCRA
7440-32-6	Titanium, total	µg/L	water	EPA 200.8	01152	1	1	20	80-120	70-130	LCRA
7440-62-2	Vanadium, dis.	µg/L	water	EPA 200.8	01085	0.01	1	20	80-120	70-130	LCRA
7440-66-6	Zinc, total	µg/L	water	EPA 200.8	01092	5	10	20	80-120	70-130	LCRA
NA	Hardness, total (as CaCO3)	mg/L	water	SM 2340B	82394	5	1.32	20	80-120	70-130	LCRA
	Pesticides, low-level in Water										
93-76-5	2,4,5-T	µg/L	water	EPA 8151A	39740	0.5	0.5	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
93-72-1	2,4,5-TP (Silvex)	µg/L	water	EPA 8151A	39760	24	0.5	30	65-135	65-135	LCRA*
94-75-7	2,4-D	µg/L	water	EPA 8151A	39730	35	0.5	30	65-135	65-135	LCRA*
72-54-8	4,4' - DDD	µg/L	water	EPA 8081A	39360	0.005	0.1	30	65-135	65-135	LCRA*
72-55-9	4,4' - DDE	µg/L	water	EPA 8081A	39365	0.004	0.1	30	65-135	65-135	LCRA*
50-29-3	4,4' - DDT	µg/L	water	EPA 8081A	39370	0.0005	0.04	30	65-135	65-135	LCRA*
15972-60-8	Alachlor	µg/L	water	EPA 525.2	77825	1	1	30	65-135	65-135	LCRA*
309-00-2	Aldrin	µg/L	water	EPA 8081A	39330	0.002	0.02	30	65-135	65-135	LCRA*
319-84-6	Alpha BHC (alpha-hexachlorocyclohexane	µg/L	water	EPA 8081A	39337	0.08	0.1	30	65-135	65-135	LCRA*
1912-24-9	Atrazine	µg/L	water	EPA 525.2	39630	1.5	1	30	65-135	65-135	LCRA
319-85-7	Beta BHC (beta-hexachlorocyclohexane)	µg/L	water	EPA 8081A	39338	0.3	0.1	30	65-135	65-135	LCRA*
63-25-2	Carbaryl	µg/L	water	EPA 632	39750	1	1	30	65-135	65-135	LCRA*
57-74-9	Chlordane, total	µg/L	water	EPA 8081A	39350	0.002	1	30	65-135	65-135	LCRA*
2921-88-2	Chlorpyrifos (Dursban)	µg/L	water	EPA 8141A	81403	0.02	0.5	30	65-135	65-135	LCRA*
319-86-8	Delta BHC	µg/L	water	EPA 8081A	34259	0.05	0.1	30	65-135	65-135	LCRA*
8065-48-3	Demeton	µg/L	water	EPA 8141A	39560	0.05	1	30	65-135	65-135	LCRA*
333-41-5	Diazinon	µg/L	water	EPA 8141A	39570	0.5	0.5	30	65-135	65-135	LCRA*
115-32-2	Dicofol (Kelthane)	µg/L	water	EPA 8081A	39780	0.1	0.1	30	65-135	65-135	LCRA*
60-57-1	Dieldrin	µg/L	water	EPA 8081A	39380	0.001	0.1	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
959-98-8	Endosulfan I (Alpha)	µg/L	water	EPA 8081A	34361	0.03	0.1	30	65-135	65-135	LCRA*
33213-65-9	Endosulfan II (Beta)	µg/L	water	EPA 8081A	34356	0.03	0.1	30	65-135	65-135	LCRA*
1031-07-8	Endosulfan Sulfate	µg/L	water	EPA 8081A	34351	0.03	0.1	30	65-135	65-135	LCRA*
72-20-8	Endrin	µg/L	water	EPA 8081A	39390	0.001	0.1	30	65-135	65-135	LCRA*
86-50-0	Guthion	µg/L	water	EPA 8141A	39580	0.005	0.5	30	65-135	65-135	LCRA*
118-74-1	HCB (Hexachlorobenzene)	µg/L	water	EPA 8081A	39700	0.01	0.1	30	65-135	65-135	LCRA*
76-44-8	Heptachlor	µg/L	water	EPA 8081A	39410	0.002	0.1	30	65-135	65-135	LCRA*
1024-57-3	Heptachlor Epoxide	µg/L	water	EPA 8081A	39420	0.08	0.1	30	65-135	65-135	LCRA*
58-89-9	Lindane (gamma BHC) (gamma-hexachlorocyclohexane)	µg/L	water	EPA 8081A	39782	0.04	0.1	30	65-135	65-135	LCRA*
121-75-5	Malathion	µg/L	water	EPA 8141A	39530	0.005	0.5	30	65-135	65-135	LCRA*
72-43-5	Methoxychlor	µg/L	water	EPA 8081A	39480	0.02	0.1	30	65-135	65-135	LCRA*
2385-85-5	Mirex	µg/L	water	EPA 8081A	39755	0.0005	0.1	30	65-135	65-135	LCRA*
56-38-2	Parathion (Ethyl)	µg/L	water	EPA 8141A	39540	0.007	0.5	30	65-135	65-135	LCRA*
122-34-9	Simazine	µg/L	water	EPA 525.2	39055	2	2	30	65-135	65-135	LCRA*
8001-35-2	Toxaphene	µg/L	water	EPA 8081A	39400	0.0001	1	30	65-135	65-135	LCRA*
	PCBs in Water										
12674-11-2	PCB-1016 (Aroclor-1016)	µg/L	water	EPA 8082	34671	0.5	0.5	30	65-135	65-135	LCRA*
11104-28-2	PCB-1221 (Aroclor-1221)	µg/L	water	EPA 8082	39488	0.5	0.5	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
11141-16-5	PCB-1232 (Aroclor-1232)	µg/L	water	EPA 8082	39492	0.5	0.5	30	65-135	65-135	LCRA*
53469-21-9	PCB-1242 (Aroclor-1242)	µg/L	water	EPA 8082	39496	0.5	0.5	30	65-135	65-135	LCRA*
12672-29-6	PCB-1248 (Aroclor-1248)	µg/L	water	EPA 8082	39500	0.5	0.5	30	65-135	65-135	LCRA*
11097-69-1	PCB-1254 (Aroclor-1254)	µg/L	water	EPA 8082	39504	0.5	0.5	30	65-135	65-135	LCRA*
11096-82-5	PCB-1260 (Aroclor-1260)	µg/L	water	EPA 8082	39508	0.5	0.5	30	65-135	65-135	LCRA*
1336-36-3	PCBs, Total	µg/L	water	EPA 8082	39516	0.001	0.5	30	65-135	65-135	LCRA*
	Semivolatile Organics, low-level in Water										
95-94-3	1,2,4,5-Tetrachlorobenzene	µg/L	water	EPA 8270C	77734	0.1	50	30	65-135	65-135	LCRA*
120-82-1	1,2,4-Trichlorobenzene	µg/L	water	EPA 8270C	34551	25	50	30	65-135	65-135	LCRA*
95-50-1	1,2-Dichlorobenzene	µg/L	water	EPA 8270C	34536	55	50	30	65-135	65-135	LCRA*
541-73-1	1,3-Dichlorobenzene	µg/L	water	EPA 8270C	34566	42	50	30	65-135	65-135	LCRA*
106-46-7	1,4-Dichlorobenzene (p-dichlorobenzene)	µg/L	water	EPA 8270C	34571	38	50	30	65-135	65-135	LCRA*
95-95-4	2,4,5-Trichlorophenol	µg/L	water	EPA 8270C	77687	32	50	30	65-135	65-135	LCRA*
88-06-2	2,4,6-Trichlorophenol	µg/L	water	EPA 8270C	34621	7	50	30	65-135	65-135	LCRA*
120-83-2	2,4-Dichlorophenol	µg/L	water	EPA 8270C	34601	40	50	30	65-135	65-135	LCRA*
105-67-9	2,4-Dimethylphenol	µg/L	water	EPA 8270C	34606	105	50	30	65-135	65-135	LCRA*
51-28-5	2,4-Dinitrophenol	µg/L	water	EPA 8270C	34616	30	50	30	65-135	65-135	LCRA*
121-14-2	2,4-Dinitrotoluene	µg/L	water	EPA 8270C	34611	0.55	50	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
606-20-2	2,6-Dinitrotoluene	µg/L	water	EPA 8270C	34626	5	50	30	65-135	65-135	LCRA*
91-58-7	2-Chloronaphthalene	µg/L	water	EPA 8270C	34581	27	100	30	65-135	65-135	LCRA*
95-57-8	2-Chlorophenol	µg/L	water	EPA 8270C	34586	40	50	30	65-135	65-135	LCRA*
88-75-5	2-Nitrophenol	µg/L	water	EPA 8270C	34591	960	50	30	65-135	65-135	LCRA*
91-94-1	3,3-Dichlorobenzidine	µg/L	water	EPA 8270C	34631	0.1	50	30	65-135	65-135	LCRA*
59-50-7	3-Methyl-4-Chlorophenol (parachlorometa cresol)	µg/L	water	EPA 8270C	34452	0.15	50	30	65-135	65-135	LCRA*
534-52-1	4,6-Dinitro-o-cresol (DNOC)	µg/L	water	EPA 8270C	34657	11	50	30	65-135	65-135	LCRA*
101-55-3	4-Bromophenyl Phenyl Ether	µg/L	water	EPA 8270C	34636	0.75	50	30	65-135	65-135	LCRA*
7005-72-3	4-Chlorophenyl Phenyl Ether	µg/L	water	EPA 8270C	34641	5	50	30	65-135	65-135	LCRA*
100-02-7	4-Nitrophenol	µg/L	water	EPA 8270C	34646	530	50	30	65-135	65-135	LCRA*
83-32-9	Acenaphthene	µg/L	water	EPA 8270C	34205	11	50	30	65-135	65-135	LCRA*
208-96-8	Acenaphthylene	µg/L	water	EPA 8270C	34200	5	50	30	65-135	65-135	LCRA*
120-12-7	Anthracene	µg/L	water	EPA 8270C	34220	0.15	50	30	65-135	65-135	LCRA*
92-87-5	Benzidine	µg/L	water	EPA 8270C	39120	0.0005	50	30	65-135	65-135	LCRA*
56-55-3	Benzo(a)anthracene	µg/L	water	EPA 8270C	34526	0.05	50	30	65-135	65-135	LCRA*
50-32-8	Benzo(a)pyrene	µg/L	water	EPA 8270C	34247	0.05	50	30	65-135	65-135	LCRA*
205-99-2	Benzo(b)fluoranthene	µg/L	water	EPA 8270C	34230	0.19	50	30	65-135	65-135	LCRA*
191-24-2	Benzo(ghi)perylene	µg/L	water	EPA 8270C	34521	15	50	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
207-08-9	Benzo(k)fluoranthene	µg/L	water	EPA 8270C	34242	0.19	50	30	65-135	65-135	LCRA*
111-91-1	bis-(2-Chloroethoxy) methane	µg/L	water	EPA 8270C	34278	5	50	30	65-135	65-135	LCRA*
111-44-4	bis-(2-Chloroethyl) ether	µg/L	water	EPA 8270C	34273	0.15	50	30	65-135	65-135	LCRA*
39638-32-9	bis-(2-Chloroisopropyl) ether	µg/L	water	EPA 8270C	34283	700	50	30	65-135	65-135	LCRA*
117-81-7	bis-(2-Ethylhexyl) phthalate	µg/L	water	EPA 8270C	39100	3	50	30	65-135	65-135	LCRA*
218-01-9	Chrysene	µg/L	water	EPA 8270C	34320	0.2	50	30	65-135	65-135	LCRA*
15831-10-4	Cresol, m-, p-	µg/L	water	EPA 8270C	32779	1700	100	30	65-135	65-135	LCRA*
95-48-7	Cresol, o- (2- Methylphenol)	µg/L	water	EPA 8270C	77152	1700	50	30	65-135	65-135	LCRA*
106-44-5	Cresol, p- (4-Methylphenol)	µg/L	water	EPA 8270C	77146	1700	50	30	65-135	65-135	LCRA*
1319-77-3	Cresols, total	µg/L	water	EPA 8270C	79778	1700	150	30	65-135	65-135	LCRA*
53-70-3	Dibenz (a,h) anthracene (1,2,5,6-Dibenzanthracene)	µg/L	water	EPA 8270C	34556	0.19	50	30	65-135	65-135	LCRA*
84-66-2	Diethyl Phthalate	µg/L	water	EPA 8270C	34336	1000	50	30	65-135	65-135	LCRA*
131-11-3	Dimethyl Phthalate	µg/L	water	EPA 8270C	34341	165	50	30	65-135	65-135	LCRA*
84-74-2	Di-n-Butyl Phthalate	µg/L	water	EPA 8270C	39110	3.5	50	30	65-135	65-135	LCRA*
117-84-0	Di-n-octyl Phthalate	µg/L	water	EPA 8270C	34596	11	50	30	65-135	65-135	LCRA*
55-18-5	Ethanamine, N-ethyl-n-nitroson (N-Nitrosodiethylamine)	µg/L	water	EPA 8270C	73611	0.02	50	30	65-135	65-135	LCRA*
206-44-0	Fluoranthene	µg/L	water	EPA 8270C	34376	3	50	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
86-73-7	Fluorene	µg/L	water	EPA 8270C	34381	5.5	50	30	65-135	65-135	LCRA*
87-68-3	Hexachlorobutadiene	µg/L	water	EPA 8270C	34391	1.5	50	30	65-135	65-135	LCRA*
77-47-4	Hexachlorocyclopentadiene	µg/L	water	EPA 8270C	34386	25	50	30	65-135	65-135	LCRA*
67-72-1	Hexachloroethane	µg/L	water	EPA 8270C	34396	42	50	30	65-135	65-135	LCRA*
193-39-5	Indeno (1,2,3-cd) pyrene	µg/L	water	EPA 8270C	34403	0.19	50	30	65-135	65-135	LCRA*
78-59-1	Isophorone	µg/L	water	EPA 8270C	34408	170	50	30	65-135	65-135	LCRA*
91-20-3	Naphthalene	µg/L	water	EPA 8270C	34696	250	50	30	65-135	65-135	LCRA*
85-68-7	N-Butylbenzyl Phthalate	µg/L	water	EPA 8270C	34292	46	50	30	65-135	65-135	LCRA*
98-95-3	Nitrobenzene	µg/L	water	EPA 8270C	34447	19	50	30	65-135	65-135	LCRA*
62-75-9	N-Nitrosodimethylamine	µg/L	water	EPA 8270C	34438	0.0035	50	30	65-135	65-135	LCRA*
924-16-3	N-nitrosodi-n-butylamine	µg/L	water	EPA 8270C	73609	0.9	50	30	65-135	65-135	LCRA*
621-64-7	N-Nitroso-di-n-Propylamine	µg/L	water	EPA 8270C	34428	0.025	50	30	65-135	65-135	LCRA*
86-30-6	N-Nitrosodiphenylamine	µg/L	water	EPA 8270C	34433	290	50	30	65-135	65-135	LCRA*
608-93-5	Pentachlorobenzene	µg/L	water	EPA 8270C	77793	3	50	30	65-135	65-135	LCRA*
87-86-5	Pentachlorophenol (PCP)	µg/L	water	EPA 8270C	39032	0.5	50	30	65-135	65-135	LCRA*
85-01-8	Phenanthrene	µg/L	water	EPA 8270C	34461	15	50	30	65-135	65-135	LCRA*
108-95-2	Phenol	µg/L	water	EPA 8270C	34694	55	50	30	65-135	65-135	LCRA*
129-00-0	Pyrene	µg/L	water	EPA 8270C	34469	3.5	50	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
110-86-1	Pyridine	µg/L	water	EPA 8270C	77045	44	50	30	65-135	65-135	LCRA*
	Volatile Organics, low-level in Water										
71-55-6	1,1,1-Trichloroethane	µg/L	water	EPA 8260B	34506	100	50	30	65-135	65-135	LCRA*
79-34-5	1,1,2,2-Tetrachloroethane	µg/L	water	EPA 8260B	34516	0.85	50	30	65-135	65-135	LCRA*
79-00-5	1,1,2-Trichloroethane	µg/L	water	EPA 8260B	34511	2.5	50	30	65-135	65-135	LCRA*
75-34-3	1,1-Dichloroethane	µg/L	water	EPA 8260B	34496	2565	50	30	65-135	65-135	LCRA*
75-35-4	1,1-Dichloroethene	µg/L	water	EPA 8260B	34501	0.8	50	30	65-135	65-135	LCRA*
106-93-4	1,2-Dibromoethane	µg/L	water	EPA 8260B	77651	0.007	50	30	65-135	65-135	LCRA*
107-06-2	1,2-Dichloroethane	µg/L	water	EPA 8260B	34531	2.5	50	30	65-135	65-135	LCRA*
78-87-5	1,2-Dichloropropane	µg/L	water	EPA 8260B	34541	2.5	50	30	65-135	65-135	LCRA*
78-93-3	2-butanone (methyl ethyl ketone (MEK))	µg/L	water	EPA 8260B	81595	26000	50	30	65-135	65-135	LCRA*
110-75-8	2-Chloroethylvinyl Ether	µg/L	water	EPA 8260B	34576	50	50	30	65-135	65-135	LCRA*
107-13-1	Acrylonitrile	µg/L	water	EPA 8260B	34215	0.6	50	30	65-135	65-135	LCRA*
71-43-2	Benzene	µg/L	water	EPA 8260B	34030	2.5	50	30	65-135	65-135	LCRA*
75-27-4	Bromodichloromethane	µg/L	water	EPA 8260B	32101	2160	50	30	65-135	65-135	LCRA*
75-25-2	Bromoform (Tribromomethane)	µg/L	water	EPA 8260B	32104	75	50	30	65-135	65-135	LCRA*
56-23-5	Carbon Tetrachloride	µg/L	water	EPA 8260B	32102	1.9	50	30	65-135	65-135	LCRA*
108-90-7	Chlorobenzene	µg/L	water	EPA 8260B	34301	390	50	30	65-135	65-135	LCRA*
124-48-1	Chlorodibromomethane	µg/L	water	EPA 8260B	32105	4.6	50	30	65-135	65-135	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
75-00-3	Chloroethane	µg/L	water	EPA 8260B	34311	5	50	30	65-135	65-135	LCRA*
67-66-3	Chloroform (Trichloromethane)	µg/L	water	EPA 8260B	32106	50	50	30	65-135	65-135	LCRA*
74-87-3	Chloromethane	µg/L	water	EPA 8260B	30201	27500	50	30	65-135	65-135	LCRA*
10061-01-5	cis -1,3-Dichloropropene	µg/L	water	EPA 8260B	34704	5	50	30	65-135	65-135	LCRA*
100-41-4	Ethylbenzene	µg/L	water	EPA 8260B	34371	1090	50	30	65-135	65-135	LCRA*
74-83-9	Methyl bromide	µg/L	water	EPA 8260B	30202	110	50	30	65-135	65-135	LCRA*
1634-04-4	Methyl tert-butyl ether (MTBE)	µg/L	water	EPA 8260B	46491	7	50	30	65-135	65-135	LCRA*
75-09-2	Methylene Chloride	µg/L	water	EPA 8260B	34423	2.5	50	30	65-135	65-135	LCRA*
127-18-4	Tetrachloroethene	µg/L	water	EPA 8260B	34475	2.5	50	30	65-135	65-135	LCRA*
108-88-3	Toluene	µg/L	water	EPA 8260B	34010	500	50	30	65-135	65-135	LCRA*
1330-20-7	Total Xylenes	µg/L	water	EPA 8260B	81551	10	150	30	65-135	65-135	LCRA*
156-60-5	Trans-1,2-Dichloroethene	µg/L	water	EPA 8260B	34546	50	50	30	65-135	65-135	LCRA*
10061-02-6	trans-1,3-Dichloropropene	µg/L	water	EPA 8260B	34699	333	50	30	65-135	65-135	LCRA*
79-01-6	Trichloroethylene	µg/L	water	EPA 8260B	39180	2.5	50	30	65-135	65-135	LCRA*
NA	TTHM (Sum of total trihalomethanes)	µg/L	water	Calculation	82080	50	200	30	65-135	65-135	LCRA*
75-01-4	Vinyl Chloride	µg/L	water	EPA 8260B	39175	1	50	30	65-135	65-135	LCRA*
	Conventionals in Sediment										
NA	Grain Size Analysis - clay	% of dry wt.	sediment	ASTM D422	49900	NA	0	NA	NA	NA	LCRA*
NA	Grain Size Analysis - gravel	% of dry wt.	sediment		80256	NA	0	NA	NA	NA	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
NA	Grain Size Analysis - sand	% of dry wt.	sediment	ASTM D422	49925	NA	0	NA	NA	NA	LCRA*
NA	Grain Size Analysis - silt	% of dry wt.	sediment		49906	NA	0	NA	NA	NA	LCRA*
NA	TOC (Total Organic Carbon)	mg/kg	sediment	EPA 9060	81951	1500	1500	30	65-135	65-135	LCRA*
NA	Total Solids (dry weight)	%	sediment	SM 2540G	81373	NA	NA	NA	NA	NA	LCRA*
	Metals in Sediment										
7429-90-5	Aluminum	mg/kg	sediment	EPA 6010B[5]	01108	NA	25	30	60-140	60-140	LCRA*
7429-90-5	Aluminum	mg/kg	sediment	EPA 6020	01108	NA	2.5	30	60-140	60-140	LCRA*
7440-36-0	Antimony	mg/kg	sediment	EPA 6020	01098	12.5	2.5	30	60-140	60-140	LCRA*
7440-38-2	Arsenic	mg/kg	sediment	EPA 6010B[5]	01003	16.5	2.5	30	60-140	60-140	LCRA*
7440-38-2	Arsenic	mg/kg	sediment	EPA 6020	01003	16.5	0.5	30	60-140	60-140	LCRA*
7440-39-3	Barium	mg/kg	sediment	EPA 6010B[5]	01008	NA	0.5	30	60-140	60-140	LCRA*
7440-39-3	Barium	mg/kg	sediment	EPA 6020	01008	NA	0.5	30	60-140	60-140	LCRA*
7440-43-9	Cadmium	mg/kg	sediment	EPA 6010B[5]	01028	2.49	0.5	30	60-140	60-140	LCRA*
7440-43-9	Cadmium	mg/kg	sediment	EPA 6020	01028	2.49	0.05	30	60-140	60-140	LCRA*
7440-47-3	Chromium	mg/kg	sediment	EPA 6020	01029	55.5	0.5	30	60-140	60-140	LCRA*
7440-47-3	Chromium	mg/kg	sediment	EPA 6010B[5]	01029	55.5	2.5	30	60-140	60-140	LCRA*
7440-50-8	Copper	mg/kg	sediment	EPA 6020	01043	74.5	0.5	30	60-140	60-140	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
7440-50-8	Copper	mg/kg	sediment	EPA 6010B[5]	01043	74.5	2.5	30	60-140	60-140	LCRA*
7439-89-6	Iron	mg/kg	sediment	EPA 6010B[5]	01170	20,000	25	30	60-140	60-140	LCRA*
7439-92-1	Lead	mg/kg	sediment	EPA 6020	01052	64	0.5	30	60-140	60-140	LCRA*
7439-92-1	Lead	mg/kg	sediment	EPA 6010B[5]	01052	64	2.5	30	60-140	60-140	LCRA*
7439-96-5	Manganese	mg/kg	sediment	EPA 6010B[5]	01053	550	2.5	30	60-140	60-140	LCRA*
7439-96-5	Manganese	mg/kg	sediment	EPA 6020	01053	550	0.5	30	60-140	60-140	LCRA*
7439-97-6	Mercury	mg/kg	sediment	EPA 7471B	71921	0.355	0.1	30	60-140	60-140	LCRA*
7440-02-0	Nickel	mg/kg	sediment	EPA 6020	01068	24.3	0.5	30	60-140	60-140	LCRA*
7440-02-0	Nickel	mg/kg	sediment	EPA 6010B[5]	01068	24.3	2.5	30	60-140	60-140	LCRA*
7782-49-2	Selenium	mg/kg	sediment	EPA 6020	01148	NA	1	30	60-140	60-140	LCRA*
7440-22-4	Silver	mg/kg	sediment	EPA 6020	01078	1.1	0.05	30	60-140	60-140	LCRA*
7440-66-6	Zinc	mg/kg	sediment	EPA 6010B[5]	01093	205	25	30	60-140	60-140	LCRA*
7440-66-6	Zinc	mg/kg	sediment	EPA 6020	01093	205	2.5	30	60-140	60-140	LCRA*
	Pesticides in Sediment										
95-94-3	1,2,4,5-Tetrachlorobenzene	µg/kg	sediment	EPA 8270C	88826	795	100	30	40-160	40-160	LCRA*
93-76-5	2,4,5-T	µg/kg	sediment	EPA 8151A	39741	NA	5	30	40-160	40-160	LCRA*
93-72-1	2,4,5-TP (Silvex)	µg/kg	sediment	EPA 8151A	39761	NA	5	30	40-160	40-160	LCRA*
94-75-7	2,4-D	µg/kg	sediment	EPA 8151A	39731	NA	5	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
72-54-8	4,4' - DDD	µg/kg	sediment	EPA 8081	39363	3.91	5	30	40-160	40-160	LCRA*
72-55-9	4,4' - DDE	µg/kg	sediment	EPA 8081	39368	15.65	5	30	40-160	40-160	LCRA*
50-29-3	4,4' - DDT	µg/kg	sediment	EPA 8081	39373	23	5	30	40-160	40-160	LCRA*
309-00-2	Aldrin	µg/kg	sediment	EPA 8081	39333	40	5	30	40-160	40-160	LCRA*
319-84-6	Alpha BHC (alpha-hexachlorocyclohexane	µg/kg	sediment	EPA 8081	39076	50	5	30	40-160	40-160	LCRA*
319-85-7	Beta BHC (beta-hexachlorocyclohexane)	µg/kg	sediment	EPA 8081	34257	105	5	30	40-160	40-160	LCRA*
608-73-1	BHC	µg/kg	sediment	EPA 8081	81323	60	5	30	40-160	40-160	LCRA*
57-74-9	Chlordane, total	µg/kg	sediment	EPA 8081	39351	2.4	50	30	40-160	40-160	LCRA*
2921-88-2	Chlorpyrifos (Dursban)	µg/kg	sediment	EPA 8141	81404	NA	50	30	40-160	40-160	LCRA*
319-86-8	Delta BHC	µg/kg	sediment	EPA 8081	34262	NA	5	30	40-160	40-160	LCRA*
8065-48-3	Demeton	µg/kg	sediment	EPA 8141	82400	NA	100	30	40-160	40-160	LCRA*
333-41-5	Diazinon	µg/kg	sediment	EPA 8141	39571	NA	50	30	40-160	40-160	LCRA*
60-57-1	Dieldrin	µg/kg	sediment	EPA 8081	39383	2.15	50	30	40-160	40-160	LCRA*
959-98-8	Endosulfan I (Alpha)	µg/kg	sediment	EPA 8081	34364	NA	5	30	40-160	40-160	LCRA*
33213-65-9	Endosulfan II (Beta)	µg/kg	sediment	EPA 8081	34359	NA	5	30	40-160	40-160	LCRA*
1031-07-8	Endosulfan sulfate	µg/kg	sediment	EPA 8081	34354	NA	5	30	40-160	40-160	LCRA*
72-20-8	Endrin	µg/kg	sediment	EPA 8081	39393	103.5	5	30	40-160	40-160	LCRA*
86-50-0	Guthion	µg/kg	sediment	EPA 8141	39581	NA	50	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
118-74-1	HCB (Hexachlorobenzene)	µg/kg	sediment	EPA 8081	39701	120	5	30	40-160	40-160	LCRA*
76-44-8	Heptachlor	µg/kg	sediment	EPA 8081	39413	NA	5	30	40-160	40-160	LCRA*
1024-57-3	Heptachlor Epoxide	µg/kg	sediment	EPA 8081	39423	8	5	30	40-160	40-160	LCRA*
58-89-9	Lindane (gamma BHC) (gamma-hexachlorocyclohexane)	µg/kg	sediment	EPA 8081	39783	0.5	5	30	40-160	40-160	LCRA*
121-75-5	Malathion	µg/kg	sediment	EPA 8141	39531	NA	50	30	40-160	40-160	LCRA*
72-43-5	Methoxychlor	µg/kg	sediment	EPA 8081	39481	NA	5	30	40-160	40-160	LCRA*
56-38-2	Parathion (Ethyl)	µg/kg	sediment	EPA 8141	39541	NA	50	30	40-160	40-160	LCRA*
87-86-5	Pentachlorophenol (PCP)	µg/kg	sediment	EPA 8151A	39061	NA	5	30	40-160	40-160	LCRA*
8001-35-2	Toxaphene	µg/kg	sediment	EPA 8081	39403	16	50	30	40-160	40-160	LCRA*
	PCBs in Sediment										
12674-11-2	PCB-1016 (Aroclor-1016)	µg/kg	sediment	EPA 8082	39514	265	50	30	40-160	40-160	LCRA*
11104-28-2	PCB-1221 (Aroclor-1221)	µg/kg	sediment	EPA 8082	39491	NA	50	30	40-160	40-160	LCRA*
11141-16-5	PCB-1232 (Aroclor-1232)	µg/kg	sediment	EPA 8082	39495	NA	50	30	40-160	40-160	LCRA*
53469-21-9	PCB-1242 (Aroclor-1242)	µg/kg	sediment	EPA 8082	39499	NA	50	30	40-160	40-160	LCRA*
12672-29-6	PCB-1248 (Aroclor-1248)	µg/kg	sediment	EPA 8082	39503	750	50	30	40-160	40-160	LCRA*
11097-69-1	PCB-1254 (Aroclor-1254)	µg/kg	sediment	EPA 8082	39507	170	50	30	40-160	40-160	LCRA*
11096-82-5	PCB-1260 (Aroclor-1260)	µg/kg	sediment	EPA 8082	39511	120	50	30	40-160	40-160	LCRA*
1336-36-3	PCBs, Total	µg/kg	sediment	EPA 8082	39519	90	50	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
	Semivolatiles in Sediment										
120-82-1	1,2,4-Trichlorobenzene	µg/kg	sediment	EPA 8270C	34554	1160	167	30	40-160	40-160	LCRA*
95-50-1	1,2-Dichlorobenzene	µg/kg	sediment	EPA 8270C	34539	2220	167	30	40-160	40-160	LCRA*
541-73-1	1,3-Dichlorobenzene	µg/kg	sediment	EPA 8270C	34569	175	167	30	40-160	40-160	LCRA*
106-46-7	1,4-Dichlorobenzene (p-dichlorobenzene)	µg/kg	sediment	EPA 8270C	34574	2105	167	30	40-160	40-160	LCRA*
95-95-4	2,4,5-Trichlorophenol	µg/kg	sediment	EPA 8270C	78401	NA	167	30	40-160	40-160	LCRA*
88-06-2	2,4,6-Trichlorophenol	µg/kg	sediment	EPA 8270C	34624	NA	167	30	40-160	40-160	LCRA*
120-83-2	2,4-Dichlorophenol	µg/kg	sediment	EPA 8270C	34604	NA	167	30	40-160	40-160	LCRA*
105-67-9	2,4-Dimethylphenol	µg/kg	sediment	EPA 8270C	34609	NA	167	30	40-160	40-160	LCRA*
51-28-5	2,4-Dinitrophenol	µg/kg	sediment	EPA 8270C	34619	NA	1670	30	40-160	40-160	LCRA*
121-14-2	2,4-Dinitrotoluene	µg/kg	sediment	EPA 8270C	34614	NA	167	30	40-160	40-160	LCRA*
606-20-2	2,6-Dinitrotoluene	µg/kg	sediment	EPA 8270C	34629	NA	167	30	40-160	40-160	LCRA*
91-58-7	2-Chloronaphthalene	µg/kg	sediment	EPA 8270C	34584	NA	334	30	40-160	40-160	LCRA*
95-57-8	2-Chlorophenol	µg/kg	sediment	EPA 8270C	34589	NA	167	30	40-160	40-160	LCRA*
91-57-6	2-Methyl naphthalene	µg/kg	sediment	EPA 8270C	78868	335	167	30	40-160	40-160	LCRA*
88-75-5	2-Nitrophenol	µg/kg	sediment	EPA 8270C	34594	NA	167	30	40-160	40-160	LCRA*
59-50-7	3-Methyl-4-Chlorophenol (parachlorometa cresol)	µg/kg	sediment	EPA 8270C	34455	NA	167	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
534-52-1	4,6-Dinitro-o-cresol (DNOC)	µg/kg	sediment	EPA 8270C	34660	NA	1670	30	40-160	40-160	LCRA*
101-55-3	4-Bromophenyl Phenyl Ether	µg/kg	sediment	EPA 8270C	34639	NA	167	30	40-160	40-160	LCRA*
7005-72-3	4-Chlorophenyl Phenyl Ether	µg/kg	sediment	EPA 8270C	34644	NA	167	30	40-160	40-160	LCRA*
100-02-7	4-Nitrophenol	µg/kg	sediment	EPA 8270C	34649	NA	1670	30	40-160	40-160	LCRA*
83-32-9	Acenaphthene	µg/kg	sediment	EPA 8270C	34208	44.5	100	30	40-160	40-160	LCRA*
208-96-8	Acenaphthylene	µg/kg	sediment	EPA 8270C	34203	65	100	30	40-160	40-160	LCRA*
120-12-7	Anthracene	µg/kg	sediment	EPA 8270C	34223	422.5	167	30	40-160	40-160	LCRA*
56-55-3	Benzo(a)anthracene	µg/kg	sediment	EPA 8270C	34529	525	167	30	40-160	40-160	LCRA*
50-32-8	Benzo(a)pyrene	µg/kg	sediment	EPA 8270C	34250	725	167	30	40-160	40-160	LCRA*
205-99-3	Benzo(b)fluoranthene	µg/kg	sediment	EPA 8270C	34233	NA	167	30	40-160	40-160	LCRA*
191-24-2	Benzo(ghi)perylene	µg/kg	sediment	EPA 8270C	34524	NA	167	30	40-160	40-160	LCRA*
207-08-9	Benzo(k)fluoranthene	µg/kg	sediment	EPA 8270C	34245	NA	167	30	40-160	40-160	LCRA*
65-85-0	Benzoic acid	µg/kg	sediment	EPA 8270C	75315	325	1500	30	40-160	40-160	LCRA*
100-51-6	Benzyl alcohol	µg/kg	sediment	EPA 8270C	75212	36.5	167	30	40-160	40-160	LCRA*
111-91-1	bis-(2-Chloroethoxy) methane	µg/kg	sediment	EPA 8270C	34281	NA	167	30	40-160	40-160	LCRA*
111-44-4	bis-(2-Chloroethyl) ether	µg/kg	sediment	EPA 8270C	34276	NA	167	30	40-160	40-160	LCRA*
39638-32-9	bis-(2-Chloroisopropyl) ether	µg/kg	sediment	EPA 8270C	34286	NA	167	30	40-160	40-160	LCRA*
117-81-7	bis-(2-Ethylhexyl) phthalate	µg/kg	sediment	EPA 8270C	39102	1323.5	250	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
218-01-9	Chrysene	µg/kg	sediment	EPA 8270C	34323	645	167	30	40-160	40-160	LCRA*
1319-77-3	Cresols, total	µg/kg	sediment	EPA 8270C	88811	NA	501	30	40-160	40-160	LCRA*
53-70-3	Dibenz (a,h) anthracene (1,2,5,6-Dibenzanthracene)	µg/kg	sediment	EPA 8270C	34559	70	100	30	40-160	40-160	LCRA*
132-64-9	Dibenzofuran	µg/kg	sediment	EPA 8270C	75647	290	150	30	40-160	40-160	LCRA*
84-66-2	Diethyl Phthalate	µg/kg	sediment	EPA 8270C	34339	NA	167	30	40-160	40-160	LCRA*
131-11-3	Dimethyl Phthalate	µg/kg	sediment	EPA 8270C	34344	NA	1670	30	40-160	40-160	LCRA*
84-74-2	Di-n-Butyl Phthalate	µg/kg	sediment	EPA 8270C	39112	21.5	167	30	40-160	40-160	LCRA*
117-84-0	Di-n-octyl Phthalate	µg/kg	sediment	EPA 8270C	34599	NA	1670	30	40-160	40-160	LCRA*
206-44-0	Fluoranthene	µg/kg	sediment	EPA 8270C	34379	1115	167	30	40-160	40-160	LCRA*
86-73-7	Fluorene	µg/kg	sediment	EPA 8270C	34384	268	167	30	40-160	40-160	LCRA*
87-68-3	Hexachlorobutadiene	µg/kg	sediment	EPA 8270C	39705	6.38	100	30	40-160	40-160	LCRA*
77-47-4	Hexachlorocyclopentadiene	µg/kg	sediment	EPA 8270C	34389	NA	1670	30	40-160	40-160	LCRA*
67-72-1	Hexachloroethane	µg/kg	sediment	EPA 8270C	34399	6885	167	30	40-160	40-160	LCRA*
193-39-5	Indeno (1,2,3-cd) pyrene	µg/kg	sediment	EPA 8270C	34406	NA	167	30	40-160	40-160	LCRA*
78-59-1	Isophorone	µg/kg	sediment	EPA 8270C	34411	NA	167	30	40-160	40-160	LCRA*
91-20-3	Naphthalene	µg/kg	sediment	EPA 8270C	34445	280.5	167	30	40-160	40-160	LCRA*
85-68-7	N-Butylbenzyl Phthalate	µg/kg	sediment	EPA 8270C	34295	NA	1670	30	40-160	40-160	LCRA*
98-95-3	Nitrobenzene	µg/kg	sediment	EPA 8270C	34450	80.53	100	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
62-75-9	N-Nitrosodimethylamine	µg/kg	sediment	EPA 8270C	34441	NA	167	30	40-160	40-160	LCRA*
621-64-7	N-Nitroso-di-n-Propylamine	µg/kg	sediment	EPA 8270C	34431	NA	167	30	40-160	40-160	LCRA*
95-48-7	o-Cresol (2-methylphenol)	µg/kg	sediment	EPA 8270C	78872	31	100	30	40-160	40-160	LCRA*
106-44-5	p-Cresol (4-methylphenol)	µg/kg	sediment	EPA 8270C	78803	335	100	30	40-160	40-160	LCRA*
608-93-5	Pentachlorobenzene	µg/kg	sediment	EPA 8270C	39118	1330	100	30	40-160	40-160	LCRA*
85-01-8	Phenanthrene	µg/kg	sediment	EPA 8270C	34464	585	167	30	40-160	40-160	LCRA*
108-95-2	Phenol	µg/kg	sediment	EPA 8270C	34695	NA	167	30	40-160	40-160	LCRA*
129-00-0	Pyrene	µg/kg	sediment	EPA 8270C	34472	760	167	30	40-160	40-160	LCRA*
110-86-1	Pyridine	µg/kg	sediment	EPA 8270C	88823	NA	167	30	40-160	40-160	LCRA*
	Volatiles in Sediment										
71-55-6	1,1,1-Trichloroethane	µg/kg	sediment	EPA 8260B	34509	7915	50	30	40-160	40-160	LCRA*
79-34-5	1,1,2,2-Tetrachloroethane	µg/kg	sediment	EPA 8260B	34519	1845	50	30	40-160	40-160	LCRA*
79-00-5	1,1,2-Trichloroethane	µg/kg	sediment	EPA 8260B	34514	900	50	30	40-160	40-160	LCRA*
75-34-3	1,1-Dichloroethane	µg/kg	sediment	EPA 8260B	34499	6945	50	30	40-160	40-160	LCRA*
75-35-4	1,1-Dichloroethene	µg/kg	sediment	EPA 8260B	34504	5610	50	30	40-160	40-160	LCRA*
95-63-6	1,2,4-Trimethylbenzene	µg/kg	sediment	EPA 8260B	30351	2290	50	30	40-160	40-160	LCRA*
106-93-4	1,2-Dibromoethane	µg/kg	sediment	EPA 8260B	88805	NA	50	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
107-06-2	1,2-Dichloroethane	µg/kg	sediment	EPA 8260B	34534	12900	50	30	40-160	40-160	LCRA*
540-59-0	1,2-Dichloroethene, Total (mixed cis and trans)	µg/kg	sediment	EPA 8260B	32738	1475	10	30	40-160	40-160	LCRA*
78-87-5	1,2-Dichloropropane	µg/kg	sediment	EPA 8260B	34544	6585	50	30	40-160	40-160	LCRA*
108-67-8	1,3,5-Trimethylbenzene	µg/kg	sediment	EPA 8260B	30350	2295	50	30	40-160	40-160	LCRA*
591-78-6	2-hexanone	µg/kg	sediment	EPA 8260B	32745	14100	50	30	40-160	40-160	LCRA*
108-10-1	4-methyl-2-pentanone (MIBK)	µg/kg	sediment	EPA 8260B	32762	58295	50	30	40-160	40-160	LCRA*
67-64-1	Acetone	µg/kg	sediment	EPA 8260B	75059	183995	50	30	40-160	40-160	LCRA*
107-13-1	Acrylonitrile	µg/kg	sediment	EPA 8260B	34218	520	50	30	40-160	40-160	LCRA*
71-43-2	Benzene	µg/kg	sediment	EPA 8260B	34237	22505	50	30	40-160	40-160	LCRA*
75-27-4	Bromodichloromethane	µg/kg	sediment	EPA 8260B	34330	7370	50	30	40-160	40-160	LCRA*
75-25-2	Bromoform (Tribromomethane)	µg/kg	sediment	EPA 8260B	34290	665	50	30	40-160	40-160	LCRA*
75-15-0	Carbon disulfide	µg/kg	sediment	EPA 8260B	78544	390	50	30	40-160	40-160	LCRA*
56-23-5	Carbon tetrachloride	µg/kg	sediment	EPA 8260B	34299	18665	50	30	40-160	40-160	LCRA*
108-90-7	Chlorobenzene	µg/kg	sediment	EPA 8260B	34304	9935	50	30	40-160	40-160	LCRA*
124-48-1	Chlorodibromomethane	µg/kg	sediment	EPA 8260B	34309	470	50	30	40-160	40-160	LCRA*
75-00-3	Chloroethane	µg/kg	sediment	EPA 8260B	34314	NA	50	30	40-160	40-160	LCRA*
67-66-3	Chloroform (Trichloromethane)	µg/kg	sediment	EPA 8260B	34318	12.9	5	30	40-160	40-160	LCRA*
74-87-3	Chloromethane	µg/kg	sediment	EPA 8260B	88835	5340	50	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
10061-01-5	cis-1,3-Dichloropropene	µg/kg	sediment	EPA 8260B	34702	NA	50	30	40-160	40-160	LCRA*
98-82-8	Cumene	µg/kg	sediment	EPA 8260B	20473	26975	50	30	40-160	40-160	LCRA*
75-71-8	Dichlorodifluoromethane	µg/kg	sediment	EPA 8260B	34334	11045	50	30	40-160	40-160	LCRA*
100-41-4	Ethylbenzene	µg/kg	sediment	EPA 8260B	34374	1965	50	30	40-160	40-160	LCRA*
74-83-9	Methyl bromide (Bromomethane)	µg/kg	sediment	EPA 8260B	34416	230	10	30	40-160	40-160	LCRA*
80-62-6	Methyl methacrylate	µg/kg	sediment	EPA 8260B	20472	28,490	50	30	40-160	40-160	LCRA*
75-09-2	Methylene chloride	µg/kg	sediment	EPA 8260B	34426	11,470	20	30	40-160	40-160	LCRA*
104-51-8	n-Butylbenzene	µg/kg	sediment	EPA 8260B	20474	3285	50	30	40-160	40-160	LCRA*
103-65-1	n-Propylbenzene	µg/kg	sediment	EPA 8260B	78764	2175	50	30	40-160	40-160	LCRA*
99-87-6	p-Cymene (4-Isopropyltoluene)	µg/kg	sediment	EPA 8260B	20475	2290	2	30	40-160	40-160	LCRA*
135-98-8	sec-Butylbenzene	µg/kg	sediment	EPA 8260B	20478	2640	50	30	40-160	40-160	LCRA*
100-42-5	Styrene	µg/kg	sediment	EPA 8260B	75192	11155	50	30	40-160	40-160	LCRA*
98-06-6	tert-Butylbenzene	µg/kg	sediment	EPA 8260B	20479	3630	50	30	40-160	40-160	LCRA*
127-18-4	Tetrachloroethene	µg/kg	sediment	EPA 8260B	34478	5025	50	30	40-160	40-160	LCRA*
108-88-3	Toluene	µg/kg	sediment	EPA 8260B	34483	2830	50	30	40-160	40-160	LCRA*
1330-20-7	Total Xylenes	µg/kg	sediment	EPA 8260B	45510	NA	150	30	40-160	40-160	LCRA*
156-60-5	trans-1,2-Dichloroethene	µg/kg	sediment	EPA 8260B	34549	35920	50	30	40-160	40-160	LCRA*
10061-02-6	trans-1,3-Dichloropropene	µg/kg	sediment	EPA 8260B	34697	NA	50	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
79-01-6	Trichloroethylene	µg/kg	sediment	EPA 8260B	34487	NA	50	30	40-160	40-160	LCRA*
108-05-4	Vinyl acetate	µg/kg	sediment	EPA 8260B	30352	89.5	50	30	40-160	40-160	LCRA*
75-01-4	Vinyl chloride	µg/kg	sediment	EPA 8260B	34495	NA	50	30	40-160	40-160	LCRA*
	Metals in Tissue										
7440-38-2	Arsenic	mg/kg	tissue	EPA 6010B	01004	3	10	30	60-140	60-140	LCRA*
7440-43-9	Cadmium	µg/g	tissue	EPA 6010B	71940	0.5	1	30	60-140	60-140	LCRA*
7440-47-3	Chromium	µg/g	tissue	EPA 6010B	71939	100	10	30	60-140	60-140	LCRA*
7440-50-8	Copper	µg/g	tissue	EPA 6010B	71937	40	10	30	60-140	60-140	LCRA*
7439-92-1	Lead	µg/g	tissue	EPA 6010B	71936	1	10	30	60-140	60-140	LCRA*
7439-97-6	Mercury	µg/g	tissue	EPA 245.6	71930	0.7	0.05	30	60-140	60-140	LCRA*
7782-49-2	Selenium	mg/kg	tissue	EPA 6010B	01149	2	10	30	60-140	60-140	LCRA*
	Pesticides in Tissue										
72-54-8	4,4' - DDD	mg/kg	tissue	EPA 8081A	81897	10	0.2	30	40-160	40-160	LCRA*
72-55-9	4,4' - DDE	mg/kg	tissue	EPA 8081A	81896	5	0.2	30	40-160	40-160	LCRA*
50-29-3	4,4' - DDT	mg/kg	tissue	EPA 8081A	39376	5	0.2	30	40-160	40-160	LCRA*
309-00-2	Aldrin	mg/kg	tissue	EPA 8081A	34680	0.1	0.2	30	40-160	40-160	LCRA*
319-84-6	Alpha BHC (alpha-hexachlorocyclohexane	mg/kg	tissue	EPA 8081A	39074	0.4	0.2	30	40-160	40-160	LCRA*
319-85-7	Beta BHC (beta-hexachlorocyclohexane)	mg/kg	tissue	EPA 8081A	34258	1	0.2	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
608-73-1	BHC	mg/kg	tissue	EPA 8081A	81826	NA	0.2	30	40-160	40-160	LCRA*
57-74-9	Chlordane, total	mg/kg	tissue	EPA 8081A	34682	0.3	1	30	40-160	40-160	LCRA*
2921-88-2	Chlorpyrifos (Dursban)	mg/kg	tissue	EPA 8141A	81807	0.2	0.5	30	40-160	40-160	LCRA*
319-86-8	Delta BHC	mg/kg	tissue	EPA 8081A	34263	0.004	0.2	30	40-160	40-160	LCRA*
8065-48-3	Demeton	mg/kg	tissue	EPA 8141A	82401	0.05	1	30	40-160	40-160	LCRA*
333-41-5	Diazinon	mg/kg	tissue	EPA 8141A	81806	0.1	0.5	30	40-160	40-160	LCRA*
115-32-2	Dicofol (Kelthane)	mg/kg	tissue	EPA 8081A	85684	5	2	30	40-160	40-160	LCRA*
60-57-1	Dieldrin	mg/kg	tissue	EPA 8081A	39406	0.06	0.2	30	40-160	40-160	LCRA*
959-98-8	Endosulfan I (Alpha)	mg/kg	tissue	EPA 8081A	34365	0.004	0.2	30	40-160	40-160	LCRA*
33213-65-9	Endosulfan II (Beta)	mg/kg	tissue	EPA 8081A	34360	0.04	0.2	30	40-160	40-160	LCRA*
1031-07-8	Endosulfan sulfate	mg/kg	tissue	EPA 8081A	34355	0.01	0.2	30	40-160	40-160	LCRA*
72-20-8	Endrin	mg/kg	tissue	EPA 8081A	34685	0.01	0.2	30	40-160	40-160	LCRA*
86-50-0	Guthion	mg/kg	tissue	EPA 8141A	81802	0.05	0.5	30	40-160	40-160	LCRA*
118-74-1	HCB (Hexachlorobenzene)	mg/kg	tissue	EPA 8081A	34688	0.06	0.2	30	40-160	40-160	LCRA*
76-44-8	Heptachlor	mg/kg	tissue	EPA 8081A	34687	0.2	0.2	30	40-160	40-160	LCRA*
1024-57-3	Heptachlor Epoxide	mg/kg	tissue	EPA 8081A	34686	0.3	0.2	30	40-160	40-160	LCRA*
58-89-9	Lindane (gamma BHC) (gamma-hexachlorocyclohexane)	mg/kg	tissue	EPA 8081A	39785	6	0.2	30	40-160	40-160	LCRA*
121-75-5	Malathion	mg/kg	tissue	EPA 8141A	39534	0.05	0.5	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
72-43-5	Methoxychlor	ug/g	tissue	EPA 8081A	81644	0.02	0.2	30	40-160	40-160	LCRA*
2385-85-5	Mirex	ug/g	tissue	EPA 8081A	81645	0.04	5	30	40-160	40-160	LCRA
56-38-2	Parathion (Ethyl)	mg/kg	tissue	EPA 8141A	81810	0.5	0.5	30	40-160	40-160	LCRA*
8001-35-2	Toxaphene	mg/kg	tissue	EPA 8081A	34691	0.8	2	30	40-160	40-160	LCRA*
	Semivolatiles in Tissue										
95-94-3	1,2,4,5-Tetrachlorobenzene	mg/kg	tissue	EPA 8270C	88827	5	5	30	40-160	40-160	LCRA*
120-82-1	1,2,4-Trichlorobenzene	mg/kg	tissue	EPA 8270C	34555	0.5	5	30	40-160	40-160	LCRA*
95-50-1	1,2-Dichlorobenzene	mg/kg	tissue	EPA 8270C	34540	0.5	5	30	40-160	40-160	LCRA*
541-73-1	1,3-Dichlorobenzene	mg/kg	tissue	EPA 8270C	34570	0.5	5	30	40-160	40-160	LCRA*
106-46-7	1,4-Dichlorobenzene (p-dichlorobenzene)	mg/kg	tissue	EPA 8270C	34575	0.5	5	30	40-160	40-160	LCRA*
95-95-4	2,4,5-Trichlorophenol	mg/kg	tissue	EPA 8270C	88809	0.5	5	30	40-160	40-160	LCRA*
88-06-2	2,4,6-Trichlorophenol	mg/kg	tissue	EPA 8270C	34625	0.5	5	30	40-160	40-160	LCRA*
120-83-2	2,4-Dichlorophenol	mg/kg	tissue	EPA 8270C	34605	0.5	5	30	40-160	40-160	LCRA*
105-67-9	2,4-Dimethylphenol	mg/kg	tissue	EPA 8270C	34610	0.5	5	30	40-160	40-160	LCRA*
51-28-5	2,4-Dinitrophenol	mg/kg	tissue	EPA 8270C	34620	0.5	5	30	40-160	40-160	LCRA*
121-14-2	2,4-Dinitrotoluene	mg/kg	tissue	EPA 8270C	34615	0.5	5	30	40-160	40-160	LCRA*
606-20-2	2,6-Dinitrotoluene	mg/kg	tissue	EPA 8270C	34630	0.5	5	30	40-160	40-160	LCRA*
91-58-7	2-Chloronaphthalene	mg/kg	tissue	EPA 8270C	34585	0.5	10	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quantitation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
95-57-8	2-Chlorophenol	mg/kg	tissue	EPA 8270C	34590	0.5	5	30	40-160	40-160	LCRA*
88-75-5	2-Nitrophenol	mg/kg	tissue	EPA 8270C	34595	0.7	5	30	40-160	40-160	LCRA*
59-50-7	3-Methyl-4-Chlorophenol (parachlorometa cresol)	mg/kg	tissue	EPA 8270C	34456	0.5	5	30	40-160	40-160	LCRA*
534-52-1	4,6-Dinitro-o-cresol (DNOC)	mg/kg	tissue	EPA 8270C	34661	0.7	5	30	40-160	40-160	LCRA*
101-55-3	4-Bromophenyl Phenyl Ether	mg/kg	tissue	EPA 8270C	34640	0.5	5	30	40-160	40-160	LCRA*
7005-72-3	4-Chlorophenyl Phenyl Ether	mg/kg	tissue	EPA 8270C	34645	0.5	5	30	40-160	40-160	LCRA*
100-02-7	4-Nitrophenol	mg/kg	tissue	EPA 8270C	34650	1.7	5	30	40-160	40-160	LCRA*
83-32-9	Acenaphthene	mg/kg	tissue	EPA 8270C	34209	0.5	5	30	40-160	40-160	LCRA*
208-96-8	Acenaphthylene	mg/kg	tissue	EPA 8270C	34204	0.5	5	30	40-160	40-160	LCRA*
120-12-7	Anthracene	mg/kg	tissue	EPA 8270C	34224	0.5	5	30	40-160	40-160	LCRA*
92-87-5	Benzidine	mg/kg	tissue	EPA 8270C	34241	0.7	5	30	40-160	40-160	LCRA*
56-55-3	Benzo (a) anthracene	mg/kg	tissue	EPA 8270C	34530	0.5	5	30	40-160	40-160	LCRA*
50-32-8	Benzo (a) pyrene	mg/kg	tissue	EPA 8270C	34251	0.5	5	30	40-160	40-160	LCRA*
205-99-2	Benzo (b) fluoranthene	mg/kg	tissue	EPA 8270C	34234	0.5	5	30	40-160	40-160	LCRA*
191-24-2	Benzo (ghi) perylene	mg/kg	tissue	EPA 8270C	34525	0.7	5	30	40-160	40-160	LCRA*
207-08-9	Benzo (k) fluoranthene	mg/kg	tissue	EPA 8270C	34246	0.5	5	30	40-160	40-160	LCRA*
111-91-1	bis-(2-Chloroethoxy) methane	mg/kg	tissue	EPA 8270C	34282	0.5	5	30	40-160	40-160	LCRA*
111-44-4	bis-(2-Chloroethyl) ether	mg/kg	tissue	EPA 8270C	34277	0.5	5	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
39638-32-9	bis-(2-Chloroisopropyl) ether	mg/kg	tissue	EPA 8270C	34287	0.5	5	30	40-160	40-160	LCRA*
117-81-7	bis-(2-Ethylhexyl) phthalate	mg/kg	tissue	EPA 8270C	39099	0.5	5	30	40-160	40-160	LCRA*
218-01-9	Chrysene	mg/kg	tissue	EPA 8270C	34324	0.5	5	30	40-160	40-160	LCRA*
1319-77-3	Cresols, total	mg/kg	tissue	EPA 8270C	88812	880	15	30	40-160	40-160	LCRA*
53-70-3	Dibenz (a,h) anthracene (1,2,5,6-Dibenzanthracene)	mg/kg	tissue	EPA 8270C	34560	0.5	5	30	40-160	40-160	LCRA*
84-66-2	Diethyl Phthalate	mg/kg	tissue	EPA 8270C	34340	0.5	5	30	40-160	40-160	LCRA*
131-11-3	Dimethyl Phthalate	mg/kg	tissue	EPA 8270C	34345	0.5	5	30	40-160	40-160	LCRA*
84-74-2	Di-n-Butyl Phthalate	mg/kg	tissue	EPA 8270C	34683	0.5	5	30	40-160	40-160	LCRA*
117-84-0	Di-n-octyl Phthalate	mg/kg	tissue	EPA 8270C	34600	0.5	5	30	40-160	40-160	LCRA*
55-18-5	Ethanamine, N-ethyl-n-nitroson (N-Nitrosodiethylamine)	mg/kg	tissue	EPA 8270C	88818	0.01	5	30	40-160	40-160	LCRA*
206-44-0	Fluoranthene	mg/kg	tissue	EPA 8270C	34380	0.5	5	30	40-160	40-160	LCRA*
86-73-7	Fluorene	mg/kg	tissue	EPA 8270C	34385	0.5	5	30	40-160	40-160	LCRA*
87-68-3	Hexachlorobutadiene	mg/kg	tissue	EPA 8270C	34395	0.5	5	30	40-160	40-160	LCRA*
77-47-4	Hexachlorocyclopentadiene	mg/kg	tissue	EPA 8270C	34390	0.5	5	30	40-160	40-160	LCRA*
67-72-1	Hexachloroethane	mg/kg	tissue	EPA 8270C	34400	0.5	5	30	40-160	40-160	LCRA*
193-39-5	Indeno (1,2,3-cd) pyrene	mg/kg	tissue	EPA 8270C	34407	0.7	5	30	40-160	40-160	LCRA*
78-59-1	Isophorone	mg/kg	tissue	EPA 8270C	34412	0.5	5	30	40-160	40-160	LCRA*
91-20-3	Naphthalene	mg/kg	tissue	EPA 8270C	34446	0.5	5	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
85-68-7	N-Butylbenzyl Phthalate	mg/kg	tissue	EPA 8270C	34296	0.5	5	30	40-160	40-160	LCRA*
98-95-3	Nitrobenzene	mg/kg	tissue	EPA 8270C	34451	0.5	5	30	40-160	40-160	LCRA*
62-75-9	N-Nitrosodimethylamine	mg/kg	tissue	EPA 8270C	34442	1.7	5	30	40-160	40-160	LCRA*
924-16-3	N-nitrosodi-n-butylamine	mg/kg	tissue	EPA 8270C	88821	0.4	5	30	40-160	40-160	LCRA*
621-64-7	N-Nitroso-di-n-Propylamine	mg/kg	tissue	EPA 8270C	34432	0.5	5	30	40-160	40-160	LCRA*
608-93-5	Pentachlorobenzene	mg/kg	tissue	EPA 8270C	85679	14	5	30	40-160	40-160	LCRA*
87-86-5	Pentachlorophenol (PCP)	mg/kg	tissue	EPA 8270C	39060	1.7	5	30	40-160	40-160	LCRA*
85-01-8	Phenanthrene	mg/kg	tissue	EPA 8270C	34465	0.5	5	30	40-160	40-160	LCRA*
108-95-2	Phenol	mg/kg	tissue	EPA 8270C	34468	0.5	5	30	40-160	40-160	LCRA*
129-00-0	Pyrene	mg/kg	tissue	EPA 8270C	34473	0.5	5	30	40-160	40-160	LCRA*
110-86-1	Pyridine	mg/kg	tissue	EPA 8270C	88824	17	5	30	40-160	40-160	LCRA*
	PCBs in Tissue										
12674-11-2	PCB-1016 (Aroclor-1016)	mg/kg	tissue	EPA 8082	34674	0.02	1	30	40-160	40-160	LCRA*
11104-28-2	PCB-1221 (Aroclor-1221)	mg/kg	tissue	EPA 8082	34664	0.02	1	30	40-160	40-160	LCRA*
11141-16-5	PCB-1232 (Aroclor-1232)	mg/kg	tissue	EPA 8082	34667	0.02	1	30	40-160	40-160	LCRA*
53469-21-9	PCB-1242 (Aroclor-1242)	mg/kg	tissue	EPA 8082	34689	0.02	1	30	40-160	40-160	LCRA*
12672-29-6	PCB-1248 (Aroclor-1248)	mg/kg	tissue	EPA 8082	34669	0.02	1	30	40-160	40-160	LCRA*
11097-69-1	PCB-1254 (Aroclor-1254)	mg/kg	tissue	EPA 8082	34690	0.02	1	30	40-160	40-160	LCRA*

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab
11096-82-5	PCB-1260 (Aroclor-1260)	mg/kg	tissue	EPA 8082	34670	0.02	1	30	40-160	40-160	LCRA*
1336-36-3	PCBs, Total	mg/kg	tissue	EPA 8082	39515	0.1	1	30	40-160	40-160	LCRA*

1 In lieu of LCS/LCSD, sample duplicates will be analyzed.

2 E. coli samples analyzed by these methods should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended, and samples must be processed as soon as possible and within 30 hours.

3 Precision is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.

4 Samples with specific conductance >3,000 µS/cm should be analyzed with a minimum 1:10 dilution with an adjusted LOQ of 10.

6 The lab will initially analyze most metals in sediment using EPA 6010B. If the result is below detection limits, the lab will re-analyze the sample using EPA 6020.

*Parameters will be subcontracted to a NELAP accredited laboratory. The data will be submitted to TCEQ in full with the LCRA Environmental Laboratory Services final report.

Table A6.3 Measurement Performance Specifications for other Contract Laboratories

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)[1]	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab[2]
	Miscellaneous Bacteria, Metals, Inorganics, and Organics in Water										
542-75-6	1,3 - Dichloropropene	µg/L	water	EPA 8260B	34561	11		30	65-135	65-135	
35822-46-9	1,2,3,4,6,7,8 HpCDD	pg/L	water	EPA 1613	04694	NA		NA	NA	NA	
67562-39-4	1,2,3,4,6,7,8 HpCDF	pg/L	water	EPA 1613	04697	NA		NA	NA	NA	
39227-28-6	1,2,3,4,7,8 HxCDD	pg/L	water	EPA 1613	04673	NA		NA	NA	NA	
70648-26-9	1,2,3,4,7,8 HxCDF	pg/L	water	EPA 1613	04682	NA		NA	NA	NA	
55673-89-7	1,2,3,4,7,8,9 HpCDF	pg/L	water	EPA 1613	04700	NA		NA	NA	NA	
57653-85-7	1,2,3,6,7,8 HxCDD	pg/L	water	EPA 1613	04676	NA		NA	NA	NA	
57117-44-9	1,2,3,6,7,8 HxCDF	pg/L	water	EPA 1613	04685	NA		NA	NA	NA	
40321-76-4	1,2,3,7,8 PeCDD	pg/L	water	EPA 1613	04664	NA		NA	NA	NA	
57117-41-6	1,2,3,7,8 PeCDF	pg/L	water	EPA 1613	04667	NA		NA	NA	NA	
19408-74-3	1,2,3,7,8,9 HxCDD	pg/L	water	EPA 1613	04679	NA		NA	NA	NA	
72918-21-9	1,2,3,7,8,9 HxCDF	pg/L	water	EPA 1613	04688	NA		NA	NA	NA	
60851-34-5	2,3,4,6,7,8 HxCDF	pg/L	water	EPA 1613	04691	NA		NA	NA	NA	
57117-31-4	2,3,4,7,8 PeCDF	pg/L	water	EPA 1613	04670	NA		NA	NA	NA	
55684-94-1	2,3,7,8 HxCDF (total)	pg/L	water	EPA 1613	04681	NA		NA	NA	NA	
1746-01-6	2,3,7,8 TCDD	pg/L	water	EPA 1613	34751	NA		NA	NA	NA	
51207-31-9	2,3,7,8 TCDF	pg/L	water	EPA 1613	04687	NA		NA	NA	NA	
38998-75-3	HpCDF (total)	pg/L	water	EPA 1613	04707	NA		NA	NA	NA	
3268-87-9	OCDD	pg/L	water	EPA 1613	04702	NA		NA	NA	NA	
39001-02-0	OCDF	pg/L	water	EPA 1613	04705	NA		NA	NA	NA	
57465-28-8	PCB-126	ng/L	water		19601	NA		NA	NA	NA	
32774-16-6	PCB-169	ng/L	water		19637	NA		NA	NA	NA	

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)[1]	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab[2]
32598-13-3	PCB-77	ng/L	water		19562	NA		NA	NA	NA	
70362-50-4	PCB-81	ng/L	water		19566	NA		NA	NA	NA	
107-02-8	Acrolein (Propanol)	µg/L	water	EPA 8260B	34210	1.5		30	65-135	65-135	
542-88-1	Bis (chloromethyl) ether	µg/L	water		34268	0.002		30	65-135	65-135	
80-05-7	Bisphenol A (4,4-Isopropylidenediphenol)	µg/L	water		NA[5]	546					
21725-46-2	Cyanazine	µg/L	water	EPA 525.2	81757	2		30	65-135	65-135	
57-12-5	Cyanide, free (amenable to chlorination)	mg/L	water	OIA-1677	00722	0.005		30	65-135	65-135	
57-12-5	Cyanide, free (amenable to chlorination)	mg/L	water	SM 4500-CN G	00722	0.005		30	65-135	65-135	
39515-41-8	Danitol	µg/L	water	HPLC	04320	0.3		30	65-135	65-135	
330-54-1	Diuron	µg/L	water	EPA 632	39650	35		30	65-135	65-135	
NA	Enterococcus[3]	MPN/ 100 mL	water	Enterolert	31701	10	10	0.5[4]	NA	NA	
106-89-8	Epichlorohydrin (1-Chloro-2,3-epoxypropane)	µg/L	water		NA[5]	26		30	65-135	65-135	
107-21-1	Ethylene Glycol	µg/L	water	EPA 8015	NA[5]	23,372		30	65-135	65-135	
70-30-4	Hexachlorophene	µg/L	water	EPA 8270	88813	0.03		30	65-135	65-135	
51218-45-2	Metolachlor	µg/L	water	EPA 525.2	82612	2		30	65-135	65-135	
84852-15-3 and 25154-52-3	Nonylphenol	ug/L	water		37745	0.85	NA	NA	NA	NA	
NA	Oil and Grease	mg/L	water	EPA 1664	00552	5		30	65-135	65-135	
NA	Perchlorate	µg/L	water	EPA 314.0	61209	2		30	65-135	65-135	
NA	Phenols, total	µg/L	water		32730	NA		30	65-135	65-135	
7440-31-5	Tin, dis.	µg/L	water	EPA 200.7	01100	0.036		20	80-120	70-130	
688-73-3	Tributyltin (TBT)	µg/L	water	EPA 8323	30340	0.01		30	65-135	65-135	

CAS	Parameter	Units	Matrix	Method	Parameter Code	AWRL	Limit of Quanti-tation (LOQ)[1]	Precision (RPD of LCS/ LCSD)	Bias %Rec of LCS	LOQ Check Smpl % Rec	Lab[2]
	Miscellaneous Metals, Inorganics, and Organics in Sediment										
71-41-0	1-Pentanol	µg/kg	sediment	EPA 8260B	20476	NA		30	40-160	40-160	
78-93-3	2-butanone (methyl ethyl ketone (MEK))	µg/kg	sediment	EPA 8260B	75078	424		30	40-160	40-160	
67-63-0	2-Propanol	µg/kg	sediment	EPA 8260B	20477	222		30	40-160	40-160	
115-32-2	Dicofol (Kelthane)	µg/kg	sediment	EPA 8270	79799	20		30	40-160	40-160	
NA	High molecular weight PAHs	µg/kg	sediment	EPA 8270C	20468	4800		NA	NA	NA	
NA	Low molecular weight PAHs	µg/kg	sediment	EPA 8270C	20469	1580		NA	NA	NA	
2385-85-5	Mirex	µg/kg	sediment	EPA 8270	79800	650		30	40-160	40-160	
110-54-3	n-Hexane (Hexane)	µg/kg	sediment		45504	6385					
NA	Total PAH	µg/kg	sediment	EPA 8270C	20470	11400		NA	NA	NA	
75-69-4	Trichlorofluoromethane	ug/kg	sediment		34491	NA		30	40-160	40-160	
	Miscellaneous Metals, Inorganics, and Organics in Tissue										
70-30-4	Hexachlorophene	mg/kg	tissue	EPA 8270	88815	0.4		30	40-160	40-160	
7440-02-0	Nickel	mg/kg	tissue		01069	0.0175		30	60-140	60-140	
7440-66-6	Zinc	mg/kg	tissue		71938	262.5		30	60-140	60-140	

1 LOQs will be included in an amendment to this QAPP or in the QAP for the contract laboratory.

2 Laboratory will be identified in an amendment to this QAPP or in the QAP for the contract laboratory.

3 A QAP is not necessary for routine analysis of Enterococcus by a NELAP accredited contract laboratory. The Project QA Specialist or Project Manager will secure written documentation from each sub-tier project participant (e.g., contractor) stating the organization's awareness of and commitment to requirements contained in this quality assurance plan and any amendments of this plan. The signed forms must be received prior to the sampling date, or the trip will be rescheduled. TCEQ will maintain this documentation as part of the project's quality assurance records. (See a sample letter in Attachment 1 of this document.)

4 Precision is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5.

5 A parameter code has not been developed at this time.

The methods listed are the preferred methods. Other methods may be employed if the laboratory is NELAP accredited (if available) for the corresponding method, matrix, and parameter, and can meet the measurement performance specifications.

Table A6.4 Measurement Performance Specifications – Biological

Parameter	Units	Method	Parameter Code	Lab
Biological data	NA	TCEQ SOP V2	89888	NA
Ecoregion (Texas Ecoregion Code)	#	TCEQ SOP V1	89961	NA
Stream Order	#	TCEQ SOP V1	84161	NA
Benthics - Freshwater				
Area of snag surface sampled	m^2	TCEQ SOP V2	89975	NA
Bedrock at sample point	%	TCEQ SOP V2	89928	NA
Benthic Organisms, None Present	NA	TCEQ SOP V2	90005	NA
Benthic Sampler	1=surber, 2=ekman, 3=kicknet, 4=peterson, 5=hester dendy, 6=snag, 7=hess	TCEQ SOP V2	89950	NA
Benthic shredders (% of Community)	%	TCEQ SOP V2	90035	NA
Biological Data Reporting Units	1= number of individuals from subsample; 2 = number of individuals/ft2; 3 = number of individuals/m2; 4 = total number in kicknet	TCEQ SOP V2	89899	NA
Biotic Index (HBI)	NA	TCEQ SOP V2	90007	NA
Chironomidae	%	TCEQ SOP V2	90062	NA
Debris and Shoreline Sampling Effort, minutes picked	minutes	TCEQ SOP V2	89905	NA
Diptera Taxa	#	TCEQ SOP V2	90056	NA
Dominance (3 Taxa)	%	TCEQ SOP V2	90067	NA
Dominant FFG	%	TCEQ SOP V2	90010	NA
Dominant Taxon, Benthos	%	TCEQ SOP V2	90042	NA
Ekman Sampler Effort, area sampled	m^2	TCEQ SOP V2	89935	NA
Ephemeroptera Taxa	#	TCEQ SOP V2	90057	NA
EPT Index, Abundance	#	TCEQ SOP V2	90008	NA
Filterers	%	TCEQ SOP V2	90030	NA
Gatherers	%	TCEQ SOP V2	90025	NA
Gravel substrate at sample point	%	TCEQ SOP V2	89923	NA
Grazers	%	TCEQ SOP V2	90020	NA
Hester-Dendy Duration	days	TCEQ SOP V2	89933	NA
Individuals as EPT Taxa	%	TCEQ SOP V2	90060	NA
Intolerant Taxa, Benthos	#	TCEQ SOP V2	90058	NA
Kicknet Effort, area kicked	m^2	TCEQ SOP V2	89903	NA
Kicknet Effort, minutes kicked	minutes	TCEQ SOP V2	89904	NA
Macrophyte bed at sample point	%	TCEQ SOP V2	89926	NA
Mesh Size, any net or sieve, average bar (diagonal measurement) for benthic collection	cm	TCEQ SOP V2	89946	NA

Parameter	Units	Method	Parameter Code	Lab
Non-insect taxa	#	TCEQ SOP V2	90052	NA
Number of individuals in benthic sample	#	TCEQ SOP V2	89906	NA
Overhanging brush at sample point	%	TCEQ SOP V2	89922	NA
Petersen Sampler Effort, area sampled	m^2	TCEQ SOP V2	89934	NA
Predators	%	TCEQ SOP V2	90036	NA
Quantitative protocols regional benthic macroinvertebrate IBI score	NA	TCEQ SOP V2	90085	NA
Rapid bioassessment protocols statewide benthic macroinvertebrate IBI score	NA	TCEQ SOP V2	90081	NA
Rapid bioassessment protocols regional benthic macroinvertebrate IBI score	NA	TCEQ SOP V2	90082	NA
Ratio of Intolerant:Tolerant taxa, Benthos	NA	TCEQ SOP V2	90050	NA
Sand substrate at sample point	%	TCEQ SOP V2	89924	NA
Snags and brush at sample point	%	TCEQ SOP V2	89927	NA
Soft bottom at sample point	%	TCEQ SOP V2	89925	NA
Surber Sampler Effort, area sampled	m^2	TCEQ SOP V2	89901	NA
Tolerant Taxa, Benthos	%	TCEQ SOP V2	90066	NA
Total number as Elmidae	%	TCEQ SOP V2	90054	NA
Total Taxa Richness, Benthos	#	TCEQ SOP V2	90055	NA
Total Trichoptera as Hydropsychidae	%	TCEQ SOP V2	90069	NA
Undercut bank at sample point	%	TCEQ SOP V2	89921	NA
Trichoptera	%	TCEQ SOP V2	91810	NA
Diptera	%	TCEQ SOP V2	91812	NA
Diptera and Non-Insect Taxa	%	TCEQ SOP V2	91814	NA
Benthic scrapers	%	TCEQ SOP V2	91815	NA
Ephemeroptera	%	TCEQ SOP V2	91818	NA
Physical Habitat				
Aesthetics of reach HQI score	3 = wilderness, 2 = natural area, 1 = common setting, 0 = offensive	TCEQ SOP V2	89882	NA
Approximate drainage area above the most downstream transect	km^2	TCEQ SOP V2	89859	NA
Available instream cover HQI score	4=Abundant 3=Common 2=Rare 1=Absent	TCEQ SOP V2	89874	NA
Average stream depth	meters	TCEQ SOP V2	89862	NA
Average stream width	meters	TCEQ SOP V2	89861	NA
Avg. % cultivated fields as riparian vegetation	%	TCEQ SOP V2	89852	NA
Avg. % grass as riparian vegetation	%	TCEQ SOP V2	89851	NA

Parameter	Units	Method	Parameter Code	Lab
Avg. % instream cover	%	TCEQ SOP V2	84159	NA
Avg. % of substrate gravel size or larger	%	TCEQ SOP V2	89845	NA
Avg. % other as riparian vegetation	%	TCEQ SOP V2	89853	NA
Avg. % shrubs as riparian vegetation	%	TCEQ SOP V2	89850	NA
Avg. % stream bank erosion potential	%	TCEQ SOP V2	89846	NA
Avg. % trees as riparian vegetation	%	TCEQ SOP V2	89849	NA
Avg. stream bank slope	degrees	TCEQ SOP V2	89847	NA
Avg. width natural riparian buffer – left bank	meters	TCEQ SOP V2	89872	NA
Avg. width natural riparian buffer – right bank	meters	TCEQ SOP V2	89873	NA
Avg. width natural riparian vegetation	meters	TCEQ SOP V2	89866	NA
Avg.% tree canopy coverage	%	TCEQ SOP V2	89854	NA
Bank stability HQI score	3 = stable, 2 = moderately stable 1 = moderately unstable, 0 = unstable	TCEQ SOP V2	89879	NA
Bottom substrate stability HQI score	3 = stable, 2 = moderately stable 1 = moderately unstable, 0 = unstable	TCEQ SOP V2	89875	NA
Channel flow status HQI score	3 = high, 2 = moderate, 1 = low, 0 = none	TCEQ SOP V2	89878	NA
Channel sinuosity HQI score	3 = high, 2 = moderate, 1 = low, 0 = none	TCEQ SOP V2	89880	NA
Dimensions of largest pool HQI score	4 = large, 3 = moderate, 2 = small, 1 = absent	TCEQ SOP V2	89877	NA
Dominant substrate	1 = clay, 2 = silt, 3 = sand, 4 = gravel, 5 = cobble, 6 = boulder, 7 = bedrock, 8 = other	TCEQ SOP V2	89844	NA
Habitat Flow Status	1 = no flow; 2 = low; 3 = moderate; 4 = high	TCEQ SOP V2	89848	NA
HQI total score	calculation	TCEQ SOP V2	89883	NA
Land development impact	1 = unimpacted, 2 = low, 3 = moderate, 4 = high	TCEQ SOP V2	89962	NA
Lateral transects made	#	TCEQ SOP V2	89832	NA
Length of stream	km	TCEQ SOP V2	89860	NA
Maximum pool depth in study area	meters	TCEQ SOP V2	89865	NA
Moderately defined stream bends	#	TCEQ SOP V2	89841	NA
Number of riffles HQI score	4 = abundant, 3 = common, 2 = rare, 1 = absent		89876	
Overall Aesthetics	1 = wilderness, 2 = natural, 3 = common, 4 = offensive	TCEQ SOP V2	89867	NA
Poorly defined stream bends	#	TCEQ SOP V2	89842	NA
Reach length of stream evaluated	meters	TCEQ SOP V2	89884	NA

Parameter	Units	Method	Parameter Code	Lab
Riffles	#	TCEQ SOP V2	89843	NA
Riparian buffer vegetation HQI score	3 = extensive, 2 = wide, 1 = moderate, 0 = narrow	TCEQ SOP V2	89881	NA
Riparian vegetation, left bank – cultivated fields	%	TCEQ SOP V2	89828	NA
Riparian vegetation, left bank – grasses or forbs	%	TCEQ SOP V2	89826	NA
Riparian vegetation, left bank – other	%	TCEQ SOP V2	89830	NA
Riparian vegetation, left bank – trees	%	TCEQ SOP V2	89822	NA
Riparian vegetation, left bank - shrubs	%	TCEQ SOP V2	89824	NA
Riparian vegetation, right bank – cultivated fields	%	TCEQ SOP V2	89829	NA
Riparian vegetation, right bank – grasses or forbs	%	TCEQ SOP V2	89827	NA
Riparian vegetation, right bank – other	%	TCEQ SOP V2	89871	NA
Riparian vegetation, right bank – trees	%	TCEQ SOP V2	89823	NA
Riparian vegetation, right bank – shrubs	%	TCEQ SOP V2	89825	NA
Stream Cover Types	#	TCEQ SOP V2	89929	NA
Stream type	1 =perennial, 2 = intermittent w/ perennial pools, 3 = intermittent, 4 = unknown	TCEQ SOP V2	89821	NA
Streambed slope	m/km	TCEQ SOP V2	72051	NA
Streambed slope over evaluated reach	ft/ft	TCEQ SOP V2	72052	NA
Total stream bends	#	TCEQ SOP V2	89839	NA
Well-defined stream bends	#	TCEQ SOP V2	89840	NA
Nekton - Freshwater				
Area seined	m^2	TCEQ SOP V2	89976	NA
Combined length of seine hauls	meters	TCEQ SOP V2	89948	NA
Electrofishing effort, duration of shocking	Seconds	TCEQ SOP V2	89944	NA
Electrofishing method	1 = boat; 2 = backpack; 3 = tote barge	TCEQ SOP V2	89943	NA
Individuals as non-native species	%	TCEQ SOP V2	98033	NA
Individuals w/ disease/anomalies	%	TCEQ SOP V2	98030	NA
Individuals/minute electrofishing	#	TCEQ SOP V2	98069	NA
Individuals/seine haul	#	TCEQ SOP V2	98062	NA
Invertivore individuals, fish	%	TCEQ SOP V2	98021	NA
Nekton, none captured	NA	TCEQ SOP V2	98005	NA
Nekton Texas regional IBI score		TCEQ SOP V2	98123	NA
Net length	meters	TCEQ SOP V2	89941	NA
Omnivore individuals, fish	%	TCEQ SOP V2	98017	NA
Percent of individuals as hybrids	%	TCEQ SOP V2	98024	NA

Parameter	Units	Method	Parameter Code	Lab
Percent of individuals as tolerants, fish	%	TCEQ SOP V2	98016	NA
Piscivore individuals, fish	%	TCEQ SOP V2	98022	NA
Seine Maximum Mesh Size, net average bar, Nekton	in	TCEQ SOP V2	89931	NA
Seine Minimum Mesh Size, net average bar, Nekton	in	TCEQ SOP V2	89930	NA
Seining effort	# of Hauls	TCEQ SOP V2	89947	NA
Seining effort, duration	minutes	TCEQ SOP V2	89949	NA
Tolerant individuals (excluding Western Mosquitofish), fish	%	TCEQ SOP V2	98070	NA
Total benthic invertivore species, fish	#	TCEQ SOP V2	98052	NA
Total benthic species, fish	#	TCEQ SOP V2	98053	NA
Total Individuals electrofishing	#	TCEQ SOP V2	98040	NA
Total Individuals seining	#	TCEQ SOP V2	98039	NA
Total intolerant fish species	#	TCEQ SOP V2	98010	NA
Total native cyprinid species, fish	#	TCEQ SOP V2	98032	NA
Total number of darter species	#	TCEQ SOP V2	98004	NA
Total number fish species	#	TCEQ SOP V2	98003	NA
Total number of individuals in sample, fish	#	TCEQ SOP V2	98023	NA
Total number of sucker species	#	TCEQ SOP V2	98009	NA
Total sunfish species	#	TCEQ SOP V2	98008	NA

Table A6.5 Measurement Performance Specifications – Seagrass Condition Indicators

Parameter	Units	Method*	Parameter Code	Lab
Tide Stage	1=Low 2= Falling 3=Slack 4=Rising 5=High	NA	89972	Field
Average (4 reps) percent cover/m2 for Thalassia testudinum	%	NA	44571	NA
Average (4 reps) percent cover/m2 for Halodule wrightii	%	NA	44572	NA
Average (4 reps) percent cover/m2 for Halophila engelmannii	%	NA	44573	NA
Average (4 reps) percent cover/m2 for Ruppia maritima	%	NA	44574	NA
Average (4 reps) percent cover/m2 for Syringodium filiforme	%	NA	44575	NA
Average (4 reps) percent cover/m2 bare	%	NA	44576	NA
Average leaf length (0.1 cm) for Thalassia testudinum	cm	NA	44581	NA
Average leaf length (0.1 cm) for Halodule wrightii	cm	NA	44582	NA
Average leaf length (0.1 cm) for Halophila engelmannii	cm	NA	44583	NA
Average leaf length (0.1 cm) for Ruppia maritima	cm	NA	44584	NA
Average leaf length (0.1 cm) for Syringodium filiforme	cm	NA	44585	NA
Number of leaves in sample for Thalassia testudinum	#	NA	44586	NA
Number of leaves in sample for Halodule wrightii	#	NA	44587	NA
Number of leaves in sample for Halophila engelmannii	#	NA	44588	NA
Number of leaves in sample for Ruppia maritima	#	NA	44589	NA
Number of leaves in sample for Syringodium filiforme	#	NA	44590	NA

* Sampling methods for seagrass condition indicators may be found on the Updates to the Procedures for Surface Water Quality Monitoring[33] webpage. Guidance for conducting seagrass monitoring will be incorporated into the *SWQM Procedures*, Vol. 2 in the next revision of the publication.

References for Tables A6.1 – A6.5

- United States Environmental Protection Agency (USEPA), Clean Water Act Analytical Methods[34]
- Standard Methods for the Examination of Water and Wastewater[35], 20th Edition, 1998 or current online version
- TCEQ Sugar Land Laboratory Standard Operating Procedure. The principal reference for HLAB 160 is EPA 600/2-78-054. The main reference for HLAB 200 is Standard Methods 20th edition, Method 2540G
- TCEQ SOP, V1 - SWQM Procedures, Vol. 1
- TCEQ SOP, V2 - SWQM Procedures, Vol. 2
- American Society for Testing and Materials (ASTM) Annual Book of Standards[36], Vol. 11.02

33 https://www.tceq.texas.gov/waterquality/monitoring/swqm_manualupdate.html
34 https://www.epa.gov/cwa-methods
35 https://www.standardmethods.org/
36 https://www.astm.org/products-services/standards-and-publications/standards.html

Attachment 1 Example Letter of Adherence

TO: (Name)
(Organization)

FROM: Robin Cypher
TCEQ SWQM Program

RE: Surface Water Quality Monitoring Program, Water Quality Standards Program, and Water Quality Assessment Program Quality Assurance Project Plan

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

Robin Cypher
TCEQ SWQM Program
MC: 234
PO Box 13087
Austin, Texas 78711-3087

I acknowledge receipt of the "Surface Water Quality Monitoring Program, Water Quality Standards Program, and Water Quality Assessment Program Quality Assurance Project Plan". 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 this project's activities will be required to familiarize themselves with the document contents and adhere to them as well.

__________________________ _____________
Signature Date

Copies of the signed forms should be sent to the SWQM Project Quality Assurance Specialist prior to sampling date.