Quality Assurance Project Plan Fiscal Year 2016-2017 Cypress Creek Basin

Northeast Texas Municipal Water District
P.O. Box 955
Hughes Springs, Texas 75656

Clean Rivers Program

Water Quality Planning Division

Texas Commission on Environmental Quality

P.O. Box 13087, MC 234

Austin, Texas 78711-3087

Effective Period: FY 2016 to FY 2017

Questions concerning this QAPP should be directed to:

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A1 Approval Page

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CYPRESS CREEK BASIN PLANNING AGENCY
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Robert Speight Date
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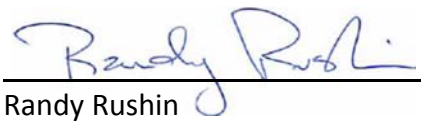
Water Monitoring Solutions, Inc.



8/25/2015

Randy Rushin Date
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8/24/2014

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Lower Colorado River Authority

Alicia Gill Date
Laboratory Manager
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Jennifer Blossom Date
Quality Assurance Officer
Jennifer.Blossom@lcra.org

The NETMWD will secure written documentation from each sub-tier project participant (e.g., subcontractors, sub-participants, or other units of government) stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or added appendices of this plan.

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List of Acronyms

AEP SWEPCO	American Electric Power Southwestern Electric Power Company
AWRL	Ambient Water Reporting Limit
BMP	Best Management Practices
CAP	Corrective Action Plan
CFR	Code of Federal Regulations
CLI	Caddo Lake Institute
COC	Chain of Custody
CRP	Clean Rivers Program
DMRG	Surface Water Quality Monitoring Data Management Reference Guide, August 2015, or most recent version
DM&A	Data Management and Analysis
DO	Dissolved Oxygen
DQO	Data Quality Objective
EPA	United States Environmental Protection Agency
FCWD	Franklin County Water District
FY	Fiscal Year
GIS	Geographical Information System
GPS	Global Positioning System
IBWC	International Boundary and Water Commission
I-Plan	Implementation Plan
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LIMS	Laboratory Information Management System
LOD	Limit of Detection
LOP	Lake O' the Pines
LOQ	Limit of Quantitation
NELAP	National Environmental Lab Accreditation Program
NETMWD	Northeast Texas Municipal Water District
MC	Mail Code
MS	Matrix Spike
PM	Project Manager
QA	Quality Assurance
QM	Quality Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Specialist
QC	Quality Control
QMP	Quality Management Plan
SLOC	Station Location
SOP	Standard Operating Procedure
SM9223-B	Standard Methods
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System

TCEQ	Texas Commission on Environmental Quality
TCFWSD	Titus County Fresh Water Supply District #1
TKN	Total Kjeldahl Nitrogen
TNI	The NELAC Institute
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
TWDB	Texas Water Development Board
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VOA	Volatile Organic Analytes
WMS	Water Monitoring Solutions, Inc.

A3 Distribution List

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Jennifer Blossom, Quality Assurance Coordinator (512) 730-5144

Alicia Gill, Lab Manager
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The NETMWD will provide copies of this project plan and any amendments or appendices of this plan to each person on this list and to each sub-tier project participant. The NETMWD will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project's quality assurance records, and will ensure the documentation is available for review.

A4 PROJECT / TASK ORGANIZATION

Description of Responsibilities

TCEQ

Sarah Eagle
CRP Work Leader

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

Daniel R. Burke
CRP Lead Quality Assurance Specialist

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

Alexandra Smith
CRP Project Manager

- Responsible for the development, implementation, and maintenance of CRP contracts. Tracks, reviews, and approves deliverables.
- Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).
- Assists CRP Lead QA Specialist in conducting the Cypress Creek Basin Planning Agency audits.
- Verifies QAPPs are being followed by contractors and that projects are producing data of known quality.

- Coordinates project planning with the Cypress Creek Basin Planning Agency Project Manager.
- Reviews and approves data and reports produced by contractors.
- Notifies QA Specialists of circumstances which may adversely affect the quality of data derived from the collection and analysis of samples.
- Develops, enforces, and monitors corrective action measures to ensure contractors meet deadlines and scheduled commitments.

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

- Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).
- Ensures DM&A staff perform data management related tasks, including coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval; ensuring that data are reported following instructions in the Surface Water Quality Monitoring Data Management Reference Guide, August 2015, or most current version (DMRG); running automated data validation checks in Surface Water Quality Monitoring Information System (SWQMIS) and coordinating data verification and error correction with CRP Project Managers; generating SWQMIS summary reports to assist CRP Project Managers' data review; identifying data anomalies and inconsistencies; providing training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures; reviewing QAPPs for valid stream monitoring stations, validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s); developing and maintaining data management-related standard operating procedures (SOPs) for CRP data management; and coordinating and processing data correction requests.

Peter Bohls
CRP Data Manager, DM&A Team

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

Coordinates and processes data correction requests.
- Participates in the development, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).

Allison Fischer
CRP Project Quality Assurance Specialist
- Serves as liaison between CRP management and TCEQ QA management.
- Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).
- Serves on planning team for CRP special projects and reviews QAPPs in coordination with other CRP staff.

Coordinates documentation and implementation of corrective action for the CRP.

CYPRESS CREEK BASIN PLANNING AGENCY
Northeast Texas Municipal Water District (NETMWD)

Walt Sears, Jr.
General Manager, Project Manager

Mr. Sears is the General Manager of NETMWD and is a member of the Steering Committee for the Cypress Creek Basin Clean Rivers Program. Mr. Sears will provide coordination and cooperation between the project partners, stakeholders, and WMS.

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

Water Monitoring Solutions, Inc. (WMS)

Water Monitoring Solutions, Inc. contracts with the Northeast Texas Municipal Water District to administer the tasks and responsibilities outlined in this QAPP on behalf of the water District.

Randy Rushin
WMS Project Manager

- Responsible for contact and coordination with NETMWD, TCEQ and other entities participating in the Cypress Creek Basin Clean Rivers Program activities.
- Responsible for reviewing the QAPP and monitoring its implementation.
- Responsible for implementing and monitoring CRP requirements in contracts, QAPP's and QAPP amendments and appendices and maintaining records of sub-tier commitment to requirements specified in this QAPP.
- Along with the Data Manager, he will be responsible for the supervision of all CRP field activities, including water quality, biological sampling and monitoring, including equipment preparation, sampling, sample preservation, fieldwork, sample transport, and chain-of-custody maintenance in compliance with the approved QAPP.
- Designates WMS staff with subordinate responsibility, and will oversee task progress and deliverables.
- Responsible for Conference Calls, CRP Meetings, workshops, initial and evolving QA/QC procedural assistance.
- Responsible in performing necessary data analysis and development of conclusions and recommendations in technical deliverables. The WMS DM will assist Mr. Rushin as necessary on behalf of the Cypress Creek Basin Planning Agency to ensure that 1) monitoring systems audits are conducted to verify that QAPP's are followed by the Cypress Creek Basin Planning Agency participants; 2) projects are producing data of known quality; 3) subcontractors are qualified to perform contracted work; 4) CRP project managers and/or QA Specialists are notified of deficiencies and non-conformances, and that issues are resolved; and 5) the validation of collected data are acceptable for reporting to the TCEQ.
- Notifies the NETMWD Project Manager of particular circumstances which may adversely affect the quality of data.
- Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP.

Scott Mgebroff
WMS Quality Assurance Officer

- Responsible for coordinating the implementation of the QA program.
- Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques.

- Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues.
- Coordinates and monitors deficiencies, non-conformances and corrective actions; coordinate and maintain records of data verification and validation.

Linard Arocha
WMS Data Manager

- Responsible for oversight of field sampling and data processing duties in accordance with standard operating procedures (SOP's), data quality objectives (DQO's) and this QAPP, reporting to the WMS QAO any deviation from SOP's or DQO's, maintaining proper documentation of sampling events, sampling preservation, sampling shipment, and field procedures at designated stations.
- Responsible for the supervision of all field activities, including water quality sampling and monitoring, and including equipment preparation, sampling, sample preservation, fieldwork, sample transport, and chain-of-custody maintenance in compliance with the approved QAPP.
- Oversees the work of the monitoring partners during the sampling events.
- Responsible for the transfer of basin quality-assured water quality data in a format compatible with the TCEQ database.
- Responsible for writing and maintaining the QAPP and monitoring its implementation including appendices and amendments.
- Assists QAO with identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues.
- Notifies the WMS PM of particular circumstances which may adversely affect the quality of data.
- Assists QAO with deficiencies, non-conformances and corrective actions; coordinate and maintain records of data verification and validation.
- Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings.
- Review data from monitoring events and provide data quality comments to the WMS Project Manager.
- Responsible for the acquisition, verification, and transfer of data to the TCEQ, oversight of data management for the study, coordinating and performing data QA prior to transfer of data to TCEQ.
- Responsible for ensuring data are submitted according to work-plan specifications, and provide the point of contact for the TCEQ Data Manager to resolve issues related to the data.
- Responsible for ensuring that field data are properly reviewed and verified.
- Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS.
- Responsible for identifying, receiving, and maintaining project QA records. Responsible

for coordinating with the TCEQ QAS to resolve QA-related issues.

- Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP.
- Ensures that field staff is properly trained and that training records are maintained.

LCRA Environmental Laboratory Services

Alicia Gill
Laboratory Manager

- Responsible for the overall performance, administration, and reporting of analyses performed by LCRA ELS.
- Responsible for ensuring that laboratory personnel involved in generating analytical data have adequate training and a thorough knowledge of the QAPP and all SOPs specific to the analysis or task performed and or supervised.
- Responsible for oversight of all operations, ensuring that all QA/QC requirements are met, and documentation related to the analysis is completely and accurately reported.

Jennifer Blossom
Quality Assurance Coordinator

Provide laboratory quality assurance/quality control and will be responsible for updating the laboratory's QM.

- Responsible for making sure QA/QC requirements of this QAPP are met for data generated by the NETMWD.
- Notifies the NETMWD Project Manager of particular circumstances that may adversely affect the quality of data.
- Enforces corrective actions as required.
- Responsible for traceability of laboratory standards and reagents, completeness and acceptability of chain of custody forms, maintaining current NELAC Accreditation, ensuring laboratory instrument and calibration data is complete.
- Ensures laboratory analysis of QC samples occurs at the required frequency and assist the WMS QAO to determine if QC results meet performance and program specifications.
- Responsible for the analytical sensitivity of laboratory instrumentation to levels consistent with this QAPP.
- Performs laboratory bench-level reviews and ensure that all laboratory samples are analyzed for all parameters.

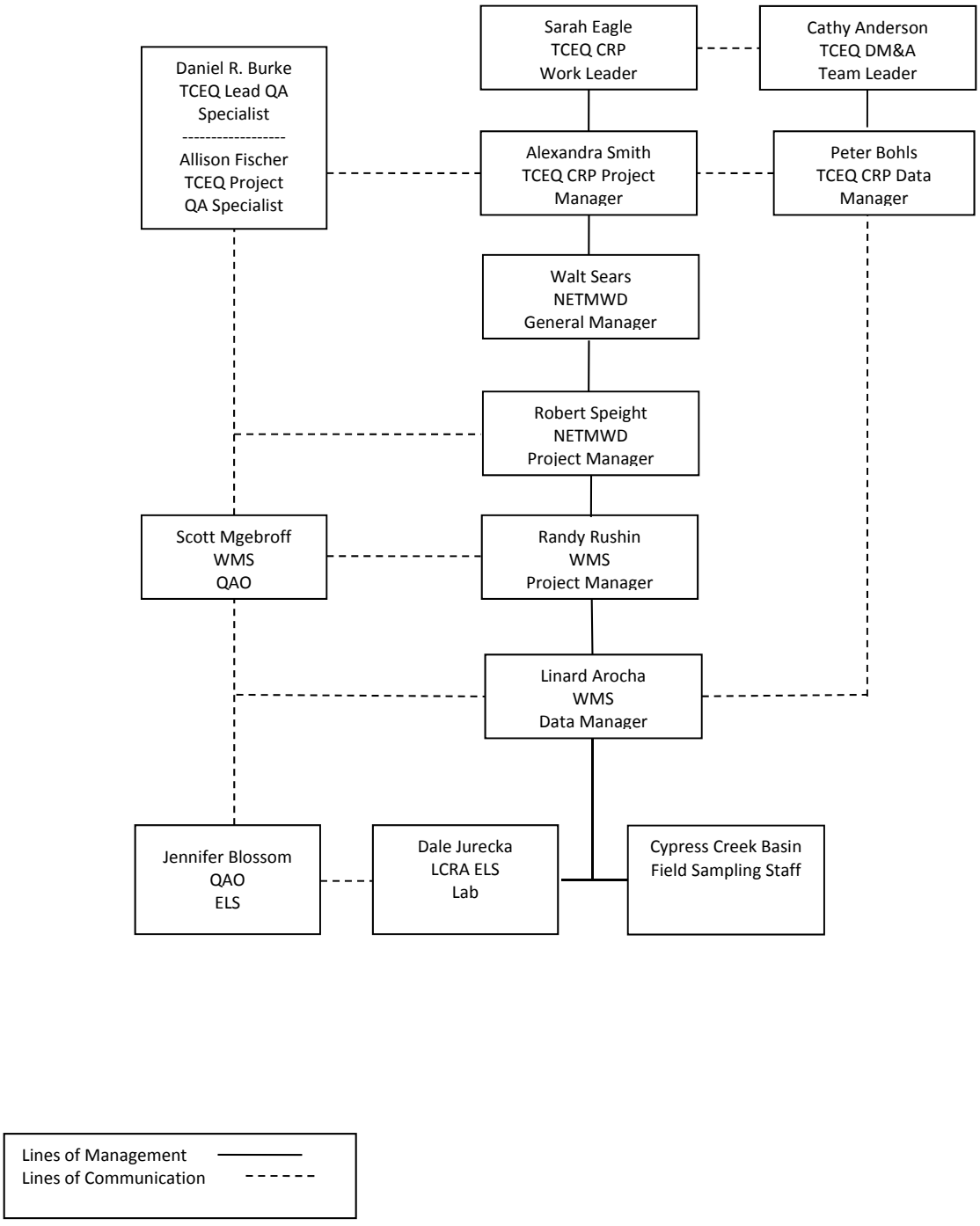
Dale Jurecka
Laboratory Project Manager

- Responsible for analyses performed by LCRA ELS.
- Responsible for project set up in LIMS.
- Will serve as the primary point of contact for all laboratory activity conducted by LCRA Corporation

Cypress Creek Basin Sampling Staff

The sampling staff will be composed of various personnel provided by WMS, NETMWD, Franklin County Water District (FCWD), Caddo Lake Institute (CLI) and Titus County Fresh Water Supply District #1 (TCFWSD). The primary responsibility will be to assist the WMS Data Manager in performing all field activities, including water quality and biological sampling and monitoring in compliance with the approved QAPP.

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



A5 Problem Definition / Background

In 1991, the Texas Legislature passed the Texas Clean River Act (Senate Bill 818) in response to growing concerns that water resource issues were not being pursued in an integrated, systematic manner. The act requires that ongoing water quality assessments be conducted for each river basin in Texas, an approach that integrates water quality issues within the watershed. The CRP legislation mandates that each river authority (or local governing entity) shall submit quality-assured data collected in the river basin to the commission. Quality-assured data in the context of the legislation means data that comply with TCEQ rules for SWQM programs, including rules governing the methods under which water samples are collected and analyzed and data from those samples are assessed and maintained. This QAPP addresses the program developed between the NETMWD and the TCEQ to carry out the activities mandated by the legislation. The QAPP was developed and will be implemented in accordance with provisions of the TCEQ Quality Management Plan, January 2013 or most recent version.

The purpose of this QAPP is to clearly delineate NETMWD QA policy, management structure, and procedures which will be used to implement the QA requirements necessary to verify and validate the surface water quality data collected. The QAPP is reviewed by the TCEQ to help ensure that data generated for the purposes described above are scientifically valid and legally defensible. This process will ensure that data collected under this QAPP and submitted to SWQMIS have been collected and managed in a way that guarantees its reliability and therefore can be used in water quality assessments, TMDL development, establishing water quality standards, making permit decisions and used by other programs deemed appropriate by the TCEQ. Project results will be used to support the achievement of CRP objectives, as contained in the *Clean Rivers Program Guidance and Reference Guide FY 2016 -2017*.

The Cypress Creek Basin, shown in Appendix C, is located in Northeast Texas, between the Sulphur River Basin on the north and the Sabine River Basin on the west and south. Big Cypress Creek and its tributaries drain the 2,933 square mile watershed. Big Cypress Creek is itself a tributary of the Red River, which it joins near Shreveport, Louisiana where it is known as Twelve-Mile Bayou.

The Cypress Creek Basin in Texas consists of three major watersheds converging at the lowermost segment of Big Cypress Creek (Segment 0402). The four largest reservoirs in the basin are Caddo Lake (Segment 0401), Lake O' the Pines (Segment 0403), Lake Bob Sandlin (Segment 0408) and Lake Cypress Springs (Segment 0405). These four reservoirs are impoundments of Big Cypress Creek and are designated for use as public water supplies. Four smaller reservoirs (Monticello, Welch, Ellison Creek, and Johnson Creek) have been constructed on tributary streams to be used primarily as cooling ponds for steam-electric power plants. While shoreline development has been permitted only around Lake Cypress Springs, recreational and retirement housing construction continues within the small watersheds draining directly into Lake Bob Sandlin, Lake O' the Pines and Caddo Lake.

The Cypress Creek Basin water quality monitoring program has been established to collect surface water samples within the basin and to continue to produce water quality data for continuing evaluation of water quality. Previous efforts of other monitoring agencies have established reliable and useful data for evaluation under the CRP water quality screening procedures. Monitoring data

has been collected at gage locations within each of the nine segments of the Cypress Creek Basin since 1981. Although there exists a large database of valuable water quality information on the Cypress Creek Basin through previous efforts of monitoring agencies, assessments made as part of the CRP have determined a need to reorganize data collection efforts.

This Cypress Creek Basin water quality monitoring plan was developed to maintain consistent sampling through time and locations, provide data with consistent detection limits, and address water quality impairments and concerns throughout the basin.

Low dissolved oxygen (DO) concentrations occur in stream and marginal reservoir habitats throughout the Cypress Creek Basin. All segments except 0408 (Lake Bob Sandlin), 0405 (Lake Cypress Springs) 0404 (Lake Cypress Springs) and 0403 (Lake O' the Pines) have reaches on the *2012 303(d) list*, or for which concerns with low DO concentrations are expressed in the *2012 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d)*. In most locations, the low DO concentrations are associated with natural low flow conditions and high levels of photosynthesis and respiration.

Marginal and backwater habitats in Caddo Lake, as in Lake O' the Pines, occasionally exhibit DO concentrations below the segment standard for support of aquatic life. However, these episodes are not generally accompanied by large daily changes in DO concentrations, and often reflect relatively constant, low concentrations throughout a 24-hour sample period. This is consistent with a lower nutrient load entering Caddo Lake than is the case in Lake O' the Pines, and which consequently does not support similarly intense algal production during summer conditions. It is more likely that in Caddo Lake we are observing an intense oxygen demand from the sediments during summer conditions, primarily from decomposition of rooted plants mass-produced with the help of nutrients in the sediment. The agency's assessment of water quality also includes a review of the DO levels in Caddo Lake. A pattern of lower DO in the upper end of the lake, with a belief that these observed low levels of DO are natural occurrences and not solely the result of man-made pollutant sources.

Assessment units in all segments; except 0401 (Caddo Lake), 0403 (Lake O' the Pines), 0405 (Lake Cypress Springs) and 0408 (Lake Bob Sandlin) have concerns for, or are listed as impaired for bacteria levels. In 2011, data collection was completed for a collaborative effort to assess sources for the listings in 0404 (Big Cypress Creek), 0404B (Tankersley Creek), and 0404C (Hart Creek). Components of the Big Cypress Creek Bacteria Assessment including examining designated uses of the water body's, standards revision, public outreach, conducting a source survey and historical data report, and bacterial source tracking were employed through a special project in segment 0404 (Big Cypress Creek below Lake Bob Sandlin) funded by the State Soil and Water Conservation Board (TSSWCB). This approach to assessing bacteria loading in the basin and its components are options to be used for assessment in other watersheds of the basin.

Except for ammonia, nutrient concentrations in streams rarely exceed TCEQ screening levels. However, total phosphorus and total nitrogen concentrations in streams throughout the Cypress Creek Basin are usually at levels that can result in excessive algal growth under low flow conditions or in impoundments. The heaviest loads have been observed originating from the Tankersley Creek watershed, and to a lesser extent, from other tributary watersheds in the upper part of the basin, for example, Prairie and Lilly Creeks, and the tributaries to Lake Cypress Springs and Lake Bob Sandlin.

The Pilgrim's Pride Corporation's Southwest Wastewater Treatment Plant; which processes wastewater from the Pilgrim's Pride Corporation Poultry Processing Facility and approximately 60 residential homes near the facility, is the source of a large proportion of the nitrogen and phosphorus load in segment 0404 of Big Cypress Creek. Some phosphorus and a large proportion of the nitrogen load is lost during transport in Big Cypress Creek from the vicinity of Mount Pleasant and Pittsburg to the headwaters of Lake O' the Pines, presumably through biological activity and trapping in the floodplain.

Locally, low pH values, toxicity in water and sediments, and mercury in fish tissues appear to be phenomena associated with the lower portion of the Cypress Creek Basin. The lower basin coincides with predominantly acid soils and forested watersheds that result in "soft", acid waters of relatively low buffering capacity. Those conditions, coupled with the intense biological activity associated with a warm, shallow, eutrophic environment are thought to be conducive to the mobilization of heavy metals, such as mercury, into aquatic food chains.

Despite the widespread occurrence of low DO concentrations, elevated nutrient and bacteria levels and other water quality problems, biological communities in streams throughout the Cypress Creek Basin continue to exhibit the abundance, trophic structure (the mixture of herbivores, detritivores and predators), and diversity appropriate to, or better than, that expected based on the quality of the habitat at those locations. To the extent that low DO concentrations are associated with low flow conditions, it is likely that aquatic communities in the Cypress Creek Basin are, to some extent, adapted to tolerate conditions that occur at least occasionally during summer conditions even in minimally disturbed streams.

The primary goal of the Cypress Creek Basin Clean Rivers Program is to provide the appropriate, quality assured data to allow continuing assessment and management of water quality in the Cypress Creek Basin. Objectives of this monitoring program include local participation in the collection and submittal of quality-assured data to assist the TCEQ in attaining reliable information concerning water quality conditions within the basin. Solid assessment of accurate information provides valuable insight into the nature and source of water quality problems. These assessments, along with sound decisions based on Texas Surface Water Quality Standards help in the evaluation of permit requirements with respect to water quality conditions and trends to specific water bodies in the basin. These evaluations, in addition to historical data are used to support the development of cost-effective water quality management programs.

A6 Project / Task Description

Assessment and management of water quality within the Cypress Creek Basin is dependent on appropriate and accurate data. Water quality monitoring and data collection is an integral part of the Clean Rivers Program. Water quality monitoring is made possible through a cooperative program directed by NETMWD. Program participants assisting NETMWD in planning, data collection, analysis, and reporting of water quality data include WMS, TCEQ, the Clean Rivers Program Steering Committee members, basin partners CLI and affiliates, Pilgrim's Pride Corporation, FCWD, the City of Marshall, the City of Longview, Titus County Fresh Water District #1, US Steel Tubular Products, Luminant, AEP SWEPCO, and the USGS.

The monitoring program for the Cypress Creek Basin Clean Rivers Program is divided into two major areas: (1) Water Quality monitoring via routine (RT) station monitoring and (2) monitoring biased to season (BS). BS monitoring includes diel studies and sampling of biological communities. Routine monitoring of physical, chemical, and bacteriological parameters was used primarily to maintain and expand the long-term water quality database. The major objective of this monitoring type was to improve the ability to follow trends and to facilitate the identification of water quality changes in the major sub-basins of the Cypress Creek Basin.

The monitoring schedule was originally based on a five-year rotating basin approach, with one group of stations monitored in close proximity during each of the five years to investigate known concerns and detect potential ones. The goal is complete coverage of the basin by the end of the schedule rotation. The design and site selection approach taken over the last few years, however, has focused attention on specific watersheds and water bodies known or suspected to have water quality issues based either on local public concern or assessment unit information contained in the TCEQ *2012 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d)*.

Biological monitoring, which is used for screening studies in combination with routine physical and chemical parameters, is scheduled to be performed in FY 2016. Data collected will provide insight into the health of aquatic life and long-range water quality protection. Routine sampling will continue into FY 2016 without the intentional examination of any particular target environmental condition or event along with a new code scheme for water quality monitoring scheduled with distinct DQOs. Diel DO monitoring will be conducted with no less than one-half and no more than two-thirds of the samples occurring in the index period, and no less than one fourth and no more than one-third will be collected in the critical period . Index and critical period is determined following the definition published in *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods* section 3.

The locations of the RT and BS monitoring stations shown in this document reflect the need for continued monitoring at locations which have been sampled historically. This will focus monitoring efforts on those designated assessment units which were determined by the TCEQ to be of most concern through the TCEQ *2012 Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d)* and to eventually provide water quality data and analysis for the entire basin.

Reservoir monitoring usually occurs near the dam or in the major arms that receive contributory surface inflow from rivers and streams. Monitoring of reservoir aquatic habitat can serve as indicators of upstream problems and possible near shore impacts. Different sub-watershed areas of the basin and their stations are generally sampled quarterly to provide information on water quality conditions.

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

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

Amendments to the QAPP

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

Special Project Appendices

Projects requiring QAPP appendices will be planned in consultation with the NETMWD and the TCEQ Project Manager and TCEQ technical staff. Appendices will be written in an abbreviated format and will reference the Basin QAPP where appropriate.

Appendices will be approved by the NETMWD Project Manager, the NETMWD QAO, the Laboratory (as applicable), and the CRP Project Manager, the CRP Project QA Specialist, the CRP Lead QA Specialist and other TCEQ personnel, as appropriate. Copies of approved QAPP appendices will be distributed by the NETMWD to project participants before data collection activities commence.

A7 Quality Objectives and Criteria

The purpose of routine water quality monitoring is to collect surface water quality data that can be used to characterize water quality conditions, identify significant long-term water quality trends, support water quality standards development, support the permitting process, and conduct water quality assessments in accordance with TCEQ's Guidance for Assessing and Reporting Surface Water Quality in Texas, August 2012 or most recent version (https://www.tceq.texas.gov/assets/public/waterquality/swqm/assess/12twqi/2012_guidance.pdf). These water quality data and data collected by other organizations (e.g. USGS, TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

An additional objective is to collect information on the biological communities at various stream locations and provide data to evaluate the aquatic communities since limited biological data exists. The biological community data gathered may provide a framework for studies to more fully characterize the aquatic communities in the Cypress Creek watershed, if needed. Twenty four-hour continuous DO measurements will provide critical data to determine stream standards compliance. Data of known quality will be provided to TCEQ. The data is intended for use in determining whether any locations have values exceeding the TCEQ's water quality criteria and/or screening levels (or in some cases values elevated above normal). Limitations for this data collection are accounted for and are as follows: not temporally representative, limited number of samples, biological sampling does not meet the specimen vouchering requirements. The NETMWD will use this information to determine future monitoring priorities.

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

Ambient Water Reporting Limits (AWRLs)

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

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

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

- The laboratory's LOQ for each analyte must be at or below the AWRL as a matter of routine practice
- The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check sample for each analytical batch of CRP samples analyzed.
- Control limits for LOQ check samples are found in Appendix A.

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

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

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

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

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

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

Completeness

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

A8 Special Training / Certification

New field personnel receive training in proper sampling and field analysis by the WMS PM and/or DM. Before actual sampling or field analysis occurs, they will demonstrate to the QA Officer (or designee) their ability to properly calibrate field equipment and perform field sampling and analysis procedures. Field personnel training is documented and retained in the personnel file and will be available during a monitoring systems audit.

The requirements for GPS certification are located in Section B10, Data Management.

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

A9 Documents and Records

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

Table A9.1 Project Documents and Records

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	NETMWD/WMS**	10	Paper/Electronic
Field SOPs	NETMWD/WMS**	10	Paper/Electronic
Laboratory Quality Manuals	LCRA Lab*/WMS**	5	Paper/Electronic
Laboratory SOPs	LCRA Lab*/WMS**	5	Paper/Electronic
QAPP distribution documentation	NETMWD/WMS**	10	Paper/Electronic
Field staff training records	NETMWD/WMS**	10	Paper/Electronic
Field equipment calibration/maintenance logs	WMS**/CLI	10	Electronic/Paper
Field instrument printouts	WMS**/CLI	10	Electronic/Paper
Field notebooks or data sheets	WMS**/CLI	10	Electronic/Paper
Chain of custody records	NETMWD/WMS**	10	Paper/Electronic
Laboratory calibration records	LCRA Lab*	5	Paper
Laboratory instrument printouts	LCRA Lab*	5	Paper
Laboratory data reports/results	NETMWD/WMS**/ LCRA Lab*	10	Paper/Electronic/ Paper
Laboratory equipment maintenance logs	LCRA Lab*	5	Paper
Corrective Action Documentation	NETMWD/WMS**/ LCRA Lab*	5	Paper/Electronic/ Paper

*Laboratory Records must be retained in accordance with the NELAC Standards
**WMS will transfer all paper documents to NETMWD annually and will retain electronic copies only.

Laboratory Test Reports

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

- Title of report and unique identifiers on each page
- Name and address of the laboratory
- Name and address of the client
- A clear identification of the sample(s) analyzed
- Station, date and time of sample collection/receipt
- Identification of method used
- Identification of samples that did not meet QA requirements and why (e.g., holding times exceeded)
- Sample results
- Units of measurement
- Sample matrix

- Dry weight or wet weight (as applicable)
- Sample depth
- A name and title of person accepting responsibility for the report
- Project-specific quality control results to include field split results (as applicable); equipment, trip, and field blank results (as applicable)
- Narrative information on QC failures or deviations from requirements that may affect the quality of results or is necessary for verification and validation of data.
- Holding time for SM9223-B
- LOQ and LOD (formerly referred to as the reporting limit and the method detection limit, respectively), and qualification of results outside the working range (if applicable)
- Certification of NELAP compliance on a result by result basis

The information in test reports will be consistent with the information that is needed to prepare data submittals to TCEQ. Otherwise, reports will be consistent with the TNI Standards and will include any additional information critical to the review, verification, validation, and interpretation of data.

Electronic Data
Data will be submitted electronically to the TCEQ in the Event/Result file format described in the most current version of the DMRG, which can be found at (http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wdma/dmrg_index.html). A completed Data Review Checklist and Data Summary (see Appendix F) will be submitted with each data submittal.

B1 Sampling Process Design

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

B2 Sampling Methods

Field Sampling Procedures

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

Table B2.1 Sample Storage, Preservation and Handling Requirements

Parameter	Matrix	Container*	Preservation**	Sample Volume	Holding Time
TSS	Water	New Plastic or New Cubitainer	Cool to 6°C, dark	400 ml	7 days
Alkalinity	Water			100 ml	14 days
Sulfate	Water			100 ml	28 days
Chloride	Water			100 ml	28 days
Nitrate and Nitrite (N)	Water			150 ml	48 hrs
Ammonia	Water	New Plastic or New Cubitainer	1-2 ml conc. H_2SO_4 to pH <2 and cool to 6°C, dark	150 ml	28 days
Total Phosphorus	Water			150 ml	28 days
TKN	Water			200 ml	28 days
TOC	Water			100 ml	28 days
Chlorophyll *a*/ Pheophytin	Water	New Amber Glass	Dark and ice before filtration; Dark and frozen after filtration	1000 ml	≤ 48 hrs Unfiltered 24 days Filtered
E. coli	Water	Plastic (sterile)	Cool to 6°C, dark sample container with sodium thiosulfate powder	200 ml	6 hours +
Total Hardness	Water	New Plastic or New Cubitainer	Cool to 6°C, dark	250 ml	48 hours
Magnesium	Water	New Plastic or New Cubitainer	1-2 ml 1+1 HNO_3 to pH<2 and cool to 6°C	500 ml	180 days
Calcium	Water				

+E.coli samples should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery, the holding time may be extended and samples must be processed as soon as possible and within 30 hours.

Sample Preservation

Samples must be placed on ice immediately after collection. Place all samples that require cooling only in ice before preserving other samples with acid. Sufficient ice will be needed to lower sample temperature to < 6°C but not to the freezing point. Sample temperature must be maintained at < 6°C until delivery to the laboratory. This may mean repacking samples prior to shipment.

Samples that are hand delivered to the laboratory the same day of collection may not meet the < 6ºC requirement. In this case, the samples are considered acceptable if there is evidence that chilling has begun, such as arrival on ice.

Sample Containers

Certificates from sample container manufacturers are maintained in a notebook by the LCRA laboratory.

Processes to Prevent Contamination

Procedures outlined in SWQM Procedures outline the necessary steps to prevent contamination of samples. These include: direct collection into sample containers, when possible; use of certified

containers for organics; and clean sampling techniques for metals. Field QC samples (identified in Section B5) are collected to verify that contamination has not occurred.

Documentation of Field Sampling Activities

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

1. Station ID
2. Sampling Date
3. Location
4. Sampling Depth
5. Sampling Time
6. Sample Collector's name and signature
7. Values for all field parameters
8. Notes containing detailed observational data not captured by field parameters, including;
    - Water appearance
    - Weather
    - Biological activity
    - Recreational activity
    - Unusual odors
    - Pertinent observations related to water quality or stream uses
    - Watershed or instream activities
    - Specific sample information
    - Missing parameters
    -

Recording Data

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

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

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

Examples of sampling method requirements or sample design deficiencies include but are not limited to such things as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately, contamination of a sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any deviations from the QAPP, SWQM Procedures, or appropriate sampling procedures may invalidate data, and require documented corrective action. Corrective action may include for samples to be discarded and re-collected. It is the

responsibility of the WMS Project Manager, in consultation with the WMS QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in the project progress reports and by completion of a CAP.

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

B3 Sample Handling and Custody

Sample Tracking

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

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

1. Date and time of collection
2. Site identification
3. Sample matrix
4. Number of containers
5. Preservative used
6. Was the sample filtered
7. Analyses required
8. Name of collector
9. Custody transfer signatures and dates and time of transfer
10. Bill of lading, if applicable

Sample Labeling

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

1. Site identification
2. Date and time of collection
3. Preservative added, if applicable
4. Indication of field-filtration for metals, as applicable
5. Sample type (i.e., analyses) to be performed

Sample Handling

The WMS Data Manager or designee will notify LCRA Lab prior to each sampling event with information regarding the expected sampling date and number of sample containers required. The LCRA Lab will deliver all sample containers, ice chests, and appropriate chain-of-custody forms to a pre-determined location prior to each sampling event. The containers used will be provided by LCRA Lab, will be pre-cleaned with proper techniques, supplied with correct preservatives, and labeled accordingly. Quality control for sample containers will be provided by LCRA Lab.

The WMS Data Manager will be responsible for collection of the samples using approved TCEQ methods. A Chain-of-Custody form will be completed for each sample collected during the sampling event. Samples will be shipped to LCRA Lab or arrangements will be made with LCRA Lab for sample pick up at a pre-determined location after each day's sampling event is completed in order to assure that the chain-of-custody forms are correctly filled out and signed. The LCRA Lab transfer custodian will also see that the samples arrive within holding time constraints. LCRA Lab will have a sample custodian who examines all arriving samples for proper documentation, and proper preservation. This custodian will accept delivery by signing the final portion of the chain-of-custody form. The sample custodian will log and monitor the progress of the samples through the analysis stage. Internal sample handling, custody, and storage procedures are described in LCRA's Quality Manual(s).

Sample Tracking Procedure Deficiencies and Corrective Action

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

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

B4 Analytical Methods

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

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

Standards Traceability

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

Analytical Method Deficiencies and Corrective Actions

Deficiencies in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, quality control samples outside QAPP defined limits, etc. In many cases, the field technician or lab analyst will be able to correct the problem. If the problem is resolvable by the field technician or lab analyst, then they will document the problem on the field data sheet or laboratory record and complete the analysis. If the problem is not resolvable, then it is conveyed to the LCRA Laboratory Supervisor, who will make the determination and notify the WMS QAO. If the analytical system failure may compromise the sample

results, the resulting data will not be reported to the TCEQ. The nature and disposition of the problem is reported on the data report which is sent to the WMS Project Manager. The Lead Organization Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

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

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

B5 Quality Control

Sampling Quality Control Requirements and Acceptability Criteria

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

Field blank

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

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

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

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Batch

A batch is defined as environmental samples that are prepared and/or analyzed together with the

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

Method Specific QC requirements

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

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

Comparison Counting

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

Limit of Quantitation (LOQ)

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

LOQ Check Sample

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

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

The percent recovery of the LOQ check sample is calculated using the following equation in which %R is percent recovery, S_R is the sample result, and S_A 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 Table A7.1.

Laboratory Control Sample (LCS)

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

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

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

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

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

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

Laboratory Duplicates

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

For most parameters except bacteria, precision is evaluated using the relative percent difference (RPD) between duplicate LCS results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X_1 and X_2, the RPD is

calculated from the following equation: (If other formulas apply, adjust appropriately.)

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

For bacteriological parameters, precision is evaluated using the results from laboratory duplicates. Bacteriological duplicates are collected on a 10% frequency (or once per sampling run, whichever is more frequent). These duplicates will be collected in sufficient volume for analysis of the sample and its laboratory duplicate from the same container.

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, Table A7.1.

If the difference in logarithms is greater than the precision criterion, the data are not acceptable for use under this project and will not be reported to TCEQ. Results from 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 Table A7.1 for bacteriological duplicates applies only to samples/sample duplicates with concentrations > 10 MPN/100mL. Field splits will not be collected for bacteriological analyses.

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

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

Matrix spikes indicate the effect of the sample on the precision and accuracy of the results generated using the selected method. 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 concentration measured in the matrix spike, S_R is the concentration in the parent sample, and S_A is the concentration of analyte that was added:

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

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

Method blank

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

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

Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

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

metals analysis are also scrutinized very closely.

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

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

B6 Instrument/Equipment Testing, Inspection, and Maintenance

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

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

B7 Instrument Calibration and Frequency

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

B8 Inspection/Acceptance of Supplies and Consumables

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

B9 Acquired Data

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

USGS gage station data will be used throughout this project to aid in determining gage height and flow. Rigorous QA checks are completed on gage data by the USGS and the data are approved by the USGS and permanently stored at the USGS. This data will be submitted to the TCEQ under parameter

code 00061 Flow, Instantaneous or parameter code 74069 Flow Estimate depending on the proximity of the monitoring station to the USGS gage station.

Reservoir stage data are collected every day from the USGS, IBWC, and the 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 at the TWDB website at http://waterdatafortexas.org/reservoirs/statewide. The web application uses real time gaged observations 7 AM reading each day (or closest reading available) from 119 major reservoirs to approximate daily storage for each reservoir, as well as daily total storage for water planning regions, river basins and the state of Texas. These instantaneous data are updated to mean daily data for all previous days. These data will be submitted to the TCEQ under parameter code 00052 Reservoir Stage and parameter code 00053 Reservoir Percent Full.

Insert additional sources of non-direct measurements as needed.

B10 Data Management

Data Management Process

The NETMWD Cypress Creek Basin CRP Database will be maintained and updated with data obtained from the Cypress Creek Basin CRP monitoring programs (routine and systematic stations, special studies, and flow studies). All data results will be maintained electronically in accordance with procedures and guidelines described in the Cypress Creek Basin Clean Rivers Program Data Management Plan revised on January 27, 2012. The process described below summarizes procedures and guidelines of the Plan.

All data to be stored in the SWQMIS will be submitted in the format specified in the SWQM Data Management Reference Guide, August 2015, or latest version.

Additional water quality data collected through this monitoring program will be introduced into the NETMWD database by either manual entry, or digital electronic files by the WMS Data Manager. In each case, the data will be screened to insure (1) transcription accuracy, and (2) that the data meets the quality criteria for that data type (e.g., were holding times exceeded, were reporting limits met) prior to its submission to the TCEQ CRP Project Manager.

This data management process will be used as guidance for the collection, quality assurance and archiving of all data collected pursuant to the CRP. This plan has been developed after a full assessment of the human, data, and computer resource needs of the CRP as appropriate for the Cypress Creek Basin. It is anticipated that the types of data to be collected and archived in the future may change, as future data retrieval, analysis and presentation needs may change. As circumstances dictate, this plan will be revised to adjust the procedures and methods necessary to reflect changes in CRP project focus, and to take advantage of opportunities for improvement of current procedures, hardware, and software.

With respect to the management of data generated in the Cypress Creek Basin CRP monitoring programs, the process begins with field sampling and ends with the data users with a typical line of transmission as follows:

1. Field Sampling
2. Sample Custodian
3. Lab Analyst
4. Lab Supervisor/Reporter
5. WMS Data Manager
6. Quality Assurance Officer
7. Transfer of Data to TCEQ CRP Project Manager
8. CRP Project Manager transfers data to CRP Data Manager
9. CRP Data Manager loads data into SWQMIS

The analytical laboratory supervisor is responsible for the management and submission of valid data from the laboratory analyses. The laboratory supervisor validates the analytical data by comparing the various quality control measurements and by recalculating a random selection of the results produced by each analyst submitting data. The laboratory services manager using the labs standard reporting format will provide results to the WMS Data Manager. The analytical laboratory will retain files of all quality assurance verifications for five years in accordance with NELAC and make them available for inspection on request.

After the laboratory supervisor has received data from the lab analyst, the supervisor screens the data to ensure accuracy and that the data meets the quality criteria for that data type. Quality assurance and control is integrated at all points along this process, with sample field sheets, chain of custody forms, analyst's bench sheets, control charts, and lab reports.

Scanned field forms and copies of the Chain of Custody forms will be sent to the WMS Data Manager for data screening and quality assurance. This information will be quality checked by the WMS Data Manager by comparing it with the appropriate CRP monitoring schedule to verify that the correct stations have been sampled, that the correct sets of measurements and samples have been collected, and that calibration procedures have been correctly applied. The WMS Data Manager will be responsible for the review of all field and laboratory-generated data for consistency with QA criteria, for accuracy of the input operations, and for timely entry and transfer to TCEQ. The WMS Data Manager will also be responsible for ensuring that all field activity reports, calibration records, and general information is maintained and properly filed according to particular investigations of the project.

Upon completion of the review, the Data Manager will convert quality-assured data into pipe-delimited text format which he then submits to the TCEQ Project Manager for review. The TCEQ Project Manager will submit the file to the TCEQ Data Manager for review and loading into the SWQMIS database. Once these procedures have been completed, copies of all information (both paper and electronic) will be deposited with and retained by NETMWD.

Data will only be deleted from the NETWMD data set files if it is determined to be erroneous, or is found to have been collected in a manner that does not follow the TCEQ guidelines for data procurement. The WMS Data Manager will alert the WMS Project Manager to any abnormalities or apparent outliers. The WMS Project Manager will evaluate the data and determine if any statistical tests need to be performed to further evaluate the data. The WMS QAO will be responsible for reviewing a random 10% of the data for any problems such as exceeded holding times or exceeded precision/accuracy limits.

All future quarterly data submittals to the SWQMIS database can be accessed on the TCEQ website (http://www.tceq.texas.gov/waterquality/clean-rivers/data/samplequery.html). Paper copies of all data and reports are maintained at the WMS offices in Sulphur Springs, Texas and transferred annually to the NETMWD office in Hughes Springs, Texas for the required duration defined in Table A9.1. Requests for data or reports can be made at either office.

Data Dictionary

Terminology and field descriptions are included in the DMRG, August 2015, or most recent version. A table outlining the entities that will be used when submitting data under this QAPP is included below for the purpose of verifying which entity codes are included in this QAPP.

Name of Monitoring Entity	Tag Prefix	Submitting Entity	Collecting Entity
Caddo Lake Institute			CL
Northeast Texas Municipal Water District	CY	NT	NT
Water Monitoring Solutions, Inc.			WM

Data Errors and Loss

The WMS Project Manager will be responsible for determining what data, if any; will be deleted from the NETMWD Cypress Creek Basin CRP Database. The Project Manager and laboratory responsible for analysis will initially review any questions concerning analytical data. If a modification of the data originally reported is deemed necessary, documentation of the original data, the question concerning that data and the modified data along with the copies of the data change will be entered in the WMS Data Manager's data log and saved electronically.

The WMS DM produces data files in Microsoft Excel formats, and transfers to the pipe-delimited text file format before being submitted to TCEQ. The file format utilized involves the established event and result file formats. Presently, WMS manually reviews all data for the established minimum, maximum, and AWRL limits set for each parameter by TCEQ.

Any values flagged during review will be first checked against the laboratory analysis files to see if there are transcription errors. If the values are correct, then an e-mail querying the validity of the value reported will be sent to the laboratory. Values that are verified as correct by the laboratory will be flagged as outliers within the data set. In addition to the review check, a minimum 10% check is done on all data sets, which are produced before their conversion to text files. A data summary form (Appendix F) will be included with the submittal of the completed data set. This summary form includes data information and comments specific to the data set being submitted at that time.

File transfer protocols concerning conversion of Excel data files to other types of files and their reconversion into the original format involves the import/export of files in both formats. However, care must be taken that all Excel files exported are in pipe-delimited text format to ensure correct transfer of all information. After the conversion of any database files into another format, a ten-percent check of the transferred files occurs. File transfer and checking is initially a responsibility of the WMS QAO, and secondarily the WMS Data Manager.

Development of data files is initially dependent on the use of forms and checklists appropriate to those specified in the QAPP. These documents include: 1) Field documentation which contains all instrument calibration/standards records, field measurements, and site characteristics (Appendix D), 2) Field notes, 3) Laboratory documentation including Analyst's comments on the condition of the sample and progress of the analysis, raw data, instrument printouts, results of calibration, QA checks, external and internal standards records, and SOP's, 4) Chain of custody forms (Appendix E), and 5) Laboratory Data Review Checklist (Exhibit of the TCEQ CRP FY 2014-2015 Guidance).

Examples of forms or checklists to be used can be found in Appendix F. Refer to QAPP Appendices as appropriate for Field and Laboratory Data Sheets, the Data Summary, etc.

Record Keeping and Data Storage

All data files and GIS data layers will be stored on the NETMWD server and WMS computers. A full backup of all WMS files is produced daily. Additionally, a backup of all files is completed weekly and stored off-site in a water & fire proof safe. Electronic data and reports will be submitted to NETMWD at the end of each quarter. All paper documents are scanned upon receipt and then transferred to NETMWD annually. In addition, all data files and reports concerning the project are available to the Project Manager at TCEQ.

The disaster recovery procedure consists of reinstalling the operation system and software either from the original software media, or from a disaster recovery CD that has been created and stored on site. Electronic files will be replaced from either the weekly or daily backup files.

Data Handling, Hardware, and Software Requirements

The data management program will interface with the data users to assure efficient retrieval and manipulation of screened, quality assured data. Staff with data management skills, who have sufficient understanding of database administration and operation to coordinate the data elements needed and manage the available resources, such as trend analysis, web page updates, or public presentation will provide direct support to the various data users. Administrative and data management needs can be filled with the use of current staff that have already been given appropriate training. The need for staff at a more specialized skill level is only occasional, and may be met by the use of consultants.

The primary source of data used to satisfy the objectives of the CRP is the descriptive data collected on water quality and natural resources within the Cypress Creek Basin. This data must be collected by reliable personnel using the established methods described in the TCEQ Program Guidance and specifically adapted to Cypress Creek Basin CRP activities in the QAPP. In addition, the CRP data will

be supplemented by acquired data sets, which may be used to establish a regional context, or to evaluate possible correlations between identified water quality problems and their likely sources. These data sets must be screened and assessed for usefulness and credibility before being integrated into the basin assessment report.

The large amount of data involved will need to be readily updateable and efficiently managed. The data must be efficiently sorted and grouped for statistical analysis. The ability to present this data in both a graphic and tabular format may be necessary to effectively communicate both the results and basis for basin assessments to the public. This action requires the procurement and use of software that has the ability to produce both graphics and tables.

The recommended software and hardware required to meet the basic requirements of the program have been identified, and are being utilized by the Cypress Creek Basin Clean Rivers Program. Program requirements are continually evaluated by NETMWD and its consultants to insure that CRP dedicated hardware continue to be adequate to meet those requirements. Criteria for hardware will include performance capable of running anticipated software and potentially useful future software products, as well as storage capacity appropriate to maintain all program-related software, and numerous years of data. Criteria for software will include the capability to manipulate, evaluate, report, and manage data consistent with the basic requirements of the water quality assessments.

Data management procedures have been developed to screen and digitally store data, convert the data received in non-compatible formats to a format suitable for analysis, apply quality control and assurance procedures, provide data access for current and future users of the data, and support assessments of water quality conditions within the basin. These procedures utilize personal computer technology to manage the data associated with the individual tasks of the program.

Once the data has been entered, screened, and quality-checked it is submitted in TCEQ required format for use in the SWQMIS database. The data is also transmitted to NETMWD to be maintained for dissemination.

WMS maintains Microsoft Office, which includes Microsoft Word, Microsoft Excel, and Microsoft Access, used for report preparation, data entry, and exploratory data analysis. Once entered, screened, and quality checked, the data is converted into delimited text files for database storage and transfer to TCEQ and NETMWD. Esri ArcGIS software are maintained for GPS, GIS (Geographic Information Systems), and graphics support.

The NETMWD computer system is a Microsoft Windows based system with Microsoft Office maintained for general report production and correspondence. Additional software similar to that already available at WMS, but not currently maintained by NETMWD, may also need to be acquired in the future to facilitate data use and manipulation.

Information Resource Management Requirements

The information management specifications include TCEQ as well as each grantee's internal information management controls. The TCEQ has the following data specification requirements: the Surface Water Quality Monitoring Data Management Reference Guide, GIS Policy (TCEQ OPP 8.11)

and GPS Policy (TCEQ OPP 8.12). Note that GPS certification is not required for positional data that will be used for photo interpolation in the SLOC request process.

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

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

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

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

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

C1 Assessments and Response Actions

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

Table C1.1 Assessments and Response Requirements

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	NETMWD	Monitoring of the project status and records to ensure requirements are being fulfilled	Report to TCEQ in Quarterly Report
Monitoring Systems Audit of the NETMWD	Dates to be determined by TCEQ CRP	TCEQ	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the TCEQ to address corrective actions
Monitoring Systems Audit of Program Sub-participants	Once per sub-participant within the contract period	NETMWD	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the NETMWD. The NETMWD will report problems to TCEQ in Progress Report.
Laboratory Inspection	Dates to be determined by TCEQ	TCEQ Laboratory Inspector	Analytical and quality control procedures employed at the laboratory and the contract laboratory	30 days to respond in writing to the TCEQ to address corrective actions

Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, *SWQM Procedures*, SOPs, or the DMRG. Deficiencies may invalidate resulting data and require corrective action. Repeated deficiencies should initiate a CAP. Corrective action for deficiencies may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff, are communicated to Lead Organization Project Manager (or other appropriate staff), and should be subject to periodic review so their responses can be uniform, and their frequency tracked. It is the

responsibility of the Lead Organization Project Manager, in consultation with the Lead Organization QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in the project progress reports and by completion of a CAP.

Corrective Action

CAPs should:

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

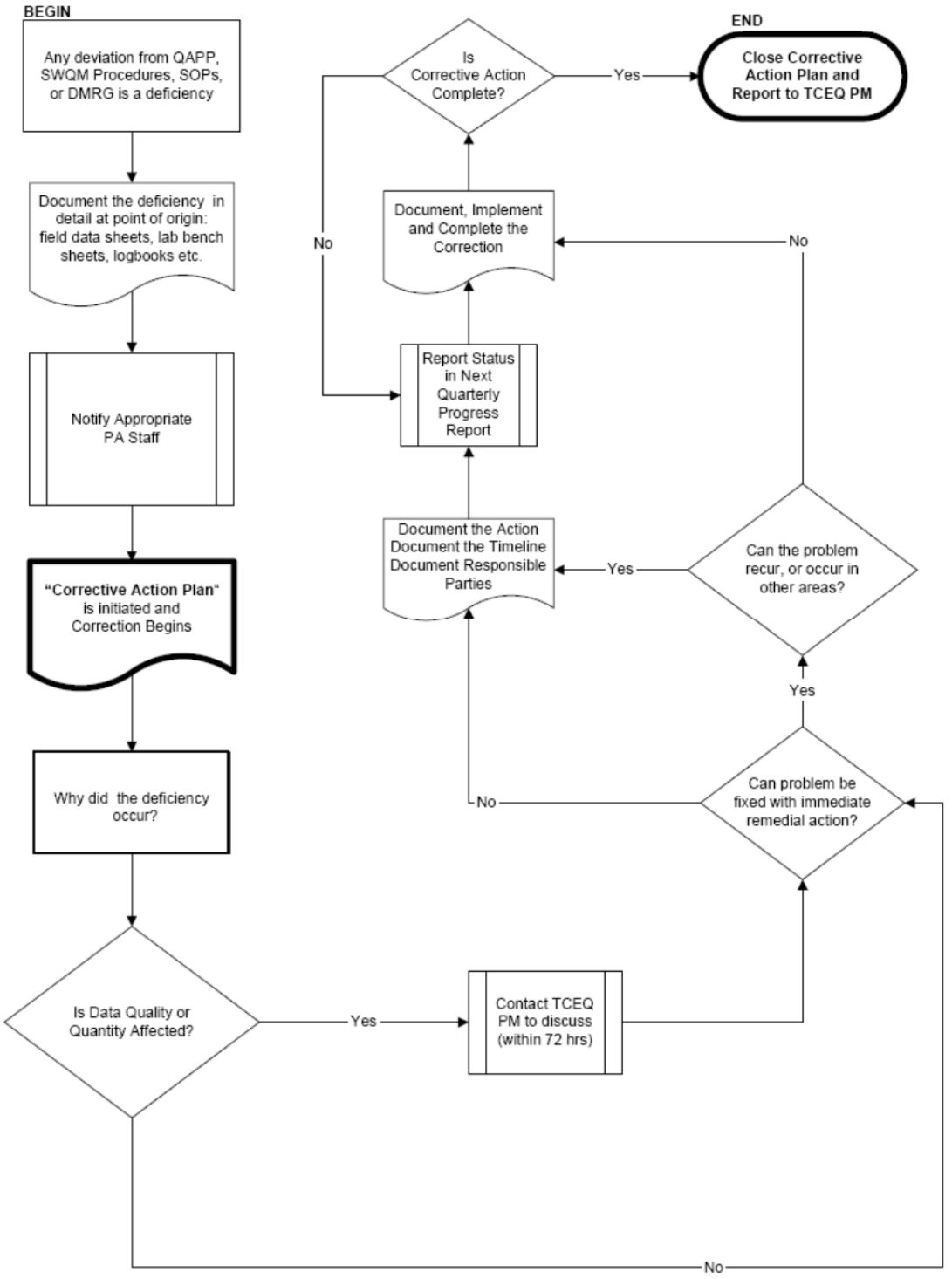
To facilitate the process a flow chart has been developed (see figure C1.1: Corrective Action Process for Deficiencies).

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

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

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

Figure C1.1 Corrective Action Process for Deficiencies



C2 Reports to Management

Table C2.1 QA Management Reports

Type of Report	Frequency (daily, weekly, monthly, quarterly, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipients
Monitoring Summary, Data Review and Sampling Results	Quarterly	By the 20th day of the month following the end of the quarter	WMS DM	NETMWD PM and TCEQ PM
Progress Report	Quarterly	By the 15th day of the month following the end of the quarter	NETMWD PM	TCEQ PM
Monitoring Systems Audit Report	Annually	Within 30 days of Audit completion	WMS QAO	NETMWD PM and TCEQ PM
Contractor Evaluations	Annually	Within 30 days of Evaluation completion	NETMWD PM	TCEQ PM

Reports to NETMWD Project Management

Each quarter, WMS QAO will review and QA laboratory results and review field sheets. Reports with any corrected actions that occurred will be sent to NETMWD for review, quarterly. NETMWD will then review and transmit these reports to TCEQ for their review. The contract laboratory will submit data and QA/QC reports within a one-month time period from the receipt of samples for analysis.

Reports to TCEQ Project Management

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

Progress Report

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

Monitoring Systems Audit Report and Response

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

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

Reports by TCEQ Project Management

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

D1 Data Review, Verification, and Validation

For the purposes of this document, the term verification refers to the data review processes used to determine data completeness, correctness, and compliance with technical specifications contained in applicable documents (e.g. QAPPs, SOPs, QMs, analytical methods). Validation refers to a specific review process that extends the evaluation of a data set beyond method and procedural compliance (i.e., data verification) to determine the quality of a data set specific to its intended use.

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

D2 Verification and Validation Methods

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

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

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

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

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

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

Table D2.1: Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified	DM[1]		DM[1]
Field QC samples collected for all analytes as prescribed in the TCEQ SWQM Procedures Manual	DM[1]		
Standards and reagents traceable	DM[1]	QAO[2]	
Chain of custody complete/acceptable	DM[1]	QAO[2]	DM[1]
NELAP Accreditation is current		QAO[2]	
Sample preservation and handling acceptable	DM[1]		
Holding times not exceeded	DM[1]		
Collection, preparation, and analysis consistent with SOPs and QAPP	DM[1]		
Field documentation (e.g., biological, stream habitat) complete	DM[1]		
Instrument calibration data complete	DM[1]	QAO[2]	
Bacteriological records complete		QAO[2]	
QC samples analyzed at required frequency	DM[1]	QAO[2]	
QC results meet performance and program specifications		QAO[2] and QAO[1]	
Analytical sensitivity (Limit of Quantitation/Ambient Water Reporting Limits) consistent with QAPP		QAO[2]	
Results, calculations, transcriptions checked			DM[1] and QAO[1]
Laboratory bench-level review performed		QAO[2]	
All laboratory samples analyzed for all scheduled parameters		QAO[2]	DM[1]
Corollary data agree			DM[1]
Nonconforming activities documented			QAO[1]
Outliers confirmed and documented; reasonableness check performed			DM[1]
Dates formatted correctly			DM[1]
Depth reported correctly and in correct units			DM[1]
TAG IDs correct			DM[1] and PM[1]
TCEQ Station ID number assigned			PM[1]
Valid parameter codes			QAO[1] and DM[1]
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly			PM[1]
Time based on 24-hour clock			DM[1]
Absence of transcription error confirmed			QAO[1] and PM[1]
Absence of electronic errors confirmed			QAO[1] and PM[1]
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)			QAO[1]
Field QC results attached to data review checklist	DM[1]		QAO[1]
Verified data log submitted			QAO[1] and PM[1]
10% of data manually reviewed			QAO[1] and DM[1]

DM – Data Manager; PM – Project Manager; QAO – Quality Assurance Officer; [1] – Responsible party is WMS staff; [2] –Responsible party is LCRA Lab staff

D3 Reconciliation with User Requirements

Data produced in this project, and data collected by other organizations, will be analyzed and reconciled with project data quality requirements. Data meeting project requirements will be used by the TCEQ for the Texas Water Quality Integrated Report in accordance with TCEQ's Guidance for Assessing and Reporting Surface Water Quality in Texas, August 2010 or most recent version, and for TMDL development, water quality standards development, and permit decisions, as appropriate. Data which do not meet requirements will not be submitted to SWQMIS nor will be considered appropriate for any of the uses noted above.

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

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

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

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

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

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

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

Table A7.1 - Measurement Performance Specifications

TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin					
Field Parameters					
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**Lab**
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 B and TCEQ SOP V1	00010	Field
TEMPERATURE, AIR (DEGREES CENTIGRADE)	DEG C	air	TCEQ SOP V1	00020	Field
RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW ENTER 1 IF REPORTING	NS	other	TCEQ Drought Guidance	00051	Field
RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL)†	FT ABOVE MSL	water	TWDB	00052	Field
RESERVOIR PERCENT FULL†	% RESERVOIR CAPACITY	water	TWDB	00053	Field
TRANSPARENCY, SECCHI DISC (METERS)	meters	water	TCEQ SOP V1	00078	Field
SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	us/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP V1	00300	Field
PH (STANDARD UNITS)	s.u	water	EPA 150.1 and TCEQ SOP V1	00400	Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	Field
WIND DIRECTION (1=N, 2=S, 3=E, 4=W, 5=NE, 6=SE, 7=NW, 8=SW)	NU	other	NA	89010	Field
WIND INTENSITY (1=CALM,2=SLIGHT,3=MOD.,4=STRONG)	NU	other	NA	89965	Field
PRESENT WEATHER (1=CLEAR,2=PTCLDY,3=CLDY,4=RAIN,5=OTHER)	NU	other	NA	89966	Field
WATER SURFACE (1=CALM,2=RIPPLE,3=WAVE,4=WHITECAP)	NU	water	NA	89968	Field
WATER COLOR (1=BRN, 2=RED, 3=GRN, 4=BLK, 5=CLR, 6=OT)	NU	water	NA	89969	Field
WATER ODOR (1=SEWAGE, 2=OILY/CHEMICAL, 3=ROTTEN EGGS, 4=MUSKY, 5=FISHY, 6=NONE, 7=OTHER)	NU	water	NA	89971	Field
PRIMARY CONTACT, OBSERVED ACTIVITY (# OF PEOPLE OBSERVED)	# of people observed	other	NA	89978	Field
EVIDENCE OF PRIMARY CONTACT RECREATION (1 = OBSERVED, 0 = NOT OBSERVED)	NU	other	NA	89979	Field

* Reporting to be consistent with SWQM guidance and based on measurement capability.
** Chlorine residual to be collected downstream of chlorinated outfalls.
*** To be routinely reported when collecting data from perennial pools.
† As published by the Texas Water Development Board on their website
http://wiid.twdb.state.tx.us/ims/resinfo/BushButton/lakestatus.asp?selcat=3&slbasin=2

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard
Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin

Flow Parameters					
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**Lab**
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP V1	74069	Field
FLOW MTH1=Gage 2=Elec 3=Mech 4=Weir/Flu 5=Doppler	NU	other	TCEQ SOP V1	89835	Field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard
Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
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TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin

Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Log Difference of Duplicates	Bias %Rec. of LCS	Lab
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/100 mL	water	SM 9223-B**	31699	1	1	NA	0.50*	NA	ELS
E.COLI, COLILERT, IDEXX, HOLDING TIME	hours	water	NA	31704	NA	NA	NA	NA	NA	ELS

* This value 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.
** 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.
***Enterococcus Samples should be diluted 1:10 for all waters.

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
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TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin

Metals in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
HARDNESS, TOTAL (MG/L AS CACO3)*	mg/L	water	SM 2340 B	00900	5	5	NA	20	80-120	ELS
CALCIUM, TOTAL (MG/L AS CA)	mg/L	water	EPA 200.7	00916	0.5	0.5	70-130	20	80-120	ELS
MAGNESIUM, TOTAL (MG/L AS MG)	mg/L	water	EPA 200.7	00927	0.5	0.5	70-130	20	80-120	ELS

*Hardness is not used for regulatory purposes but is used to assess metals in water at inland sites (estuarine sites do not require hardness analysis).

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
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TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin

Conventional Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	TCEQ AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
ALKALINITY, TOTAL (MG/L AS CACO3)	mg/L	water	SM 2320B	00410	20	20	NA	20	NA	ELS
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540D	00530	5	4	NA	NA	NA	ELS
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	00610	0.1	0.1	70-130	20	80-120	ELS
NITRITE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00615	0.05	0.05	70-130	20	80-120	ELS
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	80-120	ELS
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2 Rev. 2.0 (1993)	00625	0.2	0.2	70-130	20	80-120	ELS
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.4	00665	0.06	0.06	70-130	20	80-120	ELS
CARBON, TOTAL ORGANIC, NPOC (TOC), MG/L	mg/L	water	SM 5310 D	00680	2	2	NA	NA	NA	ELS
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00940	5	5	70-130	20	80-120	ELS
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00945	5	5	70-130	20	80-120	ELS
PHEOPHYTIN-A UG/L FLUOROMETRIC METHOD	µg/L	water	EPA 445	32213	3	3	NA	NA	NA	ELS
CHLOROPHYLL-A, FLUOROMETRIC METHOD, UG/L	µg/L	water	EPA 445.0	70953	3	3	NA	20	80-120	ELS

*Hardness is not used for regulatory purposes but is used to assess metals in water at inland sites (estuarine sites do not require hardness analysis).

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
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TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin

24 Hour Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	Lab
TEMPERATURE, WATER (DEGREES CENTIGRADE), 24HR AVG	DEG C	Water	TCEQ SOP V1	00209	field
WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	DEG C	Water	TCEQ SOP V1	00210	field
TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	DEG C	Water	TCEQ SOP V1	00211	field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR AVG	uS/cm	Water	TCEQ SOP V1	00212	field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MAX	uS/cm	Water	TCEQ SOP V1	00213	field
SPECIFIC CONDUCTANCE, US/CM, FIELD, 24HR MIN	uS/cm	Water	TCEQ SOP V1	00214	field
PH, S.U., 24HR MAXIMUM VALUE	std. units	Water	TCEQ SOP V1	00215	field
PH, S.U., 24HR, MINIMUM VALUE	std. units	Water	TCEQ SOP V1	00216	field
WATER TEMPERATURE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00221	field
SPECIFIC CONDUCTANCE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00222	field
pH, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	00223	field
DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89855	field
DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89856	field
DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP V1	89857	field
DISSOLVED OXYGEN, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP V1	89858	field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
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TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin

Biological - Habitat

Parameter	Units	Matrix	Method	Parameter Code	Lab
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	Water	TCEQ SOP V2	00061	Field
BIOLOGICAL DATA	NS	Other	NA/Calculation	89888	Field
STREAM TYPE 1=PERENNIAL 2=INTERMITTENT S/PERENNIAL POOLS 3=INTERMITTENT 4=UNKNOWN	NU	Other	NA/Calculation	89821	Field
STREAMBED SLOPE (M/KM)	M/KM	Other	NA/Calculation	72051	Field
AVERAGE PERCENTAGE INSTREAM COVER	%	Other	TCEQ SOP V2	84159	Field
STREAM ORDER	NU	Water	TCEQ SOP V2	84161	Field
NUMBER OF LATERAL TRANSECTS MADE	NU	Other	TCEQ SOP V2	89832	Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	Other	TCEQ SOP V2	89835	Field
TOTAL NUMBER OF STREAM BENDS	NU	Other	TCEQ SOP V2	89839	Field
NUMBER OF WELL DEFINED STREAM BENDS	NU	Other	TCEQ SOP V2	89840	Field
NUMBER OF MODERATELY DEFINED STREAM BENDS	NU	Other	TCEQ SOP V2	89841	Field
NUMBER OF POORLY DEFINED STREAM BENDS	NU	Other	TCEQ SOP V2	89842	Field
TOTAL NUMBER OF RIFFLES	NU	Other	TCEQ SOP V2	89843	Field
DOMINANT SUBSTRATE TYPE (1=CLAY,2=SILT,3=SAND,4=GRAVEL,5=COBBLE,6=BOULDER,7=BEDROCK,8=OTHER)	NU	Sediment	TCEQ SOP V2	89844	Field
AVERAGE PERCENT OF SUBSTRATE GRAVEL SIZE OR LARGER	%	Other	TCEQ SOP V2	89845	Field
AVERAGE STREAM BANK EROSION (%)	%	Other	TCEQ SOP V2	89846	Field
AVERAGE STREAM BANK SLOPE (DEGREES)	deg	Other	TCEQ SOP V2	89847	Field
HABITAT FLOW STATUS, 1=NO FLOW, 2=LOW,3=MOD,4=HIGH	NU	Other	TCEQ SOP V2	89848	Field
AVERAGE PERCENT TREES AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89849	Field
AVERAGE PERCENT SHRUBS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89850	Field

Biological – Habitat, continued					
AVERAGE PERCENT GRASS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89851	Field
AVERAGE PERCENT CULTIVATED FIELDS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89852	Field
AVERAGE PERCENT OTHER AS RIPARIAN VEGETATION	%	Other	TCEQ SOP V2	89853	Field
AVERAGE PERCENTAGE OF TREE CANOPY COVERAGE	%	Other	TCEQ SOP V2	89854	Field
DRAINAGE AREA ABOVE MOST DOWNSTREAM TRANSECT*	km2	Other	TCEQ SOP V2	89859	Field
REACH LENGTH OF STREAM EVALUATED (M)	m	Other	NA/Calculation	89884	Field
AVERAGE STREAM WIDTH (METERS)	M	Other	TCEQ SOP V2	89861	Field
AVERAGE STREAM DEPTH (METERS)	M	Other	TCEQ SOP V2	89862	Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)	M	Other	TCEQ SOP V2	89864	Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)	M	Other	TCEQ SOP V2	89865	Field
AVERAGE WIDTH OF NATURAL RIPARIAN VEGETATION (M)	M	Other	TCEQ SOP V2	89866	Field
AVERAGE WIDTH OF NATURAL RIPARIAN BUFFER ON LEFT BANK (M)	M	Other	NA/Calculation	89872	Field
AVERAGE WIDTH OF NATURAL RIPARIAN BUFFER ON RIGHT BANK (M)	m	Other	NA/Calculation	89873	Field
AESTHETICS OF REACH (1=WILD 2=NAT. 3=COMM. 4=OFF.)	NU	Other	TCEQ SOP V2	89867	Field
NUMBER OF STREAM COVER TYPES	NU	Other	TCEQ SOP V2	89929	Field
LAND DEVELOP IMPACT (1=UNIMP,2=LOW,3=MOD,4=HIGH)	NU	Other	TCEQ SOP V2	89962	Field
RIPARIAN VEGETATION %; LEFT BANK - TREES	%	Other	NA/Calculation	89822	Field
RIPARIAN VEGETATION %; RIGHT BANK - TREES	%	Other	NA/Calculation	89823	Field
RIPARIAN VEGETATION %; LEFT BANK SHRUBS	%	Other	NA/Calculation	89824	Field
RIPARIAN VEGETATION %; RIGHT BANK - SHRUBS	%	Other	NA/Calculation	89825	Field
RIPARIAN VEGETATION %: LEFT BANK GRASSES OR FORBS	%	Other	NA/Calculation	89826	Field
RIPARIAN VEGETATION %; RIGHT BANK GRASSES OR FORBS	%	Other	NA/Calculation	89827	Field
RIPARIAN VEGETATION %: LEFT BANK CULTIVATED FIELDS	%	Other	NA/Calculation	89828	Field
RIPARIAN VEGETATION %: RIGHT BANK CULTIVATED FIELDS	%	Other	NA/Calculation	89829	Field
RIPARIAN VEGETATION %: LEFT BANK - OTHER	%	Other	NA/Calculation	89830	Field
RIPARIAN VEGETATION %: RIGHT BANK - OTHER	%	Other	NA/Calculation	89871	Field
AVAILABLE INSTREAM COVER HQI SCORE: 4=ABUNDANT 3=COMMON 2=RARE 1=ABSENT	NU	Other	NA/Calculation	89874	Field

Biological – Habitat, continued					
BOTTOM SUBSTRATE STABILITY HQI SCORE: 4=STABLE 3=MODERATELY STABLE 2=MODERATELY UNSTABLE 1=UNSTABLE	NU	Other	NA/Calculation	89875	Field
NUMBER OF RIFFLES HQI SCORE: 4=ABUNDANT 3=COMMON 2=RARE 1=ABSENT	NS	Other	NA/Calculation	89876	Field
DIMENSIONS OF LARGEST POOL HQI SCORE: 4=LARGE 3=MODERATE 2=SMALL 1=ABSENT	NU	Other	NA/Calculation	89877	Field
CHANNEL FLOW STATUS HQI SCORE: 3=HIGH 2=MODERATE 1=LOW 0=NO FLOW	NU	Other	NA/Calculation	89878	Field
BANK STABILITY HQI SCORE: 3=STABLE 2=MODERATELY STABLE 1=MODERATELY UNSTABLE 0=UNSTABLE	NU	Other	NA/Calculation	89879	Field
CHANNEL SINUOSITY HQI SCORE: 3=HIGH 2=MODERATE 1=LOW 0=NONE	NU	Other	NA/Calculation	89880	Field
RIPARIAN BUFFER VEGETATION HQI SCORE: 3=EXTENSIVE 2=WIDE 1=MODERATE 0=NARROW	NU	Other	NA/Calculation	89881	Field
AESTHETICS OF REACH HQI SCORE: 3=WILDERNESS 2=NATURAL AREA 1=COMMON SETTING 0=OFFENSIVE	NU	Other	NA/Calculation	89882	Field
HQI TOTAL SCORE	NU	Other	NA/Calculation	89883	Field
NO FLOW ISOLATED POOL: LARGEST POOL MAX WIDTH	M	Other	NA/Calculation	89908	Field
NO FLOW ISOLATED POOL: LARGEST POOL MAX LENGTH	M	Other	NA/Calculation	89909	Field
NO FLOW ISOLATED POOL: LARGEST POOL MAX DEPTH	M	Other	NA/Calculation	89910	Field
NO FLOW ISOLATED POOL: SMALLEST POOL MAX DEPTH	M	Other	NA/Calculation	89911	Field
NO FLOW ISOLATED POOL: SMALLEST POOL MAX WIDTH	M	Other	NA/Calculation	89912	Field
NO FLOW ISOLATED POOL: SMALLEST POOL MAX LENGTH	M	Other	NA/Calculation	89913	Field
NO FLOW ISOLATED POOLS: NUMBER OF POOLS EVALUATED	NU	Other	NA/Calculation	89914	Field

* From USGS map.

References:

United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020

American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)

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TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin					
Biological - Benthics (Qualitative)					
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**Lab**
STREAM ORDER	NU	Water	TCEQ SOP, V1	84161	Field
BIOLOGICAL DATA	NS	Other	NA/Calculation	89888	Field
RAPID BIOASSESSMENT PROTOCOLS BENTHIC MACROINVERTEBRATE IBI SCORE	NS	Other	NA/Calculation	90081	Field
BENTHIC DATA REPORTING UNITS (1=NUMBER OF INDIVIDUALS IN SUB-SAMPLE, 2=NUMBER OF INDIVIDUALS/FT2, 3=NUMBER OF INDIVIDUALS/M2, 4=TOTAL NUMBER OF INDIVIDUALS IN SAMPLE)	NU	Other	TCEQ SOP V2	89899	Field
DIP NET EFFORT,AREA SWEPT (SQ.METER)	m2	Other	TCEQ SOP V2	89902	Field
KICKNET EFFORT,AREA KICKED (SQ.METER)	m2	Other	TCEQ SOP V2	89903	Field
KICKNET EFFORT,MINUTES KICKED (MIN.)	min.	Other	TCEQ SOP V2	89904	Field
DEBRIS/SHORELINE SAMPLING EFFORT, MINUTES	min.	Other	TCEQ SOP V2	89905	Field
NUMBER OF INDIVIDUALS IN BENTHIC SAMPLE	NU	Other	TCEQ SOP V2	89906	Field
UNDERCUT BANK AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89921	Field
OVERHANGING BRUSH AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89922	Field
GRAVEL BOTTOM AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89923	Field
SAND BOTTOM AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89924	Field
SOFT BOTTOM AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89925	Field
MACROPHYTE BED AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89926	Field
SNAGS AND BRUSH AT COLLECTION POINT (%)	%	Other	TCEQ SOP V2	89927	Field
BEDROCK STREAMBED AT COLLECTION POINT (%)	%	Sediment	TCEQ SOP V2	89928	Field
PETERSEN SAMPLER EFFORT, AREA SAMPLED (SQ. MTR.)	m2	Other	TCEQ SOP V2	89934	Field
EKMAN SAMPLER EFFORT, AREA SAMPLED (SQ.METER)	m2	Other	TCEQ SOP V2	89935	Field
MESH SIZE, ANY NET OR SIEVE, AVERAGE BAR (CM)	cm	Other	TCEQ SOP V2	89946	Field
BENTHIC SAMPLE COLLECTION METHOD (1=SURBER, 2=EKMAN, 3=KICKNET, 4=PETERSON, 5=HESTER DENDY, 6=SNAG, 7=HESS)	NU	Other	TCEQ SOP V2	89950	Field
ECOREGION LEVEL III (TEXAS ECOREGION CODE)	NU	Other	TCEQ SOP V1	89961	Field
BENTHOS ORGANISMS -NONE PRESENT (0=NONE PRESENT)	NS	Other	TCEQ SOP V2	90005	Field
HILSENHOFF BIOTIC INDEX (HBI)	NU	Other	TCEQ SOP V2	90007	Field
NUMBER OF EPT INDEX	NU	Other	TCEQ SOP V2	90008	Field
DOMINANT BENTHIC FUNCTIONAL FEEDING GRP, % OF INDIVIDUALS	%	Other	TCEQ SOP V2	90010	Field
BENTHIC GATHERERS, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90025	Field
BENTHIC PREDATORS, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90036	Field
DOMINANT TAXON, BENTHOS PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90042	Field

Biological - Benthics (Qualitative)					
RATIO OF INTOLERANT TO TOLERANT TAXA, BENTHOS	NU	Other	TCEQ SOP V2	90050	Field
NUMBER OF NON-INSECT TAXA	NU	Other	TCEQ SOP V2	90052	Field
ELMIDAE, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90054	Field
TOTAL TAXA RICHNESS, BENTHOS	NU	Other	TCEQ SOP V2	90055	Field
CHIRONOMIDAE, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP V2	90062	Field
PERCENT OF TOTAL TRICHOPTERA INDIVIDUALS AS HYDROPSYCHIDAE	%	Other	TCEQ SOP V2	90069	Field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

TABLE A7.1 Measurement Performance Specifications for the Cypress Creek Basin					
Biological - Nekton					
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**Lab**
STREAM ORDER	NU	Water	TCEQ SOP V1	84161	Field
NEKTON TEXAS REGIONAL IBI SCORE	NS	Other	NA/Calculation	98123	Field
BIOLOGICAL DATA	NS	Other	NA/Calculation	89888	Field
SEINE, MINIMUM MESH SIZE, AVERAGE BAR, NEKTON,IN	IN	Other	TCEQ SOP V2	89930	Field
SEINE, MAXIMUM MESH SIZE, AVG BAR, NEKTON,INCH	IN	Other	TCEQ SOP V2	89931	Field
NET LENGTH (METERS)	M	Other	TCEQ SOP V2	89941	Field
ELECTROFISHING METHOD 1=BOAT 2=BACKPACK 3=TOTEBARGE	NU	Other	TCEQ SOP V2	89943	Field
ELECTROFISH EFFORT, DURATION OF SHOCKING (SEC)	SEC	Other	TCEQ SOP V2	89944	Field
SEINING EFFORT (# OF SEINE HAULS)	NU	Other	TCEQ SOP V2	89947	Field
COMBINED LENGTH OF SEINE HAULS (METERS)	M	Other	TCEQ SOP V2	89948	Field
SEINING EFFORT, DURATION (MINUTES)	MIN	Other	TCEQ SOP V2	89949	Field
ECOREGION LEVEL III (TEXAS ECOREGION CODE)	NU	Other	TCEQ SOP V1	89961	Field
AREA SEINED (SQ METERS)	M2	Other	TCEQ SOP V2	89976	Field
NUMBER OF SPECIES, FISH	NU	Other	TCEQ SOP V2	98003	Field
NEKTON ORGANISMS-NONE PRESENT (0=NONE PRESENT)	NS	Other	TCEQ SOP V2	98005	Field
TOTAL NUMBER OF SUNFISH SPECIES	NU	Other	TCEQ SOP V2	98008	Field
TOTAL NUMBER OF INTOLERANT SPECIES, FISH	NU	Other	TCEQ SOP V2	98010	Field
PERCENT OF INDIVIDUALS AS OMNIVORES, FISH	%	Other	TCEQ SOP V2	98017	Field
PERCENT OF INDIVIDUALS AS INVERTIVORES, FISH	%	Other	TCEQ SOP V2	98021	Field
PERCENT OF INDIVIDUALS AS PISCIVORES, FISH	%	Other	TCEQ SOP V2	98022	Field
PERCENT OF INDIVIDUALS WITH DISEASE OR ANOMALY	%	Other	TCEQ SOP V2	98030	Field
TOTAL NUMBER OF NATIVE CYPRINID SPECIES	NU	Other	TCEQ SOP V2	98032	Field
PERCENT INDIVIDUALS AS NON-NATIVE FISH SPECIES (% OF COMMUNITY)	%	Other	TCEQ SOP V2	98033	Field
TOTAL NUMBER OF INDIVIDUALS SEINING	NU	Other	TCEQ SOP V2	98039	Field
TOTAL NUMBER OF INDIVIDUALS ELECTROFISHING	NU	Other	TCEQ SOP V2	98040	Field
TOTAL NUMBER OF BENTHIC INVERTIVORE SPECIES	NU	Other	TCEQ SOP V2	98052	Field
TOTAL NUMBER OF BENTHIC FISH SPECIES	NU	Other	TCEQ SOP V2	98053	Field
NUMBER OF INDIVIDUALS PER SEINE HAUL	NU	Other	TCEQ SOP V2	98062	Field
NUMBER OF INDIVIDUALS PER MINUTE ELECTROFISHING	NU	Other	TCEQ SOP V2	98069	Field
PERCENT INDIVIDUALS AS TOLERANT FISH SPECIES(EXCLUDING WESTERN MOSQUITOFISH)	%	Other	TCEQ SOP V2	98070	Field

References:
United States Environmental Protection Agency (USEPA) Methods for Chemical Analysis of Water and Wastes, Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998. (Note: The 21st edition may be cited if it becomes available.)
TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012 (RG-415).
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416)

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

Appendix B Sampling Process Design and Monitoring Schedule (plan)

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

Sample Design Rationale FY 2016

The sample design is based on the legislative intent of CRP. Under the legislation, the Basin Planning Agencies have been tasked with providing data to characterize water quality conditions in support of the Texas Water Quality Integrated Report, and to identify significant long-term water quality trends. Based on Steering Committee input, achievable water quality objectives and priorities and the identification of water quality issues are used to develop work plans which are in accord with available resources. As part of the Steering Committee process, the NETMWD coordinates closely with the TCEQ and other participants to ensure a comprehensive water monitoring strategy within the watershed.

The Clean Rivers Program water quality monitoring in the Cypress Creek Basin has taken place through a cooperative program directed by NETMWD. Participants assisting NETMWD in planning, data collection, analysis, and reporting include WMS, TCEQ, Clean Rivers Program Steering Committee members, Caddo Lake Institute (CLI), Pilgrim's Pride Corporation, FCWD, City of Marshall, City of Longview, Titus County Fresh Water District #1, U.S. Steel Tubular Products, Inc., Luminant, Northeast Texas Community College, Texas Parks and Wildlife Department, United States Geological Survey, East Texas Baptist University, and AEP SWEPCO.

The goal of this portion of the Clean Rivers Program is to provide the appropriate, quality assured data to allow continuing assessment and management of water quality in the Cypress Basin. Detailed objectives of this monitoring program include the following:

- Establish a long-term monitoring program for the basin,
- Focus on and provide for local participation in monitoring,
- Provide reliable information to the public to enhance awareness and knowledge of water quality conditions in the basin,
- Monitor and evaluate water quality trends,
- Identify the nature and source of water quality problems that result in significant impairments,
- Evaluate the applicability of State Surface Water Quality Criteria to specific water bodies in the basin,
- Evaluate permit requirements with respect to water quality conditions and trends in the basins, and,
- Provide data to support the development of cost-effective water quality management programs.

Data from the Surface Water Quality Monitoring (SWQM) Program and CRP have been the primary information used in determining water quality standards attainment and for setting permit requirements in the Cypress Creek Basin. The CRP Program provides for an integrated evaluation of physical, chemical, and biological characteristics of Texas surface water systems in relation to human health concerns, ecological condition, and designated uses. Surface water quality monitoring data provide a basis for establishment of effective TCEQ management policies that promote the protection, restoration, and judicious use of Texas surface water resources. Data collected in the CRP program and for special projects are used to characterize existing water quality and emerging problems, define long-term trends, determine water quality standards compliance, and describe seasonal variation and frequency of occurrence of selected water quality constituents. Data are also evaluated to produce the *Texas Integrated Report*. This assessment enables the public, local governments, state agencies, the Texas Legislature, the EPA, and Congress to evaluate water quality in Texas and make water quality management decisions.

During FY 2016, a total of 22 routine stations will be monitored. The results from these monitoring stations are presently maintained in the SWQMIS database. NETMWD has developed and maintained a local database that also includes this information.

The USGS currently monitors the Cypress Creek Basin at seven stream locations. Real-time stream flow and water level (gage height) data are measured, recorded and transmitted generally in 15-minute increments. This information along with the historical flow data can be accessed on the USGS web site http://waterdata.usgs.gov/tx/nwis/current?type=flow.

The major focus of the CRP in the Cypress Creek Basin has been routine and systematic monitoring and special studies. Monitoring efforts represent a large component of the CRP, providing the raw data and information required to address any concerns regarding water quality issues in the basin. The objective of these studies has been the improvement of water quality within the basin, and documentation of watershed conditions both current and historical. Several of these studies have been produced within the Clean Rivers Program as special studies. Special studies are additional water monitoring projects designed to address a specific concern or to provide additional information as a result of a previous monitoring effort or a current issue affecting water quality. As part of the Texas Clean Rivers Program, these special studies deal with specific water quality issues or are used to support other programs (e.g., TMDL development/implementation) addressing water quality issues in the basin.

Routine Monitoring

The routine monitoring stations are structured to provide long term water quality data at locations draining major sub-watersheds and important river segment reaches within the Cypress Creek Basin. The primary objective of collecting comparable water quality data over a substantial period of time is to identify temporal trends and to differentiate water quality characteristics, impairments and possible causes over discrete sub-watershed areas.

Parameters to be measured or sampled are listed in Table A7.1. Field parameters and conventional water samples for laboratory analysis will be collected regardless of the conditions encountered. Field parameters include the measurements of water temperature, DO, specific conductance, pH and water clarity (Secchi depth). Conventional water quality samples will be analyzed for total suspended solids, alkalinity, sulfate, chloride, total phosphorous, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, total Kjeldahl nitrogen, total organic carbon, hardness, chlorophyll-*a* and pheophytin.

The following changes have been made to the FY 2016 monitoring schedule. These changes are a result of concerns or requests made by Cypress Creek Basin steering committee members and/or monitoring entities at the Coordinated Monitoring Meeting.

1. Station #15249 - CADDO LAKE NEAR SHORE AT END OF FM 2198 AT DWIGHT SHELLMANS PROPERTY SE OF UNCERTAIN: Quarterly monitoring of Bacteria were added to the monitoring schedule. The NETMWD already collects field parameters, conventional parameters, and metals in water.

2. Station #14236 - CLINTON LAKE 165 METERS NORTH AND 1.09 KILOMETERS EAST TO THE INTERSECTION OF CYPRESS VILLAGE ROAD AND CYPRESS VILLAGE SOUTH AT CHANNEL MARKER C111 NEAR CADDO LAKE: Ammonia sampling will be discontinued in FY 2016. Ample data now exists for assessment purposes.

3. Station #15508 - HARRISON BAYOU AT FM 134 4 MI SOUTH OF KARNACK: Quarterly monitoring of Bacteria were added to the monitoring schedule. The NETMWD already collects field parameters, conventional parameters, metals in water, and flow.

4. Station #16934 - KELLEY CREEK AT FM250 APPROX 15KM NE OF HUGHES SPRINGS: Diel (BS) monitoring will be discontinued in FY 2016. Ample data now exists for assessment purposes. Routine monitoring will continue field parameters and flow, when possible.

5. Station #10274 - DRY CREEK AT CAMP COUNTY ROAD/MCMINN RD 1.4 KM NORTH OF FM 557: Quarterly monitoring of Dry creek will be added to the CMS for routine monitoring of field parameters, conventionals, metals in water, bacteria, and flow. Monitoring was added through an amendment in FY 2015 to address nutrient concerns for screening levels and a lack of data for assessment.

6. Station #15260 - BIG CYPRESS CREEK AT SH 37 4.6 MI NORTH OF WINNSBORO: Quarterly monitoring of conventionals and metals in water were added to the CMS. Field

parameters, bacteria, and flow are currently collected quarterly.

7. Station #10321 - JAMES BAYOU AT CASS CR 1775 1.6 MI SW OF KILDARE: Diel (BS) monitoring will be conducted quarterly. Field parameters and flow will also be collected for each event.

8. Station #14976 - JIMS BAYOU AT SH43 APPROXIMATELY 12 MI NE OF JEFFERSON AND 1.0 MI SOUTH OF KILDARE JUNCTION ON SH43: During the FY 2016 Coordinated Monitoring Meeting, it was determined that biological monitoring would be conducted on Jims Bayou to address impairments in the 2014 Integrated Report. Biased to season sampling will be conducted once during the Index Period and once during the Critical Period and will include collection and assessment of habitat, benthic macroinvertebrates, nekton, field parameters, flow and 24hr DO.

9. Station #17954 - SOUTH LILLY CREEK AT FM 2454 1.8 KM SOUTH OF THE INTERSECTION WITH FM 556 AND SOUTHWEST OF PITTSBURG: Quarterly monitoring of conventionals and metals in water were added to the CMS. Field parameters, bacteria, and flow are currently collected.

10. Station #10244 - Black Cypress Bayou at County Road 1617; 3.7 miles northeast of Berea: Quarterly diel (BS) monitoring was added in FY 2015 to address low DO levels across the bottom of the Black Cypress Bayou watershed and will continue in to FY 2016.

Conventional sampling will be conducted at nine stations. There will be an increase in the number of *E. coli* samples from seven sites to ten.

WMS will perform all monitoring activities except monthly routine monitoring of field parameters at six stations in Caddo Lake and at one in Big Cypress Creek which will be collected under the entity identified as the Caddo Lake Institute (CLI). CLI will collect monthly field parameters in Caddo Lake at mid-lake (Station 10283), Caddo Lake at Harrison Bayou (Station 10286), Caddo Lake in Goose Prairie, South of Star Ditch (Station 10288), Clinton Lake at Channel Marker C111 Near Caddo Lake (Station 14236), Caddo Lake near shore at end of FM 2198 at Dwight Shellmans Property SE of Uncertain (Station 15249), and on Big Cypress Creek at Caddo Lake State Park (Station 15022). WMS will collect quarterly conventional samples at Station 10283 and Station 15249.

Biased Season Monitoring

Diel monitoring will be conducted four times throughout the year unless associated with biological monitoring. No less than one-half and no more than two-thirds of the samples will be collected in the index period, and no less than one fourth and no more than one-third will be collected in the critical period. Diel monitoring includes quarterly sampling on James Bayou at Cass CR 1775 1.6 MI SW of Kildare (Station 10321) and on Black Cypress Bayou at County Road 1617; 3.7 miles northeast of Berea (Station 10244). Flow will be measured at all wade-able stream stations or will be obtained from a nearby USGS gaging station.

Diel monitoring as protocol for biological sampling will be conducted twice per year. Monitoring will be conducted once during the critical period and once in the index period. The diel station is Jims Bayou at SH43 Approximately 12 MI NE of Jefferson and 1.0 MI South of Kildare Junction on SH 43 (Station 14976).

Site Selection Criteria

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

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

Monitoring Sites for FY 2016

Table B1.1 *Sample Design and Schedule, FY 2016*

Segment: 0401 Caddo Lake

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE	MT	Field	Conv	Metals	Bacteria	Flow	Comments
CADDO LAKE MID LAKE 1.8 KM SOUTH OF END OF FM 727 1.9 KM NORTHWEST OF COLLIERS LAUNCH	10283	0401	5	NT	WM	RT	4	4	4			
CADDO LAKE MID LAKE 1.8 KM SOUTH OF END OF FM 727 1.9 KM NORTHWEST OF COLLIERS LAUNCH	10283	0401	5	NT	CL	RT	11					CLI Monthly Sampling Program
CADDO LAKE 0.25 MI NE OF THE MOUTH OF HARRISON BAYOU AND 0.35 MI EAST OF LONG POINT——	10286	0401	5	NT	CL	RT	11					CLI Monthly Sampling Program
CADDO LAKE IN GOOSE PRAIRIE SOUTH OF STAR DITCH 500 M SOUTHEAST OF END OF FM 2198	10288	0401	5	NT	CL	RT	11					CLI Monthly Sampling Program
CLINTON LAKE 165 METERS NORTH AND 1.09 KILOMETERS EAST TO THE INTERSECTION OF CYPRESS VILLAGE ROAD AND CYPRESS VILLAGE SOUTH AT CHANNEL MARKER C111 NEAR CADDO LAKE	14236	0401	5	NT	CL	RT	11					CLI Monthly Sampling Program
CADDO LAKE NEAR SHORE AT END OF FM 2198 AT DWIGHT SHELLMANS PROPERTY SE OF UNCERTAIN	15249	0401	5	NT	CL	RT	11					CLI Monthly Sampling Program
CADDO LAKE NEAR SHORE AT END OF FM 2198 AT DWIGHT SHELLMANS PROPERTY SE OF UNCERTAIN	15249	0401	5	NT	WM	RT	4	4	4			
HARRISON BAYOU AT FM 134 4 MI SOUTH OF KARNACK	15508	0401A	5	NT	WM	RT	4	4	4	4	4	

Segment: 0402 Big Cypress Creek below Lake O' the Pines

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE	MT	Field	Flow	24 hr DO	Comments
BIG CYPRESS CREEK APPROX 1.2KM DOWNSTREAM OF SH43 AT CADDO LAKE STATE PARK BOAT RAMP	15022	0402	5	NT	CL	RT	11	11		CLI Monthly Sampling Program; Flow from USGS gage
HUGHES CREEK AT SH155 APPROX 6KM NE OF AVINGER	16936	0402B	5	NT	WM	RT	4			Too deep to wade for flow
KELLEY CREEK AT FM250 APPROX 15KM NE OF HUGHES SPRINGS	16934	0402E	5	NT	WM	RT	4	4		

Segment: 0404 Big Cypress Creek below Lake Bob Sandlin

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE	MT	Field	Conv	Metals	Bacteria	Flow	Comments
TANKERSLEY CREEK AT FM3417 5.7 KM SOUTH OF MOUNT PLEASANT	10261	0404B	5	NT	WM	RT	4	4	4	4	4	No chlorophyll *a* or pheophytin samples
HART CREEK AT TITUS COUNTY ROAD SE 12 3.8 KM UPSTREAM OF BIG CYPRESS CREEK CONFLUENCE SOUTH OF MOUNT PLEASANT	10266	0404C	5	NT	WM	RT	4	4	4	4	4	No chlorophyll *a* or pheophytin samples
DRY CREEK AT CAMP COUNTY ROAD/MCMINN RD 1.4 KM NORTH OF FM 557	10274	0404E	5	NT	WM	RT	4	4	4	4	4	Flow will be measured when wadeable

Segment: 0405 Lake Cypress Springs

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE	MT	Field	Flow	Conv	Metals	Bacteria	Comments
BIG CYPRESS CREEK AT SH 37 4.6 MI NORTH OF WINNSBORO	15260	0405A	5	NT	WM	RT	4	4	4	4	4	Flow will be measured when wadeable

Segment: 0407 James Bayou

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE	MT	Field	Bacteria	Flow	24 hr DO	Comments
JAMES BAYOU AT CASS CR 1775 1.6 MI SW OF KILDARE	10321	0407	5	NT	WM	RT	4	4	4		Flow will be measured when wadeable;
JAMES BAYOU AT CASS CR 1775 1.6 MI SW OF KILDARE	10321	0407	5	NT	WM	BS	4		4	4	Flow will be measured when wadeable
JIMS BAYOU AT SH43 APPROXIMATELY 12 MI NE OF JEFFERSON AND 1.0 MI SOUTH OF KILDARE JUNCTION ON SH43	14976	0407	5	NT	WM	RT	4	4	4		Flow will be measured when wadeable
JIMS BAYOU AT SH43 APPROXIMATELY 12 MI NE OF JEFFERSON AND 1.0 MI SOUTH OF KILDARE JUNCTION ON SH43	14976	0407	5	NT	WM	BS	2		2	2	Flow will be measured when wadeable

Segment: 0407 James Bayou, continued

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE	MT	Field	Flow	24 hr DO	AqHab	Benthic	Nekton	Comments
JIMS BAYOU AT SH43 APPROXIMATELY 12 MI NE OF JEFFERSON AND 1.0 MI SOUTH OF KILDARE JUNCTION ON SH43	14976	0407	5	NT	WM	BS	2	2	2	2	2	2	Biological Sampling

Segment: 0409 Little Cypress Bayou (Creek)

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE*	MT**	Field	Conv	Metals	Bacteria	Flow	Comments
LILLY CREEK AT FM 556 APPROXIMATELY 1.04 KM SOUTHWEST OF HICKORY HILL IN CAMP COUNTY TEXAS	20153	0409A	5	NT	WM	RT	4	4	4	4		Too deep to wade for flow measurement; No chlorophyll a and pheophytin samples
SOUTH LILLY CREEK AT FM 2454 1.8 KM SOUTH OF THE INTERSECTION WITH FM 556 AND SOUTHWEST OF PITTSBURG	17954	0409B	5	NT	WM	RT	4	4	4	4	4	Flow will be measured when wadeable

Segment: 0410 Black Cypress Bayou (Creek)

SITE DESCRIPTION	Station ID	Waterbody ID	Region	SE	CE*	MT**	Field	24 hr DO	Flow	Comments
BLACK CYPRESS BAYOU AT COUNTY ROAD 1617 3.7 MILES NORTHWEST OF BEREA	10244	0410	5	NT	WM	RT	4		4	
BLACK CYPRESS BAYOU AT COUNTY ROAD 1617 3.7 MILES NORTHWEST OF BEREA	10244	0410	5	NT	WM	BS	4	4	4	
BLACK CYPRESS BAYOU AT SH 155 5.2 MI NE OF AVINGER	10246	0410	5	NT	WM	RT	4			

* NT=NETMWD; CL=Caddo Lake Institute; WM=Water Monitoring Solutions, Inc.; ** RT=Routine monitoring; BS=Biased-Season sampling

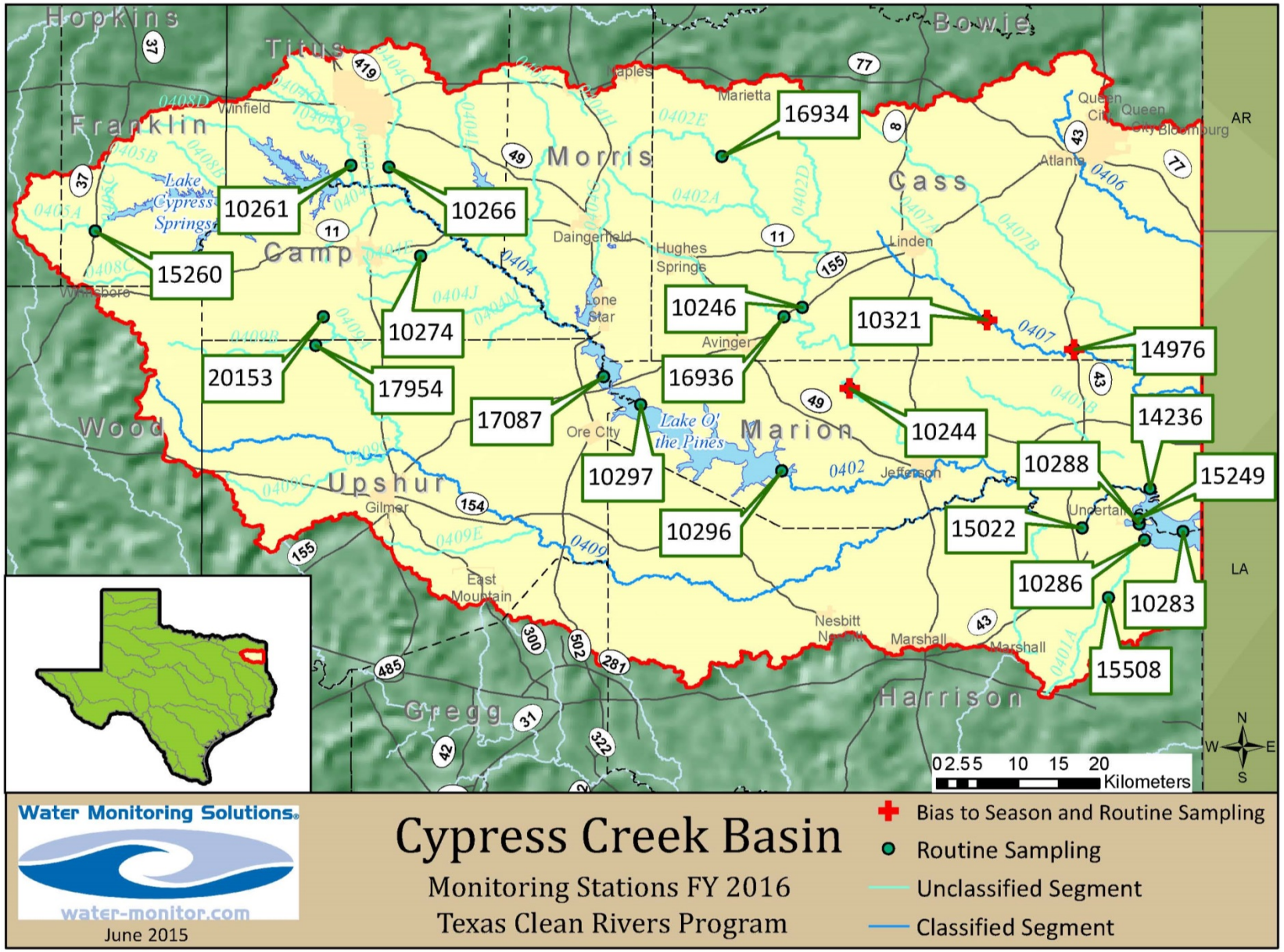
Critical vs. non-critical measurements

All data collected for CRP and entered into SWQMIS are considered critical.

Appendix C: Station Location Maps

Station Location Maps

Maps of stations monitored by the NETMWD are provided below. The map was generated by the WMS. This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact Linard Arocha at 903-439-4741.


Hopkins
Titus
Bowie
Franklin
Morris
Cass
Camp
Wood
Upshur
Marion
Harrison
Gregg
Winfield
Marietta
Daingerfield
Hughes Springs
Linden
Atlanta
Avinger
Ore City
Lake O' the Pines
Jefferson
Gilmer
East Mountain
Nesbitt
Marshall
Lake Cypress Springs
AR
LA
16934
10261
10266
15260
10274
20153
17954
17087
10246
16936
10321
14976
10244
14236
10288
15249
10297
10296
15022
10286
10283
15508
0 2.5 5 10 15 20
Kilometers
N
W
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S
Water Monitoring Solutions
water-monitor.com
June 2015
Cypress Creek Basin
Monitoring Stations FY 2016
Texas Clean Rivers Program
Bias to Season and Routine Sampling
Routine Sampling
Unclassified Segment
Classified Segment

Appendix D: Field Data Sheets

Water Monitoring Solutions

Program Code: CRP

Cypress Creek Basin Clean Rivers Program
Stream Field Form

Station ID:				Date:				Time:	
Station Location:									
Sample(s) Collected By:									
Days Since Last Rain:		Total Rainfall - 7 Days Inclusive Prior to Sampling (Inches):							
Stream Conditions: (circle one)									
Stream Type:		**Present Weather:**		**Wind Intensity**		**Wind Direction**		**Aesthetics:**	
perennial		Clear		Calm		N	S	Wilderness	
intermittent w/ perennial pools		Partly Cloudy		Slight		E	W	Natural	
		Cloudy		Moderate		NE	SE	Common	
intermittent		Rain		Strong		NW	SW	Offensive	
Flow (cfs):		**Flow Severity:**		**Water Odor:**		**Water Color:**		**Water Clarity:**	
		No Flow	Flood	Sewage	Oily/ Chemical	Brown	Red	Poor	Good
Flow Method:		Low Flow	High	Rotten Eggs	Musky	Green	Black	Fair	Excellent
		Normal	Dry	Fishy	None Other	Clear	Other		
Sample Depth (m)	**Total Depth (m)**	**Air Temp °C**	**Water Temp °C**	**Sp. Cond µS/cm**	**DO % sat**	**DO mg/L**	**DO chg**	**pH**	**Secchi (m)**
Parameters sampled:			**Field**	**Conventionals**		***E. coli***		**Rec Evidence**	
Evidence of Flow Fluctuations:								Yes	No
								Recreational Use	
Observed Stream Uses:								# of people	
Adjacent Land Use:								1-10 or >10	
Channel Obstructions/Modifications:									
Observations: (stream flow [if any], debris in water, canopy coverage, obvious signs of eutrophication, etc.):									

P.O. Box 1132 Sulphur Springs, TX 75483 903-439-4741 www.water-monitor.com

Water Monitoring Solutions

Program Code: CRP

Cypress Creek Basin Clean Rivers Program
Reservoir Field Form

Station ID:			Date:				Time:	
Station Location:								
Sample(s) Collected By:								
Days Since Last Rain:		Total Rainfall - 7 Days Inclusive Prior to Sampling (Inches):						
Water Level:		Present Weather:		Wind Intensity		Wind Direction		Water Surface
Below Normal		Clear		Calm		N	S	Calm
Normal		Partly Cloudy		Slight		E	W	Ripple
Above Normal		Cloudy		Moderate		NE	SE	Waves
		Rain		Strong		NW	SW	Whitecap
Total Depth (ft.):		Sediment Odor:		Water Odor:		Water Color:		Water Clarity:
		None	Sewage	Sewage	Oily/ Chemical	Brown	Red	Poor Good
Reservoir Stage	Reservoir % Full:	Musky	Other:	Rotten Eggs	Musky	Green	Black	Fair Excellent
		Fishy		Fishy	None Other	Clear	Other	

Photos Taken	Sample Depth (m)	Air Temp °C	Water Temp °C	Sp. Cond µS/cm	DO % sat	DO mg/L	DO chg	pH	Secchi (m)
	0.3								
	1.0								
	2.0								
	3.0								
	4.0								
	5.0								
	6.0								

% Cloud Coverage:	% Aquatic Plant Coverage:	
		Rec Evidence
Observed Uses:		Yes No
		Recreational Use
Adjacent Land Use:		# of people
		1-10 or >10

Observations: (stream flow [if any], debris in water, canopy coverage, obvious signs of eutrophication, etc.):

Parameters sampled: **Field** **Conventionals** ***E. coli***

P.O. Box 1132 Sulphur Springs, TX 75483 903-439-4741 www.water-monitor.com

STREAM FLOW (DISCHARGE) MEASUREMENT FORM

Stream: ______________________ **Date:** __________

Station Description: ______________________

Time Begin: __________ **Time End:** __________ **Meter Type:** Marsh McBirney

Observers: __________ **Stream Width*:** __________ **Section Width:** __________

Observations: Measurements taken from left right to left right bank above below the bridge crossing

Section midpoint (ft)	Section depth (ft)	Observational Depth (ft)	Velocity At Point (ft/sec)	Velocity Average (ft/sec)	Area WxD (ft^2)	Flow VxA (cfs)
$m^3/s \times 35.3 = ft^3/s$			**Total Flow (Discharge) (3Q)**			

Make a minimum of 10 measuremetns when the total width is >5.0 feet, 20 measurements preferred

Measure at 60% of depth from surface where <2.5 feet deep. Measure at 20% and 80% of depth in waters >2.5feet.

Water Monitoring Solutions

Discharge Measurement Summary

Date Generated: Tue Feb 15 2011

File Information

File Name	17954.215.WAD
Start Date and Time	2011/02/15 10:43:26

Site Details

Site Name	FM 2454
Operator(s)	RUSHIN

System Information

Sensor Type	FlowTracker
Serial #	P3026
CPU Firmware Version	3.7
Software Ver	2.11

Units (English Units)

Distance	ft
Velocity	ft/s
Area	ft^2
Discharge	cfs

Discharge Uncertainty

Category	ISO	Stats
Accuracy	1.0%	1.0%
Depth	0.1%	1.7%
Velocity	0.9%	4.9%
Width	0.1%	0.1%
Method	1.9%	-
# Stations	2.2%	-
Overall	**3.2%**	**5.2%**

Summary

Averaging Int.	20	# Stations	23
Start Edge	REW	Total Width	33.600
Mean SNR	27.9 dB	Total Area	47.130
Mean Temp	50.50 °F	Mean Depth	1.403
Disch. Equation	Mid-Section	Mean Velocity	0.0899
		Total Discharge	**4.2354**

Measurement Results

St	Clock	Loc	Method	Depth	%Dep	MeasD	Vel	CorrFact	MeanV	Area	Flow	%Q
0	10:43	2.00	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0
1	10:43	3.50	0.6	0.570	0.6	0.228	0.0755	1.00	0.0755	0.855	0.0645	1.5
2	10:44	5.00	0.6	0.950	0.6	0.380	0.0997	1.00	0.0997	1.425	0.1421	3.4
3	*10:44*	*6.50*	*0.6*	*1.150*	*0.6*	*0.460*	*0.1115*	*1.00*	*0.1115*	*1.725*	*0.1924*	*4.5*
4	10:45	8.00	0.6	1.300	0.6	0.520	0.0942	1.00	0.0942	1.950	0.1836	4.3
5	10:46	9.50	0.6	1.430	0.6	0.572	0.1270	1.00	0.1270	2.145	0.2724	6.4
6	10:47	11.00	0.6	1.550	0.6	0.620	0.1171	1.00	0.1171	2.325	0.2723	6.4
7	10:47	12.50	0.6	1.500	0.6	0.600	0.1519	1.00	0.1519	2.250	0.3418	8.1
8	10:48	14.00	0.6	1.600	0.6	0.640	0.1381	1.00	0.1381	2.400	0.3315	7.8
9	10:49	15.50	0.6	1.620	0.6	0.648	0.1073	1.00	0.1073	2.430	0.2607	6.2
10	10:49	17.00	0.6	1.620	0.6	0.648	0.1161	1.00	0.1161	2.430	0.2822	6.7
11	10:50	18.50	0.6	1.620	0.6	0.648	0.0755	1.00	0.0755	2.430	0.1834	4.3
12	10:51	20.00	0.6	2.150	0.6	0.860	0.1188	1.00	0.1188	3.225	0.3830	9.0
13	10:52	21.50	0.6	2.100	0.6	0.840	0.1027	1.00	0.1027	3.150	0.3235	7.6
14	10:52	23.00	0.6	2.000	0.6	0.800	0.0912	1.00	0.0912	3.000	0.2736	6.5
15	10:53	24.50	0.6	2.200	0.6	0.880	0.0607	1.00	0.0607	3.300	0.2003	4.7
16	10:54	26.00	0.6	1.800	0.6	0.720	0.0886	1.00	0.0886	2.700	0.2392	5.6
17	10:55	27.50	0.6	1.700	0.6	0.680	0.0902	1.00	0.0902	2.550	0.2301	5.4
18	*10:55*	*29.00*	*0.6*	*1.500*	*0.6*	*0.600*	*0.0121*	*1.00*	*0.0121*	*2.250*	*0.0273*	*0.6*
19	10:56	30.50	0.6	1.270	0.6	0.508	0.0171	1.00	0.0171	1.905	0.0325	0.8
20	*10:57*	*32.00*	*0.6*	*1.070*	*0.6*	*0.428*	*0.0000*	*1.00*	*0.0000*	*1.605*	*0.0000*	*0.0*
21	*10:58*	*33.50*	*0.6*	*0.600*	*0.6*	*0.240*	*-0.0010*	*1.00*	*-0.0010*	*1.080*	*-0.0011*	*0.0*
22	10:58	35.60	None	0.000	0.0	0.0	0.0000	1.00	0.0000	0.000	0.0000	0.0

Rows in italics indicate a QC warning. See the Quality Control page of this report for more information.

Water Monitoring Solutions

Discharge Measurement Summary

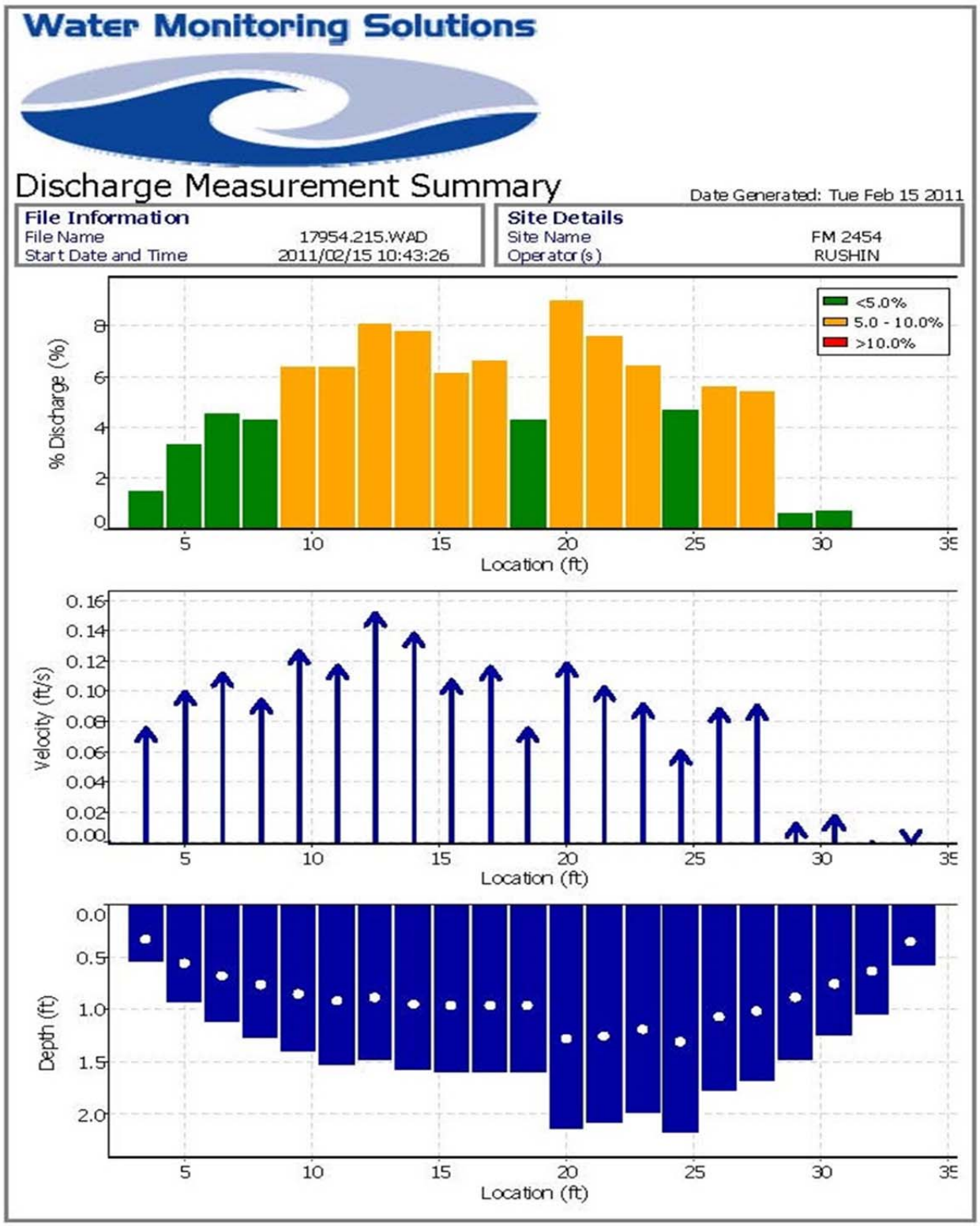
Date Generated: Tue Feb 15 2011

File Information	
File Name	17954.215.WAD
Start Date and Time	2011/02/15 10:43:26

Site Details	
Site Name	FM 2454
Operator(s)	RUSHIN

Quality Control

St	Loc	%Dep	Message
3	6.50	0.6	High SNR variation during measurement: 13.8,13.3
18	29.00	0.6	SNR (41.9) is different from typical SNR (27.9)
		0.6	High SNR variation during measurement: 10.8,7.7
20	32.00	0.6	SNR (45.3) is different from typical SNR (27.9)
21	33.50	0.6	SNR (48.3) is different from typical SNR (27.9)


Water Monitoring Solutions
Discharge Measurement Summary
Date Generated: Tue Feb 15 2011
File Information
File Name 17954.215.WAD
Start Date and Time 2011/02/15 10:43:26
Site Details
Site Name FM 2454
Operator(s) RUSHIN
<5.0%
5.0 - 10.0%
>10.0%
% Discharge (%)
Location (ft)
Velocity (ft/s)
Location (ft)
Depth (ft)
Location (ft)

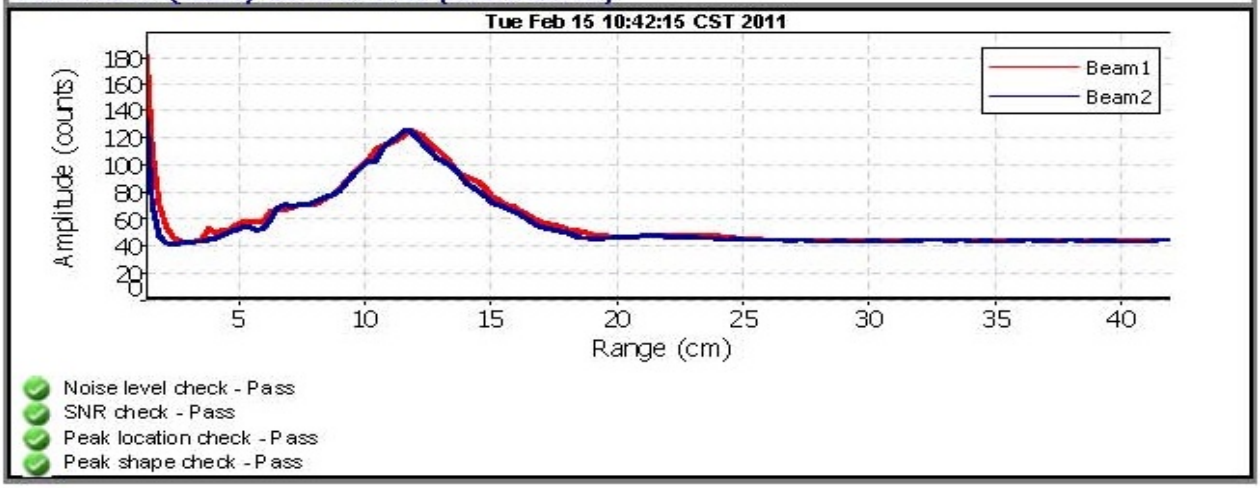
Water Monitoring Solutions

Discharge Measurement Summary

Date Generated: Tue Feb 15 2011

File Information		Site Details	
File Name	17954.215.WAD	Site Name	FM 2454
Start Date and Time	2011/02/15 10:43:26	Operator(s)	RUSHIN

Automatic Quality Control Test (BeamCheck)



- Noise level check - Pass
- SNR check - Pass
- Peak location check - Pass
- Peak shape check - Pass

Aquatic Life Monitoring and Habitat Assessment Checklist

Background Information

Name of water body: _____

Segment number: _____ Station ID: _____

On segment: Yes No

Permit number, if applicable: _____ Circle monitoring objective: ALM ALU UAA RWA

Historic stream characterization:

Intermittent | Intermittent with perennial pools sufficient to support significant aquatic life use | Perennial | Unknown

Basis for historic stream characterization (describe):

Current aquatic life use designation (if classified segment or site specific standard determined):
Exceptional High Intermediate Limited

Current assessment status on the (year)_____ Water Quality Inventory, 305(b) Report:
Supported Partially Supported Not Supported Concern Not Assessed

Field data entry (FDE) information: (TCEQ regional biologists only) Date entered into FDE: _____ RTAG #:

Field data (CRP partners only): Tag #:

Objective for Aquatic Life Use Assessment

Is this water body supporting its designated uses? Yes No Reason:
Known or potential causes of aquatic life use concern or impairment:

Identify sources of pollution:
Point source: Yes No Identify:
Nonpoint source: Yes No Identify:

Ambient toxicity tests in water body? Yes No

Results:

	Sediment Chronic	Sediment Acute	Water Chronic	Water Acute
Significant effect				
No significant effect				

Monitoring Information

Biological monitoring conducted during index period (03/15 to 06/30 and 10/01 to 10/15) and critical period (07/01-09/30).

Stream characterization event 1, date:

Dry	Pools covering_____% of the_____meters assessed	Flowing at cfs (measured)

Note: If sampling event for a RWA, characterize the receiving stream upstream of the existing discharge point or downstream of the proposed discharge point.

Stream characterization event 2, date:

Dry	Pools covering_____% of the_____meters assessed	Flowing at cfs (measured)

Describe conditions which may have adversely affected stream during each sampling event (for example, recent rains, drought, and construction):

Nekton sampling event 1:

Minimum 15-minute (900 seconds) electrofishing:	Yes	No
Minimum 6 seine hauls (or equivalent effort to sample 60 meters):	Yes	No
Fish sampling conducted in all available habitat types:	Yes	No

If no, please describe why:

Benthic macroinvertebrate sampling event 1:

Indicate method(s) used:
Rapid bioassessment (5-minute kicknet or snags):
Quantitative (Surber, snags, or dredge):

Habitat assessment event 1:

TCEQ habitat protocols:	Yes	No

Stream flow measurement event 1:

Instantaneous measurement:	Yes	No
USGS gauge reading:	Yes	No

Nekton sampling event 2:

Minimum 15-minute (900 seconds) electrofishing:	Yes	No
Minimum 6 seine hauls (or equivalent effort to sample 60 meters):	Yes	No
Fish sampling conducted in all available habitat types:	Yes	No

If no, please describe why:

Benthic macroinvertebrate sampling event 2:

Indicate method(s) Used:
Rapid bioassessment (5-minute kicknet or snags):
Quantitative (Surber, snags or dredge):

Habitat assessment event 2:

TCEQ habitat protocols:	Yes	No

If no, flow, wetted channel width, photographs, description of bank conditions relative to first event, and description of canopy cover conditions relative to first event must be provided in this packet.

Stream flow measurement event 2:

Instantaneous measurement: Yes No

USGS gauge reading: Yes No

Assessment Results (Optional)

Fish community index event 1:

Exceptional High Intermediate Limited

Fish community index event 2:

Exceptional High Intermediate Limited

Benthic macroinvertebrate community index event 1:

Exceptional High Intermediate Limited

Benthic macroinvertebrate community index event 2:

Exceptional High Intermediate Limited

Habitat index event 1:

Exceptional High Intermediate Limited

Habitat index event 2:

Exceptional High Intermediate Limited

Quantitative Biological Scoring for Evaluating
Aquatic Life Use Subcategories
Regional Criteria Worksheets for Fish

Ecoregions 33 & 35

Stream Name:		**Location:**		**Date:**	
Collectors:		**County:**			
No. seine hauls:		**Electrofishing effort (min):**			

Metric Category	Intermediate Totals for Metrics		Metric Name	Raw Value	IBI Score
Species richness and composition	Drainage basin size (km^2)				
	Number of fish species		Number of fish species		
	Number of native Cyprinid species		Number of native Cyprinid species		
	Number of benthic invertivore species		Number of benthic invertivore species		
	Number of sunfish species		Number of sunfish species		
	Number of intolerant species		Number of intolerant species		
	Number of individuals as tolerants [a]		% of individuals as tolerants [a]		
Trophic composition	Number of individuals as omnivores		% of individuals as omnivores		
	Number of individuals as invertivores		% of individuals as invertivores		
	Number of individuals as piscivores		% of individuals as piscivores		
Fish abundance and condition	Number of individuals (seine)		Number of individuals in sample		
	Number of individuals (electrofishing)		Number of individuals/seine haul		
	Number of individuals in sample		Number of individuals/min electrofishing		
	# of Individuals as non-native species		% of individuals as non-native species		
	# of Individuals with disease/anomaly		% of individuals with disease/anomaly		
			Index of biotic integrity numeric score:		
			Aquatic lif use:		

[a] Excluding western mosquitofish

This data should be incorporated with water quality, habitat, and other available biological data to assign an overall stream score.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Fish-Collection Data

Scientific-Collection Permit No.								
Water body:*					Date:*		Time:*	
Location:*								
Station ID				County*				
Weather				Lat/Long				
Secchi depth (m)		Flow (cfs)		Avg Depth (m)		Max depth (m)		
Water temp (0.3m)		DO (0.3m)		Spec cond (0.3m)		pH (0.3m)		
Collectors:**								

Gear Used

Boat-mounted Electrofisher	Low Range:		High Range:		AC or DC?	
	Pulses/sec:		% on:			
	Amps (A):		Duration (sec):			
Backpack Electrofisher	Voltage (v):			Frequency (pps)		
	Pulse width (msec):			Duration (sec)		
Gill net	Mesh size:		Length:		Duration of set:	
Trawl	Width:		No. hauls		Duration of haul:	
Seine	Length:		No. hauls		Duration of haul:	
Cast net	Diameter:		No. casts		or Duration of casting:	

Other (specify)

Habitat(s) sampled:

Observations/comments:

* Required information when reporting fish-collection data to the Texas Parks and Wildlife Department. Holders of scientific-collection permits are required to submit an annual collection summary to the TPWD.

** Collectors must be listed in Appendix I of the scientific-collection permit. Each permit contains detailed requirements.

TCEQ SPECIES-COLLECTION REPORT

Permittee Name(s):			Scientific Collection Permit Number:				
Common Name *or* Scientific Name	**Date of Collection**	**County *or* Location Where Collected**	**No. Caught and Released**	**No. Collected (live take)**	**No. Salvaged**	**No. Incidental Mortalities**	**Disposition of Specimens**

If specimens were donated, please attach list of recipients of all donated specimens.

Definitions:

No. Caught and Released—self-explanatory; No. Collected (live take)—number kept to ID in lab or as voucher specimens; No. Salvaged—number counted as a result of a fish kill, by-catch, etc.; No. Incidental Mortalities—number killed during collection activities; Disposition of Specimens—self-explanatory

TCEQ SPECIES-COLLECTION REPORT

Permittee Name(s):			**Scientific Collection Permit Number:**				
Common Name *or* Scientific Name	**Date of Collection**	**County *or* Location Where Collected**	**No. Caught and Released**	**No. Collected (live take)**	**No. Salvaged**	**No. Incidental Mortalities**	**Disposition of Specimens**
Signature of Permittee:			**Date:**				

TCEQ Fish Sample Tracking Log

Sample tracking log #:		TCEQ Station ID:		
Location description:				
Collector(s):				
Identifier(s):				
Dates				
Collected	Entered into Log	Transferred to EtOH	Identified	
Methods				
Seine hauls	Electrofish (secs.)	Gill net duration	Other	

Sample tracking log #:		TCEQ Station ID:		
Location description:				
Collector(s):				
Identifier(s):				
Dates				
Collected	Entered into Log	Transferred to EtOH	Identified	
Methods				
Seine hauls	Electrofish (secs.)	Gill net duration	Other	

Sample tracking log #:		TCEQ Station ID:		
Location description:				
Collector(s):				
Identifier(s):				
Dates				
Collected	Entered into Log	Transferred to EtOH	Identified	
Methods				
Seine hauls	Electrofish (secs.)	Gill net duration	Other	

Sample tracking log #:		TCEQ Station ID:		
Location description:				
Collector(s):				
Identifier(s):				
Dates				
Collected	Entered into Log	Transferred to EtOH	Identified	
Methods				
Seine hauls	Electrofish (secs.)	Gill net duration	Other	

TCEQ-20235 (rev. 07/18/2014)

TCEQ Fish Laboratory Bench Sheet

Sample tracking log number:	
Name of identifier:	
Location of collection:	Method of collection:
Date of collection:	
Date entered in sample tracking log:	
Date identification/enumeration started:	
Date identification/enumeration completed:	

Scientific Name	Number of Individuals

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SURFACE WATER QUALITY MONITORING/CLEAN RIVERS PROGRAM

NEKTON METADATA REPORTING FORM

RTAG# | **REGION** | **Monitoring Category** (ALM, ALU, RWA, UAA) | **COLLECTOR**

STATION ID | **SEGMENT** | **SE** | **CE** | **MT** (Required) | **MT-objective** (Optional)

STATION DESCRIPTION

COMPOSITE CATEGORY B **B=BOTH**

START DATE (M M D D Y Y Y Y) | **START TIME** (H H M M) | **START DEPTH** | M **DEPTH** meters

END DATE (M M D D Y Y Y Y) | **END TIME** (H H M M) | **END DEPTH** | M **DEPTH** meters

PARAMETER CODE	PARAMETER DESCRIPTION	VALUE
89888	**NEKTON SUMMARY AND METADATA**	1011
89961	ECOREGION LEVEL III (TEXAS ECOREGION CODE)	
98003	NUMBER OF SPECIES, FISH	
98032	TOTAL NUMBER OF NATIVE CYPRINID SPECIES	
98052	TOTAL NUMBER OF BENTHIC INVERTIVORE SPECIES	
98053	TOTAL NUMBER OF BENTHIC FISH SPECIES	
98008	TOTAL NUMBER OF SUNFISH SPECIES	
98010	TOTAL NUMBER OF INTOLERANT SPECIES, FISH	
98070	PRECENT INDIVIDUALS AS TOLERANT FISH SPECIES (EXCLUDING WESTERN MOSQUITO FISH)	
98017	PERCENT INDIVIDUALS AS OMNIVORES, FISH	
98021	PERCENT INDIVIDUALS AS INVERTIVORES, FISH	
98022	PERCENT INDIVIDUALS AS PISCIVORES, FISH	
98039	TOTAL NUMBER OF INDIVIDUALS SEINING	
98040	TOTAL NUMBER OF INDIVIDUALS ELECTROFISHING	
98062	NUMBER OF INDIVIDUALS PER SEINE HAUL	
98069	NUMBER OF INDIVIDUALS PER MINUTE ELECTROFISHING	
98033	PERCENT OF INDIVIDUALS AS NON-NATIVE FISH SPECIES (% OF COMMUNITY)	
98030	PERCENT OF INDIVIDUALS WITH DISEASE OF ANOMOLY	
98123	NEKTON TEXAS REGIONAL IBI SCORE	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON ELECTROFISHING**	1012
89943	ELECTROFISHING METHOD 1=BOAT, 2= BACKPACK, 3=TOTEBARGE	
89844	ELECTROFISHING EFFORT, DURATION OF SHOCKING (SEC)	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON SEINING**	1013
89947	SEINING EFFORT (# OF SEINE HAULS)	
89948	COMBINED LENGTH OF SEINE HAULS (METERS)	
89949	SEINING EFFORT DURATION (MINUTES)	
89976	AREA SEINED (SQ METERS)	

PARAMETER CODE	PARAMETER DESCRIPTION	VALUE
89888	**NEKTON SEINING**	1013
89930	SEINE, MINIMUM MESH SIZE, AVERAGE BAR, NEKTON, IN	
89931	SEINE, MAXIMUM MESH SIZE, AVG, BAR, NEKTON, INCH	
89941	NET LENGTH (METERS)	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON OBSERVATION**	1014
98003	NUMBER OF SPECIES, FISH	
89888	**NEKTON HOOP NET**	1015
98077	DURATION OF DEPLOYMENT (HRS)	
98003	NUMBER OF SPECIES, FISH	
98124	HOOP NET WIDTH (METERS)	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON HOOK AND LINE**	1016
89942	NET OR HOOKLINE EFFORT, DURATION IN WATER (HRS)	
98003	NUMBER OF SPECIES, FISH	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON CASTNET**	1017
89945	CASTNETTING EFFORT (#CASTS)	
98003	NUMBER OF SPECIES, FISH	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON TRAWL**	1018
89907	TRAWL, OTTER, DURATION (MINUTES)	
89953	TRAWL, OTTER, WIDTH, (M)	
98003	NUMBER OF SPECIES, FISH	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON WATER INTAKE SCREEN**	1019
89940	INTAKE SCREEN COLLECTION, DURATION IN MINUTES	
89951	COOLING WATER INTAKE SCREEN (1 = REVOLVING, 2 = STATIC)	
98003	NUMBER OF SPECIES, FISH	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**NEKTON GILL NET**	10111
98077	DURATION OF DEPLOYMENT (HRS)	
98078	GILL NET MESH SIZE (INCHES)	
98003	NUMBER OF SPECIES, FISH	
98005	NEKTON ORGANISMS-NONE PRESENT (report only if no species collected)	

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SURFACE WATER QUALITY MONITORING/CLEAN RIVERS PROGRAM

NEKTON SPECIES SEINED DATA REPORTING FORM

RTAG# | **REGION** | **Monitoring Category** (ALM, ALU, RWA, UAA) | **COLLECTOR**

STATION ID | **SEGMENT** | **SE** | **CE** | **MT** (Required) | **MT-objective** (Optional)

STATION DESCRIPTION

COMPOSITE CATEGORY B **B=BOTH**

M M D D Y Y Y Y (START DATE) | **H H M M** (START TIME) | **START DEPTH** | M **DEPTH** meters

M M D D Y Y Y Y (END DATE) | **H H M M** (END TIME) | **END DEPTH** | M **DEPTH** meters

PARAMETER	PARAMETER DESCRIPTION	VALUE

PARAMETER	PARAMETER DESCRIPTION	VALUE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SURFACE WATER QUALITY MONITORING/CLEAN RIVERS PROGRAM

NEKTON SPECIES SHOCKED DATA REPORTING FORM

RTAG# | **REGION** | **Monitoring Category** (ALM, ALU, RWA, UAA) | **COLLECTOR**

STATION ID | **SEGMENT** | **SE** | **CE** | **MT** (Required) | **MT-objective** (Optional)

STATION DESCRIPTION

COMPOSITE CATEGORY B **B=BOTH**

M M D D Y Y Y Y — **START DATE**

H H M M — **START TIME**

START DEPTH | **DEPTH** M meters

M M D D Y Y Y Y — **END DATE**

H H M M — **END TIME**

END DEPTH | **DEPTH** M meters

PARAMETER	PARAMETER DESCRIPTION	VALUE

PARAMETER	PARAMETER DESCRIPTION	VALUE

TCEQ Benthic Macroinvertebrate Sample Tracking Log

Sample tracking log number:
Name of collector:
TCEQ Station ID:
Location description:
Date of collection:
Date entered in sample tracking log:
Date identification started:
Date identification completed:
Method of collection:

Sample tracking log number:
Name of collector:
TCEQ Station ID:
Location description:
Date of collection:
Date entered in sample tracking log:
Date identification started:
Date identification completed:
Method of collection:

Sample tracking log number:
Name of collector:
TCEQ Station ID:
Location description:
Date of collection:
Date entered in sample tracking log:
Date identification started:
Date identification completed:
Method of collection:

TCEQ Benthic Macroinvertebrate Laboratory Bench Sheet

Sample tracking log number:	
Name of identifier:	
Location of collection:	Method of collection:
Date of collection:	
Date entered in sample tracking log:	
Date identification/enumeration started:	
Date identification/enumeration completed:	

Scientific Name	Number of Individuals

Metrics and Scoring for Kick Samples
Rapid Bioassessment Protocol
Benthic Macroinverebrates Worksheet

Stream Name:					
Date:		Collectors:			
Location:					
County:		Ecoregion #:			
Type of Assessment (select one)		UAA	ALA	ALM	RWA

Metric	**Value**	**Score**
1. Taxa Richnes		
2. EPT Taxa Abundance		
3. Biotic Index (HBI)		
4. % Chironomidae		
5. % Dominant Taxon		
6. % Dominant FFG		
7. % Predators		
8. Ratio of Intolerant:Tolerant Taxa		
9. % of Total Trichopteraas Hydropsycidae		
10. # of Non-insect Taxa		
11. % Collector-Gatherers		
12. % of Total Number of Elmidae		

Aquatic Life Use Point Score Ranges:
Exceptional: >36
High: 29-36
Intermediate: 22-28
Limited: < 22

Total Score:		
Aquatic Life Use		

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SURFACE WATER QUALITY MONITORING/CLEAN RIVERS PROGRAM

BENTHIC MACROINVERTEBRATE DATA REPORTING FORM

RTAG# | **REGION** | **Monitoring Category** (ALM, ALU, RWA, UAA) | **COLLECTOR**

STATION ID | **SEGMENT** | **SE** | **CE** | **MT** (Required) | **MT-objective** (Optional)

STATION DESCRIPTION

COMPOSITE CATEGORY **B** **B=BOTH**

M M D D Y Y Y Y **START DATE** | **H H M M** **START TIME** | **START DEPTH** | M **DEPTH** meters

M M D D Y Y Y Y **END DATE** | **H H M M** **END TIME** | **END DEPTH** | M **DEPTH** meters

PARAMETER CODE	PARAMETER DESCRIPTION	VALUE
89888	**BENTHIC MACROINVERTEBRATES RAPID BIOASSESSMENT PROTOCOL**	2011
89899	BENTHIC DATA REPORTING UNITS (1=NUMBER OF INDIVIDUALS IN SUB-SAMPLE; 2=NUMBER OF INDIVIDUALS/FT^3; 3=NUMBER OF INDIVIDUALS/M^3; 4=TOTAL NUMBER IN KICKNET	
89950	BENTHIC SAMPLE COLLECTION METHOD (1=SURBER; 2=EKMAN; 3=KICKNET; 4=PETERSON; 5=HESTER-DENDY	
89946	MESH SIZE, ANY NET OR SIEVE, AVERAGE BAR (CM)	
89903	KICKNET EFFORT, AREA KICKED (SQ METER)	
89904	KICKNET EFFORT, MINUTES KICKED (MIN)	
89902	DIP NET EFFORT, AREA SWEPT (SQ METER)	
89906	NUMBER OF INDIVIDUALS IN BENTHIC SAMPLE	
89905	DEBRIS/SHORELINE SAMPLING EFFORT, MINUTES	
89961	ECOREGION LEVEL III (TEXAS ECOREGION CODE)	
90055	TOTAL TAXA RICHNESS, BENTHOS	
90008	NUMBER OF EPT INDEX	
90007	HILSENHOFF BIOTIC INDEX (HBI)	
90062	CHIRONOMIDAE, PERCENT OF INDIVIDUALS	
90042	DOMINANT TAXON, BENTHOS PERCENT OF INDIVIDUALS	
90010	DOMINANT BENTHIC FUNCTIONAL FEEDING GRP, % OF INDIVIDUALS	
90036	BENTHIC PREDATORS, PERCENT OF INDIVIDUALS	
90050	DOMINANT BENTHIC FUNCTIONAL FEEDING GRP, % OF INDIVIDUALS	
90069	PERCENT OF TOTAL TRICHOPTERA INDIVIDUALS AS HYDROPSYCHIDAE	
90052	NUMBER OF NON-INSECT TAXA	
90025	BENTHIC GATHERERS, PERCENT OF INDIVIDUALS	
90054	ELMIDAE, PRECENT OF INDIVIDUALS	
90081	RAPID BIOASSESSMENT PROTOCOLS BENTHIC MACROINVERTEBRATE IBI SCORE	
90005	BENTHOS ORGANISMS-NONE PRESENT (report only if no species collected)	

PARAMETER CODE	PARAMETER DESCRIPTION	VALUE
89888	**BENTHIC MACROINVERTEBRATES QUANTITATIVE PROTOCOL**	2012
89899	BENTHIC DATA REPORTING UNITS (1=NUMBER OF INDIVIDUALS IN SUB-SAMPLE; 2=NUMBER OF INDIVIDUALS/FT^3; 3=NUMBER OF INDIVIDUALS/M^3; 4=TOTAL NUMBER IN KICKNET	
89950	BENTHIC SAMPLE COLLECTION METHOD (1=SURBER; 2=EKMAN; 3=KICKNET; 4=PETERSON; 5=HESTER-DENDY	
89946	MESH SIZE, ANY NET OR SIEVE, AVERAGE BAR (CM)	
89975	AREA OF SNAG SURFACE SAMPLED (SQ MTR)	
89933	HESTER-DENDY DURATION (DAYS)	
89934	PETERSON SAMPLER EFFORT, AREA SAMPLED (SQ MTR)	
89935	EKMAN SAMPLER EFFORT, AREA SAMPLED (SQ METER)	
89901	SURBER SAMPLER EFFORT, AREA SAMPLED (SQ METER)	
89961	ECOREGION LEVEL III (TEXAS ECOREGION CODE)	
90055	TOTAL TAXA RICHNESS, BENTHOS	
90056	NUMBER OF DIPTERA TAXA	
90057	NUMBER OF EPHEMEROPTERA TAXA	
90058	TOTAL NUMBER OF INTOLERANT TAXA, BENTHOS	
90060	EPT, PERCENT INDIVIDUALS	
90062	CHIRONOMIDAE, PERCENT OF INDIVIDUALS	
90066	TOLERANT BENTHOS, PERCENT OF INDIVIDUALS	
90020	BENTHIC GRAZERS, PERCENT OF INDIVIDUALS	
90025	BENTHIC GATHERERS, PERCENT OF INDIVIDUALS	
90030	BENTHIC FILTERERS, PERCENT OF INDIVIDUALS	
90067	DOMINANT 3 TAXA, PERCENT INDIVIDUALS	
90085	QUANTITATIVE PROTOCOLS REGIONAL BENTHIC MACROINVERTEBRATE IBI SCORE	
90005	BENTHOS ORGANISMS-NONE PRESENT (report only if no species collected)	
89888	**BENTHIC MACROINVERTEBRATES OTHER PROTOCOL**	2013
89905	DEBRIS/SHORELINE SAMPLING EFFORT, MINUTES	
89950	BENTHIC DATA REPORTING UNITS (1=NUMBER OF INDIVIDUALS IN SUB-SAMPLE; 2=NUMBER OF INDIVIDUALS/FT3; 3=NUMBER OF INDIVIDUALS/M3; 4=TOTAL NUMBER IN KICKNET	
89904	KICKNET EFFORT, MINUTES KICKED (MIN)	
89961	ECOREGION LEVEL III (TEXAS ECOREGION CODE)	
90005	BENTHOS ORGANISMS-NONE PRESENT (report only if no species collected)	

Part I - Stream Physical Characteristics Worksheet

Obervers:		**Date:**		**Time:**	
Weather conditions:					
Stream:				**Segment ID:**	
Site Location:				**Reach length:**	
Observed stream uses:					

Stream type (circle one):	**perennial**		or	**intermittent with perennial pools**			
Stream bends:	**No. well defined**		**No. moderately defined**		**No . poorly defined**		
Aesthetics (circle one):	**(1) wilderness**	**(2) natural**		**(3) common**	**(4) offensive**		
Channel obstructions or modifications:					**No. riffles**		
Channel flow status (circle one):	**high**	**moderate**		**low**	**no flow**		

Riparian vegetation (%	**Left bank**	**Right bank**	**Maximum pool depth:**		**Maximum pool width:**
Trees			**Notes:**		
Shrubs					
Grasses or forbs					
Cultivated fields					
Other					

Site map:

Part I - Stream Physical Characteristics Worksheet (continued)

Date:		Stream name:	

Location of transect	Stream width (m)	Left bank slope (°)	LB erosion potential (%)	Thalweg depth:												RB erosion potential (%)	Tree canopy (%)
				Stream Depths (m) at Points Across Transect													

Habitat type (circle one)		Dominant substrate type	Dominant types riparian vegetation:		% Gravel or larger		
Riffle	Run		Left bank:			Total	
Glide	Pool		Right bank:			CL	

Macrophytes (circle one)		Algae (circle one)		Width of natural buffer (m)		Instream cover types		% Instream cover	CR	
Abundant	Commmon	Abundant	Commmon	LB	RB				LB	
Rare	Absent	Rare	Absent						RB	

Location of transect	Stream width (m)	Left bank slope (°)	LB erosion potential (%)	Thalweg depth:												RB erosion potential (%)	Tree canopy (%)
				Stream Depths (m) at Points Across Transect													

Habitat type (circle one)		Dominant substrate type	Dominant types riparian vegetation:		% Gravel or larger		
Riffle	Run		Left bank:			Total	
Glide	Pool		Right bank:			CL	

Macrophytes (circle one)		Algae (circle one)		Width of natural buffer (m)		Instream cover types		% Instream cover	CR	
Abundant	Commmon	Abundant	Commmon	LB	RB				LB	
Rare	Absent	Rare	Absent						RB	

Location of transect	Stream width (m)	Left bank slope (°)	LB erosion potential (%)	Thalweg depth:												RB erosion potential (%)	Tree canopy (%)
				Stream Depths (m) at Points Across Transect													

Habitat type (circle one)		Dominant substrate type	Dominant types riparian vegetation:		% Gravel or larger		
Riffle	Run		Left bank:			Total	
Glide	Pool		Right bank:			CL	

Macrophytes (circle one)		Algae (circle one)		Width of natural buffer (m)		Instream cover types		% Instream cover	CR	
Abundant	Commmon	Abundant	Commmon	LB	RB				LB	
Rare	Absent	Rare	Absent						RB	

Part I - Stream Physical Characteristics Worksheet (continued)

Date:		Stream name:	

Location of transect	Stream width (m)	Left bank slope (°)	LB erosion potential (%)	Thalweg depth:												RB erosion potential (%)	Tree canopy (%)
				Stream Depths (m) at Points Across Transect													

Habitat type (circle one)		Dominant substrate type	Dominant types riparian vegetation:		% Gravel or larger	Tree canopy (%)	
Riffle	Run		Left bank:			Total	
Glide	Pool		Right bank:			CL	

Macrophytes (circle one)		Algae (circle one)		Width of natural buffer (m)		Instream cover types		% Instream cover		
									CR	
Abundant	Commmon	Abundant	Commmon	LB	RB				LB	
Rare	Absent	Rare	Absent						RB	

Location of transect	Stream width (m)	Left bank slope (°)	LB erosion potential (%)	Thalweg depth:												RB erosion potential (%)	Tree canopy (%)
				Stream Depths (m) at Points Across Transect													

Habitat type (circle one)		Dominant substrate type	Dominant types riparian vegetation:		% Gravel or larger	Tree canopy (%)	
Riffle	Run		Left bank:			Total	
Glide	Pool		Right bank:			CL	

Macrophytes (circle one)		Algae (circle one)		Width of natural buffer (m)		Instream cover types		% Instream cover		
									CR	
Abundant	Commmon	Abundant	Commmon	LB	RB				LB	
Rare	Absent	Rare	Absent						RB	

Location of transect	Stream width (m)	Left bank slope (°)	LB erosion potential (%)	Thalweg depth:												RB erosion potential (%)	Tree canopy (%)
				Stream Depths (m) at Points Across Transect													

Habitat type (circle one)		Dominant substrate type	Dominant types riparian vegetation:		% Gravel or larger	Tree canopy (%)	
Riffle	Run		Left bank:			Total	
Glide	Pool		Right bank:			CL	

Macrophytes (circle one)		Algae (circle one)		Width of natural buffer (m)		Instream cover types		% Instream cover		
									CR	
Abundant	Commmon	Abundant	Commmon	LB	RB				LB	
Rare	Absent	Rare	Absent						RB	

Texas Commission on Environmental Quality
Surface Water Quality Monitoring Program

Habitat Assessment Worksheet B Part II of III

Part II - Summary of Physical Characteristics of Water Body

Using information from all of the transects and measurements in Part I and other sources, report the following general characteristics or averages for the entire reach:

Stream Name:		**Date**	

Physical Characteristics		Value
Stream bed slope over evaluated reach (from USGS map; elevation change in meters/reach length in meters)		
Approximate drainage area above the transect furthest downstream (from USGS or county highway map in km^2)		
Stream order		
Length of stream evaluated (in meters or kilometers)		
Number of lateral transects made		
Average stream width (in meters)		
Average stream depth (in meters)		
Instantaneous stream flow (in ft3/sec)		
Flow measurement method		
Channel flow status (high, moderate, low, or no flow)		
Maximum pool width (in meters)		
Maximum pool depth (in meters)		
Total number of stream bends		
	Number of well defined bends	
	Number of moderately defined bends	
	Number of poorly defined bends	
Total number of riffles		
Dominant substrate type		
Average percent of substrate gravel sized or larger		
Average percent instream cover		
Number of stream cover types		
Average percent stream bank erosion potential		
Average stream bank slope (in degrees)		
Average width of natural buffer vegetation (in meters)		
Average riparian vegetation percent composition by: (total to equal 100%)		
	Trees	
	Shrubs	
	Grasses and Forbes	
	Cultivated fields	
	Other	
Average percent tree canopy coverage		
Overall aesthetic appraisal of the stream		

Texas Commission on Environmental Quality
Surface Water Quality Monitoring

Habitat Assessment Worksheet B Part III of III

Part III - Habitat Quality Index

Habitat Parameter	Scoring Category			
Available Instream Cover **Score**	**Abundant** >50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30-50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10-29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** <10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
	4	**3**	**2**	**1**
Bottom Substrate Stability **Score**	**Stable** >50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30-50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10-29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** <10% gravel or larger substrate; substrate is uniform sand, silt, clay or bedrock
	4	**3**	**2**	**1**
Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width **Score**	**Abundant** ≥ 5 riffles	**Common** 2-4 riffles	**Rare** 1 riffle	**Absent** No riffles
	4	**3**	**2**	**1**
Dimensions of Largest Pool **Score**	**Large** Pool covers more than 50% of the channel width; maximum depth is >1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5-1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is <0.5 meter	**Absent** No existing pools; only shallow auxiliary pockets
	4	**3**	**2**	**1**
Channel Flow Status **Score**	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or <25% of channel substrate is exposed	**Low** Water fills 25-75% of the available channel and/or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools; or stream is dry
	3	**2**	**1**	**0**
Bank Stability **Score**	**Stable** Little evidence (<10%) of erosion or bank failure; bank angles average <30°	**Moderately Stable** Some evidence (10-29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30-39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30-50%); high potential of erosion during flooding; bank angles average 40-60°	**Unstable** Large and frequent evidence (>50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average >60°
	3	**2**	**1**	**0**

Part III - Habitat Quality Index (continued)				
Habitat Parameter	**Scoring Category**			
Channel Sinuosity **Score**	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend or ≥ 3 moderately-defined bends present	**Low** <3 moderately-defined bends or only poorly-defined bends present	**None** Straight channel; may be channelized
	3	**2**	**1**	**0**
Riparian Buffer Vegetation **Score**	**Extensive** Width of natural buffer is >20 meters	**Wide** Width of natural buffer is 10.1-20 meters	**Moderate** Width of natural buffer is 5-10 meters	**Narrow** Width of natural buffer is <5 meters
	3	**2**	**1**	**0**
Aesthetics of Reach **Score**	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; water clarity is usually exceptional	**Natural Area** Trees and/or native vegetation are common; some development evident (from fields, pastures, dwellings); water clarity may be slightly turbid	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park; water clarity may be turbid or discolored	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area; water clarity is usually turbid or discolored
	3	**2**	**1**	**0**
Total Score				

HABITAT QUALITY INDEX

26 - 31 **Exceptional**
20 - 25 **High**
14 - 19 **Intermediate**
< 13 **Limited**

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SURFACE WATER QUALITY MONITORING/CLEAN RIVERS PROGRAM

HABITAT DATA REPORTING FORM

RTAG# | REGION | Monitoring Category (ALM, ALU, RWA, UAA) | COLLECTOR

STATION ID | SEGMENT | SE | CE | MT (Required) | MT-objective (Optional)

STATION DESCRIPTION

COMPOSITE CATEGORY: B (B=BOTH)

START DATE (M M D D Y Y Y Y) | START TIME (H H M M) | START DEPTH | DEPTH (M)

END DATE (M M D D Y Y Y Y) | END TIME (H H M M) | END DEPTH | DEPTH (M)

PARAMETER CODE	PARAMETER DESCRIPTION	VALUE
89888	**TCEQ HABITAT PROTOCOL**	3011
89821	STREAM TYPE; 1=PERENNIAL; 2=INTERMITTENT S/PERENNIAL POOLS; 3= INTERMITTENT; 3=UNKNOWN	
72051	STREAMBED SLOPE (M/KM)	
89859	DRAINAGE AREA ABOVE MOST DOWNSTREAM TRANSECT	
84161	STREAM ORDER	
89884	REACH LENGTH OF STREAM EVALUATED (M)	
89832	NUMBER OF LATERAL TRANSECTS MADE	
89861	AVERAGE STREAM WIDTH (METERS)	
89862	AVERAGE STREAM DEPTH (METERS)	
00061	FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	
89835	FLOW MTH 1=GAGE; 2=ELEC; 3=MECH; 4=WEIR/FLU; 5=DOPPLER	
89848	HABITAT FLOW STATUS, 1=NO FLOW; 2=LOW; 3=MOD; 4=HIGH	
89864	MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)	
89865	MAXIMUM POOL DEPTH AT TIME OF STUDY (METERS)	
89839	TOTAL NUMBER OF STREAM BENDS	
89840	NUMBER OF WELL DEFINED STREAM BENDS	
89841	NUMBER OF MODERATELY DEFINED STREAM BENDS	
89842	NUMBER OF POORLY DEFINED STREAM BENDS	
89843	TOTAL NUMBER OF RIFFLES	
89844	DOMINANT SUBSTRATE TYPES (1=CLAY; 2=SILT; 3=SAND; 4=GRAVEL; 5=COBBLE; 6=BOULDERS; 7=BEDROCK; 8=OTHER	
89845	AVERAGE PERCENT GRAVEL SIZE OR LARGER	
84159	AVERAGE PERCENT INSTREAM COVER	
89929	NUMBER OF STREAM COVER TYPES	
89846	AVERAGE STREAM BANK EROSION (%)	
89847	AVERAGE STREAM BANK SLOPE (DEGREES)	
89866	AVERAGE WIDTH OF NATURAL RIPARIAN VEGETATION (M)	
89872	AVERAGE WIDTH OF NATURAL RIPARIAN VEGETATION ON LEFT BANK (M)	
89873	AVERAGE WIDTH OF NATURAL RIPARIAN VEGETATION ON RIGHT BANK (M)	
89849	AVERAGE PERCENT TREES AS RIPARIAN VEGETATION	
89850	AVERAGE PERCENT SHRUBS AS RIPARIAN VEGEATION	
89851	AVERAGE PERCENT GRASS AS RIPARIAN VEGETATION	
89852	AVERAGE PRECENT CULTIVATED FIELDS AS RIPARIAN VEGETATION	
89853	AVERAGE PERCENT OTHER AS RIPARIAN VEGETATION	
89854	AVERAGE PERCENT TREE CANOPY COVERAGE	
89867	AESTHETICS OF REACH (1=WILD; 2=NAT.; 3=COMM.; 4= OFF.)	

PARAMETER CODE	PARAMETER DESCRIPTION	VALUE
89888	**TCEQ HABITAT PROTOCOL (continued)**	
89962	LAND DEVELOP IMPACT (1=UNIMP; 2=LOW; 3=MOD; 4=HIGH)	
89822	RIPARIAN VEGETATION %; LEFT BANK TREES	
89823	RIPARIAN VEGETATION %;RIGHT BANK TREES	
89824	RIPARIAN VEGETATION %; LEFT BANK SHRUBS	
89825	RIPARIAN VEGETATION %;RIGHT BANK SHRUBS	
89826	RIPARIAN VEGETATION %; LEFT BANK GRASSES OR FORBS	
89827	RIPARIAN VEGETATION %;RIGHT BANK GRASSES OR FORBS	
89828	RIPARIAN VEGETATION %; LEFT BANK CULTIVATED FIELDS	
89829	RIPARIAN VEGETATION %;RIGHT BANK CULTIVATED FIELDS	
89830	RIPARIAN VEGETATION %; LEFT BANK OTHER	
89871	RIPARIAN VEGETATION %;RIGHT BANK OTHER	
89874	AVAILABLE INSTREAM COVER HQI SCORE: 4=ABUNDANT; 3=COMMON; 2=RARE; 1=ABSENT	
89875	BOTTOM SUBSTRATE STABILITY HQI SCORE: 4=STABLE; 3=MODERATELY STABLE; 2=MODERATELY UNSTABLE; 1=UNSTABLE	
89876	NUMBER OF RIFFLES HQI SCORE: 4=ABUNDANT; 3=COMMON; 2=RARE; 1=ABSENT	
89877	DIMENSIONS OF LARGEST POOL HQI SCORE: 4=HIGH; 3=MODERATE; 2=SMALL; 1=ABSENT	
89878	CHANNEL FLOW STATUS HQI SCORE: 3=HIGH; 2=MODERATE; 1=LOW; 0=NO FLOW	
89879	BANK STABILITY HQI SCORE: 3=STABLE; 2=MODERATELY STABLE; 1=MODERATELY UNSTABLE; 0=UNSTABLE	
89880	CHANNEL SINUOSITY HQI SCORE: 3=EXTENSIVE; 2=MODERATE; 1=LOW; 0=NONE	
89881	RIPARIAN BUFFER VEGETATION HQI SCORE: 3=EXTENSIVE; 2=WIDE; 1=MODERATE; 0=NARROW	
89882	AESTHETICS OF REACH HQI SCORE: (1=WILDERNESS; 2=NATURAL AREA; 3=COMMON SETTING; 4= OFFENSIVE)	
89883	HQI TOTAL SCORE	
89908	NO FLOW ISOLATED POOL: LARGEST POOL MAX WIDTH (METERS)	
89909	NO FLOW ISOLATED POOL: LARGEST POOL MAX LENGTH (METERS)	
89910	NO FLOW ISOLATED POOL: LARGEST POOL MAX DEPTH (METERS)	
89911	NO FLOW ISOLATED POOL:SMALLEST POOL MAX DEPTH (METERS)	
89912	NO FLOW ISOLATED POOL: SMALLEST POOL MAX WIDTH (METERS)	
89913	NO FLOW ISOLATED POOL: LARGEST POOL MAX LENGTH WIDTH (METERS)	
89914	NO FLOW ISOLATED POOL: NUMBER OF POOLS EVALUATE	

Appendix E: Chain of Custody Forms

Environmental Laboratory Services

LCRA Environmental Laboratory Services
Request for Analysis Chain-of-Custody Record

LCRA Environmental Lab
3505 Montopolis Dr.
Austin TX 78744

Phone: (512) 356 6022 or 1 800 776 5272
Fax: (512) 356 6021
https://els.lcra.org

Lab ID#:
Client PO:

Project:	CRP Run #*	Client:	Client A	Report To:	Client A LCRA S416 AUSTIN, TX 78703
Collector:	Sample* A	Contact:		Invoice To:	Accounts Payable LCRA S-116
Event#:	*26534* / *796	Phone:			

LAB USE ONLY	Sample ID *	Collected * Date*	Collected * Time * HH:MM	Matrix* AQ = Aqueous S = Solid T = Tissue DW = Drinking Water	Container(s) Type/Preservative/Number * COMPOSITE Y/N	FILTERED Y/N	250APU	1LPU	250PHS04	125STERL					Requested Analysis * 300.0AM-28	Fld_FP	365.4AM	9223-A-30	4500-AM-NN	Fld_FldSt	445.0AM	350.1AM	F-Turb	2540-AMTSS	351.2AM	
1	12292			AQ			1	1	1	*					X	X	X	X	X	X	X	X	X	X	X	
2	12293			AQ			1	1	1	*					X	X	X	X	X	X	X	X	X	X	X	
3	12462			AQ			1	1	1	*					X	X	X	X	X	X	X	X	X	X	X	
4	12466			AQ			1	1	1	*					X	X	X	X	X	X	X	X	X	X	X	
5	12469			AQ			1	1	1	*					X	X	X	X	X	X	X	X	X	X	X	
6	12474			AQ			1	1	1	*					X	X	X	X	X	X	X	X	X	X	X	
7																										

Transfers	Relinquished By	Date/Time	Received By	Date/Time	Cooler Temp: #	TR	Obs.	Corr
1								
2					1			
3					2			

Client Special Instructions:

Lab Use Only

Note: Relinquishing sample(s) and signing the COC, client agrees to accept and is bound by the ELS Standard Terms and Conditions. All fields with an asterisk (*) are required to be completed.

Appendix F: Data Review Checklist and Summary Shells

Data Review Checklist

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

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

Data Summary

Data Set Information

Data Source: _____

Date Submitted: _____

Tag_id Range: _____

Date Range: _____

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

Planning Agency Data Manager: _____ Date: _____

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

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

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

Discrepancies or missing data for the listed tag ID:

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

Data Loss

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

Appendix G: Field and Laboratory Corrective Action Form Corrective action Status Form

CRP Cypress Creek Basin
Corrective Action Plan Form

Corrective Action Plan
Issued by:_____ Date Issued_____ Report No._____
Description of deficiency
Root Cause of deficiency
Programmatic Impact of deficiency
Does the seriousness of the deficiency require immediate reporting to the TCEQ? If so, when was it?
Corrective Action to address the deficiency and prevent its recurrence
Proposed Completion Date for Each Action
Individual(s) Responsible for Each Action
Method of Verification
Date Corrective Action Plan Closed?

TO: (name)
(organization)

FROM: Randy Rushin
Water Monitoring Solutions, Inc.

RE: NETMWD Fiscal Year 2016-17 CRP QAPP

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

PO Box 1132
Sulphur Springs, Texas 75483-1132

I acknowledge receipt of the "Quality Assurance Project Plan Fiscal Year 2016-2017 Cypress Creek Basin". I understand the document(s) describe quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria. My signature on this document signifies that I have read and approved the document contents pertaining to my program. Furthermore, I will ensure that all staff members participating in CRP activities will be required to familiarize themselves with the document contents and adhere to them as well.

_____

Name Date

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