# Upper Neches River Basin
# Surface Water Quality Monitoring Program
# Quality Assurance Project Plan


**Angelina & Neches River Authority**
**P.O. Box 387**
**Lufkin, TX 75902**

**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 2010 to FY 2011

**Questions concerning this quality assurance project plan should be directed to:**


**Matt Romig**
**ANRA Project Manager**
**P.O. Box 387**
**Lufkin, TX 75902**
**(936) 633-6435**
**mromig@anra.org**

# A1 APPROVAL PAGE

**TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**

**Water Quality Planning Division**

Laurie Curra, Manager Date
Water Quality Monitoring & Assessment Section

Allison Woodall, Group Leader Date
Clean Rivers Program

Jennifer Delk Date
Project QA Specialist
Clean Rivers Program

Natalie Bell Date
Project Manager, Clean Rivers Program

**Compliance Support Division**

Stephen Stubbs Date
TCEQ Quality Assurance Manager

Daniel R. Burke Date
Lead CRP Quality Assurance Specialist
Quality Assurance Section

**ANGELINA & NECHES RIVER AUTHORITY**

| | |
|---|---|
| Matt Romig Date | Brian Sims Date |
| ANRA Project Manager | ANRA Quality Assurance Officer |

**ANRA LABORATORY**

| | |
|---|---|
| Brian Sims Date | Jeanette Hancock Date |
| ANRA Laboratory Manager | ANRA Laboratory Quality Assurance Officer |

**CITY OF TYLER**

_____

Mike Norris Date
Water Quality Chemist

**LOWER COLORADO RIVER AUTHORITY**
**ENVIRONMENTAL LABORATORY SERVICES**

_____

Alicia Gill Date
LCRA Laboratory Manager

_____

Hollis Pantalion Date
LCRA Laboratory Quality Assurance Officer

The ANRA 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 this quality assurance project plan and any amendments or added appendices of this plan. The ANRA will maintain this documentation as part of the project's quality assurance records, and will ensure the documentation is available for review. (See sample letter in Attachment 1 of this document.)

## A2 TABLE OF CONTENTS

## LIST OF ACRONYMS

| | |
|---|---|
| **ANRA** | **Angelina & Neches River Authority** |
| **AWRL** | **Ambient Water Reporting Limit** |
| **BMP** | **Best Management Practices** |
| **CAP** | **Corrective Action Plan** |
| **COC** | **Chain of Custody** |
| **CRP** | **Clean Rivers Program** |
| **CWQM** | **Continuous Water Quality Monitoring** |
| **DOC** | **Demonstration of Capability** |
| **DMRG** | **Data Management Reference Guide** |
| **DM&A** | **Data Management and Analysis** |
| **DQO** | **Data Quality Objective** |
| **ELS** | **Environmental Laboratory Services (Lower Colorado River Authority)** |
| **EPA** | **United States Environmental Protection Agency** |
| **FY** | **Fiscal Year** |
| **GPS** | **Global Positioning System** |
| **LCRA** | **Lower Colorado River Authority** |
| **LCS** | **Laboratory Control Sample** |
| **LCSD** | **Laboratory Control Sample Duplicate** |
| **LOD** | **Limit of Detection** |
| **LOQ** | **Limit of Quantitation** |
| **NELAC** | **National Environmental Lab Accreditation Conference** |
| **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** |
| **RBP** | **Rapid Bioassessment Protocol** |
| **RWA** | **Receiving Water Assessment** |
| **SLOC** | **Station Location** |
| **SOP** | **Standard Operating Procedure** |
| **SWQM** | **Surface Water Quality Monitoring** |
| **SWQMIS** | **Surface Water Quality Monitoring Information System** |
| **TMDL** | **Total Maximum Daily Load** |
| **TCEQ** | **Texas Commission on Environmental Quality** |
| **TSWQS** | **Texas Surface Water Quality Standards** |
| **VOA** | **Volatile Organic Analytes** |

## A3 DISTRIBUTION LIST

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

Natalie Bell, Project Manager
Clean Rivers Program
MC-234
(512) 239-6941

Daniel R. Burke
Lead CRP Quality Assurance Specialist
MC-176
(512) 239-0011

Nancy Ragland
Leader, Data Management and Analysis Group
MC-234
(512) 239-6546

**Angelina & Neches River Authority**
**P.O. Box 387**
**Lufkin, Texas 75902**

Matt Romig, Project Manager
(936) 633-6435

Brian Sims, Quality Assurance Officer
(936) 633-7527

**Angelina & Neches River Authority**
**Environmental Laboratory**
**P.O. Box 387**
**Lufkin, Texas 75902**

Brian Sims, Laboratory Manager
(936) 633-7527

Jeanette Hancock, Quality Assurance Officer
(936) 633-7542

**Lower Colorado River Authority**
**Environmental Laboratory Services**

Alicia Gill, LCRA Laboratory Manager
(512) 356-6022

**City of Tyler**

Mike Norris, Water Quality Chemist
(903) 939-8278

The ANRA will provide copies of this project plan and any amendments or appendices of this plan to each person on this list and to each sub-tier project participant, e.g., subcontractors, other units of government. The ANRA 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

**Allison Woodall**
**CRP Group Leader**

Responsible for TCEQ activities supporting the development and implementation of the Texas Clean Rivers Program. Responsible for verifying that the 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 QA guidance for the CRP. Reviews and approves all QA audits, corrective actions, reviews, reports, work plans, contracts, QAPPs, and program QMP. 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 quality assurance 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.

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

**Maria Rafiuly**
**CRP Data Manager, Data Management and Analysis Group**
Responsible for coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval. Ensures that data is reported following instructions in the *Surface Water Quality Monitoring Data Management Reference Guide* (February 2009, or most current version). 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. 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 standard operating procedures for CRP data management.

**Jennifer Delk**
**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 quality assurance 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.

**ANRA**

**Matt Romig**
**ANRA Project Manager**

Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by basin planning agency participants and that projects are producing data of known quality. Ensures that subcontractors 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.

**Brian Sims**
**ANRA Quality Assurance Officer**

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

**Matt Romig**
**ANRA Data Manager**

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

**ANRA Field Technicians/ Interns**

Provide assistance to the Monitoring Coordinator and/or Project Manager, as needed, to complete field sampling and data collection.

**ANRA LABORATORY**

**Brian Sims**
**ANRA Laboratory Manager**

Responsible for ensuring adequate training and supervision of all activities involved in generating analytical data for all laboratory personnel having a thorough knowledge of the laboratory QM/QAP and all SOP's specific to the analyses or task performed and/or supervised. Ensures that analytical tests are performed in accordance with approved methods. Ensures that the laboratory maintains adequate Quality Assurance/Quality Control (QA/QC) procedures during the time samples are being analyzed and that all requirements are met and documentation related to the analyses is completely and accurately reported. Enforces corrective action as required.

**Jeanette Hancock**
**ANRA Laboratory QAO**

Monitors the implementation of the QA Plan within the laboratory to ensure complete compliance with the QA objectives as defined by the contract and in the QAPP. Conducts in-house audits to identify potential problems and ensures compliance with written SOP's. Responsible for supervising all aspects of the QA/QC in the laboratory. Performs validation and verification of data before the report is sent to the Laboratory Manager.

**CITY OF TYLER**

**Mike Norris**
**City of Tyler Project Coordinator**
Serves as a point of contact for the ANRA CRP staff. Participates in basin planning meetings and coordinates field sampling and data collection activities. Responsible for field equipment, supplies, data collection and transportation of SWQM program data and samples. Ensures all sampling procedures are followed according to the QAPP and implements field safety measures. Supervises field staff that conduct and assist with the data collection activities.

**City of Tyler Monitoring Staff**
Conduct field data collection activities in accordance with the basin coordinated monitoring schedule and the QAPP. Assist Project Coordinator with the collection and transportation of SWQM program data and samples.

## LOWER COLORADO RIVER AUTHORITY

**Alicia Gill**
**LCRA Laboratory Manager**

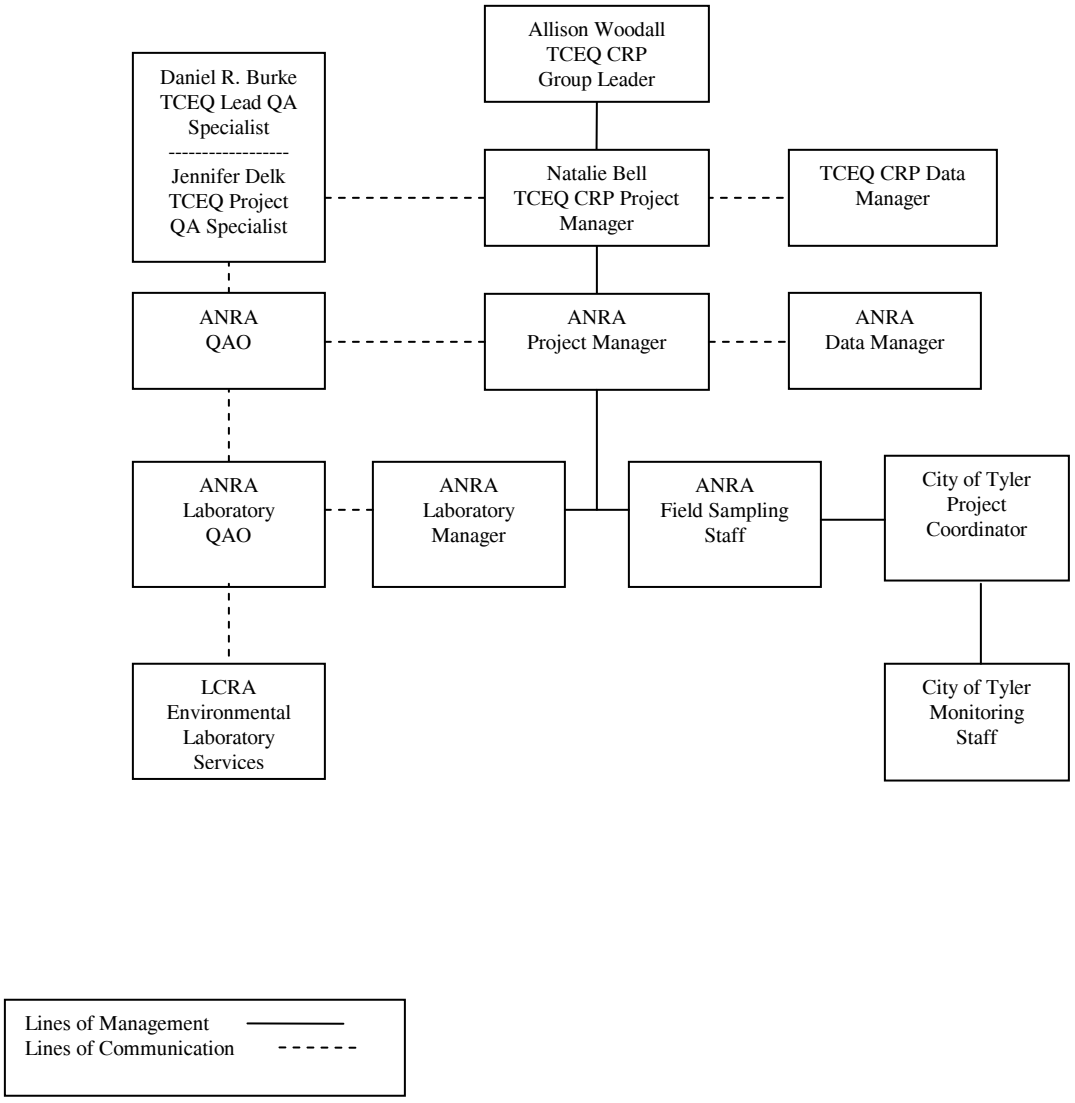
Responsible for ensuring adequate training and supervision of all activities involved in generating analytical data for all laboratory personnel having a thorough knowledge of the laboratory QM/QAP and all SOP's specific to the analyses or task performed and/or supervised. Ensures that analytical tests are performed in accordance with approved methods. Ensures that the laboratory maintains adequate Quality Assurance/Quality Control (QA/QC) procedures during the time samples are being analyzed and that all requirements are met and documentation related to the analyses is completely and accurately reported. Enforces corrective action as required.

**Hollis Pantalion**
**LCRA Laboratory Quality Assurance Officer**

Monitors the implementation of the QA Plan within the laboratory to ensure complete compliance with the QA objectives as defined by the contract and in the QAPP. Conducts in-house audits to identify potential problems and ensures compliance with written SOP's. Responsible for supervising all aspects of the QA/QC in the laboratory. Performs validation and verification of data before the report is sent to the Laboratory Manager.

## 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 Aeach river authority (or local governing entity) shall submit quality-assured data collected in the river basin to the commission.@ AQuality-assured data@ in the context of the legislation means Adata that comply with commission rules for surface water quality monitoring 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 ANRA 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 *Quality Management Plan for the Clean Rivers Program* (most recent version).

The purpose of this QAPP is to clearly delineate ANRA 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 and other programs deemed appropriate by the TCEQ. Project results will be used to support the achievement of Clean Rivers Program objectives as contained in the Clean Rivers *Program Guidance and Reference Guide* FY 2010 -2011.

The goal of the Clean Rivers Program is to maintain and improve the quality of water resources within each river basin in Texas. The program utilizes a watershed management approach to identify and evaluate water quality issues, establish priorities for corrective action and work to implement those actions to support the paramount goal of ensuring safe, adequate, and clean water supplies for the future.

In order to meet the goals of the Clean Rivers Program, it is necessary to continuously monitor basin water quality conditions to evaluate background constituent levels, identify areas of adverse water quality, assess point source and non-point source pollutant loadings, prioritize water quality issues, and provide reliable water quality data to the TCEQ and all basin entities for use in regional and state water quality assessments and permitting activities.

The ANRA monitoring program was developed to implement a basin-wide water quality monitoring program to help meet the goals of the Texas Clean Rivers Program. The monitoring program is reviewed annually and includes the following activities:

- Analyzing available water quality data and basin assessment reports to insure proper data collection.
- Coordinating with other monitoring programs in the basin to minimize any duplication of efforts.

- Developing a basin-wide coordinated monitoring schedule with maps to review at annual stakeholder meetings and coordinated monitoring meetings.

ANRA's monitoring strategy is primarily based on impairments or concerns identified in the TCEQ's 2008 Water Quality Impairments and 303(d) List. Other stations have been selected due to the fact that they are located downstream of a municipal wastewater discharge. A few sites (such as Lake Nacogdoches and Lake Sam Rayburn) have been selected based on local concern and stakeholder input.

## A6 PROJECT/TASK DESCRIPTION

During the FY 2010-2011 biennium, ANRA's monitoring program will include routine (RT) monitoring in all areas of the basin. The routine monitoring includes the following field parameters: pH, water temperature, dissolved oxygen, specific conductance, secchi depth (transparency), total water depth (reservoir sites), instantaneous stream flow (stream sites), flow severity, flow measurement method, days since last significant rainfall, present weather, and stream flow estimate (when instream flow is not available). The routine monitoring also includes the following conventional parameters analyzed in the laboratory: E. Coli, Ammonia-N, Nitrate-N+Nitrite-N, dissolved Ortho-Phosphate-P, Total Phosphorus, Sulfate, Chloride, Total Dissolved Solids, Total Suspended Solids, Chlorophyll-a, and Pheophytin. The City of Tyler will continue to monitor at four stations in the upper basin as a sub-tier participant in the Clean Rivers Program. The City of Tyler also monitors for the same routine field and conventional parameters listed above as well as testing for Total Hardness. The City of Tyler staff continues to participate in the annual coordinated monitoring meetings. They are responsible for the field monitoring activities. The ANRA and/or the LCRA laboratories perform the sample analyses for conventional parameters. All chlorophyll-a and pheophytin samples are analyzed by the LCRA laboratory. The ANRA Data Manager is responsible for the data generated by the City of Tyler and the LCRA laboratory.

The ANRA will also be collecting samples for metals analysis under a separate SWQM QAPP. This is a special project for the TCEQ and all samples will be sent to the TCEQ laboratory in Houston for analysis.

See Appendix A for the project-related work plan tasks and schedule of deliverables for a description of work defined in 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 ANRA Project Manager to the CRP Project Manager electronically. Amendments are effective immediately upon approval by the ANRA Project Manager, the ANRA QAO, the Laboratory, the CRP Project Manager, the CRP Lead QA Specialist, and the CRP Project QA Specialist. They will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the ANRA Project Manager.

**Special Project Appendices**

Projects requiring QAPP appendices will be planned in consultation with the ANRA 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. *Note: In some circumstances, special project appendices should be written in a Astand-alone@ format. This should be discussed during project planning.* Appendices will be approved by the ANRA Project Manager, the ANRA QAO, the Laboratory, the CRP Project Manager, the CRP Project QA Specialist, the CRP Lead QA Specialist and other TCEQ personnel as appropriate. Copies of approved QAPPs appendices will be distributed by the ANRA 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 needed for conducting water quality assessments in accordance with TCEQ's *Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data*. These water quality data, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

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

The measurement performance specifications to support the project purpose for a minimum data set are specified in Table A7.1 and in the text following. Only data collected that have a valid TCEQ parameter code assigned in Table A7.1 will be stored in SWQMIS.

## Table A7.1 - Measurement Performance Specifications

| PARAMETER | UNITS | MATRIX | METHOD | PARAMETER CODE | AWRL | Limit of Quantitation (LOQ) | PRECISION (RPD of LCS/LCSD) | BIAS %Rec. of LCS | LOQ CHECK STANDARD %Rec | LAB |
|---|---|---|---|---|---|---|---|---|---|---|
| **Field Parameters** | | | | | | | | | | |
| pH | pH/ units | water | EPA 150.1 and TCEQ SOP, V1 | 00400 | NA* | NA | NA | NA | NA | Field |
| DO | mg/L | water | SM 4500-O G and TCEQ SOP, V1 | 00300 | NA* | NA | NA | NA | NA | Field |
| Specific Conductance | uS/cm | water | EPA 120.1 and TCEQ SOP, V1 | 00094 | NA* | NA | NA | NA | NA | Field |
| Temperature | B C | water | SM 2550 B and TCEQ SOP V1 | 00010 | NA* | NA | NA | NA | NA | Field |
| Secchi Depth | meters | water | TCEQ SOP V1 | 00078 | NA* | NA | NA | NA | NA | Field |
| Days since last significant rainfall | days | NA | TCEQ SOP V1 | 72053 | NA* | NA | NA | NA | NA | Field |
| Maximum pool width*** | meters | water | TCEQ SOP V2 | 89864 | NA* | NA | NA | NA | NA | Field |
| Maximum pool depth*** | meters | water | TCEQ SOP V2 | 89865 | NA* | NA | NA | NA | NA | Field |
| Pool length*** | meters | water | TCEQ SOP, V2 | 89869 | NA* | NA | NA | NA | NA | Field |
| % Pool coverage in 500 meter reach*** | % | water | TCEQ SOP V2 | 89870 | NA* | NA | NA | NA | NA | Field |
| Total water depth | meters | water | TCEQ SOP V2 | 82903 | NA* | NA | NA | NA | NA | Field |
| Flow | cfs | water | TCEQ SOP V1 | 00061 | NA* | NA | NA | NA | NA | Field |
| Flow measurement method | 1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler | water | TCEQ SOP V1 | 89835 | NA* | NA | NA | NA | NA | Field |
| Flow severity | 1-no flow, 2-low, 3-normal, 4-flood, 5-high, 6-dry | water | TCEQ SOP V1 | 01351 | NA* | NA | NA | NA | NA | Field |
| Flow estimate | cfs | water | TCEQ SOP, V1 | 74069 | NA* | NA | NA | NA | NA | Field |
| Present Weather | 1-clear 2-partly cloudy 3-cloudy 4-rain 5-other | NA | NA | 89966 | NA | NA | NA | NA | NA | Field |

| PARAMETER | UNITS | MATRIX | METHOD | PARAMETER CODE | AWRL | Limit of Quantitation (LOQ) | PRECISION (RPD of LCS/LCSD) | BIAS %Rec. of LCS | LOQ CHECK STANDARD %Rec | LAB |
|---|---|---|---|---|---|---|---|---|---|---|
| **Conventional and Bacteriological Parameters ANRA and LCRA - ELS Laboratory** | | | | | | | | | | |
| TSS | mg/L | water | SM 2540 D<br>SM 2540 D | 00530 | 4 | 2.5<br>1 | 20 | 80-120 | NA | ANRA<br>ELS |
| TDS, dried at 180 degrees C | mg/L | water | SM 2540C<br>SM 2540C | 70300 | 10 | 10 | 20 | 80-120 | NA | ANRA<br>ELS |
| Sulfate | mg/L | water | SM 15th ED 426C<br>EPA 300.0 | 00945 | 5 | 5 | 20 | 80-120 | 70-130 | ANRA<br>ELS |
| Chloride | mg/L | water | SM 4500Cl-B<br>EPA 300.0 | 00940 | 5 | 5 | 20 | 80-120 | 70-130 | ANRA<br>ELS |
| Chlorophyll-a, spectrophotometric method (back up) | ug/L | water | EPA 446.0 | 32211 | 3 | 2 | 20 | 80-120 | NA | ELS |
| Pheophytin, spectrophotometric methodv (back up) | ug/L | water | EPA 446.0 | 32218 | 3 | 2 | NA | NA | NA | ELS |
| Chlorophyll-a, fluorometric method | ug/L | water | EPA 445.0 | 70953 | 3 | 2 | 20 | 80-120 | NA | ELS |
| Pheophytin-a, fluorometric method | ug/L | water | EPA 445.0 | 32213 | 3 | 2 | NA | NA | NA | ELS |
| E. coli, Holding time | hours | water | NA/ Calculation | 31704 | NA | NA | NA | NA | NA | ANRA |
| E. coli, IDEXX Colilert | MPN/100 mL | water | SM 9223-B | 31699 | 1 | 1 | 0.5**** | NA | NA | ANRA |
| Ammonia-N, total | mg/L | water | SM 4500NH3-C<br>Or<br>SM 4500NH3-D<br>EPA 350.1 | 00610 | 0.1 | 0.1 | 20 | 80-120 | 70-130 | ANRA<br>ELS |
| Hardness, total (as CaC03) | mg/L | water | SM 2340 C<br>SM 2340 B | 00900 | 5 | 5 | 20 | 80-120 | NA | ANRA<br>ELS |
| Nitrate/nitrite-N, total | mg/L | water | SM 4500-$NO_3$ E<br>SM 4500-NO3-H | 00630 | 0.05 | 0.04 | 20 | 80-120 | 70-130 | ANRA<br>ELS |
| O-phosphate-P, Diss, field filter <15min | mg/L | water | SM 4500-P E<br>EPA 300.0 | 00671 | 0.04 | 0.04 | 20 | 80-120 | 70-130 | ANRA<br>ELS |
| Total phosphorus-P, wet method | mg/L | water | SM 4500-P E<br>EPA 365.4 | 00665 | 0.06 | 0.06 | 20 | 80-120 | 70-130 | ANRA<br>ELS |

* 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.

**** Based on a range statistic as described in Standard Methods, 20th Edition, Section 9020-B, AQuality Assurance/Quality Control - Intralaboratory Quality Control Guidelines. This criterion applies to bacteriological duplicates with concentrations >10 MPN/100mL or >10 organisms/100mL.

***** E.coli samples analyzed by SM 9223-B 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 48 hours.

**References for Table A7.1:**

United States Environmental Protection Agency (USEPA) AMethods 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), AStandard 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 for Water, Sediment, and Tissue, 2008 (RG-415).

TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data, June 2007 (RG-416)

American Society for Testing and Materials (ASTM) Annual Book of Standards, Vol. 11.02

**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 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/compliance/monitoring/crp/qa/index.html. The limit of quantitation 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. 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 standard for each analytical batch of CRP Samples analyzed.**

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.

Field splits are used to assess the variability of sample handling, preservation, and storage, as well as the analytical process, and are prepared by splitting samples in the field. Control limits for field splits are defined in Section B5.

Laboratory precision is assessed by comparing replicate analyses of laboratory control samples in the sample matrix (e.g. deioinized 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 Table A7.1.

**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 laboratory control samples and LOQ Check Standards prepared with verified and known amounts of all target analytes in the sample matrix (e.g. deioinized 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 Table A7.1.

**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 the Clean Rivers Program 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 includes 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

Field personnel receive training in proper sampling and field analysis. 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 Global Positioning System (GPS) certification are located in Section B10, Data Management.

Contractors and subcontractors must ensure that laboratories analyzing samples under this QAPP meet the requirements contained in section 5.4.4 of the NELAC standards (concerning Review of Requests, Tenders and Contracts).

# A9 DOCUMENTS AND RECORDS

The documents and records that describe, specify, report, or certify activities are listed.

**Table A9.1 Project Documents and Records**

| Document/Record | Location | Retention (yrs) | Format |
|---|---|---|---|
| QAPPs, amendments and appendices | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| Field SOPs | ANRA Office | Five | Paper, Electronic |
| Laboratory Quality Manuals | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| Laboratory SOPs | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| QAPP distribution documentation | ANRA Office | Five | Paper |
| Field staff training records | ANRA Office | Five | Paper |
| Field equipment calibration/maintenance logs | ANRA Office | Five | Paper |
| Field instrument printouts | ANRA Office | Five | Paper |
| Field notebooks or data sheets | ANRA Office | Five | Paper |
| Chain of custody records | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| Laboratory calibration records | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| Laboratory instrument printouts | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| Laboratory data reports/results | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| Laboratory equipment maintenance logs | ANRA Office/ LCRA Laboratory | Five | Paper, Electronic |
| Corrective Action Documentation | ANRA Office | Five | Paper |

**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 NELAC standards (Section 5.5.10) and include the information necessary for the interpretation and validation of data. The requirements for reporting data

and the procedures are provided.
Reports of results of analytical tests performed by the laboratory contain the following elements:

- 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
- Date and time of sample 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)
- Station information
- Date and time of collection
- Sample depth
- 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 NELAC compliance on a result by result basis
- Clearly identified subcontract laboratory results (as applicable)
- 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); and RL confirmation (% recovery)
- 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.

All final ANRA Laboratory reports will be hand delivered to the ANRA Data Manager in a timely manner.

**Electronic Data**

Data will be submitted electronically to the TCEQ in the Event/Result file format described in the most current version of the *Surface Water Quality Monitoring Data Management Reference Guide* (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 E) will be submitted with each data submittal. The sub-tier participant data is included and processed like all other CRP data once copies of the laboratory reports and field sheets are provided to the ANRA Data Manager. The data from the LCRA Laboratory will be included and processed like all other CRP data once copies of the laboratory reports are provided to the ANRA Data Manager.

# 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 according to procedures documented in the *TCEQ Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2008.(RG-415) and Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data* (*RG-416).* Additional aspects outlined in Section B below reflect specific requirements for sampling under the Clean Rivers Program and/or provide additional clarification.

**Sample volume, container types, minimum sample volume, preservation requirements, and holding time requirements.**

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

| Parameter | Matrix | Container | Preservation | Sample Volume | Holding Time |
|---|---|---|---|---|---|
| TSS | water | PCP or N | < 6 $^0$C | 1000 | 7 days |
| TDS | water | PCP or N | < 6 $^0$C | 500 | 7 days |
| Ammonia -N | water | PCP or N | Acidify with $H_2SO_4$ to pH<2, < 6 $^0$C | 500 | 28 days |
| Nitrate+Nitrite | water | PCP or N | Acidify with $H_2SO_4$ to pH<2, < 6 $^0$C | 150 | 28 days |
| Phosphorus, total | water | PCP or N | Acidify with $H_2SO_4$ to pH<2, < 6 $^0$C | 150 | 28 days |
| Orthophosphate | water | PCP or N | Filter in field (<15 minutes) ; < 6 $^0$C | 150 | 48 hours |
| Chlorophyll a/ Pheophytin | water | PCP or N, brown | < 6 $^0$C*, keep in dark; filter within 48 hours | 500 | Frozen filters up to 28 days |
| E. coli* | water | SPS | < 6 $^0$C not frozen | 100 | 6 Hours |
| Chloride | water | PCP or N | < 6 $^0$C | 250 | 28 Days |
| Sulfate | water | PCP or N | < 6 $^0$C | 250 | 28 Days |
| Total Hardness | water | CG or PCP | $HNO_3$ to pH <2, | 250 | 6 months (samples filtered and acidified in the field) |

*E.coli samples analyzed by SM 9223-B 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 48 hours.

Container Key:
C = Cubitainer
A = Amber Glass
B = Borosilicate Glass
VOC = TOC/Volatile Organic Vials
N = Nalgene
CG = Clear Glass
SPS = Sterile Polystyrene
PCP=PreCleaned HDPE/LDPE

## Sample Containers

All sample containers will meet the requirements as outlined in Table B2.1. Sample containers (pre-cleaned polyethylene) are purchased pre-cleaned for conventional parameters and are disposable. Sterile Polystyrene (100ml) or Sterile Polyethylene (250ml) bottles with 1% sodium thiosulfate powder are used for bacteriological samples. All non-disposable glassware and plastics are washed and rinsed thoroughly by the laboratory before reuse. Reusable bottles are washed in a dishwasher using non-phosphate detergents and rinsed with hot tap water. They are final-rinsed by hand with deionized water in the laboratory. A detergent residue test (DRT) is performed on each batch of sample bottles. Results of the DRT are maintained in a log book by the laboratory. Certificates are maintained in a notebook by the ANRA or by the laboratory.

**Processes to Prevent Contamination**

Procedures outlined in the *TCEQ Surface Water Quality Monitoring Procedures* outline the necessary steps to prevent contamination of samples. These include: direct collection into sample containers, when possible; clean sampling techniques for metals; and certified containers for organics. 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 as presented in Appendix C. *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/signature
7. Values for all field parameters
8. Detailed observational data, including:
   - water appearance
   - weather
   - biological activity
   - unusual odors
   - pertinent observations related to water quality or stream uses (e.g., exceptionally poor water quality conditions/standards not met; stream uses such as swimming, boating, fishing, irrigation pumps, etc.)
   - watershed or instream activities (events impacting water quality, e.g., bridge construction, livestock watering upstream, etc.)
   - specific sample information (number of sediments grabs, type/number of fish in a tissue sample, etc.)
   - missing parameters (i.e., when a scheduled parameter or group of parameters is not collected)

**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:

1. Write legibly in indelible ink
2. Changes should be made by crossing out original entries with a single line, entering the changes, and initialing and dating the corrections.
3. 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 and appropriate sampling procedures may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected. It is the responsibility of the ANRA Project Manager, in consultation with the ANR 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 corrective action plan (CAP).

## 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 D). The following list of items matches the COC form in Appendix D.

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; please specify*) with an indelible marker. Label information includes:

1. Site identification
2. Date and time of collection
3. Preservative added, if applicable
4. Designation of Afield-filtered@ *(for metals)* as applicable
5. Sample type (i.e., analysis(es)) to be performed

**Sample Handling**

ANRA field data sheets (Appendix C) are supplied to all field personnel prior to initiation of collection procedures. The field data sheets have spaces dedicated to recording of all pertinent field observations and water quality parameters. The field staff has the prime responsibility to insure that all pertinent information is recorded correctly and in the proper units. All field data sheets will be kept on file at ANRA in designated field sheet log books (3-ring binders).

All samples brought to the ANRA Laboratory are examined for proper documentation, holding times, sample temperature, and preservation by the ANRA Sample Custodian. The Sample Custodian accepts delivery by signing the final portion of the official COC submitted with the samples. The accepted samples are immediately logged into the laboratory LIMS and assigned a unique laboratory sample identification (ID) number. It is the responsibility of the sample custodian to log-in collected water samples in the proper format, and to record the unique laboratory sample ID number on the sample container. The sample container is placed in the proper laboratory refrigerator by the sample custodian.

Samples to be sent to a contract laboratory are relinquished by the sample custodian when they are deemed acceptable after a thorough inspection of the sample documentation, preservation, hold times, and containers. The samples are then packed on ice in a cooler to maintain a 4$^{o}$C or cooler temperature and sealed with a custody seal to ensure that samples are not disturbed in transfer. The sealed cooler, containing sample containers and COC forms, is then received by the sample transporter and transported to the contract laboratory, where it is relinquished by the sample transporter. The contract laboratory inspects the custody seal and sample containers to be sure that the samples have not been tampered with. After this examination, the samples are received by the contract laboratory. If the samples are further sent to another contract laboratory, the above process is carried out again until the samples are received and analyzed.

Samples being analyzed by the LCRA Laboratory will be received by the ANRA Laboratory sample custodian who will sign the COC indicating the receipt of the samples. Sample water temperatures are checked to document that the samples have been cooled properly. The samples will be prepared and preserved for shipment to the LCRA Laboratory. The sample custodian will log and monitor the progress of the samples through the analysis stage. The ANRA sample custodian will ship samples to LCRA using a commercial mail carrier. The sampling coordinator requests overnight delivery for the samples. Proper documentation noting transfer of the samples is used at the time of sample drop off and delivery to the LCRA. The preserved samples are shipped in coolers containing ice to assist in the sample preservation. LCRA will verify the documentation of the COC and laboratory staff will sign

the COC indicating receipt of the samples. The samples are checked to verify that the samples are properly preserved and that holding times have not been exceeded. If, due to extenuating circumstances, samples are required to be analyzed at a subcontract laboratory, proper chain of custody procedures are followed to show transfer of sample custody.

Proper sample custody is a joint effort of the field sampling staff, the sample transporter, and the laboratory staff. The main documentation of proper sample custody for all events up to the arrival of the sample at the laboratory is the chain-of-custody (COC) form which is provided in Appendix D. If any of the information blanks or signature locations on the COC form are not completely filled out, there is a gap in the documentation of sample custody. In such an event, the laboratory sample custodian will question whether the sample should be accepted. All data acceptance questions are referred to the Laboratory Manager and ANRA Project Manager.

The following procedures outline sample handling from collection to receipt of analytical results:

1. After a sample is transferred into the proper sample container, the container is tightly capped as quickly as possible to prevent the loss of volatile components and to exclude possible oxidation. Where appropriate, samples are preserved and/or split in the field. All samples are placed on ice immediately following field measurements and transported to the laboratory as soon as possible.

2. The container is labeled with the proper laboratory sample identification number (a unique designation) on a label securely affixed to the container. A marker with waterproof ink is used when labeling the sample container and filling out the appropriate COC form.

3. The COC form is filled out completely and accurately.

4. Samples requiring subcontractor lab analysis are delivered to the subcontract laboratory for analysis as soon as possible via ground shipment. These samples are accompanied by the COC form originated in the field and accepted by the ANRA Laboratory. The COC is relinquished by the ANRA Laboratory and is delivered to the sub-contract laboratory personnel authorized to receive samples. The date and time the sample was shipped and received by the ANRA Laboratory must be filled out, along with the ANRA Laboratory custodian relinquishment signature before the subcontract lab accepts the sample(s). Copies of complete COC forms are returned along with subcontract laboratory analysis information.

5. A copy of the COC form is retained for ANRA records. Copies of COC forms are kept along with the laboratory analysis reports and associated field sheet(s) in the designated Monitoring Report Log Book.

**Sample Tracking Procedure Deficiencies and Corrective Action**

All deficiencies associated with chain-of-custody procedures as described in this QAPP are immediately reported to the Lead Organization 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 ANRA Project Manager in consultation with the ANRA 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. Corrective Action Plans 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 Table A7.1 of Section A7. The authority for analysis methodologies under the Clean Rivers Program is derived from the TSWQS ( ' ' 307.1 - 307.10) in that data generally are generated for comparison to those standards and/or criteria. The Standards state that AProcedures for laboratory analysis will be in accordance with the most recently published edition of *Standard Methods for the Examination of Water and Wastewater*, the latest version of the *SWQM Procedures, Volume 1: Physical Methods for Water, Sediment, and Tissue*, 40 CFR 136, or other reliable procedures acceptable to the Executive Director.@

Laboratories collecting data under this QAPP are compliant with the NELAC 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 ANRA Laboratory Supervisor, who will make the determination and notify the ANRA 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 ANRA 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 "holding time exceedance", "sample received unpreserved", "estimated value", etc... 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.

# B5 QUALITY CONTROL

**Sampling Quality Control Requirements and Acceptability Criteria**

The minimum Field QC Requirements are outlined in the *TCEQ Surface Water Quality Monitoring Procedures.* Specific requirements are outlined below. Field QC sample results are submitted with the laboratory data report (see Section A9.).

Field Split - A field split is a single sample subdivided by field staff immediately following collection and submitted to the laboratory as two separately identified samples according to procedures specified in the *SWQM Procedures*. Split samples are preserved, handled, shipped, and analyzed identically and are used to assess variability in all of these processes. Field splits apply to conventional samples only and are collected on a 10% basis. If less than ten samples are collected in a month, one set of field splits will be collected per month.

The precision of field split results is calculated by relative percent difference (RPD) using the following equation:

$$RPD = |(X_1 - X_2)/\{(X_1+X_2)/2\} * 100|$$

A 30% RPD criteria will be used to screen field split results as a possible indicator of excessive variability in the sample handling and analytical system. If it is determined that elevated quantities of analyte (i.e., > 5 times the LOQ) were measured and analytical variability can be eliminated as a factor, than variability in field split results will primarily be used as a trigger for discussion with field staff to ensure samples are being handled in the field correctly. Some individual sample results may be invalidated based on the examination of all extenuating information. The information derived from field splits is generally considered to be event specific and would not normally be used to determine the validity of an entire batch; however, some batches of samples may be invalidated depending on the situation. Professional judgment during data validation will be relied upon to interpret the results and take appropriate action. The qualification (i.e., invalidation) of data will be documented on the Data Summary. Deficiencies will be addressed as specified in this section under Quality Control or Acceptability Requirements Deficiencies and Corrective Actions.

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 NELAC-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. 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.

Limit of Quantitation (LOQ) – The laboratory will analyze a calibration standard (if applicable) at the LOQ on each day calibrations are performed. In addition, and LOQ check standard will be analyzed with each analytical batch. Calibrations including the standard at the LOQ will meet the calibration requirements of the analytical method or corrective action will be implemented.

LOQ Check Standard – An LOQ check standard 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 standard is spiked into the sample matrix at a level less than or near the LOQ for each analyte for each analytical batch of CRP samples run.

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

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

$$\%R = SR/SA * 100$$

Measurement performance specifications are used to determine the acceptability of LOQ Check Standard analyses as specified in 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 mid point of the calibration for each analyte. In cases of test methods with very long lists of analytes, LCSs are prepared with all the target analytes and not just a representative number, except in cases of organic analytes with multipeak responses.

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

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

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

$$\%R = SR/SA * 100$$

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

Laboratory Duplicates – A laboratory duplicate is prepared by taking aliquots of a sample from the same container under laboratory conditions and processed and analyzed independently. A laboratory control sample duplicate (LCSD) is prepared in the laboratory by splitting aliquots of an LCS. Both samples are carried through the entire preparation and analytical process. LCSDs are used to assess precision and are performed at a rate of one per preparation batch.

For most parameters, precision is calculated by the relative percent difference (RPD) of LCS duplicate 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.)*

$$RPD = |(X_1 - X_2)/\{(X_1+X_2)/2\} * 100|$$

A bacteriological duplicate is considered to be a special type of laboratory duplicate and applies when bacteriological samples are run in the field as well as in the lab. Bacteriological duplicate analyses are performed on samples from the sample bottle on a 10% basis. Results of bacteriological duplicates are evaluated by calculating the logarithm of each result and determining the range of each pair.

Measurement performance specifications are used to determine the acceptability of duplicate analyses as specified in Table A7.1. The specifications for bacteriological duplicates in Table A7.1 apply to samples with concentrations > 10 org./100mL.

Matrix spike (MS) –Matrix spikes are prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Percent recovery of the known concentration of added analyte is used to assess accuracy of the analytical process. The spiking occurs prior to sample preparation and analysis. Spiked samples are routinely

prepared and analyzed at a rate of 10% of samples processed, or one per preparation batch whichever is greater. The information from these controls is sample/matrix specific and is not used to determine the validity of the entire batch. To the extent possible, matrix spikes prepared and analyzed over the course of the project should be performed on samples from different sites. The MS is spiked at a level less than or equal to the midpoint of the calibration or analysis range for each analyte. Percent recovery (%R) is defined as 100 times the observed concentration, minus the sample concentration, divided by the true concentration of the spike.

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 laboratory shall document the calculation for %R. The percent recovery of the matrix spike is calculated using the following equation in which %R is percent recovery, SSR is the observed spiked sample concentration, SR is the sample result, and SA is the reference concentration of the spike added:

$$\%R = (SSR - SR)/SA * 100$$

The results are compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, the laboratory shall determine the internal criteria and document the method used to establish the limits. The laboratory has established limits for matrix spike recovery of 80-120% unless more stringent limits are mandated by the method. For matrix spike results outside established criteria, corrective action shall be documented or the data reported with appropriate data qualifying codes.

Method blank –A method blank is a sample of matrix similar to the batch of associated samples (when available) that is free from the analytes of interest and is processed simultaneously with and under the same conditions as the samples through all steps of the analytical procedures, 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 then 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 or 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 (example: volatiles in water) the batch shall be defined as environmental samples that are analyzed together with the same method and personnel, using the same lots of reagents, not to exceed the analysis of 20 environmental samples.

**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 ANRA 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 may automatically invalidate the sample, especially in cases where high blank values may be indicative of contamination which may be causal in putting a value above the standard. Notations of field split excursions and 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 ANRA Laboratory QAO. The Laboratory QAO will discuss with the ANRA Project Manager. If applicable, the ANRA 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 *TCEQ Surface Water Quality Monitoring 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 *TCEQ Surface Water Quality Monitoring Procedures*. Post-calibration error limits and the disposition resulting from error are adhered to. Data not meeting post-error limit requirements invalidate associated data collected subsequent to the pre-calibration and are not submitted to the TCEQ.

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

## B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

ANRA uses pre-cleaned sterile sample bottles purchased from Quality Environmental Containers, field filters purchased from Geotech Environmental and all other miscellaneous consumable supplies such as batteries and office supplies are purchased from Wal-Mart or Office Depot. All consumable laboratory supplies are purchased from Fisher Scientific.

## B9 NON-DIRECT MEASUREMENTS

This QAPP does not include the use of routine data obtained from non-direct measurement sources. Only data collected directly under this QAPP is submitted to the SWQMIS database.

## B10 DATA MANAGEMENT

**Data Management Process**

It is imperative that Clean Rivers Program data and associated applications be maintained and managed in a manner consistent with the development and use of the data. For scientifically valid results, the data, program applications, and reports must be handled in an orderly and consistent manner. Documented quality assurance and quality control checks/procedures are applied to all received data sets, individual data points and data manipulation programs.

Data to be incorporated into the ANRA database is subject to varying levels of review. The QA/QC checks evaluate each data set as a whole, and the validity of individual data points.

Each data set to be processed into the database is evaluated for any problems that might impose a limitation on the use of the data. This check is performed prior to processing/importing to the database. The following information is considered:

a. Credibility of data source
b. Acceptable QA/QC procedures
c. Intended use of the data
d. Frequency of data collection/impact of missed sampling events
e. Sample size
f. Sample collection and preservation methods
g. Field and laboratory test procedures
h. General documentation

Upon passing the evaluation of a data set's limitations, the data is incorporated into the ANRA Database. Initially the data is entered, either manually or electronically, into a set of working directory files that are consistent with the ANRA Database file structures. In the event that a deviation is found in the data set, the corresponding data points will be coded with a “D” in the remarks section of the Results Table. The remark “D” code refers to the SWQMIS data qualifiers, which means ‘did not pass all QC criteria. Any deviation found in the data set will be conveyed to the TCEQ CRP Project Manager by ANRA. Disqualified data will be removed from the dataset and will not be submitted to the TCEQ for inclusion in SWQMIS. The reason for the data removal will be listed on the data summary.

Electronic data input procedures vary according to the source and format of the data. Manual data input will be made to appropriately structured MS Access tables. Standardized procedures are followed to ensure proper data entry.

The data dictionary has been adopted and maintained to provide information on each data field of each database. The TCEQ data dictionary has been adopted and will be updated as necessary.

After the data/data sets have been input/converted into an appropriate working directory database, the individual data points will be evaluated to determine their reasonableness. Data values that are considered outliers will be discarded or coded prior to entry into the records directory. The criteria for determination of outliers will be based on individual data sets being processed for entry into the TCEQ's SWQMIS database. Once the data set is complete, any individual points falling outside the most recent Max/Min range as defined by the TCEQ SWQM Parameters Table will be considered outliers. If an outlier does occur, then it will be noted in the remark section of the database and verified against the original data report, and if necessary, verified by the laboratory. After verification, outliers will either be assigned the appropriate remark code or documented as verified with a 1 in the verify_flg section of the results table.

After the final QA checks are performed by ANRA, data are submitted to the TCEQ CRP project manager. Data are then transferred from the TCEQ CRP PM to the TCEQ CRP Data Manager, who then loads the data into SWQMIS.

Only data entered since the last data transfer, previous data sets not included in a data transfer, and/or revised data sets are transferred. The tag series transferred is documented on the Data Summary (QAPP Appendix E) that is submitted to the TCEQ upon the completion of the data transfer. All QA data sets associated with the data transfer will be submitted in the form of a QA Table. The files are transferred as pipe delimited text files formats as described in the Surface Water Quality Monitoring Data Management Reference Guide, 2009 or most recent version to the TCEQ Project Manager.

After the Data has been transferred, reviewed, and loaded into the TCEQ Database, the same Data will either be uploaded to the on-line database at www.anra.org, or a link provided to the TCEQ's Surface Water Quality Web Reporting Tool at http://www8.tceq.state.tx.us.SwqmisWeb/public/index.faces for public access. Also, electronic and/or hard copies of the data will be available upon request from ANRA.

**Data Dictionary -** Terminology and field descriptions are included in the SWQM Data Management Reference Guide, 2009 or most recent version. For the purposes of verifying which entity codes are included in this QAPP, a table outlining the entities that will be used when submitting data under this QAPP is included below.

| Name of Monitoring Entity | Tag Prefix | Submitting Entity | Collecting Entity |
|---|---|---|---|

| | | | |
|---|---|---|---|
| *Angelina & Neches River Authority* | *K* | *AN* | *AN* |
| *City of Tyler* | *K* | *AN* | *TY* |

**Data Errors and Loss**

To prevent loss of data and minimize errors, all data generated under this QAPP are verified against the appropriate quality assurance checks as defined in the QAPP, including but not limited to chain of custody procedures, field sampling documentation, laboratory analysis results, and quality control data.

The data are also verified by comparing 10% of the data in the database to hard copy reports as a check against transcription errors.

Backup/Disaster Recovery Requirements
All data associated with the CRP database and network files are completely backed-up daily. See record keeping and data storage section below for more details. The IBM Server PC is protected by an Internet Office UPS with battery backup and surge protection to safely work through blackouts and save open network files.

Should the computer system or software fail, ANRA will request the assistance of a Computer/Network Specialist to evaluate the probable cause of the failure, methods to prevent reoccurrence of the problem, and guide recovery of the system. The archived tape backups will allow for complete recovery of the hard disk drive contents.

**Record Keeping and Data Storage**

A three ring binder will be used as a data set log to track all hard copy data sets associated with the ANRA Database. The database management log will also record the structure of tables, data modifications and updates, and record of dates for all file revisions.

Complete original electronic data sets are archived on 40GB backup tapes via an internal tape drive with MS Windows 2000 Server software. Electronic data are backed up on a daily basis Monday through Friday of each work week. The weekly tapes in use are stored at an off-site location to prevent loss due to a disaster such as fire or flood. These tapes are maintained indefinitely until they are replaced by a new set of backup tapes. The original hard copies of field data sheets and laboratory reports are stored in binders at the ANRA offices for a minimum period of seven years.

**Data Handling, Hardware, and Software Requirements**

Based upon the needs of CRP data management activities and subject to available CRP resources, ANRA has put into place an electronic data processing system consisting of a network with the following configuration:

Hardware

IBM Server-Pentium III 1.3GHz, (2) 40GB hard drive (mirrored) 256MB RAM, internal tape drive, 3.5"-1.44MB diskette drive, 40x internal CD-ROM drive, 56k internal fax/modem, and 17" SVGA color monitor

Compaq Evo D310 - Pentium 4 1.8 GHz, 256 MB RAM, 40GB hard drive, 3.5"-1.44MB diskette drive, 40x internal CD-ROM drive, 56k internal fax/modem, and 19" SVGA color monitor

HP D330 - Pentium 4 2.4Ghz, 256MB RAM, 40 GB Hard Drive, 3.5"-1.44MB diskette drive, 40x internal CD-ROM drive, 56k internal fax/modem, and 17" SVGA color monitor

HP G70-246US Laptop – Pentium Dual Core 2.0 Ghz, 3 GB RAM, 160 GB Hard Drive, DVD RW drive, 17" color monitor
HP LaserJet 1320 Printer
Samsung CLP-510N Color Printer
HP Scanjet 5300 Cse Scanner

Software

Operating System: MS Windows XP
Network System: MS Windows 2000 Server
General Software:
Corel WordPerfect Office 2000 - Wordperfect 9, Quattro Pro 9, Paradox 9
Microsoft Office 2007 Professional - Word 2007, Excel 2007, PowerPoint 2007, Access 2007, Outlook 2007, Publisher 2007, Accounting Express 2008, Front Page 2002
GPS/GIS Software: ESRI ArcView 3.2a, ESRI ArcGIS 8.3, Trimble Pathfinder Office 3.0

ANRA utilizes MS Access 2007 as the primary database management software. ANRA's Water Quality Database has been developed according to CRP guidance and database structures in accordance with TCEQ requirements.

**Information Resource Management Requirements**

Data will be managed in accordance with the TCEQ Surface Water Quality Monitoring Data Management Reference Guide and applicable Basin Planning Agency information resource management policies. Global Positioning System (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 the TCEQ=s SWQMIS database. Positional data obtained by the Clean Rivers Program grantees using a Global Positioning System 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 station location.

# 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 | ANRA | Monitoring of the project status and records to ensure requirements are being fulfilled | Report to TCEQ in Quarterly Report |
| Monitoring Systems Audit of Basin Planning Agency | 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 Subparticipants | Once per participant during the contract period<br>Dates to be determined by the ANRA | ANRA | Field sampling, handling and measurement; facility review; and data management as they relate to CRP | 30 days to respond in writing to the ANRA. PA will report problems to TCEQ in Progress Report. |
| Laboratory Inspection | Dates to be determined by TCEQ | TCEQ Laboratory Inspector | Analytical and quality control procedures employed at the laboratory and the contract laboratory | 30 days to respond in writing to the TCEQ to address corrective actions |

## Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, SWQM Procedures Manual, SOPs, or Data Management Reference Guide. Deficiencies may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff. 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 corrective action plan (CAP). All deficiencies identified by ANRA will trigger a corrective action plan.

## Corrective Action

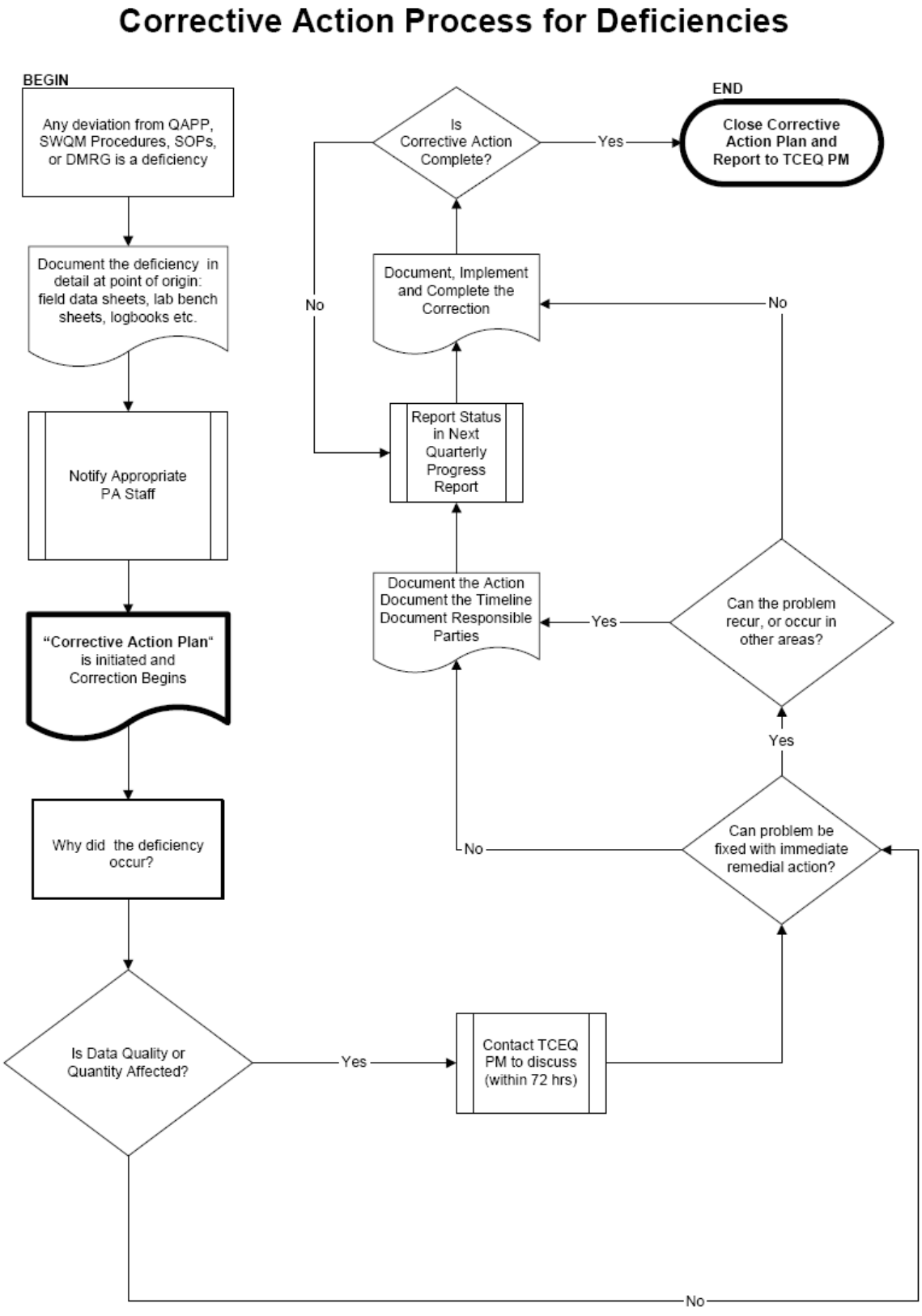
Corrective Action Plans (CAPs) should:

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

- Establish timelines and provide a schedule
- Document the corrective action

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

Figure C1.1 Corrective Action Process for Deficiencies



Status of Corrective Action Plans will be included with quarterly progress reports. In addition, significant conditions (i.e., situations 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 ANRA Project Manager is responsible for implementing and tracking corrective actions. Records of audit findings and corrective actions are maintained by the ANRA 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 CRP QMP and in agreements in contracts between participating organizations.

# C2 REPORTS TO MANAGEMENT

**Table C2.1 QA Management Reports**

| Type of Report | Frequency (daily, weekly, monthly, quarterly, etc.) | Projected Delivery Date(s) | Person(s) Responsible for Report Preparation | Report Recipients |
|---|---|---|---|---|
| Lab Analysis, Lab QA/QC Reports | Monthly | Monthly | Laboratory Manager | ANRA Project Manager, ANRA Data Manager |
| Corrective Action Reports | As needed | With Progress Reports | ANRA Quality Assurance Officer | ANRA Project Manager, TCEQ Project Manager |
| Progress Reports | Quarterly | 12/15/09, 3/15/10, 6/15/10, 9/15/10, 12/15/10, 3/15/11, 6/15/11, 8/31/11 | ANRA Project Manager | TCEQ Project Manager |
| Monitoring Systems Audit Report and Response | Once per contract period | With Progress Report | ANRA Project Manager | TCEQ Project Manager |
| Data Review Checklist and Summary | Quarterly | With Progress Report | ANRA Data Manager/ Project Manager | TCEQ Project Manager |
| Contractor Evaluation | Once per contract period | 8/31/11 | TCEQ Project Manager | ANRA Project Manager |

**Reports to ANRA Project Management**

The ANRA Project Manager is charged with the responsibility to report the status of implementation and application of the quality assurance procedures described in this QAPP and thereby the status of data quality. It is imperative that the Project Manager is properly informed of any quality assurance problems encountered and assists in the development and implementation of corrective actions. This information will be provided to the Project Manager by the ANRA QAO, Data Manager, Field Personnel and/or any performance auditor through the completion of reports. These reports may include but are not limited to the following: analytical and QC summary reports from the laboratory, field QC results and calibration records, and a data review checklist. These reports will be provided to the Project Manager as requested. The data summary is submitted to the Project Manager before each database transfer to the TCEQ. Other reports may include any corrective action forms, correspondence, etc. describing corrective actions or implementation of new processes to ensure that quality assured data are produced.

**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 ANRA's activities for each task; reports monitoring status, problems, delays, and status of corrective actions; and outlines the status of each task's deliverables.

**Monitoring Systems Audit Report and Response** - Following any audit performed by the ANRA, a report of findings, recommendations and response is sent to the TCEQ in the quarterly progress report.

**Data Review Checklist and 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 ANRA participates in a Contractor Evaluation by the TCEQ annually for compliance with administrative and programmatic standards. Results of the evaluation are submitted to the TCEQ Financial Administration Division, Procurement and Contracts Section.

## D1 DATA REVIEW, VERIFICATION, AND VALIDATION

All field and laboratory 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 are listed in the first two columns of Table D2.1, respectively. Potential errors are identified by examination of documentation and by manual *(or computer-assisted)* examination of corollary or unreasonable data. 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 ANRA 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 E) 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 ANRA 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 ANRA Data Manager with the data. This information is communicated to the TCEQ by the ANRA in the Data Summary (See Appendix E).

**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 | ANRA Project Manager | | |
| Field QC samples collected for all analytes as prescribed in the TCEQ *SWQM Procedures Manual* | ANRA Project Manager | | |
| Standards and reagents traceable | ANRA Project Manager | ANRA/ELS Laboratory Manager | |
| Chain of custody complete/acceptable | | ANRA/ELS Laboratory Manager | |
| NELAC Accreditation is current | | ANRA/ELS Laboratory Manager | |
| Sample preservation and handling acceptable | | ANRA/ELS Laboratory Manager | |
| Holding times not exceeded | | ANRA/ELS Laboratory Manager | |
| Collection, preparation, and analysis consistent with SOPs and QAPP | ANRA Project Manager | ANRA/ELS Laboratory Manager | |
| Field documentation (e.g., biological, stream habitat) complete | ANRA Project Manager | | ANRA Data Manager |
| Instrument calibration data complete | ANRA Project Manager | ANRA/ELS Laboratory Manager | ANRA Data Manager |
| Bacteriological records complete | ANRA Project Manager | ANRA/ELS Laboratory Manager | |
| QC samples analyzed at required frequency | ANRA Project Manager | ANRA/ELS Laboratory Manager | |
| QC results meet performance and program specifications | | ANRA/ELS Laboratory Manager | ANRA Data Manager |
| Analytical sensitivity (Minimum Analytical Levels/Ambient Water Reporting Limits) consistent with QAPP | ANRA Project Manager | ANRA/ELS Laboratory Manager | ANRA Data Manager |
| Results, calculations, transcriptions checked | ANRA Project Manager | ANRA/ELS Laboratory Manager | ANRA Data Manager |
| Laboratory bench-level review performed | | ANRA/ELS | |

| | | | |
|---|---|---|---|
| | | Laboratory Manager | |
| All laboratory samples analyzed for all parameters | ANRA Project Manager | ANRA/ELS Laboratory Manager | |
| Corollary data agree | | ANRA/ELS Laboratory Manager | ANRA Data Manager |
| Nonconforming activities documented | ANRA Project Manager | ANRA/ELS QA Officer | |
| Outliers confirmed and documented; reasonableness check performed | | | ANRA Data Manager |
| Dates formatted correctly | | | ANRA Data Manager |
| Depth reported correctly | | | ANRA Data Manager |
| TAG IDs correct | | | ANRA Data Manager |
| TCEQ ID number assigned | | | ANRA Data Manager |
| Valid parameter codes | | | ANRA Data Manager |
| Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly | | | ANRA Data Manager |
| Time based on 24-hour clock | | | ANRA Data Manager |
| Absence of transcription error confirmed | | | ANRA Data Manager |
| Absence of electronic errors confirmed | | | ANRA Data Manager |
| Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule) | ANRA Project Manager | | ANRA Data Manager |
| Field QC results attached to data review checklist | | | ANRA Data Manager |
| Verified data log submitted | | | ANRA Data Manager |
| 10% of data manually reviewed | | | ANRA Data Manager |

## D3 RECONCILIATION WITH USER REQUIREMENTS

Data produced in this project, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Data meeting project requirements will be used by the TCEQ for the *Texas Water Quality Inventory and 303(d) List* in accordance with TCEQ's *Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data*, and for TMDL development, stream standards modifications, 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:
# Task 3 Workplan

**Objectives:** Water quality monitoring will focus on collecting information to characterize water quality in a variety of locations and conditions. These efforts will include a combination of:

- planning and coordinating basin-wide monitoring
- routine, regularly-scheduled monitoring to collect long-term information and support statewide assessment of water quality
- systematic, regularly-scheduled short-term monitoring to screen water bodies for issues
- permit support monitoring to provide information for setting permit effluent limits
- special study, intensive monitoring targeted to:
  - identify sources and causes
  - assess priority water quality issues
  - obtain background water quality information
  - provide information for setting site-specific permit effluent limits
  - evaluate & develop statewide, regional, and site-specific water quality standards

**Task Description**:

**Monitoring Description**

In FY 2010, ANRA will monitor a minimum of 22 sites quarterly (4 times per year) for conventional, bacteria (E. coli), flow (stream sites only), and field parameters. ANRA will also collect 24 hour dissolved oxygen data at a minimum of 2 sites, three times per year.

In FY 2011, ANRA will monitor at a similar level of effort as FY 2010. The final number of sites, location, frequency, and parameters collected for FY 2011 will be based on priorities identified at the basin Steering Committee and Coordinated Monitoring meetings and included in the amended Appendix B schedule of the QAPP.

All monitoring procedures and methods will follow the guidelines prescribed in the ANRA FY 2010-2011 QAPP, the TCEQ *Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue (RG-415)* and the TCEQ *Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data (RG-416).*

**Coordinated Monitoring Meeting –** ANRA will hold an annual coordinated monitoring meeting. Qualified monitoring organizations will be invited to attend the working meeting in which monitoring needs and purposes will be discussed segment by segment and station by station. Information from participants and stakeholders will be used to select stations and parameters that will enhance overall water quality monitoring coverage, eliminate duplication of effort, and address basin priorities. The changes to the monitoring schedule will be entered into the statewide database on the Internet (http://cms.lcra.org) and communicated to meeting attendees. Changes to monitoring that occur during the course of

the year will be entered into the statewide database on the Internet and communicated to meeting attendees.

**Progress Report**
Each Progress Report will indicate the number of sampling events and the types of monitoring conducted in the quarter, to include all types of monitoring.

**Deliverables**
**& Dues Dates:** **September 1, 2009 through August 31, 2010**

A. Conduct water quality monitoring, summarize activities, and submit with Progress Report - December 15, 2009; March 15 and June 15, 2010
B. Coordinated Monitoring Meeting - between March 15 and April 30, 2010
C Coordinated Monitoring Meeting Summary of Changes - 2 weeks after meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete - May 31, 2010

**September 1, 2010 through August 31, 2011**

A. Conduct water quality monitoring, summarize activities, and submit with Progress Report - September 15 and December 15, 2010; March 15 and June 15 and August 31, 2011

B. Coordinated Monitoring Meeting - between March 15 and April 30, 2011
C Coordinated Monitoring Meeting Summary of Changes - 2 weeks after meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete - May 31, 2011

# ANRA Clean Rivers Program

## FY 2010/2011 QAPP - Appendix B Monitoring Schedule for FY 2010

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

## Sample Design Rationale FY *2010*

The sample design is based on the legislative intent of the Clean Rivers Program. Under the legislation, the Basin Planning Agencies have been tasked with providing data to characterize water quality conditions in support of the 305(b) assessment, 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 ANRA coordinates closely with the TCEQ and other participants to ensure a comprehensive water monitoring strategy within the watershed.

The following changes or additions have been made to the monitoring schedule. These changes have come about because of concerns or requests of steering committee members and TCEQ SWQM staff.

1. It was determined that access to the location necessary for the CWQM site on the upper Angelina river arm of Lake Sam Rayburn
would be very problematic and something that ANRA would not be able to accomplish given the necessary location for that site. Matt Romig discussed this issue with the stake holders at the annual Steering Committee meeting and there was no opposition to canceling that project for the time being.

2. ANRA dropped two stations on Lake Striker (17824 & 17822) these stations were picked up TCEQ R. 5.

3. ANRA added a routine station on Lake Ratcliff (17339) due to the park located there and the amount of contact recreation.

4. ANRA added a routine station on the Attoyac River at SH 21 due to the lack of data in that assessment unit.

5. ANRA added a routine station on Cedar Creek near Diboll (13526) due to the lack of data in that assessment unit because the segment was recently split to add another lower assessment unit.

6. ANRA dropped 24 hr. monitoring at all four stations (10499 USGS contract) and (16081, 14907, and 16301) due to sufficient data and/or fully supporting DO conditions

## 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 the TCEQ Surface Water Quality Monitoring Procedures, Volume 1 (RG-415). 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.

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**

Monitoring Tables for fiscal year 2010 are presented on the following page.

## Monitoring Sites for FY *2010*

The sample design for surface water quality monitoring is shown in Table B1.1 below.

### Table B1.1 Sample Design and Schedule, FY *2010*

| Segment | Region | Site Description | Station ID | Collecting Entity | Monitoring Type | 24 HR | Aquatic Habitat | Benthics | Nekton | Metals Water | Organics Water | Metals Sediment | Organics Sediment | Conventional | Amb Tox Wat | Amb Tox Sed | Indicator Bacteria | Inst Flow | Fish Tissue | Field |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 604 | 10 | JACK CREEK AT FM 2497 SOUTHWEST OF LUFKIN | 10492 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 604 | 10 | BILOXI CREEK AT ANGELINA CR216, SE OF LUFKIN, 1.4KM DOWNSTREAM OF US69 | 10499 | AN | RT | | | | | | | | | | | | 6 | 6 | | |
| 604 | 10 | NECHES RIVER AT US 69, 1.5 MI. NW OF ROCKLAND IN TYLER COUNTY | 10585 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 604 | 10 | CEDAR CREEK AT CR 1336 | 13528 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 604 | 10 | CEDAR CREEK NEAR DIBOLL | 13526 | AN | RT | | | | | | | | | 4 | | | 6 | 4 | | 4 |
| 604 | 10 | HURRICANE CREEK AT SH 324, 1MI SOUTH OF LUFKIN | 13529 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 604 | 10 | PINEY CREEK AT FM358, 6 MI. EAST OF PENNINGTON | 16096 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 604 | 10 | BILOXI CREEK AT FM1818, 9 MI. EAST OF DIBOLL | 16097 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 604 | 10 | BUCK CREEK AT FM1818, 11 MI. EAST OF DIBOLL | 16098 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 604 | 10 | LAKE RATCLIFF WHERE NORTHWEST ARM OF LAKE JOINS MAIN BODY APPROXIMATELY 400 M NORTHWEST OF THE SOUTHWEST CORNER OF DAM | 17339 | AN | RT | | | | | | | | | 4 | | | 4 | | | 4 |
| 604 | 10 | CEDAR CREEK AT FM 2497 NORTH OF DIBOLL | 10478 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| | | | | | | | | | | | | | | | | | | | | |
| 606 | 5 | BLACK FORK CREEK AT COUNTY ROAD UPSTREAM OF TYLER-WESTSIDE WWTP 5.0 KM UPSTREAM OF PRAIRIE CREEK | 10522 | TY | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| | | PRAIRIE CREEK AT SH 110 6.5 MI | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 606 | 5 | NORTHWEST OF TYLER AND 3.5 MI SOUTHWEST OF LINDALE | 18301 | TY | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| | | | | | | | | | | | | | | | | | | | | |
| 610 | 10 | SAM RAYBURM RESERVOIR NEAR SHIRLEY CREEK IN THE ANGELINA RIVER CHANNEL | 15524 | AN | RT | | | | | | | | | 4 | | | 4 | | | 4 |
| 610 | 10 | SAM RAYBURN RESERVOIR AT MARION'S FERRY | 10615 | AN | RT | | | | | | | | | 4 | | | 4 | | | 4 |
| 610 | 10 | AYISH BAYOU AT SH 103, 0.8 KM EAST OF FM 705 | 15361 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| | | | | | | | | | | | | | | | | | | | | |
| 611 | 5 | MUD CREEK AT US 84 SW OF REKLAW | 10532 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 5 | WEST MUD CREEK NEAR SOUTH END OF HOLLY TREES COUNTRY CLUB IN TYLER, 1MI ABOVE TYLER SOUTHSIDE STP | 10543 | TY | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 10 | ANGELINA RIVER AT SH 21 EAST OF ALTO | 10630 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 5 | ANGELINA RIVER AT SH 204 WEST OF CUSHING | 10633 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 5 | ANGELINA RIVER AT FM 1798 WEST OF LANEVILLE | 10635 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 5 | MUD CREEK AT US 79 BETWEEN JACKSONVILLE AND NEW SUMMERFIELD | 14477 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 10 | LAKE NACOGDOCHES IN MAIN POOL NEAR DAM, 10 MI. WEST OF NACOGDOCHES | 15801 | AN | RT | | | | | | | | | 4 | | | 4 | | | 4 |
| 611 | 10 | LAKE NACOGDOCHES UPPER LAKE, 9.0 MILES WEST OF NACOGDOCHES AND 1.5 MILES SOUTH OF SH 21 | 17818 | AN | RT | | | | | | | | | 4 | | | 4 | | | 4 |
| 611 | 10 | LA NANA BAYOU AT LOOP 224 NORTH IN THE CITY OF NACOGDOCHES | 16301 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 10 | LA NANA BAYOU AT NACOGDOCHES CR526, 6.9 MI. SOUTH OF NACOGDOCHES BETWEEN FM 2863 AND FM 1275 | 10474 | AN | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 611 | 5 | WEST MUD CREEK IMMEDIATELY EAST OF US 69 4 MI SOUTH OF TYLER AND 0.53 MI/861 M NORTH OF FM 346 | 18302 | TY | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 612 | 5 | ATTOYAC BAYOU AT US 59 NE OF GARRISON | 16076 | TY | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 612 | 10 | ATTOYAC BAYOU AT SH 21 EAST OF CHIRENO | 10636 | TY | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |
| 612 | 10 | ATTOYAC BAYOU AT SH 7 APPROXIMATELY 1.75 KM NE OF MARTINSVILLE | 15253 | TY | RT | | | | | | | | | 4 | | | 4 | 4 | | 4 |

The monitoring type code “RT” referres to routine monitoring that is ongoing and includes the following parameters:

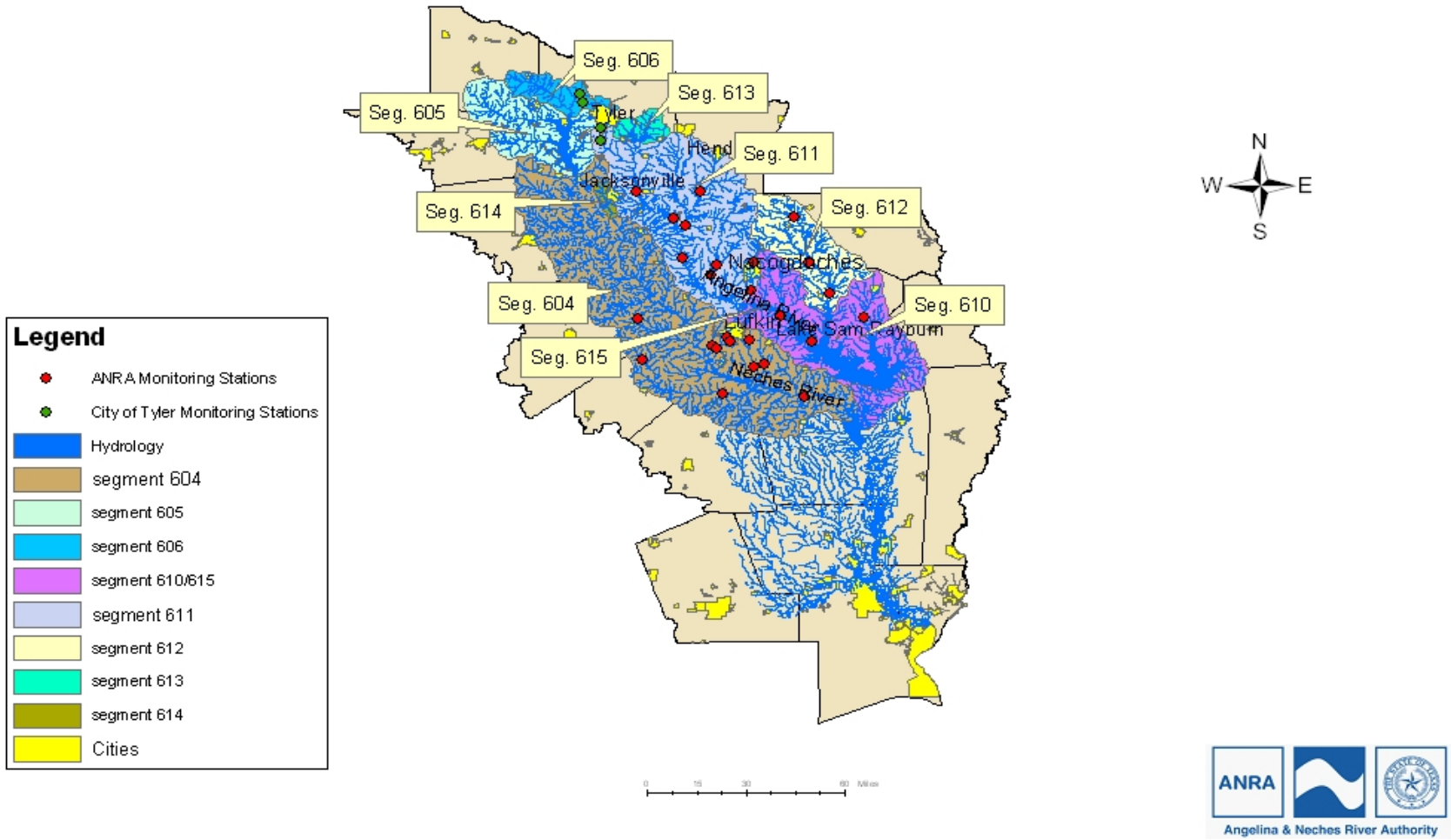
Field - Dissolved oxygen, pH, conductivity, water temperature
Conventional - Sulfate, Chloride, TSS, TDS, Total Phosphorus, Orthophosphate, Total Nitrate+Nitrite, Ammonia-Nitrogen, Chlorophyll-a, Pheophytin
Bacteria - E. coli
Flow - Instream Flow or Flow Estimate

The attached basin maps are provided to identify the general locations of all monitoring stations in the FY 2010 schedule presented in the attached monitoring schedule.

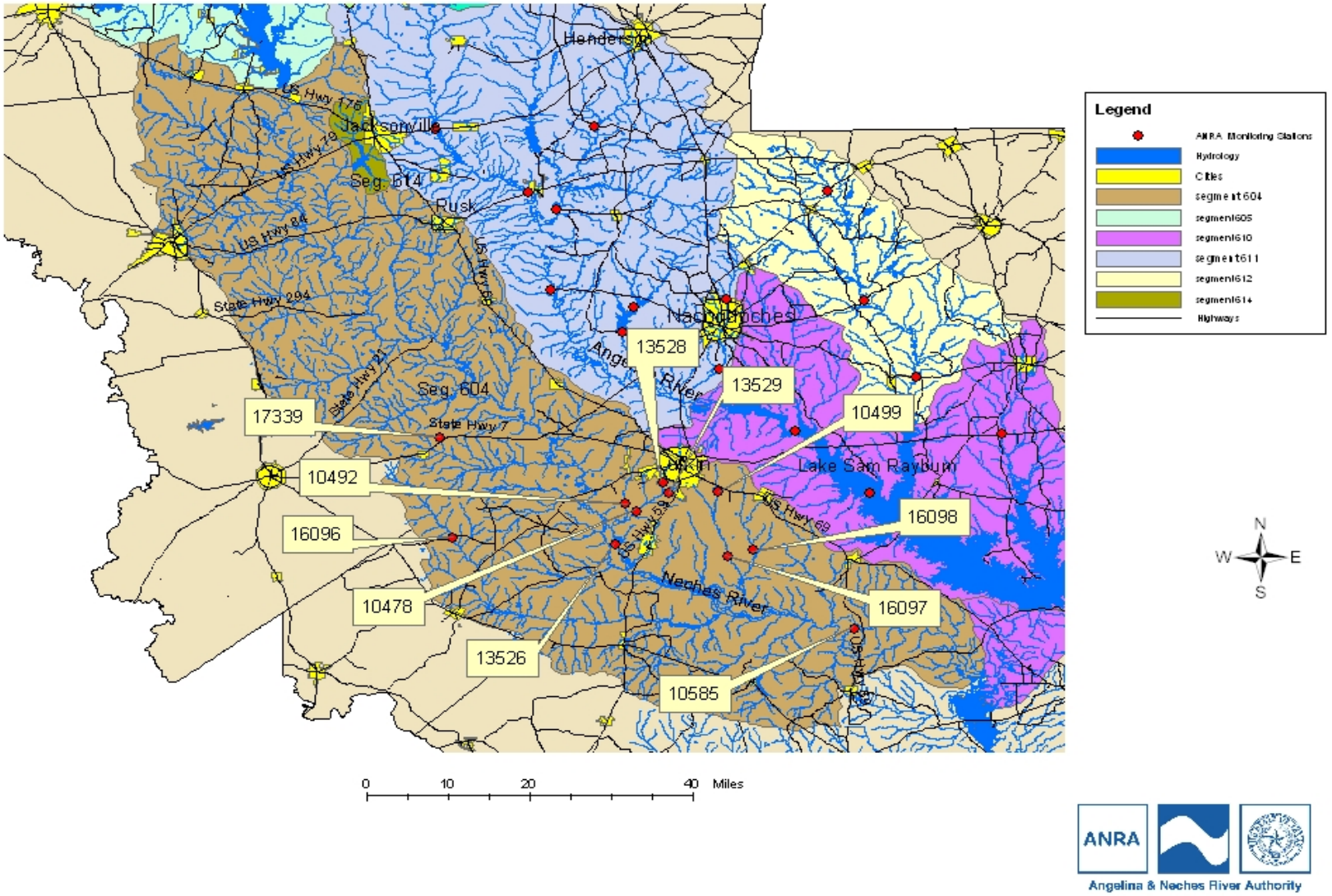
**Critical vs. non-critical measurements**

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

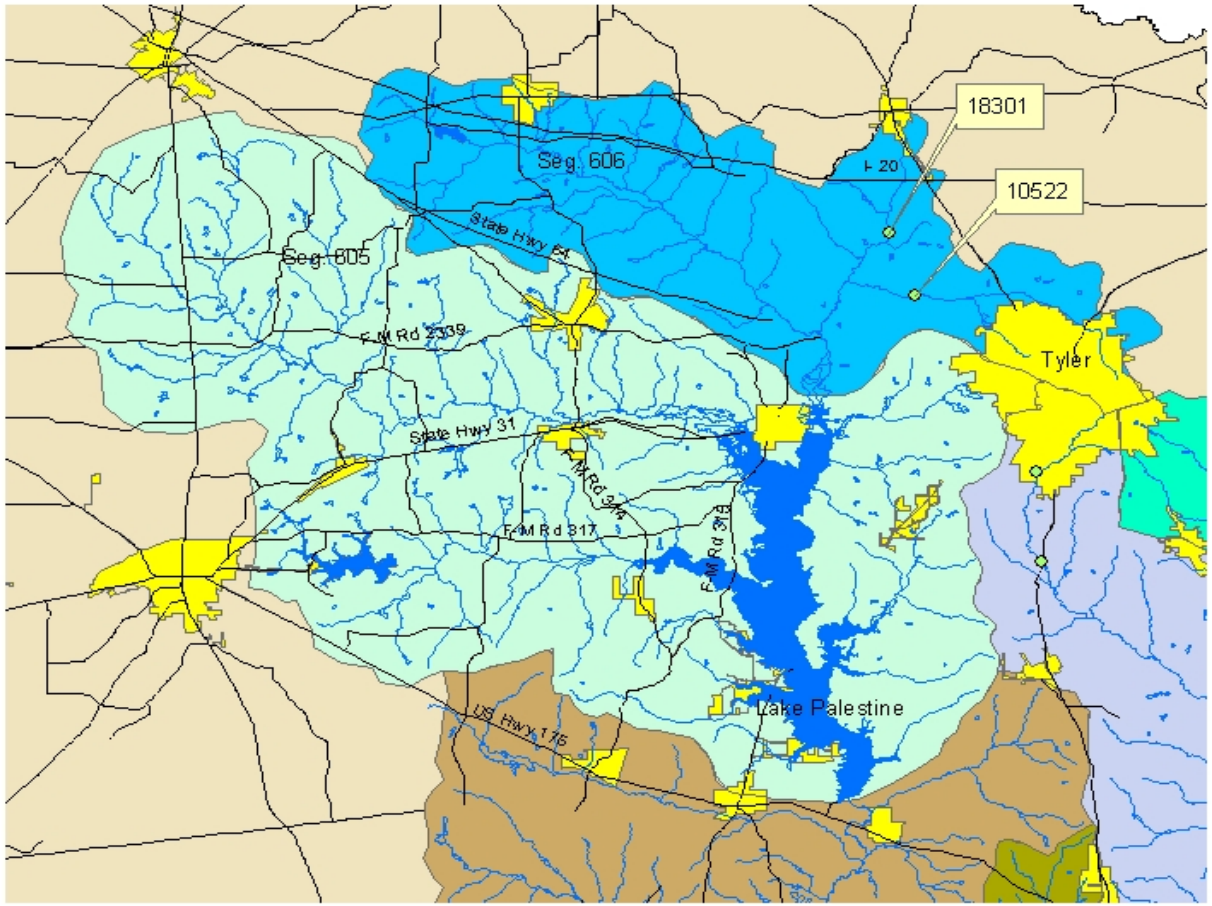
# Upper Neches River Basin FY 2010



# Segment 604 Monitoring Stations FY 2010



# Segment 606 Monitoring Stations FY 2010



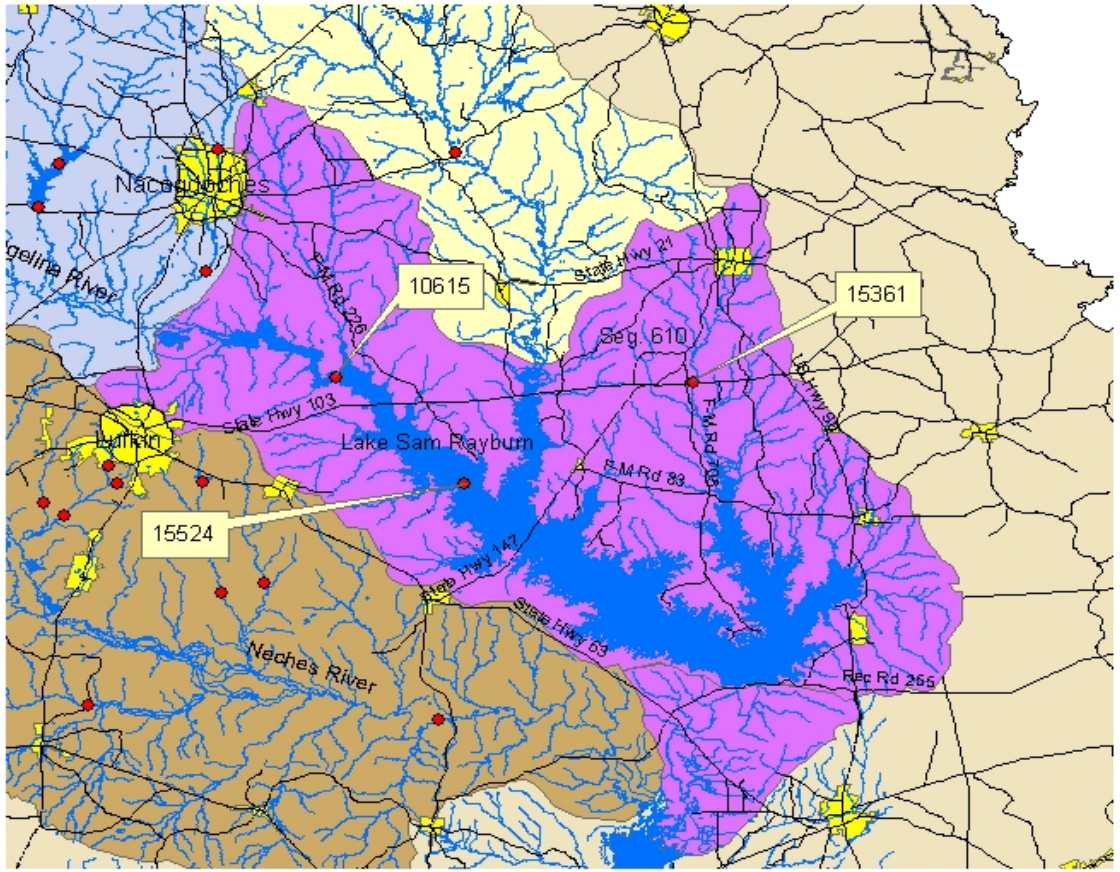

**Legend**

- City of Tyler Monitoring Stations
- Hydrology
- Cities
- segment 605
- segment 606
- Highways

N
W E
S

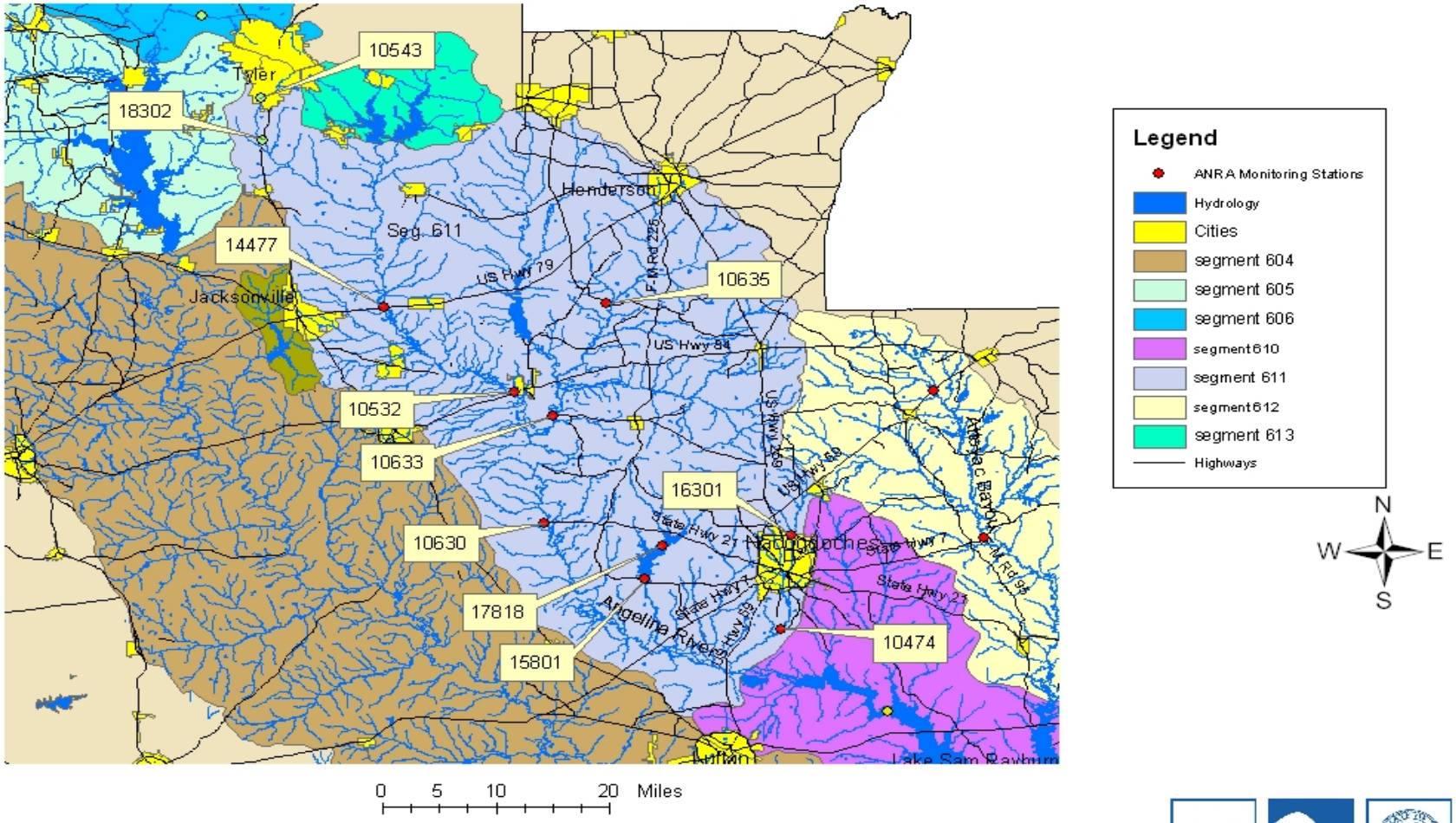
ANRA
Angelina & Neches River Authority

# Segment 610 Monitoring Stations FY 2010

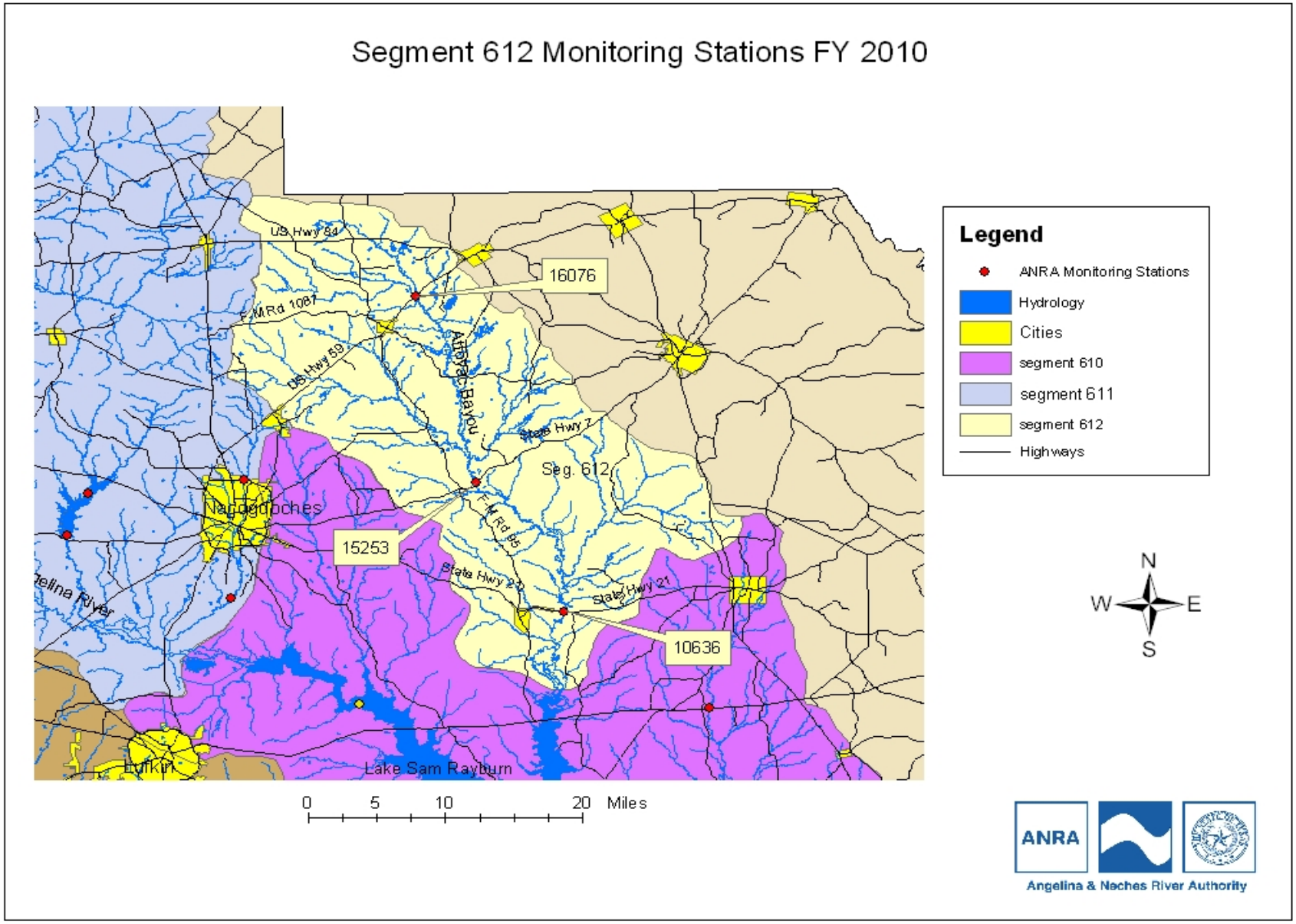



ANRA
Angelina & Neches River Authority

# Segment 611 Monitoring Stations FY 2010




Angelina & Neches River Authority


Segment 612 Monitoring Stations FY 2010
Legend
ANRA Monitoring Stations
Hydrology
Cities
segment 610
segment 611
segment 612
Highways
16076
15253
10636
Seg. 612
Nacogdoches
Lufkin
Lake Sam Rayburn
Attoyac Bayou
US Hwy 59
State Hwy 7
State Hwy 21
F.M Rd 1087
F.M Rd 95
N
W
E
S
0 5 10 20 Miles
ANRA
Angelina & Neches River Authority

# Appendix C:
# Field Data Sheets

## SURFACE WATER QUALITY MONITORING PROGRAM
## FIELD DATA SHEET

ANGELINA & NECHES RIVER AUTHORITY
P.O. BOX 387 / 210 LUFKIN AVE.
LUFKIN ,TEXAS 75902-0387
( 936 ) 632-7795

**Sample Location:**_____

**Station ID:**_____ **Date Collected:**_____

**Sample Matrix:** **Water** **Time Collected:**_____

**Collector(s) Name/Signature:**_____

**Sample Type:**_____ **Sample Depth:**_____

| **Field Tests and Measurements**: | | | **Parameters Collected**: | | | |
|---|---|---|---|---|---|---|
| | pH (standard units) | 00400 | | E. Coli | | Pheophytin-a |
| | Water Temperature $^{o}$C | 00010 | | TSS | | Chloride |
| | Dissolved Oxygen (mg/L) | 00300 | | TDS | | Sulfate |
| | Specific Conductance (µS/cm) | 00094 | | Ammonia-N | | Other: |
| | Secchi Depth (meters) | 00078 | | T. $NO_3$+$NO_2$ | | Field Split |
| | Total Water Depth (meters) | 82903 | | D. Orthophosphate | | |
| | Instant. Stream Flow (cfs) | 00061 | | T. Phosphorus | | |
| | | | | Chlorophyll-a | | |

| **Field Observations:** | |
|---|---|
| | 01351 - Flow Severity (1-no flow, 2- low, 3-normal, 4-flood, 5-high, 6-dry) |
| | 89835 - Flow measurement method (1-gage, 2-electric, 3-mechanical, 4-weir/flume, 5-doppler) |
| | 72053 - Days since last significant rainfall |
| | 89966 - Present Weather (1-clear, 2-partly cloudy, 3-cloudy, 4-rain, 5-other) |
| | 74069 - Stream Flow Estimate (cfs) **Required measurements to calculate flow estimates |
| | Stream Width (feet)** |
| | Average Depth of Stream (feet)** |
| | Distance Object Travels (feet)** |
| | Time for Object to Travel Distance (seconds)** |
| | **COMMENTS**: |

# Appendix D:
# Chain-of-Custody Forms

ANRA
Angelina & Neches River Authority

210 Lufkin Ave
Lufkin, TX 75901
Phone: (936) 633-7550
FAX: (936) 632-7799

# CHAIN OF CUSTODY RECORD

Document ID: ANRA-COC (Revised 1/10/06)

Work order #

*Shaded areas are for LAB USE ONLY*

Page 1 of 1

**SEND REPORT TO:**

Client: TCEQ - Clean Rivers Program
Contact: Matt Romig
Address: 210 Lufkin Ave
City: Lufkin State: TX Zip: 75901
Phone: 936-633-6435 Fax: 936-632-2564

**PROJECT INFORMATION**

Client Primary ID: | Sampler's Printed Name
Client Secondary ID: | Sampler's Signature

**Container & Preservative Codes**

Container Type:
N = Nalgene; SPS = Sterile Polystyrene
G = Glass, Clear; P = Plastic (HDPE/LDPE)
A = Glass, Amber; AP = Amber Plastic
V = VOC Vial; PCP = Precleaned HDPE
O = Other: _____

Preservative:
0 = None; 3 = Ice; 6 = Sodium Thiosulfate
1 = $HNO_3$; 4 = NaOH; 7. Other: _____
2 = $H_2SO_4$; 5 = HCl

**Sample Matrix Codes**

Sample Matrix:
W = Water
S = Soil; SL = Sludge; C = Compost

| Item # | Date | Time | Matrix | Comp | Grab | # Cont | Sample Description | E.coli 31699 | TDS 70300 | Chloride 00940 | Nitrate-Nitrite 00630 | Orthophosphorus 00671 00945 | Sulfate | Chlorophyll Pheophytin 32211 32218 | TSS 00530 | Ammonia-N/ T. Phosphorus 00610 00665 | | | | Sample ID |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | **Container Type** | SPS | PCP | PCP | PCP | PCP | | AP | PCP | PCP | | | | |
| | | | | | | | **Preservative** | 3, 6 | 3 | 3 | 2,3 | 3 | | 3 | 3 | 2, 3 | | | | |
| | | | | | | | **Requested Analyses** | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Total # of Containers: | | | | | | | | | | | | | ← pH Check | |

**Field Parameters**

Instantaneous Flow ____ MGD
Instantaneous Flow ____ GPM
Total Flow ____ MGD
From: To:
pH = ____ S.U.
D.O. = ____ mg/l
Temp = ____ °C
T.$Cl_2$ = ____ mg/l

**COMMENTS / SPECIAL INSTRUCTIONS**

**LAB COMMENTS**

**Temperature Check** ____ °C

**Transfer of Sample Custody**

| Relinquished by: | Date | Time | Received by: | Date | Time |
|---|---|---|---|---|---|
| Shipped on ice? ☐ Yes ☐ No | | | Received on ice? ☐ Yes ☐ No | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Shipped on ice? ☐ Yes ☐ No | | | Received on ice? ☐ Yes ☐ No | | |
| Relinquished by: | Date | Time | Received by: | Date | Time |
| Shipped on ice? ☐ Yes ☐ No | | | Received on ice? ☐ Yes ☐ No | | |

**SAMPLE RECEIPT CHECKLIST**

| YES | NO | | YES | NO | |
|---|---|---|---|---|---|
| ☐ | ☐ | Received on ice? | ☐ | ☐ | Labels & COC agree? |
| ☐ | ☐ | Analyzed upon receipt? | ☐ | ☐ | Bottles intact? |
| ☐ | ☐ | Refrigerated (1-4 °C) while awaiting analysis? | ☐ | ☐ | Custody seals? |

Checked By:

SAMPLE RECEIPT

Environmental Laboratory Services
The Solution Lab

# LCRA ENVIRONMENTAL LABORATORY SERVICES (ELS) CHAIN OF CUSTODY RECORD

NOTE: Relinquishing sample(s) to ELS obligates the submitter to all Standard Terms and Conditions stated on the back of this form.

Target Due Date: _____
Work Order No.: _____
COC No.: _____
Page _____ of _____

Results To: _____ Sampled By: _____
NAME ADDRESS CITY STATE ZIP

Bill To: _____ PO No.: _____
NAME ADDRESS CITY STATE ZIP

Phone No.: _____ Fax No.: _____ Method of Transport: _____ TAT Requested: _____ Working days E-mail: _____

Relinquished By: _____ Date: _____ Time: _____ Received By: _____ Date: _____ Time: _____ Relinquished By: _____ Date: _____ Time: _____

Report Requirements
☐ Hardcopy ☐ E-mail ☐ Fax
☐ EDD (Generic)

Regulatory Requirements
☐ None ☐ NELAP
☐ _____

Received at ELS By: _____ Date: ____ Time: _____
☐ Received on Ice Temp: _____ °C
Login Review: _____ Date: _____

ELS Mgmt. Approval for RUSH: _____
Surcharge for RUSH: _____%

| ELS ID: | SAMPLE DESCRIPTION<br>Custody Seals (circle):<br>Cooler Bottles None | MATRIX | SAMPLE COLLECTION<br>DATE | <br>TIME | CONTAINERS<br>NUMBER | <br>SIZE | <br>TYPE | ANALYSIS REQUESTED - Place an "x" in the box below to indicate request.<br>PRESERVATIVES | <br>pH |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |

Special Instructions: _____
ELS Comments: _____

# Standard Terms and Conditions

Effective July 2008

**Acceptance of Samples...** The Lower Colorado River Authority (LCRA) Environmental Laboratory Services (ELS) will accept samples and perform services in accordance with these terms and conditions. No modifications to these terms and conditions will be valid or binding unless in writing and signed by authorized representatives of both the Customer and ELS Management.

ELS reserves the right to refuse or revoke receipt of any sample due to insufficient sample volume, improper sample container, unacceptable customer credit, or risk of handling for any health, safety, regulatory, environmental, holding time issues or any other reason, at the discretion of ELS Management.

**Payment...** All services are billed directly to the Customer. The billing of a third party will not be accepted without a signed statement from the third party in which the third party acknowledges and accepts responsibility for payment. Invoices will be issued upon completion of each service. All invoices are due and payable net 30 days from receipt. A one percent (1%) per month late fee will be assessed on unpaid invoices after the due date. Minimum invoice charge is $250.

**Quoted Fees...** Written quoted fees for all services to be performed by the ELS management will be honored for a period of thirty (30) days from the quotation date unless otherwise specified by ELS in writing.

**Staff Services...** All costs associated with compliance with any subpoena for documents, testimony, or assistance, or for any other purpose relating to work performed by ELS for the Customer, will be paid by the Customer or requesting party. Such costs will include, but not be limited to, hourly charges for those responding to subpoenas, travel and accommodations, mileage, attorney's preparation of the testimony and advice of counsel in connection with response to subpoenas and all other expenses in good faith deemed reasonable by ELS Management.

**Use of Data...** The Customer accepts all responsibility for determining what actions are required as a result of the data information, recommendations, interpretations and opinions provided by ELS staff, and any other analysis and interpretations made by Customer or its agents and representatives. The Customer also assumes sole responsibility for determining whether the nature, type and quantity of work requested by the Customer is adequate and sufficient for the Customer's intended purpose.

**Reports...**ELS will deliver approved final reports and/or electronic data deliverables including any Customer-approved subcontract laboratory data by the agreed upon target due date. Reports may not be reproduced, except in full, without prior written approval by the ELS management. Reports or copies of reports will not be provided to any person or representative other than the Customer without the Customer's authorization, except as required by law.

**Confidentiality...** Strict confidentiality is maintained regarding all Customer dealings and results. Where information is lawfully subpoenaed and must be released to a regulatory or other legal entity with jurisdiction or disclosure of documents is otherwise required by of law, the Customer will be promptly notified.

Confidential, trade secret, and privileged information provided to LCRA by Customer, including sample content, analysis, and Reports, is protected from public access by exceptions to the Texas Public Information Act (the Act), to which LCRA is subject. Unless Customer directs LCRA otherwise, LCRA will assert the appropriate exception to withhold Customer information requested under the Act. Customer may be asked to provide assistance in asserting exceptions to the Act (e.g., explanation of competitive position, treatment of trade secrets, etc.).

**Sample Disclosures...** Customer agrees that all samples delivered to the ELS will be accompanied by a properly completed chain-of-custody record disclosing the presence of any contaminated, toxic or hazardous substances known or suspected to be contained in such samples, as well as suspected high-level concentrations of any compounds or analytes present in the sample.

**Analytical Errors...** Upon request by the Customer, ELS will reanalyze samples whenever test results are suspect. Should the results of the second analysis substantially agree with those of the first, the Customer will pay for the cost of the reanalysis. However, if the result of the second analysis materially differs with the first, then the ELS will absorb the reanalysis cost.

**Holding Times...** All samples must be delivered in a timely manner to ELS within 48 hours of sampling or within one-half of the applicable holding time, whichever is less. ELS assumes no responsibility for missed holding times for samples submitted outside this criterion without prior notification, acceptance, and approval of ELS management. To maintain holding time for subcontract samples, ELS may make arrangements for the Customer to deliver samples directly to the Subcontractor.

**Sample Retention & Disposal...** Samples are routinely stored for 30 days upon transmitting final analytical results to the Customer. After 30 days, samples are disposed of properly. However, Customer may request additional storage time at a storage fee of $50 per month per sample.

**Hazardous Waste...** Any samples found or suspected to be hazardous according to state and federal regulations will be returned to the customer (shipping charges will be the customer's responsibility) or the customer will be invoiced for waste disposal charges.

**Turn around Time (TAT)...** Turn around times (TAT) are based on full "working days" which are defined as 8:00 A.M. to 5:00 P.M. Monday through Friday, excluding LCRA holidays. Standard TAT is 7 to 10 working days after sample receipt, depending upon the tests requested and the sample matrix. TAT for samples subcontracted to a Customer-approved laboratory is based on the agreed target due date between all parties (i.e., the Customer, the ELS and the subcontract laboratory).

**Expedited Service...** Expedited service is available upon approval by ELS management. Surcharges will be applied to the invoice.

**Non-Standard Services...** On sample matrices or analytes for which no official or validated method exists, usage of an accepted method for a different type of sample or analyte or method development, in some situations, may be offered. In such cases, no guarantee of the success of neither the method nor warranty can be provided. The Customer will be notified of the alternate method proposed, and only after its approval, will analyses begin. Approval by the Customer of the alternate method obligates the Customer for payment for that work, regardless of whether an acceptable result can be obtained.

**Warranty...** Where applicable, ELS will use analytical methodologies in accordance with the U.S. Environmental Protection Agency (EPA), state agency, or other recognized and approved source.

ELS warrants that it possesses and maintains all licenses, accreditations and certifications that are required to perform services under these terms and conditions, provided that such requirements are documented in writing to ELS prior to sample delivery acceptance. ELS will notify the Customer in writing of any decertification or revocation of any license, or notice of either that affects work in progress.

The foregoing express warranty is exclusive and is given in lieu of all other warranties, express or implied. The ELS disclaims any other warranties, express or implied, including a Warranty of Fitness for Particular Purpose and Warranty of Merchantability. The ELS accepts no legal responsibility for the purposes for which the Customer uses the test results.

**Liability...** Customer agrees that the liability of LCRA and ELS, and Customer's sole remedy, on all claims of any kind or nature whether based on contract indemnity, warranty, tort (including negligence), strict liability or otherwise, for all losses or damages arising out of, connected with, or resulting from the performance or breach thereof, or from any goods or services covered by or furnished under these terms and conditions or any extension or expansion, is limited to a refund of payments made by the Customer for said services. If for any reason the successful analysis of a sample fails, the total liability of the ELS will not exceed the amount charged for the analyses or services provided.

**Equal Opportunity Affirmative Action Notice...** LCRA is an equal opportunity/affirmative action employer and complies with all the regulations of federal executive order 11246 and the regulations promulgated there under.

# Appendix E:
# Data Review Checklist and Summary

# 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.**

| **Data Format and Structure** | | **✓, ✗, or N/A** |
|---|---|---|
| A. | Are there any duplicate *Tag Id* numbers in the Events file? | |
| B. | Do the *Tag* prefixes correctly represent the entity providing the data? | |
| C. | Have any *Tag Id* numbers been used in previous data submissions? | |
| D. | Are TCEQ station location (SLOC) numbers assigned? | |
| E. | Are sampling *Dates* in the correct format, MM/DD/YYYY with leading zeros? | |
| F. | Are the sampling *Times* based on the 24 hour clock (e.g. 13:04) with leading zeros? | |
| G. | Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems, unrepresentative of ambient water quality)? | |
| H. | *Submitting Entity, Collecting Entity, and Monitoring Type* codes used correctly? | |
| I. | Are the sampling dates in the *Results* file the same as the one in the *Events* file for each Tag Id? | |
| J. | Are values represented by a valid parameter code with the correct units? | |
| K. | Are there any duplicate parameter codes for the same *Tag Id*? | |
| L. | Are there any invalid symbols in the *Greater Than/Less Than* (*GT/LT*) field? | |
| M. | 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** |
| A. | Are all the "less-than" values reported at the LOQ? **If no, explain in the Data Summary**. | |
| B. | Have the outliers been verified and a "1" placed in the *Verify_flg* field? | |
| C. | Have checks on correctness of analysis or data reasonableness been performed?<br>e.g.: Is ortho-phosphorus less than total phosphorus?<br>Are dissolved metal concentrations less than or equal to total metals?<br>Is the minimum 24 hour DO less than the maximum 24 hour DO?<br>Do the values appear to be consistent with what is expected for that site? | |
| D. | Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets? | |
| E. | Are all parameter codes in the data set listed in the QAPP? | |
| F. | Are all stations in the data set listed in the QAPP? | |
| **Documentation Review** | | **✓, ✗, or N/A** |
| A. | Are blank results acceptable as specified in the QAPP? | |
| B. | Were control charts used to determine the acceptability of field duplicates? | |
| C. | Was documentation of any unusual occurrences that may affect water quality included in the *Event* table's *Comments* field? | |
| D. | 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**. | |
| E. | 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.** | |

| | | |
|---|---|---|
| F. | Was the laboratory's NELAC Accreditation current for analysis conducted? | |

✓ **= Yes** ✘ **= No** **N/A** = Not applicable

# DATA SUMMARY

**Data Set Information**

**Data Source:** _____.

**Date Submitted:** _____.

**Tag_id Range:** _____.

**Date Range:** _____.

**Comments:**

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

- Inconsistencies with AWRL specifications or 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).
- Include completed Corrective Action Plans with the applicable Progress Report.

_____

_____

_____

_____

_____

_____

_____

_____

□ 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 Data Review Checklist.

**Planning Agency Data Manager:** _____.

**Date:** _____.

References:

TCEQ SOP,V1 - TCEQ Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2008 (RG-415)
TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data, June 2007 (RG-416)
United States Environmental Protection Agency (USEPA) AMethods 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), AStandard Methods for the Examination of Water and Wastewater,@ 20th Edition, 1998. *(Note: the 21st may be used if it becomes available)*
United States Environmental Protection Agency (USEPA) Manual #EPA-821-R-9S-027