QUALITY ASSURANCE PROJECT PLAN

Revision 1
for the
Red and Canadian River Basins

FY 2004 – FY 2005

Prepared in Cooperation with the
Texas Commission on Environmental Quality
Under the
Texas Clean Rivers Act

Clean Rivers Program
Quality Assurance Project Plan
for the

Red and Canadian River Basins

Revision 1.0

Red River Authority of Texas
900 8th Street, Suite 520
Wichita Falls, Texas 76301

Clean Rivers Program
Technical Analysis Division
Texas Commission on Environmental Quality
P.O. Box 13087, MC-147
Austin, Texas 78711-3087

Effective Period: FY 2004 to FY 2005

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

Red River Authority of Texas
Hamilton Building, Suite 520
900 Eighth Street
Wichita Falls, Texas 76301-6894
(940) 723-8697
info@rra.dst.tx.us

A1 APPROVAL PAGE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Technical Analysis Division

Jim Thomas, Director Technical Analysis Division	Date	Charles Dvorsky, Manager Water Quality Planning & Assessment Section	Date
Linda Brookins Program Manager, Clean Rivers Program	Date	Laurie Curra Project Manager, Clean Rivers Program	Date

Compliance Support Division

Jose A. Franco, Director Compliance Support Division	Date	Stephen Stubbs TCEQ Quality Assurance Manager	Date
Bernard Ray CRP Quality Assurance Specialist Quality Assurance Section	Date		

RED RIVER AUTHORITY OF TEXAS

Curtis W. Campbell Project Manager	Date	David L. Holub Quality Assurance Officer	Date

Red River Authority of Texas will secure written documentation from each sub-tier project participant (e.g., subcontractors, other units of government, laboratories) stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or revisions of this plan. Red River Authority of Texas will maintain this documentation as part of the project's quality assurance records, and will ensure that the document is available for review.

A2 TABLE OF CONTENTS

A2 TABLE OF CONTENTS (continued)

LIST OF ACRONYMS

AWRL	Ambient Water Reporting Limits
BAC	Basin Advisory Committee
BMP	Best Management Practices
BMP	Basin Monitoring Plan
CAR	Corrective Action Report
COC	Chain-of-Custody
COD	Chemical Oxygen Demand
CRMWA	Canadian River Municipal Water Authority
CRP	Clean Rivers Program
DBMS	Database Management System
DMP	Data Management Plan
DO	Dissolved Oxygen
DOC	Demonstration of Capability
DQO	Data Quality Objective
EDP	Electronic Data Processing
EPA	U.S. Environmental Protection Agency
FY	Fiscal Year
GIS	Geographic Information System
GPS	Global Positioning System
HUA	Hydrologic Unit Area
HUC	Hydrologic Unit Code
LAN	Local Area Network
LCRA	Lower Colorado River Authority
LCS	Laboratory Control Standard
MDMA	Monitoring Data Management & Analysis
mg	Milligrams
ml	Milliliter
NIST	National Institute Standards and Testing
NWQL	National Water Quality Laboratory
NTU	Nephalometric Turbidity Units
QA	Quality Assurance
QAM	Quality Assurance 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
RPD	Relative Percent Difference
RRA	Red River Authority of Texas (Authority)
RWA	Receiving Water Assessment
SOP	Standard Operating Procedure
SQL	Structured Query Language
SWQM	Surface Water Quality Monitoring
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRACS	TCEQ Regulatory Activities/Compliance System
TSS	Total Suspended Solids
TSWQS	Texas Surface Water Quality Standards
µg	Micrograms
USACE	U.S. Army Corps of Engineers
USGS	United States Geological Survey
VOA	Volatile Organic Analytes
VSS	Volatile Suspended Solids
WLE	Waste Load Evaluation
WMT	Watershed Management Team

A3 DISTRIBUTION LIST

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. BOX 13087
AUSTIN, TEXAS 78711-3087

Laurie Curra, Project Manager
Clean Rivers Program
MC-147
(512) 239-4627

Bernard Ray
CRP Lead Quality Assurance Specialist
MC-176
(512) 239-1976

Dr. David W. Sullivan
Manager, Monitoring Data Management and Analysis Section
MC-165
(512) 239-1623

RED RIVER AUTHORITY OF TEXAS
HAMILTON BUILDING, SUITE 520
900 EIGHTH STREET
WICHITA FALLS, TEXAS 76301-6894

Curtis W. Campbell, Project Manager
(940) 723-8697

David L. Holub, Quality Assurance Officer
(940) 723-8697

Red River Authority of Texas will provide copies of this project plan and any amendments or revisions of this plan to each person on this list and to each sub-tier project participant, e.g., subcontractors, other units of government, laboratories. Red River Authority of Texas will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project's quality assurance records, and ensure that the documentation will be available for review during a TCEQ Monitoring Systems Audit.

A4 PROJECT/TASK ORGANIZATION

Description of Responsibilities

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Linda Brookins
CRP Program Manager

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, nonconformances, 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.

Bernard Ray
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 stop work orders in order to safeguard programmatic objectives, worker safety, public health, or environmental protection. Ensures maintenance of QAPPs and audit records for the CRP.

Laurie Curra
CRP Project Manager

Responsible for the development, implementation, and maintenance of CRP contracts. Tracks 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 Red River Authority of Texas audits. Verifies QAPPs are being followed by contractors and that projects are producing data of known quality. Coordinates (with the Red River Authority of Texas Project Manager) project planning. 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.

Eric Reese
CRP Data Manager

Responsible for coordination and tracking of CRP data from initial submittal through CRP Project Manager review and approval. Performs automated data validation routines and coordinates error correction. Provides quality assured datasets to TCEQ Information Resources in compatible formats for uploading to the statewide database. Generates reports to assist CRP Project Managers' data review. Provides training and guidance to CRP and Planning Agencies on technical data issues. Reviews and approves data-related portions of program QMP and project-specific QAPPs. Develops and maintains Standard Operating Procedures for CRP data management.

Laurie Curra
CRP Project Quality Assurance Specialist

Serves as liaison between CRP management and agency 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. Coordinates documentation and implementation of corrective action for the CRP.

RED RIVER AUTHORITY OF TEXAS

Curtis W. Campbell
Red River Authority of Texas Project Manager

Responsible for ensuring that all the Authority's positions defined in the project organization are assigned to a specific person or team. 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 RRA 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 nonconformances, and that issues are resolved. Responsible for validating that data collected are acceptable for reporting to the TCEQ. In addition, is responsible for ensuring that all tasks assigned to the Authority's position are completed in accordance with the terms and conditions of the executed contract.

David L. Holub
Red River Authority of Texas 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 RRA Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies, nonconformances and corrective actions. 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.

Danna K. Hamilton
Red River Authority of Texas 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 compatible format. Maintains quality-assured data on Red River Authority of Texas internet sites.

James E. Wright
Red River Authority of Texas Laboratory Supervisor

Responsible for ensuring that all samples received in the Environmental Services Division Laboratory are within the allotted time, and that the chain-of-custody has been observed. Ensures that the samples are analyzed in accordance with standard accepted methods as described in the SOP manual. The Laboratory Supervisor further ensures that all analysis results are correctly performed and properly recorded on the lab data sheets and in the appropriate analytical log books prior to transmittal to the Quality Assurance Officer.

W. Scott Burns
RRA Clean Rivers Program Field Supervisor

Responsible for overseeing the field personnel that conduct sampling events. Ensures that all field personnel are properly trained and equipped to conduct the necessary monitoring. Ensures that personnel and equipment are available at appropriate times. The Field Supervisor ensures that all field data are collected as outlined by the QAPP and the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version*.

OTHER ENTITIES

Canadian River Municipal Water Authority (CRMWA)

Collects and analyzes specific water quality samples required for their specific operations. Data which are submitted to the Authority, as identified in Table A7.1 for use in the CRP, will be collected and analyzed under the guidelines set forth by the QAPP.

A4 PROJECT/TASK ORGANIZATION (continued)

Rod Goodwin
CRMWA Quality Assurance Officer

Responsible for coordinating the implementation of the QA program. Notifies RRA Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies, nonconformances 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 to determine compliance with project and program specifications. Ensures that field staff are properly trained and that training records are maintained.

Rod Goodwin
CRMWA Laboratory Supervisor

Responsible for ensuring that all samples received in the laboratory are within the allotted time, and that proper chain-of-custody procedures have been observed. Ensures that samples are analyzed in accordance with standard accepted methods as described in the SOP manual. The Laboratory Supervisor further ensures that all analysis results are correctly performed and properly recorded on the lab data sheets and in the appropriate analytical log books prior to transmittal to the Quality Assurance Officer.

Rod Goodwin
CRMWA Field Supervisor

Responsible for overseeing the field personnel that conduct sampling events. Ensures that all field personnel are properly trained and equipped to conduct the necessary monitoring. Ensures that personnel and equipment are available at appropriate times. The Field Supervisor ensures that all field data are collected as outlined by the QAPP and the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version*.

Contract Laboratories

Lower Colorado River Authority Laboratory

The Lower Colorado River Authority Laboratory (LCRA) is a river authority laboratory that is able to perform sophisticated chemical tests as required by the CRP and has contracted with the Authority to perform specific specialized analyses. The Authority will utilize LCRA as a source for specific tests, as identified in Table A7.1, that the Authority's laboratory cannot perform in-house.

A4 PROJECT/TASK ORGANIZATION (continued)

Alicia Gill
LCRA Environmental Laboratory Services Manager

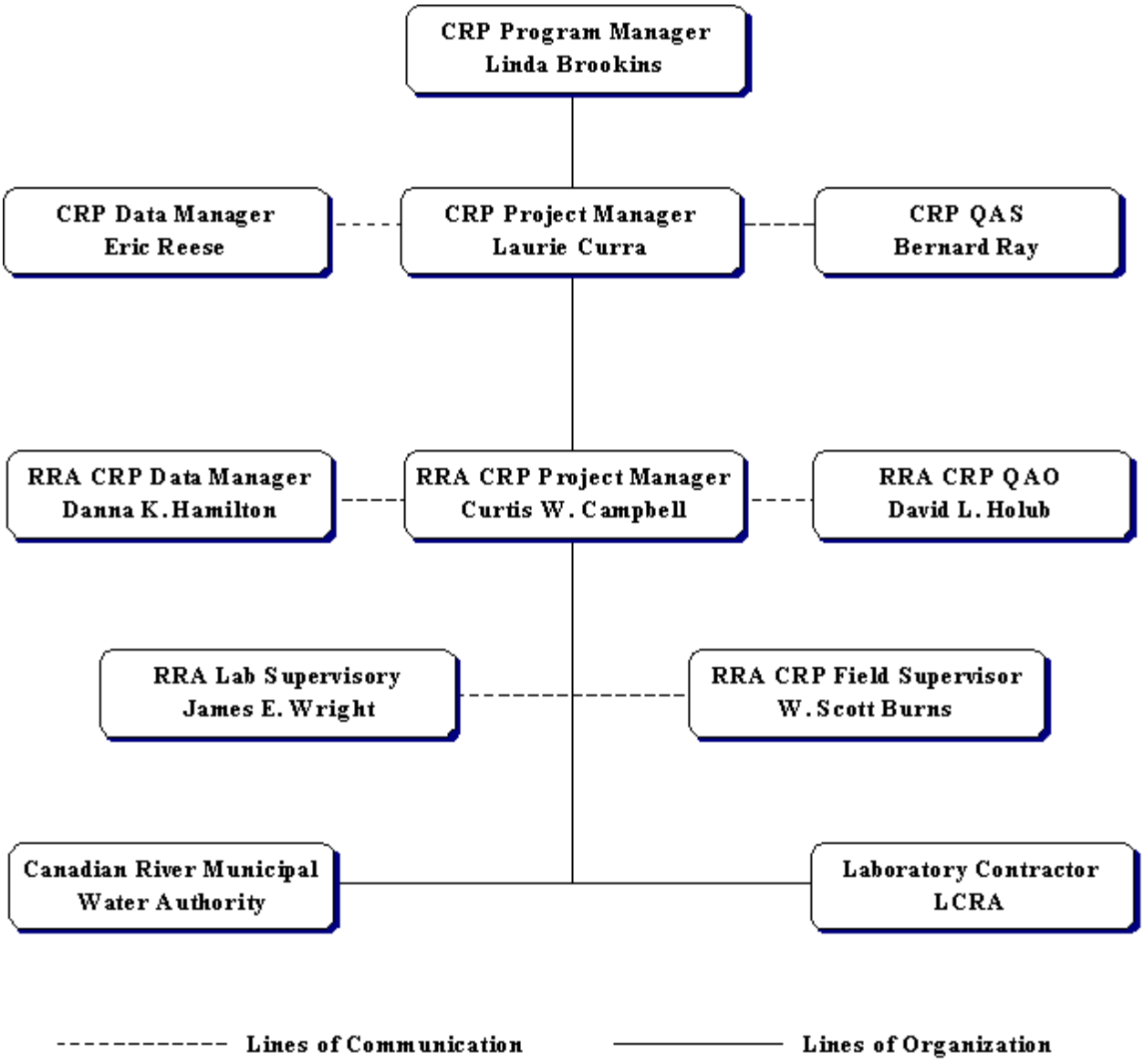
Responsible for overall performance, administration, and reporting of analyses performed by LCRA's Environmental Laboratory Services. Responsible for supervision of laboratory personnel involved in generating analytical data for the Clean Rivers Program. Ensures that laboratory personnel have adequate training and thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately.

Hollis Pentalion
LCRA Environmental Laboratory Services Quality Assurance Officer

Responsible for the overall quality control and quality assurance of analyses performed by LCRA's Environmental Laboratory Services. Monitors the implementation of the QAM/QAPP within the laboratory to ensure complete compliance with QA data quality objectives, as defined by the contract and in the QAPP. Conducts in-house audits to ensure compliance with written SOPs and to identify potential problems. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory.

PROJECT ORGANIZATION CHART

Chart 1



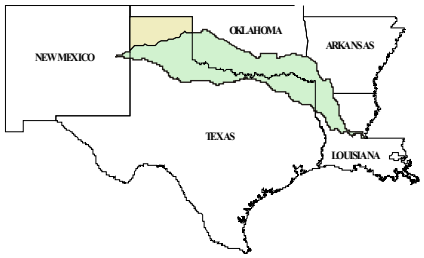
A5 PROBLEM DEFINITION/BACKGROUND

In 1991, the Texas Legislature passed the Texas Clean River Act (Senate Bill 818) in response to growing concerns that water resource issues were not being pursued in an integrated, systematic manner. The act requires that ongoing water quality assessments be conducted for each river basin in Texas, an approach that integrates water quality issues within the watershed. The CRP legislation mandates that "each river authority (or local governing entity) shall submit quality-assured data collected in the river basin to the commission." "Quality-assured data" in the context of the legislation means "data that complies with commission rules for 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 Red River Authority of Texas (RRA) and the Texas Commission on Environmental Quality (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). Refer to the Vicinity Map – Figure 1, for geographical coverage of the area.

The purpose of this QAPP is to clearly delineate the Authority's QA policy, management structure, and procedures which will be used to implement the QA requirements necessary to verify and validate the 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 the statewide database 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 2004 - 2005*.

The FY 2004 monitoring schedule and QAPP are based on results from previous Water Quality Assessment Reports conducted under the CRP, specific constituents listed on the Texas Surface Water Quality Inventory or the §303(d), and specific requests from TCEQ and the Red and Canadian River Basins Advisory Committees. The primary concerns in the basins are naturally occurring chlorides, low dissolved oxygen levels, coliform bacteria, and the lack of water quality data. Therefore, the monitoring plan developed by the Authority is designed to accomplish the following: adequate baseline water quality data throughout each basin, collect the data necessary to prove or dispute the §303(d) listings, and collect the data needed to meet the needs of TCEQ and/or the stakeholders as requested by the Basin Advisory Committee. Refer to Red and Canadian Reach Maps for geographical location of the FY 2004 Monitoring Sites.

The Canadian River Municipal Water Authority is a cooperating partner with the Red River Authority and collects and analyzes specific water quality samples from Lake Meredith in the Canadian River Basin under the guidance of RRA's QAPP. The data collected by the CRMWA are submitted to RRA, quality assured, then submitted to TCEQ with RRA's data submittal.



Red and CanadianRiver Basin
General Vicinity Map

RED RIVER AUTHORITY OF TEXAS

N
W E
S

Basins
- Canadian
- Red

Subwatershed Boundaries
25 Major Highways
General Hydrology
County Boundaries
0201 Stream Segments
Reservoirs

Population Densities
- 0 - 2826
- 2827 - 10875
- 10876 - 34395
- 34396 - 101986
- 101987 - 172289

50 0 50 100
Graphic Scale in Miles

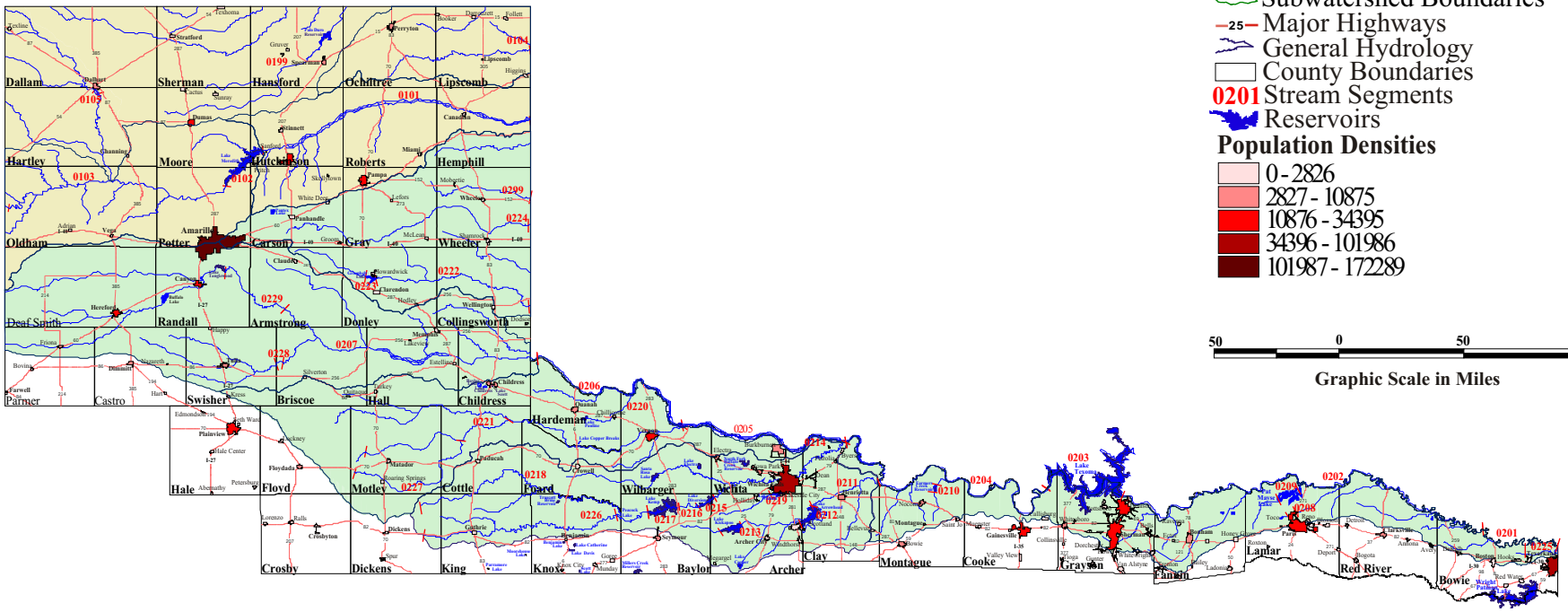


Figure 1

A6 PROJECT/TASK DESCRIPTION

The TCEQ has identified four types of monitoring: fixed station monitoring, systematic watershed evaluation, targeted monitoring and special studies. For this QAPP, the Authority will focus on **fixed** station and **systematic** monitoring only. Unless funding becomes available, no special studies will be performed this fiscal year. However, should funding become available for a special study to be performed, this QAPP will be amended with an Addendum. The following paragraphs provide a general description of what these monitoring programs are expected to accomplish:

> The ***Fixed*** station monitoring program provides an early detection of potential problems. Fixed stations can provide long-term historical information concerning the attainment or non-attainment of water quality objectives within the basin and assist the TCEQ in the assessment of Texas Surface Water Quality Standards (TSWQS) attainment. The fixed stations will allow the water quality to be compared between each of the stream segments, as well as determine any impacts from point discharges. The water quality data generated from these stations assist the TCEQ in conducting the Biennial Water Quality Assessment 305(b) required by the U.S. Environmental Protection Agency (EPA).
>
> The ***Systematic (Intensive)*** watershed assessment program allows for the screening of major and sub-watersheds utilizing both ambient water quality and bacteriological indicators on a more intensive scale and on a rotating schedule. The objectives are to evaluate known areas of concern and identify previously undetected problem areas within a watershed.

The Authority's staff will be responsible for coordinating and conducting the collection of water samples and performing field measurements. The water samples will be relinquished to LCRA or the Authority's Environmental Services Laboratory for analysis. The CRMWA will collect and analyze water samples to be submitted to the Authority under the QAPP. The parameters to be analyzed by each laboratory are shown in Table A7.1.

A6 PROJECT/TASK DESCRIPTION (continued)

A6.1 Canadian River Basin

The Canadian River Basin has a total drainage area of 22,866 square miles, the headwaters beginning in northeastern New Mexico. The Canadian River is a tributary to the Arkansas River, which eventually flows into the Mississippi River. The basin was divided into five reaches in an attempt to design the most efficient sampling plan within the limited budget available (See Figures 1-1 through 1-5). There are a total of 13 Hydrologic Unit Areas (HUAs) in the five reaches of the Canadian River Basin. The reaches were ranked so that monitoring could be scheduled corresponding to CRP priorities. The ranking of each reach was based on the combined ranking of the segments in each reach (segments were ranked in accordance with the TCEQ procedure), the total number of domestic and industrial dischargers in the reach, and the total volume of effluent discharged in the reach. The resultant ranking and corresponding schedule for focused monitoring are as follows:

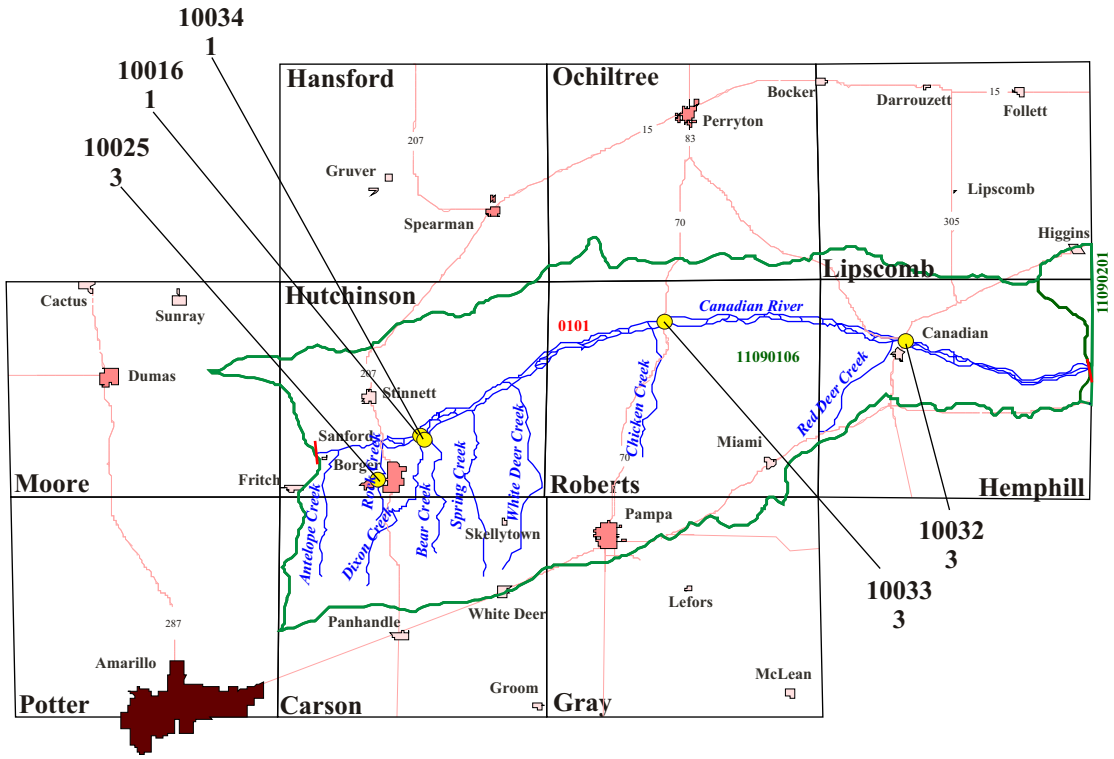
FY 2004 – Reach V
FY 2005 – Reach I

The main water quality problem within the Canadian River Basin is high concentrations of total dissolved solids (TDS). The TDS within the basin primarily originates from natural salt water intrusions below Ute Lake, New Mexico. The monitoring plan for the reaches in the Canadian River Basin will attempt to determine mineral loading for the major tributaries (including the main stem of the Canadian River), in order to determine inputs into Lake Meredith, which serves as the primary drinking water supply in the Panhandle of Texas.

Other problems in the basin include elevated nutrient levels. This will be addressed through detailed nutrient analyses and as resources become available, diurnal dissolved oxygen studies will be performed. This will determine whether the elevated nutrients are causing a problem via depleted oxygen and/or eutrophication.

Screening of *E. coli* concentrations showed many segments having concerns and possible concerns. A consistent sampling regime will be performed throughout the basin targeting those areas (segments) showing a concern or possible concern. This procedure will aid in determining whether there is truly a problem and if so, what are the sources and relationship to the other parameters (i.e. flow).

Canadian River Basin
Reach I



0 15 30

Graphic Scale in Miles

WQ Station Operators

1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

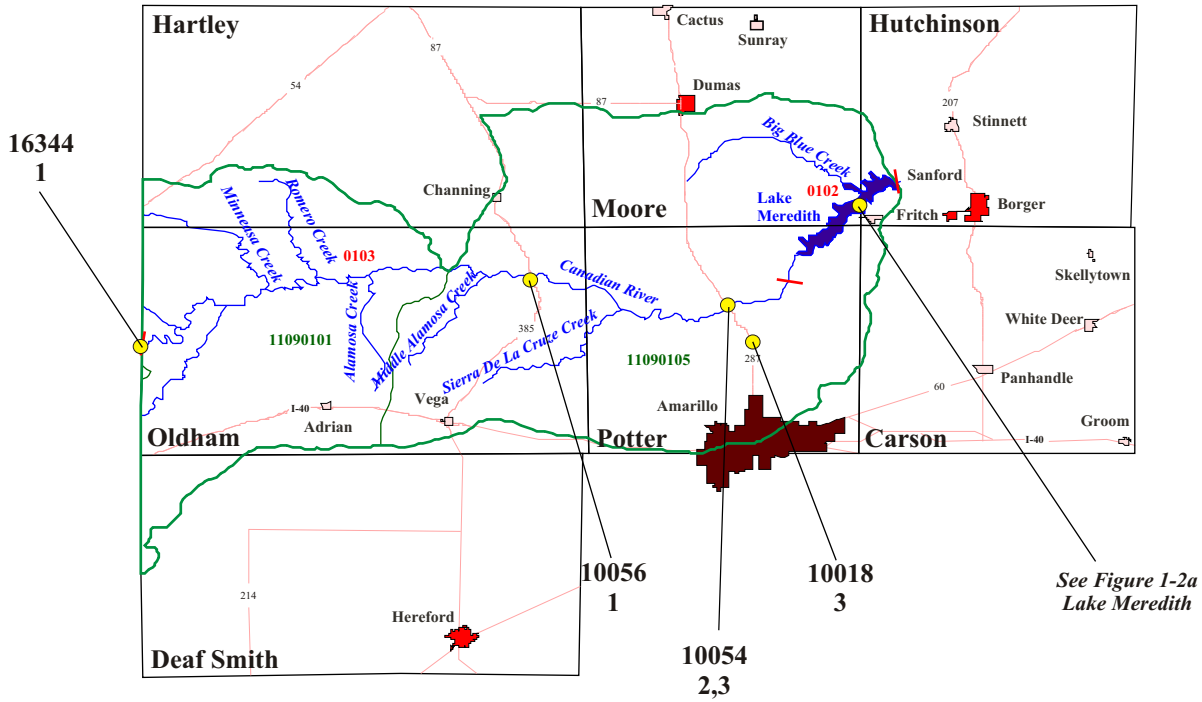
FY 2004 Monitoring Stations
0101 Stream Segments
Subwatershed Boundary
County Boundary
Major Highways
General Hydrology
Reservoirs

Population Densities

0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

Figure 1-1

Canadian River Basin
Reach II



FY 2004 Monitoring Stations
0101 Stream Segments
Subwatershed Boundary
County Boundary
Major Highways
General Hydrology
Reservoirs

Population Densities

- 0 - 2826
- 2827 - 10875
- 10876 - 34395
- 34396 - 101986
- 101987 - 172289

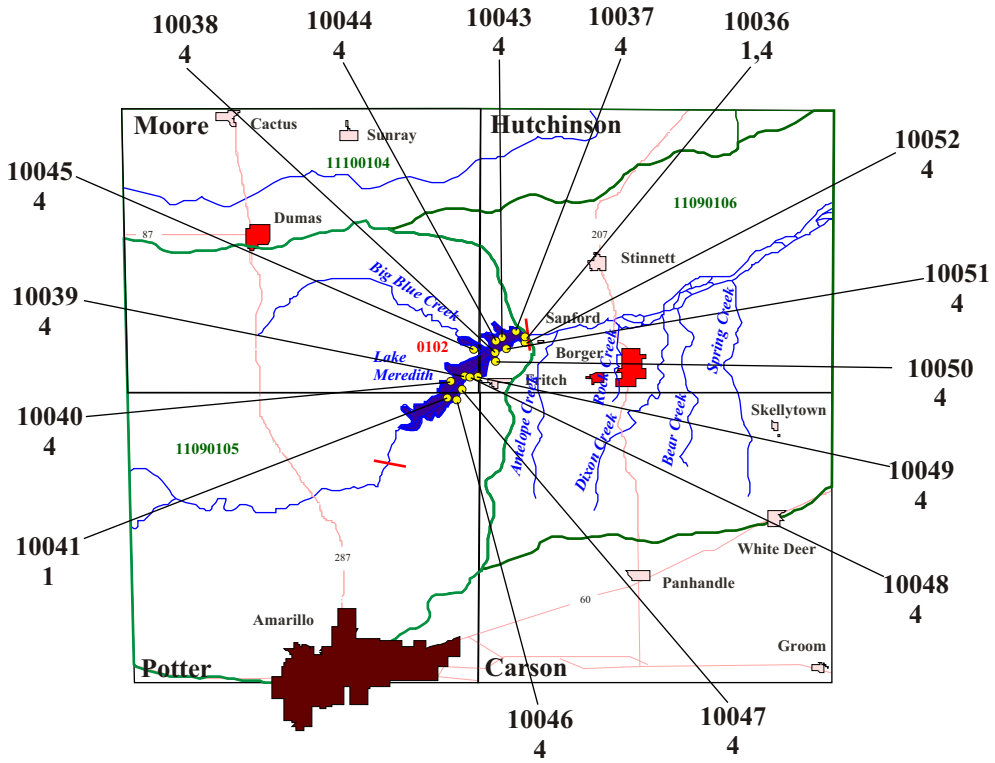
0 15 30
Graphic Scale in Miles

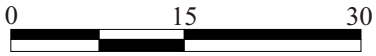
WQ Station Operators

1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

Figure 1-2

Canadian River Basin
Reach II
Lake Meredith





- FY 2004 Monitoring Stations
- 0101 Stream Segments
- Subwatershed Boundary
- County Boundary
- 25 Major Highways
- General Hydrology
- Reservoirs

Population Densities

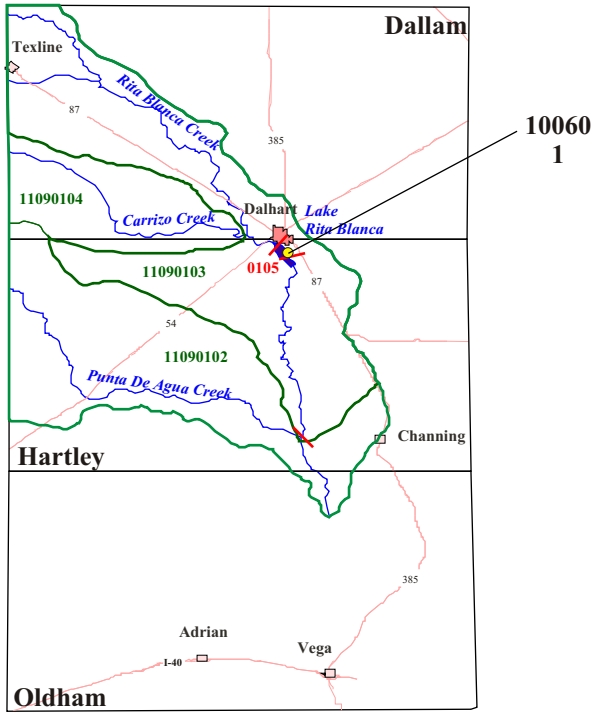
- 0 - 2826
- 2827 - 10875
- 10876 - 34395
- 34396 - 101986
- 101987 - 172289

WQ Station Operators

1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

Figure 1-2a

Canadian River Basin
Reach III



0 25 50

Graphic Scale in Miles

WQ Station Operators

1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

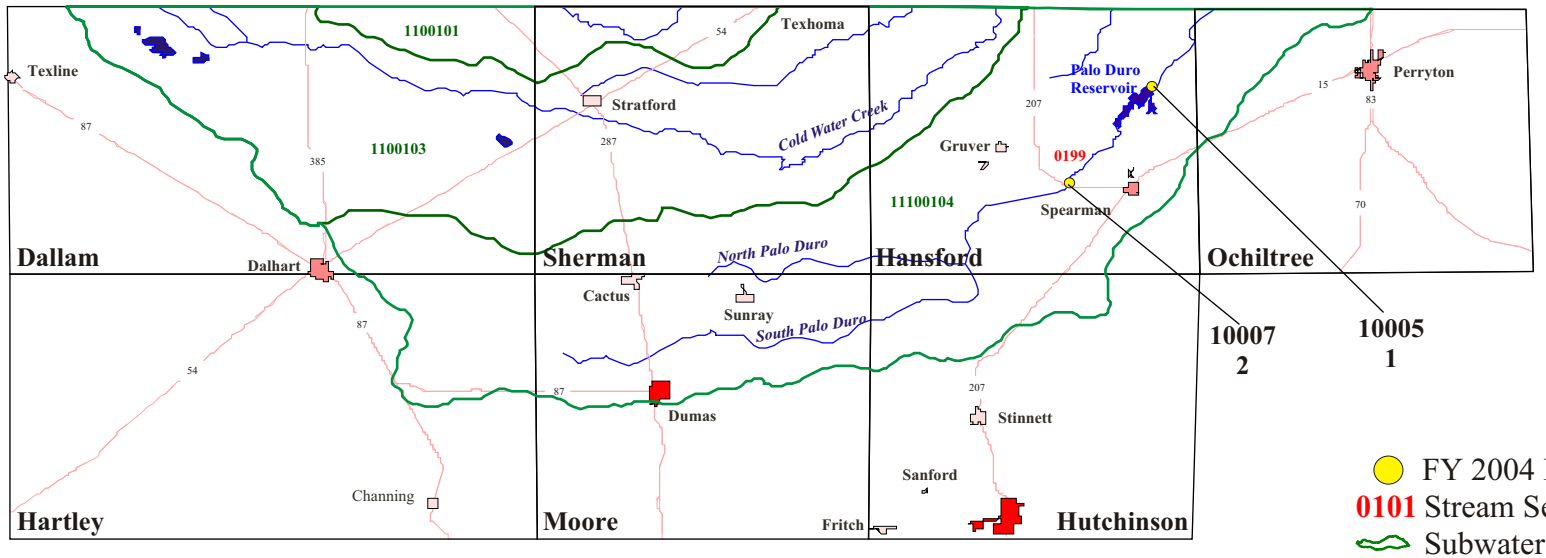
FY 2004 Monitoring Stations
0101 Stream Segments
Subwatershed Boundary
County Boundary
25 Major Highways
General Hydrology
Reservoirs

Population Densities

0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

Figure 1-3

Canadian River Basin
Reach IV



0 15 30
Graphic Scale in Miles

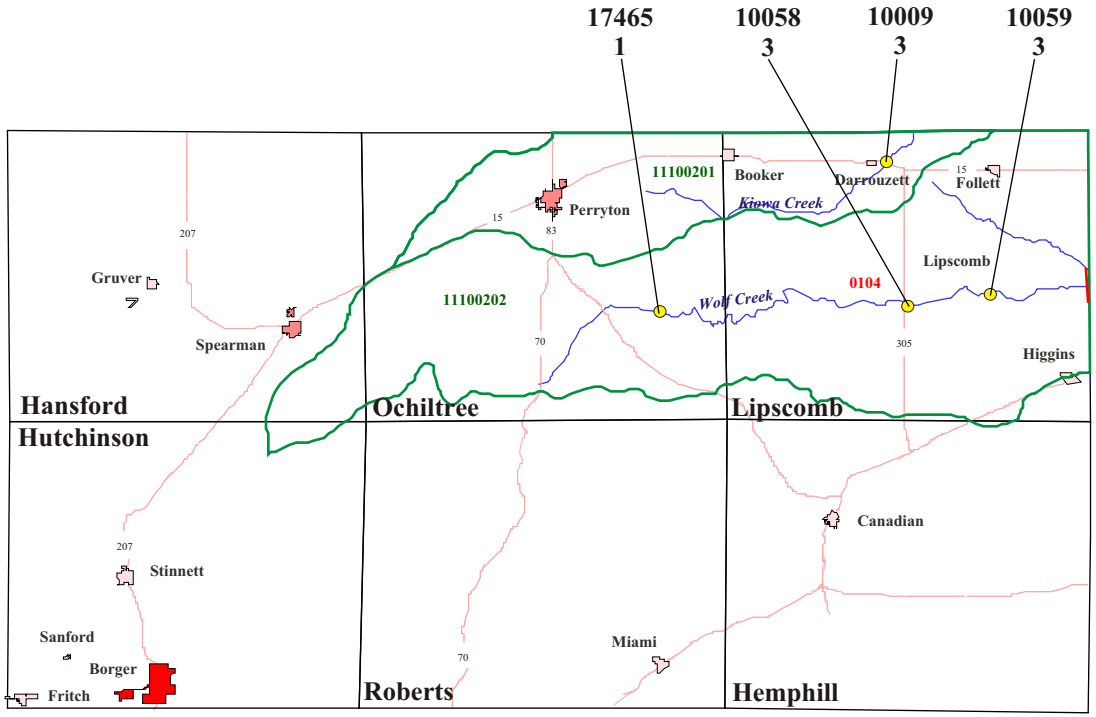
WQ Station Operators
1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

FY 2004 Monitoring Stations
0101 Stream Segments
Subwatershed Boundary
County Boundary
Major Highways
General Hydrology
Reservoirs

Population Densities
0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

Figure 1-4

Canadian River Basin
Reach V



0 15 30
Graphic Scale in Miles

WQ Station Operators
1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

FY 2004 Monitoring Stations
0101 Stream Segments
Subwatershed Boundary
County Boundary
Major Highways
General Hydrology
Reservoirs

Population Densities
0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

Figure 1-5

A6 PROJECT/TASK DESCRIPTION (continued)

A6.2 Red River Basin

The Red River Basin covers a total drainage area of 94,450 square miles; 24,463 square miles lie within Texas. The basin was divided into five reaches, in an attempt to design the most efficient sampling plan within the limited budget available (see Figures 2-1 through 2-5). Reach 1 contains four HUAs. The remaining reaches each contain five HUAs. The reaches were ranked so that monitoring could be scheduled according to CRP priorities. The ranking of each was based on the combined ranking of the segments in each reach (segments were ranked in accordance with the TCEQ industrial dischargers in the reach, and the total volume of effluent discharged in the reach. The resultant ranking and corresponding schedule for focused monitoring are as follows:

FY 2004 – Reach IV
FY 2005 – Reach V

The main water quality concern within the Red River Basin is high concentrations of total dissolved solids (TDS). The TDS within the basin primarily originates from natural salt springs. Other sources include oilfield brine and urban activities. The monitoring plans for the reaches in the Red and Canadian River Basins will attempt to determine mineral loading for the major tributaries, in order to clarify sources and to what extent these sources contribute to the elevated TDS concentrations.

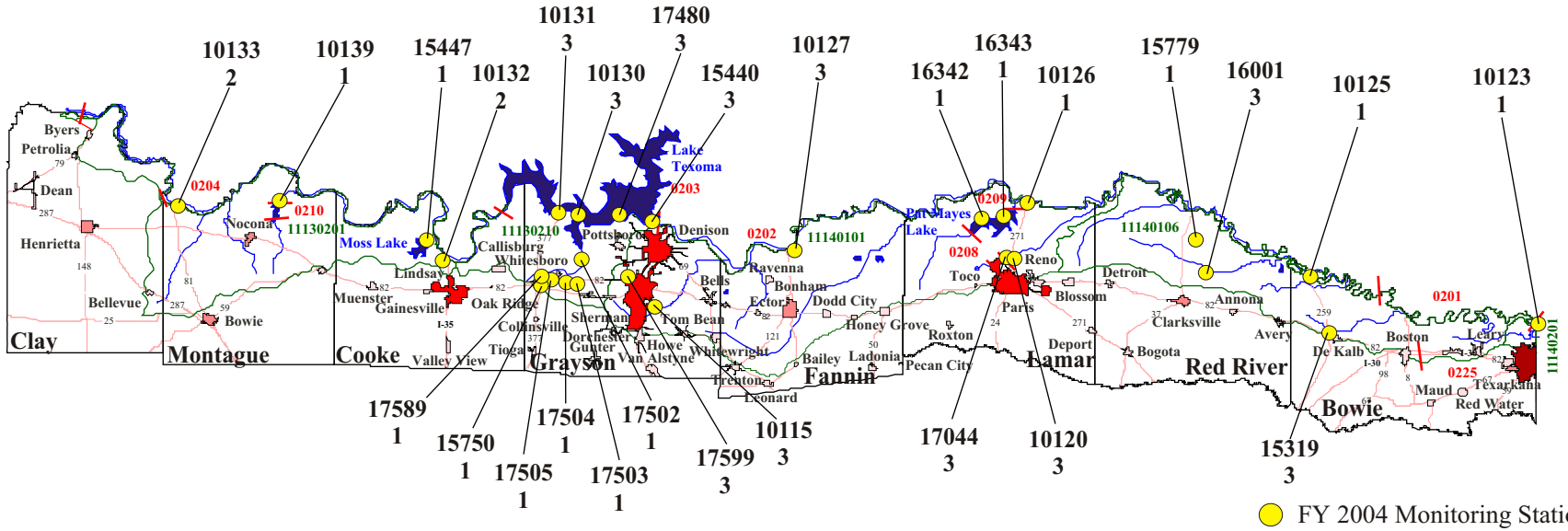
Although nutrients were not considered a concern during screening, several nutrient parameters showed abnormal fluctuations. This will be addressed through detailed nutrient analyses and as resources become available, diurnal dissolved oxygen studies will be performed. This will determine whether the elevated nutrients are causing a problem via depleted oxygen and/or eutrophication.

Screening of *E. coli* concentrations showed many segments having concerns and possible concerns. A consistent sampling regime will be performed throughout the basin targeting those areas (segments) showing a concern or possible concern. This procedure will aid in determining whether there is truly a problem, and if so, what are the sources and relationship to the other parameters.

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 to be conducted under this QAPP.

Red River Basin
Reach I



0 20 40 60

Graphic Scale in Miles

WQ Station Operators

1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

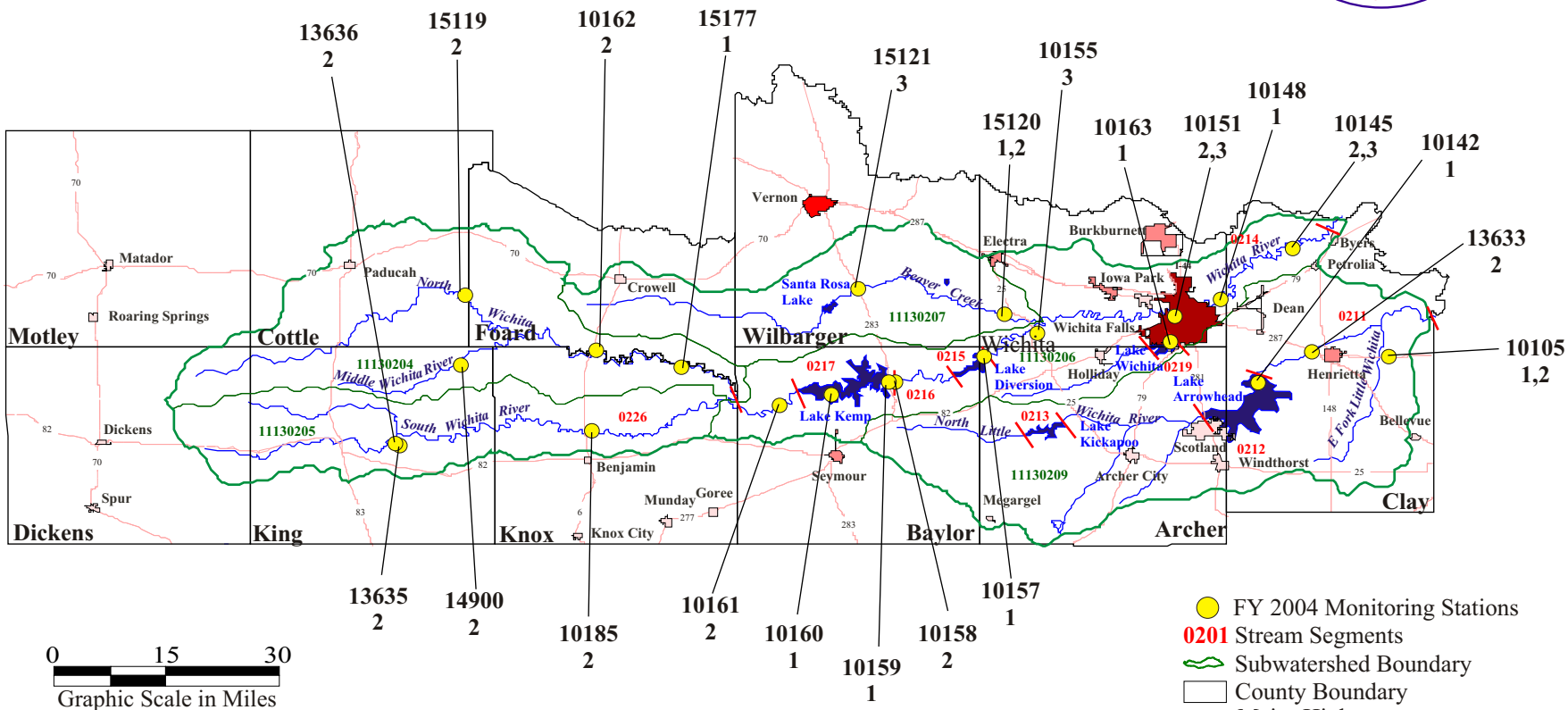
FY 2004 Monitoring Stations
0201 Stream Segments
Subwatershed Boundary
County Boundary
25 Major Highways
General Hydrology
Reservoirs

Population Densities

0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

Figure 2-1

Red River Basin
Reach II



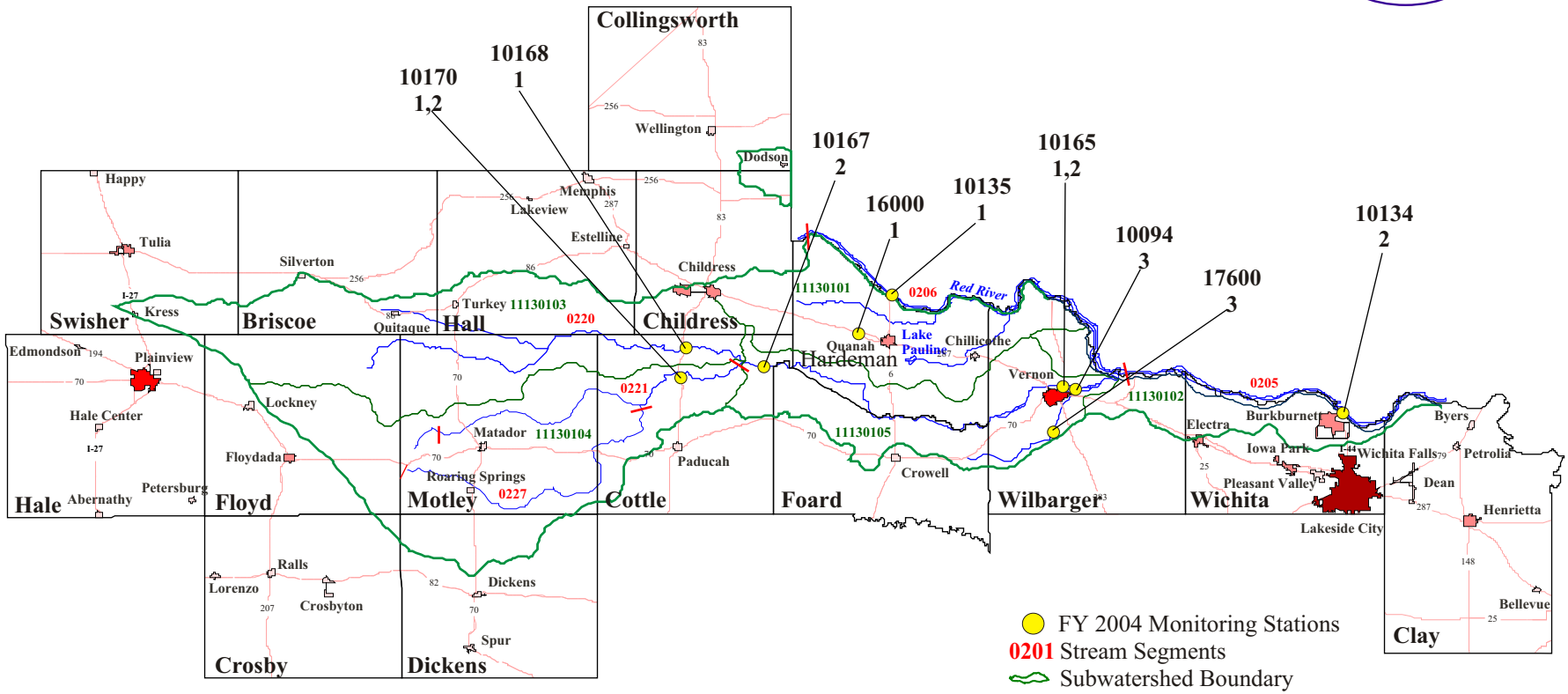
FY 2004 Monitoring Stations
0201 Stream Segments
Subwatershed Boundary
County Boundary
25 Major Highways
General Hydrology
Reservoirs

Population Densities
0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

WQ Station Operators
1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

Figure 2-2

Red River Basin
Reach III



FY 2004 Monitoring Stations
0201 Stream Segments
Subwatershed Boundary
County Boundary
Major Highways
General Hydrology
Reservoirs

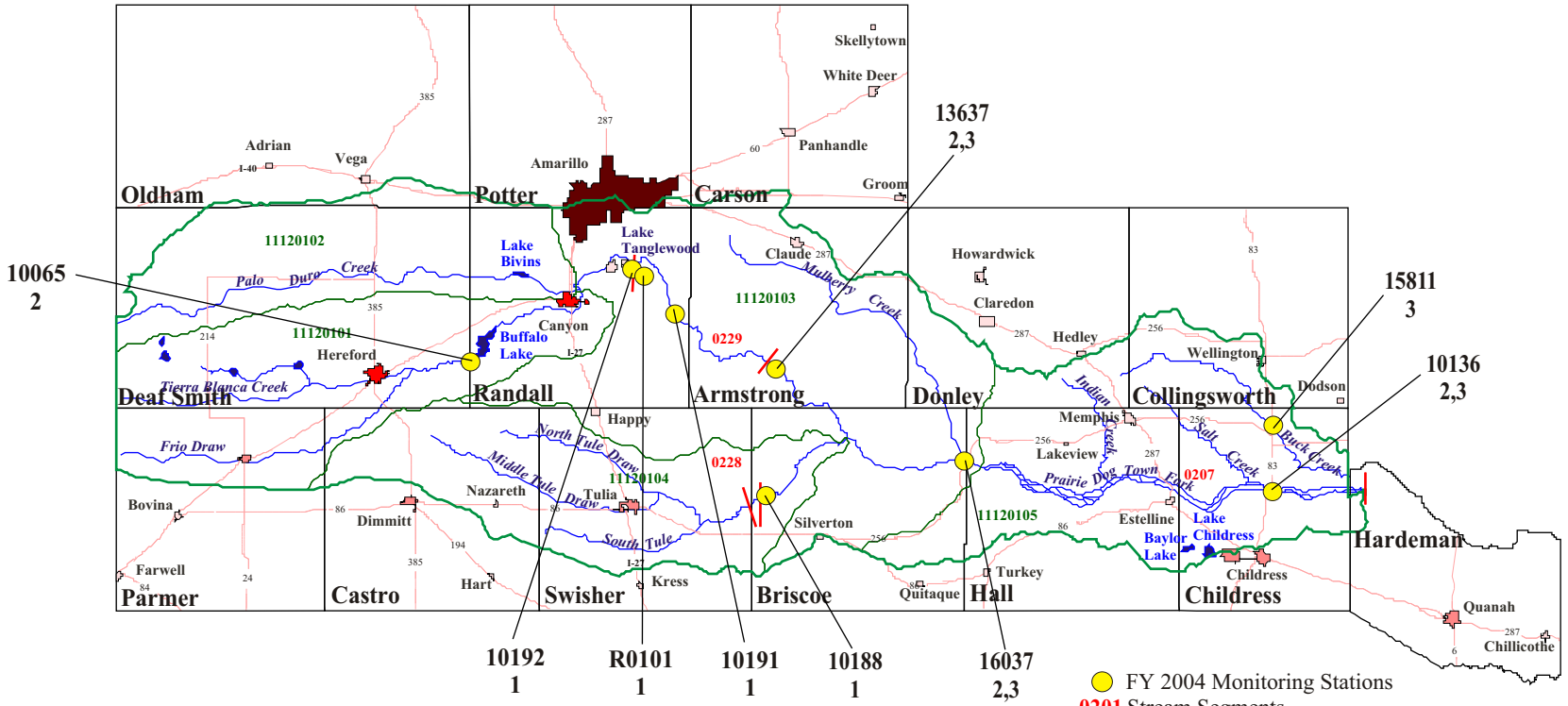
Population Densities
0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

0 20 40 60
Graphic Scale in Miles

WQ Station Operators
1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

Figure 2-3

Red River Basin
Reach IV



FY 2004 Monitoring Stations
0201 Stream Segments
Subwatershed Boundary
County Boundary
25 Major Highways
General Hydrology
Reservoirs

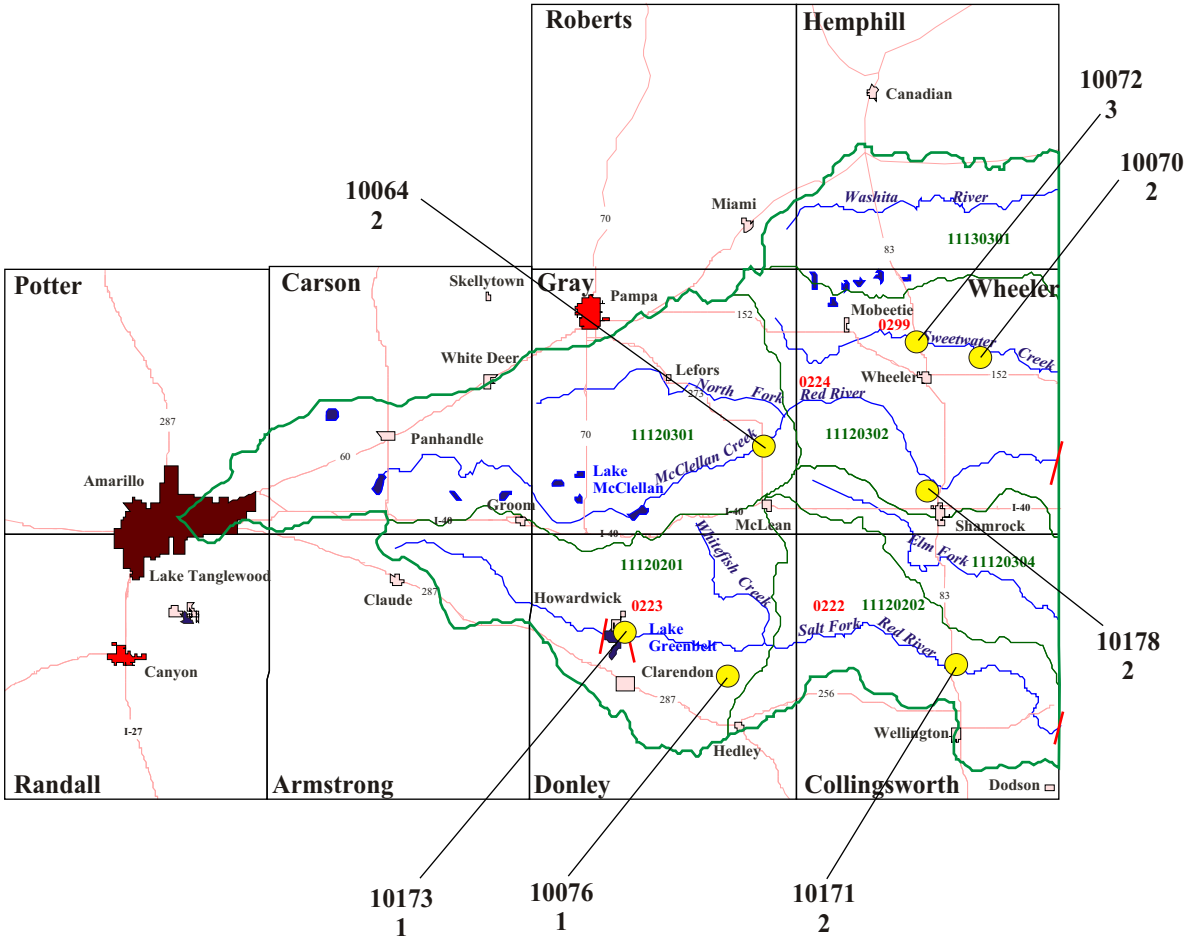
Population Densities
0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

0 20 40
Graphic Scale in Miles

WQ Station Operators
1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

Figure 2-4

Red River Basin
Reach V



FY 2004 Monitoring Stations
0201 Stream Segments
Subwatershed Boundary
County Boundary
25 Major Highways
General Hydrology
Reservoirs

Population Densities
0 - 2826
2827 - 10875
10876 - 34395
34396 - 101986
101987 - 172289

WQ Station Operators
1 - WC/FO (TCEQ)
2 - GS/GS (USGS)
3 - RR/RR (RRA)
4 - RR/CR (CRMWA)

0 15 30
Graphic Scale in Miles

Figure 2-5

A6 PROJECT/TASK DESCRIPTION (continued)

A6.3 Amendments to the QAPP

Revisions to the QAPP may be necessary to reflect changes in project organization, tasks, schedules, objectives, and methods; to improve operational efficiency; and to accommodate unique or unanticipated circumstances. Requests for amendments are directed from the Red River Authority of Texas Project Manager to the CRP Project Manager in writing. They are effective immediately upon approval by the Red River Authority of Texas Project Manager, the Red River Authority of Texas QAO, the CRP Project Manager, the CRP Lead QA Specialist, and the CRP Project QA Specialist. They will be distributed by the Red River Authority of Texas Project Manager and incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list.

A6.4 Appendices to the QAPP

Projects requiring QAPP appendices will be planned in consultation with Red River Authority of Texas and the TCEQ Project Manager and TCEQ technical staff. Appendices will be written in an abbreviated format and will reference the Basin QAPP where appropriate. Appendices will be approved by the Red River Authority of Texas Project Manager, the Red River Authority of Texas QAO, 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 Red River Authority of Texas to project participants before monitoring activities are commenced.

A7 QUALITY OBJECTIVES AND CRITERIA

The purpose of fixed/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 (Intensive) water quality monitoring allows for the selection of stations in subwatershed area, or reaches, on a rotational basis within the confines of the five year basin management cycle. This monitoring is necessary to collect data on undesignated water bodies and provide trend analysis of classified stream segments or subwatersheds. Monitoring will focus on known areas of concern and potential concern for the basin as a whole and for priority subwatersheds. Sites will be rotated over the five-year basin cycle by selecting two subwatersheds of a designated segments each year for comparability when determining overall water quality conditions of the basin reach.

In addition, the Authority will subcontract with the USGS for specific water quality parameters at selected USGS fixed monitoring gaging stations. These stations operate continuously with the data collected and quality assured by USGS and submitted annually to the TCEQ. The CRMWA is a cooperating partner with the Authority and collects and analyzes specific water quality samples from Lake Meredith in the Canadian River Basin under the guidance of the Authority's QAPP. The data collected by CRMWA is submitted to the Authority, quality assured, then submitted with the Authority's data submittal.

A7 QUALITY OBJECTIVES AND CRITERIA (continued)

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

Table A7.1 - Measurement Performance Specifications

PARAMETER	UNITS	MATRIX	METHOD	STORET	AWRL	LAB REPORTING LIMIT (RL)	RECOVERY AT RLS	PRECISION (RPD OF LCS / LCS DUPS)	BIAS %REC. OF LCS	LAB
FIELD PARAMETERS										
pH	pH/units	Water	EPA 150.1, TCEQ SOP	00400	NA*	NA	NA	NA	NA	Field
DO	mg/L	Water	EPA 360.1, TCEQ SOP	00300	NA*	NA	NA	NA	NA	Field
Conductivity	uS/cm	Water	EPA 120.1, TCEQ SOP	00094	NA*	NA	NA	NA	NA	Field
Salinity	ppt, marine only	Water	SM 2520, TCEQ SOP	00480	NA*	NA	NA	NA	NA	Field
Temperature	◦ C	Water	EPA 170.1, TCEQ SOP	00010	NA*	NA	NA	NA	NA	Field
Secchi Depth	meters	Water	TCEQ SOP	00078	NA*	NA	NA	NA	NA	Field
Days Since Last Significant Rain	Days	NA	TCEQ SOP	72053	NA*	NA	NA	NA	NA	Field
Flow	cfs	Water	TCEQ SOP	00061	NA*	NA	NA	NA	NA	Field
Flow Measurement Method	1 - gage 2 - electric 3 - mechanical 4 - weir/flume	Water	TCEQ SOP	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	01351	NA*	NA	NA	NA	NA	Field
Flow Estimate	cfs	Water	TCEQ SOP	74069	NA*	NA	NA	NA	NA	Field
Present Weather	1 - clear 2 - ptly cloudy 3 - cloudy 4 - rain	NA	NA	89966	NA	NA	NA	NA	NA	Field

Table A7.1 - Measurement Performance Specifications

PARAMETER	UNITS	MATRIX	METHOD	STORET	AWRL	LAB REPORTING LIMIT (RL)	RECOVERY AT RLS	PRECISION (RPD OF LCS / LCS DUPS)	BIAS %REC. OF LCS	LAB
FIELD PARAMETERS (continued)										
Water Clarity	1 - excellent 2 - good 3 - fair 4 - poor 5 - other	NA	NA	SA300	NA	NA	NA	NA	NA	Field
Water Color	1 - brownish 2 - reddish 3 - greenish 4 - blackish 5 - clear 6 - other	NA	NA	89969	NA	NA	NA	NA	NA	Field
Water Odor	1 - sewage 2 - chemical 3 - rotten egg 4 - musky 5 - fishy 6 - none 7 - other	NA	NA	89971	NA	NA	NA	NA	NA	Field
Turbidity	NTU	Water	SM 2130B	82079	.5	.5	75-125	20	80-120	Field
CONVENTIONAL AND BACTERIOLOGICAL PARAMETERS										
TSS	mg/L	Water	EPA 160.2	00530	4	4	NA	20	NA	RRA
TDS, Dried at 180 Degrees C	mg/L	Water	EPA 160.1	70300	10	10	NA	20	NA	RRA
TDS, Calculated	mg/L	Water	Calculation	70294	NA	NA	NA	NA	NA	RRA
Sulfate	mg/L	Water	EPA 300.0	00945	10	10	75-125	20	80-120	RRA
Chloride	mg/L	Water	EPA 300.0	00940	10	10	75-125	20	80-120	RRA
Chlorophyll-*a*, Spectrophoto-metric Method	ug/L	Water	SM 10200-H	32211	10	10	75-125	20	NA	LCRA
Pheophytin, Spectrophoto-metric Method	ug/L	Water	SM 10200-H	32218	5	5	75-125	20	NA	LCRA
E. coli, IDEXX Colilert	MPN/100 mL	Water	SM 9223-B	31699	1	1	NA	.5 **	NA	RRA
Ammonia-N, Total	mg/L	Water	EPA 350.1	00610	.02	.02	75-125	20	80-120	RRA
Fluoride, Total	mg/L	Water	EPA 300.0	00951	.5	.5	75-125	20	80-120	CRMWA
Hardness, Total (as CaC03)	mg/L	Water	EPA 130.2	00900	5	5	NA	20	80-120	RRA

Table A7.1 - Measurement Performance Specifications

PARAMETER	UNITS	MATRIX	METHOD	STORET	AWRL	LAB REPORTING LIMIT (RL)	RECOVERY AT RLS	PRECISION (RPD OF LCS / LCS DUPS)	BIAS %REC. OF LCS	LAB
FIELD, CONVENTIONAL AND BACTERIOLOGICAL PARAMETERS; NON-TSWQS METALS										
Nitrate/Nitrite-N, Total	mg/L	Water	EPA 353.3	00630	.04	.04	75-125	20	80-120	LCRA
O-phosphate-P, Dissolved	mg/L	Water	EPA 365.3	00671	.04	.04	75-125	20	80-120	RRA
Total Phosphate-P	mg/L	Water	EPA 365.3	00665	.06	.06	75-125	20	80-120	RRA
Alkalinity, Total	mg/L	Water	EPA 310.1	00410	10	10	NA	20	80-120	RRA
Alkalinity, Total	mg/L	Water	EPA 310.1	00410	10	10	NA	20	80-120	CRMWA
COD	mg/L	Water	EPA 410.2	00335	10	10	75-125	20	80-120	RRA
Calcium, Total	mg/L	Water	EPA 215.2	00916	.5	.5	75-125	20	80-120	RRA
Hardness, Total (calculated; sum of total Ca+total Mg)	mg/L	Water	SM 2340-B	82394	NA	NA	NA	NA	NA	RRA
Magnesium, Dissolve	mg/L	Water	SM 3500-Mg-B	00925	0.5	0.5	75-125	20	75-125	CRMWA
Fluoride, Dissolved	mg/L	Water	EPA 300.0	00950	.5	.5	75-125	20	80-120	CRMWA
Nitrite-N	mg/L	Water	EPA 300.0	00615	.02	.02	75-125	20	80-120	CRMWA
TOC	mg/L	Water	SM 5310B	00680	2.0	2.0	75-125	20	80-120	RRA
VSS	mg/L	Water	EPA 160.4	00535	4	4	NA	20	80-120	RRA

* Reporting to be consistent with SWQM guidance and based on measurement capability.

** Based on a range statistic as described in Standard Methods, 20th Edition, 1998, Section 9020-B, "Quality Assurance/Quality Control - Intralaboratory Quality Control Guidelines. This criterion applies to bacteriological duplicates with concentrations >10 org./100mL.

References for Table A7.1:

United States Environmental Protection Agency (USEPA) "Methods for Chemical Analysis of Water and Wastes," Manual #EPA-600/4-79-020
American Public Health Association (APHA), American Water Works Association (AWWA), and Water Environment Federation (WEF), "Standard Methods for the Examination of Water and Wastewater," 20th Edition, 1998.
TCEQ SOP - Surface Water Quality Monitoring Procedures Manual, most recent version..
American Society for Testing and Materials (ASTM) Annual Book of Standards, Vol. 11.02

A7 QUALITY OBJECTIVES AND CRITERIA (continued)

A7.1 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. The reporting limit is the lowest concentration at which the laboratory will report quantitative data within a specified recovery range. The laboratory will meet two requirements in order to report meaningful results to the Clean Rivers Program:

- The laboratory's reporting limit for each analyte will be at or below the AWRL, and
- The laboratory will demonstrate and document on an ongoing basis the laboratory's ability to quantitate at its reporting limits.

Acceptance criteria are defined in Section B5.

A7.2 Precision

Precision is a statistical measure of the variability of a measurement when a collection or an analysis is repeated and includes components of random error. It is strictly defined as the degree of mutual agreement among independent measurements as the result of repeated application of the same process under similar conditions.

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 replicate analyses of laboratory control standards or sample/duplicate pairs in the case of bacterial analysis. Precision results are plotted on quality control charts and used during evaluation of analytical performance. Control limits for laboratory control standard/laboratory control standard duplicate pairs are defined in Table A7.1.

A7.3 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 verified through the analysis of laboratory control standards prepared with certified reference materials and by calculating percent recovery. Results are plotted on quality control charts and used during evaluation of analytical performance. Project control limits for laboratory control standards are specified in Table A7.1.

A7 QUALITY OBJECTIVES AND CRITERIA (continued)

A7.4 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. Fixed/routine data collected under the Clean Rivers Program for water quality assessments are considered to be spatially and temporally representative of fixed/routine water quality conditions. 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) to include some data collected during an index period (March 15- October 15). Although data may be collected during varying regimes of weather and flow, the data sets will not be biased toward unusual conditions of flow, runoff, or season. The goal for meeting total representation of the water body will be tempered by the potential funding for complete representativeness.

A7.5 Comparability

Confidence in the comparability of fixed/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 Section B10.

A7.6 Completeness

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

A8 SPECIAL TRAINING/CERTIFICATION

New field personnel will receive training in proper sampling and field analysis. Before actual sampling or field analysis occurs, they will demonstrate to their agency's QA Officer (or designee) their ability to properly calibrate field equipment and perform field sampling and analysis procedures. Training will be documented and retained in the personnel file and in the laboratory's files and be available during a monitoring systems audit.

Laboratory analysts have a combination of experience, education, and training to demonstrate a knowledge of their function. To perform analyses for the CRP, laboratory analysts will have a demonstration of capability (DOC) on record for each test that the analysts perform. The initial DOC should be performed prior to analyzing samples and annually thereafter. In cases whereby analysts have been analyzing samples prior to an official certification of capability has been generated, a certification statement is made part of the training record to document the analyst's initial on the job training. Annual DOCs are a part of analyst training thereafter.

A9 DOCUMENTS AND RECORDS

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

Table A9.1 – Project Documents and Records

Document/Record	Location	Retention (yrs)	Format
QAPPs, Amendments and Appendices	TCEQ / RRA	Seven	Paper, Electronic
Field SOPs	RRA, CRMWA	Seven	Paper, Electronic
Laboratory QA Manuals	RRA, LCRA, CRMWA	Seven	Paper, Electronic
Laboratory SOPs	RRA, LCRA, CRMWA	Seven	Paper, Electronic
QAPP Distribution Documentation	RRA, CRMWA	Seven	Paper
Field Staff Training Records	RRA, CRMWA	Seven	Paper
Field Equipment Calibration/Maintenance Logs	RRA, CRMWA	Seven	Paper
Field Instrument Printouts	RRA, CRMWA	Seven	Paper, Electronic
Field Notebooks or Data Sheets	RRA, CRMWA	Seven	Paper
Chain of Custody Records	RRA, LCRA	Seven	Paper
Laboratory Calibration Records	RRA, LCRA, CRMWA	Seven	Paper
Laboratory Instrument Printouts	RRA, LCRA, CRMWA	Seven	Paper, Electronic
Laboratory Data Reports/Results	RRA, LCRA, CRMWA	Seven	Paper, Electronic
Laboratory Equipment Maintenance Logs	RRA, LCRA, CRMWA	Seven	Paper
Corrective Action Documentation	RRA, LCRA, CRMWA	Seven	Paper

1. Red River Authority of Texas (RRA)
   Environmental Laboratory
   900 8th Street, Hamilton Bldg., Suite 426
   Wichita Falls, Texas 76301-6894

2. LCRA Environmental Laboratory Services
   P. O. Box 200
   Austin, Texas 78767
   (or 3505 Montopolis, 78744-1417)
   (physical address)

3. Canadian River Municipal Water Authority (CRMWA)
   P.O. Box 99
   Sanford, Texas 79078

A9 DOCUMENTS AND RECORDS (continued)

A9.1 Laboratory Data Reports

Data reports from each laboratory or cooperating partner will report the test results clearly and accurately. The test report will include the information necessary for the interpretation and validation of data and will include the following:

- Name and address of the laboratory,
- Name and address of the client,
- A clear identification of the sample(s) analyzed,
- Identification of samples that did not meet QA requirements and why (i.e., holding times exceeded),
- Date of sample receipt,
- Sample results,
- Field split results (as applicable),
- 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 LCS sample results (% recovery), LCS duplicate results (%RPD), equipment, trip, and field blank results (as applicable), and RL confirmation (% recovery), and
- Narrative information on QC failures or deviations from requirements that may affect the quality of results.

A9.2 Electronic Data

Data will be submitted electronically to the TCEQ in the Event/Result file format described in the CRP Guidance. A completed Data Summary (see example in Appendix E) will be provided with each data submittal.

B1 SAMPLING PROCESS DESIGN

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

B2 SAMPLING METHODS

B2.1 Field Sampling Procedures

Field sampling will be conducted according to procedures documented in the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version*. Additional aspects outlined in Section B below reflect specific requirements for sampling under the Clean Rivers Program and/or provide additional clarification.

Table B2.1 Sample Storage, Preservation and Handling Requirements

Parameter	Container[1]	Preservation[2]	Sample Volume[3]	Holding Time[4]
Bacteriological (Water)				
Escherichia coli	P or G	Sodium Thiosulfate, Cool 4°C	250 mL	6 Hours
Conventionals and Minerals (Water)				
Total Hardness	P or G	Cool, 4°C	1.0 L	48 Hours
Alkalinity, Carbonate, Bicarbonate, P. Alkalinity	P or G	Cool, 4°C	1.0 L	14 Days
Calcium, Dissolved	P or G	HNO_3 to pH<2	250 mL	6 Months
Solids TSS, TDS, VSS	P or G	Cool, 4°C	1.0 L	7 Days
Chloride	P or G	None Required	1.0 L	28 Days
Sulfate	P or G	Cool, 4°C	1.0 L	28 Days
Turbidity	P or G	Cool, 4°C	250 mL	48 Hours
Nutrients (Water)				
Ammonia, Nitrate-N, Total, Nitrate/Nitrite-N, Total, Total Phosphorus, TOC & COD	P or G	Cool, 4°C, H_2SO_4 to pH<2	500 mL	28 Days
O-Phosphorus	P or G	Field Filtered[5], Cool, 4°C	125 mL	48 Hours
Chlorophyll *a* and Pheophytin	P or G Opaque[6]	Unfiltered, Dark, Cool, 4°C	200 mL	48 Hours
		Filtered, Dark, Frozen		28 Days
Metals (Water)				
Dissolved Calcium and Magnesium	P or G	HNO_3 to pH<2	250 mL	6 Months
Fluoride	P or G	HNO_3 to pH<2	250 mL	28 Days

[1] Polyethylene (P) or Glass (G).
[2] Sample preservation is performed immediately upon sample collection.
[3] Samples volumes are combined by preservative to minimize volumes and reduce container size and space.
[4] Samples are analyzed as soon as possible after collection. The times listed are the maximum times that samples are held before sample preparation or analysis and still be considered valid.
[5] Orthophosphorus samples are field filtered within 15 minutes of sample collection. DI blanks are run on filter lots to ensure quality control. Individual filters are rinsed with collected sample prior to actual filling of the designated container.
[6] Chlorophyll *a* and Pheophytin will be collected in brown opaque containers.

B2 SAMPLING METHODS (continued)

B2.2 Sample Containers

Red River Authority and Canadian River Municipal Water Authority utilize the same sample container methods for acquiring and cleaning. All sample containers are chosen and used according to the sample needs. Some containers are purchased either new and pre-cleaned, while others are reusable and washable. Samples for specific field and conventional parameters are collected in individual or aggregate containers depending on sample preservatives. The sample containers for metals are new, certified glass or plastic containers. Sterilized leakproof polypropylene containers are used for bacteriological samples and may have 1% sodium thiosulfate solution added. Certificates of Acceptability from the container manufacturers are maintained by the Authority as well as the laboratory providing the sample containers. Reusable containers are cleaned in accordance with the bottle washing schedule maintained for each set of containers and follows a written SOP which contains the following procedures:

1. All containers must be rinsed thoroughly as soon as possible after use. All labels must be removed from containers prior to placing in dishwasher.

2. Items that are too large to fit in the dishwasher or must be washed by hand are done so using the Liquinox® phosphate-free glassware cleaner and a bottle brush. Glassware may be acid-washed to meet constituents requirements.

3. Once all items are properly placed in the dishwasher, it is set to run. It takes approximately one (1) hour to run a complete cycle. The heating element of the dishwasher is not used in order to prevent damage to any plastic items in the dishwasher and to reduce the chance of any soap residue drying on the containers.

4. Once the dishwasher completes its cycle, the sample containers are removed and rinsed twice in deionized water and placed on the drying rack to air dry.

5. Each batch of cleaned containers is checked for cleaning solution residue by performing a pH check utilizing Bromothymol Blue. Any color change to the Bromthymol Blue results in the entire batch being rinsed in deionized water, and checked again. The results of the pH check are recorded in the Labware QC logbook.

B2.3 Processes to Prevent Contamination

Procedures outlined in the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version,* 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.

B2 SAMPLING METHODS (continued)

B2.4 Documentation of Field Sampling Activities

Field sampling activities are documented on Field Data Sheets as presented in Appendix C. The following will be recorded for all visits:

1. Station ID
2. Location Description
3. Sampling time
4. Sampling date
5. Sampling depth
6. Sample collector's initials
7. Values for all measured field parameters
8. Detailed observational data, including:
    a. water appearance
    b. weather
    c. days since last significant rainfall
    d. flow severity
9. Other observational data including but not limited to:
    a. biological activity
    b. 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.)
    c. watershed or instream activities (events impacting water quality, e.g., bridge construction, livestock watering upstream, etc.)
    d. unusual odors
    e. specific sample information (number of grabs, type, etc.)
    f. missing parameters (i.e., when a scheduled parameter is not collected)

B2.5 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. Legible writing in indelible ink with no modifications, write-overs or cross-outs;
2. Correction of errors with a single line followed by an initial and date; and
3. Close out on incomplete pages with an initialed and dated diagonal line.

B2.6 Deficiencies, Nonconformances and Corrective Action Related to Sampling Requirements

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP or other applicable documents. Nonconformances are deficiencies which affect quality and render the data unacceptable or indeterminate. Deficiencies related to sampling methods requirements include, but are not limited to, such things as sample container, volume, and preservation variations, improper/inadequate storage temperature, holding-time exceedances, and sample site adjustments.

B2 SAMPLING METHODS (continued)

Deficiencies are documented in logbooks, field data sheets, etc. by field, laboratory staff, or cooperating partner and reported to the cognizant Authority laboratory supervisor who will notify the Authority's Project Manager. The Authority's Project Manager will notify the contractor or Authority's QAO of the potential nonconformance within 24 hours. The Authority's QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The Authority's Project Manager, in consultation with the Authority's QAO (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore, is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the Authority's Project Manager in consultation with the Authority's QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the Authority's QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); programmatic impact(s); specific corrective action(s) to address the deficiency; action(s)to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and the means by which completion of each corrective action will be documented. CARs 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 both verbally and in writing.

B3 SAMPLE HANDLING AND CUSTODY

B3.1 Chain-of-Custody

The COC system described in this QAPP replaces the "tag" system as described in the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version*. This is utilized by the Authority and CRMWA.

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 COC form is used to document sample handling during transfer from the field to the laboratory and among subcontract laboratories. The following information concerning the sample is recorded on the COC form (See Appendix D).

1. Date and Time of Collection
2. Site Identification
3. Sample Matrix
4. Number of Containers
5. Preservative Used or if the Sample was Filtered
6. Analyses Required
7. Name of Collector
8. Custody Transfer Signatures and Dates and Time of Transfer

B3 SAMPLE HANDLING AND CUSTODY (continued)

B3.2 Sample Labeling

Samples are labeled on the container (*or on an adhesive label*) with an indelible marker. Label information includes:

1. Site identification;
2. Date and time of sampling;
3. Initials of sampler;
4. Preservative added, if applicable;
5. Designation of "field-filtered" *(for Orthophosphorus)* as applicable; and
6. Sample type (e.g., conventional water parameters, organics, etc. as defined in the monitoring schedule in Appendix B).

B3.3 Sample Handling

Written SOPs have been developed for sample handling, sample receiving, and sample shipping. The SOPs utilized for all Clean Rivers Program sampling include the following procedures:

1. During preparations for a sampling event, samples scheduled to be collected are assigned an ID number which is recorded in the lab accessions logbook. Preliminary sample and event information is recorded on a COC form, leaving only the date, time and sample information to be recorded when the sample is collected.

2. Sample kits are prepared and assembled including sample container type, size and preservative required, which are determined by the type of sample to be collected. The sample kits are loaded in the vehicle in the order of the proposed site visits.

3. Samples are collected under protocols documented in the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version*. The samples are then packed in loose ice and preserved in accordance with the preservation criteria listed in Table B2.1 of this document. Once each quarter a check is made to assure sample temperature reaches four degrees Celsius (4°C) in 45 minutes.

4. The date, time and collector information is completed on the sample container labels and the COC.

5. The ice chests with the samples are secured in the vehicle until delivered to the Authority's ESD Laboratory.

6. The samples are received in the lab in a designated area where the Authority's sample custodian inspects the containers and signs the COC on the receiving line.

7. The lab accessions logbook is filled in for each sample corresponding to the ID number issued during the sample event preparations. Data added to the accessions logbook include:

▪Current Date	▪Client	▪Assigned ID Number
▪Sample ID	▪Sample Source	▪Collector
▪Collection Date	▪Parameters	▪Preservative
▪Time Sample Received	▪Chain of Custody Number	

8. The unique ID number is written on the containers with a permanent marker.

9. Samples are then transported to the laboratory storage facility by the Authority's sample custodian. Access to the storage facility is limited to Environmental Services personnel only.

10. Samples to be shipped to contract laboratories are added to a separate COC form with the original COC number written in the comment section. The contract lab name will be written in the comment section of the original COC form which will remain with the Authority's laboratory.

11. The samples along with the COC are then packed in an ice chest with ice or in a box container depending on the preservation requirements. A sample of DI water chilled to 4°C and marked as "Temperature Blank" is included with the samples. The shipping container is then sealed, marked with an up-arrow (↑) on all four sides and labeled with the contract laboratory's name and address. The shipping containers may be held in the sample cooler overnight if needed.

12. The sealed sample containers are then shipped to the contract laboratory. The contract lab is contacted by phone and/or e-mail informing them of the shipped sample(s) and when they should expect delivery.

B3.4 Deficiencies, Nonconformances and Corrective Action Related to Chain-of-Custody

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP or other applicable documents. Nonconformances are deficiencies which affect quality and render the data unacceptable or indeterminate. Deficiencies related to chain-of-custody include but are not limited to delays in transfer, resulting in holding time violations; incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc.

Deficiencies are documented in logbooks, field data sheets, etc. by field, laboratory staff, or cooperating partner and reported to the cognizant Authority laboratory supervisor who will notify the Authority's Project Manager. The Authority's Project Manager will notify the

B3 SAMPLE HANDLING AND CUSTODY (continued)

contractor or Authority's QAO of the potential nonconformance within 24 hours. The Authority's QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The Authority's Project Manager, in consultation with the Authority's QAO (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore, is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the Authority's Project Manager in consultation with the Authority's QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the Authority's QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); programmatic impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and the means by which completion of each corrective action will be documented. CARs 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 both verbally and in writing.

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 "Procedures for laboratory analysis will be in accordance with the most recently published edition of *Standard Methods for the Examination of Water and Wastewater*, the latest version of the *TCEQ Surface Water Quality Monitoring Procedures Manual, 40 CFR 136*, or other reliable procedures acceptable to the Agency."

Laboratories collecting data under this QAPP are compliant with ISO/IEC Guide 25, at a minimum. Copies of laboratory Quality Assurance Manuals (QAMs) and SOPs are available for review by the TCEQ.

B4.1 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.

B4 ANALYTICAL METHODS (continued)

B4.2 Analytical Method Modification

Only data generated using approved analytical methodologies as specified in this QAPP will be submitted to the TCEQ. Requests for method modifications will be documented on form TCEQ-10364, the TCEQ Application for Analytical Method Modification, and submitted for approval to the TCEQ Quality Assurance Section. Work will begin only after the modified procedures have been approved.

B4.3 Deficiencies, Nonconformances and Corrective Action Related to Analytical Methods

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP or other applicable documents. Nonconformances are deficiencies which affect quality and render the data unacceptable or indeterminate. Deficiencies related to field and laboratory measurement systems include but are not limited to instrument malfunctions, blank contamination, quality control sample failures, etc.

Deficiencies are documented in logbooks, field data sheets, etc. by field, laboratory staff, or cooperating partner and reported to the cognizant Authority's laboratory supervisor who will notify the Authority's Project Manager. The Authority's Project Manager will notify the contractor or Authority's QAO of the potential nonconformance within 24 hours. The Authority's QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The Authority's Project Manager, in consultation with the Authority's QAO (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore, is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the Authority's Project Manager in consultation with the Authority's QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the Authority's QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); programmatic impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and, the means by which completion of each corrective action will be documented. CARs 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 both verbally and in writing.

The TCEQ has determined that analyses associated with the remark 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 TRACS. Therefore, data with these types of problems are not be reported to the TCEQ.

B5 QUALITY CONTROL

B5.1 Sampling Quality Control Requirements and Acceptability Criteria

The minimum field QC requirements are outlined in the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version.* 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 separate, identified samples according to procedures specified in the *TCEQ Surface Water Quality Monitoring Procedures Manual, most recent version*. 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 or one per batch. The precision of field split results is calculated by relative percent difference **(RPD)** using the following equation:

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

A 30% RPD criteria will be used to screen field split results as a possible indicator of excessive variability in the collection and analytical system. If it is determined that meaningful quantities of constituent (i.e., >AWRL) 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 sample results or batches of samples may be invalidated based on the examination of all extenuating information. Professional judgement 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 Deficiencies, Nonconformances, and Correction Action related to Quality Control.

B5.2 Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Detailed laboratory QC requirements and corrective action procedures are contained within the individual laboratory quality assurance manuals (QAMs). The minimum requirements that all participants abide by are stated below. Lab QC sample results are submitted with the laboratory data report (see Section A9).

AWRL/Reporting Limit Verification - The laboratory's reporting limit for each limit will be at or below the AWRL. To demonstrate ongoing ability to recover at the reporting limit, the laboratory will analyze a calibration standard (if applicable) at or below the reporting limit on each day Clean Rivers Program samples are analyzed. Two acceptance criteria will be met or corrective action will be implemented. First, calibrations including the standard at the reporting limit will meet the calibration requirements of the analytical method. Second, the instrument response (e.g., absorbance, peak area, etc.) for the standard at the

reporting limit will be treated as a response for a sample by use of the calibration equation (e.g., regression curve, etc.) in calculating an apparent concentration of the standard. The calculated and reference concentrations for the standard will then be used to calculate percent recovery (%R) at the reporting limit using the equation:

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

where CR is the calculated result and SA is reference concentration for the standard. Recoveries must be within 75-125% of the reference concentration.

When daily calibration is not required (e.g., EPA Method 624), or a method does not use a calibration curve to calculate results, the laboratory will analyze a check standard at the reporting limit on each day Clean Rivers Program samples are analyzed. The check standard does not have to be taken through sample preparation, but must be recovered within 75-125% of the reference concentration for the standard. The percent recovery of the 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:

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

If the calibration (when applicable) or the recovery of the calibration or control standard is not acceptable, corrective actions (e.g., re-calibration) will be taken to meet the specifications before proceeding with analyses of CRP samples.

The laboratory will report records of quantitation checks with the data.

Laboratory Control Standard (LCS) - A LCS consists of analyte-free water, spiked with the analyte of interest prepared from standardized reference material. The LCS is spiked into laboratory-pure water at a level less than or equal to the mid-point of the calibration curve for each analyte. The LCS is carried through the complete preparation and analytical process. The LCS is used to document the bias of the analytical process. LCSs are run at a rate of one per 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; SA is the true result.

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

Performance limits and control charts are used to determine the acceptability of LCS analyses. Project control limits are specified in Table A7.1.

Laboratory Duplicate - A laboratory duplicate is prepared in the laboratory by splitting aliquots of an LCS. Both samples are carried through the entire preparation and analytical process. LCS duplicates are used to assess precision and are performed on 10% of samples analyzed.

B5 QUALITY CONTROL (continued)

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:

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

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.

Performance limits and control charts are used to determine the acceptability of duplicate analyses. Project control limits are specified in Table A7.1. The specifications for bacteriological duplicates in Table A7.1 apply to samples with concentrations > 10 org./100mL.

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

Matrix Spike (MS) - A matrix spike is an aliquot of sample spiked with a known concentration of the analyte of interest. 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. 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 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:

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

MS recoveries are plotted on control charts and used to control analytical performance. Project control limits are not specified in this document and may be matrix-dependent.

Method Blank - A method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in the sample processing and analyzed with each batch. The method blank is carried through the complete sample preparation and analytical

procedure. The method blank is used to document contamination from the analytical process. The analysis of method blanks should yield values less than the reporting limit. 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.

Additional Method-Specific QC Requirements - Additional QC samples are run (e.g., surrogates, internal standards, continuing calibration samples, interference check samples) as specified in the methods. The requirements for these samples, their acceptance criteria, and corrective actions are method-specific.

B5.3 Deficiencies, Nonconformances and Corrective Action Related to Quality Control

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP. Nonconformances are deficiencies which affect quality and render the data unacceptable or indeterminate. Deficiencies related to quality control include but are not limited to field and laboratory quality control sample failures.

Deficiencies are documented in logbooks, field data sheets, etc. by field, laboratory staff, or cooperating partner and reported to the cognizant Authority laboratory supervisor who will notify the Authority's Project Manager. The Authority's Project Manager will notify the contractor or Authority's QAO of the potential nonconformance within 24 hours. The Authority's QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The Authority's Project Manager, in consultation with the Authority's QAO (and other affected individuals/organizations), will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore, is not a valid nonconformance, the NCR will be completed accordingly and the NCR closed. If it is determined a nonconformance does exist, the Authority's Project Manager in consultation with the Authority's QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the Authority's QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); programmatic impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and, the means by which completion of each corrective action will be documented. CARs 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 both verbally and in writing.

B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

All sampling equipment testing and maintenance requirements are detailed in the *TCEQ SWQM Procedures Manual, most recent version*. 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 QAM(s). Testing and maintenance records are maintained and are available for inspection by the TCEQ. Instruments requiring daily or in-use testing include, but are not limited to, water baths, ovens, autoclaves, incubators, refrigerators, and laboratory-pure water. Critical spare parts for essential equipment are maintained to prevent downtime. Maintenance records are available for inspection by the TCEQ.

B7 INSTRUMENT CALIBRATION AND FREQUENCY

Field equipment calibration requirements are contained in the *TCEQ SWQM Procedures Manual, most recent version*. 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 QAM(s). The laboratory QAM identifies all tools, gauges, instruments, and other sampling, measuring, and test equipment used for data collection activities affecting quality that must be controlled and, at specified periods, calibrated to maintain bias within specified limits. Calibration records are maintained, are traceable to the instrument, and are available for inspection by the TCEQ. Equipment requiring periodic calibrations include, but are not limited to, thermometers, pH meters, balances, incubators, turbidity meters, and analytical instruments.

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

A vendor of testing or analytical supplies and materials is regarded as a resource to and as an extension of the laboratory. The standards of quality imposed on vendors are the same as those imposed on the laboratory.

The vendor is responsible for marking packing slips and containers of reagents, chemicals, and testing supplies with the name of the material, vendor's name and address, vendor's item number, quantity, material specification number, and date. This assures that the material is properly identified. Receiving documents and accompanying certifications are used as part of the receiving control procedures and show information necessary to identify the material being received. Incoming supplies are unpacked by laboratory personnel and checked against the packing slip and the purchase order. If any items are missing or damaged, the vendor is contacted immediately.

Standards, reagents, and chemicals are marked with the date received, the expiration date, if applicable, and placed in storage. All standards, chemicals, and reagents are logged into the Chemical Log with the lot number, date received, and technician's initials. Supplies are used on a

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES (continued)

"first in, first out" basis. Supplies are ordered on an "as needed" basis to avoid excessive inventories of reagents and chemicals.

Packing slips, certifications, and other receiving documents are maintained in a file as a reference of procurement. Chemical logs are maintained as a trace reference for chemicals, standards, and reagents.

B9 NON-DIRECT MEASUREMENTS

This QAPP does not include the use of data obtained from non-direct measurement sources.

B10 DATA MANAGEMENT

Data Management protocols are addressed in the Data Management Plan, which is located in Appendix E of this document.

C1 ASSESSMENTS AND RESPONSE ACTIONS

The following table presents the types of assessments and response action 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	Red River Authority of Texas	Monitoring of the project status and records to ensure requirements are being fulfilled	Report to TCEQ in Quarterly Progress Report.
Monitoring Systems Audit	Dates to be Determined by TCEQ	TCEQ	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to TCEQ to address corrective actions.
Monitoring Systems Audit	Dates to be Determined by Red River Authority of Texas	Red River Authority of Texas	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the Red River Authority of Texas. PA will report problems to TCEQ in Quarterly Progress Report.
Laboratory Inspection	Dates to be Determined by TCEQ	TCEQ Laboratory Inspector	Requirements appearing in lab SOPs and QAPP, ISO/IEC Guide 25, applicable EPA methods and Standard Methods, 40 CFR 136, and other documents applicable to CRP programs including portions of the Texas Administrative Code and the Code of Federal Regulations.	30 days to respond in writing to TCEQ to address corrective actions.
Laboratory Inspection	Dates to be Determined by Red River Authority of Texas	Individual Labs (RRA will only audit contract labs in cases of suspected problems)	Field sampling, handling and measurement; facility review; and data management as they relate to CRP.	30 days to respond in writing to the Authority. The Authority will report problems to TCEQ in Quarterly Progress Report.
Performance Evaluation Samples	Annually	Laboratories and Commercial Suppliers	Evaluation of laboratory competency in performing analyses	Report problems to TCEQ in Quarterly Progress Report

C1.1 Corrective Action

The Authority Project Manager is responsible for implementing and tracking corrective action procedures as a result of audit findings. Records of audit findings and corrective actions are maintained by both the CRP and the Authority Project Manager. 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.

C1 ASSESSMENTS AND RESPONSE ACTIONS (continued)

Blank failures, calibration failures, QC sample failures, and general instrument trouble are some of the events that cause process failures in laboratory and field work. In most cases, the problem will be corrected by the laboratory or field technician. When the problem can be corrected by the technician, the problem is documented on an appropriate record sheet and the procedure will be completed. If the problem cannot be corrected by the technician, the technician reports the problem to the immediate supervisor and the Authority's QAO. The immediate supervisor and QAO make the determination whether or not the data should be included in a report. If the immediate supervisor and QAO have to make a determination on the possible exclusion of CRP data, a data report is filed with the Authority's Project Manager. The Authority retains copies of all corrective actions on file. A quarterly report that contains the information given on the data report forms will be prepared and filed with the TCEQ.

C2 REPORTS TO MANAGEMENT

C2.1 Reports to Red River Authority of Texas Project Management

The Authority's Project Manager will be kept apprized of all project status, results of assessments and any significant QA issues as they occur. Additionally, written reports and daily time sheets will contain information regarding daily activities.

C2.2 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 Red River Authority of Texas's activities for each task; reports monitoring status, problems, delays, and corrective actions; and outlines the status of each task's deliverables.

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

C2.3 Reports by TCEQ Project Management

Contractor Evaluation - The Authority 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 data quality objectives which are listed in Section A7. Only those data which are supported by appropriate quality control data and meet the data quality objectives defined for this project will be considered acceptable, and will be reported for entry into the SWQM portion of TRACS.

The procedures for verification and validation of data are described in Section D2 below. The Authority's QAO is responsible for ensuring that field data are properly collected and recorded in accordance with the QAPP, the *CRP Program Guidance and Reference Guide for FY 2004-2005* and the *TCEQ's Surface Water Quality Monitoring Procedures Manual, most recent version.* Likewise the Authority's Lab Manager, CRMWA Lab Manager, and the LCRA Lab Manager are responsible for ensuring that the data are reviewed, verified, and submitted in the required format. The QAO is responsible for validating that all data collected meets the data quality objectives of the project.

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 information to be reviewed, verified, and validated (listed by task and responsible party in Table D2.1) is evaluated against technical and project specifications and checked for errors, especially errors in calculations, data reduction, and transcription. 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 higher level project management to establish the appropriate course of action, or the data associated with the issue are rejected. Field and laboratory reviews, verifications, and validations will be documented.

Data validation tasks to be addressed by the Authority include, but are not limited to, the confirmation of lab 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. Any suspected errors or anomalous data must be addressed by the manager of the task associated with the data before data validation can be completed. A second element of the validation process is consideration of any findings identified during the annual monitoring systems audit conducted by the TCEQ Quality Assurance Specialist assigned to the project. Any issues requiring corrective action must be addressed, and the potential impact of these issues on previously collected data will be assessed. Finally, the Authority Project Manager validates that the data meet the data quality objectives of the project and are suitable for

D2 VERIFICATION AND VALIDATION METHODS (continued)

reporting to TCEQ. Pertinent information having to do with inconsistencies with reporting limit specifications; failures in sampling methods and/or laboratory procedures resulting in unavailable data; etc. will be provided on the Data Summary when the data are submitted to the TCEQ.

Table D2.1 Data Review, Verification, and Validation Tasks

Task	Verification	Validation	RRA/CRMWA Responsibility
Field data reviewed for conformance with data collection, sample handling and chain of custody, analytical and QC requirements	✔		Field Supervisors
Post-calibrations checked to ensure compliance with error limits	✔		Field Supervisors
Field data calculated, reduced, and transcribed correctly	✔		Field Supervisors
Laboratory data reviewed for conformance with data collection, sample handling and chain of custody, and analytical and QC requirements to include documentation, holding times, sample receipt, sample preparation, sample analysis, project and program QC results, and reporting	✔		QAOs
Laboratory data calculated, reduced, and transcribed correctly	✔		QAOs
Reporting limits consistent with requirements for "Ambient Water Reporting Limits."	✔	✔	Lab Supervisors
Analytical data documentation evaluated for consistency and/or improper practices	✔	✔	Lab Supervisors
Analytical QC information evaluated to determine impact on individual analyses	✔	✔	Lab Supervisors
All laboratory samples analyzed for all parameters	✔	✔	Lab Supervisors
Data set (to include field and laboratory data) evaluated for reasonableness and if corollary data agree	✔	✔	RRA Data Manager
Data review, verification, and validation performed and deviations documented		✔	RRA Data Manager
Outliers confirmed and documented		✔	RRA Data Manager
Field QC acceptable (e.g., field splits and trip, field and equipment blanks)		✔	QAOs / Field Supervisors
Sampling and analytical data gaps checked and documented		✔	RRA Data Manager
Verification and validation confirmed. Data meets conditions of end use and are reportable		✔	RRA 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 Water Quality Inventory 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 the SWQM portion of TRACS nor will be considered appropriate for any of the uses noted above.

Quality Control Review Procedures

I. Identify data limitations

   A. Missing values
   B. Varying sampling frequencies
   C. Multiple measurements
   D. Analytical uncertainty
   E. Censored data
   F. Unavailable or classified data
   G. Small sample size
   H. Outliers

II. Define how a raw data file is to be modified to address the above limitations so that a data analysis file can be created for graphical and statistical analysis

   A. Missing values: Statistical tests which require the use of regularly measured sequences are not applicable. All time periods are not equally weighted as to importance or representation.
   B. Varying sample frequencies: Statistical tests requiring temporally equal spacing are not applicable. Statistical summaries over will be weighted more to period when sampling frequency is highest.
   C. Multiple observations in the same sampling period can result from mixing original measurements with quality control measurements.
   D. Analytical uncertainty: Random analytical error is sometimes ignored. For this reason the analytical protocol must incorporate a separate QA/QC program.
   E. Censored data: Censoring data may occur when values exceed the designated upper and lower tolerance limits. Detection capabilities change over time as new technology becomes available. Sampled constituents may have differing detection limits on data sets with long periods of record.
   F. Unavailable or classified data: Unclassified segments within military or Department of Energy installations, may be difficult to access or not provide adequate information for meaningful analyses. In depth research could be necessary in the basins for data acquisition methodologies concerning these areas.

D3 RECONCILIATION WITH USER REQUIREMENTS (continued)

G. Small sample size: There are sample size limits below which meaningful statistical analysis is impossible. Familiarity with dataset size and content is integral to QA/QC completeness.

H. Outliers: Outlying data points can seriously skew statistical analysis usually resulting from extreme events or erroneous measurements. Documentation of outlier deletions or inclusions must be based on scientific evidence or sound professional judgement.

III. Procedures for quality control and assurance of data integrity should include representative sampling techniques, quality control of analytical tests, and documentation of methodologies. COC records must be accurate and complete to ensure proper handling and identification of samples and/or measurements.

A. Data Input

1. If from raw data, cross check and screen data;
2. If from monitoring stations via digital media, develop statistical routines to report on apparent data discrepancies to be reviewed; and
3. Log various errors and omissions detected for further validation or field investigation.

B. Data should be reported in the measurement units corresponding to the detection limits established in the analytical protocol.

C. Numerical rounding conventions will be established and rounding procedures followed.

D. Deletion or inclusion of outliers will be noted and explained.

E. Generate a QA/QC report detailing COC, description of weakness, adjustment, data manipulations, and proposed disposition of data.

APPENDIX A

WORK PLAN - TASK 3

TASK 3: WATER QUALITY MONITORING

OBJECTIVES: Continue water quality monitoring activities in accordance with the approved Coordinated Monitoring Plan (CMP) and Quality Assurance Project Plan (QAPP) together with a detailed monitoring schedule describing the subwatersheds and/or stream segments, parameters, sampling frequency, and locations. The plan will include coordination with other existing monitoring programs participating under the approved QAPP. The intent of the approved plan is to minimize duplicate monitoring efforts within the basins and focus on watershed coverage that provides water quality data in support of the following:

- Temporal and spatial analysis of water quality;
- Knowledge of water quality and flow for unclassified streams;
- Evaluation and development of state-wide, regional, and site-specific water quality standards;
- Permit criteria related to the flow status of receiving streams;
- Priority monitoring; and
- Use attainability assessments.

TASK DESCRIPTION:

Monitoring Description – For FY 2004 and FY 2005, the Authority will monitor and collect water quality samples for analysis from a minimum of 29 stations in the Canadian River and Red River Basins. Seven of the stations are located in the Canadian River Basin with the remaining 22 stations located in the Red River Basin. Each site will be visited a minimum of 4 times per year for the collection of field data along with conventional and indicator bacteria water samples. Instantaneous flow will be measured at 24 sites. The monitoring schedule will be designed in such a way that a proportionate amount of sites will be visited each month allowing for the monitoring of each site once per season of the year.

The Authority will use an approved Coordinated Monitoring Plan (CMP) to reflect the informational needs of both the Red and Canadian River Basins with intensive focus on priority issues identified in previous assessments and direction from the Basin Advisory Committees. The QAPP currently details the methodologies for conducting monitoring and for compliance with TCEQ guidance on a priority watershed basis.

TASK 3: WATER QUALITY MONITORING (continued)

The Authority will primarily utilize two methods of water quality monitoring. The first method is **Fixed (Routine) Monitoring (3.1)** whereby key stations are selected to delineate overall water quality from the subwatershed level to the basin as a whole. This more traditional type of monitoring is conducted at key sites over a five-year period to adequately characterize water quality trends and progress in protecting or restoring overall water quality throughout the basin. Sites are selected based on the need for continuous or up-to-date water quality information to establish temporal and spatial trends. The data collected will be utilized by TCEQ in determining compliance with water quality standards and to support revisions to the Texas Water Quality Inventory Report, CWA §305(b), CRP Summary Reports, the CWA §303(d) List and to identify sources of water quality concerns. Fixed/Routine monitoring at key sites will also be performed regardless of the reach rotation in order to maintain adequate baseline data for long-term reference, trend relationships, and determine if present water quality conditions deem further attention. The second method to be utilized is **Systematic (Intensive) Watershed Monitoring (3.2)**. This method allows for the selection of stations in subwatershed areas, or reaches, on a rotational basis within the confines of the five-year basin management cycle. This monitoring is necessary to collect data on undesignated water bodies and provide trend analysis of classified stream segments or subwatersheds. Monitoring will focus on known areas of concern and potential concern for the basin as a whole and for priority subwatersheds. Sites will be rotated over the five-year basin cycle by selecting two subwatersheds of a designated segment each year for comparability when determining overall water quality conditions of the basin reach.

In Addition, the Authority will subcontract with the USGS for specific water quality parameters at selected USGS fixed monitoring gaging stations. These stations operate continuously with the data collected and quality-assured by USGS and submitted annually to TCEQ. The CRMWA is a cooperating partner with the Authority and collects and analyzes specific water quality samples from Lake Meredith in the Canadian River Basin under the guidance of the Authority's QAPP. The data collected by the CRMWA is submitted to the Authority, quality-assured, then submitted with the Authority's data submittal.

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

TASK 3: WATER QUALITY MONITORING (continued)

DELIVERABLES AND DUES DATES:

September 1, 2003 through August 31, 2004

Task 3.1 – Routine Monitoring and 3.2 – Systematic Monitoring

A. Conduct water quality monitoring and provide details of the monitoring activities in Progress Reports – December 15, 2003, March 15, 2004, and June 15, 2004

September 1, 2004 through August 31, 2005

Task 3.1 – Routine Monitoring and 3.2 – Systematic Monitoring

A. Conduct water quality monitoring and provide details of the monitoring activities in Progress Reports – September 15, 2004, December 15, 2004, March 15, 2005, June 15, 2005, and August 31, 2005

APPENDIX B

SAMPLING PROCESS DESIGN AND MONITORING SCHEDULE

SAMPLE DESIGN RATIONALE

The sample design is based on the legislative intent of the Clean Rivers Program. Under the legislation, the Authority has been tasked with providing data to identify significant long-term water quality trends, to characterize water quality conditions in support of the 305(b) assessment. 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 Authority coordinates closely with the TCEQ and other participants to ensure a comprehensive water monitoring strategy within the Watershed. Refer to the Water Quality Monitoring Protocol and Sampling Protocol charts contained in Appendix D.

Based on previous basin assessments and evaluations of past screenings, the hydrologic subdivisions of each basin have been prioritized according to the level of concern and need for additional information in an effort to expend the limited resources as prudently as possible. A priority list is prepared for discussion with the other monitoring entities and the TCEQ at the Authority's Annual Coordinated Monitoring Meeting. The results of the priority ranking are presented for approval at a meeting of the Basin Advisory Committee. This approach enables comprehensive monitoring to occur on a rotational reach basis and completely encompasses the basins within the five-year basin management cycle, limited only by the availability of funds.

SITE SELECTION CRITERIA

This data collection effort involves monitoring fixed/routine water quality, using procedures that are consistent with the TCEQ SWQM program, for the purpose of data entry into the statewide database maintained by the TCEQ. To this end, some general guidelines are followed when selecting sampling sites, as identified below. Overall consideration is given to accessibility and safety. All monitoring activities have been developed with coordination with the CRP Steering Committee and with the TCEQ.

1. Fixed/routine monitoring sites are representative of in-stream data and are free from back-water effects.

2. Fixed/routine monitoring sites are selected to maximize stream/basin coverage. For very long stretches of river length, a station is considered representative of a water body for not more than 25 miles in freshwater and tidal streams. A single monitoring site is considered representative of 25 percent of the total reservoir acres, but not more than 5,120 acres.

3. Fixed/routine monitoring sites are located preferentially where there are "localized" water quality effects based on past water quality data.

4. Fixed/routine monitoring sites are located where historical data exists. No degradation of water quality may be indicated. However, the continuation of water quality monitoring at this site has been deemed important.

5. At least one site for each classified segment will be selected for fixed/routine monitoring unless the segment is already covered by TCEQ or other qualified monitoring entities reporting fixed/routine data to TCEQ.

SITE SELECTION CRITERIA (continued)

6. Fixed/routine monitoring sites may be selected to bracket sources of pollution, influence of tributaries, changes in land uses, and hydrological modifications.

7. Fixed/routine monitoring sites are chosen based on accessibility. When possible, sites are selected where it is likely to collect flow measurements during routine visits or where a stream flow gage is located.

MONITORING SITES

Following is the monitoring schedule for FY 2004. The goal is to have a two year QAPP which is consistent with the terms of the contract. Therefore, the following Monitoring Schedule as presented in Appendix B can be modified annually. The Monitoring Schedule for FY 2005 will be submitted in the ensuing year.

Monitoring Sites for FY 2004

The sample design for surface water quality monitoring is shown in Table B1.1 on the next page.

Critical vs. non-critical measurements

All data taken for CRP and entered into the State of Texas SWQM Database are considered critical.

RED RIVER AUTHORITY OF TEXAS
Sample Design and Schedule – Table B1.1
Fiscal Year 2004
Red and Canadian River Basins

Segment	TCEQ Region	Basin	Latitude	Longitude	Long Description	Station ID	Start Date	End Date	Mon Resp	Mon Type	Comments	24HR	Metals Water	Organics Water	Metals Sediment	Organics Sediment	Conventionals	AmbToxWtr	AmbTox Sed	Ind Bact	Inst Flow	Field
0101	1	1	35.9350	100.3700	Canadian River Bridge at US 60-83 at Canadian	10032	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0101	1	1	35.9700	100.8580	Canadian River Bridge on SH 70, North of Pampa	10033	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0101B	1	1	35.6550	101.4230	Rock Creek at Hwy 136, Downstream of Lake Weatherly, West of Borger	10025	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0102	1	1	35.7170	101.5570	Lake Meredith near Intake Tower at Dam, Northwest of Sanford	10036	09/01/03	08/31/04	RR/CR	IS							12			12		
0102	1	1	35.7210	101.5750	Lake Meredith, North Canyon Arm	10037	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6900	101.6030	Lake Meredith, Midlake Between Blue East and Fritch Fortress	10038	09/01/03	08/31/04	RR/CR	RT							12					
0102	1	1	35.6500	101.6450	Lake Meredith Mid-Lake, Southeast of Martin's Canyon	10039	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6420	101.6810	Lake Meredith, Evans Canyon	10040	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.7130	101.5960	Lake Meredith, Bugbee Canyon at Buoy Line	10043	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.7080	101.6080	Lake Meredith, North Turkey Creek Canyon Arm	10044	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6970	101.6400	Lake Meredith, Big Blue Canyon between Chimney Hollow and Timber Hollow	10045	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6080	101.6530	Lake Meredith, Turkey Creek Canyon Arm	10046	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6260	101.6500	Lake Meredith, Short Creek Canyon Arm	10047	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6480	101.6320	Lake Meredith, Harbor Bay	10048	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6530	101.6220	Lake Meredith, Fritch Canyon Arm	10049	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6750	101.6020	Lake Meredith, Meredith Harbor	10050	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.6970	101.5800	Lake Meredith, Cedar Canyon Arm	10051	09/01/03	08/31/04	RR/CR	RT										12		
0102	1	1	35.7050	101.5530	Lake Meredith, South Canyon Arm	10052	09/01/03	08/31/04	RR/CR	RT										12		
0103	1	1	35.4703	101.8792	Canadian River Bridge at US 87-287 North of Amarillo	10054	09/01/03	08/31/04	RR/RR	RT										4	4	4
0103A	1	1	35.3960	101.8340	East Amarillo Creek at US 287, North of Amarillo	10018	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0104	1	1	36.2390	100.2750	Wolf Creek at SH 305, North of Lipscomb	10058	09/01/03	08/31/04	RR/RR	IS							4			4	4	4
0104	1	1	36.2520	100.1310	Wolf Creek at FM 1454, 27.4 km (17 Miles) East of Lipscomb	10059	09/01/03	08/31/04	RR/RR	IS							4			4	4	4
0199	1	1	36.4470	100.3080	Kiowa Creek at SH 15, East of Darrouzett	10009	09/01/03	08/31/04	RR/RR	IS							4			4	4	4
0201A	5	2	33.5310	94.6370	Mud Creek at US 259, North of DeKalb	15319	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0202	4	2	33.7540	96.1960	Red River at SH 78, North of Bonham	10127	09/01/03	08/31/04	RR/RR	RT							4			4		4
0202C	5	2	33.6850	94.9940	Pecan Bayou at 1159, 6 Miles Northeast of Clarksville	16001	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0202D	5	2	33.7320	95.5480	Pine Creek at US 271, near the City of Paris	10120	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0202D	5	2	33.7300	95.5480	Smith Creek at US 271, 300 meters upstream of the confluence with Pine Creek,	17044	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0202E	4	2	33.6050	96.5760	Post Oak Creek at FM 1417, Southeast of Sherman	10115	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0202E	4	2	33.6620	96.6430	Post Oak Creek at 1417, Northwest of Sherman	17599	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0203	4	2	33.8500	96.7880	Lake Texoma Big Mineral Arm	10130	09/01/03	08/31/04	RR/RR	RT							4			4		4
0203	4	2	33.8670	96.8330	Lake Texoma at US 377, North of Gordonville	10131	09/01/03	08/31/04	RR/RR	RT							4			4		4
0203	4	2	33.8180	96.5720	Lake Texoma at South end of Denison Dam, West of SH 75A, North of Denison	15440	09/01/03	08/31/04	RR/RR	RT							4			4		4
0203	4	2	33.8480	96.6620	Lake Texoma Little Mineral Arm, South and East of Preston Shores near Intake	17480	09/01/03	08/31/04	RR/RR	RT							4			4		4
0214	3	2	34.0530	98.2960	Wichita River at FM 810, West of Byers	10145	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0214	3	2	33.9090	98.5330	Wichita River at Loop 11 in Wichita Falls	10151	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0214	3	2	33.8690	98.8390	Wichita River at SH 25	10155	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0214A	3	2	33.9620	99.2120	Beaver Creek at US 283/183, Approx 18.2 km South of Vernon	15121	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0230A	3	2	34.1580	99.2250	Paradise Creek at US 287, East of Vernon	10094	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0230A	3	2	34.7020	100.1880	Paradise Creek at FM 433, Southeast of Vernon	17600	09/01/03	08/31/04	RR/RR	RT							4			4	4	4
0207	1	2	34.5690	100.1940	Prairie Dog Town Fork Red River Bridge at US 62-83 North of Childress	10136	09/01/03	08/31/04	RR/RR	IS							4			4	4	4
0207	1	2	38.8380	101.4140	Lower Prairie Dog Town Fork Red River at SH 207, 26 Miles South of Claude	13637	09/01/03	08/31/04	RR/RR	IS							4			4	4	4
0207	1	2	34.5690	100.1940	Lower Prairie Dog Town Fork Red River at SH 70, 16 Miles North of Turkey	16037	09/01/03	08/31/04	RR/RR	IS							4			4	4	4
0207A	1	2	34.7020	100.1880	Buck Creek at US 83, North of Wellington	15811	09/01/03	08/31/04	RR/RR	IS							4			4	4	4
0299	1	2	35.4990	100.2900	Sweetwater Creek at US 83, North of Wheeler	10072	09/01/03	08/31/04	RR/RR	RT							4			4	4	4

Basin: (1) Canadian (2) Red
Region: TCEQ Region where Station is Located
Station ID: TCEQ Station ID Numbers
Site Description: Long Description of Sampling Site
Start Date: Beginning Date of Sampling Period
End Date: Ending Date of Sampling Period
Monitoring Type:
(IS) Intensive/Systematic - Subwatershed Monitoring on a Cyclical Basis;
(RT) Routine Water Sampling/Baseline - Long Term Monitoring

SC1: Monitoring Responsibility
(RR) Red River Authority of Texas;
SC2: Entity Conducting Sampling:
(CR) Canadian River Municipal Water Authority

Indicator Bacteria: E. *coli* Bacteria
Fecal Coliform Bacteria: Indicator Bacteria
Conv: Samples of Nutrients and Minerals Collected & Analyzed by a Laboratory
Inst Flow: Instantaneous Flow Measurement at Time of Sampling
Field: Parameters Measured in the Field; ie: Temperature, pH, DO, Conductivity, Flow Severity, etc.

APPENDIX C

FIELD DATA SHEETS

RED RIVER AUTHORITY OF TEXAS
FIELD DATA REPORTING FORM

Date:	Station Location:	TCEQ Site ID:
Time:	Bas/Rch/Seg: / / HUA No:	RRA Tag No:
County:	(82903) Monitoring Type: QAO:	DM Tech:

Red River ID # _____

Chain of Custody # _____

Comments: _____

Tech(s): **Stream Width:** **(ft)**

Time Start: **Time End:**

	Meters	**Sample Collection Depth**			**Section Width A**	**Midpoint of Section B**	**Section Depth C**	**Velocity D**	**Discharge AxCxD**
00010		**Water Temp (°C)**	2						
00094		**Conductivity (µS/cm)**	3						
00400		**pH (Standard Units)**	4						
00300		**Dissolved Oxygen (mg/L)**	5						
82079		**Lab Turbidity (NTU)**	6						
74069		**Flow Estimated (CFS)**	7						
00061		**Flow (CFS)**	8						
89835		**Flow Measurement Method** 1-Gage 2-Electric 3-Mechanical 4-Weir/Flume	9						
			10						
01351		**Flow Severity** 1-no flow 2-low flow 3-normal 4-flood 5-high 6-dry	11						
			12						
31699		***E. Coli* (MPN / 100 mL)**	13						
31616		**Fecal Coliform (# / 100 mL)**	14						
89969		**Water Color** 1-brown 2-reddish 3-green 4-black 5-clear 6-other*	15						
			16						
89971		**Water Odor** 1-sewage 2-oily/chem 3-rotten eggs 4-musky 5-fishy 6-none 7-other*	17						
			18						
89966		**Weather** 1-clear 2-partly cloudy 3-cloudy 4-rain	19						
			20						
72053		**Days Since Last Significant Precipitation (< or >)**	**Total Flow in CFS**						
00078		**Secchi Disk Reading (Meters)**							
SA300		**Water Clarity** 1-excellent 2-good 3-fair 4-poor 5-other*							

Other* – Indicate

MEASUREMENT COMMENTS AND FIELD OBSERVATIONS

Air Temperature:	**( ) ° Fahrenheit**
Wind Conditions:	**Calm Mild Moderate High**
Climatic Conditions:	**Winter Spring Summer Fall**
Aquatic Vegetation:	
Terrestrial Vegetation	
Aquatic Animals:	
Terrestrial Animals	
Aquatic Insects:	
Terrestrial Insects	
Left Bank:	
Right Bank:	
Watershed Activities:	
Biologic Activities:	
Water Quality:	
Stream Use(s):	
Specific Sample Info:	
Missing Parameters:	

Comments:

CANADIAN RIVER MUNICIPAL WATER AUTHORITY
FIELD DATA REPORTING FORM

Date:	Station Location:	TCEQ Site ID:
Time:	Bas/Rch/Seg: / / HUA No:	RRA Tag No:
County:	(82903) Monitoring Type: QAO:	DM Tech:

CRMWA ID # _____

Chain of Custody # _____

Comments: _____

Tech(s): **Stream Width:** **(ft)**

Time Start: **Time End:**

				Section Width A	Midpoint of Section B	Section Depth C	Velocity D	Discharge AxCxD
Meters		**Sample Collection Depth**	1					
00010		**Water Temp (°C)**	2					
00094		**Conductivity (µS/cm)**	3					
00400		**pH (Standard Units)**	4					
00300		**Dissolved Oxygen (mg/L)**	5					
82079		**Lab Turbidity (NTU)**	6					
74069		**Flow Estimated (CFS)**	7					
00061		**Flow (CFS)**	8					
89835		**Flow Measurement Method**	9					
		1-Gage 2-Electric 3-Mechanical 4-Weir/Flume	10					
01351		**Flow Severity**	11					
		1-no flow 2-low flow 3-normal 4-flood 5-high 6-dry	12					
31699		***E. Coli* (MPN / 100 mL)**	13					
31616		**Fecal Coliform (# / 100 mL)**	14					
89969		**Water Color**	15					
		1-brown 2-reddish 3-green 4-black 5-clear 6-other*	16					
89971		**Water Odor** 1-sewage 2-oily/chem	17					
		3-rotten eggs 4-musky 5-fishy 6-none 7-other*	18					
89966		**Weather**	19					
		1-clear 2-partly cloudy 3-cloudy 4-rain	20					
72053		**Days Since Last Significant Precipitation (< or >)**	**Total Flow in CFS**					
00078		**Secchi Disk Reading (Meters)**						
SA300		**Water Clarity**						
		1-excellent 2-good 3-fair 4-poor 5-other*	Other* – Indicate					

MEASUREMENT COMMENTS AND FIELD OBSERVATIONS

Air Temperature:	**( ) ° Fahrenheit**				
Wind Conditions:		**Calm**	**Mild**	**Moderate**	**High**
Climatic Conditions:		**Winter**	**Spring**	**Summer**	**Fall**
Aquatic Vegetation:					
Terrestrial Vegetation					
Aquatic Animals:					
Terrestrial Animals					
Aquatic Insects:					
Terrestrial Insects					
Left Bank:					
Right Bank:					
Watershed Activities:					
Biologic Activities:					
Water Quality:					
Stream Use(s):					
Specific Sample Info:					
Missing Parameters:					

Comments:

RED RIVER AUTHORITY OF TEXAS
E. coli BACTERIA LOG

Exp. Date of Media:					**Technician(s):**		
Date on:			**Time on:**		**Start Temp: °C**		
	Sample Location	**Sample ID No.**	**mL Used**	**Dilution Factor**	**Small Cells**	**Large Cells**	**MPN/ mL**
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							

Date off:	**Time off:**	**End Temp: °C**	**Technician(s):**

Method Used to Determine Counts: ***E. coli*** **IDEXX MPN Chart**

COMMENTS:

QAO

RED RIVER AUTHORITY OF TEXAS
TURBIDITY LOG

Date On:		Time On:
Instrument:	Last Calibration:	Technician:

	Sample Location	Sample ID #	Reading (NTU)	RPD or % R
1	Check Standard: ( )			
2	Check Standard: ( )			
3	DI Standard			
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20	QC Check: ( )			

Notes:

RPD = $(X_1 - X_2)/\{(X_1+X_2)/2\} * 100$ (where X_1 is the sample and X_2 Field Duplicate)
%R = SR/SA * 100 (where SR = Sample Result and SA = Check Standard or Lab Duplicate)

QAO

Red River Authority of Texas
Hydrolab Calibration Log
Instrument (I or II)

CALIBRATION

Date: Initials:

Time: Battery Voltage:

Function	Temp of Standard	Initial Reading	Value of Standard	Calibrated To	Comments	Expiration Date of Standards
D.O.						
Conductivity (high)						
Conductivity (low)						
pH calibrate (~7)						
pH slope (~10)						

Table _____ Alt (ft) _____ ALTCORR _____ Bar. Pres. (in) _____ BAROCORR _____

Dissolved Oxygen Standard = Table D.O. Value x ALTCORR x BAROCORR

POST CALIBRATION

Date: Initials:

Time: Battery Voltage:

Function	Temp of Standard	Initial Reading	Value of Standard	Calibrated To	Comments	Expiration Date of Standards
D.O.						
Conductivity (high)						
Conductivity (low)						
pH calibrate (~7)						
pH slope (~10)						

Table _____ Alt (ft) _____ ALTCORR _____ Bar. Pres. (in) _____ BAROCORR _____

Dissolved Oxygen Standard = Table D.O. Value x ALTCORR x BAROCORR

Check previous maintenance and use – do the following before calibration:

	Name	Date
Polish conductivity probe – Must be polished within the last 2 months or once every 15 field trips		
Change pH reference probe solution – Must be renewed within the last 2 months or once every 15 field trips		
Inspect D.O. membrane for nicks or bubbles – Must be changed within last 6 months or once every 15 field trips		
Change D.O. battery in 4141 Sonde – Change once a year		
Verify temperature function – Check the temperature function against a thermometer once a year		

BAROCORR = (NOAA pressure in inches/29.921) **ALTCORR = {760 - altitude in feet x 0.0261)}/760** **Note: 1 inch = 25.4 mm**

Red River Authority of Texas

YSI Instrument III or IV Calibration Log							Date:	Time:
Site: (where calibrated):			Technician(s):				Barometric Pressure Uncorrected:	
					Post Cal. Values		Barometer Reading:	
Calibration	**Actual** (read before final calibration)		**Sonde** (read after calibration)		**Date:**		**Calibration**	Record Constants or
Values	**Temp**	**Value**	**Temp**	**Value**	**Time:**	**Value**	Constants and Ranges	Values
Conductivity _____							Conductivity Cell (4.5 to 5.5)	
Turbidity 0 NTU								
Turbidity _____ NTU								
pH 7 (Exp.)							pH 7 – (0 to ± 40 MV)	
pH 10 (Exp.)							pH 10 – (-180 ± 40 MV)	
DO (actual)							DO Charge (25 to 75)	
DO (%)							DO Gain (0.7 to 1.7)	
Battery Voltage								
Wiper Parks 180° from Optics?	**Yes**	**No**			**Yes**	**No**	Note: Span between pH 7 and 10 should be ≈ 170 to 180 MV	
							DO Membrane Changed?	**Yes** No
							(If yes, wait 8 hours before final calibration)	

Notes and Comments:

Equipment Maintenance:

RED RIVER AUTHORITY OF TEXAS
CRP SAMPLING CHECKLIST

Equipment

- HydroLab – Units I or II (charged) ❑
- YSI – Units III or IV (charged) ❑
- Incubator – Unit A or B (W/power strip, cables and battery charger) ❑
- Incubator Battery (charged) ❑
- IDEXX Bacteria Equipment ❑
- Flow Meter (w/extra batteries) ❑
- Top Set Wading Pole ❑
- Tape Measure (w/stakes) ❑
- Torpedo ❑
- Drill (charged) ❑
- Ice Chest(s) – Samples ❑
- Small Ice Chest – Media ❑
- Bucket(s) – Sampling and Equipment ❑
- Camera ❑
- Racal GPS ❑
- Laptop Computer ❑
- Other_____ ❑

Standards / Reagents / Solutions

- E. *Coli* Media ❑
- Fecal Coliform Media ❑
- pH Standards 7 and 10 ❑
- Conductivity Standards ❑
- Sterile De-ionized Water ❑
- Bulk De-ionized Water ❑
- Tap Water ❑
- Other_____ ❑
- Other_____ ❑

Supplies

- Pipettes ❑
- Bacteria Filters ❑
- Stainless Steel Filter Manifold ❑
- Peristaltic Pump (w/tubing) ❑
- In-Line Filter Holder (w/filters-Chlorophyl *a*) ❑
- Lighter, Candle, Forceps and Alcohol ❑
- Rubber Gloves (powder free) ❑
- Paper Towels ❑
- Ice or Ice Packs ❑
- Field Data Sheets ❑
- "Field" Sampling Kits ❑
- "Conventional" Sampling Kits ❑
- Other_____ ❑

Miscellaneous

- Sharpies ❑
- Insect Repellent ❑
- Sun Screen ❑
- Waders – Hip and Chest ❑
- Shovel ❑
- Rope ❑
- Come - A - Long ❑
- Copy of QAPP Guidance ❑
- Copy of SWQM Procedures Manual ❑
- Bacteria / Turbidity Logbooks ❑
- Other_____ ❑
- Other_____ ❑

Preparer(s): _____ Date: _____

QA Check: _____ Project: _____ Anticipated Return: _____

Comments: _____

VEHICLE CHECKLIST

Vehicle Unit Number: _____

Equipment		Comments
Gas	❑	
Oil	❑	
Headlamps and Lights	❑	
Air Conditioner	❑	
Mirrors (Side and Rear View)	❑	
Battery	❑	
Tires and Spare	❑	
Antennas	❑	
Two-Way Radio	❑	
Telephone	❑	
Fire Extinguisher	❑	
Field Procedures	❑	
Equipment Manual	❑	
Slide Table and Brace	❑	
Other	❑	

Preparers: _____ Date: _____

QA Check: _____ Project: _____ Anticipated Return: _____

Special Equipment: _____

APPENDIX D

CHAIN OF CUSTODY FORM

NO 00000

CUSTODY RECORD and ANALYSIS REQUEST

Red River Authority of Texas

900 8th St., Suite 520
Wichita Falls, Texas 76301-6894

Results To: ASAP ☐

Address:

Phone: ASAP ☐ Fax: ASAP ☐ Project Name: Project No:

Sampling By: (7)

Sample Identification (2)	Lab Only	No. Containers (4)	Matrix (3): Water	Soil	Sludge	Other	Preserved (5): HNO3 (N)	H2SO4 (S)	HCL (C)	Ice (I)	None (N)	Other (O)	Sampling (1): Date	Time	Analysis Request (6)

Relinquished By: (8)	Date	Time	Received By:	Date	Time

Remarks: (9)

NO _____

CUSTODY RECORD and ANALYSIS REQUEST

Canadian River Municipal Water Authority
P. O. Box 99
Sanford, Texas 79078

Results To: ASAP ☐

Address:

Phone: ASAP ☐ Fax: ASAP ☐ Project Name: Project No:

Sampling By:

Sample Identification	Lab Only	No. Containers	Matrix: Water	Matrix: Soil	Matrix: Sludge	Matrix: Other	Preserved: HNO3 (N)	Preserved: H2SO4 (S)	Preserved: HCl (C)	Preserved: Ice Only (I)	Preserved: None (N)	Preserved: Other (O)	Sampling: Date	Sampling: Time	Analysis Request

Relinquished By:	Date	Time	Received By:	Date	Time

Remarks:

APPENDIX E

DATA MANAGEMENT PLAN

DATA MANAGEMENT PLAN

PERSONNEL

1. Management

Pursuant to the Authority's General Administrative Policy, § 1, 2, 4 and 7; personnel assigned to General Administration are responsible for applying professional management practices and established internal controls to ensure the integrity and safeguard(ing) of all data associated with various Authority business activities. Leadership is provided by key administrative personnel under guidance of the Board Adopted Administrative Policy relevant to each division, department, function or level of interactivity.

2. Program Organizational Chart

An Organizational Chart depicts the level of administration and responsibility for the operative management of data. Concise guidance and specific component accountability is achieved under the referenced organizational diagram. Revisions of the program are selectively implemented as necessary. Classification of personnel is based on a skill and/or expertise level required to perform the assigned tasks. Refer to Chart 1, in the front if this QAPP, for details of the program organizational chart.

3. Training

Continual training and instruction is provided, enabling management and staff to expand capacity and enhance skills in an effort to maintain the highest degree of accuracy and performance feasible. Performance is measured both individually and as a group, providing guidance for necessary continuing education programs and the basis for personnel career advancement, which ultimately improves unit efficiency and effectiveness.

The Authority employs an interactive data management team, which is multi-functionally cross-trained to perform under the guidance of the Authority's Administrative Policy and Procedures Manual. All data management personnel are provided continuing education, both formal and informal, to maintain proficiency with dynamic hardware, software and application protocols.

HARDWARE CONSIDERATIONS

Data management occurs within the framework of a Local Area Network (LAN) running under Novell 5.1 on a Pentium II 400 MHz. file server with 256 MB RAM and 40 GB hard drive storage. Workstations utilize Pentium II class processors operating at 300 MHz. or higher running under Microsoft Windows 98 with 128 MB of RAM and at least 20 GB hard drive storage. The LAN and workstations are supervised and maintained by the Systems Analyst under the direction of the General Manager.

SOFTWARE CONSIDERATIONS

The Authority employs a complement of proprietary software applications and support utilities in the accomplishment of data management objectives. Software acquisitions and upgrades follow a defined procedure in that all critical software meets the data management objectives for the intended use, is compatible with other statistical and geographic software applications.

The Authority utilizes Microsoft Access 2000 as its primary database management software application to screen and manage all data entering the data management system. Paradox 7.0 is utilized as an alternate database management system to maintain compatibility with other entities.

Other applications considered essential to the data management system are Corel WordPerfect Office 2000 and Microsoft Office 2000 for general word processing, presentations graphics and subsidiary data management and analysis. AutoCAD 2000 and ArcView 3.2 are used for high end graphics and the Geographical Information System (GIS). StatSoft Statistica 5.5 for Windows is the primary statistical analysis software applied to processed data. Microsoft Excel 2000 is utilized as subsidiary analysis software and to maintain compatibility with other entities.

DATA DICTIONARY

Terminology and field descriptions are included in the SWQM Data Management Reference Guide, most recent version.

For the purposes of verifying which source codes are included in this QAPP, a table outlining the codes that will be used when submitting data under this QAPP is included below. Source Code 1 specifies the entity responsible for the sampling (Red River Authority of Texas), while Source Code 2 indicates the actual entity collecting the samples in the field. If needed, this table will be resubmitted with amendments to the QAPP that involve the addition of other monitoring entities under the QAPP.

Name of Monitoring Entity	Source Code 1	Source Code 2
Red River Authority of Texas	RR	RR
Canadian River Municipal Water Authority	RR	CR
United States Geological Survey	RR	GS
Texas Commission on Environmental Quality Field Office	RR	FO

DATA MANAGEMENT PLAN IMPLEMENTATION

The Data Manager is responsible for implementation of the plan when any new data is received for storage and analysis or when exiting data inventories are retrieved for a specific task. The Data Manager provides supervision of all tasks relating to management of data contained in the system, either in hard copy or electronic format. On-line data inventories are maintained on a dedicated volume of the LAN for access by other staff members and technicians performing specialized tasks. Final quality controlled field data sheets or datasets are assembled with the lab reports and chain-of-custody reports for inclusion into a three-ring binder. Custody of the original records and off-line digital copies are maintained in the Data Manager's office.

There are a minimum of five stages of quality assurance and quality control (QA/QC) that the data is subjected to from the point of entry into the data management processing system through publication and storage. During each stage of QA/QC, the data are visually checked and/or electronically screened in accordance with a detailed QA/QC protocol to ensure that the highest data integrity is maintained. The QA/QC process returns either a pass or fail result in which case the data are returned for corrective actions or passes on to the next processing steps. A QA/QC log and/or report is generated to verify the completed processes applied to the data and show responsibility for the person or persons managing the data in support of each assigned task. The Quality Assurance Officer if responsible for performing all control processes and initializing the completed process. The Data Manager validates the QA/QC process prior to data entry or importation of data in the primary database structure.

Refer to the Quality Assurance Protocols in Section D1, D2 and D3 on pages 53 through 56 of this QAPP and the attached Data Management Schematic for details of the QA/QC stages applied during the processing path of data throughout the Data Management System.

QUALITY ASSURANCE QUALITY CONTROL

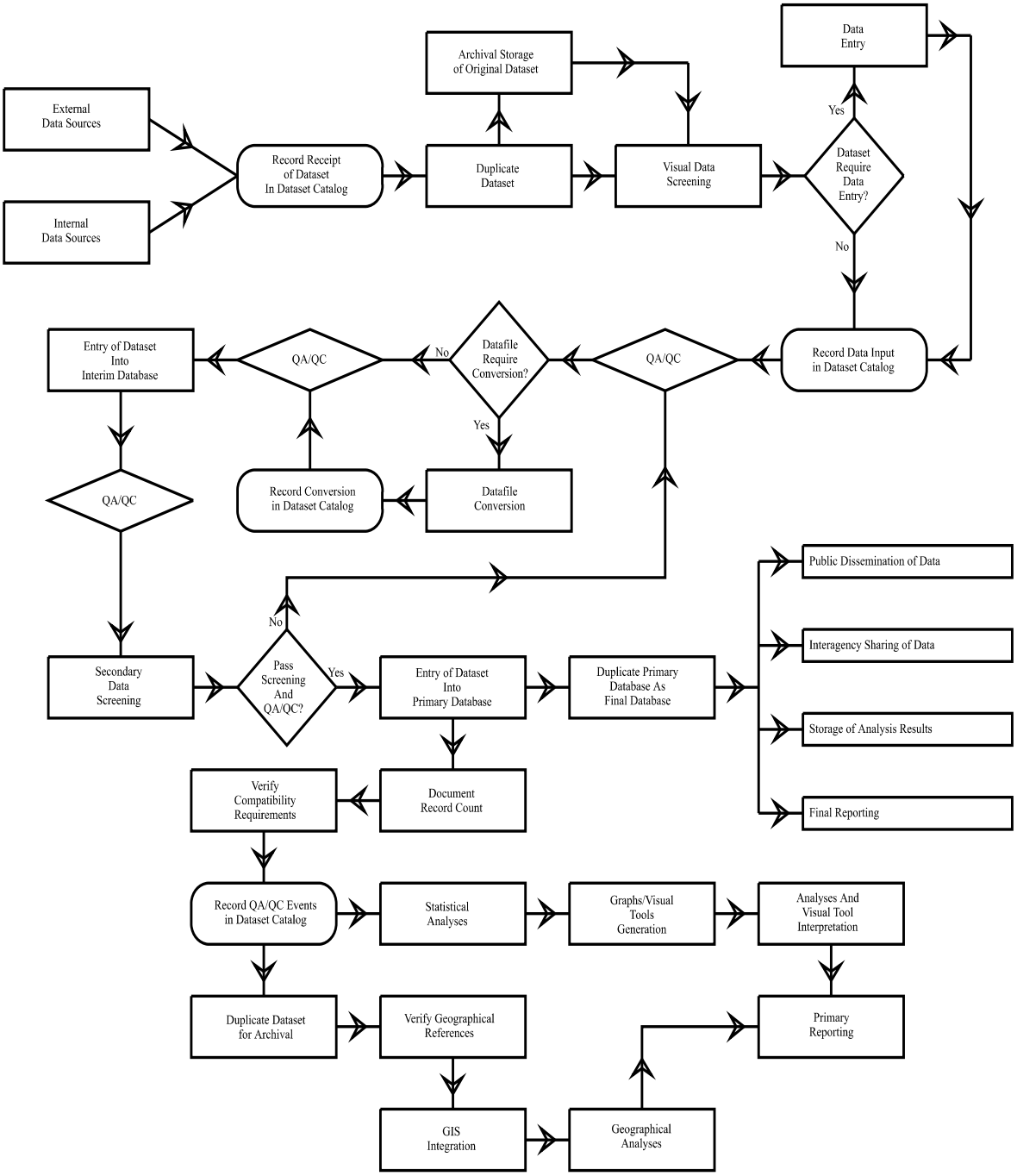
Refer to Section D1, D2 and D3 on pages 53 through 56 of this QAPP.

MIGRATION/TRANSFER/CONVERSION

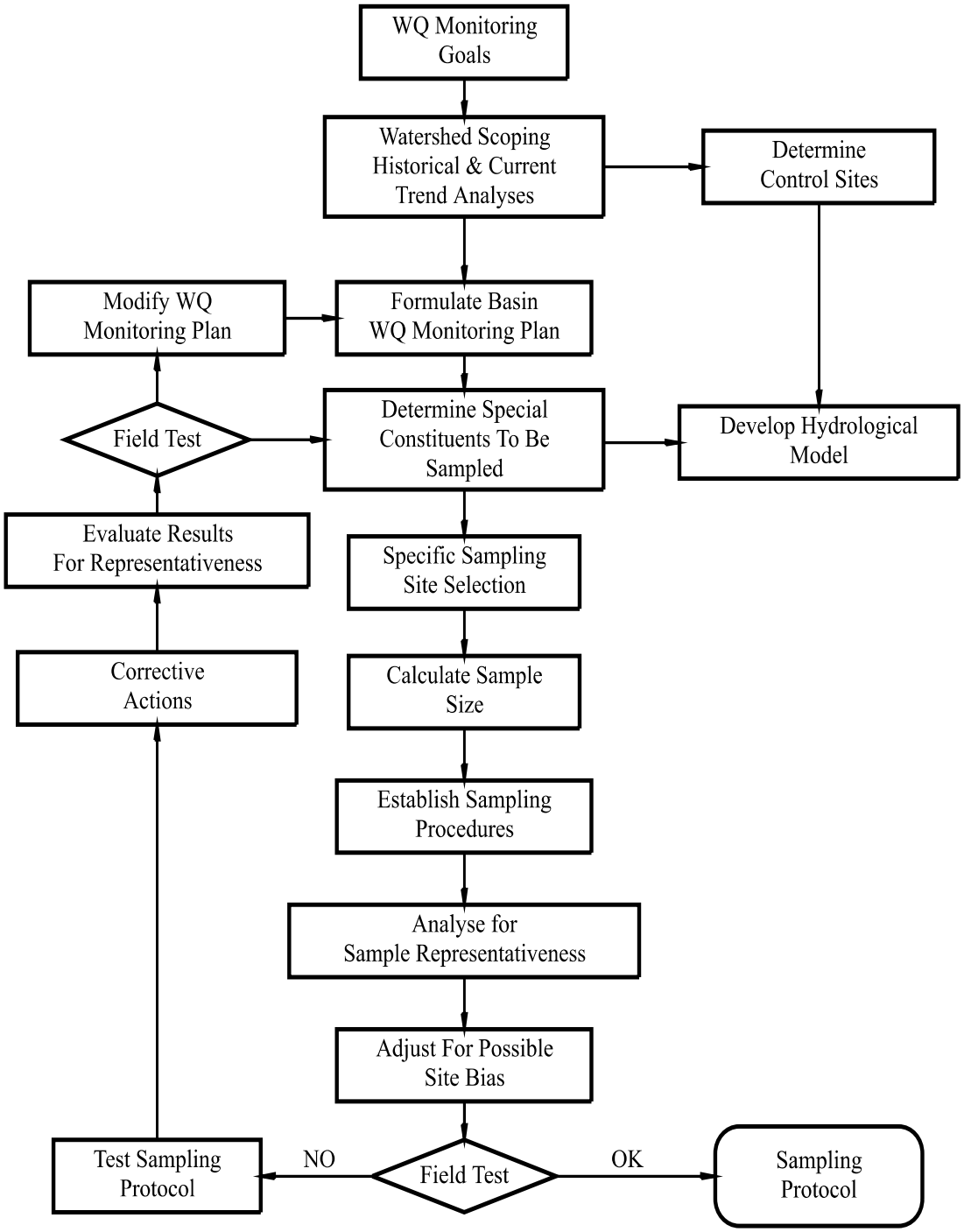
Data to be imported into a database, either from hard copy for manual data entry or in digital format for electronic entry, follows the conversion protocol best suited for the application and to comply with the structure of the host database design. In most cases, ASCII delimited text is the common migration format of choice.

Any new data for entry in the database management system (DBMS) not already in an acceptable format is converted to ASCII delimited text for importation. ASCII is the common medium for data archival and security and is utilized to maintain compatibility with all other format types, especially as new databases are introduced. An ASCII text editor is utilized to read the datafile and determine its basic format, remove dead space, and arrange the fields in the most desirable edit order. These steps are accomplished in the data screening and preparatory processing stages where individual specifications are prepared for each different dataset to be included in the DBMS.

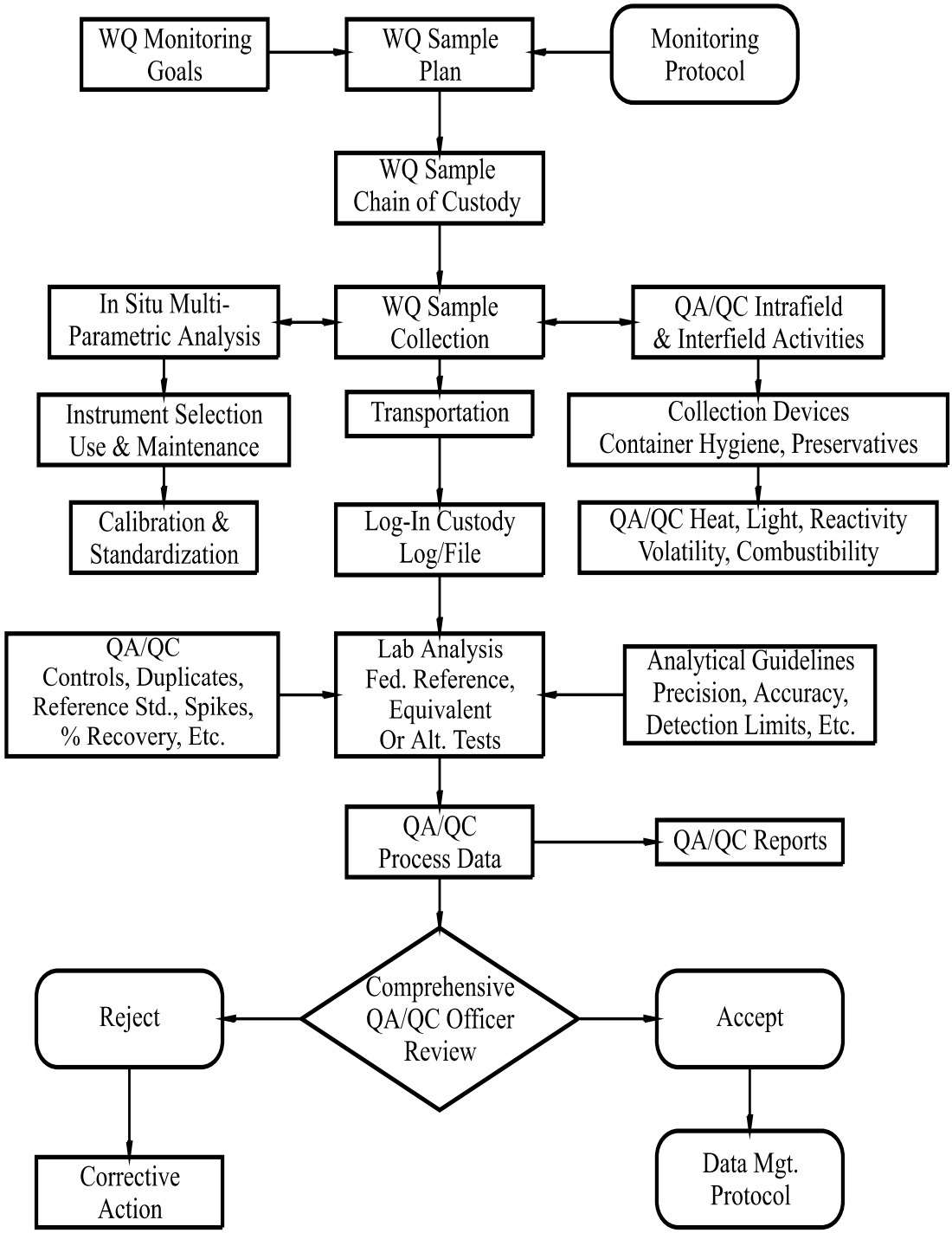
Data Management Schematic
Data Path Profile
Chart 2



WATER QUALITY MONITORING
Monitoring Protocol
Chart 3



WATER QUALITY MONITORING
Sampling Protocol
Chart 4



Working with a copy of the datafile, the conversion processing stage consists of the following defined procedures:

1. Separate datafile into subsidiary blocks by predefined table specifications;
2. Normalize the table(s) by key field group relationships;
3. Set form and table assignments;
4. Arrange field order per table;
5. Add field and record delimiters as needed; and
6. Apply QA/QC review and log.

Table blocks may then be arranged to comply with the host database structure configuration to facilitate importation without error. Preferred field/record delimiters are installed and a test import to the host database structure is performed with a sampling of actual data for QA/QC review purposes.

BACKUP/DISASTER RECOVERY

1. Archives/Datafile Backups

Copies of datafiles are retained on-line for comparison and edification with two duplicates of each datafile stored off-site on 4mm data tape. The copies are logged with one remanded to a fireproof vault and the other is remanded to senior staff members for off-site storage until they are one month old. They are then stored in a fireproof safe located on-site until they are rotated through recycling of the backup data tape alternating tape backups are made weekly and stored off-site as safety against hazards that may affect the Authority's offices.

2. Disaster Recovery

Restoration of individual datafiles and source programs may be obtained from duplicates contained on tape and stored off-line. A control duplicate of the CRP data volume contained on the Novell file server is stored on CD(s) that may be restored to any workstation or server upon recovery of the system.

3. Archives / Data Retention

Complete original datasets are archived on permanent media; tape backup, CD-ROM, and retained indefinitely on-site by the Authority and off-site for a retention period specified in the original QAPP document.

The Authority applies the rules of Generally Accepted Accounting Principles for internal controls and custody of funds in maintaining its data security and storage. That is, all software applications, source programs and archived data are retained in original form together with a backup copy and kept off-line, off premises, and in a secure environment. All datafiles are retained in their original media and format without modification. Copies are utilized for initial conversion, formatting and importation to the interim database structure for continued processing.

INFORMATION DISSEMINATION

1. Public Access

Multimedia editorials and educational programs to be distributed throughout the watersheds will be made available through the information resources library and the Authority's Internet site as funds permit. Final quality assured data contained in the primary database structure is linked to the website for ready access of the most current data available.

The Data Management Program is flexible enough to provide a vast amount of relevant information through other public information programs produced by the Authority for use in public schools and the general public through public forums and meetings.

2. Internet

An Internet World Wide Web site is hosted by the Authority and dedicated to the CRP to provide the public with timely updates of Authority projects and programs. Select datasets and other products are also made available. This site is in a continuous state of modification to provide the most current information available. The CRP home page provides current information on the assessment process and over five years of water quality monitoring data. This information may be retrieved by county, basin reach, hydrologic unit area, segment, or by station number. An information repository has been expanded to include technical summaries, intensive survey reports, priority watershed studies and other publications relevant to the CRP that may also be of interest to the general public. Data links are maintained to other similar sites of interest.

3. Reporting

The Authority produces externally available reports, such as the Biennial Regional Assessment of Water Quality, Annual Financial Report, Project Summary Reports, newsletters, and Program Reports relevant to all major programs or projects to which the Authority is engaged. Summaries of published CRP reports are made available on the Authority's website in the Public Information Repository section.

INTER-AGENCY DATA SHARING

Software packages today provide features and conversion utilities that allow nearly universal translation of digital datafiles. The Authority keeps on hand a number of software products with extensive data translation functions to ensure that any user request for data in nearly any format can be met.

RED RIVER AUTHORITY OF TEXAS
DATA SUMMARY

Data Information: _____

Date Submitted: _____

Tag ID Range: _____

Date Range: _____

Comments:

Please explain in the space below any data discrepancies including:

- Inconsistencies with AWRL specifications;
- Failures in sampling methods and/or laboratory procedures that resulted in data that could not be reported to the TCEQ; and
- Other discrepancies.

_____

_____

_____

_____

_____

_____

_____

_____

Planning Agency Data Manager: _____

Date: _____

ATTACHMENT 1 Document Adherence to the QAPP

TO: (name)
(organization)

FROM: (name)
(organization)

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

(address)

I acknowledge receipt of the referenced document(s). I understand the document(s) describe quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria.

_____

Signature Date