Sulphur River Basin Surface Water Quality Monitoring Plan
Quality Assurance Project Plan

Sulphur River Basin Authority
911 N. Bishop, Suite C-104
Wake Village, Texas 75501

Clean Rivers Program
Monitoring Operations Division
Texas Commission on Environmental Quality
P.O. Box 13087, MC 165
Austin, Texas 78711-3087

Effective Period: September 2005 to August 2007

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

Michael Burke
Executive Director / Project Manager
911 N. Bishop, Suite C-104
Wake Village, Texas 75501
(903) 223-7887
mburkesrba@cableone.net

A1 APPROVAL PAGE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Monitoring Operations Division

Steve Spaw, Director Date
Monitoring Operations Division

Patrick Roques, Manager Date
Water Quality Monitoring & Assessment Section

Laurie Curra Date
Program Manager, Clean Rivers Program

Jennifer Delk Date
Project Manager, Clean Rivers Program

Compliance Support Division

Jose A. Franco, Director Date
Compliance Support Division

Stephen Stubbs Date
TCEQ Quality Assurance Manager

Sharon Coleman Date
Acting CRP Quality Assurance Specialist
Quality Assurance Section

SULPHUR RIVER BASIN AUTHORITY

Michael Burke Date
SRBA Project Manager

Mike Buttram Date
SRBA Quality Assurance Officer

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

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LIST OF ACRONYMS

AWRL	**Ambient Water Reporting Limit**
BMP	**Best Management Practices**
CAR	**Corrective Action Report**
COC	**Chain-of Custody**
CRP	**Clean Rivers Program**
DM	**Data Manager**
DOC	**Demonstration of Capability**
DQO	**Data Quality Objective**
FY	**Fiscal Year**
LM	**Laboratory Manager**
MDMA	**Monitoring Data Management & Analysis**
PM	**Project Manager**
QA	**Quality Assurance**
QM	**Quality Manual**
QAO	**Quality Assurance Officer**
QAPP	**Quality Assurance Project Plan**
QAS	**Quality Assurance Specialist**
QC	**Quality Control**
QMP	**Quality Management Plan**
RBP	**Rapid Bioassessment Protocol**
RL	**Reporting Limit**
RWA	**Receiving Water Assessment**
SOP	**Standard Operating Procedure**
SRBA	**Sulphur River Basin Authority**
SWQM	**Surface Water Quality Monitoring**
TC	**Texarkana College**
TMDL	**Total Maximum Daily Load**
TCEQ	**Texas Commission on Environmental Quality**
TRACS	**TCEQ Regulatory Activities and Compliance System**
TSWQS	**Texas Surface Water Quality Standards**
VOA	**Volatile Organic Analytes**
WMT	**Watershed Management Team**

A3 DISTRIBUTION LIST

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

Jennifer Delk, Project Manager
Clean Rivers Program
MC-165
(512) 239-4712

Sharon Coleman
Acting CRP Lead Quality Assurance Specialist
MC-176
(512) 239-6340

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

Sulphur River Basin Authority
911 N. Bishop, Suite C-104
Wake Village, Texas 75501

Michael Burke, Project Manager
(903) 223-7887

Mike Buttram, Quality Assurance Officer
(903) 838-4541

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

A4 PROJECT/TASK ORGANIZATION

Description of Responsibilities

TCEQ

Laurie Curra
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.

Sharon Coleman
Acting CRP Lead Quality Assurance Specialist

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

Jennifer Delk
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 SRBA audits. Verifies QAPPs are being followed by contractors and that projects are producing data of known quality. Coordinates project planning with the SRBA Project Manager. Reviews and approves data and reports produced by contractors. Notifies QA Specialists of circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Develops, enforces, and monitors corrective action measures to ensure contractors meet deadlines and scheduled commitments.

Eric Reese
CRP Data Manager

Responsible for coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval. Performs automated data validation routines and coordinates error correction. Provides quality assured data sets 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 TCEQ QA management. Participates in the development, approval, implementation, and maintenance of written quality assurance standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Serves on planning team for CRP special projects. Coordinates documentation and implementation of corrective action for the CRP.

SRBA

Michael Burke
SRBA Project Manager

Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by SRBA 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.

Mike Buttram
SRBA 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 SRBA 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 on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings. Ensures that field staff is properly trained and that training records are maintained.

Patti Harman
SRBA Data Manager

Responsible for ensuring that field data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with the SWQM portion of the TRACS database. Maintains quality-assured data on SRBA internet sites. Assists SRBA QAO in the training of TC Field Staff.

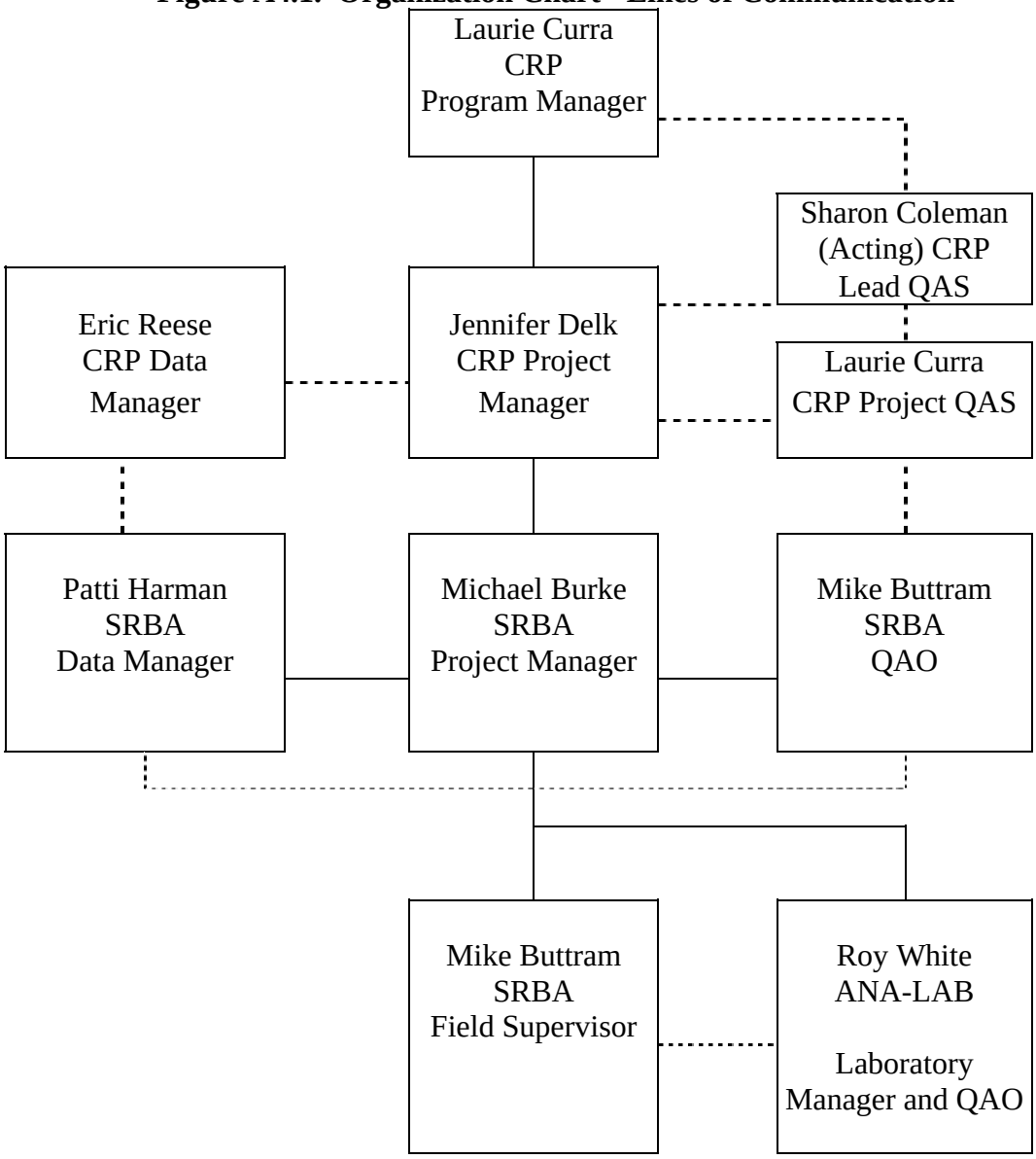
Mike Buttram, SRBA Field Supervisor

Plan and carry out all monitoring activities under contract with Texarkana College. Ensure and verify that all data conform to data collection sample handling, chain of custody, calibration, analytical, and QC requirements described in the QAPP and SWQM Manual. Verify that required data is collected in the field and that data sheets are complete. Coordinate sample delivery with employees of ANA-LAB and certify the chain of custody. Maintain instrument calibration logs, calibration standards, and data required for the certification of *E-coli* counts.

Roy White, Laboratory Manager & Quality Assurance Officer, Ana-Lab Corporation

Mr. White will provide supervision for laboratory procedures, provide laboratory quality assurance/quality control and will be responsible for updating the laboratory's QAP.

Figure 1
PROJECT ORGANIZATION CHART
Figure A4.1. Organization Chart - Lines of Communication



Lines of Communication--------

Lines of Organization———

A5 PROBLEM DEFINITION/BACKGROUND

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

The purpose of this QAPP is to clearly delineate SRBA QA policy, management structure, and procedures which will be used to implement the QA requirements necessary to verify and validate the surface water quality data collected. The QAPP is reviewed by the TCEQ to help ensure that data generated for the purposes described above are scientifically valid and legally defensible. This process will ensure that data collected under this QAPP and submitted to 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 2006 -2007.

In 2004 the SRBA conducted a review of five years of water quality data to characterize water quality in the Sulphur River Basin. A considerable body of information has been collected since that time. The following is a discussion of each segment covered in this QAPP, and reviews their history and current status.

<u>Wright Patman Lake, WPL (Segment 0302 and 303)</u>

WPL was listed on the 303(d) List (December 1999) for dissolved oxygen concentrations that are sometimes lower that the standard established to ensure optimum conditions for aquatic life. These conditions existed near the dam and in the upper regions near Hwy 8. The 303(d) List (August 31, 2000) notes that several areas of the lake fail to meet the dissolved oxygen criterion at times. These areas are the upper reservoir, near the dam, and the upper-middle portion of the lake. The overall priority for this impairment was established as "medium". The pH values are high during certain time periods in the northwestern-most tip, the Elliott Creek arm located northwest of the dam, and the middle-upper portion of the lake. These values were occasionally higher than the criterion established to safeguard general water quality uses. WPL was listed on the 303(d) List (October, 2002) for the "general use" criterion based on high pH in the arm west of the dam and in the northeast corner of the lake and for "aquatic life use" based on the depressed oxygen criterion. The overall impairment is listed as "low". The causes of the impairments are listed as both point and non-point sources. Portions of WPL are on the 2002 Texas 303(d) List (Oct 1, 2002) for low dissolved oxygen and high pH and additional data is to be collected before a TMDL is scheduled. The Draft 2004 Texas Water Quality Inventory details the standards that WPL did not meet in 2004. Areas of the lake are listed as partially supporting and not supporting "general use" due to high pH. Other portions of WPL are listed as partially supporting or not supporting "aquatic life use" due to depressed dissolved oxygen. WPL has been placed in Category 5c that requires additional data be collected before a TMDL is scheduled. See Figure 2 for the location of the three sites on WPL.

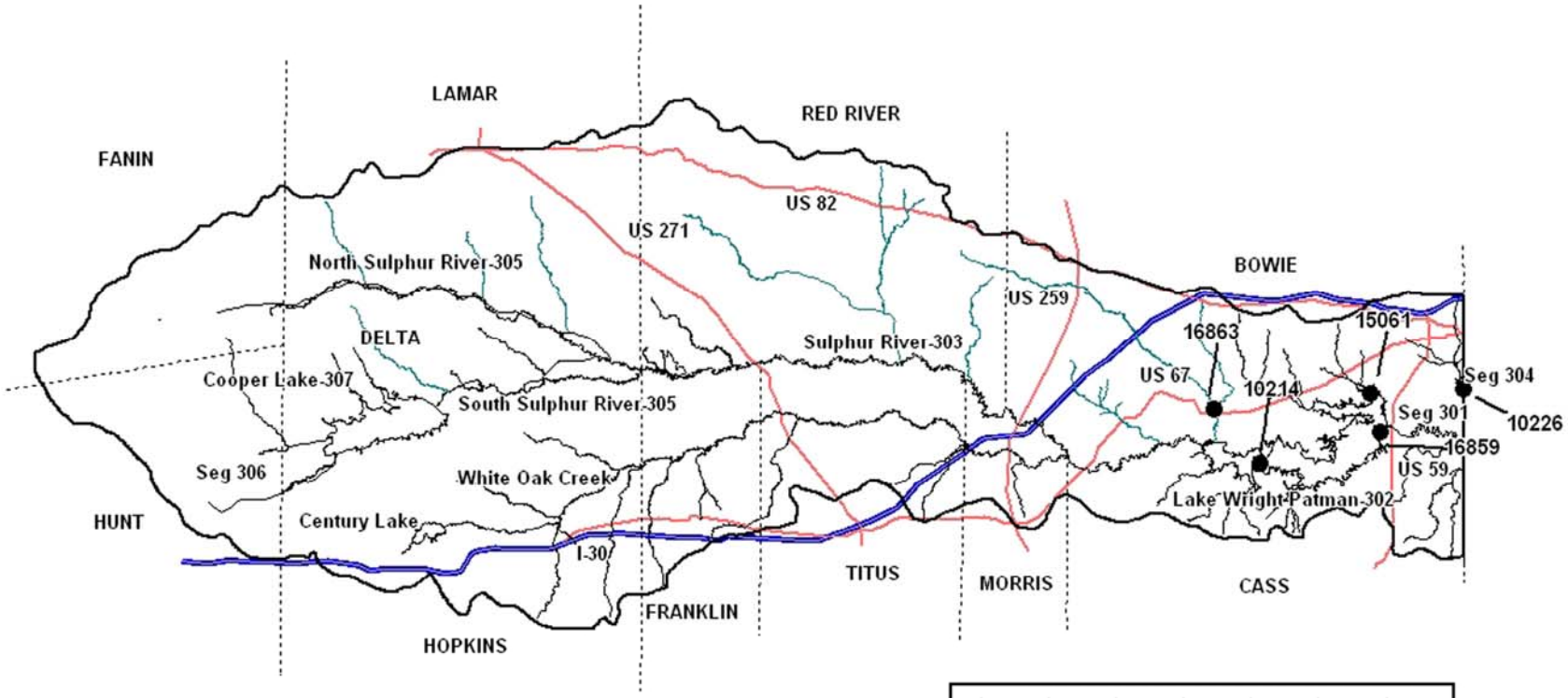
Days Creek, (Segment 0304)

Days Creek is not listed on the 303(d) List. It has a "contact recreation concern" due to bacteria based on limited data. Days Creek was the subject of a special study by TCEQ during FY 2005. The study focused on the extent and impact of hydrocarbon contamination. The results of this study are currently under review. See Figure 2 for the location of the fixed/routine site on Days Creek.

White Oak Creek, (Segment 0303b)

The lower 50 miles of White Creek is listed on the 303(d) List (August 31, 2000). The dissolved oxygen concentrations are occasionally lower than the criterion established to assure optimum conditions for aquatic life. The overall priority for this impairment was established as "medium". The lower 25 miles and the middle 25 miles near Hwy 271 are listed for the "aquatic life use" criterion based on depressed dissolved oxygen levels. The cause of the impairment is listed as both point and non-point sources. The lower 25 miles and middle 25 miles near Hwy 271 are on the 2002 Texas 303(d) (October 1, 2002) for depressed dissolved oxygen and is under review for water quality standards prior to scheduling a TMDL. The Draft 2004 Texas 303(d) List (May 13, 2005) has three twenty-five miles segments for depressed dissolved oxygen. Both point and non-point sources are indicated to be potential sources of pollutants. A review of water quality standards is to be conducted prior to a TMDL being scheduled. See Figure 3
for the location of the sites on the basin map.

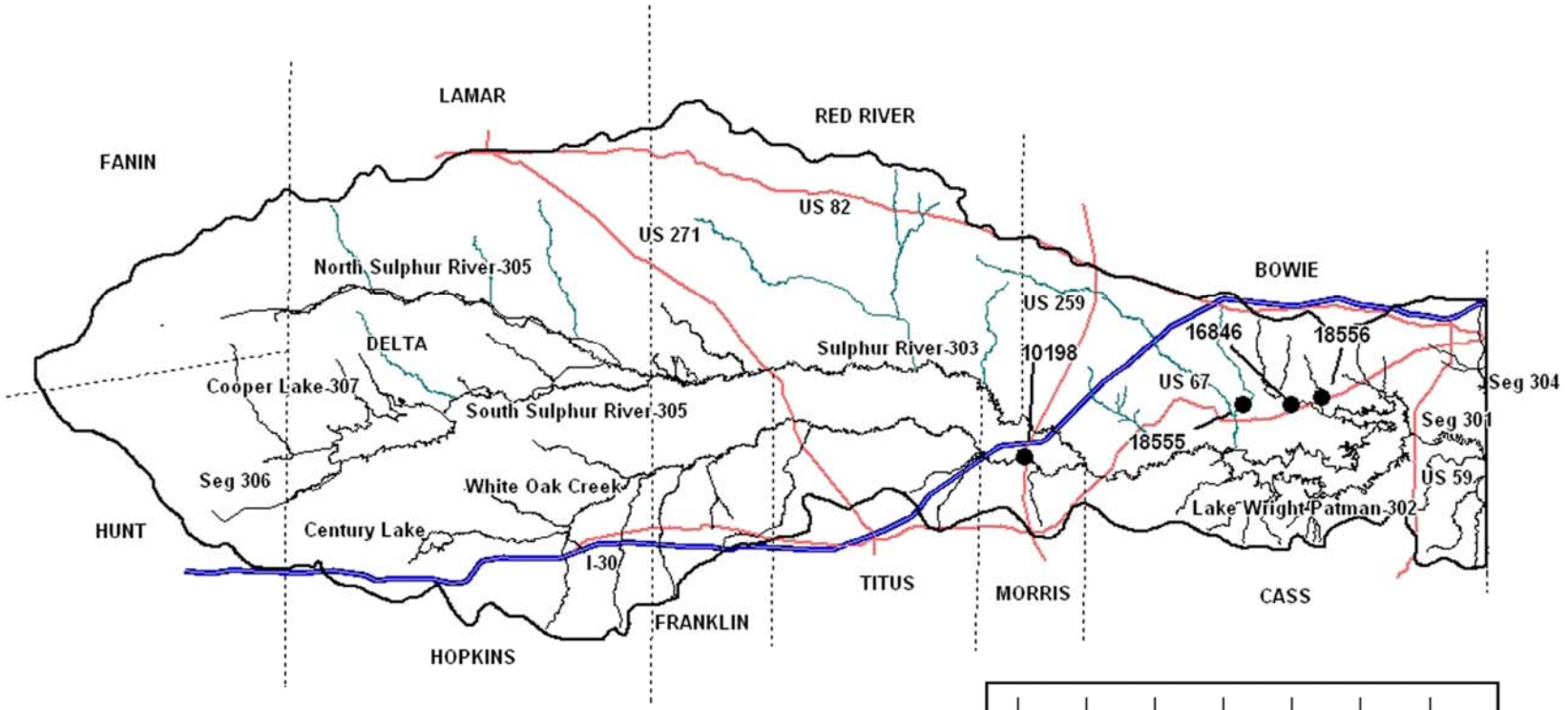
Figure 2



SULPHUR RIVER BASIN

Routine Sites

Figure 3



SULPHUR RIVER BASIN

Systematic Sites

A6 PROJECT/TASK DESCRIPTION

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

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

Amendments to the QAPP

Revisions to the QAPP may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods. Requests for amendments will be directed from the SRBA Project Manager to the CRP Project Manager electronically. They are effective immediately upon approval by the SRBA Project Manager, the SRBA QAO, the CRP Project Manager, the CRP Lead QA Specialist, and the CRP Project QA Specialist. They will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the SRBA Project Manager.

Special Project Appendices

Projects requiring QAPP appendices will be planned in consultation with the SRBA 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 SRBA Project Manager, the SRBA 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 SRBA to project participants before data collection activities commence.

A7 QUALITY OBJECTIVES AND CRITERIA

The purpose of routine water quality monitoring is to collect surface water quality data needed for conducting water quality assessments in accordance with TCEQ's *Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data*. These water quality data and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be subsequently reconciled for use and assessed by the TCEQ.

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

The SRBA does not currently have the storage capability to meet the biological vouchering requirements specified in the TCEQ Surface Water Quality Monitoring Procedures Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data, 2005 (RG-416). The SRBA collection procedure is consistent with TCEQ protocols, and the data will be reported under the program code, BN.

Biological organisms are collected and identified to see if the stream water composition is impacting the community composition or its integrity. The results of this type study can give an idea of the water quality over a period of time. The diel studies and habitat analyzes are integral parts of biological studies. Low dissolved oxygen level and poor habitat will limit the expectations for the biological community. Unknown or unusual fish collected will continue to be vouchered and identified in the lab or submitted for independent identification/verification.

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	Parameter Code	AWRL	Lab Reporting Limit (RL)	RECOVERY AT RLs	PRECISION (RPD of LCS/LCS dup)	BIAS (%Rec. of LCS)	Lab
Field Parameters										
pH	pH/ units	water	EPA 150.1 and TCEQ SOP, V1	00400	NA*	NA	NA	NA	NA	Field
DO	mg/L	water	EPA 360.1 and TCEQ SOP, V1	00300	NA*	NA	NA	NA	NA	Field
Conductivity	uS/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	NA*	NA	NA	NA	NA	Field
Temperature	degrees C	water	EPA 170.1 and TCEQ SOP V1	00010	NA*	NA	NA	NA	NA	Field
Secchi Depth	meters	water	TCEQ SOP V1	00078	NA*	NA	NA	NA	NA	Field
Days since last significant rainfall	days	NA	TCEQ SOP V1	72053	NA*	NA	NA	NA	NA	Field
Maximum pool width***	meters	water	TCEQ SOP V2	89864	NA*	NA	NA	NA	NA	Field
Maximum pool depth***	meters	water	TCEQ SOP V2	89865	NA*	NA	NA	NA	NA	Field
Pool length***	meters	water	TCEQ SOP, V2	89869	NA*	NA	NA	NA	NA	Field
% pool coverage***	%	water	TCEQ SOP V2	89870	NA*	NA	NA	NA	NA	Field
Total water depth	meters	water	TCEQ SOP V2	82903	NA*	NA	NA	NA	NA	Field
Flow	cfs	water	TCEQ SOP V1	00061	NA*	NA	NA	NA	NA	Field
Flow estimate	cfs	water	TCEQ SOP, V1	74069	NA*	NA	NA	NA	NA	Field
Present Weather	1-clear 2-partly cloudy 3-cloudy 4-rain 5-other	NA	NA	89966	NA*	NA	NA	NA	NA	Field
Wind Intensity	1-calm 2-slight 3-moderate 4-strong	NA	NA	89965	NA*	NA	NA	NA	NA	Field
Water Surface	1-calm 2-ripples 3-waves	NA	NA	89968	NA*	NA	NA	NA	NA	Field

Flow measurement method	1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler	water	TCEQ SOP V1	89835	NA*	NA	NA	NA	NA	Field
Flow severity	1-no flow, 2-low, 3-normal, 4-flood, 5-high, 6-dry	water	TCEQ SOP V1	01351	NA*	NA	NA	NA	NA	Field
PARAMETER	**UNITS**	**MATRIX**	**METHOD**	**Parameter Code**	**AWRL**	**Lab Reporting Limit (RL)**	**RECOVERY AT RLs**	**PRECISION (RPD of LCS/LCS dups)**	**BIAS %Rec. of LCS**	**Lab**
Conventional and Bacteriological Parameters										
TSS	mg/L	water	EPA 160.2	00530	4	4	NA	20	NA	ANA-LAB
TDS, dried at 180 degrees C	mg/L	water	EPA 160.1	70300	10	10	NA	20	NA	ANA-LAB
Sulfate	mg/L	water	EPA 300.0	00945	10	10	75-125	20	80-120	ANA-LAB
Chloride	mg/L	water	EPA 300.0	00940	10	10	75-125	20	80-120	ANA-LAB
Chlorophyll-a, fluorometric method	ug/L	water	EPA 445.0	70953	5	5	75-125	20	NA	ANA-LAB
Pheophytin, fluorometric method	ug/L	water	EPA 445.0	32213	3	3	75-125	20	NA	ANA-LAB
E. coli, IDEXX Colilert	MPN/100 mL	water	SM 9223-B	31699	1	1	NA	.5**	NA	TC
Ammonia-N, total	mg/L	water	EPA 350.1	00610	0.02	0.02	75-125	20	80-120	ANA-LAB
Nitrate-N, total	mg/L	water	EPA 300.0	00620	0.02	0.02	75-125	20	80-120	ANA-LAB
Nitrite-N, total	mg/L	water	EPA 300.0	00615	0.02	0.02	75-125	20	80-120	ANA-LAB
Total phosphorus	mg/L	water	EPA 365.3	00665	0.06	0.06	75-125	20	80-120	ANA-LAB

Benthics - Freshwater - RBA (Qualitative)					
PARAMETER	**UNITS**	**MATRIX**	**METHOD**	**PARAMETER CODE**	**LAB**
Biological Data Reporting Units	1= number of individuals from sub-sample; 2 = number of individuals/ft^2; 3 = number of individuals/m^2; 4 = total number in kicknet	Water	TCEQ SOP, V2	89899	NA
Kicknet Effort, area kicked	m^2	Water	TCEQ SOP, V2	89903	NA
Kicknet Effort, minutes kicked	minutes	Water	TCEQ SOP, V2	89904	NA
Number of individuals in benthic RBA sub-sample (∀ 100)	#	Water	TCEQ SOP, V2	89906	NA
Benthic Sampler	1=Surber, 2=Ekman, 3=kicknet, 4=Petersen, 5=Hester-Dendy	Water	TCEQ SOP, V2	89950	NA
Undercut bank at sample point	%	Water	TCEQ SOP, V2	89921	NA
Overhanging brush at sample point	%	Water	TCEQ SOP, V2	89922	NA
Gravel substrate at sample point	%	Water	TCEQ SOP, V2	89923	NA
Sand substrate at sample point	%	Water	TCEQ SOP, V2	89924	NA
Soft bottom at sample point	%	Water	TCEQ SOP, V2	89925	NA
Macrophyte bed at sample point	%	Water	TCEQ SOP, V2	89926	NA

Snags and brush at sample point	%	Water	TCEQ SOP, V2	89927	NA
Bedrock at sample point	%	Water	TCEQ SOP, V2	89928	NA
Benthic Organisms, None Present	NA	Water	TCEQ SOP, V2	90005	NA
Mesh Size, any net or sieve, average bar (diagonal measurement) for benthic collection	cm	NA	TCEQ SOP, V2	89946	NA
Stream Order	#	NA	TCEQ SOP, V1	84161	NA
Ecoregion (Texas Ecoregion Code)	#	NA	TCEQ SOP, V1	89961	NA
Total Taxa Richness, Benthos	#	Water	TCEQ SOP, V2	90055	NA
EPT Index, Abundance	#	Water	TCEQ SOP, V2	90008	NA
Biotic Index (HBI)	NA	Water	TCEQ SOP, V2	90007	NA
Chironomidae	%	Water	TCEQ SOP, V2	90062	NA
Dominant Taxon, Benthos	%	Water	TCEQ SOP, V2	90042	NA
Dominant FFG	%	Water	TCEQ SOP, V2	90010	NA
Predators	%	Water	TCEQ SOP, V2	90036	NA
Ratio of Intolerant:Tolerant taxa, Benthos	NA	Water	TCEQ SOP, V2	90050	NA
Total Trichoptera as Hydropsychidae	%	Water	TCEQ SOP, V2	90069	NA
Non-insect taxa	#	Water	TCEQ SOP, V2	90052	NA
Collector-gatherers	%	Water	TCEQ SOP, V2	90025	NA
Total number as Elmidae	%	Water	TCEQ SOP, V2	90054	NA

Nekton- Freshwater

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	LAB
Nekton, none captured	NA	Water	TCEQ SOP, V2	98005	NA
Electrofishing effort, duration of shocking	Seconds	Water	TCEQ SOP, V2	89944	NA
Seining effort	# of Hauls	Water	TCEQ SOP, V2	89947	NA
Combined length of seine hauls	meters	Water	TCEQ SOP, V2	89948	NA
Seining effort, duration	minutes	Water	TCEQ SOP, V2	89949	NA
Seine Minimum Mesh Size, net average bar, Nekton	in	Water	TCEQ SOP, V2	89930	NA
Seine Maximum Mesh Size, net average bar, Nekton	in	Water	TCEQ SOP, V2	89931	NA
Net length	meters	Water	TCEQ SOP, V2	89941	NA
Electrofishing method	1 = boat 2 = backpack 3 = tote barge	Water	TCEQ SOP, V2	89943	NA
Area seined	m^2	Water	TCEQ SOP, V2	89976	NA
Stream Order	#	NA	TCEQ SOP, V1	84161	NA
Ecoregion (Texas Ecoregion Code)	#	NA	TCEQ SOP, V1	89961	NA
Total number fish species	#	Water	TCEQ SOP, V2	98003	NA
Total native cyprinid species, fish	#	Water	TCEQ SOP, V2	98032	NA
Total benthic invertivore species, fish	#	Water	TCEQ SOP, V2	98052	NA
Total benthic species, fish	#	Water	TCEQ SOP, V2	98053	NA
Total sunfish species (except bass)	#	Water	TCEQ SOP, V2	98008	NA
Total intolerant fish species	#	Water	TCEQ SOP, V2	98010	NA
Tolerant individuals (excluding Western Mosquitofish), fish	%	Water	TCEQ SOP, V2	98070	NA
Omnivore individuals, fish	%	Water	TCEQ SOP, V2	98017	NA
Invertivore individuals, fish	%	Water	TCEQ SOP, V2	98021	NA
Piscivore individuals, fish	%	Water	TCEQ SOP, V2	98022	NA
Total Individuals seining	#	Water	TCEQ SOP, V2	98039	NA

Nekton- Freshwater					
PARAMETER	**UNITS**	**MATRIX**	**METHOD**	**PARAMETER CODE**	**LAB**
Total Individuals electroshocking	#	Water	TCEQ SOP, V2	98040	NA
Individuals/seine haul	#	Water	TCEQ SOP, V2	98062	NA
Individuals/minute electroshocking	#	Water	TCEQ SOP, V2	98069	NA
Individuals as non-native species	%	Water	TCEQ SOP, V2	98033	NA
Individuals w/ disease/anomalies	%	Water	TCEQ SOP, V2	98030	NA

Physical Habitat				
PARAMETER	**UNITS**	**METHOD**	**PARAMETER CODE**	**LAB**
Streambed slope over evaluated reach (from USGS map)	NA	TCEQ SOP, V2	72052	NA
Approximate drainage area above the most downstream transect from USGS map	km^2	TCEQ SOP, V2	89859	NA
Stream Order	#	TCEQ SOP, V2	84161	NA
Length of stream	km	TCEQ SOP, V2	89860	NA
Lateral transects made	#	TCEQ SOP, V2	89832	NA
Average stream width	meters	TCEQ SOP, V2	89861	NA
Average stream depth	meters	TCEQ SOP, V2	89862	NA
Instantaneous stream flow	cfs	TCEQ SOP, V2	00061	NA
Flow measurement method	1 = gage 2 = electric 3 = mechanical 4 = weir/flume	TCEQ SOP, V2	89835	NA
Channel Flow Status	1 = no flow 2 = low 3 = moderate 4 = high	TCEQ SOP, V2	89848	NA
Maximum pool width at time of study	meters	TCEQ SOP, V2	89864	NA
Maximum pool depth in study area	meters	TCEQ SOP, V2	89865	NA
Total stream bends	#	TCEQ SOP, V2	89839	NA
Well-defined stream bends	#	TCEQ SOP, V2	89840	NA
Moderately defined stream bends	#	TCEQ SOP, V2	89841	NA
Poorly defined stream bends	#	TCEQ SOP, V2	89842	NA
Riffles	#	TCEQ SOP, V2	89843	NA
Dominant substrate	1 = clay, 2 = silt, 3 = sand, 4 = gravel, 5 = cobble, 6 = boulder, 7 = bedrock, 8 = other	TCEQ SOP, V2	89844	NA
Avg. % of substrate gravel >2mm	%	TCEQ SOP, V2	89845	NA
Avg. % instream cover	%	TCEQ SOP, V2	84159	NA
Stream Cover Types	#	TCEQ SOP, V2	89929	NA
Avg. % stream bank erosion potential	%	TCEQ SOP, V2	89846	NA
Avg. stream bank angle	degrees	TCEQ SOP, V2	89847	NA
Avg. width natural riparian vegetation	meters	TCEQ SOP, V2	89866	NA
Avg. % trees as riparian vegetation	%	TCEQ SOP, V2	89849	NA
Avg. % shrubs as riparian vegetation	%	TCEQ SOP, V2	89850	NA
Avg. % grasses and forbes as riparian vegetation	%	TCEQ SOP, V2	89851	NA
Avg. % cultivated fields as riparian vegetation	%	TCEQ SOP, V2	89852	NA
Avg. % other as riparian vegetation	%	TCEQ SOP, V2	89853	NA
Avg.% tree canopy coverage	%	TCEQ SOP, V2	89854	NA

Physical Habitat				
PARAMETER	**UNITS**	**METHOD**	**PARAMETER CODE**	**LAB**
Overall Aesthetics	1 = wilderness 2 = natural 3 = common 4 = offensive	TCEQ SOP, V2	89867	NA
Texas Ecoregion Code	#	TCEQ SOP, V2	89961	NA
Land development impact	1 = unimpacted 2 = low 3 = moderate 4 = high	TCEQ SOP, V2	89962	NA

24-hour Dissolved Oxygen Monitoring Parameters									
Parameter	**Units**	**Method**	**Parameter Code**	**AWRL**	**Reporting Limit**	**Recovery at RL**	**Bias % Rec LCS**	**Precision RPD LCS/LCS**	**Lab**
24-Hr D.O. Avg.	mg/l	TCEQ SOP, V1	89857	NA*	NA	NA	NA	NA	field
Max Daily DO	mg/l	TCEQ SOP, V1	89856	NA*	NA	NA	NA	NA	field
Min Daily DO	mg/l	TCEQ SOP, V1	89855	NA*	NA	NA	NA	NA	field
# DO measurements during 24-Hrs	# meas.	TCEQ SOP, V1	89858	NA*	NA	NA	NA	NA	field
24-Hr Avg. water Temperature	degrees C	TCEQ SOP, V1	00209	NA*	NA	NA	NA	NA	field
Max Daily water Temperature	degrees C	TCEQ SOP, V1	00210	NA*	NA	NA	NA	NA	field
Min Daily water Temperature	degrees C	TCEQ SOP, V1	00211	NA*	NA	NA	NA	NA	field
# water temp measurements during 24-Hrs.	# meas.	TCEQ SOP, V1	00221	NA*	NA	NA	NA	NA	field
24-Hr Avg. Spec Conductance	uS/cm	TCEQ SOP, V1	00212	NA*	NA	NA	NA	NA	field
Max Spec Conductance	uS/cm	TCEQ SOP, V1	00213	NA*	NA	NA	NA	NA	field
Min Spec Conductance	uS/cm	TCEQ SOP, V1	00214	NA*	NA	NA	NA	NA	field
# Spec Conductance measurements during 24-Hrs.	# meas.	TCEQ SOP, V1	00222	NA*	NA	NA	NA	NA	field
Max Daily pH	Standard units	TCEQ SOP, V1	00215	NA*	NA	NA	NA	NA	field
Min Daily pH	Standard units	TCEQ SOP, V1	00216	NA*	NA	NA	NA	NA	field
# pH measurements during 24-Hrs.	# meas.	TCEQ SOP, V1	00223	NA*	NA	NA	NA	NA	field

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

** Based on range statistic as described in Standard Methods, 21st Edition, Section 9020-B, "Quality Assurance/Quality Control - Intralaboratory Quality Control Guidelines." This criterion applies to bacteriological duplicates with concentrations > 10org./100 mL.

*** To be routinely reported when collecting data from perennial pools.

References:

TCEQ SOP,V1 - TCEQ Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003 (RG-415)

TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data, 2005 (RG-416)

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

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

United States Environmental Protection Agency (USEPA) Manual #EPA-821-R-9S-027

Ambient Water Reporting Limits (AWRLs)

The AWRL establishes the reporting specification at **or below** which data for a parameter must be reported to be compared with freshwater screening criteria. The AWRLs specified in Table A7.1 are the program-defined reporting specifications for each analyte and yield data acceptable for routine water quality monitoring. 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.
- The laboratory will demonstrate and document on an ongoing basis the laboratory's ability to quantitate at its reporting limits.

Acceptance criteria and an explanation of how the AWRL requirement applies to water, sediment, and tissue sample matrices are provided in Section B5.

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 comparing replicate analyses of laboratory control standards in the sample matrix (e.g. deioinized water, sand, commercially available tissue)or sample/duplicate pairs in the case of bacterial analysis. Precision results are plotted on quality control charts which are based on historical data and used during evaluation of analytical performance. Program-defined measurement performance specifications for laboratory control standard/laboratory control standard duplicate pairs are defined in Table A7.1.

Bias

Bias is a statistical measurement of correctness and includes multiple components of systematic error. A measurement is considered unbiased when the value reported does not differ from the true value. Bias is determined through the analysis of laboratory control standards prepared with with verified and known amounts of all target analytes in the sample matrix (e.g. deioinized water, sand, commercially available tissue) and by calculating percent recovery. Results are plotted on quality control charts which are calculated based on historical data and used during evaluation of analytical performance. Program-defined measurement performance specifications for laboratory control standards are specified in Table A7.1.

Representativeness

Site selection, the appropriate sampling regime, the sampling of all pertinent media according to TCEQ SOPs, and use of only approved analytical methods will assure that the measurement data represents the conditions at the site. Routine data collected under the Clean Rivers Program for water quality assessments are considered to be spatially and temporally representative of 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.

Comparability

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

Completeness

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

A8 SPECIAL TRAINING/CERTIFICATION

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

Laboratory analysts have a general knowledge of laboratory operations, test methods, and quality assurance. They also have a combination of education, experience, skill, and training to perform their specific function. Laboratory management maintains records of qualifications and training on each employee.

A9 DOCUMENTS AND RECORDS

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

Table A9.1 Project Documents and Records

Document/Record	Location	Retention (yrs)	Format
QAPPs, amendments and appendices	SRBA	7	Paper
Field SOPs	SRBA/TC	7	Paper
Laboratory QA Manuals	TC/ANA- LAB	7/7	Paper
Laboratory SOPs	TC/ANA- LAB	7/7	Paper
QAPP distribution documentation	SRBA	7	Paper
Field staff training records	SRBA/TC	7/7	Paper
Field equipment calibration/maintenance logs	SRBA/TC	7/7	Paper
Field instrument printouts	SRBA/TC	7/7	Paper
Field notebooks or data sheets	SRBA/TC	7/7	Paper
Chain of custody records	SRBA/TC	7/7	Paper
Laboratory calibration records	TC/ANA- LAB	7/7	Paper
Laboratory instrument printouts	ANA-LAB	7	Paper
Laboratory data reports/results	SRBA/ ANA-LAB	7/7	Paper
Laboratory equipment maintenance logs	TC/ANA-LAB	7/7	Paper
Corrective Action Documentation	SRBA/TC/ANA-LAB	7/7/7	Paper

Laboratory Test Reports

Test reports from the laboratory will document 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:

- title of report and unique identifiers on each page
- name and address of the laboratory
- name and address of the client
- a clear identification of the sample(s) analyzed
- date and time of sample receipt
- identification of method used
- identification of samples that did not meet QA requirements and why (e.g., holding times exceeded)
- sample results
- clearly identified subcontract laboratory results (as applicable)
- a name and title of person accepting responsibility for the report
- project-specific quality control results to include field split results (as applicable); equipment, trip, and field blank results (as applicable); and RL confirmation (% recovery)
- Narrative information on QC failures or deviations from requirements that may affect the quality of results or is necessary for verification and validation of data.

Electronic Data

Data will be submitted electronically to the TCEQ in the Event/Result file format described in the CRP Guidance. The data will be compiled in an Access database in the Event/Result format. This data will be exported and saved as "text" files. These "text" files will be sent as email attachments to Ms Jennifer Delk of TCEQ. A completed Data Summary (see example in Appendix E) will be submitted with each data submittal. The data will be entered into the SRBA database by Patti Harman, SRBA Data Manager, and reviewed by Mike Buttram, SRBA QAO, prior to its submittal to TCEQ.

B1 SAMPLING PROCESS DESIGN

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

B2 SAMPLING METHODS

Field Sampling Procedures

Field sampling will be conducted according to procedures documented in the *TCEQ Surface Water Quality Monitoring Procedures Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003.(RG-415) and Volume 2: Methods for Collecting and Analyzing Biological Community and Habitat Data* (*RG-416).* Additional aspects outlined in Section B below reflect specific requirements for sampling under the Clean Rivers Program and/or provide additional clarification.

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

Table B2.1 Sample Storage, Preservation and Handling Requirements

Parameter	Matrix	Container	Preservation*	Sample Volume	Holding Time
TSS	Water	Plastic or Glass Bottles	Cool to 4 ^{o}C, dark	400 mL	7 days
TDS	Water	Plastic or Glass Bottles	Cool to 4 ^{o}C, dark	250 mL	7 days
Chloride	Water	Plastic or Glass Bottles	Cool to 4 ^{o}C, dark	100 mL	28 days
Sulfate	Water	Plastic or Glass Bottles	Cool to 4 ^{o}C, dark	100 mL	28 days
Nitrate-N	Water	Plastic or Glass Bottles	Cool to 4 ^{o}C, dark	150 mL	48 hours
Nitrite-N	Water	Plastic or Glass Bottles	Cool to 4 ^{o}C, dark	150 mL	48 hours
Ammonia-N	Water	Plastic or Glass Bottles	1-2mL conc. H_2SO_4 to pH<2 and cool to 4 ^{o}C, dark	1000 mL	28 days
Total Phosphorus	Water	Plastic or Glass Bottles	1-2mL conc. H_2SO_4 to pH<2 and cool to 4 ^{o}C, dark	1000 mL	28 days

Chlorophyll a	Water	Amber Glass Bottles	Cool to 4 ^{o}C, dark	100 mL	Filter <= 48 hours Filters may be stored frozen up to 30 days
Pheophytin a	Water	Amber Glass Bottles	Cool to 4 ^{o}C, dark	100 mL	Filter <= 48 hours Filters may be stored frozen up to 30 days
E. coli, IDEXX Colilert	Water	Plastic (sterile)**	Cool to 4 ^{o}C, dark	200 mL	6 hours
Benthic marcroinverte -brates & fish	Tissue	Plastic or glass	70% ethyl alcohol or 70% isopropyl alcohol, or add formaldehyde to produce a 5-10% formalin solution. Store in dark and away from extremes of hot and cold.	Variable	5 years

*Preservation is performed within 15-minutes of collection.

** Certified by IDEXX

Sample Containers

Sample containers are supplied by ANA-LAB and documentation is maintained by ANA-LAB. The containers have blank labels with barcodes prepared by ANA-LAB and already contain acid where required. Amber glass bottles supplied by ANA-LAB are used routinely for chlorophyll samples. Bottles for *E. coli* collection are supplied by IDEXX and contain sodium thiosulfate powder. The IDEXX bottles are certified for sterility and documentation is maintained in the TC laboratory. No bottles are reused.

Processes to Prevent Contamination

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

Documentation of Field Sampling Activities

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

1. Station ID
2. Sampling Date
3. Location
4. Sampling depth
5. Sampling time
6. Sample collector's name/signature
7. Values for all field parameters
8. Detailed observational data, including:
    - water appearance
    - weather
    - biological activity
    - unusual odors
    - pertinent observations related to water quality or stream uses (e.g., exceptionally poor water quality conditions/standards not met; stream uses such as swimming, boating, fishing, irrigation pumps, etc.)
    - watershed or instream activities (events impacting water quality, e.g., bridge construction, livestock watering upstream, etc.)
    - specific sample information (number of sediments grabs, type/number of fish in a tissue sample, etc.)
    - missing parameters (i.e., when a scheduled parameter or group of parameters is not collected)

Recording Data

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

1. 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;
3. Close-out on incomplete pages with an initialed and dated diagonal line.

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 data quantity and/or 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.

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

The SRBA Project Manager, in consultation with the SRBA 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 SRBA Project Manager in consultation with SRBA QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the contractor QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); 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

Chain-of-Custody

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

1. Date and time of collection
2. Site identification
3. Sample matrix
4. Number of containers
5. Preservative used or if the sample was filtered
6. Analyses required
7. Name of collector
8. Custody transfer signatures and dates and time of transfer

Sample Labeling

Samples containers are supplied by ANA-LAB with blank labels on the containers. The labels are completed in the field with an indelible marker. Label information includes:

1. Site identification
2. Date and time of sampling
3. Preservative added, if applicable
4. Sample type is controlled by the barcode, container size, and label color. The containers are prepared by ANA-LAB in accordance with the SRBA QAPP and verified by the chain of custody.

Sample Handling

The principle of sample custody is simply being able to account for sample integrity from the moment the portion of water, soil, waste, etc. is placed in a sample container until all analytical tests have been completed and any remaining sample is discarded. Documentation that will verify these actions will be a joint effort of the sampling team, the sample transporter, and the laboratory staff and involve chain-of-custody (COC) sheets and field data sheets. Copies of the COC forms and field data sheets can be found in Appendix D.

Field personnel will be responsible for recording all data and relevant observations on the field data sheet and COC sheets. Transportation of samples to ANA-LAB is provided by ANA-LAB. Personnel from ANA-LAB pick the samples up directly from the TC sampling team. Transfer of samples to laboratory personnel is indicated on COC forms. Standard operating procedures for the handling of samples at ANA-LAB are detailed in the Login Sample SOP and Sample Tracking SOP of ANA-LAB. Problems encountered during transportation or with the samples on arrival at the lab are documented on the COC form. Samples not documented properly will not be accepted for by analysis by ANA-LAB receiving personnel.

Sample bottles used in the testing procedures are supplied by ANA-LAB. The bottles are supplied pre-labeled. The labels indicate how the bottles will be used and the test to be preformed on the contents. The use and contents is both written and color-coded. The bottles are pre-acetified by ANA-LAB as required by analytical methods. TC personnel complete much of the label information prior to going into the field and group them by putting the bottles for each site in a plastic bag. The sampling time is added to the label in the field. The bottles are returned to the plastic bag and packed in ice. The sample times are recorded on the field data sheets. The COCs are completed when ANA-LAB personnel pick up the samples from TC personnel. The samples are checked at the laboratory to make certain that the temperature and pH meet QAPP requirements and that holding times are met. The internal handling of the samples by ANA-LAB is detailed in the Laboratory Quality Manual and SOPs of ANA-LAB.

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 data quantity and/or 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 or laboratory staff and reported to the cognizant field or laboratory supervisor who will notify the SRBA Project Manager. The SRBA Project Manager will notify the SRBA QAO of the potential nonconformance. The SRBA QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The SRBA Project Manager, in consultation with SRBA 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 SRBA Project Manager in consultation with the SRBA QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the SRBA QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); 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*, 40 CFR 136, or other reliable procedures acceptable to the Agency."

Laboratories collecting data under this QAPP are compliant with ISO/IEC Standard 17025, at a minimum. Copies of Laboratory QMs and SOPs are available for review by the TCEQ

Standards Traceability

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

Analytical Method 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.

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 quantity and/or 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 or laboratory staff and reported to the cognizant field or laboratory supervisor who will notify the SRBA Project Manager. The SRBA Project Manager will notify the SRBA QAO of the potential nonconformance. The SRBA QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The SRBA Project Manager, in consultation with SRBA 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 SRBA Project Manager in consultation with the SRBA QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the SRBA QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); 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 should not be reported to the TCEQ.

B5 QUALITY CONTROL

Sampling Quality Control Requirements and Acceptability Criteria

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

Field Split - A field split is a single sample subdivided by field staff immediately following collection and submitted to the laboratory as two separately identified samples according to procedures specified in the *SWQM Procedures*. Split samples are preserved, handled, shipped, and analyzed identically and are used to assess variability in all of these processes. Field splits apply to conventional samples only. Field split samples are sent to the laboratory during each quarterly monitoring with a minimum of one split for each ten sample sets
The precision of field split results is calculated by relative percent difference (RPD) using the following equation:

$$RPD = (X1-X2)/ ((X1+X2)/2))$$

A 30% RPD criteria will be used to screen field split results as a possible indicator of excessive variability in the sample handling and analytical system. If it is determined that elevated quantities of

analyte (i.e., > 5 times the RL) were measured and analytical variability can be eliminated as a factor, than variability in field split results will primarily be used as a trigger for discussion with field staff to ensure samples are being handled in the field correctly. Some individual sample results may be invalidated based on the examination of all extenuating information. The information derived from field splits is generally considered to be event specific and would not normally be used to determine the validity of an entire batch; however, some batches of samples may be invalidated depending on the situation. Professional judgment during data validation will be relied upon to interpret the results and take appropriate action. The qualification (i.e., invalidation) of data will be documented on the Data Summary. Deficiencies will be addressed as specified in this section under Deficiencies, Nonconformances, and Correction Action related to Quality Control.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

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

AWRL/Reporting Limit Verification - Water Samples

The laboratory's reporting limit for each analyte will be at or below the AWRL To demonstrate the 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., Solid Waste Method 8260), 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 results of quantitation checks with the data.

Laboratory Control Standard (LCS) - A LCS consists of a sample matrix (e.g. deioinized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analyte. The LCS is spiked into the sample matrix at a level less than near the mid-point of the calibration curve for each analyte. In cases of test methods with very long lists of analytes, LCSs are prepared with all the target analytes and not just a representative number except in cases of organic analytes with multipeak responses.

The LCS is carried through the complete preparation and analytical process. The LCS is used to document the bias of the analytical process. LCSs are run at a rate of one per batch. A batch is defined as a set of environmental samples that are prepared and/or analyzed together within the same process using the same lot of reagents.
Results of LCSs are calculated by percent recovery (%R), which is defined as 100 times the measured concentration, divided by the true concentration of the spiked sample.

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

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

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

Laboratory Duplicates - 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 at a rate of one per batch. A batch is defined as a set of environmental samples that are prepared and/or analyzed together within the same process using the same lot of reagents.

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

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

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, or one per batch whichever is greater. A batch is defined as a set of environmental samples that are prepared and/or analyzed together within the same process using the same lot of reagents. 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:

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

MS recoveries are plotted on control charts and used to control analytical performance. Measurement performance specifications for matrix spikes are not specified in this document.

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., sample duplicates, 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.

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 data quantity and/or 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 or laboratory staff and reported to the cognizant field or laboratory supervisor who will notify the SRBA Project Manager. The SRBA Project Manager will notify the SRBA QAO of the potential nonconformance. The SRBA QAO will initiate a Nonconformance Report (NCR) to document the deficiency.

The SRBA Project Manager, in consultation with SRBA 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 SRBA Project Manager in consultation with the SRBA QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by the SRBA QAO by completion of a Corrective Action Report.

Corrective Action Reports (CARs) document: root cause(s); 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 Surface Water Quality Monitoring Procedures*. Sampling equipment is inspected and tested upon receipt and is assured appropriate for use. Equipment records are kept on all field equipment and a supply of critical spare parts is maintained.

All laboratory tools, gauges, instrument, and equipment testing and maintenance requirements are contained within laboratory QM(s). 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 Surface Water Quality Monitoring Procedures*. Post-calibration error limits and the disposition resulting from error are adhered to. Data not meeting post-error limit requirements invalidate associated data collected subsequent to the pre-calibration and are not submitted to the TCEQ.

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

Items for use in monitoring and laboratory are ordered from various sources as needed. Calibration standards are obtained directly from ANA-LAB. The items are examined to make certain these meet TCEQ specifications and they are dated with the date of arrival. Standards and chemicals that are out of date as specified in the QAMs are not used in quality assured work. Items for use in E. coli monitoring are obtained directly from IDEXX, dated, and maintained in minimal amounts. The invoice for purchase of supplies and consumables are maintained in a logbook. Standards are traceable. Ana-Lab specifies in its QM how its laboratory-related supplies and consumables are maintained.

B9 NON-DIRECT MEASUREMENTS

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

B10 DATA MANAGEMENT

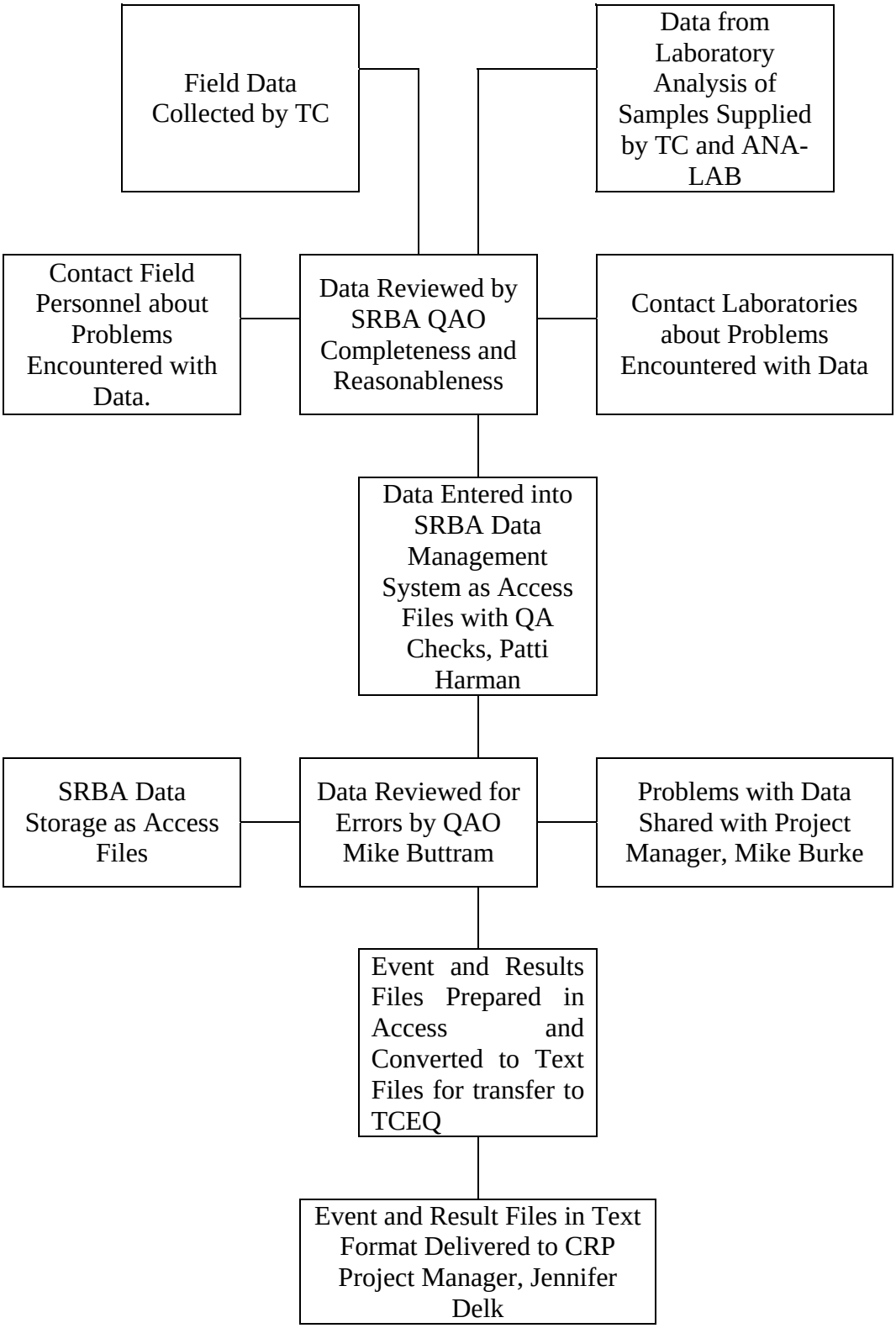
Data Management Process

The data management functions of the SRBA are many. Probably the most important, is to gather raw data that is collected from field monitors and laboratories and prepare it for entry into the TCEQ database as "quality assured data". The data comes to the data management team on field data sheets and laboratory report forms. The field data sheets are prepared by the data manager. The data sheets contain much of the data that is required by the TCEQ. However, a significant amount of data, such as storet codes, etc, is already stored in the Microsoft Access 2000 interface used for data entry. The field and laboratory data are inspected to see that all holding times have been met and that the parameters reported are reasonable. When problems with the data set are found, the field data monitors are usually contacted directly to see if the problem can be corrected. Laboratories are contacted by telephone or email. Problems that cannot be corrected are detailed on the Data Summary and the data is entered in the SRBA database only as a comment with the appropriate notation. Outliers are documented and confirmed. The field data and laboratory results are entered into a corresponding or "look alike" Access data entry form. The form is capable of carrying out many functions to assist in the data entry. Storet codes are automatically entered. The form checks data as it is entered to see if it is in an appropriate type of entry or if a number is within certain limits. The person doing the data entry visually inspects the data sheet. The form checks the data for errors as it is entered into the database and gives prompts. In a number of the cases the form can carry out numerous complex and repetitive calculations that aid in building certain required parameters. After the SRBA database files are completed, a set of queries are used to build Microsoft database files that have the "event" and "result" structure required by the TCEQ. These files are inspected visually and inspected by computer for entry errors, omissions, and file duplication. After the "event" and "results" files are deemed correct by the Data Manager and QA Officer, they are converted into a "|" delimited text format and electronically submitted to the TCEQ for inclusion in the TCEQ Regulatory Activities and Compliance System Database. The required Data Summary is mailed to the TCEQ CRP Project Manager. Figure 5 details the data management procedures. The original field data sheets and copies of the laboratory reporting forms are maintained in a field data book at TC. The information is entered into the SRBA database when it is collected and reports are created to meet TCEQ requirements. The time period for this process is kept as short as possible with the limiting factor being the laboratory water chemistry

analytical report. The time period is generally two to three weeks for completion. The electronic files are available from TCEQ, the SRBA webpage, the SRBA offices, and TC.

The Clean Rivers Program grantees do not create data using Global Positioning System (GPS) equipment. GPS equipment may be used as a component of the information required by the Station Location (SLOC) request process, but TCEQ staff are responsible for creating the certified locational data that will ultimately be entered into the TCEQ's Surface Water Quality Monitoring database. Any information developed by Clean Rivers Program grantees using a Geographic Information System (GIS) will be used solely to meet deliverable requirements and will not be submitted to the TCEQ as a certified data set. Because the Clean Rivers Program grantees do not create certified locational data, TCEQ's OPP 8.11 and 8.12 do not apply.

Figure 4 Flow Sheet For SRBA Data Management Procedures



Data Errors and Loss

The field data sheets and the computer data entry screen look exactly the same. They are compared for completeness of data entry. The computer form can be printed out and compared to the data sheets where the entries can be validated manually. The computer form checks to see if many of the parameters are withinTCEQ limits and is capable of catching many entry errors. The data is analyzed visually in tabular form to catch obvious errors in format. When the data is transferred to TCEQ is checked for obvious errors of format and for completeness by the CRP Data Manager and the CRP Project Manager. See Appendix C for examples of data forms and Appendix E for the Data Summary Form.

Record Keeping and Data Storage

Computer generated field data sheet similes are printed and filed in a data notebook along with all original field data sheets, laboratory reports, chain of custody forms, laboratory QA information, and information about duplicates. This notebook represents a complete hard copy of all data collected. The SRBA data files are maintained in two formats. The data, as entered into the Access forms, is maintained and can be recovered as sets of data exactly as entered. Data in this format is easily recovered and reviewed without much effort, but the database to accomplish this is not very efficient in terms of memory required. The files are also maintained in an Access database that is similar to the "event" and "results" files required by the TCEQ. These are somewhat more difficult to utilize but very efficient in terms of the memory required. Data files in either of the formats are available from the SRBA either electronically or on CD-ROMs. Requests should be made to Mr. Mike Burke of the SRBA. The data as submitted to the TCEQ is entered into the state database after is approved. The quality assured data from this database is made available on the SRBA web page maintained by Paul Price Associates. The web address is SULPHURR.org

Data Handling, Hardware, and Software Requirements

SRBA uses Microsoft Access as its database software. All database files are delivered to the TCEQ as ASCII text files that are generated from Access files. A significant amount of effort is expended with the production of GIS related documents. ArcView software by ESRI is utilized in the production of maps. GPS information about monitoring sites is used to locate the sites on maps and in the field. Maps are generated locally using TCEQ data files downloaded from the TCEQ website. Basins 3.0 by the EPA and the Street Atlas USA 7.0 by DeLorme are used as aids in certain instances. PPAI does some map work for the SRBA. Much of the work done requires that reports be written and presentations be produced. All word processing activities are produced in Microsoft Word 2000. Microsoft Power Point is utilized as the presentation software. Word Perfect Office 2002 is also available. This package includes Word Perfect 10, Quattro Pro 10, and Paradox 10 for use as needed. Any computer system capable of handling the Microsoft 2000 Office Professional Edition and Arc View 8 and equipped with a RW CD burner and modem is acceptable. Of course a fast computer and more storage space on the hard drive is better.

Information Resource Management Requirements

All datasets collected under this QAPP are submitted to the TCEQ PM for review and approval. The datasets are refined where necessary to meet TCEQ requirements. When the data is accepted as "quality assured" and loaded into the TCEQ database, the data management requirements have been met.

C1 ASSESSMENTS AND RESPONSE ACTIONS

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

Table C1.1 Assessments and Response Requirements

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	SRBA	Monitoring of the project status and records to ensure requirements are being fulfilled	Report to TCEQ in Quarterly Report
Monitoring Systems Audit of SRBA	Dates to be determined by TCEQ CRP	TCEQ	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the TCEQ to address corrective actions
Monitoring Systems Audit of Program Subparticipants	Once per contract period	SRBA QAO-Mike Buttram	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the SRBA. PA will report problems to TCEQ in Progress Report.
Laboratory Inspection	Dates to be determined by TCEQ	TCEQ Laboratory Inspector	Requirements appearing in lab SOPs and QAPP, ISO/IEC Standard 17025, 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 the TCEQ to address corrective actions

Corrective Action

The SRBA Project Manager is responsible for implementing and tracking corrective action resulting from audit findings outlined in the audit report. Records of audit findings and corrective actions are maintained by both the CRP and the SRBA Project Manager. Audit reports and corrective action documentation will be submitted to the TCEQ with the Progress Report.

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

C2 REPORTS TO MANAGEMENT

Reports to SRBA Project Management

The SRBA QAO will verify to the SRBA PM that the work under this QAPP has been completed and that the appropriate data has been compiled and is available for use. This includes:

- Field data sheets, notes, and photos
- Field instrument reading print outs
- COC forms
- Laboratory results, including QA testing
- Reports of all significant QA issues pertaining to sampling, field measurements, laboratory analyses, or data compilation

The SRBA QAO and the SRBA Data Manager will make all datasets/reports to the TCEQ staff available to the SRBA Project Manager. The SRBA PM is responsible for communication of all TCEQ reports to the SRBA QAO regarding quality assurance issues.

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 SRBA'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 SRBA, a report of findings, recommendations and response is sent to the TCEQ in the quarterly progress report.

Reports by TCEQ Project Management

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

D1 DATA REVIEW, VERIFICATION, AND VALIDATION

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

D2 VERIFICATION AND VALIDATION METHODS

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

Data review, verification, and validation will be performed using self-assessments and peer and management review as appropriate to the project task. The data review tasks to be performed by field and laboratory staff is listed in the first two sections of Table D.2, respectively. Potential errors are identified by examination of documentation and by manual 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 are documented.

After the field and laboratory data are reviewed, another level of review is performed once the data are combined into a data set. This review step as specified in Table D.2 is performed by the SRBA Data Manager and QAO. Data review, verification, and validation tasks to be performed on the data set include, but are not limited to, the confirmation of 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.

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

If any requirements or specifications of the CRP are not met, based on any part of the data review, the responsible party should document the nonconforming activities and submit the information to the SRBA Data Manager with the data. This information is communicated to the TCEQ by the SRBA in the Data Summary.

Table D2.1: Data Review Tasks

Field Data Review	**Responsibility**
Field data reviewed for conformance with data collection, sample handling and chain of custody, analytical and QC requirements	SRBA QAO and TC Field Staff
Post-calibrations checked to ensure compliance with error limits	SRBA QAO
Field data calculated, reduced, and transcribed correctly	SRBA QAO
Laboratory Data Review	
Laboratory data reviewed for conformance with data collection, sample handling and chain of custody, analytical and QC requirements to include documentation, holding times, sample receipt, sample preparation, sample analysis, project and program QC results, and reporting	ANA-LAB LM
Laboratory data calculated, reduced, and transcribed correctly	ANA-LAB LM
Reporting limits consistent with requirements for Ambient Water Reporting Limits.	ANA-LAB LM
Analytical data documentation evaluated for consistency, reasonableness and/or improper practices	ANA-LAB LM
Analytical QC information evaluated to determine impact on individual analyses	ANA-LAB LM
All laboratory samples analyzed for all parameters	ANA-LAB LM
Idexx Colilert Samples analyzed by TC	SRBA-QAO
Data Set Review	
The test report has all required information as described in Section A9 of the QAPP	SRBA QAO
Confirmation that field and lab data have been reviewed	SRBA QAO
Data set (to include field and laboratory data) evaluated for reasonableness and if corollary data agree	SRBA QAO
Outliers confirmed and documented	SRBA DM
Field QC acceptable (e.g., field splits and trip, field and equipment blanks)	SRBA QAO
Sampling and analytical data gaps checked and documented	SRBA QAO
Verification and validation confirmed. Data meets conditions of end use and are reportable	SRBA PM

D3 RECONCILIATION WITH USER REQUIREMENTS

Data produced in this project, and data collected by other organizations (e.g., USGS, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Data meeting project requirements will be used by the TCEQ for the *Texas Water Quality Inventory and 303(d) List* in accordance with TCEQ's *Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data*, and for TMDL development, stream standards modifications, and permit decisions as appropriate. Data which do not meet requirements will not be submitted to the SWQM portion of TRACS nor will be considered appropriate for any of the uses noted above.