Clean Water Act Section 319(h) Nonpoint Source Pollution Control Program

Surface Water Quality Monitoring to Support the Implementation of the Lampasas River Watershed Protection Plan

TSSWCB Project Number 13-09
Revision #0

Quality Assurance Project Plan

Texas State Soil and Water Conservation Board

Prepared by

Texas Institute for Applied Environmental Research
and
Texas A&M AgriLife Research

Effective Period: Upon EPA approval through September 30, 2016
(with Annual Updates Required)

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

Lisa J. Prcin
Research Associate
Texas A&M AgriLife Research
Blackland Research & Extension Center
720 E. Blackland Rd.
Temple, TX 76502
lprcin@brc.tamus.edu

A1 APPROVAL PAGE

Surface Water Quality Monitoring to Support the Implementation of the Lampasas River Watershed Protection Plan

United States Environmental Protection Agency (EPA), Region VI

Name: Curry Jones
Title: EPA Chief; State/Tribal Programs Section

Signature:__________________________________Date:___________________

Name: Henry Brewer
Title: EPA Texas Nonpoint Source Project Officer

Signature:__________________________________Date:___________________

Texas State Soil and Water Conservation Board (TSSWCB)

Name: Wesley Gibson
Title: TSSWCB Project Manager

Signature:__________________________________Date:___________________

Name: Mitch Conine
Title: TSSWCB Quality Assurance Officer (QAO)

Signature:__________________________________Date:___________________

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United States Environmental Protection Agency (EPA), Region VI

Name: Curry Jones
Title: EPA Chief; State/Tribal Programs Section

Signature:____________________ Date: 6/24/2014

Name: Henry Brewer
Title: EPA Texas Nonpoint Source Project Officer

Signature:____________________ Date: JUNE 24, 2014

Texas State Soil and Water Conservation Board (TSSWCB)

Name: Wesley Gibson
Title: TSSWCB Project Manager

Signature:____________________ Date: 6/16/14

Name: Mitch Conine
Title: TSSWCB Quality Assurance Officer (QAO)

Signature:____________________ Date: 6/16/14

Texas A&M AgriLife Research (AgriLife)

Name: Raghavan Srinivasan
Title: Principal Investigator
Signature: Raghavan Srinivasan Date: 6/16/2014

Name: Lisa Prcin
Title: Project Manager
Signature: Date: 06/16/2014

AgriLife 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. AgriLife will maintain this documentation as part of the project's quality assurance records, and will be available for review.

Texas Institute for Applied Environmental Research (TIAER)

Name: Anne McFarland
Title: Project Manager

Signature:____________________ Date: 11 June 2014

Name: Jeff Stroebel
Title: Monitoring Operations Supervisor

Signature:____________________ Date: 11 Jun 14

Name: Mark Murphy
Title: Laboratory Manager and Laboratory Quality Assurance Officer (QAO)

Signature:____________________ Date: 6/11/14

Name: Nancy Easterling
Title: Project Quality Assurance Officer (QAO)

Signature:____________________ Date: 11 June 2014

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List of Acronyms and Abbreviations

AgriLife	Texas A&M AgriLife Research
ASTM	American Society for Testing and Materials
AWRL	Ambient Water Reporting Limit
BMP	Best Management Practices
BRA	Brazos River Authority
CAR	Corrective Action Report
CFU	Colony Forming Units
COC	Chain-of -Custody
CR	County Road
CRP	Clean Rivers Program
DO	Dissolved Oxygen
FY	Fiscal Year
LR WPP	Lampasas River Watershed Protection Plan
LCS	Laboratory Control Sample
LOD	Limit of Detection
LOQ	Limit of Quantitation
mL	Milliliters
MPN	Most Probable Number
NELAC	National Environmental Laboratory Accreditation Committee
NELAP	National Environmental Laboratory Accreditation Program
NPS	Nonpoint Source
QA	Quality Assurance
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
RPD	Relative Percent Difference
SA	Sample Amount (reference concentration)
SM	Standard Methods
SOP	Standard Operating Procedure
SR	Sample Result
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TCEQ	Texas Commission on Environmental Quality
TIAER	Texas Institute for Applied Environmental Research
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WPP	Watershed Protection Plan

A3 DISTRIBUTION LIST

Organizations, and individuals within, which will receive copies of the approved QAPP and any subsequent revisions include:

U.S. Environmental Protection Agency Region 6 (EPA)
1445 Ross Avenue, Suite # 1200
Dallas, TX 75202-2733

Name: Henry Brewer
Title: Texas NPS Project Officer, Water Quality Division

Texas State Soil and Water Conservation Board (TSSWCB)
P.O. Box 658
Temple, Texas 76503

Name: Wesley Gibson
Title: TSSWCB Project Manager

Name: Mitch Conine
Title: TSSWCB QAO

Texas A&M AgriLife Research (AgriLife)
720 East Blackland Road
Temple, TX 76502

Name: Raghavan Srinivasan
Title: Principle Investigator

Name: Lisa Prcin
Title: AgriLife Project Manager

Texas Institute for Applied Environmental Research (TIAER)
Box T-0410, Tarleton Station
Stephenville, TX 76402

Name: Anne McFarland
Title: TIAER Project Manager

Name: Jeff Stroebel
Title: TIAER Monitoring Operations Supervisor

Name: Mark Murphy
Title: TIAER Laboratory Manager and Laboratory QAO

Name: Nancy Easterling
Title: Project QAO and Data Manager

AgriLife 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. AgriLife will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project's quality assurance records, and will be available for review.

A4 PROJECT/TASK ORGANIZATION

The following is a list of individuals and organizations participating in the project with their specific roles and responsibilities:

U.S. Environmental Protection Agency Region 6 (EPA)

Henry Brewer, EPA Project Officer
Responsible for managing the project for EPA. Reviews project progress and reviews and approves QAPP and QAPP amendments.

Texas State Soil and Water Conservation Board (TSSWCB)

Wesley Gibson, TSSWCB Project Manager
Responsible for ensuring that the project delivers data of known quality, quantity, and type on schedule to achieve project objectives. Provides the primary point of contact between AgriLife, TIAER and TSSWCB. Tracks and reviews deliverables to ensure that tasks in the workplan are completed as specified in the contract. Responsible for verifying that the QAPP is followed by the TIAER. Notifies the TSSWCB QAO of significant project non-conformances and corrective actions taken as documented in quarterly progress reports from AgriLife and TIAER.

Mitch Conine, TSSWCB QAO
Reviews and approves the project QAPP and any amendments or revisions and ensures distribution of approved/revised QAPPs to TSSWCB participants. Assists the TSSWCB Project Manager on QA-related issues. Coordinates reviews and approvals of QAPPs and amendments or revisions. Conveys QA problems to appropriate TSSWCB management. Monitors implementation of corrective actions. Coordinates and conducts audits.

Texas A&M AgriLife Research (AgriLife)

Raghavan Srinivasan, Principle Investigator
Responsible for managing the project for AgriLife. Reviews project progress and reviews and approves QAPP and QAPP amendments.

Lisa Prcin, Project Manager
Responsible for implementing and monitoring LR WPP requirements in the contract and the QAPP. 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. Coordinates project planning activities and work of project partners. Ensures QAPP is followed by project participants and that project is producing data of known quality. Ensures that subcontractors are qualified to perform contracted work.

Texas Institute for Applied Environmental Research (TIAER)

Anne McFarland, Project Manager
Responsible for ensuring tasks and other requirements in the contract are executed on time and are of acceptable quality. Monitors and assesses the quality of work. Responsible for verifying the QAPP is followed and the project is producing data of known and acceptable quality. Notifies the TSSWCB project manager of particular circumstances that may adversely affect the quality of data derived from the collection and analysis of samples. Enforces corrective action.

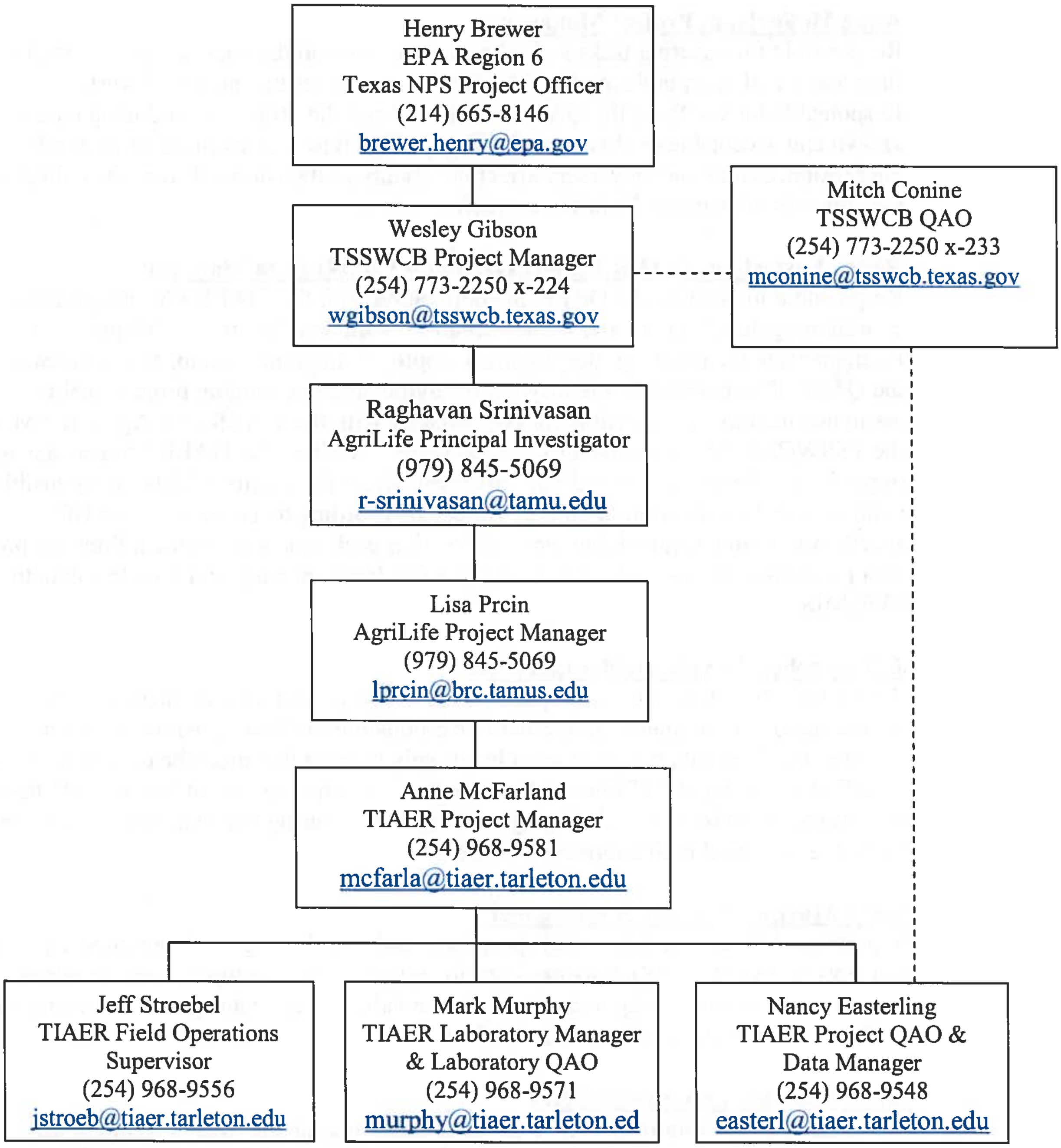
Nancy Easterling, TIAER Project QAO and Project Data Manager
Responsible for writing the QAPP, in cooperation with the TIAER PM. Responsible for coordinating development and implementation of the non-laboratory QA program. Participates in the planning, development, approval, implementation, and maintenance of the QAPP. Responsible for identifying, receiving, and maintaining project quality assurance records. Responsible for coordinating with the TIAER PM, AgriLife PM, and the TSSWCB QAO to resolve QA-related issues. Notifies the TIAER Project Manager of particular circumstances that may adversely affect the quality of data. Responsible for validation and verification of all data collected according to Table A7.1 and QC specifications and acquired data procedures after each task is performed. Prepares project data for submission to SWQMIS, completes the data summary, and transfers data to SWQMIS.

Jeff Stroebel, TIAER Field Supervisor
Responsible for supervising all aspects of the sampling and measurement of surface waters and other parameters in the field. Responsible for the acquisition of water samples and field data measurements in a timely manner that meet the quality objectives specified in Section A7 (Table A7.1), as well as the requirements of Sections B1 through B8. Responsible for field scheduling, staffing, and ensuring that staff are appropriately trained as specified in Sections A6 and A8.

Mark Murphy, Laboratory Manager
Supervises laboratory, lab safety program, and purchasing of laboratory equipment. Reviews and verifies all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validates the data against the measurement performance specifications listed in Table A7.1.

Mark Murphy, Laboratory QAO
Maintains quality assurance manual for laboratory operations, maintains operating procedures that are in compliance with the QAPP. Responsible for the overall quality control and quality assurance of analyses performed by the TIAER Laboratory.

Figure A4.1 Project Organizational Chart*-- Lines of Communication



* See Project/Task Organization in this section for a description of each position's responsibilities.

A5 PROBLEM DEFINITION/BACKGROUND

The Lampasas River (segment 1217) rises in western Hamilton County, 16 miles west of Hamilton and flows southeast for 75 miles. The river courses through Hamilton, Lampasas, Burnet and Bell Counties. In Bell County the river turns northeast and is dammed five miles southwest of Belton to form Stillhouse Hollow Lake (Segment 1216). Below Stillhouse Hollow Lake, the Lampasas River flows to its confluence with Salado Creek and the Leon River to form the Little River.

The Lampasas River is commonly characterized by low water levels and is situated within a rural and agricultural dominated landscape. The Cities of Lampasas and Kempner are the only cities situated wholly within the watershed, while the Cities of Copperas Cove and Killeen each drain a portion of their city into the Lampasas River watershed.

According to the 2002, 2004, 2006 and 2008 Texas Water Quality Inventory and 303(d) List, the Lampasas River above Stillhouse Hollow Lake is impaired by elevated bacteria concentrations and does not meet Texas Surface Water Quality Standards for contact recreation. However, the Lampasas River was not listed as impaired on the 2010 and 2012 Integrated Report. The river's delisting occurred because no additional data had been collected for assessment from 2000 until late 2009 and existing historical data no longer met TCEQ's criteria to be included in assessment but is still listed as impaired due to depressed dissolved oxygen in segments 1217B and 1217D. There is also concern for water quality based on screening levels for macrobenthic community in segments 1217_02 and 1217B_01.

Prior to the river's delisting, AgriLife Research and TSSWCB established the Lampasas River Watershed Partnership in November 2009 as part of TSSWCB project 07-11, *Lampasas River Watershed Assessment and Protection Project*. Through this project, land use was updated, water quality modeling using existing data was conducted, and a WPP was developed to address the bacteria impairment. The development of a WPP was a stakeholder driven process facilitated by AgriLife Research. With technical assistance from AgriLife Research and other state and federal partners, the Steering Committee identified water quality issues that are of particular importance to the surrounding communities. The Steering Committee also contributed information on land uses and activities that were utilized in identifying the potential sources of bacterial impairments and in guiding the development of the WPP. The WPP identified responsible parties, implementation milestones and estimated financial costs for individual management measures and outreach and education activities. The plan also described the estimated load reductions expected from full implementation of all management measures. The Partnership also developed a water quality monitoring regime that they felt would provide an accurate measure of the effectiveness of the WPP's implementation on the bacteria loads within the river and its tributaries.

During the development of the WPP, Texas Water Resources Institute (TWRI) completed a water quality monitoring and bacterial source tracking project within the Lampasas River watershed as part of TSSWCB project 10-51, *Bacterial Source Tracking to Support the Development and Implementation of Watershed Protection Plans for the Lampasas and Leon Rivers*. Fifteen river and tributary sites were selected by the Partnership to be monitored monthly for conventional field parameters, bacteria enumeration and bacterial source tracking. Sample collection for TSSWCB project 10-51 concluded in January 2012.

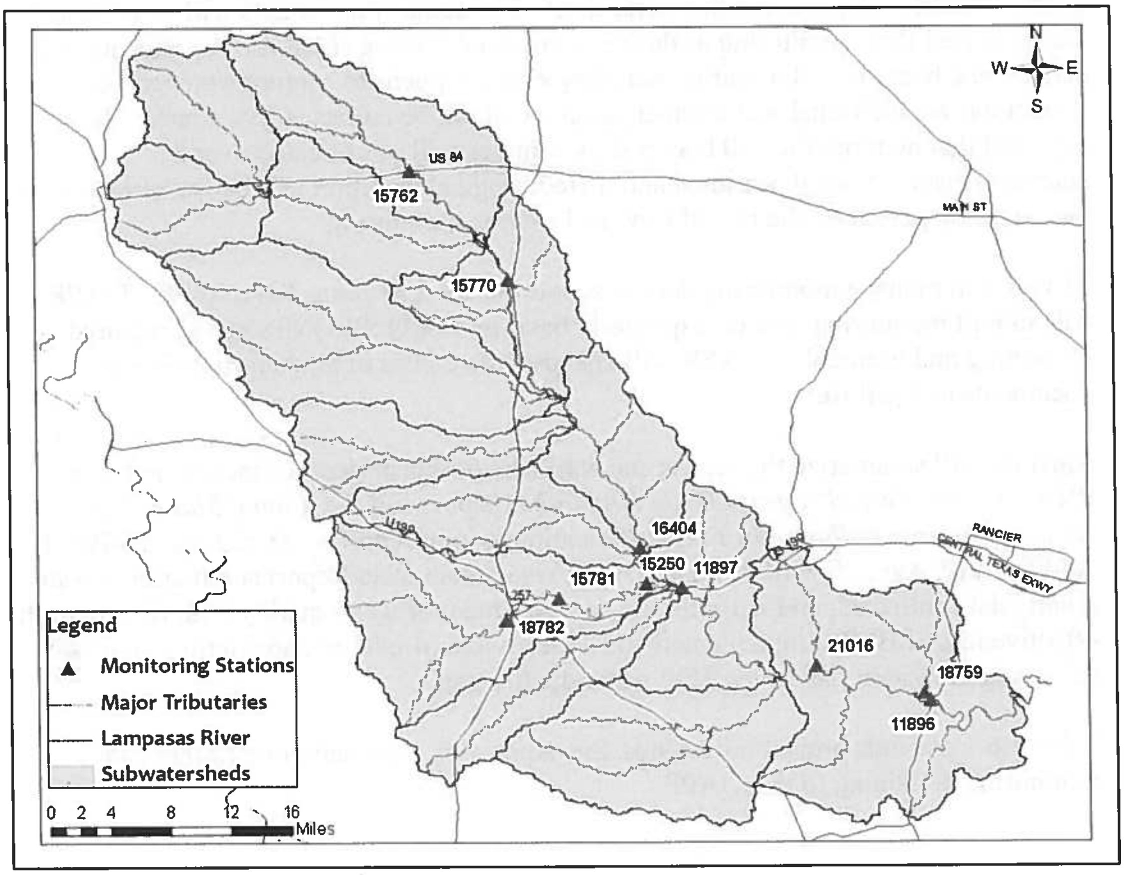
While the Brazos River Authority (BRA) and TCEQ both collect water quality data within the watershed (typically on a quarterly basis), the Partnership felt it was not intensive enough to detect changes or trends in surface water quality.

The stakeholders of the Lampasas River Watershed Partnership feel that maintaining a continuous monitoring program is crucial to the success of the WPP. This project will provide critical water quality data that will be used to judge the effectiveness of WPP implementation efforts and serve as a tool to quantitatively measure water quality restoration.

A6 PROJECT/TASK DESCRIPTION

This project will generate bacteria, conventional, flow, and field data of known and acceptable quality from surface water quality monitoring of ten main stem and tributary stations on the Lampasas River above Stillhouse Hollow Lake (1217), Reese Creek (1217F), Clear Creek (unclassified tributary to 1217), and Sulphur Creek (1217B). Two types of surface water quality monitoring will be conducted: routine and biased flow. Figure A6.1 is a map of the monitoring locations in the Lampasas River watershed.

Figure A6.1 Map of Lampasas River Monitoring Locations



AgriLife will conduct work performed under this project associated with technical and financial supervision, preparation of status reports, and coordination with local stakeholders, data analysis and development of the final project report. AgriLife will participate in the Lampasas River Watershed Partnership (LRWP), Steering Committee, Technical Advisory Group (TAG) and appropriate Work Groups in order to efficiently and effectively achieve project goals and summarize activities and achievements made throughout the course of this project.

TIAER will conduct surface water quality sample and data collection, laboratory analyses, and data preparation for submission, as required. TIAER will conduct routine monitoring at 10 sampling stations (5 mainstem and 5 tributary) on a monthly basis, collecting field and flow data, along with water quality samples that will be analyzed for conventional and bacteria parameter groups. The sampling period extends over 24 months, generating an expected 240 total number of routine samples. The routine monitoring will be coordinated with the existing routine monitoring regime conducted by TCEQ and BRA at seven of the sampling stations.

TIAER will also conduct biased flow monitoring at the same 10 stations once per quarter/season under wet weather conditions. The same types of data will be collected during biased flow monitoring as during routine monitoring (field, flow, conventional parameters, bacteria). If a routine sampling event happens to capture wet weather conditions, an additional wet weather sample will not be collected that quarter. It is expected that no more than 80 biased flow samples will be collected over 8 quarters/seasons. Spatial, seasonal and meteorological variation will be captured across the sampling period by the biased flow and routine monitoring.

TIAER will manage monitoring data in support of the Lampasas River WPP. TIAER will submit monitoring data on a quarterly basis to TCEQ SWQMIS, using required formatting and protocols. TIAER will also provide copies of all data submission documents to AgriLife.

AgriLife will summarize the results and activities of this project for inclusion in the BRA's *Clean Rivers Program Basin Highlights Report* and the *Annual Managing Nonpoint Source Pollution in Texas* publication, a joint report by TCEQ and TSSWCB. Additionally, AgriLife will develop a final Assessment Data Report summarizing water quality data collected, and will provide an assessment of water quality with respect to the effectiveness of BMPs implemented and a discussion of interim short-term progress in achieving the Lampasas River WPP water quality goals.

Table A6.1 presents project milestones. See Appendix A for sampling design and monitoring pertaining to this QAPP.

Table A6.1 Project Milestones

TASK	PROJECT MILESTONES	AGENCY	START	END
2.1	Develop QAPP for review by TSSWCB and USEPA.	TIAER & AgriLife	M1	M9
2.2	Submit revisions to QAPP as necessary.	TIAER & AgriLife	M9	M36
3.1	Monitor 10 routine sites monthly, collecting field, conventional, flow and bacteria parameter groups.	TIAER	M9	M33
3.2	Conduct biased flow monitoring at 10 sites, once per season under wet conditions, collecting field, conventional, flow and bacteria parameter groups.	TIAER	M9	M33
3.3	Transfer monitoring data on a quarterly basis to TCEQ SWQMIS. Submit station location requests to TCEQ, if required. Submit data correction requests, if errors are discovered in reported data.	TIAER	M1	M36
3.4	Summarize water quality data and conduct statistical and trend analysis to evaluate effectiveness of BMPs.	AgriLife	M28	M36

A7 QUALITY OBJECTIVES AND CRITERIA FOR DATA QUALITY

The purpose of the project's water quality monitoring is to support implementation of the Lampasas River WPP by collecting surface water data for use in evaluating the effectiveness of BMPs and in assessing water quality improvement. The water quality data and evaluations of water quality conditions will be communicated to the public and the Lampasas River Watershed Partnership Steering Committee to support adaptive management of the LR WPP and expand public knowledge on Lampasas River water quality data. Routine data collected from the mainstem of the Lampasas will be assessed by the TCEQ as part of the Integrated Report.

Routine and flow biased watershed monitoring is designed to monitor sites to characterize the water quality under a range of flow regimes created by wet and dry periods, assess water quality with respect to effectiveness of implemented best management practices, and investigate areas of potential concern. Monitoring in the Lampasas River watershed will be performed to capture spatial, seasonal and meteorological data to provide snapshots of water quality under a variety of conditions.

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

Ambient Water Reporting Limits (AWRLs)

AWRLs establish 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 TCEQ water quality assessment. The limit of quantitation (LOQ) is the minimum level, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The following requirements must be met in order to report results to the TCEQ SWQMIS:

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

Laboratory measurement quality control requirements and acceptability criteria are provided in Section B5.

Table A7.1 Measurement Performance Specifications

PARAMETER	UNITS	MATRIX	METHOD	PARA-METER CODE	AWRL	LOQ	LOQ CHECK STD %Rec	PRECISION (RPD of LCS/LCS dup)	BIAS (%Rec. of LCS)	Lab
Field Parameters										
pH	pH/ units	water	SM 4500-H^+ B. and TCEQ SOP, V1	00400	NA	NA	NA	NA	NA	Field
DO	mg/L	water	SM 4500-O G. and TCEQ SOP, V1	00300	NA	NA	NA	NA	NA	Field
Specific Conductance	µS/cm	water	SM 2510 and TCEQ SOP, V1	00094	NA	NA	NA	NA	NA	Field
Temperature	°C	water	SM 2550 and TCEQ SOP, V1	00010	NA	NA	NA	NA	NA	Field
Flow	cfs	water	TCEQ SOP, V1	00061	NA	NA	NA	NA	NA	Field
Days since precipitation event	days	water	TCEQ SOP V1	72053	NA	NA	NA	NA	NA	Field
Flow measurement method	1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler	water	TCEQ SOP, V1	89835	NA	NA	NA	NA	NA	Field
Flow severity	1-no flow 2-low 3-normal 4-flood 5-high 6-dry	water	TCEQ SOP, V1	01351	NA	NA	NA	NA	NA	Field
Flow Estimate	cfs	water	TCEQ SOP, V1	74069	NA	NA	NA	NA	NA	Field
Maximum pool width at time of study[1]	meters	other	TCEQ IGD	89864	NA	NA	NA	NA	NA	Field
Maximum pool depth at time of study[1]	meters	other	TCEQ IGD	89865	NA	NA	NA	NA	NA	Field
Pool length[1]	meters	other	TCEQ IGD	89869	NA	NA	NA	NA	NA	Field
% pool coverage in 500 meter reach[1]	meters	other	TCEQ IGD	89870	NA	NA	NA	NA	NA	Field
Conventional and Bacteriological Parameters										
TSS	mg/L	water	SM 2540 - D	00530	4	4	NA	NA	NA	TIAER
Chlorophyll-a, spectrophotometric method	µg/L	water	SM 10200 - H	32211	3	3	NA	NA	NA	TIAER
Pheophytin, spectrophotometric method	µg/L	water	SM 10200 - H	32218	3	3	NA	NA	NA	TIAER
E. coli, modified mTEC	CFU/100mL	water	EPA 1603[2]	31648	1	1	NA	0.5[3]	NA	TIAER
Total Kjeldahl Nitrogen	mg/L	water	SM 4500 – NH_3 G	00625	0.2	0.2	70-130	20	80-120	TIAER
Nitrate+Nitrite-N, total	mg/L	water	SM 4500 – NO_3 F	00630	0.05	0.05	70-130	20	80-120	TIAER
Total Phosphorus	mg/L	water	EPA 365.4	00665	0.06	0.06	70-130	20	80-120	TIAER

1 Parameters for pools to be reported only if pooled conditions are sampled as outlined under the TCEQ Interim Guidance for Routine Surface Water Quality Monitoring During Extended Drought.
2 Modification to EPA 1603 will be the use of specialized bacterial plate incubators instead of a water bath
3 This value represents the maximum allowable difference between the logarithm of the sample result and the logarithm of the duplicate result.

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," Online Edition, most recent version

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

TCEQ IGD – TCEQ's Interim Guidance for Routine Surface Water Quality Monitoring During Extended Drought. Oct. 3, 2011

Precision

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

Laboratory precision is assessed by comparing replicate analyses of laboratory control samples in the sample matrix (e.g. deionized water, sand, commercially available tissue) or sample/duplicate pairs in the case of bacterial analysis. Precision results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for precision are defined in Table A7.1.

Bias

Bias is a statistical measurement of correctness and includes multiple components of systematic error. A measurement is considered unbiased when the value reported does not differ from the true value. Bias is determined through the analysis of laboratory control samples and LOQ check samples prepared with verified and known amounts of all target analytes in the sample matrix (e.g. deionized water) and by calculating percent recovery. Results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for 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 SWQM SOPs, and use only of approved analytical methods will assure that the measurement data represents the conditions at the monitoring sites. Representativeness will be measured with the completion of sample collection in accordance with the approved QAPP. The goal for meeting total representation of the waterbody will be tempered by the availability of stream and meteorological conditions during the project and the potential funding for complete representativeness.

Routine data collected for the project and submitted to TCEQ for water quality assessments are considered to be spatially and temporally representative of routine water quality conditions. Water quality data are collected on a monthly frequency and are separated by approximately even time intervals. Although data may be collected during varying regimes of weather and flow, the data sets collected during routine monitoring will not be biased toward unusual conditions of flow, runoff, or season. The routine sites will double as targeted sites. Routine samples may satisfy the wet (biased high flow) weather conditions, depending on the flow conditions when samples are collected during the routine sampling that quarter.

Data collection for targeted sampling will be biased toward conditions influenced by storm events. Depending on meteorological conditions, monitoring for stormwater flows will occur once per season during a measurable rainfall event, if such conditions occur.

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 SWQM SOPs. Comparability is also guaranteed by reporting data in standard units, by using accepted rules for rounding figures, and by reporting data in the format required for submission to SWQMIS.

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 monitoring staff personnel receive training in proper sampling and field data collection. Before independent sampling or data collection occurs, staff demonstrate to the Field Operations Supervisor (or designee) their ability to properly calibrate field equipment and perform field sampling and data collection procedures. Field personnel training is documented and retained in the personnel file. The documentation is available during monitoring systems audits.

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

A9 DOCUMENTS AND RECORDS

The documents and records that describe, specify, report, or certify activities are listed In Table A9.1. All records are kept for a minimum of five years after the end of the project.

Table A9.1 Project Documents and Records

Document/Record	Location	Retention*	Format
QAPPs, amendments and appendices	TSSWCB/AgriLife	5 years	Paper/ Electronic
QAPP distribution documentation	AgriLife	5 years	Paper/ Electronic
QAPP commitment letters	AgriLife	5 years	Paper/ Electronic
Field notebooks or data sheets	TIAER	5 years	Paper/ Electronic
Field staff training records	TIAER	5 years	Paper/ Electronic
Field equipment calibration/maintenance logs	TIAER	5 years	Paper/ Electronic
Chain of custody records	TIAER	5 years	Paper/ Electronic
Field SOPs	TIAER	5 years	Paper/ Electronic
Laboratory QA Manuals	TIAER	5 years	Paper/ Electronic
Laboratory SOPs	TIAER	5 years	Paper/ Electronic
Laboratory data reports/results	TIAER	5 years	Paper/electronic
Laboratory staff training records	TIAER	5 years	Paper/ Electronic
Instrument printouts	TIAER	5 years	Paper/ Electronic
Laboratory equipment maintenance logs	TIAER	5 years	Paper/ Electronic
Laboratory calibration records	TIAER	5 years	Paper/ Electronic
Corrective Action Documentation	TIAER	5 years	Paper/ Electronic

*Retention period in paper format/electronic format.

All TIAER records, including notebooks and electronic files of technical staff, will be archived by TIAER for at least five years after the end of the project. Electronic data are backed up on individual computers and on the network server, which is backed up daily; data are also backed up to an external hard drive weekly. In the event of a catastrophic systems failure, the tapes can be used to restore the data in less than one day's time. Data generated on the day of the failure may be lost, but can be reproduced from raw data in most cases.

The TSSWCB may elect to take possession of records at the conclusion of the specified retention period.

Laboratory Test Reports

Test reports from the laboratory will document the test results clearly and accurately. Reporting of the data will follow standard formats and protocols for TCEQ's SWQMIS database. If needed for alternate types of reporting by TSSWCB, requirements and procedures for reporting data are provided below.

* title of report and unique identifiers on each page
* name and address of the laboratory
* name and address of the client
* a clear identification of the sample(s) analyzed
* date and time of sample collection
* date and time of sample receipt
* sample depth
* identification of analytical method used
* identification of samples not meeting QA requirements and reason (i.e., holding times exceeded)
* sample results
* units of measurement
* sample matrix
* dry weight or wet weight (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 field split results (as applicable); equipment, trip, and field blank results (as applicable); and LOQ and LOD 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
* certification of NELAC® compliance on a result by result basis.

Electronic Data

Data will be submitted electronically to the TCEQ SWQMIS and/or consultant for review in the Event/Result file format. A completed Data Summary (see example in Appendix D) will be included with each data submittal.

Revisions and Amendments to the QAPP

Until the work described is completed, this QAPP shall be revised as necessary and reissued annually on the anniversary date, or revised and reissued within 120 days of significant changes, whichever is sooner. The last approved versions of QAPPs shall remain in effect until revised versions have been fully approved; the revision must be submitted to the TSSWCB and EPA Region 6 for approval no less than sixty (60) days before the last approved version has expired. If the entire QAPP is current, valid, and accurately reflects the project goals and the organization's policy, the annual re-issuance may be done by a certification that the plan is current. This will be accomplished by submitting a cover letter stating the status of the QAPP and a copy of new, signed approval pages for the QAPP to TSSWCB and EPA Region 6, sixty (60) days prior to the last approved version expiring.

Amendments to the QAPP may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods; address deficiencies and nonconformance; improve operational efficiency; and/or accommodate unique or unanticipated circumstances. Requests for amendments will be directed from the AgriLife Project Manager to the TSSWCB Project Manager electronically. Amendments are effective immediately upon approval by the AgriLife Project Manager, TIAER Project Manager, TIAER Project QAO, the TSSWCB Project Manager, the TSSWCB QAO and EPA Region Project Officer. They will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the TIAER Project Manager. Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual revision process.

B1 SAMPLING PROCESS DESIGN

The sample design was developed to support implementation of the Lampasas River WPP by collecting surface water data for use in evaluating the effectiveness of BMPs and assessing water quality improvement. The water quality data and evaluations of water quality conditions will be communicated to the public and the Lampasas River Watershed Partnership Steering Committee to support adaptive management of the LR WPP and expand public knowledge on Lampasas River water quality data. Routine data collected from the mainstem of the Lampasas will be assessed by the TCEQ as part of the Integrated Report. . Achievable water quality objectives and priorities and the identification of water quality issues were used to develop the work plan, in accordance with available resources. The TSSWCB and AgriLife coordinate closely with other participants to ensure a comprehensive water monitoring strategy within the watershed.

Ten routine monitoring sites have been selected to provide spatial distribution of data in the watershed. (See Figure A6.1.) Monthly routine monitoring at each site includes conventional, bacterial and field parameter groups (total suspended solids, chlorophyll a, pheophytin, total Kjeldahl nitrogen, nitrate+nitrite nitrogen, total phosphorus, *E. coli*, flow pH, dissolved oxygen, water temperature, and specific conductance). Analytical results will be used to assess water quality with respect to effectiveness of best management practices implemented. There may be times, during dry weather conditions, when there is no water in the stream in the subwatersheds. Those visits will be documented but no water quality samples will be collected. During periods when water is not flowing, a flow severity of either No Flow (1) or Dry (6) will be recorded and reported. In addition, when pooled conditions exist, an Instantaneous Flow for parameter 00061 will be reported as 0. When the stream is dry no record is reported for parameter 00061. If waters are pooled at a station, not flowing, and pools meet guidelines as outlined in the TCEQ *Interim Guidance for Routine Surface Water Quality Monitoring During Extended Drought*, water samples will be collected and analyzed as routine samples. Under pooled conditions only will the additional parameters of maximum pool width, maximum pool depth, pool length, and % pool coverage in 500 meter reach be reported. Routine monitoring will complement existing routine ambient monitoring being conducted by TCEQ and BRA.

Biased flow monitoring will be conducted at the same ten sites in the Lampasas River and contributing subwatersheds. Sampling will be conducted once per quarter for eight quarters during wet weather conditions. Streams are considered under wet weather conditions after a rainfall event that contributes runoff to the base flow of the stream. In case of lightning or flooding during wet weather conditions, the safety of the sampling crew will not be compromised. In the instance that a sampling site is inaccessible or unsafe to access due to weather conditions or flooding, "no sample due to inaccessibility" will be documented in the field notebook and a flow severity of Flood (4) will be reported.

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

B2 SAMPLING METHODS

Field Sampling Procedures

Field sample and data collection will be conducted according to procedures documented in the most current version of *TCEQ Surface Water Quality Monitoring Procedures, Volume 1*. Specifications outlined in Table B2.1 reflect additional requirements for sampling for the project and/or provide additional clarification.

Table B2.1 Sample Storage, Preservation and Handling Requirements

Parameter	Matrix	Container	Preservation*	Sample Volume	Holding Time
TSS	Water	Plastic or glass	Cool, >0-≤6°C	1 L	7 days
NO_2+NO_3-N	Water	Plastic or glass	Cool, >0-≤6°C; H_2SO_4 to pH < 2*	1 L	28 days
TKN	Water	Plastic or glass	Cool,">0-≤6°C, H_2SO_4 to pH < 2*	1 L	28 days
Total Phosphorus	Water	Plastic or glass	Cool, >0-≤6°C; H_2SO_4 to pH < 2*	1 L	28 days
Chlorophyll a and Pheophytin	Water	Amber plastic or glass	Dark, Cool, ">0-≤6°C	1 L	Filter within 48 hours; 28 days at 0°C
E. coli	Water	Sterile, plastic and pretreated with sodium thiosulfate	Cool, >0-≤6°C	250 mL	8 hours

*Preservation occurs within 15 minutes of sample collection.

Sample Containers

Sterile bacteria containers and syringes for field filtering are used only once before being disposed. The remainder of the sample containers are reusable plastic bottles. Reusable containers are thoroughly cleaned upon receipt before initial use and after each use. Reusable containers are cleaned by washing them in hot, soapy (non-phosphate) water, then rinsed first in warm tap water, then with 1 N hot HCL, and finally rinsed at least three times in type II ASTM water, which has conductivity of less than 1 microsiemen per centimeter. Containers are then placed on a rack to dry. The TIAER QAM-I-116 "Preparation of Labware" contains specific steps used for cleaning sampling containers and equipment used in field operations and is available for review upon request.

TIAER's tracking system to detect contamination resulting from the washing procedure is based on method blank numbers, which are date stamped numbers assigned at the time of analysis. One method blank is evaluated with each preparation batch of 20 samples or less by analyzing deionized water in the same manner as environmental samples. Each lot of sterile, disposable bacteria containers is also tested for sterility as part of the bacterial analyses QC. If any measured concentration is greater than the LOQ, the method blank fails and is reanalyzed. If the method blank fails a second time, the data are flagged for review by the Project Manager and QAO. Sources of contamination are investigated and remediated, if found. Corrective action documentation is maintained for all method blanks that exceed the LOQ.

Processes to Prevent Contamination

Procedures in the *TCEQ Surface Water Quality Monitoring Procedures* outline the necessary steps to prevent contamination of samples, including direct collection into sample containers, when possible. 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 (see Appendix B). The following will be recorded for all visits:

- station ID
- sampling date
- sampling time
- sampling depth
- sample collector's name/signature
- values for all field parameters, including flow and flow severity
- detailed observational data, where appropriate, including:
  - water appearance
  - weather
  - biological activity
  - unusual odors
  - pertinent observations related to water quality or stream uses (i.e., exceptionally poor water quality conditions; stream uses such as swimming, boating, fishing, irrigation pumps)
  - watershed or instream activities (i.e., bridge construction, livestock watering upstream)
- 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:

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

Sampling Method Requirements or Sample Processing Design Deficiencies and Corrective Action

Examples of sampling method requirements or sample design deficiencies include but are not limited to such things as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately, contamination of a sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any deviations from the QAPP and appropriate sampling procedures may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected. It is the responsibility of the TIAER Project Manager, in consultation with the TIAER Project QAO, to ensure that the actions and resolutions to problems are documented by completion of a corrective action report (CAR) and that records are maintained in accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the AgriLife Project Manager who will inform the TSSWCB Project Manager in writing in the project progress reports.

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

B3 SAMPLE HANDLING AND CUSTODY

Sample Tracking

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

A sample is in custody if it is in actual physical possession or in a secured area that is restricted to authorized personnel. The Chain of Custody (COC) form is a record that documents the possession of the samples from the time of collection to receipt in the laboratory. The following information concerning the sample is recorded on the COC form (See Appendix C).

- Date and time of collection
- Site identification
- Sample matrix, indicated by the test group code
- Number of containers and container type ID designation
- Preservative used or if the sample was filtered, indicated by test group code
- Analyses required, indicated by the test group code
- Name of collector
- Custody transfer signatures and dates and time of transfer
- Name of laboratory accepting the sample

Sample Labeling

Samples from the field are labeled on the container with an indelible marker. Label information includes:

- Site identification
- Date of sampling
- Time of sampling
- Preservative added, if applicable

Sample Handling

After collection of samples is complete, sample containers are immediately stored in an ice chest for transport to the TIAER laboratory. Ice chests remain in the possession of the field technician or in the locked vehicle until delivered to the lab. After submission to the TIAER laboratory, the samples remain in the log-in room until log-in is complete, then they are stored in the refrigeration unit or given to an analyst for immediate analysis. Only authorized laboratory personnel handle samples received by the laboratory.

Sample Tracking Procedure Deficiencies and Corrective Action

All deficiencies associated with COC procedures and described in this QAPP are immediately reported to the TIAER Project Manager. These include such items as delays in transfer resulting in holding time violations; violations of sample preservation requirements; incomplete documentation, including signatures; possible tampering of samples; and broken or spilled samples. The TIAER Project Manager, in consultation with the AgriLife PM and TIAER Project QAO, will determine if the procedural violation may have compromised the validity of resulting data. Any failures that have reasonable potential to compromise data quality will invalidate data, and the sampling event should be repeated, if feasible. The resolution of the situation will be reported to the TSSWCB Project Manager in the project progress report. CARs will be prepared by the TIAER personnel and summarized by the TIAER PM for submittal to the AgriLife Project Manager for inclusion with project progress report.

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

B4 ANALYTICAL METHODS

The analytical methods, associated matrices, and performing laboratories are listed in Table A7.1 of Section A7. The procedures for laboratory analysis shall 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 Part 136, or other reliable procedures acceptable to the TSSWCB.

Laboratories collecting data under this QAPP are compliant with the NELAC® standards, at a minimum. Copies of laboratory SOPs are available for review by the TSSWCB.

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. Reagent bottles are labeled to trace the reagent back to preparation. Table A7.1, Measurement Performance Specifications, lists the methods to be used for field and laboratory analyses.

Deficiencies, Nonconformances and Corrective Action Related to Quality Control

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, and QC sample failures.

Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff and reported to the pertinent field or laboratory supervisor who will notify the TIAER Project Manager. A Corrective Action Report to document the deficiency is written for each deficiency.

The TIAER Project Manager, in consultation with the AgriLife PM and TIAER Project QAO (and other affected individuals/organizations), will determine whether the deficiency could affect data quality. If it is determined the item in question does not affect data quality and therefore is not a valid nonconformance, the CAR will be completed accordingly and closed. If it is determined a nonconformance does exist, the TIAER Project Manager, in consultation with the AgriLife PM and TIAER Project QAO, will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented in the CAR (see Appendix E).

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

The TCEQ has determined that analyses associated with the qualifier codes (e.g. "holding time exceedance", "sample received unpreserved", "estimated value") may have unacceptable measurement uncertainty associated with them. Therefore, data with these types of problems shall be clearly qualified when the dataset is submitted to the TCEQ. Additionally, any data collected or analyzed by means other than those stated in the QAPP, or data suspect for any reason shall be appropriately qualified (see SWQM DMRG November 2013 or most recent version for data qualifiers). TCEQ will review the data and load approved data into SWQMIS.

B5 QUALITY CONTROL

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

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

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

Detailed laboratory QC requirements and corrective action procedures are contained within the individual laboratory SOPs. The minimum requirements to which all participants abide by are stated below.

Limit of Quantitation (LOQ) – The laboratory will analyze a calibration standard (if applicable) at the LOQ on each day calibrations are performed. In addition, an LOQ check sample will be analyzed with each analytical batch. Calibration results, including the standard at the LOQ listed in Table A7.1, will meet the calibration requirements of the analytical method or corrective action will be implemented.

LOQ Check Sample – An LOQ check sample consists of a sample matrix (e.g., deionized water, sand, commercially available tissue) free from the analytes of interest spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes. The LOQ check sample is carried through the complete preparation and analytical process and run at a rate of one per analytical batch. It is used to establish intra-laboratory bias to assess the performance of the measurement system at the lower limits of analysis.

The LOQ check sample is spiked into the sample matrix at a level less than or near the LOQ for each analyte in each analytical batch of samples analyzed. If it is determined that sample results exceeded the high range of the calibration curve, samples should be diluted or run on another curve. For samples run on batches with calibration curves that do not include the LOQ, a check sample will be run at the low end of the calibration curve.

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

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

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

<u>Laboratory Control Sample (LCS)</u> - A LCS consists of a sample matrix (e.g. deionized water) free from the analytes of interest spiked with verified known amounts of analyte. It is used to establish intra-laboratory bias to assess the performance of the measurement system. The LCS is spiked into the sample matrix at a level less than or equal to 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. The LCS is carried through the complete preparation and analytical process and 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; and SA is the true result:

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

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

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

For most parameters, except bacteria, precision is evaluated using the relative percent difference (RPD) between duplicate LCS results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X1 and X2, the RPD is calculated from the following equation:

$$RPD = |(X1 - X2)/\{(X1+X2)/2\} * 100|$$

For bacteriological parameters, precision is evaluated using the results from laboratory sample duplicates. Bacteriological duplicate are collected on a 10% frequency (or once per sampling run, whichever is more frequent). These duplicates will be collected in sufficient volume (200 mL or more) for analysis of the sample and its laboratory duplicate from the same container.

The base-10 logarithms of the results from the original sample and its duplicate are calculated. The absolute value of the difference between the two logarithms will be compared to the precision criterion in Table A7.1. If the difference in logarithms is greater than the precision criterion, the data are not acceptable for use under this project and will not be reported to TSSWCB. Results from all samples associated with that failed duplicate (usually a maximum of 10 samples) will be considered to have excessive analytical variability and will be qualified as not meeting project QC requirements.

The precision criterion in Table A7.1 for bacteriological duplicates applies to only samples with concentrations > 10 MPN/100 mL. Field splits are not collected for bacteriological analyses.

<u>Matrix spike (MS)</u> –Matrix spikes are prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. The components to be spiked shall be specified by the mandated analytical method. The results from matrix spikes are primarily designed to assess the validity of analytical results in a given matrix, and are expressed as percent recovery (%R).

Matrix spikes indicate the effect of the sample on the precision and accuracy of the results generated using the selected method. The frequency of matrix spikes is specified by the analytical method, or a minimum of one per preparation batch, whichever is greater. To the extent possible, matrix spikes prepared and analyzed over the course of the project should be performed on samples from different sites.

The percent recovery of the matrix spike is calculated using the following equation, where %R is percent recovery, SSR is the concentration measured in the matrix spike, SR is the concentration in the unspiked sample and SA is the concentration of analyte that was added:

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

Matrix spike recoveries are compared to the acceptance criteria published in the mandated test method. Where there are no established criteria, the laboratory shall determine the internal criteria and document the method used to establish the limits. If the matrix spike results are outside laboratory-established criteria, there will be a review of all other associated quality control data in that batch. If all of quality control data in the associated batch passes, it will be the decision of the TIAER PM in consultation with the AgriLife PM to either report the data for the analyte that failed in the parent sample to

TCEQ SWQMIS or to determine that the result from the parent sample associated with that failed matrix spike is considered to have excessive analytical variability and does not meet project QC requirements. Depending on the similarities in composition of the samples in the batch, TIAER and AgriLife may consider excluding all of the results in the batch related to the analyte that failed recovery.

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

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

Deficiencies, Nonconformances and Corrective Action Related to Quality Control

Deficiencies are defined as unauthorized deviations from procedures documented in the QAPP or other applicable documents. Nonconformances are deficiencies that affect data quantity and/or quality and render the data unacceptable or indeterminate. Deficiencies related to QC include but are not limited to field and laboratory QC sample failures.

Deficiencies are documented in logbooks, field data sheets, etc., by field or laboratory staff and reported to the appropriate field or laboratory supervisor who will notify the TIAER Project Manager. The TIAER Project Manager will notify the TIAER QAO of the potential nonconformance. The TIAER QAO will initiate a CAR to document the deficiency.

The TIAER Project Manager, in consultation with TIAER Project 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 CAR will be completed accordingly and the CAR closed. If it is determined a nonconformance does exist, the TIAER Project Manager in consultation with the TIAER QAO will determine the disposition of the nonconforming activity or item and necessary corrective action(s);

results will be documented by the TIAER QAO by completion of a CAR (see Appendix E).

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 AgriLife and TSSWCB 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, Volume 1*. 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 SOPs.

B7 INSTRUMENT CALIBRATION AND FREQUENCY

Field equipment calibration requirements are contained in the *TCEQ Surface Water Quality Monitoring Procedures, Volume 1*. 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 SWQMIS.

Detailed laboratory calibrations are contained within the laboratory SOPs.

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

All sampling equipment testing and maintenance requirements are detailed in the most recent version of *TCEQ Surface Water Quality Monitoring Procedures, Volume 1*. 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 SOPs.

B9 NON-DIRECT MEASUREMENTS

Flow data from the United States Geological Survey (USGS) Station 08103800, Lampasas River near Kempner, Texas, is collocated with monitoring station 11897. Flow data from this USGS station will be used for this project.

For evaluating trends, historical data from SWQMIS will be included in the statistical as well as samples collected during the study period by the Brazos River Authority and TCEQ under the Clean Rivers Program.

B10 DATA MANAGEMENT

Data Management Process

Data Dictionary - Terminology and field descriptions are included in the *SWQM Data Management Reference Guide*, November 2013 or most recent version. The following table contains the codes used by TIAER when submitting data under this QAPP. The parameters associated with each sample and the sampling frequency by station are presented in Appendix A.

Table B10.1 Entity Codes

Sample Description	Tag Prefix	Monitoring Type	Submitting Entity	Collecting Entity
Routine Lampasas River mainstem grab sample (flowing, pooled, or dry)	*TX*	*RT*	*TX*	*TA*
Routine tributary grab sample (flowing, pooled, or dry)	*TX*	*RTBA*	*TX*	*TA*
Biased flow, wet-weather sample collected manually	*TX*	*BFBA*	*TX*	*TA*

TA Texas Institute for Applied Environmental Research
TX Texas State Soil and Water Conservation Board
RT Monitoring Type code for routine samples
RTBA Monitoring Type code for unbiased samples collected to evaluate BMP effectiveness
BFBA Program code for samples biased for flow conditions that are manually collected

TIAER Data Management Process

Field technicians and laboratory personnel follow protocols that ensure data collected for TSSWCB Project No. 13-09 maintain their integrity and usefulness. Field data collected at the time of the sampling event are logged by the field technician, along with notes on sampling conditions in field logs or on field data sheets. The field log/sheet is the responsibility of the field technician. The sample, accompanied by a COC, is submitted to the laboratory where a TIAER Laboratory staff member reviews the COC to verify that it is filled out correctly and completely, and matches the submitted samples. The log-in staff member assigns a unique sample number to each sample, which is then recorded on the COC and the sample container. The log-in staff member logs the sample into the TIAER database. Laboratory analysts take receipt of the sample, begin sample prep or analysis and transfer samples into the refrigerator for storage. Examples of the field data sheets and COC used can be found in Appendices B and C. Samples that are outsourced to other laboratories are accompanied by a copy of the COC.

Data generated by lab technicians are logged permanently on analysis bench sheets. The data are reviewed by the analyst prior to entering the data into the TIAER database. In the review, the analyst verifies that the sample data include date and time of analysis, documentation of dilutions and correction factors, and documentation of instrument calibrations, standard curves and control standards. The analysts also verify use of correct calculations and that data meet data quality objectives. A second review by another lab analyst/technician validates that the data meets the data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. After this review the lab analyst/technician inputs the data and quality control information into the Lab Samples Database for report generation and data storage.

The TIAER Laboratory Manager reviews the data after all analyses are complete. The analysis log is reviewed to ensure that all necessary information is included and that the data quality objectives have been met. When the report generated by the TIAER laboratory is complete, the lab director enters approval status into the database. If the TIAER Laboratory Manager or Laboratory QAO suspect there has been an error or notes missing information, the data and records are reviewed to determine the need for correction. After review for reasonableness the data is cross-checked to the analysis logs by the TIAER Laboratory Manager. If at any time errors are identified, a CAR is written to document the situation. The TIAER Project Manager is responsible for ensuring that any data anomalies are reported in data submissions to TCEQ SWQMIS. If errors are found, those errors are corrected in the TIAER database and are logged in a data correction log.

The following flow diagram outlines the path of TIAER data generated in the field:

> Field data collected → Field data sheets → Initial data transferred to TIAER water quality database → Quality control review by TIAER Monitoring Staff member → Data reviewed by TIAER Project QAO and TIAER Project Manager → ASCII file format created → TCEQ SWQMIS

The following flow diagram outlines the path of TIAER data generated in the laboratory:

> Lab analysis → Initial data transferred to TIAER water quality database → Quality control review by TIAER Laboratory Manager and Lab QAO, including check for reasonableness and verification to analysis logs → Data reviewed by TIAER Project QAO and TIAER Project Manager → ASCII file format created → TCEQ SWQMIS

The TIAER Project Manager will create the ASCII files in accordance to the guidance set forth in the TCEQ Data Management Reference Guide (DMRG) and submit the files directly to the TCEQ's Data Management & Analysis (DM&A) Team. Once received, DM&A will perform automated validation checks against the data set(s) and after all errors have been addressed, will generate a validation summary report. DM&A will not publish the data set(s) to the production environment of SWQMIS until the TSSWCB Project Manager or QA Officer has approved the validation summary.

Data Errors and Loss

To minimize the potential for data loss, TIAER databases are backed up nightly and copies of the files are stored off-site weekly. If the laboratory database or network server fails, the back-up files can be accessed to restore operation or replace corrupted files.

Record Keeping and Data Storage

After data are collected and recorded on field data sheets, the data sheets are filed for review and reference. These files are kept in paper form for a minimum of five years after the end of the project.

The data produced during each analysis is recorded on analysis bench sheets. The information contained in the bench sheets include all quality control data associated with each day's or batch's analysis. The data on the logs are transferred to the laboratory database for report generation. The bench sheets are kept in paper form for a minimum of five years after the end of the project.

The TIAER water quality database is housed on TIAER computers and is backed up on the network server nightly. The TIAER back-up copy of the network server files is stored off-site at a protected location. The network administrator is responsible for the servers and back up generation.

Copies of data submissions sent to the TCEQ SWQMIS are kept on the TIAER network server. The network server is backed up nightly.

Data Handling, Hardware, and Software Requirements

The laboratory database is housed on a TIAER server and backed up each evening. The systems run on Windows operating systems and any additional software needed for word processing, spreadsheet or presentations uses Microsoft Office 2010.

Information Resource Management Requirements

Data will be managed in accordance with the TCEQ *Surface Water Quality Monitoring Data Management Reference Guide*, and applicable TIAER information resource management policies.

The stations to be monitored for this project will be existing TCEQ stations and will not require further geospatial data processing. However, in the event that it becomes necessary to monitor new stations for this project, Global Positioning System (GPS) equipment may be used as a component of the information required by the Station Location (SLOC) request process for creating the certified positional data that will ultimately be entered into the TCEQ's SWQMIS database. Positional data obtained by TIAER staff members using a Global Positioning System will follow the TCEQ's OPP 8.11 and 8.12 policy regarding the collection and management of positional data. All positional data to be entered into SWQMIS will be collected by a GPS certified individual with an agency approved GPS device to ensure that the agency receives reliable and accurate positional data. Certification can be obtained in any of three ways: completing a TCEQ training class, completing a suitable training class offered by an outside vendor, or by providing documentation of sufficient GPS expertise and experience.

In lieu of entering coordinates collected with a Global Positioning System, positional data may be acquired using a Geographical Information System (GIS) and verified with photo interpolation using a certified source, such as USGS Digital Ortho Quarter-Quadrangles (DOQQs), Google Earth or Google Maps. The verified coordinates and map interface can then be used to develop a new station location.

C1 ASSESSMENTS AND RESPONSE ACTIONS

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

Table C1.1 Assessments and Response Requirements

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	AgriLife and TIAER	Monitoring of the project status and records to ensure requirements are being fulfilled	Report to TSSWCB in Quarterly Report
Monitoring Systems Audit of TIAER	Dates to be determined by TSSWCB	TSSWCB QAO	Field sampling, handling and measurement; facility review; and data management as they relate to the TSSWCB project #13-09	30 days to respond in writing to the TSSWCB to address corrective actions
Laboratory Inspection	Dates to be determined by TSSWCB	TSSWCB QAO	Analytical and quality control procedures employed at the TIAER laboratory and the contracted laboratories	30 days to respond in writing to the TSSWCB to address corrective actions

Corrective Action

The TIAER Project Manager, Project QAO, and Laboratory Manager are 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 TSSWCB and the TIAER Project Managers. Audit reports and corrective action documentation will be submitted to the TSSWCB via AgriLife with the Quarterly Report.

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

C2 REPORTS TO MANAGEMENT

Reports to TIAER Project Management

As part of TIAER's overall data review procedure, the TIAER Laboratory Manager reviews all laboratory QC data results prior to approving the data for use in reports or submission to SWQMIS. Any QC deficiencies are documented by a corrective action report (CAR), which is linked in the database to project samples associated with the quality excursion. The TIAER Project QAO reviews the data for field split results and generates a CAR for any that do not pass project criteria. Any problems associated with sample collection, handling, log-in, or other situation are also documented with CARs. Pertinent supervisors, QAOs, and the Project Manager all review the CARs and provide input and evaluation as necessary prior to data being approved for use or submission. Project status, assessments and significant QA issues will be dealt with by the TIAER Project Manager who will determine whether it will be included in reports to AgriLife and TSSWCB Project Management.

Reports to TSSWCB Project Management

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

<u>Quarterly Report</u> - Summarizes AgriLife and TIAER activities for each task; reports monitoring status, problems, delays, and corrective actions; and outlines the status of each task's deliverables.

<u>Monitoring Systems Audit Report and Response</u> - Following any audit performed by the TSSWCB, a report of findings, recommendations and response is included in the quarterly progress report sent to TSSWCB via AgriLife.

D1 DATA REVIEW, VERIFICATION, AND VALIDATION

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

All field and laboratory will be reviewed and verified for integrity, completeness, reasonableness, and conformance to project requirements, and then validated against the project objectives and measurement performance specifications listed in Table A7.1. Only those data supported by appropriate quality control data and meet the measurement performance specifications defined for this project will be considered acceptable, and will be reported to TCEQ SWQMIS.

D2 VERIFICATION AND VALIDATION METHODS

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

Data review, verification, and validation will be performed using self-assessments and peer and management review as appropriate to the project task. The data review tasks to be performed by field and laboratory staff are listed in the first two sections of Table D.2.1, 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 that 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.2.1 is performed by the TIAER Project QAO, then by the TIAER Project Manager. Data review, verification, and validation tasks to be performed on the data set include, but are not limited to, the confirmation of laboratory and field data review, evaluation of field QC results, additional evaluation of anomalies and outliers, analysis of sampling and analytical gaps, and confirmation that all parameters and sampling sites are included in the QAPP.

Another element of the data validation process is consideration of any findings identified during the monitoring systems audit conducted by the TSSWCB QAO. 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 TIAER Project Manager validates that the data meet the data quality objectives of the project and are suitable for reporting to TCEQ SWQMIS.

If any requirements or specifications of the TSSWCB project #13-09 are not met, based on any part of the data review, the responsible party shall document the nonconforming activities with a CAR, which will be reviewed by the TIAER Project Manager prior to submission of the data. This information is communicated to the TSSWCB by the TIAER. Depending on the nonconformance, affected data will be flagged or not transmitted to TCEQ SWQMIS.

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	TIAER Water Quality Field Technicians and Project QAO
Post-calibrations checked to ensure compliance with error limits	TIAER Water Quality Field Specialist
Field data calculated, reduced, and transcribed correctly	TIAER Quality Field Technicians and Project QAO
Laboratory Data Review	**Responsibility**
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	TIAER Project and Laboratory QAOs
Laboratory data calculated, reduced, and transcribed correctly	TIAER Laboratory Manager and TIAER Laboratory QAO
LOQs consistent with requirements for Ambient Water Reporting Limits	TIAER Laboratory QAO and TIAER Laboratory Manager
Analytical data documentation evaluated for consistency, reasonableness and/or improper practices	TIAER Laboratory QAO and TIAER Laboratory Manager
Analytical QC information evaluated to determine impact on individual analyses	TIAER Laboratory QAO and TIAER Laboratory Manager
All laboratory samples analyzed for all parameters	TIAER Laboratory QAO and TIAER Laboratory Manager
Data Set Review	**Responsibility**
The test report has all required information as described in Section A9 of the QAPP	TIAER Project QAO and TIAER Project Manager
Confirmation that field and lab data have been reviewed	TIAER Laboratory Manager and TIAER Field Operations Supervisor
Data set (to include field and laboratory data) evaluated for reasonableness and if corollary data agree	TIAER Project QAO and TIAER Project Manager
Outliers confirmed and documented	TIAER Project QAO
Field QC acceptable (e.g., field splits)	TIAER Project QAO and TIAER Field Operations Supervisor
Sampling and analytical data gaps checked and documented	TIAER Project QAO and TIAER Project Manager
Verification and validation confirmed. Data meets conditions of end use and are reportable	TIAER Project QAO and TIAER Project Manager

D3 RECONCILIATION WITH USER REQUIREMENTS

Data produced in this project, and data collected by other organizations (i.e., BRA, TCEQ, etc.), will be analyzed and reconciled with project data quality requirements. Data meeting project requirements will be used in the implementation of the Lampasas River WPP and will be submitted to TCEQ SWQMIS for use as appropriate in the development of the biennial Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d).

Appendix A
Sampling Process Design and Monitoring Schedule

Sample Design Rationale

The sample design is based on the intent of the TSSWCB project #13-09. The TSSWCB, AgriLife, and TIAER have been tasked with providing data to characterize water quality conditions in support of the implementation of the Lampasas River WPP. AgriLife will summarize the data collected and conduct statistical and trend analyses to evaluate the effectiveness of BMPs implemented. Utilizing historical knowledge of the watershed, including data generated by TSSWCB project 10-51, project participants developed a sampling plan to ensure a comprehensive water monitoring strategy within the watershed. In this project, routine and targeted monitoring is designed to evaluate water quality during a variety of spatial, seasonal and meteorological conditions, to assess water quality with respect to effectiveness of best management practices implementedThe water quality data and evaluations of water quality conditions will be communicated to the public and the Lampasas River Watershed Partnership Steering Committee to support adaptive management of the LR WPP and expand public knowledge on Lampasas River water quality data. Routine data collected from the mainstem of the Lampasas River will be assessed by the TCEQ as part of the Integrated Report.

Site Selection Criteria

This data collection effort involves monitoring routine water quality using procedures 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 basically outlined below, and discussed thoroughly in the *TCEQ Surface Water Quality Monitoring Procedures*. Overall consideration is given to accessibility and safety. All monitoring activities have been developed with the TSSWCB project #13-09 in mind.

1. Locate stream sites so that samples can be safely collected from the centroid of flow. Centroid is defined as the midpoint of that portion of stream width which contains 50 percent of the total flow. If few sites are available for a stream segment, choose one that would best represent the water body, and not an unusual condition or contaminant source. Avoid backwater areas or eddies when selecting a stream site.

2. Because historical water quality data can be very useful in assessing use attainment or impairment, sampling stations with current or past monitoring data have higher preference in selection criteria.

3. Routine monitoring sites were selected to bracket sources of pollution, influence of tributaries, changes in land uses, and hydrological modifications.

Sites should be accessible. Flow measurement will be made during routine and targeted monitoring visits.

Monitoring Sites

The Monitoring Frequency Table for TSSWCB project #13-09 is presented below as Table Appendix A.1

Legend for Table Appendix A:

TA = Texas Institute for Applied Environmental Research
RT = Program code for routine mainstem samples
RTBA = Program code for routine tributary samples
BFBA = Program code for samples biased for flow conditions

RT, RTBA and BFBA samples to include:
Bacteria = E. coli
Conventional = total suspended solids, nitrate nitrogen, chlorophyll a, pheophytin, total phosphorus, total Kjeldahl nitrogen
Flow = flow, flow method (collected by gage, electric, mechanical or Doppler), and estimated flow severity. Note: If pooled or dry, flow method will not be reported.
Field = pH, water temperature, specific conductance, dissolved oxygen

If conditions are pooled, the following pool parameters will be reported:
maximum pool width at time of study, maximum pool depth at time of study, pool length, and % pool coverage in 500 meter reach

Parameters reported if conditions are dry will be flow (reported as zero), flow severity (reported as dry), and days since last significant precipitation.

Table Appendix A.1. Monitoring stations and frequency of monitoring.

Segment ID	TCEQ Station ID	Site Description	Monitor	Monitor Type	Bacteria	Con-ventional	Flow	Field
1217	11896	Lampasas River at HWY 195	TA	RT	24	24	24	24
1217	11896	Lampasas River at HWY 195	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217	11897	Lampasas River at US 190	TA	RT	24	24	24	24
1217	11897	Lampasas River at US 190	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217B	15250	Sulphur Creek at FM 1715	TA	RT	24	24	24	24
1217B	15250	Sulphur Creek at FM 1715	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217	15762	Lampasas River at US 84	TA	RT	24	24	24	24
1217	15762	Lampasas River at US 84	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217	15770	Lampasas River at Lampasas CR 2925	TA	RT	24	24	24	24
1217	15770	Lampasas River at Lampasas CR 2925	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217	16404	Lampasas River at FM 2313	TA	RT	24	24	24	24
1217	16404	Lampasas River at FM 2313	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217F	18759	Reese Creek at FM 2670	TA	RT	24	24	24	24
1217F	18759	Reese Creek at FM 2670	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217B1217	15781	Sulphur Creek at Lampasas CR 3010	TA	RT	24	24	24	24
1217B	15781	Sulphur Creek at Lampasas CR 3010	TA	BFSI	8[1]	8[1]	8[1]	8[1]
1217B	18782	Sulphur Creek at Naruna Rd	TA	RT	24	24	24	24
1217B	18782	Sulphur Creek at Naruna Rd	TA	BFSI	8[1]	8[1]	8[1]	8[1]
Unclassified tributary to 1217	21016	Clear Creek at Oakalla Rd	TA	RT	24	24	24	24
Unclassified tributary to 1217	21016	Clear Creek at Oakalla Rd	TA	BFSI	8[1]	8[1]	8[1]	8[1]

1. Biased flow samples will be collected once per quarter under wet weather conditions. However, if routine samples are collected during wet weather conditions, an additional biased flow sample will not be collected that quarter.

Appendix B. Field Data Sheet

Field Data Sheet
Streams
Lampasses
(Working draft: 30Jan14)

Site:	Time:	Investigators:
	Color Code:	Project:
Date:	Location: *run* *glide*	**Observations (select from below):** Wind intensity Dir.(opt.)
Air Temp:	*riffle* *pool*	Present Weather

Hydrological Parameters **Event Type (circle one)**

Total Depth: ___________ft. Routine Event Biased Event

Sample #	Sample Depth (ft)	Temp C	Cond u s	DO %Sat	DO mg/L	pH	Flow Sev (select from below)	DSLP (select from below)
		Record Sonde Readings Here						
	*							
	1.00 **							
	* If total depth is <1.5 ft. collect at 1/3 total depth	** If total depth >1.5 ft. collect at 1 ft.						
	record depth							
		Conventional Sample - iced plastic bottle **A**						
		Bacteria Sample - sterilized bottle **S**						
		Chlorophyll/Pheophyton Sample - dark bottle **B**						
		TKN, TP acidified **D**						
		Field Split of Sample Nutrient Fecal Chl/Pheo TKN						

Estimated Flow Severity 1. No Flow 2. Slight 3. Normal 5. High 4. Flood 6. Dry
Wind intensity 1. Calm 2. Slight 3. Moderate 4. Strong
Present Weather 1. Clear 2. Partly Cloudy 3. Cloudy 4. Rain
Days Since Last Signif. Precipitation <1 (w/in 24 hrs) 1 2 3 4 5 6 7 >7 (over a week) _________

Flow Field Data **Method** 1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler
cfs
__________ or **Estimated Flow** (cfs) _______________

Collect sample from non-flowing pools
Pool Dimensions* Circle one: METERS or FEET
% Coverage Max Depth (ft) Max Length Max Width

_________ __________ _________ _________

DO ch **pH mv**

________ ________

Datasonde used: ___________________________

Comments:
Unusual Observations: (dBase info) ______________________________

____
____
____

General Observations: ______________________________

____
____

Appendix C. Chain of Custody Form

TIAER

Chain of Custody / Sample Information Form

Page __ of __ Field data or attachments? (Y/N)

Client or Project Manager	Client phone:	Sampler(s) and Delivery information	0-6°C temp. Therm used: T-

TIAER Project Code	TIAER Lab Sample Number	TIAER Test Group Code	Sample Date(s) (mm/dd/yy)	Sample Time(s) (hh:mm) CST for TIAER	Client Sample or Site ID	Sample Type	Matrix	Preservative	Preservative and Container type/number	Comments (if applicable): Flow Weighted data start/end date/time	bottle numbers	Other notes (special turnaround times requested may incur premium charges):	Composite only - last bottle collection date/time	pH <2 check	temp check	Disposed

Relinquished by:	Date/Time: CST DST	Received by:	Date/Time: CST DST
Relinquished by:	Date/Time: CST DST	Received by:	Date/Time: CST DST

Sample Types: G=Grab, SG=Storm Grab, S=Sequential, T=Time based comp., F=Flow based comp., M=Multisonde, O=other

Matrix: L=Liquid (nonpotable water), S=Solid or chemical

plastic, F=filter, G=glass ua/uf, H=dark glass uf, J=glass acidified uf, O=other (describe), S=sterile plastic ua/uf, V=VOA vial uf, W= plastic bag ua/uf. I=Ice, HS=Sulfuric acid, HN=Nitric acid

Form review initials/ date
Data entry:
Field review:
Lab review:

Each preservative/container code represents one container ID. If more than one container is submitted for a code, enter the number of each beside the code.

Texas Institute for Applied Environmental Research
Box T-0410, Stephenville, TX 76402, Tarleton State University 254-968-9570, 968-9560

Q-110-1, rev. 8 mm 5/15/13

Sample Acceptance Policy: TIAER retains the right to refuse acceptance of any sample and return any and all portions of samples to the client. Samples submitted with little holding time remaining may not be analyzed in time to meet project requirements. Samples should have at least 50% of holding time remaining when submitted. Unless otherwise agreed upon in writing, Client should submit samples collected and preserved in accordance with 40 CFR 136, the 2003 NELAC Standard, or other regulatory requirement stated by the Client's project. TIAER Lab shall not be responsible for data accuracy on samples improperly collected, preserved or submitted. Samples not appropriately collected, preserved or submitted may be accepted and analyzed by the TIAER Lab at the request of the Client. Unless previously arranged, normal sample acceptance hours without premium fees are Monday-Friday, 0800-1600, exclusive of official Tarleton holidays. Samples submitted outside of the normal hours may be processed at a premium surcharge. By signing to relinquish the sample(s) above, the Client or Client's representative hereby agrees to this policy & conforms to Contract or Cooperative Agreement between Client and TIAER.

Appendix D Data Summary Report

Data Summary

Data Information

Data Source: ______________________________

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 TSSWCB or TCEQ; and**
- **Other discrepancies.**

____
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________
- ______________________________

Data Manager: ______________________________

Date: ______________________________

Appendix E Corrective Action Report

Corrective Action Report

SOP-Q-105

CAR #: 08-003

Report Initiation Date ________ **Report By:** ____________________ **Procedure or QC Typ** ____________________

Deviation: ______________________________

Analyte: ______________________________

Affected Sample #s: ______________________________

Sampling Station: ______________________________

Project(s): ______________________________

Attached Documentation:
- ☐ COC
- ☐ FDS
- ☐ FlowLink
- ☐ Flow8
- ☐ GM
- ☐ Log Book
- ☐ QC Sheet
- ☐ Memo
- ☐ Other

Details of the problem, nonconformance or out-of-control situation:

Possible Causes:

Corrective Actions Taken:

Corrective Actions Suggested:

CAR routed to: ____________________ **Date:** ____________

Supervisor: ○ **Tier 1** (does not affect final data integrity) ○ **Tier 2** (data accepted but flag required) ○ **Tier 3** (possibly affects final data integrity)

Corrective actions taken for specific incident: ______________________________

Corrective actions taken to prevent recurrences: ______________________________

Corrective actions to be taken: ______________________________

Responsible Party: ____________________ **Proposed completion date:** ____________

Effect on data quality: ______________________________

Responsible Supervisor: ____________________ **Date:** ____________

Concurrence:

Program/Project Manager: ____________________ **Date:** ____________
(Tier 3 CARs only)

Quality Assurance Officer: ____________________ **Date:** ____________

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ATTACHMENT 1
Example Letter to 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

Copies of the signed forms should be sent by the TIAER to the TSSWCB Project Manager within 60 days of EPA approval of the QAPP.