TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 28, 2015

Mike Urrutia
Guadalupe-Blanco River Authority
933 E. Court St
Seguin, TX 78155

Re: GBRA Clean Rivers Program FY 2016-2017 QAPP

Dear Mr. Urrutia:

Enclosed is a final set of TCEQ signatures for the referenced quality assurance document for your files and distribution.

Please ensure that copies of the QAPP are distributed to each project participant as required by Section A3. The documentation of QAPP distribution and subcontractor commitment to QAPP requirements must be available for review during monitoring system audits.

If you have any questions, please contact your TCEQ Clean Rivers Program project manager, or you may contact me at (512) 239-0011, or by email at daniel.burke@tceq.texas.gov.

Sincerely,

Daniel R. Burke
Lead CRP Quality Assurance Specialist

enclosure

cc: Sarah Eagle, TCEQ CRP Project Manager, MC 234

Quality Assurance Project Plan Guadalupe-Blanco River Authority

933 E. Court St.
Seguin, Texas 78155

Clean Rivers Program

Water Quality Planning Division

Texas Commission on Environmental Quality

P.O. Box 13087, MC 234

Austin, Texas 78711-3087

Effective Period: FY 2016 to FY 2017

Questions concerning this QAPP should be directed to:
Mike Urrutia (GBRA Representative)
Diretor of Water Quality Services
933 E. Court St.
Seguin, Texas 78155
(830) 379-5822
murrutia@gbra.org

A1 Approval Page

Texas Commission on Environmental Quality

Water Quality Planning Division

Patricia Wise 8/28/2015

Patricia Wise, Manager Date
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8/27/15

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Allison Fischer Date
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8/27/15

Sarah Eagle Date
Project Manager, CRP
CRP

8/27/2015

Cathy Anderson, Team Leader Date
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08/28/2015

Sharon R. Coleman Date
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Daniel R. Burke Date
Lead CRP Quality Assurance Specialist
Laboratory and Quality Assurance Section
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Guadalupe-Blanco River Authority (GBRA) and Regional Laboratory

Mike Urrutia 8/27/15
Mike Urrutia Date
GBRA CRP Project Manager, Data Manager

Josephine Longoria 8/27/15
Josephine Longoria Date
GBRA Laboratory Director

Kylie Gudgell 8/27/2015
Kylie Gudgell Date
GBRA Quality Assurance Officer

Upper Guadalupe River Authority (UGRA)

Tara M Bushnoe 8/25/15
Tara Bushnoe Date
UGRA CRP Project Manager

Amy M Bryant 8/25/15
Amy Bryant Date
UGRA Laboratory Manager

San Antonio River Authority (SARA) Environmental Laboratory

David Hernandez Date
SARA Laboratory Manager

Patricia M. Carvajal Date
SARA Quality Assurance Officer

Lower Colorado River Authority Environmental Laboratory Services (LCRA ELS)

Alicia Gill Date
LCRA ELS Laboratory Manager

Jennifer Blossom Date
LCRA ELS Quality Assurance Director

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GBRA CRP Project Manager, Data Manager

Josephine Longoria — Date
GBRA Laboratory Director

Kylie Gudgell — Date
GBRA Quality Assurance Officer

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UGRA CRP Project Manager

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SARA Laboratory Manager

Patricia M. Carvajal — Date
SARA Quality Assurance Officer

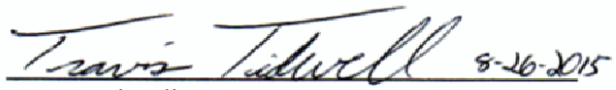
Lower Colorado River Authority Environmental Laboratory Services (LCRA ELS)

8/25/15
Alicia Gill — Date
LCRA ELS Laboratory Manager

Jennifer Blossom 08.25.15
Jennifer Blossom — Date
LCRA ELS Quality Assurance Director

Wimberley Valley Watershed Association (WVWA)

David Baker — Date
WVWA CRP Project Manager



Travis Tidwell — Date
WVWA Quality Assurance Officer

Sub-tier participants (e.g., subcontractors, subparticipants, or other units of government) will sign the QAPP, indicating 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. Signatures in section A1 will eliminate the need for adherence letters to be maintained.

A2 Table of Contents

List of Acronyms

AWRL	Ambient Water Reporting Limit
BMP	Best Management Practices
CAP	Corrective Action Plan
COC	Chain of Custody
CRP	Clean Rivers Program
DMRG	Surface Water Quality Monitoring Data Management Reference Guide, November 2013, or most recent version
DM&A	Data Management and Analysis
EPA	United States Environmental Protection Agency
FY	Fiscal Year
GBRA	Guadalupe-Blanco River Authority
GIS	Geographical Information System
GPS	Global Positioning System
LCRA ELS	Lower Colorado River Authority Environmental Laboratory Services
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LIMS	Laboratory Information Management System
LOD	Limit of Detection
LOQ	Limit of Quantitation
NELAP	National Environmental Lab Accreditation Program
QA	Quality Assurance
QM	Quality Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Specialist
QC	Quality Control
QMP	Quality Management Plan
SARA	San Antonio River Authority
SLOC	Station Location
SOP	Standard Operating Procedure
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TMDL	Total Maximum Daily Load
TCEQ	Texas Commission on Environmental Quality
TNI	The NELAC Institute
TSWQS	Texas Surface Water Quality Standards
UGRA	Upper Guadalupe River Authority
VOA	Volatile Organic Analytes
WVWA	Wimberley Valley Watershed Association

A3 Distribution List

Texas Commission on Environmental Quality
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Austin, Texas 78711-3087

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Wimberley, TX 78676

David Baker
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SARA Environmental Laboratory
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San Antonio, TX 78283-9980

David Hernandez
(210) 302-3674

LCRA Environmental Laboratory Services
3505 Montopolis
Austin, TX 78744

Dale Jurecka
(512) 730-6337

The GBRA 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, subparticipant, or other units of government. The GBRA will document distribution of the plan and any amendments and appendices, maintain this documentation as part of the project's quality assurance records, and will ensure the documentation is available for review.

A4 PROJECT / TASK ORGANIZATION

Description of Responsibilities

TCEQ

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

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

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

Cathy Anderson
Team Leader, Data Management and Analysis (DM&A) Team
Participates in the development, approval, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP). Ensures DM&A staff perform data management related tasks, including coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval; ensuring that data are reported following

instructions in the Surface Water Quality Monitoring Data Management Reference Guide, November 2013, or most current version (DMRG); running automated data validation checks in Surface Water Quality Monitoring Information System (SWQMIS) and coordinating data verification and error correction with CRP Project Managers; generating SWQMIS summary reports to assist CRP Project Managers' data review; identifying data anomalies and inconsistencies; providing training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures; reviewing QAPPs for valid stream monitoring stations, validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s); developing and maintaining data management-related standard operating procedures (SOPs) for CRP data management; and coordinating and processing data correction requests.

Peter Bohls
CRP Data Manager, DM&A Team
Responsible for coordination and tracking of CRP data sets from initial submittal through CRP Project Manager review and approval. Ensures that data are reported following instructions in the DMRG. Runs automated data validation checks in SWQMIS and coordinates data verification and error correction with CRP Project Managers. Generates SWQMIS summary reports to assist CRP Project Managers' data review. Identifies data anomalies and inconsistencies. Provides training and guidance to CRP and Planning Agencies on technical data issues to ensure that data are submitted according to documented procedures. Reviews QAPPs for valid stream monitoring stations. Checks validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s). Develops and maintains data management-related SOPs for CRP data management. Coordinates and processes data correction requests. Participates in the development, implementation, and maintenance of written QA standards (e.g., Program Guidance, SOPs, QAPPs, QMP).

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

(GBRA)

Mike Urrutia
GBRA Project Manager
Responsible for implementing and monitoring CRP requirements in contracts, QAPPs, and QAPP amendments and appendices. Coordinates basin planning activities and work of basin partners. Responsible for writing and maintaining the QAPP and monitoring its implementation. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for coordinating with the TCEQ QAS to resolve QA-related issues. Ensures monitoring systems audits are conducted to ensure QAPPs are followed by basin planning agency participants and that projects are producing data of known quality. Ensures that subparticipants are qualified to perform contracted work. Ensures CRP project managers and/or QA Specialists are notified of

deficiencies and corrective actions, and that issues are resolved. Responsible for validating that data collected are acceptable for reporting to the TCEQ.

Kylie Gudgell
GBRA Quality Assurance Officer
Responsible for coordinating the implementation of the QA program. Responsible for identifying, receiving, and maintaining project QA records. Notifies the GBRA Project Manager of particular circumstances which may adversely affect the quality of data. Coordinates and monitors deficiencies and corrective action. Coordinates and maintains records of data verification and validation. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Ensures that field staff is properly trained and that training records are maintained.

Mike Urrutia
GBRA Data Manager
Responsible for ensuring that field data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Creates Data Checklist. Maintains quality-assured data on GBRA internet sites. In coordination with GBRA Water Quality Investigator/Field Technician, corrects errors identified when data is uploaded to the SWQMIS test site.

Lee Gudgell
GBRA Water Quality Investigator/Field Technician
Responsible for coordinating sampling events, including maintenance of sampling bottles, supplies, and equipment. Maintains records of field data collection and observations and quality control related to data and samples collected in the field. Notifies the GBRA Project Manager of particular circumstances which may adversely affect the quality of data. Ensures that field staff is properly trained and that training records are maintained. Trains new field technicians. Conducts monitoring systems audits on project participants to determine compliance with project and program specifications, issues written reports, and follows through on findings. Uploads data to SWQMIS test site to identify any errors after Data Manager has reviewed data. Notifies GBRA Data Manager if errors are identified. In coordination with GBRA Data Manager, corrects errors. Submits data files, data check list and validator's report to CRP Project Manager and GBRA Data Manager.

Josephine Longoria
GBRA Regional Laboratory Director
The responsibilities of the lab director include supervision of laboratory, purchasing of equipment, maintain quality assurance manual for laboratory operations, and supervision of lab safety program. Additionally, the lab director will review and verify all field and laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validated against the data quality objectives listed in Tables A7.1.

GBRA Laboratory Analyst/Technicians (5.5)
Perform laboratory analysis for inorganic constituents, nutrients, etc.; assist in collection of field data and samples for stream monitoring and chemical sampling of environmental sites. Perform sample custodial duties.

UGRA
Tara Bushnoe
UGRA Project Manager
Responsible for directing CRP activities in the upper Guadalupe River Basin, in Kerr County. Assures strict compliance with the CRP requirements for project administration and quality assurance. Responsible for coordinating and conducting sampling events, including maintenance of sampling bottles, supplies, and equipment. Maintains records of field data collection and observations. Assists GBRA staff in collecting and analyzing bioassessment samples.

Tara Bushnoe
UGRA Quality Assurance Officer
Maintains operating procedures that are in compliance with the QAPP, amendments and appendices. Assists with monitoring systems audits for CRP projects. Ensures that field staff are properly trained and that training records are maintained. Additionally, the UGRA QAO will review and verify all field and laboratory data for integrity and continuity, reasonableness and conformance to project requirements, validating the field and lab data in accordance with the data quality objectives listed in Table A7.2.

Tara Bushnoe
UGRA Data Manager
Responsible for ensuring that field and lab data are properly reviewed and verified. Responsible for the transfer of basin quality-assured water quality data to the TCEQ in a format compatible with SWQMIS. Maintains link from the water monitoring section of the UGRA web page to the Kerr County monitoring sites section of the GBRA web page.

Amy Bryant
UGRA Laboratory Manager
The responsibilities of the lab manager include supervision of the laboratory and lab staff, maintaining quality assurance manual for laboratory operations, and supervision of lab safety program. Additionally, the lab manager will review and verify all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, validating the laboratory data for integrity and continuity, reasonableness and conformance with project requirements, validating the lab data in accordance with the data quality objectives listed in Table A7.2.

UGRA Laboratory Analyst/Field Technicians
Perform laboratory analyses for inorganic constituents, nutrients, etc.; assist in the collection of field data and samples for stream monitoring and chemical sampling of environmental sites.

WVWA

David Baker
Wimberley Valley Watershed Association Project Manager
Responsible for directing CRP activities for the Wimberley Valley Watershed Association. Assures strict compliance with the CRP requirements for project administration and quality assurance.

Wimberley Valley Watershed Association Quality Assurance Officer and Field Technician
Responsible for coordinating sampling events, including maintenance of sampling bottles, supplies, and equipment. Maintains operating procedures that are in compliance with the QAPP. Maintains records of field data collection and observations. Responsible for ensuring that field data are properly reviewed and verified. Assists with monitoring systems audits for CRP projects. Responsible for the transfer of project quality-assured water quality data to the GBRA Project Manager.

LCRA ELS

Dale Jurecka
LCRA ELS Project Manager
Reviews and verifies all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validated against the measurement performance specifications listed in Table A7.1.

Alicia C. Gill
LCRA ELS Lab Manager
Responsible for overall performance, administration, and reporting of analyses performed by LCRA ELS. Responsible for supervision of laboratory personnel involved in generating analytical data for the project. Ensures that laboratory personnel have adequate training and a thorough knowledge of the QAPP and related SOPs. Responsible for oversight of all laboratory operations ensuring that all QA/QC requirements are met, documentation is complete and adequately maintained, and results are reported accurately.

Jennifer Blossom
LCRA ELS Quality Assurance Officer
Maintains operating procedures that are in compliance with the QAPP, amendments and appendices. Responsible for the overall quality control and quality assurance of analyses performed by LCRA ELS. Assists with monitoring systems audits for CRP projects.

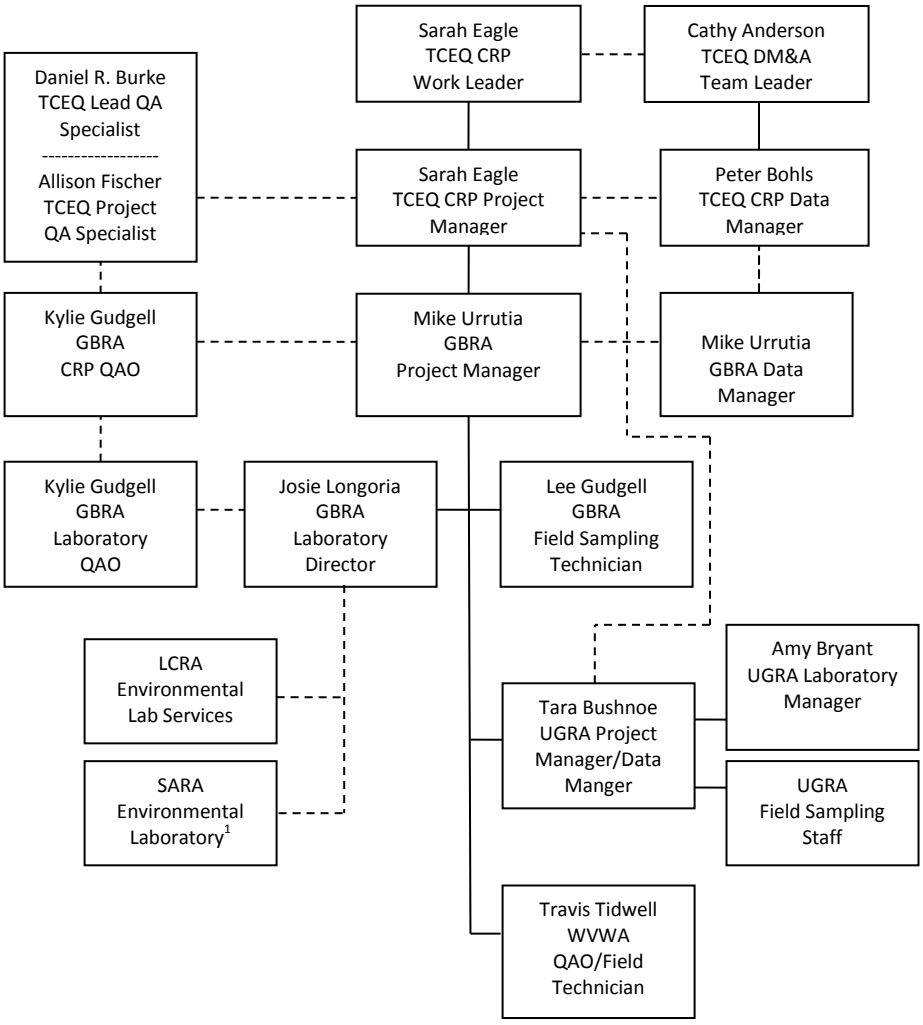
SARA

David Hernandez
SARA Lab Manager
The responsibilities of the lab director include supervision of laboratory, purchasing of equipment, and supervision of lab safety program. The SARA lab director will review and verify all laboratory data for integrity and continuity, reasonableness and conformance to project requirements, and then validated against the measurement performance specifications listed in Table A7.1.

Patricia M. Carvajal
SARA Quality Assurance Officer
Maintains quality assurance manual for laboratory operations, maintains operating procedures that are in compliance with the QAPP, amendments and appendices. Responsible for the overall quality control and quality assurance of analyses performed by SARA's Environmental Services Department. Assists with monitoring systems audits for CRP projects.

Project Organization Chart

Figure A4.1. Organization Chart - Lines of Communication



1 SARA will be used in the event of an equipment failure and the need to meet holding times.

Lines of Management ——————
Lines of Communication - - - - - -

A5 Problem Definition / Background

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

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

The GBRA in conjunction with UGRA have been monitoring water quality since the mid-1980s and have been actively involved in water quality planning since the early 1970s. By implementing the TCEQ's Surface Water Quality Monitoring Program through the Clean Rivers Program, the river authorities have enhanced and modified their existing programs. The expansion of the existing monitoring efforts has allowed the river authorities' staffs to gather data to characterize water quality conditions in areas not previously monitored. The program for FY 2016-2017 includes continuation of the existing monitoring program, including biological monitoring at station 12678 on Johnson Creek at SH 39 in Kerr County. Sampling for trace metals concentrations in water at station 12592 on the Guadalupe River at FM 766 in Dewitt County. Biological monitoring and organics in water and sediment sampling at station 13657 on Sandies Creek at Cheapside Rd in Dewitt County.

The monitoring goals for the CRP program in the Guadalupe River Basin are to verify the overall health of water bodies evaluated and identify water quality issues. UGRA has been a long term supporter of the Clean Rivers Program and has routinely participated with data collection to ensure that a consistent historic record of water quality is maintained for the Upper Guadalupe River. The long term water quality data is valuable to identify any threats to water quality or degradation in the health of the waterway.

The Wimberley Valley Watershed Association is a monitoring entity in the Guadalupe River Basin that contributes data collected under the GBRA QAPP. WVWA funds the Blanco River – Cypress Creek Water Quality Monitoring Program. The purpose of their program is to be proactive in protecting Wimberley area's water resources. The objectives of monitoring program are to detect and describe spatial and temporal changes, determine impacts of point and nonpoint sources, and assess compliance with established water quality standards for Cypress Creek and the Blanco River. The WVWA will collect data at sites on the Blanco River and Cypress Creek quarterly and diurnal events on Cypress Creek at the Blue Hole Campground. These sites are coordinated with the GBRA and TCEQ monitoring schedule annually.

A6 Project/Task Description

The locations of monitoring sites and scheduled parameters are determined at the Coordinated Monitoring Meeting. Coordinated Monitoring Meetings are held annually and are attended by the entities collecting water quality data on the Guadalupe River and its tributaries. Historical sites are maintained by each River Authority. Sites selected for biological assessment, metals in water, organics in sediment, and diurnal data collection were chosen based on stakeholder input, TCEQ assessment needs, budgetary considerations, data gaps and efforts ongoing by other entities. Conventional samples are collected monthly or quarterly based on the coordinated monitoring schedule. Ammonia and Total Kjeldahl Nitrogen are analyzed at those sites that are collected quarterly, and bimonthly on those sites visited every month.
See Appendix B for the project-related work plan tasks and schedule of deliverables for a description of work defined in this QAPP. Attach work plan tasks pertaining to this QAPP.

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

Amendments to the QAPP

Revisions to the QAPP may be necessary to address incorrectly documented information or to reflect changes in project organization, tasks, schedules, objectives, and methods. Requests for amendments will be directed from the GBRA Project Manager to the CRP Project Manager electronically. The Basin Planning Agency will submit a completed QAPP Amendment document, including a justification of the amendment, a table of changes, and all pages, sections or attachments affected by the amendment. Amendments are effective immediately upon approval by the GBRA Agency Project Manager, the GBRA QAO, the CRP Project Manager, the TCEQ QA Manager (or designee), the CRP Project QA Specialist, and additional parties affected by the amendment. Amendments are not retroactive. No work shall be implemented without an approved QAPP or amendment prior to the start of work. Any activities under this contract that commence prior to the approval of the governing QA document constitute a deficiency and are subject to corrective action as described in section C1 of this QAPP. Any deviation or deficiency from this QAPP which occurs after the execution of this QAPP should be addressed through a Corrective Action Plan (CAP). An Amendment may be a component of a CAP to prevent future recurrence of a deviation. Amendments will be incorporated into the QAPP by way of attachment and distributed to personnel on the distribution list by the GBRA Project Manager.

Special Project Appendices

Projects requiring QAPP appendices will be planned in consultation with the GBRA and the TCEQ

Project Manager and TCEQ technical staff. Appendices will be written in an abbreviated format and will reference the Basin QAPP where appropriate. Appendices will be approved by the GBRA Project Manager, the GBRA QAO, the Laboratory (as applicable), and the CRP Project Manager, the CRP Project QA Specialist, the CRP Lead QA Specialist and other TCEQ personnel, as appropriate. Copies of approved QAPP appendices will be distributed by the GBRA to project participants before data collection activities commence.

A7 Quality Objectives and Criteria

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

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

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

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

The 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. Analytical results shall be reported down to the laboratory's LOQ (i.e., the laboratory's LOQ for a given parameter is its reporting limit). The following requirements must be met in order to report results to the CRP:

- The laboratory's LOQ for each analyte must be at or below the AWRL as a matter of routine practice

- The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check sample for each analytical batch of CRP samples analyzed.
- Control limits for LOQ check samples are found in Appendix A.
- Parameter 71960 (Total Mercury in water) has a listed AWRL of 0.006 ug/L, but the LCRA Environmental Laboratory cannot recover an LOQ of less 0.2 ug/L. The AWRL for this parameter was set based upon 50% of the human health protective standard for water and fish. The LOQ for this parameter in the GBRA table A7 deviates from the CRP requirement that the LOQ of each analyte be at or below the AWRL because of the limits of laboratory quantification.

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

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

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

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

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

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

Completeness
The completeness of the data is basically a relationship of how much of the data are 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

Before new field personnel independently conduct field work the GBRA field technician trains him/her in proper instrument calibration, field sampling techniques, and field analysis procedures. New field personnel receive training in proper sampling and field analysis. Field personnel training is documented and retained in the personnel file and will be available during a monitoring systems audit.

The requirements for Global Positioning System (GPS) certification are located in Section B10, Data Management.

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

A9 Documents and Records

The documents and records that describe, specify, report, or certify activities are listed. The list below is limited to documents and records that may be requested for review during a monitoring systems audit. All documents are saved as electronic copies for retention. If a document cannot be produced electronically, then a paper copy will be created and saved as an electronic copy annually. Paper files are retained for one year after creation and electronic files are retained indefinitely.

Monthly field data collected by the GBRA field technician will be entered directly into the GBRA laboratory information system (LIMS) electronically via wireless data services or recorded on paper field sheets and transcribed into the GBRA LIMS manually. The method of collection will be determined by wireless access availability at field monitoring stations.
Field sheets are submitted by WVWA, along with samples for laboratory analysis to the GBRA Regional Laboratory. The data from the field parameters are entered into the laboratory information

system (LIMS) as part of the lab sample. Copies of the field sheets and calibration log are kept with the chain of custody documents. UGRA submits the data they collect directly to TCEQ SWQMIS. 24 hour field data excel spreadsheets from UGRA and WVWA are submitted to the GBRA electronically via email.

Table A9.1 Project Documents and Records

Document/Record	Location	Retention	Format
QAPPs, amendments and appendices	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
QAPP distribution documentation	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
QAPP commitment letters	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
Field SOPs	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	WVWA	One year	Paper
		5 years	Electronic
Field staff training records	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	WVWA	One year	Paper
		5 years	Electronic
Field equipment calibration/maintenance logs	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	WVWA	One year	Paper
		5 years	Electronic
Field notebooks or data sheets	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	WVWA	One year	Paper
		5 years	Electronic

Document/Record	Location	Retention	Format
Chain of custody records	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	WVWA	One year	Paper
		5 years	Electronic
Laboratory calibration records	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	5 years	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic
Laboratory instrument printouts	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	One year	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic
Laboratory data reports/results	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	One year	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic

Document/Record	Location	Retention	Format
Laboratory equipment maintenance logs	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	One year	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic
Laboratory Quality Manuals	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	One year	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic
Laboratory SOPs	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	One year	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic
Laboratory staff training records	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	One year	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic

Document/Record	Location	Retention	Format
Corrective action documentation	GBRA	One year	Paper
		Indefinitely, but at least 5 years	Electronic
	UGRA	One year	Paper
		5 years	Electronic
	SARA	One year	Paper
		5 years	Electronic
	LCRA ELS	One year	Paper
		5 years	Electronic

Laboratory Test Reports

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

A laboratory test report is generated upon request by the laboratory information system. A test report should be consistent with the current TNI standards and will include the following information necessary for the GBRA review, verification, validation and interpretation of data process documented in sections D1 and D2 of this document:

* title of report and unique identifiers on each page
* name and address of the laboratory
* name and customer number of the client
* a clear identification of the sample(s) analyzed
* station information (SLOC number)
* date and time of sample receipt
* date and time of collection
* identification of method used
* identification of samples that did not meet QA requirements and why (e.g., holding times exceeded)
* sample results
* units of measurement
* sample matrix
* dry weight or wet weight (as applicable)
* 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 NELAP compliance on a result by result basis.

Electronic Data

Data will be submitted electronically to the TCEQ via email in the pipe-delineated Event/Result text file format described in the most current version of the DMRG, which can be found at (http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wdma/dmrg_index.html). A completed Data Review Checklist and Data Summary (see Appendix F) will be submitted with each data submittal. The management of electronic data by non-GBRA entities is described in Section B10 Data Management.

B1 Sampling Process Design

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

B2 Sampling Methods

Field Sampling Procedures

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

Table B2.1 Sample Storage, Preservation and Handling Requirements

Parameter	Matrix	Container	Preservation[1]	Sample Volume	Holding Time
Specific Conductance	Water	Plastic or glass	Cool, >0-6°C	100 mL	28 days
Turbidity	Water	Plastic or glass	Cool, >0-6°C	100 mL	48 hours
Hardness	Water	Plastic or glass	Cool, >0-6°C, H_2SO_4 to pH < 2[1]	1 L	6 months
Solids (TSS)	Water	Plastic or glass	Cool, >0-6°C	1 L	7 days
Nitrate-nitrogen	Water	Plastic or glass	Cool, >0-6°C	1 L	48 hours
Ammonia-nitrogen	Water	Plastic or glass	Cool, >0-6°C, H_2SO_4 to pH < 2[1]	1 L	28 days
Total phosphorus	Water	Plastic or glass	Cool, >0-6°C, H_2SO_4 to pH < 2[1] or freeze without chemical preservation	1 L[2]	28 days
Total Kjeldahl Nitrogen	Water	Plastic or glass	Cool, >0-6°C, H_2SO_4 to pH < 2[1]	1 L[3]	28 days
Sulfate	Water	Plastic or glass	Cool, >0-6°C	1 L	28 days

Chloride	Water	Plastic or glass	Cool, >0-6°C	1 L	28 days
Chlorophyll a /Pheophytin	Water	Amber plastic or glass	Dark, Cool, >0-6°C before Filtration; Dark, 0°C after Filtration	1 L	Filter within 48 hours/28 days at 0°C
E. coli	Water	Sterile, plastic	Cool, >0-6°C	100 mL[2]	8 hours
Metals, total	Water	Plastic or glass	Cool, >0-6°C, HNO_3 to pH < 2[1]	1 L	6 months
Metals, dissolved	Water	Plastic or glass	Cool, >0-6°C, HNO_3 to pH < 2[1]	1 L	Filtered on site/6 months
Mercury, total	Water	Teflon or glass	Cool, >0-6°C, HNO_3 to pH < 2[1]	1 L	28 days
BTEX	Sediment	Glass	Cool, >0-6°C	40 mL	14 days
TPH	Sediment	Glass	Cool, >0-6°C	40 mL	14 days
Sediment Physical Parameters including TOC	Sediment	Glass	Cool, >0-6 °C	500 mL	28 days
Biological	Water	Plastic or glass	Ethanol CDA 19 (field); 10% Formalin (voucher)	1 L/5 mL specimen jars	1 day (field); indefinitely (voucher)

[1] Preservation occurs within 15 minutes of collection.
[2] UGRA collects 250 mL for Total Phosphorus and 120 mL sterile bottle for E. coli (duplicate is collected in 250 mL sterile bottle).
[3] UGRA collects 500 mL for TKN

Sample Containers

Sample containers are plastic two liter bottles that are cleaned and reused for unpreserved parameters and one liter plastic bottles that are pre-preserved with 2 mL of sulfuric acid. The unpreserved bottles are cleaned by the GBRA staff with the following procedure: 1) wash containers with tap water and Alconox (laboratory detergent), 2) triple rinse with hot tap water, and 3) triple rinse with deionized water. The GBRA will purchase replacement bottles for conventional analysis if the reusable bottles visibly appear discolored or are no longer water tight following the cleaning procedure. The sample containers for metals in water are provided by LCRA ELS and are new, certified glass or plastic bottles, or glass or plastic bottles cleaned and documented according to EPA method 1669, and come with the appropriate preservative. The sample containers for organic in sediment analyses are provided pre-cleaned from LCRA ELS and are 40 mL VOA vials for BTEX and TPH and a 500 mL glass bottle for sediment physical parameters (including TOC). GBRA purchases amber plastic bottles for chlorophyll samples and cleans and reuses the bottles according to the same procedure listed above for the one liter bottles. Disposable, pre-cleaned, sterile bottles are purchased for bacteriological samples. GBRA collects bacteriological samples in bottles without sodium thiosulfate because there are no locations that are immediately downstream of chlorinated discharges. GBRA purchases bottles for biological and bacteriological samples. Certificates for the purchased sample bottles are maintained in a notebook in the GBRA laboratory.

WVWA

GBRA provides WVWA the bottles used for their monitoring program.

UGRA

The bottles are cleaned by the UGRA staff with the following procedure: 1) wash containers with tap water laboratory detergent, 2) triple rinse with hot tap water, and 3) triple rinse with deionized water. UGRA cleans and reuses amber plastic bottles for chlorophyll samples according to the same procedure listed above for the one liter bottles. Disposable, pre-cleaned, sterile bottles are purchased for bacteriological samples. UGRA collects bacteriological samples in bottles with sodium thiosulfate. UGRA purchases bottles for bacteriological samples and any needed replacement one liter clear or amber plastic bottles. Certificates for the bacteriological sample bottles are maintained in a notebook in the UGRA laboratory. GBRA provides UGRA with new, pre-preserved 500 mL bottles for TKN analysis.

Processes to Prevent Contamination

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

Documentation of Field Sampling Activities

Field sampling activities are documented on entered directly into the GBRA laboratory information system (LIMS) via a wireless connection or recorded on paper field data sheets as presented in Appendix D. Flow worksheets, aquatic life use monitoring checklists, habitat assessment forms, and field biological assessment forms are part of the field data record. Parameters which are preferred by the SWQM and Water Quality Standards Programs are highlighted in the shell A7 document. The following will be recorded for all visits:

Station ID
Sampling Date
Location
Sampling Depth
Sampling Time
Sample Collector's name and initials
Values for all field parameters

Notes containing detailed observational data not captured by field parameters, including;
Water appearance
Weather
Biological activity
Recreational activity

Unusual odors
Pertinent observations related to water quality or stream uses
Watershed or instream activities
Specific sample information
Missing parameters

Recording Data

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

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

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

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

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

B3 Sample Handling and Custody

Sample Tracking

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

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

Date and time of collection
Site identification
Sample matrix
Number of containers
Preservative used
Was the sample filtered
Analyses required
Initials of collector
Custody transfer signatures and dates and time of transfer
Bill of lading, if applicable

Sample Labeling

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

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

Sample Handling

After collection of samples are complete, sample containers are immediately stored in an ice chest for transport to the laboratories (GBRA, UGRA), accompanied by the chain of custody. Ice chests will remain in the possession of the field technician or in the locked vehicle until delivered to the respective lab. Samples for chlorophyll a analyses collected by UGRA are delivered to the GBRA Laboratory by UGRA staff or by common carrier, on ice and accompanied by the chain of custody. After samples for trace metal are filtered in the field, these sample containers are immediately stored in an ice chest for transport to the LCRA ELS, Austin, Texas by regional lab or field staff, accompanied by the chain of custody. Samples for organics in sediment analyses are immediately stored in an ice chest and delivered by the GBRA lab or field staff, along with the chain of custody, to the LCRA ELS in Austin, Texas. If in the event of laboratory equipment failure and in order to meet holding times, chain of custodies and samples will be delivered on ice to the SARA laboratory, in San Antonio, Texas by GBRA personnel. After receipt at the GBRA or UGRA lab, the samples are stored in the refrigeration unit or given to the analyst for immediate analysis. Only authorized laboratory personnel will handle samples received by the laboratory.

Sample Tracking Procedure Deficiencies and Corrective Action

All deficiencies associated with COC procedures, as described in this QAPP, are immediately reported to the Basin Planning Agency Project Manager. These include such items as delays in transfer resulting in holding time violations; violations of sample preservation requirements; incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc.

Depending upon the severity of the deficiency or potential impact to reportable data, the GBRA Project Manager in consultation with the GBRA QAO will determine if the procedural violation may have compromised the validity of the resulting data. Any failures that have reasonable potential to compromise data validity will invalidate data and the sampling event should be repeated. The resolution of the situation will be reported to the TCEQ CRP Project Manager in the project progress report. CAPs will be prepared by the Lead Organization QAO and submitted to TCEQ CRP Project Manager along with project progress report.

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

B4 Analytical Methods

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

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

Standards Traceability

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

Analytical Method Deficiencies and Corrective Actions

Deficiencies in field and laboratory measurement systems involve, but are not limited to such things as instrument malfunctions, failures in calibration, blank contamination, quality control samples outside QAPP defined limits, etc. In many cases, the field technician or lab analyst will be able to correct the problem. If the problem is resolvable by the field technician or lab analyst, then they will document the problem on the field data sheet or laboratory record and complete the analysis. If the problem is not resolvable, then it is conveyed to the GBRA Laboratory Supervisor, who will make the determination and notify the GBRA QAO. If the analytical system failure may compromise the sample results, the resulting data will not be reported to the TCEQ. The nature and disposition of the problem is reported on the data report which is sent to the GBRA Manager. The GBRA Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ CRP Project Manager.

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

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

B5 Quality Control

Sampling Quality Control Requirements and Acceptability Criteria

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

Field blank

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

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

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

Field equipment blank

Field equipment blanks are required for metals-in-water samples when collected using sampling equipment. Field equipment blank is a sample of analyte-free media which has been used to rinse common sampling equipment to check the effectiveness of decontamination procedures. It is collected in the same type of container as the environmental sample, preserved in the same manner and analyzed for the same parameter.

The analysis of field equipment blanks should yield values lower than the LOQ, or, when target analyte concentrations are very high, blank values must be less than 5% of the lowest value of the

batch, or corrective action will be implemented.

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

Trip blank

Trip blanks are required for volatile organic analyses (VOA) only. VOA trip blanks are samples prepared in the laboratory with laboratory pure water and preserved as required. A trip blank is submitted with each ice chest of VOA samples submitted to the laboratory. They are transported to the sampling site, handled like an environmental sample, and returned to the laboratory for analysis. Trip blanks are not opened in the field. Their purpose is to check contamination of the sample through leaching of the septum. The analysis of trip blank should yield values less than the LOQ. When target analyte concentrations are very high, blank values should be less than 5% of the lowest value of the batch, or corrective action will be implemented.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

Batch

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

Method Specific QC requirements

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

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

Comparison Counting

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

within 10 percent. Record the results.

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

LOQ Sediment Samples – When considering LOQs for solid samples and how they apply to results, two aspects of the analysis are considered: (1) the LOQ of the sample, based on the real-world in which moisture content and interferences affect the result and (2) the LOQ in the QAPP which is a value less than or equal to the AWRL based on an idealized sample with zero % moisture.

The LOQ for a solid sample is based on the lowest non-zero calibration standard (as are those for water samples), the moisture content of the solid sample, and any sample concentration or dilution factors resulting from sample preparation or clean-up.

To establish solid-phase LOQs to be listed in Appendix A Table A7.1 of the QAPP, the laboratory will adjust the concentration of the lowest non-zero calibration standard for the amount of sample extracted, the final extract volume, and moisture content (assumed to be zero % moisture). Each calculated LOQ will be less than or equal to the AWRL on the dry-weight basis to satisfy the AWRL requirement for sediment and tissue analyses. When data are reviewed for consistency with the QAPP, they are evaluated based on this requirement. Results may not appear to meet the AWRL requirement due to high moisture content, high concentrations of non-target analytes necessitating sample dilution, etc. These sample results will be submitted to the TCEQ with an explanation on the data summary as to why results do not appear to meet the AWRL requirement.

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

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

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

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

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

Laboratory Control Sample (LCS)

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

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

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

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

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

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

Laboratory Duplicates

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

For most parameters except bacteria, precision is evaluated using the relative percent difference (RPD) between duplicate LCS results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X_1 and X_2, the RPD is calculated from the following equation: (If other formulas apply, adjust appropriately.)

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

For bacteriological parameters, precision is evaluated using the results from laboratory duplicates. Bacteriological duplicates are collected on a 10% frequency (or once per sampling run, whichever is more frequent). These duplicates will be collected in sufficient volume (100 mL-GBRA and WVWA; 250mL-UGRA) for analysis of the sample and its laboratory duplicate from the same container.

The base-10 logarithms of the result from the original sample and the result from its duplicate will be calculated. The absolute value of the difference between the two logarithms will be calculated, and that difference will be compared to the precision criterion in Appendix A, Table A7.1.

If the range of the logarithms of the sample and the duplicate are less than or equal to the precision criterion, only the value of the sample is reported. The duplicate is not reported as a sample, and is not averaged with the sample.

In the event that elevated bacteria concentrations are anticipated (i.e. samples collected after a rain event), the analysis is performed with the appropriate dilution volume including an identically diluted duplicate. When the samples are incubated and read, the values for the sample and the duplicate are multiplied by the dilution factor to determine the MPN value adjusted to the original volume. The log range is compared to the precision criterion as above. If it passes, then only the value of the sample, adjusted for dilution, is reported to TCEQ.

If the difference in logarithms is greater than the precision criterion, the data are not acceptable for use under this project and will not be reported to TCEQ. Results from all samples associated with that failed duplicate (usually a maximum of 10 samples) will be considered to have excessive analytical variability and will be qualified as not meeting project QC requirements.

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

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

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

The components to be spiked shall be as specified by the mandated analytical method. The results

from matrix spikes are primarily designed to assess the validity of analytical results in a given matrix, and are expressed as percent recovery (%R).

The percent recovery of the matrix spike is calculated using the following equation, where %R is percent recovery, S_{SR} is the concentration measured in the matrix spike, S_R is the concentration in the parent sample, and S_A is the concentration of analyte that was added:

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

Matrix spike recoveries are compared to the same acceptance criteria established for the associated LCS recoveries, rather than the matrix spike recoveries published in the mandated test method. The EPA 1993 methods (i.e. ammonia-nitrogen, ion chromatography, TKN) that establish matrix spike recovery acceptance criteria are based on recoveries from drinking water that has very low interferences and variability and do not represent the matrices sampled in the CRP. 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 laboratory QAO or GBRA Project Manager to report the data for the analyte that failed in the parent sample to TCEQ 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, GBRA may consider excluding all of the results in the batch related to the analyte that failed recovery.

Method blank

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

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

Quality Control or Acceptability Requirements Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the Lead Organization Project Manager, in consultation with

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

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

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

B6 Instrument/Equipment Testing, Inspection, and Maintenance

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

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

B7 Instrument Calibration and Frequency

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

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

B8 Inspection/Acceptance of Supplies and Consumables

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

B9 Acquired Data

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

USGS gage station data will be used throughout this project to aid in determining gage height and flow. Rigorous QA checks are completed on gage data by the USGS and the data are approved by the USGS and permanently stored at the USGS. This data will be submitted to the TCEQ under parameter code 00061 Flow, Instantaneous or parameter code 74069 Flow Estimate depending on the proximity of the monitoring station to the USGS gage station. USGS streambed slope data is calculated using USGS topographic quadrangle maps as described in TCEQ SOP, V2 - TCEQ Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data, 2014 (RG-416).

Reservoir stage data are collected from the Unites States Geological Survey (USGS), and the United States Army Corps of Engineers (USACE) websites. These data are preliminary and subject to revision. The Texas Water Development Board (TWDB) derives reservoir storage (in acre-feet) from these stage data (elevation in feet above mean sea level), by using the latest rating curve datasets available. These data are published at the TWDB website at http://waterdatafortexas.org/reservoirs/statewide. The web application uses real time gaged observations 7 AM reading each day (or closest reading available) from 119 major reservoirs to approximate daily storage for each reservoir, as well as daily total storage for water planning regions, river basins and the state of Texas. These instantaneous data are updated to mean daily data for all previous days. These data will be submitted to the TCEQ under parameter code 00052 Reservoir Stage and parameter code 00053 Reservoir Percent Full.

B10 Data Management

Data Management Process

Field technicians and laboratory personnel follow protocols that ensure that the CRP database maintains its integrity and usefulness. Field data collected at the time of the sampling event is logged by the field technician, along with notes on sampling conditions on field data sheets. The field sheet is the responsibility of the field technician and is transported with the sample to the laboratory. The lab technician /sample custodian logs the sample in the Lab Samples Database. Each sample is assigned a separate and distinct sample number. The sample is accompanied by a chain of custody. The lab technician /sample custodian must review the chain of custody to verify that it is filled out correctly and completely. Lab technicians take receipt of the sample and review the chain of custody, begin sample prep or analysis and transfer samples into the refrigerator for storage. The field data is logged into the Laboratory Samples Database by the lab technician /sample custodian or field technician, either at the time the sample is entered into the lab database or prior to the close of the month's business. An example of the field data sheet and chain of custody used can be found in

Appendices D and E. Twenty-four hour data recorded by a deployed water quality sonde is downloaded to a personal computer with applicable instrument manufacturer software and transferred to an excel spreadsheet to calculate reported minimum, maximum, and average values. The excel spreadsheet serves as the field data sheet for 24 hour data collections and data entries into the GBRA LIMS are made from this sheet. Samples that are outsourced to other laboratories are accompanied by a copy of the chain of custody. The GBRA CRP Data Manager reviews the lab bench sheets, outsourced lab data reports and field data sheets for representativeness, quality control, holding times and transcription errors.

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 Lab Samples Database. In the review, the analyst verifies that the data includes date and time of analysis, that calculations are correct, that data includes documentation of dilutions and correction factors, that data meets data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. 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.

The GBRA Regional Laboratory Director supervises the GBRA Regional laboratory. The Laboratory Director or QAO designee reviews the report that is generated when all analyses are complete. If the GBRA lab director or QAO designee feel there has been an error or finds that information is missing, the report is returned to the analyst for review and tracking to correct the error and generate a corrected copy. The GBRA Data Manager reviews the respective data for reasonableness and if errors or anomalies are found the report is returned to the laboratory staff for review and tracking to correct the error. Once per month, water quality data is transferred to the Water Quality Database. After the review for reasonableness, the data is verified to the analysis logs by the GBRA Data Manager. If at any time errors are identified, a supplemental laboratory sample number is created with the corrected data. The original sample and the supplemental sample are flagged with the associated sample numbers for sample tracking. The GBRA Data Manager is responsible for transmitting the data to TCEQ in the correct format. The GBRA water quality database creates ASCII-formatted text files for the event and results records for each sample and assigns a specific sequenced tag number that pairs the event and results files. The GBRA Data Manager reviews the event and results file and removes non-CRP data, confirms and corrects the program and source codes for sub-participants, checks data for correct significant figures and minimum and maximum data outliers. After the data is reviewed for completeness, minimum and maximum data outliers are accepted or rejected after being reviewed and confirmed for validity. The GBRA Field Technician uploads the text files to the SWQMIS test site to screen for data errors. If errors are found, the errors are corrected by the Field Technician and the GBRA Data Manager is notified. The data files and Data Check List are sent to the CRP Project Manager in order to be uploaded to SWQMIS. If errors are found after the TCEQ review, those errors are corrected by the GBRA Project Manager.

Samples are taken to the LCRA ELS or SARA for analyses that cannot be performed by the GBRA laboratory. Data for samples that are outsourced to the LCRA ELS or SARA is received in paper format. The data is reviewed by the GBRA QAO to confirm that all quality control criteria have been

met. After the report has been approved by the GBRA QAO the written report is given to the GBRA Data Manager. The GBRA Data Manager reviews the data for reasonableness and if anomalies are found the LCRA ELS or SARA is contacted to confirm data. If data is confirmed the data is entered into the water quality and lab databases and transmitted to TCEQ SWQMIS in the same way that the data generated by the GBRA laboratory and field data is transmitted.

UGRA Data Management Process

Field technicians and laboratory personnel follow protocols that ensure that the CRP database maintains its integrity and usefulness. Field data collected at the time of the sampling event is recorded by the field technician, along with notes on sampling conditions on field data sheets. The field data sheet is the responsibility of the field technician and is transported with the sample to the laboratory. The sample receipt clerk logs the sample in the Lab Samples Database. Each sample is assigned a separate and distinct sample number. The sample is accompanied by a chain of custody. The sample receipt clerk must review the chain of custody to verify that it is filled out correctly and complete. Lab technicians take receipt of the sample, begin sample prep or analysis and transfer samples into the refrigerator for storage. The laboratory manager reviews the sample information entered into the Lab Samples Database generally within 24 hours of sample receipt. The field data is logged into the Laboratory Samples Database by the field technician. Examples of the field data sheets and chains of custody used can be found in Appendices D and E. Twenty-four hour data collected by a deployed water quality sonde is downloaded to a personal computer with applicable instrument manufacturer software and transferred to an excel spreadsheet to calculate reported minimum, maximum, and average values. The UGRA field technician transfers the downloaded data to the GBRA field technician by email. The excel spreadsheet serves as the field data sheet for 24 hour data collections and associated data entries into the GBRA LIMS are made from this sheet. Samples that are outsourced to other laboratories are accompanied by a copy of the chain of custody. The respective data managers review the lab bench sheets, outsourced lab data reports and field data sheets for representativeness, quality control, holding times and transcription errors.

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 Lab Samples Database. In the review, the analyst verifies that the data includes date and time of analysis, that calculations are correct, that data includes documentation of dilutions and correction factors, that data meets data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. After the data is entered by the analyst, the laboratory manager validates that the data meets the data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards.

Samples are taken to the GBRA lab for analyses that cannot be performed by the UGRA laboratory. Data for samples that are outsourced to the GBRA laboratory are received by UGRA in electronic format. The data is reviewed by the UGRA Project Manager for completeness and the UGRA field technician enters the data into the Lab Samples Database. The UGRA Project Manager validates all field and outsourced data. Once all data has been validated by either the UGRA Project Manager or the laboratory manager, one final approval step is done by the lab manager prior to report generation.

The UGRA field technician enters all lab, field, and outsourced data in to the CRP database (excel database). The UGRA Project Manager reviews the respective data for reasonableness and if errors or anomalies are found the laboratory or field staff is notified for review and tracking to correct the error. After review for reasonableness the data is verified to the analysis logs by the UGRA Project Manager. If at any time errors are identified, an amended laboratory report is created with the corrected data and the reason for the amended report is outlined in the case narrative. The Laboratory Samples Database also contains an audit trail function at the individual sample level that records before and after values, date change made, who made the change, and why the change was made. An electronic version of all original and amended reports are retained by the lab. The UGRA Project Manager is responsible for transmitting the data to TCEQ. The UGRA Project Manager creates ASCII-formatted text files for the event and results records from the CRP database for each sample and assigns a specific sequenced tag number that pairs the event and results files. After the data is reviewed for completeness, minimum and maximum data outliers are flagged. The UGRA Project Manager uploads the text files to the SWQMIS test site to screen for data errors. If errors are found, the errors are corrected by the UGRA Project Manager. The data files and Data Check List are sent to the CRP Project Manager in order to be uploaded to SWQMIS. If errors are found after the TCEQ review, those errors are corrected by the UGRA Project Manager.

WVWA Data Management Process

WVWA field technicians record the field data on field data sheets at the time of the sampling event. The samples, along with the chain of custody, their respective field data sheets and a copy of the calibration/ post-calibration log, are delivered to the GBRA Regional Laboratory. The lab technician /sample custodian logs the sample in the Lab Samples Database. Each sample is assigned a separate and distinct sample number. The lab technician /sample custodian must review the chain of custody to verify that it is filled out correctly and complete. Lab technicians take receipt of the sample and review the chain of custody, begin sample prep or analysis and transfer samples into the refrigerator for storage. The field data is logged into the Laboratory Samples Database by the lab technician /sample custodian or field technician, either at the time the sample is entered into the lab database or prior to the close of the month's business. Examples of the field data sheets and chains of custody used can be found in Appendices D and E. Twenty-four hour data collected by a deployed water quality sonde is downloaded to a personal computer with applicable instrument manufacturer software and transferred to an excel spreadsheet to calculate reported minimum, maximum, and average values. The WVWA field technician transfers the downloaded data to the GBRA field technician by email. The excel spreadsheet serves as the field data sheet for 24-hour data collections and associated data entries into the GBRA LIMS are made from this sheet. The GBRA Data Manager reviews the lab bench sheets and field data sheets for WVWA for representativeness, quality control, holding times and transcription errors. If errors or anomalies are found the WVWA staff is contacted to investigate the error. Based on the information gathered, the data is invalidated, corrected or validated and if necessary, a corrective action form is initiated.

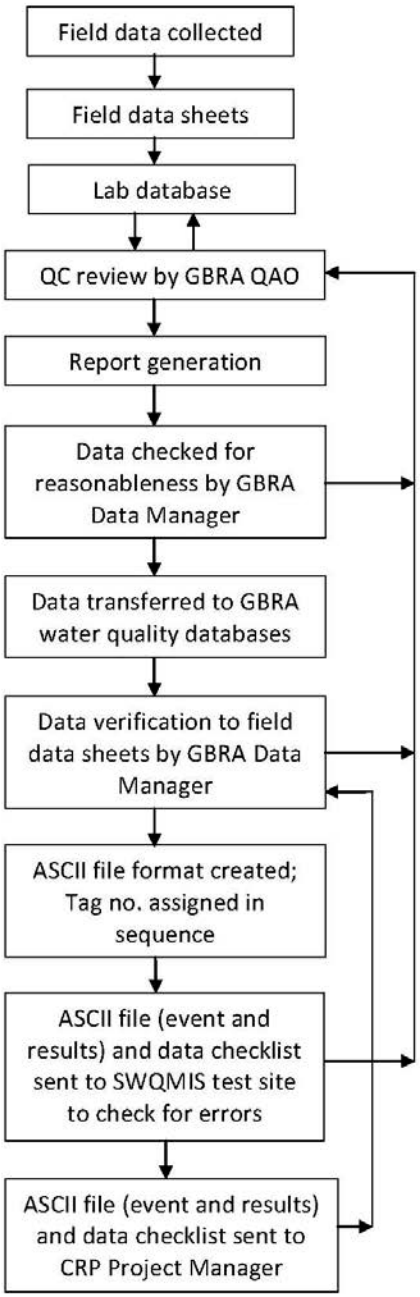
Data generated by GBRA lab technicians are logged permanently on analysis bench sheets. The data are reviewed by the analyst prior to entering the data into the Lab Samples Database. In the review, the analyst verifies that the data includes date and time of analysis, that calculations are correct, that

data includes documentation of dilutions and correction factors, that data meets data quality objectives and that the data includes documentation of instrument calibrations, standard curves and control standards. 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.

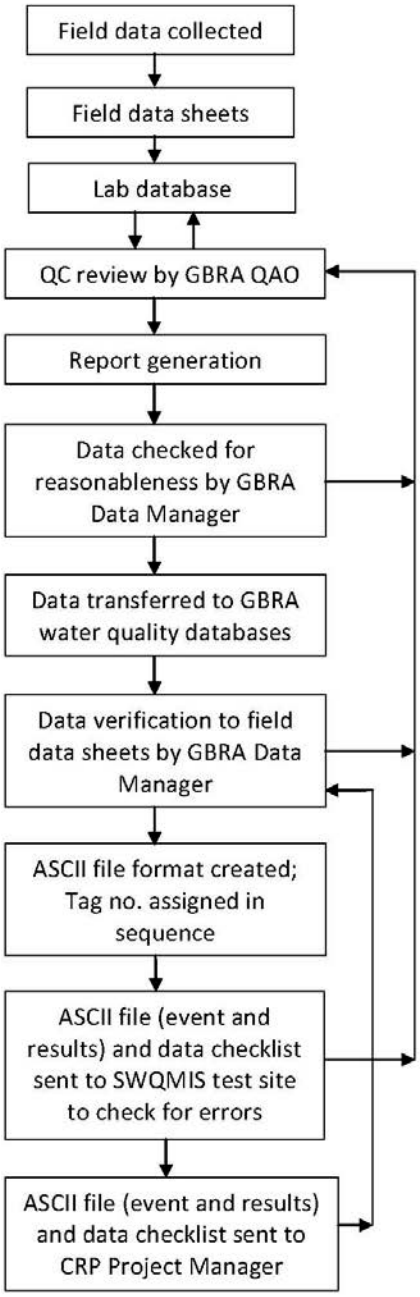
The GBRA Regional Laboratory Director supervises the GBRA Regional laboratory. The Laboratory Director, QAO or GBRA Data Manager reviews the report that is generated when all analyses are complete. If the GBRA lab director or QAO designee feel there has been an error or finds that information is missing, the report is returned to the analyst for review and tracking to correct the error and generate a corrected copy. The GBRA Data Manager reviews the respective data for reasonableness and if errors or anomalies are found the report is returned to the laboratory staff for review and tracking to correct the error. After review for reasonableness the data is verified to the analysis logs by the GBRA Data Manager. If at any time errors are identified, a supplemental laboratory sample number is created with the corrected data. The original sample and the supplemental sample are flagged with the associated sample numbers for sample tracking. Only the corrected supplemental sample data is transferred to the TCEQ. If the uncorrected data has already been submitted to TCEQ before the mistake is caught then the CRP Project manager is notified and the corrected data is resubmitted to SWQMIS in place of the original data submittal.

The GBRA Data Manager is responsible for transmitting the WVWA data to TCEQ in the correct format. Once per month, the WVWA water quality data is transferred to the Water Quality Database. After the review for reasonableness, the data is verified to the analysis logs by the GBRA Data Manager. The GBRA water quality database creates ASCII-formatted text files for the event and results records for each sample and assigns a specific sequenced tag number that pairs the event and results files. After the data is reviewed for completeness, minimum and maximum data outliers are flagged. The GBRA Field Technician uploads the text files to the SWQMIS test site to screen for data errors. If errors are found, the errors are corrected by the GBRA Field Technician and the GBRA Data Manager is notified. The data files and Data Check List are sent to the CRP Project Manager in order to be uploaded to SWQMIS. If errors are found after the TCEQ review, those errors are corrected by the GBRA Project Manager.

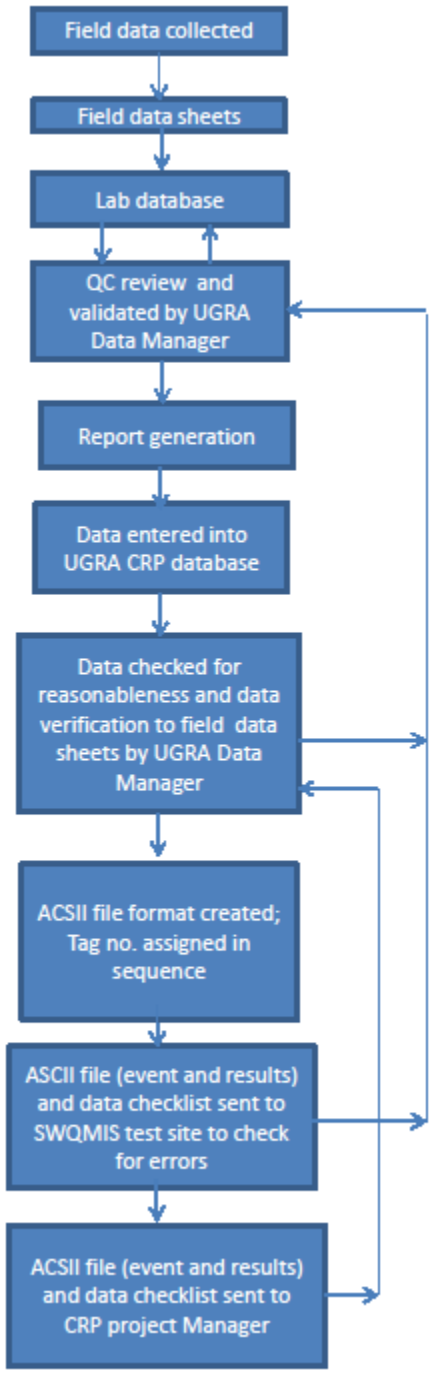
The following flow diagram outlines the path that data that is generated in the field by GBRA field staff takes:



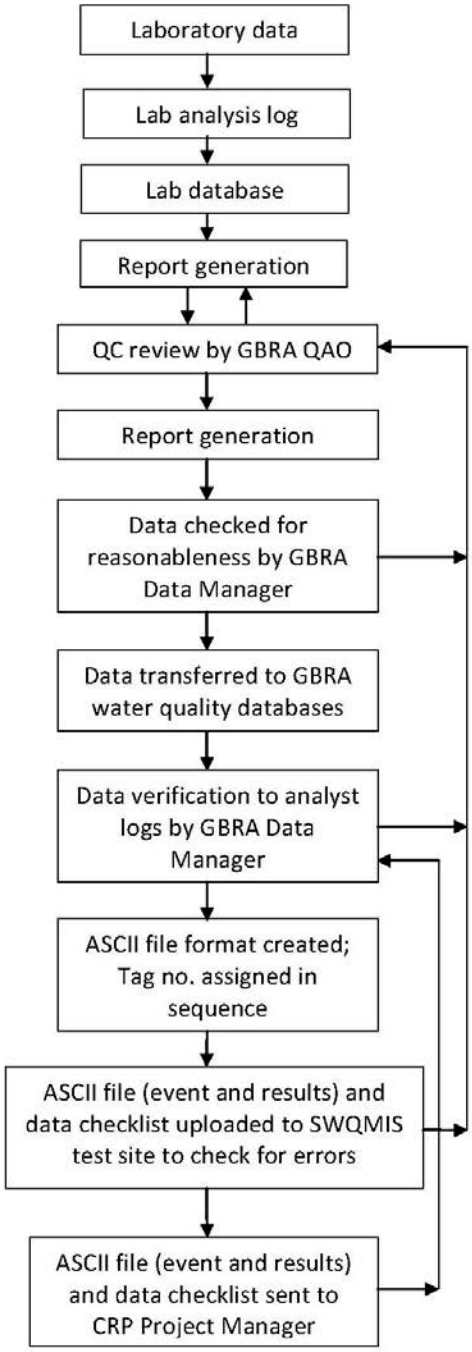
The following flow diagram outlines the path that data that is generated in the field by WVWA field staff takes:



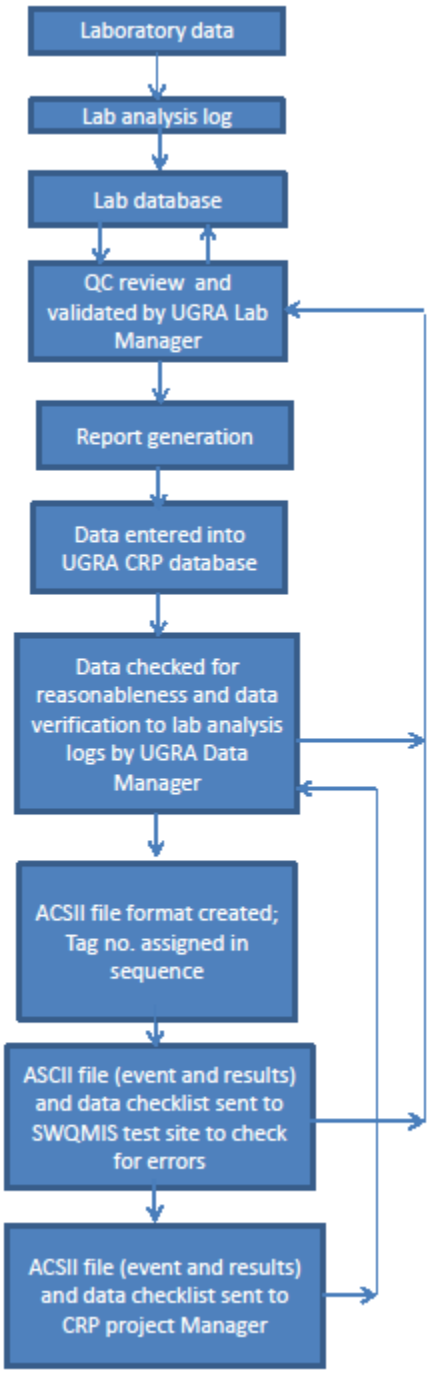
The following flow diagram outlines the path that data that is generated in the field by UGRA field staff takes:



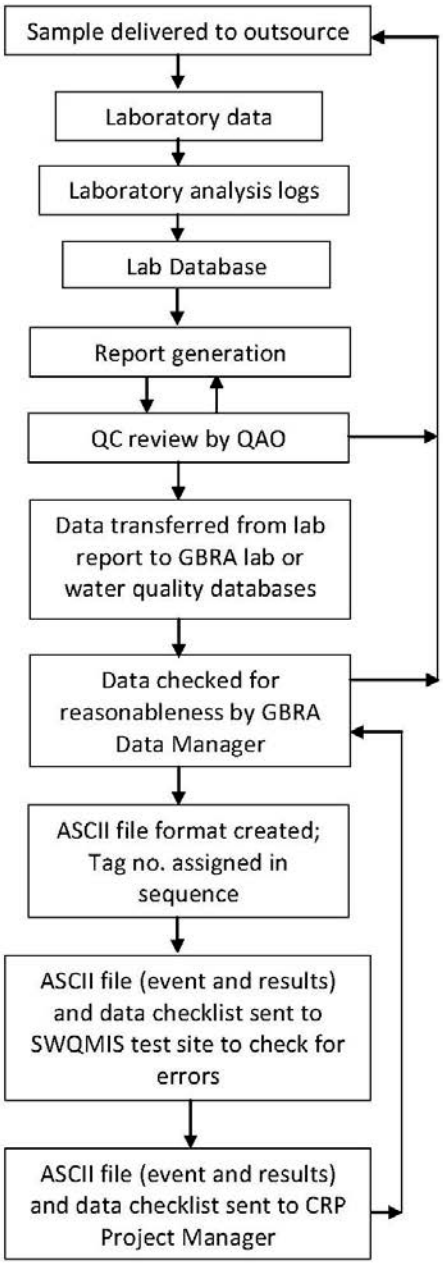
The following flow diagram outlines the path that data that is generated by the GBRA lab takes:


Laboratory data
Lab analysis log
Lab database
Report generation
QC review by GBRA QAO
Report generation
Data checked for reasonableness by GBRA Data Manager
Data transferred to GBRA water quality databases
Data verification to analyst logs by GBRA Data Manager
ASCII file format created; Tag no. assigned in sequence
ASCII file (event and results) and data checklist uploaded to SWQMIS test site to check for errors
ASCII file (event and results) and data checklist sent to CRP Project Manager

The following flow diagram outlines the path that data that is generated by the UGRA lab takes:



The following flow diagram outlines the path that data that are generated by outsource labs takes:



Data Dictionary

Terminology and field descriptions are included in the November 2013 DMRG, or most recent

version. A table outlining the entities that will be used when submitting data under this QAPP is included below for the purpose of verifying which entity codes are included in this QAPP.

Name of Monitoring Entity	Tag Prefix	Submitting Entity	Collecting Entity
Guadalupe-Blanco River Authority	*GB*	*GB*	*GB*
Wimberley Valley Watershed Association	*GB*	*GB*	*WV*
Upper Guadalupe River Authority	*UG*	*GB*	*UG*

Data Errors and Loss

The GBRA Regional Laboratory Director supervises the GBRA Regional laboratory and reviews the report that is generated when all analyses are complete. The UGRA Laboratory Director supervises the UGRA lab and reviews the report when all data is complete. The report is reviewed to see that all necessary information is included and that the data quality objectives have been met. When the report is complete, the lab director signs the report. If the lab director or QAO feel there has been an error or finds that information is missing, the report is returned to the analyst for review and tracking to correct the error and generate a corrected copy. The GBRA/UGRA Project Manager reviews the data for reasonableness and if errors or anomalies are found the report is returned to the laboratory director for review and tracking to correct the error. After review for reasonableness the data is cross-checked to the analysis logs by the GBRA/UGRA Project Manager. If at any time errors are identified, the laboratory and water quality databases are corrected. The GBRA/UGRA Project Manager is responsible for transmitting the data to TCEQ. If errors are found after the TCEQ review, those errors are corrected by the GBRA/UGRA Project Manager.

To minimize the potential for data loss, the databases, both lab and server files 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

If data is collected and recorded on field data sheets, and not directly entered into the GBRA laboratory information system in the field, then the data sheets are filed for review and use later. These files are kept in paper form for a minimum of one year and then scanned for permanent record.

The data produced during each analysis is recorded on analysis bench sheets or entered directly into the GBRA laboratory information system. The information contained in the bench sheets or LIMS electronic file includes all quality control data associated with each day's or batch's analysis. The data on paper logs are transferred to the laboratory database for report generation. If paper bench sheets are used, then they are retained in paper form for a minimum of one year and then scanned for permanent record.

The data reports that are generated are reviewed by the laboratory director and signed. They are then given to the GBRA/UGRA Project Manager for verification. If an anomaly or error is found, the report is marked and returned to the laboratory for review, verification and correction, if necessary. If a correction is made, a supplemental laboratory report is created. These reports may or may not be kept in paper form since the reports can be regenerated from the lab database at any time. If kept, the paper form is kept for a minimum of one year and then sent for scanning into the GBRA records management system.

The laboratory database is housed on the laboratory computer and is backed up on the network server nightly. The GBRA back-up copy of the network server files is made every Friday and that copy is stored off-site at a protected location. The UGRA back-up copies of the network server files are stored on -site. The network administrator is responsible for the servers and back up generation.

After data is sent to the TCEQ CRP Project Manager for review, the file that has been created is kept on the network server permanently. The network server is backed up nightly. Paper copies of the data and field duplicate sample reports are kept for a minimum of one year and then microfilmed for permanent record.

The database containing the scanned images of all lab records is contained on a network server and backed up nightly. A back-up copy of the network server files is made every Friday and that copy for GBRA is stored off-site at a protected location. UGRA stores back-up copies on-site. The GBRA records manager is the custodian of these files.

Data Handling, Hardware, and Software Requirements

The laboratory database is housed on a GBRA server and backed up each evening. The laboratory database uses SQL 2012 database software. The systems are operating in Windows XP 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 DMRG, and applicable Basin Planning Agency information resource management policies.

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

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

C1 Assessments and Response Actions

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

Table C1.1 Assessments and Response Requirements

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	GBRA	Monitoring of the project status and records to ensure requirements are being fulfilled	Report to TCEQ in Quarterly Report
Monitoring Systems Audit of Basin Planning Agency	Dates to be determined by TCEQ CRP	TCEQ	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the TCEQ to address corrective actions
Monitoring Systems Audit of Program Subparticipants	Dates to be determined by the GBRA (At least once per contract period.)	GBRA	Field sampling, handling and measurement; facility review; and data management as they relate to CRP	30 days to respond in writing to the GBRA. PA will report problems to TCEQ in Progress Report.
Laboratory Inspection	Dates to be determined by TCEQ	TCEQ Laboratory Inspector	Analytical and quality control procedures employed at the laboratory and the contract laboratory	30 days to respond in writing to the TCEQ to address corrective actions

Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, *SWQM Procedures*, SOPs, or the DMRG. Deficiencies may invalidate resulting data and require corrective action. Repeated deficiencies should initiate a CAP. Corrective action for deficiencies may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff, are communicated to GBRA/UGRA Project Manager (or other appropriate staff), and should be subject to periodic review so their responses can be uniform, and their frequency tracked. It is the responsibility of the GBRA/UGRA Project Manager, in consultation with the GBRA/UGRA QAO, to ensure that the actions and resolutions to the problems are documented and that records are maintained in

accordance with this QAPP. In addition, these actions and resolutions will be conveyed to the CRP Project Manager both verbally and in writing in the project progress reports and by completion of a CAP.

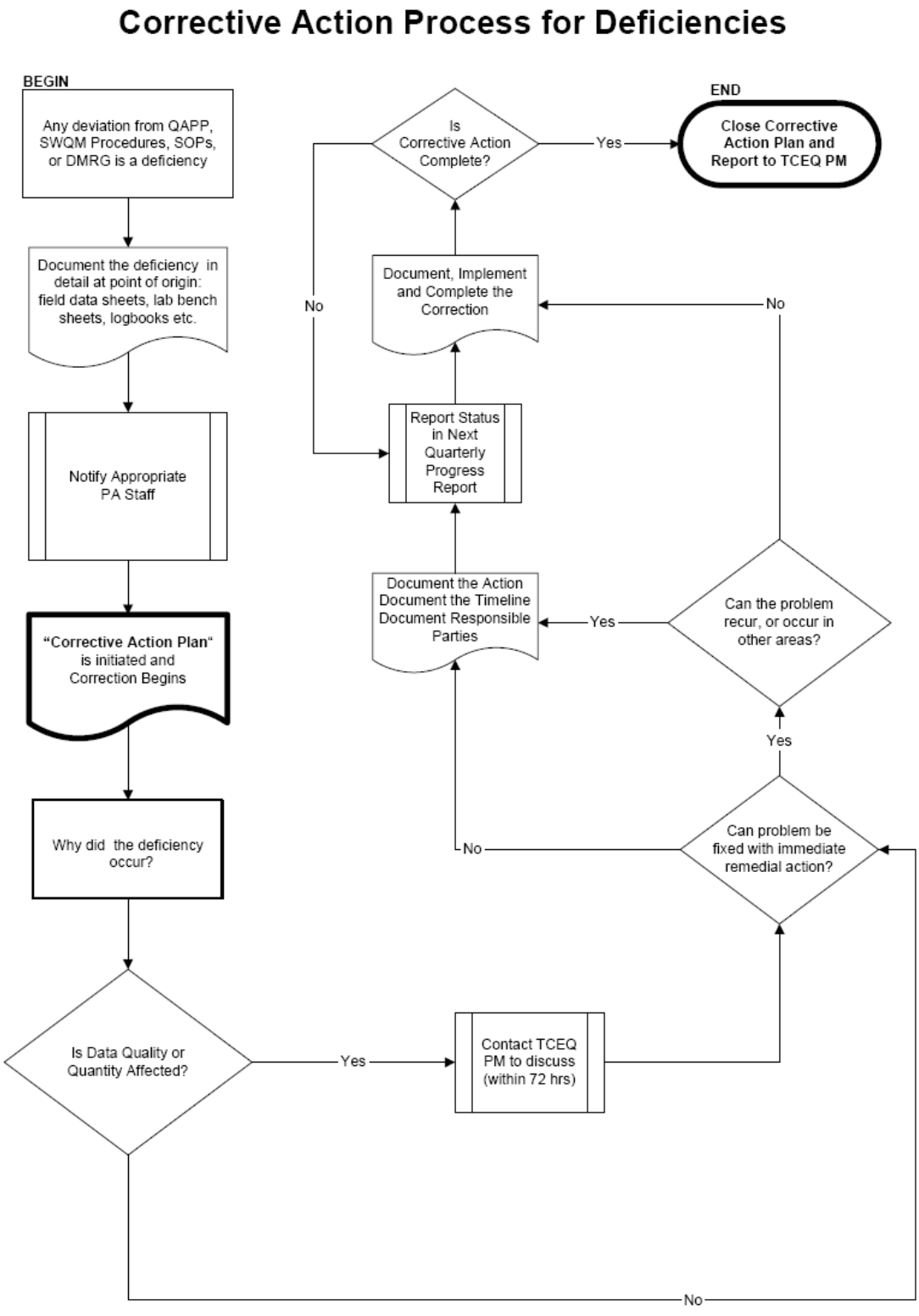
Corrective Action

CAPs should:

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

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

Figure C1.1 Corrective Action Process for Deficiencies



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

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

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

C2 Reports to Management

Table C2.1 QA Management Reports

Type of Report	Frequency (daily, weekly, monthly, quarterly, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation	Report Recipients
GBRA Progress Report	Quarterly	15th day after quarter end	GBRA Project Manager	TCEQ Project Manager
UGRA Progress Report	Quarterly	15th day after quarter end	UGRA Project Manager	GBRA Project Manager
Monitoring Systems Audit Report Response	After audit report received by GBRA	With quarterly report	GBRA Project Manager	TCEQ Project Manager
Corrective Action Plans (CAP)	Status and at time of completion of CAP	Quarterly	GBRA Data Manager	TCEQ Project Manager
		Quarterly	UGRA Data Manager	GBRA Project Manager and TCEQ Project Manager
Data Review Checklist	Prior to submission of data to TCEQ	Quarterly	GBRA Data Manager	TCEQ Project Manager
		Quarterly	UGRA Data Manager	TCEQ Project Manager
Data Summary	Prior to submission of data to TCEQ	Quarterly	GBRA Data Manager	TCEQ Project Manager
		Quarterly	UGRA Data Manager	TCEQ Project Manager

Reports to GBRA Project Management

The GBRA QAO will report any sample or data issue to the GBRA Project Manager. The GBRA Field Technician will report any sample or data issue associated with the field data to the GBRA Project Manager. The WVWA field technician will report any data issues to the GBRA Field Technician, who in turn will report the issue to the GBRA Project Manager. The UGRA project manager submits quarterly reports of progress with known data issues and requests for expense reimbursements to the GBRA project manager. The Issues can include but are not limited to, loss of data, data anomalies or outliers, equipment failures or delays in meeting holding times. Based on the discussions, an action(s), if any, will be taken (report data as is, resample, qualify the data, or report a loss of data). A corrective action report will be generated if any action is taken due to a failure in the laboratory quality system.

Reports to TCEQ Project Management

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

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

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

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

Reports by TCEQ Project Management

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

D1 Data Review, Verification, and Validation

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

D2 Verification and Validation Methods

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

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

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

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

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

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

Table D2.1: Data Review Tasks

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified - GBRA	GBRA Water Quality Investigator/Field Technician		GBRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ *SWQM Procedures Manual*- GBRA	GBRA Water Quality Investigator/Field Technician		GBRA Data Manager
Field instrument pre- and post-calibration results within limits	GBRA Water Quality Investigator/Field Technician		GBRA Data Manager
Standards and reagents traceable - GBRA	GBRA Water Quality Investigator/Field Technician	GBRA Lab Director and Quality Assurance Officer	
Chain of custody complete/acceptable – GBRA	GBRA Water Quality Investigator/Field Technician	GBRA Laboratory Analysts/ Technicians	
NELAP Accreditation is current – GBRA		GBRA Lab Director and Quality Assurance Officer	
Sample preservation and handling acceptable - GBRA	GBRA Water Quality Investigator/Field Technician	GBRA Laboratory Analysts/ Technicians	
Holding times not exceeded - GBRA	GBRA Water Quality Investigator/Field Technician	GBRA Laboratory Analysts/ Technicians	GBRA Data Manager
Collection, preparation, and analysis consistent with SOPs and QAPP - GBRA	GBRA Water Quality Investigator/Field Technician	GBRA Laboratory Analysts/ Technicians	GBRA Data Manager
Preparation, and analysis consistent with SOPs and QAPP – LCRA ELS		LCRA ELS Lab Manager LCRA ELS Quality Assurance Officer	GBRA Data Manager
Preparation, and analysis consistent with SOPs and QAPP - SARA		SARA Lab Manager; SARA Quality Assurance Officer	GBRA Data Manager

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Field documentation (e.g., biological, stream habitat) complete - GBRA	GBRA Water Quality Investigator/Field Technician		GBRA Data Manager
Instrument calibration data complete - GBRA	GBRA Water Quality Investigator/Field Technician	GBRA Laboratory Analysts/ Technicians; GBRA Quality Assurance Officer	GBRA Data Manager
Instrument calibration data complete – LCRA ELS		LCRA ELS Lab Manager; LCRA ELS Quality Assurance Officer	GBRA Data Manager
Instrument calibration data complete - SARA		SARA Lab Manager; SARA Quality Assurance Officer	GBRA Data Manager
Bacteriological records complete - GBRA		GBRA Laboratory Analysts/ Technicians	GBRA Data Manager
QC samples analyzed at required frequency - GBRA	GBRA Water Quality Investigator/Field Technician	GBRA Lab Director and Quality Assurance Officer	
QC results meet performance and program specifications - GBRA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager
Analytical sensitivity (Minimum Analytical Levels/Ambient Water Reporting Limits) consistent with QAPP - GBRA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager
Results, calculations, transcriptions checked - GBRA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Laboratory bench-level review performed - GBRA			GBRA Data Manager
All laboratory samples analyzed for all parameters - GBRA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager
Corollary data agree - GBRA			GBRA Data Manager
Nonconforming activities documented - GBRA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager
Outliers confirmed and documented; reasonableness check performed - GBRA			GBRA Data Manager
Dates formatted correctly - GBRA			GBRA Data Manager
Depth reported correctly - GBRA			GBRA Data Manager
TAG IDs correct - GBRA			GBRA Data Manager
TCEQ ID number assigned - GBRA			GBRA Data Manager
Valid parameter codes - GBRA			GBRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly - GBRA			GBRA Data Manager
Time based on 24-hour clock - GBRA			GBRA Data Manager
Absence of transcription error confirmed - GBRA			GBRA Data Manager
Absence of electronic errors confirmed - GBRA			GBRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule) - GBRA			GBRA Data Manager
Field QC results attached to data review checklist - GBRA			GBRA Data Manager
Verified data log submitted - GBRA			GBRA Data Manager
100% of data manually reviewed - GBRA			GBRA Data Manager

Table D2.2: Data Review Tasks - UGRA

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified - UGRA	UGRA Field Technicians		UGRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ *SWQM Procedures Manual*- UGRA	UGRA Field Technicians		UGRA Data Manager
Field instrument pre- and post-calibration results within limits	UGRA Field Technicians		UGRA Data Manager
Standards and reagents traceable - UGRA	UGRA Field Technicians	UGRA Quality Assurance Officer; UGRA Laboratory Manager	
Chain of custody complete/acceptable – UGRA	UGRA Field Technicians	UGRA Laboratory Manager	
NELAP Accreditation is current – UGRA		UGRA Quality Assurance Officer; UGRA Laboratory Manager	
Sample preservation and handling acceptable - UGRA	UGRA Field Technicians	UGRA Laboratory Manager	
Holding times not exceeded - UGRA	UGRA Field Technicians	UGRA Laboratory Manager	UGRA Data Manager
Collection, preparation, and analysis consistent with SOPs and QAPP - UGRA	UGRA Field Technicians	UGRA Laboratory Analyst/Field Technicians	UGRA Data Manager
Field documentation (e.g., biological, stream habitat) complete - UGRA	UGRA Field Technician		UGRA Data Manager
Instrument calibration data complete - UGRA	UGRA Field Technicians	UGRA Laboratory Analyst/Field Technicians	UGRA Data Manager
Bacteriological records complete - UGRA		UGRA Laboratory Analyst/Field Technicians	UGRA Data Manager
QC samples analyzed at required frequency - UGRA	UGRA Field Technicians	UGRA Laboratory Manager	UGRA Data Manager
QC results meet performance and program specifications - UGRA		UGRA Laboratory Manager; UGRA Quality Assurance Officer	UGRA Data Manager

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Analytical sensitivity (Minimum Analytical Levels/Ambient Water Reporting Limits) consistent with QAPP - UGRA		UGRA Laboratory Manager; UGRA Quality Assurance Officer	UGRA Data Manager
Results, calculations, transcriptions checked - UGRA		UGRA Laboratory Manager; UGRA Quality Assurance Officer	UGRA Data Manager
Laboratory bench-level review performed - UGRA			UGRA Data Manager
All laboratory samples analyzed for all parameters - UGRA		UGRA Laboratory Manager; UGRA Quality Assurance Officer	UGRA Data Manager
Corollary data agree - UGRA			UGRA Data Manager
Nonconforming activities documented - UGRA			UGRA Data Manager
Outliers confirmed and documented; reasonableness check performed - UGRA			UGRA Data Manager
Dates formatted correctly - UGRA			UGRA Data Manager
Depth reported correctly - UGRA			UGRA Data Manager
TAG IDs correct - UGRA			UGRA Data Manager
TCEQ ID number assigned - UGRA			UGRA Data Manager
Valid parameter codes - UGRA			UGRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly - UGRA			UGRA Data Manager
Time based on 24-hour clock- UGRA			UGRA Data Manager
Absence of transcription error confirmed - UGRA			UGRA Data Manager
Absence of electronic errors confirmed - UGRA			UGRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule) - UGRA			UGRA Data Manager
Field QC results attached to data review checklist - UGRA			UGRA Data Manager
Verified data log submitted - UGRA			UGRA Data Manager
10% of data manually reviewed - UGRA			UGRA Data Manager

Table D2.3: Data Review Tasks - WVWA

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified - WVWA	WVWA Field Technicians		GBRA Data Manager
Field QC samples collected for all analytes as prescribed in the TCEQ *SWQM Procedures Manual*- WVWA	WVWA Field Technicians	GBRA Water Quality Investigator/Field Technician; WVWA Project Manager	
Field instrument pre- and post-calibration results within limits	WVWA Field Technicians		GBRA Data Manager
Standards and reagents traceable - WVWA	WVWA Field Technicians		
Chain of custody complete/acceptable – WVWA	WVWA Field Technicians	GBRA Laboratory Analysts/ Technicians	
Sample preservation and handling acceptable - WVWA	WVWA Field Technicians	GBRA Water Quality Investigator/Field Technician ; GBRA Laboratory Analysts/ Technicians	
Holding times not exceeded - WVWA	WVWA Field Technicians	GBRA Laboratory Analysts/ Technicians	GBRA Data Manager
Collection, preparation, and analysis consistent with SOPs and QAPP – WVWA	WVWA Field Technicians	GBRA Laboratory Analysts/ Technicians	GBRA Data Manager
Field documentation (e.g., biological, stream habitat) complete- WVWA	WVWA Field Technicians		GBRA Data Manager
Instrument calibration data complete - WVWA	WVWA Field Technicians	GBRA Laboratory Analysts/ Technicians; GBRA Quality Assurance Officer	GBRA Data Manager

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Bacteriological records complete – WVWA		GBRA Laboratory Analysts/ Technicians	GBRA Data Manager
QC samples analyzed at required frequency - WVWA	WVWA Field Technicians	GBRA Water Quality Investigator/Field Technician	
QC results meet performance and program specifications - WVWA		GBRA Water Quality Investigator/Field Technician	GBRA Data Manager
Analytical sensitivity (Minimum Analytical Levels/Ambient Water Reporting Limits) consistent with QAPP – WVWA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager
Results, calculations, transcriptions checked – WVWA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager
Laboratory bench-level review performed – WVWA			GBRA Data Manager
All laboratory samples analyzed for all parameters – WVWA		GBRA Laboratory Analysts/ Technicians; GBRA Lab Director and Quality Assurance Officer	GBRA Data Manager
Corollary data agree – WVWA			GBRA Data Manager
Nonconforming activities documented - WVWA			GBRA Data Manager
Outliers confirmed and documented; reasonableness check performed – WVWA			GBRA Data Manager
Dates formatted correctly – WVWA			GBRA Data Manager

Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Depth reported correctly – WVWA			GBRA Data Manager
TAG IDs correct – WVWA			GBRA Data Manager
TCEQ ID number assigned – WVWA			GBRA Data Manager
Valid parameter codes – WVWA			GBRA Data Manager
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly – WVWA			GBRA Data Manager
Time based on 24-hour clock- WVWA			GBRA Data Manager
Absence of transcription error confirmed - WVWA			GBRA Data Manager
Absence of electronic errors confirmed - WVWA			GBRA Data Manager
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule) - WVWA			GBRA Data Manager
Field QC results attached to data review checklist - WVWA			GBRA Data Manager
Verified data log submitted - WVWA			GBRA Data Manager
100% of data manually reviewed - WVWA			GBRA Data Manager

D3 Reconciliation with User Requirements

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

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

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

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

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

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

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

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

TABLE A7.1 Measurement Performance Specifications for GBRA										
Field Parameters										
Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
pH (STANDARD UNITS)	s.u	water	SM 4500-H+ B. and TCEQ SOP, V1	00400	NA*	NA	NA	NA	NA	GBRA Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP, V1	00300	NA*	NA	NA	NA	NA	GBRA Field
SPECIFIC CONDUCTANCE,FIELD (uS/CM @ 25C)	us/cm	water	SM 2510 and TCEQ SOP, V1	00094	NA*	NA	NA	NA	NA	GBRA Field
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 and TCEQ SOP, V1	00010	NA*	NA	NA	NA	NA	GBRA Field
CHLORINE, TOTAL RESIDUAL (MG/L)**	mg/L	water	SM 4500-Cl G and TCEQ SOP, V1	50060	0.1	NA	NA	NA	NA	GBRA Field
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	NA*	NA	NA	NA	NA	GBRA Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	NA*	NA	NA	NA	NA	GBRA Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5= High,6=Dry	NU	water	TCEQ SOP V1	01351	NA*	NA	NA	NA	NA	GBRA Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP, V1	74069	NA*	NA	NA	NA	NA	GBRA Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE	meters	water	TCEQ SOP V2	82903	NA*	NA	NA	NA	NA	GBRA Field
RESERVOIR STAGE (FEET ABOVE MEAN SEA LEVEL)†	FT ABOVE MSL	water	TWDB	00052	NA*	NA	NA	NA	NA	GBRA Field
RESERVOIR PERCENT FULL†	% RESERVOIR CAPACITY	water	TWDB	00053	NA*	NA	NA	NA	NA	GBRA Field
RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW ENTER 1 IF REPORTING	NS	other	TCEQ Drought Guidance	00051	NA*	NA	NA	NA	NA	GBRA Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)***	meters	other	TCEQ Drought Guidance	89864	NA*	NA	NA	NA	NA	GBRA Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)***	meters	other	TCEQ Drought Guidance	89865	NA*	NA	NA	NA	NA	GBRA Field

TABLE A7.1 Measurement Performance Specifications for GBRA

Field Parameters

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
POOL LENGTH, METERS* **	meters	other	TCEQ Drought Guidance	89869	NA*	NA	NA	NA	NA	GBRA Field
% POOL COVERAGE IN 500 METER REACH* **	%	other	TCEQ Drought Guidance	89870	NA*	NA	NA	NA	NA	GBRA Field
DEPTH AT BOTTOM OF WATER AT SAMPLE SITE (METERS)	meters	other	TCEQ Drought Guidance	82903	NA*	NA	NA	NA	NA	GBRA Field
PRIMARY CONTACT, OBSERVED ACTIVITY (# OF PEOPLE OBSERVED)	# of people observed	other	NA	89978	NA	NA	NA	NA	NA	GBRA Field
EVIDENCE OF PRIMARY CONTACT RECREATION (1 = OBSERVED, 0 = NOT OBSERVED)	NU	other	NA	89979	NA	NA	NA	NA	NA	GBRA Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	NA*	NA	NA	NA	NA	GBRA Field

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

** Chlorine residual to be collected downstream of chlorinated outfalls.

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

† As published by the Texas Water Development Board on their website http://wiid.twdb.state.tx.us/ims/resinfo/BushButton/lakestatus.asp?selcat=3&slbasin=2

References:

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

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

TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012, (RG-415)

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

TABLE A7.1 Measurement Performance Specifications for GBRA

Conventional and Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
SPECIFIC CONDUCTANCE,LAB (UMHOS/CM @ 25C)	uS/cm	water	SM 2510 B	00095	NA	NA	NA	NA	NA	GBRA****
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540 D.	00530	5	1***	NA	NA	NA	GBRA****
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	NTU	water	SM 2130 B.	82079	0.5	0.5	NA	NA	NA	GBRA****
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00945	5	1	70-130	20	80-120	GBRA****
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00940	5	1	70-130	20	80-120	GBRA****
CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	ug/L	water	SM 10200-H4	32211	3	1	NA	20	80-120	GBRA****
PHEOPHYTIN-A UG/L SPECTROPHOTOMETRIC ACID. METH.	µg/L	water	SM 10200-H4	32218	3	1	NA	NA	NA	GBRA****
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/ 100 mL	water	Colilert-18	31699	1	1	NA	0.5**	NA	GBRA
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	SM 4500-NH3 D.	00610	0.1	0.1	70-130	20	80-120	SARA
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	00610	0.1	0.1	70-130	20	80-120	GBRA****
HARDNESS, TOTAL (MG/L AS CACO3)*	mg/L	water	SM 2340 C.	00900	5	5	NA	20	80-120	GBRA****
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	80-120	GBRA****
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.3	00665	0.06	0.02	70-130	20	80-120	GBRA****
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2 Rev. 2 (1993)	00625	0.2	0.2	70-130	20	80-120	GBRA****

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

** This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5. ***TSS LOQ is based on the volume of sample used.

****SARA will be used in the event of an equipment failure and the need to meet holding times.

References:

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

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

TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012, (RG-415)

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

TABLE A7.1 Measurement Performance Specifications for GBRA

24 HourParameters in Water

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

References:

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

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

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

TABLE A7.1 Measurement Performance Specifications for GBRA

Metals in Water

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
ALUMINUM, DISSOLVED (UG/L AS AL)	ug/L	water	EPA 200.8	01106	200	4	70-130	20	80-120	LCRA
ARSENIC, DISSOLVED (UG/L AS AS)	µg/L	water	EPA 200.8	01000	5	2	70-130	20	80-120	LCRA
CADMIUM, DISSOLVED (UG/L AS CD)	ug/L	water	EPA 200.8 Rev. 5.4 (1998)	01025	0.1 for waters <50 mg/L hardness ------- 0.3 for waters >50 mg/Lhardness	1	70-130	20	80-120	LCRA
CHROMIUM, DISSOLVED (UG/L AS CR)	ug/L	water	EPA 200.8 Rev. 5.4 (1998)	01030	10	1	70-130	20	80-120	LCRA
COPPER, DISSOLVED (UG/L AS CU)	ug/L	water	EPA 200.8 Rev. 5.4 (1998)	01040	3	1	70-130	20	80-120	LCRA
LEAD, DISSOLVED (UG/L AS PB)	ug/L	water	EPA 200.8 Rev. 5.4 (1998)	01049	1	1	70-130	20	80-120	LCRA
MERCURY, TOTAL, WATER, ug/L**	ug/L	water	SW7470 A	71960	0.006	0.2	70-130	20	80-120	LCRA
NICKEL, DISSOLVED (UG/L AS NI)	ug/L	water	EPA 200.8 Rev. 5.4 (1998)	01065	10	1	70-130	20	80-120	LCRA
SELENIUM, TOTAL (UG/L AS SE)	ug/L	water	EPA 200.8 Rev. 5.4 (1998)	01147	2	2	70-130	20	80-120	LCRA
SILVER, DISSOLVED (UG/L AS AG)	ug/L	water	EPA 200.8 Rev 5.4 (1998)	01075	0.5	0.5	70-130	20	80-120	LCRA
ZINC, DISSOLVED (UG/L AS ZN)	ug/L	water	EPA 200.8 Rev 5.4 (1998)	01090	5	5	70-130	20	80-120	LCRA

*Hardness is not used for regulatory purposes but is used to assess metals in water at inland sites (estuarine sites do not require hardness analysis). **TCEQ has given approval to report above the AWRL for Total Mercury in Water.

References:

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

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

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TABLE A7.1 Measurement Performance Specifications for GBRA					
Biological- Benthics					
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**Lab**
STREAM ORDER	NU	Water	TCEQ SOP, V2	84161	GBRA
BENTHIC DATA REPORTING UNITS (1=NUMBER OF INDIVIDUALS IN SUB-SAMPLE, 2=NUMBER OF INDIVIDUALS/FT2, 3=NUMBER OF INDIVIDUALS/M2, 4=TOTAL NUMBER OF INDIVIDUALS IN SAMPLE)	NU	Other	TCEQ SOP, V2	89899	GBRA
KICKNET EFFORT,AREA KICKED (SQ.METER)	m2	Other	TCEQ SOP, V2	89903	GBRA
KICKNET EFFORT,MINUTES KICKED (MIN.)	min.	Other	TCEQ SOP, V2	89904	GBRA
DEBRIS/SHORELINE SAMPLING EFFORT, MINUTES	min.	Other	TCEQ SOP, V2	89905	GBRA
NUMBER OF INDIVIDUALS IN BENTHIC SAMPLE	NU	Other	TCEQ SOP, V2	89906	GBRA
MESH SIZE, ANY NET OR SIEVE, AVERAGE BAR (CM)	cm	Other	TCEQ SOP, V2	89946	GBRA
BENTHIC SAMPLE COLLECTION METHOD (1=SURBER, 2=EKMAN, 3=KICKNET, 4=PETERSON, 5=HESTER DENDY, 6=SNAG, 7=HESS)	NU	Other	TCEQ SOP, V2	89950	GBRA
ECOREGION LEVEL III (TEXAS ECOREGION CODE)	NU	Other	TCEQ SOP, V1	89961	GBRA
BENTHOS ORGANISMS -NONE PRESENT (0=NONE PRESENT)	NS	Other	TCEQ SOP, V2	90005	GBRA
HILSENHOFF BIOTIC INDEX (HBI)	NU	Other	TCEQ SOP, V2	90007	GBRA
NUMBER OF EPT INDEX	NU	Other	TCEQ SOP, V2	90008	GBRA
DOMINANT BENTHIC FUNCTIONAL FEEDING GRP, % OF INDIVIDUALS	%	Other	TCEQ SOP, V2	90010	GBRA
BENTHIC GATHERERS, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP, V2	90025	GBRA
BENTHIC PREDATORS, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP, V2	90036	GBRA
DOMINANT TAXON, BENTHOS PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP, V2	90042	GBRA
RATIO OF INTOLERANT TO TOLERANT TAXA, BENTHOS	NU	Other	TCEQ SOP, V2	90050	GBRA
NUMBER OF NON-INSECT TAXA	NU	Other	TCEQ SOP, V2	90052	GBRA

TABLE A7.1 Measurement Performance Specifications for GBRA

Biological- Benthics

Parameter	Units	Matrix	Method	Parameter Code	Lab
ELMIDAE, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP, V2	90054	GBRA
TOTAL TAXA RICHNESS, BENTHOS	NU	Other	TCEQ SOP, V2	90055	GBRA
CHIRONOMIDAE, PERCENT OF INDIVIDUALS	%	Other	TCEQ SOP, V2	90062	GBRA
PERCENT OF TOTAL TRICHOPTERA INDIVIDUALS AS HYDROPSYCHIDAE	%	Other	TCEQ SOP, V2	90069	GBRA
RAPID BIOASSESSMENT PROTOCOLS BENTHIC MACROINVERTEBRATE IBI SCORE	NU	Other	TCEQ SOP, V2	90081	GBRA
BIOLOGICAL DATA (REPORT VALUE OF 2011 FOR BENTHIC MACROINVERTEBRATE RAPID BIOASSESSMENT QUALITATIVE)	NU	Other	TCEQ SOP, V2	89888	GBRA

References:

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

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

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

TABLE A7.1 Measurement Performance Specifications for GBRA					
Biological- Nekton					
Parameter	Units	Matrix	Method	Parameter Code	Lab
STREAM ORDER	NU	Water	TCEQ SOP, V2	84161	GBRA
SEINE, MINIMUM MESH SIZE, AVERAGE BAR, NEKTON,IN	IN	Other	TCEQ SOP, V2	89930	GBRA
SEINE, MAXIMUM MESH SIZE, AVG BAR, NEKTON,INCH	IN	Other	TCEQ SOP, V2	89931	GBRA
NET LENGTH (METERS)	M	Other	TCEQ SOP, V2	89941	GBRA
ELECTROFISHING METHOD 1=BOAT 2=BACKPACK 3=TOTEBARGE	NU	Other	TCEQ SOP, V2	89943	GBRA
ELECTROFISH EFFORT, DURATION OF SHOCKING (SEC)	SEC	Other	TCEQ SOP, V2	89944	GBRA
SEINING EFFORT (# OF SEINE HAULS)	NU	Other	TCEQ SOP, V2	89947	GBRA
COMBINED LENGTH OF SEINE HAULS (METERS)	M	Other	TCEQ SOP, V2	89948	GBRA
SEINING EFFORT, DURATION (MINUTES)	MIN	Other	TCEQ SOP, V2	89949	GBRA
ECOREGION LEVEL III (TEXAS ECOREGION CODE)	NU	Other	TCEQ SOP, V1	89961	GBRA
AREA SEINED (SQ METERS)	M2	Other	TCEQ SOP, V2	89976	GBRA
NUMBER OF SPECIES, FISH	NU	Other	TCEQ SOP, V2	98003	GBRA
NEKTON ORGANISMS-NONE PRESENT (0=NONE PRESENT)	NS	Other	TCEQ SOP, V2	98005	GBRA
TOTAL NUMBER OF SUNFISH SPECIES	NU	Other	TCEQ SOP, V2	98008	GBRA
TOTAL NUMBER OF INTOLERANT SPECIES, FISH	NU	Other	TCEQ SOP, V2	98010	GBRA
PERCENT OF INDIVIDUALS AS OMNIVORES, FISH	%	Other	TCEQ SOP, V2	98017	GBRA
PERCENT OF INDIVIDUALS AS INVERTIVORES, FISH	%	Other	TCEQ SOP, V2	98021	GBRA
PERCENT OF INDIVIDUALS AS PISCIVORES, FISH	%	Other	TCEQ SOP, V2	98022	GBRA
PERCENT OF INDIVIDUALS WITH DISEASE OR ANOMALY	%	Other	TCEQ SOP, V2	98030	GBRA
TOTAL NUMBER OF NATIVE CYPRINID SPECIES	NU	Other	TCEQ SOP, V2	98032	GBRA
PERCENT INDIVIDUALS AS NON-NATIVE FISH SPECIES (% OF COMMUNITY)	%	Other	TCEQ SOP, V2	98033	GBRA
TOTAL NUMBER OF INDIVIDUALS SEINING	NU	Other	TCEQ SOP, V2	98039	GBRA
TOTAL NUMBER OF INDIVIDUALS ELECTROFISHING	NU	Other	TCEQ SOP, V2	98040	GBRA
TOTAL NUMBER OF BENTHIC INVERTIVORE SPECIES	NU	Other	TCEQ SOP, V2	98052	GBRA
TOTAL NUMBER OF BENTHIC FISH SPECIES	NU	Other	TCEQ SOP, V2	98053	GBRA
NUMBER OF INDIVIDUALS PER SEINE HAUL	NU	Other	TCEQ SOP, V2	98062	GBRA
NUMBER OF INDIVIDUALS PER MINUTE ELECTROFISHING	NU	Other	TCEQ SOP, V2	98069	GBRA
TOTAL NUMBER OF INDIVIDUALS IN SAMPLE, FISH	NU	Other	TCEQ SOP, V2	98023	GBRA
PERCENT INDIVIDUALS AS TOLERANT FISH SPECIES(EXCLUDING WESTERN MOSQUITOFISH	%	Other	TCEQ SOP, V2	98070	GBRA
NEKTON TEXAS REGIONAL IBI SCORE	NU	Other	TCEQ SOP, V2	98123	GBRA

TABLE A7.1 Measurement Performance Specifications for GBRA

Biological- Nekton

Parameter	Units	Matrix	Method	Parameter Code	Lab
BIOLOGICAL DATA (REPORT VALUE OF 1011 FOR NEKTON TEXAS REGIONAL INDEX SUMMARY & META DATA; REPORT 1012 FOR NEKTON ELECTROFISHING; REPORT VALUE 1013 FOR NEKTON SEINING; REPORT VALUE 1014 FOR NEKTON OBSERVATION NOT CAPTURED)	NU	Other	TCEQ SOP, V2	89888	GBRA

References:

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

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

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

TABLE A7.1 Measurement Performance Specifications for GBRA					
Biological- Habitat					
Parameter	Units	Matrix	Method	Parameter Code	Lab
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	Water	TCEQ SOP, V2	00061	GBRA
STREAMBED SLOPE (M/KM)*	m/km	Other	TCEQ SOP, V2	72051	GBRA
AVERAGE PERCENTAGE INSTREAM COVER	%	Other	TCEQ SOP, V2	84159	GBRA
STREAM ORDER	NU	Water	TCEQ SOP, V2	84161	GBRA
NUMBER OF LATERAL TRANSECTS MADE	NU	Other	TCEQ SOP, V2	89832	GBRA
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	Other	TCEQ SOP, V2	89835	GBRA
TOTAL NUMBER OF STREAM BENDS	NU	Other	TCEQ SOP, V2	89839	GBRA
NUMBER OF WELL DEFINED STREAM BENDS	NU	Other	TCEQ SOP, V2	89840	GBRA
NUMBER OF MODERATELY DEFINED STREAM BENDS	NU	Other	TCEQ SOP, V2	89841	GBRA
NUMBER OF POORLY DEFINED STREAM BENDS	NU	Other	TCEQ SOP, V2	89842	GBRA
TOTAL NUMBER OF RIFFLES	NU	Other	TCEQ SOP, V2	89843	GBRA
DOMINANT SUBSTRATE TYPE(1=CLAY,2=SILT,3=SAND,4=GRAVEL,5=COBBLE,6=BOULDER,7=BEDROCK,8=OTHER)	NU	Sediment	TCEQ SOP, V2	89844	GBRA
AVERAGE PERCENT OF SUBSTRATE GRAVEL SIZE OR LARGER	%	Other	TCEQ SOP, V2	89845	GBRA
AVERAGE STREAM BANK EROSION (%)	%	Other	TCEQ SOP, V2	89846	GBRA
AVERAGE STREAM BANK SLOPE (DEGREES)	deg	Other	TCEQ SOP, V2	89847	GBRA
HABITAT FLOW STATUS, 1=NO FLOW, 2=LOW,3=MOD,4=HIGH	NU	Other	TCEQ SOP, V2	89848	GBRA
AVERAGE PERCENT TREES AS RIPARIAN VEGETATION	%	Other	TCEQ SOP, V2	89849	GBRA
AVERAGE PERCENT SHRUBS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP, V2	89850	GBRA
AVERAGE PERCENT GRASS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP, V2	89851	GBRA
AVERAGE PERCENT CULTIVATED FIELDS AS RIPARIAN VEGETATION	%	Other	TCEQ SOP, V2	89852	GBRA
AVERAGE PERCENT OTHER AS RIPARIAN VEGETATION	%	Other	TCEQ SOP, V2	89853	GBRA
AVERAGE PERCENTAGE OF TREE CANOPY COVERAGE	%	Other	TCEQ SOP, V2	89854	GBRA
DRAINAGE AREA ABOVE MOST DOWNSTREAM TRANSECT (KM2)*	km2	Other	TCEQ SOP, V2	89859	GBRA
AVERAGE STREAM WIDTH (METERS)	M	Other	TCEQ SOP, V2	89861	GBRA
AVERAGE STREAM DEPTH (METERS)	M	Other	TCEQ SOP, V2	89862	GBRA
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)	M	Other	TCEQ SOP, V2	89864	GBRA
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)	M	Other	TCEQ SOP, V2	89865	GBRA
AVERAGE WIDTH OF NATURAL RIPARIAN VEGETATION (M)	M	Other	TCEQ SOP, V2	89866	GBRA
AESTHETICS OF REACH(1=WILD 2=NAT. 3=COMM. 4=OFF.)	NU	Other	TCEQ SOP, V2	89867	GBRA
NUMBER OF STREAM COVER TYPES	NU	Other	TCEQ SOP, V2	89929	GBRA
ECOREGION LEVEL III (TEXAS ECOREGION CODE)	NU	Other	TCEQ SOP, V2	89961	GBRA
LAND DEVELOP IMPACT (1=UNIMP,2=LOW,3=MOD,4=HIGH)	NU	Other	TCEQ SOP, V2	89962	GBRA
STREAM TYPE (1=PERENNIAL 2=INTERMITTENT S/PERENNIAL POOLS 3=INTERMITTENT 4=UNKNOWN)	NU	Water	TCEQ SOP, V2	89821	GBRA
REACH LENGTH OF STREAM EVALUATED (METERS)	M	Other	TCEQ SOP, V2	89884	GBRA
AVERAGE WIDTH OF NATURAL RIPARIAN BUFFER ON LEFT BANK (METERS)	M	Other	TCEQ SOP, V2	89872	GBRA

TABLE A7.1 Measurement Performance Specifications for GBRA					
Biological- Habitat					
Parameter	Units	Matrix	Method	Parameter Code	Lab
AVERAGE WIDTH OF NATURAL RIPARIAN BUFFER ON RIGHT BANK (METERS)	M	Other	TCEQ SOP, V2	89873	GBRA
RIPARIAN VEGETATION % - LEFT BANK - TREES	%	Other	TCEQ SOP, V2	89822	GBRA
RIPARIAN VEGETATION % - RIGHT BANK - TREES	%	Other	TCEQ SOP, V2	89823	GBRA
RIPARIAN VEGETATION % - LEFT BANK - SHRUBS	%	Other	TCEQ SOP, V2	89824	GBRA
RIPARIAN VEGETATION % - RIGHT BANK - SHRUBS	%	Other	TCEQ SOP, V2	89825	GBRA
RIPARIAN VEGETATION % - LEFT BANK - GRASSES OR FORBS	%	Other	TCEQ SOP, V2	89826	GBRA
RIPARIAN VEGETATION % - RIGHT BANK - GRASSES OR FORBS	%	Other	TCEQ SOP, V2	89827	GBRA
RIPARIAN VEGETATION % - LEFT BANK - CULTIVATED FIELDS	%	Other	TCEQ SOP, V2	89828	GBRA
RIPARIAN VEGETATION % - RIGHT BANK - CULTIVATED FIELDS	%	Other	TCEQ SOP, V2	89829	GBRA
RIPARIAN VEGETATION % - LEFT BANK - OTHER	%	Other	TCEQ SOP, V2	89830	GBRA
RIPARIAN VEGETATION % - RIGHT BANK - OTHER	%	Other	TCEQ SOP, V2	89871	GBRA
AVAILABLE INSTREAM COVER HQI SCORE (4=ABUNDANT 3=COMMON 2=RARE 1=ABSENT)	NU	Other	TCEQ SOP, V2	89874	GBRA
BOTTOM SUBSTRATE STABILITY HQI SCORE (4=STABLE 3=MODERATELY STABLE 2=MODERATELY UNSTABLE 1= UNSTABLE)	NU	Other	TCEQ SOP, V2	89875	GBRA
NUMBER OF RIFFLES HQI SCORE (4=ABUNDANT 3=COMMON 2=RARE 1=ABSENT)	NU	Other	TCEQ SOP, V2	89876	GBRA
DIMENSIONS OF LARGEST POOL HQI SCORE (4=LARGE 3=MODERATE 2=SMALL 1=ABSENT)	NU	Other	TCEQ SOP, V2	89877	GBRA
CHANNEL FLOW STATUS HQI SCORE (3=HIGH 2=MODERATE 1=LOW 0=NO FLOW)	NU	Other	TCEQ SOP, V2	89878	GBRA
BANK STABILITY HQI SCORE (3=STABLE 2=MODERATELY STABLE 12=MODERATELY UNSTABLE 0= UNSTABLE)	NU	Other	TCEQ SOP, V2	89879	GBRA
CHANNEL SINUOSITY HQI SCORE (3=HIGH 2=MODERATE 1=LOW 0=NONE)	NU	Other	TCEQ SOP, V2	89880	GBRA

TABLE A7.1 Measurement Performance Specifications for GBRA Biological- Habitat					
Parameter	Units	Matrix	Method	Parameter Code	Lab
RIPARIAN BUFFER VEGETATION HQI SCORE (3=EXTENSIVE 2=WIDE 1=MODERATE 0=NARROW)	NU	Other	TCEQ SOP, V2	89881	GBRA
AESTHETICS OF REACH (3=WILDERNESS 2=NATURAL AREA 1=COMMON SETTING 0=OFFENSIVE)	NU	Other	TCEQ SOP, V2	89882	GBRA
HQI TOTAL SCORE	NU	Other	TCEQ SOP, V2	89883	GBRA
NO FLOW ISOLATED POOL-LARGEST POOL MAX WIDTH (METERS)	M	Other	TCEQ SOP, V2	89908	GBRA
NO FLOW ISOLATED POOL-LARGEST POOL MAX LENGTH (METERS)	M	Other	TCEQ SOP, V2	89909	GBRA
NO FLOW ISOLATED POOL-LARGEST POOL MAX DEPTH (METERS)	M	Other	TCEQ SOP, V2	89910	GBRA
NO FLOW ISOLATED POOL-SMALLEST POOL MAX DEPTH (METERS)	M	Other	TCEQ SOP, V2	89911	GBRA
NO FLOW ISOLATED POOL-SMALLEST POOL MAX WIDTH (METERS)	M	Other	TCEQ SOP, V2	89912	GBRA
NO FLOW ISOLATED POOL-SMALLEST POOL MAX LENGTH (METERS)	M	Other	TCEQ SOP, V2	89913	GBRA
NO FLOW ISOLATED POOL-NUMBER OF POOLS EVALUATED	NU	Other	TCEQ SOP, V2	89914	GBRA
BIOLOGICAL DATA (REPORT VALUE OF 3011 FOR HABITAT TCEQ PARTS 1, 2, AND 3 PROTOCOL)	NU	Other	TCEQ SOP, V2	89888	GBRA

* From USGS map.

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TABLE A7.1 Measurement Performance Specifications for GBRA

Organics in Sediment

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
TOTAL PETROLEUM HYDROCARBONS IN SEDIMENT, MG/KG	mg/kg	sediment	TX1005	89995	NA	500	40-160	30	40-160	LCRA
BENZENE DRY WTBOTUG/KG	µg/kg	sediment	SW846 8260B	34237	22505	50	40-160	30	40-160	LCRA
ETHYLBENZENE DRY WTBOTUG/KG	µg/kg	sediment	SW846 8260B	34374	1965	50	40-160	30	40-160	LCRA
TOLUENE DRY WTBOTUG/KG	µg/kg	sediment	SW846 8260B	34483	2830	50	40-160	30	40-160	LCRA
XYLENE SEDIMENT, DRY WT (UG/KG)	µg/kg	sediment	SW846 8260B	45510	NA	150	40-160	30	40-160	LCRA
PARTICLE SIZE,CLAY0.002-0.0002mm DRYWT,SEDIMENT%*	%	sediment	EPA 600/2-78-054	49900	NA		NA	%clay – 20		LCRA
PARTICLE SIZE, 0.05-0.002mm SILT, DRYWT,SEDIMENT*	%	sediment	EPA 600/2-78-054	49906	NA		NA	%silt - 20	NA	LCRA
SEDIMENT PRCTL.SIZE CLASS 0.05-2.0MM, SAND, %DRY WT*	%	sediment	EPA 600/2-78-054	49925	NA		NA	%sand – 20	NA	LCRA
SEDIMENT PRTCL.SIZE CLASS >2.0MM GRAVEL %DRY WT*	% DRY WT	sediment	EPA 600/2-78-054	80256	NA		NA	%gravel - 20	NA	LCRA
SOLIDS IN SEDIMENT, PERCENT BY WEIGHT (DRY)	% DRY WT	sediment	SM2540-G	81373	NA		NA	20	NA	LCRA
TOTAL ORGANIC CARBON,NPOC(TOC), SED DRY WT,MG/KG*	mg/kg	sediment	EPA 9060	81951	NA		65-135	30	65-135	LCRA
SEDIMENT PRTL.SIZE CLASS.0039-.0625 SILT %DRY W*	% DRY WT	sediment	EPA 600/2-78-054	82008	NA		NA	%silt - 20	NA	LCRA
SEDIMENT PRCTL.SIZE CLASS <.0039 CLAY %DRY WT*	%	sediment	EPA 600/2-78-054	82009	NA		NA	%clay – 20	NA	LCRA
SEDIMENT PRCTL.SIZE CLASS,SAND .0625-2MM %DRYWT*	%	sediment	EPA 600/2-78-054	89991	NA		NA	%sand - 20	NA	LCRA

References:

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

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

TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012, (RG-415)

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

TABLE A7.2 Measurement Performance Specifications for UGRA Field Parameters										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**AWRL**	**LOQ**	**LOQ Check Sample %Rec**	**Precision (RPD of LCS/LCSD)**	**Bias %Rec. of LCS**	**Lab**
PH (STANDARD UNITS)	s.u	water	SM 4500-H+ B. and TCEQ SOP, V1	00400	NA*	NA	NA	NA	NA	UGRA Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP, V1	00300	NA*	NA	NA	NA	NA	UGRA Field
SPECIFIC CONDUCTANCE,FIELD (uS/CM @ 25C)	us/cm	water	SM 2510 and TCEQ SOP, V1	00094	NA*	NA	NA	NA	NA	UGRA Field
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 and TCEQ SOP, V1	00010	NA*	NA	NA	NA	NA	UGRA Field
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	NA*	NA	NA	NA	NA	UGRA Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	NA*	NA	NA	NA	NA	UGRA Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood ,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	NA*	NA	NA	NA	NA	UGRA Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP, V1	74069	NA*	NA	NA	NA	NA	UGRA Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	NA*	NA	NA	NA	NA	UGRA Field
CHLORINE, TOTAL RESIDUAL (MG/L)**	mg/L	water	SM 4500-Cl G and TCEQ SOP, V1	50060	0.1	NA	NA	NA	NA	UGRA Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)***	meters	other	TCEQ SOP V2	89864	NA*	NA	NA	NA	NA	UGRA Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)***	meters	other	TCEQ SOP V2	89865	NA*	NA	NA	NA	NA	UGRA Field
PERCENT POOL COVERAGE IN 500 M REACH***	%	other	TCEQ SOP V2	89870	NA*	NA	NA	NA	NA	UGRA Field
POOL LENGTH, METERS***	meters	other	TCEQ SOP V2	89869	NA*	NA	NA	NA	NA	UGRA Field
DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE***	meters	water	TCEQ SOP V2	82903	NA*	NA	NA	NA	NA	UGRA Field
PRIMARY CONTACT, OBSERVED ACTIVITY (# OF PEOPLE OBSERVED)	# of people observed	other	NA	89978	NA	NA	NA	NA	NA	UGRA Field

TABLE A7.2 Measurement Performance Specifications for UGRA

Field Parameters

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
EVIDENCE OF PRIMARY CONTACT RECREATION (1 = OBSERVED, 0 = NOT OBSERVED)	NU	other	NA	89979	NA	NA	NA	NA	NA	UGRA Field

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

** Chlorine residual to be collected downstream of chlorinated outfalls.

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

References:

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

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

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

TABLE A7.2 Measurement Performance Specifications for UGRA

Conventional and Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of	Bias %Rec. of LCS	Lab
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540 D.	00530	5	1.0**	NA	NA	NA	UGRA
TURBIDITY,LAB NEPHELOMETRIC TURBIDITY UNITS, NTU	NTU	water	SM 2130 B	82079	0.5	0.5	NA	NA	NA	UGRA
SULFATE (MG/L AS SO4)	mg/L	water	EPA 300.0 Rev. 2.1, (1993)	00945	5	0.4	70-130	20	80-120	UGRA
CHLORIDE (MG/L AS CL)	mg/L	water	EPA 300.0 Rev. 2.1, (1993)	00940	5	0.4	70-130	20	80-120	UGRA
CHLOROPHYLL-A UG/L SPECTROPHOTOMETRIC ACID. METH	ug/L	water	SM 10200-H4	32211	3	1	NA	20	80-120	GBRA
PHEOPHYTIN-A UG/L SPECTROPHOTOMETRIC ACID. METH.	µg/L	water	SM 10200-H4	32218	3	1	NA	NA	NA	GBRA
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/ 100 mL	water	SM 9223 B	31699	1	1	NA	0.5*	NA	UGRA
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0	00620	0.05	0.04	70-130	20	80-120	UGRA
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	SM 4500-P E.	00665	0.06	0.04	70-130	20	80-120	UGRA
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2 Rev. 2 (1993)	00625	0.2	0.2	70-130	20	80-120	GBRA
RESIDUE, VOLATILE NONFILTRABLE (MG/L)	mg/L	water	SM 2540 E.	00535	4	1	NA	NA	NA	UGRA

*This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5. ** TSS

LOQ is based on the volume of sample used.

References:

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

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

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

TABLE A7.2 Measurement Performance Specifications for UGRA

24 HourParameters in Water

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

References:

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

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

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

TABLE A7.3 Measurement Performance Specifications for Wimberly Valley Watershed Association Field Parameters										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**AWRL**	**LOQ**	**LOQ Check Sample %Rec**	**Precision (RPD of LCS/LCSD)**	**Bias %Rec. of LCS**	**Lab**
TEMPERATURE, WATER (DEGREES CENTIGRADE)	DEG C	water	SM 2550 and TCEQ SOP, V1	00010	NA*	NA	NA	NA	NA	WVWA Field
FLOW STREAM, INSTANTANEOUS (CUBIC FEET PER SEC)	cfs	water	TCEQ SOP V1	00061	NA*	NA	NA	NA	NA	WVWA Field
SPECIFIC CONDUCTANCE,FIELD (uS/CM @ 25C)	us/cm	water	SM 2510 and TCEQ SOP, V1	00094	NA*	NA	NA	NA	NA	WVWA Field
OXYGEN, DISSOLVED (MG/L)	mg/L	water	SM 4500-O G and TCEQ SOP, V1	00300	NA*	NA	NA	NA	NA	WVWA Field
PH (STANDARD UNITS)	s.u	water	SM 4500-H+ B. and TCEQ SOP, V1	00400	NA*	NA	NA	NA	NA	WVWA Field
FLOW SEVERITY:1=No Flow,2=Low,3=Normal,4=Flood,5=High,6=Dry	NU	water	TCEQ SOP V1	01351	NA*	NA	NA	NA	NA	WVWA Field
DAYS SINCE PRECIPITATION EVENT (DAYS)	days	other	TCEQ SOP V1	72053	NA*	NA	NA	NA	NA	WVWA Field
STREAM FLOW ESTIMATE (CFS)	cfs	Water	TCEQ SOP, V1	74069	NA*	NA	NA	NA	NA	WVWA Field
DEPTH AT BOTTOM OF WATER AT SAMPLE SITE (METERS)	meters	Water	TCEQ Drought Guidance	82903	NA*	NA	NA	NA	NA	WVWA Field
FLOW MTH 1=GAGE 2=ELEC 3=MECH 4=WEIR/FLU 5=DOPPLER	NU	other	TCEQ SOP V1	89835	NA*	NA	NA	NA	NA	WVWA Field
MAXIMUM POOL WIDTH AT TIME OF STUDY (METERS)**	meters	other	TCEQ Drought Guidance	89864	NA*	NA	NA	NA	NA	WVWA Field
MAXIMUM POOL DEPTH AT TIME OF STUDY(METERS)**	meters	other	TCEQ Drought Guidance	89865	NA*	NA	NA	NA	NA	WVWA Field
POOL LENGTH, METERS**	meters	other	TCEQ Drought Guidance	89869	NA*	NA	NA	NA	NA	WVWA Field
% POOL COVERAGE IN 500 METER REACH**	%	other	TCEQ Drought Guidance	89870	NA*	NA	NA	NA	NA	WVWA Field
PRIMARY CONTACT, OBSERVED ACTIVITY (# OF PEOPLE OBSERVED)	# of people observed	other	NA	89978	NA	NA	NA	NA	NA	WVWA Field

TABLE A7.3 Measurement Performance Specifications for Wimberly Valley Watershed Association

Field Parameters

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of LCS/LCSD)	Bias %Rec. of LCS	Lab
EVIDENCE OF PRIMARY CONTACT RECREATION (1 = OBSERVED, 0 = NOT OBSERVED)	NU	other	NA	89979	NA	NA	NA	NA	NA	WVWA Field

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

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

References:

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

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

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

TABLE A7.3 Measurement Performance Specifications for Wimberly Valley Watershed Association
Conventional and Bacteriological Parameters in Water

Parameter	Units	Matrix	Method	Parameter Code	AWRL	LOQ	LOQ Check Sample %Rec	Precision (RPD of	Bias %Rec. of LCS	Lab
RESIDUE, TOTAL NONFILTRABLE (MG/L)	mg/L	water	SM 2540 D.	00530	5	1**	NA	NA	NA	GBRA
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	SM 4500-NH3 D.	00610	0.1	0.1	70-130	20	80-120	SARA
NITROGEN, AMMONIA, TOTAL (MG/L AS N)	mg/L	water	EPA 350.1 Rev. 2.0 (1993)	00610	0.1	0.1	70-130	20	80-120	GBRA
NITRATE NITROGEN, TOTAL (MG/L AS N)	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	70-130	20	80-120	GBRA
NITROGEN, KJELDAHL, TOTAL (MG/L AS N)	mg/L	water	EPA 351.2 Rev. 2 (1993)	00625	0.2	0.2	70-130	20	80-120	GBRA
PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	mg/L	water	EPA 365.3	00665	0.06	0.02	70-130	20	80-120	GBRA
E. COLI, COLILERT, IDEXX METHOD, MPN/100ML	MPN/ 100 mL	water	Colilert-18	31699	1	1	NA	0.5*	NA	GBRA

*This value is not expressed as a relative percent difference. It represents the maximum allowable difference between the logarithm of the result of a sample and the logarithm of the duplicate result. See Section B5. ** TSS LO is based on the volume of sample used.

References:

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

TABLE A7.3 Measurement Performance Specifications for Wimberly Valley Watershed Association 24 HourParameters in Water										
Parameter	**Units**	**Matrix**	**Method**	**Parameter Code**	**AWRL**	**LOQ**	**LOQ Check Sample %Rec**	**Precision (RPD of**	**Bias %Rec. of LCS**	**Lab**
TEMPERATURE, WATER (DEGREES CENTIGRADE), 24HR AVG	DEG C	Water	TCEQ SOP, V1	00209	NA	NA	NA	NA	NA	WVWA Field
WATER TEMPERATURE, DEGREES CENTIGRADE, 24HR MAX	DEG C	Water	TCEQ SOP, V1	00210	NA	NA	NA	NA	NA	WVWA Field
TEMPERATURE, WATER (DEGREES CENTIGRADE) 24HR MIN	DEG C	Water	TCEQ SOP, V1	00211	NA	NA	NA	NA	NA	WVWA Field
SPECIFIC CONDUCTANCE, uS/CM, FIELD, 24HR AVG	uS/cm	Water	TCEQ SOP, V1	00212	NA	NA	NA	NA	NA	WVWA Field
SPECIFIC CONDUCTANCE, uS/CM, FIELD, 24HR MAX	uS/cm	Water	TCEQ SOP, V1	00213	NA	NA	NA	NA	NA	WVWA Field
SPECIFIC CONDUCTANCE, uS/CM, FIELD, 24HR MIN	uS/cm	Water	TCEQ SOP, V1	00214	NA	NA	NA	NA	NA	WVWA Field
PH, S.U., 24HR MAXIMUM VALUE	std. units	Water	TCEQ SOP, V1	00215	NA	NA	NA	NA	NA	WVWA Field
PH, S.U., 24HR, MINIMUM VALUE	std. units	Water	TCEQ SOP, V1	00216	NA	NA	NA	NA	NA	WVWA Field
WATER TEMPERATURE, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP, V1	00221	NA	NA	NA	NA	NA	WVWA Field
SPECIFIC CONDUCTANCE, # OF MEASUREMENTS IN 24-HR	NU	Water	TCEQ SOP, V1	00222	NA	NA	NA	NA	NA	WVWA Field
pH, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP, V1	00223	NA	NA	NA	NA	NA	WVWA Field
DISSOLVED OXYGEN, 24-HOUR MIN. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP, V1	89855	NA	NA	NA	NA	NA	WVWA Field
DISSOLVED OXYGEN, 24-HOUR MAX. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP, V1	89856	NA	NA	NA	NA	NA	WVWA Field
DISSOLVED OXYGEN, 24-HOUR AVG. (MG/L) MIN. 4 MEA	mg/l	Water	TCEQ SOP, V1	89857	NA	NA	NA	NA	NA	WVWA Field
DISSOLVED OXYGEN, # OF MEASUREMENTS IN 24-HRS	NU	Water	TCEQ SOP, V1	89858	NA	NA	NA	NA	NA	WVWA Field

References:

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

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

TCEQ SOP, V1 - TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods, 2012, (RG-415)

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

Appendix B Sampling Process Design and Monitoring Schedule (plan)

TASK 3: WATER QUALITY MONITORING

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

- planning and coordinating basin-wide monitoring;
- routine, regularly-scheduled monitoring to collect long-term information and support statewide assessment of water quality; and
- systematic, regularly-scheduled short-term monitoring to screen water bodies for issues;

Task Description: The GBRA will conduct water quality monitoring and provide details in the progress report as prescribed in the FY2016-2017 CRP Guidance. The actual number of sites, location, frequency, and parameters collected for FY 2014 will be based on priorities identified at the basin Steering Committee and Coordinated Monitoring meetings and included in the amended Appendix B schedule of the QAPP.

Monitoring Description*:* In FY 16, the GBRA will conduct routine monitoring at a minimum of 15 sites monthly and a minimum of 9 sites quarterly for field, conventional, flow (at stream sites), and bacteria parameter groups. Biological and habitat monitoring will be conducted at two sites in the GBRA's basin. In addition, the GBRA will coordinate with the UGRA for the monitoring of a minimum of 10 sites quarterly in Kerr County and Kendall County for field, conventional, flow (at stream sites), and bacteria parameter groups. In FY 17, the GBRA will monitor at a similar level of effort as in FY 16. The actual number of sites, location frequency, and parameters collected for FY 17 will be included in the GBRA QAPP Appendix B update.

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

Coordinated Monitoring Meeting - The GBRA will hold an annual coordinated monitoring meeting as described in the FY 16-17 CRP Guidance. Qualified monitoring organizations will be invited to attend the working meeting in which monitoring needs and purposes will be discussed segment by segment and station by station. Information from participants and stakeholders will be used to select stations and parameters that will enhance overall water quality monitoring coverage, eliminate duplication of effort, and address basin priorities. A summary of the changes will be provided to the participants within two weeks of the meeting. The changes to the monitoring schedule will be entered into the statewide database on the Internet (http://cms.lcra.org) and communicated to meeting attendees. Changes to monitoring that occur during the course of the year will be entered into the statewide database on the Internet and communicated to meeting attendees.

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

Deliverables & Dues Dates:

September 1, 2015 through August 31, 2016

A. Conduct water quality monitoring, summarize activities, and submit with Progress Report - December 15, 2015; March 15 and June 15, 2016
B. Coordinated Monitoring Meeting - between March 15 and April 30, 2016
C. Coordinated Monitoring Meeting Summary of Changes - within 2 weeks of the meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete - May 31, 2016

September 1, 2016 through August 31, 2017

A. Conduct water quality monitoring, summarize activities, and submit with Progress Report - September 15 and December 15, 2016; March 15 and June 15 and August 31, 2017
B. Coordinated Monitoring Meeting - between March 15 and April 30, 2017
C. Coordinated Monitoring Meeting Summary of Changes – within 2 weeks of the meeting
D. Email notification that Coordinated Monitoring Schedule updates are complete - May 31, 2017

Sample Design Rationale FY 2016

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

1. A metals in water sample will be collected from Station 12592 (Guadalupe River at FM 766) on Segment 1803 by the GBRA in FY 16 to determine possible metals contamination near the city of Cuero.
2. The GBRA will begin an aquatic life monitoring sampling event at Station 13657 (Sandies Creek NE of Westhoff) on Segment 1803B twice per year for 24-hour DO, Aquatic Habitat, Benthic & Nekton. These events will be used to determine if the current aquatic life use impairments are still justified.
3. The GBRA will also begin sampling for TPH & BTEX in water and sediment at at Station 13657 (Sandies Creek NE of Westhoff) on Segment 1803B once per year in FY 16. This sampling may be used as a screening for contamination from oilfield activities in the area.
4. Station 17134 (Guadalupe River at FM 1117) will no longer be monitored by TCEQ Region 13. The GBRA will begin monitoring at this location quarterly to retain assessment information for sub segment 1804_02.
5. GBRA will reduce the sampling frequency at station 15110 (Guadalupe River downstream of H-5 Dam) on segment 1804 from monthly to quarterly in order to free up money for additional

sampling at station 17134 and a new station 21736 on the Guadalupe River downstream of H-4 dam.

6. The GBRA will begin monitoring an additional station 21736 on sub-segment 1804_05 (area downstream of H-4 dam) in FY16 in order to provide additional information to the assessment.
7. The UGRA will reduce the frequency of sampling at station 12616 (Guadalupe River at G Street) on Segment 1806 and station 12546 (Camp Meeting Creek) on Segment 1806A_01 from monthly to quarterly. The UGRA will eliminate sampling at station 12618 (Guadalupe River at UGRA Lake Dam).
8. At station 12615 (Guadalupe River at Kerrville State Park) on segment 1806, the UGRA will begin reporting data from the Flat Rock Dam USGS gage below Kerrville (Gage # 08166250 Guadalupe Rv nr Center Point, TX) for this station as instantaneous streamflow (parameter code 00061) instead of a flow estimate after consultation with the Bill Harrison, the TCEQ assessor for the basin.
9. The aquatic life monitoring event will occur at station 12678 (Johnson Creek at Ingram) on segment 1816 beginning in FY 16. This event will consist of 24-Hour DO, Aquatic Habitat, Benthic, & Nekton monitoring at a frequency of twice per year.
10. The biological & 24-hour DO monitoring by the GBRA for station 12640 (Plum Creek at CR 135) on segment 1810 will be removed from the FY 16 monitoring schedule because enough data has been collected for assessment.
11. The description for station 12660 (Blanco River at Fulton Ranch Rd) on segment 1813 lists the wrong CR 173 and was changed to CR 174 by the TCEQ data manager.
12. TKN was added to the WVWA monitoring at station 12661 (Blanco at RR12) and station 12660 (Blanco at Fulton Ranch Rd) in order to monitor upstream and downstream of the effluent from the new Wimberley Blue Hole WWTP that discharges into the Deer Creek tributary of the Blanco River.
13. The WVWA will increase the frequency of 24-hour DO monitoring events at station 12675 (Cypress Creek at Blue Hole) to two per year beginning in FY 16 in order to meet assessment needs.

Site Selection Criteria

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

1. Locate stream sites so that samples can be safely collected from the centroid of flow. Centroid is

defined as the midpoint of that portion of stream width which contains 50 percent of the total flow. If few sites are available for a stream segment, choose one that would best represent the water body, and not an unusual condition or contaminant source. Avoid backwater areas or eddies when selecting a stream site.

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

Monitoring Sites for FY 2016

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
GUADALUPE RIVER AT LOWER GUADALUPE DIVERSION DAM AND SALT WATER BARRIER	12578	1802	18	14	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
GUADALUPE RIVER AT FM 447 WEST OF NURSERY AND UPSTREAM OF SOUTH TEXAS ELECTRIC	12590	1803	18	14	GB	GB	RT	4	4	4	4									
GUADALUPE RIVER AT OLD SAN ANTONIO ROAD/FM766 WEST OF CUERO	12592	1803	18	14	GB	GB	RT	12	12	12	12					1				NH3 and TKN will be done bimon
GUADALUPE RIVER AT US 183 IN HOCHHEIM IN DEWITT COUNTY	20470	1803	18	14	GB	GB	RT	4	4	4	4									
SANDIES CREEK 100 FT DOWNSTREAM OF COUNTY HIGHWAY 1.9 MI UPSTREAM FROM BIRDS CREEK 2.0 MI NE OF WESTHOFF	13657	1803B	18	14	GB	GB	RT	12	12	12	12						1		1	NH3 and TKN will be done bimon; org in water-TPH and BTEX only
SANDIES CREEK 100 FT DOWNSTREAM OF COUNTY HIGHWAY 1.9 MI UPSTREAM FROM BIRDS CREEK 2.0 MI NE OF WESTHOFF	13657	1803B	18	14	GB	GB	BS					2	2	2	2					Aquatic Life Monitoring (ALM) Event

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
PEACH CREEK AT GONZALES CR 353 14.0KM EAST OF GONZALES	14937	1803C	18	14	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
GUADALUPE RIVER IMMEDIATELY DOWNSTREAM OF H-5 DAM AT WOOD LAKE SW OF GONZALES TX	15110	1804	18	14	GB	GB	RT	4	4	4	4									
GUADALUPE RIVER AT FM 1117 RIVER CROSSING 2.1 MILES SOUTH OF SH 90A 5.2 MILES EAST OF SEGUIN	17134	1804	18	13	GB	GB	RT	4	4	4	4									
GUADALUPE RIVER 200 METERS DOWNSTREAM OF H-4 DAM AT LAKE GONZALES	21736	1804	18	13	GB	GB	RT	4	4	4	4									
LAKE DUNLAP-GUADALUPE RIVER NORTH BANK AT ACS PLACE AT MID POINT OF LONE STAR DRIVE	12596	1804	18	13	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
LAKE MCQUEENEY 1154 METERS UPSTREAM OF MCQUEENEY DAM ON SOUTHEAST BANK	15149	1804	18	13	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
GERONIMO CREEK AT HABERLE ROAD/CR 1103 MILES SOUTH OF GERONIMO	12576	1804A	18	13	GB	GB	RT	12	12	12	12									ecoregion reference site NH3 and TKN will be done bimonthly
CANYON LAKE AT JACOBS CREEK PARK BOAT RAMP	17443	1805	18	13	GB	GB	RT	4	4	4										

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
CANYON LAKE SOUTH OF JACOBS CREEK PARK 500 YARDS EAST OF PENINSULA	12598	1805	18	13	GB	GB	RT	12	12	12										NH3 and TKN will be done bimon
GUADALUPE RIVER AT FM 474 AT AMMANS CROSSING NE OF BOERNE	17404	1806	18	13	GB	GB	RT	4	4	4	4									
GUADALUPE RIVER AT HERMANN SONS RD ADJACENT TO HERMANN SONS HOME WEST OF COMFORT	12605	1806	18	13	GB	UG	RT	4	4	4	4									
GUADALUPE RIVER AT G STREET/FORMERLY OLD MEDINA RD IN KERRVILLE SEGMENT KM 177.9	12616	1806	18	13	GB	UG	RT	4	4	4	4									
GUADALUPE RIVER AT KERRVILLE STATE PARK SEGMENT KM 174.4	12615	1806	18	13	GB	UG	RT	12	4	12	4									
GUADALUPE RIVER SH 16 IN KERRVILLE	12617	1806	18	13	GB	UG	RT	12		12										
GUADALUPE RIVER AT RIVERVIEW RD IN INGRAM TX	15111	1806	18	13	GB	UG	RT	4	4	4	4									

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
GUADALUPE RIVER AT RR 311 1.9 MI SE OF SPRING BRANCH 7.5 MI DOWNSTREAM FROM CURRY CREEK	13700	1806	18	13	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
GUADALUPE RIVER AT SAN ANTONIO RD/FM1621 IN WARING	12602	1806	18	13	GB	UG	RT	4	4	4	4									
GUADALUPE RIVER CENTER POINT LAKE	12608	1806	18	13	GB	UG	RT	4	4	4	4									
GUADALUPE RIVER AT SPLIT ROCK RD OFF SH 27 2.6 KM DOWNSTREAM OF FLATROCK DAM	15113	1806	18	13	GB	UG	RT	4	4	4	4									
GUADALUPE RIVER AT LOUISE HAYS PARK DAM APPROX 50M DOWNSTREAM OF SH 16	16243	1806	18	13	GB	UG	RT	12		12										
GUADALUPE RIVER AT FOOTBRIDGE IN LOUISE HAYS PARK APPROX 100M UPSTREAM OF SH16	16244	1806	18	13	GB	UG	RT	12		12										
CAMP MEETING CREEK 0.1 KM UPSTREAM CONFLUENCE WITH GUADALUPE IN KERRVILLE	12546	1806A	18	13	GB	UG	RT	4	4	4	4									
QUINLAN CREEK AT TRAVIS STREET IN KERRVILLE	12541	1806D	18	13	GB	UG	RT	12		12										
TOWN CREEK AT HAMILTON STREET IN KERRVILLE	12549	1806E	18	13	GB	UG	RT	12		12										

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
COLETO CREEK RESERVOIR AT MID POINT OF DAM ON COLETO CREEK PARK ROAD	20827	1807	18	14	GB	GB	RT	12	12	12										depth profiles will be completed quarterly; nh3 and tkn bimonthly
LOWER SAN MARCOS RIVER AT SH 80 SOUTH OF LULING	12626	1808	18	11	GB	GB	RT	12	12	12	12									
PLUM CREEK AT CR 202 SE OF LOCKHART	12647	1810	18	11	GB	GB	RT	12	12	12	12									
SAN MARCOS RIVER AT US90A 3.3KM WEST OF INTERSECTION OF US90A AND US183 IN GONZALES 7KM UPSTREAM OF CONFL. WITH GUADALUPE RIVER	16578	1808	18	14	GB	GB	RT	4	4	4	4									
PLUM CREEK AT OLD WOODEN BRIDGE ON CALDWELL CR 135 SE OF LULING	12640	1810	18	11	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
PLUM CREEK AT PLUM CREEK ROAD NORTH OF UHLAND	17406	1810	18	11	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
COMAL RIVER DOWNSTREAM CLEMONS DAM IN NEW BRAUNFELS	12653	1811	18	13	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
COMAL RIVER AT LANDA PARK AREA 16 2.45 MI UPSTREAM FROM CONFLUENCE WITH GUADALUPE RIVER IN NEW BRAUNFELS	15082	1811	18	13	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
GUADALUPE RIVER AT RIVER RD 2ND CROSSING UPSTREAM OF NEW BRAUNFELS	12658	1812	18	13	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
DRY COMAL CREEK AT MISSOURI-KANSAS-TEXAS RAILROAD CROSSING IN NEW BRAUNFELS	12570	1811A	18	13	GB	GB	RT	12	12	12	12									NH3 and TKN will be done bimon
GUADALUPE RIVER 200YDS OR 183 METERS UPSTREAM OF BRIDGE ON FM306 0.5MI DOWNSTREAM OF HORSESHOE FALLS	16703	1812	18	13	GB	GB	RT	4	4	4	4									
BLANCO RIVER AT LOW WATER CROSSING CR1492 AT PIONEER TOWN	12663	1813	18	11	GB	WV	RT	4	4	4	4									conventionals-Total P, NO3-N, NH3-N, TSS

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
BLANCO RIVER AT PLEASANT VALLEY CROSSING ON FISHER STORE RD	12665	1813	18	11	GB	WV	RT	4	4	4	4									conventionals-Total P, NO3-N, NH3-N, TSS
CYPRESS CREEK AT CONFLUENCE WITH THE BLANCO RIVER	12673	1815	18	11	GB	WV	RT	4	4	4	4									conventionals-Total P, NO3-N, NH3-N, TSS
GUADALUPE RIVER AT THE BEGINNING OF CYPRESS BEND PARK IN NEW BRAUNFELS	12656	1812	18	13	GB	GB	RT	4	4	4	4									
CYPRESS CREEK AT FM 12 AT WIMBERLEY	12674	1815	18	11	GB	GB	RT	4	4	4	4									
CYPRESS CREEK AT DOWNSTREAM END IN BLUE HOLE CAMPGROUND	12675	1815	18	11	GB	WV	BS					2								conventionals-Total P, NO3-N, NH3-N, TSS
BLANCO RIVER AT BRIDGE ON SH 12 AT WIMBERLEY	12661	1813	18	11	GB	WV	RT	4	4	4	4									conventionals-TKN, Total P, NO3-N, NH3-N, TSS
BLANCO RIVER AT LOW WATER CROSSING AT CR 174/FULTON RANCH RD	12660	1813	18	11	GB	WV	RT	4	4	4	4									conventionals-TKN, Total P, NO3-N, NH3-N, TSS
CYPRESS CREEK AT DOWNSTREAM END IN BLUE HOLE CAMPGROUND	12675	1815	18	11	GB	WV	RT	4	4	4	4									
CYPRESS CREEK AT RR 12 1 MILE NORTH OF WIMBERLEY	12676	1815	18	11	GB	WV	RT	4	4	4	4									conventionals-Total P, NO3-N, NH3-N, TSS

Site Description	Station ID	Waterbody ID	Basin	Reg	SE	CE	MT	Field	Conv	Bact	Flow	24 hr DO	AqHab	Benth	Nekton	Metal Water	Org Water	Metal Sed	Organic Sed	Comments
CYPRESS CREEK AT JACOBS WELL SPRING APPROXIMATELY 670 METERS UPSTREAM OF HAYS CR 220/JACOBS WELL ROAD NORTH OF WIMBERLEY CAMS 0745	12677	1815	18	11	GB	WV	RT	4	4	4	4									conventionals-Total P, NO3-N, NH3-N, TSS
JOHNSON CREEK AT SH 39 IN INGRAM	12678	1816	18	13	GB	UG	RT	4	4	4	4									
JOHNSON CREEK AT SH 39 IN INGRAM	12678	1816	18	13	GB	UG	BS					2								Diurnal data for biological event
JOHNSON CREEK AT SH 39 IN INGRAM	12678	1816	18	13	GB	GB	BS						2	2	2					
SAN ANTONIO RIVER FM 2506 EAST OF FANNIN	12790	1901	19	14	GB	GB	RT	12	12	12	12									
NORTH FORK GUADALUPE AT RIVER GAGING STATION NEAR CAMP WALDEMAR	12682	1817	18	13	GB	UG	RT	4	4	4	4									
SOUTH FORK GUADALUPE ADJACENT TO HUNT LIONS PARK	12684	1818	18	13	GB	UG	RT	4	4	4	4									

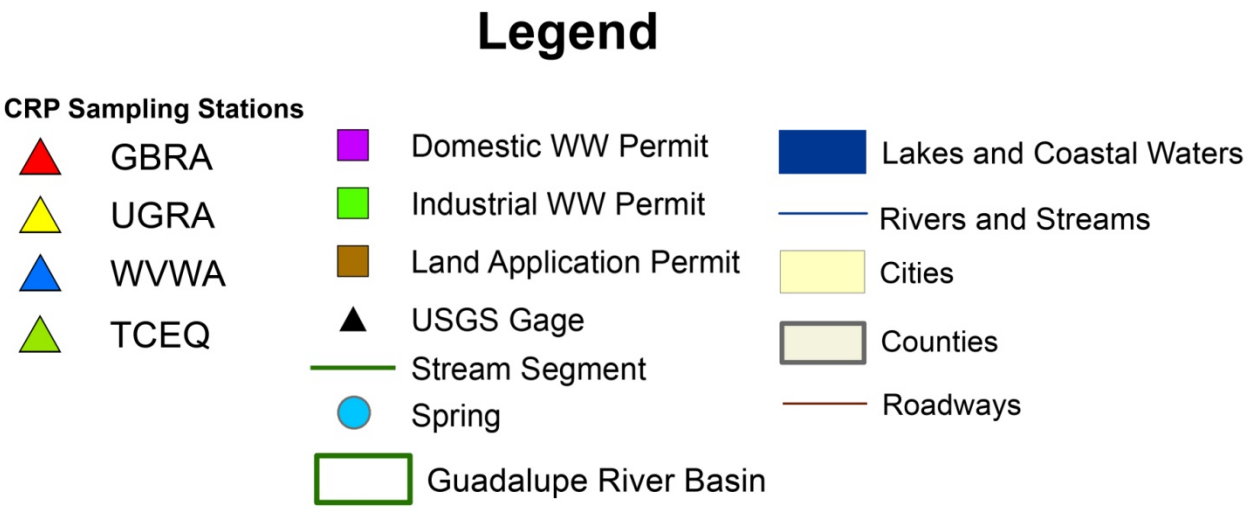
Critical vs. non-critical measurements

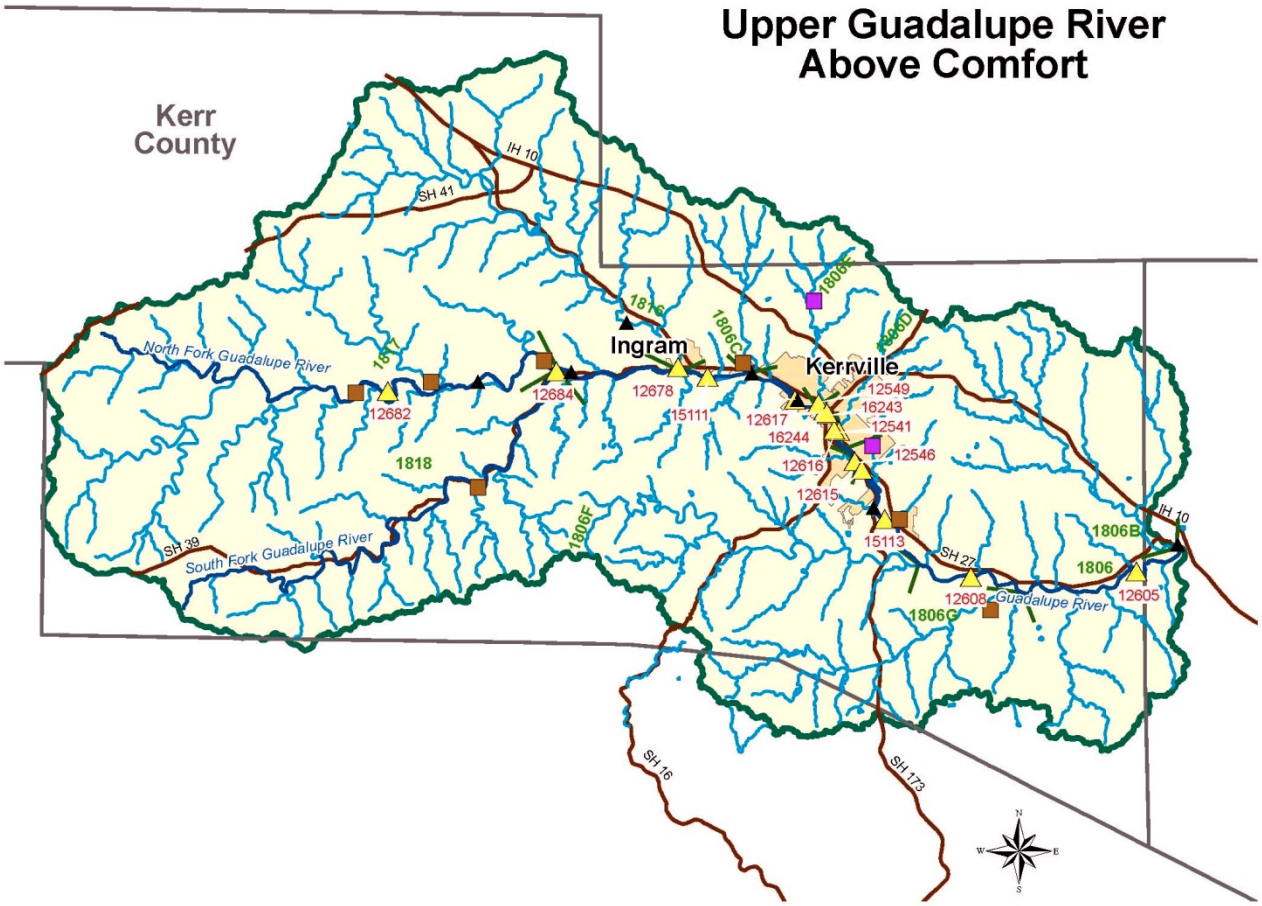
All data taken for CRP and entered into SWQMIS are considered critical.

Appendix C: Station Location Maps

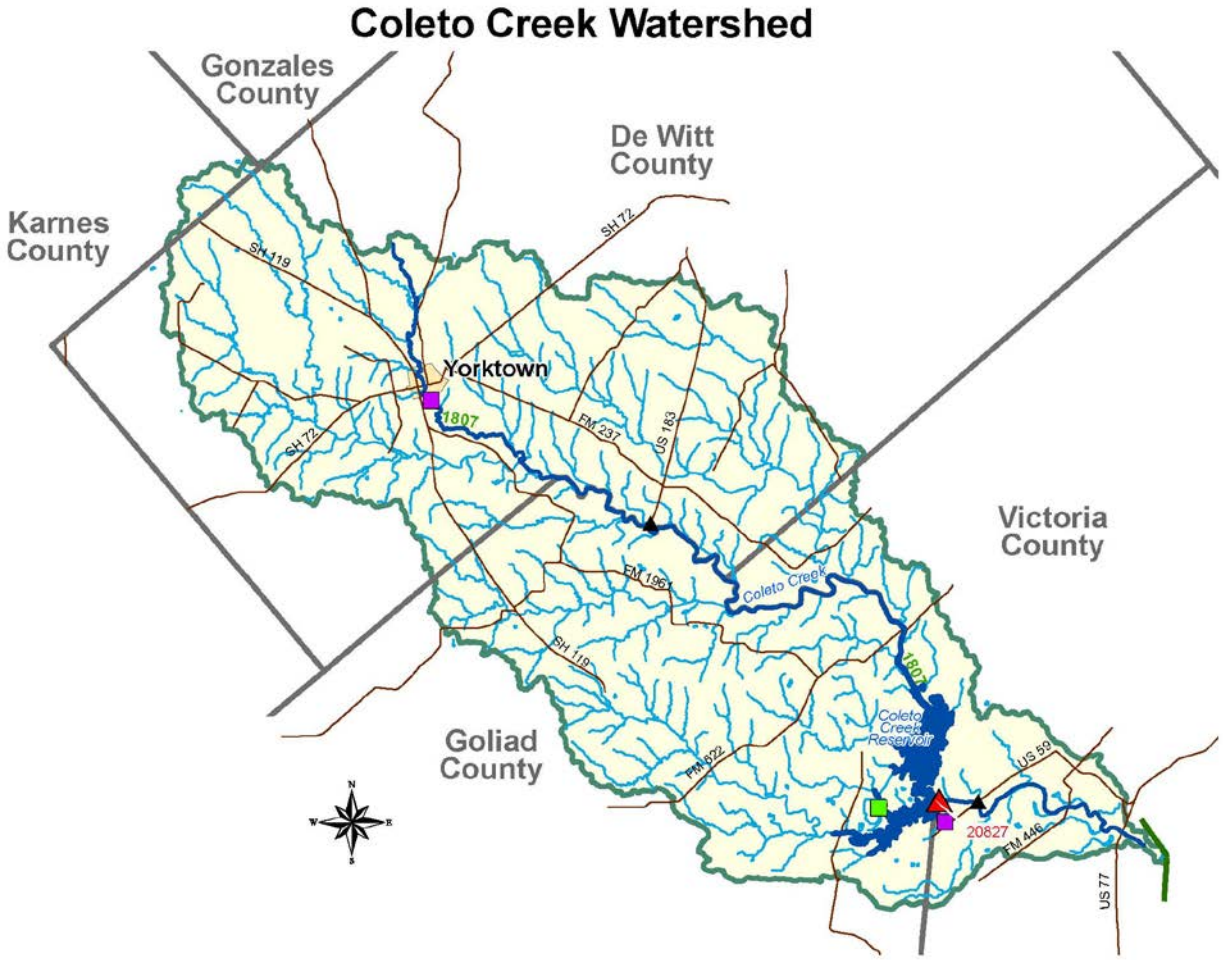
Station Location Maps

Maps of stations monitored by the GBRA are provided below. The maps were generated by the GBRA . This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. It does not represent an on-the-ground survey and represents only the approximate relative location of property boundaries. For more information concerning this map, contact the Mike Urrutia at 830-379-5822.




Upper Guadalupe River
Above Comfort
Kerr
County
IH 10
SH 41
North Fork Guadalupe River
1817
12682
12684
1818
SH 39
South Fork Guadalupe River
1816
Ingram
1806C
12678
15111
1806F
1806E
1806D
Kerrville
12549
16243
12541
12617
16244
12546
12616
12615
15113
SH 27
12608
Guadalupe River
1806G
1806B
1806
12605
IH 10
SH 16
SH 173
N
W
E
S

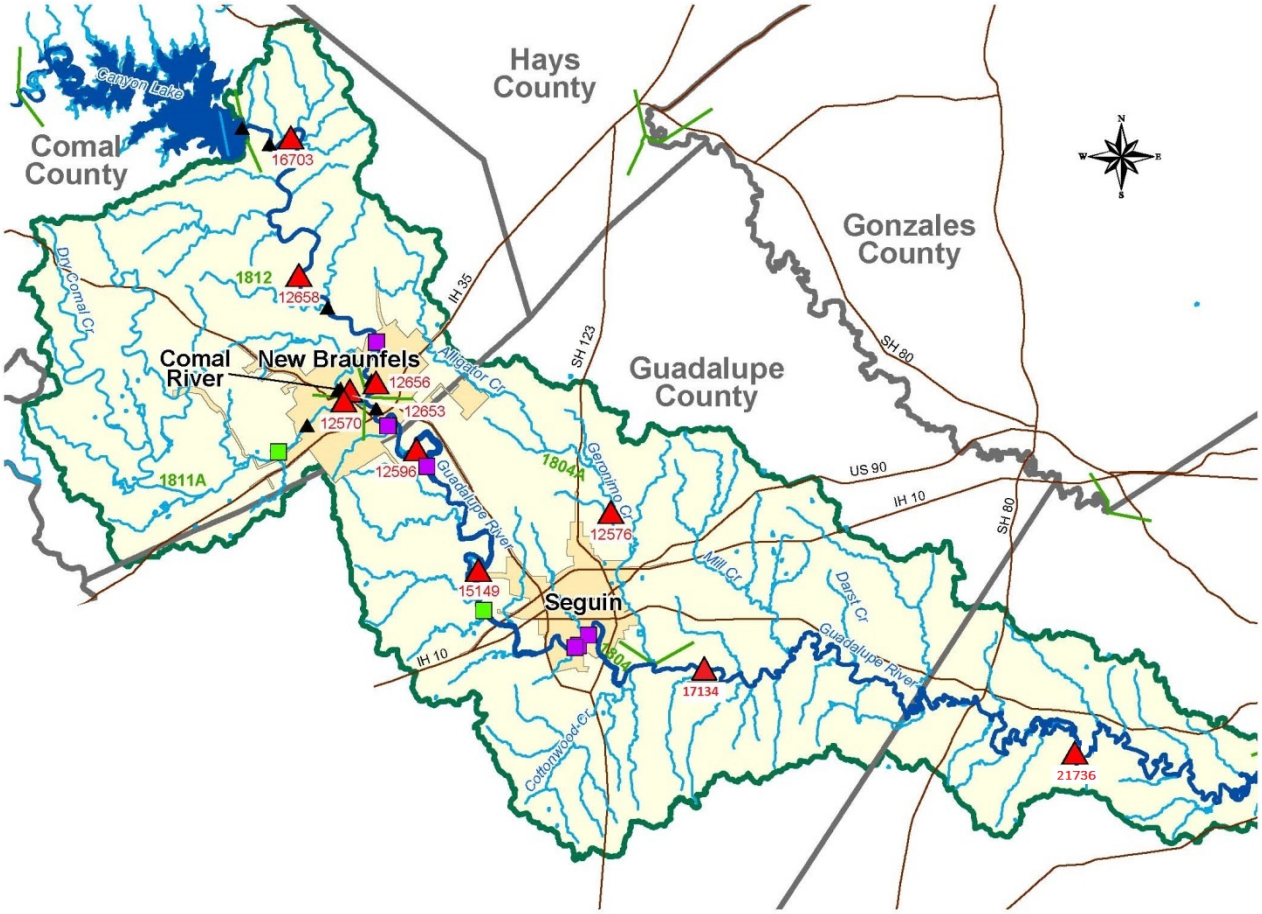
Blanco River Watershed


Coleto Creek Watershed
Gonzales County
De Witt County
Karnes County
Victoria County
Goliad County
Yorktown
SH 119
SH 72
FM 237
US 183
FM 1961
Coleto Creek
FM 622
US 59
FM 446
US 77
1807
20827
Coleto Creek Reservoir

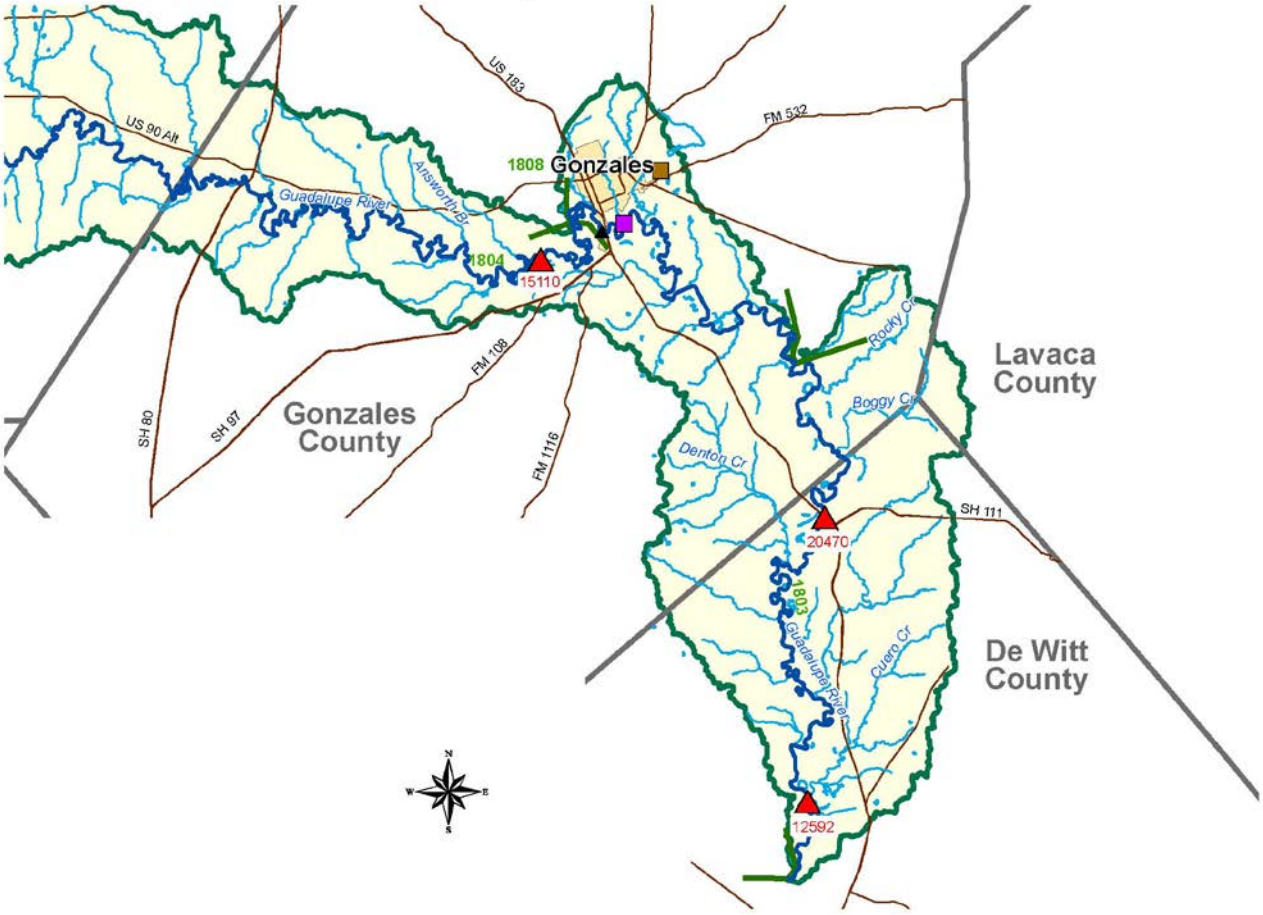
Guadalupe River Below Comfort

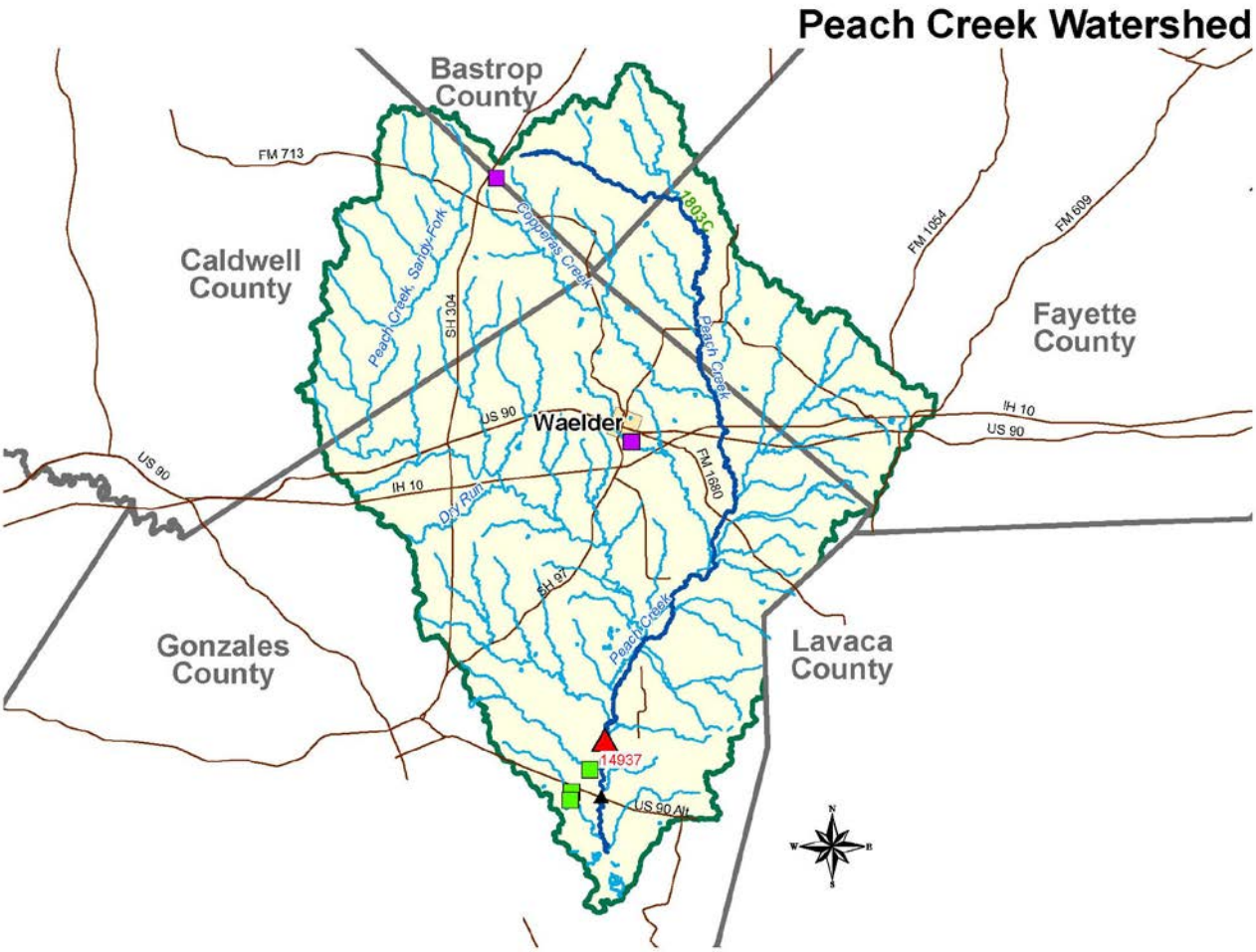
Lower Guadalupe River Watershed

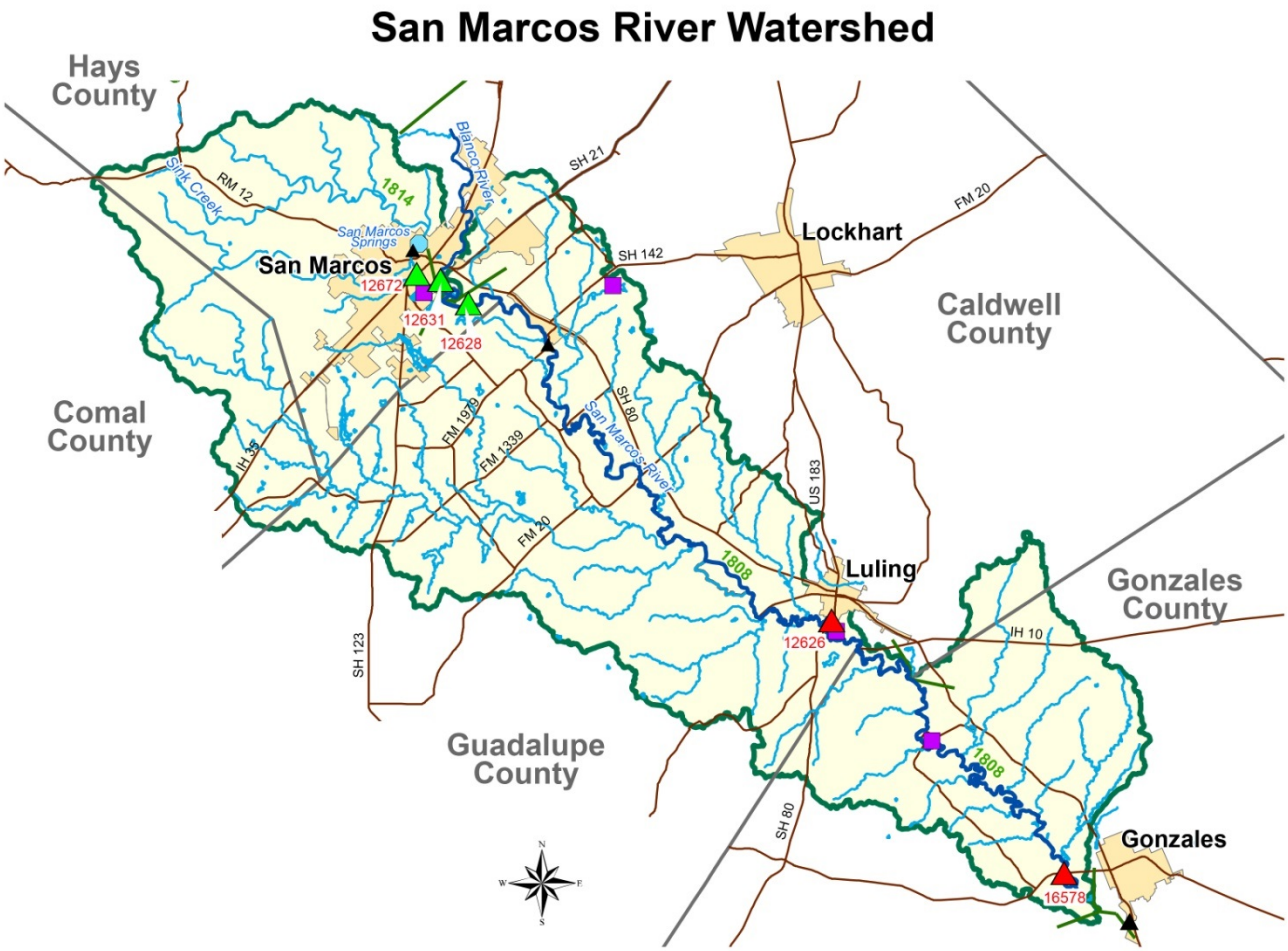
Middle Guadalpe River Watershed Part A

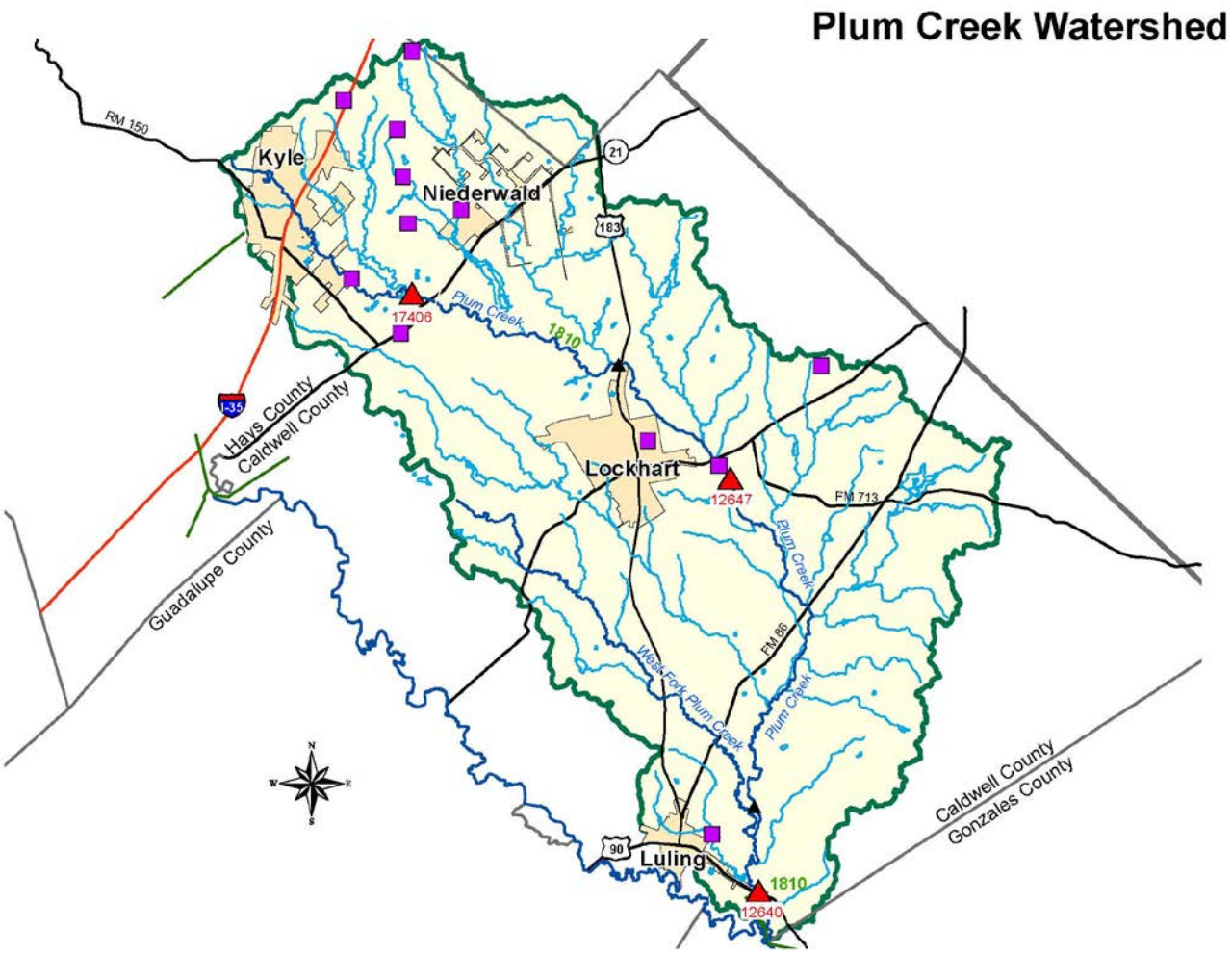


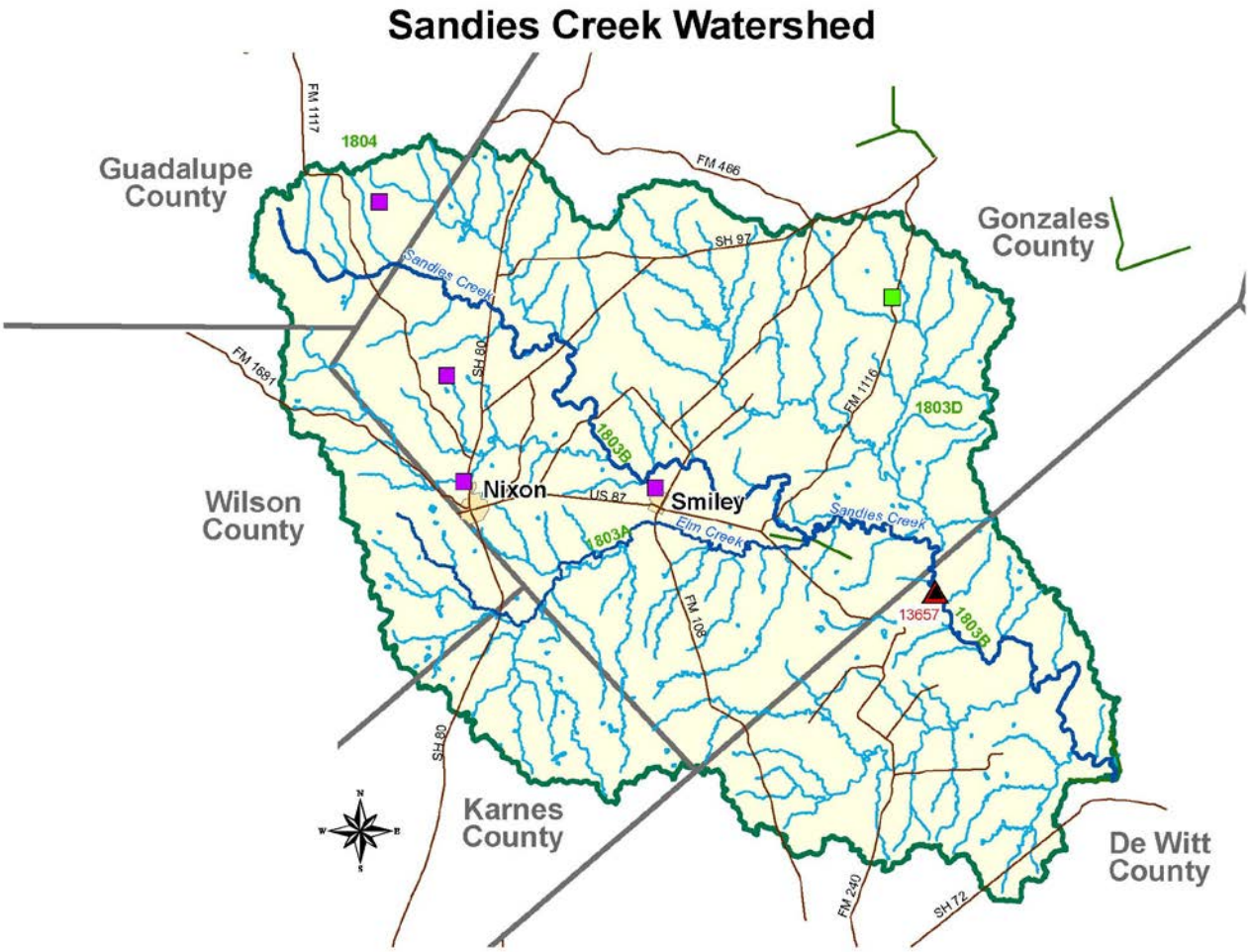
Middle Guadalpe River Watershed Part B




Peach Creek Watershed
Bastrop County
Caldwell County
Fayette County
Gonzales County
Lavaca County
Waelder
FM 713
SH 304
US 90
IH 10
FM 1680
FM 1054
FM 609
SH 97
US 90 Alt
Peach Creek
Dry Run
Cummins Creek
1803C
14937


San Marcos River Watershed
Hays County
Comal County
Caldwell County
Guadalupe County
Gonzales County
Lockhart
San Marcos
Luling
Gonzales
Blanco River
Sink Creek
RM 12
1814
San Marcos Springs
12672
12631
12628
SH 21
SH 142
FM 20
IH 35
FM 1979
FM 1339
SH 80
San Marcos River
US 183
1808
12626
IH 10
SH 123
16578


Plum Creek Watershed
RM 150
Kyle
Niederwald
21
183
17406
Plum Creek
1810
Hays County
Caldwell County
I-35
Lockhart
12647
FM 713
Guadalupe County
Plum Creek
FM 86
West Fork Plum Creek
Plum Creek
N
W
E
S
Caldwell County
Gonzales County
90
Luling
1810
12640


Sandies Creek Watershed
Guadalupe County
Gonzales County
Wilson County
Karnes County
De Witt County
Nixon
Smiley
1804
1803A
1803B
1803D
13657
Sandies Creek
Elm Creek
FM 1117
FM 466
SH 97
SH 80
FM 1681
FM 1116
US 87
FM 109
FM 240
SH 72

Appendix D: Field Data Sheets

Texas Commission on Environmental Quality
Surface Water Quality Monitoring Program

Field Data Reporting Form

RTAG# | REGION | EMAIL-ID: | COLLECTOR

STATION ID | SEGMENT | SEQUENCE | DATA SOURCE

Station Description _____

GRAB SAMPLE

M M D D Y Y Y Y — DATE | H H M M — TIME | x — DEPTH | M = meters F = feet

COMPOSITE SAMPLE

COMPOSITE CATEGORY : | T = TIME | S = SPACE (i.e. Depth) | B = BOTH | F = FLOW WEIGHT

M M D D Y Y Y Y — START DATE | H H M M — START TIME | START DEPTH (SURFACE) | M = Meters F = Feet

M M D D Y Y Y Y — END DATE | H H M M — END TIME | END DEPTH (DEEPEST) | M = Meters F = Feet

COMPOSITE TYPE : | ## = Number of Grabs in Composite | CN = Continuous

00010		WATER TEMP (°C only)	72053		DAYS SINCE LAST SIGNIFICANT PRECIPITATION
00400		pH (s.u)	01351		FLOW SEVERITY: 1-no flow; 2-low; 3-normal; 5-high; 4-flood; 6-dry
00300		D.O. (mg/L)			
00094		SPECIFIC COND (Φmhos/cm)	00061		INSTANTANEOUS STREAM FLOW (ft^3/sec)
00480		SALINITY (ppt, marine only)	89835		FLOW MEASUREMENT METHOD: 1- Flow Gage Station; 2- Electric; 3- Mechanical; 4- Weir/Flume; 5-Acoustic Doppler
89978		PRIMARY CONTACT, OBSERVED ACTIVITY (# of people observed)			
89979		EVIDENCE OF PRIMARY CONTACT RECREATION (1 = OBSERVED, 0 = NOT OBSERVED)	74069		FLOW ESTIMATE (ft^3/sec)
00051		RESERVOIR ACCESS NOT POSSIBLE LEVEL TOO LOW (ENTER 1 IF REPORTING)*	82903		DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE (meters)*
00052		RESERVOIR STAGE (feet above mean sea level)*	89864		MAXIMUM POOL WIDTH AT TIME OF STUDY (meters)*
00053		RESERVOIR PERCENT FULL (%)*	89865		MAXIMUM POOL DEPTH AT TIME OF STUDY(meters)
			89869		POOL LENGTH (meters) *
			89870		% POOL COVERAGE IN 500 M REACH (%) *

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

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UGRA Field Data Reporting Form

Field Data Reporting Form

RTAG# | REGION | EMAIL-ID: | COLLECTOR

STATION ID | SEGMENT | SEQUENCE | DATA SOURCE

Station Description _____

GRAB SAMPLE

M M D D Y Y Y Y — DATE

H H M M — TIME

DEPTH

M = meters
F = feet

COMPOSITE SAMPLE

COMPOSITE CATEGORY :

T = TIME | S = SPACE (i.e. Depth) | B = BOTH | F = FLOW WEIGHT

M M D D Y Y Y Y — START DATE

H H M M — START TIME

START DEPTH (SURFACE)

M = Meters
F = Feet

M M D D Y Y Y Y — END DATE

H H M M — END TIME

END DEPTH (DEEPEST)

M = Meters
F = Feet

COMPOSITE TYPE :

= Number of Grabs in Composite

CN = Continuous

00010		WATER TEMP (°C only)	72053		DAYS SINCE LAST SIGNIFICANT PRECIPITATION		
00400		pH (s.u)	01351		FLOW SEVERITY	1-no flow	2-low
00300		D.O. (mg/L)			3-normal 5-high 4-flood 6-dry		
00094		SPECIFIC COND (µmhos/cm)	00061		INSTANTANEOUS STREAM FLOW (ft^3/sec)		
50060		CHLORINE RESIDUAL (mg/L)	89835		FLOW MEASUREMENT METHOD 1- Flow Gage Station 2- Electric 3- Mechanical 4- Weir/Flume 5-Doppler		
89978		Primary Contact, observed activity (# people observed)					
89979		Evidence of Primary Contact Recreation (1 = observed, 0 = not observed)	74069		FLOW ESTIMATE (ft^3/sec)		
			89864		MAXIMUM POOL WIDTH (meters) *		
			89869		POOL LENGTH (meters) *		
			89865		MAXIMUM POOL DEPTH (meters) *		
			82903		DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE (meters) *		
			89870		PERCENT POOL COVERAGE IN 500 METER REACH		

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of zero reported.

Measurement Comments and Field Observations:

_____

_____

_____

_____

Texas Commission on Environmental Quality
Surface Water Quality Monitoring Program

Field Data Reporting Form

RTAG# | REGION | EMAIL-ID: | COLLECTOR

STATION ID | SEGMENT | SEQUENCE | DATA SOURCE

Station Description _____

GRAB SAMPLE

M M D D Y Y Y Y — DATE | H H M M — TIME | x — DEPTH | M = meters, F = feet

COMPOSITE SAMPLE

COMPOSITE CATEGORY : | T = TIME | S = SPACE (i.e. Depth) | B = BOTH | F = FLOW WEIGHT

M M D D Y Y Y Y — START DATE | H H M M — START TIME | START DEPTH (SURFACE) | M = Meters, F = Feet

M M D D Y Y Y Y — END DATE | H H M M — END TIME | END DEPTH (DEEPEST) | M = Meters, F = Feet

COMPOSITE TYPE : | ## = Number of Grabs in Composite | CN = Continuous

00010		WATER TEMP (°C only)	72053		DAYS SINCE LAST SIGNIFICANT PRECIPITATION		
00400		pH (s.u)	01351		FLOW SEVERITY	1-no flow	2-low
00300		D.O. (mg/L)			3-normal / 5-high	4-flood	6-dry
00094		SPECIFIC COND (Φmhos/cm)	00061		INSTANTANEOUS STREAM FLOW (ft^3/sec)		
			89835		FLOW MEASUREMENT METHOD: 1- Flow Gage Station; 2- Electric; 3- Mechanical; 4- Weir/Flume; 5-Acoustic Doppler		
89978		PRIMARY CONTACT, OBSERVED ACTIVITY (# of people observed)					
89979		EVIDENCE OF PRIMARY CONTACT RECREATION (1 = OBSERVED, 0 = NOT OBSERVED)	74069		FLOW ESTIMATE (ft^3/sec)		
			82903		DEPTH OF BOTTOM OF WATER BODY AT SAMPLE SITE (meters)*		
			89864		MAXIMUM POOL WIDTH AT TIME OF STUDY (meters)*		
			89865		MAXIMUM POOL DEPTH AT TIME OF STUDY(meters)		
			89869		POOL LENGTH (meters) *		
			89870		% POOL COVERAGE IN 500 M REACH (%) *		

*Parameters related to data collection in perennial pools; i.e., Flow Severity of 1 and Flow of 0 cfs reported.

Measurement Comments and Field Observations:

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Appendix E: Chain of Custody Forms

Chain of Custody

Guadalupe-Blanco River Authority Regional Laboratory

933 E. Court Street, Seguin, Texas 78155
830-379-5822 • Fax 830-379-7478

Customer Information

Customer Acct. # _____

Name: _____ Phone: _____

Address: _____ Fax: _____

_____ E-mail: _____

Sample Collected By: _____ _____
Signature Printed Name

Residual Chlorine (Total/Free) Results _____

Thermometer No._____ pH Paper GBRA reagent no. _____

Temp C	Date Collected	Time Collected	Matrix WW=Wastewater DW=Drinking Water SW=Surface Water S=Soils/Sludge O=Other	Sx Vol. P=Plastic G=Glass	Sample Name/Description	TCEQ ID Number	Grab/ Comp.	Analysis Requested	GBRA Sample ID	Bottle ID No.	pH	GBRA Preservation

Delivered By: _____ Date/Time _____ Received By: _____ Date/Time: _____

Delivered By: _____ Date/Time _____ Received By: _____ Date/Time: _____

**Special Notes/Ship To: _____

Ice:_____ (Y or N) Number of Containers:_____ Condition of Container(s): (intact)_____

RL-042/COC-0101/TWG-6000/2011 (QASM App. c) GBRA Doc. 3019-C Rev 15 Eff: 8/25/2011 by JT

Upper Guadalupe River Authority Environmental Laboratory
Chain of Custody Record

Report To:			Invoice To:	E-mail: PLEASE PRINT CLEARLY	Fax To: ($3 fee)
Customer			Same? Y N		Name
Address			Info:		Fax#
City	State	Zip			
Attn:	Phone #				

Sample Information:	Hardcopy Report? Y N (Hardcopy: $3 fee. Emailed Report: Free)	Requested Analysis:
Project Name:	Comments:	
Sampled By:		

System Name: and Public Water ID # (if applicable)	Sample Location	Collected Date	Collected Time	Sample Type	Source	Cl_2 residual	#of containers	Chemical Preservative	Requested Analysis	Work Order number (Lab use only)
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					
				Distribution Construction Raw Repeat Effluent ______	Groundwater Surface water Wastewater					

Condition of Sample(s):	Temperature:	Send out:			
Relinquished by:	Date	Time	Received by:	Date	Time
Relinquished by:	Date	Time	Received by:	Date	Time

UGRA use only: $______ ☐ Paid
Cash CC Check ref.#__________

UGRA Form 122 Rev 0 125 Lehmann Drive, Suite 100 Kerrville, TX 78028 (830) 896 5445 - Fax (830) 257 2621

Appendix F: Data Review Checklist and Summary Shells

Data Review Checklist

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

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

Data Summary

Data Set Information

Data Source: _____

Date Submitted: _____

Tag_id Range: _____

Date Range: _____

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

Planning Agency Data Manager: _____ Date: _____

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

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

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

Discrepancies or missing data for the listed tag ID:

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

Data Loss

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