TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

August 26, 2011

Ryan Bass
City of Boerne
402 E. Blanco
Boerne, Texas 78006

Re: Water Quality Monitoring for the Upper Cibolo Creek (Segment 1908) Watershed Protection Plan Quality Assurance Project Plan (QAPP) Amendment #1

Approved: August 26, 2011 (Update due February 25, 2012)

Dear Mr. Bass:

The above named QAPP amendment has been approved. The original QAPP and signature page is enclosed as documentation of approval.

In accordance with the terms of the QAPP, **please ensure that copies of this document and any subsequent amendments are distributed to each sub-tier participant as noted in Section A3 of the QAPP.** This approval letter must be available for review during a monitoring systems audit.

Should you have questions, please contact me at (512) 239-0425.

Sincerely,

Kyle Girten
Quality Assurance Specialist

enclosure

cc: Sharon Coleman, Senior Quality Assurance Specialist, MC 165
Lauren Bilbe, Project Manager, MC 203

Amendment # 1
to the Water Quality Monitoring for the Upper Cibolo Creek (Segment 1908) Watershed Protection Plan Quality Assurance Project Plan

City of Boerne
402 E. Blanco
Boerne, Texas 78006

Funding Source:

Nonpoint Source Program CWA §319(h)
Prepared in cooperation with the Texas Commission on Environmental Quality
and the U.S. Environmental Protection Agency
Federal ID #99614613

Effective Date: Upon date of final signature

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

Ryan Bass, Watershed Planning Coordinator
City of Boerne
402 E. Blanco
Boerne, Texas 78006
(830) 249-9511
rbass@ci.boerne.tx.us

Justification: In order to meet the data quality objectives of the project the following changes are proposed to the Quality Assurance Project Plan

1. Add LCRA staff to Section A4 Roles and Responsibilities
   a. LCRA is being added in order to allow the SARA Regional Environmental Laboratory to outsource the samples if it becomes necessary due to insufficient staff or equipment problems.
   b. Add LCRA staff to Figure A4.1 Organizational Chart – Lines of Communication.
2. Add the following table to allow water quality samples to be analyzed at the LCRA laboratory. LCRA is being added in order to allow the SARA Regional Environmental Laboratory to outsource the samples if it becomes necessary due to insufficient staff or equipment problems.
   a. Table A7.5
3. Correct Ortho phosphorus container in Table B2.1
   a. The container originally identified for Ortho phosphorus was incorrect.
4. Section B3 -- revise section to indicate that the SARA laboratory will arrange for the transport of samples to LCRA if it is deemed necessary by the SARA laboratory staff.
5. Section B10 – revise section to indicate the data management process as it related to the outsourced analytical results obtained from LCRA. Results will be sent to the City of Boerne via the San Antonio River Authority Laboratory.

Detail of Changes:

1. Add LCRA staff to Section A4 Roles and Responsibilities to include LCRA staff. LCRA is being added in order to allow the SARA Regional Environmental Laboratory to outsource the samples if it becomes necessary due to insufficient staff or equipment problems.

A4 PROJECT/TASK ORGANIZATION

TCEQ

Field Operations Support Division

Kyle Girten
Lead QA Specialist
Assists the TCEQ Project Manager in QA related issues. Serves on planning team for NPS projects. Participates in the planning, development, approval, implementation, and maintenance of the QAPP. Determines conformance with program quality system requirements. Coordinates or performs audits, as deemed necessary and using a wide variety of assessment guidelines and tools. Concurs with proposed corrective actions and verifications. Monitors corrective action. Provides technical expertise and/or consultation on quality services. Provides a point of contact at the TCEQ to resolve QA issues. Recommends to TCEQ management that work be stopped in order to safe guard project and programmatic objectives, worker safety, public health, or environmental protection.

Water Quality Planning Division

Kerry Niemann, Manager
NPS Program
Responsible for management and oversight of the TCEQ NPS Program. Oversees the development of QA guidance for the NPS program to be sure it is within pertinent frameworks of the TCEQ. Monitors the effectiveness of the program quality system. Reviews and approves all NPS projects, internal QA audits, corrective actions, reports, work plans, and contracts. Enforces corrective action, as required. Ensures

NPS personnel are fully trained and adequately staffed.

Lauren Bilbe
TCEQ NPS Project Manager
Maintains a thorough knowledge of work activities, commitments, deliverables, and time frames associated with projects. Develops lines of communication and working relationships between the City of Boerne, the TCEQ, and the EPA. Tracks deliverables to ensure that tasks are completed as specified in the contract. Responsible for ensuring that the project deliverables are submitted on time and are of acceptable quality and quantity to achieve project objectives. Serves on planning team for NPS projects. Participates in the development, approval, implementation, and maintenance of the QAPP. Assists the TCEQ QAS in technical review of the QAPP. Responsible for verifying that the QAPP is followed by the City of Boerne. Notifies the TCEQ QAS of particular circumstances which may adversely affect the quality of data derived from the collection and analysis of samples. Enforces corrective action.

Anju Chalise
TCEQ NPS Project Quality Assurance Specialist
Assists Lead QAS with NPS QA management. Serves as liaison between NPS management and Agency QA management. Responsible for NPS guidance development related to program quality assurance. Serves on planning team for NPS projects. Participates in the development, approval, implementation, and maintenance of the QAPP.

Rebecca Ross
TCEQ NPS Data Manager
Responsible for coordination and tracking of NPS data sets from initial submittal through NPS Project Manager review and approval. Ensures that data is reported following instructions in the Surface Water Quality Monitoring Data Management Reference Guide (January 2010, or most current version). Runs automated data validation checks in SWQMIS and coordinates data verification and error correction with NPS Project Managers' data review. Generates SWQMIS summary reports to assist NPS Project Managers' data reviews. Provides training and guidance to NPS and Planning Agencies on technical data issues. Reviews QAPPs for valid stream monitoring stations. Checks validity of parameter codes, submitting entity code(s), collecting entity code(s), and monitoring type code(s). Develops and maintains data management-related standard operating procedures for NPS data management. Serves on planning team for NPS projects.

City of Boerne

Don Burger
City of Boerne, Project Manager
Responsible for ensuring tasks and other requirements in the contract are executed on time and are of acceptable quality. Monitors and assesses the quality of work. Coordinates attendance at conference calls, training, meetings, and related project activities with the TCEQ. Responsible for verifying the QAPP is followed and the project is producing data of known and acceptable quality. Ensures adequate training and supervision of all monitoring and data collection activities. Complies with corrective action requirements.

Ryan Bass
City of Boerne, QAO
Responsible for coordinating development and implementation of the QA program. Responsible for

writing and maintaining the QAPP. Responsible for maintaining records of QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project quality assurance records. Responsible for coordinating with the TCEQ QAS to resolve QA- related issues. Notifies the contractor Project Manager and TCEQ Project Manager of particular circumstances which may adversely affect the quality of data. Responsible for validation and verification of all data collected according with Table 4 procedures and acquired data procedures after each task is performed. Coordinates the research and review of technical QA material and data related to water quality monitoring system design and analytical techniques. Conducts laboratory inspections. Develops, facilitates, and conducts monitoring systems audits.

Ryan Bass
City of Boerne, Data Manager
Responsible for the acquisition, verification, and transfer of data to the TCEQ. Oversees data management for the study. Performs data quality assurances prior to transfer of data to TCEQ. Responsible for transferring data to the TCEQ in the acceptable format. Ensures data are submitted according to workplan specifications. Provides the point of contact for the TCEQ Data Manager to resolve issues related to the data. Responsible for transferring data to the TCEQ in the Event/Result format as specified in the DMRG (January 2010, or most recent version).

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

Charles J. Lorea, IV
Laboratory Manager
Responsible for supervision of laboratory personnel involved in generating analytical data for this project. Responsible for ensuring that laboratory personnel involved in generating analytical data have adequate training and a thorough knowledge of the QAPP and all SOPs specific to the analyses or task performed and/or supervised. Responsible for oversight of all operations, ensuring that all QA/QC requirements are met, and documentation related to the analysis is completely and accurately reported. Enforces corrective action, as required. Develops and facilitates monitoring systems audits.

Patricia M. Carvajal
Laboratory QAO
Monitors the implementation of the QAM and the QAPP within the laboratory to ensure complete compliance with QA objectives as defined by the contract and in the QAPP. Conducts internal audits to identify potential problems and ensure compliance with written SOPs. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory. Performs validation and verification of data before the report is sent to the City of Boerne. Insures that all QA reviews are conducted in a timely manner from real-time review at the bench during analysis to final pass-off of data to the QA officer.

U.S. EPA Region 6

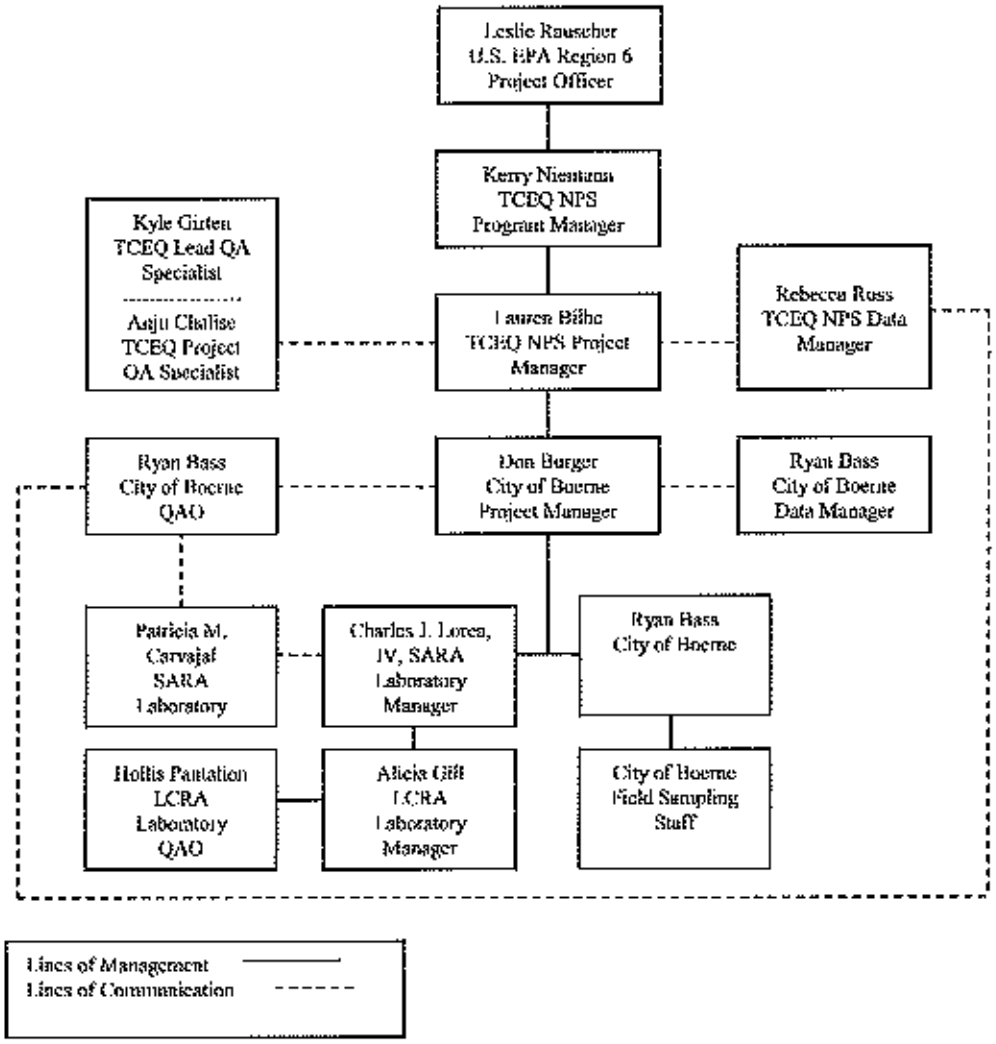
Leslie Rauscher
EPA Project Officer
Responsible for managing the CWA Section 319 funded grant on the behalf on EPA. Assists the TCEQ in approving projects that are consistent with the management goals designated under the State's NPS management plan and meet federal guidance. Coordinates the review of project workplans, draft deliverables, and works with the State in making these items approvable. Meets with the State at least semi-annually to evaluate the progress of each project and when conditions permit, participate in a site visit on the project. Fosters communication within EPA by updating management and others, both verbally and in writing, on the progress of the State's program and on other issues as they arise. Assists the regional NPS coordinator in tracking a State's annual progress in its management of the NPS program. Assists in grant close-out procedures ensuring all deliverables have been satisfied prior to closing a grant.

Lower Colorado River Authority Environmental Laboratory Services

Alicia Gill
Laboratory Manager
Responsible for supervision of laboratory personnel involved in generating analytical data for this project. Responsible for ensuring that laboratory personnel involved in generating analytical data have adequate training and a thorough knowledge of the QAPP and all SOPs specific to the analyses or task performed and/or supervised. Responsible for oversight of all operations, ensuring that all QA/QC requirements are met, and documentation related to the analysis is completely and accurately reported. Enforces corrective action, as required. Develops and facilitates monitoring systems audits.

Hollis Pantalion
Laboratory QAO
Monitors the implementation of the QAM and the QAPP within the laboratory to ensure complete compliance with QA objectives as defined by the contract and in the QAPP. Conducts internal audits to identify potential problems and ensure compliance with written SOPs. Responsible for supervising and verifying all aspects of the QA/QC in the laboratory. Performs validation and verification of data before the report is sent to the City of Boerne. Insures that all QA reviews are conducted in a timely manner from real-time review at the bench during analysis to final pass-off of data to the QA officer.

Figure A4.1. Organization Chart - Lines of Communication



2. Add Tables A7.5 to allow water quality samples to be analyzed at the LCRA laboratory.

A7 QUALITY OBJECTIVES AND CRITERIA

Only data collected that have valid TCEQ parameter codes assigned in Tables A7.1 – A7.4 are stored in SWQMIS. Any parameters listed in Tables A7.1 – A7.4 that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

Table A7.1 Field Parameters

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)	PRECISION (RPD of LCS/LCSD)	BIAS %Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB
pH	S.U.	water	EPA 150.1 and TCEQ SOP, V1	00100	NA[5]	NA	NA	NA	NA	Field
DO	mg/L	water	SM 4500-O G and TCEQ SOP, V1	00300	NA[5]	NA	NA	NA	NA	Field
Specific Conductance	µS/cm	water	EPA 120.1 and TCEQ SOP, V1	00094	NA[5]	NA	NA	NA	NA	Field
Temperature	° C	water	SM 2550 B and TCEQ SOP V1	00010	NA[5]	NA	NA	NA	NA	Field
Transparency Secchi Disk	meters	water	TCEQ SOP V1	00078	NA[5]	NA	NA	NA	NA	Field
Days since precipitation event	days	NA	TCEQ SOP V1	72053	NA[5]	NA	NA	NA	NA	Field
Flow Stream, instantaneous	cfs	water	TCEQ SOP V1	00061	NA[5]	NA	NA	NA	NA	Field
Flow measurement method	1-gage 2-electric 3-mechanical 4-weir/flume 5 doppler	water	TCEQ SOP V1	89835	NA[5]	NA	NA	NA	NA	Field
Flow severity	1-no flow, 2-low, 3-normal, 4-flood, 5-high, 6-dry	water	TCEQ SOP V1	01351	NA[5]	NA	NA	NA	NA	Field
Estimated Flow	cfs	NA	TCEQ SOP V1	74069	NA[5]	NA	NA	NA	NA	Field
Water Color	1-brown 2-reddish 3-green 4-black 5-clear 6-other	NA	TCEQ SOP V1	89969	NA[5]	NA	NA	NA	NA	Field
Water Odor	1-sewage 2-oily/chemical 3- H_2S 4- musky 5-fishy 6-none 7-other	NA	TCEQ SOP V1	89971	NA[5]	NA	NA	NA	NA	Field

Table A7.1 Field Parameters

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)	PRECISION (RPD of LCS/LCSD)	BIAS %Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB
Present Weather	1-clear 2-partly cloudy 3- cloudy 4-rain 5-other	NA	TCHQ SOP V1	89966	NA[2]	NA	NA	NA	NA	Field

Table A7.2 Priority Parameters for Routine Monitoring

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)[1]	PRECISION (RPD of LCS/LCSD & Sample/Sample Dup)	BIAS %Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB
Residue, Total NonFiltrable (TSS)	mg/L	water	SM 2540 D[3]	00530	4	4.0	20	80-120	NA	SARA
E. coli, IDEXX Colilert	MPN/100 mL	water	SM 9223-B[3]	31699	1	1	5[3]	NA	NA	SARA
Holding time, E. coli, IDEXX Colilert[3]	hours	water	NA[4]	31704	NA	NA	NA	NA	NA	SARA
Ammonia-N, total (non distilled)	mg/L	water	SM 4500-NH_3 D[3]	00610	0.1	0.1	20	80-120	70-130	SARA
Total Kjeldahl N	mg/L	water	EPA 351.2	00625	0.2	0.2	20	90-110	70-130	SARA
Total Phosphorus - P	mg/L	water	EPA 365.3	00665	0.06	0.02	20	80-120	70-130	SARA
O-phosphate-P, field filter <15 min.	mg/L	water	EPA 365.3	00671	0.04	0.02	20	80-120	70-130	SARA
Chlorophyll a	µg/L	water	SM 10200-H[3]	32211	3	1[7]	20[6]	80-120	N/A	SARA
Pheophytin-a	µg/L	water	SM 10200-H[3]	32218	3	1[7]	N/A	N/A	N/A	SARA

Table A7.3 Conventional and Bacteriological Parameters for Routine Monitoring

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)[1]	PRECISION (RPD of LCS/LCSD & Sample/Sample Dup)	BIAS %Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB
Residue, Total NonFiltrable (TSS)	mg/L	water	SM 2540 D[3]	00530	4	4.0	20	80-120	NA	SARA
Sulfate	mg/L	water	EPA 300.0, Rev. 2.1 (1993)	00945	5.0	5.0	20	90-110	70-130	SARA
Chloride	mg/L	water	EPA 300.0 Rev. 2.1	00940	5.0	5.0	20	90-110	70-130	SARA

Table A7.3 Conventional and Bacteriological Parameters for Routine Monitoring

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)[4]	PRECISION (RPD of LCS/LCSD & Sample/Sample Dup)	BIAS %Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB
			(1993)							
E. coli, IDEXX Colilert	MPN/100 mL	water	SM 9223-B[5]	31699	1	1	.5[7]	NA	NA	SARA
holding time, E. coli, IDEXX Colilert	hours	water	NA[5]	31701	NA	NA	NA	NA	NA	SARA
Ammonia-N, total (non distilled)	mg/L	water	SM 4500-NH_3 B[5]	00610	0.1	0.1	20	80-120	70-130	SARA
Total Kjeldahl N	mg/L	water	EPA 351.2	00625	0.2	0.2	20	90-110	70-130	SARA
Nitrate-N, total	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00620	0.05	0.05	20	90-110	70-130	SARA
Nitrite-N, total	mg/L	water	EPA 300.0 Rev. 2.1 (1993)	00615	0.05	0.05	20	90-110	70-130	SARA
TOC	mg/L	water	SM 5310 C[5]	00680	2.0	1.0	20	80-120	70-130	SARA
Total Phosphorus - P	mg/L	water	EPA 365.3	00665	0.06	0.02	20	80-120	70-130	SARA
BOD	mg/L	water	SM 5210B[5]	00310	2	2	15.4 (RSD)	N/A	N/A	SARA
O-phosphate-P, field filter <15 min.	mg/L	water	EPA 365.3	00671	0.04	0.02	20	80-120	70-130	SARA
Chlorophyll a	µg/L	water	SM 10200-H[5]	32211	3	1[2]	20[5]	80-120	N/A	SARA
Pheophytin-a	µg/L	water	SM 10200-H[5]	32218	3	1[2]	N/A	N/A	N/A	SARA

Table A7.4 Stormwater Monitoring Parameters

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)[4]	PRECISION (RPD of LCS/LCSD & Sample/Sample Dup)	BIAS % Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB	Sample Type
Residue, Total NonFiltrable (TSS)	mg/L	water	SM 2540 D[5]	00530	4	4.0	20	80-120	NA	SARA	Composite
E. coli, IDEXX Colilert	MPN/100 mL	water	SM 9223-B[5]	31699	1	1	.5[7]	NA	NA	SARA	Composite
holding time, E. coli, IDEXX Colilert	hours	water	NA[5]	31701	NA	NA	NA	NA	NA	SARA	Composite
Ammonia-N, total (non distilled)	mg/L	water	SM 4500-NH_3 D[5]	00610	0.1	0.1	20	80-120	70-130	SARA	Composite
Total Kjeldahl N	mg/L	water	EPA 351.2	00625	0.2	0.2	20	90-110	70-130	SARA	Composite

Table A7.4 Stormwater Monitoring Parameters											
PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)[4]	PRECISION (RPD of LCS/LCSD & Sample/Sample Dup)	BIAS %Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB	Sample Type
Total Phosphorus - P	mg/L	water	EPA 365.3	00665	0.06	0.02	20	80-120	70-130	SARA	Composite
O-phosphate-P, field filter <15 min.	mg/L	water	EPA 365.3	00671	0.01	0.02	20	80-120	70-130	SARA	Composite

PARAMETER	UNITS	MATRIX	METHOD	PARAMETER CODE	AWRL	Limit of Quantitation (LOQ)[4]	PRECISION (RPD of LCS/LCSD Sample/Sample Dup RPD)	BIAS %Rec. of LCS	LOQ CHECK STANDARD %Rec	LAB
Table A7.5 LCRA[9] Conventional and Bacteriological Parameters										
Sulfate	mg/L	water	EPA 300.0	00945	5.0	5.0	20	90-110	70-130	LCRA
Chloride	mg/L	water	EPA 300.0	00940	5.0	5.0	20	90-110	70-130	LCRA
Nitrate-N, total	mg/L	water	EPA 300.0	00620	0.05	0.05	20	90-110	70-130	LCRA
Nitrite-N, total	mg/L	water	EPA 300.0	00615	0.05	0.05	20	90-110	70-130	LCRA
Chlorophyll a	µg/L	water	EPA 445.0	70953	3	2[7]	20[6]	80-120	N/A	LCRA
Phaeophytin-a	µg/L	water	EPA 445.0	32213	3	2[7]	N/A	N/A	N/A	LCRA
Total Organic Carbon	mg/L	water	SM 5310D	00680	2.0	1.0	20	80-120	70-130	LCRA
Total Kjeldahl Nitrogen	mg/L	water	EPA 351.2	00625	0.2	0.2	20	80-120	70-130	LCRA

[1] SM 21st Edition
[4] Reporting limit. Not a NELAP-defined LOQ (commercially available spiking solution used as LOQ check standard).
[5] SM 20th Edition
[6] The RSD Laboratory analyses LOQ's at or below existing CRP AWRLs.
[7] NA Not Applicable
[6] This criterion applies to Chlorophyll duplicates with average concentrations >10µg/L.
[7] Based on a range statistic as described in Standard Methods, 20th Edition, Section 9020 B, "Quality Assurance/Quality Control - Intralaboratory Quality Control Guidelines. This criterion applies to bacteriological sample duplicates with average concentrations >10 MPN/100mL or >10 organisms/100mL.
[8] E.coli samples analyzed by SM 9223-B should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 48 hours.
[9] LCRA Laboratory may be used in the event it becomes necessary for the SARA laboratory to outsource samples. This applies to Priority, Conventional and Stormwater samples for the above listed analyses.

Precision

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

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

Laboratory precision is assessed by comparing replicate analyses of laboratory control samples in the sample matrix (e.g. deionized water, sand, commercially available tissue) or sample/duplicate pairs in the case of bacterial analysis. Precision results are compared against measurement performance specifications and used during evaluation of analytical performance. Program-defined measurement performance specifications for precision are defined in Table A7.1 through A7.4.

Bias

Bias is a statistical measurement of correctness and includes multiple components of systematic error. A measurement is considered unbiased when the value reported does not differ from the true value. Bias is determined through the analysis of laboratory control samples and LOQ Check Standards prepared with verified and known amounts of all target analytes in the sample matrix (e.g. 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 Table A7.1 through A7.4.

Representativeness

Site selection, the appropriate sampling regime, the sampling of all pertinent media according to TCEQ SOPs, and use of only approved analytical methods will assure that the measurement data represents the conditions at the site. Routine data collected 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.

In sampling storm water, the project goals include the calculation of selected parameter normal pollutant loadings to the receiving stream. Toward this goal, typical rainfall events experienced in the region and suggested to be monitored, are defined in section B1 of this document as to frequency duration, intensity and quantity. In addition, sample protocols to insure the representativeness of collected samples from typical rainfall events are described in section B1.

Completeness

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

Comparability

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

Limit of Quantitation

Ambient Water Reporting Limits (AWRLs)
The AWRL establishes the reporting specification at **or below** which data for a parameter must be reported to be compared with freshwater screening criteria. The AWRLs specified in Table A7 are the program-defined reporting specifications for each analyte and yield data acceptable for the TCEQ's water quality assessment. A full listing of AWRLs can be found at http://www.tceq.state.tx.us/compliance/monitoring/crp/qa/index.html. The limit of quantitation is the minimum level, concentration, or quantity of a target variable (e.g., target analyte) that can be reported with a specified degree of confidence. The following requirements must be met in order to report results:

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

- **The laboratory must demonstrate its ability to quantitate at its LOQ for each analyte by running an LOQ check standard for each analytical batch of Samples analyzed for this project.**

Analytical Quantitation
To demonstrate the ability to recover at the limit of quantitation, the laboratory will analyze an LOQ check standard for each batch of samples run.

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

3. Correct Ortho phosphorus container in Table B2.1

Table B2.1 Sample Storage, Preservation and Handling Requirements					
Parameter	**Matrix**	**Container**	**Preservation**	**Sample Volume**	**Holding Time**
TSS	Water	Cubitainer	Cool to 0 ≤6°C	500 mL	7 days
Sulfate	Water	Cubitainer	Cool to 0 ≤6°C	100[2] mL	28 days
Chloride	Water	Cubitainer	Cool to 0 ≤6°C	100[2] mL	28 days
E. coli, IDEXX Colilert	Water	Whirl-pack containing Sodium Thiosulfate	Cool to 0 ≤6°C	250 mL	8 hrs[1]
Ammonia-N, total	Water	Cubitainer	H_2SO_4 to pH <2 Cool to 0 ≤6°C	500 mL	28 days
BOD	Water	Cubitainer	Cool to 0 ≤6° C	2 L	48 hours
Nitrate-N, total	Water	Cubitainer	Cool to 0 ≤6°C	100[2] mL	48 hours
Nitrite-N, total	Water	Cubitainer	Cool to 0 ≤6°C	100[2] mL	48 hours
Total phosphorus	Water	Cubitainer	H_2SO_4 to pH <2 Cool to 0 ≤6°C	100 mL	28 days
TOC	Water	Cubitainer	H_2SO_4 to pH <2 Cool to 0 ≤6°C	100 mL	28 days
Total Kjeldahl Nitrogen	Water	Cubitainer	H_2SO_4 to pH <2 Cool to 0 ≤6°C	500 mL	28 days
O-phosphate-P, field filter <15 min.	Water	Plastic Bottle	Cool to 0 ≤6° C	100 mL	48 hours[3]
Chlorophyll-a	Water	Amber Plastic	Dark and ice before filtration (within 48 hours) Dark and frozen after filtration (held up to 28 days)	2000 mL[4]	28 days
Pheophytin	Water	Amber Plastic	Dark and ice before filtration (within 48 hours) Dark and frozen after filtration (held up to 28 days)	2000 mL[4]	28 days

[1]E.coli samples analyzed by SM 9223-B should always be processed as soon as possible and within 8 hours. When transport conditions necessitate delays in delivery longer than 6 hours, the holding time may be extended and samples must be processed as soon as possible and within 48 hours.
[2]Sulfate, Chloride, Nitrite and Nitrate are analyzed together using Ion Chromatography; the volume required is a total of 100 mLs, not 100 mLs per parameter
[3]Filtered in the field by sampling staff
[4]Chlorophyll-a and phcophytin are analyzed together, the volume required is a total of 2000 mLs

4. Amend section B3 to include the possibility of outsourcing samples to LCRA. LCRA is being added in order to allow the SARA Regional Environmental Laboratory to outsource the samples if it becomes necessary due to insufficient staff or equipment problems.

B3 SAMPLE HANDLING AND CUSTODY

Sample Labeling

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

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

Sample Handling

Water quality samples (conventional and bacteriological parameters) are collected according to procedures identified in TCEQ's SOP, V1 - *TCEQ Surface Water Quality Monitoring Procedures, Volume 1: Physical and Chemical Monitoring Methods for Water, Sediment, and Tissue, 2003.* The field data sheet is filled out in the field when the sample is collected and the results of field parameters are posted on this sheet. This sheet documents sample collection, flow data collected is also documented with this form or by attachment.

Samples requiring analysis that require acid preservation are collected in containers prepared for acid preserved sample collection prior to departing for the days sample collection. These containers are prepared by dispensing 2 mL of acid in the container at the beginning of the day. The sample container is labeled with a permanent water proof marker directly on the container and placed in an ice chest where they are covered with ice.

The samples are transported to the SARA-REL. Upon arrival at the laboratory, all samples and paperwork are relinquished to the sample custodian. The sample custodian accepts the sample, checking for any abnormalities in the sample (i.e. leakers, missing or torn COC seals, etc.) and notes any abnormalities at log in. The sample custodian also checks and documents the temperature of the samples using an infrared thermometer, and that all acid preserved samples are below 2 S.U. pH. Paperwork is examined for completeness and the sample custodian accepts the sample and documentation by signing the chain of custody (field data sheet) and also posting the date and time of acceptance.

The sample custodian enters the sample information into the laboratory's information management system and prints out one set of labels. Each sample container brought in, gets a label with a unique identification number. The water quality samples are then either given directly to an analyst, preparing to analyze the sample(s) immediately, or placed in a refrigerator in a secured (access is controlled through the use of programmed access cards) portion of the laboratory.

Laboratory staff run backlog reports to identify samples that need to be analyzed and identify when sample hold time elapses.

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 COC form is used to document sample handling during transfer from the field to the laboratory and among City of Boerne staff. The following information concerning the sample is recorded on the COC form (See Appendix F).

1. Date and time of collection
2. Site identification
3. Sample matrix
4. Number of containers
5. Preservative used
6. Was the sample filtered
7. Analyses required
8. Name of collector
9. Custody transfer signatures and dates and time of transfer
10. Bill of lading (*if applicable*)

In the event that samples need to be outsourced to LCRA Environmental Laboratory Services, the San Antonio River Authority Environmental Laboratory will outsource the samples to LCRA. LCRA will report the results to the SARA laboratory. SARA will forward the results to the City of Boerne with the analytical report as required by the SARA Regional Environmental Laboratory Quality Assurance manual.

Sample Tracking Procedure Deficiencies and Corrective Action
All deficiencies associated with chain-of-custody procedures as described in this QAPP are immediately reported to the City of Boerne Project Manager. These include such items as delays in transfer, resulting in holding time violations; violations of sample preservation requirements; incomplete documentation, including signatures; possible tampering of samples; broken or spilled samples, etc. The City of Boerne Project Manager in consultation with the City of Boerne 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 NPS Project Manager in the project progress report. Corrective Action Plans will be prepared by the City of Boerne QAO and submitted to TCEQ NPS Project Manager along with project progress report.

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

5. Add information regarding the use of the LCRA laboratory and the management of the data that would results from the process of outsourcing samples to LCRA.

B10 DATA MANAGEMENT

Personnel
Section A4 lists responsibilities and lines of communication for data management personnel.

Field personnel may consist of staff in the Public Works division of the city of Boerne. Any personnel that assist in collection of field samples will receive training to verify competency (Refer to A8).

Data Management Process

Field Data:

- Field measurements and observations will be recorded on loose-leaf field data sheets by project field staff.

- Individual field data sheets will be used at each sampling station.

- Field data will be entered into Excel spreadsheets by project staff and reviewed by the City of Boerne Project Manager. Data will be stored on the City of Boerne Data Manager's desktop computer and the City of Boerne's secure on site server, which is operated and maintained by the City of Boerne Information Technology Department.

Laboratory Data:

- Laboratory results will be submitted electronically (via PDF report) to the City of Boerne Data Manager. Lab results will be stored on the City of Boerne Data Manager's desktop computer and the City of Boerne's secure on site server
- In the event the SARA laboratory outsources samples to LCRA Environmental Laboratory Services, SARA laboratory staff will be responsible for arranging the transportation of samples to LCRA. The analytical results provided by LCRA will be sent to the SARA laboratory. The LCRA analytical report will be forwarded to the City of Boerne with the SARA laboratory analytical report as required by the SARA Regional Environmental Laboratory Quality Assurance Manual.

Data Submittal:

- Laboratory and field results will be submitted to TCEQ Project Manager by the City of Boerne Data Manager for review and submittal to SWQMIS.

See Appendix H for the Data Management Process Flow Chart.

Archives/Data Retention
Complete original data sets are archived on permanent *(specify media type)* media and retained on-site by the City of Boerne for a retention period specified in section A9.

Data Verification/Validation
The control mechanisms for detecting and correcting errors and for preventing loss of data during data reduction, data reporting, and data entry are contained in Sections D1, D2, and D3.

Forms and Checklists
See Appendix E for the Field Data Sheets.
See Appendix C for the Data Review Checklist and Summary.

Data Dictionary
Terminology and field descriptions are included in the SWQM DMRG (January 2010 or most recent version). For the purposes of verifying which entity codes are included in this QAPP, a table outlining the entities that will be used when submitting data under this QAPP is included below.

Name of Monitoring Entity	Tag Prefix	Submitting Entity	Collecting Entity
City of Boerne	*BC*	*BC*	*BC*

Data Handling
Data are processed using the Microsoft Excel suite of tools and applications. Data integrity is maintained by of peer review for data entry processes. The administrative assistant will enter the results into the worksheets; the project QAO will then review these entries for accuracy.

Hardware and Software Requirements
Hardware configurations are sufficient to run Microsoft Excel under the Windows operating system.

Information Resource Management Requirements
City of Boerne information technology (IT) policy is contained in IT SOPs which are available for review at City of Boerne offices.

Quality Assurance/Control
See Section D of this QAPP

Distribution: QAPP Amendments will be distributed to all personnel on the distribution list maintained by the Contractor.

These changes will be incorporated into the QAPP document and TCEQ and the City of Boerne will acknowledge and accept these changes by signing this amendment.

City of Boerne

Don Burger, City of Boerne Project Manager — Date: 8/9/11

Ryan Bass, City of Boerne QAO — Date: 8/9/11

Water Quality Planning Division

Lauren Bilbe, TCEQ NPS Project Manager — Date: 8/16/11

Kyle Girten, Lead NPS QA Specialist — Date: 8/16/11

Anju Chalise, NPS QA Specialist — Date: 8/17/2011

Kerry Niemann, TCEQ NPS Team Leader — Date: 8/17/2011

San Antonio River Authority Regional Environmental Laboratory

7-20-11

Charles J. Lorea, Laboratory Operations Supervisor — Date

7-20-11

Patricia M. Carvajal
Water Quality Planner III/QAO — Date

Lower Colorado River Authority Environmental Laboratory Services

7/20/11

Alicia Gill, LCRA Laboratory Manager Date

7/20/11

Hollis Pantalion, LCRA QA Officer Date

The City of Boerne will secure written documentation from additional project participants (e.g., subcontractors, laboratories) stating the organization's awareness of and commitment to requirements contained in this quality assurance project plan and any amendments or revisions of this plan. The City of Boerne will maintain this documentation as part of the project's quality assurance records. This documentation will be available for review. Copies of this documentation will also be submitted as deliverables to the TCEQ NPS Project Manager within 30 days of final TCEQ approval of the QAPP Amendment.