TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

September 30, 2010

Chuck Brown
Upper Colorado River Authority
512 Orient Street
San Angelo, Texas 76903

Re: Brady Creek Watershed Protection Plan Quality Assurance Project Plan (QAPP)

Approved: September 30, 2010 (Update due September 30, 2011)

Dear Mr. Brown:

The above named QAPP 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 176
Lauren Bilbe, Project Manager, MC 203

BRADY CREEK WATERSHED PROTECTION PLAN
Quality Assurance Project Plan
Agreement No. 582-10-90472

Upper Colorado River Authority
512 Orient Street, San Angelo, Texas 76903

Funding Source:

Nonpoint Source Protection Program CWA §319(h)
Prepared in cooperation with the Texas Commission on Environmental Quality
and the U.S. Environmental Protection Agency
Federal ID # 99614614

Effective Period: One year from date of final approval

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

Chuck Brown
Director of Operations
Upper Colorado River Authority
512 Orient Street
San Angelo, Texas 76903
325.655.0565
chuckb@ucratx.org

A1 APPROVAL PAGE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Field Operations Support Division

Stephen Stubbs, QA Manager — Date: 9/30/10

Kyle Girten, QA Specialist, Quality Assurance Team — Date: 9/30/10

Water Quality Planning Division

Monica Harris, Manager, Water Quality Planning and Implementation Section — Date: 9/15/10

Kerry Neimann, Manager, Nonpoint Source Program — Date: 9/14/2010

Nancy Ragland, Team Lead, Data Management and Analysis — Date: 9/23/10

Lauren Bilbe, Project Manager, Nonpoint Source Program — Date: 9/13/10

Anju Chalise, QA Specialist, Nonpoint Source Program — Date: 9/14/2010

Upper Colorado River Authority

Chuck Brown, Project Officer — Date: 9/7/10

Fred Teagarden, QA Officer — Date: 9/7/10

Lower Colorado River Authority Environmental Laboratory Services

Alicia C. Gill, Laboratory Manager — Date

Hollis Pantalion, Laboratory QA Officer — Date

The Upper Colorado River Authority (UCRA) 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 UCRA will maintain this documentation as part of the project's quality assurance records. This documentation will be available for review. (See sample letter in Attachment "1" of this document.)

A1 APPROVAL PAGE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Field Operations Support Division

Stephen Stubbs, QA Manager Date

Kyle Girten, QA Specialist Date
Quality Assurance Team

Water Quality Planning Division

Monica Harris, Manager Date
Water Quality Planning and Implementation Section

Kerry Neimann, Manager Date
Nonpoint Source Program

Nancy Ragland, Team Lead Date
Data Management and Analysis

Anju Chalise, QA Specialist Date
Nonpoint Source Program

Lauren Bilbe Date
Project Manager, Nonpoint Source Program

Upper Colorado River Authority

Chuck Brown
Project Officer Date

Fred Teagarden
QA Officer Date

Lower Colorado River Authority Environmental Laboratory Services

9/13/10
Alicia C. Gill
Laboratory Manager Date

Hollis Pantalion 9/13/10
Hollis Pantalion
Laboratory QA Officer Date

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A2 TABLE OF CONTENTS

Include section headings, page numbers, figures, and attachments.

A3 DISTRIBUTION LIST

The TCEQ QA Specialist will provide original versions of this project plan and any amendments or revisions of this plan to the TCEQ Project Manager and the UCRA Project Manager. The TCEQ Project Manager will provide copies to the TCEQ Data Management and Assessment Work Leader and EPA Project Officer within two weeks of approval. The TCEQ Project Manager will document receipt of the plan and maintain this documentation as part of the project's quality assurance records. This documentation will be available for review.

Nancy Ragland, Team Lead
Data Management and Analysis
MC-234
512-239-6546

U.S. Environmental Protection Agency Region 6
State/Tribal Section
1445 Ross Avenue
Suite # 1200
Dallas, TX 75202-2733
Leslie Rauscher, Project Officer
214-665-2773

The UCRA will provide copies of this project plan and any amendments or revisions of this plan to each project participant defined in the list below. The UCRA will document receipt of the plan by each participant and maintain this documentation as part of the project's quality assurance records. This documentation will be available for review.

Upper Colorado River Authority
512 Orient Street
San Angelo, Texas 76903

Chuck Brown, Project Manager
325-655-0565
Fred Teagarden, Quality Assurance Officer
325-655-0565

LCRA Environmental Laboratory Services
P.O. Box 220
Austin, Texas 78767
Alicia C. Gill, Laboratory Manager
512-356-6022
Hollis Pantalion, Laboratory Quality Assurance Officer
512-356-6022

Texas Institute for Applied Environmental Research
Tarleton State University
Box T0410, Tarleton Station
Stephenville, Texas 76402
Larry Hauck, PhD P.E.
Asst. Dir. Of Environmental Science
254-968-9561

City of Brady
P.O. Box 351
Brady, Texas 76825
Joe Mosier, Flood Plain Administrator
325-597-1461

List of Acronyms

AWRL	Ambient Water Reporting Limit
BMP	Best Management Practice
CAP	Corrective Action Plan
COC	Chain of Custody
CWA	Clean Water Act
DOC	Demonstration of Capability
DMP	Data Management Plan
DMRG	Data Management Reference Guide
DM&A	Data Management and Analysis
DQO	Data Quality Objective
EPA	Environmental Protection Agency
FC	Fecal Coliform
GIS	Geographic Information System
GPS	Global Positioning System
IT	Information Technology
LCRA	Lower Colorado River Authority
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LOD	Limit of Detection
LOQ	Limit of Quantitation
NELAC	National Environmental Laboratory Accreditation Conference
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
PO	Project Officer
QA/QC	Quality Assurance/Quality Control
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Specialist
QM	Quality Management
QMP	Quality Management Plan

RPD	Relative Percent Difference
SLOC	Station Location
SOP	Standard Operating Procedure
SOW	Scope of Work
SWAT	Soil and Water Assessment Tool (Model)
SWQM	Surface Water Quality Monitoring
SWQMIS	Surface Water Quality Monitoring Information System
TCEQ	Texas Commission on Environmental Quality
TIAER	Texas Institute for Applied Environmental Research
TPWD	Texas Parks and Wildlife Department
TSWQS	Texas Surface Water Quality Standards
UCRA	Upper Colorado River Authority
WPP	Watershed Protection Plan
WQI	Water Quality Inventory

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 contractor, 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 contractor. 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.

Upper Colorado River Authority

Chuck Brown
UCRA 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.

Fred Teagarden
UCRA 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.

Alicia C. 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 contractor. 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.

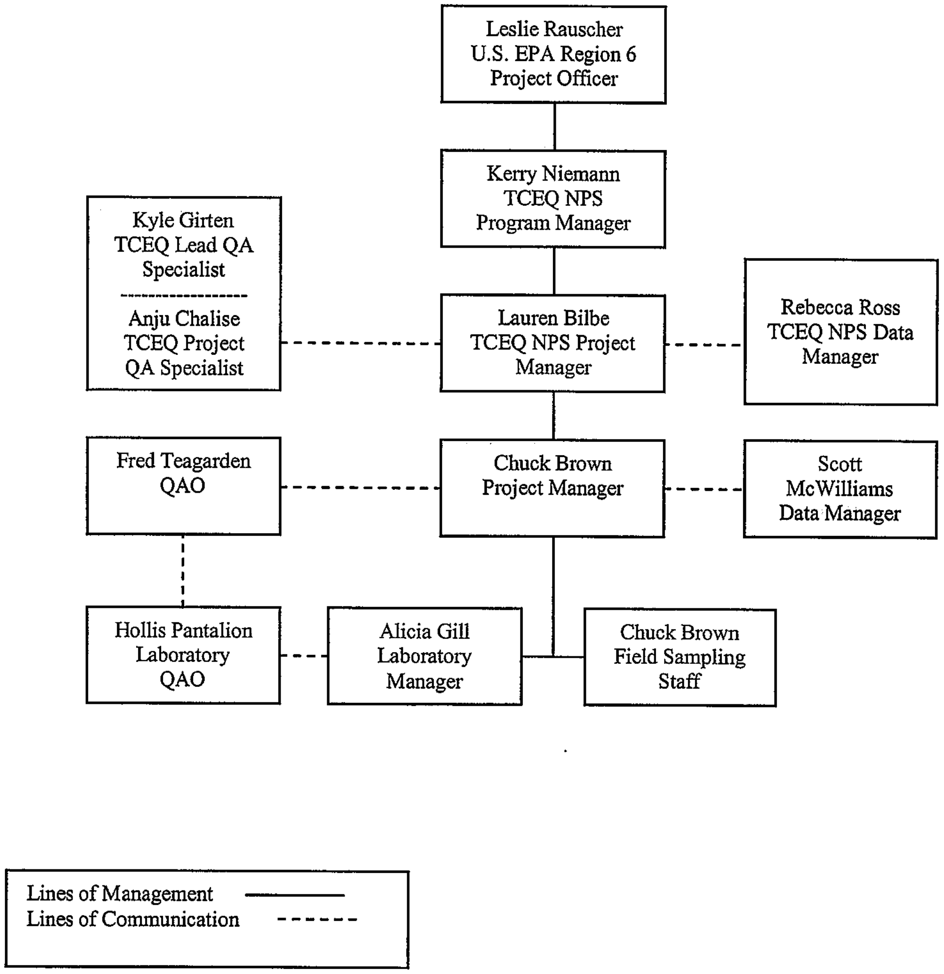
Scott McWilliams
UCRA Data Manager
Responsible for the acquisition, verification, and transfer of data to the TCEQ. Oversees data management for the study. Performs data quality assurances prior to transfer of data to TCEQ. Responsible for transferring data to the TCEQ in the Event/Result format as specified in the DMRG (January 2010, or most current version).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.

Chuck Brown
UCRA 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.

U.S. EPA Region 6

Leslie Raucher
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 workplan, 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.

Figure A4.1: Organization Chart - Lines of Communication



A5 PROBLEM DEFINITION/BACKGROUND

Water quality in Brady Creek through the city of Brady has continued to degrade since the construction of Brady Lake. Brady Creek has been identified as impaired on the Texas 303(d) list since 2004 for not supporting its designated aquatic life due to low dissolved oxygen. The absence of scouring stream flows and perennial flows has resulted in the stream functioning primarily as a series of storm water ponds with intermittent stream flows. As a result, it often displays the characteristics of a eutrophic stream with prolific algae blooms, odors, and a generally unpleasant appearance. There is also a history of fish kills that have been investigated by the Texas Parks and Wildlife Department (TPWD) and the Texas Commission on Environmental Quality (TCEQ). Reported investigations conclude that the fish kills were the result of nonpoint source (NPS) urban runoff.

In partnership with the city of Brady and the LCRA, the UCRA applied for and received funding for two (2) NPS abatement projects (Phase I & II). Phase I included the completion of a Master Plan for the downtown portion of Brady Creek and a demonstration Best Management Practice (BMP). Phase II included demonstration BMPs and a preliminary Watershed Characterization plan, based primarily on existing data of a Watershed Protection Plan (WPP) for the entire Brady Creek watershed.

In order to determine pollutant loads from unimpaired portions of the watershed and to determine more precise pollutant loadings from urban watershed within the city of Brady, the UCRA will develop and apply appropriate computer models. Soil and Water Assessment Tool (SWAT) modeling will be developed for the greater watershed and urban quality/hydraulic modeling will be developed for the urban Brady watershed. A separate QAPP will be developed and submitted for approval covering modeling activities. Inputs from existing data collected from the aforementioned projects, as well as newly acquired water quality data, will be used to evaluate environmental issues in the Brady Creek watershed and to address needs for estimating loading reductions. The purpose of this project is to develop and complete a watershed planning process for Brady Creek. The additional monitoring and modeling efforts are necessary for a greater assurance that the implementation of the WPP will achieve the goal to meet stream standards, along with maintaining/improving water quality in the greater watershed.

The UCRA will complete a WPP for Brady Creek (Segments 1416A, B and C). The primary goal of the WPP is to restore water quality to meet stream standards. The WPP will meet the nine required elements established by the EPA. Under this project, the UCRA will:

- Refine the Brady Creek Watershed Characterization by:
  - Conducting additional water quality monitoring and modeling
  - Further identifying and quantifying pollutant loading sources
- Utilize the Brady Creek Master Plan by:
  - Prioritizing BMPs identified in the Master Plan for the City of Brady
- Identify additional BMPs for the greater watershed
- Estimate costs and load reductions to be achieved through BMP implementation
- Create a schedule for implementation with measurable milestones and methods of determining whether milestones have been met.
- Involve stakeholders throughout the process.

The goal of the completed Brady Creek WPP, a plan for the entire Brady Creek watershed, is to give basin stakeholders a strategy that will result in the maintenance and restoration of water quality conditions consistent with the State of Texas Surface Water Quality Standards for the designated uses of the stream or water body. Basin-wide water quality goals include the maintenance of appropriate levels of dissolved oxygen, prevention of eutrophic conditions due to elevated nutrient loads, prevention of erosion and sediment deposition within the stream and, where possible, maximize stream base flows to restore or enhance aquatic utilization. This 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 all data submitted to SWQMIS have been collected and analyzed in a way that helps guaranty their reliability and therefore can be used by programs deemed appropriate by the TCEQ.

A6 PROJECT/TASK DESCRIPTION

Watershed planning is an iterative and adaptive process. A successful WPP begins with adequate planning and a clear and consistent message of what is required. Development of the project Scope of Work was based on the understanding and interpretation of 1) *the Nonpoint Source Program and Grants Guidelines for States and Territories* promulgated by the United States Environmental Protection Agency (EPA) in 2003 (hereafter referred to as the 2003 Guidelines), and 2) the *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*, finalized by EPA in 2008 (hereafter referred to as the EPA Handbook). The Scope of Work structure is designed to ensure the project is consistent with and satisfies the EPA's nine elements fundamental to a successful watershed-based plan.

The UCRA will work with the TCEQ during the development of the WPP. The TCEQ will provide direction and oversight to the UCRA during development of the WPP, through review and approval of objective deliverables. Collectively, the objectives and their respective deliverables will address EPA's nine elements of a successful WPP. As each objective is completed, and each deliverable approved, the UCRA and respective stakeholders will move closer to the completion of a successful plan.

As part of the collaborative process, the UCRA will work with stakeholders and partners to create a vision, goals, and action items that incorporate the environmental, economic, and social values of stakeholders and partners. The UCRA will work with stakeholders and partners to reconcile different values and viewpoints of the various participants in order to arrive at a mutually acceptable WPP.

To establish a good foundation for the development of EPA's nine elements for development of a WPP, steps 1 through 3 in the Watershed Planning and Implementation Process, as outlined in Chapter 2 of the EPA Handbook will continue to be followed. Steps 4 through 6 will be captured within development of EPA's nine elements. Steps 1 through 3 of the Watershed Planning and Implementation Process are as follows:

- Build Partnerships
    - Identify key stakeholders
    - Identify issues of concern

  - Set preliminary goals
  - Develop indicators
  - Conduct public outreach
- Characterize the watershed to identify problems (These objectives will be expanded to include additional monitoring and modeling under this project.)
  - Gather existing data and create a watershed inventory
  - Identify data gaps and collect additional data if needed
  - Analyze data
  - Identify causes and sources of pollution that need to be controlled
  - Estimate pollutant loads
- Set goals and identify solutions
  - Set overall goals and management objectives
  - Develop indicators/targets
  - Determine load reductions needed
  - Identify critical areas
  - Develop management measures to achieve goals

A summary of the project work tasks is as follows:
(1) Project Administration; (2) Build Partnerships; (3) Element A: Watershed Characterization – Phase 2: Data Collection and Analysis; (4) Element A: Watershed Characterization- Phase 3: Identification of Causes and Sources of Pollution and Estimation of Pollutant Loads; (5) Element B: Estimate of Pollutant Load Reductions Expected from Management. Measures; (6) Element C: Description of Management Measures; (7) Element D: Estimate of Technical and Financial Assistance Needed; (8) Element E: Information and Education; (9) Element F: Schedule for Implementation of Management Measures; (10) Element G: Description of Interim, Measurable Milestones; (11) Element H: Criteria to Determine if Load Reductions are Achieved; (12) Element I: Monitoring Component to Evaluate Effectiveness; (13) Completion of the WPP.
This QAPP generally describes activities associated with Elements (3), (4) and (5). A separate modeling QAPP will also address these elements and in addition, provide input into the following assessment and planning elements.

See Appendix A and Appendix D for the area location map and detailed site maps.

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

See Section B1 for monitoring to be conducted under this QAPP.

Revisions to the QAPP

Until the work described is completed, this QAPP shall be revised as necessary and reissued annually on the anniversary date, or revised and reissued within 120 days of significant changes, whichever is sooner. The most recently approved QAPPs shall remain in effect until revisions have been fully approved; reissuance (i.e., annual updates) must be submitted to the TCEQ for approval before the last version has expired. If the entire QAPP is current, valid, and accurately reflects the project goals and organization's policy, the annual reissuance may be done by a certification that the plan is current. This can be accomplished by submitting a cover letter stating the status of the QAPP and a copy of new, signed approval pages for the QAPP.

Amendments

Amendments to the QAPP may be necessary to reflect changes in project organization, tasks, schedules, objectives, and methods; address deficiencies and non-conformances; improve operational efficiency; and/or accommodate unique or unanticipated circumstances. Requests for amendments are directed from the contractor Project Manager to the TCEQ Project Manager, in writing, using the QAPP Amendment shell. The changes are effective immediately upon approval by the TCEQ NPS Project Manager and Quality Assurance Specialist, or their designees, and the EPA Project Officer.

Amendments to the QAPP and the reasons for the changes will be documented, and revised pages will be forwarded-to all persons on the QAPP distribution list by the Contractor QAO. Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual revision process or within 120 days of the initial approval in cases of significant changes.

A7 QUALITY OBJECTIVES AND CRITERIA

Quantitative and qualitative information regarding measurement data needed to monitor storm water and in-stream water quality are provided below:

Table A7.1 Measurement Performance Specifications for Storm Water Monitoring

Parameter	Units	Method	Parameter Code	AWRL	LOQ	LOQ Check Standard	Precision LCS/LCS duplicate (%RPD)	Recovery of LCS/ LCSD mean	Complete -ness (%)	Laboratory
Nitrate/ nitrite -N	mg/L	SM4500-NO3-H	00630	.05	0.02	70-130%	20	80-120%	90	LCRA-ELS
T-Kjeldahl-N	mg/l	EPA 351.2	00610 00625	0.2	0.2	70-130%	20	80-120%	90	LCRA-ELS
Residue non-filtrable	mg/L	SM2540D	00530	4	1	NA	20	NA	90	LCRA-ELS
T-Phosphorus -P	mg/L	EPA 365.4	00665	.06	.06	70-130%	20	80-120%	90	LCRA-ELS
rainfall	inches in last 24 hr	TCEQ SOP	82553	NA	NA	NA	NA	NA	90	Field
Flow Stream Instantaneous	cfs	TCEQ SOP VI	00061	NA	NA	NA	NA	NA	NA	Field
Flow Estimate	cfs	TCEQ SOP VI	74069	NA	NA	NA	NA	NA	NA	Field
Days Since Last Significant Rainfall	days	TCEQ SOP VI	72053	NA	NA	NA	NA	NA	NA	Field

Parameter	Units	Method	Parameter Code	AWRL	LOQ	LOQ Check Standard	Precision LCS/LCS duplicate (%RPD)	Recovery of LCS/ LCSD mean	Complete -ness (%)	Laboratory
Flow Measurement Method	1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler	TCEQ SOP VI	89835	NA	NA	NA	NA	NA	NA	Field

Table A7.2 Measurement Performance Specifications for In-stream Monitoring

Parameter	Units	Method	Parameter Code	AWRL	LOQ	LOQ Check Standard	Precision LCS/LCS duplicate (%RPD)	Recovery of LCS/LCSD mean	Complete-ness (%)	Laboratory
pH	pH/ units	EPA 150.1 and TCEQ SOP	00400	NA	NA	NA	NA	NA	90	Field
DO	mg/L	EPA 360.1 and TCEQ SOP	00300	NA	NA	NA	NA	NA	90	Field
Specific Conductance	uS/cm	EPA 120.1 and TCEQ SOP	00094	NA	NA	NA	NA	NA	90	Field
Temperature	□ C	EPA 170.1 and TCEQ SOP	00010	NA	NA	NA	NA	NA	90	Field
Residue non-filterable	mg/l	SM2540D	00530	4	1	NA	20	NA	90	LCRA-ELS
Nitrate/ nitrite-N	mg/L	SM4500-NO3-H	00630	.05	.02	70-130%	20	80-120%	90	LCRA-ELS
Ammonia N total	mg/L	EPA 350.1	~~00625~~ 00610	0.1	0.02	70-130%	20	80-120%	90	LCRA-ELS
T. Kjeldahl N	mg/L	EPA 351.2	~~00610~~ 00625	0.2	0.2	70-130%	20	80-120%	90	LCRA-ELS
T-Phosphorus -P	mg/L	EPA 365.4	00665	.06	.06	70-130%	20	80-120%	90	LCRA-ELS
Chlorides	mg/L	TCEQ SOP EPA 300.0	00940	5	5	70-130%	20	80-120%	90	LCRA-ELS
E.coli Bact.	MPN/ 100 ml	SM 9223-B	31699	1	1	NA	0.5	NA	80-120	LCRA-ELS
Flow stream, instantaneous	cfs	TCEQ SOP VI	00061	NA	NA	NA	NA	NA	NA	Field
Flow Estimate	cfs	TCEQ SOP VI	74069	NA	NA	NA	NA	NA	NA	Field
Days Since Last Significant Rainfall	days	TCEQ SOP VI	72053	NA	NA	NA	NA	NA	NA	Field

Flow Measurement Method	1-gage 2-electric 3-mechanical 4-weir/flume 5-doppler	TCEQ SOP VI	89835	NA	NA	NA	NA	NA	NA	Field
Holding Time, E-Coli, IDEXX Colilert	Hrs.	NA	31704	NA	NA	NA	NA	NA	NA	LCRA-ELS

Note for SM9223-B - : 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.

References: *US EPA Methods for Chemical Analysis of Water and Wastewater*, Manual #EPA-600/4-79-020. American Public Health Association, American Water Works Association and Water Environment Federation, *Standard Methods for the Examination of Water and Waste Water*, 20th Ed., Texas Commission on Environmental Quality *Surface Water Quality Monitoring Procedures*, Volume 1, October 2008.

Only data collected that have a valid TCEQ parameter code assigned in Table A7.1 and A7.2 will be stored in SWQMIS. Any parameters listed in Table A7.1 or A7.2 that do not have a valid TCEQ parameter code assigned will not be stored in SWQMIS.

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. de-ionized 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 Tables A7.1&A7.2.

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. de-ionized 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 Tables A7.1&A7.2.

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 funding, rainfall occurrences and contract restrictions 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
AWRLs (Tables A7.1& A7.2) are used in this project as the *limit of quantitation specification*, so data collected under this QAPP can be compared against the TSWQS. Laboratory *limits of quantitation* (Tables A7.1& A7.2) must be at or below the AWRL for each applicable parameter.

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

A8 SPECIAL TRAINING/CERTIFICATION

City of Brady staff responsible for operating the automated samplers and making initial flow observations will undergo a training event by the UCRA. UCRA staff have undergone training by the equipment manufacturer and have extensive experience in the deployment, operation and maintenance of the equipment being utilized. In addition, the UCRA staff routinely monitor stream and storm water flows and are familiar with all of the methods and/or equipment to be utilized to collect this data. The UCRA QA officer will observe and participate in the training and provide record of the training as to date, participants and scope.

UCRA field personnel have received extensive training in proper sampling and field analysis and have been audited by CRP QA staff on numerous occasions. The UCRA QA officer will verify through the UCRA field supervisor that sampling and field analysis are performed by qualified staff. Any new staff placed in the field will undergo extensive training and orientation by the UCRA field supervisor prior to any assignment. Once deemed ready for field assignment, the staff would be added to the project Personnel Eligibility List (PEL) and the revised list provided by the field supervisor to the project QA officer. Only staff that are found on the project PEL are authorized to perform duties related to the project. The new trained staff will also be documented as part of the Quality Assurance/Data Collection System.

Global Positioning System (GPS) equipment may be used as a component of the information required by the Station Location (SLOC) request process for creating the certified positional data that will ultimately be entered into the TCEQ's SWQMIS database. Any positional data obtained by Nonpoint Source Program grantees using a Global Positioning System will follow the TCEQ's OPP 8.11 and 8.12 policy regarding the collection and management of positional data.

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 Map. The verified coordinates and map interface can then be used to develop a new SLOC.

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

A9 DOCUMENTS AND RECORDS

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 NELAC standards (Section 5.5.10) and include the information necessary for the interpretation and validation of data. The requirements for reporting data and the procedures are provided. All test reports will be provided by the laboratory automatically upon test and report completion. Test Reports will be initially received by the UCRA Field Supervisor and immediately provided to the project QA officer for review and submittal to the UCRA data officer.

- Report title
- Name and address of laboratory
- Name and address of client and project name
- Subcontractor results clearly identified
- Description and unambiguous name of tested sample
- Date and time of sample collection, date of sample receipt, and date and time of analysis
- Identification of test method
- QC results for LCS/LCS duplicates, LCS, field splits, % recovery of AWRL
- Holding Time for SM9223-B
- An explanation of failed QC and any non-standard conditions that may have affected quality
- A signature and title of laboratory director or designee

Electronic Data

Data will be submitted to the TCEQ in the event/result format specified in the TCEQ Data Management Reference Guide (DMRG) for upload to the Surface Water Quality Monitoring Information System (SWQMIS). The Data Summary as contained in Appendix C of this document will be submitted with the data.

A station location request (SLOC) will be submitted to the TCEQ Project Manager for each sampling site to obtain a station identification number.

All reported Events will have a unique Tag ID (see DMRG). A Tag Prefix must be requested from the TCEQ in accordance with the DMRG where the Reporting Entity does not already have one. Tag IDs used in this project will be seven-character alphanumerics with the structure of the two-letter Tag prefix followed by a four digit number and ending with the character "N": for example - KI1234N, KI1235N, etc.

Submitting Entity, Collecting Entity, and Monitoring Type will reflect the project organization and monitoring type in accordance with the DMRG. The proper coding of Monitoring Type is essential to accurately capture any bias toward certain environmental condition (for example, high flow events). The Project Manager should be consulted to assure proper use of the Monitoring Type code.

Sample Description	Submitting Entity	Collecting Entity	Monitoring Type	Tag Prefix
Routine monitoring to establish baseline conditions	UC	UC	RT	UC
Monitoring during rainfall runoff.	UC	UC	BF	UC

Records and Documents Retention Requirements

Document/Record	Location	Retention	Form
QAPP, amendments, and appendices	Org.	5 years	Paper & Electronic
QAPP distribution documentation	Org.	5 years	Paper
Training records	Org.	5 years	Paper
Field notebooks or field data sheets	Org.	5 years	Paper & Electronic
Field equipment calibration/maintenance l	Org.	5 years	Paper
Chain of custody records	Org.	5 years	Paper
Field SOPs	Org.	5 years	Paper
Laboratory QA manuals	Lab	5 years	Electronic
Laboratory SOPs	Lab	5 years	Electronic
Laboratory procedures	Lab	5 years	Electronic
Instrument raw data files	Lab	5 years	LIMS Electronic
Instrument readings/printouts	Lab	5 years	Paper & Electronic
Laboratory data reports/results	Lab	5 years	Paper& Electronic
Laboratory equipment maintenance logs	Lab	5 years	Electronic
Laboratory calibration records	Lab	5 years	LIMS Electronic
Corrective action documentation	Lab	5 years	Electronic

B1 SAMPLING PROCESS DESIGN (EXPERIMENTAL DESIGN)

B1 Sampling Process Design

The sample design rationale is based on the intent to assess the water quality within the Brady Creek watershed, including ambient water quality at five locations within the watershed as well as both rural and urban storm water quality. Monitoring sites are specified in Tables B1.1 and B1.2. The project area and the sample sites are located on the attached maps. The ambient water quality sites proposed are identical to those utilized in the Phase 1 Watershed Characterization project previously completed. The **urban** storm water sites have been selected to (1) sample areas of the city not previously monitored and (2) re-sample sub-basins with suspected heavy impact on Brady Creek water quality. An additional urban storm water site has been selected on Brady Creek below the City of Brady to quantify total loadings from the City of Brady. This site is routinely monitored quarterly by TCEQ Region 8 staff and historical ambient data is available in SWQMIS. The **rural** storm water sites selected are the three ambient sites above Brady Lake. These samples will be used to calculate storm loadings to Brady Lake.

The intent is to sample urban storm water pursuant to provide a basis for loading calculations based on typical storm event conditions. To define what a typical storm event might be, the planners have considered several documented factors that have a major impact on storm water quality. First, storm intensity may have a major impact on the storm water pollutant loading in that high runoff velocities tend to transport more materials during strong storms. Small and moderate storms would tend to generate less runoff quantitatively and produce lesser scouring velocities. Conversely, very small storms following extended dry periods could produce high concentrations of pollutants, although total loadings would still remain lower. The time since rainfall may have a significant effect on runoff quality. The longer the period since the last rainfall, the greater the expected pollutant loading. As you will note above, the word intensity is used to describe storm events in lieu of the total rainfall accumulation. Intensity in this context means rainfall during a specific span of time, usually expressed as inches per hour.

In the Brady Creek watershed, the majority of rainfall comes from thunderstorms relatively short in duration, primarily in the spring and fall. Based on regional observations and for the purpose of this study, the planners have defined an intense storm as one that produces in excess of one inch of rainfall within a two-hour period, but no more than two inches within a two-hour period; and a minor storm as one that produces less than one half (1/2) inch of rainfall within a two-hour period. The majority of the storms that occur within the watershed will fall in one of these categories.

Ideally, at least one of each storm type defined, should be sampled. This will result at a minimum, in the monitoring of one intense rainfall event and one minor rainfall event. Additional rainfall events will be monitored if they occur and conditions allow. A minimum of five days must transpire between any rainfall events producing storm water runoff before monitoring a subsequent storm event. Sampling in this manner will produce storm water analytical qualities that will approximate typical conditions within the city and allow realistic loadings to be calculated.

The typical storm water hydrograph (plotting flow rates vertically and time horizontally) displays a rapidly increasing flow rate to the peak and then a slower dwindling flow rate to the end of the event. Many factors will dictate the dimensions of the hydrograph, such as the storm characteristics, the area, slope and configuration of the watershed, the storm water channel or conveyance characteristics and the length of the reach above the point of measurement. Water quality samples collected during a storm event, should at a minimum, be determined by the collection of five sub-samples: two sub-samples on the ascending portion of the hydrograph, one sub-sample at the peak, and two sub-samples on the descending portion of the hydrograph. Automatic samplers, which are capable of collecting a large number of sub-samples, will be utilized in monitoring storm water in the urban areas during the runoff event. The sub-samples will be composited on a flow weighted basis prior to analysis. Analytical results of this composite sample along with flow data will determine the total loading of individual pollutants to the stream. Inherent in this process is the accurate definition of the storm water hydrograph through frequent flow measurements during the period.

To best meet project objectives, the four sites within the urban watershed, including one historical in stream site immediately downstream of the City of Brady, will be sampled. A minimum of three storm events will be monitored at each site and dependent upon contract and budget constraints and rainfall event occurrence within the period, additional monitoring events will be conducted. Periodic and frequent flow observations and measurements at the sample locations will allow for the collection of sub-samples from the all portions of the hydrograph as described above. Accurate water elevation measurements at predetermined locations and specific sites will be utilized to calculate flows and prepare site flow charts in waters deemed too dangerous to measure. In estimating these flows, average velocity of the flow through a given cross-sectional area will be utilized or roughness/slope calculations performed prior to sampling. The samples will be collected as near the thalweg as possible and shall be a minimum of 1000 ml in volume.

Following training by UCRA staff, two designated City of Brady employees will conduct the urban storm water sample collection protocol. In addition to the UCRA staff, the employees will be under the supervision of the City Flood Plain Administrator, who is a member of the Watershed Stakeholder Group and been previously trained as a watershed steward and volunteer water quality monitor. The UCRA will provide two ISCO model 3230 automatic samplers to the city. UCRA staff will be responsible for compositing the samples prior to laboratory shipment.

Rural storm water sites will be sampled at a minimum of three events. Depending on contract and budget constraints and the occurrence of rainfall events, additional sampling may occur. Three sites above Brady Lake have been selected in order to monitor potential suspended solids and nutrient loadings to Brady Lake from cultivation land uses. As previously mentioned, an in-stream site below the City of Brady will also be sampled. This site will provide water quality data regarding nonpoint source (NPS) export loadings to downstream portions of Brady Creek. The plan calls for the monitoring of rural stormwater sites to be accomplished by the collection of grab samples taken at, or as near to peak flow conditions as is practicable. The samples will be manually collected.

A third monitoring protocol is planned for the collection of ambient water quality samples in several areas of Brady Creek in which little or no data existed prior to the Phase 1 watershed characterization. The sample design is a spatially representative set of five sites established along Brady Creek from the headwaters of the creek to its confluence with the San Saba River. In order to characterize water quality during base flows, these sites will be sampled monthly. The five sites selected include three located above Brady Lake, one site at Brady Lake and one site located downstream of Brady near the confluence of the San Saba River. The downstream site is typically perennial in flow characteristics, while the upstream sites are intermittent. Site "D" is located on a tributary arm of Brady Lake and is representative of ambient lake water quality.

This data collection effort involves monitoring routine water quality parameters while using procedures and methods that are consistent with the TCEQ Surface Water Quality Monitoring Procedures, Volume 1 (RG-415). Overall consideration is also given to accessibility and safety. All water quality analyses will be conducted by the LCRA Environmental Laboratory Services.

Table B1.1 Storm water monitoring sites

TCEQ Station ID	Site Description	Latitude Longitude	Start Date	End Date	Sample Matrix	Monitoring Frequencies (per year)				
						Total Suspended Solids	Nutrients	Flow	Rainfall	Comments
1416.20067	#1 Storm Water Sub-basin E	N31°.13707 W99°.33894	See Note	See Note	water	Three event minimum	Three event min.	Cont.	As needed	Sampling tied to rainfall
1416.20811	#2 Storm water Sub-basin B	N 31°7.425 W 99° 19.594	"	"	water	Three event minimum	Three event min.	Cont.	As needed	Sampling tied to rainfall
1416.20812	#3 Storm water Sub-basin A	N 31°6.297 W 99°19.485	"	"	water	Three event minimum	Three event min.	Cont.	As needed	Sampling tied to rainfall
1416.14232	#4 Storm water TCEQ SWQM site	N 31°6.725 W 99°18.736	"	"	water	Three event minimum	Three event min.	Cont.	As needed	Sampling tied to rainfall
1416.20406	#5 Storm water ambient site "A"	N 31° 10.057 W 99° 29.594	"	"	water	Three event minimum	Three event min.	Peak flow	As needed	Grab Sampling tied to rainfall
1416.20409	#6 Storm water ambient site "B"	N 31° 12.221 W 99° 34.875	"	"	water	Three event minimum	Three event min.	Peak flow	As needed	Grab Sampling tied to rainfall
1416.17347	#7 Storm water ambient site "C"	N 31° 10.057 W 99° 29.594	"	"	water	Three event minimum	Three event min.	Peak flow	As needed	Grab Sampling tied to rainfall

Table B1.2 In stream ambient monitoring sites								
TCEQ Station I.D.	**Site Description**	**Latitude Longitude**	**Start Date**	**End Date**	**Matrix**	**Monitoring In – Stream Parameters**	**Field Data**	**Frequencies Comments**
1416.20406	A	N 31°11.102 W 99°50.494	See Note	See Note	Water	monthly - dependent upon flow	monthly dependent upon flow	Intermittent flows
1416.20409	B	N 31° 12.221 W 99° 34.875	"	"	Water	monthly - dependent upon flow	monthly dependent upon flow	Intermittent flows
1416.17347	C	N 31° 10.057 W 99° 29.594	"	"	Water	monthly - dependent upon flow	monthly dependent upon flow	Intermittent flows
1416.20410	D	N 31° 7.130 W 99°23.837	"	"	Water	monthly	monthly	Reservoir
1416.20411	E	N 31° 7.738 W 98° 59.664	"	"	Water	monthly	monthly	Perennial

Note: The monitoring start date shall be the date of QAPP approval.
Monitoring shall end 15 months prior to contract termination, or on Nov. 30, 2011.

B2 SAMPLING METHODS

Field Sampling Procedures

The field sampling design for monitoring is described in Section B1. In addition, a SOP for an automated sampler data collection if utilized is attached as Appendix E of this document. An automatic sampler will be utilized for all urban storm water sites.

Routine in-stream sample collection conducted by the project staff will follow the field sampling procedures for conventional parameters documented in the TCEQ Surface Water Quality Monitoring Procedures Manual (most recent addition).

The sample volumes, container types, minimum sample volume, preservation requirements, and holding time requirements are specified in tables B 2.1 and B 2.2

Table B2.1 Storm Water Monitoring

Parameter	Matrix	Sample Type	Container	Preservation	Sample Volume	Holding Time
Nitrite+nitrate-N	Water	Composite & grab	Pre-cleaned	ice,<6C, dark, pH<2 with H2SO4	250 ml	28 days
Total Phosphorus-P	Water	Composite & grab	Pre-cleaned	ice,<6C, dark, pH<2 with H2SO4	250 ml	28 days
Total Suspended Solids	Water	Composite & grab	Pre-cleaned	ice,<6C, dark	500 ml	7 days
Total Kjeldahl Nitrogen	Water	Composite & Grab	Pre-Cleaned	Ice, <6 C, H2SO4 pH<2	500 ml	28 days

Table B2.2 In-stream Monitoring

Parameter	Matrix	Sample Type	Pre-cleaned	Preservation	Sample Volume	Holding Time
Total Suspended Solids	water	Grab	Pre-cleaned	Ice, <6 C,	200 ml	7 days
Nitrate-Nitrite Nitrogen	water	Grab	Pre-cleaned	Ice, <6C, dark, pH <2 with H_2SO_4	250 ml	28 days
Chlorophyll-A	water	Grab	Amber, Polyethylene or glass	Dark,Ice, <6 C, before filt. Frz. After	500 ml	48 hr., 28 days after filt., if frz.
Total Kjeldahl Nitrogen	water	Grab	Pre-cleaned	Ice,<6 C, H2SO4 pH<2	500 ml	28 days
Chlorides	water	Grab	Pre-cleaned	Ice,<6 C	100 ml	28 days
E. coli	water	Grab	Sterile, Poly.	Ice, <6 C, Sodium thiosulfate	125	48 hrs.

Note: 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.

Documentation of Field Sampling Activities

Field sampling activities are documented on the Field Data Reporting Form as presented in Appendix F. For all visits, station ID, location, sampling time, sampling date, sampling depth, preservatives added to samples, and sample collector's name/signature are recorded. Values for all measured field parameters are recorded. Detailed observational data are recorded including water appearance, weather, biological activity, stream uses, unusual odors, specific sample information, missing parameters, days since last significant rainfall, and flow severity.

Recording Data

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

1. Legible writing in indelible, waterproof ink with no modifications, write-over's or cross-outs;
2. Changes should be made by crossing out original entries with a single line, entering the changes, and initialing and dating the corrections.
3. Close-outs on incomplete pages with an initialed and dated diagonal line.

Sampling Method Requirement or Sampling Process Design Deficiencies and Corrective Action

Examples of sampling method requirement or sample design deficiencies include but are not limited to such things as inadequate sample volume due to spillage or container leaks, failure to preserve samples appropriately, contamination of a sample bottle during collection, storage temperature and holding time exceedance, sampling at the wrong site, etc. Any deviations from the QAPP and appropriate sampling procedures may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected. It is the responsibility of the UCRA Project Manager, in consultation with the UCRA 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 NPS Project Manager both verbally and in writing in the project progress reports and by completion of a corrective action plan (CAP).

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

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

As discussed in Section B1, samples submitted for laboratory analysis in storm water sampling will be flow weighted composite samples. The local sample team shall assist the UCRA field coordinator in the collection of on-site flow data and the timed sub-samples based on the hydrograph characteristics as described in section B1. In anticipation of the storm event, the UCRA Field Coordinator (FC), who will immediately depart the UCRA offices for Brady, alerting the contract laboratory and the local sample team as to the deployment. If appropriate to the storm event characteristics, the UCRA FC will collect the rural storm water grab samples in transit to Brady. The sites are located along or near the travel route from San Angelo to Brady. If storm characteristics are not compatible with early collection, then the UCRA FC will revisit the rural sites as urban storm samples are being collected. All storm water samples will be preserved and prepared for shipment at the conclusion of the event. Upon arrival in Brady, the UCRA FC will assess the storm event as to intensity and duration and make any necessary recommendations regarding the status of the deployment. UCRA FC will also determine the storm event flow characteristics pertinent to sample collection and flow monitoring frequency.

Following conclusion of the storm water flows and sampling, the UCRA FC will define the urban storm water hydrograph, collect the sub-samples and prepare the flow weighted composite samples and the discrete samples for transport to the laboratory. The preparation will include the implementation of proper sample preservation techniques as defined in this document and the preparation of COC for each sample to be shipped to the LCRA laboratory in Austin. Based on the required time of shipment from Brady and San Angelo to Austin and the parameters to be analyzed, sample holding times should be assured. Laboratory staff, however, will verify that sample holding time and sample preservation has been met in sample logging procedures. The UCRA FC will record all pertinent data and information regarding the sample event including flows utilized in the hydrograph, number and all information regarding the sub-samples, storm event characteristics, pertinent dates and times including notification, departure, arrival in Brady, departure from Brady and sample delivery in a field logbook.

The in-stream samples will be collected by the UCRA FC and immediately shipped to the contract laboratory upon completion of the sample collection event. Based on anticipated collection time and travel from the Brady and San Angelo to Austin and the parameters to be analyzed, sample holding time should be assured. During sample collection and transport, the preparation will include the implementation of proper sample preservation techniques as defined in this document and the preparation of COC for each sample to be transported to the laboratory in Austin.

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 contractors. The following information concerning the sample is recorded on the COC form (See Appendix G).

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*)

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 Contractor 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 UCRA Project Manager in consultation with the UCRA 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 Contractor QAO and submitted to TCEQ NPS Project Manager along with project progress report.

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

B4 ANALYTICAL METHODS

The analytical methods are listed in Tables A7.1 and A7.2 of Section A7. Laboratories collecting data under this QAPP are compliant with the NELAC Standards. Copies of laboratory SOPs are retained by the contractor and are available for review by the TCEQ. Laboratory SOPs are consistent with EPA requirements as specified in the method.

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

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 LCRA Laboratory Supervisor, who will make the determination and notify the UCRA 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 UCRA Manager. The UCRA Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ NPS Project Manager.

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

The TCEQ has determined that analyses associated with the qualifier codes "holding time exceedance" and "sample received unpreserved", " estimated value", etc. 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.

B5 QUALITY CONTROL

Sampling Quality Control Requirements and Acceptability Criteria

Field Split - A field split is a single sample subdivided by field staff immediately following collection and submitted to the laboratory as two separately identified samples according to procedures specified in the *SWQM Procedures*. Split samples are preserved, handled, shipped, and analyzed identically and are used to assess variability in all of these processes. Field splits apply to conventional samples only. Sample protocol for this project will include the collection of split samples for 10% of the samples collected or at a minimum, one (1) split sample per collection run. This includes all sample types (in-stream, urban and rural storm water).

The precision of field split results is calculated by relative percent difference (RPD) using the following equation:

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

A 30% RPD criteria will be used to screen field split results as a possible indicator of excessive variability in the sample handling and analytical system. If it is determined that elevated quantities of analyte (i.e., > 5 times the LOQ) were measured and analytical variability can be eliminated as a factor, than variability in field split results will primarily be used as a trigger for discussion with field staff to ensure samples are being handled in the field correctly. Some individual sample results may be invalidated based on the examination of all extenuating information. The information derived from field splits is generally considered to be event specific and would not normally be used to determine the validity of an entire batch; however, some batches of samples may be invalidated depending on the situation. Professional judgment during data validation will be relied upon to interpret the results and take appropriate action. The qualification (i.e., invalidation) of data will be documented on the Data Review Checklist and Summary. Deficiencies will be addressed as specified in this section under Quality Control or Acceptability Requirement Deficiencies and Corrective Actions.

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 NELAC-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. 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.

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

LOQ Sediment and Tissue 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 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 Review Checklist and Summary as to why results do not appear to meet the AWRL requirement.

LOQ Check Standard – An LOQ check standard 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 standard is spiked into the sample matrix at a level less than or near the LOQ for each analyte for each analytical batch of samples run.

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

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

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

Measurement performance specifications are used to determine the acceptability of LOQ Check Standard analyses as specified in 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 mid point 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; SR is the measured result; and SA is the true result:

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

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

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

For most parameters, precision is calculated by the relative percent difference (RPD) of LCS duplicate results as defined by 100 times the difference (range) of each duplicate set, divided by the average value (mean) of the set. For duplicate results, X_1 and X_2, the RPD is calculated from the following equation:

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

A bacteriological duplicate is considered to be a special type of laboratory duplicate and applies when bacteriological samples are run in the field as well as in the lab. Bacteriological duplicate analyses are performed on samples from the sample bottle on a 10% basis. Results of bacteriological duplicates are evaluated by calculating the logarithm of each result and determining the range of each pair.

Measurement performance specifications are used to determine the acceptability of duplicate analyses-as specified in Table A7.1. The specifications for bacteriological duplicates in Table A7.1 apply to samples with concentrations > 10 org./100mL.

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

Matrix spike (MS) – Matrix spikes are prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

Percent recovery of the known concentration of added analyte is used to assess accuracy of the analytical process. The spiking occurs prior to sample preparation and analysis. Spiked samples are routinely prepared and analyzed at a rate of 10% of samples processed, or one per preparation batch whichever is greater. The information from these controls is sample/matrix specific and is not used to determine the validity of the entire batch. The MS is spiked at a level less than or equal to the midpoint of the calibration or analysis range for each analyte. Percent recovery (%R) is defined as 100 times the observed concentration, minus the sample concentration, divided by the true concentration of the spike.

The 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 laboratory shall document the calculation for %R. The percent recovery of the matrix spike is calculated using the following equation in which %R is percent recovery, SSR is the observed spiked sample concentration, SR is the sample result, and SA is the reference concentration of the spike added:

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

Measurement performance specifications for matrix spikes are not specified in this document.

The results are compared to the acceptance criteria as published in the mandated test method. Where there are no established criteria, the laboratory shall determine the internal criteria and document the method used to establish the limits. For matrix spike results outside established criteria, corrective action shall be documented or the data reported with appropriate data qualifying codes.

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

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

Quality Control or Acceptability Requirement Deficiencies and Corrective Actions

Sampling QC excursions are evaluated by the Contractor Project Manager, in consultation with the Contractor 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 UCRA 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 may automatically invalidate the sample, especially in cases where high blank values may be indicative of contamination which may be causal in putting a value above the standard. Notations of field split excursions and 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 Laboratory QAO. The Laboratory QAO will discuss with the UCRA Project Manager. If applicable, the UCRA Project Manager will include this information in the CAP and submit with the Progress Report which is sent to the TCEQ Project Manager.

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

B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

Automated sampler testing and maintenance requirements are contained with Appendix H of this document.

All in-stream sampling equipment testing and maintenance requirements are detailed in the *TCEQ Surface Water Quality Monitoring Procedures, Volume 1.* Equipment records are kept on all field equipment and a supply of critical spare parts is maintained by the Contractor Field Supervisor.

All laboratory tools, gauges, instrument, and equipment testing and maintenance requirements are contained within laboratory QAM(s). Testing and maintenance records are maintained and are available for inspection by the TCEQ. Instruments requiring daily or in-use testing may include, but are not limited to, water baths, ovens, autoclaves, incubators, refrigerators, and laboratory pure water. Critical spare parts for essential equipment are maintained to prevent downtime. Maintenance records are available for inspection by the TCEQ.

B7 INSTRUMENT/EQUIPMENT CALIBRATION AND FREQUENCY

Calibration requirements for the automated monitoring equipment are included in Appendix I of this document.

In-stream field Equipment calibration requirements are contained in the TCEQ *Surface Water Quality Monitoring Procedures Manual*. Post calibration error limits and the disposition resulting from error are adhered to. Data not meeting post-error limit requirements invalidates associated data collected subsequent to the pre-calibration and are not submitted to the TCEQ.

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

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

New batches of supplies are tested before use to verify that they function properly and are not contaminated. The laboratory QAM provides additional details on acceptance requirements for laboratory supplies and consumables.

B9 NON-DIRECT MEASUREMENTS

Only data collected directly under this QAPP will be submitted to the TCEQ for storage in SWQMIS. This project will not submit any acquired or non-direct measurement data to SWQMIS that has been or is going to be collected under another QAPP. All data collected under this QAPP and any acquired or non-direct measurements will comply with all requirements/guidance of the project.

Current and historical data as specifically described below will be utilized for watershed assessment purposes. All TCEQ Surface Water Quality Monitoring data collected by the TCEQ Regional office or Clean Rivers partners from the watershed and data reported in previous TCEQ project watershed characterization reports will be incorporated into the plan. Specifically, data utilized to complete this project from sources outside of data collected under this QAPP include the following:

1. Data collected under TCEQ project (Contract No.582141309) published in August 2004 and entitled "Brady Creek Master Plan, Urban Runoff/Non-Point Source Abatement Project". Also, data collected under the same project and published in September, 2004 entitled "Brady Creek Urban Runoff/Non Point Source Abatement Master Plan and Demonstration Project, Final Report". Data collected during this project was accomplished under approved QAPP with basically identical quality objectives as the present project.

2. Data Collected under TCEQ project (Contract No. 582570852) approved in April, 2010 and entitled " Brady Creek Watershed Characterization & Final Project Report, Pursuant to Preparation of a Brady Creek Watershed Protection Plan", January, 2010. Data collected under this project was accomplished through an approved QAPP with basically identical quality objectives as the present project.
3. SWQMIS data collected within the watershed.
4. Flow data for the period of record collected by the USGS at station No. 88145000, Brady Creek @ Brady, Texas.
5. Reservoir water elevation and contents for the period of record collected by the USGS at station No. 88144900, Brady Creek Reservoir near Brady, Texas.

B10 DATA MANAGEMENT

Personnel

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

Data Path

Samples are collected and are transferred to the laboratory for analyses as described in Sections B1 and B2. As stated in the sample plan (section B1), urban and rural storm water will be monitored through the collection of at least 21 samples at 7 sites and the in-stream quality monitored through monthly sampling of five sites depending on the availability of base flows. Initial sampling information (i.e. site location, date, time, sampling depth, etc.) will be recorded in the field data records, in the COC records and in the laboratory logging procedures. The field data, the analytical results and the QC laboratory records will be maintained in the Laboratory as file paper copies and/or in the laboratory electronic database. Following receipt of laboratory analysis records and laboratory QC data, the contractor will create both physical file (paper) and electronic files of the total sample record. The contractor also will prepare electronic disc copies of the file records for permanent storage in a fire resistant (fireproof safe) location. Following completion of all sampling and data verification, the contractor will prepare and submit data to TCEQ. See Appendix I for the Data Management Process flow chart.

Record-keeping and Data Storage

Contractor record keeping and document control procedures are contained in the water quality sampling and laboratory standard operating procedures (SOPs) and this QAPP. Original field and laboratory data sheets are stored in the Contractor offices in a fireproof file in accordance with the record-retention schedule in Section A9. Electronic copies of the sample information and sample laboratory results are maintained by both the laboratory and the contractor. The contractor will also prepare back-up electronic disc copies for storage in a fireproof safe in the Contractor office. If necessary, disaster recovery will be accomplished by information resources staff using the backup database.

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 F for the Field and Laboratory Data Sheets.
See Appendix C for the Data Review Checklist and Summary.

Data Handling

Data are processed using the Microsoft Access 2000 suite of tools and applications. Data integrity is maintained by the implementation of password protections which control access to the database and by limiting update rights to a select user group. No data from external sources are maintained in the database. The database administrator is responsible for assigning user rights and assuring database integrity.

Hardware and Software Requirements

Hardware configurations are sufficient to run Microsoft Access 2000 under the Windows operating system in a networked environment. Information resources staff are responsible for assuring hardware configurations meet the requirements for running current and future data management/database software as well as providing technical support. Software development and database administration are also the responsibility of the information resources department. Information resources develops applications based on user requests and assures full system compatibility prior to implementation.

Information Resource Management Requirements

The UCRA information technology (IT) policy is contained in IT SOPs which are available for review at UCRA offices.

C1 ASSESSMENTS AND RESPONSE ACTIONS

Table C1.1 Assessments and Response Requirements

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	Contractor Project Manager	Monitoring of the project status and records to ensure requirements are being fulfilled.	Report to TCEQ in Quarterly Report
Laboratory Inspections	Dates to be determined by the TCEQ lab inspector	TCEQ Lab 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
Monitoring Systems Audit	Dates to be determined by TCEQ	TCEQ QAS	The assessment will be tailored in accordance with objectives needed to assure compliance with the QAPP. Field sampling, handling and measurement; facility review; and data management as they relate to the NPS Project	30 days to respond in writing to the TCEQ to address corrective actions
Laboratory Inspection	Based on work plan and or discretion of contractor	Contractor QAO	Analytical and quality control procedures employed at the laboratory and the contract laboratory	30 days to respond in writing to the contractor QAO to address corrective actions
Monitoring Systems Audit	Based on work plan and or discretion of contractor	Contractor QAO	The assessment will be tailored in accordance with objectives needed to assure compliance with the QAPP. Field sampling, handling and measurement; facility review; and data management as they relate to the NPS Project	30 days to respond in writing to the contractor QAO to address corrective actions
Site Visit	Dates to be determined by TCEQ	TCEQ PM	Status of activities. Overall compliance with work plan and QAPP	As needed

Corrective Action Process for Deficiencies

Deficiencies are any deviation from the QAPP, SWQM Procedures Manual, SOPs, or Data Management Reference Guide. Deficiencies may invalidate resulting data and may require corrective action. Corrective action may include for samples to be discarded and re-collected. Deficiencies are documented in logbooks, field data sheets, etc. by field or laboratory staff. It is the responsibility of the UCRA Project Manager, in consultation with the UCRA 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 NPS Project Manager both verbally and in writing in the project progress reports and by completion of a corrective action plan (CAP).

Corrective Action

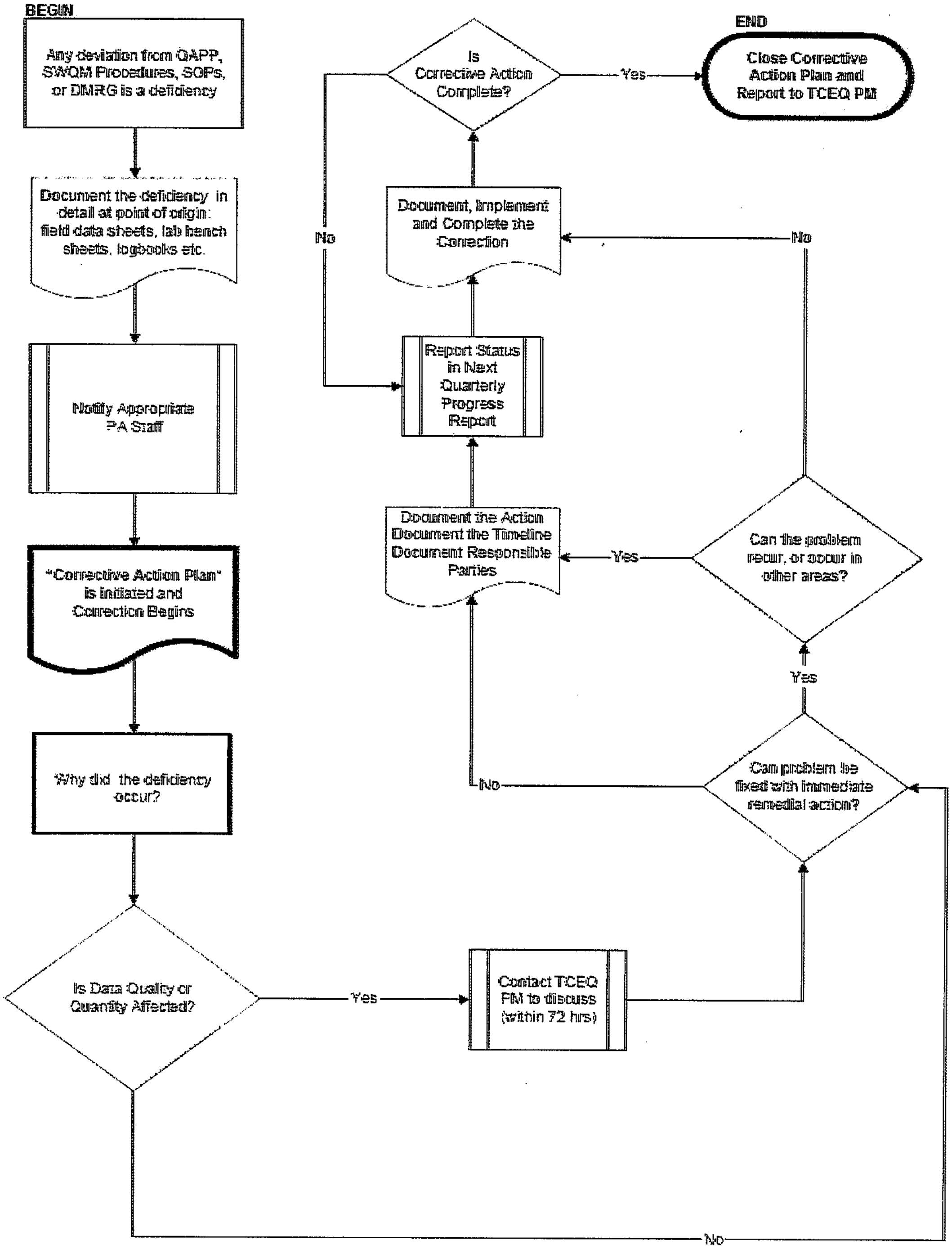
CAPs should:

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

Corrective Action Process for Deficiencies



Status of CAPs will be documented on the Corrective Action Status Table (See Appendix L) and included with Quarterly Progress Reports. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TCEQ immediately.

The UCRA Project Manager is responsible for implementing and tracking corrective actions. Corrective action plans will be documented on the Corrective Action Plan Form (See Appendix M) and submitted, when complete, to the TCEQ Project Manager. Records of audit findings and corrective actions are maintained by both the TCEQ and the UCRA QAO. Audit reports and corrective action documentation will be submitted to the TCEQ with the Quarterly 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 organization

C2 REPORTS TO MANAGEMENT

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.

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

Quarterly Progress Report - Summarizes the Contractor's activities for each task; reports monitoring status, problems, delays, and corrective actions; and outlines the status of each task's deliverables.

Monitoring System Audit Response - The contractor will respond in writing to the TCEQ within 30 days upon receipt of a monitoring system audit report to address corrective actions.

Contractor Evaluation - The Contractor participates in a Contractor Evaluation by the TCEQ annually for compliance with administrative and programmatic standards.

Final Project Report - Summarizes the Contractor's activities for the entire project period including a description and documentation of major project activities; evaluation of the project results and environmental benefits; and a conclusion.

Reports by TCEQ Project Management

Contractor Evaluation - The Contractor 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

For the purposes of this document, data verification is a systematic process for evaluating performance and compliance of a set of data to ascertain its completeness, correctness, and consistency using the methods and criteria defined in the QAPP. Validation means those processes taken independently of the data-generation processes to evaluate the technical usability of the verified data with respect to the planned objectives or intention of the project. Additionally, validation can provide a level of overall confidence in the reporting of the data based on the methods used.

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

The procedures for verification and validation of data are described in Section D2, below. The UCRA Field Supervisor is responsible for ensuring that field data are properly reviewed and verified for integrity. The Laboratory Supervisor is responsible for ensuring that laboratory data are scientifically valid, defensible, of acceptable precision and bias, and reviewed for integrity. The UCRA Data Manager will be responsible for ensuring that all data are properly reviewed and verified, and submitted in the required format to the project database and if considered acceptable, to the SWQMIS database. The Contractor QAO is responsible for validating a minimum of 10% of the data produced in each task. Finally, the UCRA Project Manager, with the concurrence of the UCRA QAO, is responsible for validating that all data to be reported meet the objectives of the project and are suitable for reporting to TCEQ.

D2 VERIFICATION AND VALIDATION METHODS

All data will be verified to ensure they are representative of the samples analyzed and locations where measurements were made, and that the data and associated quality control data conform to project specifications. The staff and management of the respective field, laboratory, and data management tasks are responsible for the integrity, validation and verification of the data each task generates or handles throughout each process. The field and laboratory tasks ensure the verification of raw data, electronically generated data, and data on chain-of-custody forms and hard copy output from instruments.

Verification, validation and integrity review of data will be performed using self-assessments and peer review, as appropriate to the project task, followed by technical review by the manager of the task. The data to be verified (listed in table D2.1) are evaluated against project performance specifications (Section A7) and are checked for errors, especially errors in transcription, calculations, and data input. 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 electronically or by initialing and dating the associated paperwork. 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. The performance of these tasks is documented by completion of the Data Review Checklist and Summary (Appendix C).

The UCRA Project Manager and QAO are each responsible for validating that the verified data are scientifically valid, defensible, of known precision, bias, integrity, meet the data quality objectives of the project, and are reportable to TCEQ. One element of the validation process involves evaluating the data again for anomalies. Any suspected errors or anomalous data must be addressed by the manager of the task associated with the data, before data validation can be completed.

A second element of the validation process is consideration of any findings identified during the monitoring systems audit conducted by the TCEQ QAS assigned to the project. Any issues requiring corrective action must be addressed, and the potential impact of these issues on previously collected data will be assessed. Finally, the UCRA Project Manager, with the concurrence of the QAO validates that the data meet the data quality objectives of the project and are suitable for reporting to TCEQ.

Table D2.1. Data Verification Procedures

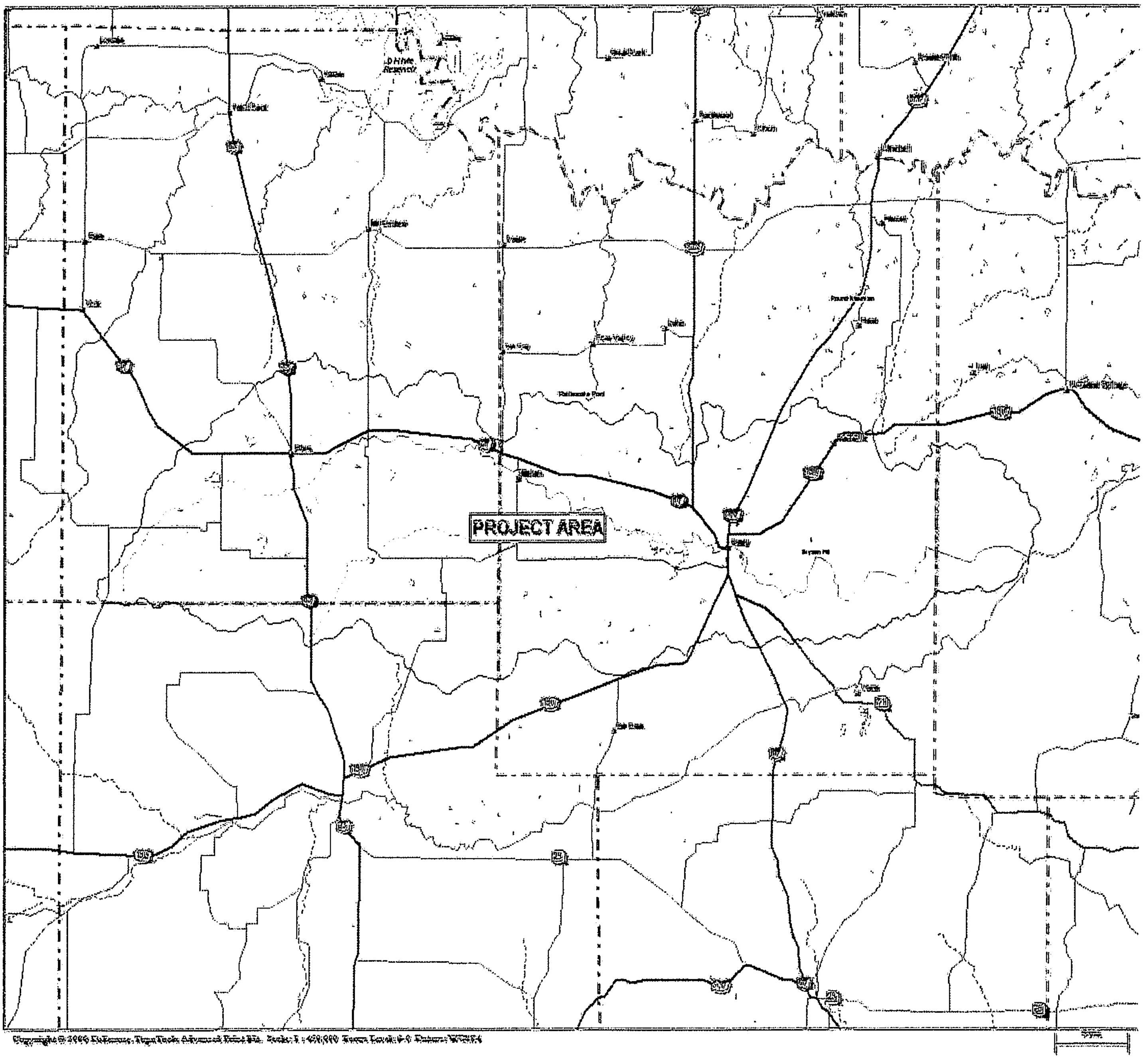
Data to be Verified	Field Task	Laboratory Task	Lead Organization Data Manager Task
Sample documentation complete; samples labeled, sites identified	✔	✔	
Field QC samples collected for all analytes as prescribed in the TCEQ *SWQM Procedures Manual*	✔		
Standards and reagents traceable	✔	✔	
Chain of custody complete/acceptable	✔	✔	
Sample preservation and handling acceptable	✔	✔	
Holding times not exceeded	✔	✔	
Collection, preparation, and analysis consistent with SOPs and QAPP	✔	✔	✔
Field documentation (e.g., biological, stream habitat) complete	✔		
Instrument calibration data complete	✔	✔	
Bacteriological records complete	✔	✔	
QC samples analyzed at required frequency	✔	✔	✔
QC results meet performance and program specifications	✔	✔	✔
Analytical sensitivity (Minimum Analytical Levels/Ambient Water Reporting Limits) consistent with QAPP		✔	✔
Results, calculations, transcriptions checked	✔	✔	
Laboratory bench-level review performed		✔	
All laboratory samples analyzed for all parameters		✔	
Corollary data agree	✔	✔	✔
Nonconforming activities documented	✔	✔	✔
Outliers confirmed and documented; reasonableness check performed			✔
Dates formatted correctly			✔
Depth reported correctly			✔
TAG IDs correct			✔
TCEQ ID number assigned			✔
Valid parameter codes			✔
Codes for submitting entity(ies), collecting entity(ies), and monitoring type(s) used correctly			✔
Time based on 24-hour clock			✔
Absence of transcription error confirmed	✔	✔	✔
Absence of electronic errors confirmed	✔	✔	✔
Sampling and analytical data gaps checked (e.g., all sites for which data are reported are on the coordinated monitoring schedule)	✔	✔	✔
Field QC results attached to data review checklist			✔
Verified data log submitted			✔
10% of data manually reviewed			✔

D3 RECONCILIATION WITH USER REQUIREMENTS

Analytical data collected under this QAPP will be analyzed by UCRA and TIAER project staff to determine the usability and sufficiency in combination with other data (previous water quality data and ongoing CRP data) to perform the modeling tasks as detailed in the SOW. Generally, the modeling tasks will determine storm water loadings, BMP efficiencies and assist in performing water quality assessment of the entire watershed.

Current and historical data as well as the results of an on-going special study for aquatic life from the Texas Clean Rivers Program will be used in the watershed plan. TCEQ Surface Water Quality Monitoring data and data reported in the Phase 1 watershed characterization report will be also be incorporated into the plan. The data will be utilized to assess the water quality of Brady Creek through out it's reach, determine existing and potential sources of water quality degradation and as input to the modeling activities. As stated above, the data collections and modeling will allow determination of storm water loadings, BMP efficiencies and assist in performing water quality assessment of the entire watershed.

Appendix A. Area Location Map


PROJECT AREA

Appendix B . Work Plan

NONPOINT SOURCE SUMMARY PAGE for the CWA §319(h) Urban Nonpoint Source Grant Program					
Title of Project:	**Brady Creek Watershed Protection Plan**				
Project Goals:	To assess the current water quality conditions and impairments in the Brady Creek watershed thru 1) targeted water quality sampling and analysis to provide a more complete data set of ambient and storm flow water quality information for incorporation into watershed planning models, 2) enhancing the watershed characterization and expanding the GIS land use/land cover (LU/LC) inventory, 3) analyze water quality data using Load Duration Curves (LDCs) and spatially explicit modeling, 4) Aquatic Life Assessment (ALA) monitoring, 5) establish and provide direction for a stakeholder group that will serve as a decision making body in the assessment of the Brady Creek watershed and facilitate the development of a Watershed Protection Plan (WPP) that satisfies EPA's nine key element requirement and will guide any further assessment or planning activities. The primary goal of the WPP is to restore water quality to meet stream standards.				
Project Tasks:	(1) Project Administration; (2) Build Partnerships; (3) Element A: Watershed Characterization – Phase 2: Data Collection and Analysis; (4) Element A: Watershed Characterization- Phase 3: Identification of Causes and Sources of Pollution and Estimation of Pollutant Loads; (5) Element B: Estimate of Pollutant Load Reductions Expected from Management. Measures; (6) Element C: Description of Management Measures; (7) Element D: Estimate of Technical & Financial Assistance Needed; (8) Element E: Information & Education Component; (9) Element F: Schedule for Implementation of Management Measures; (10) Element G: Description of Interim, Measurable Milestones; (11) Element H: Criteria to Determine if Load Reductions are Achieved; (12) Element I: Monitoring Component to Evaluate Effectiveness; (13) Completion of the WPP				
Measures of Success:	(1) Coordination and engagement of a watershed stakeholder committee; (2) Completed enhanced GIS and LU/LC update of the watershed with potential pollutant sources identified; (3) Collection and analysis of quality assured data generated for watershed sampling sites; (4) Completion of the LDCs and Modeling output report with pollutant loads recalculated; (5) ALA data acquired and incorporated into the watershed characterization; (6) Completed WPP approved by stakeholders, TCEQ, and EPA with management measures identified that will achieve the WPP goal to meet stream standards based on the outputs of the watershed characterization modeling exercises.				
Project Type:	**Implementation ( ); Education (X); Planning (X); Assessment (X); Groundwater ( )**				
Status of Water Body: 2008 Texas Water Quality Inventory and 303(d) List	**Segment ID:**	**Parameter:**		**Category:**	
	Brady Creek below Brady Ck. Reservoir (1416A): Segments 1416A_01, 1416A_02, 1416A_03	**Dissolved Oxygen** **Nutrient Screening Levels**		**5c** **CS**	
	Brady Creek Reservoir (1416B): Segments 1416B_01	Dissolved Oxygen, *E.coli*		**FS**	
	Brady Creek above Brady Ck. Reservoir (1416C)	**Not assessed**			
Project Location (Statewide or Watershed and County)	The Brady Creek Watershed, a tributary to the San Saba river in San Saba, McCulloch, Concho and Menard Counties.				
Key Project Activities:	Hire Staff ( ); Surface Water Quality Monitoring (X); Technical Assistance ( ); Education (X); Implementation ( ); BMP Effectiveness Monitoring ( ); Demonstration ( ); Planning (X); Modeling (X); Bacterial Source Tracking ( ); Other ( )				
Texas NPS Management Program Elements:	Element One (LTG Objectives 1, 2, 5, 6, & 7; STG 1B, STG 1C, STG 3A, STG 3B, STG 3D) Element Two Element Five				
Project Costs:	**Federal:**	$ 175,967	**Non-Federal:**	**$ 117,311**	**Total:** $ 293,278
Project Management:	Upper Colorado River Authority				
Project Period:	**January 1, 2010 – August 31, 2012**				

Part I – Applicant Information

Applicant							
Project Lead	Chuck Brown						
Title	Director of Operations						
Organization	Upper Colorado River Authority						
E-mail Address	chuckb@ucratx.org						
Street Address	512 Orient						
City	San Angelo	County	Tom Green	State	TX	Zip Code	76903
Telephone Number	325.655.0565			Fax Number	325.655.1371		

Project Partners	
Names	**Roles & Responsibilities**
Texas Commission On Environmental Quality (TCEQ)	Provide state oversight and management of all project activities and ensure coordination of activities with related projects and TSSWCB. Provide some matching funds through the Clean Rivers Program LCRA contract.
Lower Colorado River Authority (LCRA)	Aquatic Life Assessment conducted under the Clean Rivers Program.
Texas Institute for Applied Environmental Research (TIAER), Tarleton State University	Soil and Water Assessment Tool and P8-UCM (P8 – Urban Catchment Model Modeling)
Brady Creek WPP Steering Committee Members	Provide input on the development of the WPP

Part II – Project Information

Project Type					
Surface Water	X	Groundwater			
Does the project implement recommendations made in a completed Watershed Protection Plan or an adopted TMDL or Implementation Plan?	Yes		No	X	
If yes, identify the document.					
If yes, identify the agency/group that developed and/or approved the document.		Year Developed			

Watershed Information				
Watershed Name(s)	**Hydrologic Unit Code (8 Digit)**	**Segment ID**	**305 (b) Category**	**Size (Acres)**
Brady Creek	**12090110**	**1416A, B and C**	**5c, 2, 3**	**~320,000**

Water Quality Impairment
Describe all known causes (pollutants of concern) of water quality impairments from any of the following sources: 2008 Texas Water Quality Inventory and 303(d) List, Clean Rivers Program Basin Summary, Basin Highlights Reports or Other Documented Sources.

IMPAIRMENTS (*2008 Texas Water Quality Inventory and 303(d) List*)

Segment 1416: Brady Creek: From the confluence of the San Saba River southwest of San Saba in San Saba County to Brady Lake **Dam west of Brady in McCulloch County**

	Impairment	Category	Year Listed
1416_03: From FM 714 upstream to Brady Lake dam	**Dissolved Oxygen**	**5c**	**2004**

CONCERNS (*2008 Texas Water Quality Inventory*)

		Level of Concern	
1416_02	**nutrient screening**	**CS**	**(concern screening levels)**
1416_03	**nutrient screening**	**CS**	

2009 Highlights Report; Lower Colorado River Authority

"Brady Creek does not support its aquatic life use based on low levels of dissolved oxygen." The general uses are "supported with concerns for elevated levels of nutrients in Brady Creek."

Project Narrative

Problem/Need Statement

Water quality in Brady Creek through the City of Brady has continuously degraded since the construction of Brady Lake. Since 2004, Brady Creek has been identified as impaired on the Texas 303(d) List for not supporting its designated aquatic life use due to low dissolved oxygen. The absence of scouring stream flows and perennial flows has resulted in the stream functioning primarily as a series of storm water ponds with intermittent stream flows. As a result, the stream often displays the characteristics of a eutrophic stream with prolific algae blooms, odors, and a generally unpleasant appearance. There is also history of fish kills that have been investigated by the Texas Parks and Wildlife Department (TPWD) and the Texas Commission on Environmental Quality (TCEQ). Reported investigations conclude that fish kills were the result of nonpoint source (NPS) urban runoff.

In partnership with the City of Brady and the LCRA, the UCRA applied for and received funding for two (2) NPS abatement projects (Phase I & II). Phase I included the completion of a Master Plan for the downtown portion of Brady Creek and a demonstration Best Management Practice (BMP). Phase II included demonstration BMPs and the preliminary Watershed Characterization portion, based primarily on existing data, of a WPP for the entire Brady Creek watershed.

In order to determine pollutant loads from unimpaired portions of the watershed and to more precisely determine pollutant loadings from the City of Brady urban watersheds the UCRA will develop and apply appropriate computer models: SWAT modeling for the greater watershed and P8-UCM modeling for urban City of Brady. Inputs from existing data collected from aforementioned projects as well as newly acquired water quality data will be used to evaluate environmental issues in the Brady Creek watershed and to address needs for estimating loading reductions. This project will develop and complete the watershed planning process for Brady Creek. The additional monitoring and modeling efforts are necessary to have a greater assurance that the implementation of the WPP will achieve the goal to meet stream standards, along with maintaining/improving water quality in the greater watershed.

Project Narrative

General Project Description (Include Project Location Map)

Watershed planning is an iterative and adaptive process. A successful WPP begins with adequate planning and a clear and consistent message of what is required. Development of this Scope of Work is based on the understanding and interpretation of 1) *the Nonpoint Source Program and Grants Guidelines for States and Territories* promulgated by the United States Environmental Protection Agency (EPA) in 2003 (hereafter referred to as the 2003 Guidelines), and 2) the *Handbook for Developing Watershed Plans to Restore and Protect Our Waters*, finalized by EPA in 2008 (hereafter referred to as the EPA Handbook). The Scope of Work structure is designed to ensure the project is consistent with and satisfies the EPA's nine elements fundamental to a successful watershed-based plan.

The UCRA will work with the TCEQ during the development of the WPP. The TCEQ will provide direction and oversight to the UCRA during development of the WPP, particularly by way of review and approval of objective deliverables. Collectively, the objectives and their respective deliverables will address EPA's nine elements of a successful WPP. As each objective is completed, and each deliverable approved, the UCRA and respective stakeholders will move closer to the completion of a successful plan.

As part of the collaborative process, the UCRA will work with stakeholders and partners to create a vision, goals, and action items that incorporate the environmental, economic, and social values of stakeholders and partners. The UCRA will work with stakeholders and partners to reconcile different values and viewpoints of the various participants in order to arrive at a mutually acceptable WPP.

EPA's nine key elements are as follows, and will direct development of this WPP:

a. Identification of causes of impairment and pollutant sources or groups of similar sources that need to be controlled to achieve needed load reductions, and any other goals identified in the watershed plan. Sources that need to be controlled should be identified at the significant subcategory level along with estimates of the extent to which they are present in the watershed (e.g., X number of dairy cattle feedlots needing upgrading, including a rough estimate of the number of cattle per facility; Y acres of row crops needing improved nutrient management or sediment control; or Z linear miles of eroded stream bank needing remediation).

b. An estimate of the load reductions expected for the management measures described under paragraph (c) below (recognizing the natural variability and the difficulty in precisely predicting the performance of management measures over time). Estimates should be provided at the same level as in item (a) above (e.g., the total load reduction expected for dairy cattle feedlots; row crops; or eroded stream banks).

c. A description of the NPS management measures that will need to be implemented to achieve the load reductions estimated under paragraph (b) above (as well as to achieve other watershed goals identified in this watershed-based plan), and an identification (using a map or a description) of the critical areas in which those measures will be needed to implement this plan.

d. An estimate of the amounts of technical and financial assistance needed, associated costs, and/or the sources and authorities that will be relied upon, to implement this plan. As sources of funding, States should consider the use of their Section 319 programs, State Revolving Funds, USDA's Environmental Quality Incentives Program and Conservation Reserve Program, and other relevant Federal, State, local and private funds that may be available to assist in implementing this plan.

e. An information/education component that will be used to enhance public understanding of the project and encourage their early and continued participation in selecting, designing, and implementing the NPS management measures that will be implemented.

f. A schedule for implementing the NPS management measures identified in this plan that is reasonably expeditious.

g. A description of interim, measurable milestones for determining whether NPS management measures or other control actions are being implemented.

h. A set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made towards attaining water quality standards and, if not, the criteria for determining whether this watershed-based plan needs to be revised or, if a NPS TMDL has been established, whether the NPS TMDL needs to be revised.

i. A monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria *established under item (h) immediately above.*

To establish a good foundation for the development of EPA's nine elements for development of a WPP, steps 1 through 3 in the Watershed Planning and Implementation Process, as outlined in Chapter 2 of the EPA Handbook will continue to be followed. Steps 4 through 6 will be captured within development of EPA's nine elements. Steps 1 through 3 of the Watershed Planning and Implementation Process are as follows:

- Build Partnerships
  - Identify key stakeholders
  - Identify issues of concern
  - Set preliminary goals
  - Develop indicators
  - Conduct public outreach
- Characterize the watershed to identify problems (These objectives will be expanded to include additional monitoring and modeling under this project.)
  - Gather existing data and create a watershed inventory
  - Identify data gaps and collect additional data if needed
  - Analyze data
  - Identify causes and sources of pollution that need to be controlled
  - Estimate pollutant loads
- Set goals and identify solutions
  - Set overall goals and management objectives
  - Develop indicators/targets
  - Determine load reductions needed
  - Identify critical areas
  - Develop management measures to achieve goals

The UCRA will complete a WPP for Brady Creek (Segments 1416A, B and C). The primary goal of the WPP is to restore water quality to meet stream standards.

The WPP will meet the nine required elements established by the EPA. Under this project, the UCRA will:

- Refine the Brady Creek Watershed Characterization by
  - Conducting additional water quality monitoring and modeling
  - Further identifying and quantifying pollutant loading sources
- Utilize the Brady Creek Master Plan by
  - Prioritizing BMPs identified in the Master Plan for the City of Brady
- Identify additional BMPs for the greater watershed
- Estimate costs and load reductions to be achieved through BMP implementation
- Create a schedule for implementation with measurable milestones and methods of determining whether milestones have been met.
- Involve stakeholders throughout the process.

The goal of the completed Brady Creek WPP, a plan for the entire Brady Creek watershed, is to give Basin Stakeholders a strategy that will result in the maintenance and restoration of water quality conditions consistent with the State of Texas Surface Water Quality Standards for the designated uses of the stream or water body. Basin wide water quality goals include the maintenance of appropriate levels of dissolved oxygen, prevention of eutrophic conditions due to elevated nutrient loads, prevention of erosion and sediment deposition within the stream and, where possible, maximize stream base flows to restore or enhance aquatic utilization.

The scope of this project has been defined with the consideration of the following factors:

- Geographic area
- Number of water quality issues to be addressed
- Type and breadth of potential goals to be attained

- Time required for plan implementation

All reports and public documents produced as deliverables for this project will provide relevant information and data clearly and sufficiently explained in lay terminology. Additional documents may be produced by the UCRA or subcontractors that present and/or reference technical information explaining specifics of monitoring results, modeling exercises, proposed best management practices, or other information. Such documents may be produced using technical terminology, with a nontechnical summary to be made available to stakeholders via the project website.

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 1:	Project Administration					
Costs:	Federal:	12,017.00	Non-Federal:	8,011.00	Total:	20,028.00
Objective:	To effectively administer, coordinate and monitor all work performed under this project including technical and financial supervision and preparation of status reports.					
Subtask 1.1:	The UCRA will provide technical and fiscal oversight of project staff and/or sub grantee(s)/ subcontractor(s) to ensure Tasks and Deliverables are acceptable, and are completed as scheduled and within budget. With the TCEQ Project Manager's authorization, the UCRA may secure the services of sub grantee(s)/ subcontractor(s) as necessary for technical support, repairs, and training. Project oversight status will be provided to the TCEQ via Quarterly Progress Reports (QPRs).					
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012		
Subtask 1.2:	The UCRA will submit QPRs to the TCEQ by the 15th of the month following each state fiscal quarter for incorporation into the Grant Reporting and Tracking System (GRTS). Progress reports will contain a level of detail sufficient to document the activities that occurred under each task during the quarter, and will contain a comprehensive tracking of deliverable status under each task. Progress reports will be distributed to all project partners.					
	Start Date:	March 15, 2010	Completion Date:	August 31, 2012		
Subtask 1.3:	UCRA will submit Reimbursement Forms to the TCEQ by the last day of the month following each state fiscal quarter. For the last reporting period of the project, Reimbursement Forms are required on a monthly basis, specifically for the months of June, July, and August.					
	Start Date:	March 31, 2010	Completion Date:	August 31, 2012		
Subtask 1.4:	The UCRA will participate in a post-award orientation meeting with TCEQ within 60 days of contract execution. The UCRA will maintain regular telephone and/or email communication with the TCEQ Project Manager regarding the status and progress of the project in regard to any matters that require attention between QPRs. This will include a call or meeting each January, April, July, and October. Minutes recording the important items discussed and decisions made during each call will be attached to each QPR. Matters that must be communicated to the TCEQ Project Manager in the interim between QPRs may include the following: • Requests for prior approval of activities or expenditures for which the contract requires advance approval or that are not specifically included in the scope of work • Notification in advance when UCRA has scheduled public meetings or events, initiation of construction, or other major task activities under this contract • Information regarding events or circumstances that may require changes to the budget, scope of work, or schedule of deliverables. Such information must be reported within 48 hours of discovering these events or circumstances					
	Start Date:	January 1, 2010	Completion Date:	March 1, 2010		
Subtask 1.5:	The UCRA will participate in an annual Contractor Evaluation.					
	Start Date:	August 15, 2010	Completion Date:	August 31, 2012		

Subtask 1.6:	The UCRA will develop a one-page fact sheet of the project using the TCEQ NPS Projects Template. The fact sheet will briefly describe what the project is going to accomplish, and will provide background information on why the project is being conducted, the current status of the project, and who is involved in the project. The project fact sheet will be submitted to the TCEQ within 60 days after contract initiation. The fact sheet will be updated annually, and submitted with the fourth QPR. The fact sheet will be updated more often, as the project status changes. The fact sheet will be published on the UCRA website after approval from the TCEQ Project Manager.			
	Start Date:	March 1, 2010	Completion Date:	August 31, 2012
Subtask 1.7:	The UCRA will provide an article for the Nonpoint Source Annual Report upon request by the TCEQ. This report is produced annually in accordance with Section 319(h) of the Clean Water Act (CWA), and is used to report Texas' progress toward meeting the CWA § 319 goals and objectives, and toward implementing it's strategies as defined in the Texas Nonpoint Source Management Program. The article will include a brief summary of the. project and describe the activities of the past fiscal year.			
	Start Date:	July 1, 2010	Completion Date:	August 31, 2012
Deliverables	• Minutes of Post-Award Orientation Meeting • QPRs • Reimbursement Forms • Minutes of Quarterly Contract Conference Calls • Contractor Evaluation • Project Fact Sheet • Annual Report Article			

*If project includes an environmental data collection component use Task 2 text, if not delete Task 2 text.

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 2:	Build Partnerships					
Costs:	Federal:	3,815.00	Non-Federal:	2,544.00	Total:	6,359.00
Objective:	This Objective is the first step in watershed planning and meets a portion of Element E of the 2003 Guidelines. Guidance for developing this objective can be found in the EPA Handbook, Chapters 3, 4 and 12. To lead the community-based component of the WPP and project by the development of a balanced and diversified Stakeholder Group, enhance public understanding of the project and encourage early and continued public participation in selecting, designing, and implementing appropriate NPS management measures.					
Subtask 2.1:	The UCRA will develop a draft public participation plan (PPP) for the current Stakeholder Group. The PPP will establish the proposed determination of Stakeholder Group membership and the ground rules for its meetings and activities as well as for public participation in the project beyond the Stakeholder Group. The draft PPP must be approved by the TCEQ Project Manager. The final PPP must be approved by the WPP Stakeholder Group and TCEQ Project Manager.					
	Start Date:	January 1, 2010	Completion Date:	May 31, 2010		
Subtask 2.2:	The UCRA will continue to engage the Stakeholder Group, which includes representatives of local, state and federal government; landowners and facility operators in all major land use categories present in the watershed; environmental groups, developers and other special interest groups active in the watershed; and other local residents.					
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012		

Subtask 2.3:	The UCRA will facilitate the Stakeholder Group's work to: • Establish how meetings will be conducted and their frequency • Identify issues of concern and develop WPP goals and objectives • Determine guidelines for stakeholder involvement, roles, and responsibilities • Gain community acceptance of the project • Identify a lead organization to manage the WPP at the end of the project			
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012
Subtask 2.4:	The UCRA will facilitate the Stakeholder Group's work to set goals that will include (at a minimum) meeting the appropriate water quality standards for pollutants that threaten or impair the physical, chemical, or biological integrity and the designated uses of the watershed covered in the plan. If a Total Maximum Daily Load (TMDL) has been developed in the watershed, the WPP goals must include achieving waste load and load allocations identified in the TMDL. If a Texas Pollutant Discharge Elimination System (TPDES) permit has been issued or is anticipated, the WPP goals must include achieving the requirements of the permit.			
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012
Subtask 2.5:	The UCRA will facilitate Stakeholder Group meetings to establish priorities and focus work efforts. Meetings will be held on a regular basis to provide status of work progress to the group and obtain input on subsequent steps. Stakeholders will review and approve the plan prior to finalization.			
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012
Subtask 2.6:	The UCRA will use Stakeholder Group meetings and the project webpage to disseminate project information in accordance with the PPP. Activities will include the following: • Presentation of all deliverable reports for Objectives 2 through 15 to stakeholders: o Solicit input from stakeholders upon initiation of Objective activities o Present draft reports to stakeholders o Solicit input/comments from stakeholders regarding each draft report o Track input/comments provided by stakeholders and the responses by the UCRA to comments. o Present final reports to stakeholders • Additional activities may include: o Texas Watershed Steward trainings o Texas Stream Team education events and trainings o Community partnerships to develop a group name and logo			
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012
Subtask 2.7:	Biannual updates and a final document will be submitted documenting the status of the following: • The completion of objectives and tasks of the PPP • The strategy for achieving the remaining objectives and goals of the PPP through the completion of the project • Outreach and education activities • Activities of, and input provided by, the Stakeholder Group			
	Start Date:	September 30, 2010	Completion Date:	August 31, 2012
Deliverables	• Draft and Final PPP • Project webpage and updates • Stakeholder Group and Public meeting agendas, minutes, sign in sheets and other available documentation • PPP Progress Reports			

Tasks, Objectives and Schedules (Replicate or modify table as needed)	
Task 3:	Element A: Watershed Characterization – Phase 2: Data Collection and Analysis

Costs:	Federal:	90,950.00	Non-Federal:	60,633.00	Total:	151,853.00
Objective:	This Objective meets a portion of Element A of the 2003 Guidelines. Guidance for developing this objective can be found in Chapters 6 and 7 of the EPA Handbook. To provide the baseline information for determination of amounts of existing non-point sources of pollution and existing point sources of pollution; to provide additional data for incorporation into a model, which will serve to determine the pollutant assimilative capacity of the water body, and to determine pollutant load reductions needed to achieve the goals of the WPP. UCRA will develop a SWAT model for the greater watershed and will apply the P8-UCM to estimate storm loadings from the urban areas of the City of Brady. The information collected will also form the baseline for future monitoring to determine if the pollutant load reduction goals are being met.					
Subtask 3.1:	Project objectives include the improvement in water quality of Brady Creek through the project area. The objective of project evaluation is the collection and utilization of water quality data and other hydrologic information pursuant to measurement of the effectiveness of constructed BMPs, water quality improvements in Brady Creek and preparation of the watershed characterization portion of a WPP. Quantitative and qualitative information regarding measurement data needed to measure BMP efficiency and instream water quality. The data collected for both objectives will be considered representative of the target population or phenomenon to be studied. The representativeness of the data is dependent on; 1) the sampling locations; 2) the flow regime during sample collection; 3) the number of years sampling is performed, and; 4) the sampling procedures. Site selection and sampling of pertinent media (i.e. water) and use of only approved analytical methods will assure that the measurement data represents the population being studied at the site. After the Quality Assurance Project Plan (QAPP) is approved, sampling events will be initiated. Plans are to monitor a minimum of 5 sites every other month for routine water chemistry to include flow, field, conventional parameters, and bacteria. In addition, 3 storm water runoff events will be monitored at the aforementioned sites. UCRA will also conduct 3 storm water monitoring events within the urbanized city of Brady. Areas targeted will be subwatersheds that either 1) have not been sampled in previous projects and 2) subwatersheds that are believed to contribute the highest loadings to Brady Creek.					
	Start Date:	January 1, 2010	Completion Date:	May 1, 2010		
Subtask 3.2:	The UCRA will conduct a data review to identify data gaps, and to determine the types of data needed to identify causes and sources of pollution. The acceptability of existing data will be reviewed by UCRA.					
	Start Date:	January 1, 2010	Completion Date:	June 1, 2012		
Subtask 3.3:	The UCRA will schedule Quality Assurance Project Plan (QAPP) planning meetings with the TCEQ Project Manager, Quality Assurance staff, technical staff, management, and contractors, to implement a systematic planning process, based on the elements of the TCEQ NPS QAPP Shell. The information developed during the planning meetings will be incorporated into a QAPP. A planning meeting may also be conducted to determine if any changes need to be made to an existing QAPP.					
	Start Date:	January 1, 2010	Completion Date:	May 1, 2010		
Subtask 3.4:	The UCRA will develop a QAPP for monitoring. The UCRA will schedule QAPP planning meetings with the TCEQ Project Manager, Quality Assurance staff, technical staff, management, and contractors to implement a systematic planning process based on the elements of the TCEQ NPS QAPP Shell. The information developed during the planning meetings will be incorporated into a QAPP. A planning meeting may also be conducted to determine if any changes need to be made to an existing QAPP.					
	Start Date:	January 1, 2010	Completion Date:	May 1, 2010		

Subtask 3.5:	The UCRA will develop a QAPP for modeling. The UCRA will develop and submit to the TCEQ a QAPP with project specific quality objectives and criteria for model inputs/outputs consistent with the *EPA Guidance for Quality Assurance Project Plans for modeling(EPA QA/G-5M)* format and the TCEQ TMDL QAPP Modeling Shell 120 days prior to the initiation of any modeling. The QAPP will be developed by the UCRA with review provided by the TCEQ Project Manager, Quality Assurance staff, technical staff, management, and contractors. The QAPP will be approved by the TCEQ.			
	Start Date:	January 1, 2010	Completion Date:	May 1, 2010
Subtask 3.6:	The UCRA will provide input annually throughout the project period to TCEQ 60 days prior to the end of the effective period of the QAPP, and will develop annual QAPP revisions 30 days prior to the end of the effective period of the QAPP.			
	Start Date:	January 1, 2010	Completion Date:	December 31, 2011
Subtask 3.7:	The UCRA will develop a monitoring program and conduct monitoring, as outlined in the QAPP, to achieve data quality objectives.			
	Start Date:	May 1, 2010	Completion Date:	February 29, 2012
Subtask 3.8:	The UCRA will incorporate relevant data into a model(s) selected by the UCRA with the approval of the TCEQ Project Manager and the Stakeholder Group, as outlined in the modeling QAPP, to achieve data quality objectives. Data sources used in the model, including literature values and other assumptions will be presented to the Stakeholder Group and feedback will be solicited by the UCRA. The model(s) will be, a) calibrated using available water quality data, b) utilized to assist in the determination of causes and sources of pollution and pollutant loadings, and c) applied to determine load reductions from various agricultural conservation practices and urban best management practices.			
	Start Date:	May 1, 2010	Completion Date:	February 29, 2012
Subtask 3.9:	The UCRA will review, verify, and validate water quality monitoring and modeling data before it is submitted to the TCEQ. Data will be submitted to TCEQ twice annually and at least 1 month prior to use, or prior to presenting to stakeholders.			
	Start Date:	August 1, 2010	Completion Date:	May 1, 2012
Subtask 3.10:	The UCRA will provide to the TCEQ and stakeholders a report that describes the results of sampling and modeling activities, and recommendations for future monitoring efforts.			
	Start Date:	August 15, 2010	Completion Date:	May 1, 2012
Deliverables	• Draft and Final Sampling Plan • Draft and Final QAPP • Draft and Final QAPP Annual Updates • Data Submittals • Draft and Final Watershed Characterization – Phase 2: Data Collection and Analysis Report			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 4:	Element A: Watershed Characterization – Phase 3: Identification of Causes and Sources of Pollution and Estimation of Pollutant Loads					
Costs:	Federal:	7,658.00	Non-Federal:	5,105.00	Total:	12,763.00
Objective:	This Objective completes Element A of the 2003 Guidelines. Guidance for developing this objective can be found in Chapters 5, 6, 7, and 8 of the EPA Handbook. Identification of the causes and sources, or groups of similar sources, that will need to be controlled to achieve the load reductions estimated in this watershed-based plan (and to achieve any other watershed goals identified in the watershed-based plan), as discussed in item (a) of the 2003 Guidelines.					

Subtask 4.1:	The UCRA will further define watershed goals and refine numeric water quality targets for the pollutants or sources identified in Objective 5. The watershed goals and targets will be used to guide the identification and selection of management practices in Objective 6.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2012

Subtask 4.2:	The UCRA will analyze data to identify the causes and sources of water quality problems in the watershed. The analysis will:
	• Identify pollutant sources and causes of impairments or water quality concerns, including the following:
	  o Point sources
	  o NPSs
	  o Stakeholders' concerns and observations
	  o Effects on water quality and overall watershed functions
	• Compare available monitoring data to water quality standards, and to the current 303(d) list and 305(b) assessments.
	
	An evaluation will be done of the relative magnitude of sources, the location of sources, and the timing of source loading:
	• Major sources of pollution will be identified at a significant subcategory and subwatershed level
	• Minor sources of pollution may be identified by a general characterization
	
	The methods for analysis may include mapping, modeling, monitoring, field assessments, and stakeholder surveys.			

	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Subtask 4.3:	The UCRA will estimate pollutant loads for water quality parameters that: • Do not meet standards • Are identified as a concern in the Texas Water Quality Inventory 305(b) Report • May prohibit the water body from meeting designated uses In addition, pollutant loads may be also be estimated for water quality parameters identified by stakeholders as a concern. Pollutant loads will be calculated based on the relative magnitude of sources, the location of sources, and the timing of source loading. The loading analysis will be used in subsequent Objectives of this project to plan restoration and/or protection strategies, target load reduction efforts, and project future loads under new conditions.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Subtask 4.4:	The UCRA will provide maps of the watershed and subwatersheds that identify the major causes and sources of the water quality problems.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Subtask 4.5	UCRA will develop a report using data developed in this phase to identify causes and sources of pollution that need to be controlled. Pollutant load data and associated maps developed under this Objective will be included in the report. The document will also identify additional gaps in data, and methods to deal with these gaps will be recommended.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Deliverables	• Watershed maps that identify the causes and sources of water quality problems • Draft and Final Watershed Characterization - Phase 3: Identification of Causes and Sources of Pollution and Estimation of Pollutant Loads Report			

Tasks, Objectives and Schedules (Replicate or modify table as needed)	
Task 5:	Element B: Estimate of Pollutant Load Reductions Expected from Management Measures

Costs:	Federal:	2,344.00	Non-Federal:	1,562.00	Total:	3,906.00
Objective:	This Objective meets Element B of the 2003 Guidelines. Guidance for developing this objective can be found in Chapters 8 and 9 of the EPA Handbook. To provide an estimate of the load reductions expected for the management measures described under Objective. Estimates should be provided at the same level as in Element A					
Subtask 5.1:	The UCRA will determine the load reductions that are needed to meet the watershed goals and water quality standards. Load reduction estimates will be calculated at key locations in the watershed in order to depict the major problem areas and sources, and to support efficient and targeted management. The load reductions should be calculated at the same spatial scale and level of detail as the causes and sources and pollutant loads identified in Objective 4. The load reductions identified should be sufficient to ensure that water quality standards and designated uses are met. If a Total Maximum Daily Load (TMDL) has been developed in this watershed, the WPP must be designed to achieve the waste load and load allocations identified in the TMDL. If TPDES permits have been issued or are anticipated, the WPP load reductions must achieve in the requirements of the permits.					
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010		
Subtask 5.2:	The UCRA will provide a report describing the watershed goals, targets, and the necessary load reductions that are needed to meet the watershed goals.					
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010		
Deliverables	• Draft and Final Element B: Estimate of Pollutant Load Reductions Expected from Management Measures Report					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 6:	Element C: Description of Management Measures					
Costs:	Federal:	5,858.00	Non-Federal:	3,905.00	Total:	9,763.00
Objective:	This Objective meets Element C of the 2003 Guidelines. Guidance for developing this objective can be found in Chapters 10 and 11 of the EPA Handbook. Identify and describe the NPS management measures that will need to be implemented to achieve load reductions identified in Element B, and describe the critical areas where those measures will be needed to implement this plan. In addition, management measures may be identified to achieve other goals of the WPP.					
Subtask 6.1:	The UCRA will develop management objectives targeted at specific pollutants or sources to achieve the goals of the WPP. Management objectives will be determined with the input and approval of the Stakeholder Group.					
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010		
Subtask 6.2:	The UCRA will identify the programs, management strategies, and ordinances already being implemented in the watershed and determine the effectiveness of the measures in terms of achieving desired load reductions or meeting other management goals and objectives.					
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010		
Subtask 6.3:	The UCRA will select methodolog(ies) and/or model(s) that will be used to identify needed BMPs, to quantify load reductions achieved by each proposed BMP and to prioritize the suite of potential BMPs. Methods and/or models will be determined with the input and approval of the Stakeholder Group.					
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010		
Subtask 6.4:	Using the locations of pollutant sources identified in Element B, the UCRA will identify management practices that can be used to achieve the additional load reductions required. The critical areas and needed management measures will be determined with the input and approval of the Stakeholder Group.					
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010		

Subtask 6.5:	The UCRA will provide estimated pollutant load reductions expected for each management measure proposed. This will be accomplished by using published literature values and other available data, with the recognition of the natural variability of site specific BMPs and the difficulty in precisely predicting the performance of management measures over time. A report detailing this information will be provided to the Stakeholder Group and the TCEQ Project Manager.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Subtask 6.6	The UCRA will prioritize potential BMPs, with consideration of water quality benefits, costs, stakeholder support and other factors identified. This Task is related to and is dependent upon Objective 5. The prioritization of management measures will be conducted with the input and approval of the Stakeholder Group.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Subtask 6.7	The UCRA will develop Management Strategies and associated estimates of the total potential pollutant removal. Identify which combinations of management practices can meet the goals for load reductions and cost effectiveness.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Subtask 6.8	The UCRA will prepare a description and summary list of BMPs. Identify the specific need for each BMP and estimate load reductions that each BMP may provide. The suite of BMPs selected should reflect estimated load reductions needed to achieve water quality standards for the designated uses of the water body, and to achieve other goals of the WPP.			
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010
Deliverables	• Draft and Final Element C: Management Measures Report			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 7:	Element D: Estimate of Technical and Financial Assistance Needed					
Costs:	**Federal:**	5,858.00	**Non-Federal:**	3,906.00	**Total:**	9,764.00
Objective:	This Objective meets Element D of the 2003 Guidelines. Guidance for developing this objective can be found in Chapter 12 the EPA Handbook. Estimate the amount of technical and financial assistance needed, and/or the sources and authorities that will be relied upon to implement the plan.					
Subtask 7.1:	The UCRA will estimate the costs of implementing BMPs based on the type of management practice/restoration activity, installations, operation and maintenance, and method of cost calculation. Add the costs estimated to the Element C: Description of Management Measures Report.					
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010		
Subtask 7.2:	The UCRA will identify financial and technical assistance needed for different stages of implementing the WPP, including the following: • Continuation of watershed coordination and associated administrative costs • Implementation, operation, and maintenance of structural and educational BMPs • Measuring the effectiveness of implementation measures through monitoring modeling, data analysis, and data management • Updating the WPP In addition, identify any relevant authority or legislation that specifically allows, prohibits, or requires action. Shortfalls between needs and available resources should be identified and addressed in the WPP.					
	Start Date:	December 31, 2011	**Completion Date:**	June 1, 2010		

Subtask 7.3:	The UCRA will identify opportunities to help fund each BMP listed in the WPP plan, including leveraging existing efforts and seeking in-kind services by using existing data sources, studies, partnerships, and other contributions. Identify federal, state, local, and private funds or resources that are available to assist in implementing the plan.			
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010
Subtask 7.4:	The UCRA will communicate with potential sources of technical and financial assistance to inform these entities/individuals about the WPP and the type and level of assistance desired. The UCRA will request letters of support for the development and implementation of the WPP.			
	Start Date:	December 31, 2011	Completion Date:	June 1, 2010
Deliverables	• Draft and Final Element D: Financial and Technical Assistance Report			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 8:	Element E: Information and Education Component					
Costs:	Federal:	6,158.00	Non-Federal:	4,105.00	Total:	10,263.00
Objective:	This Objective meets a portion of Element E of the 2003 Guidelines. Guidance for developing this objective can be found in Chapter 12 of the EPA Handbook. Develop an information and education component used to enhance public understanding of the project and encourage the continued participation in implementation of the WPP.					
Subtask 8.1:	The UCRA will identify education and outreach goals for WPP implementation. The outreach goals will be specific, measurable, action-oriented, and time-focused.					
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012		
Subtask 8.2:	The UCRA will identify the audience which needs to be reached in order to meet the goals and objectives identified in Task 8.1.					
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012		
Subtask 8.3:	The UCRA will create an effective plan to reach the target audiences with specific information and social marketing solutions to inform the public, garner support and change behaviors. Activities may include: • Partnerships with schools to conduct outreach water quality education • Campaigns to distribute water protection brochures and market the outreach plan • Urban growth workshops • Septic system workshops • Campaigns regarding illegal dumping and litter • Agricultural waste collection days					
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012		
Subtask 8.4:	The UCRA will develop an evaluation component into the plan that measures success qualitatively and quantitatively to ensure the needed impact is generated through the education and outreach program and that the education and outreach goals of the WPP are met.					
	Start Date:	January 1, 2010	Completion Date:	August 31, 2012		
Deliverables	• Draft and Final Element E: Information & Education Plan Report					

Tasks, Objectives and Schedules (Replicate or modify table as needed)	
Task 9	Element F: Schedule for Implementation of Management Measures

Costs:	Federal:	5,858.00	Non-Federal:	3,906.00	Total:	9,764.00
Objective:	This Objective meets Element F of the 2003 Guidelines. Guidance for developing this objective can be found in Chapter 12 of the EPA Handbook. Create a schedule for implementing the management measures identified in this plan that is reasonably expeditious.					
Subtask 9.1:	The UCRA will develop a plan that will include a schedule of activities with dates for assessing progress in accomplishing the activities. The schedule should reflect the milestones developed in Element G. The schedule will be summarized in a table format and presented as a report.					
	Start Date:	May 1, 2012		Completion Date:	August 31, 2012	
Deliverables	• Draft and Final Element F: Schedule for Implementation of Management Measures Report					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 10:	Element G: Description of Interim, Measureable Milestones					
Costs:	Federal:	5,858.00	Non-Federal:	3,904.00	Total:	9,764.00
Objective:	This Objective meets Element G of the 2003 Guidelines. Guidance for developing this objective can be found in Chapter 12 of the EPA Handbook. Develop descriptions of interim measurable milestones for determining whether NPS management measures or other control actions are being implemented.					
Subtask 10.1:	The UCRA will develop a plan that will include measurable milestones to measure progress in implementing the management measures, and to determine whether they are being implemented on schedule. The milestones should reflect the schedule for implementing the WPP developed in Element F and the criteria for determining effectiveness of implementation measures developed in Element H. The milestones will be summarized in a table format and presented as a report.					
	Start Date:	May 1, 2012		Completion Date:	August 31, 2012	
Deliverables	• Draft and Final Element G: Description of Interim, Measurable Milestones Report					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 11:	This Objective meets Element H of the 2003 Guidelines. Guidance for developing this objective can be found in Chapter 12 of the EPA Handbook. Goals: Establish a set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards. In addition, a set of criteria will be established to determine if the other milestone measures and goals of the WPP are being achieved.					
Costs:	Federal:	5,858.00	Non-Federal:	3,904.00	Total:	9,764.00
Objective:	This Objective meets Element H of the 2003 Guidelines. Guidance for developing this objective can be found in Chapter 12 of the EPA Handbook. Establish a set of criteria that can be used to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards. In addition, a set of criteria will be established to determine if the other milestone measures and goals of the WPP are being achieved.					

Subtask 11.1:	The UCRA will develop a plan that will measure the effectiveness of the management measures in regard to accomplishments in loading reductions and advances toward attaining water quality standards and other goals of the WPP. The plan will establish assessment criteria for water quality and outreach efforts and will consider other means to quantify the success of BMPs.			
	Start Date:	May 1, 2012	Completion Date:	August 31, 2012
Subtask 11.2:	The UCRA will develop a plan for adaptive management that will provide the basis for determining whether the WPP needs to be revised if interim targets are not met. Possible revisions could include changing management practices, updating the loading analyses, and reassessing the time it takes for pollution concentrations to respond to treatment.			
	Start Date:	May 1, 2012	Completion Date:	August 31, 2012
Deliverables	• Draft and Final Element H: Criteria to Determine if Load Reductions are Achieved Report			

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 12:	Element I: Monitoring Component to Evaluate Effectiveness					
Costs:	Federal:	5,860.00	Non-Federal:	3,906.00	Total:	9,766.00
Objective:	This Objective meets Element I of the 2003 Guidelines. Guidance for developing this objective can be found in Chapter 12 of the EPA Handbook. Develop a monitoring component to evaluate the effectiveness of the implementation efforts over time, measured against the criteria established under Element H.					
Subtask 12.1:	The UCRA will develop a monitoring component to evaluate the effectiveness of implementation efforts. The monitoring component will determine whether progress is being made toward attaining or maintaining the applicable water quality standards and other goals of the WPP. The monitoring program should be fully integrated with the established schedule and with the interim milestone criteria identified. The monitoring component should be designed to determine whether loading reductions are being achieved over time and if substantial progress in meeting water quality standards is being made. Watershed-scale monitoring can be used to measure the effects of multiple programs, projects, and trends over time. In stream monitoring does not have to be conducted for individual BMPs.					
	Start Date:	May 1, 2012	Completion Date:	August 31, 2012		
Deliverables	• Draft and Final Element I: Monitoring Component to Evaluate Effectiveness Report					

Tasks, Objectives and Schedules (Replicate or modify table as needed)						
Task 13:	Completion of the Watershed Protection Plan					
Costs:	Federal:	17,875.00	Non-Federal:	11,917.00	Total:	29,792.00
Objective:	Guidance for developing this objective can be found in Chapter 12 of the EPA Handbook. Compile the WPP and receive approval from the Stakeholder Group.					

<table>
<tr><td rowspan="2">Subtask 13.1:</td><td colspan="4">The UCRA will compile the approved sections of the WPP. The WPP will include the following information:
• Title
• Table of Contents
• Executive Summary (see Task 14.2)
• Acknowledgement of the Stakeholder Group and other contributors to the WPP Project
• Introduction
• Problem Definition
• Designated Uses and Water Quality Standards
• Description of Watershed
• Compilation of the reports produced under Objectives 2 through 13 of this project.
• Results and Observations
• List of references of data used
• Appendices of important documents or information needed for explanation and implementation of the WPP</td></tr>
<tr><td>Start Date:</td><td>May 1, 2012</td><td>Completion Date:</td><td>August 31, 2012</td></tr>
<tr><td rowspan="2">Subtask 13.2:</td><td colspan="4">The UCRA will develop a plan that will include in the Executive Summary Section of the WPP, a summary of EPA's nine elements of watershed plans, how the WPP achieves these elements, and in which sections of the WPP these elements are addressed.</td></tr>
<tr><td>Start Date:</td><td>May 1, 2012</td><td>Completion Date:</td><td>August 31, 2012</td></tr>
<tr><td rowspan="2">Subtask 13.3:</td><td colspan="4">The UCRA will submit the Draft WPP to the TCEQ NPS Program for review, and will respond to comments provided by the TCEQ.</td></tr>
<tr><td>Start Date:</td><td>May 1, 2012</td><td>Completion Date:</td><td>August 31, 2012</td></tr>
<tr><td rowspan="2">Subtask 13.4:</td><td colspan="4">The UCRA will present the Draft WPP to the Stakeholder Group for review and approval. The UCRA will respond to comments provided by the Stakeholder Group.</td></tr>
<tr><td>Start Date:</td><td>May 1, 2012</td><td>Completion Date:</td><td>August 31, 2012</td></tr>
<tr><td rowspan="2">Subtask 13.5:</td><td colspan="4">The UCRA will present the Final WPP to local officials and programs which provide potential sources of funding for education and support.</td></tr>
<tr><td>Start Date:</td><td>May 1, 2012</td><td>Completion Date:</td><td>August 31, 2012</td></tr>
<tr><td rowspan="2">Subtask 13.5:</td><td colspan="4">The UCRA will present the Final WPP to the public for education and support.</td></tr>
<tr><td>Start Date:</td><td>May 1, 2012</td><td>Completion Date:</td><td>August 31, 2012</td></tr>
<tr><td>Deliverables</td><td colspan="4">• Draft and Final WPP</td></tr>
<tr><td colspan="5">Project Goals (Expand from NPS Summary Page)</td></tr>
<tr><td colspan="5">To assess the current water quality conditions and impairments in the Brady Creek watershed thru 1) targeted water quality sampling and analysis to provide a more complete data set of ambient and storm flow water quality information for incorporation into watershed planning models, 2) enhancing the watershed characterization and expanding the GIS land use/land cover (LU/LC) inventory, 3) analyze water quality data using LDCs and spatially explicit SWAT and P8-UCM modeling, 4) ALA monitoring collected by LCRA under the Clean Rivers Program , 5) establish and provide direction for a stakeholder group that will serve as a decision making body in the assessment of the Brady Creek watershed and facilitate the development of a WPP that satisfies EPA's nine key element requirement and will guide any further assessment or planning activities.

The goal of the completed Brady Creek WPP, a plan for the entire Brady Creek watershed, is to give Basin Stakeholders a strategy that will result in the maintenance and restoration of water quality conditions consistent with the State of Texas Surface Water Quality Standards for the designated uses of the stream or water body. Basin wide water quality goals include the maintenance of appropriate levels of dissolved oxygen, prevention of eutrophic conditions due to elevated nutrient loads, prevention of erosion and sediment deposition within the stream and, where possible, maximize stream base flows to restore or enhance aquatic utilization.</td></tr>
</table>

Measures of Success (Expand from NPS Summary Page)
(1) Coordination and engagement of a watershed stakeholder committee; this committee will be continued from the initial watershed characterization phase. It will equally represents all stakeholder groups in the watershed and gives them a platform to dictate future management of their watershed (2) Completed enhanced GIS and LU/LC update of the watershed with potential pollutant sources identified: this information will provide the most up-to-date source of watershed characteristics to be utilized in watershed modeling, load reduction estimates, needed management strategies and WPP development (3) Collection and analysis of quality assured data generated for watershed sampling sites; data will be vital to the correct and more precise assessment of the Brady Creek watershed. (4) Completion of LDC, SWAT and P8-UCM analysis to be used to develop needed pollutant load reductions and aid in identifying key areas in the watershed where management should be focused (5) ALA data acquired through the LCRA Clean Rivers Program and incorporated into the watershed characterization. (6) Completed WPP approved by stakeholders, TCEQ and EPA; the WPP will outline the voluntary management approach desired by Brady Creek watershed landowners and stakeholders that will achieve the WPP goal to meet stream standards based on the outputs of the watershed characterization modeling exercises.

2005 Texas Nonpoint Source Management Program Reference (Expand from NPS Summary Page)

Goals and/or Milestone(s)

Element One – Explicit short- and long-term goals, objectives and strategies that protect surface … water.

LTG Objectives

- 1 – Focus NPS …available resources in watersheds identified as impacted by NPS pollution in the latest state approved *Texas Water Quality Inventory and 303(d) List.*
- 2 – Support the implementation of state, regional and local programs to prevent NPS pollution through assessment… and education.
- 5 – Develop partnerships, relationships… to facilitate collective, cooperative approaches to manage NPS pollution.
- 6 – Increase overall public awareness of NPS issues and prevention activities.
- 7 – Enhance public participation and outreach by providing forums for citizens and industry to contribute their ideas and concerns about the water quality management process.

Short-term Goals

Goal One – Data Collection and Assessment: Coordinate with appropriate federal, state, regional and local entities, private sector groups, and citizen groups and target CWA §319(h) grant funds toward water quality assessment activities in high priority, NPS-impacted watersheds…

- Objective B – Conduct special studies to determine sources of NPS pollution and gain information to target TMDL and BMP implementation activities.
- Objective C – Develop and adopt at the state level, … WPPs for watersheds identified as impacted by NPS pollution on the latest state approved CWA §303(d) List.

Goal Three – Education: Conduct education… activities to help increase awareness of NPS pollution and prevent activities contributing to the degradation of water bodies… by NPS pollution.

- Objective A – Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of NPS education.
- Objective B – Administer programs to educate citizens about water quality and their potential role in causing NPS pollution.
- Objective D – Conduct outreach through CRP, Extension, SWCDs and others to facilitate broader participation and partnerships [that] enable stakeholders and the public to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.

Element Two – Working partnerships and linkages with appropriate state, regional, and local entities, private sector groups and Federal agencies.

Element Four -

Element Five – The state program identifies waters and their watersheds impaired by NPS pollution …and establishes a process to progressively address these identified waters by conducting more detailed watershed assessments…

Milestone A: Employ or develop a local watershed committee to solicit input and encourage the participation of affected stakeholders in the decision-making process.

Milestone B: Complete the assessment of pollutant problems by reviewing existing water quality data, conducting an inventory of point/nonpoint sources, land use data, and all known stressors influencing water quality

Milestone C: Complete water quality monitoring. Analyze data, assess loadings, and determine the origin and distribution of pollutants.

Milestone D: Develop and apply models to determine numerical load allocations…

Milestone E: Develop a detailed action plan (WPP) which establishes overall goals and objectives, load allocation, strategy for load allocation, timetable for implementation, and a list of expected results.

Element One – Explicit short- and long-term goals, objectives and strategies that protect surface … water.

LTG Objectives

- 1 – Focus NPS …available resources in watersheds identified as impacted by NPS pollution in the latest state approved *Texas Water Quality Inventory and 303(d) List.*
- 2 – Support the implementation of state, regional and local programs to prevent NPS pollution through assessment… and education.
- 5 – Develop partnerships, relationships… to facilitate collective, cooperative approaches to manage NPS pollution.
- 6 – Increase overall public awareness of NPS issues and prevention activities.
- 7 – Enhance public participation and outreach by providing forums for citizens and industry to contribute their ideas and concerns about the water quality management process.

Short-term Goals

Goal One – Data Collection and Assessment: Coordinate with appropriate federal, state, regional and local entities, private sector groups, and citizen groups and target CWA §319(h) grant funds toward water quality assessment activities in high priority, NPS-impacted watersheds…

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- Objective C – Develop and adopt at the state level, … WPPs for watersheds identified as impacted by NPS pollution on the latest state approved CWA §303(d) List.

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- Objective A – Enhance existing outreach programs at the state, regional, and local levels to maximize the effectiveness of NPS education.
- Objective B – Administer programs to educate citizens about water quality and their potential role in causing NPS pollution.
- Objective D – Conduct outreach through CRP, Extension, SWCDs and others to facilitate broader participation and partnerships [that] enable stakeholders and the public to participate in decision-making and provide a more complete understanding of water quality issues and how they relate to each citizen.

Appendix C. Data Review Checklist and Summary

NPS DATA REVIEW CHECKLIST AND SUMMARY

A completed checklist must accompany all data sets submitted to the TCEQ by the Contractor.

Data Format and Structure	**Y, N, or N/A**
A. Are there any duplicate *Tag_Ids* in the *Events* file?	________
B. Are all *StationIds* associated with assigned station location numbers?	________
C. Are all dates in the correct format, MM/DD/YYYY?	________
D. Are all times based on the 24 hour clock format, HH:MM?	________
E. Is the *Comment* field filled in where appropriate (e.g. unusual occurrence, sampling problems)?	________
F. Are *Submitting Entity*, *Collecting Entity*, and *Monitoring Type* codes used correctly?	________
G. Do the *Enddates* in the *Results* file match those in the *Events* file for each *Tag_Id*?	________
H. Are all measurements represented by a valid *Parameter code* with the correct units?	________
I.. Are there any duplicate *Parameter codes* for the same *Tag_Id*?	________
J. Are there any invalid symbols in the Greater Than/Less Than (*Gt/lt*) field?	________
K. Are there any tag numbers in the *Result* file that are not in the *Event* file?	________
L. Have verified outliers been identified with a "1" in the *Remark* field?	________

Data Quality Review	
A. Are all the "less-than" values reported at or below the specified reporting limit?	________
B. Have checks on correctness of analysis or data reasonableness performed?	________
e.g.: Is ortho-phosphorus less than total phosphorus?	________
Are dissolved metal concentrations less than or equal to total metals?	________
C. Have at least 10% of the data in the data set been reviewed against the field and laboratory data sheets?	________
D. Are all *Parameter codes* in the data set listed in the QAPP?	________
E. Are all *StationIds* in the data set listed in the QAPP?	________

Documentation Review	
A. Are blank results acceptable as specified in the QAPP?	________
B. Was documentation of any unusual occurrences that may affect water quality included in the *Event* table's *Comments* field?	________
C. Were there any failures in sampling methods and/or deviations from sample design requirements that resulted in unreportable data? If yes, explain on next page.	
D. Were there any failures in field and laboratory measurement systems that were not resolvable and resulted in unreportable data? If yes, explain on next page.	

Describe any data reporting inconsistencies with performance specifications. Explain failures in sampling methods and field and laboratory measurement systems that resulted in data that could not be reported to the TCEQ. (attach another page if necessary):

Date Submitted to TCEQ: ______________________________

TAG Series: ______________________________

Date Range: ______________________________

Data Source: ______________________________

Comments (attach file if necessary): ______________________________

____

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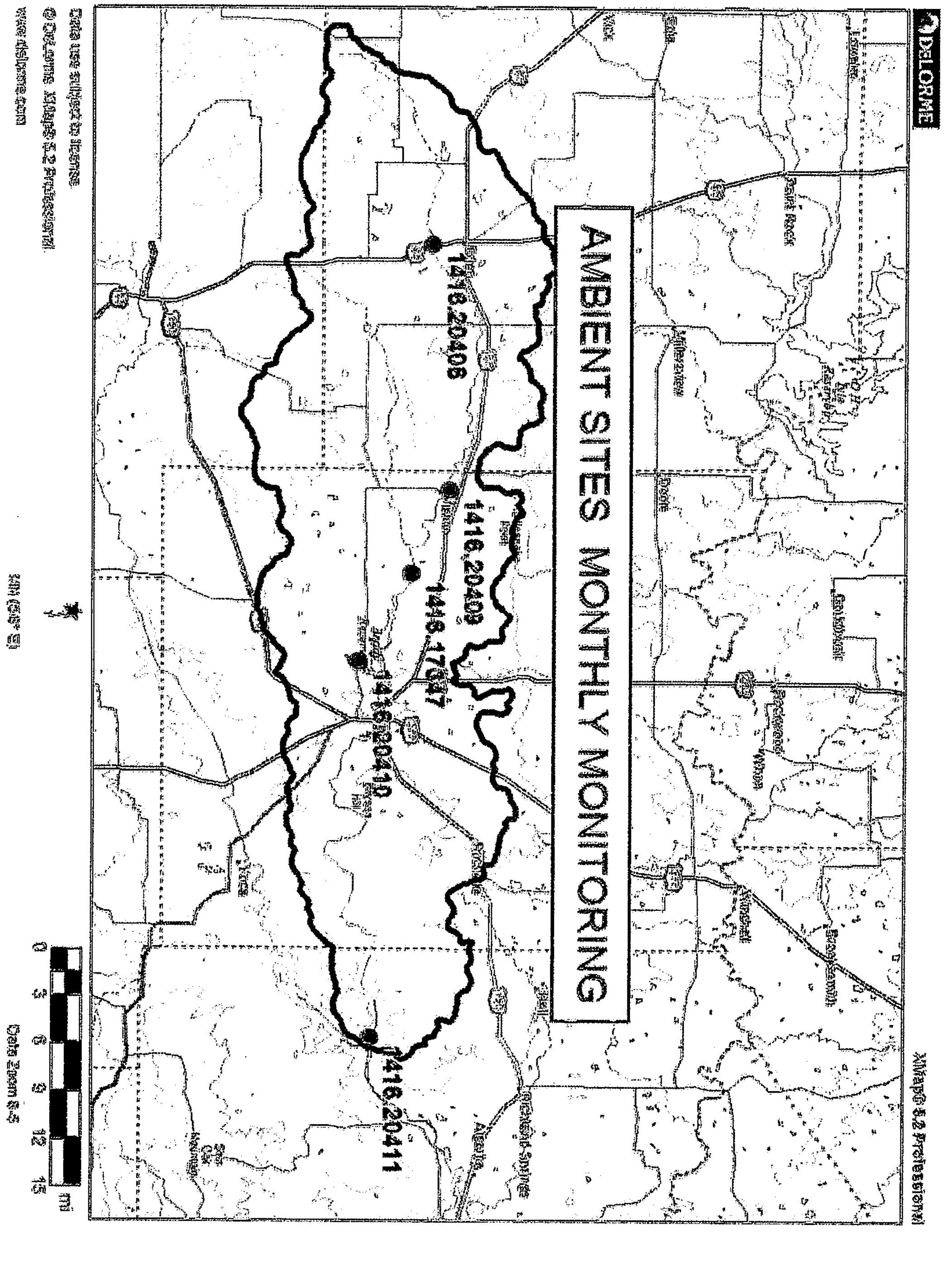
Contractor's Signature: ______________________________

Date: ______________________________

Appendix D. Detailed Site Location Maps



DELORME
AMBIENT SITES MONTHLY MONITORING
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1416.20409
1416.17347
1416.20410
1416.20411
XMap® 5.2 Professional
Data use subject to license
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www.delorme.com
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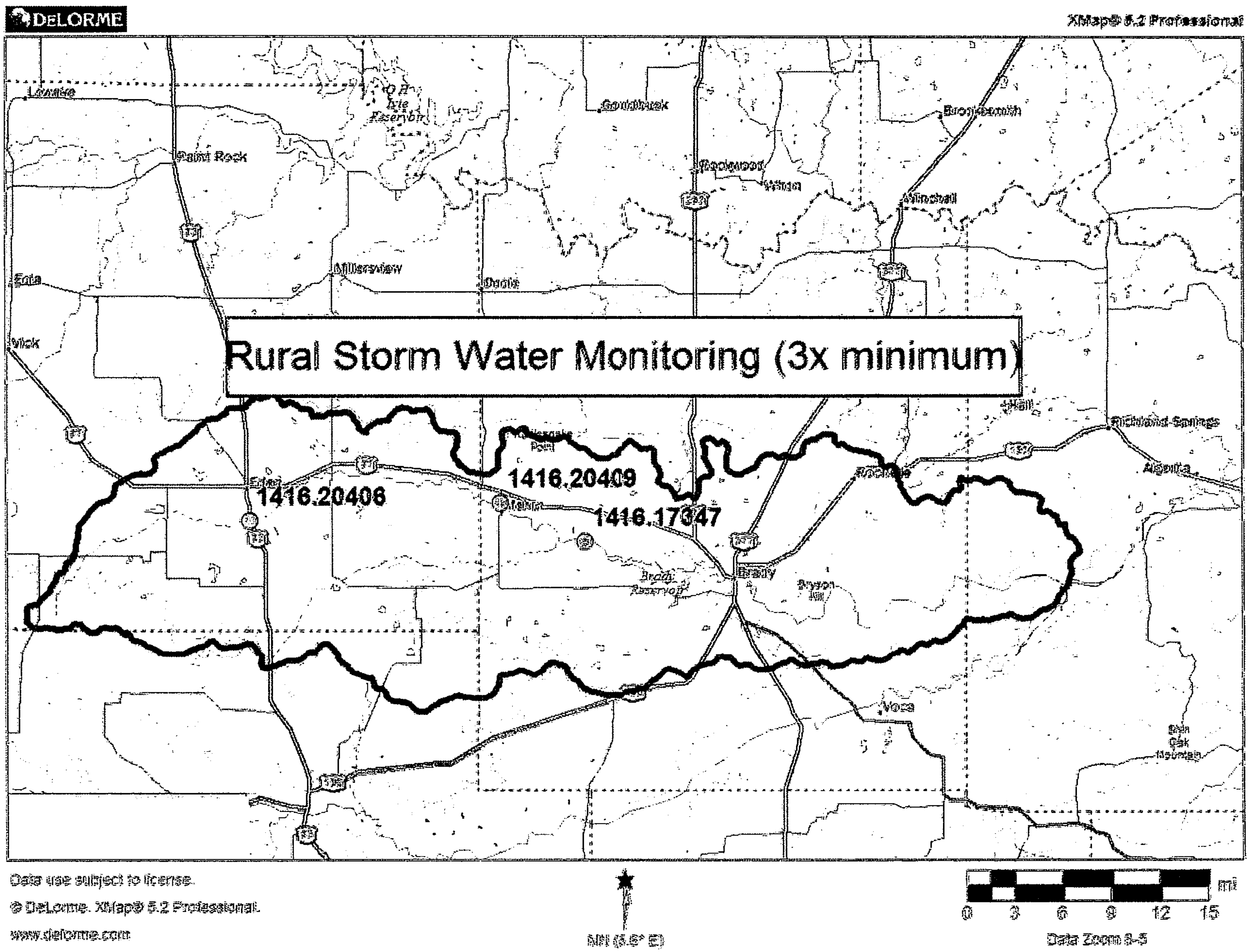
DELORME
XMap® 5.2 Professional
Rural Storm Water Monitoring (3x minimum)
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Paint Rock
Millersview
Eola
Vick
Doole
Goldsboro
Rockwood
Brookesmith
Mercury
Voca
Brady
Melvin
Eden
Rochelle
Richland Springs
Algerita
Brady Reservoir
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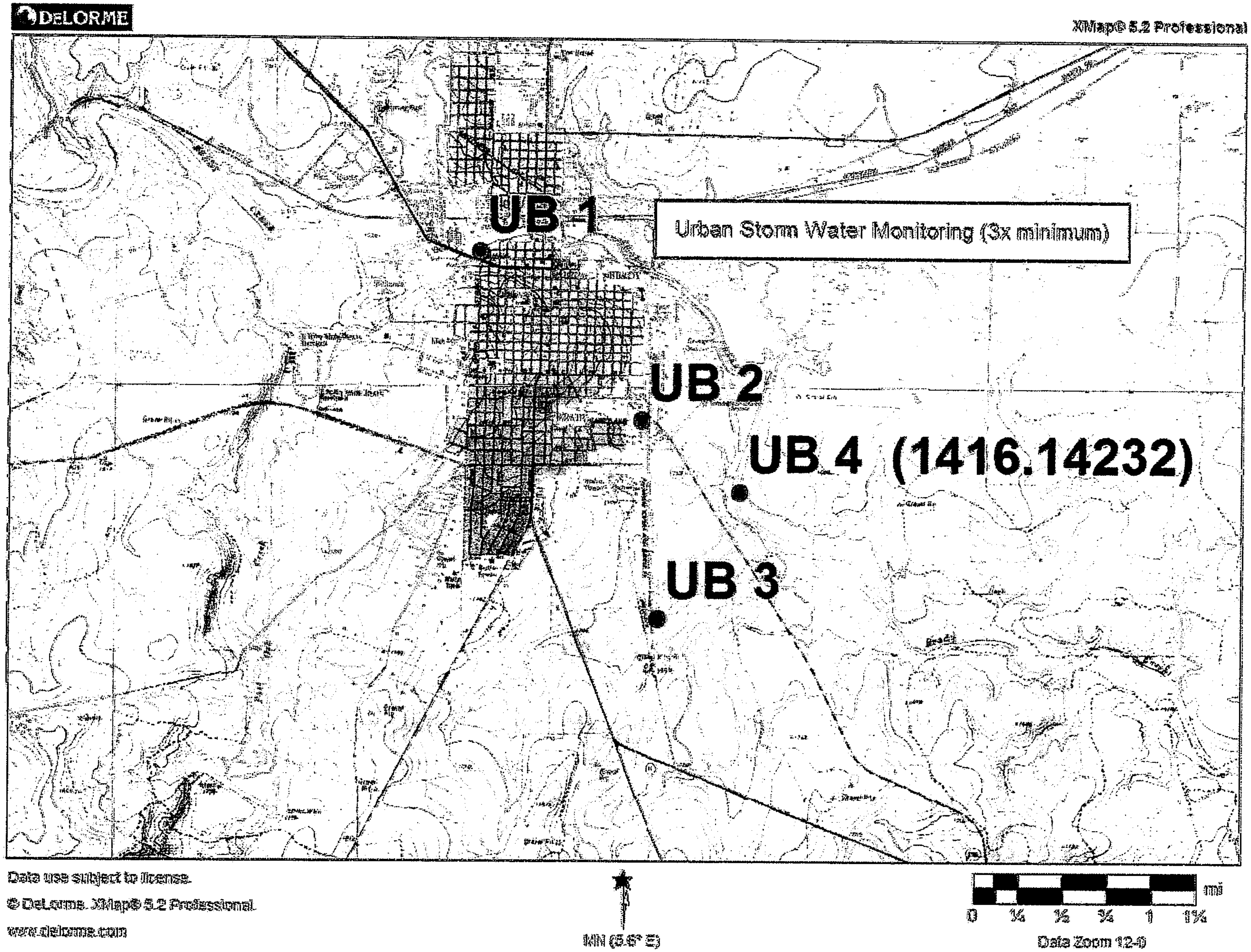
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UB 4 (1416.14232)
UB 3
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NPS

Appendix E . Flow Logger and Automated Sampler SOP (Including testing, maintenance and calibration requirements)

Introduction:

The Upper Colorado River Authority (UCRA) proposes to utilize Teledyne ISCO model 3700 automated samplers and where appropriate, ISCO model 3230 flow bubbler system in the collection of urban stormwater samples. The samplers will be provided for the project by the UCRA. The UCRA will also provide training to the City of Brady sampling team in the proper deployment and operation of the samplers. The UCRA will also provide assistance and on-site supervision in the collection of the samplers. Protocols to be utilized in sampling, sample preparation and sample transport are discussed in sections B1 and B2 of this document.

The manufacturer of the automated samplers have provided a comprehensive installation and operations guide for the equipment. In addition, UCRA staff has received training from manufacturer. Since this guide is over 200 pages in length, it has not been included in this document. The guide, however is available for review in the offices of the UCRA project staff and includes such items as an introduction, set-up procedures, programming guidelines, options and interfacing features, routine maintenance, servicing, replacement parts, accessories, general safety procedures, display index, calculating flow increments between samples and a glossary of terms. The guide will also be available for review in Brady by the sampling team staff.

Purpose:

This document describes the analytical procedures for triggered storm water sample collection and continuous automated analysis of stream flow utilizing the Teledyne ISCO 3700 automated sampler with an ISCO 3230 bubbler module installed.

Scope and Applicability:

This procedure is intended for the monitoring of storm water in intermittent streams and engineered drainage culverts.

The ISCO 3230 bubbler module is intended to provide a channel water level, which can be used to provide a continuous calculated flow value utilizing operator defined physical characteristics of the channel and the Manning equation.

The channel water level value provided by the ISCO 3230 bubbler module can be used to trigger the collection of temporally sequenced surface water bottles throughout a defined storm water runoff event by the ISCO 3700 automated sampler.

The calculated flow values logged by the automated sampler can be utilized to manually perform a flow-based composite of surface water bottles collected during a storm runoff event.

ISCO 3700 measurements can be used for data validation purposes. The working range of the ISCO 3230 bubble module level sensor is listed in the table below.

Parameter	Working Range	Reported Accuracy
Water Level (feet)	0.010 -10.000 feet	+/- 0.01 feet +/- Temperature Coefficient (0.0006 x level x temperature change from 25 °C) when level is below 5 feet. +/- 0.035 feet +/- Temperature Coefficient (0.0005 x level x temperature change from 25 °C) when level is above 5 feet and below 10 feet.
Flow (cfs)	The calculated value is dependent upon the physical characteristics of stream	The calculated value is dependent upon the accuracy of the operator defined physical characteristics of the stream.

Method Summary:

The ISCO 3700 automated sampler is deployed near the water body or drainage culvert of interest and outside of the area of expected runoff. A 3/8" ID vinyl suction line with an attached debris strainer is secured to the expected open channel or flume sample collection location along with a 1/8" ID vinyl bubbler line with an attached stainless steel tube outlet extension. The other end of these lines is attached to the back of the ISCO 3700 automated sampler. An 11-13 volt direct current battery is attached to the automated sampler in order to supply the instrument with power. When a triggered sample event occurs, water is pumped through the body of the sampler with a peristaltic pump and into 24 individual bottles of an attached carousel with an internal robotic distributer arm. The sampler will begin filling bottles with ambient water when a water level trigger event is registered by the installed ISCO 3230 bubbler module. The bubbler module uses a differential pressure transducer and a flow of bubbles to measure liquid levels up to ten feet in height. The bubbler is unaffected by wind, fluctuations in air or liquid temperatures, turbulence, stream, foam on the surface, corrosive chemicals, debris, oil, floating grease, or lightning. The water level trigger event will be dependent upon the deployment location and will be programmed into the sampler by the operator of the site. The operator can also program the instrument to calculate flow in any area with a known level-to-flow relationship.

The ISCO 3230 is calibrated to a known water level, by the operator. The current water level is measured with a yard stick or survey rod by the operator during each site visit. This manually measured water level is recorded in an operator log for the automated sampler along with the current instrument water level reading.

The ISCO 3700 automated sampler is programmed by the operator or manufacturer's representative to begin collecting storm water samples at a defined frequency once the water level reaches a location specific trigger level. This water trigger level will always be at or above the position of the inlet suction line in the stream.

The operator of the automated sampler will check the instrument every morning following a defined rainfall event near the deployment location to determine if a storm runoff event has been collected by the automated sampler. If a triggered storm water collection event has occurred the operator will record the date and time of sample collection, any observational data relevant to the event, the number of filled bottles collected and any errors encountered or repairs made to the instrument. The operator will label the bottle carousel with the date, time and location of the bottle collection and download the event data with a laptop computer to with the ISCO Flowlink software.

Limitations

The ISCO 3700 peristaltic pump contains replaceable pump tubing, which can develop holes and punctures during the course of normal operation. A breach in the pump tubing will prevent the automated sampler from creating enough pressure to retrieve samples through the inlet hose. The pump tubing should be inspected on a regular basis to ensure that it is does not have any punctures.

The ISCO 3700 3/8" ID vinyl inlet tubing and 1/8" ID vinyl bubble tubing are capable of developing holes or punctures as a result of physical damage from floating debris, high volumes of water or radiation from the sun. A breach in the inlet hose will prevent the automated sampler from properly retrieving a sample and a breach in the bubbler line will prevent the sampler from accurately measuring water level, calculating flow and triggering a storm runoff event. These hoses should be inspected for damage on a regular basis and will ideally be covered by some type of protective sheath.

The strainer or outlet for the ISCO 3700 3/8" ID vinyl inlet tubing and 1/8" ID vinyl bubble tubing are capable of becoming obstructed by sediment, algae or debris, which can prevent the proper functioning of the sampler. The outlets for each of these tubes should be inspected on a regular basis for clogging and cleaned as needed.

The ISCO 3230 bubbler module is capable of minor shifts in level variance due to environmental conditions, which can have an effect on calculated flow values and storm water trigger levels over extended periods of time. The measured water level should be checked manually on a regular basis to ensure that no major shifts have occurred and corrected if these values fall outside of the QC criteria described in section 9.0.

The flow calculations produced by the ISCO sampler are only as accurate as the physical characteristics of the stream that are programmed by the operator. It is very possible that an automated sampler deployed in a channel with excessive vegetation, water back flows and pressurized flows, a very irregular channel cross section, an immeasurable water surface slope, or an unknown degree of channel roughness will not provide accurate flow calculations, because there is not a very good relationship between stream height and the rate of flow.

Safety:

This procedure includes processes that can be potentially hazardous. Therefore, always notify someone of your destination before attempting to sample a storm water runoff collection location. Pay particular attention to sampling during periods of high flows or limited visibility and do not attempt to retrieve a sample if there is a reasonable risk of being caught in high water or other unsafe weather conditions.

Equipment and Reagents:

Teledyne ISCO 3700 automated sampler with attached ISCO 3230 bubbler module

Teledyne Isco 24 bottle carousel

Twenty-four Teledyne ISCO 1-Liter, autoclave-able bottles with Teflon lids

Two 1-Liter plastic laboratory bottles for sample compositing

100mL sterile plastic laboratory bottle for *E. coli* analysis if appropriate.

100mL glass graduated cylinder for sample compositing

Automated sampler operator logbook

Teledyne ISCO 3700 USB connection cable

Laptop computer equipped with a USB port and Teledyne ISCO Flow link software installed

100 foot Teledyne ISCO 3/8" inside diameter (ID) suction hose with stainless steel strainer

100 foot Teledyne ISCO 1/8" inside diameter (ID) bubbler tube with stainless steel outlet extender

Reagents

Concentrated Sulfuric Acid for sample preservation

De-ionized (DI) Type I water

Alconox powdered precision cleaner

Procedure:
Automated Sampler Installation

The ISCO 3700 automated sampler should be placed within a 100 foot radius of the channel that is to be monitored.

The sampler should not be placed more than 30 feet above the sampler inlet suction hose.

The sampler should not be placed directly in the floodplain unless it is completely unavoidable as a result of the previous distance restrictions.

The sampler should be secured to a permanent fixture such as a tree or metal post to ensure that it is not removed from the sample location by high waters or vandals.

The sampler inlet suction hose should be permanently attached to the channel of interest, at a representative section of the water body, near the centroid of the stream flow.

One end of the suction hose should be attached to a stainless steel strainer, this end of the hose should be attached to an immovable object near a representative section of the water body, such as the center of the channel.

The strainer will ideally be attached to a concrete structure with concrete screws and anchors, but if no immovable structures are available, a metal post may be mounted in the center of the channel in order to attach the hose with mounting brackets or cable ties.

The stainless steel strainer should not be placed in areas of excessive vegetation, or siltation.

The opposite end of the inlet suction hose should be attached to the pump tubing on the 3700 automated sampler. The inlet tubing should be cut to the approximate length of the distance between the automated sampler and the position of the stainless steel strainer, with approximately 3 extra feet left on the sampler end.

This inlet tubing should be covered with a protective sheath such as flexible plastic tubing, or PVC piping in order to prevent physical damage from adverse weather conditions and vandals.

The bubbler hose should be permanently attached to the channel of interest, at a representative section of the water body, near the centroid of the stream flow.

The bubbler hose should be mounted in the same manner as the sampler suction hose described in sections 7.1.2.1-7.1.2.5.

The bubbler hose may share the same protective casing and mounting brackets as the sampler inlet hose, however the stainless steel bubbler hose extender is much longer than the strainer of the sampler hose and the amount of space used for the final mount will be proportionately larger.

The bubbler hose will attach to a male plastic fitting on the back of the 3230 bubbler module instead of the opaque pump tubing where the suction line attaches.

The Teledyne ISCO 3700 sampler will require the installation of a 12 volt direct current power supply. Depending upon the level of isolation of the deployment location, the sampler can either be attached to an AC power converter or the unit can be attached to a 12 volt battery.

If a battery is connected to the sampler, it is also advisable to mount and connect a 120 watt solar panel in order to charge the onsite battery.

Automated Sampler Programming

Ensure that the Bubbler Module has been inserted into the sampler before attempting to program the sampler.

Turn the sampler on by pressing the On/Off key in the upper right hand corner of the ISCO 3700 keypad.

The "Program" option should be blinking, in which case the return arrow key should be pressed on the keypad of the 6712.

If the "Program" option is not blinking, navigate up and down the menu by pressing the up and down arrow keys on the bottom of the keypad.

The next screen will display "Change Program Name". Press the up arrow key on the keypad followed by the return key to highlight the blinking "Yes" under the change program name text on the screen, in order to enter the site appropriate location description. Navigate to the desired alphabetical or numeric characters displayed on the ISCO 6712 screen with the up and down arrows on the keypad and press the return arrow key after each desired character in order to fill out the desired program name description.

When the correct program name is displayed on the screen, use the down arrow key on the keypad to highlight the down arrow on in the bottom right hand corner of the instrument display. Press the return key to advance the display to the next screen. By highlighting the down or up arrows on the display the program menu can be advanced to the next quick view screen or a previous quick view screen can be readdressed.

The next quick view screen will ask if the site description is correct. Enter the correct site description in the same manner as the program name description described in section 7.2.4 and 7.2.5.

The next quick view screen will ask about the desired units for length. Select the "ft" units and advance to the next quick view menu.

The next quick view screen will ask about the units for flow rate. Select the "cfs" unit and advance to the next quick view screen

Next set the units for flow volume to "cf" and advance to the next quick view screen.

Select "yes" under the "program module" quick view screen.

Select "flowmeter" under the "mode of operation quick view screen.

Select "Equation Manning" under the next quick view screen.
Select the appropriate "Trapezoidal" or "rectangular" menu item appropriate to the shape of the storm channel to be measured.
Enter the appropriate channel physical characteristics using the numeric keypad. Depending upon the shape of the channel these characteristics will normally include the "maximum width of the channel" the "minimum width of the channel" the "water surface slope" and the "stream roughness coefficient".
These values will need to be determined by the operator from physical measurements and observations at the desired storm monitoring location.
The next quick view menu will ask to confirm that a new module has been setup. Select "done" and advance to the next screen.
Select the "adjust current level" screen and type in the current water level in feet at the area of the channel wear the bubble hose was affixed. This measurement will need to be made by the operator of the site with a yardstick or other appropriate measuring device. Advance to the next quick view screen
Adjust the "data storage interval" on the next screen to "5 minutes".
The next quick view screen will be the will ask about the number of bottles in the kit. Highlight this menu and press the return key. Highlight "24" and press the return key once again and then advance to the next quick view screen.
The next screen will ask about the bottle volume. Highlight this menu and press the return key. Enter 1000 ml into the text box with the numeric keypad and then press the return key. Continue to advance to the next quick view screen.
The next quick view screen will ask about the suction line length. Access this menu and type the measured length of the suction line from one end to the other and then press the return key. Advance to the next quick view screen.
Select "Auto Suction Head" from the next quickview screen.
Select "0 rinse cycles" from the next quick view screen.
Select "0 retries" from the next quick view screen.
Select "One-Part Program" from the next quick view screen.
Select "uniform time paced" from the next quick view screen.
Type 1 hours and 0 Minutes into the "time between sample events" field using the numerical keypad on the sampler. Advance to the next quick view screen.
Select "1 bottles per sample event"
Select "switch bottles every 1 samples"
Select "No" when the program asks if it should run continuously. Select 1000 mL with the numeric keypad when the program asks about sample volume.
Select Enable with "Level"
Select Enable set point and enter a set point level condition that will be just above the height of the suction line from the bottom with the numeric keypad on the instrument.
Select enabled when "above set point"
Select "once enabled stay enabled".
Select "Yes" under the "sample at enable" quick view screen.
Select "Done"

"Select "No Delay to Start"
The system is now programmed to begin sampling when storm water flows through the channel at a level greater than the position of the intake suction line in the channel.

Collecting Automated Storm water Samples:

The ISCO storm water sampler will be checked immediately by the City of Brady staff upon notification by the UCRA field supervisor of possible deployment.
Upon deployment of the equipment, the site operator will enable the equipment and check the instrument LCD display and examine the location to see if any water is passing through the storm water channel
If the Instrument display says that the program is "enabled", it will also say the number of the next bottle that it will sample and will give a countdown time. The amount of time needed for the sampler to complete its full cycle can be calculated by subtracted the current bottle sampling number from 24.
If the Instrument display says that sampling has completed it will also display the total flow for the event.
The time that the sampling cycle started and ended can be determined by navigating to the "view" and "sampling report" menus on the display and recording the time that bottle number 1 and bottle number 24 were sampled.
The UCRA Field Coordinator (FC) will download all of the data about the sampling event from the ISCO 3700 with a laptop computer equipped with the "Flowlink" software.
The FC will connect the proprietary ISCO USB cable to the USB port on the computer and the screw the other end of the cable into the round female plug underneath the picture of a laptop on the back of the ISCO 3700 instrument.
The FC will open the "Flowlink" software on the laptop computer display by double-clicking the associated Flowlink icon with the computer mouse.
The FC will click the square "3700 Instruments" button that appears in the middle of the screen.
The operator will click the "connect" button at the bottom left of the screen or alternatively press the "F7" key on the keyboard.
The operator will click the "retrieve data" button on the bottom left of the screen or alternatively press the "F8" key.
The operator will select the default graph or press the F3 button. The operator will right click on the graph and then left click the "properties" field.
The operator will select the "series" tab and ensure that the "display samples" box is checked. The operator will click "Ok"
The operator will navigate to the "File" menu in the flowlink software and select "save as" under the menu that appears. The operator will type a site location and into the field that appears in order to save a graph for this location. The operator will select the "Export" field from the "file" menu and type the name of the file to which the graphed data will be exported.
The exported file name will include the site description and the date of sample collection.
The operator will transfer the saved export file along with the samples and chain of custody to the laboratory for final compositing.

The FC will separate the top of the ISCO 3700 auto sampler and remove the bottle carousel from the bottom.
The FC will cap all of the filled bottles with Teflon caps and prepare for final compositing.
The FC will label the bottle carousel with the site description and date of sample collection. The site operator will separate the top of the ISCO 3700 auto sampler and remove the bottle carousel from the bottom
The FC will fill out composite the sample bottles using the percentages from each bottle recorded in the Flow based compositing spreadsheet. The FC will transfer the data from the exported data file created by the site operator in order to determine the relevant dates, times, flows and stage heights for each sample bottle in order to determine the proper percentage that each bottle will contribute to the final sample volume.

ISCO 6712 Calibration and Maintenance

The ISCO 3700 pump tubing will be checked for holes and breaches whenever the "Check Pump Tubing Alarm" is displayed on the instrument display.
The pump tubing is easily removed by disconnecting the suction hose from each end of the tubing, opening the 2 stainless spring clamps at the top of the sampler head and unscrewing the black plastic screw at the very top of the instrument.
If there is any sign of a breach in the tubing it will be replaced with a new pump tube and this will be noted in the operator logbook for this instrument.
The ISCO 3700 inlet suction hose and bubbler hose line will be inspected by the operator for holes and breaches upon every site visit and the stainless screens and outlets for these hoses will be cleared of any debris that could prevent the efficient passage of water.
The operator will replace the inlet suction hose or bubble tubing if a breach is discovered.
The Operator will record the current water depth level displayed on the instrument LCD upon each site visit in the operator log for each instrument. The operator will measure the water height with a yard stick and compare this measurement with the current height displayed by the instrument. If the value measured by the operator differs by more than 0.025 form the value displayed by the instrument then the operator will adjust the instrument current level to the manually measured value by programming in the instrument as described in section 7.2.16 and recording this new value in the operator logbook for the instrument.
If there is no water in the channel the current level reading should be 0.00 feet +/- 0.025 feet.
ISCO 6712 References
Further in-depth knowledge of ISCO 3700 procedures, programming, calibration & maintenance can be found in the ISCO 3700 Portable Sampler Installation and Operation Guide.

Appendix F. Field Data Reporting Form

UCRA FIELD DATA FORM

DATE:__________ TIME:__________ OBSERVER(S):__________________

SITE:______________________________ SITE #:_________________________

SpC:_____uhoms/cm TEMP:_____ °C DO:______mg/L pH :______ SECCHI:______m

WEATHER:____

DEPTH	VELOCITY	FLOW	DEPTH	VELOCITY	FLOW
1.			16.		
2.			17.		
3.			18.		
4.			19.		
5.			20.		
6.			21.		
7.			22.		
8.			23.		
9.			24.		
10.			25.		
11.			26.		
12.			27.		
13.			28.		
14.			29.		
15.			30.		

EST. FLOW________________CFS CALC FLOW.:__________________CFS

FLUME:_____/____gpm=______CFS USGS:______CFS FLOW SEVERITY:_______
FLUME:_____/____gpm=______CFS
FLUME:_____/____gpm=______CFS Precip:____________

NOTES:____

HT	GPM	CFS	HT	GPM	CFS	HT	GPM	CFS	HT	GPM	CFS	HT	GPM	CFS
.01	.19	.0004237	.15	42.75	.0953325	.29	159.79	.3563317	.43	351.31	.7834213	.57	617.31	1.3766013
.02	.76	.0016948	.16	48.64	.1084672	.3	171	.38133	.44	367.84	.8202832	.58	639.16	1.4253268
.03	1.71	.0038133	.17	54.91	.1224493	.31	182.59	.4071757	.45	384.75	.8579925	.59	661.39	1.4748997
.04	3.04	.0067792	.18	61.56	.1372788	.32	194.56	.4338688	.46	402.04	.8965492	.6	684	1.5253
.05	4.75	.0105923	.19	68.59	.1529557	.33	206.91	.4614093	.47	419.71	.9359533	.61	706.99	1.5765877
.06	6.84	.0152532	.2	76	.16948	.34	219.64	.4897972	.48	437.76	.9762048	.62	730.36	1.6287028
.07	9.31	.0207613	.21	83.79	.1868517	.35	232.75	.5190325	.49	456.19	1.0173037	.63	754.11	1.6816653
.08	12.16	.0271168	.22	91.96	.2050708	.36	246.24	.5491152	.5	475	1.05925	.64	778.24	1.7354752
.09	15.39	.0343197	.23	100.51	.2241373	.37	260.11	.5800453	.51	494.19	1.1020437	.65	802.75	1.7901325
.1	19	.04237	.24	109.44	.2440512	.38	274.36	.6118228	.52	513.76	1.1456848	.66	827.64	1.8456372
.11	22.99	.0512677	.25	118.75	.2648125	.39	288.99	.6444477	.53	533.71	1.1901733	.67	845.289	1.8849947
.12	27.36	.0610128	.26	128.44	.2864212	.4	304	.67792	.54	554.04	1.2355092	.68	878.56	1.9591888
.13	32.11	.0716053	.27	138.51	.308873	.41	319.39	.7122397	.55	574.75	1.2816925	.69	904.59	2.0172357
.14	37.24	.0830452	.28	148.96	.3321808	.42	335.16	.7474068	.56	595.84	1.3287232	.7	931	2.07613

Appendix G. Chain-of-Custody Form

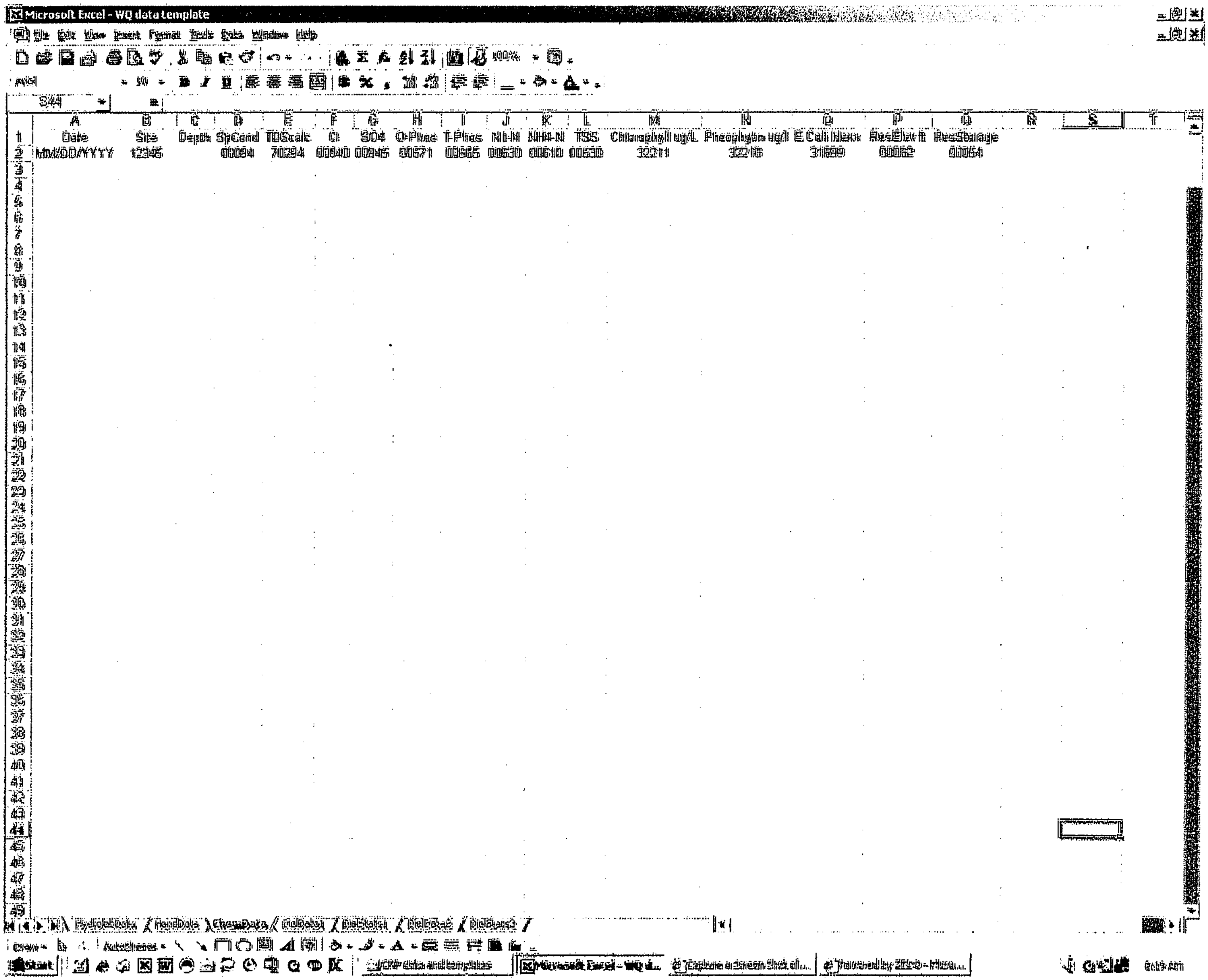
Laboratory or Lead Org. Name
Address

CHAIN OF CUSTODY RECORD

Project Name:					# of containers	Analyses Required											
Station ID	Date	Time (24hr)	Matrix	Description													Sample ID

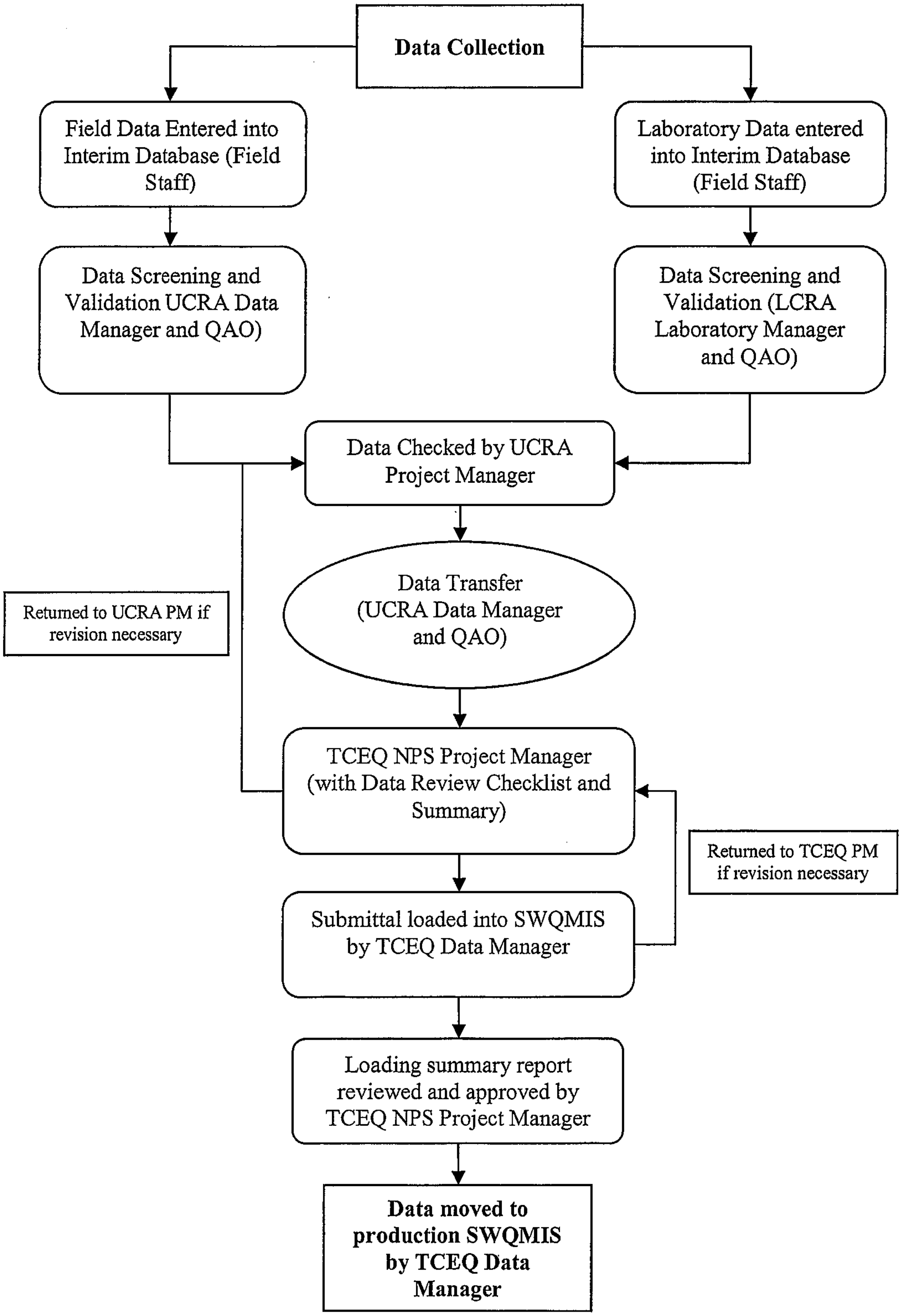
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Laboratory remarks:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Lab log #
Relinquished by: (Signature)	**Date:**	**Time:**	**Received by: (Signature)**	**Date:**	**Time:**	**Laboratory Name:**

Appendix H. Field and Laboratory Data Sheets


Microsoft Excel - WQ data template
Date
Site
Depth
SpCond
TDScalc
Cl
SO4
O-Phos
T-Phos
NH4-N
TSS
Chlorophyll ug/L
ResStorage
MM/DD/YYYY
12345
00094
70294
00940
00945
00671
00665
00630
00610
00530
32211
32218
31699
00062
00054

Appendix I. Data Management Flow Chart

Draft NPS Data Management Process Flow Chart



Appendix J. Corrective Action Status Table

Appendix J - Corrective Action Status Table

Corrective Action #	Date Issued	Description of Deficiency	Action Taken	Date Closed

Appendix K. Corrective Action Plan Form

Appendix K - Corrective Action Plan Form

Corrective Action Plan
Issued by:________________ **Date Issued**________________ **Report No.**____________________
Description of deficiency
Root Cause of deficiency
Programmatic Impact of deficiency
Does the seriousness of the deficiency require immediate reporting to the TCEQ? If so, when was it?
Corrective Action to address the deficiency and prevent its recurrence
Proposed Completion Date for Each Action
Individual(s) Responsible for Each Action
Method of Verification
Date Corrective Action Plan Closed?

ATTACHMENT 1
Example Letter to Document Adherence to the QAPP

TO: (name)
(organization)

FROM: (name)
(organization)

RE: Upper Colorado River Authority, Brady Creek Watershed Protection Plan QAPP

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

(address)

I acknowledge receipt of the "Brady Creek Watershed Protection Plan, Revision Date". I understand that the document describes quality assurance, quality control, data management and reporting, and other technical activities that must be implemented to ensure the results of work performed will satisfy stated performance criteria.

My signature on this document signifies that I have read and approved the document contents. Furthermore, I will ensure that all staff members participating in activities covered under this QAPP will be required to familiarize themselves with the document contents and adhere to the contents as well.

____

Signature Date

Copies of the signed forms should be sent by the Contractor to the TCEQ NPS Project Manager within 60 days of TCEQ approval of the QAPP.