

Appendix F

To the

**Guadalupe Blanco River Authority
And
Upper Guadalupe River Authority
Clean Rivers Program
FY 2002-03**

**Investigation of elevated sulfate concentrations
in the Upper Blanco River
Phase I**

Quality Assurance Project Plan

Prepared in Cooperation with the Guadalupe-Blanco River Authority and the Texas Natural Resource Conservation Commission Under the Authorization of the Texas Clean Rivers Act

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

Clean Rivers Program
Technical Analysis Division
Texas Natural Resource Conservation Commission
P.O. Box 13087, MC 147
Austin, TX 78711-3087

Questions concerning this amendment should be directed to:

Debbie Magin
Director of Water Quality Services
Guadalupe-Blanco River Authority
933 E. Court St.
Seguin, TX 78155
(830) 379-5822
dmagin@gbra.org

December 1, 2001

SS1-A1 APPROVAL PAGE

In addition to the approvals listed in section A1 of the 2002-03 QAPP, the following is required for the special study:

Debbie Magin, GBRA Project Manager Date

Hopkins Haden, GBRA Quality Assurance Officer Date

Allison Woodall, TNRCC CRP Project Manager Date

Bernard Ray, TNRCC CRP Lead Quality Assurance Specialist Date

Laurie Curra, TNRCC CRP Project Quality Assurance Specialist Date

GBRA will secure written documentation from each participant attesting to their awareness of and commitment to requirements contained in this quality assurance project plan appendix. GBRA will maintain this documentation as part of the project's quality assurance records.

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LIST OF ACRONYMS

AWRL	Ambient Water Reporting Limits
BMP	Best Management Practices
COC	Chain-of Custody
CRP	Clean Rivers Program
DMP	Data Management Plan
DQO	Data Quality Objective
FY	Fiscal Year
GBRA	Guadalupe-Blanco River Authority
LCRA	Lower Colorado River Authority
MDMA	Monitoring Data Management & Analysis
QA	Quality Assurance
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QAS	Quality Assurance Specialist
QC	Quality Control
QMP	Quality Management Plan
RBP	Rapid Bioassessment Protocol
RWA	Receiving Water Assessment
SOP	Standard Operating Procedure
SWQM	Surface Water Quality Monitoring
TMDL	Total Maximum Daily Load
TNRCC	Texas Natural Resource Conservation Commission
TRACS	Texas Regulatory and Compliance System
TSWQS	Texas Surface Water Quality Standards
VOA	Volatile Organic Analytes
WMT	Watershed Management Team

SS1-A3 DISTRIBUTION LIST

For distribution list, refer to Section A3 of the 2002-03 QAPP.

SS1-A4 PROJECT/TASK ORGANIZATION

Guadalupe-Blanco River Authority

Debbie Magin
GBRA Project Manager

As described in the basin-wide QAPP, Revision 6, Section A4.

Hopkins Haden
GBRA Quality Assurance Officer

As described in the basin-wide QAPP, Revision 6, Section A4.

Debbie Magin
GBRA Data Manager

As described in the basin-wide QAPP, Revision 6, Section A4.

Michael McCall
GBRA Laboratory Analyst/Field Technician

As described in the basin-wide QAPP, Revision 6, Section A4.

Hopkins Haden
GBRA Regional Laboratory Director

As described in the basin-wide QAPP, Revision 6, Section A4.

Chanda Burgoon
GBRA Laboratory Technician

As described in the basin-wide QAPP, Revision 6, Section A4.

Brian Lyssy
GBRA Laboratory Technician

As described in the basin-wide QAPP, Revision 6, Section A4.

Org chart

SS1-A5 PROBLEM DEFINITION/BACKGROUND

The Clean Rivers Program monitoring efforts and water quality assessments in the Guadalupe River Basin are described in Section A5 of the 2002-03 QAPP. A special study on the sub-watersheds of the upper Blanco River will be conducted to investigate the occurrence of elevated sulfate concentrations. Between September 1999 and November 2000, eight of the thirteen possible sampling events conducted at the GBRA routine monitoring site on the upper Blanco River had sulfate concentrations that were greater than the proposed stream standard of 50 mg/L and all thirteen were greater than the current standard of 25 mg/L. Monitoring sites will be monitored in the sub-watersheds of the Blanco River upstream of the GBRA monitoring site in stream segment 1813 to locate the source of the elevated concentrations. Though the historical average sulfate concentration at the routine site is below the proposed standard, the one-year project will attempt to identify possible sources of sulfate concentrations, while investigating the relationship between flow and sulfate concentrations in the Blanco River.

SS1-A6 PROJECT/TASK DESCRIPTION

The proposed study will be divided into two phases. The first phase will consist of monthly monitoring at 12 locations for one year, mixed between main stem and tributaries, in addition to the current monitoring location on the Blanco River is at FM 165. Data collected will include flow, sulfate, and conductivity. The sites will be located at county roads and state highways for accessibility. The sub-watersheds that will be included are: Koch Creek, Cottonwood Creek, McKinney Creek, Big Creek, Crabapple Creek and Falls Creek. The effluent from the Blanco wastewater treatment facility will be monitored for sulfate, conductivity, and discharge volume. The city's discharge point is located upstream of the existing monitoring site. As a part of phase I, a database search of groundwater quality will be conducted and a map will be prepared delineating watershed size and land uses. If a sub-watershed or potential source of sulfate concentrations is identified in Phase I of the study, phase II will be conducted in the second year of the biennium and will be developed to concentrate monitoring efforts in that area.

Figure SS1-1 is a map of the study area, with monitoring sites labeled.

Figure SS1

SSI-A7 DATA QUALITY OBJECTIVES AND CRITERIA

The purpose of the project is to investigate the elevated sulfate concentrations found in the upper Blanco River. The measurement performance criteria to support the project objectives are specified in Table A7.1 in the 2002-2003 QAPP. Sulfate concentrations, conductivity and flow measurements at the special study sampling sites will be compared to concentrations and flow measured at the existing monitoring location as well as to the stream standard.

Question 1: Does the monitoring site upstream of the existing monitoring site exhibit similar levels of sulfate as the existing monitoring site?

Decision Rule 1: If the concentration of flow-corrected sulfate in mg/L at the existing monitoring site is greater than 25% of the closest upstream site on average over the period of the study, then there may be a significant source of sulfate in that reach of the stream. If so, the GBRA will contact the city of Blanco and discuss the findings. The GBRA will assist the city of Blanco in identifying the potential causes for the elevated levels of sulfate.

Question 2: Do any of the monitoring sites exhibit significant levels of sulfate and cause levels in the Blanco River to become elevated downstream?

Decision Rule 2: If, after one year of monthly sampling, one or more upstream sites are found to have significantly higher (approximately 25% or greater) concentrations of sulfate than the others on an event basis (at least 50% of the time), then additional monitoring will take place in that (those) subwatersheds in an attempt to locate the source of the elevated sulfate concentrations. If none of the special study sampling sites shows significantly greater concentrations of sulfate than the other sites, then no additional monitoring will take place.

This additional sampling design will be described in an update to this appendix. Groundwater data may be employed in this instance to attempt to locate the source of the sulfate. The historical data on sulfate concentrations at the existing sampling site will be reviewed in relation to flow and time. The period when the sulfate concentrations were greatest will be characterized based on these two variables.

Precision

As described in Section A7 of the basin-wide QAPP.

Accuracy

As described in Section A7 of the basin-wide QAPP.

Representativeness

Representativeness of the project and selected sampling sites are based on the recent monthly sampling data collected by the GBRA and the contributing sub-watersheds above the existing monitoring site. Specific site locations in the sub-watersheds are selected based on their proximity to their confluence with the main stem, so that the entire sub-watershed may be represented, with consideration given to public access and safety considerations. Sites were selected throughout the Blanco River watershed upstream of the exiting sampling location in order to ensure any contributions of sulfate upstream are quantified.

Monthly sampling for one year will be conducted at all the special study sampling sites in order to account for variations in variables such as season, temperature, and flow. If elevated levels of sulfate are found at any of the special study sites, additional monitoring in those sub-watersheds will take place for an additional year to target the location(s) of the source(s).

Comparability

As described in Section A7 of the basin-wide QAPP.

Completeness

As described in Section A7 of the basin-wide QAPP.

SS1-A8 SPECIAL TRAINING/CERTIFICATION

No special training or certifications are required for this project. Training on field techniques, quality assurance, data management, etc., is provided by the TNRCC for the Planning Agencies as part of the Clean Rivers Program.

SS1-A9 DOCUMENTS AND RECORDS

The documents that describe, specify, report, or certify activities are listed in Table A9.1 in Section A9 of the 2002-03 QAPP.

SS1-B1 SAMPLING PROCESS DESIGN

Sample Design Rationale

The sample design rationale is based on the intent of the study to investigate the elevated sulfate concentrations found in the upper Blanco River as defined in SS1-A7.

Site Selection Criteria

Monthly monitoring will occur at 12 locations that are mixed between main stem and tributaries, in addition to the current monitoring location on the Blanco River is at FM 165. Data collected will include flow, sulfate, and conductivity. The sites will be located at county roads and state highways for accessibility. The sub-watersheds that will be included are:

- Koch Creek,
- Cottonwood Creek,
- McKinney Creek,
- Big Creek,
- Crabapple Creek, and
- Falls Creek.

The effluent from the Blanco wastewater treatment facility will be monitored for sulfate, conductivity, and discharge volume. The city's discharge point is located upstream of the existing monitoring site.

SS1-B2 SAMPLING METHODS

Field Sampling Procedures

The field sampling procedures are documented in the TNRCC *Surface Water Quality Monitoring Procedures Manual* (1999, or subsequent editions).

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

As prescribed in the Table B2.1 in the 2002-03 QAPP, Section B2.

Sample Containers

As prescribed in the 2002-03 QAPP, Section B2.

Processes to Prevent Contamination

As prescribed in the 2002-03 QAPP, Section B2.

Documentation of Field Sampling Activities

As prescribed in the 2002-03 QAPP, Section B2.

Recording Data

As prescribed in the 2002-03 QAPP, Section B2.

Failures in Sampling Methods Requirements and/or Deviations from Sample Design and Corrective Action

As prescribed in the 2002-03 QAPP, Section B2.

SS1-B3 SAMPLING HANDLING AND CUSTODY PROCEDURES

Chain of Custody

As prescribed in the 2002-03 QAPP, Section B3.

Sample Labeling

As prescribed in the 2002-03 QAPP, Section B3.

Sample Handling

As prescribed in the 2002-03 QAPP, Section B3.

Failures in Chain-of-Custody and Corrective Action

As prescribed in the 2002-03 QAPP, Section B3.

SS1-B4 ANALYTICAL METHODS

The analytical methods, associated matrices, and performing laboratories are listed in Table A.7.1 of Section A7 of the 2002-03 QAPP. The authority for analysis methodologies under the Clean Rivers Program is derived from the TSWQS (307.1-307.10) in that data generally are generated from comparison to those standards and/or criteria. The Standards state that a procedure for laboratory analysis will be in accordance with the most recently published edition of *Standard Methods for the Examination of Water and Wastewater*, the latest version of the TNRCC *Surface Water Quality Monitoring Procedures Manual*, 40 CFR 136 or other reliable procedures acceptable to the executive director. Copies of laboratory SOPs are retained by GBRA and are available for review by the TNRCC. Laboratory SOPs are consistent with EPA requirements as specified in the method.

Standards Traceability

As prescribed in the 2002-03 QAPP, Section B4.

Alternative Method Modification

As prescribed in the 2002-03 QAPP, Section B4.

Failures or Deviations in Analytical Method Requirements and Corrective Actions

As prescribed in the 2002-03 QAPP, Section B4.

SS1-B5 QUALITY CONTROL

Sampling Quality Control Requirements and Acceptability Criteria

As prescribed in the 2002-03 QAPP, Section B5.

Laboratory Measurement Quality Control Requirements and Acceptability Criteria

As prescribed in the 2002-03 QAPP, Section B5.

Failures in Field and Laboratory Quality Control and Corrective Action

As prescribed in the 2002-03 QAPP, Section B5.

SS1-B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

As prescribed in the 2002-03 QAPP, Section B6.

SS1-B7 INSTRUMENT CALIBRATION AND FREQUENCY

As prescribed in the 2002-03 QAPP, Section B7.

SS1-B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

As prescribed in the 2002-03 QAPP, Section B8.

SS1-B9 NON-DIRECT MEASUREMENTS

Historical data collected under approved Clean Rivers Program QAPPs beginning in 1996 will be used for comparison to special sampling site data.

SS1-B10 DATA MANAGEMENT

The data will be managed according to the Data Management Plan, Appendix E of the 2002-03 QAPP.

SS1-C1 ASSESSMENTS AND RESPONSE ACTIONS

As appropriate, the Table C1.1 in Section C1 of the 2002-03 QAPP will be followed. In addition to the responses listed there, there will be a report of findings submitted to the TNRCC and to the Guadalupe River Basin CRP Steering committee. Corrective actions described in Section C1 of the 2002-03 QAPP will apply to the Special Study 1 as well.

SS1-C2 REPORTS TO MANAGEMENT

Reports to GBRA Project Management, and TNRCC Project Management

Deliverables and their dates of completion for the special study can be found in the work plan, under Task 3. Only data that has been validated and verified will be reported in the report of findings.

SS1-D1 DATA REVIEW, VERIFICATION, AND VALIDATION

As prescribed in the 2002-03 QAPP, Section D1.

SS1-D2 VERIFICATION AND VALIDATION METHODS

As prescribed in the 2002-03 QAPP, Section D2.

SS1-D3 RECONCILIATION WITH USERS REQUIREMENTS

The TNRCC Surface Water Quality Monitoring Team stream assessment guidance for the generation of the 305b report will be used as a starting place in the evaluation of significant differences between special sampling sites and the routine monitoring site. Additional statistical evaluations may be used in the evaluation process.

SS1-ATTACHMENT 1 TABLE OF SPECIAL STUDY MONITORING LOCATIONS