TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
WICHITA RIVER
CONTINUOUS WATER QUALITY MONITORING
PROJECT PLAN

A1 APPROVAL PAGE

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The Wichita River Continuous Water Quality Monitoring Network (CWQMN) Project Plan documents project specific details for new continuous water quality projects. Critical project specific details for new CWQMN stations are not covered in the CWQMN Quality Assurance Project Plan (QAPP). Please see the CWQMN QAPP for other network details.

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Figure 5. Proposed left bank upstream site for traffic box.

LIST OF ACRONYMS

°C	Degrees Celsius
CAMS	Continuous Ambient Monitoring Station
cfs	cubic feet per second
CoWF	City of Wichita Falls
CRP	Texas Clean Rivers Program
CWQMN	Continuous Water Quality Monitoring Network
DM&QA	Data Management and Quality Assurance
EPA	Environmental Protection Agency
FOD	Field Operation Division
ft	feet
FY	Fiscal Year
LEADS	Leading Environmental Analysis and Display System
mgd	million gallons per day
mg/L	milligram per Liter
MOPS	TCEQ Monitoring Operations Division
NA	Not Applicable
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
RO	Reverse Osmosis
RPD	Relative Percent Difference
RPE	Relative Percent Error
RRA	Red River Authority of Texas
SOP	Standard Operating Procedure
SWQM	Surface Water Quality Monitoring Team
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TPWD	Texas Parks and Wildlife Department
µS/cm	micro Siemens per centimeter
USGS	United States Geological Survey
WQM&A	Water Quality Monitoring & Assessment Section

A3 DISTRIBUTION LIST

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Ms. Anne Panko, Quality Assurance & Audit Team, Data Management & Quality Assurance Section, Monitoring Operations Division
Ms. Gail Rothe, Categorical 106 Grant Project Manager

A4 PROJECT/TASK ORGANIZATION

This section is intended to identify individuals and organizations that will be responsible for developing and/or supporting this project. For a list of additional project/task and responsibilities please refer to section A4 of the CWQMN QAPP.

A4.1 TCEQ CWQMN Network Coordinator (Charles Dvorsky)

- Provides overall support for coordination, development, and installation of new Continuous Ambient Monitoring Station (CAMS)

A4.2 TCEQ SWQM Project Lead (Pat Bohannon)

- Develop Project Plan
- Responsible for coordination of the overall project
- Plan and participate in site reconnaissance; coordinate with appropriate internal and external parties to accomplish objectives of site visits
- Participate in deployment of station as appropriate

A4.3 TCEQ CWQMN Quality Control Officer (Edward Ragsdale)

- Provides QC oversight of project
- Reviews and comments on proposed Project Plan

A4.4 TCEQ Systems Planning and Implementation Team (Larry Lehmann)

- Provides overall support and logistics for deployment of monitoring stations
- Provides training to operate and maintain station infrastructure

A4.5 TCEQ Region 3 (Dan Warren)

- Site Operation and Maintenance
- Participate in station development

A4.6 TCEQ Data Validation (Water Data Management and Analysis Team)

- Processes Site Initiation and Update Forms and assigns Station ID's in the Surface Water Quality Monitoring Information System (SWQMIS)
- Provides data validation for two field parameter sites
- Train operators on data validation software and procedures when applicable including Manual Validation
- Provide training for Site Operator on the data display system
- Contacts Site Operator and Project Lead to when potential data issues arise

A4.7 United States Geological Survey (Keith Snider)

- Install/maintain flow gage at downstream site

A5 PROBLEM DEFINITION/BACKGROUND

Excessive concentrations of total dissolved solids, sulfate, and chloride are a general problem in the upper Red River Basin, due in large part, by the presence of salt water springs, seeps, and gypsum outcrops. The excessive amounts of dissolved solids and chlorides in the water present problems to managers, planners, and others concerned with water treatment for municipal use. The upper Red River Basin makes up the majority of the state water planning region B. The City of Wichita Falls (CoWF) is the only wholesale water provider in Region B and is a regional provider for much of the water in Wichita, Archer, and Clay counties. The CoWF helped build Lake Kemp in the 1920's for flood control on the Big Wichita River and Lake Diversion in the 30's for irrigation while retaining rights to a portion of that water. Due to high concentrations of dissolved solids, chlorides and sulfates in Lakes Kemp and Diversion, the CoWF relied on its other two surface water resources, Lakes Arrowhead and Kickapoo, which have lower levels.

Several water management strategies have been identified to meet future water use requirements through conservation techniques, protecting current resources, and enhancing the water quality of current water resources. One major project contributing to the enhancement of water quality is the Red River Authority of Texas (RRA) sponsored federal chloride control project to control the natural chloride level in the Red River Basin by impounding high chloride waters from the natural brine springs. Additionally, recent advances in water treatment technologies, specifically reverse osmosis (RO), have allowed Lakes Kemp and Diversion to be considered for augmenting the regional surface water supply. Therefore, the CoWF is in the process of constructing a pump station and pipeline to convey Lake Kemp/Diversion water to the Cypress Water Treatment Facility where it will be treated by a new (RO) plant treating 10 million gallons of water per day (mgd) for municipal purposes.

As a consequence of desalination by reverse osmosis, a brine slurry, approximating 25% of the volume of water processed, is created and must be disposed. The high concentration waste stream is generally discharged to the water source from which it came. The addition of the concentrated discharge does not change the amount of volume of dissolved salts in the stream but does change their concentrations until they are remixed (diluted) as they flow downstream. The CoWF proposes to discharge the brine slurry into the Wichita River at the Barnett Road (FM 1634) bridge which is located in Segment 0214 (from the confluence with the Red River in Clay County to Diversion Dam in Archer County).

The primary objective of this project is to provide water quality and flow data near real time as a research tool to determine potential environmental impacts of the discharge on ambient water chemistry, fish and other aquatic life, and environmental conditions favoring golden alga. These data will be compared to baseline data collected prior to the plant becoming operational. At the time of this writing, the data will be available on the TCEQ website: http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/swqm_realtime_swf.html.

In-situ water quality monitoring is tentatively scheduled to begin Winter 2008. Water quality measurements will be logged every 15 minutes during all months and environmental conditions for a period of at least two years.

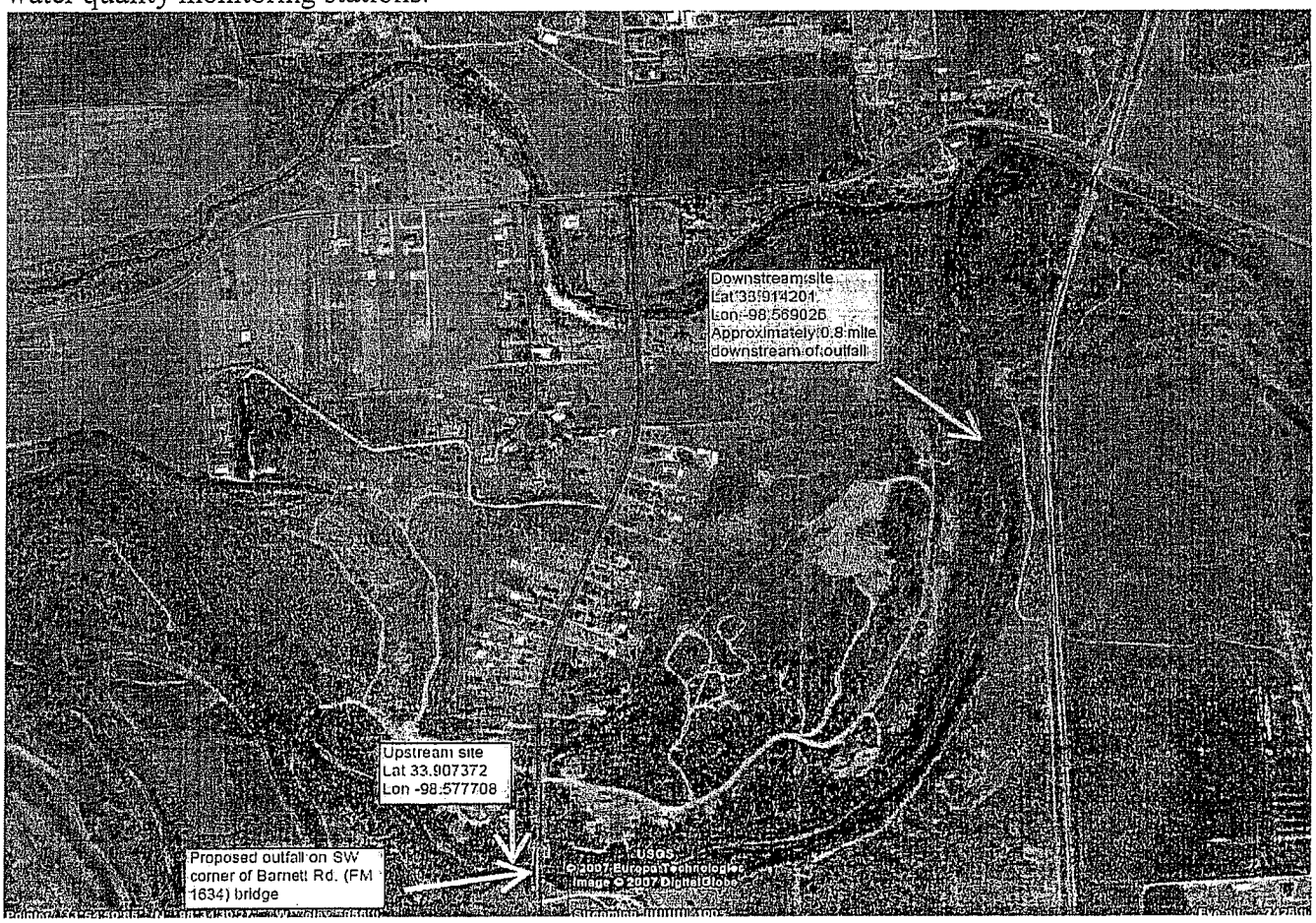
A6 PROJECT/TASK DESCRIPTION

TCEQ will establish two continuous water quality monitoring (CWQM) sites on the Wichita River in Wichita Falls, Texas. The RO plant brine discharge outfall will be located at the upstream side of the Barnett Road (FM 1634) bridge. A downstream station (CAMS 0746, Station ID ?) will be located approximately 0.8 mile downstream of the outfall. A second station (CAMS 0747, Station ID 10152) will be located just upstream of the discharge outfall (Figure 1). Water quality monitoring equipment for both sites will include Greenspan CS4-1200 multi-parameter sondes.

An existing TCEQ/USGS contract will be amended to include flow monitoring installation and maintenance at the downstream site and at the end of the discharge pipe.

Site installation is expected to be completed in Fall/Winter 2007 with in-situ water quality sampling beginning immediately upon installation and continuing for a period of at least (but not limited to) two years. All water quality and water level/flow data will be transmitted and stored in the Leading Environmental Analysis and Display System (LEADS) database. All data will be available to the public via the internet.

Figure 1: Proposed locations of Reverse-osmosis plant outfall and upstream/downstream continuous water quality monitoring stations.



A7 QUALITY OBJECTIVES AND CRITERIA

Water quality and water level measurement performance specifications to support the project objectives are specified in Table A7.1.

Methods for the Greenspan CS4-1200 are based on *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, 1998 unless otherwise noted.

Table A7.1 – Greenspan CS4-1200 Sonde (Multi-Probe) Data Quality Objectives

Parameter	Parameter Code	Units	Method	Calibration Verification Sample (CVS) **
pH	00400	pH / units	Glass electrode, Standard Method 4500-H+B	±0.50 pH unit
Dissolved Oxygen	00300	mg/L	Galvanic membrane electrode, Standard Method 4500-O-G	±0.50 mg/L
Specific Conductance	00094	µS/cm	Toroidal*	≤5.0% RPE
Total Dissolved Solids	00094	mg/l	Calculated by LEADS. Sonde SC measurements are multiplied by 0.65	≤5.0% RPE (SC CVS)
Temperature	00010	°C	Standard Method 2550 B	NA

*Method not based on *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, 1998
** CVS criteria for use in the 305(b) and 303(d) Lists per SWQM DQOs.
NA = Not Applicable

Ambient Water Reporting Limits (AWRLs)
NA

Precision
NA.

Bias
As described in Section A7.1 of the CWQMN QAPP.

Representativeness
As described in Section A7.2 of the CWQMN QAPP.

Comparability
As described in Section A7.3 of the CWQMN QAPP.

Completeness
A general requirement of 75 percent data completeness goal has been set for the CWQM network. Periods of no flow or other conditions that necessitate the shutdown of any or all instrumentation during these times are not considered in the calculation for data completeness. See Section A7.5 CWQM QAPP.

A8 SPECIAL TRAINING/CERTIFICATION

TCEQ Region 3 staff will be the lead for site operation and maintenance for both CWQM stations. Region staff will receive training for sonde setup and calibration of the Greenspan CS4-1200 multi-parameter sonde prior to the deployment of the CAMS. A follow-up training will be conducted by SWQM CO staff upon instrument installation at the stations.

Region 3 staff completed LEADS Data Management training in February 2007. Since that training, LEADS has been subject to a redesign/upgrade. Region 3 staff will have the opportunity to attend a second LEADS Data Management training on the updated system if necessary.

A9 DOCUMENTS AND RECORDS

As described in sections A9 of the CWQMN QAPP.

B1 SAMPLING PROCESS DESIGN

Site Selection Criteria

Site selection is based on geographic location relative to the RO plant discharge outlet and landowner access. The upstream station will monitor water quality in the river prior to the brine discharge point. The downstream station will monitor for potential effects of the RO discharge, particularly specific conductivity (see Figure 2).

Monitoring Station Design

Downstream (CAMS 0746) and Upstream (CAMS 0747) Monitoring and Support Equipment

Water quality monitoring and support equipment for both upstream and downstream sites will include:

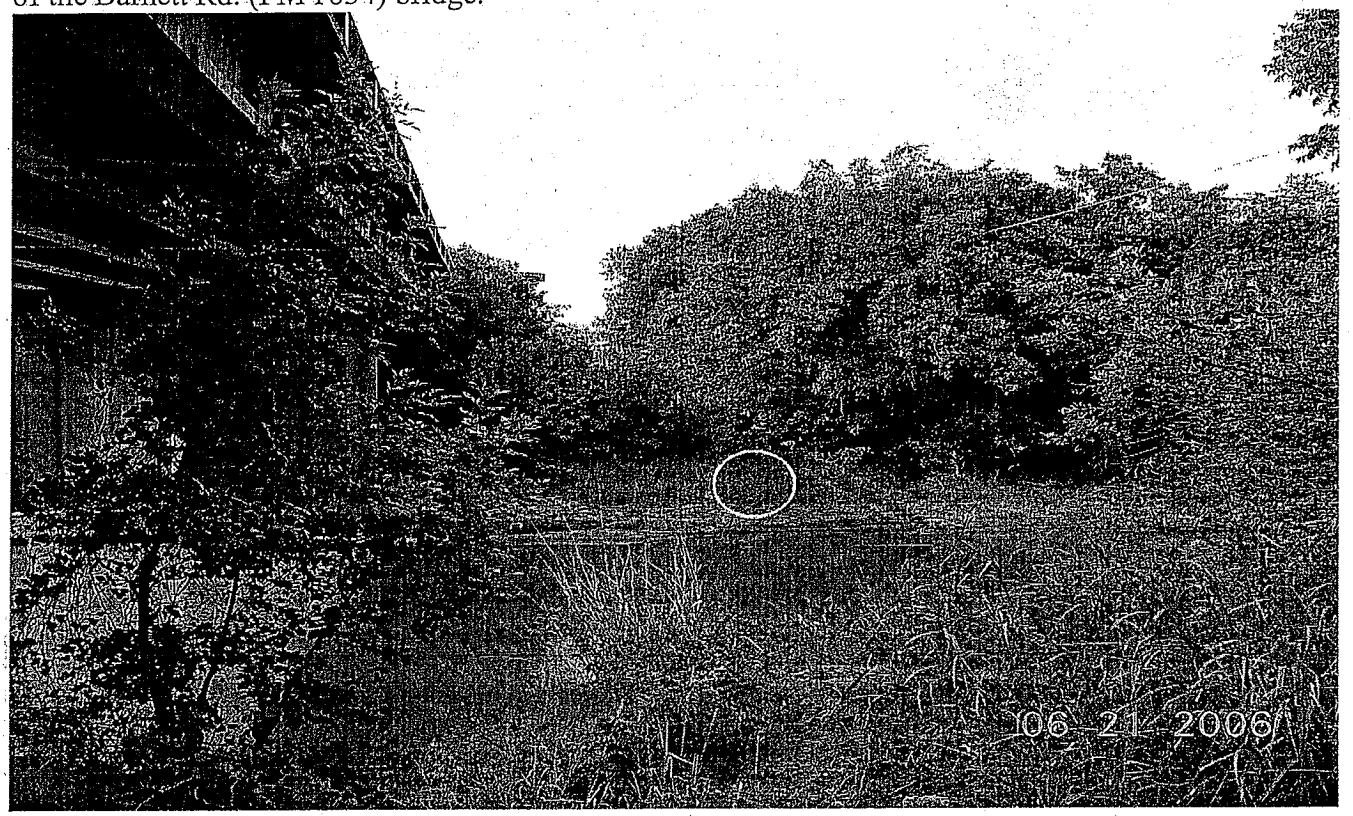
- Greenspan CS4-1200 multi-parameter water quality sondes with communication cables and support structure
- Zeno data loggers
- Wireless Enfora modem
- Traffic Boxes and solar panels
- Various sampling system support hardware

Downstream and Upstream Equipment Configuration

The sondes will be housed in a length of 4 in. diameter PVC pipe installed on the river bank. The lower 3 feet of pipe will be perforated to allow water flow across the sensors. The pipe will be secured to the bank and the river bed with extruded aluminum channel pipe. The water level sensor will be secured to the channel pipe (see Figures 3, 4, and 5).

Traffic boxes, powered by solar panels and containing Zeno data loggers and telemetry equipment will be mounted on poles secured by anchor bolts, will be installed and oriented for maximum sunlight exposure but not more than 200 linear feet from the sonde. Conduit containing power and data cables connecting the sonde to the traffic box will be buried in a shallow trench (<1.0 ft.).

Figure 2. Proposed site for City of Wichita Falls Reverse Osmosis plant outfall on the northeast corner of the Barnett Rd. (FM 1634) bridge.



B2 SAMPLING METHODS

In-situ water quality and water level measurements are logged once every 15-minutes by the data logger. The data are then transmitted via wireless modem to the MeteoStar/LEADS system in Austin, Texas where the data are ingested, archived, and posted to the appropriate TCEQ internet site.

Sampling/Measurement System Corrective Action

As described in Section B2.2 of the CWQMN QAPP.

Figure 3. Proposed left bank downstream site for sonde deployment.

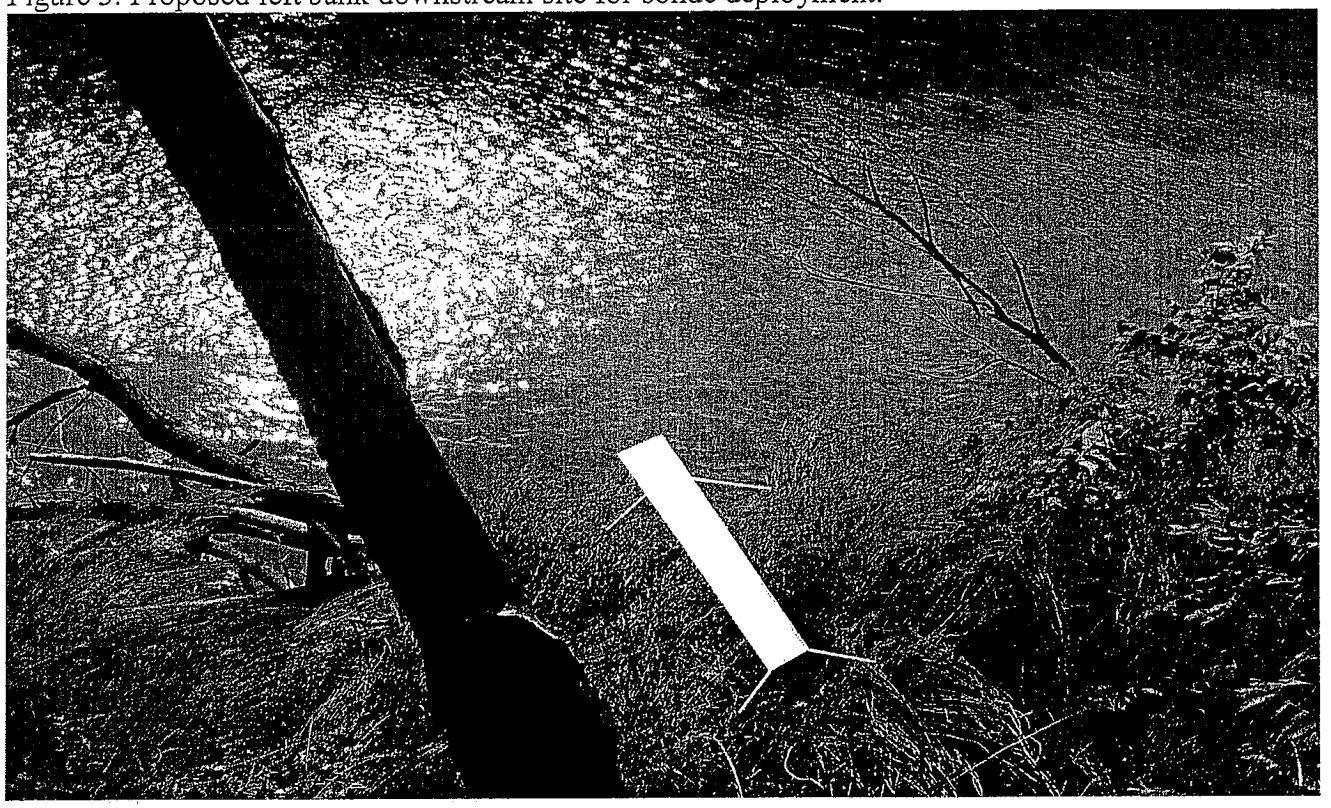


Figure 4. Proposed left bank upstream site for sonde deployment.

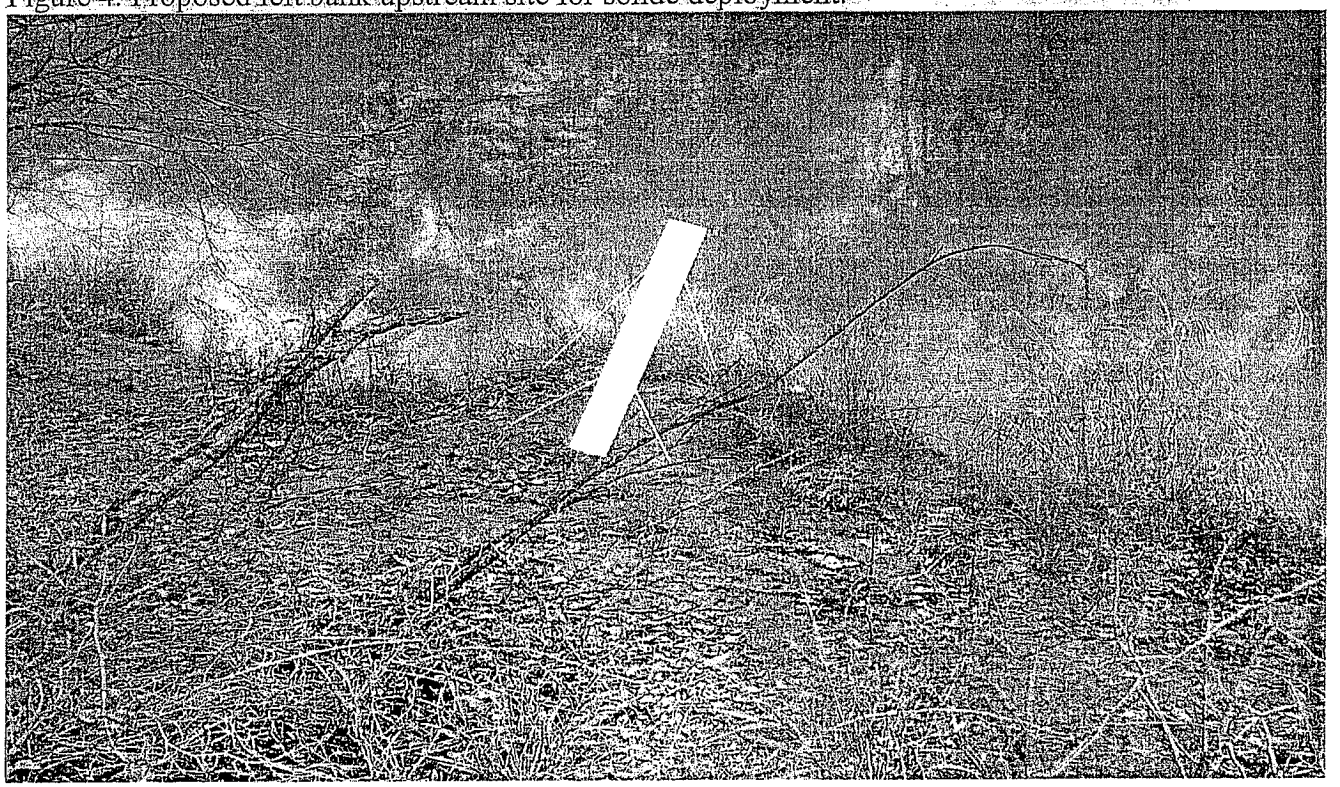
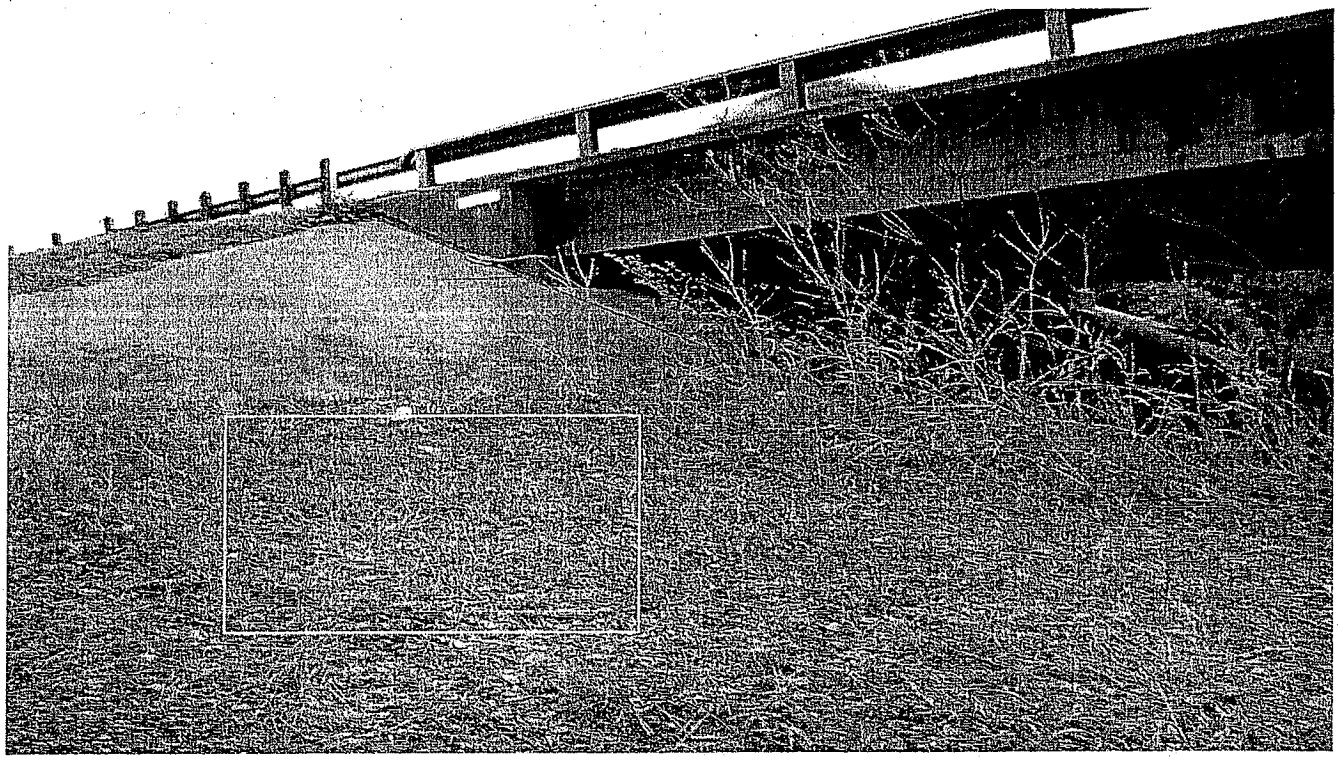


Figure 5. Proposed left bank upstream site for traffic box.



B3 SAMPLING HANDLING AND CUSTODY

As described in Section B3 of the CWQMN QAPP.

B4 ANALYTICAL METHODS

Analytical methods are listed in Section A.7.

B5 QUALITY CONTROL

As described in Section B5 of the CWQMN QAPP.

Greenspan CS4-1200 Sonde

Please see Table A7.1 for QC criteria

An Analytical SOP is in development that will detail instrument operation and quality control procedures. Operator manual will be used in the interim.

Sonde DO, pH, and conductivity parameters are calibrated at a minimum once monthly. DO, SC, and pH Calibration Verification Samples (CVSs) are analyzed at minimum of once monthly.

Corrective Action Related to Quality Control

As described in Section B5 of the CWQMN QAPP.

B6 INSTRUMENT/EQUIPMENT TESTING, INSPECTION AND MAINTENANCE

Greenspan Sonde
Greenspan Sonde maintenance SOP is under development. TCEQ Austin Staff will provide sonde maintenance support.

B7 INSTRUMENT CALIBRATION AND FREQUENCY

Greenspan Sonde
The site operator will calibrate sonde DO, SC, and pH parameters once monthly at a minimum.

B8 INSPECTION/ACCEPTANCE OF SUPPLIES AND CONSUMABLES

MOPs ambient monitoring section keeps an inventory of common spare parts. Parts can be mailed via United Parcels Service and will usually arrive the next day (if mailed before noon on the mailing day). The Project lead will be responsible for the coordination of parts replacement.

Greenspan Sonde
Common Greenspan sonde spare parts are stocked by MOPs.

The site operator will contact the Project lead to obtain pH calibration standards. Greenspan specific conductance is calibrated by a calibration loop that will be supplied with the unit.

B9 NON-DIRECT MEASUREMENTS

There are no non-direct measurements used in this project.

B10 DATA MANAGEMENT

As described in CWQMN QAPP.

Data validation will be performed by TCEQ DM&QA staff as noted in section A4.6.

Project water temperature, pH, dissolved oxygen, specific conductance, and water level data will be stored in TCEQ's Leading Environmental Analysis and Display System (LEADS).

C1 ASSESSMENTS AND RESPONSE ACTIONS

As described in CWQMN QAPP.

Corrective Action

As described in Section C1 of the CWQMN QAPP.

C2 REPORTS TO MANAGEMENT

As described in Section C2 of the CWQMN QAPP.

Reports to TCEQ Project Management

As described in Section C2 of the CWQMN QAPP.

D1 DATA REVIEW, VERIFICATION, AND VALIDATION

As described in Section D1 of the CWQMN QAPP.

Data validation will be conducted by Water Data Management and Analysis Team at TCEQ Central Office in Austin, Texas.

Sonde data validation is described in Section D1 of the CWQMN QAPP. Please see SOP DQRP-015, *Validation of Continuous Water Quality Monitoring Data Collected by Multi-parameter Sonde* (Appendix B).

D2 VERIFICATION AND VALIDATION METHODS

As described in Section D2 of the CWQMN QAPP.

D3 RECONCILIATION WITH USER REQUIREMENTS

As described in Section D3 of the CWQMN QAPP.