Clean Water Act §319(h) Nonpoint Source Grant Program

PLAN for Tomorrow: Poultry Litter Application on New Sites

Quality Assurance Project Plan
Revision 0

Texas State Soil and Water Conservation Board
Project 05-06

prepared by

Texas AgriLife Extension Service
Department of Soil and Crop Sciences

Effective Period: May 2007 to August 2008

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

Dr. Monty C. Dozier, Assistant Professor and Extension Specialist - Water Resources
Texas AgriLife Extension Service
Department of Soil and Crop Sciences
Texas A&M University
2474 TAMU
College Station, Texas 77843-2474
(979) 845-2761
m-dozier@tamu.edu

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Section A1: Approval Sheet

Plan for Tomorrow: Poultry Litter Application on New Sites

United States Environmental Protection Agency (EPA), Region VI

Name: Donna Miller
Title: Chief, State/Tribal Programs Section

Signature: _____ Date: _____

Name: Ellen Caldwell
Title: EPA Texas Nonpoint Source Project Manager

Signature: _____ Date: _____

Texas State Soil and Water Conservation Board (TSSWCB)

Name: Pamela Casebolt
Title: Project Manager

Signature: _____ Date: _____

Name: Donna Long
Title: Quality Assurance Officer

Signature: _____ Date: _____

Texas AgriLife Extension Service (AgriLife Extension) and Texas AgriLife Research (AgriLife Research) - Department of Soil & Crop Sciences

Name: Travis Miller
Title: Professor, Associate Department Head & Extension Program Leader

Signature: _____ Date: _____

Name: Monty Dozier
Title: Assistant Professor and Extension Specialist - Water Resources
Project Manager/QAO

Signature: _____ Date: _____

Name: Scott Senseman
Title: Professor and AgriLife Research Lab Director

Signature: _____ Date: _____

United States Department of Agriculture - Agricultural Research Service (USDA-ARS)

Name: Daren Harmel
Agricultural Engineer and Field Demo Coordinator

Signature: _____ Date: _____

Section A2: Table of Contents

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List of Acronyms and Abbreviations

ACS	American Chemical Society
AgriLife Research	Texas AgriLife Research
AgriLife Extension	Texas AgriLife Extension Service
BMP	best management practice
BR	Brazos River
CAFO	confined animal feeding operations
CAR	corrective action report
CD-ROM	compact disc-read only memory
CEAP	Conservation Effects Assessment Project
CFU	colony forming units of bacteria
COC	chain of custody
COL	colonies
CropMan	Crop Management
CRP	Clean Rivers Program
CS	College Station
CWA	Clean Water Act
DQO	data quality objectives
EPA	United States Environmental Protection Agency
FM	Farm to Market Road
GOALS	Goal Oriented Algorithm for Lasting Solutions
ID	identification
MAL	minimum analytical level
MDL	minimum detection limit
MSU	Midwestern State University
MUG	4-methylumbelliferyl-beta-D-glucuronide
NA	not applicable
NIST	National Institute of Standards and Technology
NPS	nonpoint source
PM	project manager
QA	quality assurance
QAO	quality assurance officer
QAPP	quality assurance project plan
QC	quality control
RPD	relative percent deviation
SH	state highway
SM	Standard Methods for the Examination of Water and Wastewater
SOP	standard operating procedure
SWCD	Soil and Water Conservation District
TCEQ	Texas Commission on Environmental Quality
TMDL	total maximum daily load
TSSWCB	Texas State Soil and Water Conservation Board
USDA	United States Department of Agriculture
USDA-ARS	United States Department of Agriculture – Agricultural Research Service
UV	ultraviolet light

Section A3: Distribution List

Organizations, and individuals within, which will receive copies of the approved QAPP and any subsequent revisions include:

United States Environmental Protection Agency, Region VI
6WQ-AT
1445 Ross Avenue
Suite 1200
Dallas, Texas 75202-2733

Name: Ellen Caldwell
Title: EPA Texas Nonpoint Source Project Manager

Texas State Soil and Water Conservation Board
P.O. Box 658
Temple, Texas 76503

Name: Pamela Casebolt
Title: Project Manager

Name: Donna Long
Title: QA Officer

Texas AgriLife Extension Service and Texas AgriLife Research - Department of Soil and Crop Sciences
Texas A&M University
MS 2474
College Station, Texas 77843-2474

Name: Monty Dozier
Title: Associate Professor and Extension Specialist - Water Resources
Project Manager and QAO

Name: Scott Senseman
Professor and AgriLife Research Lab Director

United States Department of Agriculture – Agricultural Research Service
808 E. Blackland Road
Temple, Texas 76502-6712

Name: Daren Harmel
Agricultural Engineer and Field Demo Coordinator

Section A4: Project/Task Organization

The following is a list of individuals and organizations participating in the project with their specific roles and responsibilities:

EPA – Provides project overview and funding at the Federal level.

Ellen Caldwell, Texas Nonpoint Source Project Manager
Responsible for overall performance and direction of the project at the Federal level. Ensures that the project assists in achieving the goals of the federal Clean Water Act (CWA). Reviews and approves the QAPP, project progress, and deliverables.

TSSWCB - Provides project overview and funding at the state level.

Pamela Casebolt, Project Manager
Responsible for ensuring that the project delivers data of known quality, quantity, and type on schedule to achieve project objectives. Tracks and reviews deliverables to ensure that tasks in the work plan are completed as specified.

Donna Long, Quality Assurance Officer
Reviews and approves QAPP and any amendments or revisions and ensures distribution of approved/revised QAPPs to TSSWCB and EPA participants. Responsible for verifying that the QAPP is followed by project participants. Determines that the project meets the requirements for planning, quality assessment (QA), quality control (QC), and reporting under the CWA Section 319 program. Monitors implementation of corrective actions. Coordinates or conducts audits of field and laboratory systems and procedures.

AgriLife Extension /AgriLife Research – Provides the primary point of contact between the TSSWCB and the project contractors. Tracks and reviews deliverables to ensure that tasks in the work plan are completed as specified. Responsible for coordination, review, and delivery of quarterly reports and the final project report.

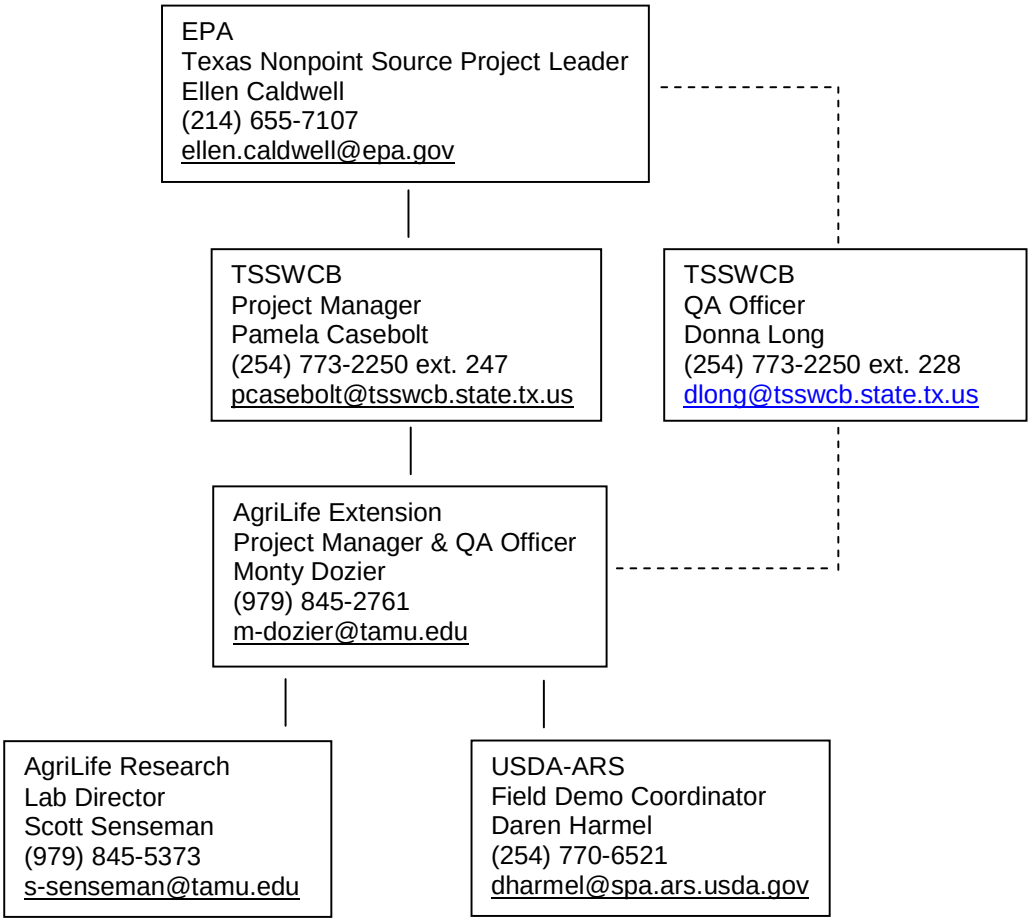
Monty Dozier, Project Manager and QAO
Responsible for sample collection and ensuring that tasks and other requirements in the contract are executed on time and as defined by the grant work plan; assessing the quality of work by participants; submitting accurate and timely deliverables and costs to the TSSWCB Project Lead; and coordinating attendance at conference calls, meetings, and related project activities. Responsible for determining that the QAPP meets the requirements for planning, quality control, quality assessment, and reporting for activities conducted by AgriLife Extension. Responsible for maintaining the official, approved QAPP and for distribution to project partners identified in Section A3.

Scott Senseman, AgriLife Research Lab Director
Responsible for analysis of all samples.

USDA-ARS -Coordinates all field work at the USDA-ARS facility in Riesel and collects storm generated runoff samples from edge of field.

Daren Harmel, Agricultural Engineer and Field Demo Coordinator
Responsible for maintenance of all demonstration plots, completion of all farm related activities, maintenance of automatic samplers, and collection and storage of runoff samples collected at the Riesel Station.

Figure A4-1: Project Organization Chart



Section A5: Problem Definition/Background

A goal of common interest now and in the future of the environmental and agricultural communities should be to prevent water quality degradation, and thus avoid ecological damage and the need for intense legal and regulatory pressure. Many previous efforts between agriculture and the State of Texas have focused on solving water quality problems after a determination that agriculture contributes to the problem.

In this project, the benefits of a proactive approach focused on achieving multiple objectives will be demonstrated on established poultry litter application sites near Riesel in Falls and McLennan Counties of Texas. Typically, a single objective such as sustainable agricultural production or short-term economic viability is the focus of agricultural producers; however, increasing concern for agriculture's contribution to water quality degradation is forcing farmers to also consider environmental protection. This type of approach that considers multiple objectives should be effective in minimizing current and preventing future water quality impairments. The approach can be effective on new poultry litter application sites, which are rapidly increasing in number in Central Texas because previous land application sites located near areas with extensive animal operations have reached or soon may reach soil P thresholds. With the increasing number of new 3rd party land application sites, it is important to demonstrate the benefits of utilizing proper conservation practices from the beginning.

This project will also assess the presence of bacteria (*E. coli*) based on the fact that waterbody segment 1242 (see Table A5-1) is located between Lake Brazos and the confluence of Navasota River and the Brazos River. Land uses in the watershed include intensive row crop agriculture and livestock production. Various crop protection and yield enhancing amendments are commonly used in the watershed. In addition, confined animal feeding operations (CAFOs) related to poultry production are located in the watershed.

Table A5-1: Bacteria Impaired Segments within the Project Area

Segment Name	Brazos River Above Navasota River
Segment #	1242 (D, I, K, L, M, N, & P)
HUC	12070101 & 12070103
Category	5c[1]
Priority	D

1 – Indicates additional data required before a TMDL is scheduled

The objectives of this project are as follows:

1. To educate 3rd party applicators of poultry litter to the environmental benefits of using proper application management techniques beginning on Day 1 of application on new sites.
2. Avoid potential nutrient-related water quality problems.
3. To demonstrate that poultry litter can be land applied in an environmentally friendly manner that supplies necessary crop nutrients without increasing nutrient levels in runoff.
4. To determine if multiple objectives (such as: profitability, resource utilization, and water quality protection) can be met with this fertilization strategy.
5. To determine if bacteria (*E. coli*) are present in surface runoff from agricultural land with applied poultry litter, and
6. To assess the presence of bacteria (*E. coli*) in segment 1242.

Section A6: Project/Task Description

General Project Description

The project will be conducted with the cooperation of several state and federal agencies, including AgriLife Extension, AgriLife Research, USDA-ARS, SWCDs in TSSWCB State Districts 3 and 5 and Midwestern State University (MSU). The responsibilities are briefly described below.

Demonstration sites will be established on ten watersheds at Riesel managed as typical farm and ranch fields that have received annual poultry litter application since 2001. Under the proposed project, litter application and management practices will be maintained by USDA-ARS and AgriLife Research personnel **(Task 1)**. Data on water and soil quality will continue to be collected by USDA-ARS personnel with USDA-ARS direct funding and Conservation Effects Assessment Project (CEAP) funding. These data will be used to support the demonstration efforts. AgriLife Extension /AgriLife Research personnel from College Station (CS) will secure runoff samples collected by automatic samplers during storm events at the demonstration plots maintained by USDA-ARS and AgriLife Research for analysis of the presence of bacteria in the runoff samples. AgriLife Extension and AgriLife Research-CS will also collect monthly grab samples (**TASK 4)** from nine sites associated with segment 1242 for analysis of the presence of bacteria. In addition, information on management practices and on-farm economics will be collected and analyzed by USDA-ARS, AgriLife Research, and MSU personnel **(Task 3)** and be used to strengthen the public participation and technology transfer components **(Task 2)**. Preliminary results indicate that poultry litter can be used in agricultural fertilization strategies without detrimental impacts on runoff water quality, but *only if* recommended management practices are followed. The importance of following these recommendations will be demonstrated by AgriLife Extension personnel with assistance from SWCD personnel **(Task 2)**.

Project Tasks, Estimated Costs, and Schedules to meet project objectives:

TASK 1: Maintain various nutrient management practices on cultivated and pasture fields to demonstrate the importance of using nutrient management BMPs for poultry litter application.

Subtask 1.1 Establish demonstration watershed sites at the USDA-ARS Grassland Soil and Water Research Center near Riesel, Texas.

Subtask 1.2 Conduct management practices on the project demonstration watersheds. Management practices will include: tillage, weed and insect control, crop production, and fertilizer application (including both poultry litter and commercial/inorganic formulations).

Subtask 1.3 Gather and record land management and crop yield information to support the technology transfer activities.

Deliverables:

- Runoff water quality data from plots
- Land management information including crop yields
- Net profits or losses associated with each production system

TASK 2: Conduct demonstration, educational, and technology transfer activities on the benefits of a pro-active approach to nutrient application management related to poultry litter application.

Subtask 2.1 Present information at field days in Falls and McLennan counties (where considerable interest in using organic fertilizers has been shown by the local agricultural producers).

Subtask 2.2 Present educational information generated from project during two agriculture producer meetings/field days annually in the Central Texas region outside of Falls and McLennan Counties.

Subtask 2.3 Present information generated from project during two state-wide Texas Plant Protection Association Annual meetings.

Subtask 2.4 Conduct a pre and post test questionnaire at one of the field days, annually, to determine knowledge gained as a measure of effectiveness of educational and technology transfer efforts.

Subtask 2.5 Develop an Extension publication on the "importance of doing things right" from the beginning on new application sites so that future problems are avoided.

Subtask 2.6 Place Extension publication on AgriLife Extension Bookstore website and AgriLife Extension Department of Soil and Crop Sciences website.

Deliverables:

- Agendas from field days/meetings
- Copies of presentations presented at field days/meetings
- Copy of Extension publication

TASK 3: Demonstrate the use of a decision support tool for use in managing on-farm nutrient application to meet the multiple objectives of profitability, animal by-product resource utilization, and water quality protection.

Subtask 3.1 Use the economic capabilities of CROPMAN to generate annual operating cost estimates to be used with measured data on yields and gross sales to produce on-farm profit data for each nutrient management alternative.

Subtask 3.2 Adapt a recently developed spreadsheet-based programming decision support tool called Goal Oriented Algorithm for Lasting Solutions (GOALS) for use in on-farm decision making.

Subtask 3.3 Use profit data and GOALS to demonstrate the various economic and environmental alternatives involved in nutrient management.

Subtask 3.4 Demonstrate the use of a decision support tool for use in managing on-farm poultry litter and other nutrient applications to meet the multiple objectives of profitability, animal by-product resource utilization, and water quality protection.

Deliverables:

- Annual on-farm profit data for each nutrient management alternative
- Economic data associated with each nutrient management alternative
- GOALS output for various scenarios

TASK 4: Develop and maintain a water sampling and analysis program for monthly grab samples collected from segment 1242 of the Brazos River and for runoff samples collected at the poultry litter application site to determine the presence of *E. coli* bacteria.

Subtask 4.1 Establish nine water sampling sites on segment 1242. The specific locations will be identified in the QAPP.

Subtask 4.2 Collect monthly grab water samples from each of the sampling sites identified in the QAPP.

Subtask 4.3 Process and analyze all grab water samples for the presence of *E. coli* bacteria.

Subtask 4.4 Secure runoff water samples collected from the edge-of-field demonstration sites on the Riesel watershed.

Subtask 4.5 Process and analyze all runoff water samples for the presence of *E. coli* bacteria.

Deliverables:

- QAPP for bacterial sampling
- Water quality data reports for grab samples from segment 1242 of the Brazos River
- Water quality data reports for runoff samples from the poultry demonstration sites

Table A6-1: Project Plan Milestones

Task	Project Milestone	Agency	Start	End
1.1	Establish demonstration watershed sites at Riesel	USDA-ARS	Dec. 05	Aug. 06
1.2	Maintain farm production practices on demonstration watershed sites	USDA-ARS	Jan. 06	Aug. 08
1.3	Gather and record land management and crop yield data	USDA-ARS	Dec. 05	Aug. 08
2.1	Present project information at Falls and McLennan County field days, seminars	AgriLife Extension	June 06	Aug. 08
2.2	Present project information at two producer meetings/field dates annually in Central Texas region	AgriLife Extension	June 06	Aug. 08
2.3	Present project information at two state-wide Texas Plant Protection meetings	AgriLife Extension	Jan. 06	Jan. 08
2.4	Develop AgriLife Extension publication on proper use of poultry litter to enhance crop yield and reduce a risk of WPS from application sites	AgriLife Extension	Dec. 07	Aug. 08
2.5	Place AgriLife Extension publication on AgriLife Extension Bookstore website and AgriLife Extension Department of Soil and Crop Sciences website	AgriLife Extension	Mar. 08	Aug. 08
3.1	Develop CROPMAN based production cost estimates	AgriLife Research	Jan. 07	Aug. 08
3.2	Adapt Goals support tool for use in on-farm decision making	MSU	Jan. 07	Aug. 08
3.3	Use Goals to demonstrate various economic and environmental alternatives	MSU	Jan. 07	Aug. 08
3.4	Demonstrate use of a decision support tool for managing on-farm poultry litter and other nutrient applications	MSU	Jan. 07	Aug. 08
4.1	Establish nine water sampling sites on Segment # 1242 of the Brazos River	AgriLife Extension	Jan. 06	June 06
4.2	Collect monthly grab samples at each sampling site	AgriLife Extension	Sept. 06	Aug. 08
4.3	Process and analyze all grab samples for the presence of *E. coli*	AgriLife Extension /AgriLife Research	Sept. 06	Aug. 08
4.4	Secure water samples collected from edge-of-field demonstration sites	AgriLife Extension	Sept. 06	Aug. 08
4.5	Process and analyze edge-of-field samples for presence of *E. coli*	AgriLife Extension /AgriLife Research	Sept. 06	Aug. 08

Complete and Submit Final Report	AgriLife Extension	June 08	Aug. 08

Section A7: Quality Objectives and Criteria for Measurement Data

The objective of this section is to ensure that data collected meets the data quality objectives (DQOs) of the project. Objective one is to monitor the presence of *E. coli* in segment 1242 of the Brazos River. A second objective is to monitor micro-watersheds at Riesel through data collection and analysis, and provide data to inform agencies and landowners of any potential or existing *E. coli* water quality issues and/or problems associated with use of poultry litter as a nutrient source.

Following are actions that will be undertaken by this project to assess the presence of *E. coli* in the Brazos River.

- Monitor water quality on nine sites as related to bacterial NPS pollution associated with segment 1242 by monthly in-stream water sampling.

The measurement performance criteria to support the project objective are specified in Table A7-1.

Routine manual grab samples with be collected from the Brazos River at nine sites on a monthly basis. Edge-of-field runoff samples will be collected when generated by storm events on the 13 micro-watersheds. All grab and runoff samples will be analyzed for the presence of *E. coli* and fecal coliform.

Precision

The precision of laboratory data is a measure of the reproducibility of a result from an analysis repeated. It is strictly defined as a measure of the closeness with which multiple analyses of a given sample agree with each other. Precision is assessed by repeated analyses of a sample. For quantitative microbiological analyses, the method to be used for calculating precision is the one outlined in *Standard Methods for the Examination of Water and Wastewater*, 20th Edition, section 9020 B.8.b.

$$RPD_{bacteria} = (\log X_1 - \log X_2)$$

The $RPD_{bacteria}$ should be lower than $3.27 \sum R_{log}/n$, where R_{log} is the difference in the natural log of duplicates for the first 15 positive samples.

Accuracy

Accuracy is a statistical measurement of correctness and includes components of systemic error. A measurement is considered accurate when the result reported does not differ from the true situation. Performance limits are specified in Table A7-1. An additional element of accuracy is the absence of contamination. This is determined through the analysis of field blank samples of sterile water taken to the field and processed in a manner identical to the sample. Requirements for field blank samples are discussed in Section B5.

Table A7-1: Data Quality Objectives for Measurement Data

Parameter	Units	Method Type	Method[1]	Method Description	MDL[2]/MAL	Precision of Laboratory Duplicates	Accuracy[3]	Precision of Field Duplicates	Percent Complete
E. coli in water	Colonies/ 100 mL	Membrane filter culture on m-ColiBlue24 broth	Millipore (EPA 40 CFR, parts 141 & 143)	Membrane Filter	1	3.27^{0} ∑Riog/n	NA	NA	90

1 – As modified for holding times (see B-2)
2 – MDLs for field parameters represent manufacturer specifications.
3 – Manufacturer specifications are presented for accuracy limits and method detection limits for field parameters.

Representativeness

Data collected under this project will be considered representative of ambient water quality conditions for the River sampling sites and stormwater runoff at Riesel. Representativeness is a measure of how accurately a monitoring program reflects the actual water quality conditions typical of a receiving water. The representativeness of the data is dependent on 1) the sampling locations, 2) the number of samples collected, 3) the number of years and seasons when sampling is performed, 4) the number of depths sampled, and 5) the sampling procedures. Site selection procedures will assure that the measurement data represent the conditions at the site. The goal for meeting total representation of the water body and watershed is tempered by the availability of time and funding. Representativeness will be measured with the completion of sample collection in accordance with the approved QAPP.

Comparability

The comparability of the data produced is predetermined by the commitment of the staff to use only approved procedures as described in this QAPP. Comparability is also guaranteed by reporting all ambient, high flow and QC data for evaluation by others.

Completeness

The completeness of the data is a measure of how much of the data is available for use compared with the total potential data. Ideally, 100% of the data would be available. However, the possibility of unavailable data due to accidents, weather, 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 percent data completion is achieved.

Section A8: Special Training Requirements/Certifications

All personnel involved in sampling, sample analyses, and statistical analyses will have the appropriate education and training required to adequately perform their duties. No special certifications are required. AgriLife Extension is responsible for all training related to bacterial sampling for the River. USDA-ARS is responsible for training associated with sampling on edge-of-field sites at Riesel. AgriLife Research is responsible for training in bacterial analysis. USDA-ARS will provide all training and certification related to agricultural management practices conducted on the micro-watershed sites.

Section A9: Documentation and Records

Hard copies of general maintenance records, all field data sheets, chain of custody forms (COCs), laboratory data entry sheets, calibration logs, and corrective action reports (CARs) will be archived by each participating partner based on task responsibilities for at least five years. In addition, AgriLife Extension will archive electronic forms of all project data for at least five years. A blank CAR form is presented in Appendix A, a blank COC form is presented in Appendix B, and a blank field data reporting form is presented in Appendix C.

Quarterly progress reports will note activities conducted in connection with the water quality monitoring program, items or areas identified as potential problems, and any variations or supplements to the QAPP. TSSWCB staff will review QAPP variations and supplements for approval. CARs will be utilized when necessary. CARs that result in any changes or variations from the QAPP will be made known to pertinent TSSWCB personnel and documented in an update or amendment to the QAPP. QAPP will be reviewed annually by TSSWCB staff and AgriLife Extension PM. All quarterly progress reports and QAPP revisions will be distributed to personnel listed in Section A3 by the AgriLife Extension PM.

The TSSWCB may elect to take possession of records at the conclusion of the specified retention period.

Section B1: Sampling Process Design (Experimental Design)

This project will be conducted by an integrated team among the multiple agencies and groups involved with the project to efficiently and effectively achieve project goals and to summarize activities and achievements made throughout the course of the project. However, the primary goal of this project is to monitor segment 1242 of the Brazos River and the Riesel micro-watersheds through data collection and analysis, and provide data to inform agencies and landowners of any potential or existing water quality issues and/or problems. Achievement of these objectives will support decisions regarding BMPs associated with the use of poultry litter in Central Texas production systems. The ambient water quality data collected in segment 1242 will provide a basis for a more sound scientific decision concerning the 5c bacteria impairment.

This project is designed to evaluate water quality parameters that indicate bacterial contamination. This project will also be used as an opportunity to educate area landowners concerning associated BMPs focused on reducing potential contamination sources within segment 1242 of the Brazos River. The waterborne constituents that will be measured are shown in Table B1-1.

Table B1-1: Waterborne Constituents

Parameter	Status	Reporting Units
E. coli	Critical	Colonies per 100 milliliters (col/mL)

The sampling program is designed to characterize water quality conditions in areas of segment 1242 of the Brazos River. Water quality grab samples will be collected on a routine monthly basis. Water quality samples collected as part of the routine sampling schedule will be analyzed for presence of *E coli*.

In order to obtain temporally representative results, including wet and dry conditions and seasonal variation, the ambient water sampling will occur on a routine schedule over the course of 24 months, and capture dry and runoff-influenced events at their natural frequency, as they occur. There will be no prejudice against rainfall or high flow events, except that the safety of the sampling crew will not be compromised in case of lightning or flooding. In the instance that a sampling site is inaccessible, “no sample due to inaccessibility” will be documented in the field notebook. If, near the end of the study, the TSSWCB PM/QAO agrees that the sampling has not achieved good representativeness of typical conditions, they may restrict the final sampling event(s) to target a particular condition (e.g., rainfall).

Sampling at Riesel will be done by use of Isco automatic stormwater samplers. USDA-ARS staff will collect samples from the Isco units at the conclusion of the storm event. Once samples are removed from the sampling units, samples will be stored under refrigeration until they are transported to the AgriLife Research Lab in College Station. All sites at Riesel are accessible to USDA-ARS staff.

The number of anticipated samples collected from segment 1242 is estimated at 216 samples based on 9 sites sampled once a month for 24 months. Stormwater samples are estimated at 260 based on 13 sampling sites x 20 expected/budgeted storm events over 24 months.

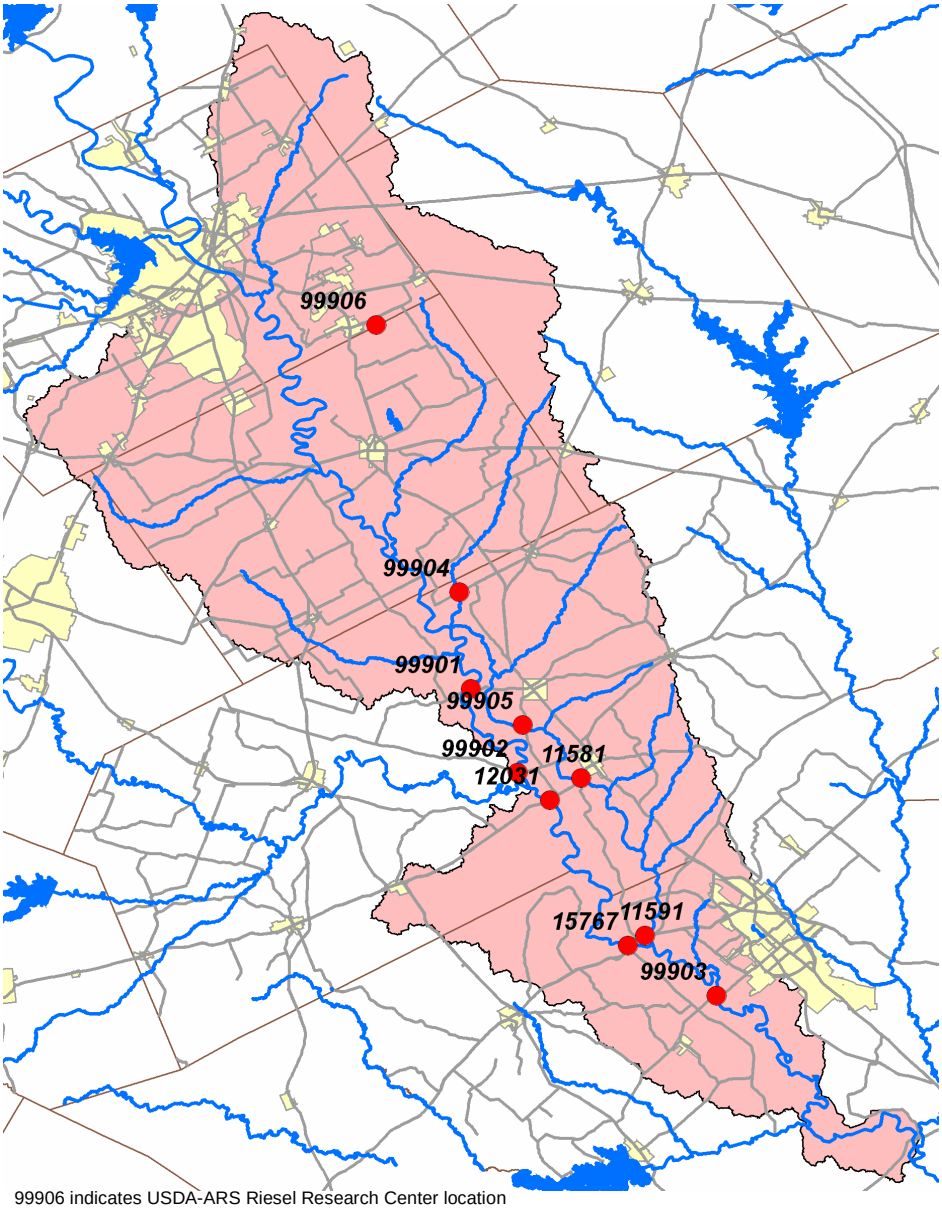
Table B1-2: Sampling Sites

Station ID[1,2]	Subwatershed & General Location	Latitude/Longitude	
99901	Brazos River at FM 979 West of Calvert	30.979856°N	96.758681°W
99902	Brazos River at FM 485 West of Hearne	30.865228°N	96.694598°W
12031	Brazos River at US 79 Southwest of Hearne	30.826822°N	96.650925°W
15767	Brazos River at SH 21 Northeast of Caldwell	30.627790°N	96.544205°W
99903	Brazos River at FM 60 Southwest of College Station	30.559275°N	96.423172°W
99904	Little Brazos River at FM 1373 Southwest of Bremond	31.112216°N	96.774097°W
11581	Little Brazos River at US 79 Southwest of Hearne	30.857475°N	96.607910°W
11591	Little Brazos River at SH 21 West of Bryan	30.641666°N	96.520836°W
99905	Little Brazos River at FM 1644 South of Calvert	30.930381°N	96.687531°W
ARSxx	USDA-ARS Riesel Research Center	31.478658°N	96.887761°W

FM = Farm to Market Road
US = United States Highway
SH = State Highway
1 – 999xx prefix indicates no existing TCEQ Station ID Number
2 – ARSxx prefix indicates 1 of 13 edge-of-field locations at USDA-ARS Riesel Research Center

Edge-of-field runoff samples from the Riesel micro-watershed demonstration site will also be collected as generated by natural storm events. These samples will also be analyzed for the presence of *E. coli*.

Figure B1-1: Sampling Location Map



99906 indicates USDA-ARS Riesel Research Center location

Section B2: Sampling Method Requirements

Water samples will be collected directly from the stream into sterile wide-mouthed polypropylene bottles. All sample containers will be labeled with the following information:

Station ID
Station Location
Description of Sample Site and Weather Conditions
Sampling Date
Sampling Time
Name of Sample Collector

For routine, ambient samples collected from river sites, staff will use a clean wire basket and rope from a bridge (upstream side) to collect the samples from the stream. Bottles will be held in the wire basket. Care will be taken to avoid contaminating the sample. Specifically, staff must utilize extreme care to ensure that the basket and rope not come into contact with the bridge. These samples will be transported at 4-6℃ in an iced container to the AgriLife Research laboratory for analysis. All samples must be received by the lab, filtered, and placed in the incubator within 8 hours of being collected from each river site. In the event routine samples can not be processed and incubated within 8 hours, samples will neither be analyzed nor reported and the collection event will be repeated.

In a study funded by EPA, Pope et al concluded, *E. coli* samples analyzed beyond 8 hours after sample collection still generate comparable *E. coli* data, provided that the samples are held below 10℃ and are not allowed to freeze. Pope reported a majority of sites (40 of 57) showed no significant differences in *E. coli* densities between the 0-hour and the 48-hour holding times. Additionally, Pope reported, a majority of *E. coli* samples (13 of 16) held at 20 and 35℃ showed no significant difference at the 8-hour hold time compared to the 0-hour results. [*Applied and Environmental Microbiology*, Oct. 2003, pp 6201 – 6207]

Stormwater samples from edge-of-field watershed sites at Riesel will be collected using automatic Isco samplers. These samples will be collected and stored by USDA-ARS for transport by AgriLife Extension to the AgriLife Research laboratory for analysis. 250 mL samples will be collected by automatic samplers, poured into sterile plastic bottles and stored in refrigeration at 4-6℃. Edge-of-field samples must be removed from automatic samplers and placed in refrigeration within 8 hours of the start of a runoff event, that is, from the first automatically collected stormwater sample. These samples must be transported to the AgriLife Research laboratory, filtered, and placed in the incubator within 48 hours of being retrieved from the automatic samplers and placed in refrigeration by USDA-ARS. All samples will be transported by AgriLife Extension at 4-6℃ to the AgriLife Research laboratory for analysis. All filtration and incubation will be performed in the laboratory. Samples must be filtered and incubated by AgriLife Research within 48 hours of retrieval from the automatic samplers. Samples must be stored at 4-6℃ until processed by AgriLife Research laboratory. In the event samples can not be processed and incubated within 48 hours, samples will neither be analyzed nor reported.

Table B2-1: Sample Volume, Container Types, Minimum Sample Volume, Preservation Requirements, and Holding Time Requirements

Parameter	Matrix	Container	Preservation	Sample Volume	Temperature	Max. Time From Collection to Placement in Incubator
E. coli	ambient water	sterile plastic bottle	None	500 ml	4 - 6°C	8 hours
E. coli	storm water	sterile plastic bottle	None	250 ml	< 35°C [1] 4 - 6°C [2]	8 hours[1] 48 hours[2]

1 – Automatic collection to manual retrieval
2 – Manual retrieval to incubation

Documentation of Field Sampling Activities

Sampling activities are documented on data reporting forms as presented in Appendix C and maintained in a field sampling notebook. The following will be recorded for all ambient water sampling:

Station ID
Station Location
Description of Sample Site and Weather Conditions
Sampling Date
Sampling Time
Name of Sample Collector

Recording Data

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

Legible writing with no modifications, write-overs or cross-outs
Correction of errors with a single line followed by an initial and date
Close-outs on incomplete pages with an initialed and dated diagonal line

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

Examples of failures in sampling methods and/or deviations from sample design requirements include but are not limited to such things as sample container problems, sample site considerations, etc. Failures or deviations from the QAPP are documented on the field data reporting form and reported to the sampling agency PM. The sampling agency PM will determine if the deviation from the QAPP compromises the validity of the resulting data. The sampling agency PM, in consultation with the TSSWCB QAO will decide to accept or reject data associated with the sampling event, based on best professional judgment. The resolution of the situation will be reported to the TSSWCB in the quarterly report.

Section B3: Sample Handling and Custody Requirements

Chain-of-Custody

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. The COC form is used to document sample handling during transfer from the field to the laboratory. The sample number, location, date, changes in possession and other pertinent data will be recorded in indelible ink on the COC. The sample collector will sign the COC and transport it with the sample to the laboratory. At the laboratory, samples are inventoried against the accompanying COC. Any discrepancies will be noted at that time and the COC will be signed for acceptance of custody. Sample numbers will then be recorded into a laboratory sample log, where the laboratory staff member who receives the sample will sign it. A copy of a blank COC form is included as Appendix B.

Sample Labeling

Samples are labeled on the container with an indelible, waterproof marker. Label information includes the site identification, the date, the sampler's initials, and time of sampling. The COC form will accompany all sets of sample containers.

Sample Handling

River Grab Samples
Following collection, samples are placed on ice in an insulated cooler for transport to the laboratory. At the laboratory, 500 ml samples are placed in a refrigerated cooler dedicated to sample storage. The Laboratory Supervisor has the responsibility to ensure that the 8 hour holding time is met with water samples. Any problems will be documented with a CAR.

Edge-of-Field Micro-Watershed Samples
Following collection by automatic samplers, a sample of 250 mL will be poured from the sampler bottles into a sterilized, plastic bottle. The subsamples are to be placed in the USDA-ARS station refrigeration storage unit until being transported to AgriLife Research lab. Samples are to be stored on ice during transport between the USDA-ARS station in Riesel to the AgriLife Research laboratory in College Station. Upon arrival at the AgriLife Research lab, samples are placed in a refrigerated storage unit. The Laboratory director has the responsibility to ensure that the 48 hour holding time is met with water samples. Any problems will be documented with a CAR.

Failures in Chain-of-Custody and Corrective Action

All failures associated with COC procedures are immediately reported to the TSSWCB PM. 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 AgriLife Extension PM and the TSSWCB PM/QAO will determine if the procedural violation may have compromised the validity of the resulting data. Any failures determined to have compromised the validity of the ambient data will result in the ambient sampling event being repeated. The resolution of the situation will be reported in the quarterly progress report to TSSWCB. CARs will be maintained by the

AgriLife Extension PM.

Section B4: Analytical Methods Requirements

E. coli in water samples will be isolated and enumerated by the laboratory using m-ColiBlue24 broth produced by Millipore as approved by the EPA (40 CFR; parts 141, 143). After the 24 hour incubation period at 35^0 C, blue colonies will be counted to determine number of *E. coli* colonies present. Red colonies are identified as coliform colonies.

All laboratory sampling areas and equipment will be sterilized with at least one or in any combination of the following methods: either ethyl alcohol or bleach.

Table B4-1: Laboratory Analytical Methods

Parameter	Method	Equipment Used
E. coli	Millipore m-Coliblue24 broth	Incubator, filtering apparatus

Failures in Analytical Methods and Corrective Action

Failures associated with analytical methodology are documented and reported via CARs. The AgriLife Extension PM, in consultation with the TSSWCB PM/QAO, will determine if the failure may have compromised the validity of the resulting data. Any failures determined to have compromised the validity of the data will render the data unacceptable or indeterminate. CARs will be maintained by the AgriLife Extension Project Manger. CARs will be included with quarterly progress reports to TSSWCB.

Section B5: Quality Control Requirements

Table A7-1 in Section A7 lists the required accuracy, precision, and completeness limits for the parameter of interest. It is the responsibility of the AgriLife Extension PM to verify that the data are representative. The AgriLife Extension PM also has the responsibility of determining that the 90 percent completeness criteria is met, or will, in conjunction with the TSSWCB PM/QAO, justify acceptance of a lesser percentage. All incidents requiring corrective action will be documented through use of CARs (Appendix A). Laboratory audits and quality assurance of field sampling methods will be conducted by the TSSWCB QAO. A laboratory audit and a field audit will each be conducted at least once per life of the project by the TSSWCB QAO.

Field Blanks

Field blanks consist of 250 ml of sterile distilled water that is taken to the field and transferred to the appropriate container in precisely the same manner as a sample during the course of a sampling event. They are used to assess the contamination from field sources such as air borne materials, carryover from prior sampling sites, and containers. A field blank should be included for each sampling event. The analysis of field blanks should yield a value of no colonies detected.

Laboratory Blanks

Laboratory blanks consist of 100 mL sterile distilled water that are processed in the same manner as a sample, at the beginning and the end of a sample set. They are used to assess the sterilization techniques employed throughout the sample process. Laboratory blanks will be included at the beginning and the end of the sample set for each sampling event. The analysis of laboratory blanks should yield a value of no colonies detected. A lab blank will be run for every 10 field samples processed.

Laboratory Duplicates

Analyze bacteriological laboratory duplicates with every tenth sample. If less than 10 samples are collected in a month, analyze one set of duplicates per month. When analyzing a bacteriological duplicate use another aliquot from the parent sample.

Failures in Quality Control and Corrective Action

Notations of blank contamination will be noted in the quarterly report and the final QA/QC Report. Corrective action will involve identification of the possible cause of the contamination failure where possible. Any failures determined to have compromised the validity of the data will result in the event being repeated. Any failures and methods employed to resolve such a situation will be reported to the TSSWCB in the quarterly progress report. CARs will be maintained by the AgriLife Extension PM.

Section B6: Equipment Testing, Inspection, & Maintenance Requirements

To minimize downtime of all measurement systems, spare parts for field and laboratory equipment will be kept in the laboratory, and all field measurement and sampling equipment, in addition to all laboratory equipment, will be maintained in a working condition. All field and laboratory equipment will be tested, maintained, and inspected in accordance with manufacturer's instructions and recommendations in Standard Methods for the Examination of Water and Wastewater, 20th Edition. Maintenance and inspection logs will be kept on each piece of laboratory equipment. General maintenance checklists will be filled out for field sampling equipment, by the field technician, on a quarterly basis.

Records of all tests, inspections, and maintenance will be maintained and log sheets kept showing time, date, and analyst signature by AgriLife Extension (field equipment), AgriLife Research (lab equipment), and USDA-ARS (automatic sampling units). These records will be available for inspection by the TSSWCB.

Failures in any testing, inspections, or calibration of equipment will result in a CAR and resolution of the situation will be reported to the TSSWCB in the quarterly report. CARs will be maintained by the AgriLife Extension PM.

Table B6-1: Equipment Inspection and Maintenance Requirements

Equipment (some or all may/may not apply to this project)	Relevant Testing, Inspection and Maintenance Requirement
Media dispensing apparatus	SM 9020 B 3.f
Refrigerator	SM 9020 B 3.l
Freezer	SM 9020 B 3.j
Membrane filter equipment	SM 9020 B 3.k
Biological safety cabinet	SM 9020 B 3.m
Incubators	SM 9020 B 3.o
Glassware and plastic ware	SM 9020 B 4.a
Utensils and containers	SM 9020 B 4.b
Automatic samplers	Manufacturer’s Guide

Section B7: Instrument Calibration and Frequency

All instruments or devices used in obtaining environmental measurement data will be calibrated prior to use. Each instrument has a specialized procedure for calibration and a specific type of standard used to verify calibration. Equipment requiring periodic calibrations includes, but is not limited to, automated samplers, thermometers, incubators, and other analytical and field instruments.

The frequency of calibration recommended by the equipment manufacturer, as well as any instructions specified by applicable analytical methods, will be followed. In the absence of manufacturer calibration recommendations, calibration requirements contained in the *TCEQ Surface Water Quality Monitoring Procedures* will be adhered to. All information concerning calibration will be recorded in a calibration logbook by the person performing the calibration and will be accessible for verification during either a laboratory or field audit.

All instruments or devices used in obtaining environmental measurement data will be used according to appropriate laboratory or field practices. Written copies of SOPs are available for review upon request.

Standards used for instrument or method calibrations shall be of known purity and be NIST traceable whenever possible. When NIST traceability is not available, standards shall be of American Chemical Society (ACS) or reagent grade quality, or of the best attainable grade. All certified standards will be maintained traceable with certificates on file in the laboratory. Dilutions from all standards will be recorded in the standards log book and given unique identification numbers. The date, analyst initials, stock sources with lot number and manufacturer, and how dilutions were prepared will also be recorded in the standards log book.

Failures in any testing, inspections, or calibration of equipment will result in a CAR and resolution of the situation will be reported to the TSSWCB in the quarterly report. CARs will be maintained by the AgriLife Extension PM.

Section B8: Inspection/Acceptance Requirements for Supplies and Consumables

All standards, reagents, media, plates, filters, and other consumable supplies are purchased from manufacturers with performance guarantees, and are inspected upon receipt for damage, missing parts, expiration date, and storage and handling requirements. Labels on reagents, chemicals, and standards are examined to ensure they are of appropriate quality, initialed by staff member and marked with receipt date. Volumetric glassware is inspected to ensure class "A" classification, where required. Media will be checked as described in quality control procedures. All supplies will be stored as per manufacturer labeling and discarded past expiration date. In general, supplies for microbiological analysis are received pre-sterilized, used as received, and not re-used.

Section B9: Data Acquisition Requirements (Non-Direct Measurements)

Crop yields for corn will be collected and reported in bushels per acre. Forage yields will be collected in tons per acre. This data will be used to determine yield results from fields receiving poultry litter applications to calculate economic returns.

Data collected from segment 1242 will be compared to results from the CRP and TCEQ sampling programs.

Table B9-1: Data Quality Objectives for Non-Direct Measurement Data

Parameter	Units	Method Type	Method	Method Description	MDL[1]/MAL	Precision of Laboratory Duplicates	Accuracy	Precision of Field Duplicates	Percent Complete
Crop Yield	bu/ac[2]	mech. harvest	USDA-ARS SOP	Field Observation	NA	NA	NA	NA	85
Forage Yield	tons/ac[3]	mech. harvest	USDA-ARS SOP	Field Observation	NA	NA	NA	NA	85

1 – MDLs for field parameters represent manufacturer specifications.
2 – Measured in bushels per acre
3 – Measured in tons per acre

Section B10: Data Management

Field Collection and Management of Samples

Field staff will visit river sampling sites on a monthly basis to collect grab water samples. Site identification, date, time, personnel, and any comments or conditions at the site are noted on a field data sheet. One field data sheet is filled out in the field for each site visited. An example of a field data sheet is shown in Appendix C.

Grab samples are collected at the site, and an identification number (either a sample identification number or a site code) is written in marker on the outside of the sterile, polypropylene sample bottle. The bottles are placed in an iced chest for transportation to the laboratory.

Sample identification numbers will include sample site number and collection date. Each sample bottle is labeled with the appropriate ID number by marking the number on each bottle. Sample ID numbers are recorded on the COC forms. Sample bottles being processed are typically placed in order of collection time, so the order of the sample bottles matches the order of the field data and the COC sample ID numbers, reducing transcription errors. Site name, time of collection, comments, and other pertinent data are copied from the field data sheets to the COC. The COC and accompanying sample bottles are submitted to laboratory, with relinquishing and receiving personnel both signing and dating the COC.

Original data recorded on paper files will be stored for at least five years in a locked, restricted-access, fire-resistant storage area. Electronic data files will be archived to CD-ROM after approximately one year, then maintained in the above storage area by AgriLife Extension PM.

Samples collected from the micro-watersheds will be identified by micro-watershed identification number, automatic sampler bottle sequence number, and date collected. Data from these samples will be managed as outlined for the river grab samples above.

Laboratory Data

All field samples will be logged into the laboratory upon receipt, COCs will be checked for number of samples, proper and exact I.D. number, signatures, dates, and type of analysis specified. TSSWCB will be notified if any discrepancies are found and laboratory analysis will not occur until proper corrections are made. All samples will be stored at 4ºC until analysis. Bacteriological samples will be given a unique identification number and logged into an electronic spreadsheet. Enumerated bacteriological data will be manually entered into the database system for electronic storage. The electronic spreadsheet will be created in Microsoft Excel or Corel QuatroPro software on an IBM-compatible microcomputer with Windows -based Operating System. Hard copies of data will be printed and housed in the laboratory for a period of five years. Any COCs and bacteriological records related to QA/QC of bacteriological procedures will be housed at AgriLife Extension College Station.

Data Reporting

Data will be reported according to the standards of the TSSWCB.

Data Dissemination

At the conclusion of the project, the AgriLife Extension PM will provide a copy of the complete project electronic database via recordable CD-ROM media to the TSSWCB PM, along with the final report. The TSSWCB may elect to take possession of all project records. However, summaries of the data will be presented in the final project report.

Section C1: Assessments and Response Actions

The following table presents the types of assessments and response action for activities applicable to this QAPP.

Table C1-1: Assessments and Response Actions

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	AgriLife Extension, AgriLife Research, and USDA-ARS	Monitoring of the project status and records to ensure requirements are being fulfilled. Monitoring and review of contract laboratory performance and data quality.	AgriLife Extension, AgriLife Research, and USDA-ARS will report to TSSWCB PM via quarterly report.
Laboratory Inspections	Once during life of project	TSSWCB QAO	Analytical and QC procedures employed at the laboratory.	AgriLife Extension has 30 days to respond in writing to the TSSWCB QAO to address corrective actions
Monitoring Systems Audit	Once during life of project	TSSWCB 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 project.	AgriLife Extension has 30 days to respond in writing to the TSSWCB QAO to address corrective actions

Corrective Action

The AgriLife Extension PM is responsible for implementing and tracking corrective action procedures as a result of audit findings. Records of audit findings are maintained by the TSSWCB QAO.

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

Section C2: Reports to Management

Quarterly progress reports will be generated by AgriLife Extension personnel and will note activities conducted in connection with the water quality monitoring program, items or areas identified as potential problems, and any variations or supplements to the QAPP. TSSWCB staff will review QAPP variations and supplements for approval. CARs will be utilized when necessary (Appendix A). CARs will be maintained in an accessible location for reference at AgriLife Extension in College Station. CARs that result in any changes or variations from the QAPP will be made known to pertinent project personnel, documented in an update or amendment to the QAPP and distributed to personnel listed in Section A3.

The river and edge-of-field measurement and sampling and laboratory analysis for the project will be done according to the QAPP. However, if the procedures and guidelines established in this QAPP are not successful, corrective action is required to ensure that conditions adverse to quality data are identified promptly and corrected as soon as possible. Corrective actions include identification of root causes of problems and successful correction of identified problem. CARs will be filled out to document the problems and the remedial action taken.

Section D1: Data Review, Validation, and Verification

All data obtained from field and laboratory measurements will be reviewed and verified for integrity, continuity, reasonableness, and conformance to project requirements, and then validated against the data quality objects outlined in Section A7. Only those data that are supported by appropriate QC data and meet the DQOs defined for this project will be considered acceptable for use. At least 10% of all data manually entered in the database will be reviewed for accuracy by the AgriLife Extension PM to ensure that there are not any transcription errors.

The procedures for verification and validation of data are described below. The AgriLife Extension PM is responsible for ensuring that field and laboratory data collected by staff is properly reviewed, verified, and submitted in the required format for the project database. The TSSWCB QAO is responsible for validating that all data collected meet the data quality objectives of the project.

Data Validation

Using the review of laboratory data, any parameters that are not representative of environmental conditions because they were generated through poor field or laboratory practices will not be submitted to the TSSWCB. This determination will be made by the AgriLife Extension PM, TSSWCB QAO, and other personnel having direct experience with the data collection effort. This coordination is essential for the identification of valid data and the proper evaluation of that data. The validation will include the following checks specified in Table D2-1.

Section D2: Validation and Verification 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 QC data conform to project specifications. The AgriLife Extension PM is responsible for the integrity, validation and verification of the data each field and laboratory task generates or handles throughout each process. The field and laboratory QA tasks ensure the verification of field 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 are evaluated against project specifications (Section A7 and Section B5) and are checked to ensure the verification of raw data for errors, especially errors in transcription, calculations, and data input. Potential outliers are identified by examination for unreasonable data, or identified using computer-based statistical software. If a question arises or an error or potential outlier is identified, the manager of the task responsible for generating the data is contacted to resolve the issue. Issues that can be corrected are corrected and documented electronically or by initialing and dating the associated paperwork. If an issue cannot be corrected, the AgriLife Extension PM consults with the TSSWCB QAO to establish the appropriate course of action, or the data associated with the issue are rejected.

The AgriLife Extension PM and TSSWCB QAO, as appropriate, are responsible for validating that the verified data are scientifically valid, defensible, of known precision, accuracy, integrity, meet the data quality objectives of the project, and are reportable to the TSSWCB.

Table D2-1: Data Review, Verification and Validation Procedures

Data to be Verified	Field Supervisor and Staff	Laboratory Supervisor and Staff	PM/QAO*
Collection and analysis techniques consistent with SOPs and QAPP	X	X	X
Field QC samples collected for all parameters as prescribed in the QAPP	X		X
Field documentation complete	X		X
Bacteriological records complete		X	X
Sample documentation complete	X	X	X
Field QC results within acceptance limits	X		X
Sample identifications	X	X	X
Chain of custody complete/acceptable	X	X	X
Sample preservation and handling	X	X	X
Holding times	X	X	X
Instrument calibration data	X	X	X
QC samples analyzed at required frequencies		X	X
QC samples within acceptance limits		X	X
Internal/external standards	X		X
Instrument readings/printouts	X	X	X
Calculations	X	X	X
Laboratory data verification for integrity, precision, accuracy and validation		X	X
Laboratory data reports		X	X
Data entered in required format	X	X	X
Site ID number assigned	X		
Absence of transcription error	X	X	X
Reasonableness of data	X	X	X
Electronic submittal errors	X	X	X
Sampling and analytical data gaps	X	X	X

*TSSWCB PM / QAO will monitor data for QA/QC purposes as needed.
All other entities are required to inspect 100% of the data prior to approval.

Section D3: Reconciliation with User Requirements

Data that have been reviewed, verified, and validated will be summarized for each site individually, as well as all sites together, for their ability to meet the data quality objectives of the project and the informational needs of water quality agency decision-makers. Data meeting project requirements will be used to 1) assess segment 1242's compliance with the single sample maximum and geometric mean bacteria standard, 2) assess the impact poultry litter application has on water quality with respect to bacteria concentrations, and 3) satisfy other projects tasks identified in Section A6, including conducting demonstration, educational, and technology transfer activities. These summaries will be included in the final report.

Appendix A
Corrective Action Report

CAR #:_____

Date:_____ Area/Location:_____

Reported by:_____ Activity:_____

State the nature of the problem, nonconformance or out-of-control situation:

_____

_____

_____

Possible causes:

_____

_____

_____

Recommended Corrective Actions:

_____

_____

_____

CAR routed to: _____

Received by: _____

Corrective Actions taken:

_____

_____

_____

Has problem been corrected? YES NO

Immediate Supervisor: _____ Project Manager: _____

TSSWCB QAO: _____

Appendix B
Chain of Custody Record

Chain of Custody Record

Page ________ of ________

Project No.		Client/Project					P.O. #
Lab ID No.	Field Sample No./ Identification	Date and Time	Sample Container (SizeMat'l)	Sample Type (Liquid Sludge, Etc.)	Preser-vative	ANALYSIS REQUESTED	LABORATORY REMARKS

Samplers: *(Print)*	Relinquished by: *(Signature)*	Date: Time:	Received by: *(Signature)*	Date: Time:	
Affiliation	Relinquished by: *(Signature)*	Date: Time:	Received by: *(Signature)*	Date: Time:	REC'D ON ICE Yes ____ No ____
	Relinquished by: *(Signature)*	Date: Time:	Received by Laboratory: *(Signature)*	Date: Time:	Intact:
Results by ________ Rush Charges Authorized Yes ______ No ______	REMARKS:		Data Results To:		Laboratory No.

Appendix C
Field Data Reporting Form