



**Texas State Soil and Water Conservation Board
 State Nonpoint Source Grant Program
 FY 2014 Project 14-50**

PROJECT SUMMARY PAGE		
Title of Project	Evaluation and demonstration of VTA effectiveness to protect runoff water quality on small pork production facilities in Texas	
Project Goals/Objectives	The goal of this project is to demonstrate and evaluate VTA effectiveness at small pork operations and transfer findings to natural resource agencies and pork producers	
Project Tasks	1) Project administration 2) VTA demonstration 3) VTA evaluation 4) Producer outreach and education	
Measures of Success	1) Evaluate the effectiveness of VTAs in reducing bacteria and nutrient runoff from three evaluation sites and one demonstration site 2) Ensure data of known and acceptable quality is collected utilizing established methods 3) Transfer results from VTA effectiveness evaluation/demonstration to landowners, natural resource agencies and others involved in animal waste management through presentations, a fact sheet and a refereed publication 4) Pursue incorporation of findings, as appropriate, into practice standards and program guidance of natural resource management agencies	
Project Type	Implementation (); Education (); Planning (); Assessment (x)	
Status of Waterbody on 2012 Integrated Report	<u>Segment ID:</u> 1209E 1213A 1902A	<u>Parameter:</u> bacteria bacteria Bacteria, Depressed DO Nitrate, Total Phosphorus
		<u>Category:</u> 5b 5c CN CS
Project Location (Statewide or Watershed and County)	<u>County</u> Bexar Bell Brazos Robertson	<u>Watershed</u> Martinez Creek Big Elm Creek Wickson Creek Little Brazos River
Key Project Activities	Hire Staff (); Surface Water Quality Monitoring (x); Technical Assistance (); Education (x); Implementation (); BMP Effectiveness Monitoring (x); Demonstration (x); Planning (); Modeling (); Bacterial Source Tracking (); Other ()	
Texas NPS Management Program Elements	<ul style="list-style-type: none"> • Component 1 LTGs A, B • Component 1 STGs 2B • Component 2 • Component 4 	
Project Costs	\$263,520	
Project Management	Texas Water Resources Institute (TWRI) United States Department of Agriculture – Agricultural Research Service (USDA-ARS)	
Project Period	September 1, 2013 – April 30, 2016	

Part I – Applicant Information

Applicant							
Project Lead		Dr. Kevin Wagner					
Title		Associate Director					
Organization		Texas Water Resources Institute					
E-mail Address		klwagner@ag.tamu.edu					
Street Address		1500 Research Parkway, Suite A240 2118 TAMU					
City	College Station	County	Brazos	State	TX	Zip Code	77843-2118
Telephone Number		979-845-2649		Fax Number		979-845-8554	

Project Co-Lead		Dr. Daren Harmel					
Title		Agricultural Engineer					
Organization		USDA-ARS					
E-mail Address		daren.harmel@ars.usda.gov					
Street Address		808 E. Blackland Rd.					
City	Temple	County	Bell	State	TX	Zip Code	76502
Telephone Number		254-770-6521		Fax Number		254-770-6561	

Project Partners	
Names	Roles & Responsibilities
Texas State Soil and Water Conservation Board (TSSWCB)	<ul style="list-style-type: none"> - Provide state oversight and management of all project activities and ensure coordination of activities with related projects. - Assist with soil sampling.
USDA-NRCS	<ul style="list-style-type: none"> - Assist with soil sampling.
USDA-ARS, Grassland, Soil and Water Research Laboratory	<ul style="list-style-type: none"> - Stormwater sampling training and assistance. - Soil sampling and analysis. - Laboratory analysis for sediment, nitrogen, phosphorus. - Lead data analysis and reporting. - Dissemination of project findings.
Guadalupe – Blanco River Authority (GBRA)	<ul style="list-style-type: none"> - Weekly sampler maintenance, data download, and grab sample collection. - Stormwater sample retrieval. - Laboratory analysis for <i>E. coli</i> (1603) for Bexar County site.
Texas Water Resources Institute (TWRI)	<ul style="list-style-type: none"> - Project management. - Quality assurance management - Manage subcontract for water quality sampling. - Assist with data analysis and reporting. - Dissemination of project findings.
Texas A&M Soil & Aquatic Microbiology Lab (SAML)	<ul style="list-style-type: none"> - Laboratory analysis for <i>E. coli</i> (1603) for Bell, Brazos and Robertson County sites.
Cooperating pork producers	<ul style="list-style-type: none"> - Conduct land management. - Record land management data for VTA and grazed pasture sites.

Part II – Project Information

Watershed Information				
Watershed Name	Hydrologic Unit Code (8 Digit)	Segment ID	305(b) Category	Size (Acres)
Martinez Creek	12100304	1902A	CN	22,833
Big Elm Creek	12070204	1213A	5c	642,127
Little Brazos River	12070101	1242E	N/A	104,847
Wickson Creek	12070103	1209E	5b	74,816

Water Quality Impairment

IMPAIRMENTS:

2010 Texas Integrated Report

Segment 1209E: Wickson Creek- Perennial stream from the confluence with an unnamed first order tributary (approximately 1.3 km upstream of Reliance Road crossing) upstream to the confluence with an unnamed first order tributary approximately 15 meters upstream of Dilly Shaw Road

	<u>Impairment</u>	<u>Category</u>	<u>Year Listed</u>
1209E_01: Entire water body	bacteria	5b	2006

Segment 1213A: Big Elm Creek- From the confluence with Little River in Milam county, 4.5 km northeast of the City of Cameron, upstream to its headwaters in McLennan County, 0.7 km west of Moody.

	<u>Impairment</u>	<u>Category</u>	<u>Year Listed</u>
1213A_01: Portion of Big Elm Creek from the confluence with the Little River upstream to confluence with Little Elm Creek.	bacteria	5b	2010

2012 Texas Integrated Report

Segment 1209E: Wickson Creek- Perennial stream from the confluence with an unnamed first order tributary (approximately 1.3 km upstream of Reliance Road crossing) upstream to the confluence with an unnamed first order tributary approximately 15 meters upstream of Dilly Shaw Road

	<u>Impairment</u>	<u>Category</u>	<u>Year Listed</u>
1209E_01: Entire water body	bacteria	5b	2006

Segment 1213A: Big Elm Creek- From the confluence with Little River in Milam county, 4.5 km northeast of the City of Cameron, upstream to its headwaters in McLennan County, 0.7 km west of Moody.

	<u>Impairment</u>	<u>Category</u>	<u>Year Listed</u>
1213A_01: Portion of Big Elm Creek from the confluence with the Little River upstream to confluence with Little Elm Creek.	bacteria	5c	2010

Segment 1902A: Martinez Creek (unclassified waterbody) - Perennial stream from the confluence with Escondido Creek upstream to Binz-Engleman Road.

	<u>Impairment</u>	<u>Category</u>
1902A_01: From confluence with Cibolo Creek to confluence with Salatrillo Creek.	bacteria	CN

1902A_03: From confluence with Escondido Creek to about 1.9 miles downstream of IH 10.

	<u>Impairment</u>	<u>Category</u>
1902A_04: From approximately 1.1 km downstream of FM 1516 to Binz-Engleman Road.	depressed dissolved oxygen	CN

	<u>Impairment</u>	<u>Category</u>
1902A_03: From confluence with Escondido Creek to about 1.9 miles downstream of IH 10.	nitrate	CS

	<u>Impairment</u>	<u>Category</u>
1902A_01: From confluence with Cibolo Creek to confluence with Salatrillo Creek.	total phosphorus	CS

Project Narrative

Problem/Need Statement

On December 15, 2002, the Administrator of the United States Environmental Protection Agency (EPA) signed the final rule regulating concentrated animal feeding operations (CAFOs). In this rule, it reinforced the need for all animal feeding operations (AFOs), regardless of the definition as a CAFO and required to operate under the coverage of a National Pollutant Discharge Elimination System (NPDES) permit, to manage manures and wastewater by-products in a manner that is protective of waters of the U.S. The requirement for nutrient management plans (NMPs) and the recommendation that all AFOs obtain comprehensive nutrient management plans (CNMPs) was a key strategy for achieving maximum protection. As EPA has delegated the NPDES program to the State of Texas, the Texas Commission on Environmental Quality (TCEQ) has adopted the Texas Pollutant Discharge Elimination System (TPDES) under administrative rule, and certain management practices and technical requirements specific to unpermitted AFOs in Texas Administrative Code §321.47.

In Texas, the Texas State Soil and Water Conservation Board (TSSWCB), the agency responsible for the management, prevention, and abatement of nonpoint source (NPS) pollution from agricultural and silvicultural activities, administers a certified Water Quality Management Plan (WQMP) Program. The term NPS, as it relates to AFOs, is loosely used to differentiate between AFOs, which do not require written authorization from TCEQ, from point source CAFOs, which do require written authorization under a permit. Because of this understanding, the TSSWCB's WQMP Program is applicable for any AFO not defined as a CAFO. There are approximately 3000 such AFOs currently operating under the authority of a WQMP certified in accordance with Texas Agriculture Code §201.026. The technical elements of a WQMP are based entirely on the United States Department of Agriculture - Natural Resource Conservation Service's (NRCS) Field Office Technical Guide (FOTG), which is the best available technology and the basis for many of the management practices and agricultural engineering standards incorporated into the permitting program. A certified WQMP developed for an AFO that meets the technical requirements of the FOTG is a CNMP. A WQMP is effectively a conservation plan that includes a functionally equivalent level of environmental protection from a voluntary perspective. As a result, the TSSWCB encourages as many AFOs as possible to voluntarily participate in the WQMP Program, even if they are not explicitly required to obtain permit coverage.

Historically, the dairy and poultry industries have demonstrated significant levels of interest in WQMPs and make up the bulk of the AFOs currently participating. In contrast, limited participation of the pork industry has occurred largely due to logistical and operational issues on smaller operations. Smaller pork facilities generally operate on smaller tracts of land that do not support traditional animal waste management systems such as waste storage ponds, treatment lagoons, and significant expanses of land application acreage. The manure and wastewater is generally kept contained in "waste pits" and other structural measures that may or may not be adequate. As a result, this project will evaluate an alternative wastewater treatment system including manure scraping and offsite hauling and a vegetated treatment area (VTA) that was designed by NRCS to treat runoff and wash water prior to leaving the VTA. This system is compatible with the style of operation of small producers and was designed to function well with minimal management intensity. In addition, this project will serve to demonstrate the potential effectiveness of the alternative system to the regulatory community and unpermitted pork producers, thus encouraging increased participation in the WQMP program. Finally, this project will provide scientific evaluation of the system for possible inclusion into the WQMP Program as an approved practice and assistance from the EQIP Program.

Project Narrative

General Project Description

This project will evaluate the alternative wastewater treatment system, which was designed for small pork production facilities in Texas and includes manure scraping, offsite hauling and a VTA. The implementation and demonstration of the system was initiated through several previous TSSWCB projects. These include:

- *Demonstration of Alternative Best Management Practices for Small Pork Production Facilities (09-56, 11-53)*
- *Continued Demonstration of Alternative Best Management Practices for Small Pork Production Facilities (12-50)*
- *Preliminary Evaluation of VTA Effectiveness to Protect Runoff Water Quality on Small Pork Production Facilities in Texas (12-53)*

In the current project (14-50), demonstration of the system will be conducted at one small pork production facility in Bexar County in years 1-2. Further, evaluation of the system will be conducted on three small pork production facilities in Bell, Brazos, and Robertson Counties (See Figure 1) in years 1-3. At each of these facilities, water quality monitoring stations have been established: 1) on a control site (with the exception of the demonstration site) to represent typical rural/agricultural land use, 2) below the pens and barns to quantify water quality leaving the facility prior to treatment in the VTA, and 3) at the VTA outlet to quantify effectiveness of the VTA in treating runoff. Rainfall depth, rainfall intensity, and flow will be measured for each event. Event mean concentrations for *E. coli*, nitrogen (N) and phosphorus (P) will be determined for each runoff event where sufficient sample volume is available. The project will allow scientific evaluation of the quality of water entering VTAs from runoff and washing and the water quality exiting the VTAs. Soil sampling will also be conducted to assess the spatial distribution and transport of nutrients within the VTAs.

Data produced in this project will be used by TWRI and USDA-ARS to evaluate VTAs as alternative wastewater treatment systems for small pork production facilities. At the conclusion of the project, TWRI and USDA-ARS will provide findings to TSSWCB, USDA-NRCS and others to show the effectiveness or lack thereof of VTAs to protect runoff water quality on small pork production facilities. Results of the VTA effectiveness will be distributed through outreach materials and producer meetings. If VTA effectiveness is confirmed, TWRI and USDA-ARS will develop a fact sheet summarizing the effectiveness of the VTA practice. This will be submitted to TSSWCB for review prior to publication. USDA-ARS and TWRI will present results to the Pork Producers Association and at State and National meetings. Finally, if VTA use is shown to be an effective practice, TWRI, TSSWCB, and USDA-ARS will work with USDA-NRCS and TCEQ to incorporate results into practice standards and achieve acceptance of this practice for meeting required environmental safeguards.

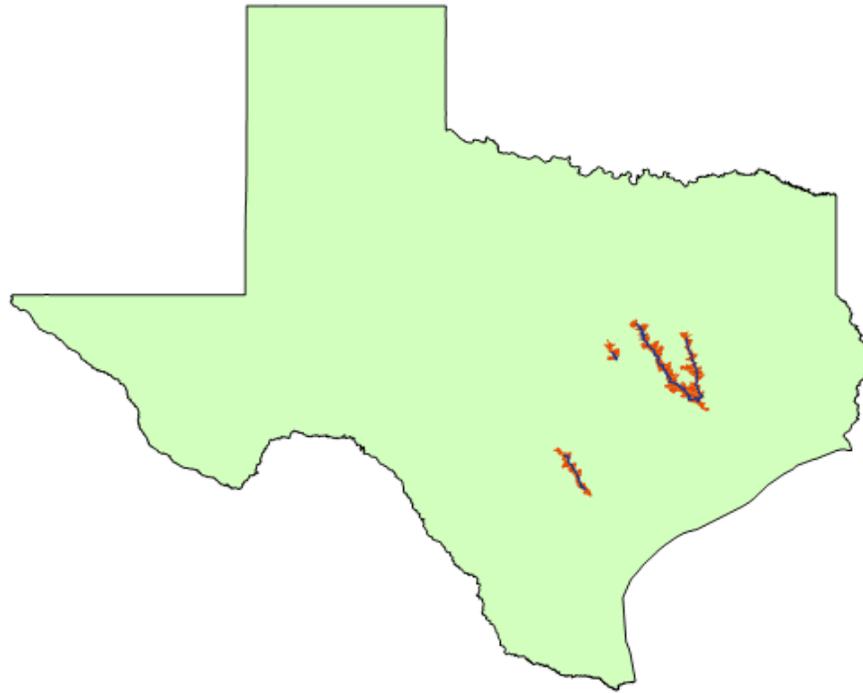


Figure 1. Map of watersheds potentially affected by project.

Project Goals (Expand from Summary Page)

Goal: Reduce bacteria and nutrient runoff from small pork operations

Objectives:

- 1) Demonstrate and evaluate VTA effectiveness at small pork operations.
- 2) Transfer findings to natural resource agencies and pork producers.

Measures of Success (Expand from Summary Page)

To achieve the goals of this project, the project team will 1) evaluate the effectiveness of VTAs in reducing bacteria and nutrient runoff from three evaluation sites and one demonstration site, 2) ensure data of known and acceptable quality are collected utilizing established methods, 3) transfer results from VTA effectiveness evaluation/demonstration to landowners, natural resource agencies and others involved in animal waste management through presentations, a fact sheet and a refereed publication, and 4) pursue incorporation of findings, as appropriate, into practice standards and program guidance of natural resource management agencies.

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

- **Component 1** – Explicit short- and long-term goals, objectives and strategies that protect surface and ground water.
- **Long-Term Goal – Objective 2** – Support the implementation of state, regional, and local programs to prevent NPS pollution through assessment, implementation, and education.
- **Short-Term Goal 2 – Implementation – Objective B** – Develop and implement BMPs to address constituents of concern or waterbodies not meeting water quality standards in watersheds identified as impacted by NPS pollution.
- **Component 2** – Working partnerships and linkages to appropriate state, regional, and local entities, private sector groups, and federal agencies.
- **Component 4** – Abatement of water quality impairments from NPS pollution and prevention of significant threats to water quality from present and future NPS activities.

Tasks, Objectives and Schedules						
Task 1:	Project Administration					
Costs:	Federal:	\$20,000	Non-Federal:	\$0	Total:	\$20,000
Objective:	To effectively administer, coordinate, and monitor all work performed under this project including technical and financial supervision and preparation of status reports.					
Subtask 1.1:	TWRI and USDA-ARS will prepare electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 15 th of December, March, June and September. QPRs shall be provided to all project partners.					
	Start Date:	Month 1	Completion Date:	Month 32		
Subtask 1.2:	TWRI will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly.					
	Start Date:	Month 1	Completion Date:	Month 32		
Subtask 1.3:	TSSWCB will host coordination meetings or conference calls with project partners, and any subcontractors as appropriate, at least bi-annually to discuss project activities, project schedule, communication needs, deliverables and other requirements.					
	Start Date:	Month 1	Completion Date:	Month 32		
Subtask 1.4:	Quality assurance: Implement data quality objectives (DQOs) and quality assurance/control (QA/QC) activities to ensure data of known and acceptable quality are generated through this project. TWRI will submit annual revisions and necessary amendments to the QAPP originally developed under TSSWCB project #12-53.					
	Start Date:	Month 21	Completion Date:	Month 32		
Subtask 1.5:	TWRI and USDA-ARS will develop the project final report for submission to TSSWCB.					
	Start Date:	Month 30	Completion Date:	Month 32		
Deliverables	<ul style="list-style-type: none"> • Quarterly Progress Reports in electronic format • Reimbursement forms • QAPP with annual revisions and amendments • Final Report 					

Tasks, Objectives and Schedules						
Task 2:	VTA Demonstration					
Costs:	Federal:	\$16,084	Non-Federal:	\$0	Total:	\$16,084
Objective:	Manage site and measure runoff water quality from the Bexar County VTA and its barn outlets.					
Subtask 2.1:	Land management. The cooperating hog farm will perform grazing management, tillage, weed and insect control, fertilizer application, and crop production on the VTA. Cooperator will gather and record land management data for each site and provide that data to USDA-ARS.					
	Start Date:	Month 1	Completion Date:	Month 24		
Subtask 2.2:	Soil sampling. TSSWCB and USDA-NRCS with assistance from USDA-ARS will collect soil samples. USDA-ARS will analyze soil samples to evaluate N and P movement and potential buildup in the VTA.					
	Start Date:	Month 1	Completion Date:	Month 24		
Subtask 2.3:	Grab sampling. If flowing, weekly grab samples will be collected by GBRA at the outlet of each barn and at the outlet of the VTA.					
	Start Date:	Month 1	Completion Date:	Month 24		
Subtask 2.4:	Stormwater sampling. Stormwater runoff samples will be collected by GBRA at the outlet of the VTA following runoff events.					
	Start Date:	Month 1	Completion Date:	Month 24		

Subtask 2.5:	Lab analysis of water quality samples. GBRA will perform <i>E. coli</i> analysis on samples from the Bexar County hog farm site. USDA-ARS will perform N and P analysis for all samples.			
	Start Date:	Month 1	Completion Date:	Month 24
Deliverables	<ul style="list-style-type: none"> VTA demonstration results described in fact sheet (Task 4.1), presentations (Task 4.2-4.3), practice standards (Task 4.4), journal article (Task 4.5), and final report (Task 1.5) 			

Tasks, Objectives and Schedules						
Task 3:	VTA Evaluation					
Costs:	Federal:	\$207,436	Non-Federal:	\$0	Total:	\$207,436
Objective:	Manage sites and measure runoff water quality from VTA inlets and outlet and an adjacent pasture site on small hog farms in Bell, Brazos, and Robertson counties.					
Subtask 3.1:	Land management. Cooperating hog farms will perform grazing management, tillage, weed and insect control, fertilizer application, and crop production on VTAs and adjacent pastures. Cooperators will gather and record land management data for each site and provide that data to USDA-ARS.					
	Start Date:	Month 1	Completion Date:	Month 32		
Subtask 3.2:	Soil sampling. USDA-ARS with assistance from TSSWCB and USDA-NRCS, will collect and analyze soil samples to evaluate N and P movement and potential buildup in the VTAs and adjacent pastures.					
	Start Date:	Month 1	Completion Date:	Month 32		
Subtask 3.3:	Grab sampling. If flowing, weekly grab samples will be collected by USDA-ARS at the inlet and outlet of each VTA and at the adjacent pasture.					
	Start Date:	Month 1	Completion Date:	Month 32		
Subtask 3.4:	Stormwater sampling. Stormwater runoff samples will be collected by USDA-ARS at the inlets and outlets of each VTA site and the adjacent pasture following runoff events.					
	Start Date:	Month 1	Completion Date:	Month 32		
Subtask 3.5:	Lab analysis of water quality samples. SAML will perform <i>E. coli</i> analysis on samples from the Bell, Brazos and Robertson County hog farm sites. USDA-ARS will perform N and P analysis for all samples.					
	Start Date:	Month 1	Completion Date:	Month 32		
Deliverables	<ul style="list-style-type: none"> VTA evaluation results described in fact sheet (Task 4.1), presentations (Task 4.2-4.3), practice standards (Task 4.4), journal article (Task 4.5), and final report (Task 1.5) 					

Tasks, Objectives and Schedules						
Task 4:	Producer Outreach and Education					
Costs:	Federal:	\$20,000	Non-Federal:	\$0	Total:	\$20,000
Objective:	To provide the results of the VTAs' effectiveness and evaluation to pork producers, natural resource agencies, and others involved in animal waste management.					
Subtask 4.1:	If VTA effectiveness is confirmed, TWRI and USDA-ARS will develop and distribute a fact sheet summarizing the results of the VTA evaluation.					
	Start Date:	Month 12	Completion Date:	Month 32		
Subtask 4.2:	USDA-ARS and TWRI will present results to the Pork Producers Association and at other venues as needed to disseminate the results of the VTA effectiveness study.					
	Start Date:	Month 12	Completion Date:	Month 32		
Subtask 4.3:	USDA-ARS, TWRI, and SAML will deliver presentations at State and National meetings to disseminate results of the VTA evaluation.					
	Start Date:	Month 1	Completion Date:	Month 32		

Subtask 4.4:	If VTA use is shown to be an effective practice, TWRI, TSSWCB, and USDA-ARS will work with USDA-NRCS and TCEQ to incorporate results into practice standards and achieve acceptance of this practice for meeting required environmental safeguards.			
	Start Date:	Month 12	Completion Date:	Month 32
Subtask 4.5:	USDA-ARS, TWRI, and SAML will draft a journal article describing the evaluation and its results.			
	Start Date:	Month 12	Completion Date:	Month 32
Deliverables	<ul style="list-style-type: none"> • Fact Sheet • Presentation(s) to Pork Producers Association • Presentation(s) at State and National meetings • Revise practice standards/environmental requirements, if appropriate • DRAFT refereed journal publication 			

Part III – Financial Information

Budget Summary	
Category	Costs
Personnel	\$53,410
Fringe Benefits	\$14,384
Travel	\$1,380
Equipment	\$0
Supplies	\$15,140
Contractual	\$141,021
Construction	\$0
Other	\$3,813
Total Direct Costs	\$229,148
Indirect Costs (15%)	\$34,372
Total Project Costs	\$263,520

Budget Justification		
Category	Costs	Justification
Personnel	\$53,410	<ul style="list-style-type: none"> • TWRI PI @ 0.05 FTE in Yr-1 and 0.20 FTE in Yr-2, and 0.59 mos. in Yr-3 (\$24,152) • TWRI QAO @ 0.01 FTE in Yr-1 and Yr-2 (\$1,202) • TWRI Communications Manager @ 0.04 FTE in Yr-2, and 0.74 mos. in Yr-3 (\$5,428) • TWRI Communications Coordinator @ 1.44 mos. in Yr-3 (\$5,120) • TWRI Program Manager @ 0.03 FTE in Yr-1 and Yr-2 (\$2,984) • SAML Graduate Student @ 0.25 FTE in Yr-1 and Yr-2, and 1.2 mos. in Yr-3 (\$14,524)
Fringe Benefits	\$14,384	17.4% of TWRI personnel + group health (\$474/mo) prorated per FTE Graduate Student benefits are 10.3% of salary + group health (\$300/mo)
Travel	\$1,380	Out-of-state travel to 1 national conference @ \$1,380/trip (\$1,380)
Equipment	\$0	N/A
Supplies	\$15,140	SAML (539 samples @ \$28 ea = \$15,092) Other miscellaneous sampling supplies (\$48)
Contractual	\$141,021	Subcontracts for water quality sampling. <ul style="list-style-type: none"> • USDA-ARS (\$134,110) • GBRA (\$6,911)
Construction	\$0	N/A
Other	\$3,813	<ul style="list-style-type: none"> • TWRI Publication Costs (\$1,992) • TWRI statistics software license (\$28) • TWRI storage rental fee (\$140) • TWRI Conference Registration (\$525) • SAML Chemicals & Gases (\$852) • SAML Computer Parts (\$276)
Indirect	\$34,372	15% of Total Direct Costs

Contractual Budget Justification – USDA-ARS		
Category	Costs	Justification
Personnel	\$50,000	USDA-ARS Agricultural Engineer @ .5 FTE in YR 1 and 2 (\$50,000)
Fringe Benefits	\$4,000	Calculated at 8% of USDA-ARS personnel costs
Travel	\$5,429	Out-of-state travel to regional/national meeting to present results (\$1,219) In-state travel to sampling sites (\$0.555/mile rate, 154 miles) (\$4,210)
Equipment	\$0	N/A
Supplies	\$17,400	Purchase of water quality sampling equipment supplies including, but not limited to, tubing, batteries, replacement of failing components (\$7,500/year in yrs 1-2 and \$2,400 in yr-3)
Contractual	\$0	N/A
Construction	\$0	N/A
Other	\$39,788	Soil sampling and soil and water analysis (\$17,788) Landowner costs (\$22,000)
Indirect	\$17,493	15% of Total Direct Costs

Contractual Budget Justification – GBRA		
Category	Costs	Justification
Personnel	\$3,543	GBRA staff @ \$40/hr X 3,691 hrs/mo X 24 mos. = (\$3,543)
Fringe Benefits	\$1,288	Calculated at 36.37% of GBRA personnel costs
Travel	\$746	In-state travel to Bexar County site; 31 trips, 43.36 mi/trip @ \$.555/mi = (\$746)
Equipment	\$0	N/A
Supplies	\$0	N/A
Contractual	\$0	N/A
Construction	\$0	N/A
Other	\$440	<i>E.coli 1603 method</i> water analysis for Bexar County site
Indirect	\$894	15% of Total Direct costs