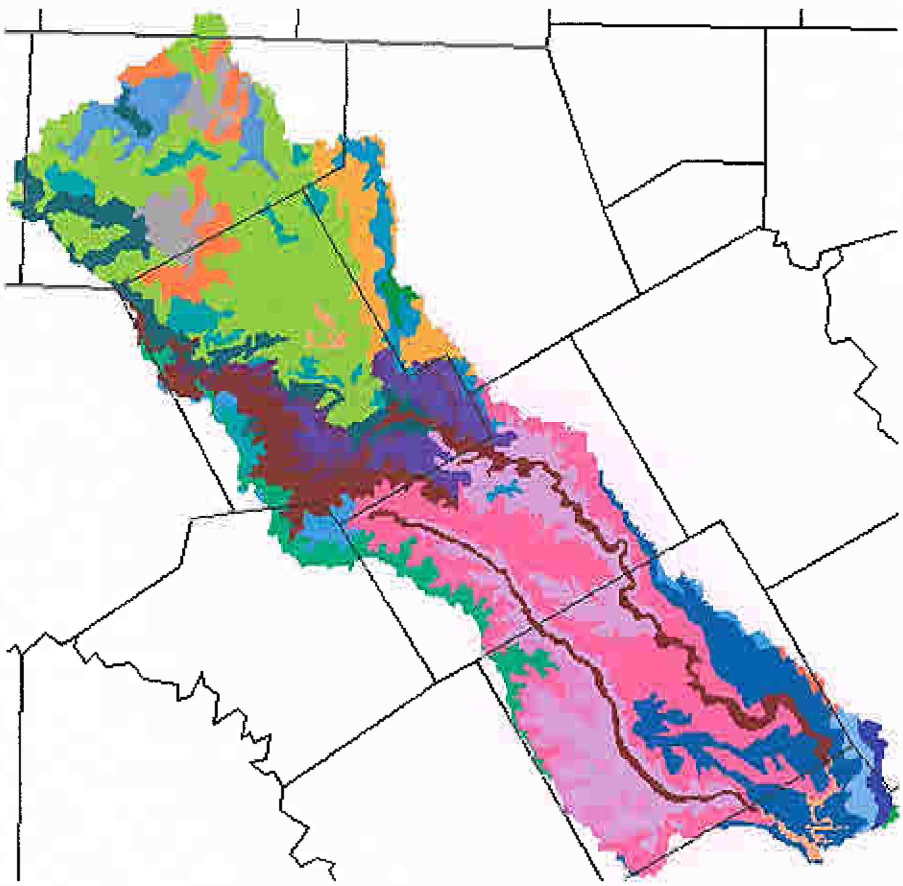
Leon River Watershed Project

Final Report

FY 94 CWA, Section 319 (h) Project

Texas Agricultural Experiment Station
Blackland Research Center
Temple, Texas



July 1999

Leon River: Texas State Soil and Water Conservation Board 319(h) Base Grant

FINAL REPORT

Texas Agricultural Experiment Station
Temple, Texas
Contract # 994-592-556D/H-C9-996236-01-0
FY 95 CWA Section 319(h)

Final Report

FY1994-1998

Principal Investigators
Wesley Rosenthal
Dennis Hoffman

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Appendices

Acknowledgements

The statewide implementation of this project required a great deal of cooperation and participation from several state and federal agencies. We would especially like to express our gratitude to the Texas Agricultural Extension Service and Natural Resources Conservation Service managers located in the Leon River Watershed for providing technical assistance, and supporting data. A special thanks goes to the Texas State Soil and Water Conservation Board for their promotional support and excellent management of this project.

INTRODUCTION

In the 1994 EPA base grant for the Texas State Soil and Water Conservation Board, one of the efforts was to implement best management practices through utilization of tools including targeting, geographical information systems, hydrologic modeling, water quality monitoring, education, demonstration technical assistance, and best management (BMP) implementation tracking for the Leon River watershed above Lake Belton. The watershed includes the Leon River, Belton Lake, Proctor Lake and Cowhouse Creek. Municipalities include Eastland, Comanche, Hamilton, and Gatesville, as well as the Fort Hood Military Base. In the 1988-1990 assessment of nonpoint sources, five segments in the watershed were identified as having potential for and concerns related to NPS attributed agricultural activities. These include animal confinement facilities in the upper portion of the watershed and irrigated farmland and agricultural runoff from the lower portion of the watershed.

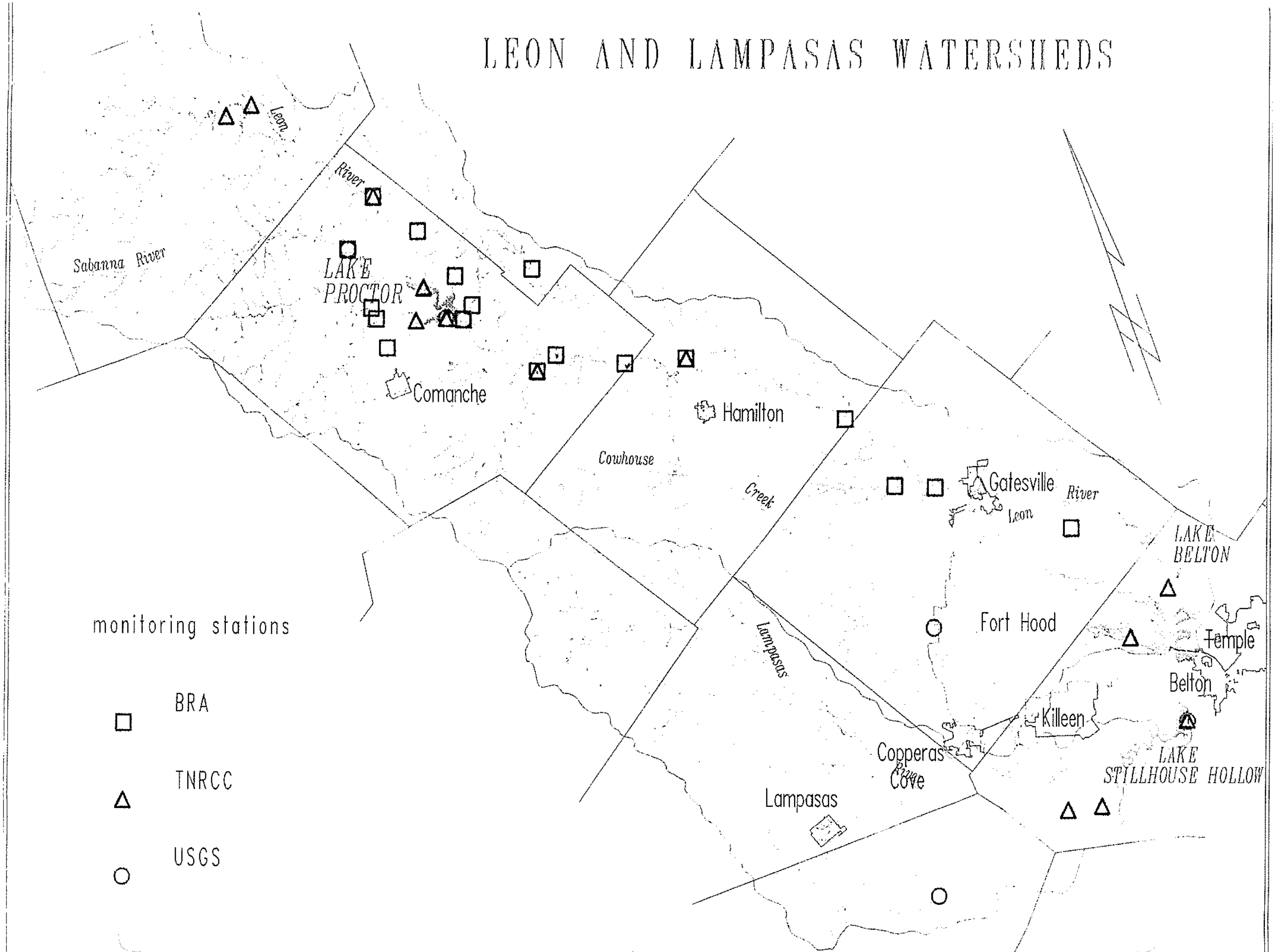
Involved cooperating agencies include the Texas Agricultural Experiment Station, USDA National Resources Conservation Service, and local Soil and Water Conservation Districts. Quarterly meetings of the cooperators facilitated decision-making regarding activities and progress.

The project was designed incrementally. The first item addressed was to target geographic problem areas using appropriate tools (GIS, hydrologic models, etc.) Targeting was geared especially for the Leon River, but initial targeting has begun for the entire state. Targeting helped place more costly efforts such, as water quality sampling, in the most likely areas in which to focus BMP implementation. Current monitoring sites collected by USGS, TNRCC, and BRA are shown in an accompanying figure. Priority sub-watersheds were selected for BMP implementation. After the sub-watersheds were identified, proper BMP(s) were targeted for implementation within the targeted sub-watersheds. To determine which BMP may be appropriate, differential sensitivity of a variety of BMPs were determined using modeling and other information.

Monitoring activities commenced to ascertain the effectiveness of the targeted BMP implementation. At the beginning of the project, data quality objectives were established and a quality assurance project plan was submitted to EPA. Monitoring sites were prioritized based on GIS databases and modeling. Monitored data was documented and supported modeling activities by using actual data.

Once appropriate BMPs were identified the project focused on informing and educating agricultural producers as to the benefits of BMPs through demonstrations. The USDA-National Resource Conservation Service was integral in assisting identifying appropriate implementation activities.

LEON AND LAMPASAS WATERSHEDS



PROGRAM ELEMENT 1

PROJECT PLANNING AND COORDINATION

Objective: To arrive at a coordinated process with project cooperators to plot the course of the project, and to receive input for quarterly progress reports.

Task1.1 ***Conduct initial meeting with cooperators and prospective cooperators to review plans and purposes of this project and to obtain feedback from cooperators and prospective cooperators.***

The initial meeting was conducted January 3, 1995 with cooperators to review plans and purposes of the project. The cooperators were Texas State Soil Water Conservation Board, National Resources Conservation Service, appropriate Soil and Water Conservation Districts and the Texas Institute for Applied Research (TIAER) at Tarleton State University.

Task1.2 ***Identify an informal informational "loop" to allow cooperators to stay abreast of project activities.***

An informational loop was formed in the January 3, 1995 meeting by which cooperators were kept abreast of activities. This was completed thorough periodic meetings and visits within the watershed.

Task1.3 ***Use informational loop to coordinate project activities.***

Numerous meetings were conducted to coordinate activities. One took place on January 11, 1995 at Stephenville.

Task 1.4 ***Conduct quarterly meetings of cooperators for updates on project activities and to facilitate decision-making regarding project activities.***

Periodic and quarterly meetings were conducted.

January 3, 1995 - QM
June 14, 95 – QM
July26, 95 – Field trip (Scouting watersheds)
August 8, 95 – Field trip (Scouting watersheds)
September 1, 95 – QM
October 10, 95 – Field trip (Identifying possible sampling locations)
January 11, 96 - QM
April 9, 96 - QM
July 17, 96 - QM
November 13, 96 -QM
January 17, 97 -QM
March 21, 97 - QM
June 24, 1997 -QM
October 6, 97 - QM
November 13, 97 - QM
January 28, 98 - QM
April 27, 98 - QM

Attached are progress reports that summarize business conducted at the meetings (Appendix H).

PROGRAM ELEMENT 2

TARGET GEOGRAPHIC AND PROBLEM AREAS USING APPROPRIATE TOOLS

Objective: To demonstrate the use and applicability of GIS to target and justify appropriate BMPs for implementation.

Task 2.1 ***Analyze water quality through modeling for selected priority watersheds listed in the 1994 TSSWCB Management Plan.***
The process to target areas is through the use of the Geographic Information System (GIS) Geographic Resources Analysis Support System (GRASS) spatial data bases and hydrologic models. The hydrologic model used is the Soil and Water Assessment Tool (SWAT). SWAT is an improved version of the Simulator for Water Resources of Rural Basins (Arnold et al., 1990) and operates on a daily time step. Major model output components include surface runoff percolation, groundwater contribution to stream flow, and sediment, pesticide and nutrient loadings.

Available spatial data bases include the U.S. Geological Survey 1:250,000 digital elevation model (Figure 1), land use (Figure 2), and the Natural Resources Conservation Service STATSGO data base (Figure 3). From the digital elevation model, 62 subwatersheds were identified, ranging in size from 6 to 477 km^2 (Figure 4). Twenty years (1970-1989) of weather data were used to get a range of rainfall conditions. Once the input files were developed, SWAT was run during this time frame.

Task 2.2 ***Rank priority watersheds using output from the model.***
Average monthly flow estimates were compared to USGS measured flow at Gatesville (drainage area approximately 7000 km^2). The comparison between 1972 and 1974 is shown in Figure 5. Note that the correlation coefficient (r) was 0.83. Nutrients were validated in the adjacent watershed (Upper North Bosque) and was generally within 30% of measured readings. Average annual loadings were 3.9 kg ha^{-1} NO_3 and 0.03 kg ha^{-1} soluble P. Sediment yield averaged 0.33 T ha^{-1}. Model output of average annual yields nutrients indicate that subwatersheds in Coryell and Comanche counties can contribute a significant fraction of the total sediment or nutrients (Figure 6).

Task 2.3 ***Review rankings in light of other selection criteria.***
Upon getting the model results, a field trip was completed to the prioritized watersheds to a) evaluate the reasonableness of the model output and b) select the watershed for BMP implementation. After such evaluation, the consensus was that the output was realistic.

Task 2.4 ***Select priority watersheds for BMP implementation efforts.***
After the visit several options were selected. The subwatershed selected for the sediment reduction BMP implementation was located in Coryell county. This subwatershed had significant contributions to sediment loading of the river. This is likely to be so since the soils are primarily clay and the farming practices include field crops (corn, grain

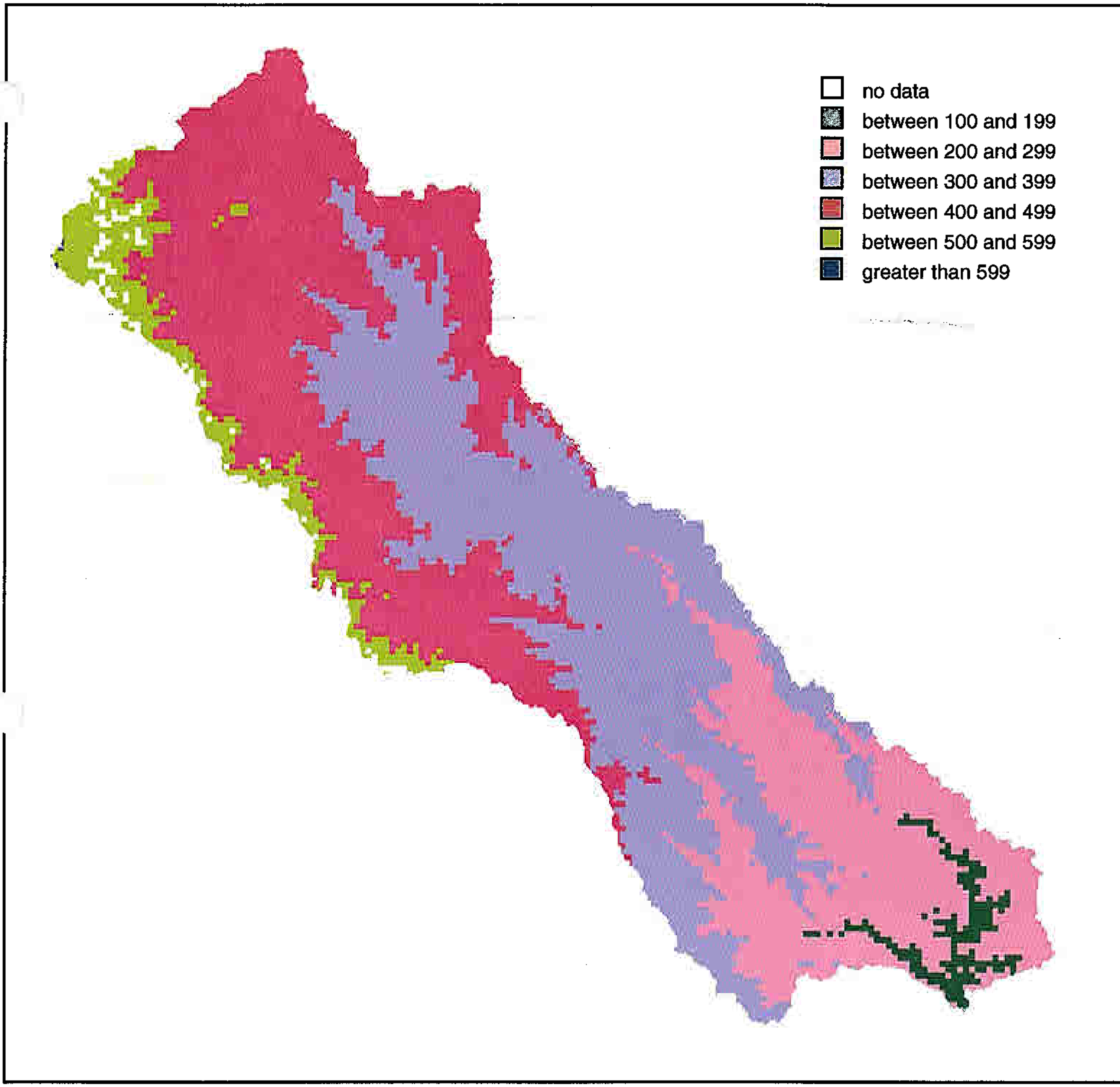


Figure 1. Digital elevation map (m) of the Leon River watershed.

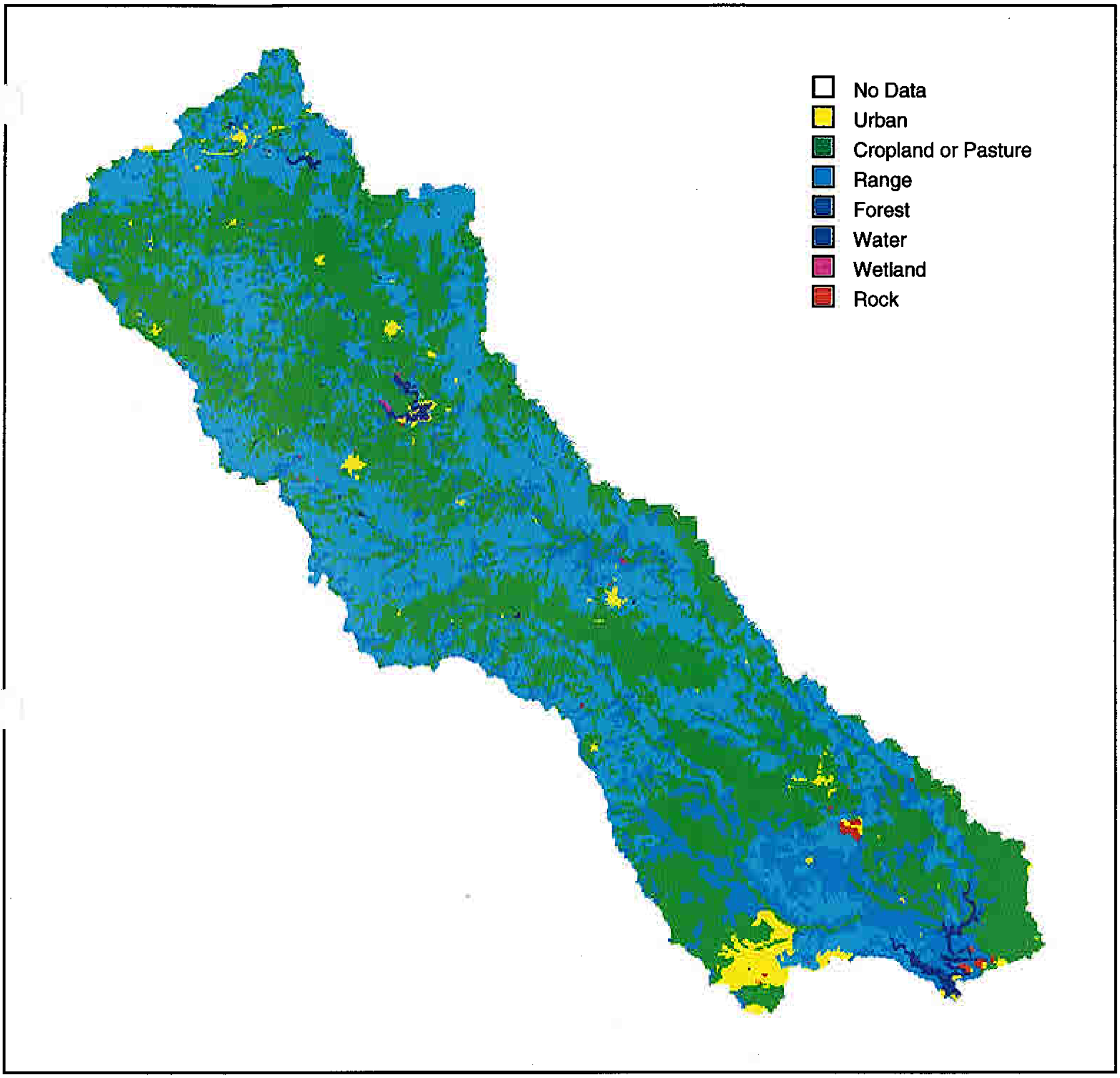


Figure 2. Landuse map of the Leon River watershed.

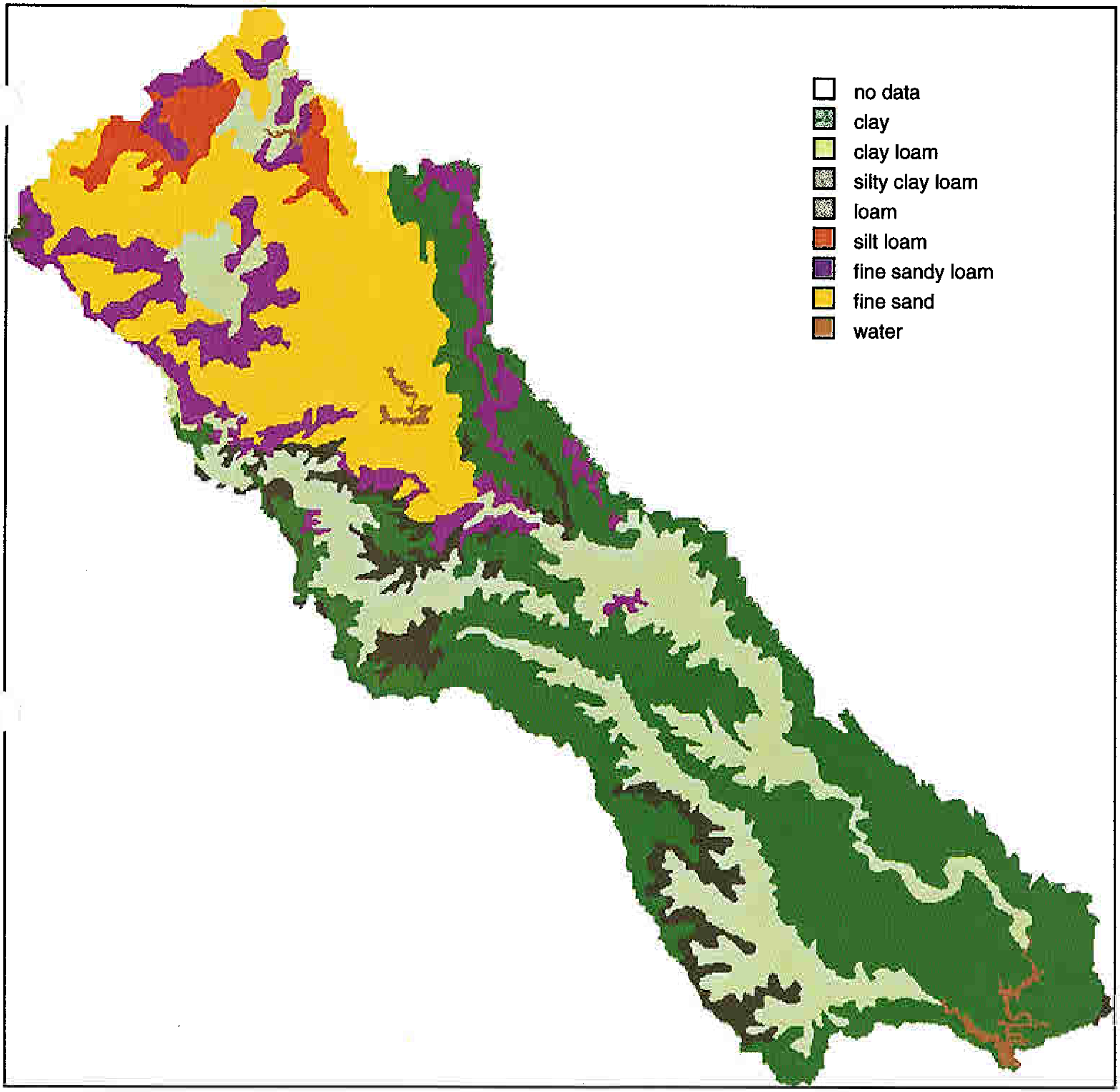


Figure 3. Soils map of the Leon River watershed.

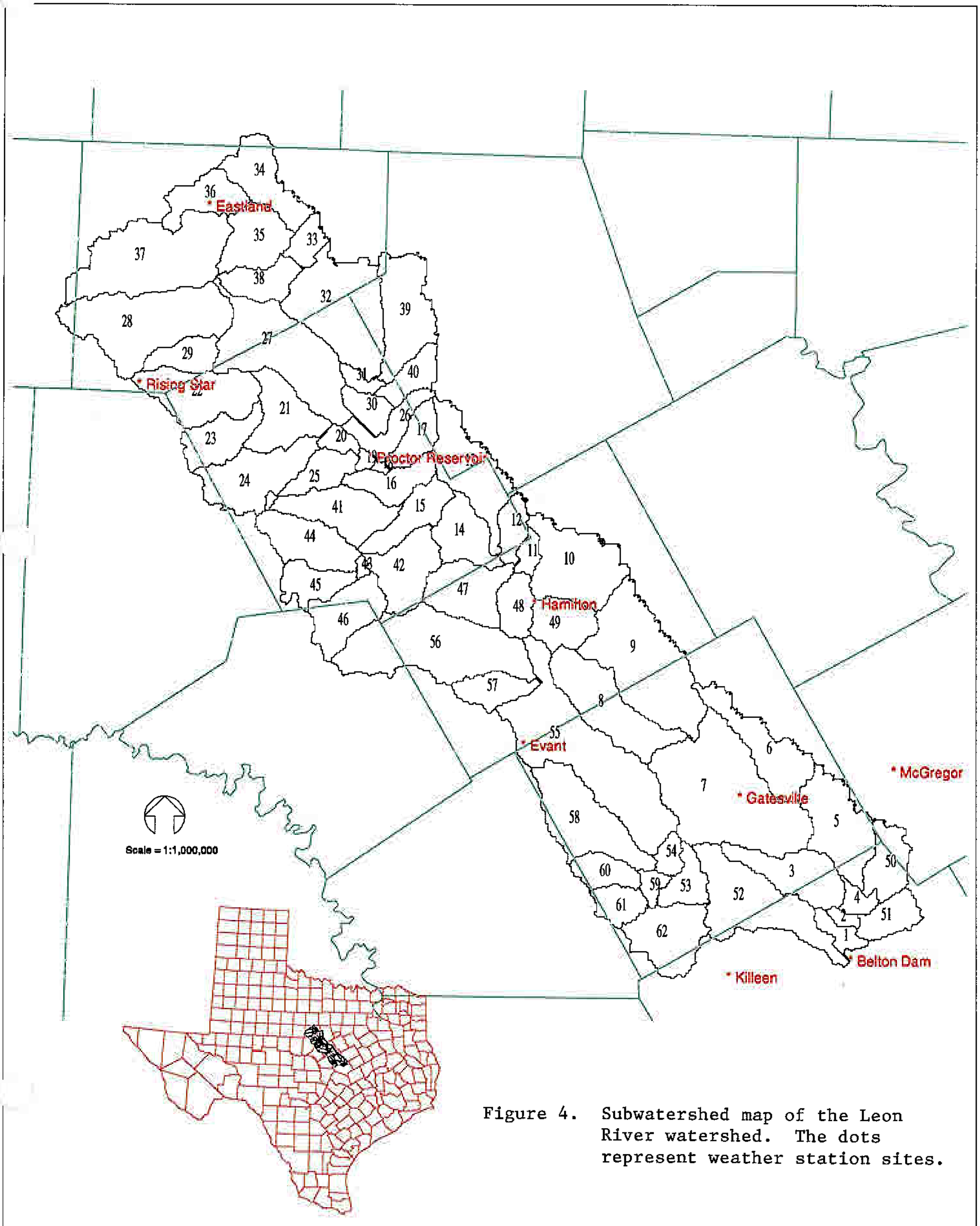


Figure 4. Subwatershed map of the Leon River watershed. The dots represent weather station sites.

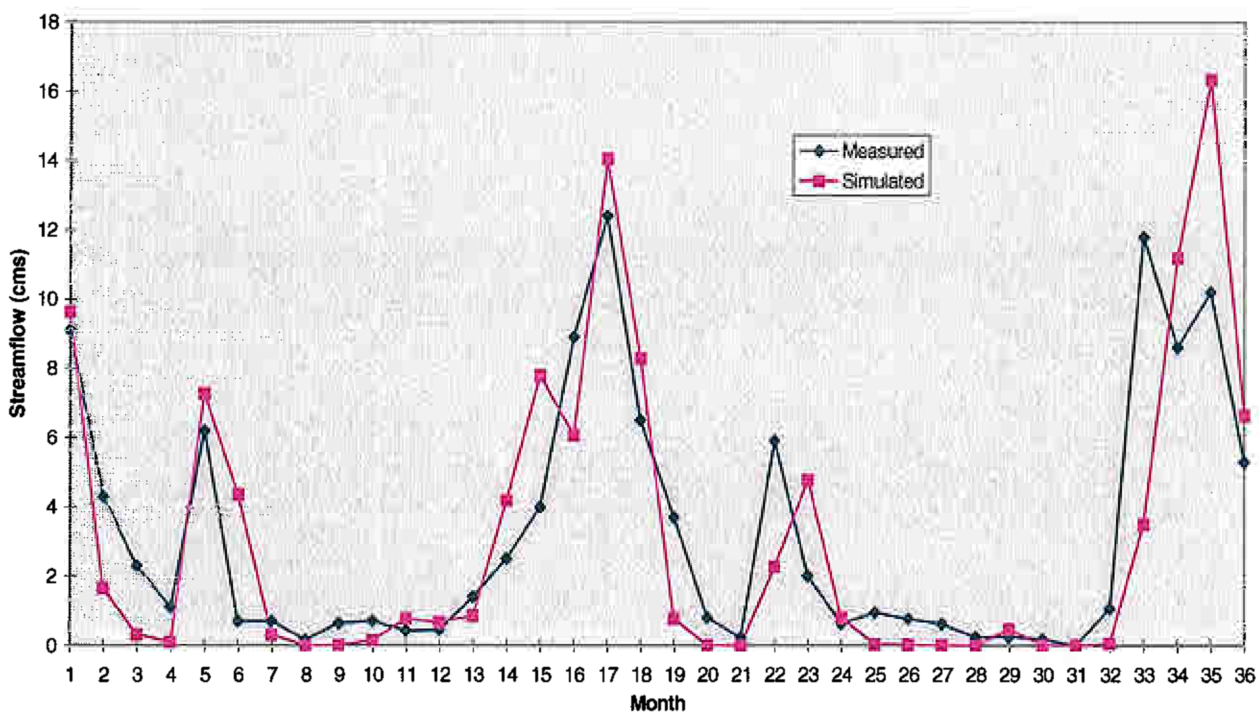


Figure 5. Average daily streamflow at Gatesville for each month during 1972-1974. (r=0.83). Month 1 is January 1972, month 36 is December 1974.

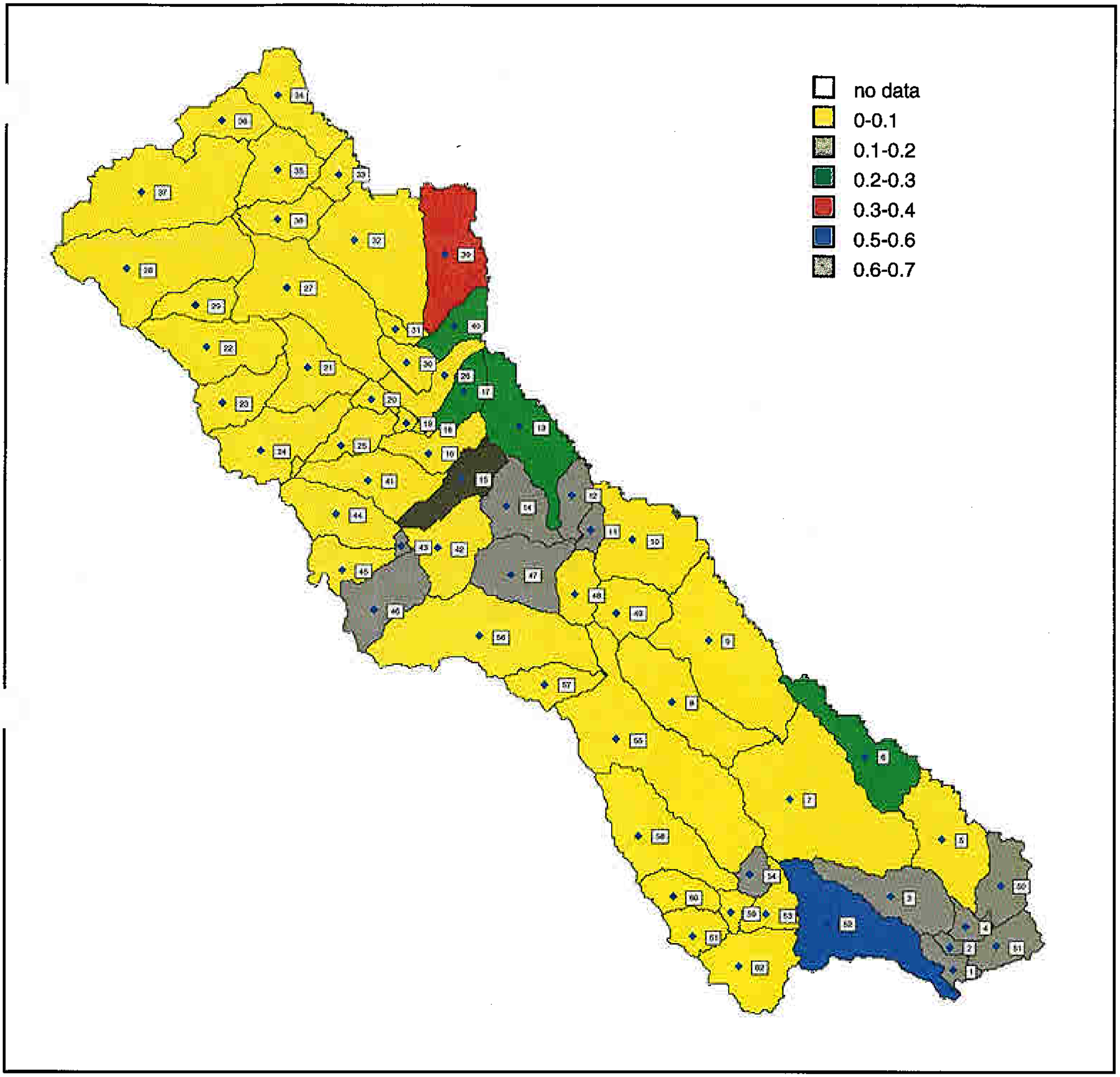


Figure 6. Average monthly simulated sediment yield (t/ha) by subwatershed for 1970-1989.

sorghum). A second targeted subwatershed was located in Comanche county. The concern there is nutrient loadings in surface runoff from improper dairy facilities.

PROGRAM ELEMENT 3
TARGET PROPER BMP FOR IMPLEMENTATION WITHIN THE TARGETED PRIORITY WATERSHEDS

Objective: To prescribe appropriate BMPs based on priority watershed characteristics.

Task 3.1 ***Test differential sensitivity of selected BMPs on the targeted watersheds.***
To aid in testing different BMPs for the different targeted subwatersheds, APEX (the farm version of the Erosion Productivity Impact Calculator (EPIC)) was run for the corresponding practices: filter strip, no-tillage, and lagoon installation. The practices analyzed were for the targeted subwatershed in Coryell county. The impact was to reduce sedimentation. The analyzed practices on corn include minimum tillage and filter strips. After touring the other targeted subwatershed in Hamilton county, the impacted concerns are excessive nutrients in the runoff. In this case a practice of applying effluent from a lagoon was simulated.

Task 3.2 ***Analyze water quality effect of each BMP for priority watersheds.***
The results indicate that a 90% reduction can be seen following the filter strip practice for wheat, grain sorghum and a 50% reduction in nutrient loading from the application field receiving lagoon effluent. Results are summarized in Appendix B.

Task 3.3 ***Select the BMPs which achieve optimum water quality goals for priority watersheds.***
It was decided from the results and suggestions from NRCS to implement the following BMP demonstration treatments on a corn field with erosive soils: a) conventional tillage b) conservation tillage and c) filter strip. An effort was made to set up a demonstration lagoon system for one dairyman in Comanche county, but he went out of business before implementation.

PROGRAM ELEMENT 4

MONITORING FOR WATER QUALITY EFFECTS

Objective: To obtain water quality on BMPs in pre and post implementation phases.

Task 4.1 - Review existing monitoring data in the watershed.
It was learned that the Brazos River Authority and the Texas Natural Resources Conservation Commission were collecting water quality data concurrent with this project. Their monitoring sites are shown in figure 7. A review of existing information was compiled and presented by TIAER (Include in appendix? This was their responsibility only).

Task 4.2 - Write quality assurance project plan (QAPP).
A QAPP was developed, presented, and approved by EPA. A copy is enclosed in appendix A.

Task 4.3 - Prioritize monitoring sites.
SWAT model runs conducted on the Leon River Watershed identified sub-watersheds at high risk for NPS nutrient and sediment loss. Targeted areas were evaluated based on soil type and topography. In July and October of 1995 "windshield surveys" were conducted to identify potential locations for monitoring/demonstration within targeted areas. Three locations were eventually chosen for the project. Two monitoring stations were established on the Leon River at up and downstream locations. River stations were established to determine and monitor NPS nutrification and sedimentation of the entire watershed. A third location was selected to demonstrate appropriate BMP's within the targeted area.

Task 4.4 - Install monitoring devices at selected sites.
A total of six monitoring/demonstration stations were installed. Automated equipment was installed at two river locations to monitor storm runoff events and estimate overall watershed conditions. Four lowland cropping locations were instrumented and monitored to demonstrate and evaluate selected BMP's. Descriptions of each monitoring/demonstration site follow:

<u>Monitoring Stations (LEO1, LEO6)</u>: The upstream monitoring site, designated LE01, was installed on the northwest bank of the Leon River under the Highway 36 bridge near Jonesboro in Hamilton County, Texas. Permission to work at this location was obtained from MR. Everette Blackwell, the property owner, and the Texas Department of Transportation. The installation was completed in December of 1995. LEO6, the downstream monitoring site, was installed on the property of Mr. James Fulton near Leon Junction in Coryell County. The station was located 0.5 miles downstream from the County Road 322 bridge. Installation of this site was completed in March of 1996. Equipment installed at each site included an equipment shelter, a solar power system, an ISCO 4230 Bubble Flow Meter, and an ISCO 3700 Automated Water Sampler (Appendix

C). A cross-section survey of the river channel and estimates of water velocity, at various river stages, led to the development of a flow discharge curve for each site. The discharge curves were utilized to estimate flow based on water levels, collected by the ISCO 4230 Bubble Flow Meters (Appendix D). Storm water runoff samples were collected on a non-uniform time basis (see Leon QAPP for schedule) when river stages exceeded programmed trigger levels. These levels were frequently adjusted based on river conditions.

Demonstration Stations (LEO2-LEO5): These four demonstration sites were located approximately 1.5 miles northwest of Mother Neff State Park on the property of Mr. Felix Morris in Coryell County, Texas and were installed in August of 1996. A paired watershed study design was chosen for this demonstration based on recommendations attained from EPA publication 841-F-93-009 "Paired Watershed Study Design". Four micro-watersheds were established on 2.2 acres by using earth berms 0.5 meters high. Three micro-watersheds (LEO2-LEO4) were utilized for BMP demonstration while the fourth (LEO5) provided a control (comparison). Each micro-watershed was 75 meters in length (parallel to slope) and 25 meters in width encompassing an area of approximately 0.46 acres. The area had a 2% uniform slope (Appendix E). Gauging stations were installed on the downslope of each mirco-watershed. Overland flow due to storm water runoff was directed by the earth berms to a metal approach section and associated one foot H-fume. ISCO 4230 bubble flow meters were utilized to record the depth of stormwater runoff channeled by the flumes. This allowed accurate estimation of stormwater runoff from each watershed. ISCO 3700 Automated Water Samplers were used concurrently to collect runoff samples, based on a uniform time schedule, during storm events (Appendix C).

Soil samples were collected within the micro-watersheds and evaluated for fertility at the Texas A&M Soil Testing Laboratory (Appendix F). Soil testing data was utilized during SWAT model runs. Crop rotations of wheat, oats and corn were grown in the micro-watershed during the demonstration period. Portions of the area were also open to grazing by cattle. An electric fence was installed around established vegetative filter strips to discourage grazing (Appendix G).

A one year calibration period was utilized to determine the characteristics of each micro-watershed prior to BMP installation. Runoff from several storm events were collected and analyzed during the calibration period. No significant rainfall events occurred during the post BMP installment portion of the project. No rainfall data for pre and post BMP comparisons was available.

Selected BMP for this demonstration consisted of various vegetative filter strip technologies. Vegetative filter strips employed were; a turf forming type, an economic crop type and a stiff-grass hedge type. Descriptions of installed BMP's follow:

a) Turf Forming Filter Strip- In March of 1998, a ten meter wide area across the bottom of micro-watershed LEO4, directly adjacent to the approach section and discharge flume, was planted with Coastal Bermudagrass (*Cyndodn dactylon* L.). Coastal Bermudagrass sprigs were spread and rototilled into the soil to a depth of approximately five centimeters. By May 1998 the turf forming type vegetative filter strip had a 15-20% cover.

b) Economic Crop Filter Strip- In September of 1997, a ten meter wide area across the bottom of micro-watershed LEO2, directly adjacent to the approach section and discharge flume, was planted with Winter Wheat (*Triticum aestivum* L.). The cooperating landowner plant the economic crop filter strip with conventional seed drilling equipment. By October 1997 the filter strip had a 100% cover.

c) Stiff-Grass Hedge Filter Strip- In October of 1997, a one meter wide area across the bottom of micro-watershed LEO3, directly adjacent to the approach section and discharge flume, was planted with Switchgrass (*Panicum virgatum* L.). Two trenches, each 10 centimeters wide by 20 centimeters deep, were dug one meter apart. Rooted Switchgrass tillers were placed in the trenches which were then backfilled. By spring of 1998 the stiff-grass hedge filter had a cover of approximately 10%.

Task 4.5 - Collect water samples.
Tables representing the collected data are given in the appendix.

Task 4.6 - Analyze water samples and enter and manage data
With data collected from 1996-1998 reliable water quality trends could not be determined.

PROGRAM ELEMENT 5
INFORM, EDUCATE, AND DEMONSTRATE PROPER BMP'S

Objective: To disseminate proper BMP implementation information to all targeted audiences and demonstration of BMP implementation in the priority watersheds.

Task 5.1 ***Use assembled materials to inform and educate targeted audiences.***
Through a similar project using TEX*A*SYST, brochures were handed out to interested people at meetings throughout the watershed and at the demonstration site. These meetings occurred on the following dates and were attended by the following number of people: June 11, 1998, 49?? attendees.

See also Section 2.

Task 5.2 ***Conduct meetings through coordination with local Soil and Water Conservation Districts.***
Several meetings were conducted with the local Soil and Water Conservation District of the impacted watersheds. Information on the water quality results will be distributed to the district.

In the upper portion of the watershed four field days/educational meetings were held to amplify the educational efforts of the project the field days/meetings were held on the following dates:

January 8, 1996
June 3, 1996
February 24, 1997
May 1, 1997

See also Section 2.

Task 5.3 ***Provide technical assistance in the implementation phase of the demonstration projects.***
Technical assistance was provided through the modeling activity (Task 3) and assistance in installing the demonstration treatments. For example, an implement used to set up berms was borrowed.

See also Section 2.

PROGRAM ELEMENT 6

TRACK BMP IMPLEMENTATION

Objective: To use tracking system to quantify the implementation of new BMPs in each priority watershed.

Task 6.1 ***NRCS and SWCD's will provide technical assistance for tracking implementation of new BMP's***
See Section 2.

Task 6.2 ***NRCS and SWCD's will track the implementation of new BMP's in priority watersheds.***
See Section 2.

Task 6.3 ***TAES-BRC and TIAER will document the water quality effects fo BMP implementation through GIS and associated modeling activities.***
Technical assistance was provided to the cooperating farmer in terms of implementing the BMP treatments. The water quality data was monitored at this site but only 2 years of data does not give full indications of improvements. Preliminary indications through modeling are that the filter strips could help reduce sediment loadings from a corn field by roughly 90%. Further work is continuing in other parts of the watershed implementing this and other BMPs. Associated with this the modeling activity will provide information on long-term benefits for BMP implementation.

SECTION 2. NRCS CONTRIBUTION

PROGRAM ELEMENT 5
INFORM, EDUCATE, AND DEMONSTRATE PROPER BMP'S

Objective: To disseminate proper BMP implementation information to all targeted audiences and demonstration of BMP implementation in the priority watersheds.

Task 5.1 ***Use assembled materials to inform and educate targeted audiences.***
Also, accelerated land planning and education assistance were conducted by NRCS and Soil and Water Conservation District employees to target producers on a priority basis. Producers that have the greatest impact on the Leon River Watershed receive the highest probability of BMP implementation. These documents are on display at the entrance to the Agricultural Service Centers in Comanche, Hamilton, and Gatesville to encourage the field trips to individual farms and ranches in the watershed present this educational material to clients. These efforts have resulted in accelerated planning and implementation of BMP's. Attached deliverables include copies of education materials used in this task (Appendix I).

Task 5.2 ***Conduct meetings through coordination with local Soil and Water Conservation Districts.***
There were approximately 40 land users from the targeted watershed at each of the educational events. Sign up sheets are available at the local field office upon request. Planning and educational assistance was provided to the field day participants to promote implementation of BMP's in the Leon River Watershed. Assistance provided at these field days was a product of the Leon River Watershed project.

Task 5.3 ***Provide technical assistance in the implementation phase of the demonstration projects.***
Also, accelerated technical assistance was provided to fifty-one land users in the targeted watershed area to assist with implementation of BMP's. A copy of the spreadsheet listing the producer's names with planned BMP's is included as a deliverable for this task (Appendix I).

PROGRAM ELEMENT 6

TRACK BMP IMPLEMENTATION

Objective: To use tracking system to quantify the implementation of new BMPs in each priority watershed.

Task 6.1 ***NRCS and SWCD's will provide technical assistance for tracking implementation of new BMP's***

The tracking of accelerated implementation of BMP's are shown on attached sheets developed by the NRCS (Appendix I). The NRCS and SWCD personnel in Comanche, Hamilton and Gatesville offices maintain these lists AS implementation of practices occur, the spreadsheets information will be updated. These spreadsheets are the deliverables for this task.

Task 6.2 ***NRCS and SWCD's will track the implementation of new BMP's in priority watersheds.***

The tracking of accelerated implementation of BMP's are shown on attached sheets developed by the NRCS (Appendix I). NRCS and SWCD personnel in Comanche, Hamilton and Gatesville offices maintain these lists. As practice implementation occurs, information on the spreadsheets will be updated. These spreadsheets are the deliverables for this task.

LEON RIVER WATERSHED PROJECT
EPA No. C9-996236-01-0
FY94 CWA, SECTION 319 (h) PROJECT
TSSWCB PROJECT No. 94-1
COOPERATIVE AGREEMENT No. 69-7442-5-236

Covering work preformed from Sept. 1, 1997 through Aug.31, 1998
file: leonriverwshed319a.doc

Program Element 5:
Inform, educate, and demonstrate proper BMPs

Objective: The USDA, Natural Resources Conservation Service (NRCS) in cooperation with the local Soil and Water Conservation Districts (SWCD's) will disseminate proper BMP implementation information to all targeted audiences and demonstration of BMP implementation in the priority watershed(s).

Task 5.1 Use assembled materials to inform and educate targeted audiences.

Accelerated land planning and education assistance were conducted by NRCS and Soil and Water Conservation District employees to target producers on a priority basis. Producers that have the greatest impact on the Leon River Watershed receive the highest priority for accelerated assistance. Best Management Practices (BMPs) educational documents were assembled and targeted towards priority producers to increase the probability of BMP implementation. These documents are on display at the entrance to the Agricultural Service Centers in Comanche, Hamilton, and Gatesville to encourage the accelerated installation of BMPs in the watershed. NRCS and SWCD personnel making field trips to individual farms and ranches in the watershed present this educational material to clients. These efforts have resulted in accelerated planning and implementation of BMPs. Attached deliverables include copies of education materials used in this task.

Task 5.2 Conduct meetings through coordination with local Soil and Water Conservation Districts (SWCDs).

Four field days/educational meetings were held in the watershed to amplify the educational efforts of the project. The field days/meetings were held on the following dates:

January 8, 1996
June 3, 1996
February 24, 1997
May 1, 1997

There were approximately 40 land users from the targeted watershed at each of the educational events. Sign up sheets are available at the local field office upon request. Planning and educational assistance was provided to the field day participants to promote implementation of BMP's in the Leon River Watershed. Assistance provided at these field days was a product of the Leon River Watershed project.

Task 5.3 Provide technical assistance in the implementation phase of the demonstration projects(s).

Accelerated technical assistance was provided to fifty-one land users in the targeted watershed area to assist with implementation of BMPs. A copy of the spreadsheet listing the producer's names with planned BMP's is included as a deliverable for this task.

Program Element 6:
Track BMP implementation

Objective: To use tracking system to quantify the implementation of new BMPs in each priority watershed.

Task 6.1 NRCS and SWCDs will provide technical assistance for tracking implementation of new BMPs.

The tracking of accelerated implementation of BMPs are shown on attached sheets developed by the NRCS. The NRCS and SWCD personnel in Comanche, Hamilton and Gatesville offices maintain these lists. As implementation of practices occur the spreadsheets information will be up dated. These spreadsheets are the deliverables for this task.

Task 6.2 NRCS and SWCD's will track the implementation of new BMPs in priority watershed(s).

The tracking of accelerated implementation of BMPs are shown on attached sheets developed by the NRCS. NRCS and SWCD personnel in Comanche, Hamilton and Gatesville offices maintain these lists. As practice implementation occurs information on the spreadsheets will be up dated. These spreadsheets are the deliverables for this task.

LEON RIVER WATERSHED 319 PROJECT UPPER LEON SWCD — file leonriver319.xls

PRODUCER NAME	DATE SWCD APPROVED PLAN	DATE PLAN COMPLETED	PLAN COMPONENTS APPLIED	STATE 503 COST	PRODUCER COST INPUTS cash	PRODUCER COST INPUTS time and equipment	PRODUCER TOTAL COST	NRCS PLANNING COST PER PLAN
[redacted]	1/3/95	4/21/97	Pasture planting and fencing	$ 7,095	$ 7,095	$ 3,500	$ 10,595	$ 4,400
	1/9/95	6/6/95	Pasture planting	$ 8,999	$ 8,999	$ 4,500	$ 13,499	$ 5,600
	9/20/95	not complete	Waste storage pond settling basin, diversion fencing	$ 17,000	$ 4,100	$ 4,100	$ 8,200	$ 6,300
	2/9/95	6/17/97	Brush control Range seeding Pasture planting fencing	$ 10,000	$ 10,000	$ 5,000	$ 15,000	$ 6,200
	7/18/95	Not complete	none	$ -	$ -	$ 500	$ 500	$ 200
	6/5/95	on going	Pasture mgt. And proper grazing use	$ -	$ -	$ 10,000	$ 10,000	$ 2,500
	6/7/95	on going	Pasture mgt. And proper grazing use	$ -	$ -	$ 10,000	$ 10,000	$ 2,500
	6/7/95	5/5/97	Well and fencing	$ 1,912	$ 1,913	$ 975	$ 2,888	$ 1,200
	8/16/95	on going	Pasture mgt.	$ -	$ -	$ 8,000	$ 8,000	$ 2,000
	5/30/96	not complete	Waste storage pond blocks,waterway,diverson pasture planting	$ 18,500	$ -	$ 5,000	$ 5,000	$ 5,900
	12/12/94	5/30/95	Trough or tank, fencing pasture planting, brush mgt.	$ 8,357	$ 8,357	$ 4,000	$ 12,357	$ 3,000
	9/23/96	n/a	Fence, waste storage pond pasture mgt., proper grazing					
	3/19/97	n/a	Diversion, fence, waterway pasture planting, past. mgt. waste storage pond					
	7/5/94	6/1/95	Waste storage pond					

LEON RIVER WATERSHED 319 PROJECT UPPER LEON SWCD				file leonriver319.xls				
PRODUCER NAME	DATE SWCD APPROVED PLAN	DATE PLAN COMPLETED	PLAN COMPONENTS APPLIED	STATE 503 COST	PRODUCER COST INPUTS cash	time and equipment	PRODUCER TOTAL COST	NRCS PLANNING COST PER PLAN
[redacted]			diversion, fencing					
			pasture mgt.					
	3/20/96	n/a	Proper grazing					
			range planting					
	12/7/95	n/a	Diversion, fencing					
			pasture mgt., past. planting					
	5/30/96	n/a	Diversion, waterway,					
			fencing, waste storage pond					
			brush mgt., pasture planting					
			pasture mgt., proper grazing					
	12/22/94	12/11/96	Brush mgt., fencing	$ 7,386	$ 7,386	$ 3,500	$ 10,886	$ 1,800
			proper grazing use					
	8/14/96	n/a	Fencing, pasture management					
			proper grazing use					
	9/25/96	n/a	Fencing, proper grazing use,					
			range planting, trough or tank					
			pasture management, well					
	12/12/94	5/22/95	Pasture management	$ 2,638	$ 2,638	$ 1,400	$ 4,038	$ 700
			proper grazing, range seeding					
			pasture planting					
	7/5/95	n/a	Brush management, fencing					
			pasture management					
			pasture planting, proper grazing					
	12/12/94	8/24/95	Brush management	$ 3,579	$ 3,579	$ 1,800	$ 5,379	$ 900
			pasture management					
			pasture planting, proper grazing					
			range seeding					
	6/19/96	n/a	Brush management, fencing					
			pasture management					
			pasture planting, proper grazing					
			range planting, well					

LEON RIVER WATERSHED 319 PROJECT UPPER LEON SWCD				file leonriver319.xls				
PRODUCER NAME	DATE SWCD APPROVED PLAN	DATE PLAN COMPLETED	PLAN COMPONENTS APPLIED	STATE 503 COST	PRODUCER COST INPUTS cash	time and equipment	PRODUCER TOTAL COST	NRCS PLANNING COST PER PLAN
[redacted]	8/16/95	n/a	Fence, Pasture management,					
			Pasture planting					
	8/4/94	4/14/95	Fence, waste storage pond	$ 4,997	$ 4,997	$ 2,500	$ 7,497	$ 1,300
			brush mgt., pasture mgt.,					
			pasture planting, proper grazing					
	1/12/95	n/a	Diversion, waterway					
			waste storage pond					
			pasture management					
			pasture planting, proper grazing					
	1/17/96	n/a	Diversion, fencing					
			pasture management					
			pasture planting, waste storage					
	2/9/94	5/25/95	Fencing, pasture management,					
			pasture planting, proper grazing					
	3/19/97	n/a	Proper grazing					
	12/19/94	4/29/95	Brush management, fencing					
			pasture planting					
			pasture management, well					
	7/20/94	n/a	Diversion,fence, waste storage					
			pasture management					
			proper grazing					
	1/15/97	n/a	fencing, pasture management					
	3/19/97	n/a	fencing, proper grazing, well					
	7/5/95	n/a	Brush management, fence					
			proper grazing, range seeding					
			well					
	12/15/97	n/a	Pond, fence, waste storage	$ 7,632	$ 2,544		$ 2,544	
			pasture planting, pipeline					

LEON RIVER WATERSHED 319 PROJECT UPPER LEON SWCD				file leonriver319.xls				
PRODUCER NAME	DATE SWCD APPROVED PLAN	DATE PLAN COMPLETED	PLAN COMPONENTS APPLIED	STATE 503 COST	PRODUCER COST INPUTS cash	time and equipment	PRODUCER TOTAL COST	NRCS PLANNING COST PER PLAN
[redacted]	6/17/98	n/a	Waste storage, liner					
			pump					
	7/20/98	n/a	Fence, pasture planting					
			pipeline					
	9/29/97	n/a	Fence, pipeline, pond					
			range seeding					
	5/11/98	n/a	Fence, pipeline, well	$ 924	$ 308		$ 308	
	2/19/97	n/a	Critical area shaping	$ 5,196	$ 1,732		$ 1,732	
			Pasture planting					
			Range seeding, pipeline					
			Brush mgt.					
	5/20/98	n/a	Pond, fencing	$ 1,760	$ 587		$ 587	
			pasture planting					
	9/29/97	n/a	Fencing, pasture planting	$ 4,675	$ 1,558		$ 1,558	
			range seeding					
	4/24/97	n/a	Pasture planting					
	3/2/98	n/a	Fencing, pipeline, well					
			pasture planting					
	5/11/98	n/a	Pond, fencing					
	7/15/98	n/a	Fencing, pond, pasture planting					
	5/11/98	n/a	Fencing, pond	$ 1,778	$ 592		$ 592	
	10/19/97	n/a	Fencing, range seeding					
	7/20/98	n/a	Brush mgt, pond, fencing	$ 2,224	$ 742		$ 742	
			pasture planting					
	1/15/97	n/a	Fencing, pond,pipeline	$ 7,093	$ 2,364		$ 2,364	

LEON RIVER WATERSHED 319 PROJECT UPPER LEON SWCD				file leonriver319.xls				
PRODUCER NAME	DATE SWCD APPROVED PLAN	DATE PLAN COMPLETED	PLAN COMPONENTS APPLIED	STATE 503 COST	PRODUCER COST INPUTS cash	time and equipment	PRODUCER TOTAL COST	NRCS PLANNING COST PER PLAN
SUB TOTALS				$ 121,745	$ 69,491	$ 64,775	$ 134,266	$ 44,500

LEON RIVER 319 PROJECT UPPER LEON SWCD

PRODUCER NAME	DATE SWCD PLAN APPROVED	PASTURE PLANTING acres	FENCING feet	BRUSH CONTROL acres	RANGE SEEDING acres	WASTE STORAGE number	SETTLING BASINS number	DEVERSONS feet	WATER WELLS number	WATERWAYS acres	PASTURE MGT. acres	PROPER GRAZING acres	PIPELINE feet	CR. AREA SHAPE acres	POND number
[redacted]	01/03/95	80	3,300												
[redacted]	01/09/95	186													
[redacted]	09/20/95					1									
[redacted]	02/09/95	28	4,400	10	93				1						
[redacted]	07/01/95					1									
[redacted]	06/06/95										161	161			
[redacted]	06/07/95	28	3,400		18						10	18			
[redacted]	06/07/95		1,000						1						
[redacted]	08/16/95	50									84	49			
[redacted]	05/30/96		800			1		400		1	114				
[redacted]	12/12/94	49		16											
[redacted]	09/25/96		600			1					176	141			
[redacted]	03/19/97	21	900			1		1,400		2	21				
[redacted]	07/05/94		950			1		500			109				
[redacted]	03/20/97				88							508			
[redacted]	12/07/95	28	800			1		300			149				
[redacted]	05/30/96	47	800	30		1		250		1	125	30			
[redacted]	12/11/96		6,150	899								3,271			

LEON RIVER 319 PROJECT UPPER LEON SWCD

PRODUCER NAME	DATE SWCD PLAN APPROVED	PASTURE PLANTING acres	FENCING feet	BRUSH CONTROL acres	RANGE SEEDING acres	WASTE STORAGE number	SETTLING BASINS number	DEVERSONS feet	WATER WELLS number	WATERWAYS acres	PASTURE MGT. acres	PROPER GRAZING acres	PIPELINE feet	CR. AREA SHAPE acres	POND number
[redacted]	08/14/96		1,500			1					149	40			
	09/25/96		4,050		80				1		94	243			
	12/12/94	42			12										
											109	166			
	07/05/94	30	100	131							47	885			
	12/12/94	49		3	8						131	29			
	06/19/96	20	2,600	8	8				1		39	187			
	08/16/95	25	300								51				
	08/04/94	50	550	50		1					84	50			
	1/12/95	100				2		1,700		1	100	233			
	1/17/96	11	500			2		600			49				
	2/9/94	85	4,200								315	112			
	3/19/97											202			
	12/19/94	43	1,050	28					1		43				
	7/20/94		600			1		453			33	97			
	1/15/97		13,250								156				
	3/19/97		4,900						1			229			
	7/5/95		2,800	124	153				1			246			
	12/15/97	31				1									

LEON RIVER 319 PROJECT UPPER LEON SWCD																
PRODUCER NAME	DATE SWCD PLAN APPROVED	PASTURE PLANTING acres	FENCING feet	BRUSH CONTROL acres	RANGE SEEDING acres	WASTE STORAGE number	SETTLING BASINS number	DEVERSONS feet	WATER WELLS number	WATERWAYS acres	PASTURE MGT. acres	PROPER GRAZING acres	PIPELINE feet	CR. AREA SHAPE acres	POND number
[redacted]	6/17/98														
[redacted]	7/20/98														
[redacted]	9/29/97														
[redacted]	5/11/98												140		
[redacted]	2/19/97	64.5												4.5	
[redacted]	5/20/98														1
[redacted]	9/29/97	24.3	4,983												
[redacted]	4/24/97														
[redacted]	3/2/98														
[redacted]	5/11/98														
[redacted]	7/15/98														
[redacted]	5/11/98														1
[redacted]	10/19/97														
[redacted]	7/20/98		2,825												
[redacted]	1/15/98														4
Totals		1,092	67,308	1,299	460	16	-	5,603	7	5	2,349	6,897	140	4.5	6

United States Department of Agriculture

Soil Conservation Service

1 Management Ideas for Farmers

Why Be Concerned About Water Quality?

Everyone depends on water for drinking, but to farmers water is even more necessary. Farming depends on water for crops, livestock, and household uses.

You can protect the water on, under, and around your farm by applying management practices that show effective and practical means of preventing or reducing water pollution. Generally, water quality problems attributed to farm operations come from five sources: sediment, nutrients, pesticides, animal wastes, and naturally occurring elements in soil.

Sediment

Sediment is composed of particles of eroding soil carried by runoff or wind into streams, ponds, lakes, and estuaries. Sediment carries nutrients and pesticides and muddies receiving waters. Reducing erosion helps maintain soil productivity and water quality.

Reduce Erosion With:

- Conservation cropping systems
- Conservation tillage
- Contour farming
- Cover and green manure crops
- Critical area planting
- Diversions
- Grassed waterways
- No-till planting
- Pasture and hay land management
- Strip cropping
- Terraces
- Tree planting
- Filter strips
- Windbreaks

Nutrients

Nutrients supply the essential elements for crop growth. Nutrients, however, can affect water quality. Proper management of nutrients optimizes crop yields, reduces movement of nutrients to surface and ground water, and improves the soil.

Manage Nutrients With:

- Conservation cropping systems
- Cover and green manure crops
- Soil testing and plant analysis
- Split applications of nitrogen
- Spring application of nitrogen
- Correct timing and placement of fertilizers
- Waste utilization
- Precise application rates
- Properly calibrated equipment
- Erosion and sediment control
- Grasses and legumes in rotation
- Proper management of irrigation
- Manure analysis

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

2 The Farmer's Guide to Controlling Erosion

Why Be Concerned About Erosion?

Soil can be both a water pollutant and a carrier of other pollutants. Erosion carries away soil resources and produces large quantities of sediment that degrade water. Soil washed off the land may carry pesticides, toxins, and nutrients into surface waters.

Sediment in streams and reservoirs reduces their capacity to hold water and increases water treatment costs. Sediment suspended in the water also destroys fish habitat. Fortunately, erosion and sediment can be reduced at much less than the cost of repairing the damage.

The Erosion Process and Water Quality

The impact of a raindrop on bare soil is like a small explosion on the surface that sends particles in all directions. As rain falls and soil becomes saturated, a thin layer of water moves along the surface. Raindrops hit the moving water as the soil particles suspended in the water flow downhill. Sheet erosion results from thin layers of soil that are removed by flowing water.

Rill erosion is the result of concentrated runoff being channeled into continuous surface depressions.

Gully erosion develops in areas where runoff becomes concentrated and the fast-flowing water scours the soil, forming large and deep ditches.

While sheet erosion is difficult to see, rill and gully erosion are highly visible. Rills can be erased by cultivation and crossed by farm machinery, but gullies are obstructions to machinery.

The rate of soil loss depends on the characteristics of the soil, cropping systems, topography, management practices, and rainfall. Management practices can reduce erosion by shortening slope length and protecting the soil surface with vegetation or residues. Reducing soil erosion improves the quality of surface water.

United States Department of Agriculture

Soil Conservation Service

3 Improving Water Quality by Managing Animal Waste

Animal Waste Is a Resource

Animal waste is a resource that, if properly managed, can help your crops grow and reduce the need for commercial fertilizer. It is a valuable source of nitrogen and phosphorus and contains other nutrients essential for plant growth. It can increase the amount of organic matter in your soil and improve the tilth and water-holding capacity of your soil. Animal waste includes livestock and poultry manure, wasted feed, bedding, litter, milk house waste water, and feedlot runoff.

A written waste management plan provided by the Soil Conservation Service (SCS) and developed jointly between you and SCS should be a part of your overall water quality improvement plan.

Animal Waste Consequences to Water Quality

Animal waste can affect the quality of your water. It can wash into streams and lakes from areas of animal concentrations and unprotected manure storage. Poor soil conditions, steep and unprotected slopes, lack of vegetative cover, adverse climatic conditions, and proximity to receiving waters are the types of site features that can result in animal wastes being washed into surface waters. As animal waste decomposes in surface water, it depletes dissolved oxygen and endangers fish and other aquatic life. Nutrients from animal waste promote excessive algae growth. Too much algae in water causes an unpleasant taste and odor and further reduces oxygen.

Serious problems can result when waste materials from storage facilities and land applications seep into ground water. Drinking water taken from ground water containing nitrates can cause health problems in humans, especially infants, and livestock.

Planning an Animal Waste Management System

Managing animal waste can improve your agricultural operation and protect water quality. A waste management system is part of a total soil and water conservation plan on farms with livestock or poultry. Waste management systems address the following:

Production: Identify the amount and type of waste to be managed. Include waste produced by animals, poultry, and other sources, such as milk house waste and runoff to and from feedlots and confinement areas. Look for opportunities to reduce volume by diverting clean water, such as roof and land runoff and rain, from the waste.

Vegetated filter strip: Install a strip of land in permanent vegetation downslope of agricultural operations. The strip traps sediment and other potential pollutants that move through it with the runoff.

Roof runoff management: Collect, control, and dispose of rain and melted snow from roofs. The primary purpose of roof runoff management is to keep water clean by diverting runoff away from waste materials.

Livestock exclusion: Exclude livestock from areas that are sensitive to changes in water quality and from places not intended for grazing, such as streambanks and wetlands.

Planned grazing system: Implement a system in which two or more grazing units are alternatively grazed and rested in a planned sequence. This improves forage production, maintains vegetative cover, and retains animal waste.

Where to Get Help

For more information or help in managing animal waste, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

4 A Farmer's Guide to Managing Nutrients

Why Be Concerned About Managing Nutrients?

To manage nutrients properly, you must know how, when, and where to use plant nutrients. A nutrient management plan developed by you and the Soil Conservation Service helps ensure that your crops receive the nutrients they need to produce profitable yields, while allowing few nutrients to leach or run off.

You Can Find Plant Nutrients In:

- Organic waste
- Commercial fertilizer
- Legumes
- Crop residues

Managing Nutrients:

- Supplies nutrients for better forage and crop yields
- Improves the biological and chemical conditions of your soil
- Minimizes the entry of nutrients into surface and ground water
- Maximizes your profits

Nutrients Are Potential Pollutants:

If you apply too many or unnecessary nutrients, they can be:

- Carried from your field by runoff
- Transported with soil particles into surface waters
- Lost by leaching into ground water

Nutrient losses are costly and can pose a health threat to your family, livestock, and community. To protect the quality of your water, decide how soil, water, and plant resources will be managed before you apply nutrients.

Four Steps to Developing a Nutrient Management Plan:

- **Step 1.** Determine the amount of nutrients your crops need. Base your total on realistic yields. Check prior production records and soil survey interpretations.

- **Step 2.** Test your soil to find out which nutrients are already in it. Be sure to include nutrient credits for legumes and residues from previous crops. To calculate the amount of nutrients needed from other sources, subtract the nutrients already in your soil from the total nutrient needs determined in step 1.

United States Department of Agriculture
Soil Conservation Service

5 A Farmer's Guide to Pesticide Management

When Properly Managed, Pesticides Can:

- Produce more and better crops
- Prevent, destroy, and repel pests
- Control plant growth
- Defoliate plants

If Mismanaged, However, Pesticides Can:

- Contaminate surface and ground water
- Present health risks to humans and animals
- Reduce or eliminate beneficial insects

Current Conditions

In 26 States, nearly 50 agricultural pesticides have been detected in ground water. Though most detections are below the U.S. Environmental Protection Agency's estimated health risk concentrations, public concern is growing. This concern has led to more proposals for State and Federal legislation. The Food, Agriculture, Conservation, and Trade Act of 1990 requires all farmers who apply restricted-use pesticides to keep records of their use of these pesticides for 2 years.

Pesticide Use and the Law

Federal and State laws and regulations require you to:

- Apply pesticides according to the directions on the product label
- Dispose of pesticides properly

Some Types of Pesticides Are:

- Insecticides
- Herbicides
- Fungicides
- Nematicides

Integrated Pest Management (IPM)

Before using pesticides, be sure that you really need them. If you do decide to use pesticides, use them efficiently and effectively. One way to ensure efficient and effective pesticide use is through IPM. With IPM, you can:

- Produce more crops
- Reduce plant growth problems
- Care for the environment

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

6 Choosing and Using Pesticides

A Water Quality Checklist for Farmers

Before You Choose A Pesticide:

- Scout your fields for current and potential pest problems.
- Consider alternatives such as:
  Using natural pesticides
  Growing pest-resistant crops
  Rotating crops and tillage practices.

Before You Use A Pesticide, Learn About Its:

- Proper use
- Movement through the soil
- Pollution characteristics
- Water solubility
- Soil absorption capabilities
- Duration in the soil
- Best application time

To Use Pesticides Effectively and Efficiently:

- Mix only the quantities you need.
- Use accurate measurement containers.
- Keep records of the chemicals you use.
- Keep your application equipment correctly calibrated.
- Avoid applying pesticides before heavy rains.
- Know wind direction and speed before you spray.
- Use the right spray nozzles and pressure.
- Band instead of broadcast herbicides on row crops.
- Rotate pesticide usage.
- Use integrated pest management.
- Complete certified pesticide applicator training.

To Help Prevent Ground Water Contamination:

- Mix, handle, apply, and dispose of pesticides away from and downslope of wells and surface waters.
- Use pesticides with low leaching rates.
- Exercise caution when applying pesticides on highly permeable soils.
- Avoid spraying chemicals near streams, ponds, and other surface waters.
- Plug abandoned wells.
- Use berms and diversions to keep runoff from surface waters and sinkholes.

Water Quality and Quantity for the 90's

United States Department of Agriculture
Soil Conservation Service

7 Managing Animal Waste

A Water Quality Checklist for Farmers

To Keep Animal Waste Under Control:

- Develop and follow animal waste and nutrient management plans.
- Confine animals and their wastes to protected areas.
- Include milk house waste in your waste management plan.
- Use filter strips to treat milk house waste.

Use Barnyard Management Measures

- Intercept runoff from land upslope of the barnyard.
- Use diversions and waterways.
- Use subsurface drains to manage seepage areas.
- Direct barnyard runoff away from streams and other bodies of water.
- Direct barnyard runoff toward grass filter strips, pasture fields, and croplands.
- Use gutters, downspouts, underground outlets, and diversions to keep clean water out of barnyards and waste storage structures.

Manage Manure

- Store manure to allow flexibility in time of application.
- Use manure as a replacement for commercial fertilizer.
- Spread manure on crops that need nutrients.
- Avoid spreading manure on frozen ground.
- Avoid spreading manure near streams, sinkholes, and wells.
- Calibrate manure spreaders to prevent over-fertilization.
- Use conservation practices to reduce runoff and erosion on land receiving manure.
- Use manure as a component of integrated crop management.
- Use tests to determine the nutrient value of manure.
- Store manure in stacking sheds to reduce nutrient losses.

Where To Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

8 Protecting Water Quality at Home and on the Farm

A Water Quality Checklist for Farmers

Did You Know?

- Water is the Earth's most abundant resource, but only 1 percent of it is suitable for drinking.
- The average American uses nearly 180 gallons of water a day.
- Everybody lives in a watershed.
- Everybody lives downstream of another water user.
- Everybody generates nonpoint source pollution.

To Prevent Ground Water Pollution On Your Farm:

- Maintain the wetlands on your farm.
- Properly dispose of your refuse and waste oil.
- Test your drinking water for potential problems.
- Check your underground fuel tanks for leaks.
- Collect and dispose of silage juice with the disposal system you use for manure.

At Home:

- Properly dispose of your household wastes.
- Avoid wasting water.
- Have your septic tank pumped every 3 to 5 years.

Where to Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

Water Quality and Quantity for the 90's

United States Department of Agriculture
Soil Conservation Service

9 Keeping Sediment Under Control

A Water Quality Checklist for Farmers

Keep Sediment Under Control With:

- Conservation tillage
- Windbreaks
- Crop rotation
- Cover crops
- Planned grazing systems
- Contour farming

To Control Runoff:

- Manage surface water runoff.
- Have preparations for storm water runoff.

In Your Waterways:

- Use grass buffer strips to eliminate the direct discharge of runoff and sediment.
- Establish and maintain sod cover.

If You Have Sloping Land:

- Use diversions or terraces to intercept runoff and sediment.
- Use stripcropping.
- Plant grass or trees.
- Farm on the contour.
- Construct your access roads to follow the contour.
- Have your land in the Conservation Reserve Program.

Where to Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

10 Managing Nutrients

A Water Quality Checklist for Farmers

To Reduce Nutrient Losses:

- Use appropriate conservation practices to reduce erosion and runoff.
- Rotate crops to reduce fertilizer needs.
- Use cover crops to take up excess plant nutrients.
- Follow the principles of integrated crop management.
- Give nutrient and fertilizer credits to manure, legumes, sewage, sludge, and previous crops.

Before You Apply Nutrients:

- Develop a nutrient management plan.
- Establish realistic goals for crop yields based on soils and past yields rather than maximum yield.

When You Apply Nutrients:

- Apply only the amounts needed.
- Follow soil test and manure analyses.
- Properly calibrate your application equipment.
- Avoid spreading manure, fertilizer, or lime on frozen ground.
- Band or sidedress fertilizer applications.
- Apply nitrogen when crop is growing to maximize uptake.
- Incorporate or inject manure and nitrogen into the soil.
- Use pre-sidedress nitrogen tests to determine crop needs.

Where To Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

SCS.WQ.10 June 1991

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

11 Glossary of Water Quality Terms

Aerobic decomposition
The decay of organic matter by bacteria and other micro-organisms in the presence of oxygen.

Agricultural wastes
Wastes usually associated with producing and processing agricultural products. Agricultural wastes include:

- Animal manure
- Dead animals
- Crop residues
- Fertilizers
- Pesticides

Algae
Simple plants that form the base of the aquatic food chain. Many kinds of algae are microscopic. When environmental conditions are suitable for their prolific growth, algae can create water quality problems.

Ammonia nitrogen
A gas (NH3) released by the microbiological decay of plant and animal proteins.

Anaerobic decomposition
The decay of organic matter by bacteria and other microbes that do not need oxygen.

Aquifer
A soil or rock formation capable of storing and transmitting usable ground water to the surface of the land.

Assimilative capacity
The ability of surface or ground water to purify itself of organic pollution without harmful effects.

Best management practices
A practice or combination of practices that State or local agencies determine to be the most effective means of controlling point and nonpoint pollutants. They can be structural, vegetative, or management measures.

Biochemical oxygen demand
A measure of oxygen that is removed from aquatic environments by the metabolic requirements of aerobic micro-organisms. Also called biological oxygen demand or BOD.

Coliform
A group of bacteria used to indicate the cleanliness of water. High levels of coliforms signify unclean water. Large numbers of coliform organisms are present in the intestines of humans and other mammals.

Cone of depression
A cone-shaped depression in a water table that occurs after water is pumped from a well.

Conservation practice
A soil and water conservation technique or measure for which standards and specifications have been developed.

Contaminant
Potential pollutants such as chemicals, sediments, or bacteria that can make surface waters and aquifers unfit for use.

Discharge
The flow of ground or surface water from sources such as pipes, springs, and channels.

Dissolved oxygen
Gaseous oxygen dissolved in a liquid, usually water.

Drainage well
Vertical opening into a permeable substratum into which an irrigation system directs surface and subsurface waters.

Drawdown
The drop in a water table in the vicinity of a well. Drawdown is caused by pumping.

Erosion
Wearing away of the land surface by water, wind, ice, or other geologic processes.

Eutrophication
The artificial or natural enrichment of a body of water by the influx of nutrients; these nutrients promote plant growth over that of fish and animal life.

Ground water
All water below the surface of the land. Ground water usually refers to subsurface water in a zone of saturation that can be pumped from a well or that flows from a spring or seep.

Hardness
A characteristic of water containing the salts of calcium, magnesium, and iron.

Saltwater intrusion
The movement of salt water into a freshwater aquifer.

Saturated zone
A zone in the soil in which all voids and cavities are filled with water.

Sediment
Solid particles of eroded soil, rock, or biological materials transported by water.

Structural controls
Control devices constructed to reduce damage caused by runoff and flood water.

Sustainable agriculture
A farming method which maximizes the efficient use and management of nutrients and other chemicals.

Total dissolved solids
The total concentration of dissolved mineral constituents in water.

Toxicity
The degree to which a chemical detrimentally affects an organism.

Turbidity
The cloudy condition caused by solids suspended in a liquid. Turbidity is also a measure of the cloudiness of water caused by suspended solids.

Vegetative controls
Conservation practices that use plants to reduce erosion and water pollution. Such practices include cropping systems, cover crops, permanent grass, and other vegetative cover.

Unsaturated zone
A zone in the soil where air remains in voids and cavities. It is also called the zone of aeration.

Water table
The upper surface of the ground water, or the level below it, in which the soil is saturated by water.

Watershed
See hydrologic unit.

Wetland
An area of mostly hydric soils that is saturated by surface or ground water at a frequency and duration sufficient to support hydrophytic vegetation adapted for saturated soil conditions.

Sources
- Agricultural Waste Management Field Handbook, SCS.
- Resource Conservation Glossary, Soil and Water Conservation Society.
- Federal Glossary of Selected Terms, Subsurface Water Flow and Solute Transport, U.S. Department of the Interior, Geological Survey.

Where to Get Help

For information and assistance in planning soil erosion control and water quality protection, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service, Extension Service, or Agricultural Stabilization and Conservation Service.

United States Department of Agriculture
Soil Conservation Service
Agricultural Stabilization and Conservation Service
Extension Service

12 USDA 1991 Water Quality Projects

USDA Water Quality Initiative

Water is one of our Nation's most precious resources. Agricultural and public concern has raised preservation of water quality to both a U.S. Department of Agriculture (USDA) and Presidential Initiative.

USDA's emphasis is on education, technical and financial assistance, research, and data base development. Eleven USDA agencies are involved in the Water Quality Initiative, working with State and local governments, other Federal agencies, and the private sector.

Water quality projects sponsored by USDA are underway in 48 States and the Caribbean Area to address agriculture-related water quality concerns.

Many of these projects were selected from areas identified by States in response to Section 319 of the Water Quality Act of 1987, which directed States to assess and prioritize their most severe water quality problem areas and to develop nonpoint source management programs to solve these problems. Present projects focus on four major areas: hydrologic units, demonstration projects, Agricultural Conservation Program (ACP) water quality special projects, and other initiatives.

Hydrologic Unit Areas

Seventy-four hydrologic unit areas—agricultural watersheds—were selected in fiscal years 1990 and 1991. The goal of hydrologic unit areas is to help farmers and ranchers in voluntarily applying agricultural production and conservation practices that will help achieve water quality goals.

In each area, cost-sharing is provided to farmers to install practices such as animal waste control facilities, sod waterways, water management systems, and integrated crop management—fertilizer and pesticide management—for water quality improvement. Cost-share funds may come from several sources, including ACP cost-share funds and State cost-share programs.

The hydrologic unit areas are under the joint leadership of two agencies, the Extension Service (ES) and the Soil Conservation Service (SCS). ES provides information and education assistance, including specific recommendations on the use of nutrients and pesticides, and SCS helps farmers and ranchers develop conservation systems to reduce adverse water quality effects. The Agricultural Stabilization and Conservation Service (ASCS) provides cost-share assistance where appropriate.

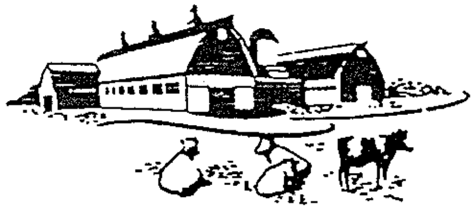
Other Initiatives

As part of its 5-year plan, USDA will continue to support ongoing regional projects: the Chesapeake Bay Program, the Colorado River Salinity Control Program, the Puget Sound Estuary Program, Land and Water 201 Program (includes counties in Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee and Virginia), and the Great Lakes Program. In addition to these regional initiatives, other USDA programs contribute to the effort to solve agricultural nonpoint source problems. These include the Rural Clean Water Program, Water Quality Incentive Program, Water Bank Program, Wetland Reserve Program, Multi-Year Cost Share, Public Law 83-566 Watershed Protection and Flood Prevention Program, Great Plains Conservation Program, and others.

To facilitate these programs, ES and SCS are developing extensive programs of staff training to assure that field staff are familiar with the latest technology and its use in helping farmers, ranchers, and landowners to enhance or protect water quality while maintaining profitable agricultural operations.

Fact Sheet

Dairy Farms



MAY 1994

United States Department of Agriculture

Soil Conservation Service

THE SOIL CONSERVATION SERVICE PLANNING PROCESS

The USDA-Soil Conservation Service (SCS) has been helping farmers and ranchers protect their resources for over 60 years. The following flow-chart was prepared to help you understand the planning process the SCS will use to develop your conservation plan.

You and SCS will make an appointment to meet on your farm.

YOU AND SCS PREPARE FOR THE PLANNING MEETING.

1. SCS gathers background information and maps of your farm.
2. You will need to provide SCS with the background information, do a soils test, and begin thinking about your future plans for your dairy. (See the Planning Information Fact Sheet for Dairies.)
3. You may stop the planning process at any time and use a private consultant.

SCS WILL HELP YOU APPRAISE YOUR RESOURCES.

This will require visits to your dairy farm. SCS will determine which soils are on your farm and their condition; note your land uses and field boundaries; recognize any resource problems; and survey your property for engineering designs as needed.

DECISION MAKING TIME.

SCS will develop and present to you several conservation treatment options and the effects of your plan on your operations. You decide on the land use and land treatment of your dairy farm.

RECORDING DECISIONS.

SCS will prepare your conservation plan folder complete with maps, soils data, land treatment decisions, Agricultural Waste Management System, and engineering designs custom designed for your dairy farm based on your decisions.

PLAN REVIEW.

SCS will review your conservation plan with you. After you sign your conservation plan, it will be reviewed and signed by the local Soil and Water Conservation District and SCS district conservationist.

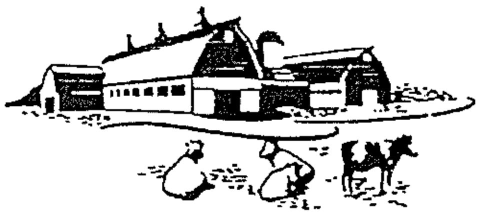
YOU RECEIVE YOUR COMPLETED CONSERVATION PLAN.

SCS will continue to work with you to help you install and maintain your conservation plan.

Fact Sheet

Dairy Farms

May 1994



United States Department of Agriculture

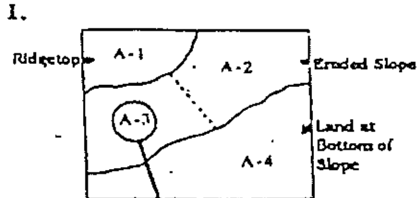
Soil Conservation Service

How On Earth Do I Take A Soil Sample?

What is a soil sample?

A soil sample is a mixture of 10 to 15 samples of soil taken from a uniform area of 10 to 40 acres in a field.

Step 1.



Step 2.

Why do I need to take a soil sample?

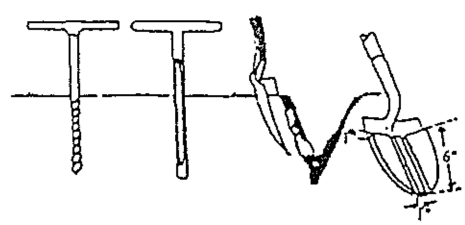
To help you and your USDA-SCS soil conservationist plan your agricultural waste management system. The chemical test results will tell you the present nutrient levels in the fields you plan to use for waste disposal. The test results will help you determine how much agricultural waste you can apply to those fields.

When do I need to take a soil sample?

Take your sample prior to planting the next crop and before applying any type of nutrients. The sooner the test results are in, the sooner you and your soil conservationist can begin planning your agricultural waste management system.

How do I take a soil sample?

Step 3.



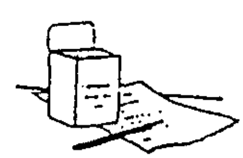
Use a spade, soil auger, or soil sampling tube as illustrated. Scrape the litter from the soil surface. If you are using a spade, dig a V-shaped hole and take a 1-inch slice of soil from the smooth side of the hole. Then take a 1 X 1 inch core from the center of the shovel as illustrated. If you are using a soil auger or soil sampling tube, make the core or boring 6 inches deep in the soil. For permanent sod, sample to a depth of 3 to 4 inches.

Repeat in 10 to 15 different places in each uniform area of 10 to 40 acres in a field. Collect soil in a clean plastic bucket - do not use metal. Mix thoroughly. Remove one pint to use as the soil sample representing that field or area.

Where do I send the soil sample?

After completing the soil sample information form, enclose the form and payment inside the package containing the soil samples. Make your check payable to Soil Testing. Do not send cash. A private laboratory can be used or address the letter and package to one of the following:

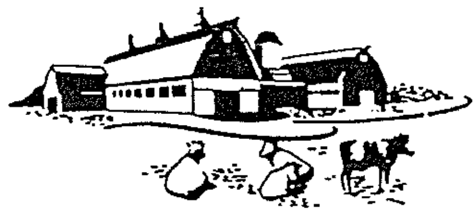
Step 4.



Extension Soil, Water, and Forage Testing Laboratory
Texas A&M University - Soil & Crop Sciences
College Station, Texas 77843-2474
Phone 409/845-4816

Fact Sheet

Dairy Farms



MAY 1994

United States Department of Agriculture

Soil Conservation Service

PLANNING INFORMATION FACT SHEET FOR DAIRIES

As you learned on the SCS Planning Process fact sheet, the USDA-Soil Conservation Service will be contacting you to gather some background information in order to help you develop your customized conservation plan. The following includes information the SCS will need and also some things that you, the dairy farmer, need to be thinking about--your future plans for your dairy.

As you read this, please begin answering as many questions as you can and begin thinking about the rest. It will help your soil conservationist to serve you better.

✔ How many milking cows do you currently have?

✔ What is the maximum number of milking cows you plan to have in the future?

✔ How many confined animals do you currently have that are being milked?

✔ What is their estimated live weight?

✔ What is the maximum number of confined milking cows you plan to have in the future and what is their estimated live weight?

✔ How many heifers do you currently confine and what is their estimated live weight?

✔ What is the maximum number of heifers you plan to confine in the future and what is their estimated live weight?

✔ How many dry cows do you currently confine and what is their estimated live weight?

✔ What is the maximum number of dry cows you plan to confine in the future and what is their estimated live weight?

✔ How many other animals do you currently confine and what is their estimated live weight?

✔ What is the maximum number of other animals you plan to confine in the future and what is their estimated live weight?

✔ How many pens do you currently have?

✔ How many cows do you put in each pen?

✔ How many acres are in each pen?

✔ Will the pen area remain the same? If not, the SCS will help you stake or measure the new pen area for the SCS surveying team.

✔ How many cows can you milk at one time?

TEXAS AGRICULTURAL EXTENSION SERVICE
THE TEXAS A&M UNIVERSITY SYSTEM

Soil, Water, and Forage Testing Laboratory

SOIL SAMPLE INFORMATION FORM

Please submit this completed form and payment with your soil samples. Mark each soil sample bag with your sample identification which should correspond with the sample identification written on this form. See mailing instructions under Step 4 on the back of this form (Please Do Not Send Cash).

SUBMITTED BY: Results will be mailed to this address.

Name ________________ County ________
Address ________________ Phone ________
City ________ State ____ Zip ________

FOR: (Optional)

Name ________________
Address ________________
City ________ State ____ Zip ________

SAMPLE I.D.		PLANT INFORMATION			
Laboratory # (For Lab Use)	Your Sample I.D.	To Be Irrigated	Previous Lime Or Fertilizer	Intended Plant To Be Fertilized	Yield Goal

Circle Requested Analyses

	Cost Per Sample
Complete Analysis (Routine Analysis + Micronutrients, Boron and Lime Requirement.)	$ 25.00
Routine Analysis (pH, NO_3, P, K, Ca, Mg, Na, S, & Salinity)	$ 10.00
Routine + Micronutrients (Zn, Fe, Cu, Mn)	$ 14.00
Salinity (Detailed Analysis)	$ 15.00
Boron	$ 5.00
Potting Media (Non-Soil Mixes) Saturation Extract Analysis	$ 15.00
Organic Matter Analysis	$ 5.00
Soil Texture Analysis	$ 10.00

How Is Forage Used?

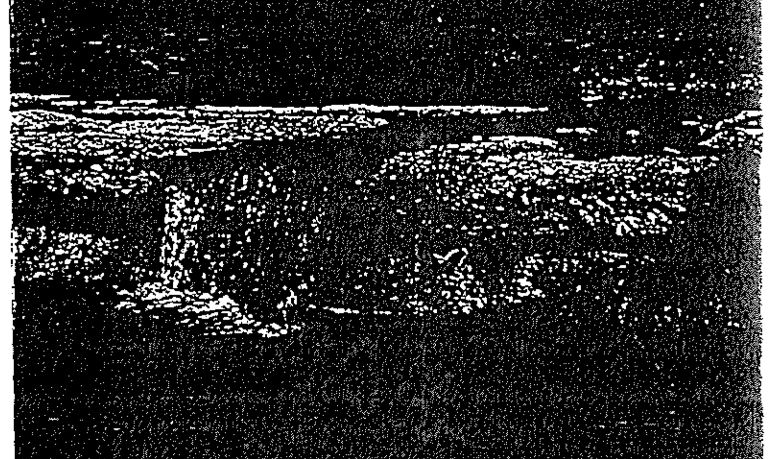
Grazing Only ____
Hay Only ____
Grazing and Hay ____
New Establishment ____
Minimum Requirement Est. ____

Describe any problems ________________________________

You Have A Choice

Prepared by
Texas State Soil and Water Conservation Board
(in cooperation with Texas Soil & Water Conservation Districts)
P. O. Box 658
Temple, Texas 76503
Telephone (817) 773-2250
Toll free 1-800-792-3485

Texas State
Soil and Water Conservation
Board
★
Soil and Water
Conservation Districts



Agricultural and Silvicultural Nonpoint Source Management

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SECTION 3 - TIAER CONTRIBUTION

TIAER
PR 9913

WATER QUALITY MONITORING ON DEMONSTRATION DAIRY SITES IN THE LEON RIVER WATERSHED

Final Report to the Texas State Soil and Water Conservation Board for the Section 319(h) Project: Leon River Watershed Water Quality Demonstration Project

John Thiebaud, Anne McFarland, Nancy Easterling, and Tim Jones

October 1999

Texas Institute for Applied Environmental Research
Tarleton State University • Tarleton Station • Stephenville, Texas • 76402
254.968.9567 • FAX 254.968.9568

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INTRODUCTION

The Leon River watershed is a sub-basin of the Brazos River Basin that flows through portions of Eastland, Comanche, Erath, Hamilton, Coryell and Bell Counties, Texas (Figure 1). The watershed originates in Eastland County and extends southeasterly for 250 miles to the dam on Lake Belton. It encompasses approximately 3,533 mi^2 and includes Lakes Leon, Proctor and Belton as well as the Leon River and its tributaries. Lake Leon, located in the uppermost reaches of the watershed, supplies drinking water to the city of Eastland and surrounding communities. The Leon River below Lake Leon is a major tributary to Lake Proctor and supplies water to a number of small communities including Comanche, Proctor, Dublin and Gorman. Below Lake Proctor, the Leon River flows 173 miles before emptying into Lake Belton, the primary drinking water supply for residents within the Temple, Belton, Killeen and Fort Hood areas.

The Texas Natural Resource Conservation Commission (TNRCC) has designated five classified segments in the Leon River watershed (TNRCC, 1994 and 1996). These segments include:

- Segment 1220–originating at the Belton Dam in Bell County and running to a point 100 meters upstream of Farm-to-Market (FM) 236 in Coryell County;
- Segment 1221–from segment 1220 to the dam on Lake Proctor in Comanche County;
- Segment 1222–from Lake Proctor Dam to a point immediately upstream of the confluence of the Leon River and Mill Branch in Comanche County;
- Segment 1223–from segment 1222 to the Lake Leon Dam; and,
- Segment 1224–Lake Leon.

Primarily rural, the economy of the Leon River watershed is dominated by agriculture and includes dairies, open range beef cattle operations, hay production, wheat, oats, sorghum, corn, cotton, peanut and pecan operations. Contamination of surface water resources from nonpoint source (NPS) pollution generated by runoff from agricultural activities is a primary concern in the Leon River watershed. An assessment of nonpoint sources conducted from 1988 through 1990 identified the five segments of this watershed as having the potential for and concerns related to agriculturally generated NPS pollutants (TWC & TSSWCB, 1991). In response, the Texas State Soil and Water Conservation Board (TSSWCB) designated the Leon River watershed as a priority watershed under the Clean Water Act, Section 319 assessment process. Specific concerns are animal waste and animal confinement facilities in

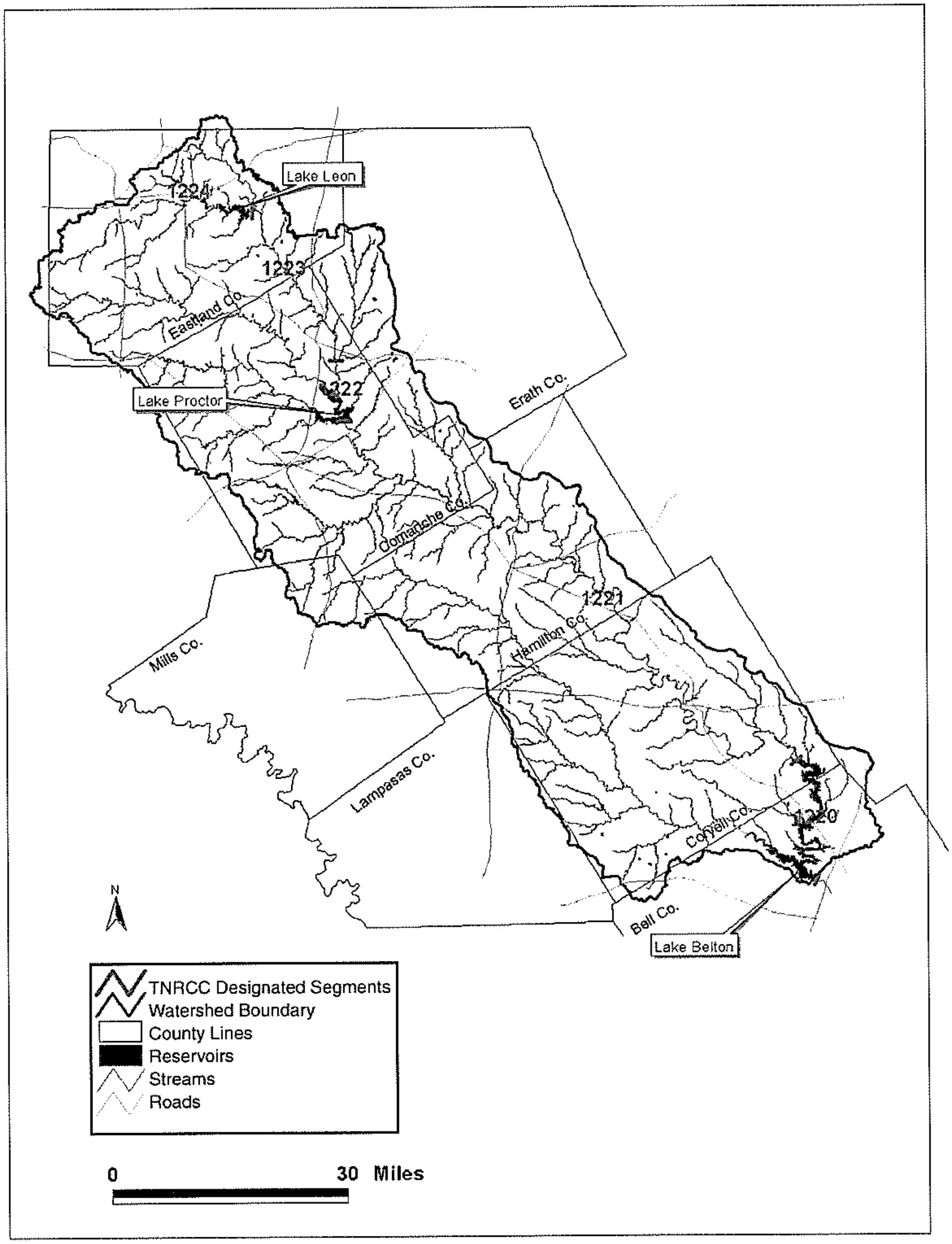

Figure 1. Overview of Leon River watershed.

the upper portion of the watershed and ranching and row cropping operations in the lower portion.

Section 305(b) of the Clean Water Act requires the TNRCC to prepare the *State of Texas Water Quality Inventory* on a biennial basis. The Leon River below Lake Proctor, segment 1221, was given a ranking of 9 out of 366 classified stream segments in Texas in 1994. This ranking indicated poor water quality and a high action priority. No rankings were presented in the 1996 State of Texas Water Quality Inventory, however, percentages of water quality parameters that exceeded screening levels were listed. All segments of the Leon River except segment 1220 (Lake Belton) were of a concerned nature. The Brazos River Authority (BRA) and TNRCC expressed concerns related to data collected in the middle segments (1221, 1222, and 1223) of the Leon River watershed (BRA, 1996).

Segment 1221, the Leon River below Proctor Lake, was named in the 1996 Texas 303(d) list in accordance with the Clean Water Act 303(d). The segment was again listed in the 1999 303(d) list (TNRCC, 1999). Segment 1221 is classified on the 1999 303(d) list with a medium overall priority ranking for TMDL development for Texas waterbodies. Water quality concerns in this segment are associated with nonpoint source rather than point source discharges.

Confined animal feeding operations (CAFOs), specifically dairies, are a major contributor to agricultural activities in the upper reaches of the Leon River watershed. A review of existing information (Hauck and Easterling, 1998) pertaining to the Leon River watershed indicated approximately 170 dairies were located in stream segment 1221 in the mid-1990's. It is, however, recognized that this number has diminished since the time the information was compiled. Herd sizes in stream segment 1221 range from about 3,500 to less than 100 milking head with most dairies milking less than 250 head. Dairies milking less than 250 cows are not typically required to obtain a TNRCC permit to operate. With the large number of dairies operating in stream segment 1221 as unpermitted facilities, it is likely that the implementation of best management practices (BMPs) for dairy waste management on these smaller dairies would help improve water quality conditions within this stream segment.

Section 319(h) Project Description

The TSSWCB, with a U. S. Environmental Protection Agency Section 319(h) NPS water pollution program grant funded through the TNRCC, conducted a demonstration and education project in the Leon River watershed. The Leon River watershed NPS Project is a multidisciplinary effort to evaluate the effectiveness of selected BMPs in controlling NPS water pollution. As part of this project, Texas Institute of Applied Environmental Research (TIAER) monitored surface water runoff on two dairy demonstration sites in the Leon River watershed to collect data on nutrient concentrations at those sites in relation to BMP effectiveness.

TIAER was responsible for monitoring water quality, laboratory analysis of collected samples, and statistical analysis of data collected at these sites. The regional office of the TSSWCB in Dublin, Texas and the Comanche County field office of the USDA-NRCS, located in Comanche, Texas, were instrumental in identifying dairy operators agreeing to cooperate in the program. The dairy operators were responsible for the implementation of the BMP plans in cooperation with the USDA-NRCS and the TSSWCB. This report presents a summary of the water quality data collected at these two Leon River watershed demonstration dairy sites.

DEMONSTRATION DAIRY SITES

General Descriptions

The two demonstration dairies selected each milked less than 250 cows. Thus, neither dairy was required to have a waste disposal permit, although both were required to implement waste management plans to meet TNRCC no-discharge criteria. In order for the BMPs to be implemented both operators required financial assistance, and both operators had requested financial assistance in the form of matching Senate Bill (SB) 503 funds for design and implementation of BMPs.

Both dairies have ephemeral waterways running through their properties; a physical characteristic common to most operations in the area. Wastewater, produced by the milking parlor operation and runoff from the confinement area adjacent to the milking parlor, can enter these waterways and eventually make its way to the main stem of the Leon River. The two dairies chosen as demonstration sites were selected because they 1) were located in the upper portion of Leon River segment 1221 and 2) had filed applications for SB503 water management plans and financial assistance with the TSSWCB.

Luckie Dairy

The Michael Luckie Dairy is located in Comanche County, Texas, approximately 9 miles southeast of the intersection of U. S. Highway 377/67 and State Highway 36 off Comanche County Road (CR) 216 and CR218 (Figure 2). The dairy farm encompasses 244 acres and is a mixture of wooded native areas, cultivated fields and Coastal bermudagrass pastures. Approximately 110 dairy cattle were maintained at this dairy, with about 90 cows milked twice daily.

Sampling stations were located at two sites along an unnamed tributary of Holmsley Creek that runs through the property occupied by the dairy (Figure 3). This ephemeral waterway receives runoff from the dairy and only flows following relatively heavy rainfall events. Runoff from the dairy confinement area and process waters from the milking parlor area enters the tributary between the two stock ponds. The lower pond is located in the middle of a Coastal bermudagrass pasture that is often grazed by dry cows and heifers and provides a drinking water source for these cows. Below this pond, no defined stream is apparent. On rare occasions, when rainfall was sufficient to cause the pond to overflow, runoff from the pond flowed around the dam and through a grassed waterway. Runoff was not channelized and erosion of the field was not observed.

As an upstream-downstream monitoring approach was selected for this dairy location, the upstream sampling site (LD020) was situated at the spillway of the uppermost stock pond. The watershed above this pond is wooded with some native pasture and encompasses approximately

586 acres, of which about 100 acres are located on the Luckie Dairy property. Dairy heifers were occasionally observed grazing in the watershed above LD020.

The downstream sampling site (LD030) was erected on the tributary below the point at which washdown water and rainfall runoff from the milking parlor and confinement area enter the stream and above the downstream stock pond. The milking parlor and cattle confinement areas are located approximately 100 yards from tributary. Between the milking parlor and the down stream sampling site is the remnant of a wastewater retention pond which is silted in from runoff from the milking parlor and confinement area and no longer contains runoff. The milking herd is usually confined to an area of about 10 acres. This confinement area is located on a somewhat steep slope, upgradient of the downstream sampling site (LD030). Due to excessive trampling and grazing, there are large areas of bare ground in the confinement area that contribute to sediment loads during runoff events. Following the siltation of the original lagoon, no waste containment system was in effect. Wastewater and runoff from the milking parlor and confinement areas traverse a bermudagrass field through an open ditch and enter the tributary on which the monitoring equipment was installed between sites LD020 and LD030. This bermudagrass pasture is occasionally grazed. During periods of little or no runoff, the only flow in the tributary was wastewater from the milking parlor.

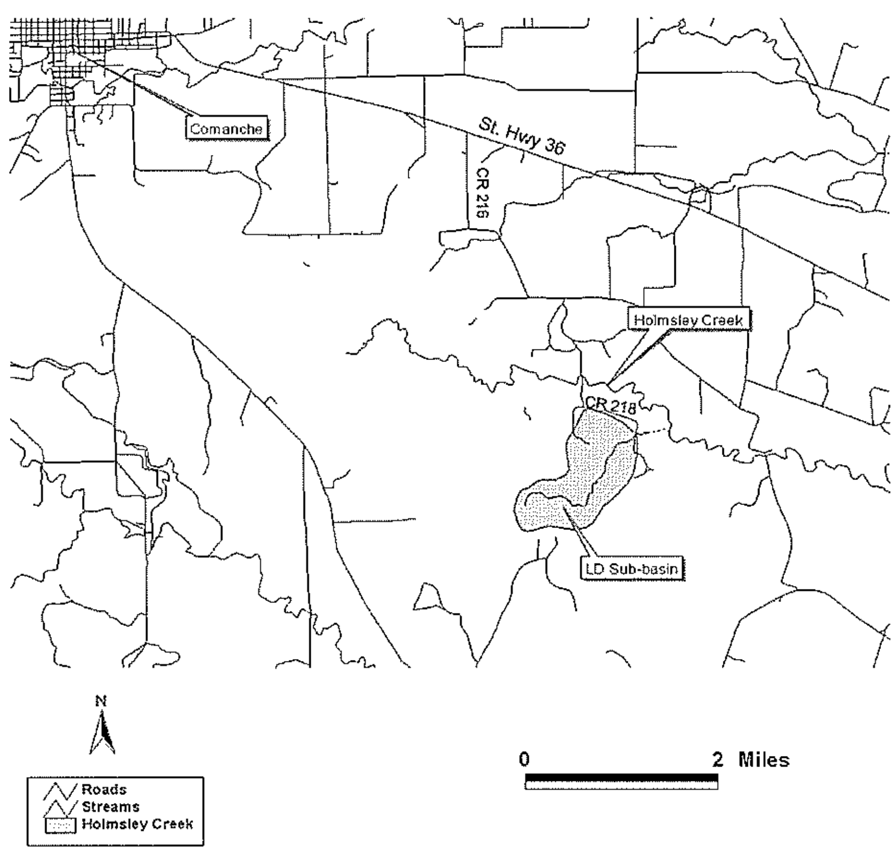

Figure 2. Location of Luckie Dairy sub-basin

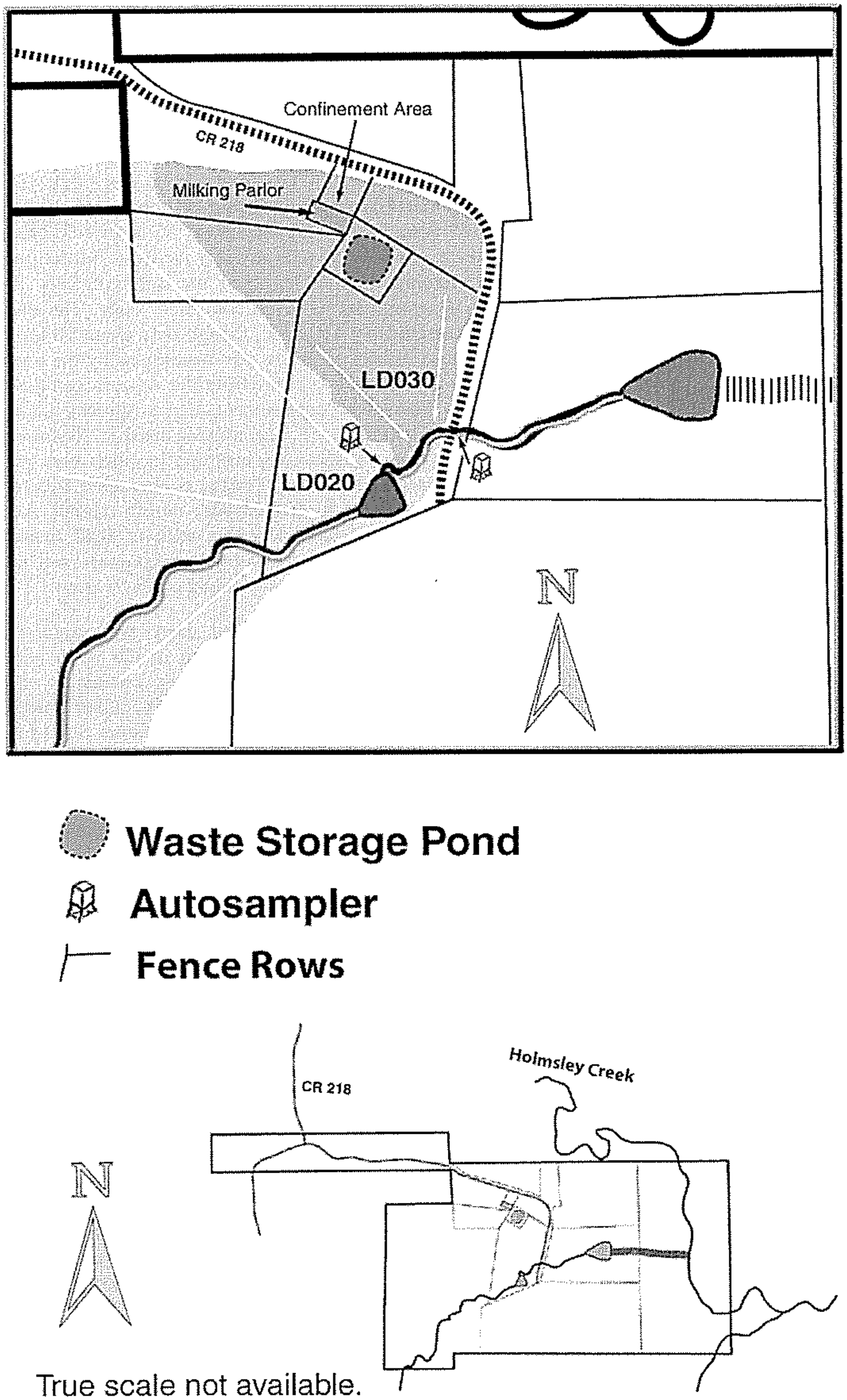

Figure 3. Sampling site locations on the Luckie Dairy

H. & C.C. Dairy

The H. & C.C. Dairy is located approximately 4 miles south of Dublin, Texas in Erath County off FM1702 and CR565 (Figure 4). The dairy encompasses about 426 acres consisting of approximately 174 acres rangeland, 152 acres Coastal bermudagrass, 82 acres cultivated fields, and the balance in roadways and physical facilities. In the immediate vicinity surrounding the milking barn are approximately 25 acres Coastal bermudagrass and 67 acres cultivated fields. The dairy herd consists of approximately 110 head, though only about 90 are milked. Less than 20 head of beef cattle are also maintained by the owner. The milking parlor is located 100 yards from the western bank of Resley Creek with an 8-acre cow confinement area positioned between the barn and the creek (Figure 5). The milking herd is confined to this confinement area most of the time, resulting in either bare ground or closely grazed grass. The proximity of the confinement area to Resley Creek made it susceptible to erosion both during rainfall events and flooding of the creek. Occasionally, the milking head accesses two other pastures for grazing; one Coastal bermudagrass and the other cultivated Sudan or winter wheat, depending on the season.

As no waste storage pond exists at this dairy, wastewater from the milking parlor is collected in a curbed pit at the north end of the milking parlor. Routinely, liquid waste slurry, containing suspended solids, is pumped from this holding pit into a tanker spreader, i.e. Honey Wagon, and applied to waste application fields. Solid wastes are removed from the pit with a front-end-loader-equipped tractor, deposited in a broadcast-type manure spreader, and also applied to the waste application fields. As the waste stream from the milking parlor is collected and managed, stormwater runoff from the confinement area is the primary source of nutrient NPS pollution from this dairy. Reduction of runoff from the confinement area was the primary focus of the waste management plan developed for this site.

TIAER elected to install automated monitoring equipment in a drainage area of approximately 30-35 acres for an upstream-downstream monitoring approach (Figure 5). The drainage area is traversed by a small waterway that primarily serves as a drainage way for stormwater runoff and, occasionally, overflows from Resley Creek during flood stage. No baseflow was ever observed in this drainage, though residual runoff occurred for several days following heavy rains. The upper reach is a poorly defined drainage that passes through a 10–15 acre bermudagrass pasture, entering the confinement area at a fence line approximately 100 yards from Resley Creek. The lower portion below the fence is a severely eroded waterway that cuts through the confinement area before entering Resley Creek. Sampling sites were placed in this drainage. The upstream site (HD050) was installed at the lower end of bermudagrass pasture just above the point at which the waterway entered the confinement area. The lower site (HD055) was located where the drainage exited the confinement area, approximately 10 yards above the confluence with Resley Creek.

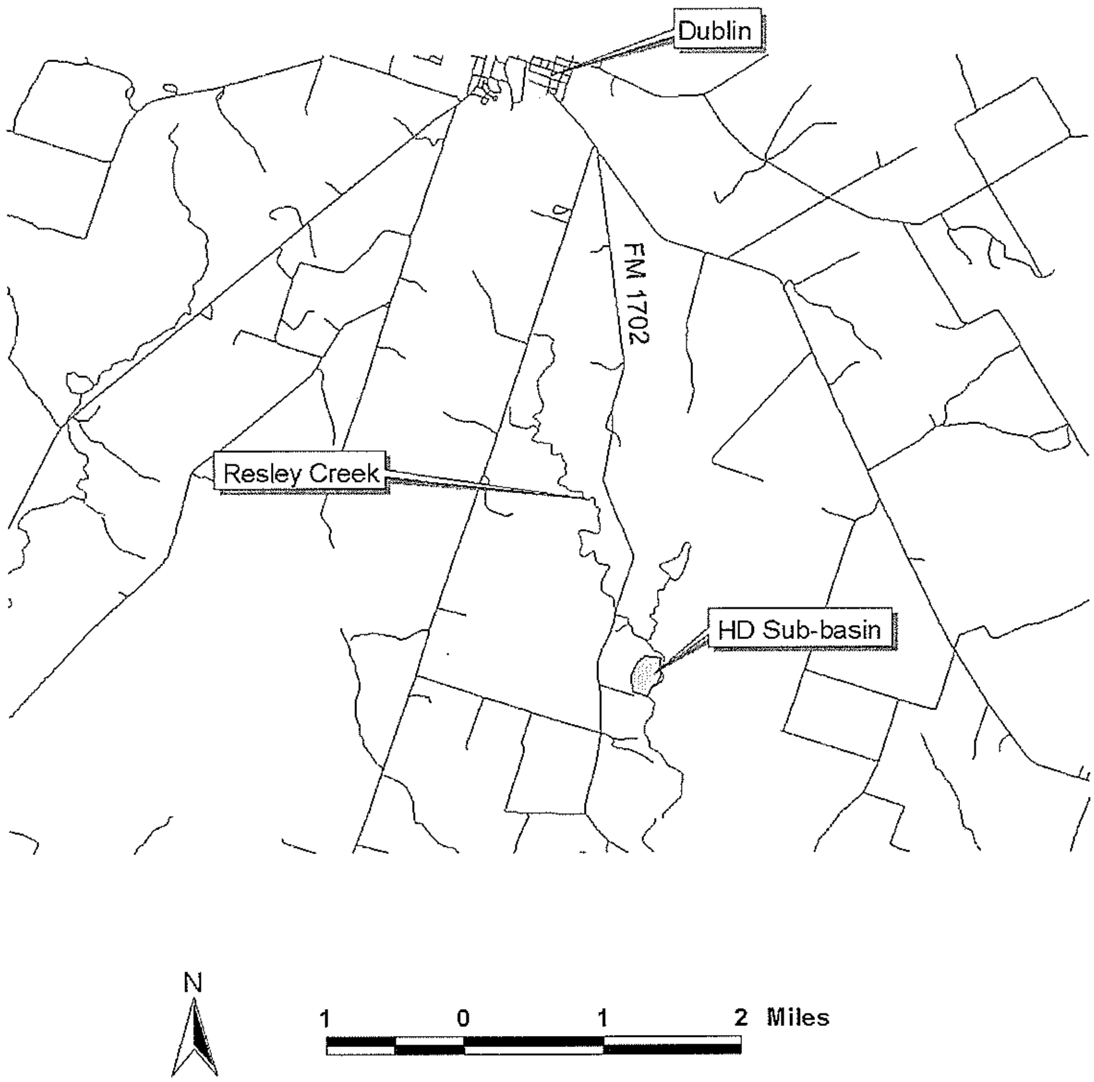

Figure 4. Location of H. &C.C. Dairy sub-basin

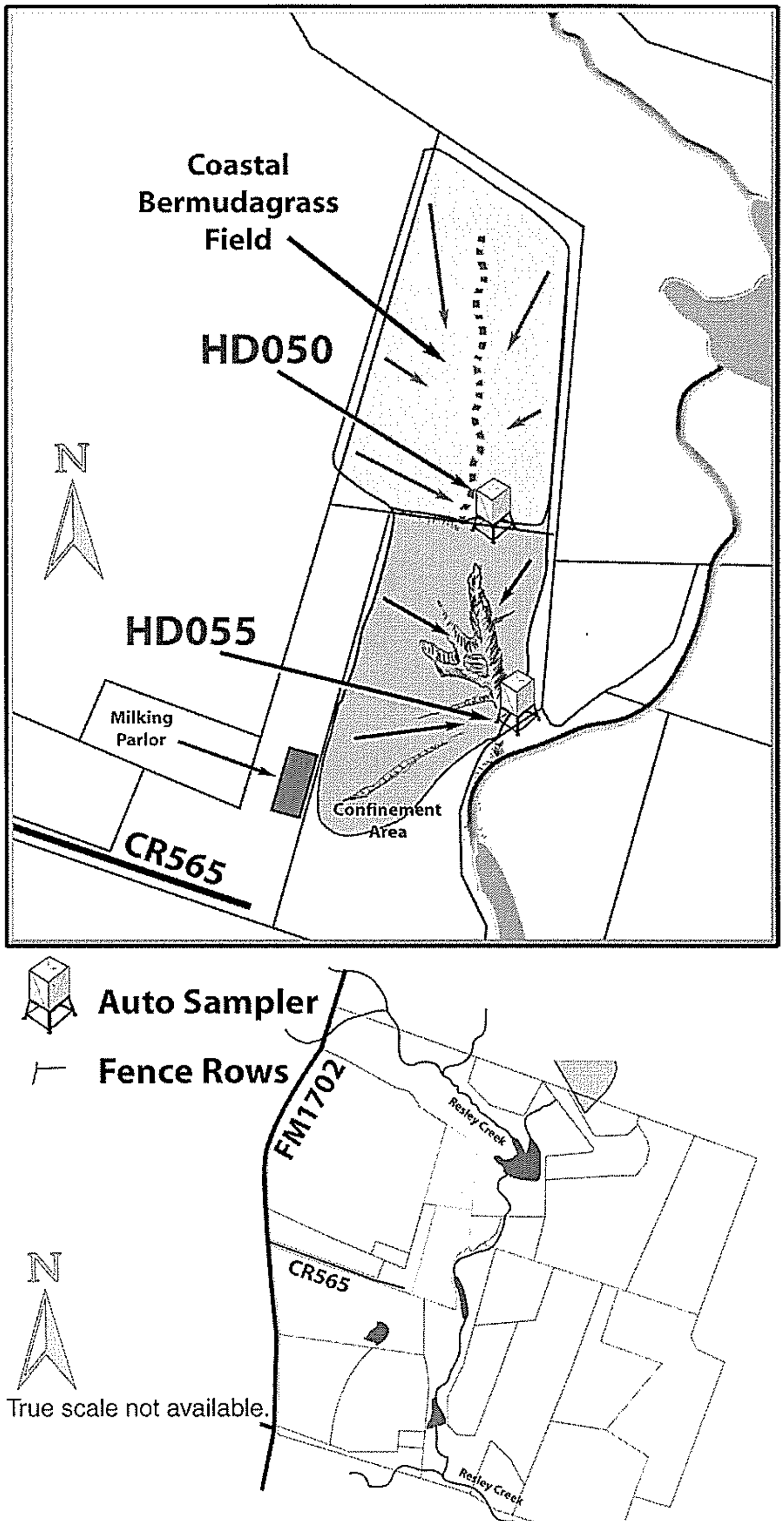

Figure 5. Sampling site locations on the H. & C.C. Dairy

EXPERIMENTAL DESIGN

The focus of this portion of the section 319(h) demonstration project was to gather water quality data before and after the installation of best management practices on the two dairies to evaluate the efficacy of the BMPs. Two automated samplers were installed on each dairy to collect stormwater water samples to characterize water quality pre- and post-BMP implementation. The experimental design and placement of sampling equipment reflected the drainage patterns of each dairy.

An upstream-downstream experimental design was implemented on both the Luckie Dairy and the H. & C.C. Dairy with automated monitoring equipment located upstream and downstream of the confinement area portions of each dairy operation (Figures 3 and 5). This approach compares analyte concentrations in stream water sampled up-gradient of a specific land area to concentrations in stream water sampled down-gradient of that area and is discussed in more detail by Spooner *et al.* (1985).

Automatic sampling sites were installed on the Luckie Dairy in November 1995. The upstream sampling site (LD020) was located on a small, ephemeral, unnamed stream at the spillway of a small stock pond. The watershed above this monitoring site is wooded and native pasture. The steep topography and rocky soils facilitate rapid runoff events of short duration. Because of the rapid rise and fall of the runoff, flow measurements were infrequently collected. As the stock tank was constructed in the stream channel, runoff from rainfall events at LD020 usually did not occur unless the tank was full. When runoff did exit the tank, water flowed through the spillway area in which the upstream sampler was installed. A sandbag structure was constructed to confine runoff to the channel so flow measurements could be accurately collected.

The second automated sampler (LD030) was located below the area into which wastes from the dairy operation entered the stream. The intake and bubbler lines for the sampler were anchored in the downstream end of a corrugated metal culvert that passed under a private road on the dairy property. Large quantities of liquid and suspended solid wastes collected in a catch basin formed by the streambed immediately upstream of the culvert. Under storm water conditions, this accumulated waste material, along with new material from the barn and confinement area was flushed through the culvert and collected by the automated stormwater sampling system. Except under most extreme storm events when the road was overtopped, all runoff from the barn, confinement area passed through this culvert.

On the H. & C.C. Dairy, automatic sampling sites were installed in October 1996. The upstream site (HD050) was installed at the lower end of a grassed waterway that channeled stormwater runoff and, occasionally, overflows from Resley Creek. Water flowing through this channel was funneled through an H-flume in which both the level sensor and intake lines were mounted. Sandbags were used to divert drainage from field through the flume. Down gradient of the flume, the waterway cut through the confinement area for approximately 100 yards, prior to entering Resley Creek. This channel was severely eroded and held water for several days following rainfall events. The downstream sampler (HD055), sensor and intake lines were installed in this channel just outside the confinement area, approximately 10 yards from the confluence of the channel with Resley Creek.

BMP Plans

Site specific BMP plans were developed for each demonstration dairy. The Texas State Soil and Water Conservation Board (TSSWCB) developed the H. & C.C. Dairy's BMP plan, #525-98-219. The United States Department of Agriculture - Natural Resources Conservation Service (USDA-NRCS) in Comanche, Texas, developed plan #525-98-033 for the Luckie Dairy. The main components of the BMP plan for the H. & C.C. Dairy involved revegetation of the confinement area and the addition of fencing along the creek to keep cattle out of the creek and from along the creek bank. The main component of the BMP plan for the Luckie Dairy involved installation of a waste storage lagoon to capture runoff from the confinement area and wastewater from the milking parlor.

Evaluation of BMPs/ Water Quality Improvement

While the ultimate goal of this project was to evaluate the efficacy of BMP implementation on the two demonstration dairies, dry weather conditions limited the post-BMP data collection and circumstances beyond control of the participating agencies prevented full implementation of the BMP plans on either dairy.

In May 1997, the H. & C. C. Dairy conducted a dispersal sale of the dairy herd and ceased to operate as a dairy before the TSSWCB developed BMP plan could be implemented. Though the facility no longer operated as a dairy after May 1997, TIAER maintained and monitored automated storm water samplers until April 1998 under agreement with the TSSWCB. These samplers remained active for the year following closure of the dairy in anticipation that data could be collected revealing improvement in runoff water quality from the confinement area as natural revegetation occurred. As the number of cattle allowed access to the confinement area was reduced, grasses began to cover the area formerly left bare from grazing and trampling. Ten pre-BMP storm events were monitored between October 1996 and May 1997 and six post-BMP storm events were monitored between June 1997 and April 1998 during which both the upstream and downstream sampling sites were activated. These storm event data were used to compare relationships between the upstream and downstream sites as pre- and post-BMP periods. The BMPs evaluated included cessation of the dairy operation and the natural revegetation of the confinement area.

The Luckie dairy also ceased to operate as a dairy in August 1997, however, the owner pursued the installation of the BMP plan in anticipation of either leasing the facility or reviving the operation in the future. A small herd of non-milking cows was maintained in the confinement area following August 1997. In August 1998, a waste storage lagoon, designed by the Comanche, Texas NRCS office, was completed on the Luckie Dairy to collect both runoff (based on a 25-year, 24-hour rainfall event) from the confinement area and wastewater from the milking parlor. To avoid collection of samples that would reflect construction activities, the automated samplers were turned off from April through August 1998, during lagoon construction. Following the completion of the lagoon, the automated samplers at both the upstream and downstream sites were reactivated. Before construction of the lagoon, wash water (wastewater) from the milking parlor and runoff from the confinement area ran directly into the stream above site LD030. It was assumed that the lagoon would contain all normal runoff from the confinement area and wastewater from the milking parlor had the dairy had been in operation. It was also assumed that the storm water sampled at LD030 (the downstream site) would be indicative of the improvement caused by implementation of this BMP.

Although post-BMP monitoring was continued until June 1999, very dry conditions persisted throughout the post-BMP monitoring phase of the project at the Luckie Dairy. Between August 1997 (when the dairy went out of operation) and June 1999 (when monitoring was terminated), only one storm event occurred which initiated sampling at both LD020 and LD030. An approach other than evaluating upstream and downstream water quality relationships was needed to determine any changes in the runoff water quality from the Luckie Dairy during the post-BMP monitoring period. Of note were several small runoff events during which sampling occurred at LD030 (the downstream site) and not at LD020 (the upstream site). While these data were very limited (five events, represented by 28 samples, during the pre-BMP period and three events, represented by 10 samples, during the post-BMP period), a general comparison of these data is presented to indicate the potential effectiveness of the lagoon installation on water quality improvement.

METHODS OF DATA COLLECTION AND ANALYSIS

All data represent water quality samples collected from sampling sites on the Luckie Dairy between November 1995 and June 1999. Data collection at the H. & C.C. Dairy occurred from October 1996 through August 1998. Monitoring efforts were conducted under the approved quality assurance project plan (QAPP) for the research project (Blackland Research Center, 1996). Data collected for this project will be archived by TIAER for at least five years.

Data Collection Methods

Each automated stormwater sampling site consisted of an ISCO 3230 or 4230 bubbler-type flow meter and an ISCO 3700 automatic sampler.[1] The flow meter sampler and power supply were enclosed in a weatherproof, lockable sheet metal shelter. Flow meters recorded water level data at five-minute intervals by measuring the pressure required to force an air bubble through a one-eighth inch polypropylene tube (bubbler line). A 12-volt deep-cycle marine battery powered each system. Electrical charge for each battery was maintained by a 15-volt, 4.2-watt solar panel. At the H. & C.C. Dairy, the sampler intake and bubbler lines for site HD050 were located in an open channel, while the lines for HD055 were mounted in an H-flume. At the Luckie Dairy, the lines for LD020 were installed in an open stream channel, while at LD030 the lines were mounted in a corrugated culvert.

Pre-set sampling programs for the automatic samplers were initiated by the flowmeters when a threshold actuation level was exceeded. Actuation levels selected for each site were as low as possible, but avoided actuation resulting from causes other than rainfall events. Actuation levels for the sites were adjusted as necessary during the course of the project to accommodate variances in precipitation, baseflow level, and other disturbances.

Once activated, samplers were programmed to retrieve samples in the time sequence suited for each site. The time sequence selected for the H-flume at HD050 was an initial sample, 4 samples at 15-minute intervals, 4 samples at 30-minute intervals, 4 samples at 1-hour intervals, 4 samples at 2-hour intervals and all remaining samples at 6-hour intervals. The three remaining sites were programmed as follows: an initial sample, 3 samples at 1-hour intervals, 4 samples at 2-hour intervals, and the remainder at 6-hour intervals. Sampling sequences were selected to collect more samples during the typical rapid rise and peak periods of a storm hydrograph and fewer samples during the slower, receding portion of a storm hydrograph.

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[1] Mention of trade names or equipment manufacturers does not represent endorsement of these products or manufacturers by TIAER.

Rating curves used for flow weighting were developed for each site using best-fit methodology. The rating curve for the culvert at LD030 was developed using the Chézy-Manning roughness coefficient equation (Linsley *et al.*, 1982). Similarly, a flume equation (Grant and Dawson, 1995) was used to develop the rating curve for the H-flume installed at HD050. Manual measurement of flow to develop a rating curve was required at sites LD020 and HD055, because neither site was located at a control structure, *e.g.* flume.

Developing a rating curve for sites LD020 and HD055 proved difficult due to the ephemeral nature of these two sites. Though some velocity measurements were collected at these sites, the number of measurements proved insufficient to develop rating curves. As a rating curve was necessary to convert the concentrations of individual samples into volume-weighted mean concentrations by event, an approximate rating curve for sites LD020 and HD055 was created. A general form of the stage-discharge relationship is given by Maidment (1993) as

$$Q=C(h+a)^N$$

where

Q=discharge

C and N = constants

h=stage

a=stage at which zero discharge occurs.

The value of 'a' was zero based on the locations of the bubbler lines at these sites, while the vales of 'C' and 'N' were unknown for sites LD020 and HD055. 'N' is generally based on the shape of the cross-section, while for a weir 'C' is considered a function of the angle of the streambank (Maidment, 1993). As the purpose of the rating curve in this project was to calculate event mean concentrations (EMCs) rather than loadings, rating curves for LD020 and HD055 were estimated by setting 'C' to 1 and 'N' to 2.5 to approximate a triangular streambed shape with a very shallow slope. For comparison, a value of 2.5 for 'N' is generally used for a V-notch weir, while a value of 1.5 is often used for a rectangular weir. These approximate rating curves are probably not accurate enough to compare loading estimates between upstream-downstream sites but were considered adequate for the less sensitive task of calculating volume-weighted EMCs for site comparisons. The rating curves used for all four sites are presented in Appendix A.

Laboratory Analysis Methods

A general outline of the water quality constituents measured, the abbreviations used in this report and the units of measurements are provided in Table 1. The EPA-approved methods of analysis used by TIAER are listed in Table 2.

Table 1. Descriptions, abbreviations and units of water quality constituents measured at stream sites in the Leon watershed.

Constituent	Abbreviation	Units	Description
Ammonia-Nitrogen	NH_3-N	mg/L	Inorganic form of nitrogen that is readily soluble and available for plant uptake. Elevated levels are toxic to many fish species.
Nitrite-plus-Nitrate-Nitrogen	NO_{23}-N	mg/L	Total of two inorganic forms of nitrogen. Allows the comparison of the total amount of inorganic nitrogen regardless of the phase. NO_2 is an inorganic form of nitrogen. Generally a transitory phase in the nitrification of NH_3 to NO_3. NO_3 is an inorganic form of nitrogen that is readily soluble and available for plant uptake. Considered the end product in the conversion of N from ammonia to nitrite then to nitrate under aerobic conditions
Total Kjeldahl Nitrogen	TKN	mg/L	Organic and ammonia forms of nitrogen are included in TKN.
Total Nitrogen	total-N	mg/L	Total of inorganic and organic forms of nitrogen. It is calculated by adding NO_2, NO_3 and TKN, rather than being a measured parameter.
Orthophosphate-Phosphorus	PO_4-P	mg/L	Inorganic form of phosphorus that is readily soluble and available for plant uptake. Dissolved reactive phosphorus (DRP) is another term for this constituent
Total Phosphorus	total-P	mg/L	Represents both organic and inorganic forms of phosphorus.
Total Suspended Solids	TSS	mg/L	Measures the solid materials, i.e., clay, silts, sand and organic, suspended in the water.

Table 2. Analysis methods and method detection limits for water quality constituents.

Constituent	Method†	Estimated MDL‡
Ammonia-Nitrogen	EPA 350.1	0.022 - 0.037 mg/L
Nitrite- and Nitrate-Nitrogen	EPA 353.2	0.003 - 0.016 mg/L
Orthophosphate-Phosphorus	EPA 365.2	0.008 - 0.011 mg/L
Total Kjeldahl Nitrogen	EPA 351.2	0.173 - 0.195 mg/L
Total Phosphorus	EPA 365.4	0.024 - 0.153 mg/L
Total Suspended Solids	EPA 160.2	3 - 10 mg/L

† EPA–Methods for Chemical Analysis of Water and Wastes, March 1983.

‡ Estimated method detection limits were periodically updated; therefore, the range of MDLs estimated during the project are presented.

Data Management Procedures

Outliers

Screening was used to highlight questionable data points. Questionable data were then tracked through the Chain of Custody sheets and field and laboratory notebooks, as necessary, to verify if these points represented transcription errors in the database. If a transcription error was found, the error was corrected prior to statistical analysis of the data. No statistical methods were used to identify or remove outliers from the water quality database for stream water quality data.

Censored Data

Left censored data (values measured below the laboratory method detection limit) were entered as one-half the method detection limit (MDL) as recommended by Gilliom and Helsel (1986) and Ward *et al.* (1988).

Statistical Analysis Methods

Data analysis methods varied somewhat for the two demonstration dairy sites based on the timing of the BMP implementation and the amount of post-BMP data collected. For both dairy sites, data were statistically analyzed to compare water quality between the upstream and downstream sites only if water samples were collected from both sites as a result of the same stormwater runoff event. Data for each set of sites were summarized and compared by individual storm event. Comparison of individual observations within storm events was not possible due to differences in the response timing of the sites to rainfall-runoff events. Basic statistics (mean, median, volume-weighted mean, standard deviation, minimum, maximum and the number of observations in each event) are presented for each site by storm event in Appendix B. Because only one storm event occurred during the post-BMP storm data both Luckie Dairy, a general comparison of samples collected at LD030 when flow and sampling did not occur at LD020 is presented as an indication of water quality changes between the pre- and post-BMP sampling periods.

To summarize the storm event data, volume-weighted storm EMCs for water quality constituents were calculated across storm events for comparison between paired sites. Generally, a volume-weighted mean value is more meaningful for comparisons between sites than a straight mean or median as it takes into account the flow associated with each storm event. Volume-weighted means were calculated by combining the storm hydrograph with the water quality data for each storm event. The flow hydrograph was divided into intervals based on the date and time when water quality samples were taken using a midpoint rectangular method between water quality samples (Stein, 1977). Constant flow was assumed between each five-minute water level measurement to estimate the water volume associated with each water quality sample. The beginning of each storm event was set an hour before the first water quality sample was taken to include any rise in the hydrograph that occurred before the sampler was initiated. The end of each storm event was set six hours after the last sample was taken. A new storm event was defined if more than 12 hours occurred between water quality samples or if an obvious new pulse of flow was indicated in the storm hydrograph.

Two general statistical approaches were taken to evaluate the data collected. Paired and unpaired Student's *t*-tests where used to indicate differences between the upstream and downstream sites on each dairy. In addition, regression analysis was used on data collected at the H. & C.C. Dairy to compare water quality responses between the upstream and downstream sites during the pre- and post-BMP sampling periods. Comparison of pre-BMP to post-BMP regression relationships represents the typically recommended approach with upstream-downstream experimental designs (Spooner *et al.*, 1985). The regression approach was not used for data collected on the Luckie Dairy due to limitations in the post-BMP sampling.

The unpaired *t*-test compares the EMCs of all storm events for both sites, while the paired *t*-test evaluates the difference between the EMCs of the two sites for all of the paired storm events. For the unpaired *t*-test, the null hypothesis is that the mean values of the EMCs of the two populations are equal. The null hypothesis for the paired *t*-test is that the mean of the difference between the two populations is zero. The paired *t*-test was used to remove extraneous variance existing from storm to storm for these paired observations (Ott, 1984). Prior to these analyses the data were evaluated to determine whether data transformations were needed using a Shapiro-Wilks test to evaluate the normality of the distribution of the data (SAS, 1992; Ott, 1984). Water quality samples often follow a log normal distribution rather than a normal distribution, thus violating one of the assumptions for using parametric statistics, such as analysis of variance (Spooner, 1994). The log normal distribution accounts for the occasional high values or great differences in magnitude between water quality measurements which may result in a distribution that is greatly skewed to the right. A log normal transformation is generally recommended for data sets with a skewed distribution or unequal variances (Little and Hill, 1975; Spooner, 1994).

The Shapiro-Wilks test was evaluated on the difference between storm values for the paired *t*-test and the summarized storm event values for the unpaired *t*-tests as $\log_{(e)}$ transformed and untransformed values (Ott, 1984). Overall, a natural-log transformation was indicated to better fit the assumptions of normality than the non-transformed data for all of these comparisons. Prior to running the unpaired *t*-test, the standard deviations across storm events for volume-weighted EMCs were also tested for equal variances using Hartley's F-test (Ott, 1984). The Hartley's F-test generally confirmed the need for using a natural-log transformation of the water quality data in that the assumption of equal variances was generally indicated for the transformed values but not the non-transformed values. All data used in the paired and unpaired *t*-tests were log transformed based on the results of the Shaprio-Wilkes and Hartley's F tests. Differences were considered to be significant at α = 0.05 and highly significant at α = 0.01. Basic statistics for each site across storm events are presented in Appendix C.

Regression analysis was used to assess BMP effectiveness at the H. & C.C. Dairy by comparing the relationship of EMCs between the upstream and downstream sites during the pre- and post-BMP sampling periods. As a log-log relationship is often indicated in these types of analyses (Spooner *et al.*, 1985), regressions were evaluated using both non-transformed and $\log_{(e)}$-transformed data and the residuals plotted to determine the "best fit" models. The residuals of each regression model were also evaluated using the Shaprio-Wilkes test for normality. Overall the $\log_{(e)}$-transformed regressions were found to have a better fit indicated by higher correlation coefficients (R^2 values) and to have residuals that were more normally distributed than the regression models developed from the untransformed data. The $\log_{(e)}$-transformed regression models, if significant, were then used for the pre- and post-BMP evaluation using analysis of covariance methods as outlined in EPA (1993).

H. & C.C. Dairy

At the H. & C.C. Dairy, highly significant differences ($\alpha = 0.01$) between the upstream and downstream sites were indicated for all constituents except NH_3-N, NO_{23}-N and PO_4-P during the pre-BMP monitoring period (Table 3). For NH_3-N significant differences at $\alpha = 0.05$ were indicated for the paired but not the unpaired *t*-test results. During the post-BMP monitoring, significant differences between the upstream and downstream sites were indicated only for TSS and NO_{23}-N at $\alpha = 0.05$ indicating some change in water quality between the pre- and post-BMP monitoring periods.

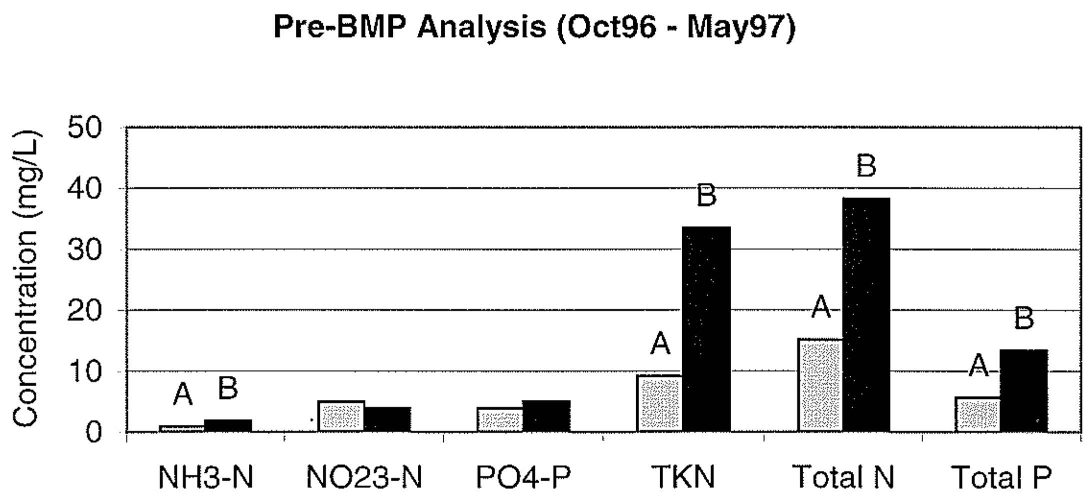
Table 3. Paired and unpaired t-test results for the natural-log transformed data for pre- and post-BMP monitoring periods at the H. & C.C. Dairy sites. 'n' indicates the number of storm events evaluated.

	Volume-Weighted Means			
	Paired	Unpaired	Paired	Unpaired
	Pre-BMP (n=10)		Post-BMP (n=6)	
NH_3-N	0.0128*	0.1853	0.8719	0.9096
NO_{23}-N	0.3059	0.6436	0.0235*	0.1031
PO_4-P	0.7418	0.4164	0.0729	0.8192
TKN	0.0003**	0.0005**	0.0979	0.1238
Total N	0.0011**	0.0096**	0.0836	0.1160
Total P	0.0005**	0.0067**	0.1193	0.1721
TSS	0.0001**	0.0000**	0.0156*	0.0257*

* indicates significant difference at $\alpha = 0.05$
** indicates significant difference at $\alpha = 0.01$

This change in nutrient water quality between the pre- and post-BMP periods is emphasized in Figure 6. TSS is not presented in Figure 6 due to differences in scale with the other water quality constituents. Geometric mean TSS values at HD050 were 158 mg/L pre-BMP and 276 mg/L post-BMP, while geometric mean TSS values at HD055 were 1,916 mg/L pre-BMP and 1,688 mg/L post-BMP. During the pre-BMP monitoring period very distinct differences in water quality were noted between the upstream and downstream sites. When significant differences were indicated, the downstream site (HD055) consistently experienced higher stormwater concentrations than the upstream site (HD050). During the post-BMP monitoring period during which the dairy was not in operation and natural revegetation was occurring in the area between the dairy and the creek, the water quality at the downstream site was very similar to the water quality at the upstream site.

As weather conditions varied between the pre- and post-BMP sampling periods, the pre- and post-BMP data at a site typically cannot be compared directly to indicate BMP effectiveness. Regression techniques combined with analysis of covariance are often used with an



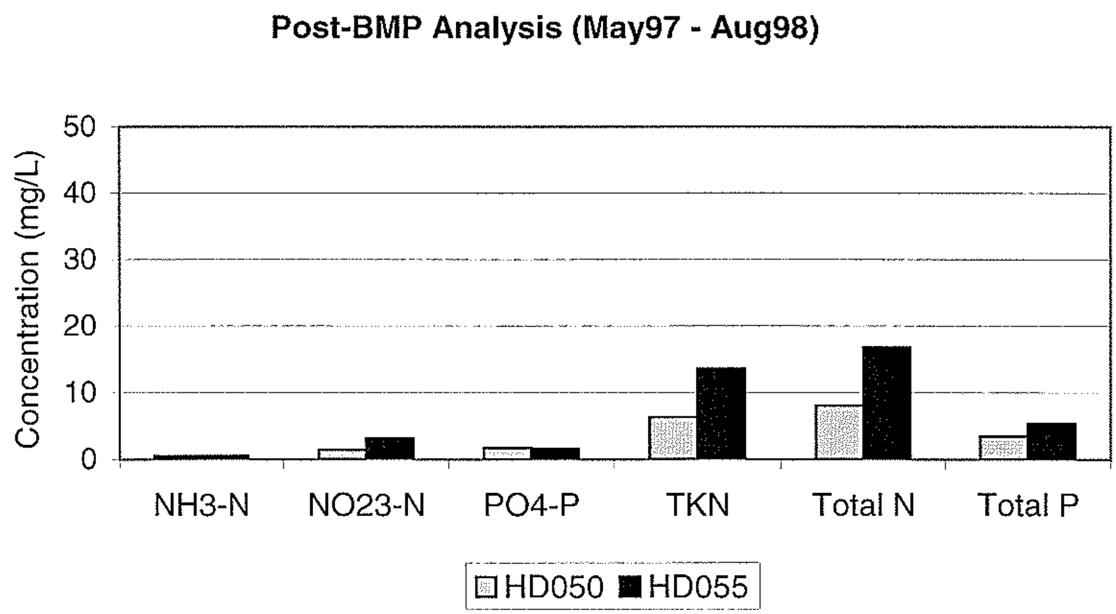


Figure 6. Geometric mean values of volume-weighted event mean concentrations for upstream (HD050) and downstream (HD055) sampling sites on the H. & C.C. Dairy for pre- and post-BMP monitoring. Different letters indicate significantly different mean values at a 0.05 probability level for the unpaired t-test results. TSS not presented due to scale differences with other constituent values.

upstream/downstream approach using the upstream site acting as the covariate accounting for the impacts of weather between the pre- and post-BMP monitoring periods (EPA, 1993). Significant linear regression relationships must be established during the pre-BMP and post-BMP sampling periods for the analysis of covariance method to be applied. The analysis of covariance technique then allows a comparison of the pre- and post-BMP monitoring periods through evaluation of changes in the slope of these regression relationships. The slope should decrease in the post-BMP monitoring with improvement in water quality at the downstream site if the BMP implemented is effective (Spooner *et al.*, 1985).

Pre- and post-BMP regression relationships are summarized for sites HD050 and HD055 in Table 4. Significant positive pre-BMP regression relationships were indicated for NH_3-N, NO_{23}-N, PO_4-P, total N and total P. For TKN and TSS, the nonsignificant regression relationships obtained indicate only that the water quality at HD050 does not have a linear relationship with the water quality at HD055 based on the 10 storm events evaluated in the pre-BMP monitoring period. During the post-BMP monitoring period only six storm events occurred greatly limiting the potential for developing significant regression relationships. Only NO_{23}-N indicated a significant regression relationship during the pre- and post-BMP monitoring periods. In evaluating the slopes of the regression lines between the two time periods using analysis of covariance methods for NO_{23}-N, no significant difference in the slopes was indicated at $\alpha = 0.05$.

The regression and analysis of covariance methods were unable to determine a significant improvement in water quality between the upstream and downstream sites at the H. & C.C. Dairy. This does not necessarily mean that the BMPs were not effective, rather it could mean the data collection was inadequate to show actual BMP effectiveness. Because storm events were limited by drought conditions, particularly during post-BMP monitoring, the lack of sufficient data was likely the reason BMP effectiveness could not be determined. Nonetheless, there does appear to be a general decrease in the slope of the regression lines between the pre- and post-BMP sampling periods for all constituents with significant pre-BMP regression relationship expect NO_{23}-N. This indicates that with continued sampling a significant improvement in water quality probably would have been observed. This conclusion is supported by the *t*-test results which indicate a strong similarity in the water quality between the upstream and downstream sites during the post-BMP monitoring that was not indicated during the pre-BMP monitoring (Table 3).

Table 4. Pre- and post-BMP regression relationships for sites on the H. & C.C. Dairy.

Constituent	Monitoring Period	Equation	R^2	p-value	Standard Deviation of the Slope
NH_3-N	Pre	Ln(HD055)=0.66+0.71*Ln(HD050)	0.65	0.0047 **	0.18
NH_3-N	Post	Ln(HD055)=-0.20+0.69*Ln(HD050)	0.30	0.2654	0.53
NO_{23}-N	Pre	Ln(HD055)=-0.01+0.86*Ln(HD050)	0.66	0.0042 **	0.22
NO_{23}-N	Post	Ln(HD055)=0.37+2.17*Ln(HD050)	0.89	0.0049 **	0.38
PO_4-P	Pre	Ln(HD055)=0.01+1.16*Ln(HD050)	0.75	0.0011 **	0.24
PO_4-P	Post	Ln(HD055)=0.09+0.70*Ln(HD050)	0.31	0.2485	0.52
TKN	Pre	Ln(HD055)=1.78+0.78*Ln(HD050)	0.24	0.1471	0.48
TKN	Post	Ln(HD055)=1.81+0.43*Ln(HD050)	0.11	0.5259	0.62
Total N	Pre	Ln(HD055)=1.14+0.92*Ln(HD050)	0.43	0.0390 *	0.37
Total N	Post	Ln(HD055)=1.41+0.68*Ln(HD050)	0.17	0.4202	0.75
Total P	Pre	Ln(HD055)=0.29+1.33*Ln(HD050)	0.58	0.0103 *	0.40
Total P	Post	Ln(HD055)=0.65+0.84*Ln(HD050)	0.21	0.3602	0.81
TSS	Pre	Ln(HD055)=8.52-0.19*Ln(HD050)	0.02	0.6729	0.43
TSS	Post	Ln(HD055)=0.34+1.26*Ln(HD050)	0.44	0.2257	0.83

* indicates significance at a probability level of 0.05.
** indicates significance at a probability level of 0.01.

Luckie Dairy

At the Luckie Dairy, significant differences (α=0.05) between upstream and downstream sites were indicated for the paired and unpaired *t*-tests for all constituents except NO_{23}-N (Table 5). Geometric means of the $\log_{(e)}$-transformed EMCs for NH_3-N, NO_{23}-N, PO_4-P, TKN, Total N and Total P are presented in Figure 7 to emphasize the differences in constituent values between the two sites. Geometric mean values for TSS were not presented in the graph due to differences in scale with the other constituents. Geometric mean TSS values were 77 mg/L at LD020 and 288 mg/L at LD030. When significant differences were indicated, higher constituent values were consistently indicated at the downstream site than at the upstream site.

Table 5. Paired and unpaired t-test results for data collected for the Luckie Dairy sampling sites from 16 storm events.

	Volume-Weighted Means	
	Paired	Unpaired
NH_3-N	0.0001**	0.0001**
NO_{23}-N	0.1118	0.1995
PO_4-P	0.0001**	0.0000**
TKN	0.0001**	0.0004**
Total N	0.0001**	0.0005**
Total P	0.0001**	0.0001**
TSS	0.0003**	0.0259*

* indicates significant differences at α = 0.05
** indicates significant differences at α = 0.01

Because only one storm event was monitored during the post-BMP period at the Luckie Dairy, a direct comparison could not be made of the BMP effectiveness using statistical methods. However, there were some runoff events during the pre- and post-BMP monitoring periods during which storm samples were collected at LD030 but not at LD020. These samples from LD030 cannot be statistical compared between the pre- and post-BMP sampling periods due to variances in weather conditions during the two time periods that would be accounted for in an upstream/downstream sampling approach. Although a statistical analysis for the post-BMP period was not appropriate, an overview of the data collected only at LD030 does give an indication of the impact that installation of the lagoon should have on runoff water quality from the dairy operation (Table 6 and Figure 8). A very noticeable decrease in concentrations occurs for almost all constituents indicating that most nutrient and TSS loadings associated with the Luckie Dairy were probably associated with runoff from the confinement area and wastewater from the milking parlor. Even though the dairy was not in operation at the time of the post-BMP monitoring, it is anticipated that the lagoon would have captured any runoff or milking parlor wastewater that occurred from normal dairy operations. These post-BMP monitoring results are considered indicative of the expected improvement in water quality due to the installation of the lagoon had the dairy been in operation.

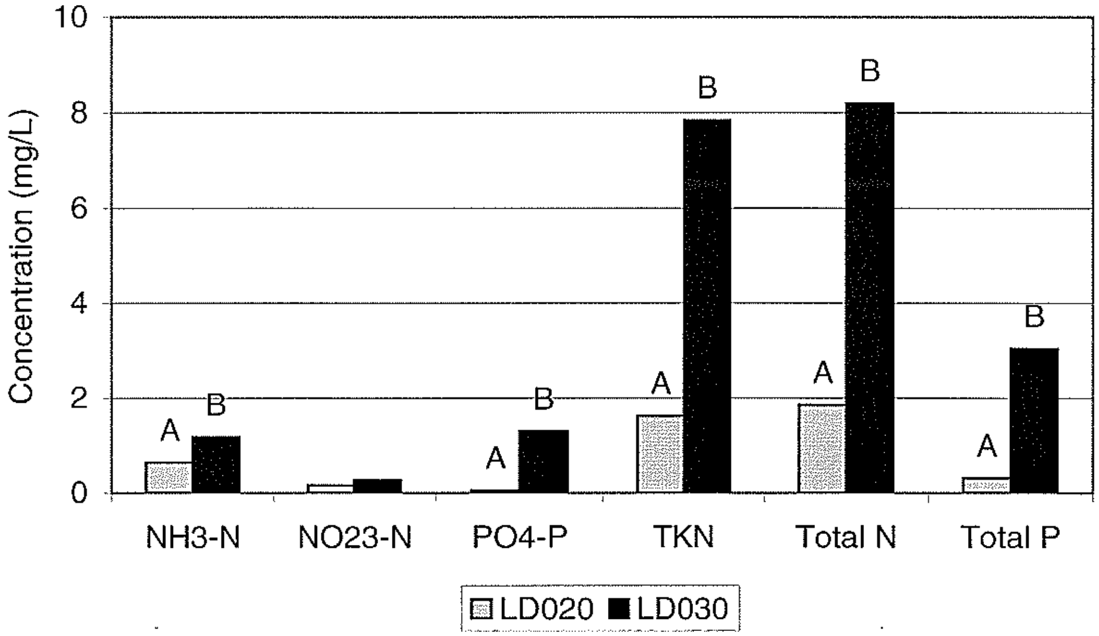


Figure 7. Comparison of upstream (LD020) and downstream (LD030) water quality for the Luckie Dairy demonstration sites during the pre-BMP monitoring period. Values represent the geometric mean of volume-weighted event mean concentrations. Different letters indicate significantly different mean values at a 0.05 probability level for the unpaired t-test results. TSS values not presented due to scale differences with the other constituent values.

Table 6. General summary of pre- and post-BMP storm samples collected at LD030 when sampling did not occur at LD020.

Constituent	Period	Mean	Median	Std	Minimum	Maximum	Number of Samples	Number of Storm Events
		(mg/L)						
NH_3-N	Post	0.59	0.25	0.67	0.15	2.25	10	3
	Pre	23.50	6.19	38.41	1.50	152.00	28	5
NO_{23}-N	Post	1.73	1.57	0.64	0.79	3.14	10	3
	Pre	2.19	2.54	1.38	0.04	4.56	28	5
TKN	Post	4.33	3.30	2.46	2.22	9.81	10	3
	Pre	107.15	41.80	135.98	25.80	637.00	27	5
Total N	Post	6.06	5.10	2.66	3.91	11.25	10	3
	Pre	109.29	44.29	135.15	29.36	637.75	27	5
PO_4-P	Post	1.98	1.74	1.13	0.68	4.60	10	3
	Pre	11.83	9.20	6.34	5.52	30.20	28	5
Total P	Post	2.84	2.44	1.59	1.50	6.64	10	3
	Pre	38.50	18.10	42.02	8.40	181.00	27	5
TSS	Post	427	202	463	49	1,320	10	3
	Pre	2,097	1,200	2,212	214	8,540	28	5

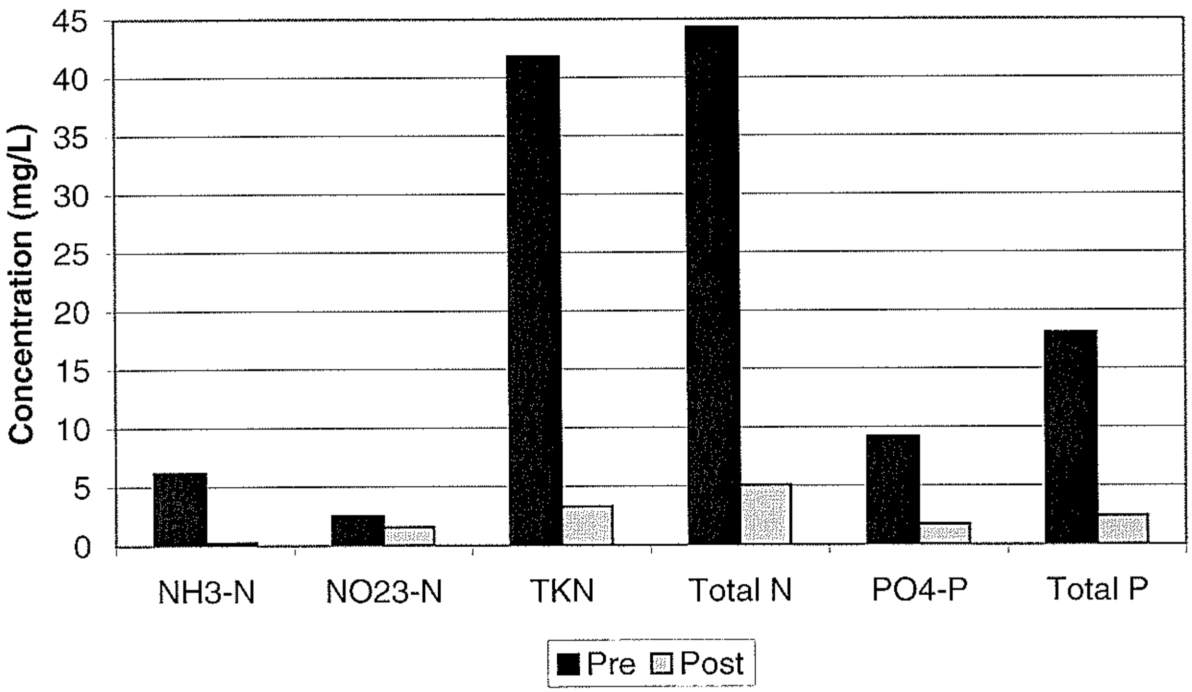


Figure 8. Median pre-and post-BMP values for storm samples collected at LD030 when sampling did not occur at LD020. TSS values not presented due to scale differences with the other constituent values.

SUMMARY AND CONCLUSIONS

Upstream-downstream automated monitoring sites were installed at both the H. & C.C. and the Luckie dairies to gather nutrient data from stormwater runoff. Water quality and level data were obtained for all storm events to characterize conditions prior to and after the BMP implementation. BMPs were designed and installed to treat source areas in the intervening drainage area between the upstream and downstream monitoring sites. These source areas include confinement pens and milking parlor wash water. The drainage area of the upstream monitoring site was designed to act as a control, thus receiving no treatment. Due to dry weather conditions and changes in the operation of each dairy, post-BMP monitoring was somewhat limited but did indicate improvement in runoff water quality from around the dairy facilities due to BMP implementation.

At both dairies during the pre-BMP monitoring, all statistically significant relationships between the upstream and downstream sites indicated higher concentrations of constituents at the downstream than at the upstream sampling sites. This trend supported the initial concern that stormwater runoff from the milking parlors and/or confinement areas was contributing to the NPS pollution of the watersheds. During post-BMP monitoring on the H. & C.C. Dairy, up and downstream water quality was similar for all constituents but NO_{23}-N indicating an improvement due to BMP implementation. This improvement, however, could not be statistically verified using regression and analysis of covariance methods due to the limited post-BMP data collected. On the Luckie Dairy a statistical analysis for the post-BMP period was not appropriate as only one rainfall runoff event lead to sampling at both the upstream and downstream sites during this period. An overview of the data collected between the pre- and post-BMP periods when sampling occurred only at LD030 does give an indication of the impact that installation of the lagoon should have on runoff water quality from the dairy operation. A very noticeable decrease in concentrations occurred for almost all constituents indicating that most nutrient and TSS loadings associated with the Luckie Dairy were probably associated with runoff from the confinement area and wastewater from the milking parlor.

BMPs implementation on the Luckie and H.&C.C. dairies was considered to have improved water quality for the Leon River watershed. The lack of rainfall events, especially for the post-BMP monitoring, prevented the use of rigorous statistical procedures to show efficiency of BMPs. However, less rigorous review of the data from both dairies was used to substantiate indications of water quality improvement from BMP implementation.

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Appendix A: Rating Curves for Sampling Sites

Figure A-1. Rating curves for HD050 and HD055

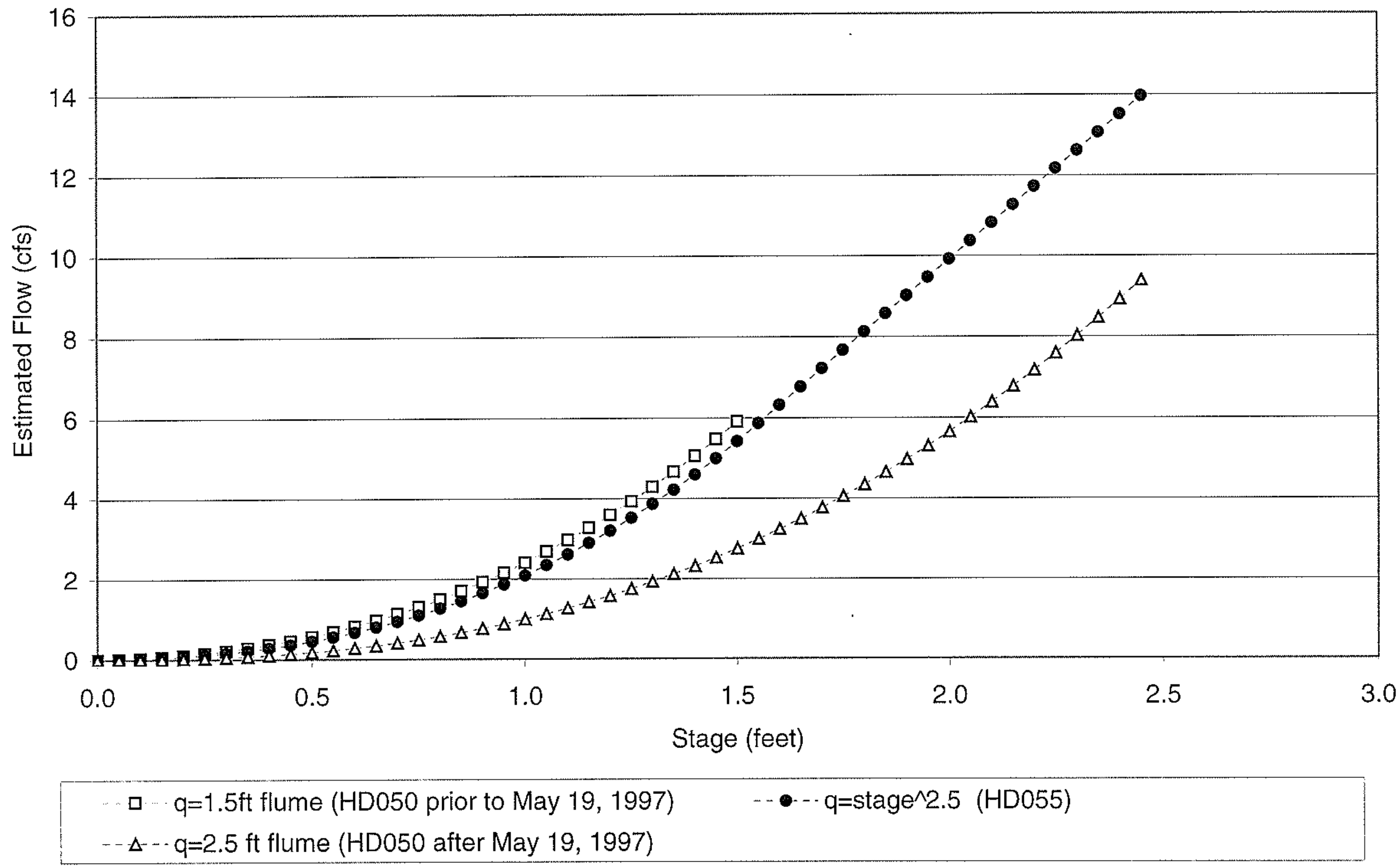
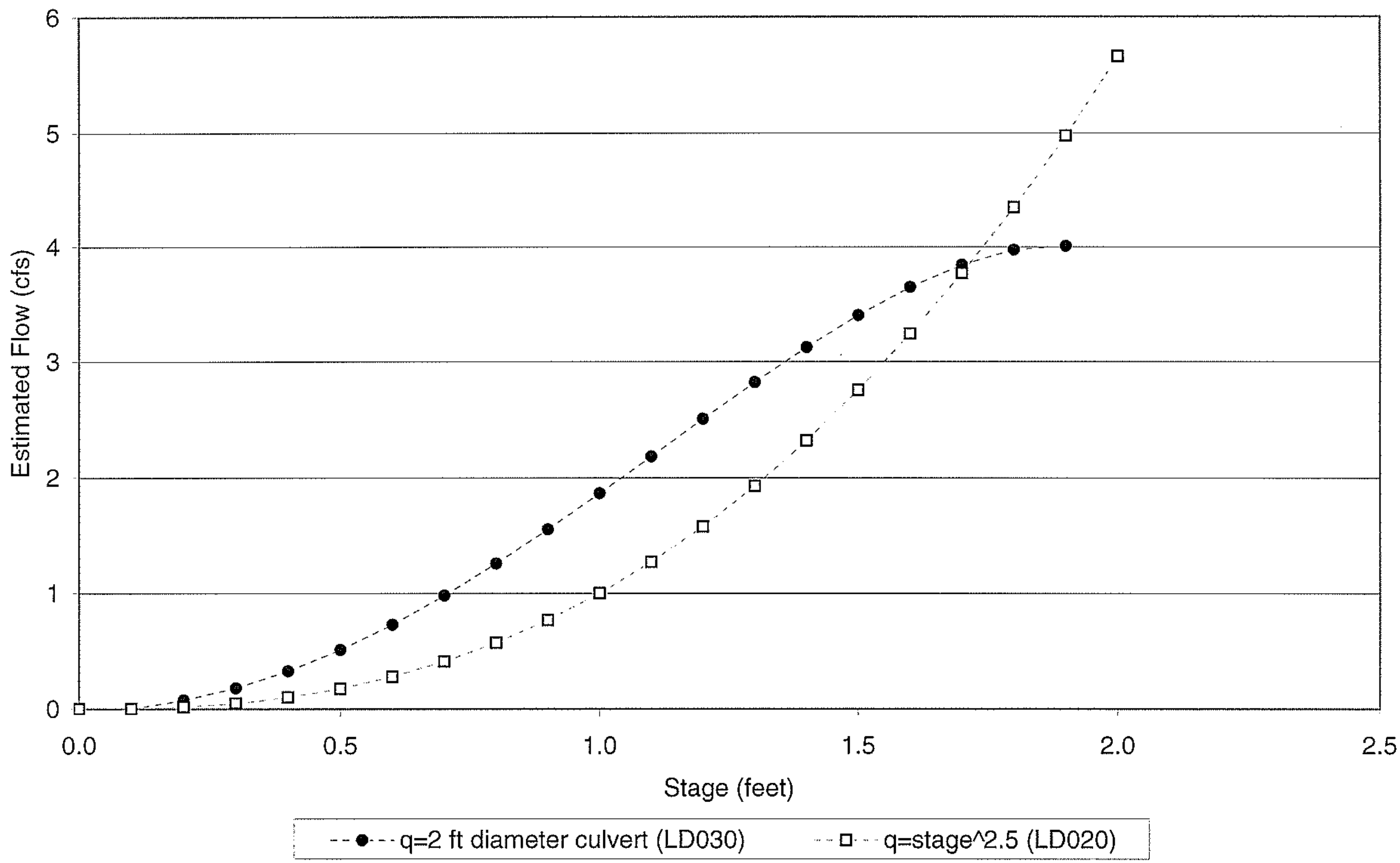


Figure A-2. Rating Curves for LD020 and LD030



Appendix B: Basic Statistics for Demonstration Sites by Storm Event

Table B-1. Basic statistics for samples collected during storm events at H &CC Dairy site HD050.

HD050 Storm 1				First Sample / Last Sample		27-Oct-96 / 28-Oct-96	18:55 / 18:25	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	4.88	4.57	4.27	1.86	7.90	2.02	13
Total N	mg/L	10.16	10.15	9.18	2.11	15.16	7.48	13
NH_3-N	mg/L	0.26	0.34	0.02	0.33	0.78	0.02	13
PO_4-P	mg/L	3.28	3.43	3.37	0.90	4.26	1.06	13
TKN	mg/L	5.27	5.58	4.88	1.54	8.06	3.01	13
Total P	mg/L	4.22	4.38	4.14	0.85	5.53	3.02	13
TSS	mg/L	97	101	51	120	428	24	13
HD050 Storm 2				**First Sample / Last Sample**		**7-Nov-96 / 7-Nov-96**	**0:45 / 2:15**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	7.36	7.33	7.25	0.85	8.51	6.45	4
Total N	mg/L	13.54	13.48	13.32	0.76	14.58	12.95	4
NH_3-N	mg/L	0.55	0.54	0.54	0.05	0.61	0.49	4
PO_4-P	mg/L	3.60	3.57	3.68	0.18	3.71	3.34	4
TKN	mg/L	6.18	6.15	5.92	0.70	7.20	5.68	4
Total P	mg/L	4.67	4.64	4.67	0.30	4.97	4.39	4
TSS	mg/L	174	181	178	46	222	120	4
HD050 Storm 3				**First Sample / Last Sample**		**29-Nov-96 / 29-Nov-96**	**1:30 / 14:00**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	7.41	8.10	6.95	1.33	10.29	6.00	12
Total N	mg/L	19.47	19.08	19.01	2.09	23.63	16.78	8
NH_3-N	mg/L	3.11	3.31	3.04	0.48	3.85	2.00	12
PO_4-P	mg/L	6.95	6.84	7.13	0.55	7.49	6.01	12
TKN	mg/L	11.97	10.98	11.75	2.73	16.40	8.72	8
Total P	mg/L	7.42	7.37	7.31	0.52	8.21	6.85	8
TSS	mg/L	119	73	109	107	412	20	12

Table B-1. Basic statistics for samples collected during storm events at H &CC Dairy site HD050 (cont.).

HD050 Storm 4				First Sample / Last Sample		6-Feb-97 / 7-Feb-97	10:15 / 4:45	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	20.29	21.25	19.54	5.68	26.87	11.67	15
Total N	mg/L	47.45	48.09	44.55	5.64	55.97	39.20	15
NH_3-N	mg/L	7.22	7.52	6.58	2.09	9.84	4.49	15
PO_4-P	mg/L	9.51	9.53	8.50	2.01	12.60	7.40	15
TKN	mg/L	27.15	26.84	27.50	3.08	31.80	18.40	15
Total P	mg/L	12.33	12.21	12.30	1.52	14.90	9.39	15
TSS	mg/L	143	114	126	133	498	19	15
HD050 Storm 5				First Sample / Last Sample		12-Feb-97 / 13-Feb-97	4:10 / 10:40	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	10.93	11.55	10.41	2.22	15.82	7.90	17
Total N	mg/L	29.71	29.53	29.28	3.80	36.42	22.70	17
NH_3-N	mg/L	3.19	3.87	3.19	0.93	4.31	1.15	17
PO_4-P	mg/L	4.67	7.23	5.79	3.98	10.30	0.34	17
TKN	mg/L	18.78	17.98	18.30	2.44	23.30	14.80	17
Total P	mg/L	9.20	10.15	8.45	1.46	12.00	7.37	17
TSS	mg/L	383	182	252	426	1780	21	17
HD050 Storm 6				First Sample / Last Sample		19-Feb-97 / 21-Feb-97	13:15 / 6:45	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	3.55	0.86	3.94	2.59	7.46	0.30	13
Total N	mg/L	14.04	6.89	15.70	6.93	21.64	3.88	13
NH_3-N	mg/L	0.98	0.50	0.78	0.55	1.93	0.35	13
PO_4-P	mg/L	5.10	1.86	6.06	2.74	8.75	1.01	13
TKN	mg/L	10.49	6.03	12.00	4.73	15.40	3.40	13
Total P	mg/L	6.36	2.78	7.29	3.14	10.60	1.24	13
TSS	mg/L	152	653	74	218	837	11	13

Table B-1. Basic statistics for samples collected during storm events at H &CC Dairy site HD050 (cont.).

HD050 Storm 7				First Sample / Last Sample		2-Mar-9 / 3-Mar-9	0:55 / 13:35	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	1.27	0.95	1.33	0.66	2.44	0.27	18
Total N	mg/L	11.83	9.55	10.63	7.57	26.84	3.42	10
NH_3-N	mg/L	0.63	0.79	0.58	0.23	1.12	0.29	18
PO_4-P	mg/L	2.92	2.29	3.02	0.87	4.22	1.04	18
TKN	mg/L	10.57	8.60	9.52	7.32	25.60	3.08	10
Total P	mg/L	5.50	5.16	5.66	2.00	8.95	1.84	10
TSS	mg/L	401	169	199	481	1690	19	18
HD050 Storm 8				First Sample / Last Sample		4-Apr-97 / 5-Apr-97	6:10 / 6:10	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	7.48	10.38	1.07	13.55	31.60	0.42	5
Total N	mg/L	14.69	17.65	8.21	13.47	38.31	6.52	5
NH_3-N	mg/L	0.38	0.45	0.23	0.33	0.96	0.19	5
PO_4-P	mg/L	5.06	4.66	6.04	1.98	6.93	2.14	5
TKN	mg/L	7.21	7.27	6.71	1.43	9.65	5.91	5
Total P	mg/L	6.46	6.27	6.86	0.99	7.58	5.40	5
TSS	mg/L	62	61	39	69	182	5	5
HD050 Storm 9				First Sample / Last Sample		25-Apr-97 / 26-Apr-97	10:40 / 16:55	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	6.39	6.97	6.08	2.77	9.99	2.24	13
Total N	mg/L	15.66	16.20	16.38	3.92	22.83	8.89	13
NH_3-N	mg/L	0.65	0.66	0.63	0.26	1.28	0.10	13
PO_4-P	mg/L	3.70	3.26	3.22	1.14	5.63	2.36	13
TKN	mg/L	9.28	9.23	8.28	3.30	18.20	6.34	13
Total P	mg/L	5.84	5.20	5.97	1.42	8.06	3.27	13
TSS	mg/L	170	158	37	254	783	14	13

Table B-1. Basic statistics for samples collected during storm events at H &CC Dairy site HD050 (cont.).

HD050 Storm 10				First Sample / Last Sample		23-May-97 / 24-May-97	13:55 / 5:40	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	2.11	2.21	2.28	0.98	3.58	0.09	13
Total N	mg/L	9.16	9.24	8.76	3.20	13.81	5.04	8
NH_3-N	mg/L	0.25	0.25	0.24	0.07	0.39	0.12	13
PO_4-P	mg/L	2.43	2.38	2.51	0.55	3.11	0.94	13
TKN	mg/L	7.27	7.03	7.39	3.08	11.20	3.83	8
Total P	mg/L	4.04	3.99	4.04	0.48	4.75	3.48	8
TSS	mg/L	345	335	112	465	1660	30	13

HD050 Storm 11				First Sample / Last Sample		10-Jun-97 / 10-Jun-97	1:30 / 11:30	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	1.68	1.62	1.74	0.51	2.32	0.80	7
Total N	mg/L	5.21	4.39	4.72	2.22	7.63	3.26	3
NH_3-N	mg/L	0.47	0.55	0.44	0.26	0.86	0.20	7
PO_4-P	mg/L	2.10	1.66	2.28	0.70	2.62	0.79	7
TKN	mg/L	3.68	2.77	2.98	1.69	5.61	2.46	3
Total P	mg/L	2.58	2.44	2.70	1.19	3.71	1.34	3
TSS	mg/L	TSS samples not run - as per Corrective Action Report 97-197 (lab overload)						0

HD050 Storm 12				First Sample / Last Sample		16-Jun-97 / 16-Jun-97	23:25 / 23:25	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	2.84	2.84	2.84		2.84	2.84	1
Total N	mg/L	16.64	16.64	16.64		16.64	16.64	1
NH_3-N	mg/L	0.39	0.39	0.39		0.39	0.39	1
PO_4-P	mg/L	2.59	2.59	2.59		2.59	2.59	1
TKN	mg/L	13.80	13.80	13.80		13.80	13.80	1
Total P	mg/L	5.21	5.21	5.21		5.21	5.21	1
TSS	mg/L	624	624	624		624	624	1

Table B-1. Basic statistics for samples collected during storm events at H &CC Dairy site HD050 (cont.).

HD050 Storm 13				First Sample / Last Sample		22-Jun-97 / 23-Jun-97	12:55 / 10:55	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.81	0.93	0.83	0.26	1.08	0.41	5
Total N	mg/L	17.43	12.58	11.52	18.99	43.50	3.19	4
NH_3-N	mg/L	0.44	0.32	0.30	0.42	1.13	0.08	5
PO_4-P	mg/L	1.79	0.64	1.24	1.56	4.20	0.43	5
TKN	mg/L	16.62	11.65	10.79	18.87	42.50	2.40	4
Total P	mg/L	6.89	4.97	4.86	7.41	16.90	0.95	4
TSS	mg/L	899	237	276	1229	2960	71	5
HD050 Storm 14				**First Sample / Last Sample**		**7-Aug-97 / 7-Aug-97**	**9:35 / 18:35**	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	1.34	1.63	1.52	0.47	1.84	0.61	7
Total N	mg/L	4.85	4.75	4.49	0.79	6.30	4.03	7
NH_3-N	mg/L	0.29	0.25	0.19	0.21	0.63	0.11	7
PO_4-P	mg/L	2.28	1.96	2.19	0.43	2.92	1.65	7
TKN	mg/L	3.50	3.12	3.42	0.64	4.78	2.65	7
Total P	mg/L	2.73	2.38	2.85	0.44	3.41	2.11	7
TSS	mg/L	108	99	91	53	204	53	7
HD050 Storm 15				**First Sample / Last Sample**		**25-Feb-98 / 25-Feb-98**	**18:50 / 22:50**	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	1.35	1.31	1.41	0.16	1.46	1.11	4
Total N	mg/L	9.84	9.72	9.42	1.91	12.51	7.98	4
NH_3-N	mg/L	1.21	1.32	1.16	0.34	1.67	0.87	4
PO_4-P	mg/L	2.52	2.64	2.43	0.44	3.11	2.10	4
TKN	mg/L	8.49	8.41	7.98	2.05	11.40	6.59	4
Total P	mg/L	3.93	4.04	3.86	0.32	4.34	3.64	4
TSS	mg/L	275	269	218	211	577	86	4

Table B-1. Basic statistics for samples collected during storm events at H &CC Dairy site HD050 (cont.).

HD050				First Sample		15-Mar-98	22:55	
Storm 16				Last Sample		16-Mar-98	5:55	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.78	0.91	0.73	0.33	1.47	0.33	8
Total N	mg/L	6.49	6.42	6.80	1.58	8.14	4.00	8
NH_3-N	mg/L	0.51	0.46	0.38	0.25	0.92	0.32	8
PO_4-P	mg/L	2.54	1.86	1.17	2.86	7.19	0.68	8
TKN	mg/L	5.71	5.51	6.14	1.57	7.32	3.14	8
Total P	mg/L	3.19	2.69	2.35	2.26	7.36	1.33	8
TSS	mg/L	363	405	350	116	540	218	8

Table B-2. Basic statistics for samples collected during storm events at H& CC Dairy site HD055.

HD055 Storm 1			First Sample / Last Sample			27-Oct-96 / 28-Oct-96	17:55 / 16:55	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	4.20	3.19	3.58	1.97	8.35	2.22	10
Total N	mg/L	43.75	62.12	20.25	50.73	176.58	10.00	10
NH_3-N	mg/L	1.81	1.92	1.40	1.33	5.10	0.74	10
PO_4-P	mg/L	5.14	5.38	5.03	1.21	6.92	2.56	10
TKN	mg/L	39.55	58.93	16.70	50.86	173.00	5.82	10
Total P	mg/L	12.96	18.36	9.25	10.66	39.90	4.88	10
TSS	mg/L	3420	5253	864	7149	23500	23	10

HD055 Storm 2			First Sample / Last Sample			7-Nov-96 / 7-Nov-96	0:15 / 1:15	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	8.06	8.07	8.06	0.17	8.18	7.94	2
Total N	mg/L	47.26	47.56	47.26	4.27	50.28	44.24	2
NH_3-N	mg/L	2.40	2.38	2.40	0.23	2.56	2.23	2
PO_4-P	mg/L	4.66	4.60	4.66	0.81	5.23	4.08	2
TKN	mg/L	39.20	39.49	39.20	4.10	42.10	36.30	2
Total P	mg/L	13.70	13.72	13.70	0.28	13.90	13.50	2
TSS	mg/L	1990	2084	1990	1344	2940	1040	2

HD055 Storm 3			First Sample / Last Sample			29-Nov-96 / 29-Nov-96	1:20 / 4:50	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	7.14	7.12	6.37	2.26	10.38	5.43	4
Total N	mg/L	116.19	112.22	105.23	27.40	147.38	95.97	3
NH_3-N	mg/L	3.98	4.27	3.91	1.63	5.64	2.46	4
PO_4-P	mg/L	6.18	6.52	5.77	0.98	7.63	5.56	4
TKN	mg/L	109.00	105.10	99.80	24.72	137.00	90.20	3
Total P	mg/L	43.27	42.88	42.40	7.24	50.90	36.50	3
TSS	mg/L	2060	1797	1575	1463	4190	900	4

Table B-2. Basic statistics for samples collected during storm events at H& CC Dairy site HD055 (cont.).

HD055 Storm 4				First Sample / Last Sample		6-Feb-97 / 6-Feb-97	9:20 / 15:25	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	16.47	16.40	16.78	3.51	21.44	12.24	6
Total N	mg/L	83.10	74.48	76.70	36.04	152.80	55.44	6
NH_3-N	mg/L	9.03	9.54	9.87	2.23	11.30	5.10	6
PO_4-P	mg/L	10.82	11.35	11.90	2.19	12.30	6.74	6
TKN	mg/L	66.63	58.08	62.30	37.26	137.00	34.00	6
Total P	mg/L	26.57	23.01	22.50	15.16	56.20	15.60	6
TSS	mg/L	3031	1984	1645	4170	11300	191	6

HD055 Storm 5				First Sample / Last Sample		12-Feb-97 / 13-Feb-97	4:05 / 3:05	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	7.96	6.33	7.57	3.10	13.34	3.69	10
Total N	mg/L	72.06	62.35	53.73	41.34	141.31	26.40	10
NH_3-N	mg/L	5.99	5.72	5.79	1.38	8.34	3.70	10
PO_4-P	mg/L	12.65	12.36	9.70	7.28	22.90	0.17	10
TKN	mg/L	64.10	56.02	46.45	40.56	137.00	19.80	10
Total P	mg/L	22.23	21.65	18.20	9.61	43.40	13.40	10
TSS	mg/L	7992	12174	6110	8877	31300	278	10

HD055 Storm 6				First Sample / Last Sample		19-Feb-97 / 21-Feb-97	11:45 / 4:45	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	3.24	0.64	2.65	3.25	11.81	0.24	11
Total N	mg/L	34.62	7.89	26.91	35.09	118.81	4.15	11
NH_3-N	mg/L	1.68	0.31	2.18	1.01	2.80	0.22	11
PO_4-P	mg/L	5.73	0.93	6.91	4.49	10.40	0.58	11
TKN	mg/L	31.38	7.25	22.20	151.37	107.00	3.67	11
Total P	mg/L	12.74	2.40	12.90	10.60	33.50	1.34	11
TSS	mg/L	971	864	590	1092	3120	60	11

Table B-2. Basic statistics for samples collected during storm events at H& CC Dairy site HD055 (cont.).

HD055 Storm 7				First Sample Last Sample		2-Mar-97 3-Mar-97	1:35 6:35	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	5.26	0.93	2.12	7.54	24.54	0.49	10
Total N	mg/L	28.15	27.21	26.77	14.97	54.14	11.58	6
NH_3-N	mg/L	1.12	0.87	0.98	0.59	2.55	0.61	10
PO_4-P	mg/L	4.14	3.82	3.78	1.46	6.66	2.49	10
TKN	mg/L	20.70	26.28	20.40	9.30	31.40	5.82	6
Total P	mg/L	9.00	11.58	8.82	3.64	14.30	4.32	6
TSS	mg/L	1027	1347	1150	661	2080	171	10
HD055 Storm 8				First Sample Last Sample		4-Apr-97 5-Apr-97	4:40 5:55	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	4.42	1.76	2.10	5.61	18.66	0.42	14
Total N	mg/L	30.83	19.63	20.09	23.15	96.09	13.64	14
NH_3-N	mg/L	1.18	1.06	1.13	0.48	1.92	0.13	14
PO_4-P	mg/L	6.96	7.41	7.45	1.16	8.12	4.68	14
TKN	mg/L	26.41	17.87	18.00	21.69	93.50	11.20	14
Total P	mg/L	12.62	11.65	11.20	3.67	23.80	9.66	14
TSS	mg/L	1363	670	525	2483	9800	140	14
HD055 Storm 9				First Sample Last Sample		25-Apr-97 26-Apr-97	9:55 14:55	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	10.76	17.52	8.64	9.68	32.68	1.46	8
Total N	mg/L	39.16	63.18	26.85	24.02	85.48	17.31	8
NH_3-N	mg/L	1.77	1.76	1.73	0.88	3.11	0.14	8
PO_4-P	mg/L	5.86	4.78	6.05	1.88	8.91	2.09	8
TKN	mg/L	28.40	45.66	21.45	15.70	52.80	14.70	8
Total P	mg/L	11.64	15.04	10.89	3.66	16.60	7.39	8
TSS	mg/L	922	1951	510	1051	3010	150	8

Table B-2. Basic statistics for samples collected during storm events at H& CC Dairy site HD055 (cont.).

HD055 Storm 10				First Sample / Last Sample		23-May-97 / 24-May-97	15:45 / 6:45	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	2.13	2.43	2.10	0.47	2.98	1.57	7
Total N	mg/L	12.75	16.76	9.45	5.78	20.98	8.19	5
NH_3-N	mg/L	0.73	0.82	0.64	0.16	1.04	0.62	7
PO_4-P	mg/L	3.31	3.41	3.32	0.17	3.51	3.06	7
TKN	mg/L	10.59	14.33	7.48	5.37	18.00	6.25	5
Total P	mg/L	6.06	7.26	5.52	1.63	8.09	4.51	5
TSS	mg/L	515	923	327	555	1590	68	7

HD055 Storm 11				First Sample / Last Sample		10-Jun-97 / 10-Jun-97	0:30 / 17:30	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	4.23	2.35	2.18	6.14	20.56	1.29	9
Total N	mg/L	22.49	10.80	10.81	28.88	80.26	5.32	6
NH_3-N	mg/L	0.85	0.86	0.59	0.74	2.67	0.10	9
PO_4-P	mg/L	2.42	2.92	1.36	1.68	5.74	0.95	9
TKN	mg/L	17.27	8.45	8.74	21.44	59.70	4.03	6
Total P	mg/L	5.64	3.91	4.13	5.55	15.90	1.37	6
TSS	mg/L	TSS samples not run - as per Corrective Action Report 97-197 (lab overload)						

HD055 Storm 12				First Sample / Last Sample		16-Jun-97 / 17-Jun-97	23:15 / 0:15	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	27.82	15.00	27.82	26.33	46.43	9.20	2
Total N	mg/L	74.32	82.85	74.32	17.52	86.70	61.93	2
NH_3-N	mg/L	0.71	0.43	0.71	0.57	1.11	0.31	2
PO_4-P	mg/L	1.61	1.20	1.61	0.83	2.19	1.02	2
TKN	mg/L	46.50	67.85	46.50	43.84	77.50	15.50	2
Total P	mg/L	13.87	19.47	13.87	11.50	22.00	5.73	2
TSS	mg/L	3355	4447	3355	2242	4940	1770	2

Table B-2. Basic statistics for samples collected during storm events at H& CC Dairy site HD055 (cont.).

HD055 Storm 13				First Sample / Last Sample		22-Jun-97 / 24-Jun-97	11:50 / 4:50	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	19.96	0.99	12.98	21.47	58.53	0.01	10
Total N	mg/L	35.58	8.00	39.73	27.73	62.08	4.02	6
NH_3-N	mg/L	0.73	0.16	0.36	0.76	2.31	0.09	10
PO_4-P	mg/L	1.63	0.69	0.96	1.17	3.47	0.61	10
TKN	mg/L	14.78	7.01	7.44	18.58	50.20	1.99	6
Total P	mg/L	5.70	3.50	3.73	5.53	14.30	1.05	6
TSS	mg/L	1121	804	184	2353	7660	18	10
HD055 Storm 14				**First Sample / Last Sample**		**7-Aug-97 / 7-Aug-97**	**8:55 / 15:55**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	4.83	5.41	2.40	4.48	12.28	1.58	6
Total N	mg/L	30.13	25.86	24.09	27.73	62.82	4.84	6
NH_3-N	mg/L	0.67	0.72	0.55	0.58	1.50	0.08	6
PO_4-P	mg/L	2.69	2.86	2.37	0.70	3.73	2.11	6
TKN	mg/L	25.30	20.45	18.51	25.26	60.70	3.02	6
Total P	mg/L	7.32	5.76	5.17	7.03	20.90	2.58	6
TSS	mg/L	1366	807	569	2373	6160	36	6
HD055 Storm 15				**First Sample / Last Sample**		**25-Feb-98 / 26-Feb-98**	**18:15 / 5:15**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	3.18	3.29	3.12	0.75	4.36	2.23	8
Total N	mg/L	15.38	13.93	14.53	3.86	23.08	11.06	8
NH_3-N	mg/L	1.09	1.10	1.12	0.26	1.40	0.64	8
PO_4-P	mg/L	3.12	2.67	2.97	0.55	4.12	2.43	8
TKN	mg/L	12.20	10.64	10.35	4.02	20.40	8.54	8
Total P	mg/L	5.73	4.59	4.65	2.00	9.29	4.04	8
TSS	mg/L	716	468	472	774	2500	116	8

Table B-2. Basic statistics for samples collected during storm events at H& CC Dairy site HD055 (cont.).

HD055				First Sample		15-Mar-98	22:35	
Storm 16				Last Sample		17-Mar-98	9:35	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	6.79	1.44	1.37	10.35	31.46	0.03	12
Total N	mg/L	12.67	8.54	11.06	6.85	26.09	4.32	8
NH_3-N	mg/L	0.51	0.29	0.49	0.30	0.90	0.01	12
PO_4-P	mg/L	1.40	0.89	1.04	0.72	3.06	0.77	12
TKN	mg/L	11.07	7.10	10.51	5.12	19.30	4.29	8
Total P	mg/L	4.57	3.46	4.32	1.98	8.39	1.98	12
TSS	mg/L	5118	10163	2420	5910	20900	460	12

Table B-3. Basic statistics for samples collected during storm events at Luckie Dairy site LD020.

LD020 Storm 1				First Sample / Last Sample		31-May-96 / 31-May-96	4:55 / 16:40	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.56	0.57	0.54	0.17	0.77	0.32	10
Total N	mg/L	2.56	2.57	2.61	0.17	2.79	2.21	10
NH_3-N	mg/L	0.07	0.07	0.07	0.01	0.08	0.05	10
PO_4-P	mg/L	0.11	0.11	0.11	0.01	0.11	0.10	10
TKN	mg/L	2.00	2.01	2.02	0.09	2.14	1.87	10
Total P	mg/L	0.33	0.33	0.31	0.05	0.40	0.25	10
TSS	mg/L	76	68	81	28	104	5	10
LD020 Storm 2				**First Sample / Last Sample**		**4-Jun-96 / 4-Jun-96**	**0:55 / 23:55**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	0.18	0.18	0.17	0.10	0.40	0.02	12
Total N	mg/L	1.65	1.61	1.59	0.32	2.57	1.35	12
NH_3-N	mg/L	0.08	0.08	0.08	0.02	0.11	0.05	12
PO_4-P	mg/L	0.06	0.05	0.05	0.02	0.10	0.03	12
TKN	mg/L	1.47	1.43	1.43	0.26	2.17	1.13	12
Total P	mg/L	0.25	0.26	0.22	0.09	0.40	0.13	12
TSS	mg/L	75	79	58	53	170	20	12
LD020 Storm 3				**First Sample / Last Sample**		**16-Aug-96 / 17-Aug-96**	**10:15 / 4:20**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	0.40	0.42	0.44	0.12	0.47	0.06	11
Total N	mg/L	3.20	3.05	2.20	3.75	14.46	1.56	11
NH_3-N	mg/L	0.15	0.15	0.14	0.05	0.24	0.08	11
PO_4-P	mg/L	0.08	0.08	0.07	0.05	0.23	0.06	11
TKN	mg/L	2.79	2.63	1.76	3.86	14.40	1.16	11
Total P	mg/L	0.35	0.37	0.31	0.31	1.22	0.05	11
TSS	mg/L	157	181	168	86	298	57	11

Table B-3. Basic statistics for samples collected during storm events at Luckie Dairy site LD020 (cont.).

LD020 Storm 4				First Sample Last Sample		27-Aug-96 28-Aug-96	22:20 9:20	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.09	0.11	0.08	0.07	0.16	0.01	8
Total N	mg/L	1.73	1.74	1.69	0.27	2.18	1.34	8
NH_3-N	mg/L	0.06	0.06	0.07	0.03	0.10	0.02	7
PO_4-P	mg/L	0.11	0.08	0.07	0.09	0.33	0.06	8
TKN	mg/L	1.64	1.63	1.64	0.23	2.02	1.33	8
Total P	mg/L	0.29	0.30	0.31	0.05	0.36	0.18	8
TSS	mg/L	46	48	50	13	70	28	8
LD020 Storm 5				First Sample Last Sample		29-Aug-96 29-Aug-99	0:25 9:25	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.30	0.28	0.25	0.16	0.65	0.19	7
Total N	mg/L	2.06	2.04	2.15	0.56	2.96	1.36	7
NH_3-N	mg/L	0.09	0.09	0.09	0.03	0.14	0.06	7
PO_4-P	mg/L	0.02	0.03	0.01	0.02	0.06	0.01	7
TKN	mg/L	1.75	1.76	1.90	0.48	2.31	1.08	7
Total P	mg/L	0.36	0.38	0.34	0.12	0.56	0.21	7
TSS	mg/L	285	311	166	271	865	48	7
LD020 Storm 6				First Sample Last Sample		31-Aug-96 1-Sep-96	17:10 7:10	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.20	0.19	0.20	0.05	0.25	0.15	3
Total N	mg/L	1.52	2.17	2.33	1.77	4.81	1.39	3
NH_3-N	mg/L	2.84	0.07	0.08	0.06	0.16	0.05	3
PO_4-P	mg/L	0.08	0.09	0.08	0.01	0.09	0.08	3
TKN	mg/L	2.64	1.98	2.13	1.72	4.56	1.24	3
Total P	mg/L	0.78	0.66	0.64	0.24	1.05	0.64	3
TSS	mg/L	390	268	330	365	782	59	3

Table B-3. Basic statistics for samples collected during storm events at Luckie Dairy site LD020 (cont.).

LD020 Storm 7				First Sample Last Sample		28-Oct-96 28-Oct-96	6:35 23:35	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.11	0.12	0.11	0.06	0.20	0.04	10
Total N	mg/L	1.61	1.63	1.62	0.24	1.98	1.13	10
NH_3-N	mg/L	0.07	0.08	0.07	0.03	0.15	0.05	10
PO_4-P	mg/L	0.21	0.23	0.08	0.19	0.60	0.07	10
TKN	mg/L	1.50	1.51	1.49	0.22	1.92	1.09	10
Total P	mg/L	0.40	0.40	0.40	0.08	0.52	0.29	10
TSS	mg/L	250	259	259	100	393	94	10
LD020 Storm 8				First Sample Last Sample		7-Nov-96 7-Nov-96	7:45 9:45	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.08	0.07	0.07	0.02	0.10	0.06	3
Total N	mg/L	11.55	10.80	10.77	1.62	13.40	10.46	3
NH_3-N	mg/L	0.04	0.07	0.03	0.04	0.08	0.01	3
PO_4-P	mg/L	0.05	0.04	0.05	0.02	0.07	0.04	3
TKN	mg/L	11.47	10.73	10.70	1.59	13.30	10.40	3
Total P	mg/L	2.07	1.94	2.12	0.17	2.21	1.88	3
TSS	mg/L	52	39	36	31	88	33	3
LD020 Storm 9				First Sample Last Sample		20-Feb-97 28-Feb-97	3:35 23:35	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.08	0.09	0.07	0.04	0.23	0.01	40
Total N	mg/L	0.89	1.02	0.66	0.59	3.03	0.28	40
NH_3-N	mg/L	0.05	0.04	0.04	0.05	0.21	0.01	40
PO_4-P	mg/L	0.03	0.03	0.03	0.02	0.07	0.01	40
TKN	mg/L	0.81	0.93	0.61	0.56	2.89	0.27	40
Total P	mg/L	0.12	0.15	0.05	0.13	0.57	0.05	40
TSS	mg/L	6	14	5	5	31	5	27

Table B-3. Basic statistics for samples collected during storm events at Luckie Dairy site LD020 (cont.).

LD020				First Sample		2-Mar-97	14:00	
Storm 10				Last Sample		6-Mar-97	8:00	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.08	0.08	0.06	0.06	0.19	0.01	14
Total N	mg/L	0.47	0.50	0.40	0.27	0.91	0.11	10
NH_3-N	mg/L	0.03	0.03	0.04	0.02	0.06	0.01	16
PO_4-P	mg/L	0.05	0.04	0.04	0.04	0.13	0.01	16
TKN	mg/L	0.41	0.42	0.39	0.21	0.74	0.10	11
Total P	mg/L	0.06	0.07	0.05	0.03	0.14	0.05	11
TSS	mg/L	8	10	5	9	42	5	16
LD020				First Sample		12-Mar-97	9:15	
Storm 11				Last Sample		13-Mar-97	8:15	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.07	0.07	0.06	0.04	0.14	0.03	10
Total N	mg/L	0.76	0.79	0.74	0.10	0.92	0.66	6
NH_3-N	mg/L	0.02	0.02	0.01	0.02	0.06	0.01	10
PO_4-P	mg/L	0.02	0.02	0.02	0.01	0.03	0.01	10
TKN	mg/L	0.70	0.72	0.70	0.06	0.78	0.63	6
Total P	mg/L	0.06	0.07	0.05	0.02	0.11	0.05	6
TSS	mg/L	16	13	15	7	25	5	10
LD020				First Sample		3-Apr-97	17:50	
Storm 12				Last Sample		6-Apr-97	4:50	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.10	0.10	0.09	0.04	0.20	0.05	16
Total N	mg/L	0.96	1.04	0.90	0.26	1.38	0.64	16
NH_3-N	mg/L	0.08	0.09	0.07	0.05	0.24	0.05	16
PO_4-P	mg/L	0.08	0.10	0.09	0.05	0.17	0.01	16
TKN	mg/L	0.80	0.94	0.83	0.22	1.25	0.58	16
Total P	mg/L	0.12	0.17	0.10	0.08	0.24	0.05	16
TSS	mg/L	40	47	36	28	108	5	16

Table B-3. Basic statistics for samples collected during storm events at Luckie Dairy site LD020 (cont.).

LD020 Storm 13				First Sample Last Sample		25-Apr-97 27-Apr-97	11:45 10:45	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.18	0.22	0.18	0.07	0.31	0.05	14
Total N	mg/L	1.24	1.34	1.20	0.23	1.60	0.91	14
NH_3-N	mg/L	0.08	0.08	0.08	0.08	0.25	0.01	14
PO_4-P	mg/L	0.04	0.05	0.04	0.01	0.07	0.02	14
TKN	mg/L	1.06	1.12	0.99	0.18	1.40	0.76	14
Total P	mg/L	0.29	0.36	0.23	0.18	0.60	0.05	14
TSS	mg/L	33	31	26	25	85	10	14
LD020 Storm 14				First Sample Last Sample		9-May-97 10-May-97	3:30 8:30	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.23	0.25	0.23	0.09	0.41	0.07	11
Total N	mg/L	1.91	2.39	1.43	1.05	3.87	1.09	6
NH_3-N	mg/L	0.09	0.09	0.08	0.03	0.15	0.05	11
PO_4-P	mg/L	0.14	0.16	0.13	0.07	0.24	0.07	11
TKN	mg/L	1.72	2.14	1.24	1.01	3.64	1.02	6
Total P	mg/L	0.26	0.37	0.14	0.27	0.75	0.03	6
TSS	mg/L	207	281	72	282	872	17	11
LD020 Storm 15				First Sample Last Sample		15-May-97 16-May-97	16:05 9:05	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.23	0.26	0.22	0.09	0.38	0.07	9
Total N	mg/L	1.94	2.86	1.12	1.99	5.97	0.83	6
NH_3-N	mg/L	0.10	0.11	0.09	0.02	0.16	0.08	9
PO_4-P	mg/L	0.01	0.01	0.01	0.01	0.04	0.00	9
TKN	mg/L	1.73	2.60	0.92	1.91	5.59	0.76	6
Total P	mg/L	0.25	0.44	0.13	0.40	1.07	0.03	6
TSS	mg/L	294	478	55	638	1,980	19	9

Table B-3. Basic statistics for samples collected during storm events at Luckie Dairy site LD020 (cont.).

LD020 Storm 16				First Sample / Last Sample		19-May-97 / 19-May-97	9:20 / 9:20	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.04	0.04	0.04		0.04	0.04	1
Total N	mg/L	0.70	0.70	0.70		0.70	0.70	1
NH_3-N	mg/L	0.03	0.03	0.03		0.03	0.03	1
PO_4-P	mg/L	0.02	0.02	0.02		0.02	0.02	1
TKN	mg/L	0.66	0.66	0.66		0.66	0.66	1
Total P	mg/L	0.30	0.30	0.30		0.30	0.30	1
TSS	mg/L	5	5	5		5	5	1
LD020 Storm 17				First Sample / Last Sample		22-Jun-97 / 23-Jun-97	21:30 / 6:30	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.17	0.19	0.19	0.08	0.25	0.01	8
Total N	mg/L	1.29	1.36	1.22	0.35	1.86	0.93	5
NH_3-N	mg/L	0.03	0.03	0.02	0.02	0.07	0.01	8
PO_4-P	mg/L	0.05	0.05	0.04	0.03	0.10	0.00	8
TKN	mg/L	1.13	1.17	0.99	0.31	1.66	0.92	5
Total P	mg/L	0.09	0.10	0.10	0.07	0.20	0.03	5
TSS	mg/L	67	66	36	78	253	20	8
LD020 Storm 18				First Sample / Last Sample		16-Mar-98 / 17-Mar-98	0:45 / 11:45	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.21	0.21	0.21	0.02	0.25	0.18	12
Total N	mg/L	1.56	1.43	1.31	0.93	4.29	0.87	12
NH_3-N	mg/L	0.10	0.10	0.11	0.07	0.23	0.01	12
PO_4-P	mg/L	0.08	0.09	0.08	0.04	0.13	0.03	12
TKN	mg/L	1.35	1.22	1.10	0.92	4.06	0.67	12
Total P	mg/L	0.32	0.32	0.30	0.09	0.50	0.17	12
TSS	mg/L	75	82	62	58	165	12	12

Table B-4. Basic statistics for samples collected during storm events at Luckie Dairy site LD030.

LD030 Storm 1				First Sample / Last Sample		30-May-96 / 31-May-96	20:00 / 4:05	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	1.78	1.74	1.81	0.89	3.08	0.59	5
Total N	mg/L	35.16	33.71	25.32	25.80	80.19	16.08	5
NH_3-N	mg/L	10.38	10.39	11.60	4.03	15.40	6.10	5
PO_4-P	mg/L	7.94	8.42	7.05	1.77	10.70	6.59	5
TKN	mg/L	33.38	31.97	23.40	26.57	79.60	13.00	5
Total P	mg/L	16.00	15.20	11.60	12.05	37.30	7.81	5
TSS	mg/L	1,899	1,519	720	3,130	7,480	184	5

LD030 Storm 2				First Sample / Last Sample		4-Jun-96 / 4-Jun-96	0:15 / 10:00	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	0.78	0.78	0.64	0.56	1.75	0.22	8
Total N	mg/L	32.68	27.04	10.01	62.45	186.77	5.60	8
NH_3-N	mg/L	5.59	4.78	2.07	8.97	27.60	1.33	8
PO_4-P	mg/L	4.32	3.97	2.58	3.90	13.10	1.95	8
TKN	mg/L	31.90	26.26	9.09	62.43	186.00	5.27	8
Total P	mg/L	10.99	9.25	3.63	18.99	57.60	2.74	8
TSS	mg/L	1,462	1,145	200	3,532	10,200	101	8

LD030 Storm 3				First Sample / Last Sample		16-Aug-96 / 16-Aug-96	9:35 / 18:35	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	0.87	0.77	0.51	0.84	2.65	0.21	7
Total N	mg/L	16.79	16.46	6.85	21.43	64.01	5.57	7
NH_3-N	mg/L	2.97	2.98	1.77	2.48	7.87	1.13	7
PO_4-P	mg/L	2.78	2.68	1.79	1.84	5.58	1.57	7
TKN	mg/L	15.92	15.69	6.44	21.55	63.80	4.80	7
Total P	mg/L	7.32	7.13	2.80	9.36	27.70	2.49	7
TSS	mg/L	1,260	1,253	318	2,412	6,720	191	7

Table B-4. Basic statistics for samples collected during storm events at Luckie Dairy site LD030 (cont.).

LD030 Storm 4				First Sample / Last Sample		27-Aug-96 / 28-Aug-96	20:30 / 3:30	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.79	Equipment Malfunction	0.46	0.61	1.77	0.34	6
Total N	mg/L	57.17	Equipment Malfunction	48.10	49.48	152.39	10.44	6
NH_3-N	mg/L	4.41	Equipment Malfunction	4.49	2.10	7.82	1.51	6
PO_4-P	mg/L	3.18	Equipment Malfunction	3.77	1.37	4.38	1.31	6
TKN	mg/L	56.38	Equipment Malfunction	46.95	49.52	152.00	10.10	6
Total P	mg/L	24.16	Equipment Malfunction	19.45	20.06	62.80	4.84	6
TSS	mg/L	2,200	Equipment Malfunction	740	3,706	9,700	217	6
LD030 Storm 5				**First Sample / Last Sample**		**29-Aug-96 / 29-Aug-96**	**8:40 / 15:55**	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.22	0.20	0.25	0.08	0.29	0.07	6
Total N	mg/L	7.12	8.23	5.90	4.86	16.07	2.80	6
NH_3-N	mg/L	1.62	1.88	1.46	1.18	3.73	0.43	6
PO_4-P	mg/L	1.72	1.74	1.53	0.58	2.87	1.22	6
TKN	mg/L	6.90	8.03	5.64	4.93	16.00	2.51	6
Total P	mg/L	3.01	3.26	2.40	1.49	5.92	2.00	6
TSS	mg/L	352	351	203	363	1,080	112	6
LD030 Storm 6				**First Sample / Last Sample**		**31-Aug-96 / 31-Aug-97**	**16:25 / 17:25**	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.11	0.11	0.11		0.11	51.10	1
Total N	mg/L	51.21	51.21	51.21		51.21	51.21	1
NH_3-N	mg/L	1.50	1.50	1.50		1.50	1.50	1
PO_4-P	mg/L	3.08	3.08	3.08		3.08	3.08	1
TKN	mg/L	51.10	51.10	51.10		51.10	51.10	1
Total P	mg/L	34.00	34.00	34.00		34.00	34.00	1
TSS	mg/L	2,750	2,750	2,750		2,750	2,750	1

Table B-4. Basic statistics for samples collected during storm events at Luckie Dairy site LD030 (cont.).

LD030 Storm 7				First Sample / Last Sample		28-Oct-96 / 28-Oct-96	7:00 / 9:30	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.96	1.05	0.69	0.58	1.83	0.64	4
Total N	mg/L	11.50	13.36	5.17	12.75	30.63	5.03	4
NH_3-N	mg/L	1.63	2.01	0.42	2.71	5.65	0.01	4
PO_4-P	mg/L	2.35	2.81	0.83	3.17	7.09	0.64	4
TKN	mg/L	10.54	12.31	4.48	12.18	28.80	4.39	4
Total P	mg/L	5.00	5.73	2.47	5.34	13.00	2.08	4
TSS	mg/L	461	513	373	296	889	208	4
LD030 Storm 8				**First Sample / Last Sample**		**6-Nov-96 / 7-Nov-96**	**23:25 / 2:25**	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	2.94	3.33	2.84	0.96	3.87	1.53	5
Total N	mg/L	57.66	45.54	47.48	29.57	95.33	27.50	5
NH_3-N	mg/L	7.29	6.19	7.24	2.45	10.40	4.71	5
PO_4-P	mg/L	7.60	7.54	7.46	1.01	9.17	6.36	5
TKN	mg/L	54.72	42.21	44.80	30.41	93.80	23.70	5
Total P	mg/L	20.62	17.17	16.50	9.07	31.70	12.10	5
TSS	mg/L	1,699	1,184	1,280	1,325	3,680	393	5
LD030 Storm 9				**First Sample / Last Sample**		**20-Feb-97 / 1-Mar-97**	**4:15 / 3:15**	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.11	0.09	0.08	0.08	0.33	0.02	37
Total N	mg/L	5.83	2.73	1.47	16.30	87.65	0.44	37
NH_3-N	mg/L	0.46	0.37	0.22	0.74	3.86	0.08	37
PO_4-P	mg/L	0.82	0.41	0.22	2.10	10.10	0.05	36
TKN	mg/L	5.72	2.64	1.42	16.28	87.50	0.41	37
Total P	mg/L	2.27	0.98	0.36	6.79	32.10	0.05	37
TSS	mg/L	20	19	8	26	109	5	26

Table B-4. Basic statistics for samples collected during storm events at Luckie Dairy site LD030 (cont.).

LD030 Storm 10				First Sample / Last Sample		2-Mar-97 / 6-Mar-97	14:00 / 8:00	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	0.07	0.07	0.06	0.06	0.21	0.01	16
Total N	mg/L	1.85	1.63	1.15	2.51	9.31	0.62	11
NH_3-N	mg/L	0.73	0.70	0.22	1.21	4.67	0.08	16
PO_4-P	mg/L	0.73	0.67	0.24	1.24	4.07	0.03	15
TKN	mg/L	1.79	1.56	1.01	2.52	9.28	0.56	11
Total P	mg/L	0.51	0.46	0.30	0.72	2.66	0.17	11
TSS	mg/L	129	124	19	264	835	5	16
LD030 Storm 11				**First Sample / Last Sample**		**12-Mar-97 / 13-Mar-97**	**12:30 / 5:30**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	0.08	0.06	0.09	0.03	0.12	0.02	9
Total N	mg/L	1.96	1.66	1.95	0.85	3.22	1.07	6
NH_3-N	mg/L	0.23	0.18	0.22	0.15	0.59	0.09	9
PO_4-P	mg/L	0.52	0.36	0.45	0.43	1.57	0.18	9
TKN	mg/L	1.88	1.60	1.87	0.82	3.10	1.03	6
Total P	mg/L	0.60	0.47	0.59	0.35	1.07	0.24	6
TSS	mg/L	95	59	52	106	292	5	9
LD030 Storm 12				**First Sample / Last Sample**		**3-Apr-97 / 6-Apr-97**	**21:05 / 8:05**	
Constituent	**Units**	**Mean**	**Volume Weighted Mean**	**Median**	**Std Dev**	**Maximum**	**Minimum**	**#**
NO_{23}-N	mg/L	0.15	0.13	0.14	0.08	0.33	0.05	16
Total N	mg/L	2.38	2.37	2.15	1.26	5.22	0.82	16
NH_3-N	mg/L	0.27	0.24	0.28	0.14	0.54	0.06	16
PO_4-P	mg/L	0.64	0.63	0.57	0.47	1.58	0.07	16
TKN	mg/L	2.23	2.24	1.98	1.20	4.89	0.77	16
Total P	mg/L	0.86	0.83	0.73	0.66	2.30	0.14	16
TSS	mg/L	52	45	60	32	108	5	16

Table B-4. Basic statistics for samples collected during storm events at Luckie Dairy site LD030 (cont.).

LD030				First Sample		26-Apr-97	6:40	
Storm 13				Last Sample		27-Apr-97	11:40	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.36	0.25	0.35	0.19	0.68	0.02	11
Total N	mg/L	5.75	3.58	3.02	8.61	30.68	0.93	11
NH_3-N	mg/L	0.62	0.41	0.33	0.95	3.41	0.01	11
PO_4-P	mg/L	0.92	0.58	0.62	0.86	2.63	0.10	11
TKN	mg/L	5.39	3.33	2.60	8.47	30.00	0.91	11
Total P	mg/L	2.27	1.43	1.43	2.85	10.30	0.27	11
TSS	mg/L	143	77	59	263	918	10	11
LD030				First Sample		9-May-97	4:15	
Storm 14				Last Sample		10-May-97	8:15	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.27	0.26	0.29	0.11	0.42	0.04	10
Total N	mg/L	41.55	30.88	2.05	97.24	240.04	1.11	6
NH_3-N	mg/L	2.28	2.70	0.22	6.44	20.60	0.11	10
PO_4-P	mg/L	1.45	1.69	0.36	3.57	11.60	0.05	10
TKN	mg/L	41.30	30.62	1.73	97.34	240.00	0.95	6
Total P	mg/L	11.62	8.64	0.43	27.38	67.50	0.25	6
TSS	mg/L	829	1,008	101	2,108	6,800	14	10
LD030				First Sample		15-May-97	16:50	
Storm 15				Last Sample		16-May-97	9:10	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.22	0.24	0.22	0.07	0.34	0.08	9
Total N	mg/L	21.73	11.88	1.66	45.39	114.08	1.14	6
NH_3-N	mg/L	1.35	0.91	0.20	3.36	10.30	0.11	9
PO_4-P	mg/L	2.01	1.24	0.11	3.76	9.03	0.06	9
TKN	mg/L	21.52	11.64	1.44	45.45	114.00	0.95	6
Total P	mg/L	7.06	3.92	0.32	14.98	37.50	0.13	6
TSS	mg/L	1,381	1,050	81	3,091	9,380	18	9

Table B-4. Basic statistics for samples collected during storm events at Luckie Dairy site LD030 (cont.).

LD030				First Sample		19-May-97	9:10	
Storm 16				Last Sample		19-May-97	9:10	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.03	0.03	0.03		0.03	0.03	1
Total N	mg/L	1.11	1.11	1.11		1.11	1.11	1
NH_3-N	mg/L	0.19	0.19	0.19		0.19	0.19	1
PO_4-P	mg/L	0.14	0.14	0.14		0.14	0.14	1
TKN	mg/L	1.08	1.08	1.08		1.08	1.08	1
Total P	mg/L	0.42	0.42	0.42		0.42	0.42	1
TSS	mg/L	12	12	12		12	12	1
LD030				First Sample		22-Jun-97	21:20	
Storm 17				Last Sample		23-Jun-97	8:20	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.35	0.36	0.33	0.14	0.64	0.20	8
Total N	mg/L	4.38	4.19	5.12	1.96	6.59	2.14	5
NH_3-N	mg/L	1.69	1.23	0.40	3.42	10.10	0.13	8
PO_4-P	mg/L	0.69	0.61	0.57	0.35	1.16	0.26	7
TKN	mg/L	4.00	3.83	4.48	1.93	6.19	1.85	5
Total P	mg/L	1.47	1.41	1.92	0.77	2.18	0.52	5
TSS	mg/L	381	279	134	722	2,160	54	8
LD030				First Sample		15-Mar-98	22:50	
Storm 18				Last Sample		17-Mar-98	9:50	
Constituent	Units	Mean	Volume Weighted Mean	Median	Std Dev	Maximum	Minimum	#
NO_{23}-N	mg/L	0.47	0.31	0.21	0.52	1.62	0.16	11
Total N	mg/L	3.00	1.92	1.72	2.89	10.26	1.07	11
NH_3-N	mg/L	0.12	0.08	0.09	0.08	0.26	0.01	11
PO_4-P	mg/L	0.59	0.34	0.12	0.97	3.18	0.03	11
TKN	mg/L	2.53	1.61	1.55	2.39	8.64	0.86	11
Total P	mg/L	1.18	0.71	0.37	1.41	4.14	0.21	11
TSS	mg/L	389	150	93	867	2,970	14	11

Appendix C:
Basic Statistics across Storm Events by Sampling Site

Table C-1. Basic pre-BMP statistics for sites HD050 and HD055 on the H & CC Dairy.

Site	Monitoring Period	Constituent	Geometric Mean	Lower Standard Deviation	Upper Standard Deviation	Min	Max	Number
HD050	Pre	NH_3-N	0.94	0.29	2.99	0.25	7.52	10
HD050	Pre	NO_{23}-N	4.94	1.69	14.44	0.86	21.25	10
HD050	Pre	PO_4-P	3.93	2.29	6.77	1.86	9.53	10
HD050	Pre	TKN	9.22	5.53	15.37	5.58	26.84	10
HD050	Pre	Total N	15.17	8.42	27.31	6.89	48.09	10
HD050	Pre	Total P	5.67	3.65	8.83	2.78	12.21	10
HD050	Pre	TSS	158	78	319	61	653	10
HD055	Pre	NH_3-N	1.84	0.66	5.12	0.31	9.54	10
HD055	Pre	NO_{23}-N	3.92	1.25	12.23	0.64	17.52	10
HD055	Pre	PO_4-P	5.00	2.41	10.36	0.93	12.36	10
HD055	Pre	TKN	33.49	14.97	74.91	7.25	105.10	10
HD055	Pre	Total N	38.34	16.82	87.40	7.89	112.22	10
HD055	Pre	Total P	13.43	6.20	29.05	2.40	42.88	10
HD055	Pre	TSS	1,916	801	4,583	670	12,174	10

Table C-2. Basic post-BMP statistics for sites HD050 and HD055 on the H & CC Dairy.

Site	Monitoring Period	Constituent	Geometric Mean	Lower Standard Deviation	Upper Standard Deviation	Min	Max	Number
HD050	Post	NH_3-N	0.47	0.26	0.83	0.25	1.32	6
HD050	Post	NO_{23}-N	1.42	0.93	2.18	0.91	2.84	6
HD050	Post	PO_4-P	1.73	1.03	2.90	0.64	2.64	6
HD050	Post	TKN	6.33	3.23	12.41	2.77	13.80	6
HD050	Post	Total N	8.05	4.69	13.82	4.39	16.64	6
HD050	Post	Total P	3.43	2.40	4.92	2.38	5.21	6
HD050	Post	TSS	276	139	548	99	624	5
HD055	Post	NH_3-N	0.49	0.24	1.01	0.16	1.10	6
HD055	Post	NO_{23}-N	3.10	1.17	8.24	0.99	15.00	6
HD055	Post	PO_4-P	1.59	0.84	3.05	0.69	2.92	6
HD055	Post	TKN	13.56	5.61	32.78	7.01	67.85	6
HD055	Post	Total N	16.74	6.87	40.82	8.00	82.85	6
HD055	Post	Total P	5.38	2.79	10.40	3.46	19.47	6
HD055	Post	TSS	1,688	454	6,280	468	10,163	5

Table C-3. Basic pre-BMP statistics for sites LD020 and LD030 on the Luckie Dairy.

Site	Monitoring Period	Constituent	Geometric Mean	Lower Standard Deviation	Upper Standard Deviation	Min	Max	Number
LD020	Pre	NH_3-N	0.07	0.04	0.11	0.02	0.14	16
LD020	Pre	NO_{23}-N	0.16	0.08	0.33	0.04	0.60	16
LD020	Pre	PO_4-P	0.06	0.02	0.13	0.02	0.28	16
LD020	Pre	TKN	1.63	0.76	3.49	0.45	10.66	16
LD020	Pre	Total N	1.83	0.87	3.83	0.55	10.73	16
LD020	Pre	Total P	0.31	0.14	0.73	0.07	1.93	16
LD020	Pre	TSS	77	18	336	5	851	16
LD030	Pre	NH_3-N	1.18	0.33	4.14	0.18	10.39	16
LD030	Pre	NO_{23}-N	0.27	0.07	0.98	0.03	3.33	16
LD030	Pre	PO_4-P	1.30	0.41	4.12	0.14	8.42	16
LD030	Pre	TKN	7.84	2.13	28.91	1.08	51.10	16
LD030	Pre	Total N	8.19	2.23	30.09	1.11	51.21	16
LD030	Pre	Total P	3.05	0.74	12.54	0.42	34.00	16
LD030	Pre	TSS	288	52	1,577	12	2,750	16

APPENDIX A - QUALITY ASSURANCE PROJECT PLAN

Quality Assurance Project Plan

for the

Environmental Measurement Activities Relating to the Leon River Watershed Water Quality Demonstration Program

319 Nonpoint Source Project Grant

United States Environmental Protection Agency

Name:	Petra Sanchez
Title:	Region VI, Project Manager
Signature:	______________________ Date:__________

Name:	Richard Hoppers
Title:	Region VI, Quality Assurance Manager
Signature:	______________________ Date:__________

Texas State Soil and Water Conservation Board

Name:	Byron Spoonts
Title:	Quality Assurance Officer
Signature:	______________________ Date:__________

Name:	Deirdre Carlson
Title:	Agricultural Project Manager
Signature:	______________________ Date:__________

Texas Agricultural Experiment Station

Name: C. Allan Jones
Title: Executive Director
Signature: ______________________ Date:__________

Name: Dennis Hoffman
Title: Project Manager
Signature: ______________________ Date:__________

Texas Institute for Applied Environmental Research

Name: Larry Hauck
Title: Project Manager
Signature: ______________________ Date:__________

Name: Nancy Easterling
Title: Quality Assurance Manager
Signature: ______________________ Date:__________

Section A2: Table of Contents

This QAPP is applicable to Region 6, Quality Management Plan entitled "Quality Assurance Management Plan, Texas State Soil and Water Conservation Board", approved July, 1994. (QTRAK No. Q-94-159)

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

  Name: Petra Sanchez
  Title: Region VI, Project Manager

  Name: Richard Hoppers
  Title: Region VI, Quality Assurance Manager

- Texas State Soil and Water Conservation Board

  Name: Byron Spoonts
  Title: Quality Assurance Officer

  Name Deirdre Carlson
  Title: Agricultural Project Manager

- Texas Agricultural Experiment Station

  Name: Allan Jones
  Title: Executive Director

  Name Dennis Hoffman
  Title: Program Manager

- Texas Institute for Applied Environmental Research

  Name: Larry Hauck
  Title: Project Manager

  Name Nancy Easterling
  Title: Quality Assurance Manager

Section A4: Project / Task Organization

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

Petra Sanchez, Project Manager
United States Environmental Protection Agency (EPA), Region VI, Dallas
Responsible for overall performance and direction of the project at the federal level. Approves the final products and deliverables.

Richard Hoppers, Quality Assurance Manager
United States Environmental Protection Agency (EPA), Region VI, Dallas
Responsible for determining that the Project Plan meets the Federal requirements for planning, quality control, quality assessment and reporting.

Bo Spoonts, Quality Assurance Officer
Texas State Soil and Water Conservation Board (TSSWCB)
Responsible for tracking project administration.

Deirdre Carlson, Project Manager
Texas State Soil and Water Conservation Board (TSSWCB)
Responsible for overseeing the implementation of the proposed demonstration project.

Suzanne Cardwell, Contract Manager
Texas State Soil and Water Conservation Board (TSSWCB)
Responsible for tracking project progress and expenditures.

Allan Jones, Executive Director
Texas Agricultural Experiment Station / Blackland Research Center (TAES)
Responsible for overall operation, integrity and success of the TAES Blackland Research Center, Temple, Texas.

Dennis Hoffman, Project and Laboratory Manager
Texas Agricultural Experiment Station / Blackland Research Center (TAES)
Responsible for coordinating cooperation between TAES and TIAER and overseeing surface water sampling and laboratory analysis in the lower portion of the Leon River Watershed.

Wesley Rosenthal, GIS / Modeling Expert
Texas Agricultural Experiment Station / Blackland Research Center (TAES)
Responsible for GIS mapping of the Leon River Watershed and evaluation of BMPs utilizing hydrological models.

June Wolfe III, Field Manager
Texas Agricultural Experiment Station / Blackland Research Center (TAES)
Responsible for performing groundwater field sampling and data processing in the lower portion of the Leon River Watershed according to guidelines outlined in the QAPP and / or by knowledge attained in formal training sessions.

Ron Jones, Executive Director
Texas Institute for Applied Environmental Research (TIAER)
Responsible for overall operation, integrity and success of TIAER at Stephenville, Texas.

Larry Hauck, Project Manager
Texas Institute for Applied Environmental Research (TIAER)
Responsible for tracking project at the TIAER level , coordinating cooperation between TIAER and TAES and overseeing surface water sampling and laboratory analysis in the upper portion of the Leon River Watershed.

Nancy Easterling, Quality Assurance Manager
Texas Institute for Applied Environmental Research (TIAER)
Responsible for determining that the Project Plan meets the requirements for planning, quality control, quality assessment and reporting.

Mark Murphy, Laboratory Manager
Texas Institute for Applied Environmental Research (TIAER)
Responsible for overseeing laboratory analysis of water samples collected in the upper portion of the Leon River Watershed.

Tim Jones, Field Manager
Texas Institute for Applied Environmental Research (TIAER)
Responsible for performing surface water field sampling and data processing in the upper portion of the Leon River Watershed according to guidelines outlined in the QAPP and / or by knowledge attained in formal training sessions.

Project Organization Chart

- Richard Hoppers (EPA)
  - Petra Sanchez (EPA)
- Bo Spoonts (TSSWCB)
  - Dee Carlson (TSSWCB)
  - Suzanne Cardwell (TSSWCB)
- Allan Jones (TAES)
  - Dennis Hoffman (TAES)
    - Wesley Rosenthal (TAES)
    - June Wolfe III (TAES)
- Ron Jones (TIAER)
  - Nancy Easterling (TIAER)
  - Larry Hauck (TIAER)
    - Mark Murphy (TIAER)
    - Tim Jones (TIAER)

Section A5: Problem Definition / Background

The Leon River Watershed includes the Leon River and three reservoirs which supply drinking water to over 250,000 residents of Central Texas. The upper Leon River is a major tributary to Lake Proctor which supplies water to a number of small communities including Comanche, Proctor, and Gorman. The lower portion of the river flows into Lake Belton which is the primary drinking water supply for residents within the Temple, Belton, Killeen and Fort Hood areas. Nonpoint source pollution from cropland and dairy runoff has the potential for contaminating surface water resources in the Leon River Watershed. The TSSWCB has designated the Leon River Watershed as an impacted area under the section 319 process. Five segments of this watershed are identified in the 1988-1990 assessment of nonpoint sources as having potential for and concerns related to non-point source (NPS) pollutants attributed to agricultural activities. Specifically, the concerns are animal waste and animal confinement facilities in the upper portion of the watershed and ranching and row cropping operations in the lower portion.

This project will establish best management practices (BMPs) that will reduce NPS pollutants in the watershed during stormwater runoff events. Techniques of managing water, land resources, fertility programs, cropping sequences, and dairy wastes will be introduced to area landowners. BMPs will be selected based on local needs and their potential to reduce nutrient loading of the watershed from agricultural activities.

Beneficiaries of this project will include rural and metropolitan areas that depend on Leon River water resources for domestic uses. The coordinated educational phase of the project will inform land users and area residents of BMPs that will improve and protect the quality of water resources. The educational program will be extended to other regions of the state providing positive effects on improvement in Texas water quality.

The Texas State Soil and Water Conservation Board (TSSWCB) in cooperation with the Texas Agricultural Experiment Station (TAES), the Texas Institute for Applied Environmental Research (TIAER), the Texas Agricultural Extension Service (Extension), the Natural Resources Conservation Service (NRCS), and local Soil and Water Conservation Districts (SWCDs) will implement this project in accordance with a Memorandum of Understanding or interagency contracts. The purpose of the project is to conduct a water quality demonstration program to document the reduction of NPS impact to the Leon River Watershed resulting from implementation of appropriate BMPs.

TAES and TIAER are under contract with TSSWCB and will develop and conduct a sampling program to document the effects of BMP implementation and the collection of water samples from select watersheds to assess the effects of specific agricultural practices. Follow up sampling will provide data to assess the effects of implementing BMPs within selected demonstration areas. The project tasks which include demonstration and implementation of BMPs are described in Section A6 "Project/Task Definition".

Tasks and milestones which involve the educational program that will be implemented with the demonstration fields are also funded under the approved workplan. Tasks and milestones for the educational plan are described in Section A6 "Project/Task Definition".

Section A6: Project / Task Description

The *Leon River Watershed Water Quality Demonstration Program* will be a multidiscipline effort to demonstrate and evaluate the effectiveness of selected BMPs to reduce nutrient loading of the Leon River Watershed with emphasis on stormwater runoff events. The project includes watershed modeling and evaluation by TAES, BMP selection and water quality evaluation by TAES and TIAER, and final BMP evaluation by TAES, TIAER, Extension and TSSWCB.

The purpose of this project is to collect sufficient data on selected subwatersheds to determine if installation of BMPs significantly improves water quality. The concentration of nutrient levels before and after installation of BMPs will be used to determine the effectiveness of selected BMPs in reducing nutrient loading of the Leon River Watershed.

The approved workplan contains details of activities relating to this project. The major work tasks are briefly described below:

Program Element One: TAES will coordinate and direct project participants to carry out the planning phase of the project. The planning phase will identify an informational component to allow cooperators to remain current with project activities and insure a coordinated effort in the planning and implementation of the project.

Program Element Two: Specific target sites will be identified through GIS modeling and mapping techniques. Subwatersheds will be ranked in the order of priority using output from modeling efforts which describe nutrient and sediment loading from dairy, ranching, and row cropping activities. Subwatersheds and associated BMPs appropriate for evaluation will be selected.

Program Element Three: BMPs appropriate for implementation within selected subwatersheds will be identified by TSSWCB, TAES and TIAER based on priority subwatershed characteristics. Water quality within targeted subwatersheds will be evaluated for current nutrient levels prior to BMP implementation. BMP sensitivity and water quality effects will be identified.

Program Element Four: TAES in cooperation with TIAER will obtain and document water quality trends pre and post BMP implementation. Activities will include: review of existing water quality data in the watershed, preparation of a QAPP, prioritization of monitoring sites, installation of monitoring equipment at selected sites, collection of water samples, analysis of water samples and data management.

Program Element Five: The NRCS in cooperation with local SWCDs will disseminate proper BMP implementation information to targeted audiences and demonstrate BMP implementation in the priority subwatersheds. Local meetings hosted by local SWCDs will educate targeted audiences and provide technical assistance in the implementation phase of the demonstration project.

Program Element Six: The NRCS and SWCDs will provide technical assistance and track the implementation of BMPs. TAES and TIAER will document the water quality effects of BMP implementation through GIS and associated modeling activities. Table A6-1 lists demonstration plan milestones. Table A6-2 describes educational plan milestones.

Table A6-1 Demonstration Plan Milestones

Jan	1995	Design demonstration program and QAPP for sampling and analyses.
Feb	1995	Acquire supplies.
Mar	1995	Submit QAPP to the TSSWCB for approval by EPA, Region VI.
Mar	1995	Quarterly Report.
Jun	1995	Quarterly Report.
Aug	1995	Complete GIS mapping and modeling.
Sep	1995	Quarterly Report.
Oct	1995	Review existing water quality data.
Oct	1995	Select demonstration sites, install equipment and begin monitoring water quality.
Dec	1995	Annual Report.
Mar	1996	Quarterly Report.
Jun	1996	Quarterly Report.
Sep	1996	Quarterly Report.
Oct	1996	Install BMPs and monitor water quality.
Dec	1996	Annual Report.
Mar	1997	Quarterly Report.
Jul	1997	Quarterly Report.
Oct	1997	Quarterly Report.
Nov	1997	Complete monitoring of water quality
Nov	1997	Identify water quality effects of BMP implementations.
Dec	1997	Final Report.

Table A6-2 Educational Plan Milestones

Jul	1995	Conduct public meeting/field trip at BMP site(s) to introduce the demonstration project and objectives. Publicize scheduled field days.
Dec	1995	Design BMPs for maximum public benefit and finalize nutrient/cropping management plan with the cooperators.
Jul	1996	Conduct field meeting at BMP site(s) to discuss the demonstration and preliminary results.
Oct	1997	Conduct field meeting at BMP site(s) to discuss the demonstration and final results.

Section A7: Data Quality Objectives for Measurement Data

Nonpoint source pollution which may be generated from the agricultural practices has the potential for contaminating surface water resources in the Leon River Watershed including Lakes Leon, Proctor and Belton, which supply drinking water to over 250,000 residents in Central Texas. The project quality objective is to demonstrate BMPs designed to reduce nutrient loading of the Leon River Watershed with an emphasis on stormwater runoff. BMPs will be evaluated in their effectiveness to a confidence level of 90 percent. The project hosts a number of participants including:

1) US Environmental Protection Agency, Region VI (EPA)
2) Texas State Soil and Water Conservation Board (TSSWCB)
3) Texas Agricultural Experiment Station (TAES)
4) Texas Institute for Applied Environmental Research (TIAER)
5) Texas Agricultural Extension Service (Extension)
6) Natural Resources Conservation Service (NRCS)
7) Local Soil and Water Conservation Districts (SWCDs)
8) Local landowners

Overall project management will be conducted by TSSWCB and overseen by EPA. Watershed selection and modeling, water sampling and analysis and BMP selection and evaluation will be conducted by TAES and TIAER. BMP implementation, demonstration and education will be carried out by the NRCS and local SWCDs under the direction of TSSWCB.

The Leon River flows through portions of Bell, Comanche, Coryell, Eastland, and Hamilton counties forming three reservoirs (Leon, Proctor, and Belton) along its 250 mile course within the Leon River Watershed. The TSSWCB has designated the Leon River Watershed an impacted area under the section 319 process, with five segments being identified in the 1988-1990 assessment of NPS as having potential for and concerns related to pollutants attributed to agricultural activities. Specifically, the concerns are animal waste and animal confinement facilities in the upper portion of the watershed, and ranching and row crop agricultural runoff in the lower portion. The data required for the evaluation of this demonstration will include:

1) Previous water quality data from the watershed

2) GIS modeling and mapping of the watershed

3) Nutrient/pollutant levels (Table A7-1) pre and post BMP implementation

The prevalent agricultural practices differ between the upper and lower portions of the Leon River Watershed. Due to concerns about dairy waste, the analysis of water samples collected from demonstration sites in the upper portion will include, but not be limited to, total suspended solids, nitrate nitrogen, ammonia nitrogen, total Kjeldahl nitrogen, orthophosphate phosphorous, total phosphorous, pH, temperature, dissolved oxygen and fecal coliform bacteria. In contrast, agricultural activities in the lower portion of the watershed below Hamilton include ranching and row cropping operations. Therefore, water samples collected in the lower half of the watershed will be analyzed for nitrate nitrogen, orthophosphate phosphorous, pH, temperature, dissolve oxygen and total suspended solids (Table A7-1). EPA approved laboratory procedures will be used for all sample analysis.

Table A7-1 Accuracy and Precision Limits of Measured Parameters

Nutrient/pollutant	Processing Agency	Precision Limits (PD)	Accuracy Limits	Practical Quantity Limits
Total Suspended Solids	TAES, TIAER	20%	80-120%	10 mg/L
Nitrate-Nitrogen	TAES, TIAER	20%	80-120%	0.1 mg/L
Orthophosphate	TAES, TIAER	20%	80-120%	0.1 mg/L
Ammonia Nitrogen	TIAER	20%	80-120%	0.2 mg/L
Total Kjeldahl Nitrogen	TIAER	20%	80-120%	0.1 mg/L
Potential hydrogen (pH)	TAES, TIAER	NA	NA	0.1 pH units
Temperature	TAES, TIAER	NA	NA	0.1 °C
Dissolved oxygen	TAES, TIAER	NA	NA	1.0 mg/L
Total Phosphorous	TIAER	20%	80-120%	0.1 mg/L
Fecal Coliform Bacteria	TIAER	NA	NA	20 colonies/100 ml

The spatial boundaries of the demonstration will include a total of twelve sampling sites within the watershed. Six sampling sites will be located in the upper portion of the watershed above Hamilton (four in subwatersheds and two in the river channel), while the remaining six will be located in the lower portion below Hamilton (four in subwatersheds and two in the river channel). Sampling site and BMP selection cannot be made until GIS modeling is completed. However, primary focus of the project will be on segment 1221 of the Leon River. As the project progresses, sampling site and BMP selection will be included in quarterly and annual reports.

The temporal boundaries of the demonstration include a one year period prior to and one year following BMP implementation to determine BMP effectiveness. When flow exists, water samples will be collected from subwatersheds every two weeks (bi-weekly) during the two year monitoring period. In the upper portion of the basin, the fecal coliform sampling will be limited to bi-weekly sampling because proper sterile bacteriological sampling can not occur with automated storm sampling equipment. Water samples from individual stormwater runoff events will also be collected with automatic sampling equipment during the two year period.

EPA publication number 841-F-93-009 entitled "Paired Watershed Study Design" outlines an effective means for statistically evaluating treatments imposed within watersheds (Appendix A). This project will demonstrate the effectiveness of selected BMPs to reduce nutrient loading of the Leon River, with emphasis on stormwater runoff events, by utilizing a modified form of the paired watershed design to evaluate BMPs at a 90 percent level of confidence. Refer to Section B1 "Sample Process Design (Experimental Design)" for more detail.

Data collection and analyses will meet a 90 percent confidence level. These data will be presented as mean levels for evaluation. Statistical comparison of BMPs will include analysis of variance with a 90 percent level of confidence. Although 100 percent of collected data should be available, accidents, insufficient sample volume, or other problems must be expected. A goal of 90 percent data completeness will be required for data usage. Should less than 90 percent data completeness occur, the Program Manager will initiate corrective action. Data completeness will be calculated as a percent value and evaluated with the following formula:

$$\% \text{ completeness} = \frac{SV}{ST} \times 100$$

Where: SV = number of samples with a valid analytical report
ST = total number of samples collected

The TAES and TIAER Laboratories will determine the precision of their analyses. This will be accomplished by repeating the entire analysis of a sample once per batch or once per 10 samples which ever is the greater frequency. Percent deviation (PD) of duplicate analyses (X_1 and X_2) will be calculated using the formula:

$$PD = \frac{(X_1 - X_2)}{(X_1+X_2)/2} \times 100$$

The accuracy of the analytical process will be monitored by determining the percent recovery of a spiked quantity of the parameter in question. The following formula will be utilized to determine percent recovery:

$$\%\ Recovery = \frac{SSR-SR}{SA} \times 100$$

Where: SSR = spiked sample result
SR = un-spiked sample result
SA = spike added

Data will be reviewed for abnormalities or any unusual results. Any unusual results will be traced for error sources. In the event no error is found, the data will be assumed normal and appropriate for decision determinations. If an error is found and cannot be resolved, the data will be discarded.

The Project Manager will coordinate with the laboratory supervisor and field supervisor to ensure that proper protocols are utilized. Table A7-1 shows the study limits established for accuracy and precision.

Concurrent with the collection of samples and the implementation of BMPs, educational activities will be conducted, under the direction of TSSWCB, at the demonstration field sites.

Quarterly progress reports will be submitted to TSSWCB throughout the project. Yearly reports will summarize activities as well as data collected and analyzed to date. A final report which identifies the reduction in nutrient loading rates from each BMP will also be submitted to TSSWCB.

A10 Documentation and Records

Reporting will include quarterly progress reports, reimbursement requests, annual reports, and a final report at the culmination of the study.

Quarterly progress reports will note activities conducted throughout the quarter, items or areas identified as potential problems, and any variations or supplements to the QAPP. Corrective Action Report forms(CARs) will be utilized when necessary (Attachment A10-1).

Reimbursement requests for TAES will be handled by the Texas A&M University - TAES accounting office in College Station. Reimbursement requests for TIAER will be handled by the Tarleton State University accounting office in Stephenville.

Annual Reports will include laboratory results with a summary of data to date. In addition, activities conducted throughout the year, items or areas identified as potential problems, and any variations or supplements to the QAPP will be included. Variations from the QAPP and subsequent CARs will be filed by the Project Manager.

The final report will include copies of all raw data, laboratory analyses, documentation records, calibration logs, and other pertinent information. All original data, both hardcopy and electronic forms, will be archived by TAES and TIAER for at least five years.

Attachment A10-1 Corrective Action Report (CAR) Form

EXAMPLE

Section B1: Sampling Process Design (Experimental Design)

This project is designed to target Leon River subwatersheds which have the potential to contribute NPS pollution into the watershed, identify the levels of contamination, implement appropriate NPS pollution control BMPs, and demonstrate any resulting changes in water quality. The waterborne constituents which will be measured to demonstrate BMP effectiveness are shown in Table B1-1.

Table B1-1 Waterborne Constituents

Parameter	Area of Interest	Status	Reporting Units
Ammonia Nitrogen	Upper	Critical	mg/L
Total Kjeldahl Nitrogen	Upper	Critical	mg/L
Nitrate/Nitrite Nitrogen	Upper & Lower	Critical	mg/L
Orthophosphate Phosphorous	Upper & Lower	Critical	mg/L
Total Phosphorous	Upper	Critical	mg/L
Potential hydrogen (pH)	Upper & Lower	Non-critical	pH Units
Temperature	Upper & Lower	Non-critical	°C
Dissolved Oxygen	Upper & Lower	Non-critical	mg/L
Total Suspended Solids	Upper & Lower	Critical	mg/L
Fecal Coliform Bacteria	Upper	Non-Critical	colonies/100 ml

In order to assess the overall water quality of the Leon River, baseline water quality grab samples will be collected at approximately two week intervals. These samples will be collected a minimum of twenty times per year for two years from a total of four sites located within the Leon River channel (Table B1-2). Two sites will be situated above Hamilton and two will be placed below Hamilton, Texas concentrating in Segment 1221 of the Leon River. ISCO automatic water samplers will also be placed in these locations to obtain water samples during stormwater runoff events.

Table B1-2 Number of Samples

Sample Type	Agency	Sites	Sampling Dates	Maximum Number of Samples
Routine [1]	TAES	2	20	40/year
Routine [1]	TIAER	6	20	120/year
Runoff [2]	TAES	6	Up to 15	18/event
Runoff [2]	TIAER	6	Up to 15	18/event

[1] Grab samples - minimum 20/year per site.

[2] Stormwater runoff samples collected at BMP sites with automated samplers.

Eight subwatersheds will be selected by evaluating simulation results from GIS modeling supplemented with available information about the location of NPS pollution within the watershed. Stormwater runoff will be collected in these locations with ISCO automatic sampling devices during each rainfall event that is of sufficient intensity and duration to trigger the automatic sampling devices. Stormwater runoff samples will be collected on paired watershed demonstration sites a maximum of 15 times per year. Sampling on the subwatersheds will be completely weather dependent so fewer than 15 runoff events may occur (Table B1-2). The exception is the four upper basin stormwater sites. With emphasis on dairies in the upper portion of the basin, the four subwatershed sites may be located in streams with some base flow. This situation will allow grab sampling at two week intervals. The automatic sampler timers will be programmed with a sampling regime developed by TIAER on previous projects (see Table B1-3). These sampling times may be adjusted as individual collection sites warrant.

Table B1-3 Automatic Water Sampler Timer Regime

Sample Number	Time Interval
1-3	One hour intervals
4-7	Two hour intervals
8 -24	Six hour intervals until sampler reaches capacity

BMPs will be site specific and cannot be determined until sites are selected. A supplement to Section B1 "Sampling Process Design" will be prepared and submitted with a quarterly report when targeted subwatersheds and appropriate BMPs have been selected.

EPA publication number 841-F-93-009 entitled "Paired Watershed Study Design" outlines an effective means for statistically evaluating BMPs (see Appendix A). The paired watershed design requires a minimum of two watersheds (control and treatment) and two periods (calibration and treatment). This project will utilize a modified form of this statistical design to evaluate up to six BMPs at a confidence level of 90 percent on "paired" subwatersheds within the Leon River Watershed over a two year period. Water quality data collected pre and post BMP implementation will be compared to demonstrate BMP effectiveness.

Section B2: Sampling Methods Requirements

Emphasis during this project will be placed on stormwater runoff, however, measurements must be made to determine base flow nutrient levels within the watershed. Routine grab samples will be collected at four sites within the river channel a minimum of twenty times per year. Base flow samples may also be collected within subwatersheds depending upon agricultural activity. As discussed in Section B1 "Sampling Process Design (Experimental Design)", base flow sampling may be appropriate at all upper basin sites. If appropriate, grab samples will be collected in these areas. Upon collection, samples will be transported to the TAES or TIAER laboratory for analysis. At the time of routine sample collection, the following parameters will be measured and recorded on site: pH, temperature, and dissolved oxygen.

Stormwater runoff samples will be collected with automatic sampling equipment. Each unit will consist of a weatherproof, lockable instrument shelter; a solar / battery power system; timer controlled ISCO Model 3700 Water Sampler; and an ISCO Model 4230 or 3230 Bubble Flow Meter. The flow meter monitors and records water level in the stream channel and also activates the sampler when the water rises to a predetermined level which will be site specific. Automatic sampler times will be set as described in Table B2-2. Up to 24 samples may be collected as the ISCO 3700 water sampler contains a set of 24 one liter polyethylene bottles. Additional equipment such as rain gauges and temperature probes may be installed at individual BMP demonstration sites, as required.

Water samples collected with automatic equipment will be selectively analyzed. Concurrent flow data will provide information to locate the beginning, peak and end of stormwater runoff events at each site. Flow will be estimated from water levels with standard open-channel flow equations such as the Chezy-Manning equation. As a minimum, one sample for analysis will be selected near midpoint of the rising hydrograph, one at the peak, and one near the midpoint of falling hydrograph. Upon collection, samples will be transported to the TAES or TIAER laboratory for analysis.

All automatic sampling equipment will be inspected at least once every two weeks and serviced as needed. Specific sampling procedures are listed in Table B2-1 and analysis will be performed by the Project Manager or his representative.

All corrective action is the responsibility of the Project Manager. Corrective action must be documented in writing (See Attachment A10-1) and distributed to the study participants at the earliest opportunity. Any CARs will be discussed and reviewed at the quarterly progress review meetings by all participants.

Table B2-1 Sampling Procedures

Parameter	Method(s)
Ammonia nitrogen	EPA[1] 350.1
Total Kjeldahl nitrogen	EPA 351.1
Nitrate nitrogen	EPA 352.1
Nitrate/nitrite nitrogen	EPA 353.2
Orthophosphate phosphorous	EPA 365.1, 365.2
Total phosphorous	EPA 365.1. 365.2
Potential hydrogen (pH)	EPA 150.1
Temperature	EPA 170.1
Dissolve Oxygen	EPA 360.1
Total suspended solids	EPA 160.1
Fecal coliform bacteria	SM[2] 9222D

[1] EPA - Methods for Chemical Analysis of Water and Wastes, March 1983
[2] SM - Standard Methods for the Examination of Water and Wastewater, 18th edition

B3 Sample Handling and Custody Requirements

Chain-of custody (COC) tags will not be used. The use COC tags is usually limited to those projects where the potential for litigation or fines exists. This project involves the collection of water quality data from control/management of NPS pollution sources for demonstration purposes. Instead of formal COCs, specifically designed data sheets will be completed for all samples collected. These sheets will not record change in possession but will require that the sample container have pertinent data (number, location, date, etc.) inked onto the sample container as written on the data sheet. The data sheets will be signed by the sample collector and will be transported with the samples to the TAES or TIAER Laboratory, depending upon collection location of sample. Examples of the data sheets will be included in the appropriate quarterly report as field and lab protocol are established.

Sample analyses for the lower watershed will be completed in the TAES laboratory while those for the upper portion will be completed in the TIAER laboratory. Sample holding requirements will meet EPA accepted times and preservation procedures. Table B3-1 describes sample container, preservation and holding time information for the parameters of interest.

Table B3-1 Sampling Procedures and Handling Methods

Parameter	Method(s)	Sample Size	Container	Preservation	Holding Time
Ammonia nitrogen	EPA[1] 350.1	1 liter	HDPE[3]	pH <2 H_2SO_4, 4°C	28 days
Total Kjeldahl nitrogen	EPA 351.1	125 ml	HDPE	pH <2 H_2SO_4, 4°C	28 days
Nitrate nitrogen	EPA 352.1	125 ml	HDPE	pH <2 H_2SO_4, 4°C	28 days
Nitrate/nitrite nitrogen	EPA 353.2	250 ml	HDPE	pH <2 H_2SO_4, 4°C	28 days
Orthophosphate phosphorous	EPA 365.1	125 ml	HDPE	4°C	48 hours
Total phosphorous	EPA 365.1, 365.2	125 ml	HDPE	pH <2 H_2SO_4, 4°C	28 days
Potential hydrogen (pH)	EPA 150.1	NA	NA	NA	NA
Temperature	EPA 170.1	NA	NA	NA	NA
Dissolved Oxygen	EPA 360.1	NA	NA	NA	NA
Total suspended solids	EPA 160.1	250 ml	HDPE	4°C	7 days
Fecal Coliform	SM[2] 9222D	125 ml	HDPE, sterile	4°C	6 hours

[1] EPA - Methods for Chemical Analysis of Water and Wastes, March 1983
[2] SM - Standard Methods for the Examination of Water and Wastewater, 18th edition
[3] HDPE - high density polyethylene bottle

Section B4: Analytical Methods Requirements

Water samples collected during this project will be analyzed by the TAES Laboratory at Temple or by the TIAER Laboratory at Stephenville. A listing of analytical methods requirements which will be used by each laboratory are listed in Table B4-1. Methodologies for all parameters of interest are included in Appendix B.

In the event of a failure in the analytical system, the Project Manager will be notified. The Laboratory Supervisors and the Project Managers will then determine if the existing sample integrity is intact, if re-sampling can and should be done, or if the data should be omitted.

Table B4-1 Analytical Methods Requirements

Parameter	Method	Equipment Used	Estimated MDL*
Ammonia nitrogen	EPA[1] 350.1	Perstorp Analytical Autoanalyzer	0.011 mg/L
Total Kjeldahl nitrogen	EPA 351.1	Same, with Tecator block digestor	0.078 mg/L
Nitrate nitrogen	EPA 352.1	Genesys 5 Spectrophotometer	0.027 mg/L
Nitrate/nitrite nitrogen	EPA 353.2	Perstorp Analytical Autoanalyzer	0.016/0.005 mg/L
Orthophosphate phosphorous	EPA 365.1	Perstorp Analytical Autoanalyzer	0.007 mg/L
Total phosphorous	EPA 365.1, 365.2	Perstorp Analytical Autoanalyzer or Genesys 5 Spectrophotometer	0.032 mg/L
Potential hydrogen (pH)	EPA 150.1	Hach, ORION inst. PH Meter	2 pH units
Temperature	EPA 170.1	YSI Dissolved Oxygen Probe	0 °C
Dissolved oxygen	EPA 360.1	YSI Dissolved Oxygen Probe	1 mg/L
Total suspended solids	EPA 160.1	Sartorius AC21P or Mettler AT261 Analytical Balance, Oven	10 mg/L
Fecal Coliform	SM[2] 9222D	Incubator, filtering apparatus	40 colonies/100ml

* MDL - Method Detection Limit

Section B5: Quality Control Requirements

The TAES and TIAER Laboratories will determine the precision of their analyses. Quality assurance of field sampling methods will be done by annual testing of sample collection and handling skills through the use of split samples. Annually, split samples from the upper portion of the watershed will be sent to TAES and those from the lower portion will be sent to TIAER.

All analyses will have the precision and accuracy of data determined on the particular day that the data were generated. This requires the analysis of a minimum of one duplicate and one spike each time a particular parameter is measured. Larger batches of samples require that additional precision and accuracy checks be made. This is ten percent of the total batch. Depending on the analysis, certain methodologies require that water blanks, standards and reagent blanks be analyzed to verify that no instrument or chemical problem will affect data quality. Table B5-1 outlines the required analytical quality control for the parameters of interest.

The use of approved sampling and analytical methods will ensure the measured data accurately represents the conditions at each monitoring site. The comparability of the data produced is predetermined by the commitment of the TSSWCB staff and the contracted laboratory staff to use only EPA approved analytical methods. Table A7-1 in Section A7 "Data Quality Objectives" lists the required accuracy limits for the parameters of interest. The completeness of the data will be affected by the reliability of the equipment, frequency of field and laboratory errors or accidents, and unexpected events; however, it will be the general goal that 90 percent data completion will be required.

It will be the responsibility of the Project Managers to verify that the data is representative. The data's precision, accuracy, and comparability will be the responsibility of each laboratory supervisor. The Project Managers will also have the responsibility of determining that the 90 percent completeness criteria is met, or will justify acceptance of a lesser percentage. All incidents requiring corrective action will be documented through the use of CARs (Attachment A10-1).

Table B5-1 Required Quality Control Analyses

Parameter	Blank	Standard	Duplicate	Spike
Ammonia nitrogen	A	A	B	B
Total Kjeldahl nitrogen	A	A	B	B
Nitrate/nitrite nitrogen	A	A	B	B
Orthophosphate phosphorous	A	A	B	B
Total phosphorous	A	A	B	B
Potential hydrogen (pH)	None	A	None	None
Temperature	None	None	None	None
Dissolved oxygen	None	None	None	None
Total suspended solids	A	A	B	None
Fecal coliform bacteria	A	None	B	None

A - Where specified, blanks and standard shall be performed each day that samples are analyzed.
B - Where specified, duplicate and spike analyses shall be performed on a 10% basis each day that samples are analyzed. If one to 10 samples are analyzed on a particular day, then one duplicate and one spike analyses shall be performed.

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. All calibration procedures will meet the requirements specified in the EPA approved methods of analysis. The frequency of calibration recommended by the equipment manufacturer as well as any instructions specified by applicable analytical methods will be followed. All records of calibration will be kept by the person performing the calibration and will be accessible for verification during either a laboratory or field audit.

Laboratory equipment and devices needing calibration and recalibration are numerous and varied. All equipment will have a verifiable calibration report maintained and available for inspection in the lab. Laboratory reagents will be standardized to verify that the percentage or normality is that which is prescribed for the analytical method.

All calibration procedures used in the field or laboratory will meet or exceed the calibration frequencies published in the test methods used for this project. Additional calibration procedures may be conducted if laboratory personnel determine additional calibration is warranted as beneficial to this project.

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

Task 4.1 of the workplan requires a review of existing water quality monitoring data in the Leon River Watershed. All acceptable sources will be compiled from published data and a database developed to aid in characterization of the water quality in the Leon River Watershed and BMP demonstration site selection.

Evaluations of the BMPs used in these demonstrations will be based entirely on data collected from the demonstration site during the time-frame of this project. No additional data bases or literature files (other than site histories and weather data) will be utilized to evaluate the BMPs implemented during this demonstration. Existing data have typically been collected and analyzed by federal and state agency personnel so no special requirements on existing data are necessary.

Rainfall and temperature records will be obtained from local government weather stations which will be identified after BMP demonstration areas have been selected. A supplement to Section B9 "Data Acquisition Requirements (Non-Direct Measurements)" will be prepared and submitted with the appropriate quarterly report when local weather stations associated with selected BMP demonstration sites have been identified.

Section C1: Assessments and Response Actions

The commitment to use approved equipment and methods when obtaining environmental samples and producing field or laboratory measurement must involve periodic verification that the equipment and methods are utilized and employed correctly. This verification constitutes the annual field performance audit. Field investigators will be observed during actual field operations to verify that equipment and procedures are properly applied.

All laboratory samples will have the precision and accuracy of data determined on the particular day that the data were generated. Depending on the analysis, certain methodologies require that water blanks, standards, and reagent blanks be analyzed to verify that no instrument or chemical problem will affect data quality.

To minimize downtime of all measurement systems, all field measurement and sampling equipment, in addition to all laboratory equipment, must be maintained in a working condition. Also, backup equipment or common spare parts will be made available if any piece of equipment fails during use so that repairs or replacement can be made quickly, allowing measurement tasks to be resumed.

Data collection and analytical results will be reviewed semi-annually by the Project Managers to ensure that the data collection program is obtaining the desired results. During this semi-annual review, any necessary modification to the data collection efforts will be implemented to improve the integrity, validity and usefulness of the data.

Section C2: Reports to Management

The field measurement and sampling for the project will be done according to the approved workplan. The Laboratory Supervisors of the TAES and TIAER will be required to report on the proper implementation of the procedures outlined in this QAPP and thereby the status of the data quality. The QAOs will be informed of any quality assurance problems encountered and solutions adopted through the use of CARs. This information will be provided by the Project Managers.

The annual quality assurance report to the EPA, submitted by the QAOs, will be the main QA report for this project. However, upon completion of the project, the final report will contain a detailed quality assurance section to address the accuracy, precision and completeness of the measurement data used in the project's conclusions. It will also discuss any problems encountered and solutions made. This final project QA report is therefore the responsibility of the Project Manager with any assistance required from the QAO and Laboratory Supervisor.

Section D1: Review Validation and Verification Requirements

The Project Managers, Laboratory Supervisors, and monitoring team personnel will be responsible for reviewing, validating and verifying the measurement and sample data and the routine assessment of measurement procedures for precision and accuracy.

Whenever the procedures and guidelines established in this QAPP fail to meet the specified levels of data quality, corrective actions in the form of CARs will be required. Corrective action may be initiated by the QAOs, if variances from proper protocol are noted. The responsibility to see that corrective actions are made will be the responsibility of the Project Manager, Field Manager or Laboratory Supervisor. Each manager may also initiate corrective action on his own initiative, if situations arise that require immediate attention. Documentation of any corrective action procedures will be provided by the appropriate manager, along with the results of the implemented changes through the use of CARs.

Section D3: Quality Objectives Reconciliation

Data completeness in this project will be relative to the number of weather events sampled as compared to the number of proposed sampling events. Accidents in handling, shipping and laboratory analysis may also reduce the completeness of the sampling program. It will be the goal of this project to achieve 90 percent completeness; however, statistical analysis will be the final indicator of data validity.

Representativeness and comparability of data, while unique to each individual collection site, is the responsibility of the Project Manager. By following the guidelines described in this QAPP, and through careful sampling design, the data collected in this project will be representative of the actual field conditions and comparable to similar applications. Representativeness and comparability of laboratory analyses will be the responsibility of the Laboratory Manager.

The Project Managers will review the final data to ensure that it meets the requirements as described in this QAPP.

United States Environmental Protection Agency | Office of Water Washington, D.C. 20460 | 841-F-93-009 September 1993

EPA

Paired Watershed Study Design

INTRODUCTION

The purpose of this fact sheet is to describe the paired watershed approach for conducting nonpoint source (NPS) water quality studies. The basic approach requires a minimum of two watersheds - control and treatment - and two periods of study - calibration and treatment. The control watershed accounts for year-to-year or seasonal climate variations, and the management practices remain the same during the study. The treatment watershed has a change in management at some point during the study. During the calibration period, the two watersheds are treated identically and paired water quality data are collected (Table 1). Such paired data could be annual means or totals, or for shorter studies (<5 yr), the observations could be seasonal, monthly, weekly, or event-based. During the treatment period, one watershed is treated with a best management practice (BMP) while the control watershed remains in the original management (Table 1). The treated watershed should be selected randomly by such means as a coin toss. The reverse of this schedule is possible for certain BMPs; the treatment period could precede the calibration period. For example, the study could begin with two watersheds in two different treatments, such as "BMP" and "no BMP". Later both watersheds could be managed identically to calibrate them. Since no calibration exists before the treatment occurs, this reversed design is considered risky.

Table 1. Schedule of BMP implementation.

Period	Watershed: Control	Watershed: Treated
Calibration	no BMP	no BMP
Treatment	no BMP	BMP

The basis of the paired watershed approach is that there is a quantifiable relationship between paired water quality data for the two watersheds, and that this relationship is valid until a major change is made in one of the watersheds. At that time, a new relationship will exist. This basis does not require that the quality of runoff be statistically the same for the two watersheds; but rather that the relationship between paired observations of water quality remains the same over time except for the influence of the BMP. Often, in fact, the analysis of paired observations indicates that the water quality is different between the paired watersheds. This difference further substantiates the need to use a paired watershed approach because the technique does not assume that the two watersheds are the same; it does assume that the two watersheds respond in a predictable manner together.

EXAMPLE

To illustrate the paired watershed approach, data taken from a study in Vermont will be used. The purpose of the study was to compare changes in field runoff (cm) due to conversion of conventional tillage to conservation tillage.

Selection of Watersheds

1. Watersheds should be similar in size, slope, location, soils, and land cover.
2. Watersheds should be small enough to obtain uniform treatment over the entire watershed.
3. Watershed outlets should have a stable channel and cross section for discharge monitoring, and should not leak at the outlet.
4. Each watershed should be in the same land cover for a number of years prior to the study so that they are at a steady-state.

Advantages

1. Climate and hydrologic differences over years are statistically controlled.
2. Can attribute water quality changes to a treatment.
3. Control watershed eliminates need to measure all components causing change.
4. Watersheds need not be identical.
5. Study can be completed in shorter time frame than trend studies.
6. Cause-effect relationships can be indicated.

Disadvantages

1. Response to treatment likely to be gradual over time which influences the variance.
2. Study vulnerable to catastrophes such as hurricanes.
3. Shortened calibration may result in serially correlated data.
4. Variances between time periods may not be equal due to drastic treatment.
5. Minimal change in the control watershed is permitted.
6. Requires similar watersheds in close proximity.

The west watershed was the control and was 1.46 hectares (ha) in area. The east watershed was the treatment field and was 1.10 ha. Conventional tillage was moldboard plow whereas conservation tillage was a single disk harrow. The calibration period was one year during which 49 paired observations of storm runoff were made. The treatment period was three years during which 114 paired observations of runoff were made. Data were log-transformed to approach normality based upon the Wilks-Shapiro (W) statistic. The equality of variances between periods was tested using the F-test. Residual plots were examined to check for independence of errors. The statistical package SAS® was used for all analyses.

CALIBRATION

The relationship between watersheds during the calibration period is described by a simple linear regression (Figure 1) between the paired observations, taking the form:

$$treated_i = b_o + b_1(control_i) + e \quad (1)$$

where *treated* and *control* represent flow, water quality concentration, or mass values for the appropriate watershed, b_o and b_1 are regression coefficients representing the regression intercept and slope, respectively, and e is the residual error.

Three important questions must be answered prior to shifting from the calibration period to the treatment period: a) is there a significant relationship between the paired watersheds for all parameters of interest, b) has the calibration period continued for a sufficient length of time, and c) are the residual errors about the regression smaller than the expected BMP effect?

Regression significance. The significance of the relationship between paired observations is tested using analysis of variance (ANOVA). The test assumes that the regression residuals are normally distributed, have equal variances between treatments, and are independent.

Hand calculations to test for the significance of the relationship are shown in Snedecor and Cochran (1980, p. 157) (Table 2). The values for Table 2 are calculated from:

$$S_y^2 = \Sigma Y_i^2 - \frac{(\Sigma Y_i)^2}{n} \quad (2)$$

$$S_x^2 = \Sigma X_i^2 - \frac{(\Sigma X_i)^2}{n} \quad (3)$$

$$S_{xy} = \Sigma X_i Y_i - \frac{(\Sigma X_i)(\Sigma Y_i)}{n} \quad (4)$$

$$S_{yx}^2 = \frac{S_y^2 - (S_{xy})^2/S_x^2}{n - 2} \quad (5)$$

Also, the regression coefficients and coefficient of determination are determined from:

$$b_1 = \frac{S_{xy}}{S_x^2} \quad (6)$$

$$b_o = \overline{Y} - b_1\overline{X} \quad (7)$$

$$r^2 = \frac{(S_{xy})^2/S_x^2}{S_y^2} \quad (8)$$

Table 2. Analysis of variance for linear regression.

Source	Degrees of freedom	Sum of squares	Mean squares	F
regression	1	$(S_{xy})^2/S_x^2$	$(S_{xy})^2/S_x^2$	$[(S_{xy})^2/S_x^2]/S_{yx}^2$
residual	n-2	$S_y^2-(S_{xy})^2/S_x^2$	S_{yx}^2	
total	n-1	S_y^2		

In order to perform the calculations by hand, initially calculate: ΣX_i, ΣY_i, $\Sigma X_i Y_i$, ΣX_i^2, ΣY_i^2, $\bar{X}$, $\bar{Y}$. The mean squares (MS) are determined by dividing the sum of squares by the degrees of freedom (df).

For the example above, the following was calculated by hand: $\Sigma X_i = -123.403$, $\Sigma Y_i = -180.704$, $\Sigma X_i Y_i = 533.553$, $\Sigma X_i^2 = 381.713$, $\Sigma Y_i^2 = 814.847$, $\bar{X} = -2.518$ ($10^X = 0.003041$ cm), and $\bar{Y} = -3.688$ ($10^Y = 0.000205$ cm). Therefore, $S_y^2 = 148.441$, $S_{xy} = 78.463$, $S_x^2 = 70.933$, and $S_{yx}^2 = 1.312$. Using SAS, the appropriate program is listed below. This program was used to generate Table 3.

SAS PC Program

```
data flow;
  title 'Total Flow (cm)';
  infile 'fname.dat';
  input flow1 flow2;
logflow1=log10(flow1);
logflow2=log10(flow2);
Proc reg;
  Model logflow2=logflow1
         / P CLM;
run;
```

The resulting F statistic for this example would indicate that the regression relationship adequately explains a significant amount ($p<0.001$) of the variation in paired flow data.

Calibration duration. The ratio between the residual variance (mean squares) (S_{yx}^2) for the regression and the smallest worthwhile difference (d) is used to determine if a sufficient sample

Table 3. Analysis of variance for regression of treatment watershed runoff on control watershed runoff.

Source	df	MS	F	p
model	1	86.79	66.17	0.0001
error	47	1.31		
total	48			

has been taken to detect that difference, from:

$$\frac{S_{yx}^2}{d^2} = \frac{n_1 n_2}{n_1+n_2}\left\{\frac{1}{F(1+\frac{F}{n_1+n_2-2})}\right\} \qquad (9)$$

where S_{yx}^2 is the estimated residual variance about the regression, d^2 is the square of the smallest worthwhile difference; n_1 and n_2 are the numbers of observations in the calibration and treatment periods ($n_1 = n_2$ for this calculation because n_2 is not known yet), and F is the table value ($p=0.05$) for the variance ratio at 1 and $n_1 + n_2 - 3$ df. The difference (d) is selected based on experience and would vary with project expectations. If the left side of the equation is greater than the right side of the equation, then there are an insufficient number of samples taken to detect the difference. For the example, S_{yx}^2 was 1.312 (from Table 3), $n_1 = n_2$ was 49, and F was 3.94. A ten percent change from the mean was considered a worthwhile difference; therefore, $d = 0.10 * \bar{X} = 0.10 * \log 0.003041$ cm and $S_{yx}^2/d^2 = 20.7$. The right side of Equation (9) = 6.0; since 20.7 is greater than 6.0, there

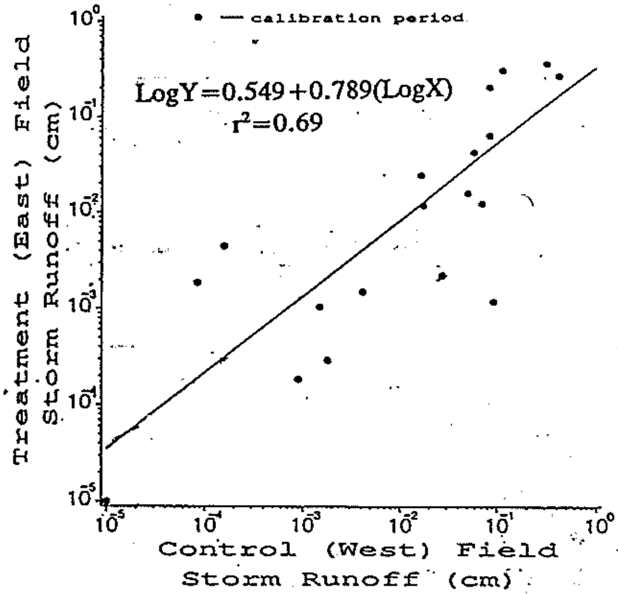


Figure 1. Calibration period regression.

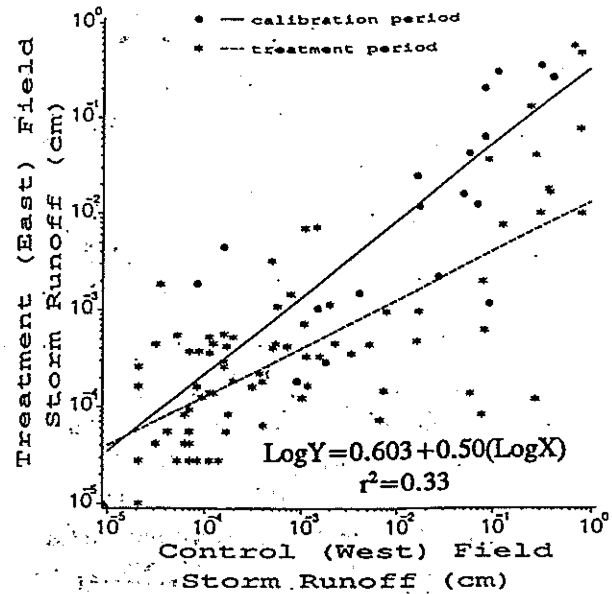


Figure 2. Treatment and calibration period regressions.

was an insufficient number of observations to detect a 10% change in discharge. There were enough samples to detect a 20% change in discharge ($S^2/d^2 = 5.2$).

Residual errors. The confidence bands for the regression equation allow determining the level of change needed to have a significant treatment effect. Thus, how far away from the calibration regression must the treatment data be to be significantly different? Confidence bands for the regression are determined from:

$$CI = \pm(t)(S_{yx})\sqrt{\frac{1}{n}+\frac{(X_i-\bar{X})^2}{S_x^2}} \qquad (10)$$

where CI is the confidence interval, S_{yx} is the square root of S_{yx}^2, n and S_x^2 have been previously defined, t is Student's 't', and X_i is the value at the point of comparison to compare to the mean on the regression line. Confidence limits can be generated in SAS by adding / P CLM to the MODEL statement (see page 4).

TREATMENT

At the end of the treatment period the significance of the effect of the BMP is determined using analysis of covariance (ANCOVA). The analysis is actually a series of steps determining a) the significance of the treatment regression equation, b) the significance of the overall regression which combines the calibration and treatment period data, c) the difference between the slopes of the calibration and treatment regressions, and d) the difference between the intercepts of the calibration and treatment regressions. The

Table 4. Analysis of covariance for comparing regression lines.

Source	df	S_x^2	S_{xy}	S_y^2	b_1	df	SS	MS	F
Within									
Calibration	n_1-1	Eq.(3)	Eq.(4)	Eq.(2)	Eq.(6)	n_1-2	$S_y^2-(S_{xy})^2/S_x^2$	Eq.(5)	–
Treatment	n_2-1	Eq.(3)	Eq.(4)	Eq.(2)	Eq.(6)	n_2-2	" "	Eq.(5)	–
				Pooled	Error	Σ	Σ	SS/df	
Slopes	n_1+n_2-2	Σ	Σ	Σ	Eq.(6)	n_1+n_2-3	$S_y^2-(S_{xy})^2/S_x^2$	Eq.(5)	
				Slope difference		1	Slope SS - Error SS		MS/Error MS
						1	Combined SS - Slope SS		MS/Slope MS
Intercepts	n_1+n_2-1	combined data				n_1+n_2-2	$S_y^2-(S_{xy})^2/S_x^2$		

analysis can be computed by hand as shown in Table 4 (Snedecor and Cochran, 1980, p. 386). In order to perform the calculations by hand, the following are determined for the example treatment data: ΣX_i = -358.14, ΣY_i = -416.05, $\Sigma X_i Y_i$ = 1408.37, ΣX_i^2 = 1352.54, ΣY_i^2 = 1653.43, $\bar{X}$ = -3.1416, $\bar{Y}$ = -3.650, and n = 114. Therefore, S_y^2 = 135.00, S_{xy} = 101.32, and S_x^2 = 227.43. The ANCOVA is completed for the example in Table 5. The summations symbol(Σ) in Table 4 is used to signify the addition of the column entries above it.

Since the slopes were found to be different, the differences in intercepts do not have any real meaning and do not need to be calculated. That is, if slopes are different, intercepts will usually be different. However, the calculation for the test of intercepts is presented to show the method. The combined data are determined by summing the ΣX_i, ΣY_i, $\Sigma X_i Y_i$, ΣX_i^2, and ΣY_i^2 values for both the calibration and treatment periods and calculating new values for S_y^2, S_{xy}, and S_x^2. The calculation of F for the intercept uses the slope MS in the denominator. The F for the slope test uses the error MS in the denominator. A significant difference in intercepts but not slopes indicates an overall parallel shift in the regression equation.

Using SAS, an example program is listed below. This program contains both a test of the treatment regression in the PROC REG statement and a test comparing the regression lines in the PROC GLM statement.

SAS PC Program

```
Proc reg;
  model logflow2=logflow1;
run;
Proc glm;
  class period;
  model logflow2=logflow1 period
        logflow1*period;
run;
```

The treatment period regression was found to be significant based on the analysis of variance for regression (Table 7).

Table 5. Example analysis of covariance for comparing regression lines.

Source	df	S_x^2	S_{xy}	S_y^2	b_1	df	SS	MS	F
Within									
Calibration	48	70.933	78.463	148.441	1.106	47	61.650	1.3117	
Treatment	113	227.430	101.315	135.000	0.445	112	89.866	0.8024	
				Error		159	151.516	0.9529	
Slopes	161	298.363	179.778	283.441	0.603	160	175.116	1.0945	
				Slope difference		1	23.600	23.600	24.77***
						1	5.8453	5.8453	5.34*
Intercepts	162	311.671	178.762	283.492		161	180.961		

*** indicates significance at $p=0.001$
* indicates significance at $p=0.05$

Table 7. ANOVA for regression of treatment watershed runoff on control watershed runoff for the treatment period.

Source	df	MS	F	p
model	1	45.13	56.25	0.0001
error	112	0.80		
total	113			

Table 8. ANCOVA for comparing calibration and treatment regressions.

Source	df	MS	F	p
model	3	43.99	46.17	0.001
error	159	0.95		
overall	1	103.09	108.18	0.0001
intercept	1	5.47	5.74	0.0178
slope	1	23.42	24.58	0.0001

The analysis of covariance obtained in SAS output summarizes the significance of the overall model, compares the two regression equations, the regression intercepts, and slopes (Table 8). The ANCOVA indicates that the overall treatment and calibration regressions were significantly different, and that the slopes and intercepts of the equations also were different. The difference in slopes is evident in Figure 2. The slight differences in F values between the hand calculation method and the SAS output are due to rounding errors.

DISPLAYING AND INTERPRETING RESULTS

The most common methods for displaying the results include a bivariate plot of paired observations together with the calibration and treatment regression equations (Figure 2). Another useful graph is a plot of deviations ($y_{observed} - y_{predicted}$) as a function of time during the treatment. The predicted values are obtained from the calibration regression equation. For the example, the plot of deviations indicates that for most paired observations, the observed value was less than that predicted by the calibration regression equation. Results should be provided of mean values for each period and each watershed. The overall results due to the treatment can be expressed as the % change based on the mean predicted and observed values. For the example, there was a 64 % reduction in mean runoff due to the treatment (Table 9).

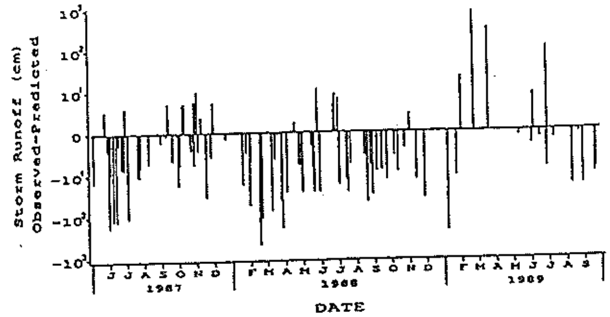


Figure 3. Observed deviations from predicted discharge.

Table 9. Mean values by period and watershed.

	Runoff (cm) x 10^{-2}	
Calibration		
Control	0.30	
Treatment	1.63	
Treatment		
Control	0.08	
Treatment	0.04	
Predicted	0.11	-64%

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APPENDIX B - APEX OUTPUT FOR DIFFERENT MANAGEMENT PLANS

Comparison of Control and Filter Strip – Avg. values as computed by APEX

Variable	Control	Filter Strip	Difference
Q	1.9	50.1	48.2
MUSS	4.52	0	-4.52
YON	78.17	0.04	-78.13
YP	12.93	0.03	-12.9
YNO3	1.0021	1.0011	-0.001
PRKN	27.0391	1.0021	-26.037
YAP	0.1752	0.2532	0.078
TNO3*	150.6353	9.194667	-141.440633
Wheat yield	57.6	2.9	----- +
Forage Sorghum yield	-	-	-

*Computed by Excel

+Control in unit/acre and Filter in t/ha.

→ A negative sign means that the no till number is less than the control one

As can be seen, the soil loss from erosion (MUSS), organic nitrogen loss with sediment (YON), phosphorus loss with sediment (YP), the NO_3 loss in surface runoff (YNO3), mineral nitrogen loss in percolate (PRKN), and total NO_3-N present in the soil profile (TNO3) have been reduced. At the same time, the surface runoff (Q) and the soluble phosphorus loss in runoff (YAP) have increased. Finally, crop yields can not be compared at this time.

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	3.69	0	1.11	0.56	0.4212	0	0.2142	3.83
2	77.97	0	0	0	1.9722	0.0011	0.1832	18.01
3	61.43	0	0	0.01	1.0021	2.0021	0.1932	14.05
4	24.04	0	0.02	0.02	0.9732	3.0041	0.1422	15.29
5	182.89	0	0.01	0.01	1.7012	2.0011	0.1162	10.53
6	90.94	0	0.01	0.01	1.0011	3.0021	0.1642	11.1
7	55.67	0	0.01	0.01	0.8412	0.1992	0.0862	12.59
8	121.37	0	0.01	0.01	1.8432	5.0021	0.1582	5.97
9	37.85	0	0.01	0.02	0.4862	0.0282	0.0812	6.83
10	77.88	0	0.01	0.01	0.6132	0	0.1482	9.32
11	53.9	0	0.01	0.01	0.7312	4.0021	0.1722	2.32
12	55.01	0	0.01	0.01	1.0021	0.6202	0.1792	10.65
13	5.55	0	0.01	0.01	0.0061	0.0021	0.1762	9.07
14	21.27	0	0.01	0.01	0.0021	0	0.1982	6.2
15	35.03	0	0.01	0.02	0.0011	0	0.1532	12.8
16	8.12	0	0.02	0.03	0.0021	0	0.1752	8.14
17	53	0	0.01	0.01	1.0021	0.1892	0.2132	4.38
18	28.87	0	0.01	0.01	0.0021	0	0.2042	8.28
19	26.87	0	0.01	0.01	0.0011	0	0.2732	9.65
20	72.77	0	0.01	0.02	1.0011	1.0011	0.3092	9.29
21	56.15	0	0.01	0.02	1.9412	1.0021	0.3772	5.75
22	10.66	0	0	0.01	0.9422	0.7632	0.4162	8.97
23	33.33	0	0	0.01	1.0021	0	0.4912	13.27
24	61.82	0	0	0	1.0021	2.0011	0.4232	8.85
25	11.73	0	0.01	0.01	0.8492	0	0.4642	7.6
26	48.82	0	0	0.01	0.7292	0.0053	0.5572	10.14
27	44.13	0	0.01	0.02	0.9402	1.9982	0.5542	9.43
28	77.06	0	0.01	0.01	1.0021	4.0021	0.5132	12.09
29	17.1	0	0.01	0.02	0.5152	0	0.5042	4.89
30	48.78	0	0	0	1.0011	0	0.5042	6.55
Avg (by APEX)	50.1	0	0.04	0.03	1.0011	1.0021	0.2532	9.194667

Leon River
Winter Wheat
Filter Strip

Comparison of Control and No Till – Avg. values as computed by EPIC

Variable	Control	No Till	Difference
Q	1.9	1.9	0
MUSS	4.52	4.46	-0.06
YON	78.17	77.86	-0.31
YP	12.93	12.98	0.05
YNO3	1.0021	1.0021	0
PRKN	27.0391	27.0391	0
YAP	0.1752	0.1912	0.016
TNO3*	150.6353	150.3947	-0.2406
Wheat yield	57.6	57.7	0.1
Corn yield	-	-	-

*Computed by Excel

→ A negative sign means that the no till number is less than the control one

As can be seen, the surface runoff (Q), the NO_3 loss in surface runoff (YNO3), and mineral nitrogen loss in percolate (PRKN) did not change, but soil loss from erosion (MUSS), organic nitrogen loss with sediment (YON), and total NO_3-N present in the soil profile (TNO3) have been reduced. At the same time, phosphorus loss with sediment (YP) and the soluble phosphorus loss in runoff (YAP) have increased. Finally, wheat yield has increased by using a no till best management practice.

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.08	0.17	184.5	28.56	0.0021	0	0.2692	106.65
2	3.23	0.06	4.12	0.62	1.0011	25.0471	0.1542	147.01
3	1.87	0.76	102.24	15.38	1.0011	40.0381	0.3682	128.48
4	1.14	0.02	0.68	0.1	0.0011	0	0.1252	151.15
5	8.86	70.99	399.88	61.83	4.0021	73.0351	0.0552	115.03
6	1.95	0.04	1.14	0.17	1.0011	8.0191	0.1172	114.48
7	2.76	12.2	217.88	34.08	1.0021	39.0231	0.1372	108.2
8	2.43	0.07	1.65	0.24	1.0011	9.0141	0.0942	102.15
9	1.56	4.11	127.19	19.9	1.0021	37.0201	0.1392	108.79
10	2.8	0.08	1.9	0.29	1.0011	29.0361	0.1362	141.63
11	2.54	8.54	169.28	26.76	1.0011	53.0331	0.1322	106.32
12	0.51	0.01	0.33	0.05	0.0021	0.0231	0.1222	146.39
13	0.2	0.07	130.32	20.81	0.0061	17.0231	0.2842	151.25
14	0	0	0.02	0	0	0	0	172.48
15	1.69	1.3	103.76	17.96	1.0031	17.0551	0.3642	182.81
16	0.05	0	0.02	0	0.0051	0	0.2082	214.81
17	2.59	9.66	159.14	26.19	3.0041	60.0741	0.1682	181.48
18	0.03	0	1.02	0.17	0.4172	0	0.1942	235.03
19	1.48	2.82	113.05	18.76	1.0021	22.0871	0.3502	239.57
20	1.87	0.06	1.24	0.2	1.0011	31.0831	0.1692	200.44
21	3.44	11.81	202.49	38.39	2.0021	135.0531	0.2882	112.06
22	0.48	0.01	0.31	0.05	0.0011	0	0.1672	189.08
23	1.63	5.83	115.11	22.65	1.0021	12.0481	0.3772	188.73
24	1.62	0.06	1.1	0.18	0.0011	0	0.1662	173.55
25	1.07	2.23	95.93	16.34	0.0021	53.0501	0.1622	156.98
26	2.96	0.09	1.72	0.29	1.9282	61.0481	0.1572	136.18
27	1.64	2.14	106.52	19.71	1.0021	63.0371	0.3772	113.78
28	3.05	0.1	1.88	0.33	1.9072	10.0261	0.1802	103.38
29	1.24	2.18	100.12	17.76	0.0021	13.0261	0.1642	108
30	1.28	0.04	0.73	0.13	1.0021	0	0.1802	183.17
Avg (by EPIC)	1.9	4.52	78.17	12.93	1.0021	27.0391	0.1752	150.6353

Leon River
Winter Wheat
Control

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.08	0.17	184.7	28.6	0.0021	0	0.2782	106.61
2	3.24	0.06	4.12	0.62	1.0011	25.0471	0.1622	147.12
3	1.88	0.76	102.23	15.41	1.0011	40.0381	0.4312	128.54
4	1.14	0.02	0.68	0.1	1.0021	0	0.1022	151.08
5	8.87	70.97	398.65	61.8	4.0021	73.0351	0.0582	114.89
6	1.95	0.04	1.14	0.17	1.0011	8.0191	0.1042	114.3
7	2.76	12.2	217.78	34.06	1.0021	39.0221	0.1442	108.11
8	2.43	0.07	1.64	0.24	1.0011	9.0141	0.0912	102.06
9	1.56	4.11	127.27	19.88	1.0021	37.0201	0.1392	108.64
10	2.8	0.08	1.9	0.29	1.0011	29.0361	0.1382	141.44
11	2.54	8.54	169.38	26.8	1.0011	52.0331	0.1332	106.12
12	0.51	0.01	0.33	0.05	0.0021	0.0221	0.1232	146.3
13	0.2	0.07	130.32	20.79	0.0061	17.0231	0.3202	151.05
14	0	0	0.02	0	0	0	0	172.27
15	1.69	1.27	103.58	18.31	2.0041	17.0551	0.4252	182.45
16	0.05	0	0.02	0	0.0051	0	0.2272	214.26
17	2.59	9.58	158.25	26.21	3.0041	60.0731	0.1752	181.14
18	0.03	0	1.02	0.17	0.4172	0	0.2032	234.68
19	1.48	2.8	112.83	18.85	1.0021	22.0871	0.4052	239.18
20	1.87	0.06	1.25	0.21	1.0011	31.0831	0.1852	199.95
21	3.44	10.6	195.89	38.41	2.0031	135.0531	0.3402	111.84
22	0.48	0.01	0.31	0.05	0.0011	0	0.1872	188.58
23	1.63	5.67	114.81	23.58	1.0021	12.0481	0.4502	188.51
24	1.61	0.06	1.09	0.18	0.0011	0	0.1702	173.24
25	1.07	2.24	96.2	16.37	0.0021	53.0501	0.1622	156.54
26	2.96	0.09	1.72	0.29	1.9382	60.0481	0.1652	135.92
27	1.64	1.98	106.06	19.89	1.0021	63.0371	0.4482	113.5
28	3.05	0.1	1.88	0.34	1.9112	9.0261	0.1892	102.91
29	1.24	2.12	99.98	17.74	0.0021	14.0261	0.1642	107.31
30	1.28	0.04	0.73	0.13	1.0021	0	0.1862	183.3
Avg (by EPIC)	1.9	4.46	77.86	12.98	1.0021	27.0391	0.1912	150.3947

Leon River
Winter Wheat
No Till

Comparison of Control and Filter Strip – Avg. values as computed by APEX

Variable	Control	Filter Strip	Difference
Q	1.7	48.7	47
MUSS	4.41	0	-4.41
YON	101.66	0.04	-101.62
YP	15.38	0.03	-15.35
YNO3	1.0021	1.0011	-0.001
PRKN	16.0681	1.0021	-15.066
YAP	0.0602	0.2522	0.192
TNO3*	215.0997	9.050667	-206.049033
Wheat yield	-	-	-
Grain Sorghum yield	32.1	3.4	----- +

*Computed by Excel

+Control in unit/acre and Filter in t/ha.

→ A negative sign means that the no till number is less than the control one

As can be seen, the soil loss from erosion (MUSS), organic nitrogen loss with sediment (YON), phosphorus loss with sediment (YP), the NO_3 loss in surface runoff (YNO3), mineral nitrogen loss in percolate (PRKN), and total NO_3-N present in the soil profile (TNO3) have been reduced. At the same time, the surface runoff (Q) and the soluble phosphorus loss in runoff (YAP) have increased. Finally, crop yields can not be compared at this time.

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	3.67	0	1.11	0.56	0.4212	0	0.2142	3.7
2	78.01	0	0	0	1.9852	0.0011	0.1852	17.92
3	61.53	0	0	0.01	1.0021	2.0021	0.1952	12.14
4	19.61	0	0.02	0.02	0.0011	2.0041	0.1592	14.08
5	170.76	0	0.01	0.01	1.6622	1.0011	0.1102	9.77
6	82.92	0	0.01	0.01	1.0011	3.0021	0.1662	9.41
7	51.21	0	0.01	0.01	0.8732	0.0142	0.0922	12.07
8	114.97	0	0.01	0.01	1.8692	4.0021	0.1612	5.84
9	43.87	0	0.01	0.02	0.4982	0.0062	0.0892	5.38
10	73.61	0	0.01	0.02	0.6422	0	0.1512	8.6
11	48.24	0	0	0.01	0.7512	4.0021	0.1722	2.82
12	51.39	0	0.01	0.01	1.0011	0.7512	0.1852	11.02
13	4.36	0	0.01	0.01	0.0051	1.0021	0.1762	8.72
14	21.43	0	0.01	0.01	0.0011	0	0.1942	5.94
15	36.01	0	0.01	0.02	0.0011	0	0.1512	12.73
16	8.14	0	0.02	0.03	0.0021	0	0.1682	8.31
17	52.91	0	0	0	1.0021	0.1912	0.1912	4.33
18	28.95	0	0	0.01	0.0021	0	0.1972	8.14
19	26.98	0	0	0	0.0011	0	0.2592	9.86
20	72.74	0	0.01	0.01	1.0011	1.0011	0.2902	9.77
21	55.54	0	0.01	0.02	1.9942	1.0021	0.3602	7.83
22	10.73	0	0	0.01	0.0011	0.9882	0.3962	9.92
23	32.99	0	0.01	0.01	1.0021	0	0.4712	13.43
24	62.05	0	0	0	1.0021	2.0011	0.4132	9.4
25	11.55	0	0.01	0.01	0.8562	0	0.4542	7.41
26	49.38	0	0.01	0.02	0.7202	0.0043	0.5492	9.78
27	43.99	0	0	0.01	0.0011	1.0011	0.5422	9.63
28	77.05	0	0.01	0.01	1.0021	4.0021	0.5022	12.21
29	17.14	0	0.01	0.01	0.5152	0	0.4932	4.71
30	48.64	0	0	0	1.0011	0	0.4922	6.65
Avg (by APEX)	48.7	0	0.04	0.03	1.0011	1.0021	0.2522	9.050667

Leon River
Grain Sorghum
Filter Strip

Comparison of Control and No Till – Avg. values as computed by EPIC

Variable	Control	No Till	Difference
Q	1.7	1.7	0
MUSS	4.41	4.42	0.01
YON	101.66	101.41	-0.25
YP	15.38	15.29	-0.09
YNO3	1.0021	1.0021	0
PRKN	16.0681	16.0681	0
YAP	0.0602	0.0512	-0.009
TNO3*	215.0997	214.6363	-0.4634
Wheat yield	-	-	-
Grain Sorghum yield	32.1	32.1	0

*Computed by Excel

→ A negative sign means that the no till number is less than the control one

As can be seen, the surface runoff (Q), the NO_3 loss in surface runoff (YNO3), and mineral nitrogen loss in percolate (PRKN) did not change, but organic nitrogen loss with sediment (YON), phosphorus loss with sediment (YP), the soluble phosphorus loss in runoff (YAP), and total NO_3-N present in the soil profile (TNO3) have been reduced. At the same time, soil loss from erosion (MUSS) has increased. Finally, grain sorghum yield has not changed using a no till best management practice.

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.07	0.08	141.41	21.83	0.0021	0	0.2222	102.72
2	2.44	1.68	100.67	14.69	1.0011	2.0211	0.1162	159.62
3	2.09	3.47	86.97	13.11	1.0021	8.0231	0.1542	132.74
4	0.71	0.81	108.66	15.98	0.0021	0	0.0682	146.45
5	8.12	28.28	222.82	31.68	2.9732	21.0401	0.0212	148.83
6	3.42	11.84	131.57	19.62	2.0021	30.0351	0.0762	131.01
7	2.8	6.04	154.49	22.54	1.7262	0	0.0032	118.24
8	3.97	12.57	150.07	21.98	1.0011	23.0361	0.0422	141
9	1.39	1.44	76.12	11.16	0.8552	0	0.0082	93
10	1.87	4.33	96.04	14.06	1.0011	0	0.0382	124.06
11	2.16	7.51	128.98	19.09	1.0021	21.0181	0.0852	132.74
12	1.24	4.99	120.33	17.91	1.0031	5.0411	0.0882	163.5
13	0.06	0.07	93.07	13.88	0.0031	0	0.1152	200.32
14	0.11	0.21	60.21	8.86	0.0041	0	0.0472	246.06
15	0.86	0.36	68.84	10.31	0.0021	0	0.1082	267.83
16	0.05	0	95.96	14.4	0.0061	0	0.1282	299.45
17	1.57	8.54	120.5	18.26	0.8802	12.1271	0.0782	298.56
18	0.53	0.99	70.75	10.72	1.0041	4.1321	0.1092	328.3
19	0.45	0.12	60.23	9.23	0.0031	0	0.0772	350.18
20	1.73	2.69	82.31	12.52	1.0021	71.1301	0.0632	262.06
21	1.8	2.25	102.05	15.84	1.0021	21.1031	0.0702	246.04
22	0.37	0.38	80.9	12.72	0.9802	0	0.0622	298.86
23	0.9	0.69	58.48	9.28	1.0031	0	0.0832	326.81
24	2	8.26	78.82	12.32	1.0021	99.1251	0.0622	255.12
25	0.68	0.74	70.37	11.14	0.8852	0	0.0082	283.5
26	2.12	2.32	73.03	11.46	1.0021	14.1261	0.0452	271.64
27	1.07	0.93	90.7	14.72	1.0031	24.1151	0.1012	288.09
28	3.18	11.24	136.4	22.09	2.0021	125.0971	0.0902	191.19
29	1.02	1.94	92.9	14.79	0.9922	0	0.0913	197.57
30	1.69	7.6	96.25	15.31	1.0011	0	0.0592	247.5
Avg (by EPIC)	1.7	4.41	101.66	15.38	1.0021	16.0681	0.0602	215.0997

Leon River
Grain Sorghum
Control

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.07	0.08	141.41	21.83	0.0021	0	0.2222	102.06
2	2.44	1.68	100.65	14.43	1.0011	2.0211	0.0582	158.92
3	2.09	3.47	86.77	12.95	1.0021	8.0231	0.1362	132.12
4	0.71	0.81	108.58	15.93	0.0021	0	0.0502	145.96
5	8.12	28.29	222.57	31.62	2.9722	24.0401	0.0202	148.23
6	3.42	11.93	129.45	19.29	2.0021	30.0351	0.0712	130.46
7	2.81	6.05	153.71	22.43	1.7262	0	0.0032	117.42
8	3.97	12.6	149.42	21.89	1.0011	23.0351	0.0422	140.65
9	1.39	1.45	75.46	11.03	0.8552	0	0.0082	92.66
10	1.87	4.33	95.73	14	1.0011	0	0.0352	123.72
11	2.16	7.52	128.7	19.03	1.0021	21.0181	0.0842	132.43
12	1.24	5	119.98	17.85	1.0031	5.0411	0.0882	163.05
13	0.06	0.07	92.81	13.83	0.0031	0	0.1142	200.09
14	0.11	0.21	60.25	8.85	0.0041	0	0.0462	245.94
15	0.8	0.34	68.55	10.2	0.0021	0	0.0782	266.15
16	0.05	0	96.05	14.37	0.0061	0	0.1122	299.82
17	1.57	8.55	120.71	18.23	0.8762	12.1271	0.0762	297.91
18	0.53	0.99	70.57	10.67	1.0041	4.1311	0.1072	327.67
19	0.45	0.12	60.23	9.2	0.0031	0	0.0602	349.52
20	1.73	2.68	82.19	12.42	1.0021	71.1301	0.0522	261.6
21	1.8	2.25	101.89	15.75	1.0021	21.1031	0.0582	244.76
22	0.37	0.38	80.93	12.67	0.9962	0	0.0272	297.79
23	0.9	0.69	58.61	9.19	1.0031	0	0.0492	325.97
24	2	8.25	78.91	12.29	1.0021	99.1251	0.0612	254.61
25	0.68	0.75	70.05	11.06	0.8852	0	0.0082	283.8
26	2.13	2.32	72.75	11.3	1.0021	14.1261	0.0332	271.63
27	1.07	0.93	90.64	14.6	1.0031	24.1151	0.0702	287.95
28	3.18	11.23	135.92	21.9	2.0021	125.0971	0.0832	191.04
29	1.02	1.94	92.57	14.72	0.9902	0	0.1013	197.58
30	1.69	7.61	96.15	15.26	1.0011	0	0.0582	247.58
Avg (by EPIC)	1.7	4.42	101.41	15.29	1.0021	16.0681	0.0512	214:6363

Leon River
Grain Sorghum
No Till

Comparison of Control and Filter Strip – Avg. values as computed by APEX

Variable	Control	Filter Strip	Difference
Q	1.5	50.4	48.9
MUSS	1.73	0	-1.73
YON	54.34	0.04	-54.3
YP	8.47	0.03	-8.44
YNO3	1.0021	1.0011	-0.001
PRKN	19.0931	1.0021	-18.091
YAP	0.1122	0.2642	0.152
TNO3*	325.093	9.089	-316.004
Wheat yield	-	-	-
Forage Sorghum yield	-	-	-

*Computed by Excel

→ A negative sign means that the no till number is less than the control one

As can be seen, the soil loss from erosion (MUSS), organic nitrogen loss with sediment (YON), phosphorus loss with sediment (YP), the NO_3 loss in surface runoff (YNO3), mineral nitrogen loss in percolate (PRKN), and total NO_3-N present in the soil profile (TNO3) have been reduced. At the same time, the surface runoff (Q) and the soluble phosphorus loss in runoff (YAP) have increased. Finally, crop yields have not changed by using a filter strip best management practice.

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	3.72	0	1.11	0.56	0.4222	0	0.2142	3.59
2	77.34	0	0	0	1.9782	0	0.1852	18
3	61.43	0	0	0.01	1.0021	2.0021	0.1932	14.12
4	23.18	0	0.02	0.02	0.9652	3.0041	0.1482	13.49
5	186.94	0	0.01	0.01	1.7192	2.0021	0.1422	10.17
6	91	0	0.01	0.01	1.0011	3.0021	0.1642	11.17
7	54.2	0	0.01	0.01	0.8412	0.3022	0.0872	11.23
8	123.63	0	0.01	0.01	1.8362	5.0031	0.1872	5.39
9	37.55	0	0.01	0.02	0.4892	0.0052	0.0872	6.26
10	73.54	0	0.01	0.01	0.6732	0	0.1522	8.33
11	53.99	0	0	0.01	0.7362	3.0021	0.1792	2.84
12	54.92	0	0.01	0.01	1.0021	0.7602	0.1872	11.06
13	5.51	0	0.01	0.01	0.0061	0.0021	0.1802	8.47
14	21.89	0	0.01	0.01	0.0021	0	0.2042	5.84
15	35.09	0	0.01	0.02	0.0011	0	0.1582	12.91
16	7.77	0	0.02	0.03	0.0011	0	0.1792	7.81
17	55.99	0	0.01	0.01	1.0021	0.0032	0.2062	4.52
18	28.65	0	0	0.01	0.0021	0	0.2092	8.41
19	26.33	0	0.01	0.01	0.0021	0	0.2812	9.6
20	75.65	0	0.01	0.02	1.0011	2.0021	0.3302	9.73
21	55.87	0	0.01	0.02	1.9612	1.0021	0.4052	6.62
22	10.28	0	0.01	0.01	0.8392	0.8522	0.4222	9.44
23	32.7	0	0	0.01	1.0021	0	0.5042	13.22
24	62.15	0	0	0	1.0021	2.0011	0.4272	9.68
25	11.6	0	0.01	0.01	0.8682	0	0.4692	7.27
26	51.99	0	0.01	0.01	0.7352	0.1102	0.5552	10.16
27	44.12	0	0.01	0.02	0.9432	1.9892	0.5582	9.65
28	76.76	0	0.01	0.01	1.0021	4.0021	0.5112	12.02
29	18.99	0	0.01	0.02	0.5302	0	0.5002	4.95
30	48.7	0	0	0	1.0011	0	0.5202	6.72
Avg (by APEX)	50.4	0	0.04	0.03	1.0011	1.0021	0.2642	9.089

Leon River
Forage Sorghum/Wntr Wheat
Filter Strip

Comparison of Control and No Till – Avg. values as computed by EPIC

Variable	Control	No Till	Difference
Q	1.5	1.5	0
MUSS	1.73	1.71	-0.02
YON	54.34	55.77	1.43
YP	8.47	8.64	0.17
YNO3	1.0021	1.0021	0
PRKN	19.0931	19.0941	0.001
YAP	0.1122	0.1012	-0.011
TNO3*	325.093	327.2677	2.1747
Wheat yield	-	-	0
Forage Sorghum yield	-	-	0

*Computed by Excel

→ A negative sign means that the no till number is less than the control one

As can be seen, the surface runoff (Q) and the NO_3 loss in surface runoff (YNO3) did not change, but soil loss from erosion (MUSS) and the soluble phosphorus loss in runoff (YAP) have been reduced. At the same time, organic nitrogen loss with sediment (YON), phosphorus loss with sediment (YP), and mineral nitrogen loss in percolate (PRKN), and total NO_3-N present in the soil profile (TNO3) have increased. Finally, crop yields have not changed by using a no till best management practice.

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.07	0.11	154.54	23.95	0.0021	0	0.2412	42.74
2	3.03	0.05	3.73	0.52	1.0011	6.0231	0.0562	116.08
3	1.62	0.33	71.43	10.56	1.0011	12.0221	0.0272	73.05
4	0.62	0.01	0.7	0.1	0.8392	0	0.0762	164.24
5	8.24	34.13	255.93	39.39	4.0021	37.0391	0.0762	131.04
6	1.43	0.03	0.91	0.13	0.7122	0	0.0982	179.88
7	2.39	2.93	138.12	21.49	1.0021	32.0541	0.1502	191.47
8	2.12	0.08	1.84	0.27	0.6252	0	0.0792	224.84
9	1.56	0.37	72.05	11.18	1.0021	69.0731	0.1562	219.43
10	1.55	0.04	1.07	0.16	1.0011	0	0.1142	303.5
11	2.43	5.16	120.06	18.76	2.0031	124.0971	0.1372	217.56
12	0.31	0.01	0.29	0.04	0.4552	0	0.1372	259.53
13	0.07	0.03	105.33	16.51	0.0111	0	0.1562	281.62
14	0	0	0.05	0.01	0	0	0	333.81
15	0.47	0	72.77	11.39	0.8522	0	0.1382	329.51
16	0.09	0	0.17	0.03	0.0041	0	0.1632	397.2
17	1.9	6.31	116	18.16	2.0051	30.1411	0.1282	301.85
18	0.02	0	0.84	0.13	0.4352	0	0.1382	437.87
19	0.61	0.09	65.9	10.37	0.0011	0	0.1612	418.36
20	1.28	0.04	0.82	0.12	0.6912	0	0.0872	448.06
21	2.08	0.5	100.7	15.82	2.0031	109.1781	0.1542	339.92
22	0.52	0.01	0.36	0.06	0.7442	0	0.2142	538.98
23	0.7	0.02	68.31	10.89	0.9352	0	0.1412	478.72
24	0.9	0.05	1.04	0.16	0.6522	0	0.1052	515.53
25	0.89	0.48	81.88	13	1.0031	0	0.1852	544.4
26	2.59	0.07	1.63	0.23	1.0011	7.2511	0.0902	538.5
27	0.97	0.09	92.67	14.61	1.0031	133.2151	0.1552	370.74
28	2.58	0.08	2.02	0.31	1.9932	0	0.1362	431.09
29	1.1	0.73	97.34	15.53	1.0031	0	0.1922	440.87
30	1.57	0.05	1.57	0.25	0.7062	0	0.1682	482.4
Avg (by EPIC)	1.5	1.73	54.34	8.47	1.0021	19.0931	0.1122	325.093

Leon River
Forage Sorghum/Wntr Wheat
Control

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
			Variable Totals by Year					
1	0.07	0.11	163.24	25.28	0.0021	0	0.2402	43.07
2	3.03	0.05	3.73	0.52	1.0011	6.0221	0.0352	114.78
3	1.62	0.34	74.92	10.99	1.0011	12.0221	0.0252	72.38
4	0.62	0.01	0.7	0.1	0.8412	0	0.0752	163.67
5	8.23	33.9	255.77	39.01	4.0021	37.0381	0.0722	130.63
6	1.44	0.03	0.91	0.13	0.7312	0	0.0702	179.17
7	2.39	2.85	140.65	21.68	1.0021	32.0541	0.1402	191.24
8	2.13	0.09	1.85	0.27	0.6272	0	0.0722	224.41
9	1.56	0.4	74.6	11.45	1.0021	69.0731	0.1402	219.07
10	1.56	0.04	1.07	0.16	1.0021	0	0.0912	302.89
11	2.43	5.05	120.9	18.65	2.0031	124.0971	0.1272	217.16
12	0.32	0.01	0.29	0.04	0.4552	0	0.1362	258.8
13	0.08	0.03	107.79	16.74	0.0111	0	0.1512	280.21
14	0	0	0.05	0.01	0	0	0	332.79
15	0.47	0	76.92	11.97	0.8582	0	0.1322	328.25
16	0.1	0	0.17	0.03	0.0041	0	0.1752	395.32
17	1.9	6.25	116.64	18.27	2.0051	30.1401	0.1272	299.78
18	0.02	0	0.84	0.13	0.4352	0	0.1382	435.68
19	0.62	0.09	66.72	10.47	0.0011	0	0.1512	427.92
20	1.28	0.04	0.83	0.11	0.6992	0	0.0382	462.51
21	2.09	0.49	101.16	15.78	2.0031	114.1841	0.1482	348.23
22	0.52	0.01	0.36	0.06	0.7392	0	0.2162	546.93
23	0.7	0.02	72.7	11.64	0.9372	0	0.1382	486.78
24	0.9	0.05	1.05	0.16	0.6502	0	0.1062	523.01
25	0.9	0.53	86.12	13.53	1.0031	0	0.1692	551.51
26	2.61	0.07	1.63	0.22	1.0011	9.2551	0.0552	544.4
27	0.97	0.09	93.79	14.69	1.0031	136.2181	0.1522	373.86
28	2.59	0.08	2.03	0.31	1.9962	0	0.1222	434.36
29	1.1	0.73	101.06	16.5	1.0031	0	0.1842	444.25
30	1.59	0.05	1.58	0.25	0.7152	0	0.1682	484.97
Avg (by EPIC)	1.5	1.71	55.77	8.64	1.0021	19.0941	0.1012	327.2677

Leon River
Forage Sorghum/Wntr Wheat
No Till

Comparison of Control and Filter Strip – Avg. values as computed by APEX

Variable	Control	Filter Strip	Difference
Q	2.0	50.8	48.8
MUSS	7.14	0	-7.14
YON	89.2	0.04	-89.16
YP	14.92	0.03	-14.89
YNO3	1.0011	1.0011	0
PRKN	12.0191	1.0011	-11.018
YAP	0.0932	0.2582	0.165
TNO3*	146.609	9.247333	-137.361667
Wheat yield	61.9	1.2	----- +
Corn yield	75.5	4.6	----- +

*Computed by Excel

+Control in unit/acre and Filter in t/ha.

→ A negative sign means that the no till number is less than the control one

As can be seen, the NO_3 loss in surface runoff (YNO3) did not change, but soil loss from erosion (MUSS), organic nitrogen loss with sediment (YON), phosphorus loss with sediment (YP), mineral nitrogen loss in percolate (PRKN), and total NO_3-N present in the soil profile (TNO3) have been reduced. At the same time, the surface runoff (Q) and the soluble phosphorus loss in runoff (YAP) have increased. Finally, crop yields for both corn and wheat could not be compared.

Pesticide is 2,4-D
Corn/Wheat Rotation

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	3.63	0	1.1	0.56	0.4212	0	0.2132	3.82
2	78.03	0	0	0	1.9882	0.0011	0.1832	18.2
3	61.44	0	0.01	0.01	1.0021	2.0021	0.1922	14.07
4	24.18	0	0.02	0.02	0.9472	3.0041	0.1422	14.43
5	182.98	0	0.01	0.01	1.7012	1.8992	0.1132	10.62
6	90.93	0	0.01	0.01	1.0011	3.0021	0.1642	11.41
7	54.69	0	0.01	0.01	0.8262	0.2382	0.0852	12.27
8	120.92	0	0.01	0.01	1.8592	4.0021	0.1582	6.08
9	37.95	0	0.01	0.02	0.4862	0.0262	0.0832	6.87
10	76.5	0	0.01	0.01	0.5852	0	0.1482	9.22
11	53.9	0	0.01	0.01	0.7342	4.0021	0.1732	2.33
12	54.91	0	0.01	0.01	1.0021	0.6472	0.1792	10.78
13	5.52	0	0.01	0.01	0.0061	0.0011	0.1762	9.07
14	21.23	0	0.01	0.01	0.0021	0	0.1982	6.33
15	35.04	0	0.01	0.02	0.0011	0	0.1542	12.84
16	8.12	0	0.02	0.03	0.0021	0	0.1752	8.29
17	53	0	0.01	0.01	1.0021	0.1902	0.2132	4.41
18	28.89	0	0	0.01	0.0021	0	0.2052	8.58
19	27	0	0.01	0.01	0.0011	0	0.2772	9.73
20	72.74	0	0.01	0.02	1.0011	1.0011	0.3092	9.43
21	56.15	0	0.01	0.02	1.9442	1.0021	0.3782	5.79
22	10.65	0	0	0.01	0.9482	0.7602	0.4192	9.05
23	33.37	0	0	0.01	1.0021	0	0.4932	13.31
24	61.89	0	0	0	1.0021	2.0011	0.4252	9.56
25	11.87	0	0.01	0.01	0.8472	0	0.4682	7.41
26	48.68	0	0.01	0.01	0.7332	0.0043	0.5612	10.31
27	52.18	0	0.01	0.02	1.9672	1.0011	0.5592	9.43
28	80.65	0	0.01	0.01	1.0021	4.0021	0.5102	12.25
29	19.06	0	0.01	0.02	0.5462	0	0.5092	4.9
30	56.69	0	0	0	1.0011	0	0.5032	6.63
Avg (by APEX)	50.8	0	0.04	0.03	1.0011	1.0011	0.2582	9.247333

Mother Neff
Filter Strip BMP

Comparison of Control and No Till – Avg. values as computed by EPIC

Variable	Control	No Till	Difference
Q	2.0	2.0	0
MUSS	7.14	5.85	-1.29
YON	89.2	85.95	-3.25
YP	14.92	14.61	-0.31
YNO3	1.0011	1.0021	0.001
PRKN	12.0191	12.0181	-0.001
YAP	0.0932	0.1032	0.01
TNO3*	146.609	128.623	-17.986
Wheat yield	61.9	62.2	0.3
Corn yield	75.5	75.8	0.3

*Computed by Excel

→ A negative sign means that the no till number is less than the control one

As can be seen, the surface runoff (Q) did not change, but soil loss from erosion (MUSS), organic nitrogen loss with sediment (YON), phosphorus loss with sediment (YP), mineral nitrogen loss in percolate (PRKN), and total NO_3-N present in the soil profile (TNO3) have been reduced. At the same time, the NO_3 loss in surface runoff (YNO3) and the soluble phosphorus loss in runoff (YAP) have increased. Finally, crop yields for both corn and wheat have increased by using a no till best management practice.

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.04	0.02	91.61	18.43	0.4252	0	0.4722	162.92
2	3.76	11.53	184.9	28.38	2.0021	16.0191	0.1272	203.32
3	2.4	15.21	88.31	13.11	1.0021	0	0.0772	168.36
4	0.93	0.73	74.1	14.13	1.0031	7.0261	0.1112	170.63
5	8.75	73.01	362.26	54.98	3.0021	39.0201	0.0382	171.62
6	2.63	0.2	15.82	2.34	1.0011	25.0221	0.0582	134.93
7	1.92	2.78	98.87	18.95	0.8022	4.0201	0.0182	86.14
8	4.3	20.17	206.57	31.02	1.0011	28.0151	0.1042	124.68
9	1.21	0.02	23.5	3.53	0.0011	6.0151	0.0392	119.62
10	2.49	3.93	86.5	16.25	0.7342	4.0151	0.1112	78.51
11	2.43	9.13	146.79	22.08	1.9232	14.0101	0.1142	117.89
12	0.77	0.34	8.45	1.26	0.0011	7.0121	0.0372	110.05
13	0.1	0.07	76.62	15.72	0.0111	6.0111	0.5332	125.5
14	0.33	1.42	81.11	12.41	0.0041	0	0.1322	169.85
15	1.54	2.12	21.71	3.28	1.0011	0	0.1082	152.57
16	0.1	0.08	73.45	15.83	0.0081	4.0241	0.1322	182.36
17	2.53	11.82	148.48	23.01	1.0021	18.0171	0.1122	194.25
18	0.34	0.06	5.79	0.88	0.4572	1.0201	0.1112	166.29
19	0.94	0.93	53.75	11.26	1.0031	0	0.0822	182.17
20	2.51	9.95	126.27	19.47	1.0021	52.0251	0.0952	170.7
21	2.82	0.91	21.19	3.25	1.0021	33.0241	0.0712	117.52
22	0.65	0.8	61.25	13.19	0.0021	1.0211	0.0662	163.74
23	1.66	6.01	98.99	15.61	1.0011	15.0171	0.1192	180.36
24	2.01	0.43	9.07	1.38	1.0011	7.0211	0.0412	149.39
25	0.72	0.63	56.47	11.58	0.4582	12.0241	0.1312	123.82
26	3.45	15.45	149.68	23.5	1.0021	33.0181	0.1092	135.81
27	1.38	5.29	41.55	6.46	0.0011	19.0241	0.1172	112.4
28	3.62	15.07	129.67	25	1.0011	29.0211	0.2472	131.49
29	1.25	6.03	126.42	20.22	0.0011	4.0121	0.1342	157.3
30	1.89	0.2	6.78	1.04	1.0011	0.0131	0.0162	134.08
Avg (by EPIC)	2.0	7.14	89.20	14.92	1.0011	12.0191	0.0932	146.609

Mother Neff Control

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.04	0.02	107.52	22.09	0.4252	0	0.4882	115.55
2	3.78	11.53	209.2	32.66	2.0021	16.0191	0.1352	202.82
3	2.38	0.11	7.52	1.19	1.0021	0	0.2132	151.44
4	0.93	0.72	71.83	14.11	1.0031	7.0261	0.1162	125.13
5	8.75	71.16	366.11	55.63	4.0021	37.0191	0.0392	170.24
6	2.63	0.07	5.56	0.83	1.0011	24.0221	0.0562	120.21
7	1.91	2.51	103.15	19.88	0.8152	4.0201	0.0192	69.95
8	4.3	18.15	198.82	29.72	1.0011	28.0141	0.1002	125.07
9	1.2	0.02	16.02	2.43	0.0011	6.0151	0.0392	106.42
10	2.48	3.82	84.48	16.39	0.6992	4.0151	0.1242	61.76
11	2.43	7.96	158.06	23.51	1.9782	14.0101	0.1062	115.97
12	0.76	0.06	4.19	0.63	0.0021	6.0121	0.0412	94.47
13	0.1	0.07	73.93	15.45	0.0121	5.0111	0.5382	84.65
14	0.34	1.36	94.2	14.4	0.0051	0	0.1302	168.16
15	1.59	0.02	3.96	0.61	1.0021	0	0.1132	139.62
16	0.1	0.02	71.61	15.65	0.0101	5.0231	0.2382	132.27
17	2.55	10.74	152.12	23.82	2.0031	17.0161	0.1192	190.15
18	0.33	0.06	2.09	0.32	0.4572	1.0191	0.1092	147.68
19	0.93	0.52	49.55	10.7	1.0051	0	0.1252	130.16
20	2.53	8.92	134.9	20.95	2.0021	46.0221	0.1022	168.74
21	2.82	0.08	9	1.39	1.0021	31.0231	0.0662	106.07
22	0.65	0.78	64.72	13.92	0.0021	1.0201	0.0682	121.4
23	1.67	5.8	107.57	17.29	0.0011	14.0171	0.1322	181.02
24	2	0.16	2.39	0.35	1.0011	6.0201	0.0412	135.77
25	0.71	0.62	60.53	12.67	0.4602	12.0231	0.1382	84.37
26	3.44	14.91	156.98	24.64	1.0021	32.0171	0.1082	135.26
27	1.38	0.04	7.85	1.24	1.0021	18.0241	0.1092	103.61
28	3.63	10.22	112.69	22.84	1.0011	28.0211	0.2862	89.22
29	1.24	5.09	139.76	22.46	1.0021	4.0121	0.1402	159.14
30	1.86	0.06	3.2	0.48	1.0011	0.0131	0.0122	122.37
Avg (by EPIC)	2.0	5.85	85.98	14.61	1.0021	12.0181	0.1032	128.623

Mother Neff
No Till BMP

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.28	0	0.97	0.32	0.4972	0	0.9202	12.33
2	14.17	0.27	10.82	4.8	0.0021	0	0.0031	21.38
3	33.64	0.48	14.28	6.17	1.0021	1.0031	1.0021	30.24
4	120.78	3.2	63.73	27.61	2.0021	0.1892	4.0041	40.4
5	26.54	0.24	10.09	4.31	6.0221	2.0021	1.0031	69.73
6	60.51	0.39	17.59	7.52	1.0021	1.0011	2.0031	66.34
7	53.86	0.24	15.44	6.55	1.0031	2.7372	2.0031	90.38
8	35.49	0.28	17.88	7.61	1.0021	3.0031	1.0031	94.52
9	39.79	0.21	9.13	3.87	0.0011	2.0031	1.0031	88.44
10	38.09	0.2	11.23	4.82	1.0031	2.0031	1.0041	113.49
11	20.26	0.12	5.45	2.32	0.0021	1.0031	1.0041	104.84
12	28.63	0.12	9.4	4.01	2.0081	1.0041	1.0041	164.73
13	19.33	0.08	7.21	3.06	1.0071	5.0061	1.0031	188.55
14	96.62	0.87	31.5	13.41	3.0031	24.0121	3.0031	178.19
15	14.63	0.03	2.94	1.26	1.0101	3.0071	1.0031	202.52
16	2.28	0.01	0.52	0.22	2.1021	0	0.0031	263.07
17	6.72	0.07	4.03	1.69	1.0101	0	0.0021	392.64
18	0.33	0	0.06	0.02	0.0331	0	0.0021	508.28
19	0	0	0.04	0.02	0	0	0	501.62
20	14.04	0.09	3	1.24	0.0031	0	0.0011	351.08
21	17.88	0.26	10.49	4.59	1.0051	0	0.0031	385.97
22	71.19	0.43	14.47	6.23	4.0061	0	2.0021	243.19
23	7.75	0.01	1.99	0.86	1.0101	14.0381	0.0041	246.32
24	12.11	0.05	2.95	1.27	1.0071	14.0411	0.0031	306.08
25	34.7	0.09	4.14	1.78	1.0031	0	1.0031	278.53
26	52.05	0.53	24.95	10.74	4.0071	34.0351	2.0031	170.28
27	32.47	0.25	12.73	5.55	1.0021	1.0161	1.0051	225.37
28	20.06	0.13	6.58	2.84	4.0191	9.0261	1.0031	200.57
29	20.08	0.17	5.18	2.24	1.0051	0	1.0031	300.7
30	5.21	0.02	3.49	1.52	2.0381	6.0361	0.0041	222.08
Avg (by APEX)	30.0	0.29	10.74	4.61	1.0051	4.0091	1.0031	202.062

Lagoon
Windthorst

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.29	0	0.98	0.32	0.5142	0	0.9202	11.72
2	16.87	0.35	12.98	5.76	0.0031	0	0.0031	27.97
3	32.51	0.48	15.1	6.52	1.0021	1.0021	1.0021	39.32
4	130.31	3.69	74.92	32.48	3.0021	3.0011	5.0041	48.46
5	35.83	0.39	19.77	8.49	6.0171	3.0021	1.0031	81.91
6	75.73	0.58	22.53	9.63	1.0021	7.0031	2.0031	91.63
7	65.09	0.41	22.55	9.61	2.0031	19.0051	2.0031	117.57
8	39.61	0.44	26.21	11.19	1.0031	12.0061	1.0031	134.83
9	46.98	0.51	17.48	7.42	1.0011	10.0061	1.0031	154.25
10	44.84	0.38	21.97	9.41	2.0041	15.0071	2.0031	199.97
11	23.54	0.22	10.15	4.36	1.0031	4.0061	1.0041	213.51
12	35.98	0.27	21.07	9.04	3.0081	17.0071	1.0041	259.78
13	26.11	0.17	15.41	6.58	1.0061	18.0111	1.0031	221.5
14	107.5	1.4	52.78	22.56	3.0031	40.0111	4.0031	215.44
15	17.84	0.07	8.63	3.69	2.0101	10.0081	1.0041	231.95
16	2.97	0	1.09	0.46	2.0641	3.0061	0.0031	254.99
17	6.62	0.08	4.67	1.97	2.0271	0	0.0031	491.13
18	1.96	0.01	0.73	0.31	1.0631	0.0031	0.0021	400.24
19	0.52	0	0.02	0.01	0.0571	1.0021	0.0011	285.05
20	19.76	0.2	5.74	2.48	2.0091	10.0061	0.0021	252.64
21	39.87	1.06	35.16	15.6	3.0081	11.0061	1.0041	258.69
22	83.83	1.08	44.88	19.67	4.0051	17.0091	3.0041	229.18
23	12.96	0.07	7.25	3.17	1.0101	8.0061	1.0051	243.85
24	14.15	0.11	9.89	4.3	1.0101	11.0081	0.0031	299.26
25	65.03	0.44	18.44	7.98	2.0031	17.0081	2.0031	233.77
26	57.76	0.91	56.22	24.4	4.0071	30.0091	3.0041	217.05
27	37	0.59	24.92	10.78	2.0071	5.0061	2.0041	304.02
28	24.73	0.25	11.52	5	4.0161	9.0071	1.0031	268.11
29	30.76	0.31	13.6	5.95	2.0061	10.0061	1.0041	271.97
30	14.82	0.1	12.83	5.62	5.0351	10.0051	1.0041	243.04
Avg (by APEX)	37.1	0.49	19.65	8.49	2.0061	10.0071	1.0031	210.0933

Scrape
Windthrost

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.29	0	0.99	0.32	0.5152	0	0.9202	10.45
2	15.56	0.31	11.7	5.19	0.0021	0	0.0031	22.77
3	29.21	0.41	12.88	5.56	0.0021	1.0031	1.0021	31.73
4	122.73	3.29	66.05	28.64	2.0021	0.3622	5.0041	42.1
5	28.11	0.26	10.9	4.66	6.0221	2.0021	1.0031	72.4
6	62.52	0.39	17.36	7.42	1.0021	2.9812	2.0031	68.1
7	55.69	0.25	15.79	6.71	2.0031	2.6812	2.0031	92.07
8	36.86	0.32	19.62	8.36	1.0021	3.0021	1.0031	99.18
9	42.49	0.3	11.68	4.95	0.0011	2.0021	1.0031	108.09
10	40.37	0.26	14.85	6.36	2.0041	6.0041	1.0041	142.36
11	20.67	0.15	6.94	2.97	1.0031	1.0051	1.0041	182.29
12	31.48	0.17	13.19	5.64	2.0081	10.0081	1.0041	210.8
13	20.89	0.1	9.98	4.24	1.0061	9.0101	1.0031	222.17
14	99.13	0.96	36.15	15.43	3.0031	32.0121	3.0031	199.94
15	12.78	0.03	3.72	1.59	1.0101	5.0091	0.0041	235.81
16	1.81	0	0.24	0.1	2.0831	2.0121	0.0031	251.25
17	3.89	0.03	2.79	1.17	0.0121	0	0.0031	436.62
18	0.45	0	0.04	0.01	0.0371	0	0.0021	415.17
19	0	0	0.02	0.01	0	0	0	410.61
20	18.17	0.15	3.91	1.63	1.0041	1.0371	0.0011	293.31
21	22.57	0.33	13	5.74	2.0081	3.0091	1.0031	279.56
22	68.92	0.54	24.21	10.63	5.0071	12.0101	2.0031	187.52
23	10.93	0.04	4.9	2.14	1.0121	4.0071	0.0041	241.98
24	14.62	0.09	6.52	2.83	1.0081	10.0111	0.0031	336.86
25	53.56	0.2	7.45	3.2	1.0031	6.0101	2.0031	228.43
26	62.31	0.79	43.13	18.72	3.0051	17.0071	3.0041	174.3
27	32.97	0.38	19.42	8.49	1.0031	1.0051	2.0051	236.13
28	22.49	0.21	9.34	4.06	4.0191	6.0061	1.0031	253.22
29	24.82	0.2	9.59	4.16	1.0041	3.0061	1.0031	253.92
30	8.53	0.04	5.65	2.47	3.0301	7.0051	0.0041	215.14
Avg (by APEX)	32.2	0.34	13.40	5.78	2.0051	5.0061	1.0031	198.476

Scrape
Frio

Variable Totals by Year

Simulation Year	Q	MUSS	YON	YP	YNO3	PRKN	YAP	TNO3
1	0.28	0	0.97	0.32	0.4972	0	0.9202	12.33
2	14.17	0.27	10.82	4.8	0.0021	0	0.0031	21.38
3	33.64	0.48	14.28	6.17	1.0021	1.0031	1.0021	30.24
4	120.78	3.2	63.73	27.61	2.0021	0.1892	4.0041	40.4
5	26.64	0.24	10.09	4.31	6.0221	2.0021	1.0031	69.73
6	60.51	0.39	17.59	7.52	1.0021	1.0011	2.0031	66.34
7	53.86	0.24	15.44	6.55	1.0031	2.7372	2.0031	90.38
8	35.49	0.28	17.88	7.61	1.0021	3.0031	1.0031	94.52
9	39.79	0.21	9.13	3.87	0.0011	2.0031	1.0031	88.44
10	38.09	0.2	11.23	4.82	1.0031	2.0031	1.0041	113.49
11	20.26	0.12	5.45	2.32	0.0021	1.0031	1.0041	104.84
12	28.63	0.12	9.4	4.01	2.0081	1.0041	1.0041	164.73
13	19.33	0.08	7.21	3.06	1.0071	5.0061	1.0031	188.55
14	96.62	0.87	31.5	13.41	3.0031	24.0121	3.0031	178.19
15	14.63	0.03	2.94	1.26	1.0101	3.0071	1.0031	202.52
16	2.28	0.01	0.52	0.22	2.1021	0	0.0031	263.07
17	6.72	0.07	4.03	1.69	1.0101	0	0.0021	392.64
18	0.33	0	0.06	0.02	0.0331	0	0.0021	508.28
19	0	0	0.04	0.02	0	0	0	501.62
20	14.04	0.09	3	1.24	0.0031	0	0.0011	351.08
21	17.88	0.26	10.49	4.59	1.0051	0	0.0031	385.97
22	71.19	0.43	14.47	6.23	4.0061	0	2.0021	243.19
23	7.75	0.01	1.99	0.86	1.0101	14.0381	0.0041	246.32
24	12.11	0.05	2.95	1.27	1.0071	14.0411	0.0031	306.08
25	34.7	0.09	4.14	1.78	1.0031	0	1.0031	278.53
26	52.05	0.53	24.95	10.74	4.0071	34.0351	2.0031	170.28
27	32.47	0.25	12.73	5.55	1.0021	1.0161	1.0051	225.37
28	20.06	0.13	6.58	2.84	4.0191	9.0261	1.0031	200.57
29	20.08	0.17	5.18	2.24	1.0051	0	1.0031	300.7
30	5.21	0.02	3.49	1.52	2.0381	6.0361	0.0041	222.08
Avg (by APEX)	30.0	0.29	10.74	4.61	1.0051	4.0091	1.0031	202.062

Lagoon
Frio

APPENDIX C - STATISTICAL ESTIMATION OF FLOW AND LOADINGS

Estimation of Nutrient and Sediment Loads in the Leon River
Statistical Methodology

Estimation of Flow.

Field data of level, average velocity, and area were used to develop equations of flow as a function of level.

At Jonesboro (site LE01) ten sample points with values for the mentioned variables were used to develop the following regression equation (Neter, et al. 1989) for the prediction of flow.

$Y=36.9819 - 5.6702X + 0.8995X^2$ $R^2 = 0.997$

At Leon Junction (site LE06) eight sample points were used to fit the following equation:

$Y= 317.2376X$ $R^2 = 0.945$

Y: Water flow (ft^3/sc)
X: Water level (ft)

Field water levels measured every five minutes at the two study sites and the above equations were used for calculation of flows every five minutes.

Augmentation of Concentration Data.

Concentration data of suspended sediments, nitrates, and phosphates were limited to few points. During storm periods the concentration values are five in average, and during base flow periods it is common to have only one concentration value for several weeks of flow. Estimation of total loads of sediments or nutrients per unit of time requires to have a continuum of concentration data during the estimation period.

The concentration data available was augmented using regression analysis (Neter, et al. 1989) in two steps. First, a regression model of concentration (suspended sediments, nitrates and phosphates) as function of flow was fitted using pairs of data resulted from the field sampled concentration and the flow that took place during the sampling time. The total time series was arbitrarily segmented for the development of the regression equations. Each time series segment contained both samples taken during storms and during base flow (grab samples). The length of the segment was selected making sure that there was sufficient data for an adequate estimation of the regression parameters. Second, the best regression model fitted in a time series segment was used to predict concentration every five minutes.

Two types of regression models were employed for concentration augmentation:

$Y = \beta_0 + \beta_1 X + \beta_2 X^2 + \beta_3 X^3$ or $Y = EXP(\beta_0 + \beta_1 X + \beta_2 X^2 + \beta_3 X^3) - 1$

Where Y: concentration prediction

β_0, β_1, β_2, and β_3 : regression parameters.

The model shown above are the general form of the models fitted to the different concentrations either sediments, nitrates or phosphates in the different time segments. In some cases the best model was the linear polynomial, in others, the best was the exponential polynomial. The degree of the polynomial also changed between 1 and 3 from case to case. In most of the cases the intercept of the model (β_0) was equal to zero, indicating that the model goes through the origin (zero flow yields zero concentration). In some few cases the best model did not go through the origin.

Estimation of Monthly Loads.

The concentrations every five minutes is transformed to load using the following equations:

$V = Q * 28.32$

$L = C * V * 10^6$

Where V: Instantaneous water volume in liters.

Q: Flow in ft^3/sc

L: Load of sediments, nitrates or phosphates in Kg

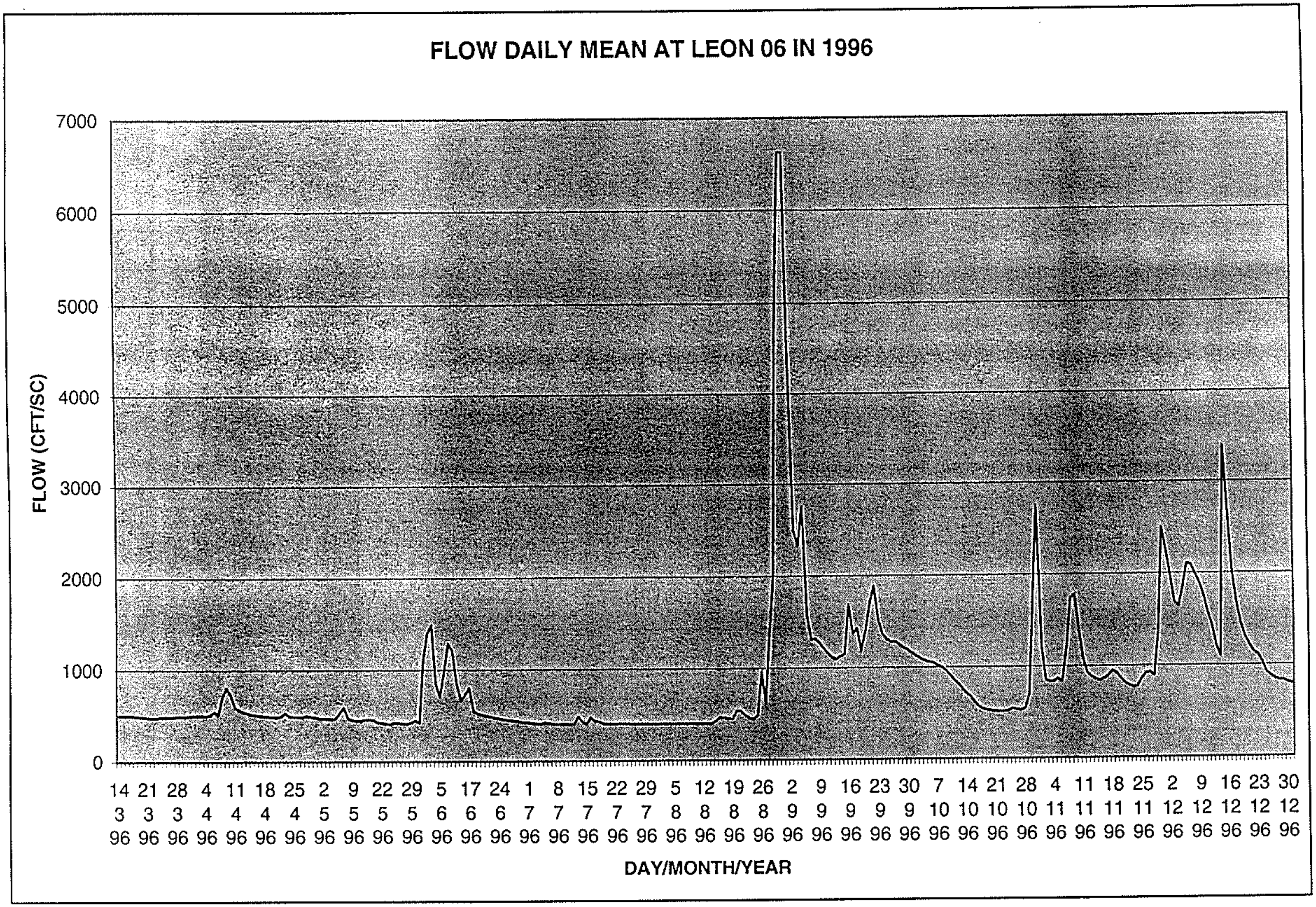
C: Concentration of sediments, nitrates or phosphates in mg/l.

Now the load is a continuous function of time. To estimate the total load of sediments or nutrients in a time segment, the load function should be integrated to calculate the area under the function. The integration was performed numerically using the Trapezoid Rule (Conte, and Boor. 1965). The area under the load curve is partitioned in trapezoids made up by a rectangle in the bottom and a triangle in the top. The base of the rectangle is five minutes, height of the rectangle is the load at time t, height of the triangle is the load at time t+5 minutes if the load function is ascending or at t-5 minutes if the load function is descending. The triangle and rectangle areas are added to obtain the trapezoid area. Total load in the time segment is equal to the addition of all trapezoid areas in it. The accuracy of this integration method for the calculation of total load is high because in each of the time segments the area under the curve was decomposed in several hundred trapezoids.

References:

Conte, S.D., and Carl de Boor. 1965. Elementary Numerical Analysis. 2nd Edition. Mc Graw Hill. New York, NY. Pg 284-289.

Neter, J, W. Wasserman, and M.K. Kutner. 1989. Applied Linear Regression Models. 2nd Ed. Irwin, Inc. Homewood, IL. Pg. 315 and 549.



FLOW DAILY MEAN AT LEON 06 IN 1996
FLOW (CFT/SC)
7000
6000
5000
4000
3000
2000
1000
0
14 3 96
21 3 96
28 3 96
4 4 96
11 4 96
18 4 96
25 4 96
2 5 96
9 5 96
22 5 96
29 5 96
5 6 96
17 6 96
24 6 96
1 7 96
8 7 96
15 7 96
22 7 96
29 7 96
5 8 96
12 8 96
19 8 96
26 8 96
2 9 96
9 9 96
16 9 96
23 9 96
30 9 96
7 10 96
14 10 96
21 10 96
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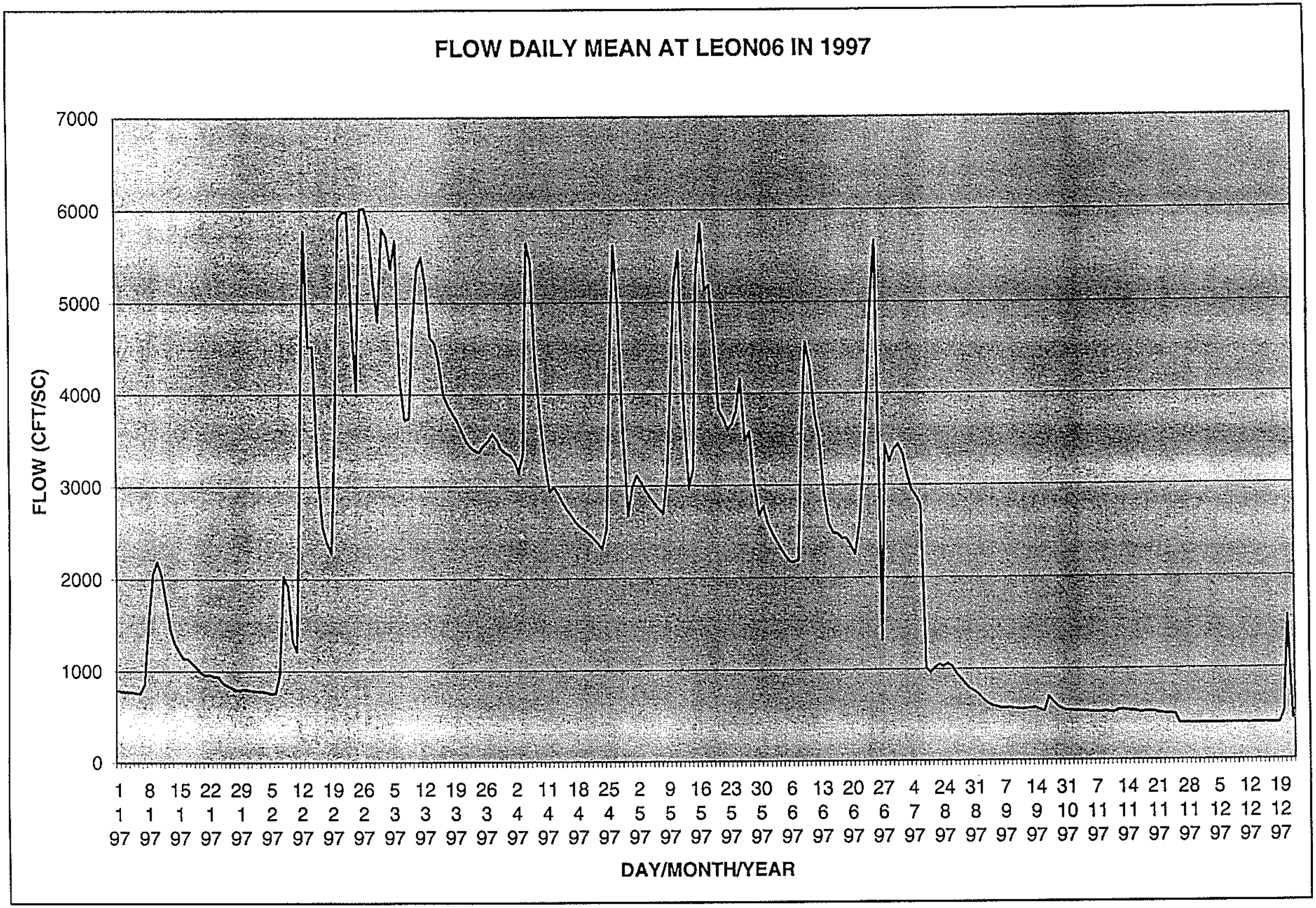
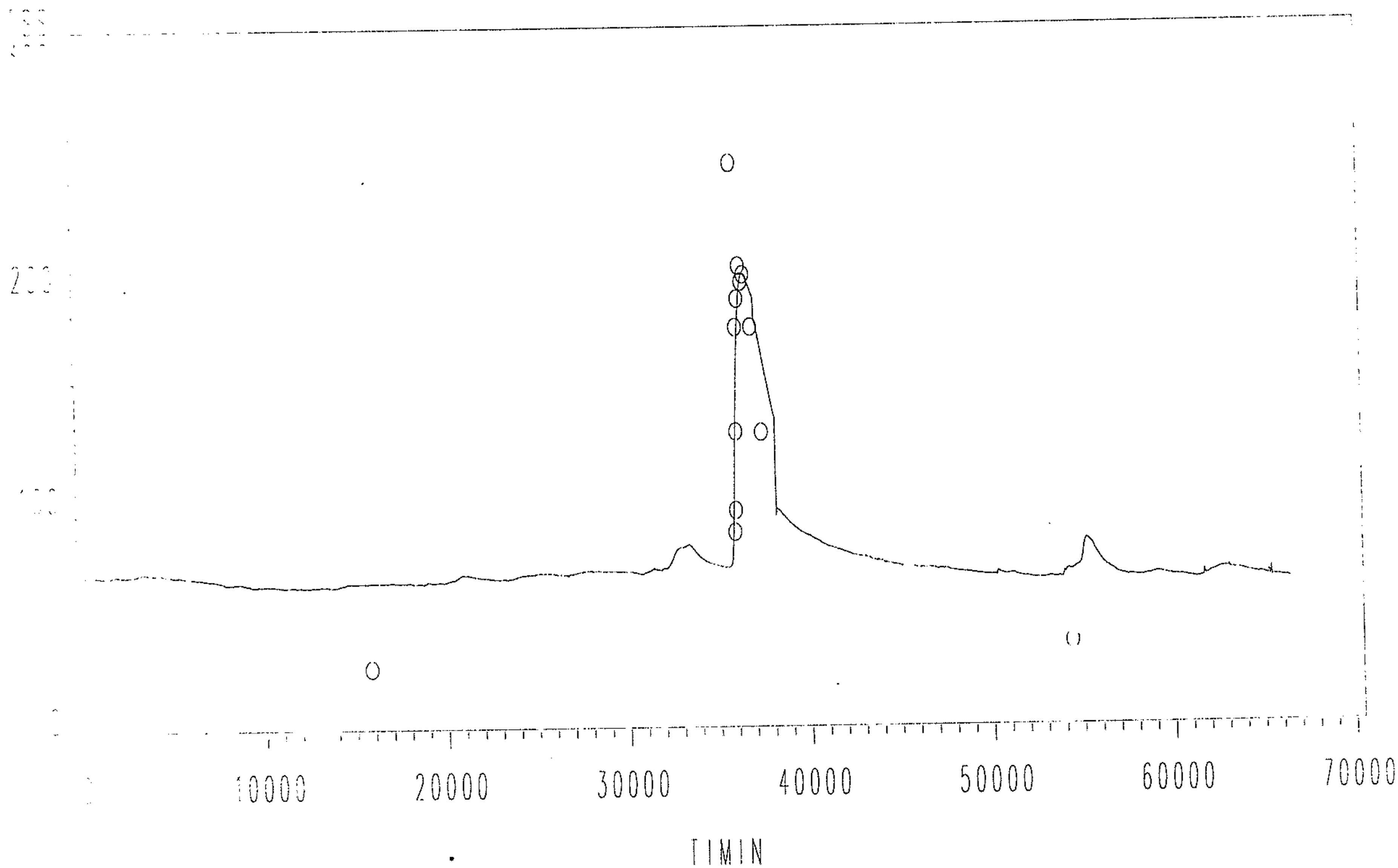
2 12 96
9 12 96
16 12 96
23 12 96
30 12 96
DAY/MONTH/YEAR


FLOW DAILY MEAN AT LEON06 IN 1997
FLOW (CFT/SC)
0
1000
2000
3000
4000
5000
6000
7000
1 8 15 22 29 5 12 19 26 5 12 19 26 2 11 18 25 2 9 16 23 30 6 13 20 27 4 24 31 7 14 31 7 14 21 28 5 12 19
1 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4 5 5 5 5 5 6 6 6 6 7 8 8 9 9 10 11 11 11 11 12 12 12
97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97 97
DAY/MONTH/YEAR

OBS	Y	M	SEDTOT
1	96	3	1217461.85
2	96	4	2628109.44
3	96	5	1703911.73
4	96	6	39396074.68
5	96	7	349064.47
6	96	8	60149410.99
7	96	9	229706469.29
8	96	10	62513812.94
9	96	11	42772549.99
10	96	12	155074657.76
11	97	1	9066176.35
12	97	2	488580696.14
13	97	3	1477249388.25
14	97	4	689844191.68
15	97	5	292794964.05
16	97	6	149110893.87
17	97	7	26697446.60
18	97	8	536224.99
19	97	9	131919.69
20	97	10	47067.81
21	97	11	152908.02
22	97	12	364703.56

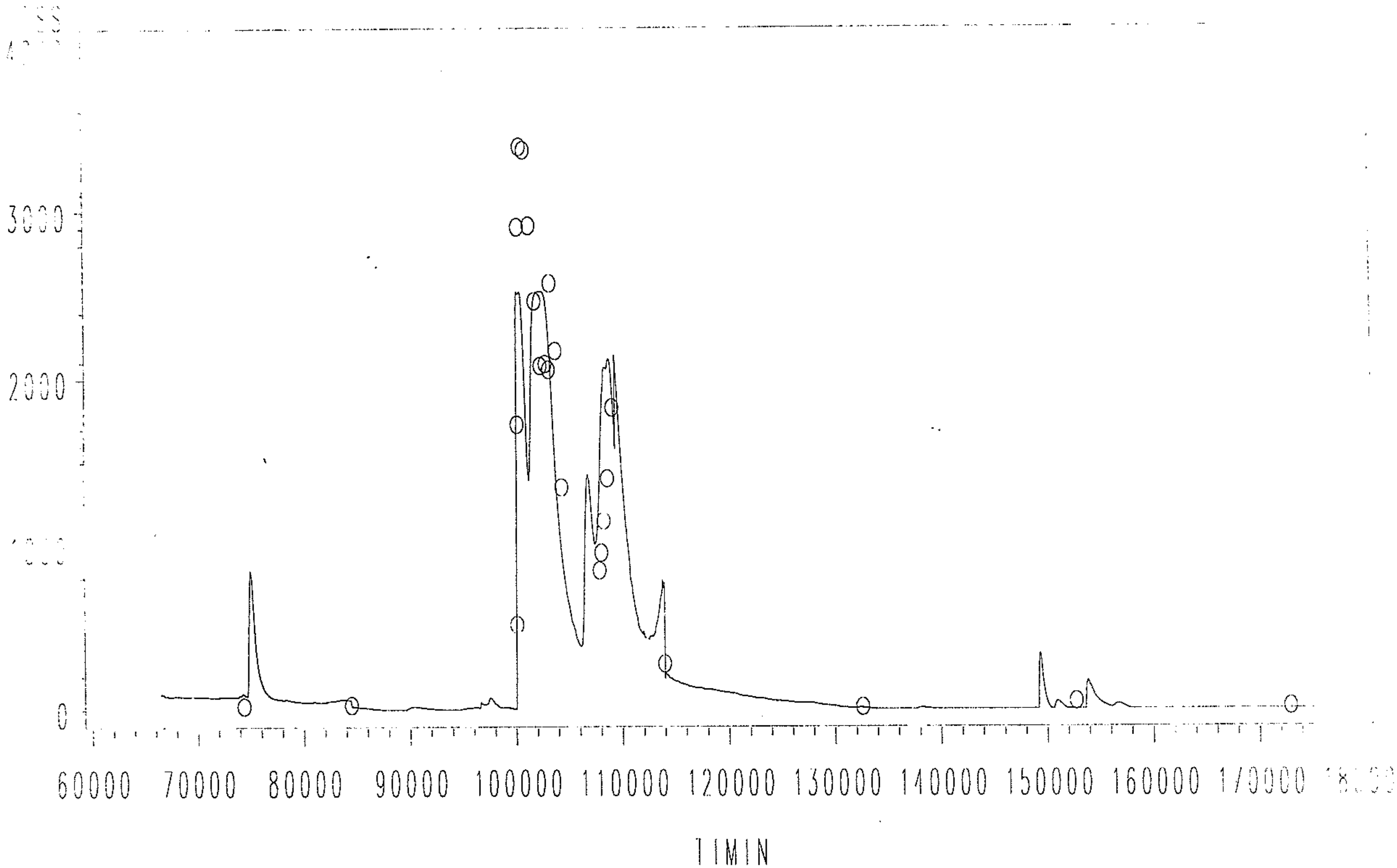
OBSERVED AND PREDICTED SEDIMENTS AT LEON 06

CONTINUOUS LINE PREDICTED TSS
CIRCLES OBSERVED TSS
PERIOD=1 MAR_APR 96



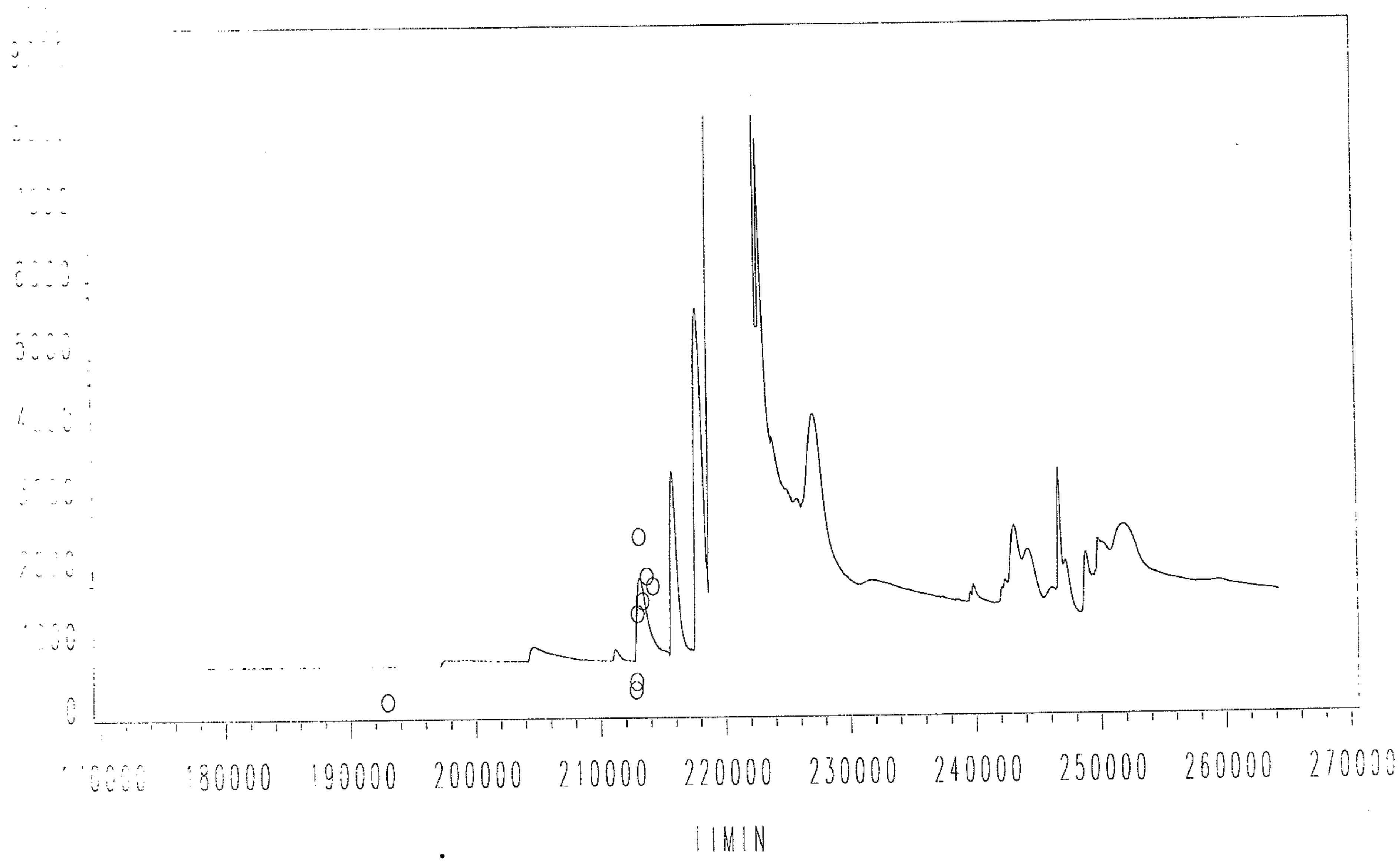
OBSERVED AND PREDICTED SEDIMENTS AT LEON 06

CONTINUOUS LINE PREDICTED TSS
CIRCLES OBSERVED TSS
PERIOD 2 MAY JUL 96



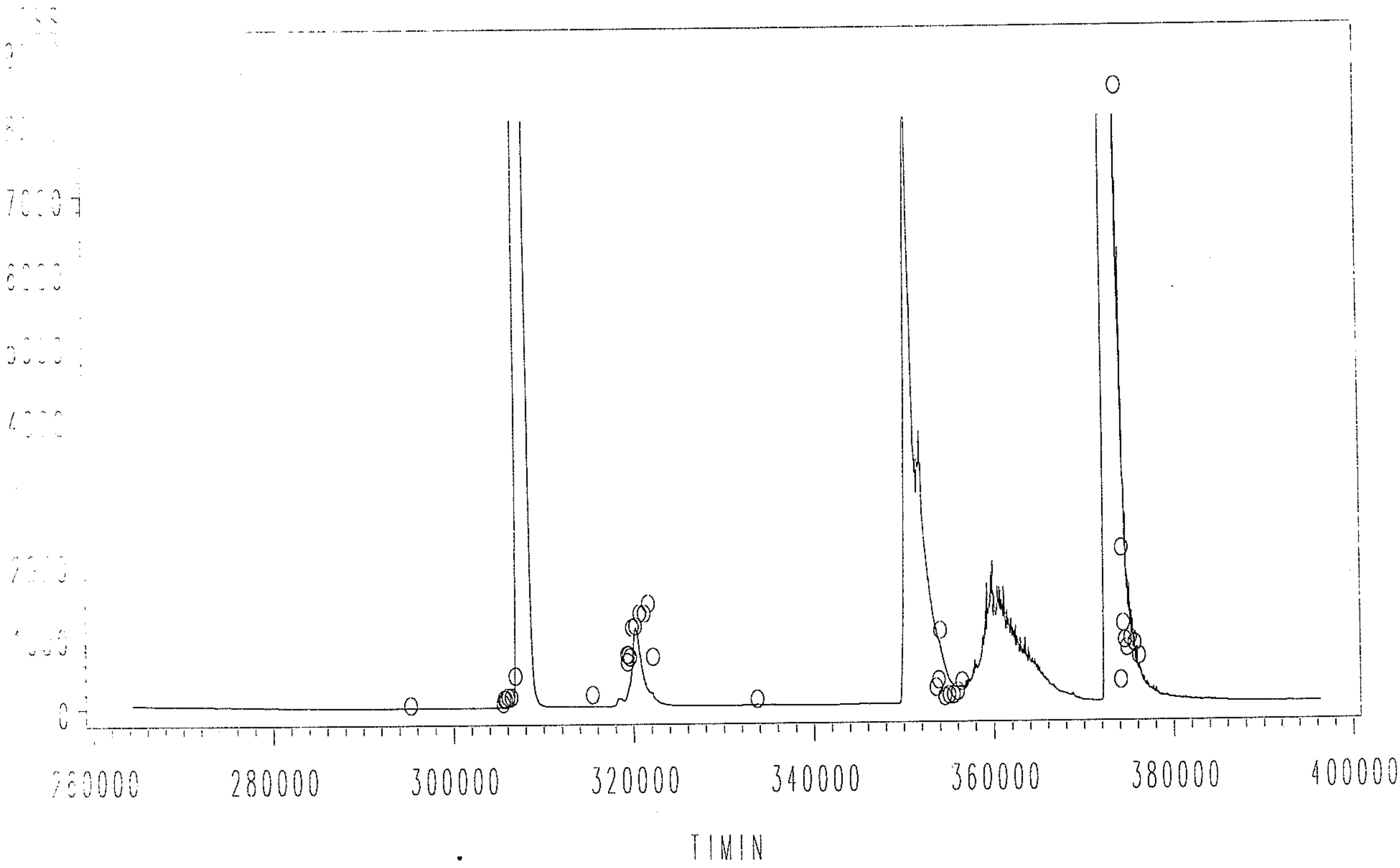
OBSERVED AND PREDICTED SEDIMENTS AT LEON 06

CONTINUOUS LINE: PREDICTED TSS
CIRCLES OBSERVED TSS
PERIOD 3 AUG_SEP 96



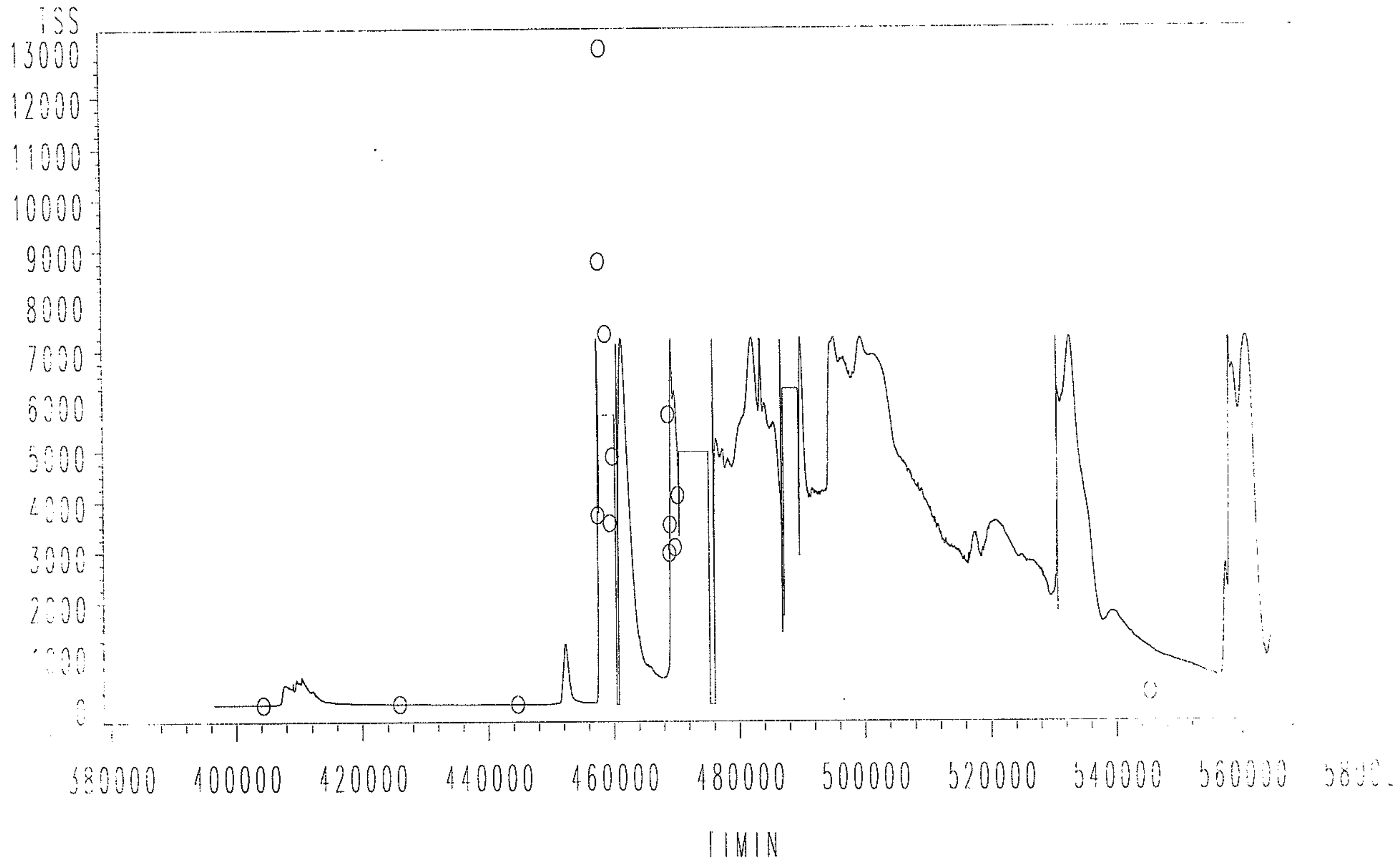
OBSERVED AND PREDICTED SEDIMENTS AT LEON 06

CONTINUOUS LINE   PREDICTED TSS
CIRCLES   OBSERVED TSS
PERIOD-4 OCT_DEC 96



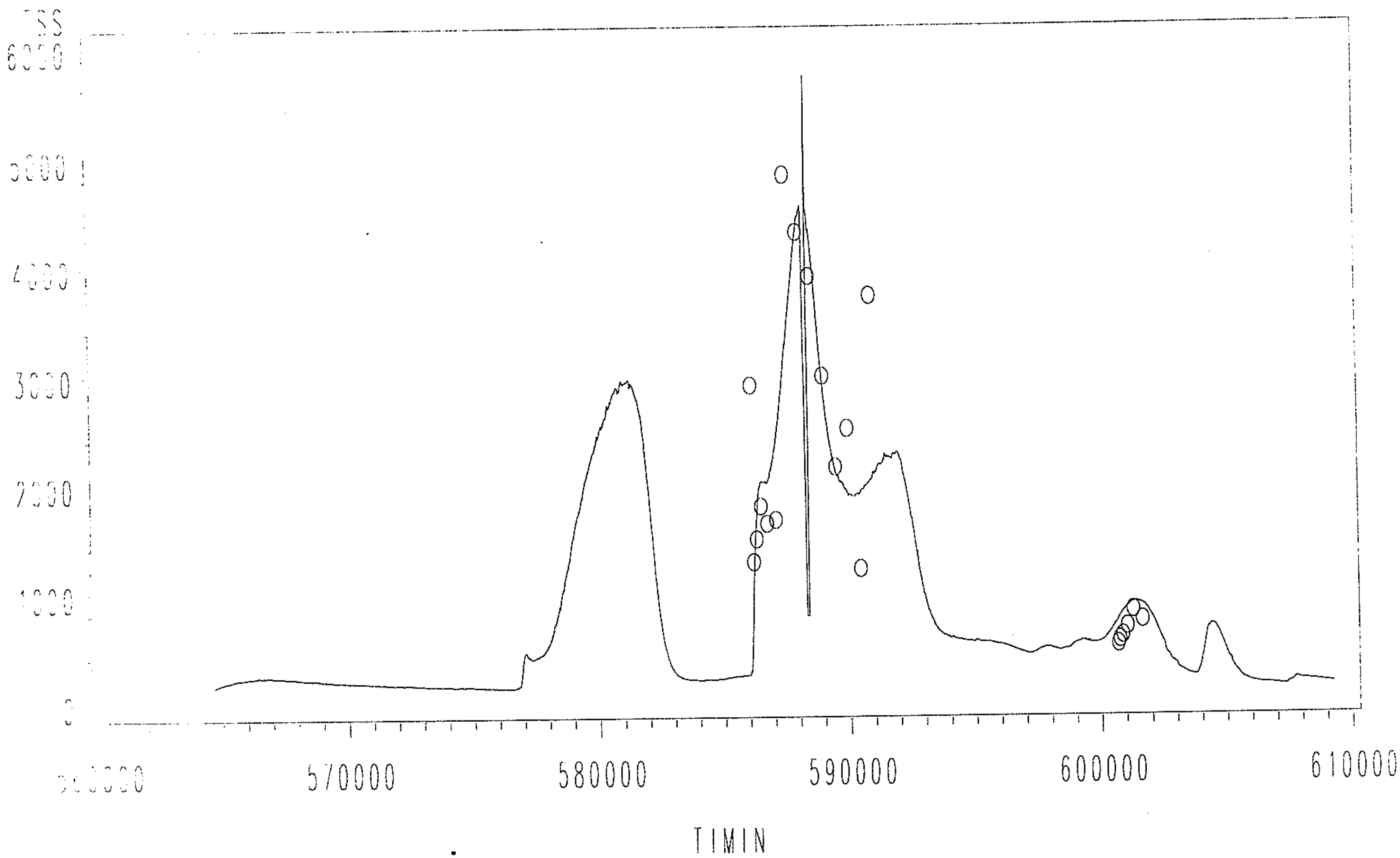
OBSERVED AND PREDICTED SEDIMENTS AT LEON 06

CONTINUOUS LINE = PREDICTED TSS
CIRCLES = OBSERVED TSS
PERIOD-5 JAN_APR 97



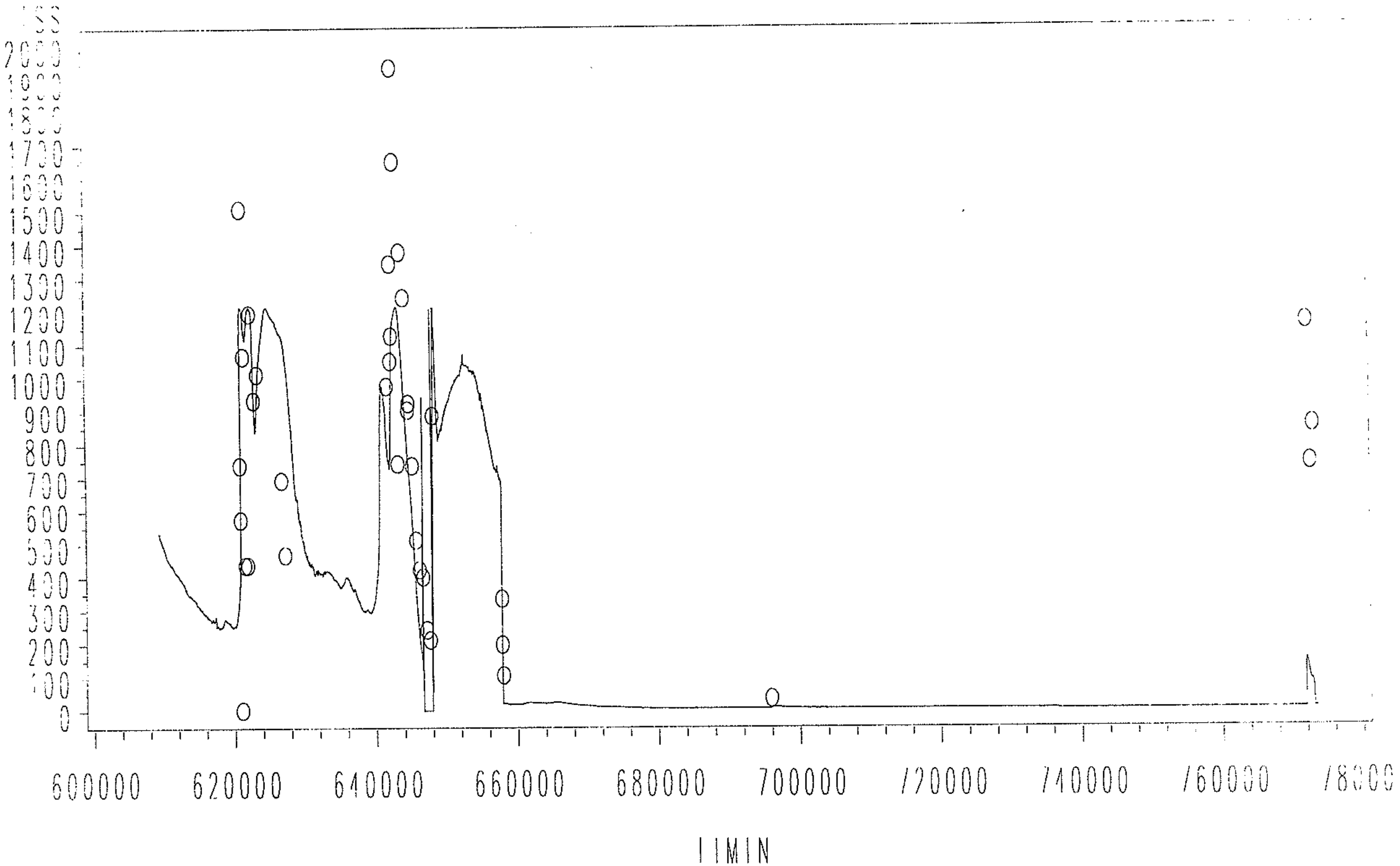
OBSERVED AND PREDICTED SEDIMENTS AT LEON 06

CONTINUOUS LINE PREDICTED TSS
CIRCLES OBSERVED TSS
PERIOD 6 MAY 97



OBSERVED AND PREDICTED SEDIMENTS AT LEON 06

CONTINUOUS LINE   PREDICTED ISS
CIRCLES   OBSERVED ISS
PERIOD / JUN DEC 97



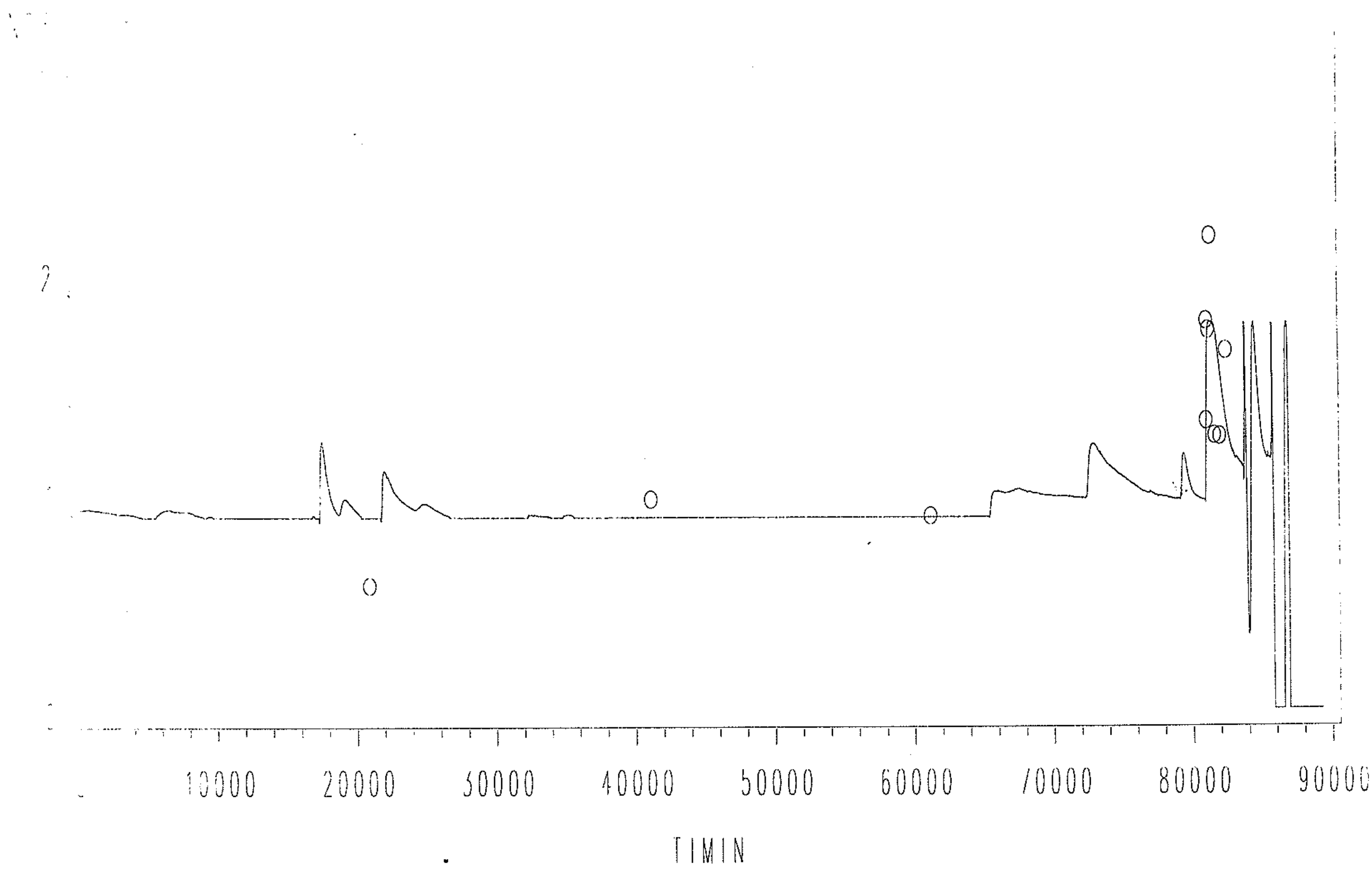
MONTHLY PREDICTIONS OF NO3 LOADS (KG) AT

OBS	Y	M	NO3TOT
1	96	7	26093.45
2	96	8	35357.54
3	96	9	137405.35
4	96	10	123109.72
5	96	11	139002.71
6	96	12	124667.26
7	97	1	240792.59
8	97	2	296823.86
9	97	3	319476.09
10	97	4	157374.56
11	97	5	265085.42
12	97	6	292118.31
13	97	7	3568.28
14	97	8	25655.93
15	97	9	47480.47
16	97	10	15734.34
17	97	11	79400.49
18	97	12	26663.80

OBSERVED AND PREDICTED NO3 AT LEON 06

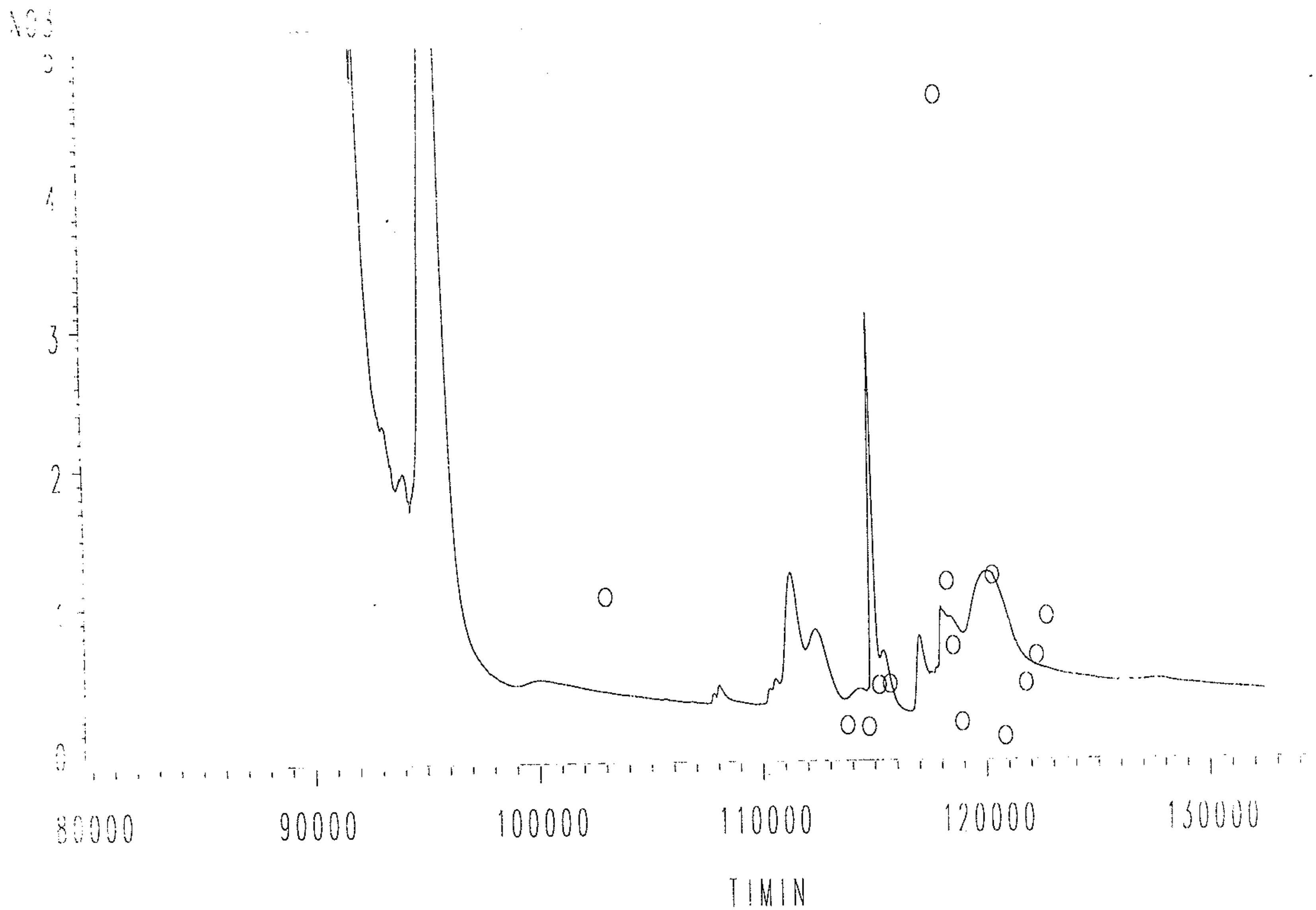
CONTINUOUS LINE - PREDICTED NO3
CIRCLES - OBSERVED NO3

PERIOD 1 JUL AUG 96



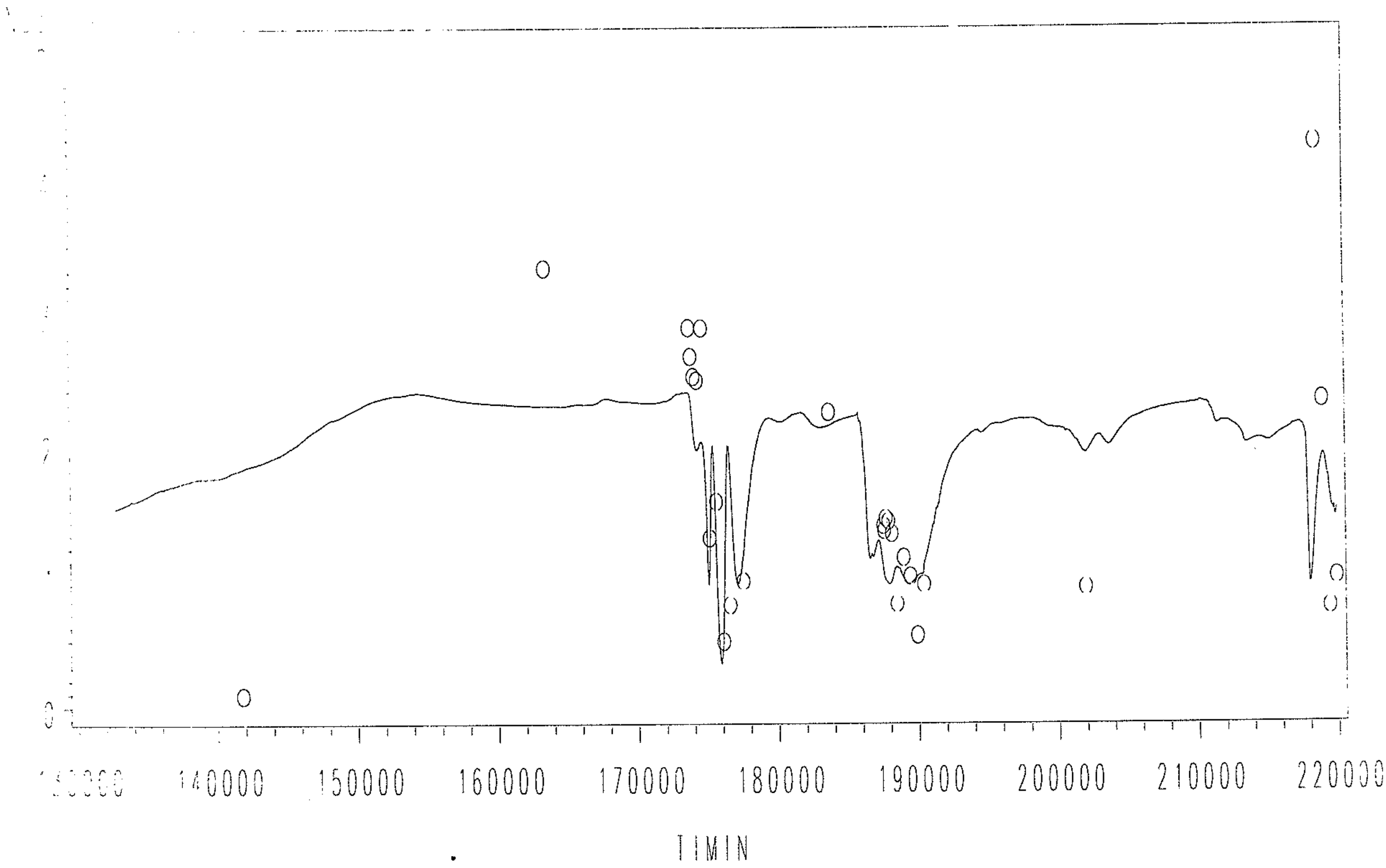
OBSERVED AND PREDICTED NO3 AT LEON 06

CONTINUOUS LINE PREDICTED NO3
CIRCLES OBSERVED NO3
PERIOD 2 SEP 96



OBSERVED AND PREDICTED NO3 AT LEON 06

CONTINUOUS LINE PREDICTED NO3
CIRCLES OBSERVED NO3
PERIOD 3 OCT NOV 96

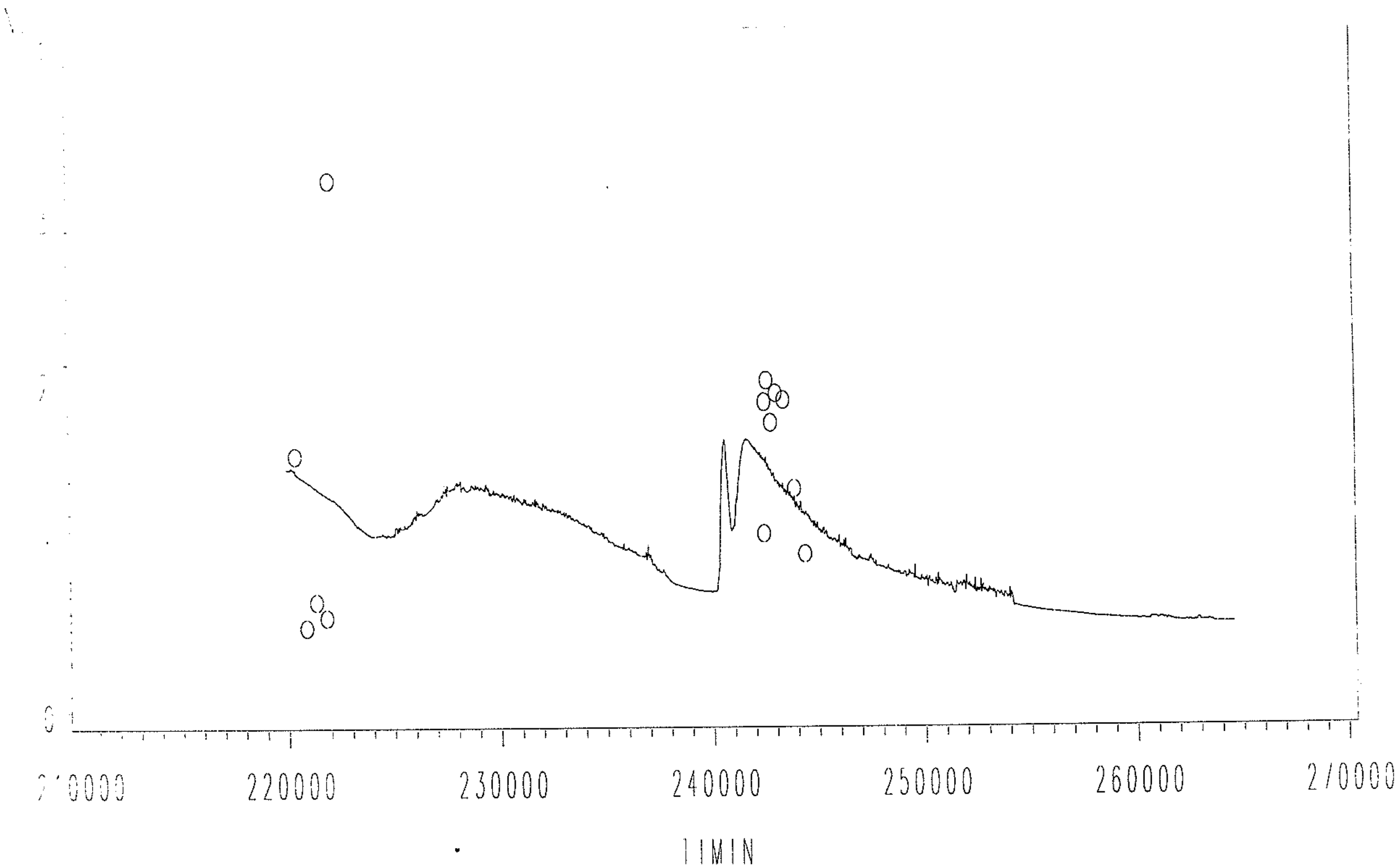


OBSERVED AND PREDICTED NO3 AT LEON 06

CONTINUOUS LINE: PREDICTED NO3

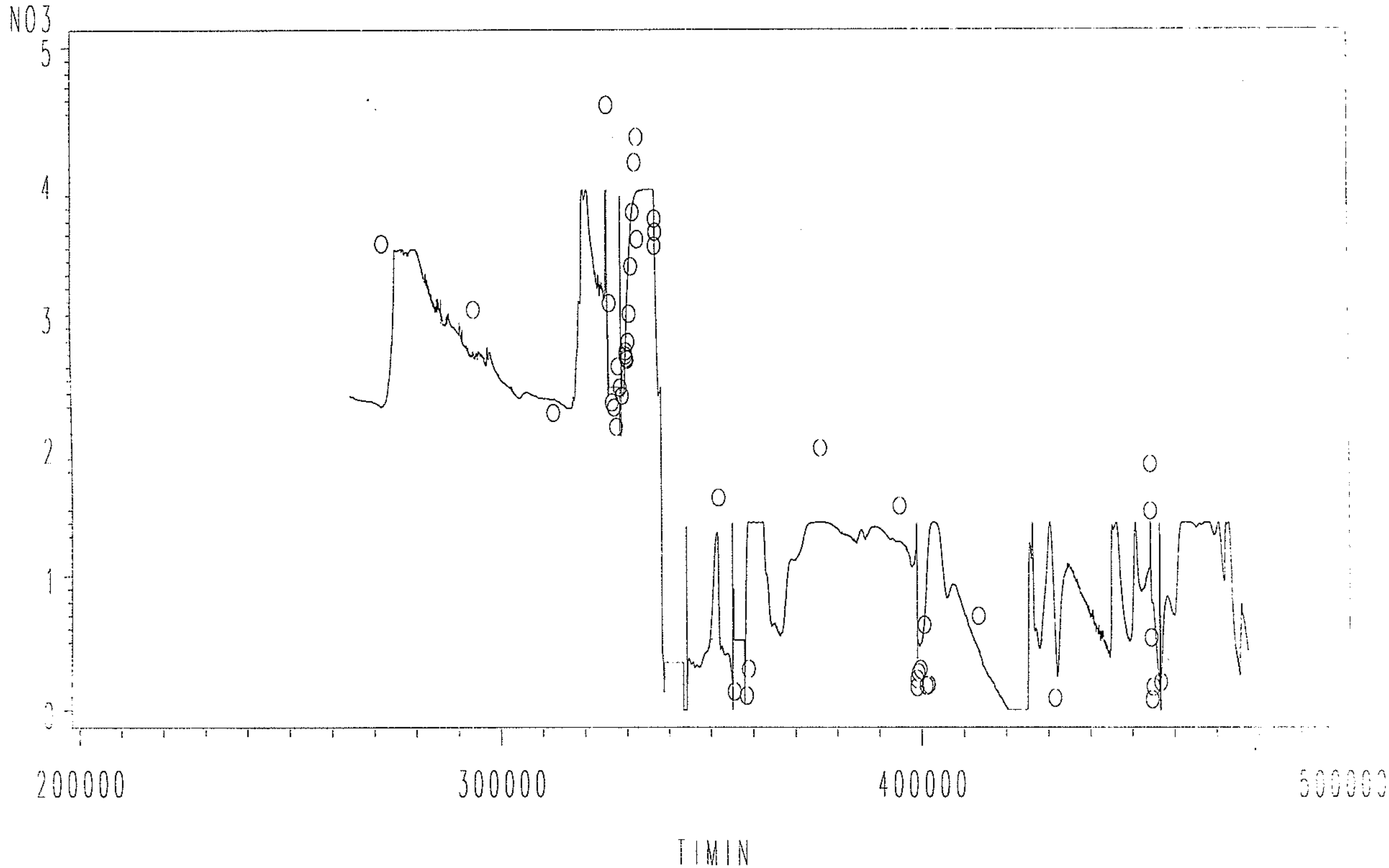
CIRCLES: OBSERVED NO3

PERIOD=4 DEC 96



OBSERVED AND PREDICTED NO3 AT LEON 06

CONTINUOUS LINE   PREDICTED NO3
CIRCLES   OBSERVED NO3
PERIOD:5 JAN_MAY 97

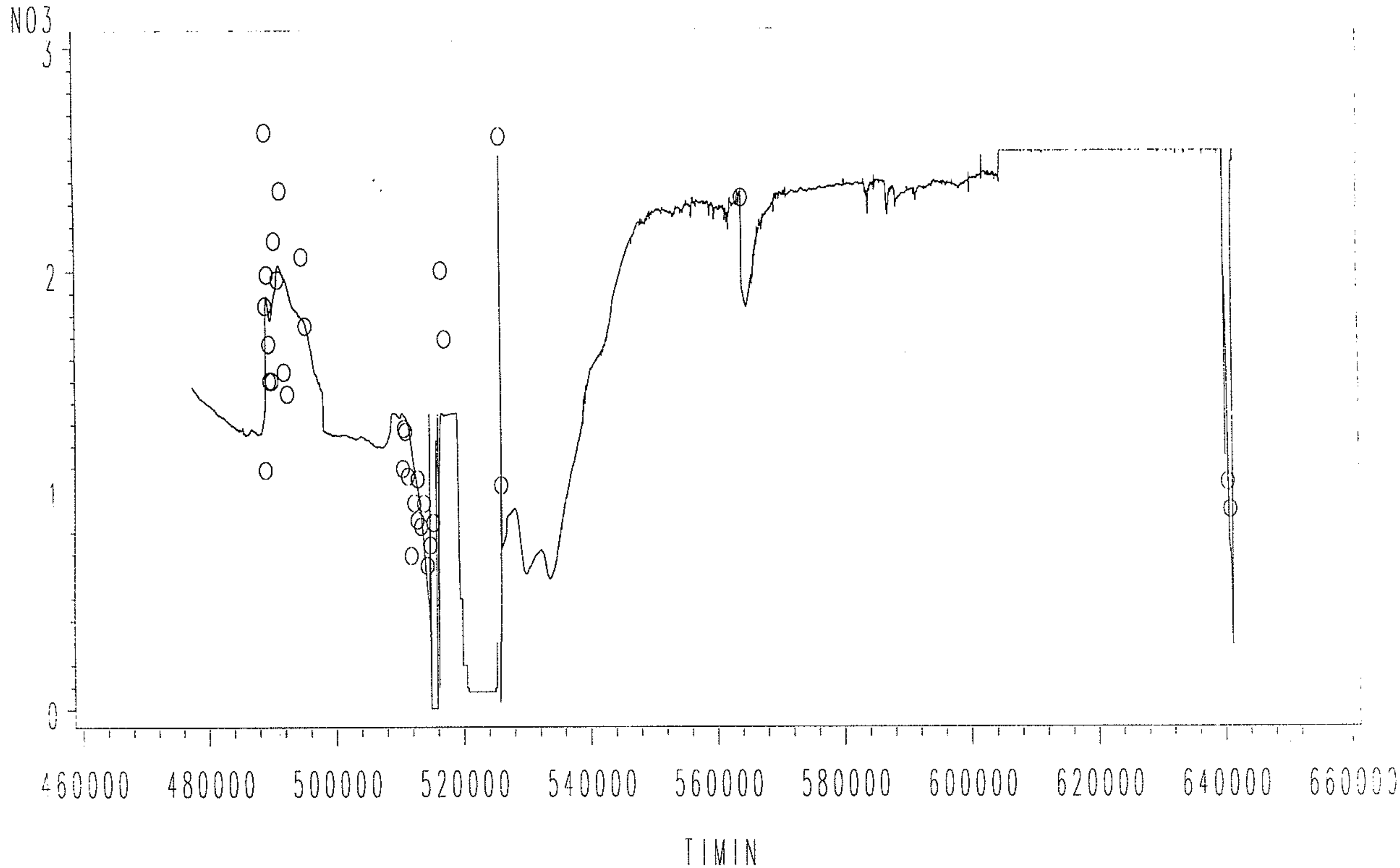


OBSERVED AND PREDICTED NO3 AT LEON 06

CONTINUOUS LINE PREDICTED NO3

CIRCLES OBSERVED NO3

PERIOD 6 JUN DEC 97



APPENDIX D - AUTOMATED STORMWATER MONITORING EQUIPMENT

Introducing Isco 4200 Series Flow Meters

ACCURATE FLOW MEASUREMENT THAT'S VERSATILE AND EASY TO USE

ISCO®

4230 Bubbler Flow Meter

Isco 4230 Bubbler Flow Meters use an internal air compressor to force a metered amount of air through a bubble line submerged in the flow channel. By measuring the pressure needed to force air bubbles out of the line, the level of the water is accurately determined.

Versatile and Accurate

The 4230 provides accurate measurement in a variety of conditions. It is not affected by wind, steam, foam or turbulence. And, because only the bubble tube contacts the flow, corrosive chemicals are not a problem. The 4230 also resists damage by lightning and debris, making it ideal for storm water applications.

Automatic Drift Compensation allows the 4230 to compensate for transducer drift. This makes our bubbler flow meters the most accurate level measurement technology. In standby applications such as storm water runoff monitoring, Automatic Drift Compensation also allows the 4230 to maintain its level calibration indefinitely.

Dependable Operation

The 4230 is not affected by suspended solids and rapidly changing head heights that can cause problems for some bubbler flow meters. Automatic bubble line purging prevents clogging. And, Isco Super Bubble Software senses rapidly rising heads and increases the bubble rate to maintain maximum accuracy.

A 4230 Bubbler paces an Isco 3700 Sampler to collect flow proportioned samples.

HAS REPLACED THE 3230

Isco 4230 Specifications

Flow Meter

Size *(H x W x D)* *(without power source)*	17.0 in. x 11.5 in. x 10.5 in.	43.2 cm x 29.2 cm x 26.7 cm
Weight *(without power source)*	19.1 lbs.	8.6 kg
Material	High-impact molded polystyrene structural foam	
Enclosure *(self-certified)*	NEMA 4X	IP65
Power	12 to 14V DC, 16 mA average at 12.5V DC (printer set at 1 in./hr (2.5 cm/hr), 1 bubble per second, 15 minute purge, and continuous level reading interval)	
Typical Battery Life	*(printer set at 1 in./hr (2.5 cm/hr), 1 bubble per second, 15 minute purge, and continuous level reading interval)*	
934 Nickel-Cadmium Battery	7 to 10 days	
946 Lead-Acid Battery	10 to 15 days	
948 Lead-Acid Battery	2 to 3 months	
Program Memory	Non-volatile, programmable flash; can be updated via interrogator port without opening the enclosure	
Display	Backlit LCD, 2-line, 80-character (5.5 mm high x 3.2 mm wide)	
Level-to-Flow Rate Conversions		
Weirs	V-notch, rectangular with and without end contractions, Cipolletti, Isco Flow Metering Inserts	
Flumes	Parshall, Palmer-Bowlus, Leopold-Lagco, Trapezoidal, H, HS, HL	
Manning formula	Round, U-channel, rectangular, trapezoidal	
Data Points	Four sets of 50 level-flow rate points	
Equation	Two-term polynomial	
Totalizers		
LCD	9-digit, floating decimal point, resettable	
Mechanical *(optional)*	7-digit, non-resettable	
Rain Gauge Input	Contact closure, normally open	
Resolution	0.01 or 0.004 in.	0.25 or 0.1 mm
Parameter Inputs	pH and temperature *(with optional Isco 201 Parameter Module)*, or dissolved oxygen and temperature *(with optional Isco 270 Parameter Module)*	
Sampler Activation Conditions	Enabled, disabled, AND and OR combinations of any two of level, flow rate, rainfall, pH or DO, and temperature	
Sampler Pacing Output	12V pulse	
Sampler Input	Event mark, bottle number	
Printer		
Recording Modes	Up to 3 graphs of level, flow rate, pH or DO, and temperature vs time; includes totalized flow. Rainfall and sampler events (time and bottle number) are also recorded	
Speed	Off, 0.5, 1, 2, 4 inches per hour	Off, 1.25, 2.5, 5, 10 cm per hour
Recording Span	User selectable with multiple over-ranges	
Resolution	1/240 of recording span	
Reports Printed	Flow meter program, 2 independent time interval reports, flow meter history, sampler history	
Interval Report Contents	Site number; time interval; total flow; minimum, maximum, and average flow rate; level; pH or DO, and temperature, and time of occurrence; interval flow; total rainfall; number of samples, flow meter history and sampler history	
Character Size	0.09 in. high x 0.07 in. wide (2.4 mm x 1.7 mm), 12 pitch	
Paper	4.5 in. wide x 65 ft. (11.4 cm x 19.8 m) plain white paper, replaceable roll	
Ribbon	19.7 ft. (6.0 m) black nylon, replaceable	
Data Storage Memory		
Capacity	80,000 bytes (approximately 40,000 readings) divided into a maximum of 6 memory partitions: equal to 120 days of level, rainfall, pH or DO, and temperature readings at 15 minute intervals, plus 2,500 sample events	
Setup and Data Retrieval	IBM PC or compatible computer with Isco Flowlink Software Version 3.1	
Communication	Direct connection, optional internal 2400 baud telephone modem with voice messaging, or optional internal short haul modem	
Voice Messaging *(with optional internal telephone modem)*		
Activation conditions	AND and OR combinations of any two of level, flow rate, rainfall, pH or DO, and temperature	
Telephone Numbers	5 with programmable delay between calls	
Voice Message	Site number, request for acknowledgment	
Acknowledgment	Touch tones or call back	
Analog Output	4 to 20 mA based on flow rate *(with optional 4 to 20 mA Output Interface)*	
Relay Outputs	2 form C relays with field selectable trip points based on flow rate *(with optional High/Low Alarm Relays)*	
Operating Temperature	0° to 140°F	-18° to 60°C
Storage Temperature	-40° to 140°F	-40° to 60°C

Bubbler

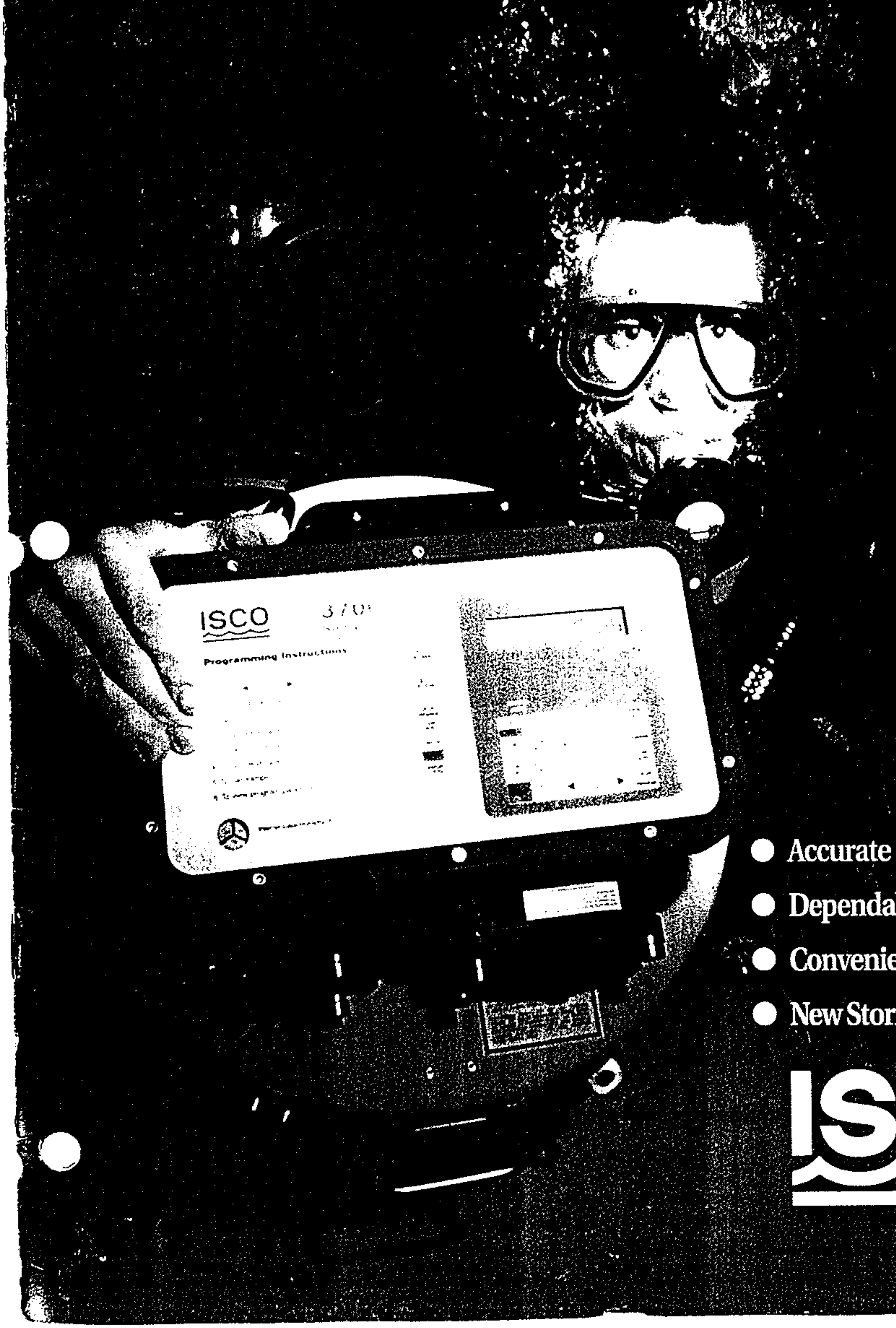
Range	0.01 to 10 ft.	0.003 to 3.05 m
Level Measurement Accuracy *Linearity, Repeatability, and Hysteresis at 72°F (22°C)*	Level* / Error	Level* / Error
	0.01 to 1.0 ft. ±0.005 ft.	0.003 to 0.31 m ±0.002 m
	0.01 to 5.0 ft. ±0.010 ft.	0.003 to 1.52 m ±0.003 m
	0.01 to 10 ft. ±0.035 ft.	0.003 to 3.05 m ±0.011 m
Temperature Coefficient *Maximum error within compensated temperature range (per degree of temperature change)*	±0.0003 x level x temperature change from 72°F *where level is measured in feet*	±0.0009 x level x temperature change from 22°C *where level is measured in meters*
Automatic Drift Correction	After a 5 minute warm-up period, zero level is corrected to ±0.002 ft. (±0.0006 m) at intervals between 2 and 15 minutes	
Long-Term Level Calibration Change	Typically 0.5% of reading per year	
Ambient Operating Temperature Range	0° to 140°F	-18° to 60°C
Compensated Temperature Range	32° to 140°F	0° to 60°C

* *Actual vertical distance between the end of the bubble line and the liquid surface*

SOLAR - 1200.00
TEMP - 175.00
RAIN - 600.00

The Ultimate in Performance

Isco 3700 Series Portable Wastewater Samplers



- Accurate Sampling Results
- Dependable in Harsh Environm
- Convenient On-Site Printed Rep
- New Storm Water Program

ISCO®

Model 3700 Sampler

The world's most advanced sequential/composite sampler

The full-featured Isco 3700 Sampler sets new standards in accuracy and dependability. It collects sequential or composite samples based on either time, flow rate, or storm conditions.

Exclusive STORM Program

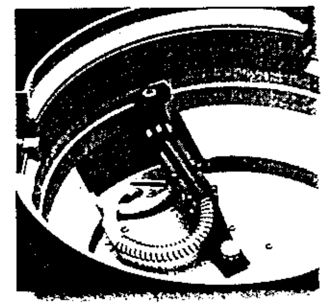
The new STORM program allows your Isco 3700 Sampler to collect separate first flush samples and flow-weighted composite samples. This unique program allows one or more timed samples to be taken after a programmed time delay. While this first flush sample is being collected, the sampler also monitors flow signals from a connected flow meter. Each time a preset volume of runoff water has passed the monitoring point, a flow-weighted sample is collected in bottles separate from the first flush sample.

Built-in Multiplexer

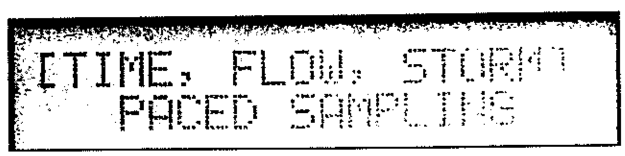
The built-in multiplexing feature expands sampling versatility. It allows multiple samples to be placed in individual bottles, or samples to be placed into multiple bottles at each sampling interval. Additional multiplexing modes allow you to quickly and easily set up a sampling routine to fit your application.

Rugged Distributor

The Geneva drive distributor locks the distributor arm into position over the sample bottles for accurate sample delivery. The distributor arm is constructed of polypropylene for corrosion resistance. At the heart of this distribution system is the Isco peristaltic pump which meets EPA requirements for representative sample flow velocity.



A rugged, corrosion resistant polypropylene distributor arm combined with the exclusive Geneva drive provides accurat positioning time after time.



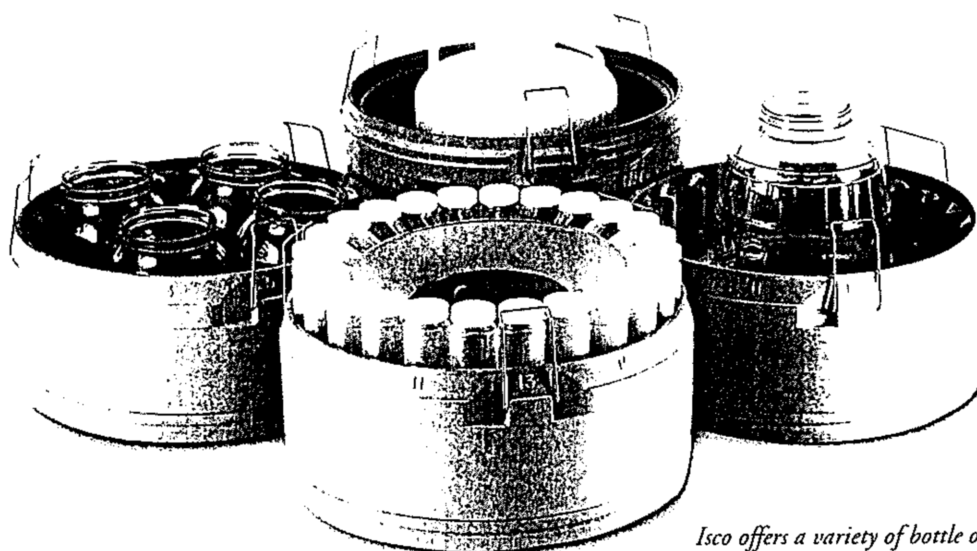
The alphanumeric LCD makes programming fast and easy.

Large, 2 row, 40 Character LCD

The 3700 Series Samplers effectively communicate with the first time user or experienced professional. The large, 2 row, dot matrix Liquid Crystal Display provides self-prompting, easy to follow programming instructions for fast and convenient sampler setup. It continuously displays sampling program status for quick, convenient reference.

Versatile Bottle Options

You can collect sequential samples in 24 (350 ml) glass or (1000 ml) polypropylene, or four 1-gallon glass bottles. The 3700 also allows you to collect composite samples in a 2 $^{1}/_{2}$ gallon glass or polyethylene bottle. An optional composite base with a 4 gallon polyethylene bottle is available for larger composite samples.



Isco offers a variety of bottle options fo both composite or sequential sampling. Choices range from 350 ml glass to fo gallon polyethylene bottles.

Model 3700 Technical Specifications

[illegible]

[illegible]

[illegible]

Sampler base capacity:
Sequential Base: 24 polypropylene (1000 ml), 24 glass (350 ml), 4 glass (1 gallon or 3780 ml) bottles or 1 polyethylene (2 1/2 gallon or 9450 ml) or one glass (2 1/2 gallon or 9450 ml) bottle.
Optional Composite Base: One polyethylene (4 gallon or 15,120 ml) bottle.

Liquid presence detection: Non-wetted, non-conductive sensor detects when liquid sample reaches the pump to automatically compensate for changes in head height.

Controller watertightness: Self certified NEMA 4x and 6 ratings (submersible, watertight, dust-tight, and corrosion resistant.)

Programming modes: Basic, extended, STORM.

Sampling modes:
Sample pacing: Uniform time, non-uniform time, flow, flow paced/time switched, STORM (time and flow paced sampling during sample collection). (Flow modes are controlled by external flow meter pulses.)

Sample distribution: Sequential, composite.

Multiplexing: Samples per bottle (1 to 50 with 1000 ml bottles; 1 to 17 with 350 ml bottles), bottles per sample (1 to 24), multiple bottle compositing.

[illegible]

Flow meter signal requirements: 5 to 15 volt DC pulse or isolated contact closure of at least 25 milliseconds duration. (4 to 20 ma analog or pulse duration signal may be used with optional interface unit.)

Rinse cycles: Suction line automatically rinsed with source liquid before sample collection, 0 to 3 rinses.

Sample retries: Sampling cycle automatically repeated if sample not obtained on initial attempt, 0 to 3 retries.

Program lock: Provides password protection for input displays.

Program storage: Stores up to 3 programs.

Sampling stop/resume: Up to 24 real time/date sample stop/resume commands.

Master/slave: Allows the automatic start of second (slave) sampler.

Interface port: 8 pin connector; data output at 2400 baud in ASCII RS-232 format with handshake. Allows transfer of Program Setting Report (PSR) and Sample Results Report (SRR) to Field Printer or personal computer.

[illegible]

[illegible]

Diagnostics: Tests RAM, ROM, pump and distributor.

Number of composite samples to shutoff: Up to 999 samples. (Optional fail-safe float shutoff.)

Sample volume: 10 to 9990 ml in 1 ml increments. (Automatically limited by programmed bottle size and sampling mode.)

Sample volume repeatability: ±10 ml, typical.

Real time clock accuracy: 1 minute per month, typical.

Suction tubing (intake): 3 ft. to 99 ft. length of 1/4" ID vinyl, 3/8" ID vinyl, or 3/8" ID Teflon lined tubing.

Suction lift: 26 ft. (7.9 m), maximum.

Pumping rate (at 3 ft. head):
1/4" ID suction tubing: 3000 ml per minute.
3/8" ID suction tubing: 3500 ml per minute.

Line transport velocity (at 3 ft. head):
1/4" ID suction tubing: 5.1 ft. per second.
3/8" ID suction tubing: 2.5 ft. per second.

[illegible]

[illegible]

Icing capacity: 30 lbs of ice with 24 glass (350 ml) bottles.

Base insulation: Standard thermal resistanc factor of R-11.

Sampler power requirements: 12 volts DC (Supplied by battery or AC power converte

Sampler standby current: 10 milliamps, maximum.

External Isco nickel cadmium battery capacity: 7 standard sampling programs. (24 samples at a rate of one 200 ml sample per hour, using 10 ft. of 3/8" vinyl suction line at a 5 ft. head.)

Controller internal lithium battery life (maintains internal logic and user selecte settings): 5 years minimum.

APPENDIX E - CHANNEL CROSS-SECTION SURVEYS AND VELOCITY ESTIMATES FOR MONITORING STATIONS LE01 AND LE06

Surface Velocity Estimates - Leon River Project

LE01 - Leon River @ Jonesboro (HWY 36)

Level (feet)	Float Time (seconds)	Average Velocity (feet/sec)
5.0	41	1.463
3.0	48	1.250
3.9	52	1.154
4.6	32	1.875
5.6	21	2.857
3.0	34	1.765
2.6	38	1.579
2.2	56	1.071
13.8	10	6.000
8.0	19	3.158

LE06 - Leon river @ Leon Junction (Fulton Farm)

Level (feet)	Float Time (seconds)	Average Velocity (feet/sec)
4.11	39	1.538
2.14	10	6.000
3.35	20	3.000
6.75	24	2.500
7.35	16	3.750
11.6	10	6.000
17.57	15	4.000
16.5	14	4.286

N.B. Average velocity is corrected surface velocity (Sv*0.6)

Leon River Project - Data from Surveys for Level to Area Conversion
*Processing fortran program accepts only 60 data points

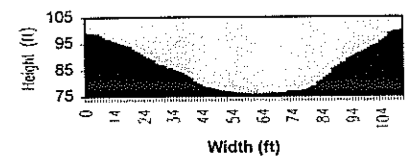
LE001 (odd values only)*

Horizontal	Elevation
0	99.01
5	98.84
7	98.61
9	97.98
10	97.08
12	96.23
14	95.44
16	94.54
18	93.96
20	92.74
21	92.06
23	90.78
25	89.49
27	88.33
29	86.76
31	86.25
33	85.32
35	84.46
37	83.58
39	81.99
41	80.2
43	79.19
45	78.09
47	77.59
49	77.12
51	76.69
53	76.39
55	76.02
57	75.86
59	75.61
61	75.57
63	75.39
65	75.62
67	75.82
69	75.91
71	75.84
73	76.62
75	76.78
77	76.94
79	77.78
81	78.48
83	80.76
85	82.44
87	85.19
89	86.33
91	87.65
93	89.46
95	90.74
97	91.6
99	92.99
101	94.12
103	95.53
105	96.97
107	99.07
109	99.56

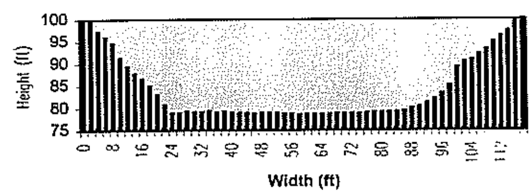
LE006 - Leon Junction

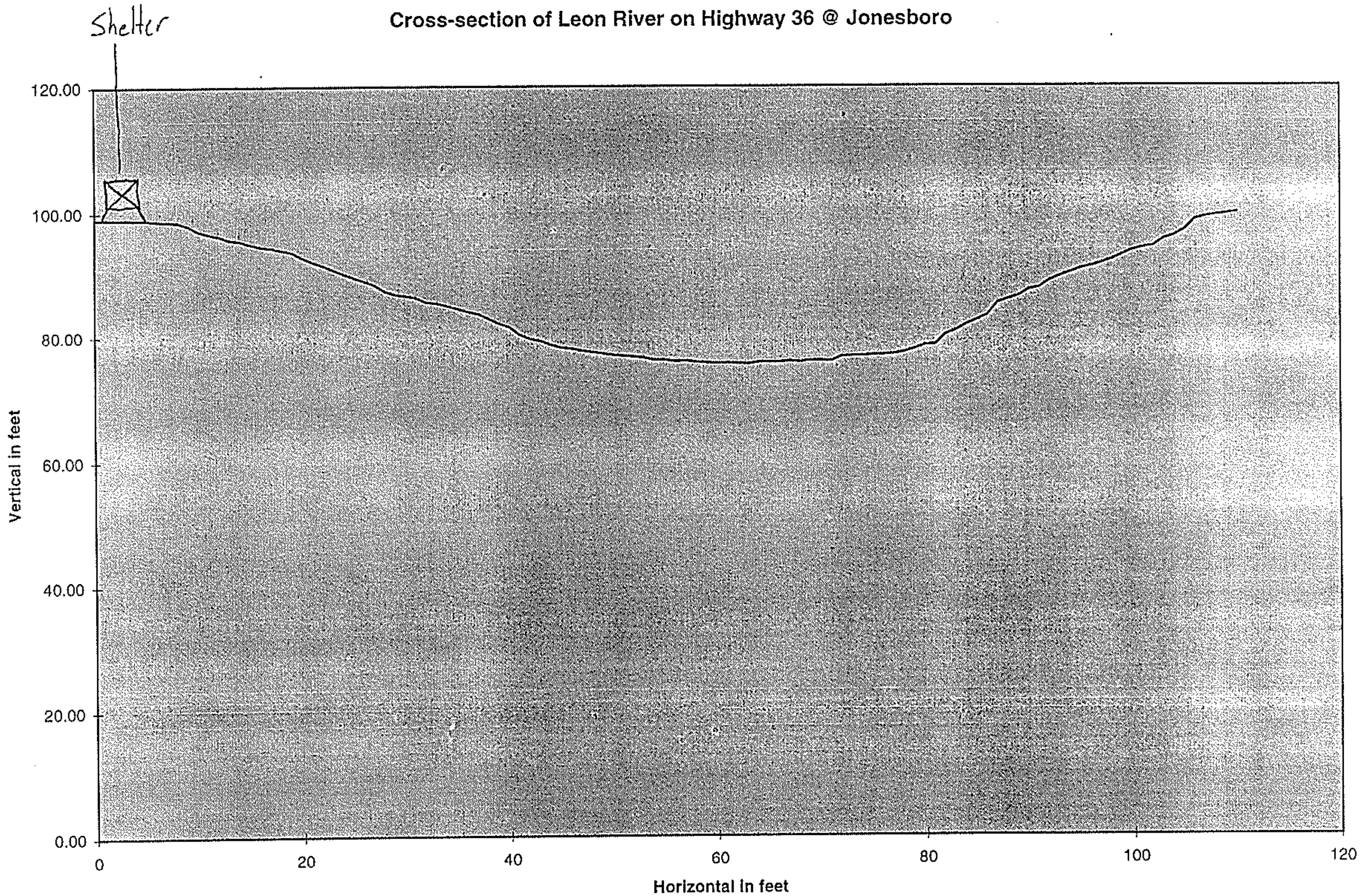
Horizontal	Elevation
0	99.52
2	99.65
4	97.25
6	96.05
8	94.6
10	91.25
12	89.43
14	87.72
16	86.57
18	85.01
20	83.01
22	80.75
24	78.99
26	78.96
28	79.34
30	79.18
32	79.18
34	79.36
36	79.12
38	79.34
40	79.01
42	78.94
44	78.97
46	78.9
48	79
50	79.05
52	78.94
54	78.73
56	78.79
58	78.62
60	78.64
62	78.64
64	78.75
66	78.78
68	78.84
70	78.85
72	78.87
74	78.85
76	78.93
78	79.12
80	79.1
82	79.16
84	79.28
86	79.3
88	80.06
90	80.31
92	81.19
94	82.1
96	83.26
98	85.08
100	89.2
102	90.42
104	90.83
106	92.19
108	93.25
110	94.96
112	96.27
114	97.42
116	99.46
118	100.12

LE001



LE006



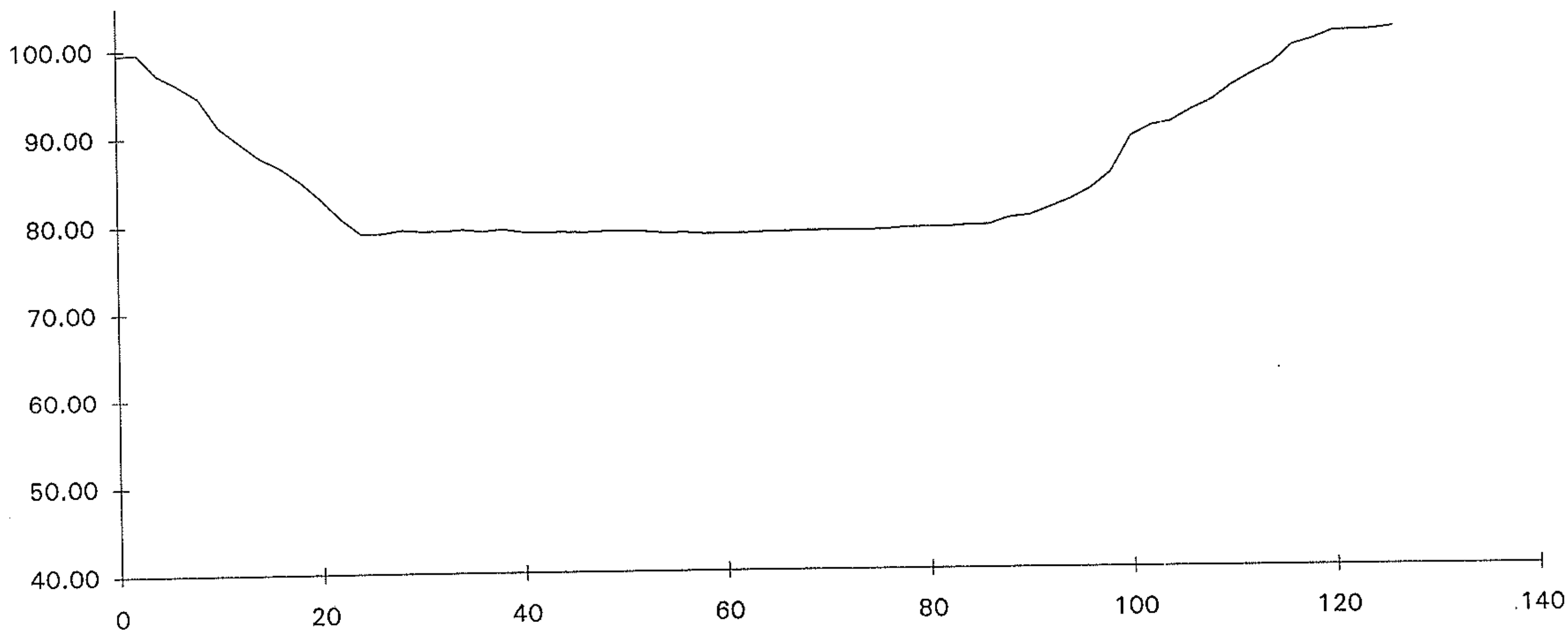

Shelter
Cross-section of Leon River on Highway 36 @ Jonesboro
120.00
100.00
80.00
60.00
40.00
20.00
0.00
Vertical in feet
0
20
40
60
80
100
120
Horizontal in feet

				10-Jan-96		
	Jonesboro @ Hghy. 36					
	Cross-section at Bubbler					
Location	B. S.	H. I.	F. S.	Elev.		
B. M.	3.75	103.75		100.00		
TIAER Bubbler			23.84	79.91		
0			4.74	99.01		
5			4.91	98.84		
6			5.07	98.68		
7			5.14	98.61		
8			5.26	98.49		
9			5.77	97.98		
10			6.67	97.08		
11			7.16	96.59		
12			7.52	96.23		
13			8.10	95.65		
14			8.31	95.44		
15			8.82	94.93		
16			9.21	94.54		
17			9.43	94.32		
18			9.79	93.96		
19			10.12	93.63		
20			11.01	92.74		
21			11.69	92.06		
22			12.27	91.48		
23			12.97	90.78		
24			13.65	90.10		
25			14.26	89.49		
T.P. 1	5.03		19.40	84.35		
		89.38				
26			0.44	88.94		
27			1.05	88.33		
28			2.12	87.26		
29			2.62	86.76		
30			2.85	86.53		
31			3.13	86.25		
32			3.88	85.50		
33			4.06	85.32		
34			4.49	84.89		
35			4.92	84.46		
36			5.44	83.94		
37			5.80	83.58		

38			6.57	82.81		
39			7.39	81.99		
40			7.94	81.44		
41			9.18	80.20		
42			9.86	79.52		
43			10.19	79.19		
44			10.85	78.53		
45			11.29	78.09		
46			11.50	77.88		
47			11.79	77.59		
48			12.03	77.35		
49			12.26	77.12		
50			12.52	76.86		
51			12.69	76.69		
52			12.83	76.55		
53			12.99	76.39		
54			13.36	76.02		
55			13.36	76.02		
56			13.57	75.81		
57			13.52	75.86		
58			13.68	75.70		
59			13.77	75.61		
60			13.87	75.51		
61			13.81	75.57		
62			13.89	75.49		
63			13.99	75.39		
64			13.76	75.62		
T.P. 2	17.26		6.25	83.13		
		100.39				
65			24.77	75.62		
66			24.71	75.68		
67			24.57	75.82		
68			24.66	75.73		
69			24.48	75.91		
70			24.46	75.93		
71			24.55	75.84		
72			23.84	76.55		
73			23.77	76.62		
74			23.72	76.67		
75			23.61	76.78		
76			23.55	76.84		
77			23.45	76.94		
78			23.16	77.23		
79			22.61	77.78		
80			22.03	78.36		
81			21.91	78.48		
82			20.29	80.10		

83			19.63	80.76			
84			18.65	81.74			
85			17.95	82.44			
86			17.15	83.24			
87			15.20	85.19			
88			14.62	85.77			
89			14.06	86.33			
90			13.10	87.29			
91			12.74	87.65			
92			11.59	88.80			
93			10.93	89.46			
94			10.29	90.10			
95			9.65	90.74			
96			9.28	91.11			
97			8.79	91.60			
98			8.20	92.19			
99			7.40	92.99			
100			6.68	93.71			
101			6.27	94.12			
102			6.00	94.39			
103			4.86	95.53			
104			4.35	96.04			
105			3.42	96.97			
106			1.75	98.64			
107			1.32	99.07			
108			1.02	99.37			
109			0.83	99.56			
110			0.58	99.81			
Survey performed by: J. Stroebel, T. Adams and J. Wolfe							

Leon Junction X-SECTION April 17, 96



17-Apr-96

Leon Junction

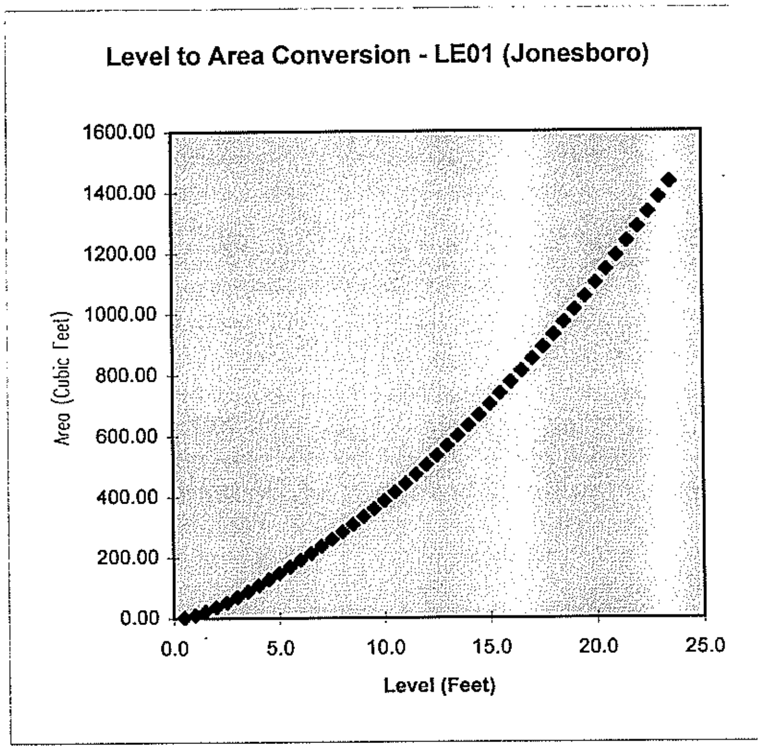
Cross - section

Location	B. S.	H. I.	F. S.	Elev.
B. M.	1.96	101.96		100
Bubbler			22.6	79.36
0			2.44	99.52
2			2.31	99.65
4			4.71	97.25
6			5.91	96.05
8			7.36	94.60
10			10.71	91.25
12			12.53	89.43
14			14.24	87.72
16			15.39	86.57
18			16.95	85.01
20			18.95	83.01
22			21.21	80.75
24			22.97	78.99
26			23.00	78.96
28			22.62	79.34
30			22.78	79.18
32			22.78	79.18
34			22.60	79.36
36			22.84	79.12
38			22.62	79.34
40			22.95	79.01
42			23.02	78.94
44			22.99	78.97
46			23.06	78.90
48			22.96	79.00
50			22.91	79.05
52			23.02	78.94
54			23.23	78.73
56			23.17	78.79
58			23.34	78.62
60			23.32	78.64
62			23.32	78.64
64			23.21	78.75
66			23.18	78.78
68			23.12	78.84
70			23.11	78.85
72			23.09	78.87
74			23.11	78.85
76			23.03	78.93

78			22.84	79.12	
80			22.86	79.10	
82			22.80	79.16	
84			22.68	79.28	
86			22.66	79.30	
88			21.90	80.06	
90			21.65	80.31	
92			20.77	81.19	
94			19.86	82.10	
96			18.70	83.26	
98			16.88	85.08	
100			12.76	89.20	
102			11.54	90.42	
104			11.13	90.83	
106			9.77	92.19	
108			8.71	93.25	
110			7.00	94.96	
112			5.69	96.27	
114			4.54	97.42	
116			2.50	99.46	
118			1.84	100.12	
120			0.91	101.05	
122			0.85	101.11	
124			0.78	101.18	
126			0.48	101.48	
Survey performed by: J. Stroeble and T. Adams					

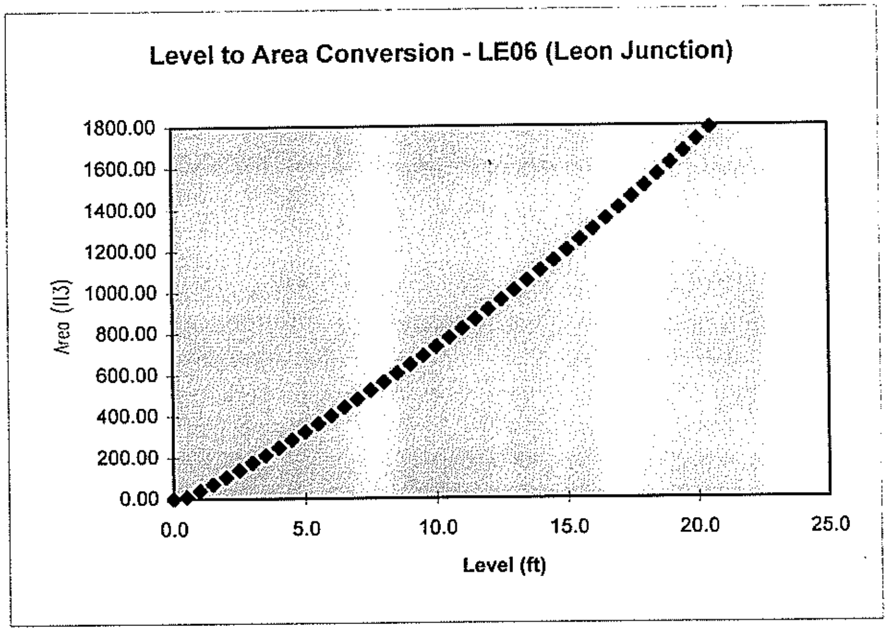
LE001 - Leon River at Leon Junction

Level (ft)	Area (ft3)
0.0	0.00
0.5	2.94
1.0	10.84
1.5	22.76
2.0	37.02
2.5	52.95
3.0	70.46
3.5	89.03
4.0	108.27
4.5	128.23
5.0	148.88
5.5	170.08
6.0	191.83
6.5	214.16
7.0	237.07
7.5	260.55
8.0	284.53
8.5	309.05
9.0	334.31
9.5	360.32
10.0	387.11
10.5	414.85
11.0	443.58
11.5	473.56
12.0	504.41
12.5	535.96
13.0	568.11
13.5	600.92
14.0	634.44
14.5	668.70
15.0	703.73
15.5	739.56
16.0	776.30
16.5	813.98
17.0	852.43
17.5	891.61
18.0	931.57
18.5	972.38
19.0	1014.20
19.5	1057.17
20.0	1101.06
20.5	1145.89
21.0	1191.69
21.5	1238.45
22.0	1286.04
22.5	1334.17
23.0	1382.99
23.5	1433.07

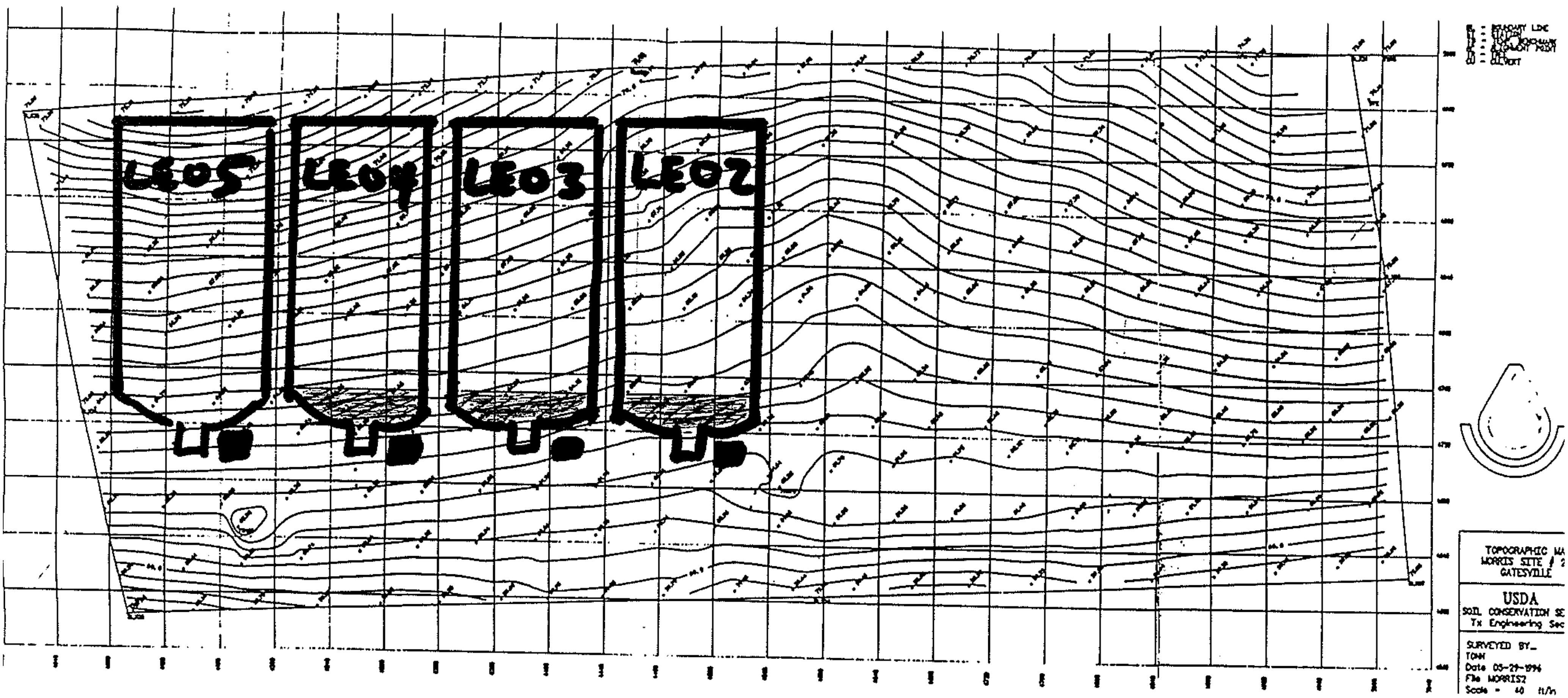


LE006 - Leon River at Leon Junction

Level (ft)	Area (ft3)
0.0	0.00
0.5	10.64
1.0	40.03
1.5	72.29
2.0	106.04
2.5	140.73
3.0	176.20
3.5	212.44
4.0	249.39
4.5	286.99
5.0	325.23
5.5	363.99
6.0	403.28
6.5	443.10
7.0	483.40
7.5	524.14
8.0	565.33
8.5	607.02
9.0	649.27
9.5	692.04
10.0	735.22
10.5	778.81
11.0	822.91
11.5	867.71
12.0	913.25
12.5	959.99
13.0	1007.42
13.5	1055.37
14.0	1103.87
14.5	1153.00
15.0	1202.70
15.5	1252.84
16.0	1303.43
16.5	1354.57
17.0	1406.41
17.5	1458.98
18.0	1512.34
18.5	1566.54
19.0	1621.53
19.5	1677.01
20.0	1732.94
20.5	1789.32



APPENDIX F -MORRIS FARM DEMONSTRATION SITES



APPROXIMATE LOCATION OF MICROWATERSHEDS ON MORRIS PROPERTY

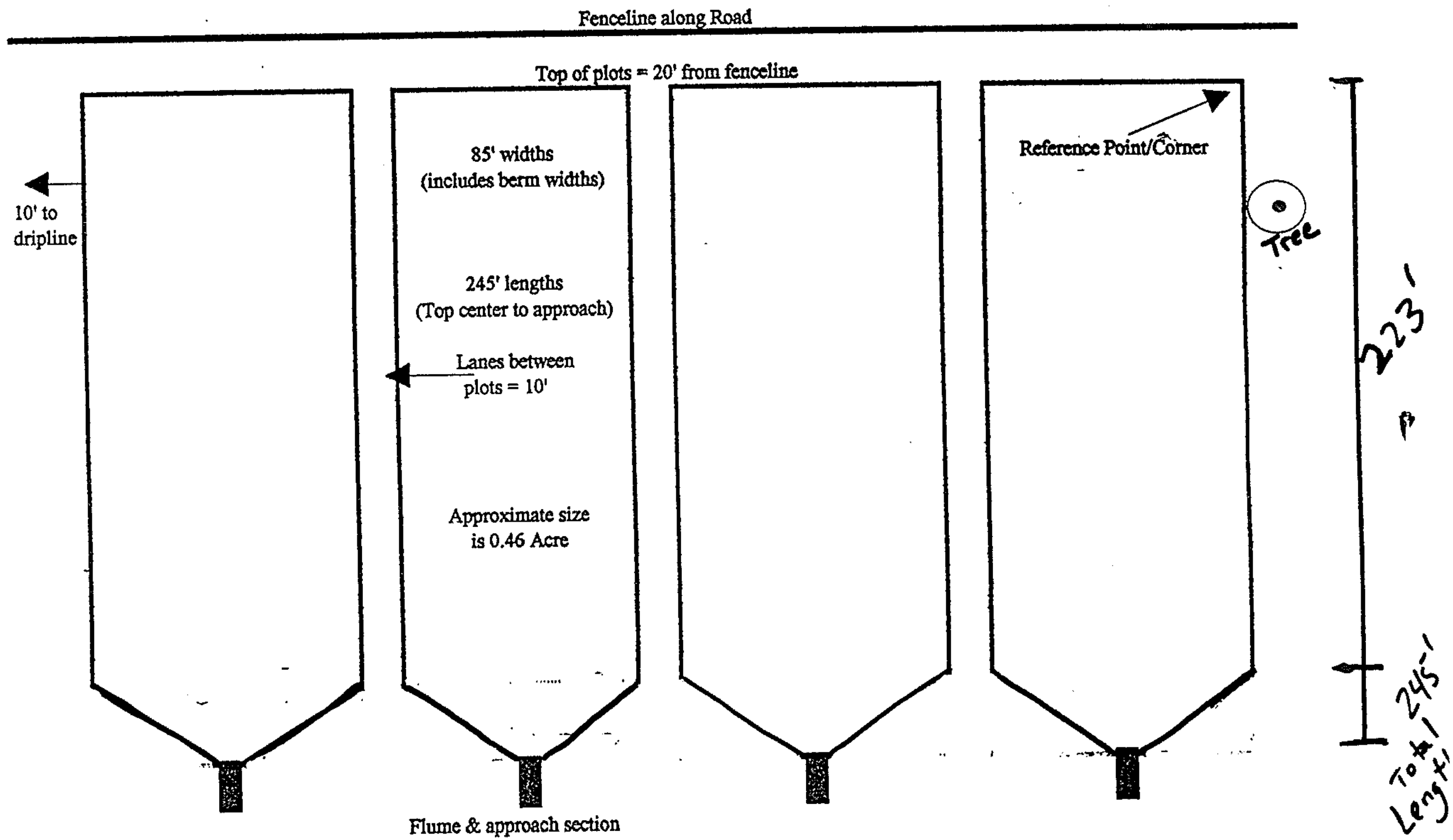
LEO2 - ECONOMIC CROP FILTER STRIP - WHEAT

LEO3 - STIFF-GRASS HEDGE FILTER STRIP - SWITCHGRASS

LEO4 - TURF FORMING FILTER STRIP - BERMUDAGRASS

LEO5 - CONTROL, NO BMP INSTALLED

MORRIS SITE LAYOUT



A demonstration micro-watershed site showing crop, filter strip, flume and shelter with water sampling equipment.

APPENDIX G -SOIL FERTILITY AND CROPPING DATA FROM MORRIS FARM DEMONSTRATION SITES

SOIL TEST REPORT

TEXAS AGRICULTURAL EXTENSION SERVICE -- THE TEXAS A & M UNIVERSITY SYSTEM
SOIL TESTING LABORATORY, COLLEGE STATION TX. 77843

DR. TONY PROVIN
LAB DIRECTOR (409)845-4816

RECEIVED 7/11/96

INV# 035073
FOR: TAES BLACKLAND RES CTR
808 EAST BLACKLAND RD
TEMPLE, TX
76502
FEE : $10.00

DATE RECEIVED : 5/31/96
DATE PROCESSED: 06/06/96
COUNTY : BELL
COUNTY#: 027
LAB # : 22910

SAMPLE ID# 1 MOTHER NEFF 1 UPPER

SOIL ANALYSIS

SOIL TEST RATINGS - PPM ELEMENT (AVAILABLE FORM)

PH ACIDITY	NITROGEN	PHOSPHO-RUS	POTASSIUM	CALCIUM	MAGNESIUM	SALINITY	ZINC	IRON	MANGANESE	COPPER	SODIUM	SULPHUR	
7.8 MILDLY ALKALINE	3. VERY LOW	118. VERY HIGH	500. VERY HIGH	12710 VERY HIGH	830. HIGH	325. NONE					45. VERY LOW	674 HIGH	

(PPM X 2 = LBS/ACRE 6 INCHES DEEP)

CROP AND YIELD RANGE: NO CROP GIVEN

FURTHER INFORMATION AND ASSISTANCE CAN BE OBTAINED FROM YOUR COUNTY EXTENSION AGENT :
JAMES M. DAVIS
1605 N. MAIN BELTON TX. 76513

TEXAS AGRICULTURAL EXTENSION SERVICE -- THE TEXAS A & M UNIVERSITY SYSTEM
SOIL TESTING LABORATORY, COLLEGE STATION TX. 77843

DR. TONY PROVIN
LAB DIRECTOR (409)845-4816

INV# 035073
FOR: TAES BLACKLAND RES CTR
808 EAST BLACKLAND RD
TEMPLE, TX
76502
FEE : $10.00

DATE RECEIVED : 5/31/96
DATE PROCESSED: 06/06/96
COUNTY : BELL
COUNTY#: 027
LAB # : 22911

SAMPLE ID# 2 MOTHER NEFF 1 LOWER

SOIL ANALYSIS

SOIL TEST RATINGS - PPM ELEMENT (AVAILABLE FORM)

PH ACIDITY	NITROGEN	PHOSPHO-RUS	POTASSIUM	CALCIUM	MAGNESIUM	SALINITY	ZINC	IRON	MANGANESE	COPPER	SODIUM	SULPHUR	
7.9 MILDLY ALKALINE	2. VERY LOW	120. VERY HIGH	465. VERY HIGH	12701 VERY HIGH	797. HIGH	325. NONE					46. VERY LOW	780 HIGH	

(PPM X 2 = LBS/ACRE 6 INCHES DEEP)

CROP AND YIELD RANGE: NO CROP GIVEN

FURTHER INFORMATION AND ASSISTANCE CAN BE OBTAINED FROM YOUR COUNTY EXTENSION AGENT :
JAMES M. DAVIS
1605 N. MAIN BELTON TX. 76513

SOIL TEST REPORT

TEXAS AGRICULTURAL EXTENSION SERVICE -- THE TEXAS A & M UNIVERSITY SYSTEM
SOIL TESTING LABORATORY, COLLEGE STATION TX. 77843

DR. TONY PROVIN
LAB DIRECTOR (409)845-4816

INV# 035073
FOR: TAES BLACKLAND RES CTR
808 EAST BLACKLAND RD
TEMPLE, TX
76502
FEE : $10.00

DATE RECEIVED : 5/31/96
DATE PROCESSED: 06/06/96
COUNTY : BELL
COUNTY#: 027
LAB # : 22912

SAMPLE ID# 3 MOTHER NEFF 2 UPPER

SOIL ANALYSIS

SOIL TEST RATINGS - PPM ELEMENT (AVAILABLE FORM)

PH ACIDITY	NITROGEN	PHOSPHO-RUS	POTASSIUM	CALCIUM	MAGNESIUM	SALINITY	ZINC	IRON	MANGANESE	COPPER	SODIUM	SULPHUR	
7.9 MILDLY ALKALINE	2. VERY LOW	106. VERY HIGH	488. VERY HIGH	12715 VERY HIGH	763. HIGH	260. NONE					36. VERY LOW	668 HIGH	

(PPM X 2 = LBS/ACRE 6 INCHES DEEP)

CROP AND YIELD RANGE: NO CROP GIVEN

FURTHER INFORMATION AND ASSISTANCE CAN BE OBTAINED FROM YOUR COUNTY EXTENSION AGENT :
JAMES M. DAVIS
1605 N. MAIN BELTON TX. 76513

TEXAS AGRICULTURAL EXTENSION SERVICE -- THE TEXAS A & M UNIVERSITY SYSTEM
SOIL TESTING LABORATORY, COLLEGE STATION TX. 77843

DR. TONY PROVIN
LAB DIRECTOR (409)845-4816

INV# 035073
FOR: TAES BLACKLAND RES CTR
808 EAST BLACKLAND RD
TEMPLE, TX
76502
FEE : $10.00

DATE RECEIVED : 5/31/96
DATE PROCESSED: 06/06/96
COUNTY : BELL
COUNTY#: 027
LAB # : 22913

SAMPLE ID# 4 MOTHER NEFF 2 LOWER

SOIL ANALYSIS

SOIL TEST RATINGS - PPM ELEMENT (AVAILABLE FORM)

PH ACIDITY	NITROGEN	PHOSPHORUS	POTASSIUM	CALCIUM	MAGNESIUM	SALINITY	ZINC	IRON	MANGANESE	COPPER	SODIUM	SULPHUR	
7.9 MILDLY ALKALINE	1. VERY LOW	98. VERY HIGH	375. VERY HIGH	12666 VERY HIGH	796. HIGH	260. NONE					37. VERY LOW	838 HIGH	

(PPM X 2 = LBS/ACRE 6 INCHES DEEP)

CROP AND YIELD RANGE: NO CROP GIVEN

FURTHER INFORMATION AND ASSISTANCE CAN BE OBTAINED FROM YOUR COUNTY EXTENSION AGENT :
JAMES M. DAVIS
1605 N. MAIN BELTON TX. 76513

TEXAS AGRICULTURAL EXTENSION SERVICE -- THE TEXAS A & M UNIVERSITY SYSTEM
SOIL TESTING LABORATORY, COLLEGE STATION TX. 77843

DR. TONY PROVIN
LAB DIRECTOR (409)845-4816

INV# 035073
FOR: TAES BLACKLAND RES CTR
808 EAST BLACKLAND RD
TEMPLE, TX
76502
FEE : $10.00

DATE RECEIVED : 5/31/96
DATE PROCESSED: 06/06/96
COUNTY : BELL
COUNTY#: 027
LAB # : 22914

SAMPLE ID# 5 MOHTER NEFF 3 UPPER

SOIL ANALYSIS

SOIL TEST RATINGS - PPM ELEMENT (AVAILABLE FORM)

PH ACIDITY	NITROGEN	PHOSPHORUS	POTASSIUM	CALCIUM	MAGNESIUM	SALINITY	ZINC	IRON	MANGANESE	COPPER	SODIUM	SULPHUR	
7.9 MILDLY ALKALINE	3. VERY LOW	52. HIGH	394. VERY HIGH	12846 VERY HIGH	449. HIGH	260. NONE					24. VERY LOW	415 HIGH	

(PPM X 2 = LBS/ACRE 6 INCHES DEEP)

CROP AND YIELD RANGE: NO CROP GIVEN

FURTHER INFORMATION AND ASSISTANCE CAN BE OBTAINED FROM YOUR COUNTY EXTENSION AGENT :
JAMES M. DAVIS
1605 N. MAIN BELTON TX. 76513

SOIL TEST REPORT

TEXAS AGRICULTURAL EXTENSION SERVICE -- THE TEXAS A & M UNIVERSITY SYSTEM
SOIL TESTING LABORATORY, COLLEGE STATION TX. 77843

DR. TONY PROVIN
LAB DIRECTOR (409)845-4816

INV# 035073
FOR: TAES BLACKLAND RES CTR
808 EAST BLACKLAND RD
TEMPLE, TX
76502
FEE : $10.00

DATE RECEIVED : 5/31/96
DATE PROCESSED: 06/06/96
COUNTY : BELL
COUNTY#: 027
LAB # : 22915

SAMPLE ID# 6 MOTHER NEFF 3 LOWER

SOIL ANALYSIS

SOIL TEST RATINGS - PPM ELEMENT (AVAILABLE FORM)

PH ACIDITY	NITROGEN	PHOSPHO-RUS	POTASSIUM	CALCIUM	MAGNESIUM	SALINITY	ZINC	IRON	MANGANESE	COPPER	SODIUM	SULPHUR	
8.0 MODERATELY ALKALINE	4. VERY LOW	50. HIGH	425. VERY HIGH	12840 VERY HIGH	449. HIGH	260. NONE					25. VERY LOW	444 HIGH	

(PPM X 2 = LBS/ACRE 6 INCHES DEEP)

CROP AND YIELD RANGE: NO CROP GIVEN

FURTHER INFORMATION AND ASSISTANCE CAN BE OBTAINED FROM YOUR COUNTY EXTENSION AGENT :
JAMES M. DAVIS
1605 N. MAIN
BELTON TX. 76513

APPENDIX H - QUARTERLY REPORTS

EXHIBIT C

Quarterly Progress Report for Leon River Basin Project

November 1,1994 through December 31, 1994

TAES / Blackland Research Center

ACTIVITIES:

1) A memorandum was sent on December 9, 1994 to participating agencies expressing the need to schedule a date to review plans and initiate project as per Task 1.1 in EXHIBIT B WORKPLAN. Feedback on possible dates was obtained.

2) A memorandum was sent on December 22, 1994 announcing a meeting at 10:00 am January 3, 1995 at the Blackland Reasearch Center to accomplish Tasks 1.1, 1.2, 1.3, and 1.4 of EXHIBIT B WORKPLAN.

EXHIBIT C

Quarterly Progress Report for Leon River Basin Project

January 1,1995 through March 31, 1995

TAES / Blackland Research Center

ACTIVITIES:

1) An initial meeting took place between the Texas State Soil and Water Conservation Board (TSSWCB), the Texas Agricultural Experiment Station (TAES) and the Texas Institute for Applied Environmental Research (TIAER) at Blackland Research Center (BRC), Temple on January 3, 1995 completing Tasks 1.1, 1.2, and 1.4 of the approved workplan. Specific tasks and timelines of the project were discussed as per Task 1.3.

2) A meeting took place between TAES and TIAER personnel at Stephenville on January 11, 1995 (Task 1.3). Current sampling and analytical techniques utilized by TIAER were discussed with TAES. TAES personnel were given tours of TIAER laboratory facilities and three field monitoring sites.

3) A meeting took place at Blackland between TSSWCB, TAES and TIAER personnel on January 13, 1995. Progress on the generation of GIS 1:250,000 maps (Tasks 2.1-3) and the QAPP were discussed (Task 4.2).

4) A meeting took place at BRC on February 9, 1995 between TAES and TSSWCB personnel to discuss status of the project. Progress on Leon River Basin GIS mapping was shown by Wes Rosenthal (Tasks 2.1-4). QAPP preparation was discussed (Task 4.2).

5) GIS progress to date (Tasks 2.1-3):

- Individual subwatersheds have been identified. An example subwatershed map is attached. The map displays the pattern of major streams within the basin, county boundaries, and subwatersheds. Lake Belton is located in the lower right part of the basin.
- With the help of TIAER personnel, dairy locations have been identified for Erath and Comanche counties. Information on herd size is included in the dataset.
- Initial model SWAT runs have been completed for the basin. The initial assumption is, no dairy practices were followed in the basin. Scenarios where dairy waste is applied to fields in the subwatersheds are currently being input into model runs.

6) TIAER personnel have begun assembly of a database containing existing monitoring data in the watershed as per Task 4.1.

7) The initial version of a QAPP was completed as per Task 4.2.

Quarterly Progress Report Leon River Basin Project
October 1, 1995 through December 31, 1995
TAES / Blackland Research Center

ACTIVITIES:

1) An informal quarterly meeting and field trip in Coryell and Hamilton counties took place on October 10 between TSSWCB (Texas State Soil and Water Conservation Board), NRCS Natural Resources Conservation Service), BRC (Blackland Research Center) and TIAER (Texas Institute for Applied Environmental Research) personnel to discuss and identify possible field sampling sites (Tasks 1.3, 1.4, 2.3, and 2.4).
2) TSSWCB and BRC personnel attended NRCS board meeting and encouraged cooperation on project activities (Task 1.3 and 6.1).
3) TSSWCB and BRC personnel attended county commissioners meetings in Coryell and Hamilton counties on October 23 and November 8 to alert county officials of planned project activities (Task 1.3).
4) An instream sampling site was installed in the Leon River channel 1.5 miles north of Jonesboro on Highway 36 under the bridge in the state right of way (Task 4.4).
5) Routine grab sampling and analysis continued (Tasks 4.5 and 4.6).

PREVIOUSLY PROJECTED ACTIVITIES (October - December 1995):

1) Installation of monitoring devices at selected sites (Task 4.4). **Partially completed. One site was selected, the landowner contacted, and equipment installed.**
2) Collection of water samples (Task 4.5). **Scheduled work done.**
3) Analysis of water samples; entering and management of data (Task 4.6). **Scheduled work done.**

PROJECTED ACTIVITIES (January - March 1996):

1) Installation of monitoring devices at selected sites (Task 4.4)
2) Collection of water samples (Task 4.5)
3) Analysis of water samples; entering and management of data (Task 4.6)

Quarterly Progress Report Leon River Basin Project
April 1, 1996 through June 30, 1996
TAES / Blackland Research Center

ACTIVITIES:

1) A quarterly meeting for the Leon River Basin Water Quality Project took place on April 9, 1996 at Blackland Research Center (Task 1.1). TAES, TIAER, TSSWCB, and NRCS personnel were present. Topics discussed included: Overall project progress, plans for demonstration sites, programming of automatic sampling equipment in river locations.
2) A landowner/cooperator was identified and contacted (Task 1.1). The landowner agreed to participate in the project. Property is located within a priority watershed identified earlier by modeling (Task 2.4).
3) A survey was conducted on the selected property in Coryell county. Microwatershed locations appropriate for the selected site were proposed (See Attachment 1). NRCS, and BRC members evaluated the demonstration site (Task 3.3). Possible BMPs for the site include: conservation tillages, fertilizer management, and vegetative filter strips.
4) Grab sampling and lab analysis continued (Tasks 4.5 and 4.6).

PREVIOUSLY PROJECTED ACTIVITIES (April - June 1996):

1) Quarterly meeting of cooperators, to discuss project activities and facilitate decision making, is scheduled for April 9, 1996 10:00am at BRC (Task 1.4) **DONE**
2) Installation of monitoring devices at selected BMP sites (Task 4.4) **IN PROGRESS**
3) Collection of water samples (Task 4.5) **DONE**
4) Analysis of water samples; entering and management of data (Task 4.6) **DONE**

PROJECTED ACTIVITIES (July - September 1996):

1) Quarterly meeting of cooperators, to discuss project activities and facilitate decision making will be conducted (Task 1.4)
2) Installation of monitoring devices at selected BMP sites (Task 4.4)
3) Collection of water samples (Task 4.5)
4) Analysis of water samples; entering and management of data (Task 4.6)

FY96 4th Quarter Progress Report
Leon River Watershed Project
July 1, 1996 to September 30, 1996
TAES / Blackland Research Center
October 1, 1996

ACTIVITIES:

Program Element 1: Project planning and coordination

Task 1.1 Completed.
Task 1.2 Completed
Tasks 1.3 and 1.4 A quarterly meeting for the Leon River Basin Water Quality Project took place on July 17, 1996 at Blackland Research Center. TIAER, TSSWCB, and NRCS personnel were present. Topics discussed included overall project progress, existing problems and anticipated problems, required revision of the QAPP, project extension and administrative issues, and cooperative efforts needed for completion of tasks.

Program Element 2: Target geographic and problem areas using appropriate tools

Tasks 2.1 to 2.4 Completed.

Program Element 3: To target proper BMPs for implementation within the targeted priority watersheds

Tasks 3.1 and 3.2 Personnel are in the process of gathering the necessary information on typical farming practices in the area in order to initialize modeling runs to assess the impacts of various BMPs. Input files are being developed and preliminary EPIC runs have been performed.

Program Element 4: Monitoring for water quality effects

Task 4.1 Completed.
Task 4.2 A revised QAPP was submitted to TSSWCB on August 16, 1996.
Task 4.3 Completed.
Task 4.4 Four microwatersheds have been installed on a landowner's property in southeast Coryell County.
Task 4.5 Biweekly water samples continue to be collected. Water samples from approximately three storm events have been collected during this quarter. One

large event which occurred at the end of August caused widespread flooding. Sampling houses were partially submerged for about one week. Samples were collected by the automated equipment during this event and were intact, but could not be collected from the field in a timely fashion so holding times were not met.

Task 4.6 Ongoing.

Program Element 5: Inform, educate and demonstrate proper BMPs

Tasks 5.1 to 5.3 No activity this quarter. These tasks are to be performed by the NRCS and the local SWCDs.

Program Element 6: Track BMP implementation

Tasks 6.1 to 6.3 No activity this quarter. Tasks 6.1 and 6.2 are to be performed by the NRCS and the local SWCDs.

PROJECTED ACTIVITIES (October to December 1996):

1) Quarterly meeting of cooperators will be conducted to discuss project activities and facilitate decision making (Task 1.4).
2) Continue modeling efforts to assess the impacts of various BMPs (Tasks 3.1 and 3.2).
3) Install and enable monitoring equipment and rain gauge on the four microwatersheds (Task 4.4).
4) Continue collection of water samples (Task 4.5).
5) Continue analysis of water samples and entering and management of data (Task 4.6).

FY97 1st Quarter Progress Report
Leon River Watershed Project
October 1, 1996 to December 31, 1996
TAES / Blackland Research Center
January 17, 1997

ACTIVITIES:

Program Element 1: Project planning and coordination

Task 1.1 Completed.
Task 1.2 Completed
Tasks 1.3 and 1.4 A quarterly meeting for the Leon River Basin Water Quality Project took place on November 13, 1997 at TIAER in Stephenville. TIAER, TAES, TSSWCB, and NRCS personnel were present. Topics discussed included overall project progress, existing problems and anticipated problems, project extension and administrative issues, and cooperative efforts needed for completion of tasks. Following the meeting, participants had the opportunity to tour TIAER's monitoring sites and receive information on field techniques utilized.

Program Element 2: Target geographic and problem areas using appropriate tools

Tasks 2.1 to 2.4 Completed.

Program Element 3: To target proper BMPs for implementation within the targeted priority watersheds

Tasks 3.1 and 3.2 Personnel are in the process of gathering the necessary information on typical farming practices in the area in order to initialize modeling runs to assess the impacts of various BMPs. Input files are being developed and preliminary EPIC runs have been performed.

Program Element 4: Monitoring for water quality effects

Task 4.1 Completed.
Task 4.2 A revised QAPP was submitted to TSSWCB on August 16, 1996. There has still been no official approval forthcoming from the EPA project officer.
Task 4.3 Completed.

Task 4.4 Four microwatersheds installed on a landowner's property in southeast Coryell County have required continued maintenance due to cattle damage and erosion of alleyways. Grass seedings to the alleyways have been performed on several occasions, and a temporary electric fence has been deployed on the lower portion of the watersheds to protect the berms, cutoff walls and flumes.

Task 4.5 Biweekly water samples continue to be collected. Water samples from approximately four storm events have been collected during this quarter. The microwatersheds were online to catch their first storm event occurring on November 7.

Task 4.6 Databases have been redesigned to allow efficient exporting for statistical analysis and integration. Currently finalizing SAS programs to summarize the data and estimate loadings.

Program Element 5: Inform, educate and demonstrate proper BMPs

Tasks 5.1 to 5.3 No activity this quarter. These tasks are to be performed by the NRCS and the local SWCDs. NRCS will need to work closely with the participating landowner in Coryell County to coordinate activities and provide technical assistance for BMPs. We suggest that the NRCS field office in Gatesville act as the liaison between the landowner and Blackland Research Center to increase coordination and cooperation among all parties involved in the project.

Program Element 6: Track BMP implementation

Tasks 6.1 to 6.3 No activity this quarter. Tasks 6.1 and 6.2 are to be performed by the NRCS and the local SWCDs.

PROJECTED ACTIVITIES (January to March 1997):

1) Quarterly meeting of cooperators will be conducted to discuss project activities and facilitate decision making (Task 1.4).
2) Continue modeling efforts to assess the impacts of various BMPs (Tasks 3.1 and 3.2).
3) Continue maintenance of four microwatersheds (Task 4.4).
4) Continue collection of water samples (Task 4.5).
5) Continue analysis of water samples and entering and management of data. Begin collecting velocity data so that total storm flows can be estimated (Task 4.6).
6) We recommend that the TSSWCB hold a meeting between NRCS and other project cooperators so that NRCS can successfully meet required tasks within a time-frame consistent with the current project schedule.

FY97 2nd Quarter Progress Report
Leon River Watershed Project
January 1, 1997 to March 31, 1997
TAES / Blackland Research Center
April 1, 1997

ACTIVITIES:

Program Element 1: Project planning and coordination

Task 1.1 Completed.
Task 1.2 Completed
Tasks 1.3 and 1.4 A quarterly meeting for the Leon River Basin Water Quality Project took place on March 21, 1997 at Blackland Research Center in Temple. TIAER, TAES, TSSWCB, and NRCS personnel were present. Topics discussed included overall project progress, existing problems and anticipated problems, project extension and administrative issues, and cooperative efforts needed for completion of tasks

Program Element 2: Target geographic and problem areas using appropriate tools

Tasks 2.1 to 2.4 Completed.

Program Element 3: To target proper BMPs for implementation within the targeted priority watersheds

Tasks 3.1 and 3.2 NRCS personnel have provided the necessary information on typical farming practices in the area. Input files are being developed and preliminary EPIC runs have been performed. Runs will also be performed using APEX to assess the potential impacts of filter strip BMPs.

Program Element 4: Monitoring for water quality effects

Task 4.1 Completed.
Task 4.2 A revised QAPP was submitted to TSSWCB on August 16, 1996. **There has still been no official approval forthcoming from the EPA project officer.**
Task 4.3 Completed.
Task 4.4 Four microwatersheds installed on a landowner's property in southeast Coryell County have required continued maintenance due to cattle damage, erosion of alleyways, and flooding of the fields.

Task 4.5 Biweekly water samples continue to be collected. Water samples from numerous storm events have been collected during this quarter. Many of the stormwater samples pulled did not meet holding times due to severe flooding conditions at all the sites. The microwatersheds were partially flooded on two separate occasions. The Leon River site at Jonesboro was submerged for approximately 10 days. The Leon River site at Leon Junction was not submerged, but access roads to the sites were inaccessible for about a week due to high water.

Task 4.6 Databases have been redesigned to allow efficient exporting for statistical analysis and integration. Currently finalizing SAS programs to summarize the data and estimate loadings.

Program Element 5: Inform, educate and demonstrate proper BMPs

Tasks 5.1 to 5.3 No activity this quarter. These tasks are to be performed by the NRCS and the local SWCDs. NRCS will need to work closely with the participating landowner in Coryell County to coordinate activities and provide technical assistance for BMPs. We met with the District Conservationist at the Gatesville office on February 11, 1997 and he will be working with the landowner to coordinate our activities and will provide technical assistance for the demonstration.

Program Element 6: Track BMP implementation

Tasks 6.1 to 6.3 No activity this quarter. Tasks 6.1 and 6.2 are to be performed by the NRCS and the local SWCDs.

PROJECTED ACTIVITIES (April to June 1997):

1) Quarterly meeting of cooperators will be conducted to discuss project activities and facilitate decision making (Task 1.4).
2) Continue modeling efforts to assess the impacts of various BMPs (Tasks 3.1 and 3.2).
3) Continue maintenance of four microwatersheds (Task 4.4).
4) Continue collection of water samples (Task 4.5).
5) Continue analysis of water samples and entering and management of data. Begin collecting velocity data so that total storm flows can be estimated (Task 4.6).
6) Coordinate with NRCS personnel with demonstration site activities (Task 5.3).

FY97 4th Quarter Progress Report
Leon River Watershed Project
July 1, 1997 to September 30, 1997
TAES / Blackland Research Center
October 17, 1997

ACTIVITIES:

Program Element 1: Project planning and coordination

Task 1.1 Completed.
Task 1.2 Completed
Tasks 1.3 and 1.4 A quarterly meeting for the Leon River Basin Water Quality Project took place on October 6, 1997 at Texas State Soil and Water Conservation Board in Temple. TIAER, TAES, TSSWCB, and NRCS personnel were present. Topics discussed included overall project progress, existing problems and anticipated problems, project extension and administrative issues, and cooperative efforts needed for completion of tasks.

Program Element 2: Target geographic and problem areas using appropriate tools

Tasks 2.1 to 2.4 Completed.

Program Element 3: To target proper BMPs for implementation within the targeted priority watersheds

Tasks 3.1 and 3.2 NRCS personnel have provided the necessary information on typical farming practices in the area. Input files are being developed and preliminary EPIC runs have been performed. Runs are being performed using APEX to assess the potential impacts of filter strip BMPs.

Program Element 4: Monitoring for water quality effects

Task 4.1 Completed.
Task 4.2 No revision to the QAPP is required at this time, aside from the submission of a new signature page. The Jonesboro sampling site was pulled on July 30, 1997, in accordance with a mandate from the TxDOT (Texas Department of Transportation). The Leon Junction sampling site will remain at the present location for the remainder of the following quarter. Verbal permission has been given, by the TSSWCB, to pull the river site in December contingent to a major stormwater runoff event during that period.
Task 4.3 Completed.

Task 4.4 Four microwatersheds installed on a landowner's property in southeast Coryell County have been continually maintained. Three filterstrip BMP's have been selected for demonstration purposes of these microwatersheds: an agronomic crop (wheat); a wide filterstrip (short, sod forming, coastal Bermuda grass); and a narrow filterstrip (tall, stiff switchgrass). A multi-species (Alamo, Blackwell, Caddo, and Kanlow) switchgrass BMP was implemented at one of the watersheds at the end of this quarter. Implementation of an agronomic crop BMP will be accomplished in the next quarter.

Task 4.5 Biweekly water samples continue to be collected when no storm events occur. Water samples from storm events have been collected during this quarter. Some of the stormwater samples pulled did not meet holding times due to mechanical problems with laboratory equipment.

Task 4.6 Currently finalizing SAS programs to summarize the data and estimate loadings.

Program Element 5: Inform, educate and demonstrate proper BMPs

Tasks 5.1 to 5.3 No activity this quarter. These tasks are to be performed by the NRCS and the local SWCDs. NRCS will need to work closely with the participating landowner in Coryell County to coordinate activities and provide technical assistance for BMPs. The District Conservationist at the Gatesville office will be working with the landowner to coordinate our activities and will provide technical assistance for the demonstration.

Program Element 6: Track BMP implementation

Tasks 6.1 to 6.3 No activity this quarter. Tasks 6.1 and 6.2 are to be performed by the NRCS and the local SWCDs.

PROJECTED ACTIVITIES (October to December 1997):

1) Quarterly meeting of cooperators will be conducted to discuss project activities and facilitate decision making (Task 1.4).
2) Continue modeling efforts to assess the impacts of various BMPs (Tasks 3.1 and 3.2).
3) Continue maintenance of four microwatersheds. Installation of an agronomic crop filterstrip (wheat) (Task 4.4).
4) Continue collection of water samples (Task 4.5).
5) Continue analysis of water samples and entering and management of data. Continue collecting river velocity data so that total storm flows can be estimated (Task 4.6).
6) Coordinate with NRCS personnel with demonstration site activities (Task 5.3).

FY98 1st Quarter Progress Report
Leon River Watershed Project
October 1, 1997 to December 31, 1997
TAES / Blackland Research Center
February 27, 1998

ACTIVITIES:

Program Element 1: Project planning and coordination

Task 1.1 Completed.
Task 1.2 Completed
Tasks 1.3 and 1.4 A quarterly meeting for the Leon River Basin Water Quality Project took place on January 28, 1998 at Texas Agricultural Experiment Station—Blackland Research Center in Temple and at Tarleton State University in Stephenville, simultaneously, via TTVN (Trans Texas Video Network). TIAER, TAES, and NRCS personnel were present. Topics discussed included overall project progress, existing problems and anticipated problems, project extension and administrative issues, and cooperative efforts needed for completion of tasks.

Program Element 2: Target geographic and problem areas using appropriate tools

Tasks 2.1 to 2.4 Completed.

Program Element 3: To target proper BMPs for implementation within the targeted priority watersheds

Tasks 3.1 and 3.2 NRCS personnel have provided the necessary information on typical farming practices in the area. Input files are being developed and preliminary EPIC runs have been performed. Runs are being performed using APEX to assess the potential impacts of filter strip BMPs.

Program Element 4: Monitoring for water quality effects

Task 4.1 Completed.
Task 4.2 Minor revisions to the QAPP were made upon request from TIAER. Submission of a new signature page and the revised QAPP were submitted. The Leon Junction sampling site was removed on December 22, 1997 in coordination with the removal of the Leon River sampling sites maintained by TIAER.
Task 4.3 Completed.

Task 4.4 Four microwatersheds installed on a landowner's property in southeast Coryell County have been continually maintained. Implementation of an agronomic crop (wheat) BMP was achieved at the end of this quarter. Implementation of a wide filterstrip (short, sod forming, coastal Bermuda grass) BMP will be accomplished in the next quarter.

Task 4.5 Biweekly water samples continue to be collected when no storm events occur. Water samples from storm events have been collected during this quarter.

Task 4.6 Currently finalizing SAS programs to summarize the data and estimate loadings.

Program Element 5: Inform, educate and demonstrate proper BMPs

Tasks 5.1 to 5.3 No activity this quarter. These tasks are to be performed by the NRCS and the local SWCDs. NRCS will need to work closely with the participating landowner in Coryell County to coordinate activities and provide technical assistance for BMPs. The District Conservationist at the Gatesville office will be working with the landowner to coordinate our activities and will provide technical assistance for the demonstration.

Program Element 6: Track BMP implementation

Tasks 6.1 to 6.3 No activity this quarter. Tasks 6.1 and 6.2 are to be performed by the NRCS and the local SWCDs.

PROJECTED ACTIVITIES (January to March 1997):

1) Quarterly meeting of cooperators will be conducted to discuss project activities and facilitate decision making (Task 1.4).
2) Continue modeling efforts to assess the impacts of various BMPs (Tasks 3.1 and 3.2).
3) Continue maintenance of four microwatersheds. Installation of a wide filterstrip (short, sod forming, coastal Bermuda grass) BMP (Task 4.4).
4) Continue collection of water samples (Task 4.5).
5) Continue analysis of water samples and entering and management of data. (Task 4.6).
6) Coordinate with NRCS personnel with demonstration site activities (Task 5.3).

FY98 3rd Quarter Progress Report
Leon River Watershed Project
April 1, 1998 to June 30, 1998
TAES / Blackland Research Center
July 27, 1998

ACTIVITIES:

Program Element 1: Project planning and coordination

Task 1.1 Completed.
Task 1.2 Completed
Tasks 1.3 and 1.4 The last quarterly meeting for the Leon River Basin Water Quality Project took place on April 27, 1998 at Texas Agricultural Experiment Station—Blackland Research Center in Temple and at Tarleton State University in Stephenville, simultaneously, via TTVN (Trans Texas Video Network). TIAER, TAES, and NRCS personnel were present. Topics discussed included overall project progress, existing problems, project extension and administrative issues, and cooperative efforts needed for completion of tasks.

Program Element 2: Target geographic and problem areas using appropriate tools

Tasks 2.1 to 2.4 Completed.

Program Element 3: To target proper BMPs for implementation within the targeted priority watersheds

Tasks 3.1 and 3.2 NRCS personnel have provided the necessary information on typical farming practices in the area. Input files have been developed and EPIC runs have been performed. Runs have been performed using APEX to assess the potential impacts of filter strip BMPs.

Program Element 4: Monitoring for water quality effects

Task 4.1 Completed.
Task 4.2 Completed.
Task 4.3 Completed.
Task 4.4 Four microwatersheds installed on a landowner's property in southeast Coryell County will be removed on July 23, 1998.
Task 4.5 No water samples from storm events were collected during this quarter.
Task 4.6 Currently finalizing SAS programs to summarize the data and estimate loadings.

Program Element 5: Inform, educate and demonstrate proper BMPs

Tasks 5.1 to 5.3 A field day/workshop was held, on June 11, 1998, at Blackland Research Center, in Temple, TX, to demonstrate the proper use of BMP's and pesticide application techniques, in an effort to inform and educate local farmers.

Program Element 6: Track BMP implementation

Tasks 6.1 to 6.3 Sub-basins have been identified for BMP implementations.

PROJECTED ACTIVITIES (July to September 1998):

1) Begin working on the final report for the Leon River Watershed Water Quality Demonstration Project (Tasks 1.3 and 1.4).

APPENDIX I - SUPPORTING INFORMATION

Leon River Watershed Project: Bi-Weekly Grab samples
Station LE01 - Leon River @ Jonesboro (HWY 36 Bridge)

			Nitrate					Orthophosphate				
					Quality Assurance					Quality Assurance		
Sample Number	Laboratory ID Number	Collection Date	Analysis Date	Dionex Value (mg/L)	Holding Time	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding Time	Duplicate	Spike
1	2	9/11/95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	3	9/25/95	9/26/95	0.030	Compliant	NonCompliant	NonCompliant	9/26/95	0.006	Compliant	NonCompliant	NonCompliant
3	5	10/9/95	10/10/95	0.040	Compliant	NonCompliant	NonCompliant	10/10/95	0.020	Compliant	NonCompliant	NonCompliant
4	7	10/23/95	10/24/95	0.080	Compliant	NonCompliant	NonCompliant	10/24/95	0.000	Compliant	NonCompliant	NonCompliant
5	9	11/6/95	11/7/95	0.030	Compliant	NonCompliant	NonCompliant	11/7/95	0.000	Compliant	NonCompliant	NonCompliant
6	18	2/26/96	2/27/96	0.150	Compliant	NonCompliant	NonCompliant	2/27/96	0.005	Compliant	NonCompliant	NonCompliant
7	22	11/20/95	11/21/95	0.001	Compliant	NonCompliant	NonCompliant	11/21/95	0.000	Compliant	NonCompliant	NonCompliant
8	24	12/4/95	12/5/95	0.004	Compliant	NonCompliant	NonCompliant	12/5/95	0.005	Compliant	NonCompliant	NonCompliant
9	32	12/18/95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
10	33	12/18/95	12/19/95	0.040	Compliant	NonCompliant	NonCompliant	12/19/95	0.000	Compliant	NonCompliant	NonCompliant
11	51	4/8/96	4/9/96	0.760	Compliant	NonCompliant	NonCompliant	4/9/96	0.001	Compliant	NonCompliant	NonCompliant
12	72	4/22/96	4/22/96	0.012	Compliant	NonCompliant	NonCompliant	4/22/96	-0.001	Compliant	NonCompliant	NonCompliant
13	83	1/2/96	1/2/96	0.105	Compliant	NonCompliant	NonCompliant	1/2/96	0.000	Compliant	NonCompliant	NonCompliant
14	90	1/16/96	1/18/96	0.080	Compliant	NonCompliant	NonCompliant	1/18/96	0.000	Compliant	NonCompliant	NonCompliant
15	93	1/29/96	1/30/96	0.060	Compliant	NonCompliant	NonCompliant	1/30/96	0.001	Compliant	NonCompliant	NonCompliant
16	98	2/13/96	2/15/96	0.300	Compliant	NonCompliant	NonCompliant	2/15/96	0.002	Compliant	NonCompliant	NonCompliant
17	109	3/11/96	3/12/96	0.200	Compliant	NonCompliant	NonCompliant	3/12/96	0.009	Compliant	NonCompliant	NonCompliant
18	111	3/25/96	3/26/96	0.100	Compliant	NonCompliant	NonCompliant	3/26/96	0.008	Compliant	NonCompliant	NonCompliant
19	122	5/20/96	5/21/96	0.008	Compliant	NonCompliant	NonCompliant	5/21/96	-0.002	Compliant	NonCompliant	NonCompliant
20	153	6/17/96	6/18/96	0.381	Compliant	NonCompliant	NonCompliant	6/18/96	0.074	Compliant	NonCompliant	NonCompliant
21	166	5/6/96	5/7/96	0.016	Compliant	NonCompliant	NonCompliant	5/7/96	0.017	Compliant	NonCompliant	NonCompliant
22	398	6/3/96	6/4/96	0.419	Compliant	NonCompliant	NonCompliant	6/4/96	0.003	Compliant	NonCompliant	NonCompliant
23	496	7/1/96	7/3/96	0.999	Compliant	Compliant	Compliant	7/3/96	0.000	Compliant	NonCompliant	NonCompliant
24	515	7/15/96	7/15/96	0.023	Compliant	Compliant	Compliant	7/15/96	0.000	Compliant	Compliant	Compliant
25	540	7/29/96	7/29/96	0.035	Compliant	Compliant	Compliant	7/29/96	0.000	Compliant	Compliant	Compliant
26	565	8/12/96	8/12/96	0.189	Compliant	Compliant	Compliant	8/12/96	0.015	Compliant	Compliant	Compliant
27	608	8/26/96	8/26/96	1.340	Compliant	Compliant	Compliant	8/26/96	0.178	Compliant	Compliant	Compliant
28	709	9/10/96	9/10/96	0.616	Compliant	Compliant	Compliant	9/10/96	0.055	Compliant	Compliant	Compliant
29	749	9/20/96	9/20/96	0.618	Compliant	Compliant	Compliant	9/20/96	0.042	Compliant	Compliant	Compliant
30	780	10/7/96	10/7/96	0.724	Compliant	Compliant	Compliant	10/7/96	0.042	Compliant	Compliant	Compliant
31	801	10/22/96	10/22/96	1.256	Compliant	Compliant	Compliant	10/22/96	0.000	Compliant	NonCompliant	NonCompliant
32	803	10/28/96	11/1/96	7.298	NonCompliant	Compliant	Compliant	11/1/96	0.261	NonCompliant	Compliant	Compliant
33	843	11/5/96	11/6/96	1.202	Compliant	Compliant	Compliant	11/6/96	0.000	Compliant	Compliant	Compliant
34	876	11/18/96	11/18/96	0.369	Compliant	Compliant	Compliant	11/18/96	0.000	Compliant	Compliant	Compliant
35	912	12/2/96	12/2/96	1.211	Compliant	Compliant	Compliant	12/2/96	0.050	Compliant	Compliant	Compliant
36	1003	12/16/96	12/17/96	0.665	Compliant	NonCompliant	NonCompliant	12/17/96	0.000	Compliant	Compliant	Compliant
37	1043	1/6/97	1/8/97	1.181	Compliant	Compliant	Compliant	1/8/97	0.000	Compliant	Compliant	Compliant
38	1055	1/21/97	1/23/97	1.385	Compliant	Compliant	Compliant	1/23/97	0.000	Compliant	NonCompliant	NonCompliant
39	1070	2/3/97	2/4/97	0.442	Compliant	Compliant	Compliant	2/4/97	0.000	Compliant	Compliant	Compliant
40	1153	2/17/97	2/17/97	1.529	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
41	1205	3/2/97	3/4/97	1.304	Compliant	Compliant	Compliant	3/4/97	0.000	Compliant	Compliant	Compliant
42	1276	3/19/97	3/19/97	1.265	Compliant	Compliant	Compliant	3/19/97	0.051	Compliant	Compliant	Compliant
43	1308	4/1/97	4/2/97	0.997	Compliant	Compliant	Compliant	4/2/97	0.000	Compliant	NonCompliant	NonCompliant
44	1399	4/17/97	4/17/97	0.891	Compliant	Compliant	Compliant	4/17/97	0.000	Compliant	NonCompliant	NonCompliant
45	1494	5/13/97	5/17/97	1.862	NonCompliant	Compliant	Compliant	5/17/97	0.000	NonCompliant	NonCompliant	NonCompliant
46	1567	5/20/97	6/3/97	1.675	NonCompliant	Compliant	Compliant	6/3/97	0.063	NonCompliant	Compliant	Compliant
47	1737	7/17/97	7/18/97	0.533	Compliant	Compliant	Compliant	7/18/97	0.000	Compliant	NonCompliant	NonCompliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Bi-Weekly Grab samples

Station LE01 - Leon River @ Jonesboro (HWY 36 Bridge)

			Total Suspended Solids (sediment)				Fecal Coliform Bacteria			Field Measured Water Parameters		
			Analysis	Gravimetric	Quality Assurance		Analysis	Bacterial Count	Quality Assurance	pH	Temperature	Dissolved Oxygen
Sample Number	Laboratory ID Number	Collection Date	Date	(mg/L)	Holding Time	Duplicate	Date	(colonies/100ml)	Blanks		(Centigrade)	(mg/L)
1	2	9/11/95	9/12/95	191.6	Compliant	Compliant	NA	NA	NA	8.02	25.90	6.77
2	3	9/25/95	9/26/95	178.4	Compliant	Compliant	NA	NA	NA	7.60	20.90	8.43
3	5	10/9/95	10/10/95	73.7	Compliant	Compliant	NA	NA	NA	7.56	20.20	8.23
4	7	10/23/95	10/24/95	35.0	Compliant	Compliant	NA	NA	NA	7.76	18.60	9.50
5	9	11/6/95	11/8/95	26.0	Compliant	Compliant	NA	NA	NA	8.05	14.50	10.88
6	18	2/26/96	2/27/96	40.9	Compliant	Compliant	2/26/96	73	Compliant	8.15	16.70	7.92
7	22	11/20/95	11/21/95	35.7	Compliant	Compliant	NA	NA	NA	7.83	15.10	9.98
8	24	12/4/95	12/5/95	26.0	Compliant	Compliant	NA	NA	NA	7.83	13.50	10.13
9	32	12/18/95	NA	NA	NA	NA	12/18/95	386	Compliant	NA	NA	NA
10	33	12/18/95	12/19/95	31.0	Compliant	Compliant	NA	NA	NA	NA	12.70	9.21
11	51	4/8/96	4/8/96	378.2	Compliant	Compliant	4/8/96	1092	Compliant	7.98	14.10	9.50
12	72	4/22/96	4/22/96	99.5	Compliant	Compliant	4/22/96	250	Compliant	7.91	20.90	6.27
13	83	1/2/96	1/3/96	16.5	Compliant	Compliant	1/2/96	133	Compliant	7.35	8.70	11.42
14	90	1/16/96	1/18/96	10.3	Compliant	Compliant	1/16/96	57	Compliant	8.07	10.50	12.23
15	93	1/29/96	1/29/96	10.4	Compliant	Compliant	1/29/96	80	Compliant	8.33	7.90	11.47
16	98	2/13/96	2/16/96	32.4	Compliant	Compliant	2/13/96	87	Compliant	8.49	10.00	11.13
17	109	3/11/96	3/11/96	21.1	Compliant	Compliant	3/11/96	40	Compliant	8.32	10.20	12.32
18	111	3/25/96	3/25/96	42.7	Compliant	Compliant	3/25/96	96	Compliant	8.27	15.20	9.88
19	122	5/20/96	5/21/96	49.6	Compliant	Compliant	5/20/96	53	Compliant	7.92	25.10	5.21
20	153	6/17/96	6/18/96	98.5	Compliant	Compliant	6/17/96	284	Compliant	7.98	28.10	6.27
21	166	5/6/96	5/7/96	74.2	Compliant	Compliant	5/6/96	20	Compliant	7.98	23.80	0.00
22	398	6/3/96	6/4/96	628.0	Compliant	Compliant	NA	NA	NA	7.54	25.30	5.69
23	496	7/1/96	7/3/96	34.3	Compliant	Compliant	7/1/96	192	Compliant	7.80	28.20	5.51
24	515	7/15/96	7/22/96	32.8	Compliant	Compliant	7/15/96	530	Compliant	7.78	26.50	4.43
25	540	7/29/96	8/1/96	14.2	Compliant	Compliant	7/29/96	70	Compliant	7.63	29.10	5.61
26	565	8/12/96	8/13/96	59.8	Compliant	Compliant	8/12/96	20000	Compliant	7.51	25.90	4.62
27	608	8/26/96	8/27/96	136.4	Compliant	Compliant	8/26/96	1600	Compliant	7.89	23.60	6.57
28	709	9/10/96	9/23/96	227.5	NonCompliant	Compliant	9/10/96	203	Compliant	NA	NA	NA
29	749	9/20/96	10/2/96	250.5	NonCompliant	Compliant	NA	NA	NA	NA	NA	NA
30	780	10/7/96	10/28/96	138.6	NonCompliant	Compliant	10/7/96	134	Compliant	NA	NA	NA
31	801	10/22/96	10/28/96	51.8	Compliant	Compliant	10/22/96	253	Compliant	7.88	18.50	NA
32	803	10/28/96	10/28/96	1533.0	Compliant	Compliant	NA	NA	NA	NA	NA	NA
33	843	11/5/96	11/4/96	122.0	Compliant	Compliant	11/5/96	115	Compliant	7.82	15.90	9.63
34	876	11/18/96	11/25/96	89.7	Compliant	Compliant	11/18/96	423	Compliant	7.94	16.40	8.82
35	912	12/2/96	12/9/96	212.8	Compliant	Compliant	12/2/96	1380	Compliant	8.09	9.70	10.65
36	1003	12/16/96	12/20/96	82.2	Compliant	Compliant	12/16/96	770	Compliant	8.10	10.80	10.70
37	1043	1/6/97	1/9/97	4.8	Compliant	Compliant	1/6/97	85	Compliant	8.09	12.20	10.16
38	1055	1/21/97	1/28/97	18.0	Compliant	Compliant	1/21/97	105	Compliant	8.21	8.80	11.46
39	1070	2/3/97	2/5/97	14.9	Compliant	Compliant	2/3/97	40	Compliant	8.15	10.90	10.65
40	1153	2/17/97	2/26/97	213.0	NonCompliant	onCompliant	2/17/97	350	Compliant	8.18	9.30	10.90
41	1205	3/2/97	3/17/97	883.2	NonCompliant	onCompliant	NA	NA	NA	NA	NA	NA
42	1276	3/19/97	4/9/97	304.6	NonCompliant	Compliant	3/19/97	100	Compliant	8.10	13.70	9.32
43	1308	4/1/97	4/9/97	205.0	NonCompliant	Compliant	4/1/97	60	Compliant	7.89	16.00	8.99
44	1399	4/17/97	4/19/97	216.2	Compliant	Compliant	4/17/97	630	Compliant	7.97	16.80	8.84
45	1494	5/13/97	5/21/97	273.5	NonCompliant	Compliant	5/13/97	525	Compliant	7.94	19.40	8.00
46	1567	5/20/97	5/26/97	272.0	Compliant	Compliant	NA	NA	NA	NA	25.20	6.96
47	1737	7/17/97	7/21/97	225.8	Compliant	Compliant	7/17/97	100	Compliant	NA	NA	NA

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP

For calculation details see QAPP and Laboratory QC Reports

Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours

Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery

Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples
Station LE01 - Leon River @ Jonesboro (HWY 36 Bridge)

					Nitrate					Orthophosphate				
							Quality Assurance					Quality Assurance		
Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Analysis Date	Dionex Value (mg/L)	Holding	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding	Duplicate	Spike
1	41	4/6/96	1	04	4/8/96	0.250	Compliant	NonCompliant	NonCompliant	4/8/96	0.001	Compliant	NonCompliant	NonCompliant
2	42	4/6/96	1	05	4/8/96	0.230	Compliant	NonCompliant	NonCompliant	4/8/96	0.001	Compliant	NonCompliant	NonCompliant
3	43	4/6/96	1	06	4/8/96	0.210	Compliant	NonCompliant	NonCompliant	4/8/96	0.001	Compliant	NonCompliant	NonCompliant
4	44	4/8/96	2	14	4/8/96	0.560	Compliant	NonCompliant	NonCompliant	4/8/96	0.001	Compliant	NonCompliant	NonCompliant
5	332	6/1/96	3	06	6/1/96	0.463	Compliant	NonCompliant	NonCompliant	6/1/96	0.007	Compliant	NonCompliant	NonCompliant
6	333	6/1/96	3	07	6/3/96	0.249	Compliant	NonCompliant	NonCompliant	6/3/96	0.001	Compliant	NonCompliant	NonCompliant
7	334	6/1/96	3	08	6/3/96	0.643	Compliant	NonCompliant	NonCompliant	6/3/96	0.040	Compliant	NonCompliant	NonCompliant
8	335	6/2/96	3	09	6/3/96	0.632	Compliant	NonCompliant	NonCompliant	6/3/96	0.022	Compliant	NonCompliant	NonCompliant
9	336	6/2/96	3	10	6/4/96	0.381	Compliant	NonCompliant	NonCompliant	6/4/96	0.001	Compliant	NonCompliant	NonCompliant
10	337	6/2/96	3	11	6/4/96	0.341	Compliant	NonCompliant	NonCompliant	6/4/96	0.001	Compliant	NonCompliant	NonCompliant
11	338	6/3/96	3	12	6/4/96	0.454	Compliant	NonCompliant	NonCompliant	6/4/96	0.002	Compliant	NonCompliant	NonCompliant
12	339	6/3/96	3	13	6/4/96	0.422	Compliant	NonCompliant	NonCompliant	6/4/96	0.001	Compliant	NonCompliant	NonCompliant
13	340	6/3/96	3	14	6/5/96	0.430	Compliant	NonCompliant	NonCompliant	6/5/96	0.000	Compliant	NonCompliant	NonCompliant
14	341	6/4/96	3	15	6/5/96	0.426	Compliant	NonCompliant	NonCompliant	6/5/96	0.002	Compliant	NonCompliant	NonCompliant
15	342	6/4/96	3	16	6/5/96	0.299	Compliant	NonCompliant	NonCompliant	6/5/96	0.002	Compliant	NonCompliant	NonCompliant
16	343	6/4/96	3	17	6/5/96	0.236	Compliant	NonCompliant	NonCompliant	6/5/96	0.002	Compliant	NonCompliant	NonCompliant
17	344	6/5/96	3	19	6/7/96	0.261	Compliant	NonCompliant	NonCompliant	6/7/96	0.002	Compliant	NonCompliant	NonCompliant
18	345	6/5/96	3	20	6/7/96	0.223	Compliant	NonCompliant	NonCompliant	6/7/96	0.001	Compliant	NonCompliant	NonCompliant
19	346	6/6/96	3	21	6/7/96	0.233	Compliant	NonCompliant	NonCompliant	6/7/96	0.003	Compliant	NonCompliant	NonCompliant
20	347	6/6/96	3	22	6/7/96	0.279	Compliant	NonCompliant	NonCompliant	6/7/96	0.011	Compliant	NonCompliant	NonCompliant
21	368	5/31/96	3	01	6/1/96	0.443	Compliant	NonCompliant	NonCompliant	6/1/96	0.002	Compliant	NonCompliant	NonCompliant
22	369	5/31/96	3	02	6/1/96	0.451	Compliant	NonCompliant	NonCompliant	6/1/96	0.003	Compliant	NonCompliant	NonCompliant
23	370	5/31/96	3	05	6/1/96	0.387	Compliant	NonCompliant	NonCompliant	6/1/96	0.014	Compliant	NonCompliant	NonCompliant
24	444	6/7/96	3	03	6/10/96	0.461	NonCompliant	NonCompliant	NonCompliant	6/10/96	0.001	NonCompliant	NonCompliant	NonCompliant
25	445	6/7/96	3	04	6/10/96	0.454	NonCompliant	NonCompliant	NonCompliant	6/10/96	0.001	NonCompliant	NonCompliant	NonCompliant
26	446	6/7/96	3	05	6/10/96	0.570	NonCompliant	NonCompliant	NonCompliant	6/10/96	0.002	NonCompliant	NonCompliant	NonCompliant
27	447	6/8/96	3	06	6/10/96	0.441	Compliant	NonCompliant	NonCompliant	6/10/96	0.002	Compliant	NonCompliant	NonCompliant
28	448	6/8/96	3	07	6/10/96	0.321	Compliant	NonCompliant	NonCompliant	6/10/96	0.002	Compliant	NonCompliant	NonCompliant
29	449	6/8/96	3	08	6/10/96	0.315	Compliant	NonCompliant	NonCompliant	6/10/96	0.002	Compliant	NonCompliant	NonCompliant
30	450	6/9/96	3	09	6/10/96	0.345	Compliant	NonCompliant	NonCompliant	6/10/96	0.131	Compliant	NonCompliant	NonCompliant
31	451	6/9/96	3	10	6/12/96	0.425	NonCompliant	NonCompliant	NonCompliant	6/12/96	0.004	NonCompliant	NonCompliant	NonCompliant
32	452	6/9/96	3	11	6/12/96	0.440	NonCompliant	NonCompliant	NonCompliant	6/12/96	0.002	NonCompliant	NonCompliant	NonCompliant
33	453	6/10/96	3	12	6/12/96	0.443	Compliant	NonCompliant	NonCompliant	6/12/96	0.002	Compliant	NonCompliant	NonCompliant
34	582	8/12/96	4	01	8/16/96	0.085	NonCompliant	Compliant	Compliant	8/16/96	0.097	NonCompliant	Compliant	Compliant
35	583	8/12/96	4	02	8/16/96	0.033	NonCompliant	Compliant	Compliant	8/16/96	0.000	NonCompliant	Compliant	Compliant
36	584	8/12/96	4	03	8/16/96	0.058	NonCompliant	Compliant	Compliant	8/16/96	0.000	NonCompliant	Compliant	Compliant
37	585	8/12/96	4	04	8/16/96	0.093	NonCompliant	Compliant	Compliant	8/16/96	0.000	NonCompliant	Compliant	Compliant
38	586	8/13/96	4	05	8/16/96	0.166	NonCompliant	Compliant	Compliant	8/16/96	0.000	NonCompliant	Compliant	Compliant
39	587	8/13/96	4	06	8/16/96	0.116	NonCompliant	Compliant	Compliant	8/16/96	0.000	NonCompliant	Compliant	Compliant
40	589	8/13/96	4	07	8/16/96	0.100	NonCompliant	Compliant	Compliant	8/16/96	0.000	NonCompliant	Compliant	Compliant
41	590	8/13/96	4	08	8/16/96	0.112	NonCompliant	Compliant	Compliant	8/16/96	0.000	NonCompliant	Compliant	Compliant
42	591	8/14/96	4	09	8/16/96	0.116	Compliant	Compliant	Compliant	8/16/96	0.000	Compliant	Compliant	Compliant
43	592	8/14/96	4	10	8/16/96	0.115	Compliant	Compliant	Compliant	8/16/96	0.000	Compliant	Compliant	Compliant
44	593	8/14/96	4	11	8/16/96	0.118	Compliant	Compliant	Compliant	8/16/96	0.000	Compliant	Compliant	Compliant
45	594	8/15/96	4	12	8/16/96	0.023	Compliant	Compliant	Compliant	8/16/96	0.000	Compliant	Compliant	Compliant
46	595	8/15/96	4	13	8/16/96	0.100	Compliant	Compliant	Compliant	8/16/96	0.000	Compliant	Compliant	Compliant
47	596	8/15/96	4	14	8/16/96	0.128	Compliant	Compliant	Compliant	8/16/96	0.000	Compliant	Compliant	Compliant
48	597	8/16/96	4	15	8/16/96	0.117	Compliant	Compliant	Compliant	8/16/96	0.000	Compliant	Compliant	Compliant
49	598	8/18/96	5	01	8/19/96	0.007	Compliant	Compliant	Compliant	8/19/96	0.000	Compliant	Compliant	Compliant
50	599	8/18/96	5	02	8/19/96	0.009	Compliant	Compliant	Compliant	8/19/96	0.000	Compliant	Compliant	Compliant

Leon River Watershed Project: Storm Samples

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					Nitrate					Orthophosphate				
								Quality Assurance					Quality Assurance	
Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Analysis Date	Dionex Value (mg/L)	Holding	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding	Duplicate	Spike
51	600	8/18/96	5	03	8/19/96	0.057	Compliant	Compliant	Compliant	8/19/96	0.000	Compliant	Compliant	Compliant
52	601	8/18/96	5	04	8/19/96	0.165	Compliant	Compliant	Compliant	8/19/96	0.000	Compliant	Compliant	Compliant
53	602	8/18/96	5	05	8/19/96	0.212	Compliant	Compliant	Compliant	8/19/96	0.000	Compliant	Compliant	Compliant
54	603	8/19/96	5	06	8/19/96	0.254	Compliant	Compliant	Compliant	8/19/96	0.000	Compliant	Compliant	Compliant
55	604	8/19/96	5	07	8/19/96	0.263	Compliant	Compliant	Compliant	8/19/96	0.000	Compliant	Compliant	Compliant
56	605	8/19/96	5	08	8/20/96	0.174	Compliant	Compliant	Compliant	8/20/96	0.000	Compliant	Compliant	Compliant
57	606	8/20/96	5	09	8/20/96	0.183	Compliant	Compliant	Compliant	8/20/96	0.000	Compliant	Compliant	Compliant
58	607	8/20/96	5	10	8/20/96	0.194	Compliant	Compliant	Compliant	8/20/96	0.000	Compliant	Compliant	Compliant
59	615	8/24/96	6	01	8/27/96	0.793	NonCompliant	Compliant	Compliant	8/27/96	0.000	NonCompliant	Compliant	Compliant
60	616	8/24/96	6	02	8/27/96	1.030	NonCompliant	Compliant	Compliant	8/27/96	0.000	NonCompliant	Compliant	Compliant
61	617	8/24/96	6	03	8/27/96	0.873	NonCompliant	Compliant	Compliant	8/27/96	0.000	NonCompliant	Compliant	Compliant
62	618	8/25/96	6	05	8/27/96	1.398	Compliant	Compliant	Compliant	8/27/96	0.050	Compliant	Compliant	Compliant
63	619	8/25/96	6	06	8/27/96	0.986	Compliant	Compliant	Compliant	8/27/96	0.000	Compliant	Compliant	Compliant
64	620	8/25/96	6	07	8/27/96	0.459	Compliant	Compliant	Compliant	8/27/96	0.000	Compliant	Compliant	Compliant
65	621	8/25/96	6	08	8/27/96	0.764	Compliant	Compliant	Compliant	8/27/96	0.073	Compliant	Compliant	Compliant
66	622	8/26/96	6	09	8/27/96	1.286	Compliant	Compliant	Compliant	8/27/96	0.130	Compliant	Compliant	Compliant
67	649	8/29/96	7	01	9/2/96	NA	NA	NA	NA	NA	NA	NA	NA	NA
68	650	8/29/96	7	02	9/2/96	NA	NA	NA	NA	NA	NA	NA	NA	NA
69	651	8/29/96	7	03	9/2/96	NA	NA	NA	NA	NA	NA	NA	NA	NA
70	708	8/29/96	7	25	9/11/96	1.448	NonCompliant	Compliant	Compliant	9/11/96	0.084	NonCompliant	Compliant	Compliant
71	716	9/15/96	8	01	9/20/96	0.452	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
72	717	9/15/96	8	02	9/20/96	0.150	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
73	718	9/15/96	8	03	9/20/96	0.211	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
74	719	9/15/96	8	04	9/20/96	0.341	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
75	720	9/15/96	8	05	9/20/96	0.184	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
76	721	9/16/96	8	06	9/20/96	0.000	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
77	722	9/16/96	8	07	9/20/96	0.000	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
78	723	9/16/96	8	08	9/20/96	0.000	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
79	724	9/17/96	8	09	9/20/96	0.000	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
80	725	9/17/96	8	10	9/20/96	0.000	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
81	726	9/17/96	8	11	9/20/96	0.000	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
82	727	9/18/96	8	12	9/20/96	0.000	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
83	728	9/18/96	8	13	9/20/96	0.124	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
84	729	9/18/96	8	14	9/20/96	0.123	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
85	730	9/19/96	8	15	9/20/96	0.401	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
86	731	9/19/96	8	16	9/20/96	0.478	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
87	746	8/30/96	8	26	9/11/96	1.014	NonCompliant	Compliant	Compliant	9/11/96	0.171	NonCompliant	Compliant	Compliant
88	747	9/1/96	8	27	9/11/96	0.574	NonCompliant	Compliant	Compliant	9/11/96	0.000	NonCompliant	Compliant	Compliant
89	756	9/20/96	8	01	10/2/96	0.000	NonCompliant	Compliant	Compliant	10/2/96	0.000	NonCompliant	Compliant	Compliant
90	757	9/20/96	8	02	10/2/96	0.576	NonCompliant	Compliant	Compliant	10/2/96	0.000	NonCompliant	Compliant	Compliant
91	758	9/20/96	8	03	10/2/96	0.364	NonCompliant	Compliant	Compliant	10/2/96	0.000	NonCompliant	Compliant	Compliant
92	759	9/20/96	8	04	10/2/96	0.520	NonCompliant	Compliant	Compliant	10/2/96	0.000	NonCompliant	Compliant	Compliant
93	774	9/22/96	9	10	9/23/96	0.474	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
94	775	9/23/96	9	11	9/23/96	0.299	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
95	776	9/23/96	9	12	9/23/96	0.223	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
96	777	9/23/96	9	13	9/23/96	0.435	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
97	778	9/24/96	9	14	9/24/96	0.553	Compliant	Compliant	Compliant	9/24/96	0.000	Compliant	Compliant	Compliant
98	779	9/24/96	9	15	9/24/96	0.663	Compliant	Compliant	Compliant	9/24/96	0.000	Compliant	Compliant	Compliant
99	800	9/3/96	9	28	9/11/96	1.109	NonCompliant	Compliant	Compliant	9/11/96	0.137	NonCompliant	Compliant	Compliant
100	807	10/28/96	10	01	10/29/96	1.330	Compliant	Compliant	Compliant	10/29/96	0.078	Compliant	Compliant	Compliant

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Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
101	808	10/28/96	10	02	10/29/96	1.655	Compliant	Compliant	Compliant	10/29/96	0.000	Compliant	Compliant	Compliant
102	809	10/28/96	10	03	10/29/96	1.730	Compliant	Compliant	Compliant	10/29/96	0.000	Compliant	Compliant	Compliant
103	810	10/28/96	10	04	10/29/96	1.831	Compliant	Compliant	Compliant	10/29/96	0.000	Compliant	Compliant	Compliant
104	811	10/28/96	10	05	10/29/96	1.654	Compliant	Compliant	Compliant	10/29/96	0.000	Compliant	Compliant	Compliant
105	812	10/29/96	10	06	10/29/96	1.361	Compliant	Compliant	Compliant	10/29/96	0.000	Compliant	Compliant	Compliant
106	813	10/29/96	10	07	10/29/96	1.330	Compliant	Compliant	Compliant	10/29/96	0.000	Compliant	Compliant	Compliant
107	814	10/29/96	10	08	10/30/96	1.433	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
108	815	10/30/96	10	09	10/30/96	1.037	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
109	816	10/30/96	10	10	10/30/96	1.158	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
110	827	10/30/96	10	11	11/1/96	1.191	Compliant	Compliant	Compliant	11/1/96	0.056	Compliant	Compliant	Compliant
111	828	10/31/96	10	12	11/1/96	1.020	Compliant	Compliant	Compliant	11/1/96	0.087	Compliant	Compliant	Compliant
112	829	10/31/96	10	13	11/1/96	1.040	Compliant	Compliant	Compliant	11/1/96	0.850	Compliant	Compliant	Compliant
113	830	10/31/96	10	14	11/1/96	1.131	Compliant	Compliant	Compliant	11/1/96	0.081	Compliant	Compliant	Compliant
114	831	11/1/96	10	15	11/1/96	1.218	Compliant	Compliant	Compliant	11/1/96	0.088	Compliant	Compliant	Compliant
115	832	11/1/96	10	16	11/1/96	1.512	Compliant	Compliant	Compliant	11/1/96	0.125	Compliant	Compliant	Compliant
116	847	11/7/96	11	01	11/8/96	0.751	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
117	848	11/7/96	11	02	11/8/96	1.163	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
118	849	11/7/96	11	03	11/8/96	0.930	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
119	850	11/7/96	11	04	11/8/96	0.901	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
120	851	11/7/96	11	05	11/8/96	0.911	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
121	852	11/7/96	11	06	11/8/96	0.833	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
122	853	11/8/96	11	07	11/8/96	1.867	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
123	854	11/8/96	11	08	11/8/96	1.409	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
124	865	11/8/96	11	09	11/10/96	0.923	Compliant	Compliant	Compliant	11/10/96	0.053	Compliant	NonCompliant	NonCompliant
125	866	11/9/96	11	10	11/10/96	0.714	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
126	867	11/9/96	11	11	11/10/96	0.902	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
127	868	11/9/96	11	12	11/10/96	1.186	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
128	869	11/10/96	11	13	11/10/96	1.010	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
129	914	11/29/96	12	01	12/2/96	0.539	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
130	915	11/29/96	12	02	12/2/96	1.020	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
131	916	11/29/96	12	03	12/2/96	1.050	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
132	917	11/29/96	12	04	12/2/96	1.157	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
133	918	11/29/96	12	05	12/2/96	0.290	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
134	919	11/30/96	12	06	12/2/96	1.339	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
135	920	11/30/96	12	07	12/2/96	2.056	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
136	921	11/30/96	12	08	12/2/96	1.043	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
137	922	12/1/96	12	09	12/2/96	0.806	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
138	923	12/1/96	12	10	12/2/96	0.739	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
139	924	12/1/96	12	11	12/2/96	0.810	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
140	925	12/2/96	12	12	12/2/96	0.972	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
141	926	12/2/96	12	13	12/2/96	1.131	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
142	959	12/2/96	12	14	12/4/96	1.223	Compliant	Compliant	Compliant	12/4/96	0.000	Compliant	Compliant	Compliant
143	960	12/3/96	12	15	12/4/96	0.977	Compliant	Compliant	Compliant	12/4/96	0.043	Compliant	Compliant	Compliant
144	961	12/3/96	12	16	12/4/96	0.000	Compliant	Compliant	Compliant	12/4/96	0.000	Compliant	Compliant	Compliant
145	962	12/3/96	12	17	12/4/96	0.000	Compliant	Compliant	Compliant	12/4/96	0.000	Compliant	Compliant	Compliant
146	963	12/4/96	12	18	12/4/96	0.770	Compliant	Compliant	Compliant	12/4/96	0.000	Compliant	Compliant	Compliant
147	964	12/4/96	12	19	12/4/96	0.800	Compliant	Compliant	Compliant	12/4/96	0.000	Compliant	Compliant	Compliant
148	1088	2/12/97	13	19	2/13/97	0.950	Compliant	Compliant	Compliant	2/13/97	0.000	Compliant	NonCompliant	NonCompliant
149	1089	2/12/97	13	20	2/13/97	1.146	Compliant	Compliant	Compliant	2/13/97	0.000	Compliant	NonCompliant	NonCompliant
150	1090	2/7/97	13	25	2/13/97	7.463	NonCompliant	Compliant	Compliant	2/13/97	3.689	NonCompliant	NonCompliant	NonCompliant

Leon River Watershed Project: Storm Samples

Station LE01 - Leon River @ Jonesboro (HWY 36 Bridge)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
151	1140	2/13/97	13	01	2/14/97	1.653	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
152	1141	2/13/97	13	02	2/14/97	1.649	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
153	1142	2/12/97	13	03	2/14/97	1.571	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
154	1143	2/13/97	13	04	2/14/97	1.544	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
155	1144	2/13/97	13	05	2/14/97	1.417	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
156	1145	2/14/97	13	06	2/14/97	1.275	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
157	1146	2/14/97	13	07	2/14/97	1.607	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
158	1150	2/14/97	13	08	2/16/97	1.900	Compliant	Compliant	Compliant	2/16/97	0.000	Compliant	Compliant	Compliant
159	1151	2/15/97	13	09	2/16/97	1.917	Compliant	Compliant	Compliant	2/16/97	0.000	Compliant	Compliant	Compliant
160	1152	2/15/97	13	10	2/16/97	1.856	Compliant	Compliant	Compliant	2/16/97	0.000	Compliant	Compliant	Compliant
161	1155	2/15/97	13	11	2/17/97	1.779	Compliant	Compliant	Compliant	2/17/97	0.044	Compliant	Compliant	Compliant
162	1156	2/16/97	13	12	2/17/97	2.210	Compliant	Compliant	Compliant	2/17/97	0.108	Compliant	Compliant	Compliant
163	1157	2/16/97	13	13	2/17/97	2.123	Compliant	Compliant	Compliant	2/17/97	0.094	Compliant	Compliant	Compliant
164	1158	2/16/97	13	14	2/17/97	2.121	Compliant	Compliant	Compliant	2/17/97	0.053	Compliant	Compliant	Compliant
165	1159	2/17/97	13	15	2/17/97	1.642	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
166	1160	2/17/97	13	16	2/17/97	1.495	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
167	1225	3/7/97	14	01	3/7/97	1.251	Compliant	Compliant	Compliant	3/7/97	0.055	Compliant	NonCompliant	NonCompliant
168	1232	3/7/97	14	02	3/7/97	1.459	Compliant	Compliant	Compliant	3/7/97	0.000	Compliant	NonCompliant	NonCompliant
169	1233	3/8/97	14	03	3/10/97	1.404	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
170	1234	3/8/97	14	04	3/10/97	1.364	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
171	1235	3/8/97	14	05	3/10/97	1.297	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
172	1236	3/9/97	14	06	3/10/97	1.253	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
173	1237	3/9/97	14	07	3/10/97	1.212	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
174	1238	3/9/97	14	08	3/10/97	1.176	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
175	1239	3/10/97	14	09	3/10/97	0.985	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
176	1258	3/10/97	14	10	3/11/97	0.988	Compliant	Compliant	Compliant	3/11/97	0.000	Compliant	Compliant	Compliant
177	1259	3/10/97	14	11	3/11/97	0.892	Compliant	Compliant	Compliant	3/11/97	0.000	Compliant	Compliant	Compliant
178	1260	3/11/97	14	12	3/11/97	1.198	Compliant	Compliant	Compliant	3/11/97	0.000	Compliant	Compliant	Compliant
179	1266	3/11/97	14	25	3/14/97	1.151	NonCompliant	NonCompliant	NonCompliant	3/14/97	0.000	NonCompliant	NonCompliant	NonCompliant
180	1272	3/13/97	15	18	3/14/97	1.097	Compliant	NonCompliant	NonCompliant	3/14/97	0.000	Compliant	NonCompliant	NonCompliant
181	1273	3/13/97	15	19	3/14/97	0.981	Compliant	NonCompliant	NonCompliant	3/14/97	0.000	Compliant	NonCompliant	NonCompliant
182	1274	3/13/97	15	20	3/14/97	1.011	Compliant	Compliant	Compliant	3/14/97	0.000	Compliant	NonCompliant	NonCompliant
183	1275	3/14/97	15	21	3/14/97	1.031	Compliant	Compliant	Compliant	3/14/97	0.000	Compliant	NonCompliant	NonCompliant
184	1310	4/4/97	16	01	4/6/97	0.000	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
185	1311	4/4/97	16	02	4/6/97	1.094	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
186	1312	4/4/97	16	03	4/6/97	1.130	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
187	1313	4/4/97	16	04	4/6/97	1.293	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
188	1314	4/4/97	16	05	4/6/97	1.162	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
189	1315	4/4/97	16	06	4/6/97	1.226	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
190	1316	4/5/97	16	07	4/6/97	1.251	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
191	1317	4/5/97	16	08	4/6/97	1.236	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
192	1318	4/5/97	16	09	4/6/97	1.439	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
193	1319	4/6/97	16	10	4/6/97	1.197	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
194	1377	4/6/97	16	11	4/8/97	1.542	Compliant	Compliant	Compliant	4/8/97	0.000	Compliant	NonCompliant	NonCompliant
195	1378	4/6/97	16	12	4/8/97	1.955	Compliant	Compliant	Compliant	4/8/97	0.048	Compliant	NonCompliant	NonCompliant
196	1379	4/7/97	16	13	4/8/97	1.471	Compliant	Compliant	Compliant	4/8/97	0.072	Compliant	NonCompliant	NonCompliant
197	1380	4/7/97	16	14	4/8/97	1.529	Compliant	Compliant	Compliant	4/8/97	0.071	Compliant	NonCompliant	NonCompliant
198	1381	4/7/97	16	15	4/8/97	1.571	Compliant	Compliant	Compliant	4/8/97	0.074	Compliant	NonCompliant	NonCompliant
199	1382	4/8/97	16	16	4/8/97	1.434	Compliant	Compliant	Compliant	4/8/97	0.056	Compliant	NonCompliant	NonCompliant
200	1401	4/25/97	17	01	5/1/97	0.000	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant

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201	1402	4/26/97	17	06	5/1/97	1.487	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
202	1403	4/28/97	17	11	5/1/97	1.962	NonCompliant	Compliant	Compliant	5/1/97	0.047	NonCompliant	NonCompliant	NonCompliant
203	1455	5/10/97	18	03	5/16/97	3.053	NonCompliant	Compliant	Compliant	5/16/97	0.073	NonCompliant	NonCompliant	NonCompliant
204	1456	5/11/97	18	06	5/16/97	2.266	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
205	1457	5/11/97	18	08	5/16/97	2.384	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
206	1521	5/14/97	19	01	5/17/97	0.645	NonCompliant	Compliant	Compliant	5/17/97	0.000	NonCompliant	NonCompliant	NonCompliant
207	1522	5/14/97	19	06	5/18/97	0.952	NonCompliant	Compliant	Compliant	5/18/97	0.000	NonCompliant	NonCompliant	NonCompliant
208	1523	5/15/97	19	08	5/18/97	0.757	NonCompliant	Compliant	Compliant	5/18/97	0.000	NonCompliant	NonCompliant	NonCompliant
209	1524	5/15/97	19	09	5/18/97	0.754	NonCompliant	Compliant	Compliant	5/18/97	0.548	NonCompliant	NonCompliant	NonCompliant
210	1525	5/16/97	19	10	5/18/97	0.698	Compliant	Compliant	Compliant	5/18/97	0.000	Compliant	NonCompliant	NonCompliant
211	1526	5/16/97	19	11	5/18/97	1.012	Compliant	Compliant	Compliant	5/18/97	0.000	Compliant	NonCompliant	NonCompliant
212	1527	5/16/97	19	12	5/18/97	1.094	Compliant	Compliant	Compliant	5/18/97	0.000	Compliant	NonCompliant	NonCompliant
213	1528	5/17/97	19	13	5/18/97	1.435	Compliant	Compliant	Compliant	5/18/97	0.000	Compliant	NonCompliant	NonCompliant
214	1529	5/17/97	19	14	5/18/97	1.273	Compliant	Compliant	Compliant	5/18/97	0.000	Compliant	NonCompliant	NonCompliant
215	1535	5/17/97	19	15	5/20/97	2.313	NonCompliant	Compliant	Compliant	5/20/97	0.000	NonCompliant	NonCompliant	NonCompliant
216	1536	5/18/97	19	16	5/20/97	1.993	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
217	1537	5/18/97	19	17	5/20/97	1.629	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
218	1538	5/18/97	19	18	5/20/97	1.407	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
219	1539	5/19/97	19	19	5/20/97	1.091	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
220	1564	5/24/97	20	01	6/3/97	0.240	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
221	1565	5/25/97	20	06	6/3/97	1.414	NonCompliant	Compliant	Compliant	6/3/97	0.060	NonCompliant	Compliant	Compliant
222	1566	5/25/97	20	08	6/3/97	1.067	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
223	1609	6/8/97	21	01	6/10/97	0.331	Compliant	Compliant	Compliant	6/10/97	0.064	Compliant	Compliant	Compliant
224	1610	6/8/97	21	02	6/10/97	0.906	Compliant	Compliant	Compliant	6/10/97	0.000	Compliant	Compliant	Compliant
225	1611	6/9/97	21	03	6/10/97	1.049	Compliant	Compliant	Compliant	6/10/97	0.000	Compliant	Compliant	Compliant
226	1612	6/9/97	21	04	6/10/97	0.902	Compliant	Compliant	Compliant	6/10/97	0.000	Compliant	Compliant	Compliant
227	1613	6/9/97	21	05	6/10/97	1.529	Compliant	Compliant	Compliant	6/10/97	0.000	Compliant	Compliant	Compliant
228	1645	6/9/97	21	06	6/11/97	0.731	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
229	1646	6/9/97	21	07	6/11/97	0.541	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
230	1647	6/10/97	21	08	6/11/97	0.665	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
231	1648	6/10/97	21	09	6/11/97	0.921	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
232	1649	6/10/97	21	10	6/11/97	0.958	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
233	1650	6/11/97	21	11	6/11/97	1.992	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
234	1663	6/13/97	21	12	6/14/97	1.041	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
235	1664	6/13/97	21	13	6/14/97	1.097	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
236	1665	6/13/97	21	14	6/14/97	1.604	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
237	1666	6/13/97	21	15	6/14/97	1.270	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
238	1667	6/13/97	21	16	6/14/97	1.425	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
239	1668	6/13/97	21	17	6/14/97	1.155	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
240	1689	6/23/97	21	01	6/26/97	0.266	NonCompliant	Compliant	Compliant	6/26/97	0.057	NonCompliant	Compliant	Compliant
241	1690	6/23/97	21	02	6/26/97	0.596	NonCompliant	Compliant	Compliant	6/26/97	0.000	NonCompliant	Compliant	Compliant
242	1691	6/23/97	21	03	6/26/97	0.659	NonCompliant	Compliant	Compliant	6/26/97	0.000	NonCompliant	Compliant	Compliant
243	1692	6/23/97	21	04	6/26/97	0.383	NonCompliant	Compliant	Compliant	6/26/97	0.000	NonCompliant	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

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Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Total Suspended Solids: Gravimetric (mg/L)	Quality Assurance: Holding	Quality Assurance: Duplicate
1	41	4/6/96	1	04	4/8/96	231.4	Compliant	Compliant
2	42	4/6/96	1	05	4/8/96	412.1	Compliant	Compliant
3	43	4/6/96	1	06	4/8/96	464.9	Compliant	Compliant
4	44	4/8/96	2	14	4/8/96	364.4	Compliant	Compliant
5	332	6/1/96	3	06	6/3/96	1739.0	Compliant	Compliant
6	333	6/1/96	3	07	6/3/96	2585.0	Compliant	Compliant
7	334	6/1/96	3	08	6/3/96	1726.0	Compliant	Compliant
8	335	6/2/96	3	09	6/3/96	2093.0	Compliant	Compliant
9	336	6/2/96	3	10	6/4/96	2452.0	Compliant	Compliant
10	337	6/2/96	3	11	6/4/96	1748.0	Compliant	Compliant
11	338	6/3/96	3	12	6/4/96	1020.0	Compliant	Compliant
12	339	6/3/96	3	13	6/4/96	695.0	Compliant	Compliant
13	340	6/3/96	3	14	6/5/96	522.0	Compliant	Compliant
14	341	6/4/96	3	15	6/5/96	609.0	Compliant	Compliant
15	342	6/4/96	3	16	6/5/96	2458.0	Compliant	Compliant
16	343	6/4/96	3	17	6/5/96	888.0	Compliant	Compliant
17	344	6/5/96	3	19	6/7/96	435.0	Compliant	Compliant
18	345	6/5/96	3	20	NA	NA	NA	NA
19	346	6/6/96	3	21	NA	NA	NA	NA
20	347	6/6/96	3	22	NA	NA	NA	NA
21	368	5/31/96	3	01	6/1/96	2026.0	Compliant	Compliant
22	369	5/31/96	3	02	6/3/96	2168.0	Compliant	Compliant
23	370	5/31/96	3	05	6/3/96	716.0	Compliant	Compliant
24	444	6/7/96	3	03	6/10/96	1620.0	Compliant	Compliant
25	445	6/7/96	3	04	6/10/96	1259.0	Compliant	Compliant
26	446	6/7/96	3	05	6/10/96	2545.0	Compliant	Compliant
27	447	6/8/96	3	06	6/10/96	2526.0	Compliant	Compliant
28	448	6/8/96	3	07	6/10/96	2292.0	Compliant	Compliant
29	449	6/8/96	3	08	6/10/96	1746.0	Compliant	Compliant
30	450	6/9/96	3	09	6/10/96	1241.0	Compliant	Compliant
31	451	6/9/96	3	10	6/12/96	706.0	Compliant	Compliant
32	452	6/9/96	3	11	6/12/96	682.0	Compliant	Compliant
33	453	6/10/96	3	12	6/12/96	643.0	Compliant	Compliant
34	582	8/12/96	4	01	8/20/96	89.5	NonCompliant	Compliant
35	583	8/12/96	4	02	8/20/96	74.8	NonCompliant	Compliant
36	584	8/12/96	4	03	8/20/96	52.6	NonCompliant	Compliant
37	585	8/12/96	4	04	8/20/96	60.9	NonCompliant	Compliant
38	586	8/13/96	4	05	8/20/96	57.0	Compliant	Compliant
39	587	8/13/96	4	06	8/20/96	51.4	Compliant	Compliant
40	589	8/13/96	4	07	8/20/96	45.5	Compliant	Compliant
41	590	8/13/96	4	08	8/20/96	46.9	Compliant	Compliant
42	591	8/14/96	4	09	8/20/96	50.9	Compliant	Compliant
43	592	8/14/96	4	10	8/20/96	39.3	Compliant	Compliant
44	593	8/14/96	4	11	8/20/96	37.1	Compliant	Compliant
45	594	8/15/96	4	12	8/20/96	31.5	Compliant	Compliant
46	595	8/15/96	4	13	8/20/96	42.5	Compliant	Compliant
47	596	8/15/96	4	14	8/20/96	33.6	Compliant	Compliant
48	597	8/16/96	4	15	8/20/96	51.0	Compliant	Compliant
49	598	8/18/96	5	01	8/27/96	65.8	NonCompliant	Compliant
50	599	8/18/96	5	02	8/27/96	119.4	NonCompliant	Compliant

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Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Total Suspended Solids: Gravimetric (mg/L)	Quality Assurance: Holding	Quality Assurance: Duplicate
51	600	8/18/96	5	03	8/27/96	282.7	NonCompliant	Compliant
52	601	8/18/96	5	04	8/27/96	386.3	NonCompliant	Compliant
53	602	8/18/96	5	05	8/27/96	325.4	NonCompliant	Compliant
54	603	8/19/96	5	06	8/27/96	180.2	NonCompliant	Compliant
55	604	8/19/96	5	07	8/27/96	113.6	NonCompliant	Compliant
56	605	8/19/96	5	08	8/27/96	204.2	NonCompliant	Compliant
57	606	8/20/96	5	09	8/27/96	100.0	Compliant	Compliant
58	607	8/20/96	5	10	8/27/96	103.0	Compliant	Compliant
59	615	8/24/96	6	01	9/2/96	238.6	NonCompliant	Compliant
60	616	8/24/96	6	02	9/2/96	268.9	NonCompliant	Compliant
61	617	8/24/96	6	03	9/2/96	447.3	NonCompliant	Compliant
62	618	8/25/96	6	05	9/2/96	2459.8	NonCompliant	Compliant
63	619	8/25/96	6	06	9/2/96	1840.0	NonCompliant	Compliant
64	620	8/25/96	6	07	9/2/96	1032.0	NonCompliant	Compliant
65	621	8/25/96	6	08	9/2/96	419.2	NonCompliant	Compliant
66	622	8/26/96	6	09	9/2/96	148.8	Compliant	Compliant
67	649	8/29/96	7	01	9/2/96	161.4	Compliant	Compliant
68	650	8/29/96	7	02	9/2/96	673.8	Compliant	Compliant
69	651	8/29/96	7	03	9/2/96	2036.4	Compliant	Compliant
70	708	8/29/96	7	25	9/23/96	1144.0	NonCompliant	Compliant
71	716	9/15/96	8	01	9/23/96	426.5	NonCompliant	Compliant
72	717	9/15/96	8	02	9/23/96	406.1	NonCompliant	Compliant
73	718	9/15/96	8	03	9/23/96	728.4	NonCompliant	Compliant
74	719	9/15/96	8	04	9/23/96	1409.4	NonCompliant	Compliant
75	720	9/15/96	8	05	9/23/96	623.1	NonCompliant	Compliant
76	721	9/16/96	8	06	9/27/96	285.0	NonCompliant	Compliant
77	722	9/16/96	8	07	9/27/96	163.1	NonCompliant	Compliant
78	723	9/16/96	8	08	9/27/96	174.9	NonCompliant	Compliant
79	724	9/17/96	8	09	9/27/96	153.8	NonCompliant	Compliant
80	725	9/17/96	8	10	9/27/96	127.1	NonCompliant	Compliant
81	726	9/17/96	8	11	9/27/96	111.7	NonCompliant	Compliant
82	727	9/18/96	8	12	9/27/96	97.9	NonCompliant	Compliant
83	728	9/18/96	8	13	9/27/96	139.3	NonCompliant	Compliant
84	729	9/18/96	8	14	9/27/96	156.9	NonCompliant	Compliant
85	730	9/19/96	8	15	9/27/96	158.1	NonCompliant	Compliant
86	731	9/19/96	8	16	9/27/96	229.3	NonCompliant	Compliant
87	746	8/30/96	8	26	9/23/96	611.0	NonCompliant	Compliant
88	747	9/1/96	8	27	9/23/96	1277.0	NonCompliant	Compliant
89	756	9/20/96	8	01	10/2/96	426.5	NonCompliant	Compliant
90	757	9/20/96	8	02	10/2/96	460.8	NonCompliant	Compliant
91	758	9/20/96	8	03	10/2/96	523.0	NonCompliant	Compliant
92	759	9/20/96	8	04	10/2/96	484.4	NonCompliant	Compliant
93	774	9/22/96	9	10	10/25/96	212.8	NonCompliant	Compliant
94	775	9/23/96	9	11	10/25/96	223.0	NonCompliant	Compliant
95	776	9/23/96	9	12	10/25/96	219.3	NonCompliant	Compliant
96	777	9/23/96	9	13	10/25/96	214.8	NonCompliant	Compliant
97	778	9/24/96	9	14	10/25/96	210.7	NonCompliant	Compliant
98	779	9/24/96	9	15	10/25/96	221.3	NonCompliant	Compliant
99	800	9/3/96	9	28	9/23/96	1026.0	NonCompliant	Compliant
100	807	10/28/96	10	01	10/28/96	195.8	Compliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE01 - Leon River @ Jonesboro (HWY 36 Bridge)

					Total Suspended Solids			
							Quality Assurance	
Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Analysis Date	Gravimetric (mg/L)	Holding	Duplicate
101	808	10/28/96	10	02	10/28/96	219.1	Compliant	Compliant
102	809	10/28/96	10	03	10/30/96	189.0	Compliant	Compliant
103	810	10/28/96	10	04	10/30/96	181.6	Compliant	Compliant
104	811	10/28/96	10	05	10/30/96	316.4	Compliant	Compliant
105	812	10/29/96	10	06	10/30/96	487.0	Compliant	Compliant
106	813	10/29/96	10	07	10/30/96	1332.4	Compliant	Compliant
107	814	10/29/96	10	08	10/30/96	3342.0	Compliant	Compliant
108	815	10/30/96	10	09	10/30/96	2271.0	Compliant	Compliant
109	816	10/30/96	10	10	10/30/96	1491.0	Compliant	Compliant
110	827	10/30/96	10	11	11/1/96	939.0	Compliant	Compliant
111	828	10/31/96	10	12	11/1/96	826.0	Compliant	Compliant
112	829	10/31/96	10	13	11/1/96	409.8	Compliant	Compliant
113	830	10/31/96	10	14	11/1/96	591.6	Compliant	Compliant
114	831	11/1/96	10	15	11/1/96	143.4	Compliant	Compliant
115	832	11/1/96	10	16	11/1/96	234.0	Compliant	Compliant
116	847	11/7/96	11	01	11/11/96	455.4	Compliant	Compliant
117	848	11/7/96	11	02	11/11/96	557.2	Compliant	Compliant
118	849	11/7/96	11	03	11/11/96	487.8	Compliant	Compliant
119	850	11/7/96	11	04	11/12/96	617.0	Compliant	Compliant
120	851	11/7/96	11	05	11/12/96	1189.2	Compliant	Compliant
121	852	11/7/96	11	06	11/12/96	613.8	Compliant	Compliant
122	853	11/8/96	11	07	11/12/96	330.2	Compliant	Compliant
123	854	11/8/96	11	08	11/12/96	345.8	Compliant	Compliant
124	865	11/8/96	11	09	11/12/96	378.2	Compliant	Compliant
125	866	11/9/96	11	10	11/12/96	276.4	Compliant	Compliant
126	867	11/9/96	11	11	11/12/96	272.0	Compliant	Compliant
127	868	11/9/96	11	12	11/12/96	294.2	Compliant	Compliant
128	869	11/10/96	11	13	11/12/96	256.0	Compliant	Compliant
129	914	11/29/96	12	01	12/9/96	284.6	NonCompliant	Compliant
130	915	11/29/96	12	02	12/9/96	116.2	NonCompliant	Compliant
131	916	11/29/96	12	03	12/9/96	154.6	NonCompliant	Compliant
132	917	11/29/96	12	04	12/9/96	422.2	NonCompliant	Compliant
133	918	11/29/96	12	05	12/9/96	370.8	NonCompliant	Compliant
134	919	11/30/96	12	06	12/9/96	258.0	NonCompliant	Compliant
135	920	11/30/96	12	07	12/9/96	240.5	NonCompliant	Compliant
136	921	11/30/96	12	08	12/9/96	284.5	NonCompliant	Compliant
137	922	12/1/96	12	09	12/9/96	281.6	NonCompliant	Compliant
138	923	12/1/96	12	10	12/9/96	241.0	NonCompliant	Compliant
139	924	12/1/96	12	11	12/9/96	272.0	NonCompliant	Compliant
140	925	12/2/96	12	12	12/9/96	259.3	Compliant	Compliant
141	926	12/2/96	12	13	12/9/96	227.5	Compliant	Compliant
142	959	12/2/96	12	14	12/9/96	199.5	Compliant	Compliant
143	960	12/3/96	12	15	12/9/96	190.7	Compliant	Compliant
144	961	12/3/96	12	16	12/9/96	164.9	Compliant	Compliant
145	962	12/3/96	12	17	12/9/96	147.2	Compliant	Compliant
146	963	12/4/96	12	18	12/9/96	146.1	Compliant	Compliant
147	964	12/4/96	12	19	12/9/96	314.6	Compliant	Compliant
148	1088	2/12/97	13	19	2/19/97	75.3	Compliant	Compliant
149	1089	2/12/97	13	20	2/19/97	1145.0	Compliant	Compliant
150	1090	2/7/97	13	25	2/19/97	930.4	NonCompliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE01 - Leon River @ Jonesboro (HWY 36 Bridge)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids Analysis Date	Gravimetric (mg/L)	Quality Assurance Holding	Duplicate
151	1140	2/13/97	13	01	2/26/97	5190.0	NonCompliant	Compliant
152	1141	2/13/97	13	02	2/26/97	1135.8	NonCompliant	Compliant
153	1142	2/12/97	13	03	2/26/97	826.8	NonCompliant	Compliant
154	1143	2/13/97	13	04	2/26/97	1012.0	NonCompliant	Compliant
155	1144	2/13/97	13	05	2/26/97	897.4	NonCompliant	Compliant
156	1145	2/14/97	13	06	2/26/97	950.4	NonCompliant	Compliant
157	1146	2/14/97	13	07	2/26/97	528.2	NonCompliant	Compliant
158	1150	2/14/97	13	08	2/26/97	870.4	NonCompliant	NonCompliant
159	1151	2/15/97	13	09	2/26/97	743.0	NonCompliant	NonCompliant
160	1152	2/15/97	13	10	2/26/97	527.4	NonCompliant	NonCompliant
161	1155	2/15/97	13	11	2/26/97	282.0	NonCompliant	NonCompliant
162	1156	2/16/97	13	12	2/26/97	293.7	NonCompliant	Compliant
163	1157	2/16/97	13	13	2/26/97	247.0	NonCompliant	Compliant
164	1158	2/16/97	13	14	2/26/97	215.8	NonCompliant	Compliant
165	1159	2/17/97	13	15	2/26/97	182.6	NonCompliant	Compliant
166	1160	2/17/97	13	16	2/26/97	169.0	NonCompliant	Compliant
167	1225	3/7/97	14	01	3/17/97	1327.2	NonCompliant	Compliant
168	1232	3/7/97	14	02	3/17/97	533.8	NonCompliant	Compliant
169	1233	3/8/97	14	03	3/20/97	410.2	NonCompliant	Compliant
170	1234	3/8/97	14	04	3/20/97	569.4	NonCompliant	Compliant
171	1235	3/8/97	14	05	3/20/97	623.0	NonCompliant	Compliant
172	1236	3/9/97	14	06	3/20/97	574.8	NonCompliant	Compliant
173	1237	3/9/97	14	07	3/20/97	623.0	NonCompliant	Compliant
174	1238	3/9/97	14	08	3/20/97	732.2	NonCompliant	Compliant
175	1239	3/10/97	14	09	3/20/97	1237.6	NonCompliant	Compliant
176	1258	3/10/97	14	10	3/20/97	946.4	NonCompliant	Compliant
177	1259	3/10/97	14	11	3/31/97	1038.0	NonCompliant	Compliant
178	1260	3/11/97	14	12	3/31/97	1141.6	NonCompliant	Compliant
179	1266	3/11/97	14	25	3/31/97	842.8	NonCompliant	Compliant
180	1272	3/13/97	15	18	3/31/97	613.0	NonCompliant	Compliant
181	1273	3/13/97	15	19	3/31/97	148.4	NonCompliant	Compliant
182	1274	3/13/97	15	20	3/31/97	66.6	NonCompliant	Compliant
183	1275	3/14/97	15	21	3/31/97	627.8	NonCompliant	Compliant
184	1310	4/4/97	16	01	4/9/97	720.6	Compliant	Compliant
185	1311	4/4/97	16	02	4/9/97	730.2	Compliant	Compliant
186	1312	4/4/97	16	03	4/18/97	555.2	NonCompliant	Compliant
187	1313	4/4/97	16	04	4/18/97	660.4	NonCompliant	Compliant
188	1314	4/4/97	16	05	4/18/97	566.8	NonCompliant	Compliant
189	1315	4/4/97	16	06	4/18/97	611.6	NonCompliant	Compliant
190	1316	4/5/97	16	07	4/18/97	1019.6	NonCompliant	Compliant
191	1317	4/5/97	16	08	4/18/97	1043.6	NonCompliant	Compliant
192	1318	4/5/97	16	09	4/18/97	904.2	NonCompliant	Compliant
193	1319	4/6/97	16	10	4/18/97	779.0	NonCompliant	Compliant
194	1377	4/6/97	16	11	4/19/97	681.6	NonCompliant	Compliant
195	1378	4/6/97	16	12	4/19/97	565.4	NonCompliant	Compliant
196	1379	4/7/97	16	13	4/19/97	618.4	NonCompliant	Compliant
197	1380	4/7/97	16	14	4/19/97	618.6	NonCompliant	Compliant
198	1381	4/7/97	16	15	4/19/97	578.0	NonCompliant	Compliant
199	1382	4/8/97	16	16	4/19/97	553.8	NonCompliant	Compliant
200	1401	4/25/97	17	01	5/20/97	550.4	NonCompliant	NonCompliant

Leon River Watershed Project: Storm Samples

Station LE01 - Leon River @ Jonesboro (HWY 36 Bridge)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Gravimetric (mg/L)	Quality Assurance: Holding	Duplicate
201	1402	4/26/97	17	06	5/20/97	991.3	NonCompliant	NonCompliant
202	1403	4/28/97	17	11	5/26/97	456.8	NonCompliant	NonCompliant
203	1455	5/10/97	18	03	5/20/97	984.8	NonCompliant	Compliant
204	1456	5/11/97	18	06	5/20/97	1019.0	NonCompliant	Compliant
205	1457	5/11/97	18	08	5/20/97	842.6	NonCompliant	Compliant
206	1521	5/14/97	19	01	5/21/97	425.2	Compliant	NonCompliant
207	1522	5/14/97	19	06	5/21/97	493.5	Compliant	NonCompliant
208	1523	5/15/97	19	08	5/21/97	361.8	Compliant	NonCompliant
209	1524	5/15/97	19	09	5/21/97	993.6	Compliant	NonCompliant
210	1525	5/16/97	19	10	5/21/97	1178.2	Compliant	NonCompliant
211	1526	5/16/97	19	11	5/21/97	955.6	Compliant	NonCompliant
212	1527	5/16/97	19	12	5/21/97	895.8	Compliant	NonCompliant
213	1528	5/17/97	19	13	5/21/97	835.6	Compliant	NonCompliant
214	1529	5/17/97	19	14	5/21/97	1546.8	Compliant	NonCompliant
215	1535	5/17/97	19	15	5/21/97	1171.0	Compliant	NonCompliant
216	1536	5/18/97	19	16	5/21/97	873.0	Compliant	NonCompliant
217	1537	5/18/97	19	17	5/21/97	642.0	Compliant	NonCompliant
218	1538	5/18/97	19	18	5/21/97	755.4	Compliant	NonCompliant
219	1539	5/19/97	19	19	5/21/97	621.6	Compliant	NonCompliant
220	1564	5/24/97	20	01	5/26/97	461.6	Compliant	Compliant
221	1565	5/25/97	20	06	5/26/97	648.6	Compliant	Compliant
222	1566	5/25/97	20	08	5/26/97	735.8	Compliant	Compliant
223	1609	6/8/97	21	01	6/12/97	267.2	Compliant	Compliant
224	1610	6/8/97	21	02	6/12/97	521.2	Compliant	Compliant
225	1611	6/9/97	21	03	6/12/97	1182.8	Compliant	Compliant
226	1612	6/9/97	21	04	6/12/97	1351.4	Compliant	Compliant
227	1613	6/9/97	21	05	6/12/97	957.8	Compliant	Compliant
228	1645	6/9/97	21	06	6/12/97	998.2	Compliant	Compliant
229	1646	6/9/97	21	07	6/16/97	449.2	Compliant	Compliant
230	1647	6/10/97	21	08	6/16/97	723.9	Compliant	Compliant
231	1648	6/10/97	21	09	6/16/97	449.6	Compliant	Compliant
232	1649	6/10/97	21	10	6/16/97	518.6	Compliant	Compliant
233	1650	6/11/97	21	11	6/16/97	608.2	Compliant	Compliant
234	1663	6/13/97	21	12	6/16/97	468.4	Compliant	Compliant
235	1664	6/13/97	21	13	6/16/97	494.6	Compliant	Compliant
236	1665	6/13/97	21	14	6/16/97	609.6	Compliant	Compliant
237	1666	6/13/97	21	15	6/16/97	620.2	Compliant	Compliant
238	1667	6/13/97	21	16	6/16/97	379.4	Compliant	Compliant
239	1668	6/13/97	21	17	6/16/97	376.0	Compliant	Compliant
240	1689	6/23/97	21	01	6/27/97	457.2	Compliant	Compliant
241	1690	6/23/97	21	02	6/27/97	573.4	Compliant	Compliant
242	1691	6/23/97	21	03	6/27/97	1018.4	Compliant	Compliant
243	1692	6/23/97	21	04	6/27/97	1124.0	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples

Station LE02 - MicroWatershed #1 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
1	859	11/7/96	1	01	11/8/96	2.331	Compliant	Compliant	Compliant	11/8/96	0.177	Compliant	Compliant	Compliant
2	860	11/7/96	1	02	11/8/96	1.927	Compliant	Compliant	Compliant	11/8/96	0.093	Compliant	Compliant	Compliant
3	1005	12/15/96	2	01	12/17/96	0.702	Compliant	NonCompliant	NonCompliant	12/17/96	0.081	Compliant	Compliant	Compliant
4	1006	12/15/96	2	02	12/17/96	0.752	Compliant	NonCompliant	NonCompliant	12/17/96	0.105	Compliant	Compliant	Compliant
5	1007	12/15/96	2	03	12/17/96	0.516	Compliant	NonCompliant	NonCompliant	12/17/96	0.085	Compliant	Compliant	Compliant
6	1008	12/15/96	2	05	12/17/96	0.468	Compliant	NonCompliant	NonCompliant	12/17/96	0.055	Compliant	Compliant	Compliant
7	1009	12/15/96	2	06	12/17/96	0.387	Compliant	NonCompliant	NonCompliant	12/17/96	0.075	Compliant	Compliant	Compliant
8	1010	12/15/96	2	07	12/17/96	0.354	Compliant	NonCompliant	NonCompliant	12/17/96	0.055	Compliant	Compliant	Compliant
9	1011	12/15/96	2	08	12/17/96	0.354	Compliant	NonCompliant	NonCompliant	12/17/96	0.070	Compliant	Compliant	Compliant
10	1012	12/15/96	2	09	12/17/96	0.283	Compliant	Compliant	Compliant	12/17/96	0.064	Compliant	Compliant	Compliant
11	1013	12/15/96	2	10	12/17/96	0.247	Compliant	Compliant	Compliant	12/17/96	0.052	Compliant	Compliant	Compliant
12	1097	2/12/97	3	01	2/14/97	0.536	Compliant	Compliant	Compliant	2/14/97	0.100	Compliant	Compliant	Compliant
13	1098	2/12/97	3	02	2/14/97	0.609	Compliant	Compliant	Compliant	2/14/97	0.100	Compliant	Compliant	Compliant
14	1099	2/12/97	3	03	2/14/97	0.349	Compliant	Compliant	Compliant	2/14/97	0.083	Compliant	Compliant	Compliant
15	1100	2/12/97	3	11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
16	1101	2/12/97	3	12	2/14/97	0.106	Compliant	Compliant	Compliant	2/14/97	0.096	Compliant	Compliant	Compliant
17	1102	2/12/97	3	13	2/14/97	0.158	Compliant	Compliant	Compliant	2/14/97	0.086	Compliant	Compliant	Compliant
18	1103	2/12/97	3	14	2/14/97	0.157	Compliant	Compliant	Compliant	2/14/97	0.095	Compliant	Compliant	Compliant
19	1104	2/12/97	3	15	2/14/97	0.187	Compliant	Compliant	Compliant	2/14/97	0.084	Compliant	Compliant	Compliant
20	1105	2/12/97	3	16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
21	1106	2/12/97	3	17	2/14/97	0.209	Compliant	Compliant	Compliant	2/14/97	0.061	Compliant	Compliant	Compliant
22	1107	2/12/97	3	18	2/14/97	0.205	Compliant	Compliant	Compliant	2/14/97	0.078	Compliant	Compliant	Compliant
23	1108	2/12/97	3	20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
24	1109	2/12/97	3	21	2/14/97	0.215	Compliant	Compliant	Compliant	2/14/97	0.074	Compliant	Compliant	Compliant
25	1110	2/12/97	3	23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
26	1111	2/12/97	3	24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
27	1240	3/9/97	4	01	3/10/97	0.170	Compliant	Compliant	Compliant	3/10/97	0.043	Compliant	NonCompliant	NonCompliant
28	1241	3/9/97	4	02	3/10/97	0.396	Compliant	Compliant	Compliant	3/10/97	0.080	Compliant	NonCompliant	NonCompliant
29	1242	3/9/97	4	03	3/10/97	0.377	Compliant	Compliant	Compliant	3/10/97	0.078	Compliant	NonCompliant	NonCompliant
30	1404	4/26/97	5	01	5/1/97	0.000	NonCompliant	Compliant	Compliant	5/1/97	0.054	NonCompliant	NonCompliant	NonCompliant
31	1405	4/26/97	5	05	5/1/97	12.015	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
32	1406	4/26/97	5	07	5/1/97	17.128	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
33	1500	5/15/97	6	01	5/17/97	2.052	Compliant	Compliant	Compliant	5/17/97	0.088	Compliant	NonCompliant	NonCompliant
34	1501	5/15/97	6	02	5/17/97	4.520	Compliant	Compliant	Compliant	5/17/97	0.082	Compliant	NonCompliant	NonCompliant
35	1502	5/15/97	6	03	5/17/97	6.392	Compliant	Compliant	Compliant	5/17/97	0.052	Compliant	NonCompliant	NonCompliant
36	1503	5/15/97	6	04	5/17/97	5.507	Compliant	Compliant	Compliant	5/17/97	0.051	Compliant	NonCompliant	NonCompliant
37	1504	5/15/97	6	05	5/17/97	19.871	Compliant	Compliant	Compliant	5/17/97	0.064	Compliant	NonCompliant	NonCompliant
38	1540	5/19/97	7	01	5/21/97	1.339	Compliant	Compliant	Compliant	5/21/97	0.149	Compliant	Compliant	Compliant
39	1541	5/19/97	7	02	5/21/97	1.950	Compliant	Compliant	Compliant	5/21/97	0.120	Compliant	Compliant	Compliant
40	1542	5/19/97	7	03	5/21/97	2.091	Compliant	Compliant	Compliant	5/21/97	0.132	Compliant	Compliant	Compliant
41	1545	5/23/97	8	04	6/3/97	1.829	NonCompliant	Compliant	Compliant	6/3/97	0.083	NonCompliant	Compliant	Compliant
42	1546	5/23/97	8	05	6/3/97	1.870	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
43	1547	5/23/97	8	07	6/3/97	2.403	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
44	1586	5/25/97	9	03	6/10/97	3.583	NonCompliant	Compliant	Compliant	6/10/97	0.096	NonCompliant	NonCompliant	NonCompliant
45	1587	5/27/97	9	01	6/10/97	4.546	NonCompliant	Compliant	Compliant	6/10/97	0.658	NonCompliant	NonCompliant	NonCompliant
46	1588	5/27/97	0	02	6/10/97	3.592	NonCompliant	Compliant	Compliant	6/10/97	0.109	NonCompliant	NonCompliant	NonCompliant
47	1589	5/27/97	9	04	6/10/97	4.413	NonCompliant	Compliant	Compliant	6/10/97	0.375	NonCompliant	NonCompliant	NonCompliant
48	1590	5/27/97	9	05	6/10/97	3.529	NonCompliant	Compliant	Compliant	6/10/97	1.417	NonCompliant	NonCompliant	NonCompliant
49	1591	5/28/97	9	06	6/10/97	3.557	NonCompliant	Compliant	Compliant	6/10/97	1.104	NonCompliant	NonCompliant	NonCompliant
50	1592	5/28/97	9	07	6/10/97	3.446	NonCompliant	Compliant	Compliant	6/10/97	0.085	NonCompliant	NonCompliant	NonCompliant

Leon River Watershed Project: Storm Samples
Station LE02 - MicroWatershed #1 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
51	1593	5/30/97	9	23	6/10/97	0.978	NonCompliant	Compliant	Compliant	6/10/97	1.446	NonCompliant	NonCompliant	NonCompliant
52	1594	5/30/97	9	24	6/10/97	2.459	NonCompliant	Compliant	Compliant	6/10/97	0.594	NonCompliant	NonCompliant	NonCompliant
53	1597	5/30/97	9	24	6/10/97	2.056	NonCompliant	Compliant	Compliant	6/10/97	0.378	NonCompliant	Compliant	Compliant
54	1619	6/8/97	10	01	6/11/97	0.525	Compliant	Compliant	Compliant	6/11/97	1.557	Compliant	Compliant	Compliant
55	1620	6/8/97	10	02	6/11/97	1.923	Compliant	Compliant	Compliant	6/11/97	1.064	Compliant	Compliant	Compliant
56	1621	6/8/97	10	03	6/11/97	1.988	Compliant	Compliant	Compliant	6/11/97	0.852	Compliant	Compliant	Compliant
57	1622	6/8/97	10	04	6/11/97	2.935	Compliant	Compliant	Compliant	6/11/97	1.009	Compliant	Compliant	Compliant
58	1623	6/8/97	10	05	6/11/97	3.936	Compliant	Compliant	Compliant	6/11/97	0.867	Compliant	Compliant	Compliant
59	1624	6/8/97	10	06	6/11/97	3.683	Compliant	Compliant	Compliant	6/11/97	1.043	Compliant	Compliant	Compliant
60	1625	6/8/97	10	07	6/11/97	2.821	Compliant	Compliant	Compliant	6/11/97	0.796	Compliant	Compliant	Compliant
61	1626	6/8/97	10	08	6/11/97	2.428	Compliant	Compliant	Compliant	6/11/97	0.598	Compliant	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples
Station LE02 - MicroWatershed #1 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids Analysis Date	Total Suspended Solids Gravimetric (mg/L)	Quality Assurance Holding	Quality Assurance Duplicate
1	859	11/7/96	1	01	11/12/96	8667.0	Compliant	Compliant
2	860	11/7/96	1	02	11/12/96	3918.0	Compliant	Compliant
3	1005	12/15/96	2	01	12/20/96	4524.0	Compliant	Compliant
4	1006	12/15/96	2	02	NA	NA	NA	NA
5	1007	12/15/96	2	03	12/20/96	1053.0	Compliant	Compliant
6	1008	12/15/96	2	05	NA	NA	NA	NA
7	1009	12/15/96	2	06	12/20/96	996.0	Compliant	Compliant
8	1010	12/15/96	2	07	12/20/96	557.0	Compliant	Compliant
9	1011	12/15/96	2	08	12/20/96	719.0	Compliant	Compliant
10	1012	12/15/96	2	09	NA	NA	NA	NA
11	1013	12/15/96	2	10	12/20/96	604.8	Compliant	Compliant
12	1097	2/12/97	3	01	2/19/97	4472.0	Compliant	Compliant
13	1098	2/12/97	3	02	2/19/97	4493.0	Compliant	Compliant
14	1099	2/12/97	3	03	2/19/97	1691.0	Compliant	Compliant
15	1100	2/12/97	3	11	NA	NA	NA	NA
16	1101	2/12/97	3	12	2/19/97	482.2	Compliant	Compliant
17	1102	2/12/97	3	13	2/19/97	301.0	Compliant	Compliant
18	1103	2/12/97	3	14	2/19/97	360.0	Compliant	Compliant
19	1104	2/12/97	3	15	2/19/97	383.0	Compliant	Compliant
20	1105	2/12/97	3	16	NA	NA	NA	NA
21	1106	2/12/97	3	17	2/19/97	672.2	Compliant	Compliant
22	1107	2/12/97	3	18	2/19/97	743.0	Compliant	Compliant
23	1108	2/12/97	3	20	NA	NA	NA	NA
24	1109	2/12/97	3	21	2/19/97	444.4	Compliant	Compliant
25	1110	2/12/97	3	23	NA	NA	NA	NA
26	1111	2/12/97	3	24	NA	NA	NA	NA
27	1240	3/9/97	4	01	3/20/97	1852.0	NonCompliant	Compliant
28	1241	3/9/97	4	02	3/20/97	1320.0	NonCompliant	Compliant
29	1242	3/9/97	4	03	3/20/97	791.0	NonCompliant	Compliant
30	1404	4/26/97	5	01	5/20/97	421.9	NonCompliant	NonCompliant
31	1405	4/26/97	5	05	5/20/97	914.4	NonCompliant	NonCompliant
32	1406	4/26/97	5	07	5/20/97	132.3	NonCompliant	NonCompliant
33	1500	5/15/97	6	01	5/21/97	1035.0	Compliant	Compliant
34	1501	5/15/97	6	02	5/21/97	741.0	Compliant	Compliant
35	1502	5/15/97	6	03	5/21/97	1305.4	Compliant	Compliant
36	1503	5/15/97	6	04	5/21/97	1051.0	Compliant	Compliant
37	1504	5/15/97	6	05	5/21/97	428.8	Compliant	Compliant
38	1540	5/19/97	7	01	5/26/97	2229.0	Compliant	Compliant
39	1541	5/19/97	7	02	5/26/97	1252.0	Compliant	Compliant
40	1542	5/19/97	7	03	5/26/97	911.0	Compliant	Compliant
41	1545	5/23/97	8	04	5/26/97	3359.0	Compliant	Compliant
42	1546	5/23/97	8	05	5/26/97	1732.0	Compliant	Compliant
43	1547	5/23/97	8	07	5/26/97	651.0	Compliant	Compliant
44	1586	5/25/97	9	03	6/12/97	584.0	NonCompliant	NonCompliant
45	1587	5/27/97	9	01	6/12/97	2055.0	NonCompliant	NonCompliant
46	1588	5/27/97	0	02	6/12/97	1268.0	NonCompliant	NonCompliant
47	1589	5/27/97	9	04	6/12/97	562.6	NonCompliant	NonCompliant
48	1590	5/27/97	9	05	6/12/97	372.6	NonCompliant	NonCompliant
49	1591	5/28/97	9	06	6/12/97	787.6	NonCompliant	NonCompliant
50	1592	5/28/97	9	07	6/12/97	1350.0	NonCompliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE02 - MicroWatershed #1 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Total Suspended Solids: Gravimetric (mg/L)	Quality Assurance: Holding	Quality Assurance: Duplicate
51	1593	5/30/97	9	23	6/12/97	439.6	NonCompliant	Compliant
52	1594	5/30/97	9	24	6/12/97	1100.0	NonCompliant	Compliant
53	1597	5/30/97	9	24	6/12/97	1337.0	NonCompliant	Compliant
54	1619	6/8/97	10	01	6/12/97	235.0	NonCompliant	Compliant
55	1620	6/8/97	10	02	6/12/97	137.8	NonCompliant	Compliant
56	1621	6/8/97	10	03	6/12/97	11.2	NonCompliant	Compliant
57	1622	6/8/97	10	04	6/12/97	92.2	NonCompliant	Compliant
58	1623	6/8/97	10	05	6/12/97	48.0	NonCompliant	Compliant
59	1624	6/8/97	10	06	6/12/97	45.8	NonCompliant	Compliant
60	1625	6/8/97	10	07	6/12/97	30.5	NonCompliant	Compliant
61	1626	6/8/97	10	08	6/12/97	27.0	NonCompliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project Q

For calculation details see QAPP and Laboratory QC Reports

Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours

Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery

Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples
Station LE03 - MicroWatershed #2 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
1	861	11/7/96	1	01	11/8/96	1.183	Compliant	Compliant	Compliant	11/8/96	0.136	Compliant	Compliant	Compliant
2	862	11/7/96	1	02	11/8/96	1.895	Compliant	Compliant	Compliant	11/8/96	0.075	Compliant	Compliant	Compliant
3	1014	12/15/96	2	02	12/17/96	1.057	Compliant	Compliant	Compliant	12/17/96	0.285	Compliant	Compliant	Compliant
4	1015	12/15/96	2	03	12/17/96	0.443	Compliant	Compliant	Compliant	12/17/96	0.056	Compliant	Compliant	Compliant
5	1016	12/15/96	2	06	12/17/96	0.340	Compliant	Compliant	Compliant	12/17/96	0.057	Compliant	Compliant	Compliant
6	1017	12/15/96	2	07	12/17/96	0.295	Compliant	Compliant	Compliant	12/17/96	0.053	Compliant	Compliant	Compliant
7	1018	12/15/96	2	08	12/17/96	0.302	Compliant	Compliant	Compliant	12/17/96	0.038	Compliant	Compliant	Compliant
8	1019	12/15/96	2	09	12/17/96	0.242	Compliant	Compliant	Compliant	12/17/96	0.045	Compliant	Compliant	Compliant
9	1020	12/15/96	2	10	12/17/96	0.197	Compliant	Compliant	Compliant	12/17/96	0.043	Compliant	Compliant	Compliant
10	1112	2/12/97	3	02	2/14/97	0.399	Compliant	Compliant	Compliant	2/14/97	0.069	Compliant	Compliant	Compliant
11	1113	2/12/97	3	12	2/14/97	0.094	Compliant	Compliant	Compliant	2/14/97	0.055	Compliant	Compliant	Compliant
12	1114	2/12/97	3	14	2/14/97	0.156	Compliant	Compliant	Compliant	2/14/97	0.053	Compliant	Compliant	Compliant
13	1115	2/12/97	3	19	2/14/97	0.186	Compliant	Compliant	Compliant	2/14/97	0.056	Compliant	Compliant	Compliant
14	1116	2/12/97	3	22	2/14/97	0.172	Compliant	Compliant	Compliant	2/14/97	0.045	Compliant	Compliant	Compliant
15	1243	3/9/97	4	02	3/10/97	0.255	Compliant	Compliant	Compliant	3/10/97	0.063	Compliant	NonCompliant	NonCompliant
16	1244	3/9/97	4	03	3/10/97	0.312	Compliant	Compliant	Compliant	3/10/97	0.043	Compliant	NonCompliant	NonCompliant
17	1407	4/26/97	5	02	5/1/97	1.698	NonCompliant	Compliant	Compliant	5/1/97	0.052	NonCompliant	NonCompliant	NonCompliant
18	1408	4/26/97	5	05	5/1/97	11.901	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
19	1409	4/26/97	5	07	5/1/97	16.847	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
20	1543	5/19/97	6	02	5/21/97	1.616	Compliant	Compliant	Compliant	5/21/97	0.061	Compliant	Compliant	Compliant
21	1548	5/23/97	7	02	6/3/97	1.255	NonCompliant	Compliant	Compliant	6/3/97	0.087	NonCompliant	Compliant	Compliant
22	1549	5/23/97	7	03	6/3/97	1.699	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
23	1595	5/27/97	8	02	6/10/97	4.011	NonCompliant	Compliant	Compliant	6/10/97	0.132	NonCompliant	Compliant	Compliant
24	1596	5/28/97	8	06	6/10/97	3.708	NonCompliant	Compliant	Compliant	6/10/97	0.070	NonCompliant	Compliant	Compliant
25	1627	6/8/97	9	02	6/11/97	0.935	Compliant	Compliant	Compliant	6/11/97	0.364	Compliant	Compliant	Compliant
26	1628	6/8/97	9	03	6/11/97	1.346	Compliant	Compliant	Compliant	6/11/97	0.120	Compliant	Compliant	Compliant
27	1629	6/8/97	9	04	6/11/97	1.992	Compliant	Compliant	Compliant	6/11/97	0.149	Compliant	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples
Station LE03 - MicroWatershed #1 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Total Suspended Solids: Gravimetric (mg/L)	Quality Assurance: Holding	Quality Assurance: Duplicate
1	861	11/7/96	1	01	11/12/96	9797.0	Compliant	Compliant
2	862	11/7/96	1	02	11/12/96	3872.0	Compliant	Compliant
3	1014	12/15/96	2	02	NA	NA	NA	NA
4	1015	12/15/96	2	03	12/20/96	1097.0	Compliant	Compliant
5	1016	12/15/96	2	06	12/20/96	1085.0	Compliant	Compliant
6	1017	12/15/96	2	07	12/20/96	553.0	Compliant	Compliant
7	1018	12/15/96	2	08	12/20/96	751.2	Compliant	Compliant
8	1019	12/15/96	2	09	12/20/96	958.4	Compliant	Compliant
9	1020	12/15/96	2	10	12/20/96	685.0	Compliant	Compliant
10	1112	2/12/97	3	02	2/19/97	3230.0	Compliant	Compliant
11	1113	2/12/97	3	12	2/19/97	496.4	Compliant	Compliant
12	1114	2/12/97	3	14	2/19/97	374.6	Compliant	Compliant
13	1115	2/12/97	3	19	2/19/97	1012.6	Compliant	Compliant
14	1116	2/12/97	3	22	2/19/97	470.2	Compliant	Compliant
15	1243	3/9/97	4	02	3/20/97	1859.0	NonCompliant	Compliant
16	1244	3/9/97	4	03	3/20/97	617.6	NonCompliant	Compliant
17	1407	4/26/97	5	02	5/20/97	4695.0	NonCompliant	NonCompliant
18	1408	4/26/97	5	05	5/20/97	451.0	NonCompliant	NonCompliant
19	1409	4/26/97	5	07	5/20/97	317.8	NonCompliant	NonCompliant
20	1543	5/19/97	6	02	5/26/97	1674.0	Compliant	Compliant
21	1548	5/23/97	7	02	5/26/97	1856.0	Compliant	Compliant
22	1549	5/23/97	7	03	5/26/97	1140.0	Compliant	Compliant
23	1595	5/27/97	8	02	6/12/97	1302.0	NonCompliant	Compliant
24	1596	5/28/97	8	06	6/12/97	1347.0	NonCompliant	Compliant
25	1627	6/8/97	9	02	6/12/97	305.6	NonCompliant	Compliant
26	1628	6/8/97	9	03	6/12/97	139.1	NonCompliant	Compliant
27	1629	6/8/97	9	04	6/12/97	92.7	NonCompliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples

Station LE04 - MicroWatershed #3 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
1	863	11/7/96	1	1	11/8/96	1.756	Compliant	Compliant	Compliant	11/8/96	0.044	Compliant	Compliant	Compliant
2	864	11/7/96	1	02	11/8/96	2.596	Compliant	Compliant	Compliant	11/8/96	0.069	Compliant	Compliant	Compliant
3	1021	12/15/96	2	01	12/17/96	0.539	Compliant	Compliant	Compliant	12/17/96	0.000	Compliant	Compliant	Compliant
4	1022	12/15/96	2	02	12/17/96	0.658	Compliant	Compliant	Compliant	12/17/96	0.000	Compliant	NonCompliant	NonCompliant
5	1023	12/15/96	2	03	12/18/96	0.874	NonCompliant	Compliant	Compliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
6	1024	12/15/96	2	05	12/18/96	0.510	NonCompliant	Compliant	Compliant	12/18/96	0.042	NonCompliant	NonCompliant	NonCompliant
7	1025	12/15/96	2	06	12/18/96	0.299	NonCompliant	Compliant	Compliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
8	1026	12/15/96	2	07	12/18/96	0.331	NonCompliant	Compliant	Compliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
9	1027	12/15/96	2	08	12/18/96	0.143	NonCompliant	Compliant	Compliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
10	1028	12/15/96	2	09	12/18/96	0.226	NonCompliant	Compliant	Compliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
11	1029	12/15/96	2	10	12/18/96	0.138	NonCompliant	Compliant	Compliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
12	1117	2/12/97	3	01	2/14/97	0.298	Compliant	Compliant	Compliant	2/14/97	0.077	Compliant	Compliant	Compliant
13	1118	2/12/97	3	02	2/14/97	0.356	Compliant	Compliant	Compliant	2/14/97	0.053	Compliant	Compliant	Compliant
14	1119	2/12/97	3	03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
15	1120	2/12/97	3	12	2/14/97	0.363	Compliant	Compliant	Compliant	2/14/97	0.081	Compliant	Compliant	Compliant
16	1121	2/12/97	3	13	2/14/97	0.350	Compliant	Compliant	Compliant	2/14/97	0.108	Compliant	Compliant	Compliant
17	1122	2/12/97	3	14	2/14/97	0.329	Compliant	Compliant	Compliant	2/14/97	0.052	Compliant	Compliant	Compliant
18	1123	2/12/97	3	15	2/14/97	0.528	Compliant	Compliant	Compliant	2/14/97	0.090	Compliant	Compliant	Compliant
19	1124	2/12/97	3	17	2/14/97	0.944	Compliant	Compliant	Compliant	2/14/97	0.047	Compliant	Compliant	Compliant
20	1125	2/12/97	3	18	2/14/97	1.523	Compliant	Compliant	Compliant	2/14/97	0.055	Compliant	Compliant	Compliant
21	1126	2/12/97	3	20	2/14/97	0.411	Compliant	Compliant	Compliant	2/14/97	0.046	Compliant	Compliant	Compliant
22	1245	3/9/97	4	01	3/10/97	0.339	Compliant	Compliant	Compliant	3/10/97	0.066	Compliant	NonCompliant	NonCompliant
23	1246	3/9/97	4	02	3/10/97	0.293	Compliant	Compliant	Compliant	3/10/97	0.044	Compliant	NonCompliant	NonCompliant
24	1247	3/9/97	4	03	3/10/97	0.392	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
25	1327	4/4/97	5	01	4/6/97	0.000	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
26	1328	4/4/97	5	02	4/6/97	0.000	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
27	1410	4/26/97	6	01	5/1/97	5.834	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
28	1411	4/26/97	6	04	5/1/97	12.578	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
29	1412	4/26/97	6	07	5/1/97	35.562	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
30	1505	5/15/97	7	01	5/17/97	17.851	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
31	1506	5/15/97	7	02	5/17/97	33.647	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
32	1507	5/15/97	7	03	5/17/97	54.471	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
33	1550	5/23/97	8	01	6/3/97	0.526	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
34	1551	5/23/97	8	02	6/3/97	1.910	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
35	1552	5/23/97	8	03	6/3/97	3.269	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
36	1598	5/27/97	9	01	6/10/97	2.742	NonCompliant	Compliant	Compliant	6/10/97	0.000	NonCompliant	Compliant	Compliant
37	1599	5/27/97	9	02	6/10/97	3.919	NonCompliant	Compliant	Compliant	6/10/97	0.074	NonCompliant	Compliant	Compliant
38	1600	5/28/97	10	05	6/10/97	2.204	NonCompliant	Compliant	Compliant	6/10/97	0.000	NonCompliant	Compliant	Compliant
39	1601	5/30/97	11	23	6/10/97	2.438	NonCompliant	Compliant	Compliant	6/10/97	0.000	NonCompliant	Compliant	Compliant
40	1602	5/30/97	11	24	6/10/97	2.764	NonCompliant	Compliant	Compliant	6/10/97	0.000	NonCompliant	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP

For calculation details see QAPP and Laboratory QC Reports

Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours

Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery

Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples

Station LE04 - MicroWatershed #3 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Gravimetric (mg/L)	Quality Assurance: Holding	Duplicate
1	863	11/7/96	1	01	11/12/96	4302.0	Compliant	Compliant
2	864	11/7/96	1	02	11/12/96	2500.0	Compliant	Compliant
3	1021	12/15/96	2	01	12/20/96	2282.0	Compliant	Compliant
4	1022	12/15/96	2	02	NA	NA	NA	NA
5	1023	12/15/96	2	03	NA	NA	NA	NA
6	1024	12/15/96	2	05	NA	NA	NA	NA
7	1025	12/15/96	2	06	NA	NA	NA	NA
8	1026	12/15/96	2	07	NA	NA	NA	NA
9	1027	12/15/96	2	08	12/20/96	637.0	NA	NA
10	1028	12/15/96	2	09	NA	NA	NA	NA
11	1029	12/15/96	2	10	12/20/96	559.8	NA	NA
12	1117	2/12/97	3	01	2/19/97	4469.0	Compliant	Compliant
13	1118	2/12/97	3	02	2/19/97	3091.0	Compliant	Compliant
14	1119	2/12/97	3	03	NA	NA	NA	NA
15	1120	2/12/97	3	12	2/19/97	462.8	Compliant	Compliant
16	1121	2/12/97	3	13	2/19/97	829.2	Compliant	Compliant
17	1122	2/12/97	3	14	2/19/97	441.6	Compliant	Compliant
18	1123	2/12/97	3	15	2/19/97	536.4	Compliant	Compliant
19	1124	2/12/97	3	17	2/19/97	840.0	Compliant	Compliant
20	1125	2/12/97	3	18	2/19/97	1264.6	Compliant	Compliant
21	1126	2/12/97	3	20	2/19/97	535.4	Compliant	Compliant
22	1245	3/9/97	4	01	3/20/97	1527.0	NonCompliant	Compliant
23	1246	3/9/97	4	02	3/20/97	1549.0	NonCompliant	Compliant
24	1247	3/9/97	4	03	3/20/97	952.0	NonCompliant	Compliant
25	1327	4/4/97	5	01	4/18/97	646.6	NonCompliant	Compliant
26	1328	4/4/97	5	02	4/18/97	329.6	NonCompliant	Compliant
27	1410	4/26/97	6	01	5/20/97	1064.0	NonCompliant	NonCompliant
28	1411	4/26/97	6	04	5/20/97	1921.0	NonCompliant	NonCompliant
29	1412	4/26/97	6	07	5/20/97	184.7	NonCompliant	NonCompliant
30	1505	5/15/97	7	01	5/21/97	1530.0	Compliant	Compliant
31	1506	5/15/97	7	02	5/21/97	1179.0	Compliant	Compliant
32	1507	5/15/97	7	03	5/21/97	822.0	Compliant	Compliant
33	1550	5/23/97	8	01	5/26/97	2782.0	Compliant	Compliant
34	1551	5/23/97	8	02	5/26/97	1546.0	Compliant	Compliant
35	1552	5/23/97	8	03	5/26/97	802.0	Compliant	Compliant
36	1598	5/27/97	9	01	6/12/97	1838.0	NonCompliant	Compliant
37	1599	5/27/97	9	02	6/12/97	754.0	NonCompliant	Compliant
38	1600	5/28/97	10	05	6/12/97	4108.0	NonCompliant	Compliant
39	1601	5/30/97	11	23	6/12/97	2041.0	NonCompliant	Compliant
40	1602	5/30/97	11	24	6/12/97	2300.0	NonCompliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QA

For calculation details see QAPP and Laboratory QC Reports

Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours

Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery

Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples
Station LE05 - MicroWatershed #4 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
1	1030	12/15/96	1	01	12/18/96	0.367	NonCompliant	Compliant	Compliant	12/18/96	0.093	NonCompliant	NonCompliant	NonCompliant
2	1031	12/15/96	1	02	12/18/96	0.843	NonCompliant	Compliant	Compliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
3	1032	12/15/96	1	05	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
4	1033	12/15/96	1	06	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant
5	1034	12/15/96	1	10	12/18/96	0.000	NonCompliant	NonCompliant	NonCompliant	12/18/96	0.055	NonCompliant	NonCompliant	NonCompliant
6	1127	2/12/97	2	01	2/14/97	0.532	Compliant	Compliant	Compliant	2/14/97	0.079	Compliant	Compliant	Compliant
7	1128	2/12/97	2	02	2/14/97	0.536	Compliant	Compliant	Compliant	2/14/97	0.076	Compliant	Compliant	Compliant
8	1129	2/12/97	2	03	2/14/97	1.138	Compliant	Compliant	Compliant	2/14/97	0.071	Compliant	Compliant	Compliant
9	1130	2/12/97	2	12	2/14/97	0.595	Compliant	Compliant	Compliant	2/14/97	0.091	Compliant	Compliant	Compliant
10	1131	2/12/97	2	13	2/14/97	0.398	Compliant	Compliant	Compliant	2/14/97	0.105	Compliant	Compliant	Compliant
11	1132	2/12/97	2	14	2/14/97	0.388	Compliant	Compliant	Compliant	2/14/97	0.084	Compliant	Compliant	Compliant
12	1133	2/12/97	2	15	2/14/97	0.417	Compliant	Compliant	Compliant	2/14/97	0.092	Compliant	Compliant	Compliant
13	1134	2/12/97	2	18	2/14/97	0.465	Compliant	Compliant	Compliant	2/14/97	0.053	Compliant	Compliant	Compliant
14	1135	2/12/97	2	20	2/14/97	0.544	Compliant	Compliant	Compliant	2/14/97	0.089	Compliant	Compliant	Compliant
15	1136	2/12/97	2	21	2/14/97	0.420	Compliant	Compliant	Compliant	2/14/97	0.071	Compliant	Compliant	Compliant
16	1137	2/12/97	2	22	2/14/97	0.291	Compliant	Compliant	Compliant	2/14/97	0.078	Compliant	Compliant	Compliant
17	1138	2/12/97	2	23	2/14/97	0.287	Compliant	Compliant	Compliant	2/14/97	0.079	Compliant	Compliant	Compliant
18	1139	2/12/97	2	24	2/14/97	0.327	Compliant	Compliant	Compliant	2/14/97	0.068	Compliant	Compliant	Compliant
19	1248	3/9/97	3	03	3/10/97	0.469	Compliant	Compliant	Compliant	3/10/97	0.040	Compliant	NonCompliant	NonCompliant
20	1249	3/9/97	3	04	3/10/97	0.710	Compliant	Compliant	Compliant	3/10/97	0.038	Compliant	Compliant	Compliant
21	1320	4/4/97	4	01	4/6/97	0.000	Compliant	Compliant	Compliant	4/6/97	0.042	Compliant	Compliant	Compliant
22	1413	4/26/97	5	01	5/1/97	11.043	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
23	1414	4/26/97	5	04	5/1/97	14.804	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
24	1415	4/26/97	5	07	5/1/97	23.931	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
25	1508	5/15/97	6	01	5/17/97	4.495	Compliant	Compliant	Compliant	5/17/97	0.045	Compliant	NonCompliant	NonCompliant
26	1509	5/15/97	6	02	5/17/97	8.227	Compliant	Compliant	Compliant	5/17/97	0.058	Compliant	NonCompliant	NonCompliant
27	1510	5/15/97	6	03	5/17/97	10.790	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
28	1511	5/15/97	6	04	5/17/97	17.792	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
29	1544	5/19/97	7	01	5/21/97	2.525	Compliant	Compliant	Compliant	5/21/97	0.000	Compliant	Compliant	Compliant
30	1553	5/23/97	8	01	6/3/97	0.697	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
31	1554	5/23/97	8	02	6/3/97	2.167	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
32	1555	5/23/97	8	03	6/3/97	3.045	NonCompliant	Compliant	Compliant	6/3/97	0.043	NonCompliant	Compliant	Compliant
33	1603	5/27/97	9	01	6/10/97	3.212	NonCompliant	Compliant	Compliant	6/10/97	0.053	NonCompliant	Compliant	Compliant
34	1604	5/27/97	9	02	6/10/97	4.565	NonCompliant	Compliant	Compliant	6/10/97	0.000	NonCompliant	Compliant	Compliant
35	1605	5/27/97	9	04	6/10/97	3.487	NonCompliant	Compliant	Compliant	6/10/97	0.091	NonCompliant	Compliant	Compliant
36	1606	5/27/97	9	05	6/10/97	3.338	NonCompliant	Compliant	Compliant	6/10/97	0.089	NonCompliant	Compliant	Compliant
37	1607	5/30/97	10	23	6/10/97	2.015	NonCompliant	Compliant	Compliant	6/10/97	0.134	NonCompliant	Compliant	Compliant
38	1608	5/30/97	10	24	6/10/97	2.417	NonCompliant	Compliant	Compliant	6/10/97	0.072	NonCompliant	Compliant	Compliant
39	1630	6/8/97	11	01	6/11/97	1.680	Compliant	Compliant	Compliant	6/11/97	0.132	Compliant	Compliant	Compliant
40	1631	6/8/97	11	02	6/11/97	1.611	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
41	1632	6/8/97	11	03	6/11/97	1.956	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples

Station LE05 - MicroWatershed #4 @ Morris Farm

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Gravimetric (mg/L)	Quality Assurance: Holding	Duplicate
1	1030	12/15/96	1	01	NA	NA	NA	NA
2	1031	12/15/96	1	02	12/20/96	2082.0	Compliant	Compliant
3	1032	12/15/96	1	05	NA	NA	NA	NA
4	1033	12/15/96	1	06	12/20/96	869.8	Compliant	Compliant
5	1034	12/15/96	1	10	12/20/96	653.6	Compliant	Compliant
6	1127	2/12/97	2	01	2/19/97	6066.0	Compliant	Compliant
7	1128	2/12/97	2	02	2/19/97	5591.0	Compliant	Compliant
8	1129	2/12/97	2	03	2/19/97	3047.0	Compliant	Compliant
9	1130	2/12/97	2	12	2/26/97	592.8	NonCompliant	Compliant
10	1131	2/12/97	2	13	2/26/97	125.4	NonCompliant	Compliant
11	1132	2/12/97	2	14	2/26/97	631.2	NonCompliant	Compliant
12	1133	2/12/97	2	15	2/26/97	432.4	NonCompliant	Compliant
13	1134	2/12/97	2	18	2/26/97	534.6	NonCompliant	Compliant
14	1135	2/12/97	2	20	2/26/97	866.0	NonCompliant	Compliant
15	1136	2/12/97	2	21	2/26/97	1272.0	NonCompliant	Compliant
16	1137	2/12/97	2	22	2/26/97	1671.4	NonCompliant	Compliant
17	1138	2/12/97	2	23	2/26/97	1402.0	NonCompliant	Compliant
18	1139	2/12/97	2	24	2/26/97	738.0	NonCompliant	Compliant
19	1248	3/9/97	3	03	3/20/97	1659.0	NonCompliant	Compliant
20	1249	3/9/97	3	04	3/20/97	1290.4	NonCompliant	Compliant
21	1320	4/4/97	4	01	4/18/97	525.2	NonCompliant	Compliant
22	1413	4/26/97	5	01	5/20/97	1165.0	NonCompliant	NonCompliant
23	1414	4/26/97	5	04	5/20/97	2146.0	NonCompliant	NonCompliant
24	1415	4/26/97	5	07	5/20/97	2328.6	NonCompliant	NonCompliant
25	1508	5/15/97	6	01	5/21/97	1417.0	Compliant	Compliant
26	1509	5/15/97	6	02	5/21/97	992.6	Compliant	Compliant
27	1510	5/15/97	6	03	5/21/97	648.0	Compliant	Compliant
28	1511	5/15/97	6	04	5/21/97	1403.0	Compliant	Compliant
29	1544	5/19/97	7	01	5/26/97	2274.0	Compliant	Compliant
30	1553	5/23/97	8	01	5/26/97	3061.0	Compliant	Compliant
31	1554	5/23/97	8	02	5/26/97	2302.0	Compliant	Compliant
32	1555	5/23/97	8	03	5/26/97	1008.0	Compliant	Compliant
33	1603	5/27/97	9	01	6/12/97	2504.0	NonCompliant	Compliant
34	1604	5/27/97	9	02	6/12/97	1203.0	NonCompliant	Compliant
35	1605	5/27/97	9	04	6/12/97	1086.0	NonCompliant	Compliant
36	1606	5/27/97	9	05	6/12/97	1519.0	NonCompliant	Compliant
37	1607	5/30/97	10	23	6/12/97	1412.0	NonCompliant	Compliant
38	1608	5/30/97	10	24	6/12/97	1483.0	NonCompliant	Compliant
39	1630	6/8/97	11	01	6/12/97	179.1	NonCompliant	Compliant
40	1631	6/8/97	11	02	6/12/97	261.4	NonCompliant	Compliant
41	1632	6/8/97	11	03	6/12/97	119.6	NonCompliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Bi-Weekly Grab samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding Time	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding Time	Orthophosphate QA Duplicate	Orthophosphate QA Spike
1	1	9/11/95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2	4	9/25/95	9/26/95	0.020	Compliant	NonCompliant	NonCompliant	9/26/95	0.010	Compliant	NonCompliant	NonCompliant
3	6	10/9/95	10/10/95	0.040	Compliant	NonCompliant	NonCompliant	10/10/95	0.010	Compliant	NonCompliant	NonCompliant
4	8	10/23/95	10/24/95	0.090	Compliant	NonCompliant	NonCompliant	10/24/95	0.030	Compliant	NonCompliant	NonCompliant
5	10	11/6/95	11/7/95	0.070	Compliant	NonCompliant	NonCompliant	11/7/95	0.030	Compliant	NonCompliant	NonCompliant
6	19	2/26/96	2/27/96	0.500	Compliant	NonCompliant	NonCompliant	2/27/96	0.009	Compliant	NonCompliant	NonCompliant
7	23	11/20/95	11/21/95	0.002	Compliant	NonCompliant	NonCompliant	11/21/95	0.000	Compliant	NonCompliant	NonCompliant
8	25	12/4/95	12/5/95	0.010	Compliant	NonCompliant	NonCompliant	12/5/95	0.000	Compliant	NonCompliant	NonCompliant
9	34	12/18/95	12/19/95	0.060	Compliant	NonCompliant	NonCompliant	12/19/95	0.030	Compliant	NonCompliant	NonCompliant
10	52	4/8/96	4/9/96	0.910	Compliant	NonCompliant	NonCompliant	4/9/96	0.010	Compliant	NonCompliant	NonCompliant
11	73	4/22/96	4/22/96	0.900	Compliant	NonCompliant	NonCompliant	4/22/96	0.030	Compliant	NonCompliant	NonCompliant
12	82	1/2/96	1/2/96	0.090	Compliant	NonCompliant	NonCompliant	1/2/96	0.009	Compliant	NonCompliant	NonCompliant
13	91	1/16/96	1/18/96	0.120	Compliant	NonCompliant	NonCompliant	1/18/96	0.000	Compliant	NonCompliant	NonCompliant
14	95	1/29/96	1/30/96	0.210	Compliant	NonCompliant	NonCompliant	1/30/96	0.210	Compliant	NonCompliant	NonCompliant
15	99	2/13/96	2/15/96	0.410	Compliant	NonCompliant	NonCompliant	2/15/96	0.015	Compliant	NonCompliant	NonCompliant
16	110	3/11/96	3/12/96	0.970	Compliant	NonCompliant	NonCompliant	3/12/96	0.003	Compliant	NonCompliant	NonCompliant
17	112	3/25/96	3/26/96	0.800	Compliant	NonCompliant	NonCompliant	3/26/96	0.003	Compliant	NonCompliant	NonCompliant
18	123	5/20/96	5/21/96	0.640	Compliant	NonCompliant	NonCompliant	5/21/96	0.008	Compliant	NonCompliant	NonCompliant
19	154	6/17/96	6/19/96	0.100	Compliant	NonCompliant	NonCompliant	6/19/96	0.000	Compliant	NonCompliant	NonCompliant
20	167	5/6/96	5/7/96	0.650	Compliant	NonCompliant	NonCompliant	5/7/96	0.025	Compliant	NonCompliant	NonCompliant
21	309	9/9/96	9/11/96	1.383	Compliant	Compliant	Compliant	9/11/96	0.128	Compliant	Compliant	Compliant
22	399	6/3/96	6/4/96	1.787	Compliant	NonCompliant	NonCompliant	6/4/96	0.003	Compliant	NonCompliant	NonCompliant
23	497	7/1/96	7/3/96	7.814	Compliant	Compliant	Compliant	7/3/96	0.908	Compliant	NonCompliant	NonCompliant
24	516	7/15/96	7/15/96	0.574	Compliant	Compliant	Compliant	7/15/96	0.127	Compliant	Compliant	Compliant
25	541	7/29/96	7/29/96	0.970	Compliant	Compliant	Compliant	7/29/96	0.090	Compliant	Compliant	Compliant
26	566	8/12/96	8/12/96	0.893	Compliant	Compliant	Compliant	8/12/96	0.043	Compliant	Compliant	Compliant
27	609	8/26/96	8/26/96	1.994	Compliant	Compliant	Compliant	8/26/96	0.269	Compliant	Compliant	Compliant
28	710	9/10/96	9/10/96	1.055	Compliant	Compliant	Compliant	9/10/96	0.104	Compliant	Compliant	Compliant
29	750	9/20/96	9/20/96	1.445	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
30	781	10/7/96	10/7/96	0.091	Compliant	Compliant	Compliant	10/7/96	0.091	Compliant	Compliant	Compliant
31	802	10/22/96	10/22/96	3.328	Compliant	Compliant	Compliant	10/22/96	0.000	Compliant	Compliant	Compliant
32	844	11/5/96	11/6/96	2.234	Compliant	Compliant	Compliant	11/6/96	0.142	Compliant	Compliant	Compliant
33	877	11/18/96	11/18/96	0.902	Compliant	Compliant	Compliant	11/18/96	0.000	Compliant	Compliant	Compliant
34	913	12/2/96	12/2/96	3.196	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
35	1004	12/16/96	12/17/96	3.316	Compliant	NonCompliant	NonCompliant	12/17/96	0.000	Compliant	Compliant	Compliant
36	1044	1/6/97	1/8/97	3.536	Compliant	Compliant	Compliant	1/8/97	0.000	Compliant	Compliant	Compliant
37	1056	1/21/97	1/23/97	4.040	Compliant	Compliant	Compliant	1/23/97	0.000	Compliant	NonCompliant	NonCompliant
38	1071	2/3/97	2/4/97	2.253	Compliant	Compliant	Compliant	2/4/97	0.000	Compliant	Compliant	Compliant
39	1154	2/17/97	2/17/97	3.568	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
40	1206	3/2/97	3/4/97	3.841	Compliant	Compliant	Compliant	3/4/97	0.048	Compliant	Compliant	Compliant
41	1277	3/19/97	3/19/97	1.983	Compliant	Compliant	Compliant	3/19/97	0.000	Compliant	Compliant	Compliant
42	1309	4/1/97	4/2/97	1.537	Compliant	Compliant	Compliant	4/2/97	0.039	Compliant	NonCompliant	NonCompliant
43	1400	4/17/97	4/17/97	1.300	Compliant	Compliant	Compliant	4/17/97	0.000	Compliant	NonCompliant	NonCompliant
44	1493	5/13/97	5/17/97	2.993	NonCompliant	Compliant	Compliant	5/17/97	0.000	NonCompliant	NonCompliant	NonCompliant
45	1563	5/20/97	6/3/97	1.894	NonCompliant	Compliant	Compliant	6/3/97	0.070	NonCompliant	Compliant	Compliant
46	1738	7/17/97	7/18/97	1.020	Compliant	Compliant	Compliant	7/18/97	0.000	Compliant	NonCompliant	NonCompliant
47	1739	8/5/97	8/5/97	2.611	Compliant	Compliant	Compliant	8/5/97	0.000	Compliant	NonCompliant	NonCompliant
48	1744	8/20/97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
49	1753	10/3/97	10/3/97	2.324	Compliant	Compliant	Compliant	10/3/97	0.172	Compliant	Compliant	Compliant
50	1773	11/13/97	11/14/97	3.750	Compliant	Compliant	Compliant	11/14/97	0.425	Compliant	Compliant	Compliant

Leon River Watershed Project: Bi-Weekly Grab samples
Station LE06 - Leon River @ Leon Junction (Fulton Farm)

			Nitrate					Orthophosphate				
					Quality Assurance					Quality Assurance		
Sample Number	Laboratory ID Number	Collection Date	Analysis Date	Dionex Value (mg/L)	Holding Time	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding Time	Duplicate	Spike
51	1824	1/20/98	1/22/98	3.928	Compliant	Compliant	Compliant	1/22/98	0.000	Compliant	Compliant	Compliant
52	1923	1/28/98	1/30/98	3.103	Compliant	Compliant	Compliant	1/30/98	0.000	Compliant	Compliant	Compliant
53	2016	3/26/98	3/26/98	1.141	Compliant	Compliant	Compliant	3/26/98	0.000	Compliant	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Bi-Weekly Grab samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Total Suspended Solids (sediment) Analysis Date	Gravimetric (mg/L)	Quality Assurance Holding Time	Quality Assurance Duplicate	Fecal Coliform Bacteria Analysis Date	Bacterial Count (colonies/100ml)	Quality Assurance Blanks	Field Measured Water Parameters pH	Temperature (Centigrade)	Dissolved Oxygen (mg/L)
1	1	9/11/95	9/12/95	172.1	Compliant	Compliant	NA	NA	NA	7.90	25.60	6.61
2	4	9/25/95	9/26/95	335.7	Compliant	Compliant	NA	NA	NA	7.56	20.80	8.22
3	6	10/9/95	10/10/95	99.0	Compliant	Compliant	NA	NA	NA	7.70	20.10	8.03
4	8	10/23/95	10/24/95	20.7	Compliant	Compliant	NA	NA	NA	7.61	18.40	8.00
5	10	11/6/95	11/8/95	13.0	Compliant	Compliant	NA	NA	NA	7.56	14.40	9.51
6	19	2/26/96	2/27/96	20.8	Compliant	Compliant	2/26/96	43	Compliant	8.09	17.00	7.46
7	23	11/20/95	11/21/95	8.2	Compliant	Compliant	NA	NA	NA	7.73	14.90	9.98
8	25	12/4/95	12/5/95	9.8	Compliant	Compliant	NA	NA	NA	10.94	14.50	9.66
9	34	12/18/95	12/19/95	21.0	Compliant	Compliant	NA	NA	NA	NA	14.40	8.14
10	52	4/8/96	4/8/96	246.4	Compliant	Compliant	4/8/96	1122	Compliant	7.99	16.00	9.08
11	73	4/22/96	4/22/96	29.6	Compliant	Compliant	4/22/96	550	Compliant	7.70	21.00	5.70
12	82	1/2/96	1/3/96	10.0	Compliant	Compliant	1/2/96	97	Compliant	8.41	7.50	11.56
13	91	1/16/96	1/18/96	6.6	Compliant	Compliant	1/16/96	23	Compliant	8.08	9.00	12.30
14	95	1/29/96	1/29/96	18.0	Compliant	Compliant	1/29/96	2	Compliant	8.33	9.80	11.92
15	99	2/13/96	2/16/96	21.1	Compliant	Compliant	2/13/96	77	Compliant	8.38	11.90	10.22
16	110	3/11/96	3/11/96	10.6	Compliant	Compliant	3/11/96	60	Compliant	8.30	9.00	0.00
17	112	3/25/96	3/25/96	19.3	Compliant	Compliant	3/25/96	186	Compliant	8.08	15.00	7.45
18	123	5/20/96	5/21/96	29.6	Compliant	Compliant	5/20/96	13	Compliant	7.85	24.40	5.73
19	154	6/17/96	6/18/96	276.2	Compliant	Compliant	6/17/96	455	Compliant	7.85	28.30	6.44
20	167	5/6/96	5/7/96	23.3	Compliant	Compliant	5/6/96	120	Compliant	7.78	23.00	0.00
21	309	9/9/96	9/23/96	753.4	NonCompliant	Compliant	NA	NA	NA	NA	NA	NA
22	399	6/3/96	6/4/96	2055.0	Compliant	Compliant	6/3/96	20000	Compliant	7.47	25.90	4.96
23	497	7/1/96	7/3/96	15.6	Compliant	Compliant	7/1/96	29	Compliant	7.75	27.60	5.95
24	516	7/15/96	7/22/96	48.5	Compliant	Compliant	7/15/96	179	Compliant	7.41	26.80	3.07
25	541	7/29/96	8/1/96	15.5	Compliant	Compliant	7/29/96	73	Compliant	7.58	27.90	4.87
26	566	8/12/96	8/13/96	7.9	Compliant	Compliant	8/12/96	130	Compliant	7.60	26.80	4.99
27	609	8/26/96	8/27/96	1121.0	Compliant	Compliant	8/26/96	20000	Compliant	7.80	25.20	5.25
28	710	9/10/96	9/23/96	289.5	NonCompliant	Compliant	9/10/96	587	Compliant	NA	NA	NA
29	750	9/20/96	10/2/96	363.0	NonCompliant	Compliant	NA	NA	NA	NA	NA	NA
30	781	10/7/96	10/28/96	148.9	NonCompliant	Compliant	10/7/96	360	Compliant	NA	NA	NA
31	802	10/22/96	10/28/96	42.2	Compliant	Compliant	10/22/96	275	Compliant	7.41	19.00	7.52
32	844	11/5/96	11/11/96	173.4	Compliant	Compliant	11/5/96	1470	Compliant	7.88	15.90	9.22
33	877	11/18/96	11/25/96	103.6	Compliant	Compliant	11/18/96	685	Compliant	7.95	16.40	8.42
34	913	12/2/96	12/9/96	338.8	Compliant	Compliant	12/2/96	320	Compliant	8.07	9.70	10.61
35	1004	12/16/96	12/20/96	317.4	Compliant	Compliant	12/16/96	10000	Compliant	8.04	10.70	10.02
36	1044	1/6/97	1/9/97	4.4	Compliant	Compliant	1/6/97	115	Compliant	8.04	12.70	9.46
37	1056	1/21/97	1/28/97	19.7	Compliant	Compliant	1/21/97	203	Compliant	8.18	9.00	11.75
38	1071	2/3/97	2/5/97	13.0	Compliant	Compliant	2/3/97	20	Compliant	8.29	12.10	10.55
39	1154	2/17/97	2/26/97	507.8	NonCompliant	NonCompliant	2/17/97	1580	Compliant	8.15	9.40	10.75
40	1206	3/2/97	3/17/97	3017.5	NonCompliant	NonCompliant	NA	NA	NA	NA	NA	NA
41	1277	3/19/97	4/9/97	261.0	NonCompliant	Compliant	3/19/97	765	Compliant	8.01	13.60	9.24
42	1309	4/1/97	4/9/97	339.8	NonCompliant	Compliant	4/1/97	220	Compliant	7.98	17.20	8.34
43	1400	4/17/97	4/19/97	235.4	Compliant	Compliant	4/17/97	465	Compliant	7.85	16.10	9.13
44	1493	5/13/97	5/21/97	658.4	NonCompliant	Compliant	5/13/97	1900	Compliant	7.77	19.00	7.47
45	1563	5/20/97	5/26/97	523.8	Compliant	Compliant	NA	NA	NA	NA	23.80	6.60
46	1738	7/17/97	7/21/97	336.4	Compliant	Compliant	7/17/97	716	Compliant	NA	NA	NA
47	1739	8/5/97	8/5/97	199.0	Compliant	Compliant	8/5/97	663	Compliant	NA	NA	NA
48	1744	8/20/97	8/20/97	106.5	Compliant	Compliant	NA	NA	NA	7.61	31.10	6.35
49	1753	10/3/97	10/6/97	35.0	Compliant	Compliant	10/3/97	103	Compliant	7.12	24.20	7.20
50	1773	11/13/97	11/21/97	41.2	NonCompliant	Compliant	NA	NA	NA	NA	NA	NA

Leon River Watershed Project: Bi-Weekly Grab samples
Station LE06 - Leon River @ Leon Junction (Fulton Farm)

			Total Suspended Solids (sediment)				Fecal Coliform Bacteria			Field Measured Water Parameters		
					Quality Assurance				Quality Assurance			
Sample Number	Laboratory ID Number	Collection Date	Analysis Date	Gravimetric (mg/L)	Holding Time	Duplicate	Analysis Date	Bacterial Count (colonies/100ml)	Blanks	pH	Temperature (Centigrade)	Dissolved Oxygen (mg/L)
51	1824	1/20/98	1/26/98	15.1	Compliant	Compliant	1/20/98	123	Compliant	7.20	11.20	12.78
52	1923	1/28/98	1/30/98	13.4	Compliant	Compliant	NA	NA	NA	NA	NA	NA
53	2016	3/26/98	4/2/98	14.2	Compliant	Compliant	3/26/98	620	Compliant	7.21	17.80	9.60

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon River (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
1	45	4/8/96	1	01	4/8/96	0.960	Compliant	NonCompliant	NonCompliant	4/8/96	0.001	Compliant	NonCompliant	NonCompliant
2	46	4/8/96	1	02	4/8/96	1.050	Compliant	NonCompliant	NonCompliant	4/8/96	0.009	Compliant	NonCompliant	NonCompliant
3	47	4/8/96	1	03	4/8/96	1.060	Compliant	NonCompliant	NonCompliant	4/8/96	0.005	Compliant	NonCompliant	NonCompliant
4	48	4/8/96	1	04	4/8/96	1.030	Compliant	NonCompliant	NonCompliant	4/8/96	0.006	Compliant	NonCompliant	NonCompliant
5	49	4/8/96	1	05	4/8/96	0.930	Compliant	NonCompliant	NonCompliant	4/8/96	0.003	Compliant	NonCompliant	NonCompliant
6	50	4/8/96	1	06	4/8/96	1.010	Compliant	NonCompliant	NonCompliant	4/8/96	0.014	Compliant	NonCompliant	NonCompliant
7	58	4/8/96	1	07	4/10/96	0.300	Compliant	NonCompliant	NonCompliant	4/10/96	0.050	Compliant	NonCompliant	NonCompliant
8	59	4/8/96	1	08	4/10/96	0.300	Compliant	NonCompliant	NonCompliant	4/10/96	0.030	Compliant	NonCompliant	NonCompliant
9	60	4/8/96	1	09	4/10/96	0.400	Compliant	NonCompliant	NonCompliant	4/10/96	0.040	Compliant	NonCompliant	NonCompliant
10	61	4/9/96	1	10	4/10/96	0.320	Compliant	NonCompliant	NonCompliant	4/10/96	0.026	Compliant	NonCompliant	NonCompliant
11	62	4/9/96	1	11	4/10/96	0.330	Compliant	NonCompliant	NonCompliant	4/10/96	0.038	Compliant	NonCompliant	NonCompliant
12	63	4/9/96	1	12	4/10/96	0.202	Compliant	NonCompliant	NonCompliant	4/10/96	0.060	Compliant	NonCompliant	NonCompliant
13	64	4/10/96	1	13	4/11/96	0.180	Compliant	NonCompliant	NonCompliant	4/11/96	0.005	Compliant	NonCompliant	NonCompliant
14	65	4/11/96	1	14	4/11/96	0.190	Compliant	NonCompliant	NonCompliant	4/11/96	0.002	Compliant	NonCompliant	NonCompliant
15	247	8/28/96	3	01	9/6/96	1.093	NonCompliant	Compliant	Compliant	9/6/96	0.040	NonCompliant	Compliant	Compliant
16	248	8/28/96	3	02	9/6/96	0.956	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
17	249	8/28/96	3	03	9/6/96	1.370	NonCompliant	Compliant	Compliant	9/6/96	0.066	NonCompliant	Compliant	Compliant
18	250	8/28/96	3	04	9/6/96	0.790	NonCompliant	Compliant	Compliant	9/6/96	0.065	NonCompliant	Compliant	Compliant
19	251	8/28/96	3	05	9/6/96	0.418	NonCompliant	Compliant	Compliant	9/6/96	0.055	NonCompliant	Compliant	Compliant
20	252	8/28/96	3	06	9/6/96	0.397	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
21	253	8/29/96	3	07	9/6/96	0.229	NonCompliant	Compliant	Compliant	9/6/96	0.043	NonCompliant	Compliant	Compliant
22	254	8/29/96	3	08	9/6/96	0.047	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
23	255	8/29/96	3	09	9/6/96	0.215	NonCompliant	Compliant	Compliant	9/6/96	0.054	NonCompliant	Compliant	Compliant
24	256	8/30/96	3	10	9/6/96	0.036	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
25	257	8/30/96	3	11	9/6/96	0.022	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
26	258	8/30/96	3	12	9/6/96	0.000	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
27	259	8/31/96	3	13	9/6/96	0.000	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
28	260	8/31/96	3	14	9/6/96	0.000	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
29	261	8/31/96	3	15	9/6/96	0.015	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
30	262	9/1/96	0	16	9/6/96	0.057	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
31	263	9/1/96	3	17	9/6/96	0.034	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
32	264	9/1/96	3	18	9/6/96	0.027	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
33	265	9/2/96	3	19	9/6/96	0.029	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
34	266	9/2/96	3	20	9/6/96	0.041	NonCompliant	Compliant	Compliant	9/6/96	0.000	NonCompliant	Compliant	Compliant
35	286	9/2/96	3	21	9/6/96	2.129	NonCompliant	Compliant	Compliant	9/6/96	0.103	NonCompliant	Compliant	Compliant
36	287	9/3/96	3	22	9/6/96	2.410	NonCompliant	Compliant	Compliant	9/6/96	0.096	NonCompliant	Compliant	Compliant
37	288	9/3/96	3	23	9/6/96	1.974	NonCompliant	Compliant	Compliant	9/6/96	0.157	NonCompliant	Compliant	Compliant
38	289	9/3/96	3	24	9/6/96	1.108	NonCompliant	Compliant	Compliant	9/6/96	0.082	NonCompliant	Compliant	Compliant
39	348	6/1/96	2	02	6/3/96	0.587	Compliant	NonCompliant	NonCompliant	6/3/96	0.002	Compliant	NonCompliant	NonCompliant
40	349	6/1/96	2	03	6/3/96	0.695	Compliant	NonCompliant	NonCompliant	6/3/96	0.010	Compliant	NonCompliant	NonCompliant
41	350	6/1/96	2	04	6/3/96	0.792	Compliant	NonCompliant	NonCompliant	6/3/96	0.005	Compliant	NonCompliant	NonCompliant
42	371	6/1/96	2	05	6/3/96	0.609	Compliant	NonCompliant	NonCompliant	6/3/96	0.002	Compliant	NonCompliant	NonCompliant
43	372	6/2/96	2	06	6/3/96	0.493	Compliant	NonCompliant	NonCompliant	6/3/96	0.002	Compliant	NonCompliant	NonCompliant
44	373	6/2/96	2	07	6/5/96	0.140	NonCompliant	NonCompliant	NonCompliant	6/5/96	0.005	NonCompliant	NonCompliant	NonCompliant
45	374	6/2/96	2	08	6/5/96	0.114	NonCompliant	NonCompliant	NonCompliant	6/5/96	0.001	NonCompliant	NonCompliant	NonCompliant
46	375	6/3/96	2	09	6/5/96	0.080	Compliant	NonCompliant	NonCompliant	6/5/96	0.002	Compliant	NonCompliant	NonCompliant
47	376	6/3/96	2	10	6/5/96	0.162	Compliant	NonCompliant	NonCompliant	6/5/96	0.000	Compliant	NonCompliant	NonCompliant
48	377	6/3/96	2	11	6/7/96	0.506	NonCompliant	NonCompliant	NonCompliant	6/7/96	0.005	NonCompliant	NonCompliant	NonCompliant
49	378	6/4/96	2	12	6/7/96	0.299	NonCompliant	NonCompliant	NonCompliant	6/7/96	0.001	NonCompliant	NonCompliant	NonCompliant
50	379	6/4/96	2	13	6/7/96	0.360	NonCompliant	NonCompliant	NonCompliant	6/7/96	0.007	NonCompliant	NonCompliant	NonCompliant
51	440	6/5/96	2	03	6/7/96	0.493	Compliant	NonCompliant	NonCompliant	6/7/96	0.011	Compliant	NonCompliant	NonCompliant
52	441	6/5/96	2	04	6/7/96	0.424	Compliant	NonCompliant	NonCompliant	6/7/96	0.014	Compliant	NonCompliant	NonCompliant
53	442	6/6/96	2	05	6/7/96	0.338	Compliant	NonCompliant	NonCompliant	6/7/96	0.003	Compliant	NonCompliant	NonCompliant
54	443	6/6/96	2	06	6/7/96	0.362	Compliant	NonCompliant	NonCompliant	6/7/96	0.002	Compliant	NonCompliant	NonCompliant
55	454	6/6/96	2	03	6/10/96	0.788	NonCompliant	NonCompliant	NonCompliant	6/10/96	0.001	NonCompliant	NonCompliant	NonCompliant

Leon River Watershed Project: Storm Samples
Station LE06 - Leon River @ Leon River (Fulton Farm)

					Nitrate					Orthophosphate				
							Quality Assurance					Quality Assurance		
Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Analysis Date	Dionex Value (mg/L)	Holding	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding	Duplicate	Spike
56	455	6/6/96	2	04	6/10/96	0.630	NonCompliant	NonCompliant	NonCompliant	6/10/96	0.002	NonCompliant	NonCompliant	NonCompliant
57	456	6/7/96	2	05	6/10/96	0.297	NonCompliant	NonCompliant	NonCompliant	6/10/96	0.001	NonCompliant	NonCompliant	NonCompliant
58	457	6/7/96	2	06	6/12/96	0.436	NonCompliant	NonCompliant	NonCompliant	6/12/96	0.002	NonCompliant	NonCompliant	NonCompliant
59	458	6/7/96	2	07	6/12/96	0.457	NonCompliant	NonCompliant	NonCompliant	6/12/96	0.004	NonCompliant	NonCompliant	NonCompliant
60	623	8/26/96	3	01	8/27/96	1.320	Compliant	Compliant	Compliant	8/27/96	0.195	Compliant	Compliant	Compliant
61	624	8/26/96	3	02	8/27/96	1.773	Compliant	Compliant	Compliant	8/27/96	0.163	Compliant	Compliant	Compliant
62	625	8/26/96	3	03	8/27/96	1.730	Compliant	Compliant	Compliant	8/27/96	0.183	Compliant	Compliant	Compliant
63	626	8/26/96	3	04	8/28/96	2.159	Compliant	Compliant	Compliant	8/28/96	0.243	Compliant	Compliant	Compliant
64	627	8/26/96	3	05	8/28/96	1.254	Compliant	Compliant	Compliant	8/28/96	0.124	Compliant	Compliant	Compliant
65	628	8/26/96	3	06	8/28/96	1.250	Compliant	Compliant	Compliant	8/28/96	0.000	Compliant	Compliant	Compliant
66	629	8/27/96	3	07	8/28/96	1.639	Compliant	Compliant	Compliant	8/28/96	0.050	Compliant	Compliant	Compliant
67	732	9/16/96	4	01	9/20/96	0.000	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
68	733	9/16/96	4	02	9/20/96	0.471	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
69	734	9/16/96	4	03	9/20/96	0.674	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
70	735	9/16/96	4	04	9/20/96	0.262	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
71	736	9/16/96	4	05	9/20/96	0.533	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
72	737	9/16/96	4	06	9/20/96	0.375	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
73	738	9/17/96	4	07	9/20/96	0.299	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
74	739	9/17/96	4	08	9/20/96	0.117	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
75	740	9/17/96	4	09	9/20/96	0.114	NonCompliant	Compliant	Compliant	9/20/96	0.000	NonCompliant	Compliant	Compliant
76	741	9/18/96	4	10	9/20/96	0.123	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
77	742	9/18/96	4	11	9/20/96	0.000	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
78	743	9/18/96	4	12	9/20/96	0.111	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
79	744	9/19/96	4	13	9/20/96	0.407	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
80	745	9/19/96	4	14	9/20/96	0.414	Compliant	Compliant	Compliant	9/20/96	0.000	Compliant	Compliant	Compliant
81	760	9/20/96	4	01	9/23/96	1.389	NonCompliant	Compliant	Compliant	9/23/96	0.000	NonCompliant	Compliant	Compliant
82	761	9/20/96	4	02	9/23/96	2.216	NonCompliant	Compliant	Compliant	9/23/96	0.000	NonCompliant	Compliant	Compliant
83	762	9/21/96	4	03	9/23/96	4.612	Compliant	Compliant	Compliant	9/23/96	0.122	Compliant	Compliant	Compliant
84	763	9/21/96	4	04	9/23/96	1.143	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
85	764	9/21/96	4	05	9/23/96	0.682	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	NonCompliant	NonCompliant
86	765	9/21/96	4	06	9/23/96	0.139	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	NonCompliant	NonCompliant
87	766	9/21/96	4	07	9/23/96	0.000	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	NonCompliant	NonCompliant
88	767	9/22/96	4	08	9/23/96	0.000	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	NonCompliant	NonCompliant
89	768	9/22/96	4	09	9/23/96	1.183	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
90	769	9/22/96	4	10	9/23/96	0.037	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
91	770	9/23/96	4	11	9/23/96	0.000	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
92	771	9/23/96	4	12	9/23/96	0.414	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
93	772	9/23/96	4	13	9/23/96	0.610	Compliant	Compliant	Compliant	9/23/96	0.000	Compliant	Compliant	Compliant
94	773	9/24/96	4	14	9/24/96	0.890	Compliant	Compliant	Compliant	9/24/96	0.000	Compliant	Compliant	Compliant
95	806	10/28/96	5	01	10/29/96	3.022	Compliant	Compliant	Compliant	10/29/96	0.000	Compliant	Compliant	Compliant
96	817	10/29/96	5	02	10/30/96	2.876	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
97	818	10/29/96	5	03	10/30/96	2.656	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
98	819	10/29/96	5	04	10/30/96	2.503	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
99	820	10/30/96	5	05	10/30/96	2.475	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
100	821	10/30/96	5	06	10/30/96	2.873	Compliant	Compliant	Compliant	10/30/96	0.051	Compliant	NonCompliant	NonCompliant
101	822	10/30/96	5	07	10/30/96	1.280	Compliant	Compliant	Compliant	10/30/96	0.000	Compliant	NonCompliant	NonCompliant
102	833	10/30/96	5	08	11/1/96	1.558	Compliant	Compliant	Compliant	11/1/96	0.000	Compliant	Compliant	Compliant
103	834	10/31/96	5	09	11/1/96	0.493	Compliant	Compliant	Compliant	11/1/96	0.000	Compliant	Compliant	Compliant
104	835	10/31/96	5	10	11/1/96	0.769	Compliant	Compliant	Compliant	11/1/96	0.000	Compliant	Compliant	Compliant
105	836	10/31/96	5	11	11/1/96	0.000	Compliant	Compliant	Compliant	11/1/96	0.000	Compliant	Compliant	Compliant
106	837	11/1/96	5	12	11/1/96	0.953	Compliant	Compliant	Compliant	11/1/96	0.000	Compliant	Compliant	Compliant
107	855	11/8/96	6	01	11/8/96	1.373	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
108	856	11/8/96	6	02	11/8/96	1.334	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
109	857	11/8/96	6	03	11/8/96	1.428	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant
110	858	11/8/96	6	04	11/8/96	1.405	Compliant	Compliant	Compliant	11/8/96	0.000	Compliant	Compliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon River (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Nitrate Analysis Date	Nitrate Dionex Value (mg/L)	Nitrate QA Holding	Nitrate QA Duplicate	Nitrate QA Spike	Orthophosphate Analysis Date	Orthophosphate Dionex value (mg/L)	Orthophosphate QA Holding	Orthophosphate QA Duplicate	Orthophosphate QA Spike
111	870	11/8/96	6	05	11/10/96	1.311	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
112	871	11/8/96	6	06	11/10/96	0.777	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
113	872	11/9/96	6	07	11/10/96	1.129	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
114	873	11/9/96	6	08	11/10/96	0.987	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
115	874	11/9/96	6	09	11/10/96	0.537	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
116	875	11/10/96	6	10	11/10/96	0.925	Compliant	Compliant	Compliant	11/10/96	0.000	Compliant	NonCompliant	NonCompliant
117	927	11/29/96	7	01	12/2/96	7.624	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
118	928	11/29/96	7	02	12/2/96	7.220	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
119	929	11/29/96	7	03	12/2/96	6.149	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
120	930	11/29/96	7	04	12/2/96	5.621	NonCompliant	Compliant	Compliant	12/2/96	0.000	NonCompliant	Compliant	Compliant
121	931	11/30/96	7	05	12/2/96	4.261	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
122	932	11/30/96	7	06	12/2/96	2.315	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
123	933	11/30/96	7	07	12/2/96	0.746	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
124	934	11/30/96	7	08	12/2/96	0.975	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
125	935	12/1/96	7	09	12/2/96	1.546	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
126	936	12/1/96	7	10	12/2/96	0.508	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
127	937	12/1/96	7	11	12/2/96	0.663	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
128	938	12/2/96	7	12	12/2/96	0.568	Compliant	Compliant	Compliant	12/2/96	0.000	Compliant	Compliant	Compliant
129	965	12/2/96	7	13	12/4/96	0.908	Compliant	NonCompliant	NonCompliant	12/4/96	0.000	Compliant	NonCompliant	NonCompliant
130	966	12/2/96	7	14	12/4/96	0.065	Compliant	NonCompliant	NonCompliant	12/4/96	0.000	Compliant	NonCompliant	NonCompliant
131	967	12/3/96	7	15	12/4/96	0.116	Compliant	NonCompliant	NonCompliant	12/4/96	0.000	Compliant	NonCompliant	NonCompliant
132	968	12/3/96	7	16	12/4/96	0.415	Compliant	NonCompliant	NonCompliant	12/4/96	0.000	Compliant	NonCompliant	NonCompliant
133	969	12/3/96	7	17	12/4/96	0.753	Compliant	NonCompliant	NonCompliant	12/4/96	0.000	Compliant	NonCompliant	NonCompliant
134	970	12/4/96	7	18	12/4/96	1.171	Compliant	NonCompliant	NonCompliant	12/4/96	0.000	Compliant	NonCompliant	NonCompliant
135	1035	12/16/96	8	01	12/18/96	1.069	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
136	1036	12/16/96	8	02	12/18/96	1.858	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
137	1037	12/16/96	8	03	12/18/96	1.987	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
138	1038	12/16/96	8	04	12/18/96	1.736	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
139	1039	12/17/96	8	05	12/18/96	1.910	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
140	1040	12/17/96	8	06	12/18/96	1.870	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
141	1041	12/17/96	8	07	12/18/96	1.341	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
142	1042	12/17/96	8	08	12/18/96	0.945	Compliant	Compliant	Compliant	12/18/96	0.000	Compliant	Compliant	Compliant
143	1091	2/12/97	9	17	2/14/97	4.565	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
144	1092	2/12/97	9	18	2/14/97	3.088	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
145	1093	2/13/97	9	19	2/14/97	2.332	Compliant	Compliant	Compliant	2/14/97	0.070	Compliant	Compliant	Compliant
146	1094	2/13/97	9	20	2/14/97	2.293	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
147	1095	2/13/97	9	21	2/14/97	2.145	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
148	1096	2/14/97	9	22	2/14/97	2.606	Compliant	Compliant	Compliant	2/14/97	0.000	Compliant	Compliant	Compliant
149	1147	2/14/97	9	23	2/16/97	2.446	Compliant	Compliant	Compliant	2/16/97	0.000	Compliant	Compliant	Compliant
150	1148	2/14/97	9	24	2/16/97	2.384	Compliant	Compliant	Compliant	2/16/97	0.000	Compliant	Compliant	Compliant
151	1149	2/15/97	9	01	2/16/97	2.690	Compliant	Compliant	Compliant	2/16/97	0.000	Compliant	Compliant	Compliant
152	1161	2/15/97	9	02	2/17/97	2.721	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
153	1162	2/15/97	9	03	2/17/97	2.667	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
154	1163	2/15/97	9	04	2/17/97	2.657	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
155	1164	2/15/97	9	05	2/17/97	2.793	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
156	1165	2/16/97	9	06	2/17/97	3.007	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
157	1166	2/16/97	9	07	2/17/97	3.364	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
158	1167	2/16/97	9	08	2/17/97	3.772	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
159	1168	2/17/97	9	09	2/17/97	4.142	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
160	1169	2/17/97	9	10	2/17/97	4.327	Compliant	Compliant	Compliant	2/17/97	0.000	Compliant	Compliant	Compliant
161	1170	2/8/97	0	25	2/17/97	3.007	NonCompliant	Compliant	Compliant	2/17/97	0.000	NonCompliant	Compliant	Compliant
162	1178	2/20/97	10	01	2/21/97	3.518	Compliant	Compliant	Compliant	2/21/97	0.000	Compliant	Compliant	Compliant
163	1179	2/20/97	10	02	2/21/97	3.722	Compliant	Compliant	Compliant	2/21/97	0.000	Compliant	Compliant	Compliant
164	1180	2/20/97	10	03	2/21/97	3.623	Compliant	Compliant	Compliant	2/21/97	0.000	Compliant	Compliant	Compliant
165	1201	2/20/97	10	04	2/23/97	0.505	NonCompliant	Compliant	Compliant	2/23/97	0.000	NonCompliant	NonCompliant	NonCompliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon River (Fulton Farm)

					Nitrate					Orthophosphate				
							Quality Assurance					Quality Assurance		
Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Analysis Date	Dionex Value (mg/L)	Holding	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding	Duplicate	Spike
166	1202	2/20/97	10	05	2/23/97	0.000	NonCompliant	Compliant	Compliant	2/23/97	0.000	NonCompliant	NonCompliant	NonCompliant
167	1203	2/21/97	10	06	2/23/97	0.000	Compliant	Compliant	Compliant	2/23/97	0.000	Compliant	NonCompliant	NonCompliant
168	1204	2/21/97	10	07	2/23/97	0.000	Compliant	Compliant	Compliant	2/23/97	0.000	Compliant	NonCompliant	NonCompliant
169	1216	2/21/97	10	25	3/7/97	1.476	NonCompliant	Compliant	Compliant	3/7/97	0.076	NonCompliant	Compliant	Compliant
170	1217	2/25/97	0	26	3/7/97	2.108	NonCompliant	Compliant	Compliant	3/7/97	0.000	NonCompliant	Compliant	Compliant
171	1218	3/4/97	11	01	3/7/97	0.000	NonCompliant	Compliant	Compliant	3/7/97	0.000	NonCompliant	Compliant	Compliant
172	1219	3/4/97	11	02	3/7/97	0.000	NonCompliant	Compliant	Compliant	3/7/97	0.000	NonCompliant	Compliant	Compliant
173	1220	3/5/97	11	03	3/7/97	0.138	Compliant	Compliant	Compliant	3/7/97	0.000	Compliant	Compliant	Compliant
174	1221	3/5/97	11	04	3/7/97	0.000	Compliant	Compliant	Compliant	3/7/97	0.000	Compliant	Compliant	Compliant
175	1222	3/5/97	11	05	3/7/97	0.000	Compliant	Compliant	Compliant	3/7/97	0.000	Compliant	Compliant	Compliant
176	1223	3/6/97	11	06	3/7/97	0.000	Compliant	Compliant	Compliant	3/7/97	0.000	Compliant	Compliant	Compliant
177	1224	3/6/97	11	07	3/7/97	0.000	Compliant	Compliant	Compliant	3/7/97	0.048	Compliant	NonCompliant	NonCompliant
178	1226	3/6/97	11	08	3/7/97	0.000	Compliant	Compliant	Compliant	3/7/97	0.042	Compliant	NonCompliant	NonCompliant
179	1227	3/7/97	11	09	3/7/97	0.108	Compliant	Compliant	Compliant	3/7/97	0.047	Compliant	NonCompliant	NonCompliant
180	1228	3/7/97	11	10	3/7/97	0.304	Compliant	Compliant	Compliant	3/7/97	0.053	Compliant	NonCompliant	NonCompliant
181	1250	3/7/97	11	11	3/10/97	0.000	NonCompliant	Compliant	Compliant	3/10/97	0.000	NonCompliant	Compliant	Compliant
182	1251	3/8/97	11	12	3/10/97	0.000	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	Compliant	Compliant
183	1252	3/8/97	11	13	3/10/97	0.000	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	Compliant	Compliant
184	1253	3/8/97	11	14	3/10/97	0.000	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	Compliant	Compliant
185	1254	3/9/97	11	15	3/10/97	0.000	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	Compliant	Compliant
186	1255	3/9/97	11	16	3/10/97	0.000	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	Compliant	Compliant
187	1256	3/9/97	11	17	3/10/97	0.000	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	Compliant	Compliant
188	1257	3/10/97	11	18	3/10/97	0.000	Compliant	Compliant	Compliant	3/10/97	0.000	Compliant	NonCompliant	NonCompliant
189	1261	3/10/97	11	01	3/11/97	0.000	Compliant	Compliant	Compliant	3/11/97	0.000	Compliant	Compliant	Compliant
190	1262	3/10/97	11	02	3/11/97	0.000	Compliant	Compliant	Compliant	3/11/97	0.000	Compliant	Compliant	Compliant
191	1263	3/11/97	11	03	3/11/97	0.000	Compliant	Compliant	Compliant	3/11/97	0.000	Compliant	Compliant	Compliant
192	1267	3/11/97	11	25	3/14/97	0.000	NonCompliant	NonCompliant	NonCompliant	3/14/97	0.000	NonCompliant	NonCompliant	NonCompliant
193	1268	3/13/97	12	09	3/14/97	0.000	Compliant	NonCompliant	NonCompliant	3/14/97	0.000	Compliant	NonCompliant	NonCompliant
194	1269	3/13/97	12	10	3/14/97	0.000	Compliant	NonCompliant	NonCompliant	3/14/97	0.000	Compliant	NonCompliant	NonCompliant
195	1270	3/13/97	12	11	3/14/97	0.000	Compliant	NonCompliant	NonCompliant	3/14/97	0.000	Compliant	NonCompliant	NonCompliant
196	1271	3/14/97	12	12	3/14/97	0.044	Compliant	NonCompliant	NonCompliant	3/14/97	0.069	Compliant	NonCompliant	NonCompliant
197	1321	4/4/97	13	01	4/6/97	0.229	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
198	1322	4/4/97	13	02	4/6/97	0.257	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
199	1323	4/4/97	13	03	4/6/97	0.234	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
200	1324	4/4/97	13	04	4/6/97	0.000	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
201	1325	4/4/97	13	05	4/6/97	0.276	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
202	1326	4/5/97	13	06	4/6/97	0.349	Compliant	Compliant	Compliant	4/6/97	0.000	Compliant	Compliant	Compliant
203	1329	4/7/97	14	13	4/8/97	0.171	Compliant	Compliant	Compliant	4/8/97	0.000	Compliant	NonCompliant	NonCompliant
204	1383	4/7/97	0	14	4/8/97	0.276	Compliant	Compliant	Compliant	4/8/97	0.000	Compliant	NonCompliant	NonCompliant
205	1384	4/8/97	14	15	4/8/97	0.302	Compliant	Compliant	Compliant	4/8/97	0.000	Compliant	NonCompliant	NonCompliant
206	1385	4/8/97	14	16	4/8/97	0.000	Compliant	Compliant	Compliant	4/8/97	0.000	Compliant	NonCompliant	NonCompliant
207	1386	4/8/97	14	17	4/9/97	0.633	Compliant	Compliant	Compliant	4/9/97	0.000	Compliant	NonCompliant	NonCompliant
208	1387	4/9/97	14	18	4/9/97	0.181	Compliant	Compliant	Compliant	4/9/97	0.000	Compliant	NonCompliant	NonCompliant
209	1388	4/9/97	14	19	4/9/97	0.188	Compliant	Compliant	Compliant	4/9/97	0.000	Compliant	NonCompliant	NonCompliant
210	1416	4/25/97	15	02	5/1/97	0.602	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
211	1417	4/27/97	15	09	5/1/97	0.081	NonCompliant	Compliant	Compliant	5/1/97	0.000	NonCompliant	NonCompliant	NonCompliant
212	1448	4/28/97	15	12	5/2/97	0.054	NonCompliant	Compliant	Compliant	5/2/97	0.000	NonCompliant	Compliant	Compliant
213	1449	4/28/97	15	13	5/2/97	0.000	NonCompliant	Compliant	Compliant	5/2/97	0.000	NonCompliant	Compliant	Compliant
214	1450	4/29/97	15	14	5/2/97	0.000	NonCompliant	Compliant	Compliant	5/2/97	0.000	NonCompliant	Compliant	Compliant
215	1451	4/29/97	15	15	5/2/97	0.040	NonCompliant	NonCompliant	NonCompliant	5/2/97	0.000	NonCompliant	NonCompliant	NonCompliant
216	1452	4/29/97	15	16	5/1/97	0.000	Compliant	NonCompliant	NonCompliant	5/1/97	0.000	Compliant	NonCompliant	NonCompliant
217	1453	4/30/97	15	17	5/2/97	0.091	Compliant	NonCompliant	NonCompliant	5/2/97	0.000	Compliant	NonCompliant	NonCompliant
218	1454	4/30/97	15	18	5/2/97	0.000	Compliant	NonCompliant	NonCompliant	5/2/97	0.000	Compliant	NonCompliant	NonCompliant
219	1458	5/10/97	16	01	5/16/97	1.092	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
220	1459	5/10/97	16	02	5/16/97	0.058	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon River (Fulton Farm)

					Nitrate					Orthophosphate				
							Quality Assurance					Quality Assurance		
Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Analysis Date	Dionex Value (mg/L)	Holding	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding	Duplicate	Spike
221	1460	5/10/97	16	03	5/16/97	0.065	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
222	1461	5/10/97	16	04	5/16/97	0.054	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
223	1462	5/10/97	16	05	5/16/97	0.039	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
224	1463	5/11/97	16	06	5/16/97	0.022	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
225	1464	5/11/97	16	07	5/16/97	0.000	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
226	1465	5/11/97	16	08	5/16/97	0.000	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
227	1466	5/12/97	16	09	5/16/97	0.000	NonCompliant	Compliant	Compliant	5/16/97	0.000	NonCompliant	NonCompliant	NonCompliant
228	1490	5/12/97	16	10	5/17/97	0.000	NonCompliant	Compliant	Compliant	5/17/97	0.000	NonCompliant	NonCompliant	NonCompliant
229	1491	5/12/97	16	11	5/17/97	0.000	NonCompliant	Compliant	Compliant	5/17/97	0.000	NonCompliant	NonCompliant	NonCompliant
230	1492	5/13/97	16	12	5/17/97	0.071	NonCompliant	Compliant	Compliant	5/17/97	0.000	NonCompliant	NonCompliant	NonCompliant
231	1512	5/15/97	17	01	5/17/97	4.055	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
232	1513	5/15/97	17	02	5/17/97	2.367	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
233	1514	5/16/97	17	03	5/17/97	0.536	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
234	1515	5/16/97	17	04	5/17/97	0.079	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
235	1516	5/16/97	17	05	5/17/97	0.173	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
236	1517	5/16/97	17	06	5/17/97	0.000	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
237	1518	5/16/97	17	07	5/17/97	0.000	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
238	1519	5/17/97	17	08	5/17/97	0.000	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
239	1520	5/17/97	17	09	5/17/97	0.207	Compliant	Compliant	Compliant	5/17/97	0.000	Compliant	NonCompliant	NonCompliant
240	1530	5/17/97	17	10	5/20/97	0.000	NonCompliant	Compliant	Compliant	5/20/97	0.000	NonCompliant	NonCompliant	NonCompliant
241	1531	5/18/97	17	11	5/20/97	0.000	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
242	1532	5/18/97	17	12	5/20/97	0.000	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
243	1533	5/18/97	17	13	5/20/97	0.000	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
244	1534	5/19/97	17	14	5/20/97	0.000	Compliant	Compliant	Compliant	5/20/97	0.000	Compliant	NonCompliant	NonCompliant
245	1556	5/26/97	18	01	6/3/97	1.019	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
246	1557	5/26/97	18	02	6/3/97	1.597	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
247	1558	5/26/97	18	03	6/3/97	2.072	NonCompliant	Compliant	Compliant	6/3/97	0.053	NonCompliant	Compliant	Compliant
248	1559	5/26/97	18	04	6/3/97	1.875	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
249	1560	5/26/97	18	05	6/3/97	1.326	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
250	1561	5/26/97	18	06	6/3/97	1.689	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
251	1562	5/26/97	18	07	6/3/97	1.800	NonCompliant	Compliant	Compliant	6/3/97	0.000	NonCompliant	Compliant	Compliant
252	1582	5/28/97	18	01	6/4/97	1.579	NonCompliant	Compliant	Compliant	6/4/97	0.085	NonCompliant	Compliant	Compliant
253	1583	5/28/97	18	02	6/4/97	2.408	NonCompliant	Compliant	Compliant	6/4/97	0.042	NonCompliant	Compliant	Compliant
254	1584	5/28/97	18	03	6/4/97	2.347	NonCompliant	Compliant	Compliant	6/4/97	0.042	NonCompliant	Compliant	Compliant
255	1585	5/28/97	18	04	6/4/97	2.264	NonCompliant	Compliant	Compliant	6/4/97	0.054	NonCompliant	Compliant	Compliant
256	1614	6/9/97	19	01	6/10/97	1.091	Compliant	Compliant	Compliant	6/10/97	0.000	Compliant	Compliant	Compliant
257	1615	6/9/97	19	02	6/10/97	1.844	Compliant	Compliant	Compliant	6/10/97	0.000	Compliant	Compliant	Compliant
258	1616	6/9/97	19	03	6/10/97	2.621	Compliant	Compliant	Compliant	6/10/97	0.000	Compliant	Compliant	Compliant
259	1617	6/9/97	19	04	6/11/97	1.985	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
260	1618	6/9/97	19	05	6/11/97	1.671	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
261	1651	6/9/97	19	01	6/11/97	1.503	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
262	1652	6/10/97	19	02	6/11/97	2.137	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
263	1653	6/10/97	19	03	6/11/97	1.962	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	Compliant	Compliant
264	1654	6/10/97	19	04	6/11/97	2.362	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	NonCompliant	NonCompliant
265	1655	6/11/97	19	05	6/11/97	1.544	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	NonCompliant	NonCompliant
266	1656	6/11/97	19	06	6/11/97	1.443	Compliant	Compliant	Compliant	6/11/97	0.000	Compliant	NonCompliant	NonCompliant
267	1669	6/13/97	20	07	6/14/97	1.006	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
268	1670	6/13/97	20	08	6/14/97	0.964	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
269	1671	6/13/97	20	09	6/14/97	0.733	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
270	1672	6/13/97	20	10	6/14/97	1.719	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	Compliant	Compliant
271	1673	6/13/97	20	11	6/14/97	2.065	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	NonCompliant	NonCompliant
272	1674	6/13/97	20	12	6/14/97	1.753	Compliant	Compliant	Compliant	6/14/97	0.000	Compliant	NonCompliant	NonCompliant
273	1693	6/23/97	21	01	6/26/97	1.650	NonCompliant	Compliant	Compliant	6/26/97	0.000	NonCompliant	Compliant	Compliant
274	1696	6/23/97	21	01	6/26/97	1.025	NonCompliant	Compliant	Compliant	6/26/97	0.000	NonCompliant	Compliant	Compliant
275	1697	6/23/97	21	02	6/26/97	1.312	NonCompliant	Compliant	Compliant	6/26/97	0.000	NonCompliant	Compliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon River (Fulton Farm)

					Nitrate					Orthophosphate				
							Quality Assurance					Quality Assurance		
Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Analysis Date	Dionex Value (mg/L)	Holding	Duplicate	Spike	Analysis Date	Dionex value (mg/L)	Holding	Duplicate	Spike
276	1698	6/24/97	21	03	6/26/97	1.097	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	Compliant	Compliant
277	1699	6/24/97	21	04	6/26/97	1.281	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	Compliant	Compliant
278	1700	6/24/97	21	05	6/26/97	1.268	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	Compliant	Compliant
279	1701	6/24/97	21	06	6/26/97	1.061	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	Compliant	Compliant
280	1702	6/24/97	21	07	6/26/97	0.696	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	Compliant	Compliant
281	1703	6/25/97	21	08	6/26/97	0.938	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	Compliant	Compliant
282	1704	6/25/97	21	09	6/26/97	0.858	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	Compliant	Compliant
283	1705	6/25/97	21	01	6/27/97	1.049	Compliant	Compliant	Compliant	6/27/97	0.000	Compliant	NonCompliant	NonCompliant
284	1706	6/25/97	21	02	6/27/97	0.829	Compliant	Compliant	Compliant	6/27/97	0.000	Compliant	NonCompliant	NonCompliant
285	1707	6/26/97	21	03	6/26/97	0.936	Compliant	Compliant	Compliant	6/26/97	0.000	Compliant	NonCompliant	NonCompliant
286	1708	6/26/97	21	04	6/27/97	0.650	Compliant	Compliant	Compliant	6/27/97	0.000	Compliant	NonCompliant	NonCompliant
287	1709	6/26/97	21	05	6/27/97	0.743	Compliant	Compliant	Compliant	6/27/97	0.000	Compliant	NonCompliant	NonCompliant
288	1710	6/27/97	21	06	6/27/97	0.847	Compliant	Compliant	Compliant	6/27/97	0.000	Compliant	NonCompliant	NonCompliant
289	1711	6/27/97	21	07	6/30/97	0.825	NonCompliant	Compliant	Compliant	6/30/97	0.000	NonCompliant	NonCompliant	NonCompliant
290	1712	6/27/97	21	08	6/30/97	1.073	NonCompliant	Compliant	Compliant	6/30/97	0.000	NonCompliant	NonCompliant	NonCompliant
291	1713	6/28/97	21	09	6/30/97	2.002	Compliant	Compliant	Compliant	6/30/97	0.000	Compliant	NonCompliant	NonCompliant
292	1714	6/28/97	21	10	6/30/97	1.692	Compliant	Compliant	Compliant	6/30/97	0.000	Compliant	NonCompliant	NonCompliant
293	1789	12/21/97	22	01	12/22/97	2.323	Compliant	Compliant	Compliant	12/22/97	0.290	Compliant	Compliant	Compliant
294	1790	12/21/97	22	02	12/22/97	1.900	Compliant	Compliant	Compliant	12/22/97	0.097	Compliant	Compliant	Compliant
295	1791	12/21/97	22	03	12/22/97	1.446	Compliant	Compliant	Compliant	12/22/97	0.181	Compliant	Compliant	Compliant
296	1792	12/21/97	22	04	12/22/97	1.669	Compliant	Compliant	Compliant	12/22/97	0.174	Compliant	Compliant	Compliant
297	1793	12/21/97	22	05	12/22/97	1.033	Compliant	Compliant	Compliant	12/22/97	0.113	Compliant	Compliant	Compliant
298	1794	12/21/97	22	06	12/22/97	0.906	Compliant	Compliant	Compliant	12/22/97	0.106	Compliant	Compliant	Compliant
299	1795	12/21/97	22	07	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
300	1796	12/21/97	22	08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project QAPP

For calculation details see QAPP and Laboratory QC Reports

Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours

Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery

Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Gravimetric (mg/L)	Quality Assurance: Holding	Duplicate
1	45	4/8/96	1	01	4/8/96	138.7	Compliant	Compliant
2	46	4/8/96	1	02	4/8/96	80.5	Compliant	Compliant
3	47	4/8/96	1	03	4/8/96	90.3	Compliant	Compliant
4	48	4/8/96	1	04	4/8/96	125.7	Compliant	Compliant
5	49	4/8/96	1	05	4/8/96	172.7	Compliant	Compliant
6	50	4/8/96	1	06	4/8/96	185.5	Compliant	Compliant
7	58	4/8/96	1	07	4/9/96	200.2	Compliant	Compliant
8	59	4/8/96	1	08	4/9/96	193.1	Compliant	Compliant
9	60	4/8/96	1	09	4/9/96	196.3	Compliant	Compliant
10	61	4/9/96	1	10	4/9/96	172.8	Compliant	Compliant
11	62	4/9/96	1	11	4/9/96	130.7	Compliant	Compliant
12	63	4/9/96	1	12	4/9/96	125.4	Compliant	Compliant
13	64	4/10/96	1	13	4/15/96	136.1	Compliant	Compliant
14	65	4/11/96	1	14	4/15/96	123.2	Compliant	Compliant
15	247	8/28/96	3	01	9/13/96	5630.0	NonCompliant	Compliant
16	248	8/28/96	3	02	9/13/96	2938.0	NonCompliant	Compliant
17	249	8/28/96	3	03	9/13/96	1309.0	NonCompliant	Compliant
18	250	8/28/96	3	04	9/13/96	1066.8	NonCompliant	Compliant
19	251	8/28/96	3	05	9/13/96	3821.0	NonCompliant	Compliant
20	252	8/28/96	3	06	9/13/96	3173.0	NonCompliant	Compliant
21	253	8/29/96	3	07	9/13/96	3423.0	NonCompliant	Compliant
22	254	8/29/96	3	08	9/13/96	2424.0	NonCompliant	Compliant
23	255	8/29/96	3	09	9/13/96	1931.0	NonCompliant	Compliant
24	256	8/30/96	3	10	9/13/96	1363.0	NonCompliant	Compliant
25	257	8/30/96	3	11	9/13/96	1015.0	NonCompliant	Compliant
26	258	8/30/96	3	12	9/13/96	2000.0	NonCompliant	Compliant
27	259	8/31/96	3	13	9/13/96	1375.0	NonCompliant	Compliant
28	260	8/31/96	3	14	9/13/96	635.2	NonCompliant	Compliant
29	261	8/31/96	3	15	9/13/96	333.2	NonCompliant	Compliant
30	262	9/1/96	0	16	9/13/96	856.8	NonCompliant	Compliant
31	263	9/1/96	3	17	9/13/96	2280.0	NonCompliant	Compliant
32	264	9/1/96	3	18	9/13/96	3001.0	NonCompliant	Compliant
33	265	9/2/96	3	19	9/13/96	2155.0	NonCompliant	Compliant
34	266	9/2/96	3	20	9/13/96	1694.0	NonCompliant	Compliant
35	286	9/2/96	3	21	9/13/96	694.0	NonCompliant	Compliant
36	287	9/3/96	3	22	9/13/96	1148.0	NonCompliant	Compliant
37	288	9/3/96	3	23	9/13/96	4409.0	NonCompliant	Compliant
38	289	9/3/96	3	24	9/13/96	6713.0	NonCompliant	Compliant
39	348	6/1/96	2	02	6/3/96	516.0	Compliant	Compliant
40	349	6/1/96	2	03	6/3/96	1729.0	Compliant	Compliant
41	350	6/1/96	2	04	6/3/96	2906.0	Compliant	Compliant
42	371	6/1/96	2	05	6/3/96	3386.0	Compliant	Compliant
43	372	6/2/96	2	06	6/3/96	3366.0	Compliant	Compliant
44	373	6/2/96	2	07	6/4/96	2914.0	Compliant	Compliant
45	374	6/2/96	2	08	6/4/96	2467.0	Compliant	Compliant
46	375	6/3/96	2	09	6/4/96	2078.0	Compliant	Compliant
47	376	6/3/96	2	10	6/4/96	2090.0	Compliant	Compliant
48	377	6/3/96	2	11	6/7/96	2573.0	Compliant	Compliant
49	378	6/4/96	2	12	6/7/96	2168.0	Compliant	Compliant
50	379	6/4/96	2	13	6/7/96	1350.0	Compliant	Compliant
51	440	6/5/96	2	03	NA	NA	NA	NA
52	441	6/5/96	2	04	NA	NA	NA	NA
53	442	6/6/96	2	05	NA	NA	NA	NA
54	443	6/6/96	2	06	NA	NA	NA	NA
55	454	6/6/96	2	03	6/10/96	844.0	Compliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Gravimetric (mg/L)	Quality Assurance: Holding	Duplicate
56	455	6/6/96	2	04	6/10/96	951.0	Compliant	Compliant
57	456	6/7/96	2	05	6/10/96	1145.0	Compliant	Compliant
58	457	6/7/96	2	06	6/12/96	1404.0	Compliant	Compliant
59	458	6/7/96	2	07	6/12/96	1829.0	Compliant	Compliant
60	623	8/26/96	3	01	9/2/96	145.8	Compliant	Compliant
61	624	8/26/96	3	02	9/2/96	257.8	Compliant	Compliant
62	625	8/26/96	3	03	9/2/96	1174.0	Compliant	Compliant
63	626	8/26/96	3	04	9/2/96	2234.0	Compliant	Compliant
64	627	8/26/96	3	05	9/2/96	1348.0	Compliant	Compliant
65	628	8/26/96	3	06	9/2/96	1690.0	Compliant	Compliant
66	629	8/27/96	3	07	9/2/96	1555.0	Compliant	Compliant
67	732	9/16/96	4	01	9/27/96	250.1	NonCompliant	Compliant
68	733	9/16/96	4	02	9/27/96	310.7	NonCompliant	Compliant
69	734	9/16/96	4	03	9/27/96	188.9	NonCompliant	Compliant
70	735	9/16/96	4	04	9/27/96	485.5	NonCompliant	Compliant
71	736	9/16/96	4	05	9/27/96	1239.4	NonCompliant	Compliant
72	737	9/16/96	4	06	9/27/96	733.0	NonCompliant	Compliant
73	738	9/17/96	4	07	9/27/96	720.2	NonCompliant	Compliant
74	739	9/17/96	4	08	9/27/96	617.4	NonCompliant	Compliant
75	740	9/17/96	4	09	9/27/96	563.2	NonCompliant	Compliant
76	741	9/18/96	4	10	9/27/96	335.6	NonCompliant	Compliant
77	742	9/18/96	4	11	9/27/96	320.4	NonCompliant	Compliant
78	743	9/18/96	4	12	9/27/96	388.0	NonCompliant	Compliant
79	744	9/19/96	4	13	9/27/96	604.0	NonCompliant	Compliant
80	745	9/19/96	4	14	9/27/96	722.8	NonCompliant	Compliant
81	760	9/20/96	4	01	10/25/96	412.6	NonCompliant	Compliant
82	761	9/20/96	4	02	10/25/96	411.6	NonCompliant	Compliant
83	762	9/21/96	4	03	10/25/96	571.2	NonCompliant	Compliant
84	763	9/21/96	4	04	10/25/96	436.6	NonCompliant	Compliant
85	764	9/21/96	4	05	10/25/96	336.4	NonCompliant	Compliant
86	765	9/21/96	4	06	10/25/96	402.2	NonCompliant	Compliant
87	766	9/21/96	4	07	10/25/96	377.4	NonCompliant	Compliant
88	767	9/22/96	4	08	10/25/96	519.8	NonCompliant	Compliant
89	768	9/22/96	4	09	10/25/96	1069.0	NonCompliant	Compliant
90	769	9/22/96	4	10	10/25/96	1784.4	NonCompliant	Compliant
91	770	9/23/96	4	11	10/25/96	1258.6	NonCompliant	Compliant
92	771	9/23/96	4	12	10/25/96	583.2	NonCompliant	Compliant
93	772	9/23/96	4	13	10/25/96	312.6	NonCompliant	Compliant
94	773	9/24/96	4	14	10/25/96	215.6	NonCompliant	Compliant
95	806	10/28/96	5	01	10/28/96	80.2	Compliant	Compliant
96	817	10/29/96	5	02	10/30/96	64.8	Compliant	Compliant
97	818	10/29/96	5	03	10/30/96	122.5	Compliant	Compliant
98	819	10/29/96	5	04	10/30/96	118.5	Compliant	Compliant
99	820	10/30/96	5	05	10/30/96	150.0	Compliant	Compliant
100	821	10/30/96	5	06	10/30/96	147.8	Compliant	Compliant
101	822	10/30/96	5	07	10/30/96	432.6	Compliant	Compliant
102	833	10/30/96	5	08	11/1/96	2565.0	Compliant	Compliant
103	834	10/31/96	5	09	11/1/96	2245.0	Compliant	Compliant
104	835	10/31/96	5	10	11/1/96	2662.0	Compliant	Compliant
105	836	10/31/96	5	11	11/1/96	8344.0	Compliant	Compliant
106	837	11/1/96	5	12	11/1/96	2334.0	Compliant	Compliant
107	855	11/8/96	6	01	11/12/96	712.0	Compliant	Compliant
108	856	11/8/96	6	02	11/12/96	611.2	Compliant	Compliant
109	857	11/8/96	6	03	11/12/96	711.0	Compliant	Compliant
110	858	11/8/96	6	04	11/12/96	678.4	Compliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Total Suspended Solids: Gravimetric (mg/L)	Quality Assurance: Holding	Quality Assurance: Duplicate
111	870	11/8/96	6	05	11/12/96	1084.2	Compliant	Compliant
112	871	11/8/96	6	06	11/12/96	1101.8	Compliant	Compliant
113	872	11/9/96	6	07	11/12/96	1279.0	Compliant	Compliant
114	873	11/9/96	6	08	11/12/96	1275.2	Compliant	Compliant
115	874	11/9/96	6	09	11/12/96	1412.8	Compliant	Compliant
116	875	11/10/96	6	10	11/12/96	684.0	Compliant	Compliant
117	927	11/29/96	7	01	12/9/96	1283.2	NonCompliant	Compliant
118	928	11/29/96	7	02	12/9/96	904.2	NonCompliant	Compliant
119	929	11/29/96	7	03	12/9/96	684.4	NonCompliant	Compliant
120	930	11/29/96	7	04	12/9/96	349.0	NonCompliant	Compliant
121	931	11/30/96	7	05	12/9/96	268.8	NonCompliant	Compliant
122	932	11/30/96	7	06	12/9/96	214.5	NonCompliant	Compliant
123	933	11/30/96	7	07	12/9/96	194.8	NonCompliant	Compliant
124	934	11/30/96	7	08	12/9/96	279.5	NonCompliant	Compliant
125	935	12/1/96	7	09	12/9/96	269.9	NonCompliant	Compliant
126	936	12/1/96	7	10	12/9/96	312.1	NonCompliant	Compliant
127	937	12/1/96	7	11	12/9/96	267.4	NonCompliant	Compliant
128	938	12/2/96	7	12	12/9/96	239.1	Compliant	Compliant
129	965	12/2/96	7	13	12/9/96	1010.8	Compliant	Compliant
130	966	12/2/96	7	14	12/9/96	112.8	Compliant	Compliant
131	967	12/3/96	7	15	12/9/96	135.2	Compliant	Compliant
132	968	12/3/96	7	16	12/9/96	137.3	Compliant	Compliant
133	969	12/3/96	7	17	12/9/96	181.1	Compliant	Compliant
134	970	12/4/96	7	18	12/9/96	316.4	Compliant	Compliant
135	1035	12/16/96	8	01	12/20/96	8400.0	Compliant	Compliant
136	1036	12/16/96	8	02	12/20/96	2122.8	Compliant	Compliant
137	1037	12/16/96	8	03	12/20/96	1091.6	Compliant	Compliant
138	1038	12/16/96	8	04	12/20/96	860.6	Compliant	Compliant
139	1039	12/17/96	8	05	12/20/96	757.2	Compliant	Compliant
140	1040	12/17/96	8	06	12/20/96	890.6	Compliant	Compliant
141	1041	12/17/96	8	07	12/20/96	816.4	Compliant	Compliant
142	1042	12/17/96	8	08	12/20/96	644.8	Compliant	Compliant
143	1091	2/12/97	9	17	2/19/97	3732.0	Compliant	Compliant
144	1092	2/12/97	9	18	2/19/97	8771.0	Compliant	Compliant
145	1093	2/13/97	9	19	2/19/97	12947.0	Compliant	Compliant
146	1094	2/13/97	9	20	2/19/97	7331.0	Compliant	Compliant
147	1095	2/13/97	9	21	2/19/97	3576.0	Compliant	Compliant
148	1096	2/14/97	9	22	2/19/97	4892.0	Compliant	Compliant
149	1147	2/14/97	9	23	2/26/97	1975.0	NonCompliant	Compliant
150	1148	2/14/97	9	24	2/26/97	3548.0	NonCompliant	NonCompliant
151	1149	2/15/97	9	01	2/26/97	11190.0	NonCompliant	NonCompliant
152	1161	2/15/97	9	02	2/26/97	5034.0	NonCompliant	Compliant
153	1162	2/15/97	9	03	2/26/97	5635.0	NonCompliant	Compliant
154	1163	2/15/97	9	04	2/26/97	5138.0	NonCompliant	Compliant
155	1164	2/15/97	9	05	2/26/97	2708.0	NonCompliant	Compliant
156	1165	2/16/97	9	06	2/26/97	3118.0	NonCompliant	Compliant
157	1166	2/16/97	9	07	2/26/97	3146.0	NonCompliant	Compliant
158	1167	2/16/97	9	08	2/26/97	2015.0	NonCompliant	Compliant
159	1168	2/17/97	9	09	2/26/97	1881.0	NonCompliant	Compliant
160	1169	2/17/97	9	10	2/26/97	2230.0	NonCompliant	Compliant
161	1170	2/8/97	0	25	2/26/97	864.0	NonCompliant	Compliant
162	1178	2/20/97	10	01	2/26/97	5720.0	Compliant	Compliant
163	1179	2/20/97	10	02	2/26/97	2979.0	Compliant	Compliant
164	1180	2/20/97	10	03	2/26/97	3543.0	Compliant	Compliant
165	1201	2/20/97	10	04	2/28/97	4862.8	NonCompliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids Analysis Date	Gravimetric (mg/L)	Quality Assurance Holding	Quality Assurance Duplicate
166	1202	2/20/97	10	05	2/28/97	2311.0	NonCompliant	Compliant
167	1203	2/21/97	10	06	2/26/97	3094.0	Compliant	Compliant
168	1204	2/21/97	10	07	2/28/97	4124.0	Compliant	Compliant
169	1216	2/21/97	10	25	3/17/97	3292.0	NonCompliant	Compliant
170	1217	2/25/97	0	26	3/17/97	3552.0	NonCompliant	Compliant
171	1218	3/4/97	11	01	3/17/97	11750.0	NonCompliant	Compliant
172	1219	3/4/97	11	02	3/17/97	6944.0	NonCompliant	Compliant
173	1220	3/5/97	11	03	3/17/97	3850.0	NonCompliant	Compliant
174	1221	3/5/97	11	04	3/17/97	3348.0	NonCompliant	Compliant
175	1222	3/5/97	11	05	3/17/97	14625.0	NonCompliant	Compliant
176	1223	3/6/97	11	06	3/17/97	3780.0	NonCompliant	Compliant
177	1224	3/6/97	11	07	3/17/97	2552.0	NonCompliant	Compliant
178	1226	3/6/97	11	08	3/17/97	3055.0	NonCompliant	Compliant
179	1227	3/7/97	11	09	3/17/97	2185.8	NonCompliant	Compliant
180	1228	3/7/97	11	10	3/17/97	1711.4	NonCompliant	Compliant
181	1250	3/7/97	11	11	3/20/97	1714.0	NonCompliant	Compliant
182	1251	3/8/97	11	12	3/20/97	1554.0	NonCompliant	Compliant
183	1252	3/8/97	11	13	3/20/97	1597.0	NonCompliant	Compliant
184	1253	3/8/97	11	14	3/20/97	1517.0	NonCompliant	Compliant
185	1254	3/9/97	11	15	3/20/97	1601.0	NonCompliant	Compliant
186	1255	3/9/97	11	16	3/20/97	1172.0	NonCompliant	Compliant
187	1256	3/9/97	11	17	3/20/97	1422.4	NonCompliant	Compliant
188	1257	3/10/97	11	18	3/20/97	1146.0	NonCompliant	Compliant
189	1261	3/10/97	11	01	3/31/97	1259.0	NonCompliant	Compliant
190	1262	3/10/97	11	02	3/31/97	1577.6	NonCompliant	Compliant
191	1263	3/11/97	11	03	3/31/97	1693.6	NonCompliant	Compliant
192	1267	3/11/97	11	25	3/31/97	1612.4	NonCompliant	Compliant
193	1268	3/13/97	12	09	3/31/97	1253.0	NonCompliant	Compliant
194	1269	3/13/97	12	10	3/31/97	1639.0	NonCompliant	Compliant
195	1270	3/13/97	12	11	3/31/97	1395.0	NonCompliant	Compliant
196	1271	3/14/97	12	12	3/31/97	687.6	NonCompliant	Compliant
197	1321	4/4/97	13	01	4/18/97	5843.0	NonCompliant	Compliant
198	1322	4/4/97	13	02	4/18/97	1590.8	NonCompliant	Compliant
199	1323	4/4/97	13	03	4/18/97	1250.0	NonCompliant	Compliant
200	1324	4/4/97	13	04	4/18/97	1068.6	NonCompliant	Compliant
201	1325	4/4/97	13	05	4/18/97	1182.4	NonCompliant	Compliant
202	1326	4/5/97	13	06	4/18/97	491.4	NonCompliant	Compliant
203	1329	4/7/97	14	13	4/18/97	2814.0	NonCompliant	Compliant
204	1383	4/7/97	0	14	4/19/97	4038.0	NonCompliant	Compliant
205	1384	4/8/97	14	15	4/19/97	4396.0	NonCompliant	Compliant
206	1385	4/8/97	14	16	4/19/97	2555.0	NonCompliant	Compliant
207	1386	4/8/97	14	17	4/19/97	2347.0	NonCompliant	Compliant
208	1387	4/9/97	14	18	4/19/97	2054.0	NonCompliant	Compliant
209	1388	4/9/97	14	19	4/19/97	2142.0	NonCompliant	Compliant
210	1416	4/25/97	15	02	5/20/97	6515.0	NonCompliant	NonCompliant
211	1417	4/27/97	15	09	5/20/97	7067.0	NonCompliant	NonCompliant
212	1448	4/28/97	15	12	5/20/97	6028.0	NonCompliant	NonCompliant
213	1449	4/28/97	15	13	5/20/97	6895.0	NonCompliant	NonCompliant
214	1450	4/29/97	15	14	5/20/97	10564.0	NonCompliant	NonCompliant
215	1451	4/29/97	15	15	5/20/97	24993.0	NonCompliant	NonCompliant
216	1452	4/29/97	15	16	5/20/97	25862.0	NonCompliant	Compliant
217	1453	4/30/97	15	17	5/20/97	13408.0	NonCompliant	Compliant
218	1454	4/30/97	15	18	5/20/97	5931.0	NonCompliant	Compliant
219	1458	5/10/97	16	01	5/21/97	1584.0	NonCompliant	Compliant
220	1459	5/10/97	16	02	5/21/97	2136.0	NonCompliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Gravimetric (mg/L)	Quality Assurance: Holding	Quality Assurance: Duplicate
221	1460	5/10/97	16	03	5/21/97	2411.0	NonCompliant	Compliant
222	1461	5/10/97	16	04	5/21/97	2097.0	NonCompliant	Compliant
223	1462	5/10/97	16	05	5/21/97	2105.0	NonCompliant	Compliant
224	1463	5/11/97	16	06	5/21/97	2404.0	NonCompliant	Compliant
225	1464	5/11/97	16	07	5/21/97	1944.0	NonCompliant	Compliant
226	1465	5/11/97	16	08	5/21/97	1939.0	NonCompliant	Compliant
227	1466	5/12/97	16	09	5/21/97	2635.0	NonCompliant	Compliant
228	1490	5/12/97	16	10	5/21/97	1694.0	NonCompliant	Compliant
229	1491	5/12/97	16	11	5/21/97	1724.0	NonCompliant	Compliant
230	1492	5/13/97	16	12	5/21/97	4795.0	NonCompliant	Compliant
231	1512	5/15/97	17	01	5/21/97	2886.0	Compliant	Compliant
232	1513	5/15/97	17	02	5/21/97	1257.0	Compliant	Compliant
233	1514	5/16/97	17	03	5/21/97	1466.0	Compliant	Compliant
234	1515	5/16/97	17	04	5/21/97	1770.8	Compliant	Compliant
235	1516	5/16/97	17	05	5/21/97	1609.6	Compliant	Compliant
236	1517	5/16/97	17	06	5/21/97	1644.0	Compliant	Compliant
237	1518	5/16/97	17	07	5/21/97	4821.0	Compliant	Compliant
238	1519	5/17/97	17	08	5/21/97	4295.0	Compliant	Compliant
239	1520	5/17/97	17	09	5/21/97	3887.0	Compliant	NonCompliant
240	1530	5/17/97	17	10	5/21/97	2968.0	Compliant	NonCompliant
241	1531	5/18/97	17	11	5/21/97	2130.0	Compliant	NonCompliant
242	1532	5/18/97	17	12	5/21/97	2483.0	Compliant	NonCompliant
243	1533	5/18/97	17	13	5/21/97	1192.0	Compliant	NonCompliant
244	1534	5/19/97	17	14	5/21/97	3706.0	Compliant	NonCompliant
245	1556	5/26/97	18	01	5/26/97	491.8	Compliant	Compliant
246	1557	5/26/97	18	02	5/26/97	532.4	Compliant	Compliant
247	1558	5/26/97	18	03	5/26/97	568.8	Compliant	Compliant
248	1559	5/26/97	18	04	5/26/97	650.4	Compliant	Compliant
249	1560	5/26/97	18	05	5/26/97	802.2	Compliant	Compliant
250	1561	5/26/97	18	06	5/26/97	711.4	Compliant	Compliant
251	1562	5/26/97	18	07	5/26/97	702.0	Compliant	Compliant
252	1582	5/28/97	18	01	6/12/97	821.6	NonCompliant	NonCompliant
253	1583	5/28/97	18	02	6/12/97	963.0	NonCompliant	NonCompliant
254	1584	5/28/97	18	03	6/12/97	1595.0	NonCompliant	NonCompliant
255	1585	5/28/97	18	04	6/12/97	1227.0	NonCompliant	NonCompliant
256	1614	6/9/97	19	01	6/12/97	738.8	Compliant	Compliant
257	1615	6/9/97	19	02	6/12/97	574.8	Compliant	Compliant
258	1616	6/9/97	19	03	6/12/97	3.0	Compliant	Compliant
259	1617	6/9/97	19	04	6/12/97	1510.0	Compliant	Compliant
260	1618	6/9/97	19	05	6/12/97	1066.6	Compliant	Compliant
261	1651	6/9/97	19	01	6/16/97	437.6	Compliant	Compliant
262	1652	6/10/97	19	02	6/16/97	1194.8	Compliant	Compliant
263	1653	6/10/97	19	03	6/16/97	934.6	Compliant	Compliant
264	1654	6/10/97	19	04	6/16/97	1012.8	Compliant	Compliant
265	1655	6/11/97	19	05	6/16/97	560.8	Compliant	Compliant
266	1656	6/11/97	19	06	6/16/97	584.8	Compliant	Compliant
267	1669	6/13/97	20	07	6/16/97	546.2	Compliant	Compliant
268	1670	6/13/97	20	08	6/16/97	533.4	Compliant	Compliant
269	1671	6/13/97	20	09	6/16/97	581.4	Compliant	Compliant
270	1672	6/13/97	20	10	6/16/97	612.8	Compliant	Compliant
271	1673	6/13/97	20	11	6/16/97	693.6	Compliant	Compliant
272	1674	6/13/97	20	12	6/16/97	468.4	Compliant	Compliant
273	1693	6/23/97	21	01	6/27/97	976.2	Compliant	Compliant
274	1696	6/23/97	21	01	6/27/97	1051.2	Compliant	Compliant
275	1697	6/23/97	21	02	6/27/97	1344.8	Compliant	Compliant

Leon River Watershed Project: Storm Samples

Station LE06 - Leon River @ Leon Junction (Fulton Farm)

Sample Number	Laboratory ID Number	Collection Date	Storm Number	Bottle Number	Total Suspended Solids: Analysis Date	Total Suspended Solids: Gravimetric (mg/L)	Quality Assurance: Holding	Quality Assurance: Duplicate
276	1698	6/24/97	21	03	6/27/97	1127.0	Compliant	Compliant
277	1699	6/24/97	21	04	6/27/97	1931.8	Compliant	Compliant
278	1700	6/24/97	21	05	6/27/97	1652.4	Compliant	Compliant
279	1701	6/24/97	21	06	6/27/97	743.6	Compliant	Compliant
280	1702	6/24/97	21	07	6/27/97	1380.0	Compliant	Compliant
281	1703	6/25/97	21	08	6/27/97	1243.0	Compliant	Compliant
282	1704	6/25/97	21	09	6/27/97	905.0	Compliant	Compliant
283	1705	6/25/97	21	01	7/2/97	924.8	Compliant	Compliant
284	1706	6/25/97	21	02	7/2/97	738.0	Compliant	Compliant
285	1707	6/26/97	21	03	7/2/97	513.4	Compliant	Compliant
286	1708	6/26/97	21	04	7/2/97	423.8	Compliant	Compliant
287	1709	6/26/97	21	05		401.6	Compliant	Compliant
288	1710	6/27/97	21	06	7/2/97	243.2	Compliant	Compliant
289	1711	6/27/97	21	07	7/2/97	213.0	Compliant	Compliant
290	1712	6/27/97	21	08	7/2/97	888.2	Compliant	Compliant
291	1713	6/28/97	21	09	7/2/97	1361.0	Compliant	Compliant
292	1714	6/28/97	21	10	7/2/97	1106.0	Compliant	Compliant
293	1789	12/21/97	22	01	12/23/97	4240.0	Compliant	Compliant
294	1790	12/21/97	22	02	12/23/97	3510.0	Compliant	Compliant
295	1791	12/21/97	22	03	12/23/97	2602.0	Compliant	Compliant
296	1792	12/21/97	22	04	12/23/97	1708.0	Compliant	Compliant
297	1793	12/21/97	22	05	12/23/97	1161.0	Compliant	Compliant
298	1794	12/21/97	22	06	12/23/97	742.0	Compliant	Compliant
299	1795	12/21/97	22	07	12/23/97	854.0	Compliant	Compliant
300	1796	12/21/97	22	08	12/23/97	1187.0	Compliant	Compliant

Quality Control - Sample Holding Time or Laboratory Analysis either: Compliant, NonCompliant or Not Applicable (NA) with Leon River Project
For calculation details see QAPP and Laboratory QC Reports
Compliancy requirement - Nutrient Holding Time: 48 hours, TSS Holding Time: 168 hours
Compliancy requirement - NO3 Duplicate: within 20%, NO3 Spike: 80% to 120% recovery
Compliancy requirement - PO4 Duplicate: within 20%, PO4 Spike: 80% to 120% recovery

United States Department of Agriculture

Soil Conservation Service

1 Management Ideas for Farmers

Why Be Concerned About Water Quality?

Everyone depends on water for drinking, but to farmers water is even more necessary. Farming depends on water for crops, livestock, and household uses.

You can protect the water on, under, and around your farm by applying management practices that show effective and practical means of preventing or reducing water pollution. Generally, water quality problems attributed to farm operations come from five sources: sediment, nutrients, pesticides, animal wastes, and naturally occurring elements in soil.

Sediment

Sediment is composed of particles of eroding soil carried by runoff or wind into streams, ponds, lakes, and estuaries. Sediment carries nutrients and pesticides and muddies receiving waters. Reducing erosion helps maintain soil productivity and water quality.

Reduce Erosion With:

- Conservation cropping systems
- Conservation tillage
- Contour farming
- Cover and green manure crops
- Critical area planting
- Diversions
- Grassed waterways
- No-till planting
- Pasture and hay land management
- Strip cropping
- Terraces
- Tree planting
- Filter strips
- Windbreaks

Nutrients

Nutrients supply the essential elements for crop growth. Nutrients, however, can affect water quality. Proper management of nutrients optimizes crop yields, reduces movement of nutrients to surface and ground water, and improves the soil.

Manage Nutrients With:

- Conservation cropping systems
- Cover and green manure crops
- Soil testing and plant analysis
- Split applications of nitrogen
- Spring application of nitrogen
- Correct timing and placement of fertilizers
- Waste utilization
- Precise application rates
- Properly calibrated equipment
- Erosion and sediment control
- Grasses and legumes in rotation
- Proper management of irrigation
- Manure analysis

Water Quality and Quantity for the 90's

United States Department of Agriculture
Soil Conservation Service

2 The Farmer's Guide to Controlling Erosion

Why Be Concerned About Erosion?

Soil can be both a water pollutant and a carrier of other pollutants. Erosion carries away soil resources and produces large quantities of sediment that degrade water. Soil washed off the land may carry pesticides, toxins, and nutrients into surface waters.

Sediment in streams and reservoirs reduces their capacity to hold water and increases water treatment costs. Sediment suspended in the water also destroys fish habitat. Fortunately, erosion and sediment can be reduced at much less than the cost of repairing the damage.

The Erosion Process and Water Quality

The impact of a raindrop on bare soil is like a small explosion on the surface that sends particles in all directions. As rain falls and soil becomes saturated, a thin layer of water moves along the surface. Raindrops hit the moving water as the soil particles suspended in the water flow downhill. Sheet erosion results from thin layers of soil that are removed by flowing water.

Rill erosion is the result of concentrated runoff being channeled into continuous surface depressions.

Gully erosion develops in areas where runoff becomes concentrated and the fast-flowing water scours the soil, forming large and deep ditches.

While sheet erosion is difficult to see, rill and gully erosion are highly visible. Rills can be erased by cultivation and crossed by farm machinery, but gullies are obstructions to machinery.

The rate of soil loss depends on the characteristics of the soil, cropping systems, topography, management practices, and rainfall. Management practices can reduce erosion by shortening slope length and protecting the soil surface with vegetation or residues. Reducing soil erosion improves the quality of surface water.

United States Department of Agriculture

Soil Conservation Service

3 Improving Water Quality by Managing Animal Waste

Animal Waste Is a Resource

Animal waste is a resource that, if properly managed, can help your crops grow and reduce the need for commercial fertilizer. It is a valuable source of nitrogen and phosphorus and contains other nutrients essential for plant growth. It can increase the amount of organic matter in your soil and improve the tilth and water-holding capacity of your soil. Animal waste includes livestock and poultry manure, wasted feed, bedding, litter, milk house waste water, and feedlot runoff.

A written waste management plan provided by the Soil Conservation Service (SCS) and developed jointly between you and SCS should be a part of your overall water quality improvement plan.

Animal Waste Consequences to Water Quality

Animal waste can affect the quality of your water. It can wash into streams and lakes from areas of animal concentrations and unprotected manure storage. Poor soil conditions, steep and unprotected slopes, lack of vegetative cover, adverse climatic conditions, and proximity to receiving waters are the types of site features that can result in animal wastes being washed into surface waters. As animal waste decomposes in surface water, it depletes dissolved oxygen and endangers fish and other aquatic life. Nutrients from animal waste promote excessive algae growth. Too much algae in water causes an unpleasant taste and odor and further reduces oxygen.

Serious problems can result when waste materials from storage facilities and land applications seep into ground water. Drinking water taken from ground water containing nitrates can cause health problems in humans, especially infants, and livestock.

Planning an Animal Waste Management System

Managing animal waste can improve your agricultural operation and protect water quality. A waste management system is part of a total soil and water conservation plan on farms with livestock or poultry. Waste management systems address the following:

Production: Identify the amount and type of waste to be managed. Include waste produced by animals, poultry, and other sources, such as milk house waste and runoff to and from feedlots and confinement areas. Look for opportunities to reduce volume by diverting clean water, such as roof and land runoff and rain, from the waste.

Vegetated filter strip: Install a strip of land in permanent vegetation downslope of agricultural operations. The strip traps sediment and other potential pollutants that move through it with the runoff.

Roof runoff management: Collect, control, and dispose of rain and melted snow from roofs. The primary purpose of roof runoff management is to keep water clean by diverting runoff away from waste materials.

Livestock exclusion: Exclude livestock from areas that are sensitive to changes in water quality and from places not intended for grazing, such as streambanks and wetlands.

Planned grazing system: Implement a system in which two or more grazing units are alternatively grazed and rested in a planned sequence. This improves forage production, maintains vegetative cover, and retains animal waste.

Where to Get Help

For more information or help in managing animal waste, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

United States Department of Agriculture

Soil Conservation Service

4 A Farmer's Guide to Managing Nutrients

Why Be Concerned About Managing Nutrients?

To manage nutrients properly, you must know how, when, and where to use plant nutrients. A nutrient management plan developed by you and the Soil Conservation Service helps ensure that your crops receive the nutrients they need to produce profitable yields, while allowing few nutrients to leach or run off.

You Can Find Plant Nutrients In:

- Organic waste
- Commercial fertilizer
- Legumes
- Crop residues

Managing Nutrients:

- Supplies nutrients for better forage and crop yields
- Improves the biological and chemical conditions of your soil
- Minimizes the entry of nutrients into surface and ground water
- Maximizes your profits

Nutrients Are Potential Pollutants:

If you apply too many or unnecessary nutrients, they can be:

- Carried from your field by runoff
- Transported with soil particles into surface waters
- Lost by leaching into ground water

Nutrient losses are costly and can pose a health threat to your family, livestock, and community. To protect the quality of your water, decide how soil, water, and plant resources will be managed before you apply nutrients.

Four Steps to Developing a Nutrient Management Plan:

- **Step 1.** Determine the amount of nutrients your crops need. Base your total on realistic yields. Check prior production records and soil survey interpretations.

- **Step 2.** Test your soil to find out which nutrients are already in it. Be sure to include nutrient credits for legumes and residues from previous crops. To calculate the amount of nutrients needed from other sources, subtract the nutrients already in your soil from the total nutrient needs determined in step 1.

United States Department of Agriculture

Soil Conservation Service

5 A Farmer's Guide to Pesticide Management

When Properly Managed, Pesticides Can:

- Produce more and better crops
- Prevent, destroy, and repel pests
- Control plant growth
- Defoliate plants

If Mismanaged, However, Pesticides Can:

- Contaminate surface and ground water
- Present health risks to humans and animals
- Reduce or eliminate beneficial insects

Current Conditions

In 26 States, nearly 50 agricultural pesticides have been detected in ground water. Though most detections are below the U.S. Environmental Protection Agency's estimated health risk concentrations, public concern is growing. This concern has led to more proposals for State and Federal legislation. The Food, Agriculture, Conservation, and Trade Act of 1990 requires all farmers who apply restricted-use pesticides to keep records of their use of these pesticides for 2 years.

Pesticide Use and the Law

Federal and State laws and regulations require you to:

- Apply pesticides according to the directions on the product label
- Dispose of pesticides properly

Some Types of Pesticides Are:

- Insecticides
- Herbicides
- Fungicides
- Nematicides

Integrated Pest Management (IPM)

Before using pesticides, be sure that you really need them. If you do decide to use pesticides, use them efficiently and effectively. One way to ensure efficient and effective pesticide use is through IPM. With IPM, you can:

- Produce more crops
- Reduce plant growth problems
- Care for the environment

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

6 Choosing and Using Pesticides

A Water Quality Checklist for Farmers

Before You Choose A Pesticide:

- Scout your fields for current and potential pest problems.
- Consider alternatives such as:
  Using natural pesticides
  Growing pest-resistant crops
  Rotating crops and tillage practices.

Before You Use A Pesticide, Learn About Its:

- Proper use
- Movement through the soil
- Pollution characteristics
- Water solubility
- Soil absorption capabilities
- Duration in the soil
- Best application time

To Use Pesticides Effectively and Efficiently:

- Mix only the quantities you need.
- Use accurate measurement containers.
- Keep records of the chemicals you use.
- Keep your application equipment correctly calibrated.
- Avoid applying pesticides before heavy rains.
- Know wind direction and speed before you spray.
- Use the right spray nozzles and pressure.
- Band instead of broadcast herbicides on row crops.
- Rotate pesticide usage.
- Use integrated pest management.
- Complete certified pesticide applicator training.

To Help Prevent Ground Water Contamination:

- Mix, handle, apply, and dispose of pesticides away from and downslope of wells and surface waters.
- Use pesticides with low leaching rates.
- Exercise caution when applying pesticides on highly permeable soils.
- Avoid spraying chemicals near streams, ponds, and other surface waters.
- Plug abandoned wells.
- Use berms and diversions to keep runoff from surface waters and sinkholes.

United States Department of Agriculture

Soil Conservation Service

7 Managing Animal Waste

A Water Quality Checklist for Farmers

To Keep Animal Waste Under Control:

- Develop and follow animal waste and nutrient management plans.
- Confine animals and their wastes to protected areas.
- Include milk house waste in your waste management plan.
- Use filter strips to treat milk house waste.

Use Barnyard Management Measures

- Intercept runoff from land upslope of the barnyard.
- Use diversions and waterways.
- Use subsurface drains to manage seepage areas.
- Direct barnyard runoff away from streams and other bodies of water.
- Direct barnyard runoff toward grass filter strips, pasture fields, and croplands.
- Use gutters, downspouts, underground outlets, and diversions to keep clean water out of barnyards and waste storage structures.

Manage Manure

- Store manure to allow flexibility in time of application.
- Use manure as a replacement for commercial fertilizer.
- Spread manure on crops that need nutrients.
- Avoid spreading manure on frozen ground.
- Avoid spreading manure near streams, sinkholes, and wells.
- Calibrate manure spreaders to prevent over-fertilization.
- Use conservation practices to reduce runoff and erosion on land receiving manure.
- Use manure as a component of integrated crop management.
- Use tests to determine the nutrient value of manure.
- Store manure in stacking sheds to reduce nutrient losses.

Where To Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

United States Department of Agriculture

Soil Conservation Service

8 Protecting Water Quality at Home and on the Farm

A Water Quality Checklist for Farmers

Did You Know?

- Water is the Earth's most abundant resource, but only 1 percent of it is suitable for drinking.
- The average American uses nearly 180 gallons of water a day.
- Everybody lives in a watershed.
- Everybody lives downstream of another water user.
- Everybody generates nonpoint source pollution.

To Prevent Ground Water Pollution On Your Farm:

- Maintain the wetlands on your farm.
- Properly dispose of your refuse and waste oil.
- Test your drinking water for potential problems.
- Check your underground fuel tanks for leaks.
- Collect and dispose of silage juice with the disposal system you use for manure.

At Home:

- Properly dispose of your household wastes.
- Avoid wasting water.
- Have your septic tank pumped every 3 to 5 years.

Where to Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

Water Quality and Quantity for the 90's

United States Department of Agriculture
Soil Conservation Service

9 Keeping Sediment Under Control

A Water Quality Checklist for Farmers

Keep Sediment Under Control With:

- Conservation tillage
- Windbreaks
- Crop rotation
- Cover crops
- Planned grazing systems
- Contour farming

To Control Runoff:

- Manage surface water runoff.
- Have preparations for storm water runoff.

In Your Waterways:

- Use grass buffer strips to eliminate the direct discharge of runoff and sediment.
- Establish and maintain sod cover.

If You Have Sloping Land:

- Use diversions or terraces to intercept runoff and sediment.
- Use stripcropping.
- Plant grass or trees.
- Farm on the contour.
- Construct your access roads to follow the contour.
- Have your land in the Conservation Reserve Program.

Where to Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

Water Quality and Quantity for the 90's

United States Department of Agriculture

Soil Conservation Service

10 Managing Nutrients

A Water Quality Checklist for Farmers

To Reduce Nutrient Losses:

- Use appropriate conservation practices to reduce erosion and runoff.
- Rotate crops to reduce fertilizer needs.
- Use cover crops to take up excess plant nutrients.
- Follow the principles of integrated crop management.
- Give nutrient and fertilizer credits to manure, legumes, sewage, sludge, and previous crops.

Before You Apply Nutrients:

- Develop a nutrient management plan.
- Establish realistic goals for crop yields based on soils and past yields rather than maximum yield.

When You Apply Nutrients:

- Apply only the amounts needed.
- Follow soil test and manure analyses.
- Properly calibrate your application equipment.
- Avoid spreading manure, fertilizer, or lime on frozen ground.
- Band or sidedress fertilizer applications.
- Apply nitrogen when crop is growing to maximize uptake.
- Incorporate or inject manure and nitrogen into the soil.
- Use pre-sidedress nitrogen tests to determine crop needs.

Where To Get Help

For more information on protecting and improving water quality, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service or Extension Service. Financial help may be available from USDA's Agricultural Stabilization and Conservation Service.

United States Department of Agriculture
Soil Conservation Service

11 Glossary of Water Quality Terms

Aerobic decomposition
The decay of organic matter by bacteria and other micro-organisms in the presence of oxygen.

Agricultural wastes
Wastes usually associated with producing and processing agricultural products. Agricultural wastes include:
- Animal manure
- Dead animals
- Crop residues
- Fertilizers
- Pesticides

Algae
Simple plants that form the base of the aquatic food chain. Many kinds of algae are microscopic. When environmental conditions are suitable for their prolific growth, algae can create water quality problems.

Ammonia nitrogen
A gas (NH3) released by the microbiological decay of plant and animal proteins.

Anaerobic decomposition
The decay of organic matter by bacteria and other microbes that do not need oxygen.

Aquifer
A soil or rock formation capable of storing and transmitting usable ground water to the surface of the land.

Assimilative capacity
The ability of surface or ground water to purify itself of organic pollution without harmful effects.

Best management practices
A practice or combination of practices that State or local agencies determine to be the most effective means of controlling point and nonpoint pollutants. They can be structural, vegetative, or management measures.

Biochemical oxygen demand
A measure of oxygen that is removed from aquatic environments by the metabolic requirements of aerobic micro-organisms. Also called biological oxygen demand or BOD.

Coliform
A group of bacteria used to indicate the cleanliness of water. High levels of coliforms signify unclean water. Large numbers of coliform organisms are present in the intestines of humans and other mammals.

Cone of depression
A cone-shaped depression in a water table that occurs after water is pumped from a well.

Conservation practice
A soil and water conservation technique or measure for which standards and specifications have been developed.

Contaminant
Potential pollutants such as chemicals, sediments, or bacteria that can make surface waters and aquifers unfit for use.

Discharge
The flow of ground or surface water from sources such as pipes, springs, and channels.

Dissolved oxygen
Gaseous oxygen dissolved in a liquid, usually water.

Drainage well
Vertical opening into a permeable substratum into which an irrigation system directs surface and subsurface waters.

Drawdown
The drop in a water table in the vicinity of a well. Drawdown is caused by pumping.

Erosion
Wearing away of the land surface by water, wind, ice, or other geologic processes.

Eutrophication
The artificial or natural enrichment of a body of water by the influx of nutrients; these nutrients promote plant growth over that of fish and animal life.

Ground water
All water below the surface of the land. Ground water usually refers to subsurface water in a zone of saturation that can be pumped from a well or that flows from a spring or seep.

Hardness
A characteristic of water containing the salts of calcium, magnesium, and iron.

Saltwater intrusion
The movement of salt water into a freshwater aquifer.

Saturated zone
A zone in the soil in which all voids and cavities are filled with water.

Sediment
Solid particles of eroded soil, rock, or biological materials transported by water.

Structural controls
Control devices constructed to reduce damage caused by runoff and flood water.

Sustainable agriculture
A farming method which maximizes the efficient use and management of nutrients and other chemicals.

Total dissolved solids
The total concentration of dissolved mineral constituents in water.

Toxicity
The degree to which a chemical detrimentally affects an organism.

Turbidity
The cloudy condition caused by solids suspended in a liquid. Turbidity is also a measure of the cloudiness of water caused by suspended solids.

Vegetative controls
Conservation practices that use plants to reduce erosion and water pollution. Such practices include cropping systems, cover crops, permanent grass, and other vegetative cover.

Unsaturated zone
A zone in the soil where air remains in voids and cavities. It is also called the zone of aeration.

Water table
The upper surface of the ground water, or the level below it, in which the soil is saturated by water.

Watershed
See hydrologic unit.

Wetland
An area of mostly hydric soils that is saturated by surface or ground water at a frequency and duration sufficient to support hydrophytic vegetation adapted for saturated soil conditions.

Sources
- Agricultural Waste Management Field Handbook, SCS.
- Resource Conservation Glossary, Soil and Water Conservation Society.
- Federal Glossary of Selected Terms, Subsurface Water Flow and Solute Transport, U.S. Department of the Interior, Geological Survey.

Where to Get Help

For information and assistance in planning soil erosion control and water quality protection, contact your local conservation district office or the U.S. Department of Agriculture's (USDA) Soil Conservation Service, Extension Service, or Agricultural Stabilization and Conservation Service.

United States Department of Agriculture
Soil Conservation Service
Agricultural Stabilization and Conservation Service
Extension Service

12 USDA 1991 Water Quality Projects

USDA Water Quality Initiative

Water is one of our Nation's most precious resources. Agricultural and public concern has raised preservation of water quality to both a U.S. Department of Agriculture (USDA) and Presidential Initiative.

USDA's emphasis is on education, technical and financial assistance, research, and data base development. Eleven USDA agencies are involved in the Water Quality Initiative, working with State and local governments, other Federal agencies, and the private sector.

Water quality projects sponsored by USDA are underway in 48 States and the Caribbean Area to address agriculture-related water quality concerns.

Many of these projects were selected from areas identified by States in response to Section 319 of the Water Quality Act of 1987, which directed States to assess and prioritize their most severe water quality problem areas and to develop nonpoint source management programs to solve these problems. Present projects focus on four major areas: hydrologic units, demonstration projects, Agricultural Conservation Program (ACP) water quality special projects, and other initiatives.

Hydrologic Unit Areas

Seventy-four hydrologic unit areas—agricultural watersheds—were selected in fiscal years 1990 and 1991. The goal of hydrologic unit areas is to help farmers and ranchers in voluntarily applying agricultural production and conservation practices that will help achieve water quality goals.

In each area, cost-sharing is provided to farmers to install practices such as animal waste control facilities, sod waterways, water management systems, and integrated crop management—fertilizer and pesticide management—for water quality improvement. Cost-share funds may come from several sources, including ACP cost-share funds and State cost-share programs.

The hydrologic unit areas are under the joint leadership of two agencies, the Extension Service (ES) and the Soil Conservation Service (SCS). ES provides information and education assistance, including specific recommendations on the use of nutrients and pesticides, and SCS helps farmers and ranchers develop conservation systems to reduce adverse water quality effects. The Agricultural Stabilization and Conservation Service (ASCS) provides cost-share assistance where appropriate.

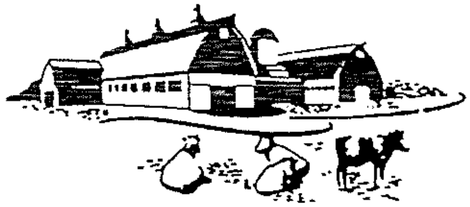
Other Initiatives

As part of its 5-year plan, USDA will continue to support ongoing regional projects: the Chesapeake Bay Program, the Colorado River Salinity Control Program, the Puget Sound Estuary Program, Land and Water 201 Program (includes counties in Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee and Virginia), and the Great Lakes Program. In addition to these regional initiatives, other USDA programs contribute to the effort to solve agricultural nonpoint source problems. These include the Rural Clean Water Program, Water Quality Incentive Program, Water Bank Program, Wetland Reserve Program, Multi-Year Cost Share, Public Law 83-566 Watershed Protection and Flood Prevention Program, Great Plains Conservation Program, and others.

To facilitate these programs, ES and SCS are developing extensive programs of staff training to assure that field staff are familiar with the latest technology and its use in helping farmers, ranchers, and landowners to enhance or protect water quality while maintaining profitable agricultural operations.

Fact Sheet

Dairy Farms



May 1994

United States Department of Agriculture

Soil Conservation Service

The Soil Conservation Service Planning Process

The USDA-Soil Conservation Service (SCS) has been helping farmers and ranchers protect their resources for over 60 years. The following flow-chart was prepared to help you understand the planning process the SCS will use to develop your conservation plan.

You and SCS will make an appointment to meet on your farm.

You and SCS prepare for the planning meeting.

1. SCS gathers background information and maps of your farm.
2. You will need to provide SCS with the background information, do a soils test, and begin thinking about your future plans for your dairy. (See the Planning Information Fact Sheet for Dairies.)
3. You may stop the planning process at any time and use a private consultant.

SCS will help you appraise your resources.

This will require visits to your dairy farm. SCS will determine which soils are on your farm and their condition; note your land uses and field boundaries; recognize any resource problems; and survey your property for engineering designs as needed.

Decision making time.

SCS will develop and present to you several conservation treatment options and the effects of your plan on your operations. You decide on the land use and land treatment of your dairy farm.

Recording decisions.

SCS will prepare your conservation plan folder complete with maps, soils data, land treatment decisions, Agricultural Waste Management System, and engineering designs custom designed for your dairy farm based on your decisions.

Plan review.

SCS will review your conservation plan with you. After you sign your conservation plan, it will be reviewed and signed by the local Soil and Water Conservation District and SCS district conservationist.

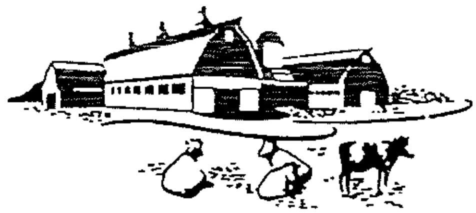
You receive your completed conservation plan.

SCS will continue to work with you to help you install and maintain your conservation plan.

Fact Sheet

Dairy Farms

May 1994



United States Department of Agriculture

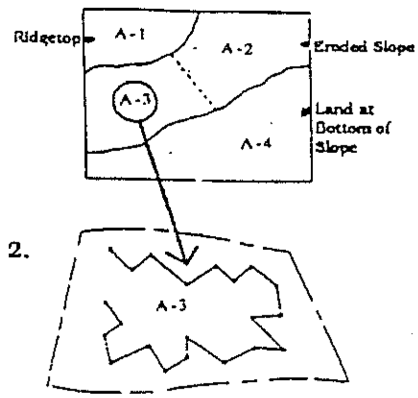
Soil Conservation Service

How On Earth Do I Take A Soil Sample?

What is a soil sample?

A soil sample is a mixture of 10 to 15 samples of soil taken from a uniform area of 10 to 40 acres in a field.

Step 1.



Step 2.

Why do I need to take a soil sample?

To help you and your USDA-SCS soil conservationist plan your agricultural waste management system. The chemical test results will tell you the present nutrient levels in the fields you plan to use for waste disposal. The test results will help you determine how much agricultural waste you can apply to those fields.

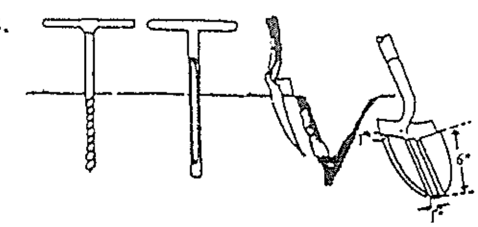
When do I need to take a soil sample?

Take your sample prior to planting the next crop and before applying any type of nutrients. The sooner the test results are in, the sooner you and your soil conservationist can begin planning your agricultural waste management system.

How do I take a soil sample?

Use a spade, soil auger, or soil sampling tube as illustrated. Scrape the litter from the soil surface. If you are using a spade, dig a V-shaped hole and take a 1-inch slice of soil from the smooth side of the hole. Then take a 1 X 1 inch core from the center of the shovel as illustrated. If you are using a soil auger or soil sampling tube, make the core or boring 6 inches deep in the soil. For permanent sod, sample to a depth of 3 to 4 inches.

Step 3.

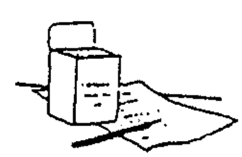


Repeat in 10 to 15 different places in each uniform area of 10 to 40 acres in a field. Collect soil in a clean plastic bucket - do not use metal. Mix thoroughly. Remove one pint to use as the soil sample representing that field or area.

Where do I send the soil sample?

After completing the soil sample information form, enclose the form and payment inside the package containing the soil samples. Make your check payable to Soil Testing. Do not send cash. A private laboratory can be used or address the letter and package to one of the following:

Step 4.



Extension Soil, Water, and Forage Testing Laboratory
Texas A&M University - Soil & Crop Sciences
College Station, Texas 77843-2474
Phone 409/845-4816

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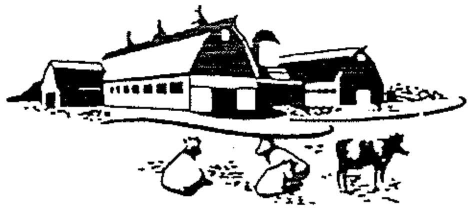
Fact Sheet

Dairy Farms

MAY 1994

United States Department of Agriculture

Soil Conservation Service



PLANNING INFORMATION FACT SHEET FOR DAIRIES

As you learned on the SCS Planning Process fact sheet, the USDA-Soil Conservation Service will be contacting you to gather some background information in order to help you develop your customized conservation plan. The following includes information the SCS will need and also some things that you, the dairy farmer, need to be thinking about--your future plans for your dairy.

As you read this, please begin answering as many questions as you can and begin thinking about the rest. It will help your soil conservationist to serve you better.

✔ How many milking cows do you currently have?

✔ What is the maximum number of milking cows you plan to have in the future?

✔ How many confined animals do you currently have that are being milked?

✔ What is their estimated live weight?

✔ What is the maximum number of confined milking cows you plan to have in the future and what is their estimated live weight?

✔ How many heifers do you currently confine and what is their estimated live weight?

✔ What is the maximum number of heifers you plan to confine in the future and what is their estimated live weight?

✔ How many dry cows do you currently confine and what is their estimated live weight?

✔ What is the maximum number of dry cows you plan to confine in the future and what is their estimated live weight?

✔ How many other animals do you currently confine and what is their estimated live weight?

✔ What is the maximum number of other animals you plan to confine in the future and what is their estimated live weight?

✔ How many pens do you currently have?

✔ How many cows do you put in each pen?

✔ How many acres are in each pen?

✔ Will the pen area remain the same? If not, the SCS will help you stake or measure the new pen area for the SCS surveying team.

✔ How many cows can you milk at one time?

✔ How many times do you milk per day?

TEXAS AGRICULTURAL EXTENSION SERVICE
THE TEXAS A&M UNIVERSITY SYSTEM

Soil, Water, and Forage Testing Laboratory

SOIL SAMPLE INFORMATION FORM

Please submit this completed form and payment with your soil samples. Mark each soil sample bag with your sample identification which should correspond with the sample identification written on this form. See mailing instructions under Step 4 on the back of this form (Please Do Not Send Cash).

SUBMITTED BY: Results will be mailed to this address.

Name ______________________ County ______________

Address ______________________ Phone ______________

City ______________ State ______ Zip ______________

FOR: (Optional)

Name ______________________

Address ______________________

City ______________ State ______ Zip ______________

SAMPLE I.D.		PLANT INFORMATION			
Laboratory # (For Lab Use)	Your Sample I.D.	To Be Irrigated	Previous Lime Or Fertilizer	Intended Plant To Be Fertilized	Yield Goal

Describe any problems ______________________

____

Circle Requested Analyses

	Cost Per Sample
Complete Analysis (Routine Analysis + Micronutrients, Boron and Lime Requirement.)	$ 25.00
Routine Analysis (pH, NO_3, P, K, Ca, Mg, Na, S, & Salinity)	$ 10.00
Routine + Micronutrients (Zn,Fe, Cu, Mn)	$ 14.00
Salinity (Detailed Analysis)	$ 15.00
Boron	$ 5.00
Potting Media (Non-Soil Mixes) Saturation Extract Analysis	$ 15.00
Organic Matter Analysis	$ 5.00
Soil Texture Analysis	$ 10.00

How Is Forage Used?

Grazing Only ______

Hay Only ______

Grazing and Hay ______

New Establishment ______

Minimum Requirement Est. ______