Pesticide Monitoring Network
1996-1997

Bob Tolford

GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
GEORGIA GEOLOGIC SURVEY

Atlanta
1997

PROJECT REPORT 31

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INTRODUCTION

To satisfy the requirements of their Pesticide Management Plan, the Georgia Department of Agriculture (DOA) requested the Georgia Geologic Survey Branch (GGS) of the Georgia Environmental Protection Division (EPD), to assist in designing a ground-water monitoring network for the agricultural region of southwest Georgia. The original plan called for the installation of a network of shallow monitor wells in those counties having the highest concentration of agricultural activity (primarily row-crop farming). However, the United States Geological Survey (USGS) was already in the process of installing monitor wells in the Apalachicola-Chattahoochee-Flint River Basin (ACF) as part of the National Water Quality Assessment Program (NAWQA). Rather than duplicate efforts, the DOA, EPD, and the USGS entered into a cooperative agreement in 1993. The agreement called for EPD to sample the USGS wells, turn the samples over to DOA for analysis using EPA-approved Gas Chromatography/Mass Spectrometry (GC/MS) methods, and all parties to share the results. EPD planned to sample the USGS wells for one year, then produce a report for the well owners and a project report suitable for publication. The first published report (GGS Project Report 22) included data from selected ACF wells generated during the period between September 1993 and July 1994.

During the latter part of 1994, the USGS installed 23 new wells in the Upper Suwannee River Basin (USRB). The USGS contacted EPD about the new wells and plans were made to include them in the next round of sampling by the Pesticide Monitoring Network (PMN). As with the ACF wells, the owners had to give EPD permission to enter their property and sample the wells in the USRB. In August 1995 sampling continued in the ACF basin on a quarterly basis, while the USRB wells were sampled as frequently as time allowed. The DOA added a new method to the laboratory procedures for the second round of sampling, bringing the total number of analytical methods to five, with more than 200 compounds detectable by the combination of the methods.

As with the previous year, sampling of the wells during 1996-1997 continued in the ACF basin on a quarterly basis, while the USRB wells were sampled as frequently as time allowed. In addition to the aforementioned difficulties in gaining access to the wells, sampling took place only when the lab could accept samples. When lab personnel were absent, the lab would request that fewer samples be collected during the upcoming week(s).

WELL LOCATION AND CONSTRUCTION

The USGS installed 36 wells in the ACF and 23 wells in the USRB. EPD attempted to obtain the consent of the landowners to access and sample the wells in both basins. Permission was obtained to sample 24 wells in the ACF and 17 in the USRB. Figure 1 provides the well locations. In 1995, five wells (LC2A, CP15A,

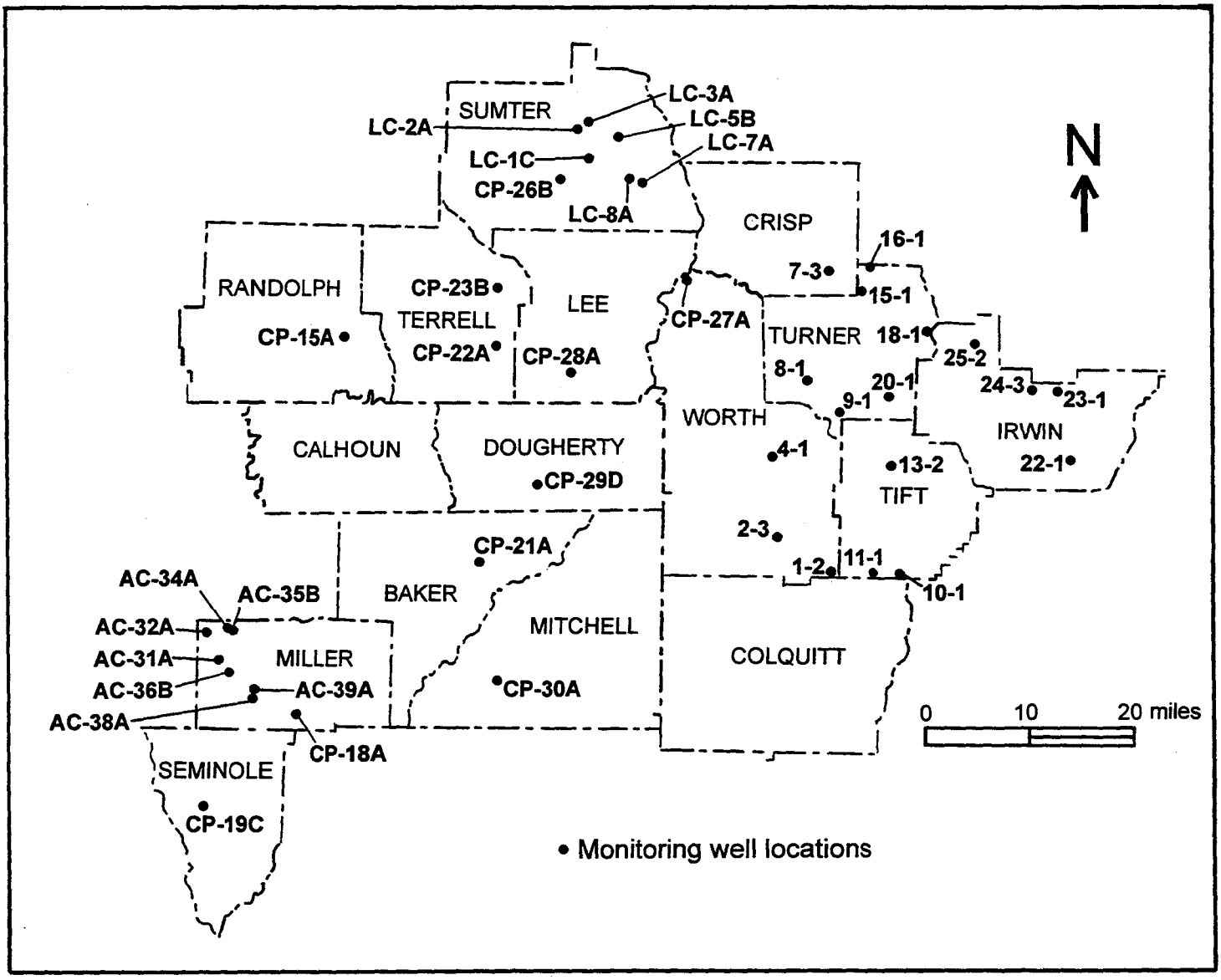

Figure 1. 1996-1997 Pesticide Monitoring Network Study Area.

CP24A, AC36B, and 9-1) were deleted from the Network due to inaccessibility or very slow recovery. A sixth well (AC39A) was deleted in 1996 (due to the fact that it was demolished) at the landowner's request to make room for a center-pivot irrigation system. Some wells were sampled less frequently than others due to problems in gaining access to the well such as: bad weather, muddy fields, damage potential to crops, and locked gates. During the 1996-1997 sampling period, EPD sampled 20 wells in the ACF Basin and 16 wells in the USRB.

Where possible, wells were drilled in or near recharge areas, in close proximity to fields that had been continuously cultivated for the preceding 10 or more years. All of the wells were constructed with PVC casings and screens and drilled to a short distance below the water table with 6-inch hollow-stem augers. The annular space around the ten-foot screened interval in each well was backfilled with a filter pack of clean sand and capped with a bentonite plug. The annulus above the bentonite plug was backfilled with either bags of sand or native materials and capped with three feet of cement grout. The casings extend one-half foot to three feet above the ground surface and are covered by locking steel boxes set in 18-inch wide concrete aprons. The wells were developed with an air bladder pump until they produced clear water. A list of monitor well construction data is in Appendix A.

SAMPLING EQUIPMENT AND PROCEDURES

Purging and sampling procedures used for the PMN were developed from *Recommended Procedures for Collection of Selected Ground Water Data from Wells* (1992 Lapham et.al.) and the *Manual for Groundwater Monitoring* (EPD task force on Ground Water Monitoring 1988). A teflon bailer was used to purge and sample the wells. Field parameters (temperature, pH, specific conductance, and dissolved oxygen) were measured/screened in the field. A YSI ® Model 3500 Water Quality Monitoring System was used to measure temperature, and specific conductance. Dissolved oxygen was screened using a Chemetrics ® test kit which includes model R-7512 self-filling ampules; pH was screened using EM Quant ® test strips. (Note: Manufacturers, trade names, or brand names of equipment or supplies mentioned in this report does not constitute endorsement by the Geologic Survey.)

Prior to collecting the sample, the volume of water in the well was calculated. After three well volumes of water was purged, the sample was collected. EPD collected two types of samples from each well. Four one-liter samples were collected in amber glass bottles; two of the bottles were preserved with a hydrochloric acid solution while in the field, the other two remained unpreserved. A 60 ml sample was collected in a 125 ml opaque, Teflon® bottle and preserved (by the laboratory prior to shipment to the field) with 1.8 ml of monochloroacetic acid. The four one-liter samples are used to analyze for screens 1-4, (organophosphate pesticides, organochlorine pesticides, and phenoxy herbicides) and the one 60-ml sample is used for screen 5 (carbamate pesticides). The sample bottles are individually labeled, bagged, and placed in coolers

filled with ice for preservation during transportation to the DOA Pesticide Residue Laboratory in Atlanta. Samples are hand delivered to the lab by EPD employees using an EPA-approved chain of custody form.

DECONTAMINATION AND QUALITY ASSURANCE / QUALITY CONTROL

To prevent potential cross-contamination, the sampling equipment was cleaned prior to and between each sampling episode. The bailer is decontaminated in the field using a three-step process: the equipment is cleaned in a Liquinox® and tap-water solution, thoroughly rinsed in tap-water, followed by additional rinsing in de-ionized water. All sampling equipment is handled with latex gloves. Equipment blanks (de-ionized water) are taken periodically to determine if the decontamination process is effective. Other forms of Quality Control (QC) samples used are spiked samples and replicate samples. The DOA laboratory runs additional QC standards before, during, and after each sample run. The results of the QC tests indicate that the methods in use at the Pesticide Residue Laboratory are consistently capable of detecting pesticides at or near their listed detection limit and the decontamination methods used in the field are effective.

LABORATORY ANALYSIS

The Department of Agriculture Pesticide Residue Laboratory uses EPA methods 507 (nitrogen and phosphorus containing compounds), 508.1 (chlorinated pesticides), 515.2 (chlorinated acids), 531.1 (N-methylcarbamoyloximes), and Method 4 for pesticide analysis. These methods have detection limits for pesticide compounds that are below the maximum contaminant levels (MCL's) established by EPA for safe drinking water. Method 531.1 and Method 4 use high-pressure liquid chromatography (HPLC) to determine the concentration of constituents. The other methods rely on gas chromatography/mass spectrometry (GC/MS) for compound identification. For more information concerning the specific analytes detectable by each method and their respective detection limits, refer to the laboratory report sheets included in Appendix B.

RESULTS

Results for the wells in the ACF and USR basins continue to indicate no pesticide detections above EPA established MCL's. Quality control samples spiked with various pesticides show that the DOA laboratory's procedures are capable of detecting pesticide concentrations that are near the MCLs established for the compounds.

Field measurements of parameters taken just prior to sampling are tabulated in Appendix C. This table includes data from September 1993 through August 1997 for all of the wells ever sampled by the PMN, whether or not they are currently part of the Network.

INTERPRETIVE CONCLUSIONS

The results of sampling in the study area (ACF and USR basins) indicate that Best Management Practices for Pesticides currently being employed do not appear to result in the pollution of Georgia's ground water by pesticides. If EPA's risk-based MCL's are appropriate indicators of contamination, then underground sources of drinking water do not currently appear to be in danger of pollution by current farming practices. This interpretation is consistent with previous surveys of pesticides in ground water conducted in Georgia. The lack of detections can possibly be attributed to the rapid dilution and degradation of pesticides due to the low amount of organic material in the soils of the Coastal Plain, the high soil and air temperatures that naturally occur during the peak times for pesticide application, and the abundant rainfall that the study area receives each year (average yearly rainfall is about 59 inches).

REFERENCES

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Lapham, W., Wilde, F., and Korterba, M., 1992. Protocols and Recommended Procedures for Collection of Selected Ground-water Data from Wells. USGS Open-file report 92-xxxx (provisional document, unfinished) pp 99-324.

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Appendix A

Monitor Well Identification and Construction

Wells in Apalachicola-Chattahoochee-Flint River Basin used between 9/93 and 8/97.

Well ID	County	Pad	Backfill	Bentonite Plug	Filter Pack	Screened Interval	Total Depth
LC-1C	Sumter	0 - 2.5	2.5 - 31.3	31.3 - 33.5	33.5- ≈ 41	35 - 45	45.0
LC-2A	Sumter	0 - 3.0	3.0 - 62	62 - 64	64 - 74.7	64.7 - 74.7	74.7
LC-3A	Sumter	0 - 3.0	3.0 - 61	61 - 63	63 - 73.4	63.4 - 73.4	73.4
LC-5B	Sumter	0 - 3. 0	3.0 - 20.2	20.2 - 22.7	22.7 - 27.0	22.4 - 32.4	32.4
LC-7A	Sumter	0 - 2.2	2.2 - 33.5	33.5 - 36.9	36.9 - 48.7	38.7 - 48.7	48.7
LC-8A	Sumter	0 - 1.3	1.3 - 38	38 - 40	40 - 51.7	41.7 - 51.7	51.7
CP-15A	Randolph	0 - 2.2	2.2 - 15.1	15.1 - 17.0	17.0 - 28.6	27.6 - 28.6	28.6
CP-18A	Miller	0 - 1.3	1.3 - 49	49 - 51	51 - 68.8	58.8 - 68.8	68.8
CP-19C	Seminole	0 - 1.3	1.3 - 31.7	31.7 - 33	33 - 54.3	44.3 - 54.3	54.3
CP-21A	Baker	0 - 2.5	2.5 - 37	37 - 39	39 - 48.8	38.8 - 48.8	48.8
CP-22A	Terrell	0 - 2.3	2.3 - 22	22 - 24	24 - 33.8	23.8 - 33.8	33.8
CP-23B	Terrell	0 - 2.0	2.0 - 26.7	26.7 - 32.8	32.8 - 44.2	32.2 - 44.2	44.2
CP-26B	Sumter	0 - 2.0	2.0 - 11.8	11.8 - 15	15 - 28.5	18.5 - 28.5	28.5
CP-27A	Worth	0 - 2.0	2.0 - 10.9	10.9 - 15	15 - 31.2	21.2 - 31.2	31.2
CP-28A	Lee	0 - 1.6	1.6 - 21.2	21.2 - 31.6	31.6 - 43.7	33.7 - 43.7	43.7
CP-29D	Dougherty	0 - 2.0	2.0 - 21	21 - 22	22 - 35.6	25.6 - 35.6	35.6
CP-30A	Mitchell	0 - 2.0	2.0 - 25.5	25.5 - 31.0	31.0 - 47.5	37.5 - 47.5	47.5
AC-31A	Miller	0 - 2.7	2.7 - 24.0	24.0 - 28.9	28.9 - 39.2	29.2 - 39.2	39.2
AC-32A	Miller	0 - 3.3	3.3 - 24.5	24.5 - 29.7	29.7 - 38.3	28.3 - 38.3	38.3
AC-34A	Miller	0 - 3.3	3.3 - 27	27 - 29	29 - 37.5	27.5 - 37.5	37.5
AC-35B	Miller	0 - 2.5	2.5 - 56	56 - 58	58 - 69.3	59.3 - 69.3	69.3
AC-36B	Miller	0 - 2.5	2.5 - 50	50 - 52	52 - 65	55 - 65	65
AC-38A	Miller	0 - 1.7	1.7 - 47	47 - 49	49 - 61	51 - 61	61
AC-39A	Miller	0 - 3.0	3.0 - 31	31 - 33	33 - 57.4	47.4 - 57.4	57.4

All measurements are in feet.

Wells in the Upper Suwannee River Basin used between 8/95 and 8/97.

Well ID	County	Pad	Backfill	Bentonite Plug	Filter Pack	Screened Interval	Total Depth
1-2	Worth	0 - 3	——	3 - 5	5 - 17	7 - 17	17
2-3	Worth	0 - 2.5	2.5 - 11	11 - 14	14 - 24	14 - 24	24
4-1	Worth	0 - 2.5	2.5 - 11	11 - 13	13 - 23	13 - 23	23
7-3	Crisp	0 - 2	2 - 4	4 - 6	6 - 20	5 - 15	20
8-1	Turner	0 - 2	2 - 6	6 - 8	8 - 20	10 - 20	20
9-1	Turner	0 - 2.5	2.5 - 24	24 - 27.7	27.7 - 60	35 - 65	65
10-1	Tift	0 - 2	2 - 9	9 - 10	10 - 22	12 - 22	22
11-1	Tift	0 - 2	2 - 15	15 - 17	17 - 31	21 - 31	31
13-2	Tift	0 - 2	2 - 5	5 - 7	7 - 19	9 - 19	19
15-1	Turner	0 - 2	2 - 16	16 - 18	18 - 51	26 - 46	51
16-1	Turner	0 - 2	2 - 11	11 - 13	13 - 30	20 - 30	30.4
18-1	Turner	0 - 2	2 - 5	5 - 7	7 - 20	5 - 15	20
20-1	Turner	0 - 2	2 - 24	24 - 25	25 - 45	30 - 40	45
22-1	Irwin	0 - 2.5	2.5 - 18	18 - 20	20 - 40	25 - 35	35
23-1	Irwin	0 - 1	1 - 10	10 - 12	12 - 27	17 - 27	27
24-1	Irwin	0 - 2.5	2.5 - 15	15 - 17	17 - 37	27 - 37	37
25-2	Irwin	0 - 2.5	2.5 - 12	12 - 14	14 - 25	15 - 25	25

All measurements are in feet

Appendix B

Laboratory Report Sheets / Analytical Parameters

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Thomas T. Irvin
Commissioner

Pesticide Residue Laboratory Report for Pesticide Analysis

Well Name _____

Sampling Date _____ Time _____

Collected by _____ _____

GDA Lab Number _____ Was sample filtered before analysis? Yes or No

Date Analyzed _____ Volume analyzed (in ml) _____

EPA Method 507 (Screen 1)

Analyte (Trade Name)	Storet #	Limits (ppb)	Level (ppb)	Analyte (Trade Name)	Storet #	Limits (ppb)	Level (ppb)
Alachlor (Lasso)	77825	(m) 2.0		*Merphos	38496	1.0	
Ametryn (Evik)	38401	0.3		Methyl paraoxon	30009	1.0	
Atraton	38414	0.2		Metolachlor (Dual)	38923	1.0	
Atrazine (Actrex)	39033	m (3.0)		Metribuzin (Sencor)	81408	1.13	
Bromacil (Hyvar)	82198	0.6		(Mevinphos)	39610	1.0	
Butachlor (Machete)	77860	0.5		Molinate (Ordram)	49562	1.0	
Butylate (Sutan)	81410	0.4		Napropamide (Devinol)	79195	0.1	
Carboxin (Vitavax)	70978	1.0		Norflurazon (Zorial)	78064	0.1	
Chlorpropham (ChlorolPC)	82322	0.5		Pebulate (Tillam)	79192	0.5	
Cycloate (RoNeet)	04031	1.0		Prometon (Pramitol)	39056	1.0	
*Diazinon (Spectacide)	39750	1.0		Prometryn (Caparol)	04036	1.0	
Dichlorvos (DDVP)	38775	1.0		*Pronamide (Kerb)	39080	0.5	
Diphenamid (Dymid)	30255	1.0		Propazine (Millogard)	38535	1.0	
*Disulfoton (Di-Syston)	39010	1.0		Simazine (Princep)	39055	1.0	
*Disulfoton sulfone	81031	1.0		Simetryn	39054	1.0	
*Disulfoton sulfoxide	81888	1.0		Stirofos	38877	1.0	
EPTC (Eptam)	81894	0.5		Tebuthluron (Spike)	45607	0.1	
Ethoprop (Prophos)	81758	0.5		Terbacil (Sinbar)	38883	0.2	
Fenamiphos (Nemacur)	38929	1.0		*Terbufos	82088	1.0	
Fenarimol	04101	1.0		Terbutryn (Igram)	38888	1.0	
Fluridone (Sonar)		1.0		Triademefon	38893	0.2	
Hexazinone (Velpar)	30264	1.0		Tricyclazole	38903	0.6	
MGK 264	4098	1.0		Vernolate (Vernam)	82200	1.0	

Limits: (m) is a Primary Maximum Contaminant Level for drinking water; * is qualitative results only;
Samples are collected in one liter amber glass bottles with no preservation added in the field.

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Pesticide Residue Laboratory Report for Pesticide Analysis

Well Name _____

Sampling Date _____ Time _____

Collected by _____ _____

GDA Lab Number _____ Was sample filtered before analysis? Yes or No

Date Analyzed _____ Volume analyzed (in ml) _____

EPA Method 508.1 (Screen 2)

Analyte (Trade Name)	Storet #	Limits (ppb)	Level (ppb)	Analyte (Trade Name)	Storet #	Limits (ppb)	Level (ppb)
4,4-DDD (Rothane)		1		Heptachlor	39410	(m) 0.4	
4,4-DDE		1		Heptachlor epoxide	39420	(m) 0.2	
4,4-DDT		1		Hexachlorbenzene	39700	1.0	
Alachlor (Lasso)	77825	(m) 2.00		Hexachlorocyclopentadiene		100	
Aldrin	39330	1		Methoxychlor (Mariate)	39480	(m) 40	
Atrazine (Aatrex)	38414	3.00(m)		Metolachlor (Dual)	38923	1.0	
*Chlorobenzilate	39460	1		Metribuzine (Sencor)	81408	1.13	
Chloroneb	38423	1		Propchlor (Ramrod)	38533	1	
Chlorothanlonil (Bravo)		1		Simazine (Princep)	39055	1.0	
Cyanazine	81757	40		Trifluralin	81284	1	
DCPA (Dacthal)	39770	0.01		alpha-HCH		0.2	
Dieldrin	39380	1		beta-HCH		0.2	
Endosulfan I (Thiodan)	34361	1		delta-HCH		0.2	
Endosulfan II	34356	1		gamma-HCH (Lindane)	39782	(m) 2.0	
Endosulfan sulfate	82623	1		alpha-chlordane (Belt)	39348	(m) 2.0	
Endrin (Rid-a-Bird)	39390	(m) 2.0		gamma-chlordane	39810	(m) 2.0	
Endrin aldehyde	82622	1		cis-Permethrin (Ambush)		0.1	
Etridiazole (Terrazole)	38793	1		trans-Permethrin	82420	0.1	

Limits: (m) is a Primary Maximum Contaminant Level for drinking water. * is qualitative results only.
Samples are collected in one liter amber glass bottles with 4 mL of 6N HCl added prior to sampling as preservation.

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Pesticide Residue Laboratory Report for Pesticide Analysis

Well Name _____

Sampling Date _____ Time _____

Collected by _____ _____

GDA Lab Number _____ Was sample filtered before analysis? Yes or No

Date Analyzed _____ Volume analyzed (in ml) _____

EPA Method 515.2 (Screen 3)

Analyte (Trade Name)	Storet #	Limits (ppb)	Level (ppb)	Analyte (Trade Name)	Storet #	Limits (ppb)	Level (ppb)
2, 4-D (Demise)	39730	(m) 70		DCPA (Dacthal)	39770	0.01	
2, 4-DB (Butoxone)	38746	1.9		Dicamba (Banvel)	38442	0.2	
2, 4, 5-TP (Silvex)	39760	(m) 50		Dicamba, 5-hydroxy-		1	
2, 4, 5-T		0.11		Dichloroprop	38451	1.0	
3, 5 Dichlorobenzoic Acid		1.0		Dinoseb (DNBP)	38779	0.1	
Acifluoren (Blazer)		1.0		Pentachlorophenol (PCP)		(m) 1	
Bentazon (Basagran)	38711	1.9		Picloram	39720	(m) 500	

Limits: (m) is a Primary Maximum Contaminant Level for drinking water; * is qualitative results only.
Samples are collected in one liter amber glass bottles with 1 mL of 1:1 HCl:H_2O added prior to sampling.

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Pesticide Residue Laboratory Report for Pesticide Analysis

Well Name _____

Sampling Date _____ Time _____

Collected by _____ _____

GDA Lab Number _____ Was sample filtered before analysis? Yes or No

Date Analyzed _____ Volume analyzed (in ml) _____

EPA Method (Screen 4)

Analyte (Trade Name)	Storet #	Limits (ppm)	Level (ppm)	Analyte (Trade Name)	Storet #	Limits (ppm)	Level (ppm)
Atrazine, de-ethylated	75981	0.04		Linuron	38477	0.006	
Barban	38418	1.04		Metribuzin DA	81408	0.007	
Carbofuran, phenol-3-keto-	81450	0.01		Metribuzin DADK	81408	0.007	
Carbofuran, phenol	81450	1.5		Metribuzin DK	81408	0.044	
Cyanazine	81757	0.04		Neburon	38521	0.096	
Diuron	39650	0.03		Pronamide metabolites	39080	0.04	
Fenamiphos sulfone		0.012		Propanil		0.007	
Fenamiphos sulfoxide		0.19		Propham		0.11	
Fluometuron	38810	0.19		Swep	38554	0.02	

Samples are collected in one liter amber glass bottles with no preservation added in the field.

_____
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Pesticide Residue Laboratory Report for Pesticide Analysis

Well Name _____

Sampling Date _____ Time _____

Collected by _____ _____

GDA Lab Number _____ Was sample filtered before analysis? Yes or No

Date Analyzed _____ Volume analyzed (in ml) _____

EPA Method 531.1(Screen 5)

Analyte (Trade Name)	Storet #	Limits (ppb)	Level (ppb)
Aldicarb (Temik)	39053	1.0	
Aldicarb sulfone	04257	2.0	
Aldicarb sulfoxide	04260	2.0	
Aprocarb (Baygon)		1.0	
Carbaryl (Sevin)	77700	2.0	
Carbofuran (Furadan)	81450	2.0	
3- Hydroxycarbofuran	82584	2.0	
Methiocarb (Mesurol)	38500	4.0	
Methomyl (Lannate)	39051	1.0	
Oxyamyl (Vydate)	38866	2.0	

Samples are collected in 60 mL FEP with 1.8 mL of buffer solution added as a preservative.

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Appendix C

Tabulation of Field Parameters

(wells arranged by county)

Baker County: CP21A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/19/93	x	5.96	25.0	x	25.7
1/5/94	8.59	4.80	20.5	.200	24.9
4/4/94	7.06	5.50	21.6	262	16.1
5/3/94	9.49	4.40	21.7	x	11.8
6/21/94	7.44	6.0	22.0	x	18.4
9/12/95	7.65	4.3	23.9	0.210	29.15
5/2/96	7.55	4.9	24.7	0.234	18.9
9/17/96	7.4	x	21.3	0.238	31.6
2/12/97	7.5	6	21	0.25	22
7/2/97	7	6	21	0.23	24.2

Crisp County: 7-3

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
4/4/96	4.79	8.7	16.4	0.159	3.9
6/18/96	3.95	7.9	20.3	0.171	8.7
6/30/96	4.5	x	x	x	16.4
4/22/97	4.5	7	21	0.172	4
7/16/97	5	8	23	0.167	13.2

Dougherty County: CP29D

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/13/93	x	11.6	17.3	x	18.8
11/16/93	7.77	x	20.0	x	17.4
2/1/94	x	7.9	18.8	x	12.5
4/4/94	7.9	8.4	19.1	0.202	11.3
5/3/94	6.86	8.2	19.3	x	9.8
6/20/94	6.27	8.6	19.4	x	14.1
8/10/95	7.3	5.8	20.9	0.213	12.2
1/25/96	6.96	5.4	17.1	0.213	20.1
2/29/96	7.08	6.1	19.6	0.201	15.2
5/8/96	7.61	6.8	18.5	0.209	13.9
9/19/96	7.04	6.7	18.8	0.207	19.9
2/12/97	6	7	20	0.21	12.3
4/30/97	6	7	19	x	12.1

Irwin County: 22-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
11/28/95	5.66	x	23.0	0.032	9.0
4/23/96	5.52	4.3	23.8	0.030	4.5
6/25/96	4.49	5.7	19.4	0.023	5.6
3/20/97	5.5	5	20	0.032	5.1
8/20/97	5	5	22	0.028	6.4

Irwin County: 23-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
11/27/95	4.72	x	21.3	0.047	18.2
4/2/96	4.73	8.4	19.6	0.047	9.6
6/25/96	3.95	8.0	20.1	0.060	12.2
3/20/97	4.5	8	x	0.051	10
8/6/97	5	8	22	0.052	16

Irwin County: 24-3

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
11/1/95	4.84	9.9	20.9	0.071	21.6
4/2/96	5.51	6.8	22.2	0.111	8.4
12/31/96	4.75	x	x	x	13.5
5/1/97	5	7	20	x	11
8/6/97	5	8	22	.095	16

Irwin County: 25-2

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
1/16/96	5.20	3.4	20.4	0.048	12.0
4/24/96	5.14	5.6	19.2	0.057	8.6
12/31/96	5	x	x	x	7.2
5/7/97	5	6	20	0.077	8.4
7/24/97	5	6	22	0.069	12.4

Lee County: CP28A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/12/93	7.42	9.2	17.7	x	18.2
11/16/93	9.24	x	21.8	x	13.9
1/12/94	x	6.7	19.6	0.300	13.7
4/27/94	6.75	6.2	21.9	x	13.5
6/14/94	6.81	5.6	21.3	x	14.6
8/10/95	7.01	5.3	23.3	0.374	16.5
3/14/96	7.24	5.3	21.0	0.370	14.2
4/30/96	7.32	6.0	21.9	0.392	17.0

Miller County: CP18A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
12/15/93	9.12	8.1	19.9	x	30.8
4/5/94	7.59	7.6	20.9	x	27.1
5/4/94	x	9	20.9	x	19.9
10/10/95	7.72	6.4	22.6	0.233	34.9
2/6/96	7.77	6.8	21.7	0.247	26.3
3/12/96	7.75	6.2	21.1	0.250	23.3
6/4/96	7.54	7.2	20.7	0.193	31.3
9/18/96	7.37	7.2	21.2	0.253	30.8
10/30/96	7.57	7.5	22.2	1.91	29.4
1/23/97	7.5	7	20.4	0.238	25.9
5/14/97	7	8	22	0.234	29.7

Miller County: AC31A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
12/1/93	5.19	x	18.3	x	15.2
2/7/96	5.78	5.2	22.7	0.040	3.1
3/12/96	5.96	5.9	22.2	0.056	2.35
5/29/96	5.12	6.2	20.7	0.053	6.45
2/19/97	5	x	21	0.045	19.2
5/28/97	5	6	21	0.04	13.7

Miller County: AC32A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
12/13/95	6.31	4.5	20.3	0.053	33.7
2/20/96	6.21	5.8	19.8	0.059	4.85
5/29/96	5.55	6.1	20.2	0.068	6.2
2/26/97	5.5	x	20	0.074	5.7

Miller County: AC34A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
12/1/93	7.48	x	18.3	x	22.2
1/5/94	7.52	8.5	19.3	x	14.1
3/2/94	7.81	10.1	19.2	x	8.1
4/19/94	x	7.3	21.2	x	0.4
9/27/95	7.61	x	22.1	0.178	26.3
2/6/96	7.75	6.0	20.7	0.202	8.0
3/5/96	7.58	6.1	21.3	0.170	4.9
5/13/96	7.58	8.0	21.3	0.158	5.7
10/16/96	7.63	7.6	21.1	0.206	5.3
2/19/97	7.5	x	20	0.207	6.75
5/21/97	7	8	21	0.21	9

Miller County: AC35B

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/28/93	7.75	8.4	19.1	x	42.3
12/7/93	8.88	x	18.4	x	37.8
2/24/94	7.47	6.5	19.5	x	21.4
4/19/94	6.88	6.2	21.1	x	12.0
9/13/95	7.44	5.0	22.3	0.278	38.8
2/7/96	7.41	5.7	20.6	0.238	24.4
3/5/96	7.52	5.2	21.2	0.214	18.8
5/13/96	7.46	6.2	21.3	0.208	18.5
2/26/97	7.5	x	19	0.224	22.25
5/21/97	7	6.0	21	0.22	25.95

Miller County: AC36B

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
12/15/93	x	6.4	19.6	0.200	34.9

Miller County: AC38A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/20/93	7.57	8.6	21.7	x	37.7
12/8/93	7.65	7.3	19.8	x	36.4
5/10/94	x	x	x	x	22.2
10/30/95	7.42	7.2	21.6	0.238	38.3
10/16/96	7.45	6.4	21.8	0.186	28.2
2/27/97	7.5	x	20	0.205	25.1
7/1/97	7	7	21	0.2	42.1

Miller County: AC39A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/19/93	6.15	x	22.6	x	33.6
12/8/93	7.75	4.8	20.2	x	32.2
2/23/94	6.93	4.8	20.4	x	19.9
4/20/94	x	5.9	21.6	x	16.5
10/30/95	7.42	7.2	21.6	0.238	38.3

Mitchell County: CP30A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/18/93	x	8.7	22.5	x	33.1
12/2/93	7.83	x	19.4	x	34.6
2/22/94	7.26	6.8	20.3	x	35.6
4/5/94	7.50	7.6	20.6	0.225	35.0
5/4/94	x	9.8	21.0	x	24.1
9/12/95	7.47	5.4	26.0	0.218	33.3
2/8/96	7.47	6.4	20.3	0.200	36.4
2/29/96	7.45	6.2	19.7	0.242	35.2
5/6/96	7.44	7.0	20.8	0.247	29.2
2/20/97	7	x	20.0	0.24	24.5

Randolph County: CP15A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/13/93	x	11.5	19.1	x	20.9
12/2/93	5.56	x	19.3	x	22.2

Seminole County: CP19C

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/28/93	7.70	8.9	20.3	x	44.5
4/20/94	x	5.8	22.9	x	25.9
9/27/95	7.55	x	21.4	0.255	43.2
2/15/96	7.41	6.0	20.6	0.286	42.8
6/4/96	7.53	5.2	21.2	0.283	39.9
1/22/97	7.5	5.9	20.2	x	40
5/14/97	7	7	21.5	0.279	31

Sumter County: LC1C

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
11/2/93	x	9.5	17.1	x	14.7
12/8/93	8.19	7.0	18.2	x	7.1
2/2/94	x	7.5	18.0	x	1.3
8/16/95	7.41	4.4	21.8	0.192	12.4
8/29/95	6.93	4.5	21.5	0.225	18.5
10/15/96	7.57	5.9	20.4	0.217	4.5
1/15/97	7	x	17	0.183	0.8
4/3/97	7	7	19	0.226	3.8

Sumter County: LC2A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
9/29/93	7.11	x	x	x	59.6

Sumter County: LC3A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/6/93	6.35	8.3	22.6	x	66.6
11/1/93	6.25	10.6	17.1	x	64.9
1/6/94	6.65	7.4	19.1	x	65.1
3/14/94	6.11	7.7	19.1	x	64.2
9/14/95	6.30	6.8	20.2	0.143	67.6
3/4/96	6.57	7.3	19.1	0.107	64.2
1/15/97	6.75	x	17	0.145	65.9
5/29/97	7	6	21	0.139	66.4

Sumter County: LC5B

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/6/93	5.52	8.3	22.9	0.030	17.9
11/1/93	4.69	11.33	17	0.030	12.4
1/11/94	x	7.9	19.3	0.020	7.9
3/29/94	4.52	7.0	19.3	0.060	3.0
4/27/94	4.59	7.4	20.2	0.082	8.6
6/13/94	4.12	6.3	20.9	0.071	11.3
8/16/95	5.42	6.8	22.8	0.055	11.0
8/29/95	5.16	6.2	21.5	0.050	19.7
1/29/96	5.65	6.5	20.7	0.062	5.4
2/27/96	5.42	6.1	21.3	0.064	26.4
5/1/96	5.64	6.9	20.8	0.055	6.0
8/27/96	4.46	7.2	19.1	0.054	17.0
10/9/96	4.87	6.5	19	0.051	19.4
1/30/97	5	6.2	20.8	0.065	4.7
5/22/97	5	7	20	0.070	10.2

Sumter County: LC7A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/11/93	x	4.7	18.6	x	24.8
11/3/94	7.32	4.8	18.3	x	16.7
2/22/94	7.70	3.7	18.6	x	5.4
3/15/94	7.73	2.5	20.8	x	4.5
4/11/94	x	x	x	x	5.6
5/9/94	7.19	x	x	x	7.2
6/21/94	7.09	2.6	20.3	x	6.7
8/30/95	7.54	3.7	23.3	0.219	20.2
1/23/96	7.43	3.4	20.0	0.225	10.1
5/6/96	7.54	3.3	22.5	0.232	7.1
5/8/97	7	5	19	0.234	9.3

Sumter County: LC8A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
9/30/93	7.43	x	x	x	38.2
11/2/93	7.81	9.6	17.2	x	29.6
1/6/94	7.69	6.8	18.3	x	15.2
3/15/94	7.42	6.2	20.4	x	11.9
4/11/94	7.99	7.1	19.8	0.203	15.4
5/9/94	7.38	x	x	x	15.1
10/30/95	7.51	5.7	20.4	0.217	28.0
1/23/96	7.79	6.0	20.4	0.216	17.4
5/16/96	7.75	7.0	21.6	0.210	17.5
8/26/96	7.06	8.6	21.7	0.133	29.8
1/23/97	7.5	6	20.1	0.211	18.8
7/2/97	7	7	22	0.204	31.4

Sumter County: CP26B

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
11/30/93	4.4	9.2	19.3	x	4.2
1/12/94	x	6.2	19.8	x	3.3
4/27/94	4.33	5.1	22.2	x	7.6
6/13/94	3.26	4.5	22.2	x	3.25
9/25/95	4.67	x	20.2	0.068	13.85
1/30/96	4.62	6.1	20.0	0.065	4.65
3/4/96	4.81	5.4	19.3	0.078	8.15
5/15/96	5.55	7.3	22.8	0.094	6.0
1/29/97	4.5	6	20	0.065	5
4/3/97	6	6	19	0.073	5.75

Terrell County: CP22A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/27/93	5.38	10.5	21.7	x	16
10/12/95	5.75	6.5	19.5	0.026	17.5
2/14/96	5.77	7.2	19.5	0.034	5.5
5/22/96	5.92	7.0	25.7	0.044	4.0
2/27/97	6	x	19	0.045	4.75
5/15/97	6	7	20.5	0.043	9.5

Terrell County: CP23B

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/13/93	x	9.34	20.0	x	32.2
12/13/95	5.23	5.7	19.1	0.020	28.2
2/14/96	5.64	7.2	19.4	0.023	23.1
3/13/96	5.68	5.4	19.4	0.026	21.8
5/23/96	5.45	7.1	20.2	0.024	25.6
9/12/96	5.99	x	20.3	0.029	33.2
1/30/97	6	7	20	0.03	27.2
4/3/97	6	7	20	0.028	25.6

Tift County: 10-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
1/9/96	4.56	x	18.6	0.230	5.9
4/17/96	4.91	8.2	16.9	0.181	3.5
6/13/96	4.17	7.9	18.5	0.183	5.2
9/25/96	4.44	6.8	21.6	0.216	10.8
3/12/97	5	7	20	0.205	4.2
7/9/97	5	7	22	0.151	5.5

Tift County: 11-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
1/9/96	4.84	x	19.4	0.108	2.6
4/9/96	5.36	5.4	21.8	0.121	1.8
6/11/96	4.15	6.8	19.0	0.119	3.2
3/12/97	4.5	6	19	0.104	2.2
7/23/97	5	6	23	0.112	7.9

Tift County: 13-2

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
1/17/96	4.54	6.6	18.4	0.161	4.8
3/26/96	4.64	6.5	16.9	0.163	0.8
6/17/96	3.88	6.1	20.6	0.187	4.5
9/25/96	4.22	5.3	23.6	0.153	3.8
11/4/96	4.59	6.3	23.4	0.133	3.8
3/20/97	4.5	7	18	0.17	1
8/21/97	5	6	23	0.188	3.3

Turner County: 8-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
2/22/96	4.68	7.2	18.5	0.051	9.2
4/8/96	4.03	6.6	18.0	0.063	6.1
6/12/96	3.95	7.3	19.3	0.063	9.6
3/4/97	4.5	7	21	0.082	6.3

Turner County: 9-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
2/22/96	5.14	2.7	20.3	0.053	11.15

Turner County: 15-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
1/10/96	5.43	5.7	19.8	0.043	14.2
4/24/96	5.15	6.2	22.4	0.026	13.8
6/18/96	4.61	7.6	20.3	0.045	15.2
3/26/97	5	6	21	0.045	12.3

Turner County: 16-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
4/3/96	4.64	8.9	19.4	0.154	9.1
6/12/96	3.86	8.2	19.6	0.154	14.3
12/30/96	4.5	x	x	x	12.1
4/23/97	4.5	8	20	0.162	14.2
8/14/97	5	8	22	0.182	18.2

Turner County: 18-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
2/21/96	3.80	8.5	14.1	0.142	2.5
4/8/96	5.13	4.9	19.2	0.186	0.9
6/26/96	3.86	6.2	22.2	0.197	4.3
3/27/97	5	7	19	0.178	2.3
8/27/97	5	6	22	0.182	7.6

Turner County: 20-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/18/95	4.74	6.4	20.4	0.082	23.3
3/27/97	5	7	20	0.075	17.8
7/10/97	5	7	22	0.095	20.3

Worth County: CP27A

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/11/93	x	9.5	20.3	x	10.9
11/3/93	7.53	9.3	20.4	x	7.4
2/22/94	7.00	8.8	19.7	x	5.5
4/28/94	6.29	7.8	20.3	x	4.5
6/14/94	6.67	6.8	20.4	x	7.3
8/30/95	7.18	6.8	24.3	0.210	12.0
1/30/96	7.11	6.7	21.4	0.202	7.6
2/27/96	6.99	6.8	22.2	0.207	7.3
5/6/96	6.57	6.8	23.3	0.201	7.5
9/4/96	7.3	6.6	21.3	0.173	10.3
9/18/96	6.56	6.2	21.1	0.178	10.4
2/12/97	7	x	x	x	9.5

Worth County: 1-2

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
10/16/95	5.91	1.6	23.6	0.070	10.4
3/25/96	4.91	8.4	16.0	0.120	2.7
6/5/96	3.93	7.4	22.0	0.127	4.8
3/4/97	5	8	18	0.122	2.5
7/9/97	5	7	22	0.123	6

Worth County: 2-3

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
11/29/95	5.34	x	21.3	0.101	9.6
4/22/96	5.32	7.1	18.4	0.111	8.5
9/24/96	5.5	6	20	0.118	13

Worth County: 4-1

Date Sampled	pH (std. units)	Dissolved Oxygen (ppm)	Temp. °C	Specific Conductance (μS)	Depth to ground water
11/29/95	4.52	x	21.6	0.128	12.5
3/25/96	4.67	7.9	16.8	0.122	5.4
6/5/96	3.94	7.0	19.8	0.166	5.8
9/24/96	4.3	6.4	22.7	0.156	12.4
3/4/97	4.5	7	19	0.155	3.4
8/7/97	5	7	22	0.162	8.2

Note: An "x" indicates the parameter was not measured due to equipment failure.