2018 TRIENNIAL SUMMARY REPORT

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER PLANNING AND ASSESSMENT DIVISION

DEQ
LOUISIANA

STATE FISCAL YEARS 2016 – 2018

ASSET

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

TABLE OF CONTENTS

APPENDICES

ACKNOWLEDGEMENTS

The Water Planning and Assessment Division's (WPAD) Aquifer Sampling and Assessment (ASSET) Program owes its success to many people and agencies for their continual support through the years. Without this support, the ASSET Program could not exist.

The water well owners, who voluntarily participate in ASSET, are owed a debt of gratitude. Without access to private, corporate, and public property and wellheads, this program could not operate.

The Louisiana Department of Natural Resources (LDNR) Ground Water Resources Program makes the Water Well Registration data set available to LDEQ, and ultimately to the WPAD, which is used for multiple purposes in the execution of ASSET.

The United States Geological Survey (USGS) Water Resources Division frequently provides well schedule data that are used during the execution of ASSET. These data are made available to the Program through a USGS-LDOTD cooperative program. In addition, the USGS allows its observation wells to be sampled.

Gratitude is also owed to the staff at EPA Region 6, Water Quality Protection Division, Assistance Programs Branch and the Source Water Protection Branch, for their assistance and support for ASSET.

This Program is funded in part by the U.S. Environmental Protection Agency through the Clean Water Act.

BACKGROUND

The Aquifer Sampling and Assessment Program, or ASSET, is conducted as a Clean Water Act activity. ASSET is designed to determine and monitor the quality of groundwater in the major freshwater aquifers across Louisiana. The data derived from this process are provided to LDEQ to aid in groundwater protection through nonpoint source pollution prevention, source water protection and remediation strategies for the State. It is also available to the public through LDEQ's website, email, and through the mail upon request. In addition, each well owner receives a copy of the field measures and laboratory analytical results from the sampling of their well.

For this reporting period, the ASSET Program monitored 176 wells in fourteen major freshwater aquifers throughout the state. Table 2 illustrates their stratigraphic occurrence while Table 3 lists these major aquifers. The number of wells assigned to each aquifer is based on its areal extent. Currently, the well density goal is approximately one well per 400 square miles. For example, an aquifer with an areal extent of 4,800 square miles would require a minimum of 12 wells to be assigned to it, 4,800/400 = 12. An effort is made to distribute sample locations (wells) evenly within the areal extent of each aquifer so that a representative sampling of the aquifer can be accomplished. Table 3 lists the areal extent of each aquifer in square miles, the number of wells currently assigned to it and the well density for each aquifer. Figures 1 - 3 more readily illustrate this by graphing the data found in Table 3. Also, the last row of Table 3 lists the total areal extent of all monitored aquifers, total number of wells sampled and the overall well density for the Program.

The sampling process is designed so that each well is monitored every three years. Following this design, all fourteen aquifers are monitored within the three-year period. The process repeats at the end of a three-year cycle. An effort is made to sample all assigned wells of the aquifer in a narrow period. Aquifers of small areal extent may be completed in a single event, whereas larger aquifers may require several events to complete. Table 4 lists the sample schedule by aquifer along with the month and number of wells sampled.

Each well is sampled for conventional parameters, inorganics, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and PCBs. In addition to the samples collected for analysis by a laboratory, field parameters (temperature, pH, specific conductance, total dissolved solids, and salinity) are measured and recorded at each well. Table 8 lists these field and laboratory parameters along with their reporting units. For specific lists of analytes, methods, and detection limits, please refer to the aquifer summaries appended to this document.

SUMMARY OF FINDINGS

INTRODUCTION

This report summarizes ASSET sampling that occurred from July 2015 through June 2018. One hundred seventy-six wells completed in fourteen different aquifers were monitored. Table 9 contains a listing of all the wells sampled, each well's owner, completed depth, use made of produced water, and the aquifers they produce from. In order to preserve privacy, "Private Owner" is listed for the well owner when a well is owned by a private citizen.

Table 5 lists the minimum, average and maximum sample results for the samples collected from each aquifer for field and conventional parameters. Table 6 lists the minimum, average and maximum sample results for the samples collected from each aquifer for inorganic parameters.

A brief summation of each aquifer's sample results and conclusions begins on the next page. Each summation includes the findings for hardness based on the scale below, and a statement on the general water quality of the aquifer based on the data derived from the wells sampled. The number of federal primary Maximum Contaminant Levels (MCLs), if any, and the number of secondary MCLs (SMCLs) that were exceeded are noted also.

For a detailed discussion of each aquifer's findings, see the aquifer summaries appended to this document. Each summary consists of a discussion of the aquifer's geology and hydrogeology, and an interpretation of the laboratory analyses. The lab analysis interpretation is accomplished by evaluating the general water quality and by comparing the historical data averages with the current data averages to detect changes in water quality over time. Initial water quality is evaluated by comparing individual parameters to their respective MCLs to assess the aquifer's use as a drinking water source, and is rated as good (no MCL exceedances), fair (no MCL exceedances in a drinking water well) or poor (one or more MCL exceedance in a drinking water well). Additionally a second water quality evaluation is made by taking into account whether or not Action Levels were exceeded, whether or not volatile organic compounds, semi-volatile organic compounds, pesticides or PCBs were detected, the number of SMCLs exceeded in relation to the number of wells sampled, and the average hardness value. This rating uses values of good, fair and poor.

It should be noted that all statements about hardness (as $CaCO_3$) in the aquifer sections and summary section are based on the following scale[1]:

Soft	< 50 milligrams per Liter (mg/L)
Moderately hard	50-150 mg/L
Hard	151-300 mg/L
Very hard	> 300 mg/L

A statewide summary of findings and summary statement can be found in the section following the Aquifer Summations section.

[1] Classification based on hardness scale from: Peavy, H. S. et al. *Environmental Engineering*. New York: McGraw-Hill, 1985.

AQUIFER SUMMATIONS

Sparta Aquifer

Eleven wells ranging in depth from 153 feet to 726 feet, with an average depth of 506 feet were sampled for this aquifer. Laboratory and field data show that of these 11 wells sampled during this reporting period for the Sparta aquifer, no primary MCL was exceeded, while 16 secondary standards were exceeded. The data also show that the groundwater produced from this aquifer is soft and is of good quality when considering short-term or long-term health risk guidelines. Water produced from this aquifer is of good quality when considering taste, odor, or appearance guidelines.

Carrizo-Wilcox Aquifer

Nine wells ranging in depth from 105 feet to 410 feet, with an average depth of 258 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Carrizo-Wilcox aquifer exceeded a primary MCL, with 13 exceedances of secondary standards. The data show that the groundwater produced from this aquifer is generally soft and is of good quality when considering short-term or long-term health risk guidelines. Water produced from this aquifer is also of good quality when considering taste, odor, or appearance guidelines.

Red River Alluvial Aquifer

Four wells ranging in depth from 47 feet to 89 feet, with an average depth of 68 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Red River Alluvial aquifer exceeded a primary MCL, while seven secondary standards were exceeded. The data also show that the groundwater produced from this aquifer is very hard and is of poor quality when considering taste, odor, or appearance guidelines, but is of good quality when considering short-term or long-term health risk guidelines.

Evangeline Aquifer

Twelve wells ranging in depth from 170 feet to 1,715 feet, with an average depth of 635 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Evangeline aquifer exceeded a primary MCL, while there were nine exceedances of secondary standards. The data show that the groundwater produced from this aquifer is soft and is of good quality when considering short-term or long-term health risk guidelines. Water produced from this aquifer is also of good quality when considering taste, odor, or appearance guidelines.

Catahoula Aquifer

Four wells ranging in depth from 352 feet to 910 feet, with an average depth of 635 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Catahoula aquifer exceeded a primary MCL, and only three secondary standards were exceeded. The data show that the groundwater produced from this aquifer is soft and is of good quality when considering short or long-term health risk guidelines. Also, the water produced from this aquifer is of good quality when considering taste, odor, or appearance guidelines.

North Louisiana Terrace Aquifer

Ten wells ranging in depth from 49 feet to 158 feet, with an average depth of 106 feet were sampled for this aquifer. Laboratory and field data show that the groundwater produced from this aquifer is moderately hard and is of fair to good quality when considering taste, odor, or appearance guidelines, with eight secondary standards exceeded. It is also of good quality when considering short-term or long-term health risk guidelines in that no well sampled for this time period exceeded a primary MCL.

Carnahan Bayou Aquifer

Nine wells ranging in depth from 143 feet to 2,036 feet, with an average depth of 882 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Carnahan Bayou aquifer exceeded a primary MCL, and only five secondary standards were exceeded. The data show that the groundwater produced from this aquifer is soft. Data also show that it is of good quality when considering short or long-term health risk guidelines, and is of good quality when considering taste, odor, or appearance guidelines.

Mississippi River Alluvial Aquifer

Twenty-two wells ranging in depth from 30 feet to 363 feet, with an average depth of 135 feet were sampled for this aquifer. Laboratory and field data show that the groundwater produced from the Mississippi River Alluvial aquifer is hard, and that the primary MCL for arsenic was exceeded in three of the 22 wells sampled.

Review of this data shows that this aquifer is of poor quality when considering taste, odor, or appearance guidelines, with 34 secondary standards being exceeded. It also shows that three wells exceeded the MCL for arsenic, making certain locations of this aquifer to be of poor quality when considering short-term or long-term health risk guidelines. It is important to note that there are certain localized areas of the Mississippi River Alluvial aquifer that exhibit good water quality characteristics, but it still exhibits the poorest overall water quality characteristics of any of the fourteen aquifers sampled.

Cockfield Aquifer

Thirteen wells ranging in depth from 80 feet to 445 feet, with an average depth of 257 feet were sampled for this aquifer. Laboratory and field data show that the groundwater produced from this aquifer is of good quality when considering short or long-term health risk guidelines given that no primary MCL was exceeded. The data also show that this aquifer is moderately hard and is of poor quality when considering taste, odor, or appearance guidelines, with 14 secondary standards exceeded in nine of the 13 wells sampled.

Chicot Aquifer

Twenty-two wells ranging in depth from 66 feet to 697 feet, with an average depth of 314 feet were sampled for this aquifer. Laboratory and field data show that no well exceeded a primary MCL and that the water produced from the Chicot aquifer is of good quality when considering short-term or long-term health risk guidelines. The data also show that the water produced from the Chicot aquifer is hard and is of poor quality when considering taste, odor, or appearance guidelines, with 37 secondary exceedances.

Williamson Creek Aquifer

Six wells ranging in depth from 248 feet to 1,657 feet, with an average depth of 693 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Williamson Creek aquifer exceeded a primary MCL and only five secondary standards were exceeded. Review of the data shows that the water produced from the Williamson Creek aquifer is moderately hard, is of good quality when considering short-term or long-term health risk guidelines, and is also of good quality when considering taste, odor, or appearance guidelines.

Chicot Equivalent Aquifer

Twenty-four wells ranging in depth from 90 feet to 775 feet, with an average depth of 354 feet were sampled for this aquifer. Laboratory and field data show that this aquifer is of good quality when considering short-term or long-term health risk guidelines given that no primary MCL was exceeded in any of the wells sampled. These findings also show that the water produced from this aquifer is soft and is of fair quality when considering taste, odor, or appearance guidelines, with 34 secondary standards exceeded in 18 of the 24 wells.

Evangeline Equivalent Aquifer

Fifteen wells ranging in depth from 185 feet to 2,004 feet, with an average depth of 976 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Evangeline Equivalent aquifer exceeded a primary MCL, whereas 10 secondary standards were exceeded. The data show that the water produced from the Evangeline Equivalent aquifer is soft and of good quality when considering short-term or long-term health risk guidelines, and is also of good quality when considering taste, odor, or appearance guidelines.

Jasper Equivalent Aquifer

Fifteen wells ranging in depth from 960 feet to 2,700 feet, with an average depth of 2,025 feet were sampled for this aquifer. Laboratory and field data show that no assigned well that was sampled during this reporting period for the Jasper Equivalent aquifer exceeded a primary MCL, while 12 secondary standards were exceeded. The data also show that the water produced from the Jasper Equivalent aquifer is soft and of good quality when considering short-term or long-term health risk guidelines, and is of good quality when considering taste, odor, or appearance guidelines.

STATEWIDE SUMMARY OF FINDINGS

COMBINED AQUIFER DATA AND HISTORICAL COMPARISON

Table 7 shows the minimum and maximum sample results from the fourteen aquifers sampled for field parameters, conventional parameters, and inorganics, as well as an average of all these sample results. A comparison of the current average values to historical average values of the reporting periods since fiscal year 2000 shows that there was only minor change for many of the parameters measured.

Table 1 highlights the minimum, maximum, and average statewide values for pH, TDS, hardness, chloride, iron, and nitrite-nitrate found in Table 7. The only statewide average listed in Table 1 that did not meet federal drinking water standards is the average for iron, which is not a health-related primary standard, but an aesthetic, non-enforceable, secondary standard. Figures 4 – 9 are the graphed representations of the average values for these same parameters on an aquifer by aquifer basis for the current reporting period, July 2015 – June 2018.

Charts 10 – 29 are the graphed representations of selected analytes resulting from the statewide average for each analyte for each three-year period from 2000 to 2018. Some are presented in logarithmic scale to more readily show the relationship between the graphed values and the limits associated with the analyte.

The following increasing or decreasing trend statements made below are based on an R-square value (slope) of 0.03 or greater. An R-square value of less than 0.03 is considered to have only a slight or no change. Of the 20 parameters represented in Charts 10 through 29, eight exhibited an increase in average concentration, seven exhibited a decrease in average concentration, and five exhibited little or no change in average concentration from 2000 to 2018. The eight parameters showing an increase in average concentration are alkalinity, ammonia, pH, salinity, specific conductance (field measure), total dissolved solids, total Kjeldahl nitrogen, and total phosphorus. The seven parameters showing decrease in average concentration are color, copper, nitrite-nitrate, sulfate, temperature, total suspended solids, and zinc. The five parameters showing little or no change in average concentration are barium, chloride, hardness, iron, and specific conductance (lab).

FEDERAL PRIMARY MCL EXCEEDANCES

A review of the laboratory and field data from all the aquifers sampled show that there were three primary MCL exceedances for arsenic, all in the Mississippi River Alluvial aquifer. For further discussion, refer to the Mississippi River Alluvial aquifer summary.

QUALITY RANKINGS

As stated previously, initial water quality is evaluated by comparing individual parameters to primary MCLs to assess the aquifer's use as a drinking water source, and is rated as good (no MCL exceedances), fair (no MCL exceedances in a drinking water well), or poor (one or more MCL exceedance in a drinking water well). Additionally, a second water quality evaluation is made by taking into account whether or not Action Levels were exceeded, whether or not volatile organic compounds, semi-volatile organic compounds, pesticides or PCBs were detected, the number of secondary standards exceeded in relation to the number of wells sampled, and the average hardness value. This rating uses values of good, fair and poor.

Using the above stated criteria against the data derived from the FY16 – FY18 sampling period it was determined, based on initial evaluation, that all but one of the aquifers monitored exhibit good water quality characteristics, while only one exhibits poor water quality characteristics. Secondary evaluation shows that eight are in the good range; two are in the fair range and four are considered poor.

Those aquifers considered by the ASSET Program to have Good water quality characteristics in both categories are: Carnahan Bayou, Carrizo-Wilcox, Catahoula, Evangeline, Evangeline Equivalent, Jasper Equivalent, Sparta, and Williamson Creek. The Chicot Equivalent and North Louisiana Terrace aquifers are considered to have Good water quality in the initial category and Fair water quality in the second category. Aquifers considered having Good initial water quality with Poor secondary water quality characteristics are the Chicot, Cockfield, and Red River Alluvial aquifers. The Mississippi River Alluvial aquifer is considered to have Poor initial and secondary water quality characteristics by this Program.

SUMMARY STATEMENT

The majority of the major freshwater aquifers of Louisiana that were sampled by the ASSET Program exhibited Good water quality characteristics when considering health based standards and Good water quality characteristics when considering non-health based standards. Just over half of the aquifers sampled exhibited Good water quality characteristics in both categories, while only the Mississippi River Alluvial aquifer exhibited Poor water quality characteristics in both categories.

Those aquifers with deeper average well depths typically exhibit the best water quality characteristics while those with shallower average well depths exhibit some of the poorest water quality characteristics. One notable exception to this is the North Louisiana Terrace aquifer that has an average well depth of just over 100 feet and exhibits similar water quality characteristics to those aquifers with much deeper average well depths.

Taking into account short-term and long-term health risk guidelines, along with the findings of the Aquifer Sampling and Assessment Program for the Fiscal Years 2000 to 2018, it is determined that the overall quality of the waters produced from Louisiana's principal freshwater aquifers is good, and that there is minimal change in the water quality characteristics of these aquifers.

TABLES AND CHARTS

Table 1 – Select Statewide Values

PARAMETER	MINIMUM	AVERAGE	MAXIMUM	DRINKING WATER LIMITS (PRIMARY OR SECONDARY)
pH (SU)	4.92	7.47	9.14	>6.5 - <8.5 Secondary
Chloride (mg/L))	1.6	54	632	250 Secondary
TDS (mg/L)	< DL	347	1,260	500 Secondary
Hardness (mg/L)	< DL	104	680	N/A
Iron (µg/L)	< DL	1601	16,100	300 Secondary
Nitrite-Nitrate (mg/L)	< DL	0.14	5.90	10 Primary

Table 2 – Hydrogeologic Column of Aquifers

SYSTEM	SERIES	Stratigraphic Unit		Hydrogeologic Unit							
				Northern Louisiana	Central and southwestern Louisiana			Southeastern Louisiana			
				Aquifer or confining unit	Aquifer system or confining unit	Aquifer or confining unit		Aquifer system or confining unit	Aquifer[1] or confining unit		
						Lake Charles area	Rice growing area		Baton Rouge area	St. Tammany, Tangipahoa, and Washington Parishes	New Orleans area and lower Mississippi River parishes
Quaternary	Pleistocene	Red River alluvial deposits Miss. River alluvial deposits Northern La. Terrace deposits Unnamed Pleistocene deposits		Red River alluvial aquifer or surficial confining unit Mississippi River alluvial aquifer or surficial confining unit Upland terrace aquifer or surficial confining unit	Chicot aquifer system or surficial confining unit	"200-foot" sand	Upper sand unit	Chicot Equivalent aquifer system[2] or surficial confining unit	Mississippi River alluvial aquifer or surficial confining unit Shallow sand "400-foot" sand "600-foot" sand	Upland terrace aquifer Upper Ponchatoula aquifer	Gramercy aquifer[3] Norco aquifer[3] Gonzales-New Orleans Aquifer[3] "1,200-foot" sand[3]
						"500-foot" sand "700-foot" sand	Lower sand unit				
Tertiary	Pliocene -----?----- Miocene	Fleming Formation	Blounts Creek Member	Pliocene-Miocene aquifers are absent in this area	Evangeline aquifer or surficial confining unit			Evangeline equivalent aquifer system[2] or surficial confining unit	"800-foot" sand "1,000-foot" sand "1,200-foot" sand "1,500-foot" sand "1,700-foot" sand	Lower Ponchatoula Aquifer Big Branch aquifer Kentwood aquifer Abita aquifer Covington aquifer Slidell aquifer	
		Fleming Formation	Castor Creek Member		Castor Creek confining unit			Unnamed confining unit	"2,000-foot" sand "2,400-foot" sand "2,800-foot" sand	Tchefuncte aquifer Hammond aquifer Amite aquifer Ramsay aquifer Franklinton aquifer	
		Fleming Formation	Williamson Creek Member Dough Hills Member Carnahan Bayou Member		Jasper aquifer system or surficial confining unit	Williamson Creek aquifer Dough Hills confining unit Carnahan Bayou aquifer		Jasper equivalent aquifer system[2] or surficial confining unit			
	-----?-----	Fleming Formation	Lena Member		Lena confining unit			Unnamed confining unit			
	Oligocene	Catahoula Formation			Catahoula aquifer			Catahoula equivalent aquifer system[2] or surficial confining unit			
		Vicksburg Group, undifferentiated		Vicksburg-Jackson confining unit	No fresh water occurs in older aquifers						
	Eocene	Jackson Group, undifferentiated									
		Claiborne Group	Cockfield Formation	Cockfield aquifer or surficial confining unit							
		Claiborne Group	Cook Mountain Formation	Cook Mountain aquifer or confining unit							
		Claiborne Group	Sparta Sand	Sparta aquifer or surficial confining unit							
		Claiborne Group	Cane River Formation	Cane River aquifer or confining unit							
		Claiborne Group	Carrizo Sand	Carrizo-Wilcox aquifer or surficial confining unit							
	Paleocene	Wilcox Group, undifferentiated									
		Midway Group, undifferentiated		Midway confining unit							

[1]Clay units separating aquifers in southeastern Louisiana are discontinuous

[2]Four aquifer systems as a group are called the Southern Hills aquifer system.

[3]Four aquifers as a group are called the New Orleans aquifer system.

Source: DOTD/USGS Water Resources Special Report No. 9, 1995

Table 3 - Aquifers Monitored

AQUIFER	WELL DEPTH RANGE (feet)	AVERAGE WELL DEPTH (feet)	NUMBER OF WELLS	AREAL EXTENT (sq.mi.)	WELL DENSITY (sq. mi./well)
Sparta	153 – 726	506	11	6,923	629
Carrizo-Wilcox	105 – 410	258	9	4,795	532
Red River Alluvial	47 – 89	68	4	1,387	346
Evangeline	170 – 1,715	635	12	4,547	378
Catahoula	352 – 910	635	4	2,590	518
North Louisiana Terrace	49 – 158	106	10	2,152	215
Carnahan Bayou	143 – 2,036	882	9	3,640	404
Mississippi River Alluvial	30 – 363	135	22	9,947	452
Cockfield	80 – 445	257	13	5,161	397
Chicot	66 – 697	314	22	9,949	452
Williamson Creek	540 – 1,657	693	6	3,243	540
Chicot Equivalent	90 – 775	354	24	6,800	283
Evangeline Equivalent	185 – 2,004	976	15	6,252	416
Jasper Equivalent	960 – 2,700	2,025	15	6,051	403
STATEWIDE	**30ft – 2,700ft**	**558ft**	**176 wells**	**73,437sq.mi.**	**417 sq.mi./well**

Table 4 – Aquifers and Number of Wells Sampled by Month

AQUIFER	MONTH(S) SAMPLED	NUMBER OF WELLS SAMPLED	TOTAL NUMBER OF WELLS SAMPLED PER AQUIFER
State Fiscal Year 2016 (July 2015 – June 2016)			
Sparta	August	6	11
	September	4	
	March	1	
Carrizo-Wilcox	November	2	9
	January	5	
	February	2	
Red River Alluvial	November	1	4
	January	2	
	February	1	
Evangeline	February	6	12
	March	6	
Catahoula	May	2	4
	June	1	
	September	1	
North Louisiana Terrace	May	4	10
	July	1	
	August	4	
	October	1	
State Fiscal Year 2017 (July 2016 – June 2017)			
Carnahan Bayou	May	1	9
	June	5	
	July	3	
Mississippi River Alluvial	October	8	22
	November	8	
	December	4	
	February	2	
Cockfield	October	4	13
	November	5	
	December	1	
	January	3	
Chicot	April	2	22
	May	7	
	June	13	

AQUIFER	MONTH(S) SAMPLED	NUMBER OF WELLS SAMPLED	TOTAL NUMBER OF WELLS SAMPLED PER AQUIFER
State Fiscal Year 2015 (July 2014 – June 2015)			
Williamson Creek	August	6	6
Chicot Equivalent	October	2	24
	November	3	
	February	4	
	March	4	
	April	1	
	May	1	
	June	9	
Evangeline Equivalent	October	5	15
	November	2	
	March	1	
	April	2	
	Mary	1	
	June	4	
Jasper Equivalent	October	3	15
	November	4	
	April	4	
	May	2	
	June	2	

Table 5 – Conventional Parameters Statistics by Aquifer

	FIELD PARAMETERS					LABORATORY PARAMETERS												
	pH SU	Sal. ppt	Sp. Cond. mmhos/cm	TDS g/L	Temp. Deg. C	Alk. mg/L	Ammonia mg/L	Cl mg/L	Color PCU	Hard mg/L	Nitrite-Nitrate (as N) mg/L	TKN mg/L	Tot. P mg/L	Sp. Cond. umhos/cm	SO4 mg/L	TDS mg/L	TSS mg/L	Turb NTU
	LABORATORY DETECTION LIMITS →					2/5	0.1	1	1/5	1/5	0.01/0.05	0.1	0.05	1/10	0.25/1	10	4	0.1/0.3/0.5
SPARTA AQUIFER																		
Min	6.41	0.05	0.023	0.024	18.79	< DL	< DL	1.6	< DL	< DL	< DL	0.20	< DL	< DL	< DL	40	< DL	< DL
Avg	7.78	0.31	0.680	0.412	21.27	186	0.12	62.9	20	21	0.12	1.02	0.24	590	8.8	325	< DL	0.96
Max	8.93	0.92	1.990	1.183	24.04	516	0.96	396.0	62	80	0.96	3.20	0.71	1780	29.6	911	5	3.40
CARRIZO-WILCOX AQUIFER																		
Min	5.77	0.23	0.476	0.310	16.45	16	< DL	18.5	< DL	< DL	< DL	0.20	< DL	270	< DL	250	< DL	< DL
Avg	8.08	0.47	0.942	0.613	18.44	257	0.35	66.4	14	36	0.11	0.82	0.27	742	38.6	511	3.7	10.10
Max	8.79	0.79	1.555	1.011	20.69	618	0.84	179.0	50	150	0.44	1.60	0.90	1410	314.0	945	10	49.40
RED RIVER ALLUVIAL AQUIFER																		
Min	6.72	0.47	0.954	0.620	16.79	371	< DL	7.8	10	320	< DL	0.56	0.37	698	< DL	460	4	43.8
Avg	6.84	0.50	1.013	0.659	17.32	483	< DL	65.5	11	430	< DL	1.40	0.73	934	51.0	633	20	126.4
Max	7.09	0.57	1.132	0.736	18.37	674	1.70	125.0	15	640	0.06	2.20	1.20	1360	180.0	960	30	258.0
EVANGELINE AQUIFER																		
Min	6.50	0.02	0.046	0.030	13.73	12	< DL	3.7	< DL	< DL	< DL	0.19	< DL	36	< DL	0	< DL	0.15
Avg	7.59	0.18	0.378	0.246	19.14	157	0.26	22.0	35	29	< DL	0.40	0.14	309	32.5	219	3	1.29
Max	9.10	0.62	1.232	0.801	24.25	407	0.68	117.0	11	58	0.07	0.84	0.33	1250	345.0	730	6	6.70
CATAHOULA AQUIFER																		
Min	7.34	0.10	0.220	0.143	17.13	98	0.18	3.7	< DL	< DL	< DL	0.33	0.06	224	3.7	225	< DL	0.60
Avg	7.74	0.14	0.293	0.190	18.64	117	0.29	10.9	10	7	< DL	0.51	0.34	297	9.0	305	< DL	2.10
Max	8.07	0.16	0.325	0.211	19.39	129	0.36	19.7	30	14	< DL	0.72	0.90	337	18.0	445	< DL	3.60
NORTH LOUISIANA TERRACE AQUIFER																		
Min	5.73	0.03	0.059	0.038	11.77	10	< DL	3.8	< DL	16	< DL	< DL	< DL	51	< DL	20	< DL	0.22
Avg	6.68	0.20	0.399	0.259	14.54	98	0.13	47.8	5	111	0.69	0.29	0.19	214	9.1	221	< DL	5.41
Max	7.40	0.82	1.621	1.054	16.71	277	0.37	322.0	10	360	3.90	1.10	0.65	457	37.3	896	8	33.70
CARNAHAN BAYOU AQUIFER																		
Min	6.31	0.05	0.101	0.066	14.23	20	< DL	6.3	< DL	< DL	< DL	0.13	< DL	96	< DL	80	< DL	0.24
Avg	7.61	0.17	0.356	0.231	21.31	150	0.32	12.6	7	40	< DL	0.46	0.22	356	12.0	255	< DL	1.58
Max	8.29	0.24	0.491	0.319	25.64	203	0.63	19.8	15	92	0.13	0.74	0.47	489	38.7	350	< DL	6.90

Table 5 (Cont'd) – Conventional Parameters Statistics by Aquifer

	FIELD PARAMETERS					LABORATORY PARAMETERS												
	pH SU	Sal. ppt	Sp. Cond. mmhos/cm	TDS g/L	Temp. Deg. C	Alk. mg/L	Ammonia mg/L	Cl mg/L	Color PCU	Hard mg/L	Nitrite-Nitrate (as N) mg/L	TKN mg/L	Tot. P mg/L	Sp. Cond. umhos/cm	SO4 mg/L	TDS mg/L	TSS mg/L	Turb NTU
	LABORATORY DETECTION LIMITS →					2/5	0.1	1	1/5	1/5	0.01/0.05	0.1	0.05	1/10	0.25/1	10	4	0.1/0.3/0.5
MISSISSIPPI RIVER ALLUVIAL AQUIFER																		
Min	6.41	0.10	0.217	0.141	8.62	39	< DL	9.5	< DL	84	< DL	< DL	< DL	219	< DL	185	< DL	0.2
Avg	7.03	0.39	0.786	0.511	11.40	355	0.76	51.8	9	334	0.54	1.04	0.57	741	16.8	472	16	58.2
Max	7.73	0.68	1.351	0.878	17.56	1000	3.80	257.0	30	680	5.90	4.10	1.30	1430	193.0	835	44	177.0
COCKFIELD AQUIFER																		
Min	5.94	0.10	0.201	0.131	9.41	79	0.15	3.8	< DL	< DL	< DL	0.14	< DL	188	< DL	140	< DL	0.4
Avg	7.47	0.36	0.720	0.468	12.32	302	0.57	51.5	13	114	< DL	0.63	1.23	648	26.9	457	< DL	6.0
Max	8.85	0.70	1.381	0.898	17.26	465	1.20	237.0	45	438	0.14	1.30	12.40	1450	176.0	780	15	30.5
CHICOT AQUIFER																		
Min	5.35	0.01	0.028	0.018	17.45	6	< DL	3.3	< DL	< DL	< DL	< DL	< DL	27	< DL	50	< DL	0.3
Avg	7.02	0.30	0.613	0.399	19.16	235	0.52	69.1	21	161	< DL	0.55	0.18	600	1.6	355	< DL	8.5
Max	7.77	0.89	1.750	1.138	21.27	472	2.20	366.0	55	316	0.28	2.00	0.40	1580	12.6	905	7	32.2
WILLIAMSON CREEK																		
Min	6.20	0.12	0.261	0.170	16.23	80	< DL	7.8	< DL	10	< DL	0.28	< DL	204	1.9	65	< DL	0.23
Avg	7.26	0.20	0.423	0.275	20.78	190	0.26	41.8	6	51	0.05	0.55	0.17	416	4.6	241	< DL	0.62
Max	8.32	0.30	0.610	0.397	27.91	500	0.51	90.1	22	138	0.23	0.78	0.29	641	10.1	360	< DL	1.10
CHICOT EQUIVALENT AQUIFER																		
Min	4.92	0.01	0.002	0.016	14.38	< DL	< DL	2.4	< DL	< DL	< DL	< DL	< DL	23	< DL	< DL	< DL	< DL
Avg	7.46	0.30	0.582	0.392	18.88	144	0.53	117.1	18	46	< DL	0.73	2.14	652	2.4	388	< DL	1.50
Max	8.86	0.99	1.942	1.262	25.56	420	2.40	632.0	146	192	0.24	2.80	55.10	2,320	10.7	1260	5	14.50
EVANGELINE EQUIVALENT AQUIFER																		
Min	6.43	0.02	0.055	0.035	15.91	18	< DL	2.4	< DL	< DL	< DL	0.13	< DL	53	< DL	35	< DL	0.10
Avg	8.02	0.12	0.251	0.163	20.53	116	0.15	5.6	< DL	9	0.08	0.72	0.24	261	7.6	186	< DL	0.56
Max	8.99	0.23	0.470	0.306	25.37	225	0.52	16.5	19	32	0.87	4.80	0.58	458	12.1	310	7	2.10
JASPER EQUIVALENT AQUIFER																		
Min	7.23	0.09	0.186	0.121	17.96	81	< DL	2.4	< DL	< DL	< DL	0.13	0.15	195	5.1	115	< DL	0.15
Avg	8.20	0.20	0.416	0.270	25.22	159	0.21	33.7	9	< DL	< DL	0.66	0.36	419	8.1	263	< DL	1.02
Max	9.14	0.55	1.129	0.734	34.47	348	0.58	270.0	40	20	0.14	1.60	0.80	1070	11.0	555	6	7.80

Table 6 – Inorganic Parameters Statistics by Aquifer

ANALYTE	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Cadmium µg/L	Chromium µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Mercury µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Thallium µg/L	Zinc µg/L
Laboratory Detection Limits	1	1	1	0.5	1	1	2/3	50/100	1	0.2	1/2	1/5	0.5/1	0.5/2	5
SPARTA AQUIFER															
Min	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	70	< DL	< DL	< DL	2.5	578	< DL	< DL	< DL	< DL	< DL	< DL	7.5
Max	< DL	< DL	232	< DL	< DL	< DL	4.9	3,050	1.1	< DL	3.3	7.3	< DL	< DL	26.3
CARRIZO-WILCOX AQUIFER															
Min	< DL	< DL	11	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	76	< DL	< DL	< DL	< DL	993	1.0	< DL	< DL	< DL	< DL	< DL	341
Max	< DL	< DL	182	0.7	< DL	5.26	7.9	3890	3.7	< DL	5.8	< DL	< DL	< DL	1850
RED RIVER ALLUVIAL AQUIFER															
Min	< DL	< DL	143	< DL	< DL	< DL	< DL	4150	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	403	< DL	< DL	1.1	7.4	8950	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Max	< DL	7.1	559	< DL	< DL	3.1	21.9	13700	1.1	< DL	< DL	< DL	< DL	< DL	< DL
EVANGELINE AQUIFER															
Min	< DL	< DL	9	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	1.0	82	< DL	< DL	< DL	5.1	406	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Max	< DL	4.8	218	< DL	< DL	< DL	15.7	2020	1.2	< DL	< DL	< DL	< DL	< DL	14.4
CATAHOULA AQUIFER															
Min	< DL	< DL	1	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	6	< DL	< DL	< DL	< DL	919	< DL	< DL	< DL	< DL	< DL	< DL	6.6
Max	< DL	< DL	14	< DL	< DL	< DL	4.9	3670	< DL	< DL	< DL	< DL	< DL	< DL	14.8
NORTH LOUISIANA TERRACE AQUIFER															
Min	< DL	< DL	44	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	154	< DL	< DL	< DL	6.2	737	2.5	< DL	1.2	< DL	< DL	< DL	6.2
Max	< DL	2.1	477	< DL	< DL	1.8	17.4	5160	17.5	< DL	5.2	< DL	< DL	< DL	26.2
CARNAHAN BAYOU AQUIFER															
Min	< DL	< DL	1.4	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	55	< DL	< DL	0.5	10.7	293	1.3	< DL	< DL	< DL	< DL	< DL	< DL
Max	< DL	1.4	289	< DL	< DL	1.0	75.6	1840	8.2	< DL	< DL	< DL	< DL	< DL	14.8

Table 6 (Cont'd) – Inorganic Parameters Statistics by Aquifer

ANALYTE	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Cadmium µg/L	Chromium µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Mercury µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Thallium µg/L	Zinc µg/L
Laboratory Detection Limits	1	1	1	0.5	1	1	2/3	50/100	1	0.2	1/2	1/5	0.5/1	0.5/2	5
MISSISSIPPI RIVER ALLUVIAL AQUIFER															
Min	< DL	< DL	26	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	6.0	453	< DL	< DL	< DL	2.5	6679	< DL	< DL	< DL	< DL	< DL	< DL	13.4
Max	< DL	64.3	1330	< DL	< DL	4.5	12.3	16100	1.6	< DL	1.9	< DL	< DL	< DL	79.9
COCKFIELD AQUIFER															
Min	< DL	< DL	5	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	126	< DL	< DL	1.3	9.3	1047	< DL	< DL	< DL	< DL	< DL	< DL	11.2
Max	< DL	5.4	352	< DL	< DL	10.1	103.0	3510	3.9	< DL	1.8	1.9	< DL	< DL	72.8
CHICOT AQUIFER															
Min	< DL	< DL	28	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	1.0	349	< DL	< DL	< DL	3.7	1134	< DL	< DL	< DL	< DL	< DL	< DL	44.0
Max	< DL	7.3	938	< DL	< DL	1.0	36.2	3480	3.0	< DL	1.6	< DL	< DL	< DL	385.0
WILLIAMSON CREEK AQUIFER															
Min	< DL	< DL	35	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	95	< DL	< DL	< DL	< DL	328	< DL	< DL	< DL	< DL	< DL	< DL	148.0
Max	< DL	1.2	319	< DL	< DL	< DL	< DL	904	1.7	< DL	3.3	7.3	< DL	< DL	1020.0
CHICOT EQUIVALENT AQUIFER															
Min	< DL	< DL	13	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	136	< DL	< DL	< DL	12.5	499	1.3	< DL	< DL	< DL	< DL	< DL	34.0
Max	< DL	7.8	583	< DL	< DL	1.2	163.0	6430	11.5	< DL	1.6	< DL	< DL	< DL	561.0
EVANGELINE EQUIVALENT AQUIFER															
Min	< DL	< DL	2	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	38	< DL	< DL	2.3	4.6	167	< DL	< DL	2.1	< DL	< DL	< DL	21.8
Max	< DL	3.4	86	< DL	< DL	28.2	36.4	1,760	1.8	< DL	20.8	< DL	< DL	< DL	264.0
JASPER EQUIVALENT AQUIFER															
Min	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	< DL	< DL	16	< DL	< DL	< DL	13.5	107	1.8	< DL	< DL	< DL	< DL	< DL	< DL
Max	1.2	< DL	70	< DL	< DL	< DL	122.0	525	13.8	< DL	1.2	< DL	< DL	< DL	7.8

Table 7 – Combined Aquifer Statistics

CONVENTIOAL PARAMETERS	FIELD PARAMETERS					LABORATORY PARAMETERS												
	pH SU	**Sal. ppt**	**Sp. Cond. mmhos/cm**	**TDS g/L**	**Temp. Deg. C**	**Alk. mg/L**	**NH3 mg/L**	**Cl mg/L**	**Color PCU**	**Hard mg/L**	**Nitrite-Nitrate (as N) mg/L**	**TKN mg/L**	**Tot. P mg/L**	**Sp. Cond. umhos/cm**	**SO4 mg/L**	**TDS mg/L**	**TSS mg/L**	**Turb NTU**
	LABORATORY DETECTION LIMITS →					2/5	0.1	1	1/5	1/5	0.01 0.05	0.1	0.05	1/10	0.25/1	10	4	0.1 0.3 0.5
COMBINED AQUIFER DATA																		
Min	4.92	0.01	0.002	0.016	8.62	< DL	< DL	1.6	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Avg	7.47	0.28	0.570	0.370	18.24	210	0.39	53.6	14	104.4	0.14	0.70	0.61	534	13.4	347	136	13.6
Max	9.14	0.99	1.990	1.262	34.47	1000	3.80	632.0	146	680	5.90	4.80	55.10	2320	345.0	1260	44	258.0

	INORGANIC PARAMETERS														
DETECTION LIMITS	**Antimony µg/L**	**Arsenic µg/L**	**Barium µg/L**	**Beryllium µg/L**	**Cadmium µg/L**	**Chromium µg/L**	**Copper µg/L**	**Iron µg/L**	**Lead µg/L**	**Mercury µg/L**	**Nickel µg/L**	**Selenium µg/L**	**Silver µg/L**	**Thallium µg/L**	**Zinc µg/L**
→	1	1	1	0.5	1	1	2/3	50/100	1	0.2	1/2	1/15	0.5/1	0.5/1	5
COMBINED AQUIFER DATA															
Min	<DL	<DL	<DL	<DL	<DL	<DL	<DL	< DL	<DL	<DL	<DL	<DL	<DL	<DL	<DL
Avg	<DL	<DL	172	<DL	<DL	<DL	6.4	1601	<DL	<DL	<DL	<DL	<DL	<DL	38.3
Max	1.2	64.3	1330	0.7	<DL	28.2	163.0	16,100	17.5	<DL	20.8	7.3	<DL	<DL	1850

Table 8 – Parameter List

PARAMETER GROUP	LIST OF ANALYTES	REPORTING UNITS
FIELD	pH	Standard Units (SU)
	Temperature	Degrees C.
	Specific Conductance	mmhos/cm
	Total Dissolved Solids	g/L
	Salinity	parts per thousand (ppt)
CONVENTIONALS	Alkalinity	mg/L
	Chloride	mg/L
	Color	PCU
	Specific Conductance	µmhos/cm
	Sulfate	mg/L
	Total Dissolved Solids	mg/L
	Total Suspended Solids	mg/L
	Turbidity	NTU
	Ammonia (NH_3) – as N	mg/L
	Hardness – as $CaCO_3$	mg/L
	Nitrite-Nitrate (NO_2-NO_3) – as N	mg/L
	Total Kjeldahl Nitrogen	mg/L
	Total Phosphorus	mg/L
INORGANICS	Antimony	µg/L
	Arsenic	µg/L
	Barium	µg/L
	Beryllium	µg/L
	Cadmium	µg/L
	Chromium	µg/L
	Copper	µg/L
	Iron	µg/L
	Lead	µg/L
	Mercury	µg/L
	Nickel	µg/L
	Selenium	µg/L
	Silver	µg/L
	Thallium	µg/L
	Zinc	µg/L
VOLATILE ORGANIC COMPOUNDS	1,1,1-Trichloroethane	µg/L
	1,1,2,2-Tetrachloroethane	µg/L
	1,1,2-Trichloroethane	µg/L
	1,1-Dichloroethane	µg/L
	1,1-Dichloroethene	µg/L

PARAMETER GROUP	LIST OF ANALYTES	REPORTING UNITS
VOLATILE ORGANIC COMPOUNDS (Cont'd)	1,2-Dichorobenzene	µg/L
	1,2-Dichloroethane	µg/L
	1,2-Dichloropropane	µg/L
	1,3-Dichorobenzene	µg/L
	1,4-Dichorobenzene	µg/L
	Benzene	µg/L
	Bromodichloromethane	µg/L
	Bromoform	µg/L
	Bromomethane	µg/L
	Carbon Tetrachloride	µg/L
	Chlorobenzene	µg/L
	Chloroethane	µg/L
	Chloroform	µg/L
	Chloromethane	µg/L
	Cis-1,3-Dichloropropene	µg/L
	Dibromochloromethane	µg/L
	Ethyl Benzene	µg/L
	Methylene Chloride	µg/L
	O-Xylene (1,2-Dimethylbenzene)	µg/L
	Styrene	µg/L
	Tert-Butyl Methyl Ether	µg/L
	Tetrachloroethylene (PCE)	µg/L
	Toluene	µg/L
	Trans-1,2-Dichlroethene	µg/L
	Trans-1,3-Dichloropropene	µg/L
	Trichloroethylene (TCE)	µg/L
	Trichlorofluoromethane (Freon-11)	µg/L
	Vinyl Chloride	µg/L
	Xylenes, M & P	µg/L
SEMI-VOLATILE ORGANIC COMPOUNDS	1,2,4-Trichlorbenzene	µg/L
	2,4,6-Trichorophenol	µg/L
	2,4-Dichlorphenol	µg/L
	2,4-Dinitrophenol	µg/L
	2,4-Dinitrotoluene	µg/L
	2-Chloronaphthalene	µg/L
	2-Chlorophenol	µg/L
	2-Nitrophenol	µg/L
	3,3'-Dichlorobenzidine	µg/L
	4,6-Dinitro-2-Methylphenol	µg/L
	4-Bromophenyl Phenyl Ether	µg/L
	4-Chloro-3-Methylphenol	µg/L

PARAMETER GROUP	LIST OF ANALYTES	REPORTING UNITS
SEMI-VOLATILE ORGANIC COMPOUNDS (Cont'd)	4-Nitrophenol	µg/L
	Acenaphthene	µg/L
	Acenaphthylene	µg/L
	Anthracene	µg/L
	Benzidine	µg/L
	Benzo(A)Anthracene	µg/L
	Benzo(A)Pyrene	µg/L
	Benzo(B)Fluoranthene	µg/L
	Benzo(G,H,I)Perylene	µg/L
	Benzo(K)Fluoranthene	µg/L
	Benzyl Butyl Phthalate	µg/L
	Bis(2-Chloroethoxy) Methane	µg/L
	Bis(2-Chloroethyl) Ether (2-Chloroethyl Ether)	µg/L
	Bis(2-Ethylethoxy) Phthalate	µg/L
	Chrysene	µg/L
	Dibenz(A,H)Anthracene	µg/L
	Diethyl Phthalate	µg/L
	Dimethyl Phthalate	µg/L
	Di-N-Butyl Phthalate	µg/L
	Di-N-Octyl Phthalate	µg/L
	Fluoranthene	µg/L
	Fluorene	µg/L
	Hexachlorobenzene	µg/L
	Hexachlorobutadiene	µg/L
	Hexachlorocyclopentadiene	µg/L
	Hexachloroethane	µg/L
	Indeno(1,2,3-C,D)Pyrene	µg/L
	Isophorone	µg/L
	Naphthalene	µg/L
	Nitrobenzene	µg/L
	N-Nitrosodimethylamine	µg/L
	N-Nitrosodi-N-Propylamine	µg/L
	N-Nitrosodiphenylamine	µg/L
	Pentachlorophenol	µg/L
	Phenanthrene	µg/L
	Phenol	µg/L
	Pyrene	µg/L
PESTICIDES	Aldrin	µg/L
	Alpha BHC (Alpha Hexachlorocyclohexane)	µg/L
	Alpha Endosulfan	µg/L
	Alpha Chlorodane	µg/L

PARAMETER GROUP	LIST OF ANALYTES	REPORTING UNITS
PESTICIDES (Cont'd)	Beta BHC (Beta Hexachlorocyclohexane)	µg/L
	Beta Endosulfan	µg/L
	Chlorodane	µg/L
	Delta BHC (Delta Hexachlorocyclohexane)	µg/L
	Dieldrin	µg/L
	Endolufan sulfate	µg/L
	Endrin	µg/L
	Endrin Aldehyde	µg/L
	Endrin Keytone	µg/L
	Gamma Chlorodane	µg/L
	Heptachlor	µg/L
	Heptachlor Epoxide	µg/L
	Methoxychlor	µg/L
	P,P'-DDD	µg/L
	P,P'-DDE	µg/L
	P,P'-DDT	µg/L
	Toxaphene	µg/L
PCBS	PCB-1016 (Arochlor 1016)	µg/L
	PCB-1221 (Arochlor 1221)	µg/L
	PCB-1232 (Arochlor 1232)	µg/L
	PCB-1242 (Arochlor 1242)	µg/L
	PCB-1248 (Arochlor 1248)	µg/L
	PCB-1254 (Arochlor 1254)	µg/L
	PCB-1260 (Arochlor 1260)	µg/L

Table 9 – Wells Sampled

WELL NUMBER	OWNER	DEPTH (FEET)	WELL USE	AQUIFER/SYSTEM
BI-192	Lucky Water System	153	Public Supply	Sparta
BI-212	RockTenn	490	Industrial	Sparta
CA-105	Vixen Water System	525	Public Supply	Sparta
L-31	City of Ruston	636	Public Supply	Sparta
L-32	City of Ruston	652	Public Supply	Sparta
OU-635	Graphic Packaging International, Inc.	726	Industrial	Sparta
SA-570	Boise Cascade, Florien	545	Industrial	Sparta
UN-205	D'Arbonne Water System	725	Public Supply	Sparta
W-237	Town of Winnfield	430	Public Supply	Sparta
WB-241	Town of Springhill	408	Public Supply	Sparta
WB-269	City of Minden	280	Public Supply	Sparta
DS-5297Z	Private Owner	170	Domestic	Carrizo-Wilcox
DS-5996Z	Private Owner	360	Domestic	Carrizo-Wilcox
CD-630	Private Owner	240	Irrigation	Carrizo-Wilcox
CD-639	SI Precast	200	Industrial	Carrizo-Wilcox
CD-642	Louisiana Lift	210	Industrial	Carrizo-Wilcox
BO-274	Village Water System	395	Public Supply	Carrizo-Wilcox
CD-453	City of Vivian	228	Public Supply	Carrizo-Wilcox
BI-236	Alberta Water System	410	Public Supply	Carrizo-Wilcox
RR-5070Z	Private Owner	105	Domestic	Carrizo-Wilcox
CD-859	East Ridge Country Club	58	Irrigation	Red River Alluvial
CD-11849Z	Private Owner	47	Domestic	Red River Alluvial
NA-5404Z	Seven C's Ranch	76	Domestic	Red River Alluvial
RR-345	Bundrick Farms	89	Irrigation	Red River Alluvial
AL-120	City of Oakdale	910	Public Supply	Evangeline
AL-363	West Allen Parish Water District	1715	Public Supply	Evangeline
AL-373	Town of Oberlin	747	Public Supply	Evangeline
AL-391	Fairview Water System	800	Public Supply	Evangeline
AV-441	Town of Evergreen	319	Public Supply	Evangeline
BE-410	PCA, DeRidder	474	Industrial	Evangeline
BE-512	Singer Water District	918	Public Supply	Evangeline
CU-1362	LAWCO	635	Public Supply	Evangeline
EV-858	Savoy Swords Water System	472	Public Supply	Evangeline
R-1350	Private Owner	180	Irrigation	Evangeline
V-668	LDWF/Fort Polk WMA HQ	280	Other	Evangeline
V-5065Z	Private Owner	170	Domestic	Evangeline

WELL NUMBER	OWNER	DEPTH (FEET)	WELL USE	AQUIFER/SYSTEM
CT-118	City of Jonesville	762	Public Supply	Catahoula
LS-278	Rogers Water System	352	Public Supply	Catahoula
R-1311	Lena Water System, Inc.	514	Public Supply	Catahoula
V-434	Town of Anacoco	910	Public Supply	Catahoula
BO-434	Red Chute Utilities	94	Public Supply	North Louisiana Terrace
BO-578	Village Water System	85	Public Supply	North Louisiana Terrace
BO-7896Z	Private Owner	96	Domestic	North Louisiana Terrace
G-342	Vanguard Synfuels, LLC	49	Industrial	North Louisiana Terrace
G-432	Central Grant Water System	158	Public Supply	North Louisiana Terrace
LS-264	City of Jena	105	Public Supply	North Louisiana Terrace
MO-124	Texas Gas	133	Public Supply	North Louisiana Terrace
MO-364	People Water Service	154	Public Supply	North Louisiana Terrace
OU-5524Z	Private Owner	95	Domestic	North Louisiana Terrace
RR-254	East Cross Water System	93	Public Supply	North Louisiana Terrace
BE-405	PCA, DeRidder	1016	Industrial	Carnahan Bayou
CO-47	City of Vidalia	310	Public Supply	Carnahan Bayou
G-5178Z	Private Owner	165	Domestic	Carnahan Bayou
R-1001	Gardner Water System	1080	Public Supply	Carnahan Bayou
R-1172	Cleco-Rodemacher	298	Power Generation	Carnahan Bayou
R-1210	City of Alexandria	2036	Public Supply	Carnahan Bayou
V-496	U.S. Army/Fort Polk	1415	Public Supply	Carnahan Bayou
V-566	Alco-Hutton VFD	143	Public Supply	Carnahan Bayou
V-656	East Central Vernon Water System	1477	Public Supply	Carnahan Bayou
AV-126	Hamburg Mills	155	Domestic	Mississippi River Alluvial
AV-462	La Delta Plantation	110	Irrigation	Mississippi River Alluvial
AV-5135Z	Private Owner	110	Domestic	Mississippi River Alluvial
CO-YAKEY	Private Owner	150	Domestic	Mississippi River Alluvial
CT-489	Louisiana Delta Plantation	144	Irrigation	Mississippi River Alluvial
CT-DENNIS	Private Owner	30	Domestic	Mississippi River Alluvial
EB-1299	La State University	363	Irrigation	Mississippi River Alluvial
EC-370	Hollybrook Land	119	Irrigation	Mississippi River Alluvial
FR-1358	Macon Ridge Research Station	60	Irrigation	Mississippi River Alluvial
IB-363	Syngenta Crop Protection, Inc.	225	Industrial	Mississippi River Alluvial
IB-COM	Private Owner	185	Domestic	Mississippi River Alluvial
MA-248	Tallulah Water Service	153	Public Supply	Mississippi River Alluvial
MO-871	Private Owner	80	Irrigation	Mississippi River Alluvial
PC-5515Z	Private Owner	156	Domestic	Mississippi River Alluvial
RI-469	Liddieville Water System	90	Public Supply	Mississippi River Alluvial

WELL NUMBER	OWNER	DEPTH (FEET)	WELL USE	AQUIFER/SYSTEM
RI-730	Start Water System	101	Public Supply	Mississippi River Alluvial
RI-RAYVIL	Rayville Water Department	230	Public Supply	Mississippi River Alluvial
SMN-33	LDOTD/Lafayette District	125	Public Supply	Mississippi River Alluvial
TS-61	Town of St. Joseph	140	Public Supply	Mississippi River Alluvial
TS-FORTENB	Private Owner	33	Domestic	Mississippi River Alluvial
WC-91	New Carroll Water Association	115	Public Supply	Mississippi River Alluvial
WC-527	Private Owner	85	Irrigation	Mississippi River Alluvial
CA-35	City of Columbia	298	Public Supply	Cockfield
EC-233	Town of Lake Providence	371	Public Supply	Cockfield
MO-479	Bayou Bonne Idee Water System	258	Public Supply	Cockfield
NA-5449Z	Private Owner	170	Domestic	Cockfield
OU-FRITH	Private Owner	80	Domestic	Cockfield
RI-127	Delhi Water Works	416	Public Supply	Cockfield
RI-450	River Road Waterworks	283	Public Supply	Cockfield
SA-BYRD	Private Owner	150	Domestic	Cockfield
UN-5332Z	Private Owner	160	Irrigation	Cockfield
W-192	Red Hill Water System	210	Public Supply	Cockfield
W-198	Atlanta Water System	445	Public Supply	Cockfield
WC-187	New Carroll Water System	110	Public Supply	Cockfield
WC-487	Town of Oak Grove	396	Public Supply	Cockfield
JD-862	City Of Welsh	697	Public Supply	Chicot
CN-92	USGS	443	Observation	Chicot
R-6947Z	Private Owner	110	Domestic	Chicot
CU-10192Z	Axiall	230	Recovery	Chicot
SMN-109	USGS	375	Observation	Chicot
CU-1366	City Of Lake Charles	685	Public Supply	Chicot
CU-1471	Axiall	525	Industrial	Chicot
LF-572	Lafayette Utilities System	570	Public Supply	Chicot
BE-378	Transcontinental Gas Pipeline	172	Industrial	Chicot
BE-412	PCA, DeRidder	202	Industrial	Chicot
BE-488	Singer Water District	262	Public Supply	Chicot
I-7312Z	Breaux Electric	180	Public Supply	Chicot
SL-7152Z	Private Owner	180	Domestic	Chicot
AC-539	City Of Rayne	251	Public Supply	Chicot
AC-8316Z	Private Owner	165	Domestic	Chicot
CU-862	Citgo Petroleum Corporation	560	Industrial	Chicot
V-535	Marlow Fire Station	66	Public Supply	Chicot
VE-151	Vermilion Oaks Country Club	250	Irrigation	Chicot

WELL NUMBER	OWNER	DEPTH (FEET)	WELL USE	AQUIFER/SYSTEM
VE-862	Town of Gueydan	249	Public Supply	Chicot
VE-882	City of Kaplan	279	Public Supply	Chicot
EV-673	City Of Mamou	247	Public Supply	Chicot
VE-VIATOR	Private Owner	200	Domestic	Chicot
BE-407	PCA, DeRidder	1657	Industrial	Williamson Creek
CO-163	USACE	513	Public Supply	Williamson Creek
R-932	City of Alexandria	466	Public Supply	Williamson Creek
R-1099	Kolin-Ruby Wise	355	Public Supply	Williamson Creek
V-420	U.S. Army/Fort Polk	920	Public Supply	Williamson Creek
V-5858Z	Private Owner	248	Domestic	Williamson Creek
AN-266	City of Gonzales	548	Public Supply	Chicot Equivalent
AN-316	Westlake Vinyls	478	Industrial	Chicot Equivalent
AN-321	Rubicon, Inc.	523	Industrial	Chicot Equivalent
AN-337	BASF Corp.	459	Public Supply	Chicot Equivalent
AN-500	Lion Copolymer	480	Industrial	Chicot Equivalent
AN-6297Z	Oxy Chemical	294	Monitor	Chicot Equivalent
AN-9183Z	Private Owner	630	Domestic	Chicot Equivalent
EB-34	ExxonMobil USA	453	Industrial	Chicot Equivalent
EB-991B	Baton Rouge Water Company	565	Public Supply	Chicot Equivalent
EB-1231	Georgia Pacific	280	Industrial	Chicot Equivalent
EB-8599Z	Private Owner	180	Domestic	Chicot Equivalent
EF-5329Z	Private Owner	97	Domestic	Chicot Equivalent
JF-224	Entergy	775	Industrial	Chicot Equivalent
LI-5477Z	Private Owner	106	Domestic	Chicot Equivalent
LI-7945Z	French Settlement Water System	455	Public Supply	Chicot Equivalent
SC-179	Union Carbide	460	Industrial	Chicot Equivalent
SH-5333Z	Private Owner	230	Domestic	Chicot Equivalent
SH-77	Transco	170	Public Supply	Chicot Equivalent
SJ-226	Noranda Alumina, LLC	248	Industrial	Chicot Equivalent
SJB-173	DuPont	425	Industrial	Chicot Equivalent
ST-11516Z	Louisiana State Parks	340	Domestic	Chicot Equivalent
TA-7627Z	Global Wildlife Center	120	Domestic	Chicot Equivalent
WA-5295Z	Private Owner	100	Domestic	Chicot Equivalent
WA-5311Z	Private Owner	90	Domestic	Chicot Equivalent
AV-680	Avoyelles Water Commission	553	Public Supply	Evangeline Equivalent
EB-1003	Baton Rouge Water Company	1430	Public Supply	Evangeline Equivalent
EF-MILEY	Private Owner	185	Domestic	Evangeline Equivalent
LI-299	Ward 2 Water District	1417	Public Supply	Evangeline Equivalent

WELL NUMBER	OWNER	DEPTH (FEET)	WELL USE	AQUIFER/SYSTEM
PC-325	Alma Plantation LTD	1252	Industrial	Evangeline Equivalent
SL-679	Alon USA	1152	Industrial	Evangeline Equivalent
ST-532	Northlake Hospital	1520	Public Supply	Evangeline Equivalent
ST-820	Southern Manor MHP	2004	Public Supply	Evangeline Equivalent
TA-284	City of Ponchatoula	608	Public Supply	Evangeline Equivalent
TA-286	Town of Kentwood	640	Public Supply	Evangeline Equivalent
TA-10046Z	Highway 51 MHP	590	Public Supply	Evangeline Equivalent
WA-241	Private Owner	400	Irrigation	Evangeline Equivalent
WA-5210Z	Private Owner	752	Domestic	Evangeline Equivalent
WBR-181	Port of Greater Baton Rouge	1900	Industrial	Evangeline Equivalent
WF-DELEE	Private Owner	240	Domestic	Evangeline Equivalent
EB-630	Baton Rouge Water Company	2253	Public Supply	Jasper Equivalent
EB-854	City of Zachary	2090	Public Supply	Jasper Equivalent
EF-272	Louisiana. War Vets Home	1325	Public Supply	Jasper Equivalent
LI-185	City of Denham Springs	2610	Public Supply	Jasper Equivalent
LI-229	Ward 2 Water District	1826	Public Supply	Jasper Equivalent
LI-257	Village of Albany	1842	Public Supply	Jasper Equivalent
PC-275	Private Owner	1912	Domestic	Jasper Equivalent
SH-104	Cal Maine Foods	1652	Industrial	Jasper Equivalent
ST-995	Insta-Gator	2290	Irrigation	Jasper Equivalent
ST-1135	Lakeshore Estates	2605	Public Supply	Jasper Equivalent
ST-FOLSOM	Village of Folsom	2265	Public Supply	Jasper Equivalent
TA-560	Town of Roseland	2032	Public Supply	Jasper Equivalent
TA-826	City of Ponchatoula	2015	Public Supply	Jasper Equivalent
WA-248	Town of Franklinton	2700	Public Supply	Jasper Equivalent
WF-264	West Feliciana Parish Utilities	960	Public Supply	Jasper Equivalent

Chart 1 – Number of Wells Sampled by Aquifer

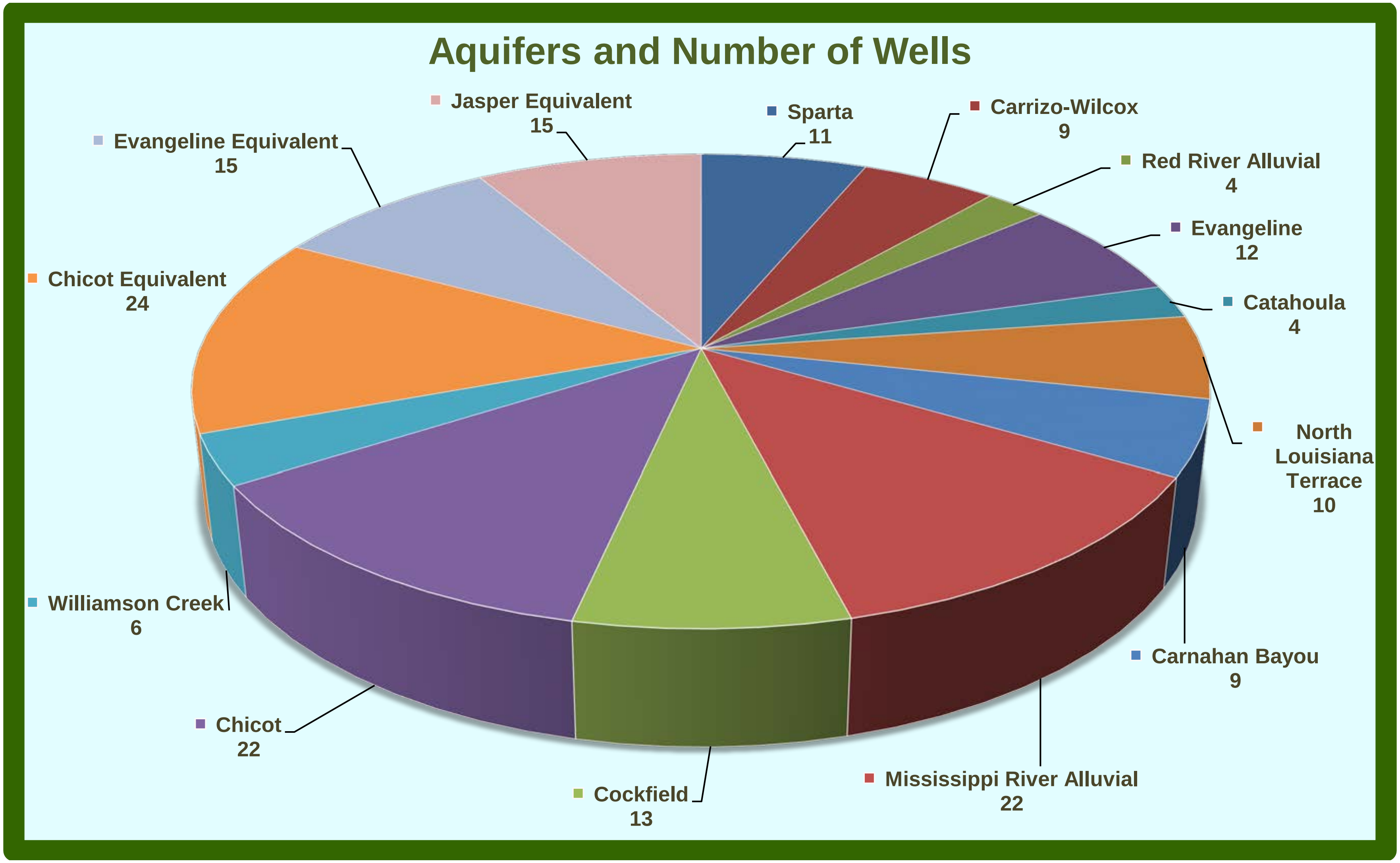


Chart 2 – Aquifer Areal Extent

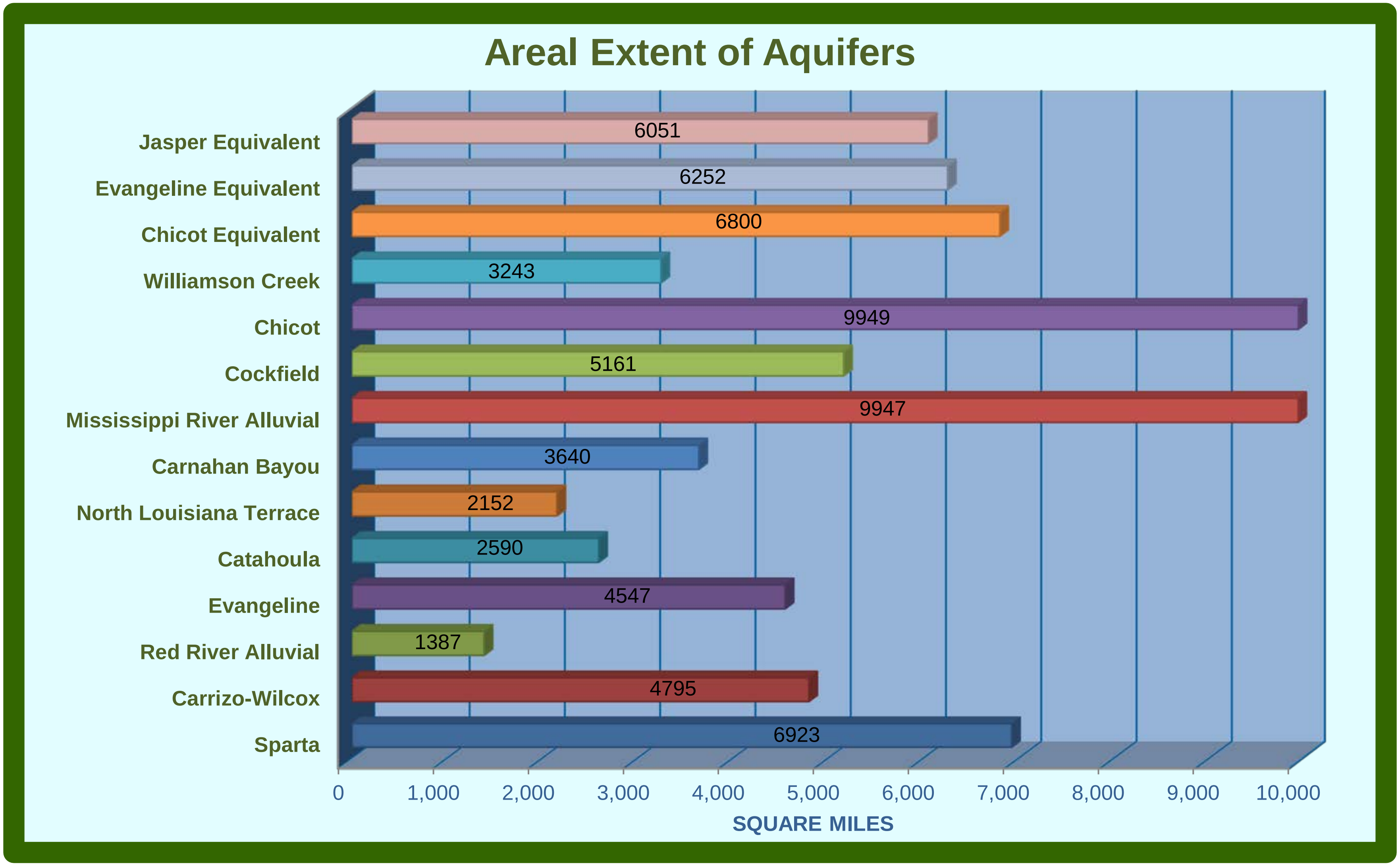


Chart 3 – Well Depth Statistics

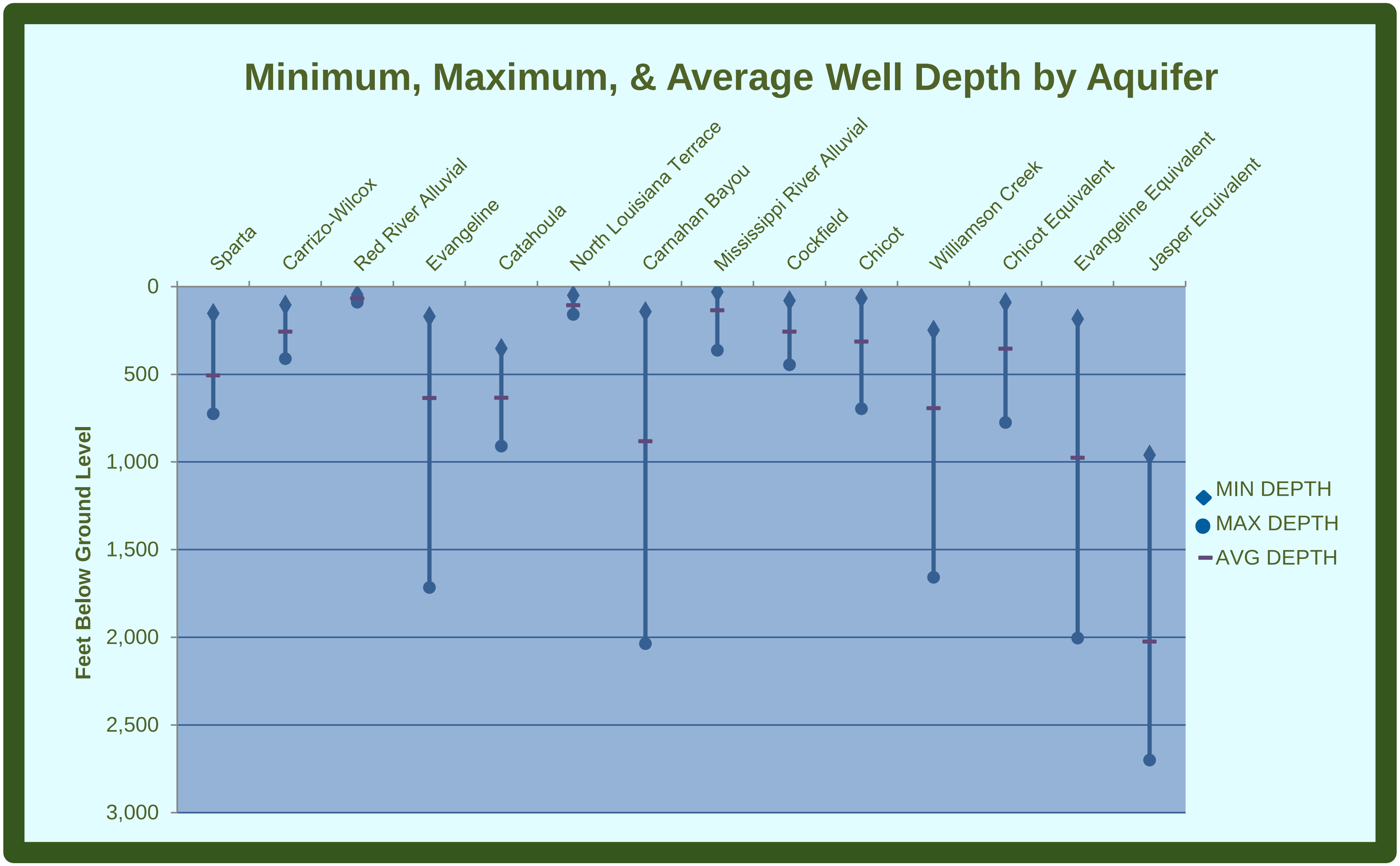


Chart 4 – Average pH Values

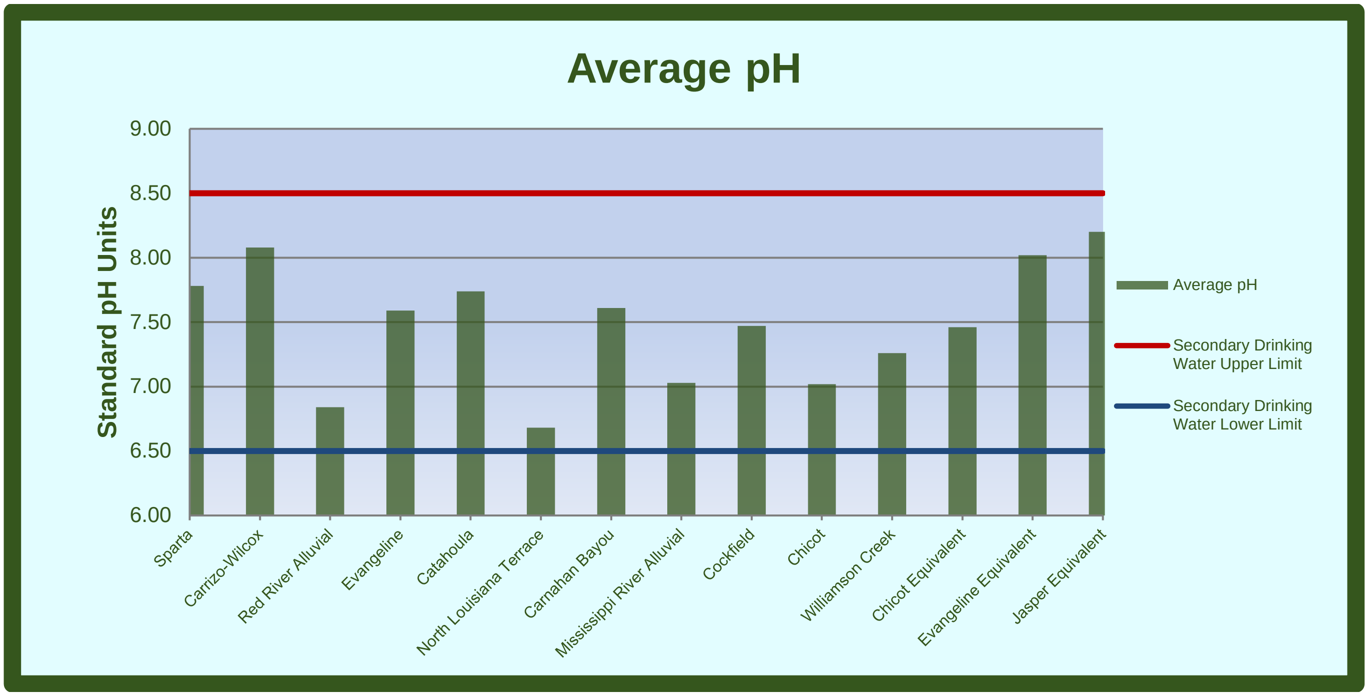


Chart 5 – Average Chloride Values

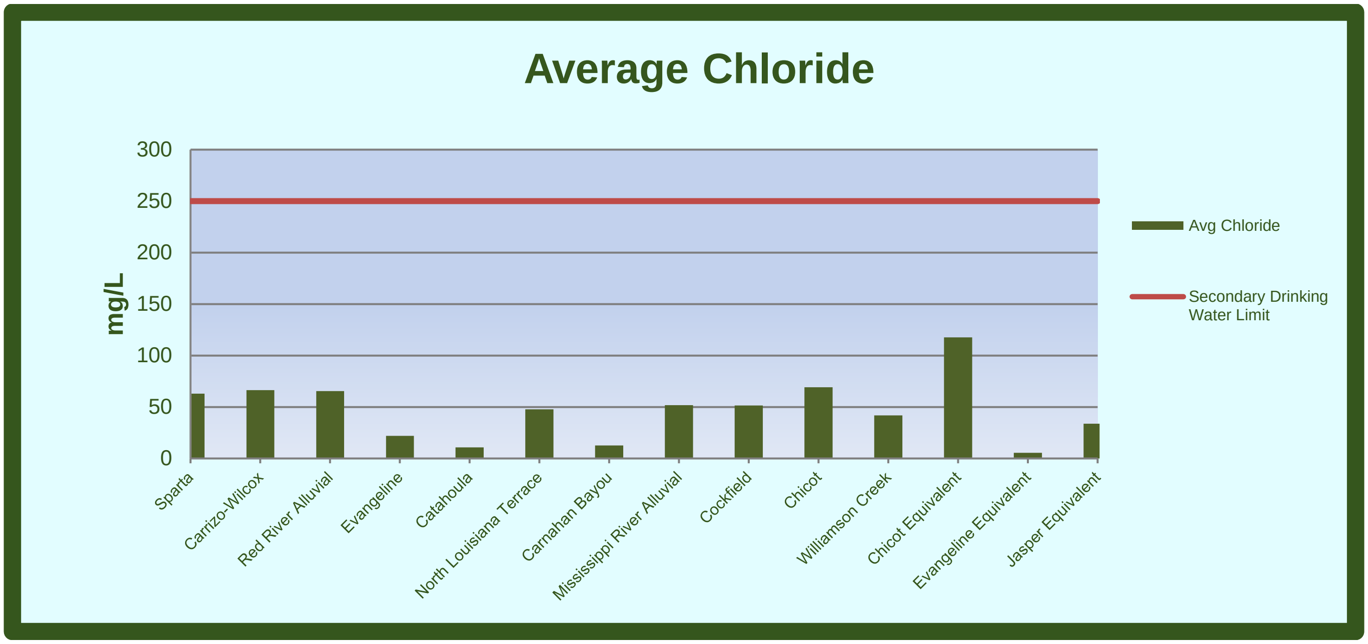


Chart 6 – Average Total Dissolved Solids Values

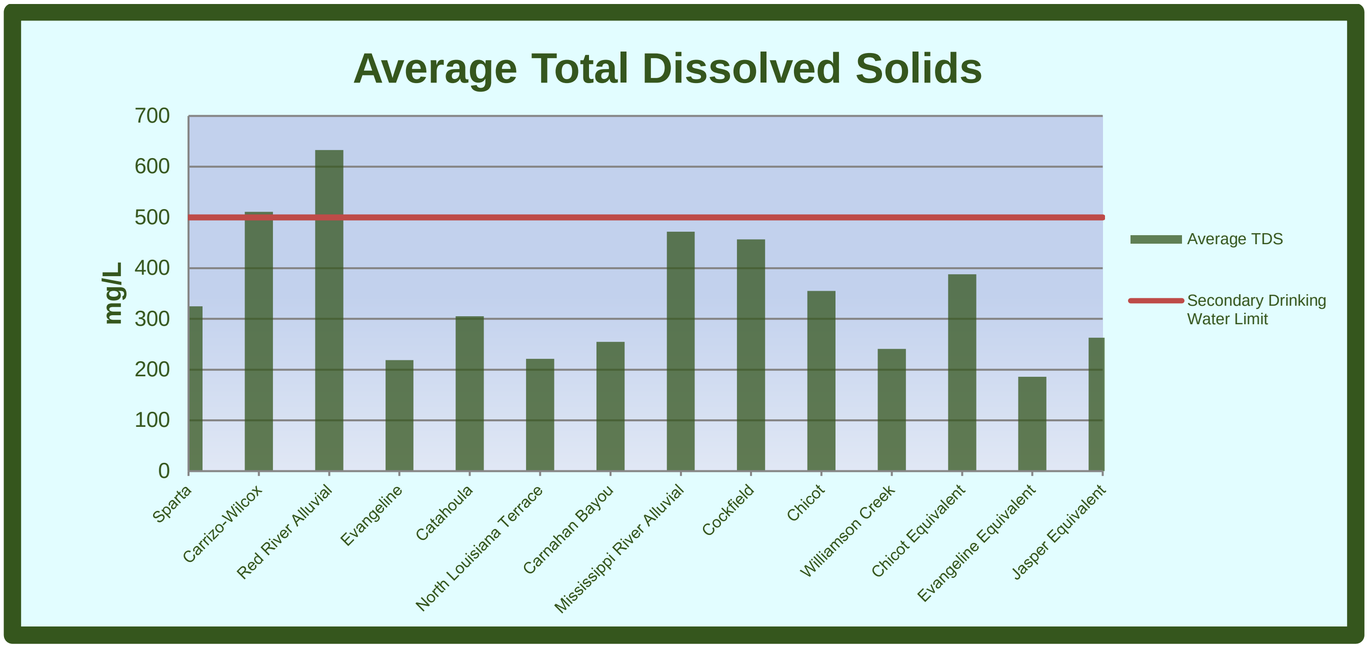


Chart 7 – Average Hardness Values

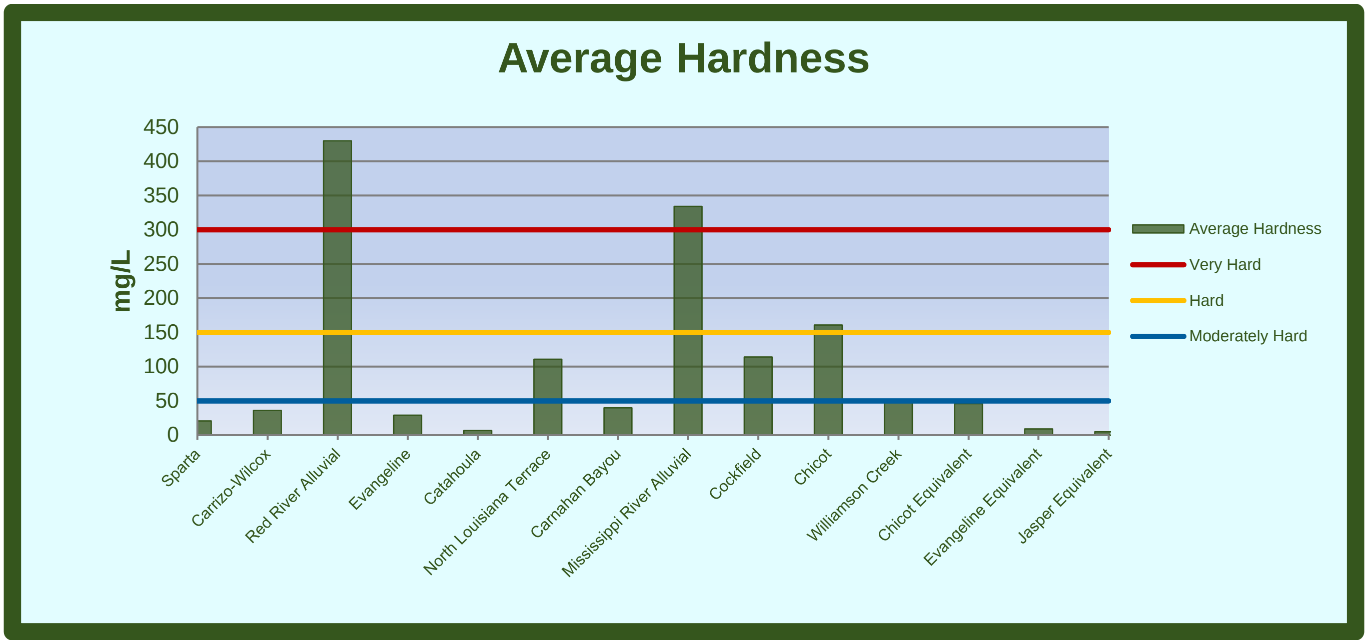


Chart 8 – Average Iron Values

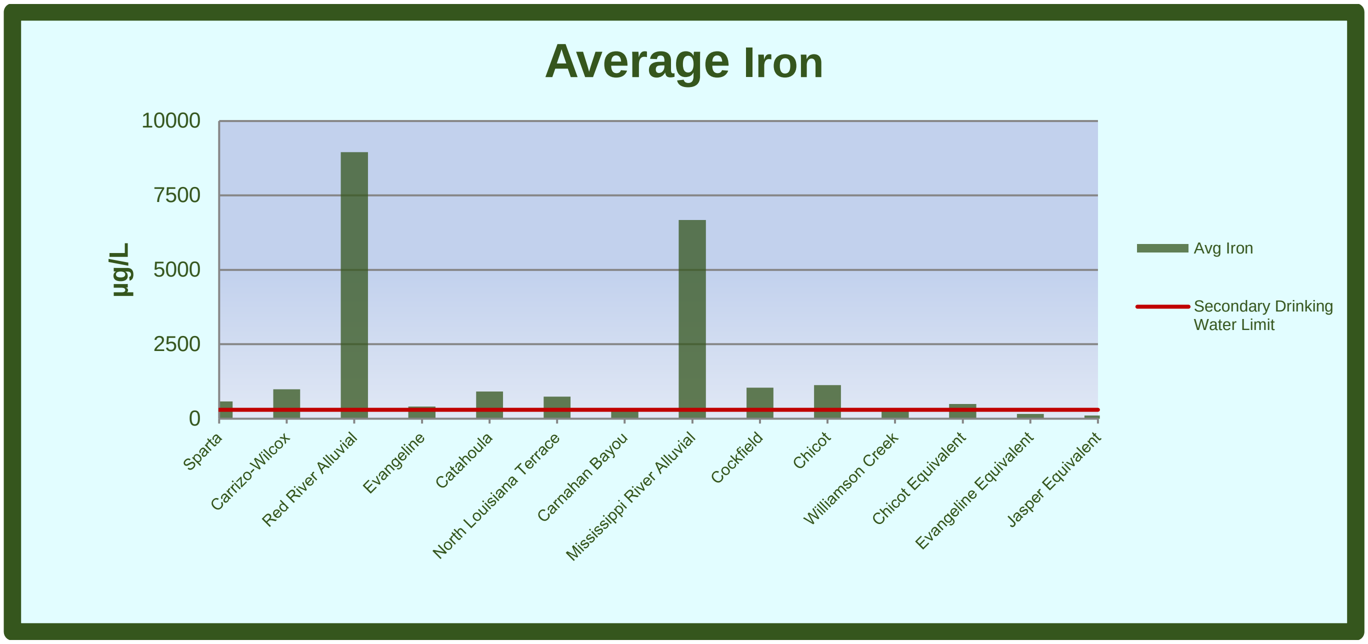
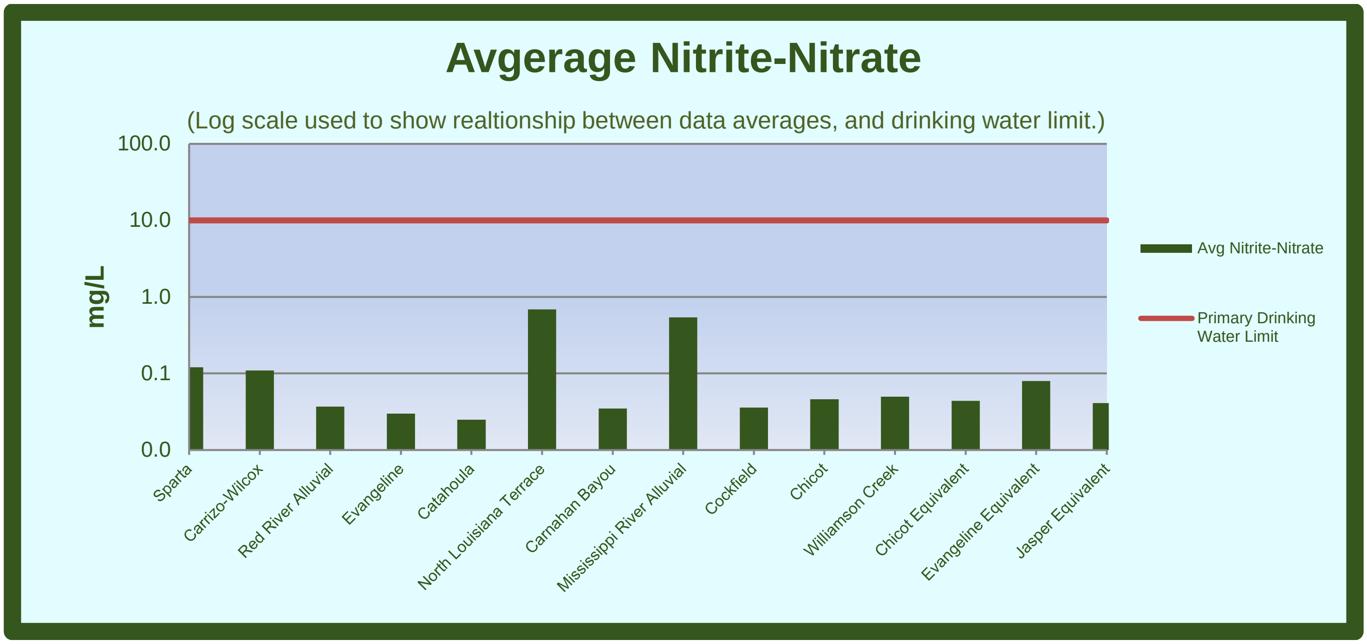
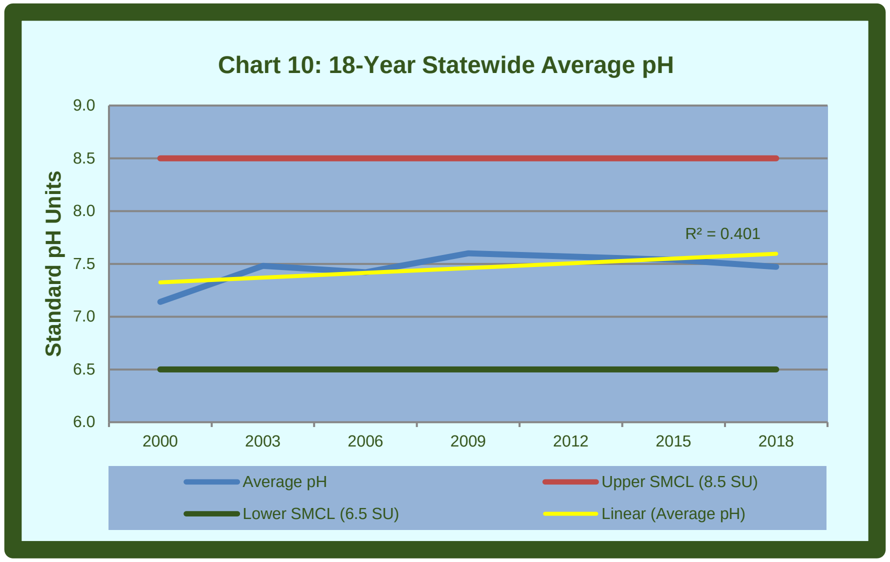


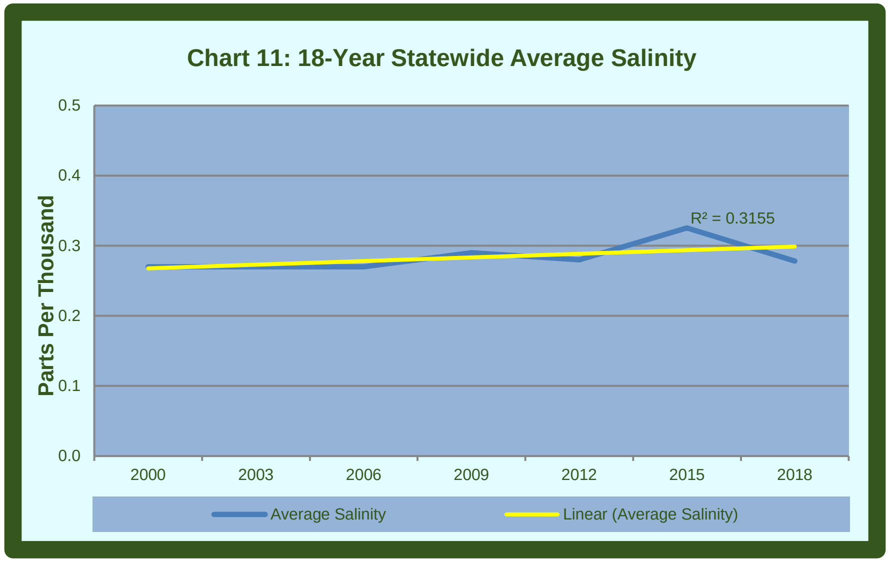
Chart 9 – Average Nitrite-Nitrate Values

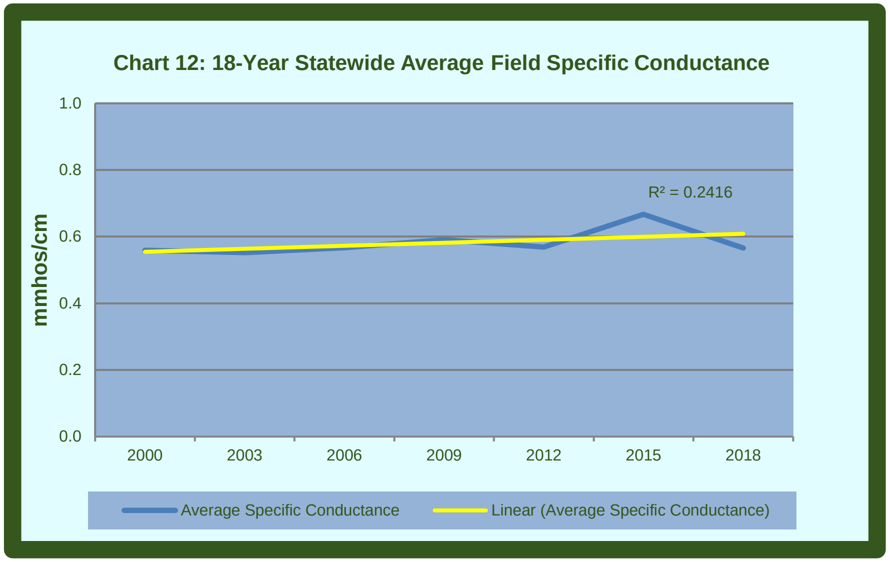


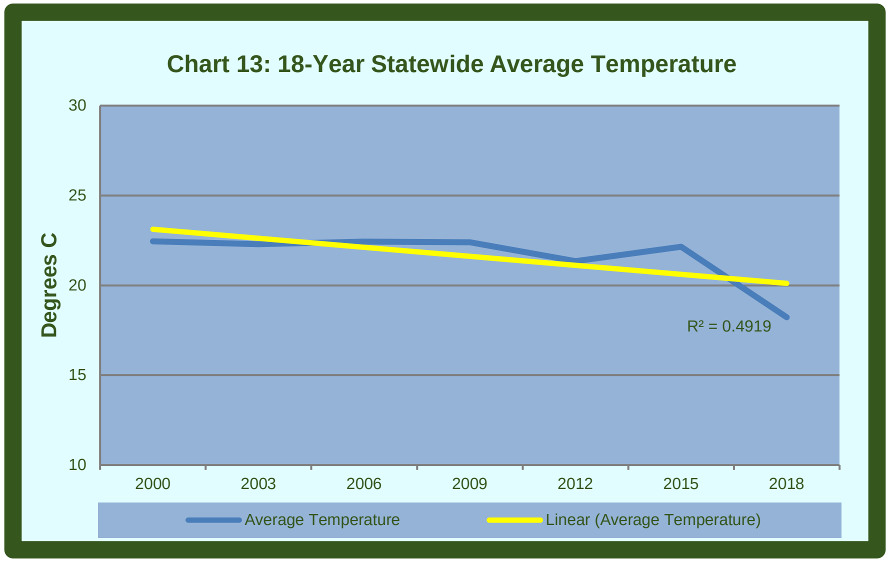
EIGHTEEN YEAR TREND OF SELECT PARAMETER AVERAGES (2000 – 2018)

FIELD PARAMETERS

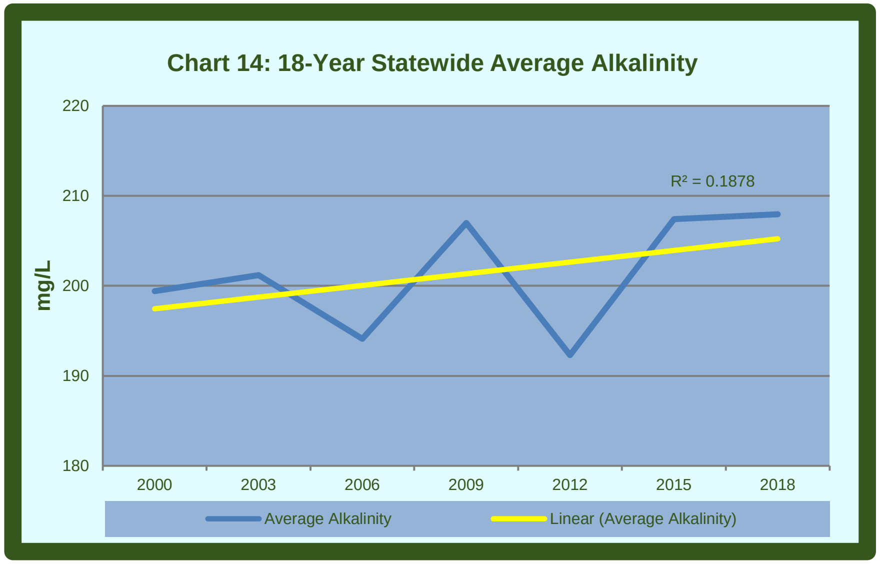


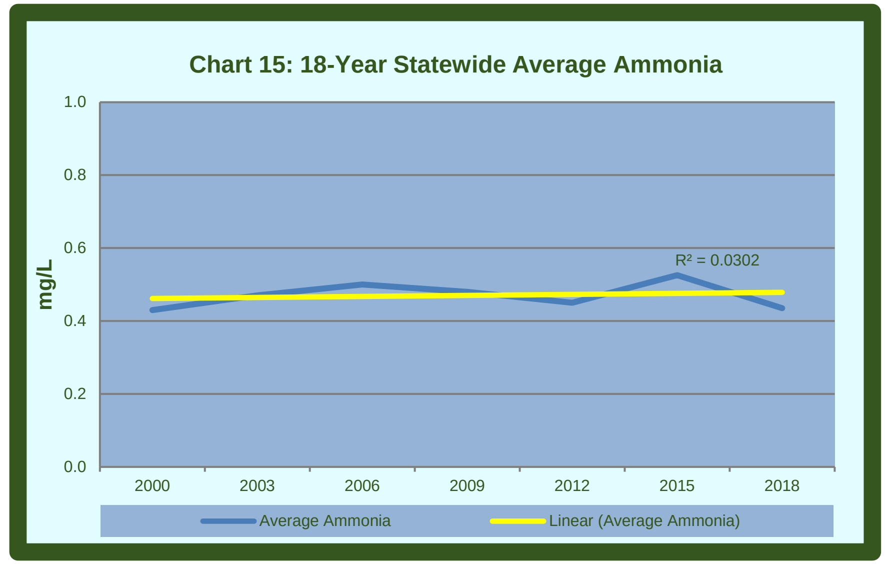


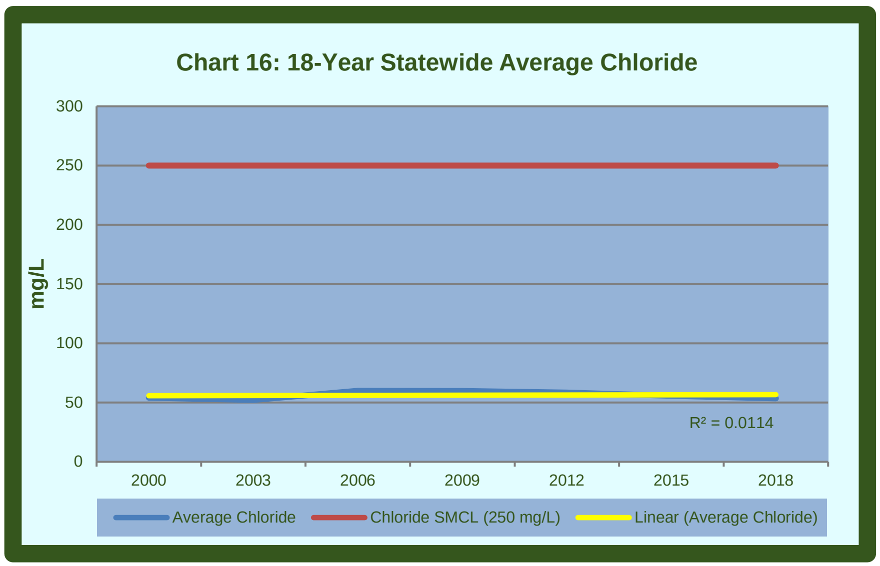


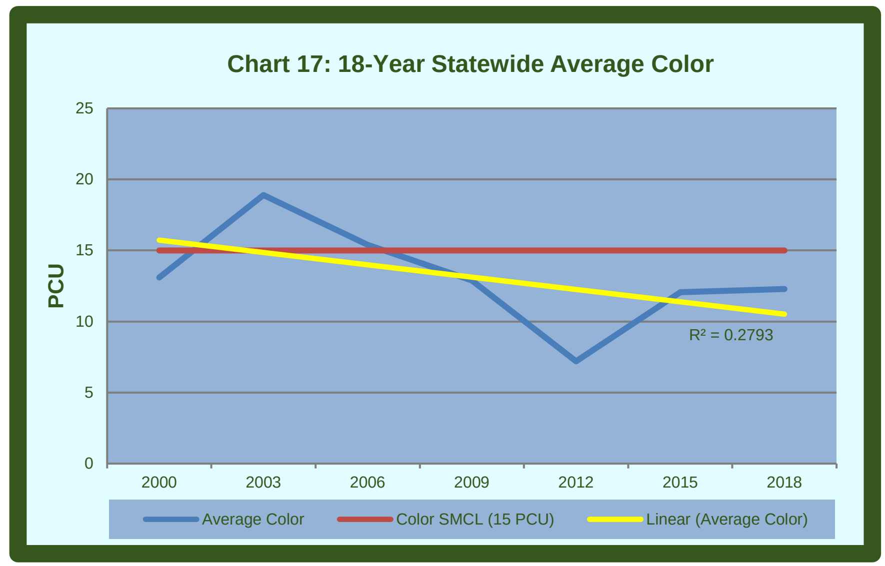


CONVENTIONAL PARAMETERS









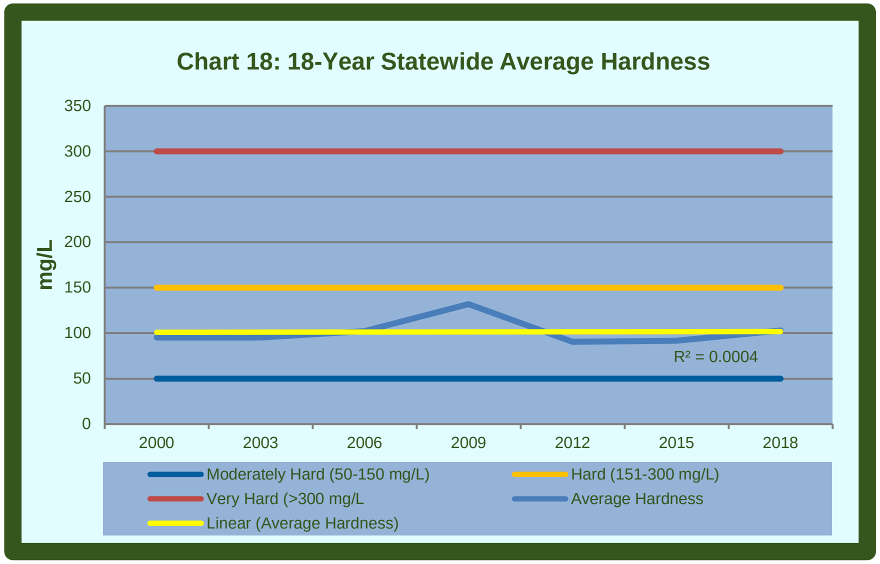


Chart 18: 18-Year Statewide Average Hardness
mg/L
350
300
250
200
150
100
50
0
2000
2003
2006
2009
2012
2015
2018
R² = 0.0004
Moderately Hard (50-150 mg/L)
Hard (151-300 mg/L)
Very Hard (>300 mg/L
Average Hardness
Linear (Average Hardness)

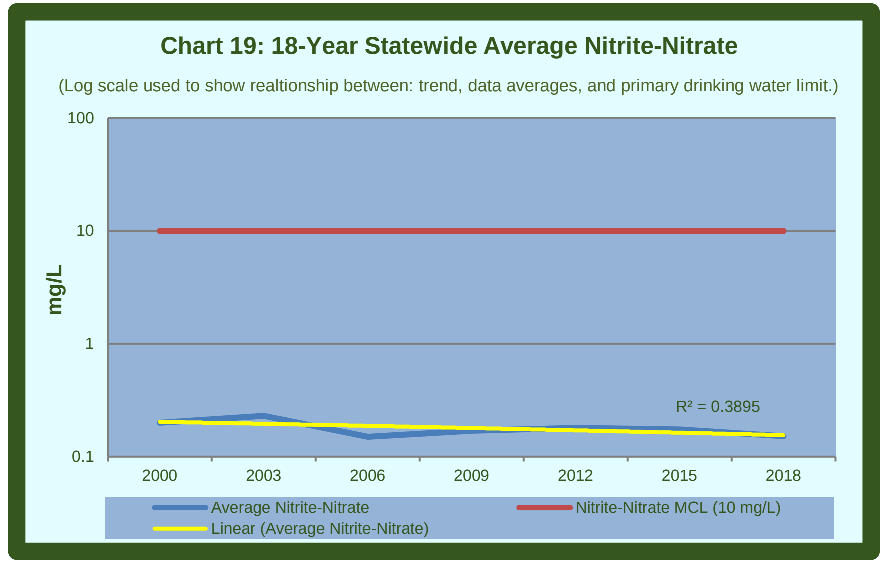


Chart 19: 18-Year Statewide Average Nitrite-Nitrate
(Log scale used to show realtionship between: trend, data averages, and primary drinking water limit.)
mg/L
100
10
1
0.1
2000
2003
2006
2009
2012
2015
2018
R² = 0.3895
Average Nitrite-Nitrate
Nitrite-Nitrate MCL (10 mg/L)
Linear (Average Nitrite-Nitrate)

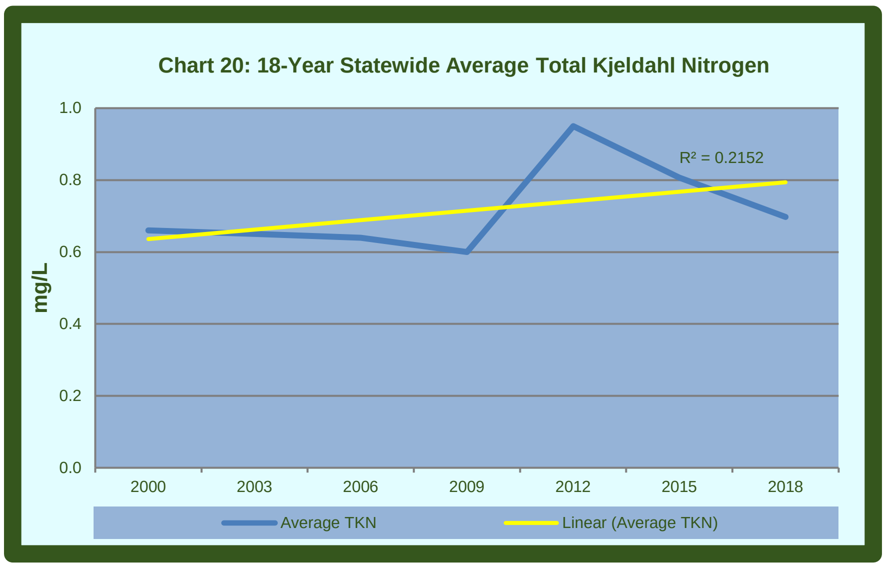


Chart 20: 18-Year Statewide Average Total Kjeldahl Nitrogen
mg/L
1.0
0.8
0.6
0.4
0.2
0.0
2000
2003
2006
2009
2012
2015
2018
R² = 0.2152
Average TKN
Linear (Average TKN)

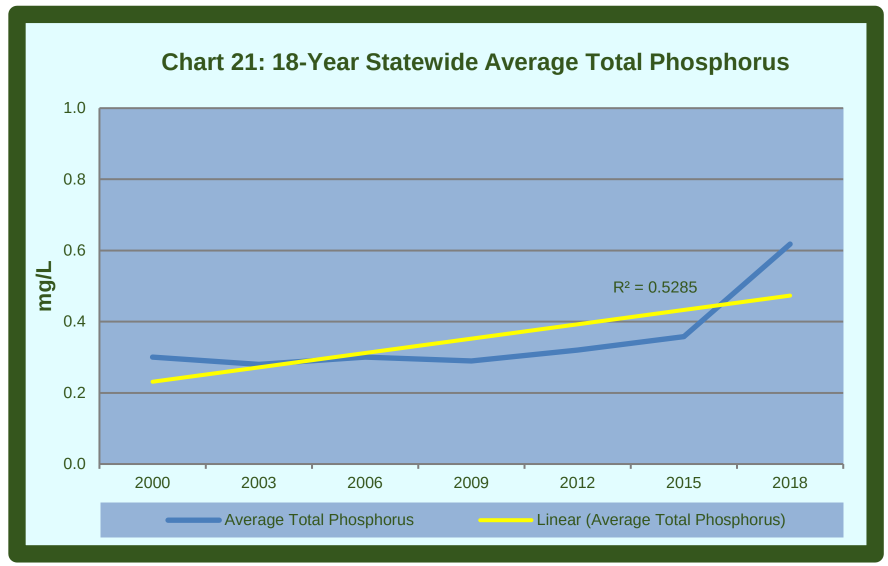


Chart 21: 18-Year Statewide Average Total Phosphorus
mg/L
1.0
0.8
0.6
0.4
0.2
0.0
2000
2003
2006
2009
2012
2015
2018
R² = 0.5285
Average Total Phosphorus
Linear (Average Total Phosphorus)

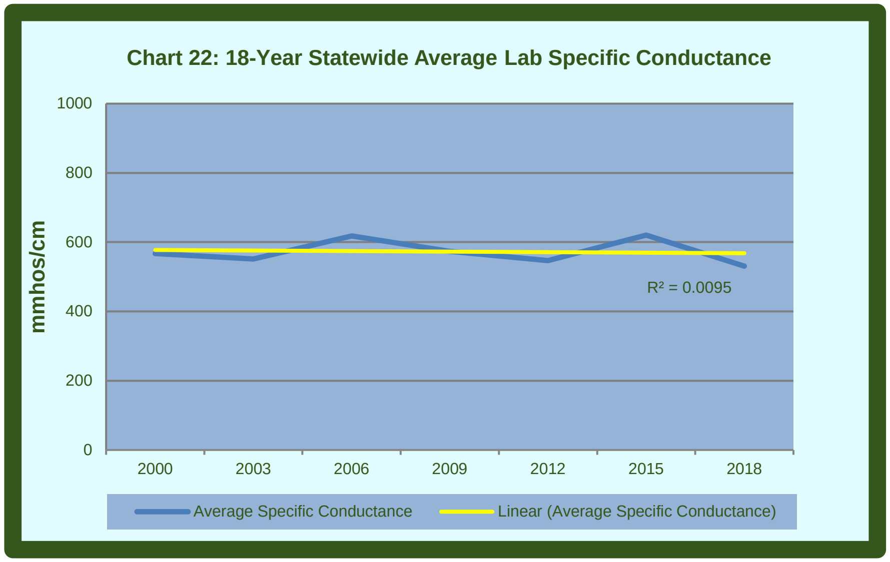


Chart 22: 18-Year Statewide Average Lab Specific Conductance
mmhos/cm
1000
800
600
400
200
0
2000
2003
2006
2009
2012
2015
2018
R² = 0.0095
Average Specific Conductance
Linear (Average Specific Conductance)

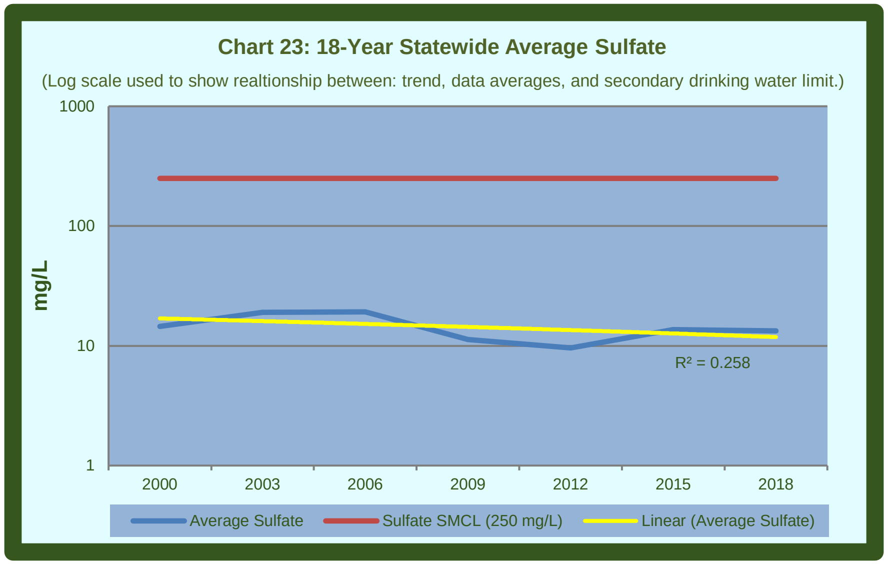


Chart 23: 18-Year Statewide Average Sulfate
(Log scale used to show realtionship between: trend, data averages, and secondary drinking water limit.)
mg/L
1000
100
10
1
2000
2003
2006
2009
2012
2015
2018
R² = 0.258
Average Sulfate
Sulfate SMCL (250 mg/L)
Linear (Average Sulfate)

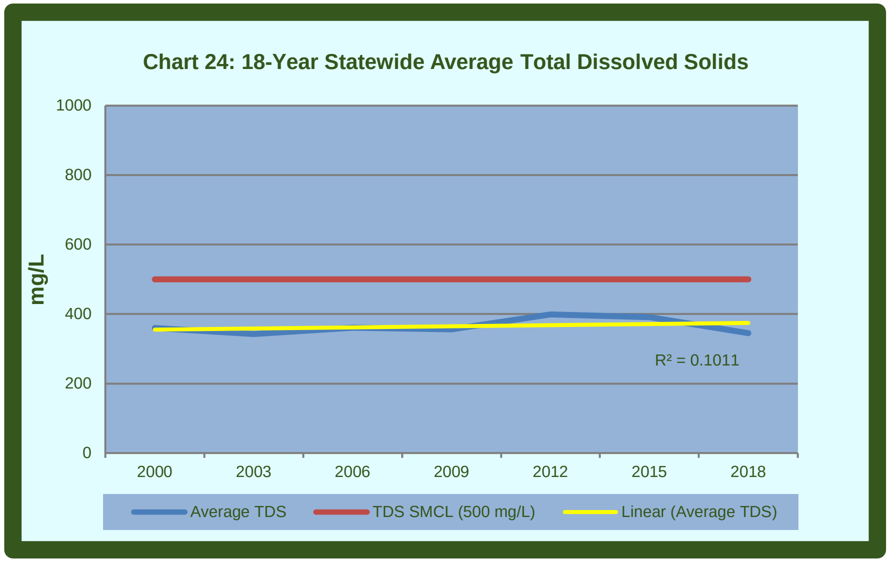


Chart 24: 18-Year Statewide Average Total Dissolved Solids
mg/L
1000
800
600
400
200
0
2000
2003
2006
2009
2012
2015
2018
R² = 0.1011
Average TDS
TDS SMCL (500 mg/L)
Linear (Average TDS)

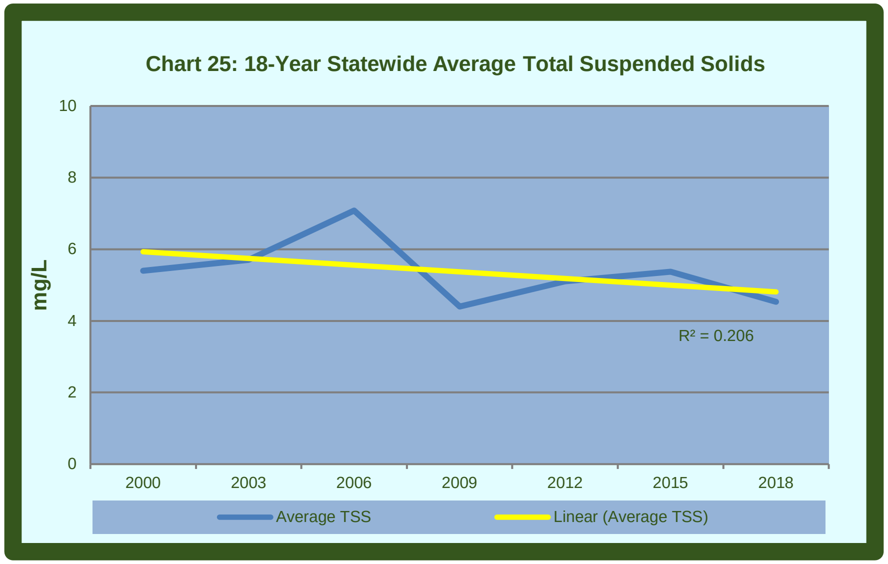
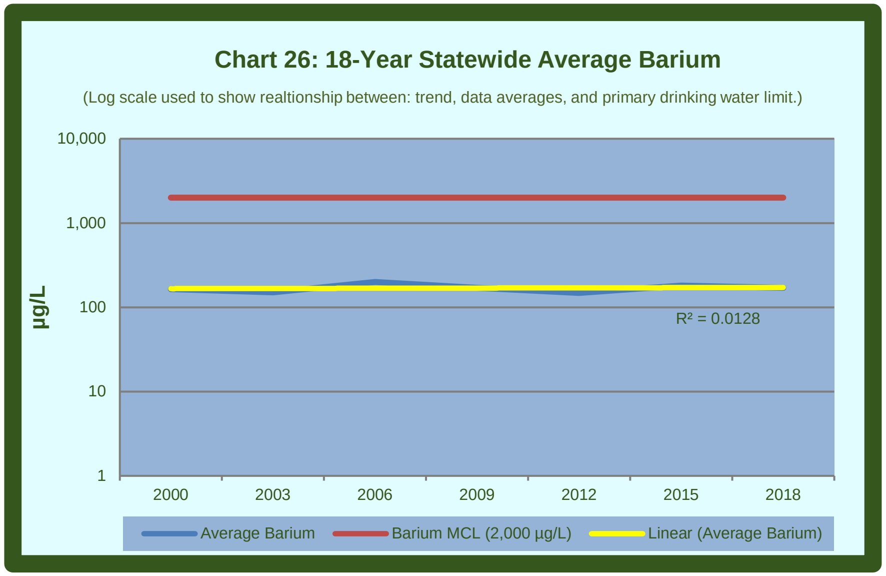
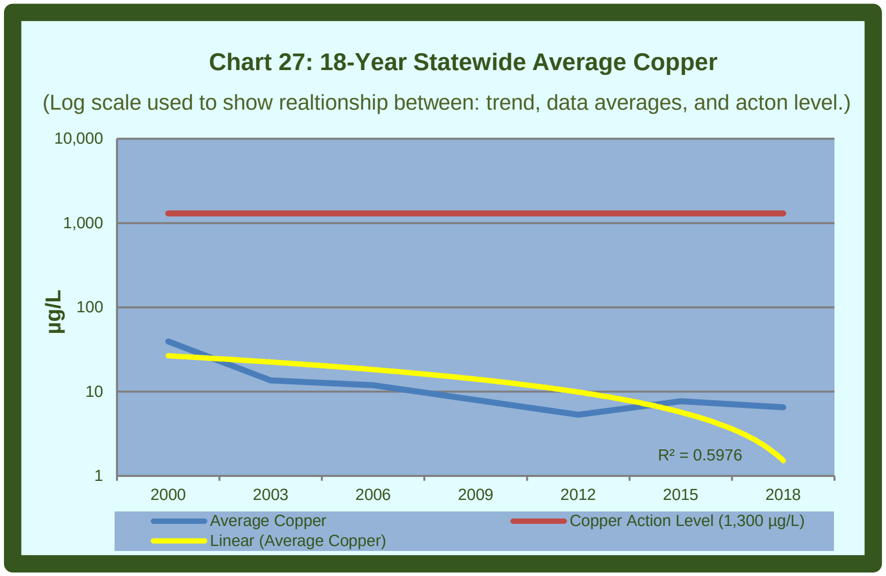
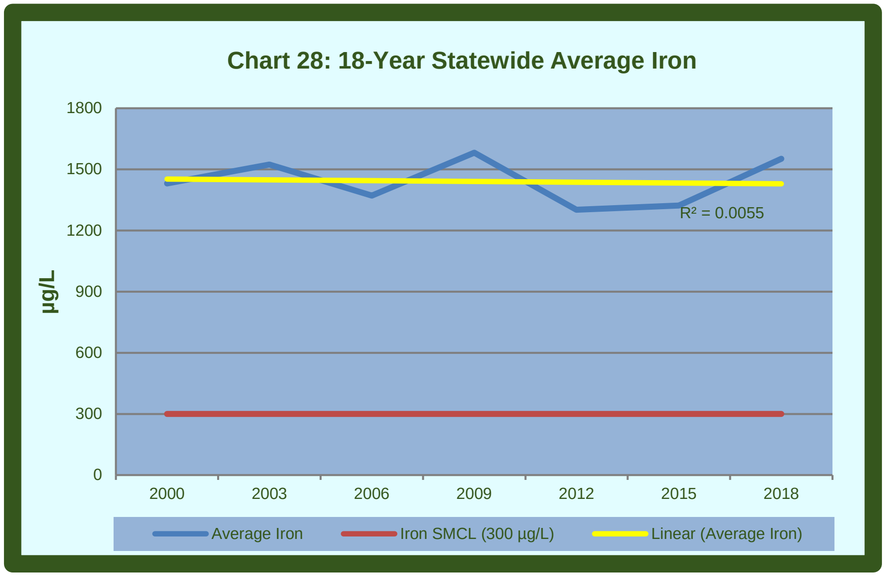


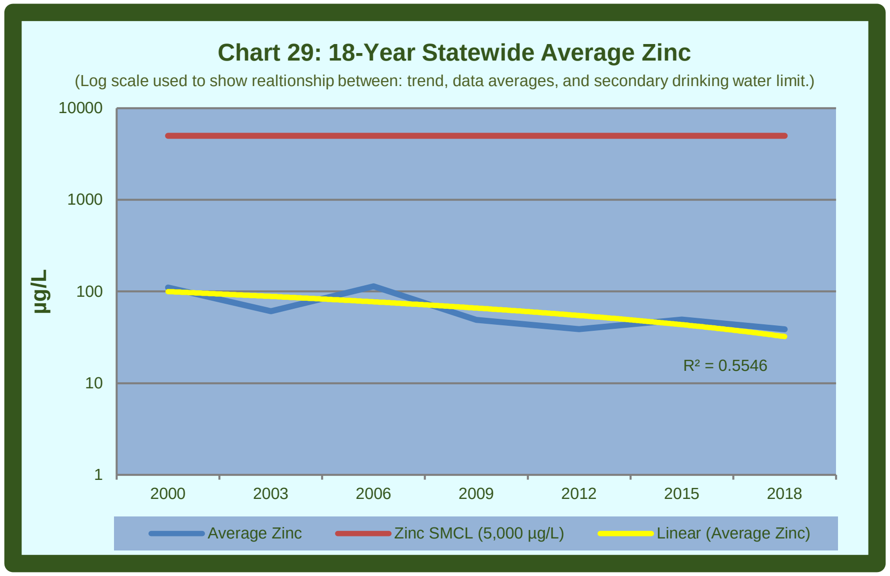
Chart 25: 18-Year Statewide Average Total Suspended Solids
mg/L
10
8
6
4
2
0
2000
2003
2006
2009
2012
2015
2018
R² = 0.206
Average TSS
Linear (Average TSS)

INORGANIC PARAMETERS









REFERENCES

Hydrogeologic column of aquifers

DOTD/USGS *Water Resources Special Report No. 9, 1995.*

Hardness scale

Peavy, H.S. et al. *Environmental Engineering, 1985.*

Geology and hydrogeology sections

Boniol, D. et al. *Recharge Potential of Louisiana Aquifers, A Supplement to the State Aquifer Recharge Map and Atlas Plates, 1989.* Louisiana Geological Survey.

Boydstun, J. et al. *State of Louisiana Water Quality Management Plan, Water Quality Inventory Section 305 (b), 1996.* Louisiana Department of Environmental Quality.

Smoot, C.W. *Louisiana Hydrologic Atlas Map No. 2: Areal Extent of Freshwater In Major Aquifers of Louisiana, 1986.* United States Geological Survey.

Smoot, C.W. *Louisiana Hydrologic Atlas Map No. 4: Geohydrologic Sections of Louisiana, 1989.* United States Geological Survey.

Buono, A. *The Southern Hills Regional Aquifer System of Southeastern Louisiana and Southwestern Mississippi, 1983.* United States Geological Survey.