CHICOT EQUIVALENT AQUIFER SYSTEM SUMMARY, 2009

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ LOUISIANA

APPENDIX 12 TO THE 2009 TRIENNIAL SUMMARY REPORT

PARTIAL FUNDING PROVIDED BY THE CWA

ASSET

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

Contents

BACKGROUND

The Louisiana Department of Environmental Quality's (LDEQ) Aquifer Sampling and Assessment Program (ASSET) is an ambient monitoring program established to determine and monitor the quality of ground water produced from Louisiana's major freshwater aquifers. The ASSET Program samples approximately 200 water wells located in 14 aquifers and aquifer systems across the state. The sampling process is designed so that all 14 aquifers and aquifer systems and associated wells are monitored every three years.

In order to better assess the water quality of a particular aquifer, an attempt is made to sample all ASSET Program wells producing from it in a narrow time frame. To more conveniently and economically promulgate those data collected, a summary report on each aquifer is prepared separately. Collectively, these aquifer summaries will make up, in part, the ASSET Program's Triennial Summary Report for 2009.

Analytical and field data contained in this summary were collected from wells producing from the Chicot Equivalent aquifer system during the 2009 state fiscal year (July 1, 2008 - June 30, 2009). This summary will become Appendix 12 of the ASSET Program Triennial Summary Report for 2009.

These data show that between August and December of 2008, and in June, 2009, 24 wells were sampled which produce from the Chicot Equivalent aquifer system. Nine wells are classified as domestic, seven are classified as industrial, five are classified as public supply, and one each are classified as irrigation, monitor, and power generation. The wells are located in 12 parishes in southeast Louisiana.

Figure 12-1 shows the geographic locations of the Chicot Equivalent aquifer system and the associated wells, whereas Table 12-1 lists the wells monitored along with their total depths, use made of produced waters and date sampled.

Well data, including well location and aquifer assignment, for registered water wells were obtained from the Louisiana Department of Transportation and Development's Water Well Registration Data file.

GEOLOGY

The Chicot Equivalent aquifer system is composed of the Pleistocene aged aquifers of the New Orleans area, the Baton Rouge area, and St. Tammany, Tangipahoa, and Washington Parishes. The aquifers are in Pleistocene aged alluvial and terrace deposits. The sedimentary sequences that make up the aquifer system are subdivided into several aquifer units separated by confining beds. Northward within southeast Louisiana, fewer units are recognized because some younger units pinch out updip and some clay layers present to the south disappear. Where clay layers are discontinuous or disappear, aquifer units coalesce. The aquifers are moderately well, to well sorted, and consist of fine sand near the top, grading to coarse sand and gravel in lower parts and are generally confined by silt and clay layers.

HYDROGEOLOGY

The deposits that constitute the individual aquifers are not readily differentiated at the surface and act as one hydraulic system that can be subdivided into several hydrologic zones in the subsurface. The Mississippi River Valley is entrenched into the Pleistocene strata in the western part of the system, resulting in water movement between the river, the shallow sands, and the Pleistocene aquifers. Recharge occurs primarily by the direct infiltration of rainfall in interstream, upland outcrop areas, by the movement of water between aquifers, and between the aquifers and the Mississippi River. The hydraulic conductivity varies between 10-200 feet/day.

The maximum depths of occurrence of freshwater in the Chicot Equivalent range from 350 feet above sea level, to 1,100 feet below sea level. The range of thickness of the fresh water interval in the Chicot Equivalent is 50 to 1,100 feet. The depths of the Chicot Equivalent wells that were monitored in conjunction with ASSET range from 90 to 878 feet.

PROGRAM PARAMETERS

The field parameters checked at each ASSET well sampling site and the list of conventional parameters analyzed in the laboratory are shown in Table 12-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 12-3. These tables also show the field and analytical results determined for each analyte. For quality control, duplicate samples were taken for each parameter from wells AN-500, EB-1231, JF-25, SH-77, SJB-175, and ST-11516Z.

In addition to the field, conventional and inorganic analytical parameters, the target analyte list includes three other categories of compounds: volatiles, semi-volatiles, and pesticides/PCBs. Due to the large number of analytes in these categories, tables were not prepared showing the analytical results for these compounds. A discussion of detections (if any), from any of these three categories, can be found in their respective sections. Tables 12-8, 12-9 and 12-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 12-4 and 12-5 provide a statistical overview of field and conventional data, and inorganic data for the Chicot Equivalent aquifer system, listing the minimum, maximum, and average results for these parameters collected in the FY 2009 sampling. Tables 12-6 and 12-7 compare these same parameter averages to historical ASSET-derived data for the Chicot Equivalent aquifer system, from fiscal years from fiscal years 1997, 2000, 2003 and 2006.

The average values listed in the above referenced tables are determined using all valid, reported results, including non-detects. Per Departmental policy concerning statistical analysis, one-half of the detection limit (DL) is used in place of zero when non-detects are encountered. However, the minimum value is reported as less than the DL, not one-half the DL. If all results for a particular analyte are reported as non-detect, then the minimum, maximum, and average values are all reported as less than the DL. One-half the DL is also used for contouring purposes, and in the figures and charts referenced below.

Figures 12-2, 12-3, 12-4, and 12-5, respectively, represent the contoured data for pH, total dissolved solids (TDS), chloride (Cl), and iron. Charts 12-1 through 12-16 represent the trend of the graphed parameter, based on the averaged value of that parameter for each three-year reporting period. Discussion of historical data and related trends is found in the **Water Quality Trends and Comparison to Historical ASSET Data** section.

INTERPRETATION OF DATA

Under the Federal Safe Drinking Water Act, EPA has established maximum contaminant levels (MCLs) for pollutants that may pose a health risk in public drinking water. An MCL is the highest level of a contaminant that EPA allows in public drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. While not all wells sampled were public supply wells, the Aquifer Sampling and Assessment Unit uses the MCLs as a benchmark for further evaluation. Data contained in Table 12-3 show that one MCL was exceeded in one of the 24 wells sampled in the Chicot Equivalent aquifer system.

EPA has set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 12-2 and 12-3 show that five parameters exceeded secondary MCLs (SMCL) in 10 of the 24 wells sampled in the Chicot Equivalent aquifer system.

Field and Conventional Parameters

Table 12-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 12-4 provides an overview of field and conventional parameter data averages for the Chicot Equivalent aquifer system, including the four previous sampling event averages.

Federal Primary Drinking Water Standards: A review of the data listed in Table 12-2 shows that no primary MCL was exceeded for field or conventional parameters for this reporting period.

Federal Secondary Drinking Water Standards: A review of the data listed in Table 12-2 shows that five wells exceeded the SMCL for pH, four wells exceeded the SMCL for chloride, four wells exceeded the SMCL for total dissolved solids (TDS), and two wells exceeded the SMCL for color. Following is a list of SMCL parameter exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 Standard Units):

AN-6297Z – 9.18 SU
SH-77 – 5.74 SU (Original and Duplicate)
TA-520 – 5.18 SU
EF-5329Z – 5.97 SU
ST-5245Z – 6.06 SU

Chloride (SMCL = 250 mg/L):

AN-6297Z – 675 mg/L
SC-179 – 454 mg/L
JF-25 – 314, Duplicate – 302 mg/L
SJB-175 – 317 mg/L, Duplicate – 318 mg/L

Color (SMCL = 15 PCU):

EB – 34 50 PCU
SC-179 – 55 PCU
JF-25 – 160 PCU (Original & Duplicate)

Total Dissolved Solids (SMCL = 500 mg/L or 0.5 g/L):

	LAB RESULTS (in mg/L)	FIELD MEASUSRES (in g/L)
AN-6297Z	1,170 mg/L	1.59 g/L
JF-25	924 mg/L, Duplicate – 920 mg/L	1.08 g/L (Original and Duplicate)
SC-179	1,020 mg/L	1.20 g/L
SJB-175	972 mg/L, Duplicate – 964 mg/L	11.2 g/L (Original and Duplicate)

Inorganic Parameters

Table 12-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 12-5 provides an overview of inorganic parameter data averages for the Chicot Equivalent aquifer system, including the four previous sampling event averages.

Federal Primary Drinking Water Standards: A review of the analysis listed on Table 12-3 shows that the Primary MCL for arsenic (10 ug/L) was exceeded in one of the 24 wells sampled for this time period. Well SJ-266, an industrial use well, reported a concentration of 13.5 ug/L for arsenic. A review of historical data for this well reveals that this is typical for this well, as shown below:

Well SJ-266 Arsenic Concentrations by Year

1999	*10.8 ug/L*
2002	*12.6 ug/L*
2005	*<10.0 ug/L*
2008	*13.5 ug/L*

Federal Secondary Drinking Water Standards: A review of the analysis listed in Table 12-3 shows that five wells exceeded the secondary MCL for iron:

Iron (SMCL = 300 ug/L):

EB-34 – 4,480 ug/L
SJB-175 - 533 ug/L, Duplicate – 548 ug/L
ST-5245Z – 1,190 ug/L
SJ-266 – 13,400 ug/L
SH-77 – 2,170 ug/L, Duplicate – 2,090

Volatile Organic Compounds

Table 12-8 shows the volatile organic compound (VOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a VOC would be discussed in this section.

No VOCs were detected at or above their respective detection limits during the FY 2009 sampling of the Chicot Equivalent aquifer system.

Semi-Volatile Organic Compounds

Table 12-9 shows the semi-volatile organic compound (SVOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however any detection of a SVOC would be discussed in this section.

There were no confirmed SVOC detections at or above its detection limit during the FY 2009 sampling of the Chicot Equivalent aquifer system.

Pesticides and PCBs

Table 12-10 shows the pesticide and PCB parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however any detection of a pesticide or PCB would be discussed in this section.

No pesticide or PCB was detected at or above its detection limit during the FY 2009 sampling of the Chicot Equivalent aquifer system.

WATER QUALITY TRENDS AND COMPARISON TO HISTORICAL ASSET DATA

Analytical and field data show that the quality and characteristics of ground water produced from the Chicot Equivalent aquifer system exhibit some changes when comparing current data to that of the four previous sampling rotations (three, six, nine and twelve years prior). These comparisons can be found in Tables 12-6 and 12-7, and in Charts 12-1 to 12-16 of this summary. Over the twelve-year period, four analytes have shown a general increase in average concentration, (barium, iron, pH and temperature), while nine analytes have shown a general decrease in average concentration, (alkalinity, chloride, color, copper, hardness, nitrite-nitrate, sulfate, TKN and TDS). All other analyte averages have remained consistent or have been non-detect for this time period. The number of secondary exceedances in the Chicot Equivalent aquifer system has increased from the previous sampling in FY 2006 of 12 SMCL exceedances, to 20 in FY 2009. Additionally, arsenic continues to be detected in industrial well SJ-266 at levels consistent with historical arsenic levels that are slightly above the primary drinking water standard of 10 ug/L.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the ground water produced from this aquifer is soft[1] and that one Primary MCL (arsenic) was exceeded in an industrial use well. The data also show that this aquifer is of fair quality when considering taste, odor, or appearance guidelines, with 20 Secondary MCLs exceeded in 10 wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Chicot Equivalent aquifer system, with four parameters showing consistent increases in average concentrations and nine parameters decreasing in average concentration with the remainder of the analyte averages staying consistent over the previous 12 year period.

It is recommended that the wells assigned to the Chicot Equivalent aquifer system be re-sampled as planned, in approximately three years. In addition, several wells should be added to the 24 currently in place to increase the well density for this aquifer.

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

Table 12-1: List of Wells Sampled – FY 2009
Chicot Equivalent Aquifer System

Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
AN-266	ASCENSION	8/5/2008	CITY OF GONZALES	548	PUBLIC SUPPLY
AN-321	ASCENSION	12/8/2008	RUBICON, INC.	523	INDUSTRIAL
AN-337	ASCENSION	12/8/2008	BASF CORP.	459	PUBLIC SUPPLY
AN-500	ASCENSION	12/9/2008	LION COPOLYMER	480	INDUSTRIAL
AN-6297Z	ASCENSION	12/8/2008	OXY CHEMICAL	294	MONITOR
AN-9183Z	ASCENSION	8/5/2008	PRIVATE OWNER	630	DOMESTIC
EB-1231	E BATON ROUGE	8/4/2008	GEORGIA PACIFIC CORP.	280	INDUSTRIAL
EB-34	E BATON ROUGE	8/4/2008	EXXONMOBIL USA	453	INDUSTRIAL
EB-8599Z	E BATON ROUGE	6/1/2009	PRIVATE OWNER	180	DOMESTIC
EB-991B	E BATON ROUGE	8/4/2008	BATON ROUGE WATER WORKS	565	PUBLIC SUPPLY
EF-5329Z	E FELICIANA	8/4/2008	PRIVATE OWNER	97	DOMESTIC
JF-25	JEFFERSON	10/21/2008	ENTERGY	878	POWER GENERATION
LI-5477Z	LIVINGSTON	8/5/2008	PRIVATE OWNER	106	DOMESTIC
LI-85	LIVINGSTON	8/5/2008	FRENCH SETTLEMENT WATER SYS	405	PUBLIC SUPPLY
SC-179	ST CHARLES	12/9/2008	UNION CARBIDE	460	INDUSTRIAL
SH-5333Z	ST HELENA	10/14/2008	PRIVATE OWNER	230	DOMESTIC
SH-77	ST HELENA	11/3/2008	TRANSCO	170	PUBLIC SUPPLY
SJ-226	ST JAMES	11/10/2008	NORANDA ALUMINA LLC	248	INDUSTRIAL

Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
SJB-175	ST JOHN THE BAPTIST	11/10/2008	E.I. DUPONT	422	INDUSTRIAL
ST-11516Z	ST TAMMANY	10/13/2008	PRIVATE OWNER	340	DOMESTIC
ST-5245Z	ST TAMMANY	10/13/2008	PRIVATE OWNER	90	DOMESTIC
TA-520	TANGIPAHOA	10/14/2008	PRIVATE OWNER	135	IRRIGATION
WA-5295Z	WASHINGTON	10/13/2008	PRIVATE OWNER	100	DOMESTIC
WA-5311Z	WASHINGTON	10/14/2008	PRIVATE OWNER	90	DOMESTIC

Table 12-2: Summary of Field and Conventional Data – FY 2009
Chicot Equivalent Aquifer System

Well Number	Temp Deg. C	pH SU	Sp. Cond. mmhos/cm	Sal. ppt	TDS g/L	Alk mg/L	Cl mg/L	Color PCU	Sp. Cond. umhos/cm	SO4 mg/L	TDS mg/L	TSS mg/L	Turb. NTU	NH3 mg/L	Hard. mg/L	Nitrite-Nitrate (as N) mg/L	TKN mg/L	Tot. P mg/L
	LABORATORY DETECTION LIMITS →					2	1.25	5	10	1.25	4	4	1	0.1	5	0.05	0.1	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AN-266	23.98	8.00	0.318	0.15	0.21	148	12.4	<5	315	3.7	217	<4	<1	0.26	43	<0.05	0.33	0.2
AN-321	21.10	8.31	0.671	0.33	0.44	159	85.4	<5	561	<1.25	334	<4	<1	0.45	23.4	<0.05	0.4	0.34
AN-337	22.94	8.24	0.590	0.29	0.38	160	88.1	<5	572	1.8	324	<4	<1	0.76	42.6	<0.05	0.72	0.24
AN-500	22.09	8.23	0.354	0.17	0.23	154	23.9	5	354	2.3	224	<4	<1	0.37	32	<0.05	0.47	0.25
AN-500*	22.09	8.23	0.354	0.17	0.23	154	23.9	5	355	2.3	226	<4	<1	0.43	32.4	<0.05	0.45	0.25
AN-6297Z	21.90	9.18	2.441	1.26	1.59	156	†675	<5	2390	<1.25	1,170	<4	<1	1.99	51.2	<0.05	2.31	<0.05
AN-9183Z	23.10	8.25	0.421	0.20	0.27	171	27.2	<5	406	2.7	280	<4	<1	<0.1	6.5	<0.05	0.33	0.17
EB-1231	20.33	6.61	0.236	0.11	0.15	66.6	28.6	<5	234	3.7	137	<4	<1	<0.1	67.6	0.07	<0.1	<0.05
EB-1231*	20.33	6.61	0.236	0.11	0.15	66.4	28.7	<5	234	3.7	142	<4	<1	<0.1	67.7	0.07	<0.1	<0.05
EB-34	22.66	7.00	0.362	0.17	0.24	175	9.9	50	342	<1.25	247	<4	16.3	0.32	51.6	<0.05	0.43	0.18
EB-8599Z	20.52	6.50	0.176	0.08	0.11	72.1	9.17	<1	183	<5	138	<4	3.58	0.706	72	<0.1	<0.5	0.113
EB-991B	22.40	7.74	0.268	0.13	0.17	129	3.2	<5	259	8.9	183	<4	<1	<0.1	12.2	<0.05	<0.1	0.12
EF-5329Z	20.24	5.97	0.044	0.02	0.03	10.3	3.2	<5	42.6	2.2	32.7	<4	<1	<0.1	13.2	0.23	<0.1	<0.05
JF-25	24.77	8.12	1.657	0.83	1.08	378	†314	†160	1649	<1.25	924	<4	<1	0.95	34.7	<0.05	1.35	0.63
JF-25*	24.77	8.12	1.657	0.83	1.08	381	†302	†160	1658	<1.25	920	<4	<1	1.08	35.6	<0.05	1.35	0.65
LI-5477Z	21.07	7.86	0.402	0.19	0.26	211	7.8	<5	402	<1.25	234	<4	<1	0.34	58.7	<0.05	0.47	0.21
LI-85	23.41	8.14	0.620	0.30	0.40	138	104	<5	614	3	360	<4	<1	0.26	62.3	<0.05	0.31	0.14
SC-179	22.18	8.02	1.842	0.94	1.20	460	†454	55	1860	<1.25	1,020	<4	<1	2.1	73.1	<0.05	2.35	0.55
SH-5333Z	21.15	6.60	0.067	0.03	0.04	21.8	7	<5	68.1	<1.25	50.7	<4	2.2	<0.1	13.3	0.06	<0.1	<0.05
SH-77	19.53	5.74	0.036	0.02	0.02	10.6	2.9	<5	35	<1.25	24	<4	5.4	<0.1	9.6	0.13	<0.1	<0.05
SH-77*	19.53	5.74	0.036	0.02	0.02	10.4	2.9	<5	34.1	<1.25	26.7	<4	5.8	<0.1	9.8	0.13	<0.1	<0.05

Well Number	Temp Deg. C	pH SU	Sp. Cond. mmhos/cm	Sal. ppt	TDS g/L	Alk mg/L	Cl mg/L	Color PCU	Sp. Cond. umhos/cm	SO4 mg/L	TDS mg/L	TSS mg/L	Turb. NTU	NH3 mg/L	Hard. mg/L	Nitrite-Nitrate (as N) mg/L	TKN mg/L	Tot. P mg/L
	LABORATORY DETECTION LIMITS →					2	1.25	5	10	1.25	4	4	1	0.1	5	0.05	0.1	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
SJ-226	19.33	7.76	0.700	0.34	0.46	204	91.2	6	708	23	388	<4	2.6	0.89	186	<0.05	1.02	0.66
SJB-175	21.43	7.97	1.716	0.87	1.12	396	†317	15	1,728	<1.25	972	<4	<1	1.55	169	<0.05	1.73	0.28
SJB-175*	21.43	7.97	1.716	0.87	1.12	399	†318	15	1,731	<1.25	964	<4	<1	1.59	169	<0.05	1.65	0.28
ST-11516Z	22.15	7.54	0.293	0.14	0.19	145	8.6	<5	293	2.5	172	<4	1.2	0.14	19.2	0.06	0.1	0.32
ST-11516Z*	22.15	7.54	0.293	0.14	0.19	144	8.6	<5	294	2.6	175	<4	1.4	0.13	18.6	0.05	0.16	0.33
ST-5245Z	20.60	6.06	0.043	0.02	0.03	7.4	4.3	<5	38.3	<1.25	34.7	<4	<1	<0.1	9.8	0.52	<0.1	<0.05
TA-520	20.63	5.18	0.035	0.01	0.02	2.3	4	<5	33.3	<1.25	40	<4	<1	<0.1	6.6	1.15	<0.1	<0.05
WA-5295Z	21.37	5.99	0.032	0.01	0.02	9	2.6	<5	30.3	<1.25	29.3	<4	<1	<0.1	6.2	<0.05	<0.1	<0.05
WA-5311Z	21.45	5.32	0.028	0.01	0.02	<2	3.7	<5	25.8	<1.25	32.7	<4	<1	<0.1	<5	0.63	<0.1	<0.05

*Denotes Duplicate Sample   Shaded cells exceed EPA Secondary Standards   †Reported from a dilution

Table 12-3: Summary of Inorganic Data – FY 2009
Chicot Equivalent Aquifer System

Well Number	Antimony ug/L	Arsenic ug/L	Barium ug/L	Beryllium ug/L	Cadmium ug/L	Chromium ug/L	Copper ug/L	Iron ug/L	Lead ug/L	Mercury ug/L	Nickel ug/L	Selenium ug/L	Silver ug/L	Thallium ug/L	Zinc ug/L
Laboratory Detection Limits	1	3	2	1	0.5	3	3	20	3	0.05	3	4	0.5	1	10
AN-266	<1	<3	109.0	<1	<0.5	<3	<3	151.0	<3	<0.05	<3	<4	<0.5	<1	<10
AN-321	<1	<3	98.4	<1	<0.5	<3	<3	128.0	<3	<0.05	<3	<4	<0.5	<1	23.2
AN-337	<1	<3	141.0	<1	<0.5	<3	<3	86.5	<3	<0.05	<3	<4	<0.5	<1	<10
AN-500	<1	<3	108.0	<1	<0.5	<3	<3	90.8	<3	<0.05	<3	<4	<0.5	<1	145
AN-500*	<1	<3	111.0	<1	<0.5	<3	<3	96.1	<3	<0.05	<3	<4	<0.5	<1	139
AN-6297Z	<1	<3	173.0	<1	<0.5	<3	<3	36.8	<3	<0.05	<3	<4	<0.5	<1	<10
AN-9183Z	<1	<3	33.2	<1	<0.5	<3	15.1	<20	<3	<0.05	<3	<4	<0.5	<1	<10
EB-1231	<1	<3	131.0	<1	<0.5	<3	<3	69.6	<3	0.05	<3	<4	<0.5	<1	<10
EB-1231*	<1	<3	127.0	<1	<0.5	<3	<3	48.4	<3	<0.05	<3	<4	<0.5	<1	<10
EB-34	<1	<3	165.0	<1	<0.5	<3	3.3	4,480	<3	<0.05	<3	<4	<0.5	<1	<10
EB-8599Z	<0.1	<0.5	210.0	<0.2	<0.08	<0.5	0.67	442	<0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<5
EB-991B	<1	<3	28.0	<1	<0.5	<3	<3	95.7	<3	<0.05	<3	<4	<0.5	<1	<10
EF-5329Z	<1	<3	21.0	<1	<0.5	<3	19.8	<20	<3	<0.05	<3	<4	<0.5	<1	66.9
JF-25	<1	<3	186.0	<1	<0.5	<3	3.6	179.0	<3	0.05	<3	<4	<0.5	<1	<10
JF-25*	<1	<3	186.0	<1	<0.5	<3	<3	176.0	<3	0.06	<3	<4	<0.5	<1	<10
LI-5477Z	<1	<3	92.5	<1	<0.5	<3	<3	33.5	<3	<0.05	<3	<4	<0.5	<1	<10
LI-85	<1	<3	190.0	<1	<0.5	<3	<3	65.1	<3	<0.05	<3	<4	<0.5	<1	<10
SC-179	<1	<3	95.4	<1	<0.5	<3	<3	269.0	<3	<0.05	<3	<4	<0.5	<1	<10
SH-5333Z	<1	<3	71.8	<1	<0.5	<3	110	<20	5.5	0.07	<3	<4	<0.5	<1	27.3
SH-77	<1	<3	18.6	<1	<0.5	<3	<3	2,170	<3	0.06	<3	<4	<0.5	<1	16.7
SH-77*	<1	<3	18.4	<1	<0.5	<3	<3	2,090	<3	0.05	<3	<4	<0.5	<1	17.5
SJ-266	<1	13.5	305.0	<1	<0.5	6.2	33.9	13,400	9.7	0.05	70.5	<4	<0.5	<1	94.1
SJB-175	<1	<3	385.0	<1	<0.5	<3	<3	533.0	<3	0.05	<3	<4	<0.5	<1	<10

Well Number	Antimony ug/L	Arsenic ug/L	Barium ug/L	Beryllium ug/L	Cadmium ug/L	Chromium ug/L	Copper ug/L	Iron ug/L	Lead ug/L	Mercury ug/L	Nickel ug/L	Selenium ug/L	Silver ug/L	Thallium ug/L	Zinc ug/L
Laboratory Detection Limits	1	3	2	1	0.5	3	3	20	3	0.05	3	4	0.5	1	10
SJB-175*	<1	<3	397.0	<1	<0.5	<3	<3	548.0	<3	0.06	<3	<4	<0.5	<1	<10
ST-11516Z	<1	<3	61.3	<1	<0.5	<3	<3	128.0	<3	0.05	<3	<4	<0.5	<1	<10
ST-11516Z*	<1	<3	60.0	<1	<0.5	<3	<3	72.6	<3	0.06	<3	<4	<0.5	<1	<10
ST-5245Z	<1	<3	56.8	<1	<0.5	<3	<3	1,190	<3	0.24	<3	<4	<0.5	<1	<10
TA-520	<1	<3	35.7	<1	<0.5	<3	6.9	<20	<3	0.07	<3	<4	<0.5	<1	10.4
WA-5295Z	<1	<3	68.2	<1	<0.5	<3	3.7	<20	<3	<0.05	<3	<4	<0.5	<1	<10
WA-5311Z	<1	<3	14.7	<1	<0.5	<3	9.4	<20	<3	0.05	<3	<4	<0.5	<1	13.5

*Denotes Duplicate Sample. Red shaded cells exceed EPA Primary Standards Rose haded cells exceed EPA Secondary Standards

Table 12-4: FY 2009 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	19.33	24.77	21.69
	pH (SU)	5.18	9.18	7.28
	Specific Conductance (mmhos/cm)	0.028	2.441	0.59
	Salinity (ppt)	0.01	1.26	0.29
	TDS (g/L)	0.018	1.587	0.38
LABORATORY	Alkalinity (mg/L)	<2	460	151.33
	Chloride (mg/L)	2.6	675	99.04
	Color (PCU)	<1	160	17.38
	Specific Conductance (umhos/cm)	25.8	2390	581.65
	Sulfate (mg/L)	<1.25	23	2.50
	TDS (mg/L)	24	1170	334.06
	TSS (mg/L)	<4	<4	<4
	Turbidity (NTU)	<1	16.3	1.65
	Ammonia, as N (mg/L)	<0.1	2.1	0.50
	Hardness (mg/L)	<5	186.0	46.65
	Nitrite - Nitrate, as N (mg/L)	<0.05	1.15	0.12
	TKN (mg/L)	<0.1	2.35	0.56
	Total Phosphorus (mg/L)	<0.05	0.66	0.21

Table 12-5: FY 2009 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	<1	<1	<1
Arsenic (ug/L)	<3	13.5	<3
Barium (ug/L)	14.7	397	123.3
Beryllium (ug/L)	<1	<1	<1
Cadmium (ug/L)	<0.5	<0.5	<0.5
Chromium (ug/L)	<3	6.2	<3
Copper (ug/L)	<3	110	7.9
Iron (ug/L)	<20	13,400	888
Lead (ug/L)	<3	9.7	<3
Mercury (ug/L)	<0.05	0.24	<0.05
Nickel (ug/L)	<3	70.5	3.8
Selenium (ug/L)	<4	<4	<4
Silver (ug/L)	<0.5	<0.5	<0.5
Thallium (ug/L)	<1	<1	<1
Zinc (ug/L)	<10	145	21.7

Table 12-6: Triennial Field and Conventional Statistics, ASSET Wells

	PARAMETER	FY 1997 AVERAGE	FY 2000 AVERAGE	FY 2003 AVERAGE	FY 2006 AVERAGE	FY 2009 AVERAGE
FIELD	Temperature (^{O}C)	21.17	21.90	21.86	22.40	21.69
	pH (SU)	7.09	7.23	7.16	7.16	7.28
	Specific Conductance (mmhos/cm)	0.618	0.692	0.669	0.54	0.59
	Salinity (Sal.) (ppt)	0.32	0.30	0.33	0.27	0.29
	TDS (Total dissolved solids) (g/L)	-	-	-	0.35	0.38
LABORATORY	Alkalinity (Alk.) (mg/L)	160.8	165.8	157.7	151.4	151.33
	Chloride (Cl) (mg/L)	108.6	125.3	120.2	104.1	99.04
	Color (PCU)	18.0	21.8	18.0	18.5	17.38
	Specific Conductance (umhos/cm)	623.9	711.6	652.8	629.9	581.65
	Sulfate (SO4) (mg/L)	3.15	2.71	2.74	2.93	2.50
	TDS (Total dissolved solids) (mg/L)	393.7	415.8	364.8	372.3	334.06
	TSS (Total suspended solids) (mg/L)	<4	<4	<4	<4	<4
	Turbidity (Turb.) (NTU)	<1	2.30	1.92	2.15	1.65
	Ammonia, as N (NH3) (mg/L)	0.58	0.51	0.70	0.58	0.50
	Hardness (mg/L)	46.5	49.1	46.2	44.6	46.65
	Nitrite - Nitrate , as N (mg/L)	0.15	0.15	0.14	0.16	0.12
	TKN (mg/L)	0.89	0.73	0.94	0.67	0.56
	Total Phosphorus (P) (mg/L)	0.21	0.22	0.14	0.21	0.21

Table 12-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	FY 1997 AVERAGE	FY 2000 AVERAGE	FY 2003 AVERAGE	FY 2006 AVERAGE	FY 2009 AVERAGE
Antimony (ug/L)	5.3	<5	<5	<10	<1
Arsenic (ug/L)	<5	<5	<5	<10	<3
Barium (ug/L)	107.1	140.6	146.0	130.9	123.3
Beryllium (ug/L)	<1	<1	<1	<1	<1
Cadmium (ug/L)	<1	<1	<1	<1	<0.5
Chromium (ug/L)	<5	<5	<5	<5	<3
Copper (ug/L)	19.6	10.8	15.4	<10	7.9
Iron (ug/L)	230.0	370.9	641.3	848.6	888.0
Lead (ug/L)	<10	<10	<10	<10	<3
Mercury (ug/L)	<0.05	0.06	<0.05	<0.05	<0.05
Nickel (ug/L)	<5	<5	<5	<5	3.8
Selenium (ug/L)	<5	<5	<5	<5	<4
Silver (ug/L)	<1	<1	<1	<10	<0.5
Thallium (ug/L)	<5	<5	<5	<5	<1
Zinc (ug/L)	32.2	32.0	37.9	21.3	21.7

Table 12-8: VOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
1,1-Dichloroethane	624	2
1,1-Dichloroethene	624	2
1,1,1-Trichloroethane	624	2
1,1,2-Trichloroethane	624	2
1,1,2,2-Tetrachloroethane	624	2
1,2-Dichlorobenzene	624	2
1,2-Dichloroethane	624	2
1,2-Dichloropropane	624	2
1,3- Dichlorobenzene	624	2
1,4-Dichlorobenzene	624	2
Benzene	624	2
Bromoform	624	2
Carbon tetrachloride	624	2
Chlorobenzene	624	2
Dibromochloromethane	624	2
Chloroethane	624	2
trans-1,2-Dichloroethene	624	2
cis-1,3-Dichloropropene	624	2
Bromodichloromethane	624	2
Methylene chloride	624	2
Ethyl benzene	624	2
Bromomethane	624	2
Chloromethane	624	2
o-Xylene	624	2
Styrene	624	2
Methylt-butyl ether	624	2
Tetrachloroethene	624	2
Toluene	624	2
trans-1,3-Dichloropropene	624	2
Trichloroethene	624	2
Trichlorofluoromethane	624	2
Chloroform	624	2
Vinyl chloride	624	2
Xylenes, m & p	624	4

Table 12-9: SVOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
1,2-Dichlorobenzene	625	10
1,2,3-Trichlorobenzene	625	10
1,2,3,4-Tetrachlorobenzene	625	10
1,2,4-Trichlorobenzene	625	10
1,2,4,5-Tetrachlorobenzene	625	10
1,3-Dichlorobenzene	625	10
1,3,5-Trichlorobenzene	625	10
1,4-Dichlorobenzene	625	10
2-Chloronaphthalene	625	10
2-Chlorophenol	625	20
2-Methyl-4,6-dinitrophenol	625	20
2-Nitrophenol	625	20
2,4-Dichlorophenol	625	20
2,4-Dimethylphenol	625	20
2,4-Dinitrophenol	625	20
2,4-Dinitrotoluene	625	10
2,4,6-Trichlorophenol	625	20
2,6-Dinitrotoluene	625	10
3,3'-Dichlorobenzidine	625	10
4-Bromophenyl phenyl ether	625	10
4-Chloro-3-methylphenol	625	20
4-Chlorophenyl phenyl ether	625	10
4-Nitrophenol	625	20
Acenaphthene	625	10
Acenaphthylene	625	10
Anthracene	625	10
Benzidine	625	20
Benzo[a]pyrene	625	10
Benzo[k]fluoranthene	625	10
Benzo[a]anthracene	625	10
Benzo[b]fluoranthene	625	10
Benzo[g,h,i]perylene	625	10
Bis(2-chloroethoxy)methane	625	10
Bis(2-ethylhexyl)phthalate	625	10
Bis(2-chloroethyl)ether	625	10
Bis(2-chloroisopropyl)ether	625	10

Table 12-9: SVOCs (Continued)

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
Butylbenzylphthalate	625	10
Chrysene	625	10
Dibenzo[a,h]anthracene	625	10
Diethylphthalate	625	10
Dimethylphthalate	625	10
Di-n-butylphthalate	625	10
Di-n-octylphthalate	625	10
Fluoranthene	625	10
Fluorene	625	10
Hexachlorobenzene	625	10
Hexachlorobutadiene	625	10
Hexachlorocyclopentadiene	625	10
Hexachloroethane	625	10
Indeno[1,2,3-cd]pyrene	625	10
Isophorone	625	10
Naphthalene	625	10
Nitrobenzene	625	10
N-Nitrosodimethylamine	625	10
N-Nitrosodiphenylamine	625	10
N-nitroso-di-n-propylamine	625	10
Pentachlorobenzene	625	10
Pentachlorophenol	625	20
Phenanthrene	625	10
Phenol	625	20
Pyrene	625	10

Table 12-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS (ug/L)
4,4'-DDD	608	0.05
4,4'-DDE	608	0.05
4,4'-DDT	608	0.05
Aldrin	608	0.05
Alpha-Chlordane	608	0.05
alpha-BHC	608	0.05
beta-BHC	608	0.05
delta-BHC	608	0.05
gamma-BHC	608	0.05
Chlordane	608	0.2
Dieldrin	608	0.05
Endosulfan I	608	0.05
Endosulfan II	608	0.05
Endosulfan Sulfate	608	0.05
Endrin	608	0.05
Endrin Aldehyde	608	0.05
Endrin Ketone	608	0.05
Heptachlor	608	0.05
Heptachlor Epoxide	608	0.05
Methoxychlor	608	0.05
Toxaphene	608	2
Gamma-Chlordane	608	0.05
PCB-1016	608	1
PCB-1221	608	1
PCB-1232	608	1
PCB-1242	608	1
PCB-1248	608	1
PCB-1254	608	1
PCB-1260	608	1

Figure 12-1: Location Plat, Chicot Equivalent Aquifer System

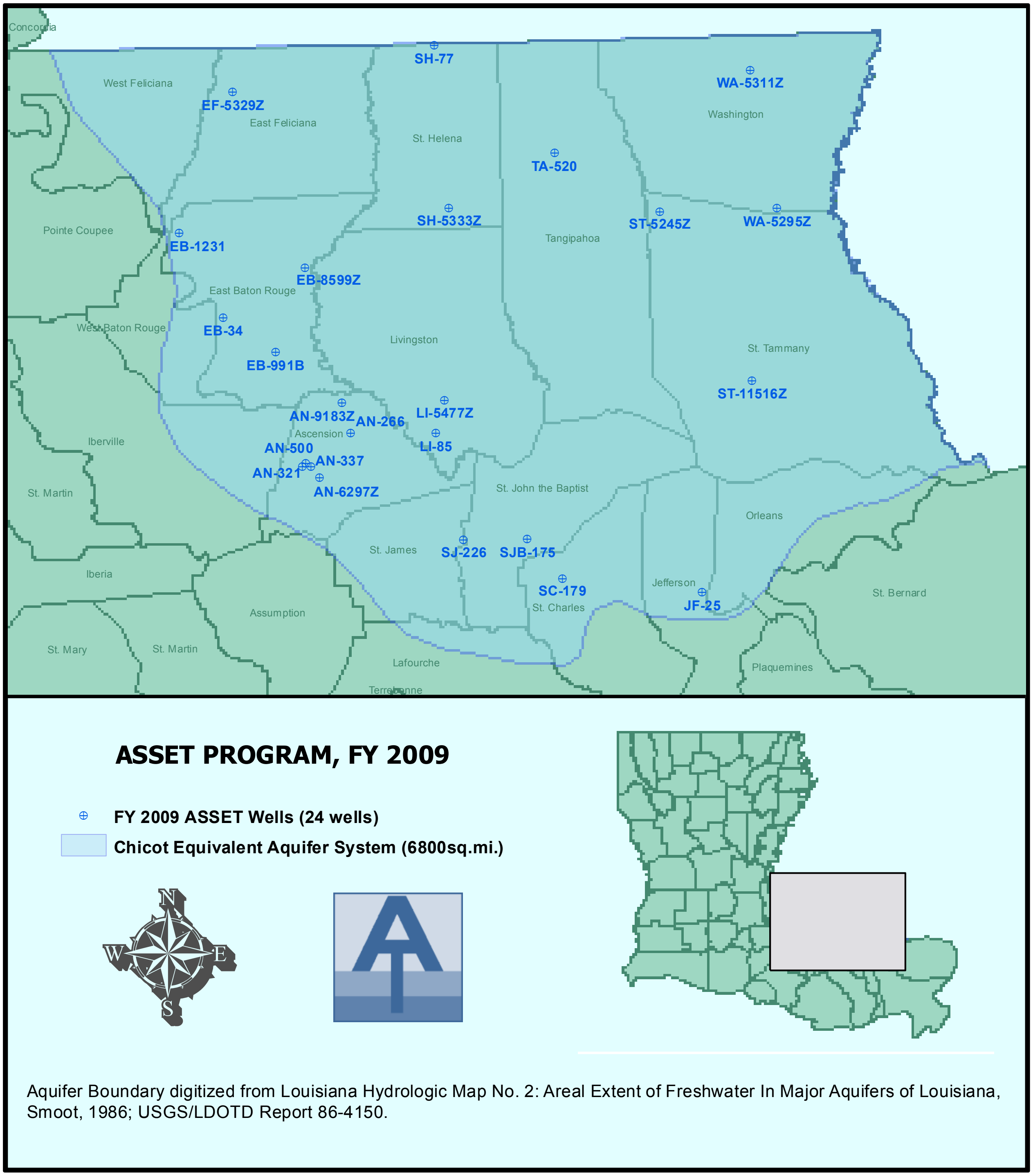

Figure 12-2: Map of pH Data

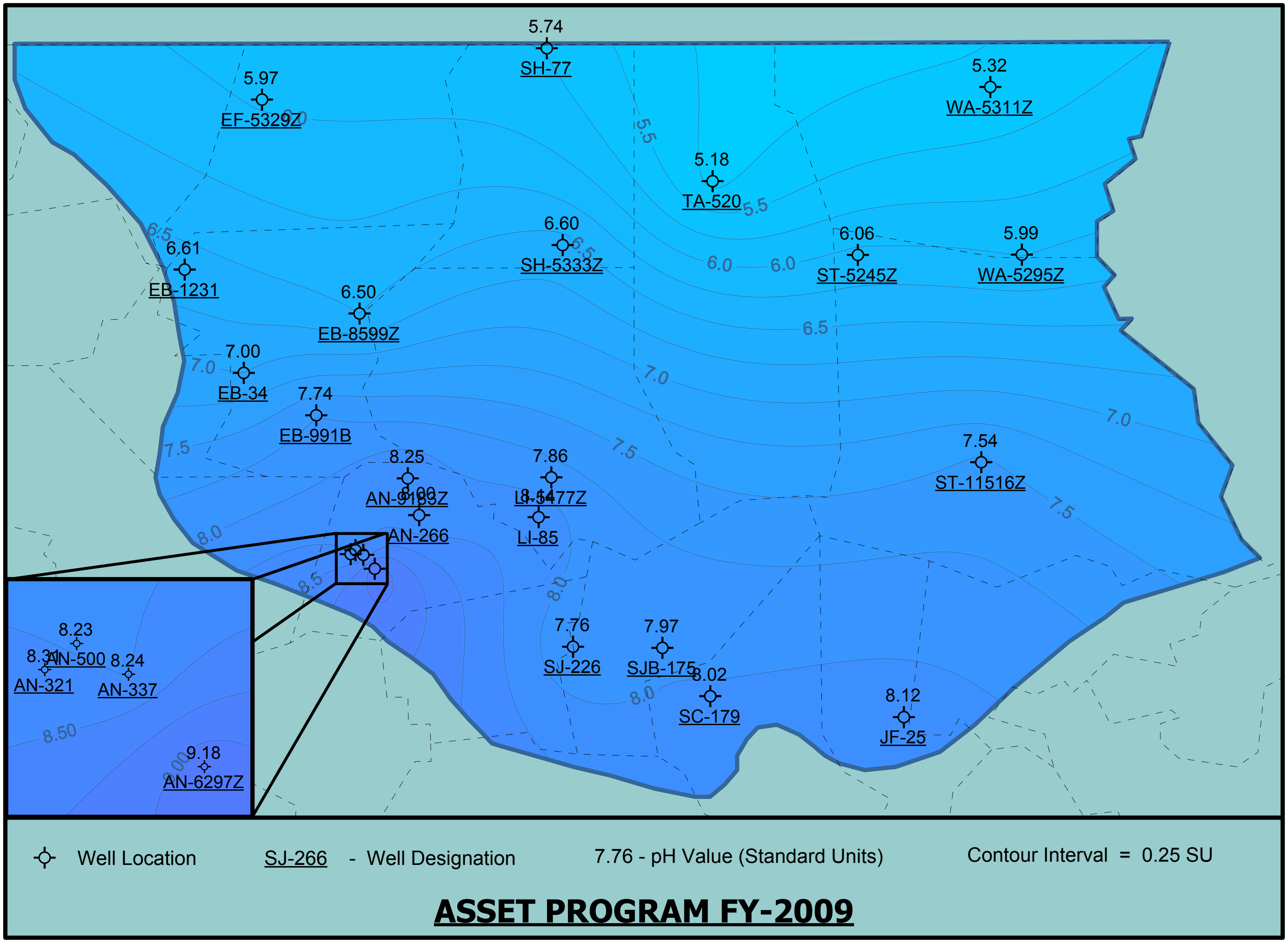

Figure 12-3: Map of TDS Lab Data

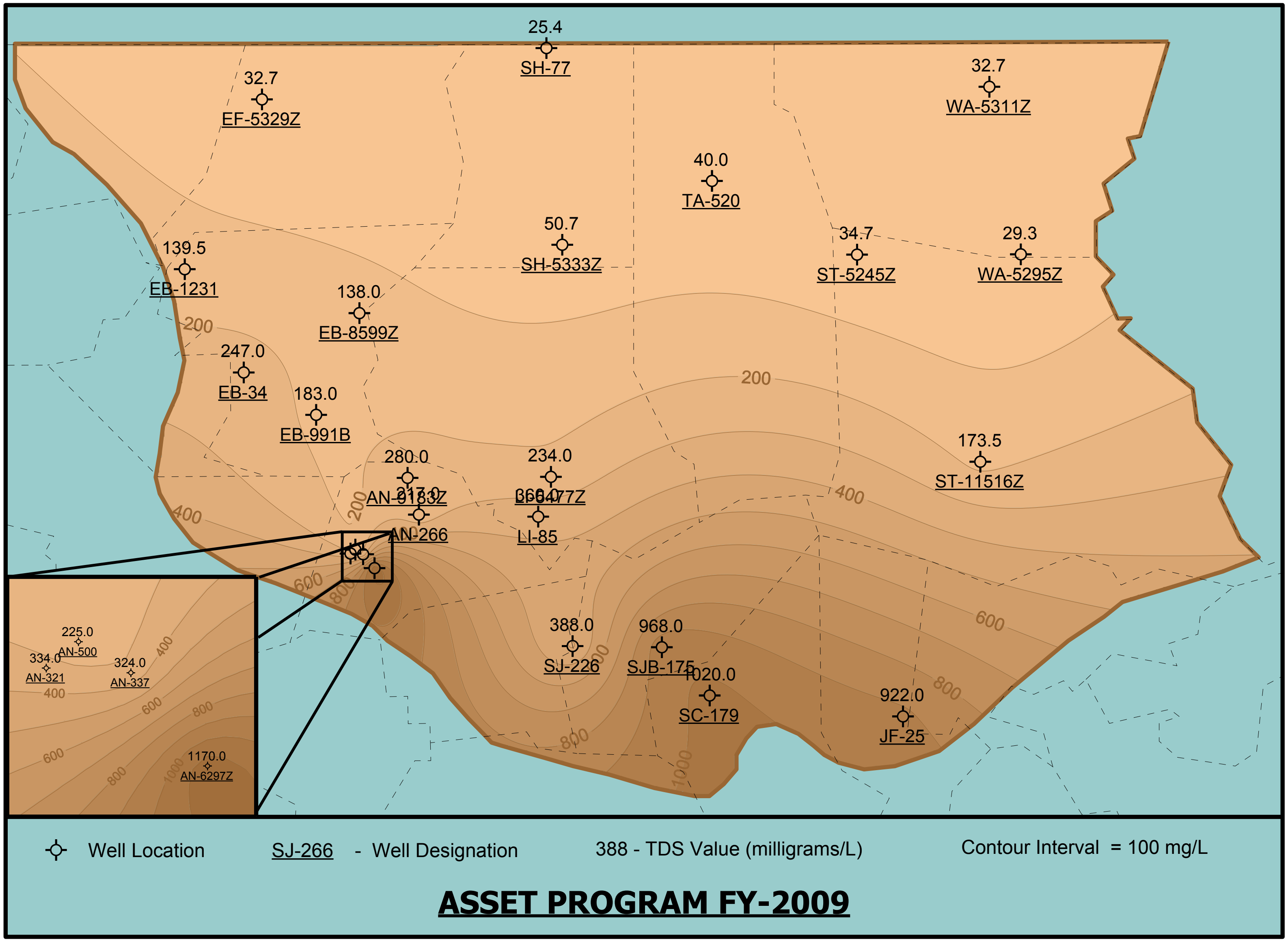

Figure 12-4: Map of Chloride Data

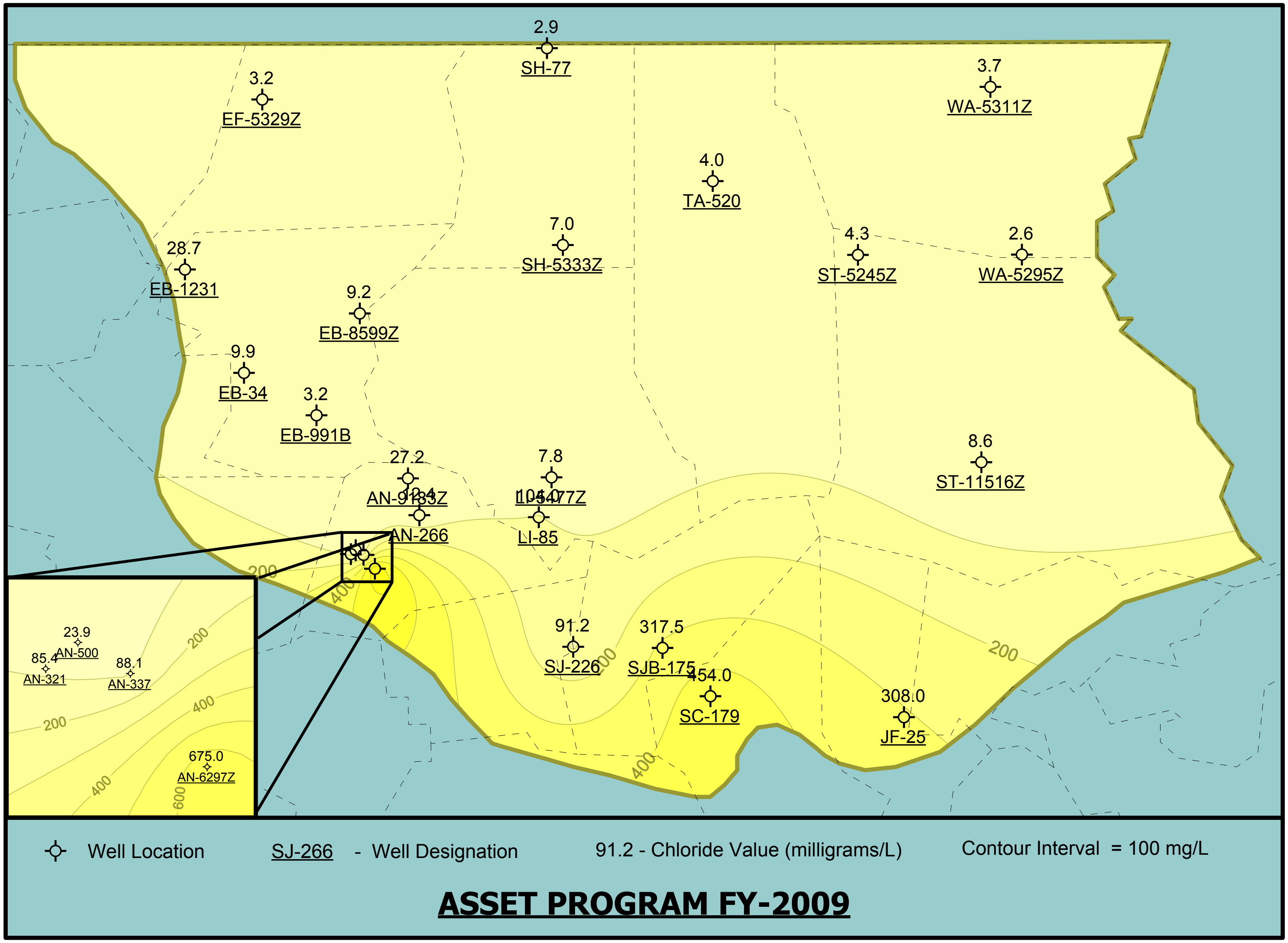

Figure 12-5: Map of Iron Data

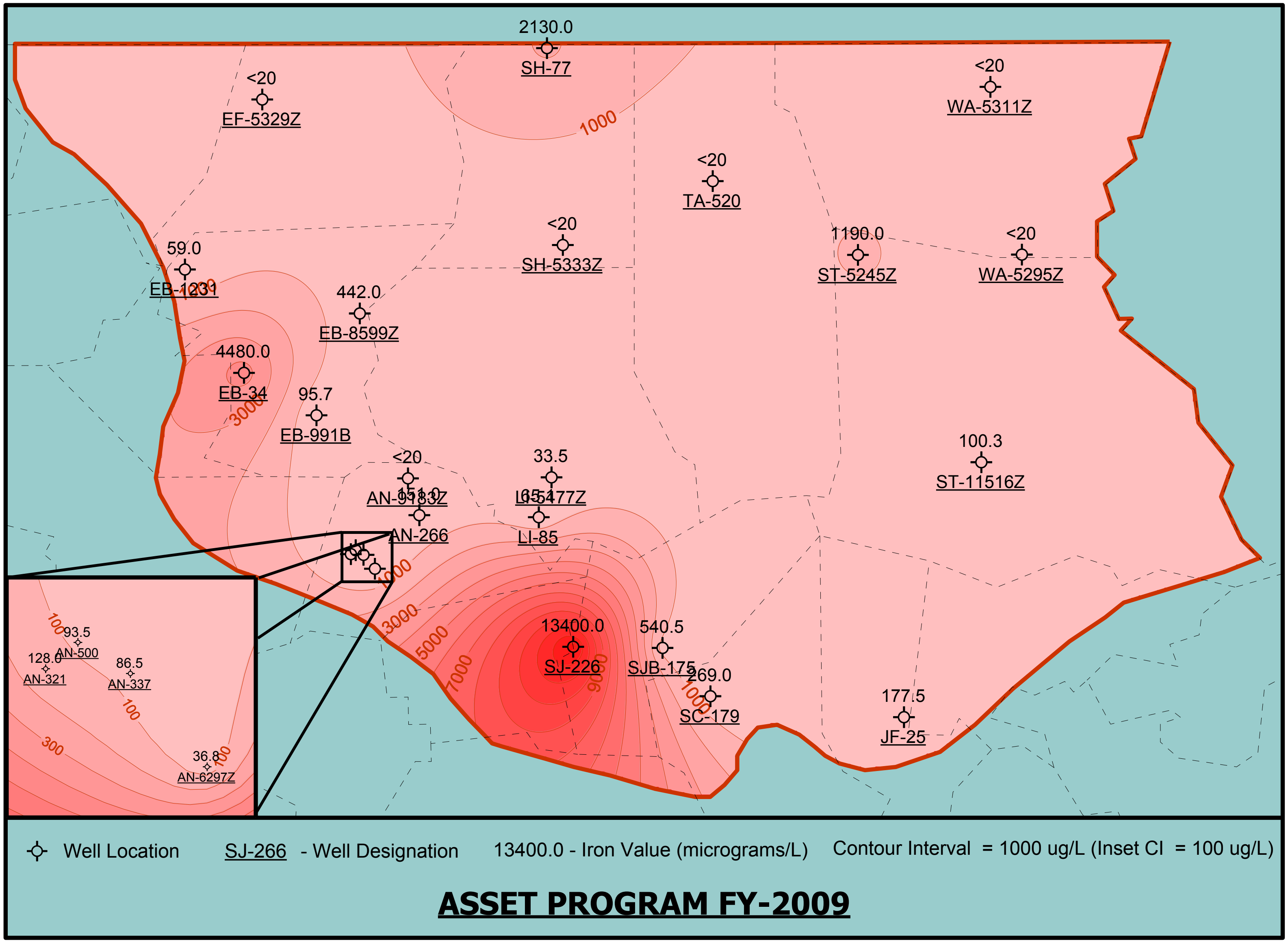

Chart 12-1: Temperature Trend

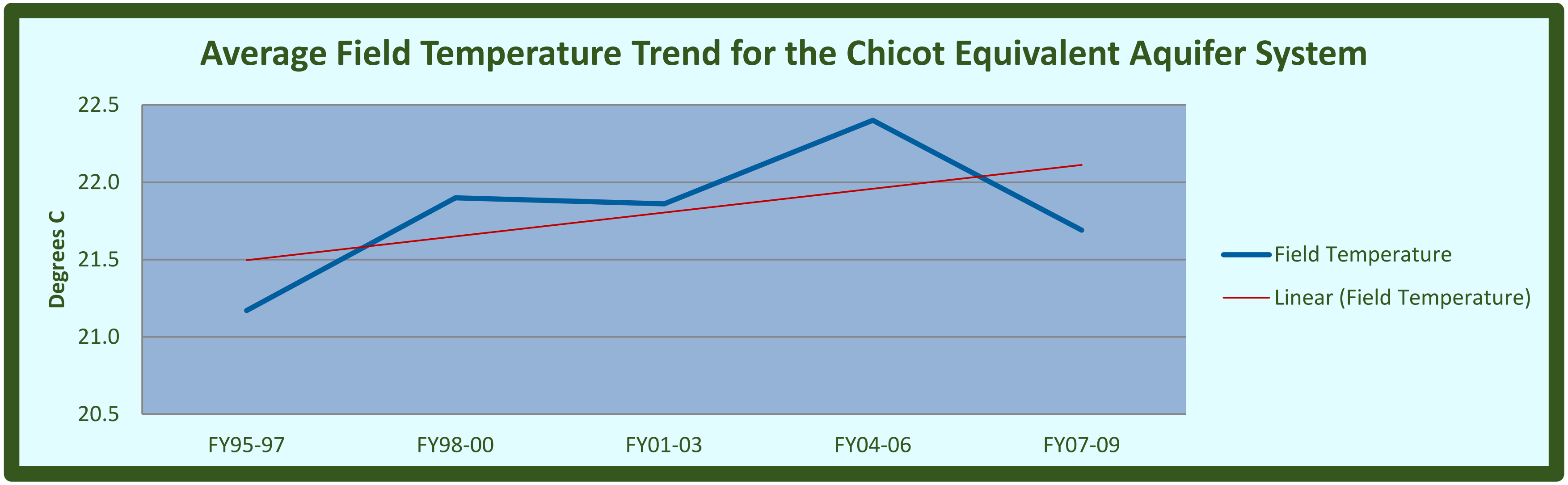

Chart 12-2: pH Trend

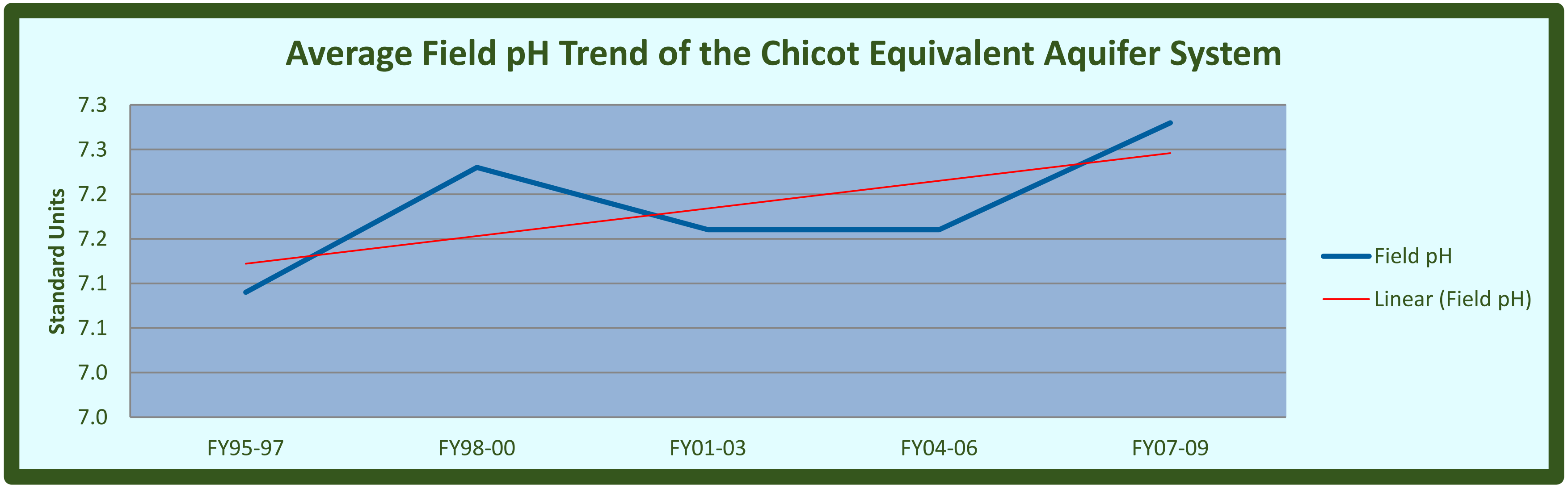

Chart 12-3: Field Specific Conductance Trend

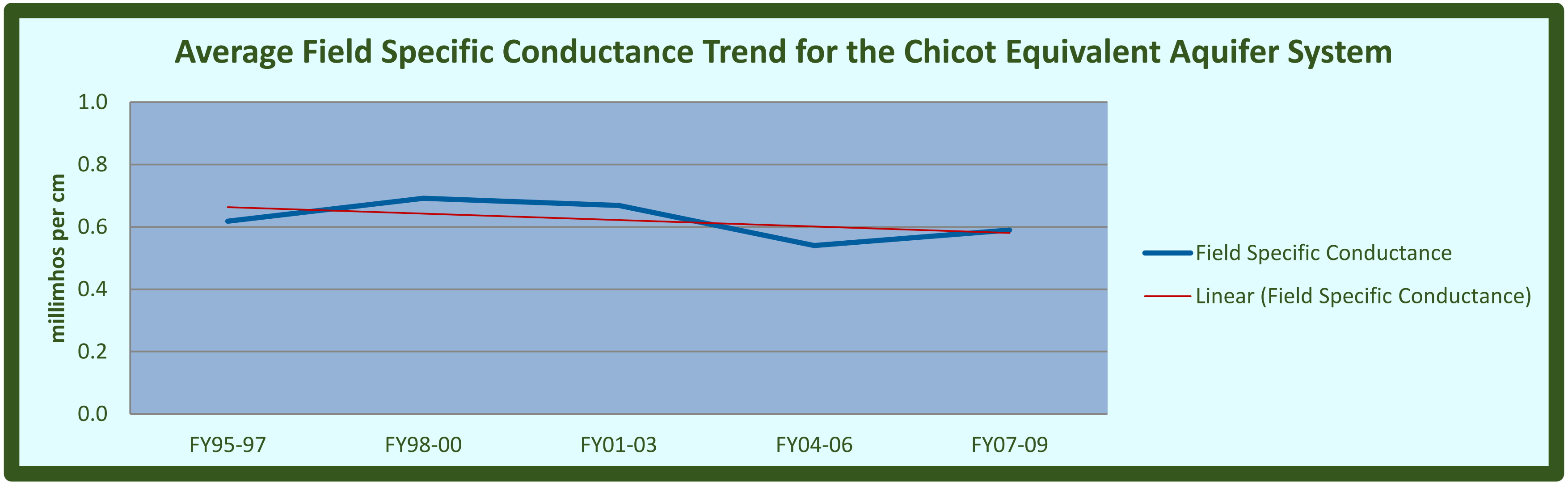

Chart 12-4: Lab Specific Conductance Trend

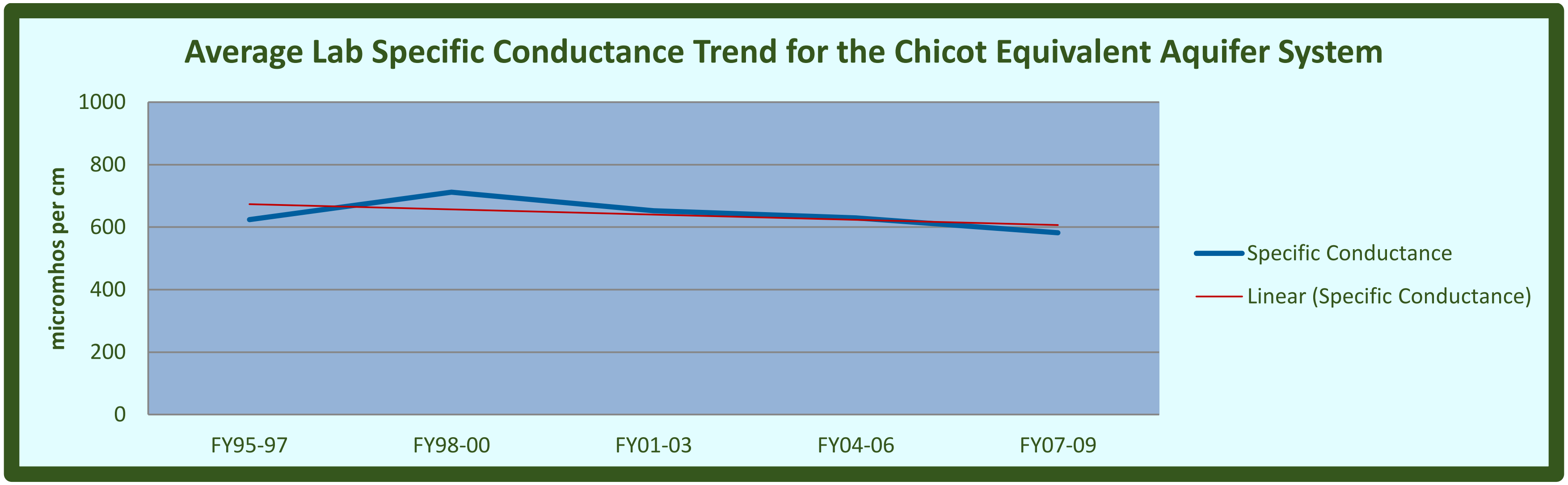

Chart 12-5: Field Salinity Trend

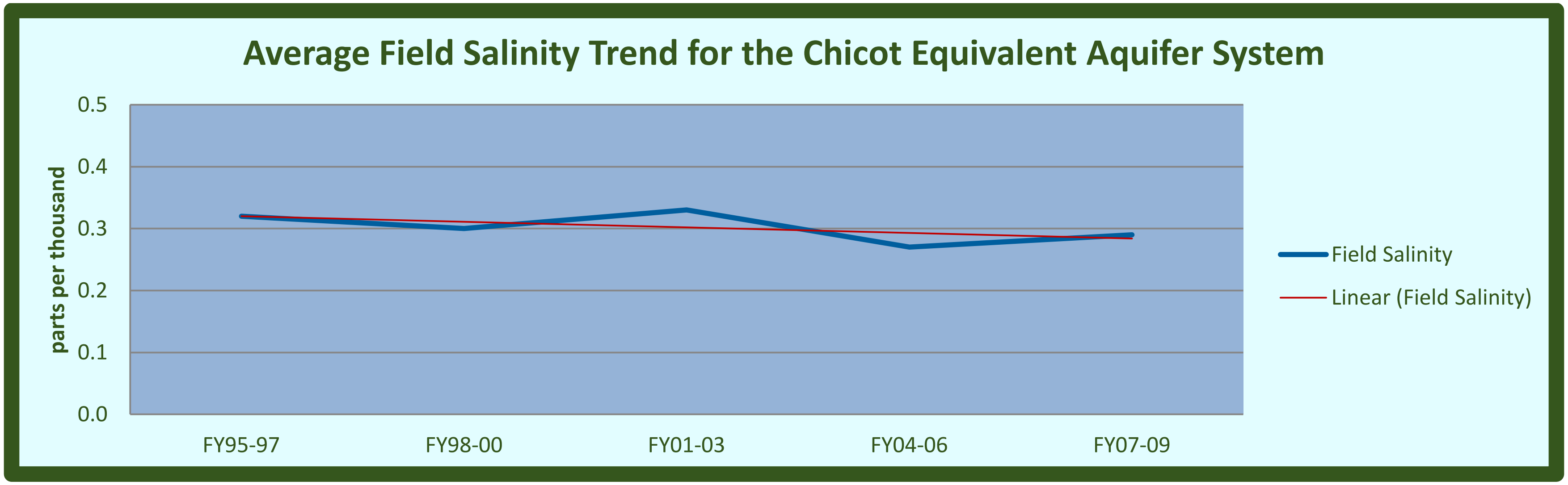

Chart 12-6: Alkalinity Trend

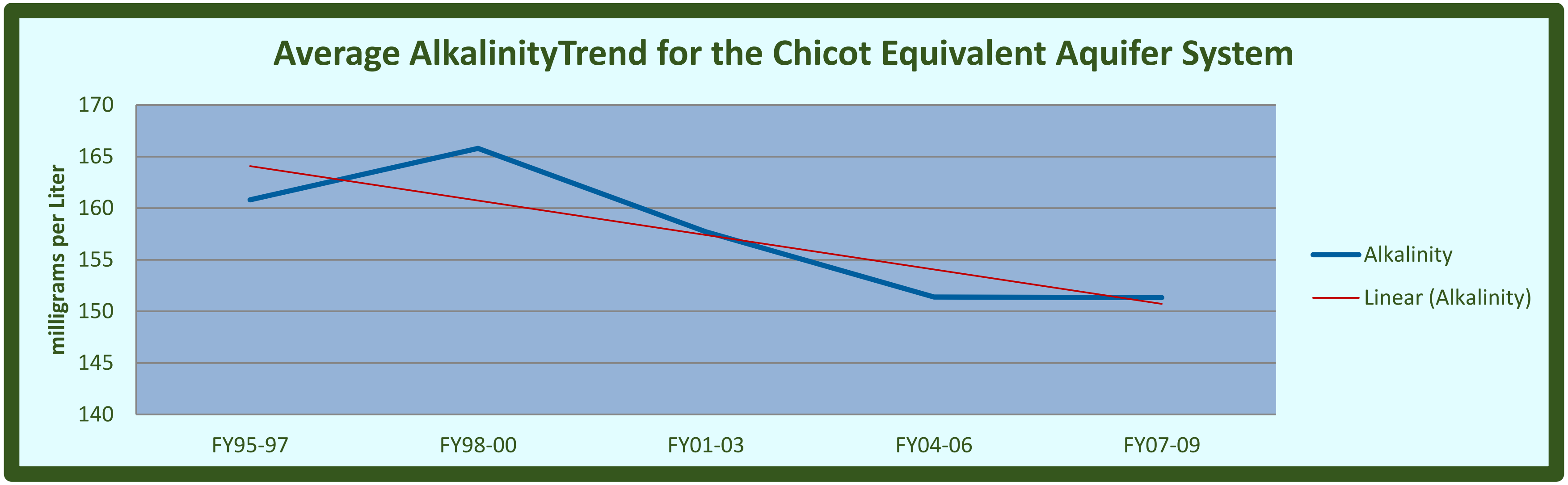

Chart 12-7: Chloride Trend

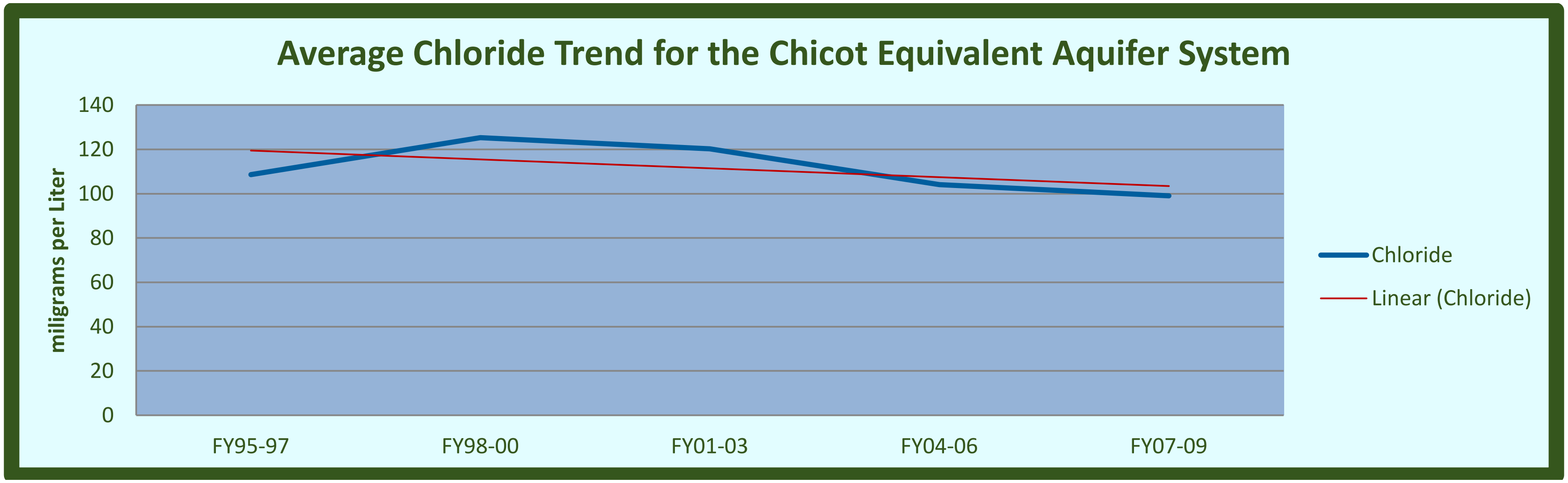

Chart 12-8: Color Trend

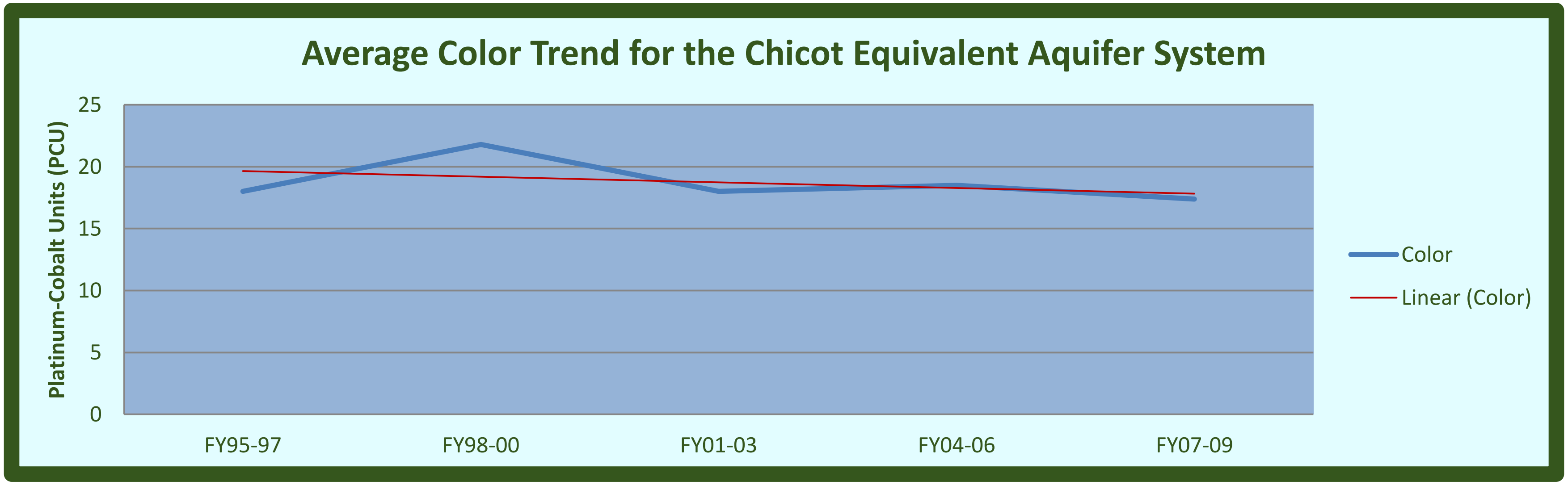

Chart 12-9: Sulfate (SO4) Trend

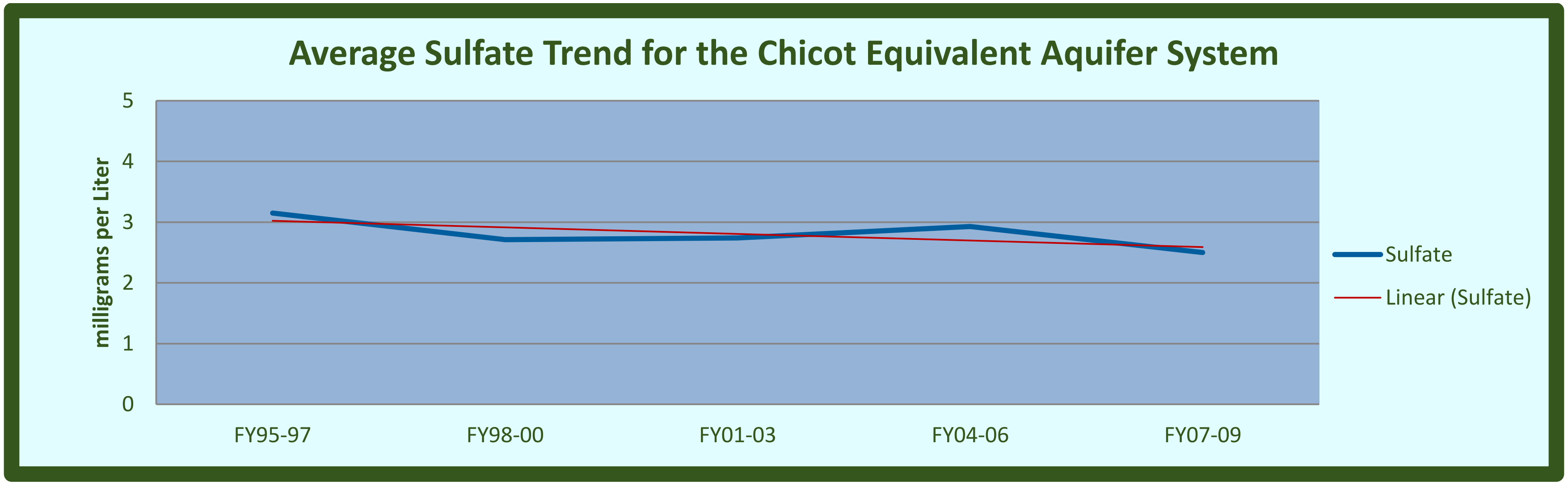

Chart 12-10: Total Dissolved Solids (TDS) Trend

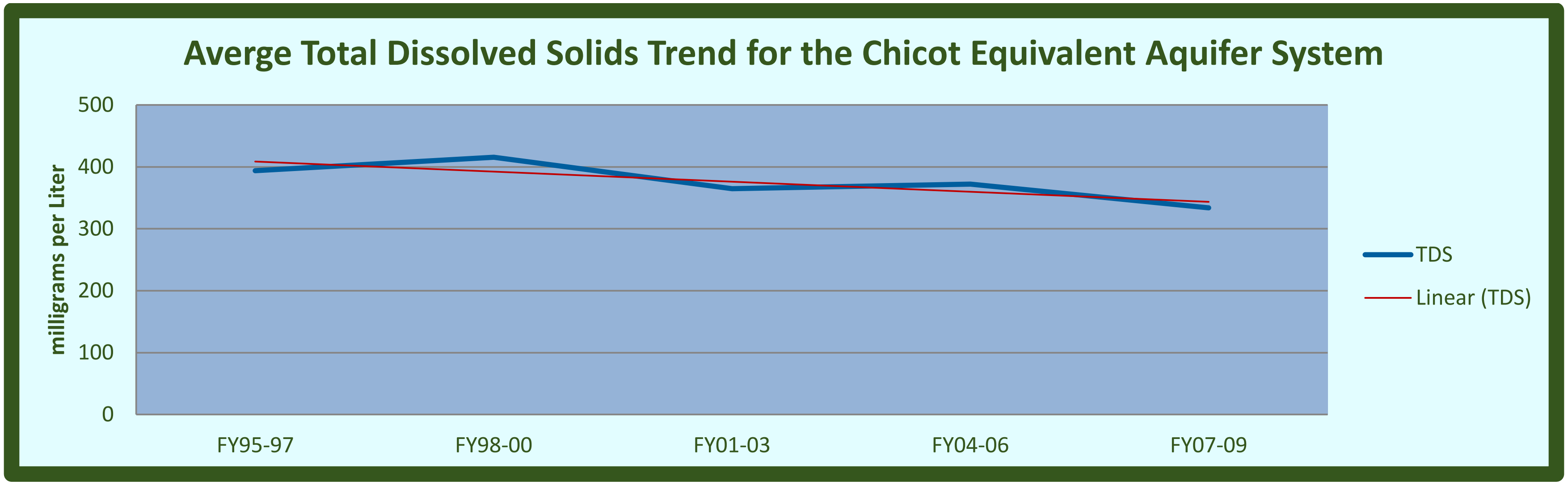

Chart 12-11: Ammonia (NH3) Trend

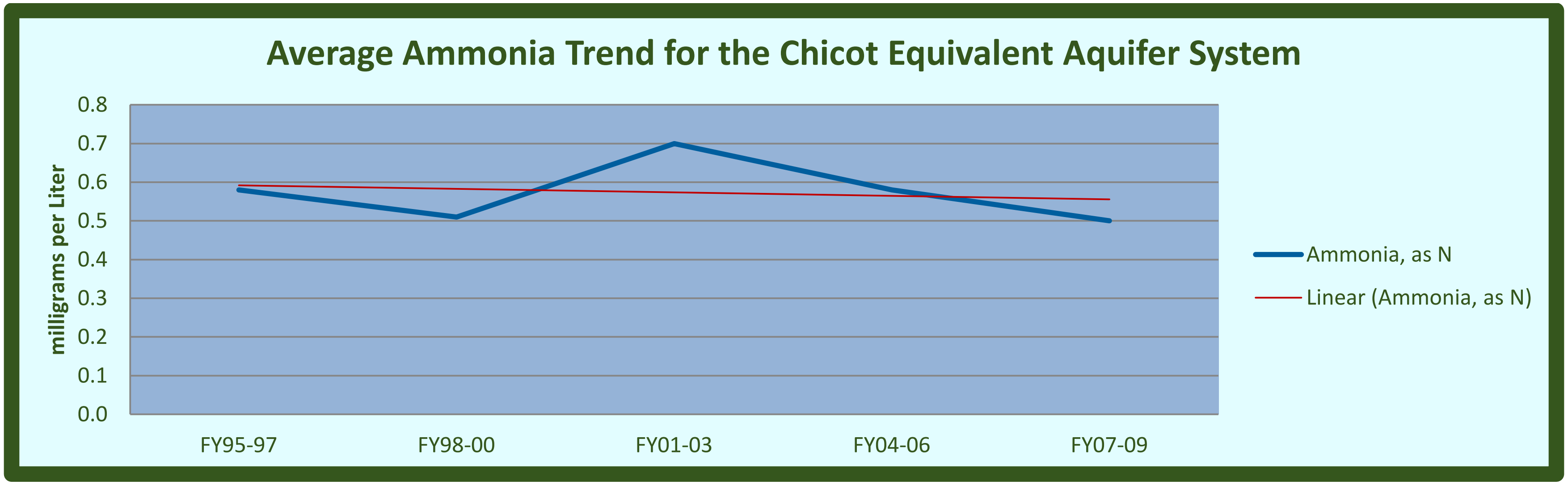

Chart 12-12: Hardness Trend

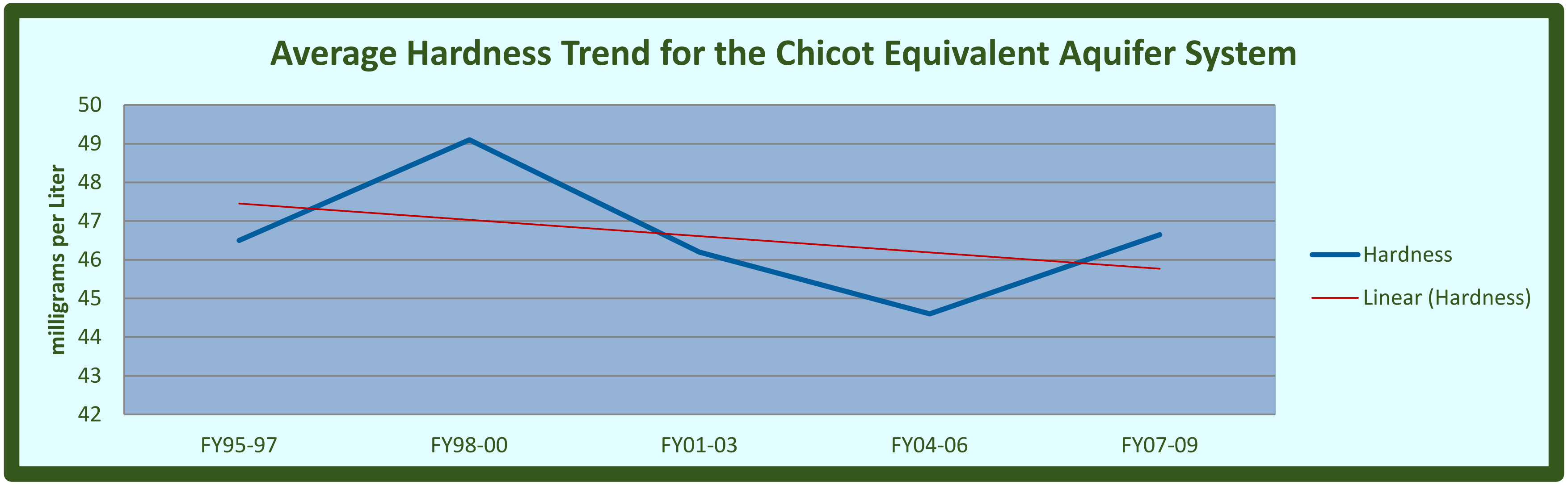

Chart 1-13: Nitrite – Nitrate Trend

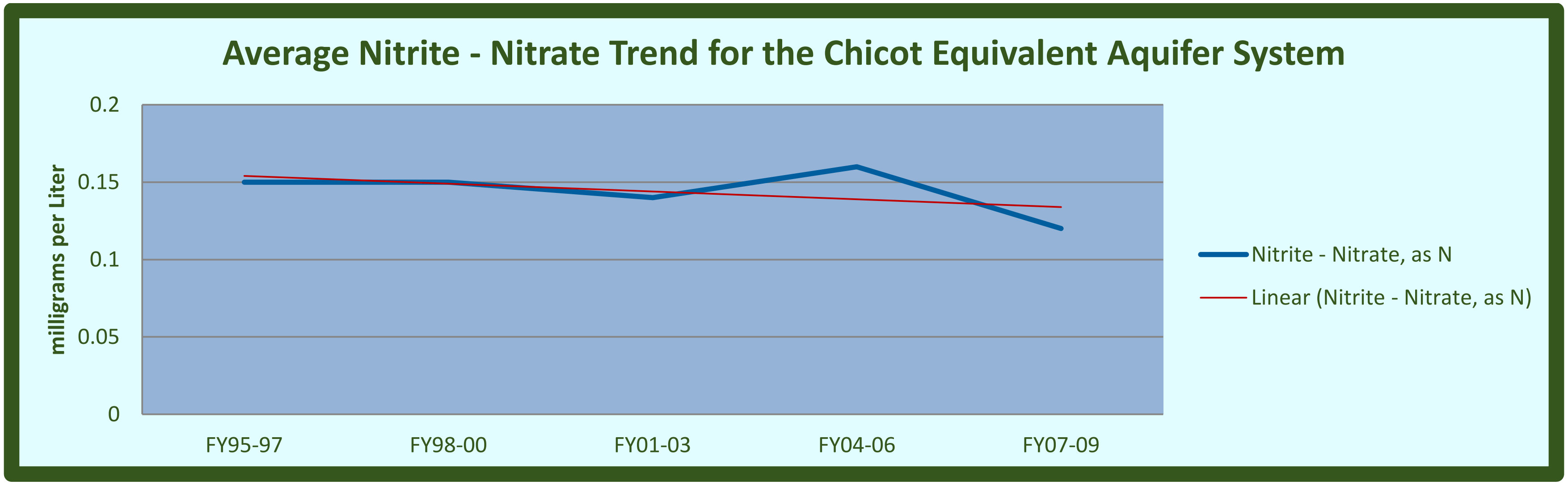

Chart 12-14: TKN Trend

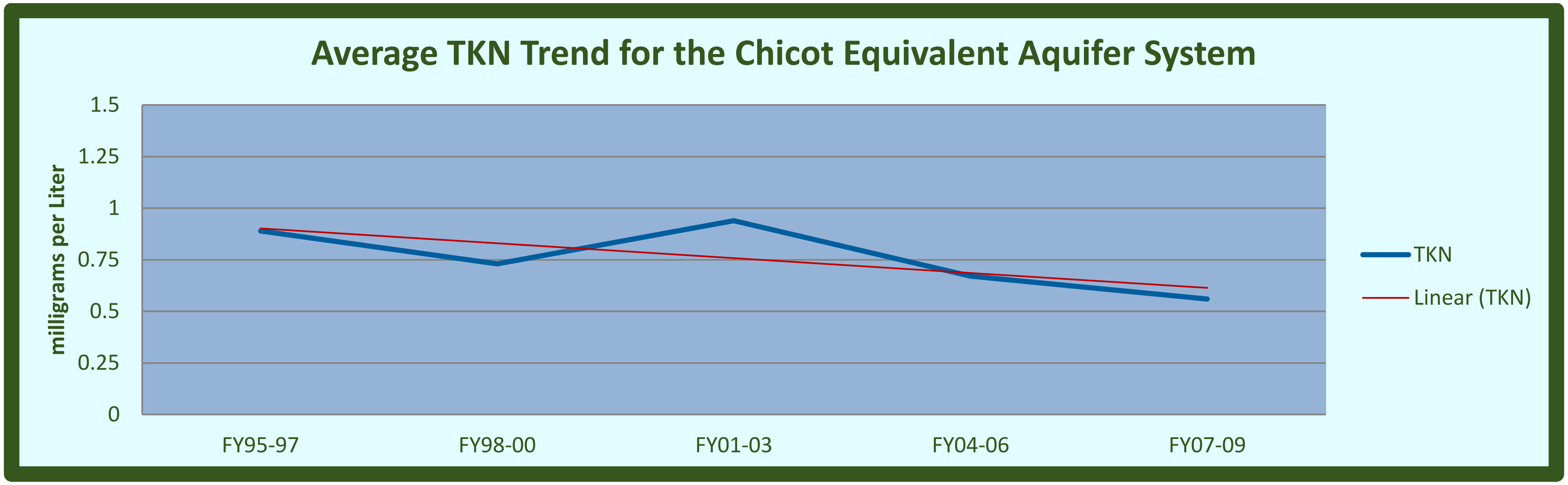

Chart 12-15: Total Phosphorus Trend

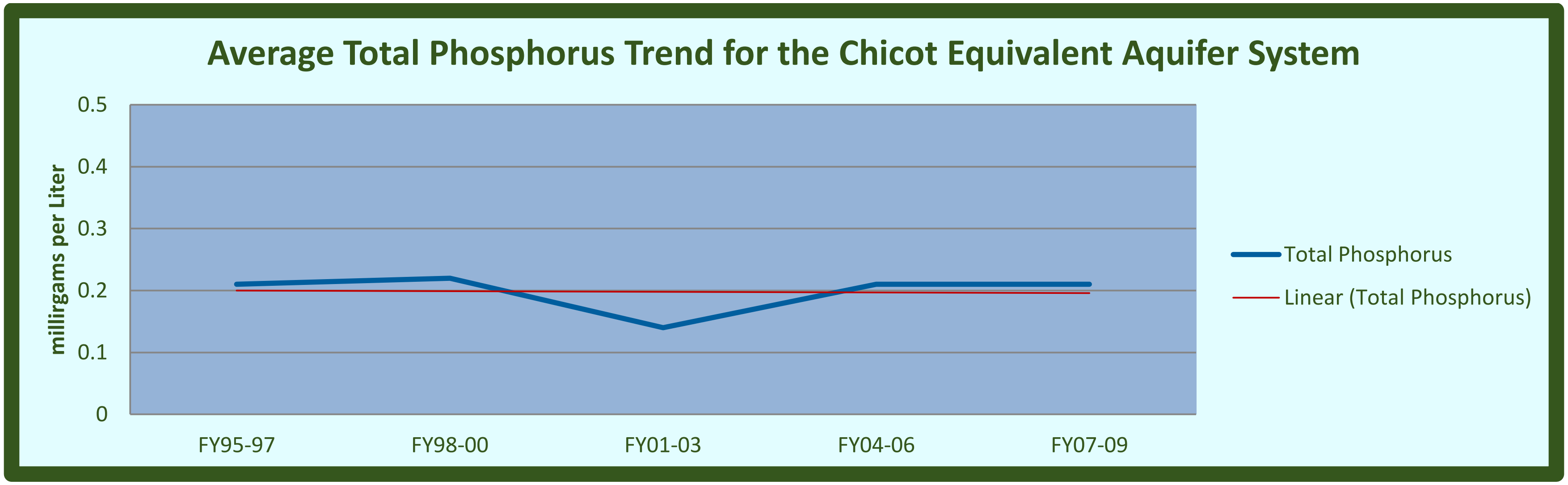

Chart 12-16: Iron Trend