CHICOT AQUIFER SUMMARY, 2008

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 10 TO THE 2009 TRIENNIAL SUMMARY REPORT

PARTIAL FUNDING PROVIDED BY THE CWA

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 aquifer during the 2008 state fiscal year (July 1, 2007 - June 30, 2008). This summary will become Appendix 10 of the ASSET Program Triennial Summary Report for 2009.

These data show that from May through June, 2008, 24 wells were sampled which produce from the Chicot aquifer. Of these 24 wells, 11 are classified as public supply, 4 each industrial and observation, 3 domestic and one each irrigation and recovery. The wells are located in 13 parishes in southwest Louisiana.

Figure 10-1 shows the geographic locations of the Chicot aquifer and the associated wells. Table 10-1 lists those wells and their corresponding parish, date sampled, owner, depth, and use classification.

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 aquifer system consists of fining upward sequences of gravels, sands, silts, and clays of the Pleistocene Prairie, intermediate, and high terrace deposits of southwestern Louisiana. The medium to coarse-grained sand and gravel aquifer units dip and thicken toward the Gulf, thin slightly toward the west into Texas, and thicken toward the east where it is overlain by alluvium of the Atchafalaya and Mississippi rivers. The aquifers are confined, have a finer texture, and are increasingly subdivided by silts and clays southward from the northern limit of the outcrop area in southern Vernon and Rapides parishes.

In the Lake Charles area, the Chicot is divided into the shallow alluvial sands, the "200-foot" sand, the "500-foot" sand, and the "700-foot" sand. East of Calcasieu parish the Chicot is divided into the "upper sand" (in hydraulic connection to the Atchafalaya sand, Abbeville sand, and "200-foot" sand) and the "lower sand" ("700-foot" sand). The "500-foot" sand is largely isolated except where it merges with the "700-foot" sand north of Calcasieu Parish. Fresh water

in the Chicot and other southwestern Louisiana aquifers is separated from fresh water in southeast Louisiana by a saltwater ridge along the western edge of the Mississippi River valley. Salt water occurs within the Chicot along the coast and in isolated bodies north of the coast.

HYDROGEOLOGY

Recharge to the Chicot occurs primarily through the direct infiltration of rainfall in the interstream, upland outcrop-subcrop areas. Recharge also occurs by water movement from the Atchafalaya alluvium, downward infiltration through the clays south of the primary recharge outcrop area, upward movement from the underlying Evangeline aquifer, and inflow from the Vermilion and Calcasieu rivers. Water movement is generally toward the pumping centers at Lake Charles and Eunice. However, there is little movement of water from the west because of pumping in the Orange, Texas area. The hydraulic conductivity varies between 40-220 feet/day.

The maximum depths of occurrence of freshwater in the Chicot range from 100 feet above sea level, to 1,000 feet below sea level. The range of thickness of the fresh water interval in the Chicot is 50 to 1,050 feet. The depths of the Chicot wells that were monitored in conjunction with the ASSET Program range from 66 to 697 feet.

PROGRAM PARAMETERS

The field parameters checked at each ASSET Program well sampling site and the list of conventional parameters analyzed in the laboratory are shown in Table 10-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 10-3. 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 CU-1366, JD-862, SL-392, and VE-882.

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 10-8, 10-9 and 10-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 10-4 and 10-5 provide a statistical overview of field and conventional data, and inorganic data for the Chicot aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2008 sampling. Tables 10-6 and 10-7 compare these same parameter averages to historical ASSET-derived data for the Chicot aquifer, from fiscal years 1996, 1999, 2002 and 2005.

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 10-2, 10-3, 10-4, and 10-5, respectively, represent the contoured data for pH, total dissolved solids (TDS), chloride, and iron. Charts 10-1 through 10-16 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 ASSET Program uses the MCLs as a benchmark for further evaluation.

EPA has set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 10-2 and 10-3 show that one or more secondary MCL (SMCL) was exceeded in 22 of the 24 wells sampled in the Chicot aquifer.

Field and Conventional Parameters

Table 10-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 10-4 provides an overview of this data for the Chicot aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 10-2 shows that no primary MCL was exceeded for field or conventional parameters for this reporting period. ASSET wells reporting turbidity levels greater than 1.0 NTU do not exceed the Primary MCL of 1.0, as this standard applies to public supply water wells that are under the direct influence of surface water. The Louisiana Department of Health and Hospitals has determined that no public water supply well in Louisiana was in this category.

Federal Secondary Drinking Water Standards: A review of the analysis listed in Table 10-2 shows that 4 wells exceeded the SMCL for pH, 3 wells exceeded the SMCL for chloride, 3 wells exceeded the SMCL for color, and 5 wells exceeded the SMCL for TDS. Laboratory results override field results in exceedance determination, thus only laboratory results will be counted in determining SMCL exceedance numbers. Following is a list of SMCL parameter exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 SU):

BE-488 – 8.87 SU
R-5428Z – 5.61 SU
BE-6227Z – 6.14 SU
V-535 – 5.47 SU

Chloride (SMCL = 250 mg/L):

CN-92 – 399 mg/L
CU-862 – 287 mg/L
VE-862 – 147 mg/L

Color (SMCL = 15 PCU):

CU-770 – 25 PCU
JD-862 – 28 PCU, Duplicate – 28 PCU
SL-392 – 170 PCU; Duplicate – 160 PCU

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
CN-5589A	480 mg/L (<SMCL)	0.52 g/L
CN-92	940 mg/L	1.4 g/L
CU-862	732 mg/L	0.76 g/L
SMN-109	704 mg/L	0.78 g/L
VE-151	540 mg/L	0.64 g/L
VE-862	640 mg/L	0.76 g/L
VE-882	484mg/L, Duplicate – 476 mg/L	0.55 g/L (Original and Duplicate)

Inorganic Parameters

Table 10-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 10-5 provides an overview of this data for the Chicot aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 10-3 shows that no primary MCL was exceeded for total metals; however the Action Level for lead was exceeded in well EV-673. An Action Level exceedance requires that a treatment technique or process be utilized that is intended to reduce the level of a contaminant in drinking water. Because this well is a backup well, and is not in use, no treatment is currently required.

Lead (AL = 15 ug/L):

EV- 673 – 22.8 ug/L

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 10-3 shows that 17 of the 24 wells sampled exceeded the secondary MCL for iron as shown in the following list:

Iron (SMCL = 300ug/L):

AC-539 – 1,600 ug/L
BE-378 – 2,600 ug/L
CU-10192Z – 1,140 ug/L
CU-1125 – 2,650 ug/L
CU-1366 – 2,270 ug/L, Duplicate – 2,240 ug/L
CU-770 – 766 ug/L
CU-862 – 2,230 ug/L
EV-673 – 1.490 ug/L
I-7312Z – 928 ug/L
JD-862 – 2,290 ugL, Duplicate – 2,320 ug/L
LF-572 – 846 ug/L
R-5428Z – 589 ug/L
SL-392 – 12,300 ug/L, Duplicate – 12,300 ug/L
SMN-109 – 1,240 ug/L
VE-151 – 3,160 ug/L
VE-862 – 958 ug/L
VE-882 – 1,270 ug/L, Duplicate – 1,300 ug/L

Volatile Organic Compounds

Table 10-6 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 2008 sampling of the Chicot aquifer.

Semi-Volatile Organic Compounds

Table 10-7 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 2008 sampling of the Chicot aquifer.

Pesticides and PCBs

Table 10-8 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 2008 sampling of the Chicot aquifer.

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 aquifer 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 10-4 and 10-5, and in Charts 10-1 to 10-16 of this summary. Over the twelve-year period, 6 analytes have shown general increases in average concentrations, while 3 have shown general decreases. Those analytes exhibiting increases are: pH, alkalinity, chloride, hardness, barium, and iron. Analytes exhibiting decreases are temperature, total phosphorus, and TKN. All other analyte averages show some general fluctuations, have remained consistent, or have been non-detect over this time period. The number of secondary exceedances in the Chicot aquifer has increased from the previous sampling in FY 2005 of 28 SMCL exceedances, to 37 in FY 2008.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the ground water produced from this aquifer is hard[1] but is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no ASSET well sampled during the Fiscal Year 2008 monitoring of the Chicot aquifer exceeded a Primary MCL. The data also show that this aquifer is of fair quality when considering taste, odor, or appearance guidelines, due to the number of wells (17) exceeding the SMCL for iron.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Chicot aquifer, with 6 parameters showing increases in average concentrations and 3 parameters showing decreases in average concentrations. The remainder of the parameter averages exhibited some general fluctuation, but for the most part, has remained consistent over the previous twelve year period.

It is recommended that the wells assigned to the Chicot aquifer 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.

---

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

Table 10-1: List of Wells Sampled – FY 2008
Chicot Aquifer

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
AC-539	ACADIA	5/6/2008	CITY OF RAYNE	251	PUBLIC SUPPLY
BE-378	BEAUREGARD	5/19/2008	TRANSCONTINENTAL GAS PIPELINE	172	INDUSTRIAL
BE-412	BEAUREGARD	5/20/2008	BOISE CASCADE	202	INDUSTRIAL
BE-488	BEAUREGARD	5/20/2008	SINGER WATER DISTRICT	262	PUBLIC SUPPLY
BE-6227Z	BEAUREGARD	5/19/2008	PRIVATE OWNER	90	DOMESTIC
CN-5589Z	CAMERON	6/23/2008	PRIVATE OWNER	140	DOMESTIC
CN-92	CAMERON	6/2/2008	USGS	443	OBSERVATION
CU-10192Z	CALCASIEU	6/24/2008	PPG INDUSTRIES	230	RECOVERY
CU-1125	CALCASIEU	6/23/2008	LDOTD	570	PUBLIC SUPPLY
CU-1366	CALCASIEU	6/23/2008	CITY OF LAKE CHARLES	685	PUBLIC SUPPLY
CU-1471	CALCASIEU	6/24/2008	PPG INDUSTRIES	525	INDUSTRIAL
CU-770	CALCASIEU	6/3/2008	USGS	490	OBSERVATION
CU-862	CALCASIEU	6/24/2008	CITGO PETROLEUM CORPORATION	560	INDUSTRIAL
EV-673	EVANGELINE	5/6/2008	CITY OF MAMOU	247	PUBLIC SUPPLY
I-7312Z	IBERIA	5/5/2008	BREAUX ELECTRIC	180	PUBLIC SUPPLY
JD-862	JEFFERSON DAVIS	5/19/2008	CITY OF WELSH	697	PUBLIC SUPPLY
LF-572	LAFAYETTE	5/6/2008	CITY OF LAFAYETTE	570	PUBLIC SUPPLY
R-5428Z	RAPIDES	5/20/2008	PRIVATE OWNER	85	DOMESTIC
SL-392	ST LANDRY	6/2/2008	USGS	126	OBSERVATION
SMN-109	ST MARTIN	6/2/2008	USGS	375	OBSERVATION
V-535	VERNON	5/20/2008	MARLOW FIRE STATION	66	PUBLIC SUPPLY
VE-151	VERMILION	5/5/2008	PRIVATE OWNER	250	IRRIGATION
VE-862	VERMILION	5/5/2008	TOWN OF GUEYDAN	249	PUBLIC SUPPLY
VE-882	VERMILION	5/5/2008	CITY OF KAPLAN	279	PUBLIC SUPPLY

Table 10-2: Summary of Field and Conventional Data – FY 2008
Chicot Aquifer

DOTD 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	20	4	1	0.1	5	0.05	0.1	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AC-539	21.84	7.58	0.651	0.32	0.42	314	27.5	<5	634	<1.25	364	<4	13.5	1.17	364	<0.05	1.19	0.23
BE-378	21.99	6.76	0.318	0.15	0.21	93	38.6	14	318	4.7	207	<4	3.1	<0.10	207	†<0.10	<0.1	0.44
BE-412	27.34	8.44	0.393	0.19	0.26	192	6.1	<5	389	8.4	240	<4	1	0.27	240	0.06	†0.31	†<0.1
BE-488	24.77	8.87	0.332	0.16	0.22	164	4.5	<5	327	5.6	202	<4	<1	0.16	202	0.05	†0.57	†0.11
BE-6227Z	19.52	6.14	0.036	0.02	0.02	3.5	5.3	<5	36.3	<1.25	31.3	<4	<1	<0.10	31.3	0.58	<0.1	<0.05
CN-5589Z	24.82	7.58	0.804	0.39	0.52	362	57.7	<5	814	<1.25	480	<4	2.4	0.72	480	<0.05	0.88	0.15
CN-92	22.22	7.88	1.753	0.89	1.14	284	†399	12	1,768	<1.25	940	<4	<1	0.46	940	<0.05	0.52	0.05
CU-10192Z	23.45	7.54	0.530	0.26	0.34	163	74.1	<5	538	2	324	<4	8.7	0.12	324	<0.05	0.18	0.22
CU-1125	21.72	7.71	0.335	0.16	0.22	146	21.4	<5	332	<1.25	211	<4	7	0.12	211	<0.05	0.17	0.23
CU-1366	23.80	7.29	0.679	0.33	0.44	144	135	*5	681	1.8	396	<4	‡11.2	<0.10	396	<0.05	0.12	0.34
CU-1366*	23.80	7.29	0.679	0.33	0.44	144	133	*5	682	1.8	400	<4	‡12.2	0.1	400	<0.05	0.1	0.34
CU-1471	22.29	8.00	0.402	0.19	0.26	198	17.4	<5	407	<1.25	242	<4	12.9	0.22	242	<0.05	0.35	0.12
CU-770	22.44	7.23	0.347	0.17	0.23	149	21.9	25	341	7.3	220	<4	1.9	<0.1	220	<0.05	<0.1	0.23
CU-862	25.10	7.39	1.172	0.58	0.76	180	†287	5	1,189	<1.25	732	<4	17.7	0.11	732	<0.05	0.16	0.19
EV-673	21.53	7.40	0.724	0.35	0.47	277	66.3	<5	727	<1.25	418	4.5	12.8	0.28	418	<0.05	†0.48	0.31
I-7312Z	21.75	7.60	0.459	0.22	0.30	242	4.5	6	442	<1.25	274	4	*9.4	<0.10	274	<0.05	0.14	0.19
JD-862	24.23	7.11	0.841	0.41	0.55	128	†179	28	831	<1.25	468	<4	17.7	0.12	468	<0.05	0.26	0.34
JD-862*	24.23	7.11	0.841	0.41	0.55	128	†182	28	830	<1.25	482	<4	17.1	0.13	482	<0.05	0.22	0.34
LF-572	20.34	7.53	0.383	0.18	0.25	194	5.4	<5	376	4.9	234	<4	5.9	0.22	234	<0.05	†0.23	0.25
R-5428Z	21.51	5.61	0.040	0.02	0.03	9.8	2.9	<5	36.1	<1.25	47.3	<4	6.5	<0.10	47.3	0.07	<0.1	<0.05
SL-392	21.19	7.11	0.411	0.20	0.27	171	13.1	†170	374	10.7	214	19	126	<0.10	214	<0.05	<0.1	0.16
SL-392*	21.19	7.11	0.411	0.20	0.27	171	13.1	†160	371	10.7	228	23	149	<0.10	228	<0.05	<0.1	0.16

DOTD 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	20	4	1	0.1	5	0.05	0.1	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
SMN-109	21.17	7.26	1.202	0.60	0.78	471	131	38	1200	<1.25	704	<4	15.5	0.74	704	<0.05	0.81	0.18
V-535	20.31	5.47	0.025	0.01	0.02	4.1	2.3	<5	22.6	<1.25	24	<4	<1	<0.10	24.0	0.09	<0.1	<0.05
VE-151	21.87	7.36	0.983	0.49	0.64	363	102	<5	961	<1.25	540	8	40.9	0.56	540	<0.05	0.78	0.33
VE-862	22.12	7.73	1.174	0.58	0.76	389	†147	<5	1159	<1.25	640	<4	6	2.11	640	<0.05	2.26	0.22
VE-882	21.36	7.58	0.844	0.41	0.55	380	52.6	<5	827	<1.25	484	<4	11	1.04	484	<0.05	1.05	0.28
VE-882*	21.36	7.58	0.844	0.41	0.55	380	52.5	<5	833	<1.25	476	<4	10.8	1.04	476	<0.05	1.04	0.28

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

Table 10-3: Summary of Inorganic Data – FY 2008
Chicot Aquifer

DOTD 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
AC-539	<1	<3	563	<1	<0.5	<3	<3	1,600	3.8	RB	<3	<4	<0.5	<1	75
BE-378	<1	<3	126	<1	<0.5	<3	<3	2,600	<3	RB	<3	<4	<0.5	<1	<10
BE-412	<1	<3	42.5	<1	<0.5	<3	4.4	102	<3	RB	<3	<4	<0.5	<1	<10
BE-488	<1	<3	14.4	<1	<0.5	<3	<3	<20	<3	RB	<3	<4	<0.5	<1	<10
BE-6227Z	<1	<3	50.1	<1	<0.5	<3	<3	<20	<3	RB	<3	<4	<0.5	<1	<10
CN-5589Z	<1	<3	482	<1	<0.5	<3	<3	161	<3	<0.05	<3	<4	<0.5	<1	19.9
CN-92	<1	<3	943	<1	<0.5	<3	<3	133	<3	<0.05	<3	<4	<0.5	<1	324
CU-10192Z	<1	<3	273	<1	<0.5	<3	<3	1,140	<3	<0.05	<3	<4	<0.5	<1	<10
CU-1125	<1	<3	178	<1	<0.5	<3	<3	2,650	<3	<0.05	<3	<4	<0.5	<1	29.1
CU-1366	<1	<3	370	<1	<0.5	<3	<3	2,270	<3	<0.05	<3	<4	<0.5	<1	<10
CU-1366*	<1	<3	367	<1	<0.5	<3	<3	2,240	<3	<0.05	<3	<4	<0.5	<1	<10
CU-1471	<1	<3	259	<1	<0.5	<3	<3	152	<3	<0.05	<3	<4	<0.5	<1	34.7
CU-770	<1	<3	246	<1	<0.5	<3	<3	766	<3	<0.05	<3	<4	<0.5	<1	480
CU-862	<1	<3	624	<1	<0.5	<3	<3	2,230	4.6	<0.05	<3	<4	<0.5	<1	<10
EV-673	<1	<3	290	<1	<0.5	<3	6.2	1,490	22.8	RB	<3	<4	<0.5	<1	56.3
I-7312Z	<1	<3	166	<1	<0.5	<3	80.5	928	8.5	RB	<3	<4	<0.5	<1	76.7
JD-862	<1	<3	690	<1	<0.5	<3	<3	2,290	<3	RB	<3	<4	<0.5	<1	<10
JD-862*	<1	<3	705	<1	<0.5	<3	<3	2,320	<3	RB	<3	<4	<0.5	<1	<10
LF-572	<1	<3	204	<1	<0.5	<3	<3	846	<3	RB	<3	<4	<0.5	<1	<10
R-5428Z	<1	<3	10.9	<1	<0.5	<3	77.8	589	<3	RB	<3	<4	<0.5	<1	27.7
SL-392	<1	<3	257	<1	<0.5	<3	<3	12,300	<3	<0.05	<3	<4	<0.5	<1	<10
SL-392*	<1	<3	255	<1	<0.5	<3	<3	12,300	<3	<0.05	<3	<4	<0.5	<1	<10

DOTD 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
SMN-109	<1	<3	735	<1	<0.5	<3	<3	1,240	<3	0.08	<3	<4	<0.5	<1	649
V-535	<1	<3	26.2	<1	<0.5	<3	12.9	128	<3	RB	<3	<4	<0.5	<1	30.6
VE-151	<1	<3	323	<1	<0.5	<3	<3	3,160	<3	RB	<3	<4	<0.5	<1	<10
VE-862	<1	<3	953	<1	<0.5	<3	9.5	958	<3	RB	<3	<4	<0.5	<1	18.2
VE-882	<1	<3	563	<1	<0.5	<3	<3	1,270	<3	RB	<3	<4	<0.5	<1	<10
VE-882*	<1	<3	575	<1	<0.5	<3	<3	1,300	<3	RB	<3	<4	<0.5	<1	<10

*Denotes Duplicate Sample. Shaded cells exceed EPA Secondary Standards RB = Data rejected, reported in Field Blank.

Table 10-4: Field and Conventional Statistics, FY 2008 ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	19.52	27.34	22.47
	pH (SU)	5.47	8.87	7.33
	Specific Conductance (mmhos/cm)	0.025	1.753	0.63
	Salinity (ppt)	0.01	0.89	0.31
	TDS (g/L)	0.016	1.139	0.40
LABORATORY	Alkalinity (mg/L)	3.5	471.0	216.2
	Chloride (mg/L)	2.3	399.0	85.9
	Color (PCU)	<5	170.0	24.3
	Specific Conductance (umhos/cm)	22.6	1768.0	660.3
	Sulfate (mg/L)	<1.25	10.70	2.76
	TDS (mg/L)	24	940	384
	TSS (mg/L)	<4	23.0	4.1
	Turbidity (NTU)	<1	149.0	20.8
	Ammonia, as N (mg/L)	<0.1	2.11	0.36
	Hardness (mg/L)	<5	329.0	161.6
	Nitrite - Nitrate, as N (mg/L)	<0.05	0.58	<0.05
	TKN (mg/L)	<0.1	2.26	0.43
	Total Phosphorus (mg/L)	<0.05	0.44	0.21

Table 10-5: Inorganic Statistics, FY 2008 ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	<1	<1	<1
Arsenic (ug/L)	<3	<3	<3
Barium (ug/L)	10.9	953.0	389.8
Beryllium (ug/L)	<1	<1	<1
Cadmium (ug/L)	<0.5	<0.5	<0.5
Chromium (ug/L)	<3	<3	<3
Copper (ug/L)	<3.0	80.5	7.2
Iron (ug/L)	<20	12,300	2,238
Lead (ug/L)	<3	22.8	<3
Mercury (ug/L)	<0.05	0.08	<0.05
Nickel (ug/L)	<3	<3	<3
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	649	105

Table 10-6: Triennial Field and Conventional Statistics, ASSET Wells

	PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE	FY 2005 AVERAGE	FY 2008 AVERAGE
FIELD	Temperature (^{O}C)	22.68	23.20	21.85	22.38	22.47
	pH (SU)	7.08	7.01	7.03	7.22	7.33
	Specific Conductance (mmhos/cm)	0.534	0.650	0.523	0.54	0.63
	Salinity (Sal.) (ppt)	0.26	0.33	0.25	0.27	0.31
	TDS (Total dissolved solids) (g/L)	-	-	-	0.35	0.40
LABORATORY	Alkalinity (Alk.) (mg/L)	199.8	188.7	193.4	190.3	216.2
	Chloride (Cl) (mg/L)	67.5	59.6	51.6	59.7	85.9
	Color (PCU)	22.5	13.0	13.5	12.7	24.4
	Specific Conductance (umhos/cm)	593.9	552.5	501.6	539.2	660.3
	Sulfate (SO4) (mg/L)	2.09	2.78	1.48	1.99	2.76
	TDS (Total dissolved solids) (mg/L)	369.1	351.9	302.0	321.5	384.4
	TSS (Total suspended solids) (mg/L)	19.5	5.4	4.0	17.9	4.1
	Turbidity (Turb.) (NTU)	13.80	14.63	13.78	16.17	20.82
	Ammonia, as N (NH3) (mg/L)	0.36	0.35	0.41	0.32	0.36
	Hardness (mg/L)	129.9	122.8	127.0	133.2	161.6
	Nitrite - Nitrate , as N (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05
	TKN (mg/L)	0.35	0.67	0.58	0.50	0.43
	Total Phosphorus (P) (mg/L)	0.24	0.25	0.13	0.23	0.21

Table 10-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE	FY 2005 AVERAGE	FY 2008 AVERAGE
Antimony (ug/L)	<5	<5	<5	<5	<1
Arsenic (ug/L)	<5	<5	<5	<5	<3
Barium (ug/L)	277.61	311.96	297.00	359.03	389.80
Beryllium (ug/L)	<5	<5	<1	<1	<1
Cadmium (ug/L)	<5	<5	<1	<1	<0.5
Chromium (ug/L)	<5	<5	<5	<5	<3
Copper (ug/L)	14.4	35.8	25.7	42.2	7.2
Iron (ug/L)	1,823.5	1,970.6	1,794.9	3073.6	2,238.0
Lead (ug/L)	<10	<10	<10	<10	<3
Mercury (ug/L)	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel (ug/L)	<5	<5	<5	<5	<3
Selenium (ug/L)	<5	<5	<5	<10	<4
Silver (ug/L)	<5	<5	<1	<5	<0.5
Thallium (ug/L)	<5	<5	<5	<50	<1
Zinc (ug/L)	346.7	152.3	123.5	620.7	105.0

Table 10-8: 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 10-8: 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

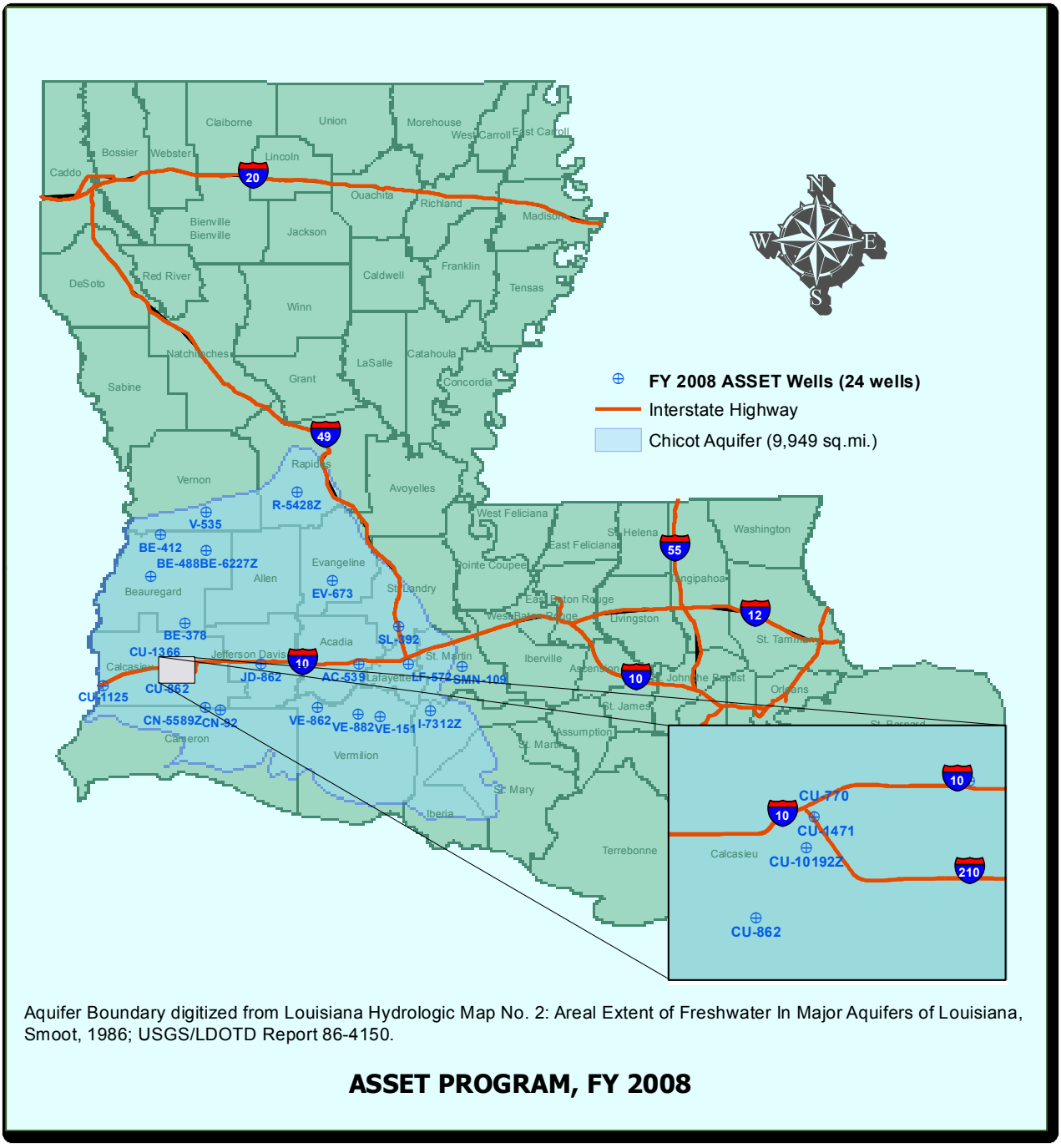
Table 10-9: SVOCs (Continued)

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 10-10: 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 10-1: Location Plat, Chicot Aquifer



Aquifer Boundary digitized from Louisiana Hydrologic Map No. 2: Areal Extent of Freshwater In Major Aquifers of Louisiana, Smoot, 1986; USGS/LDOTD Report 86-4150.

ASSET PROGRAM, FY 2008

Figure 10-2: Map of pH Data

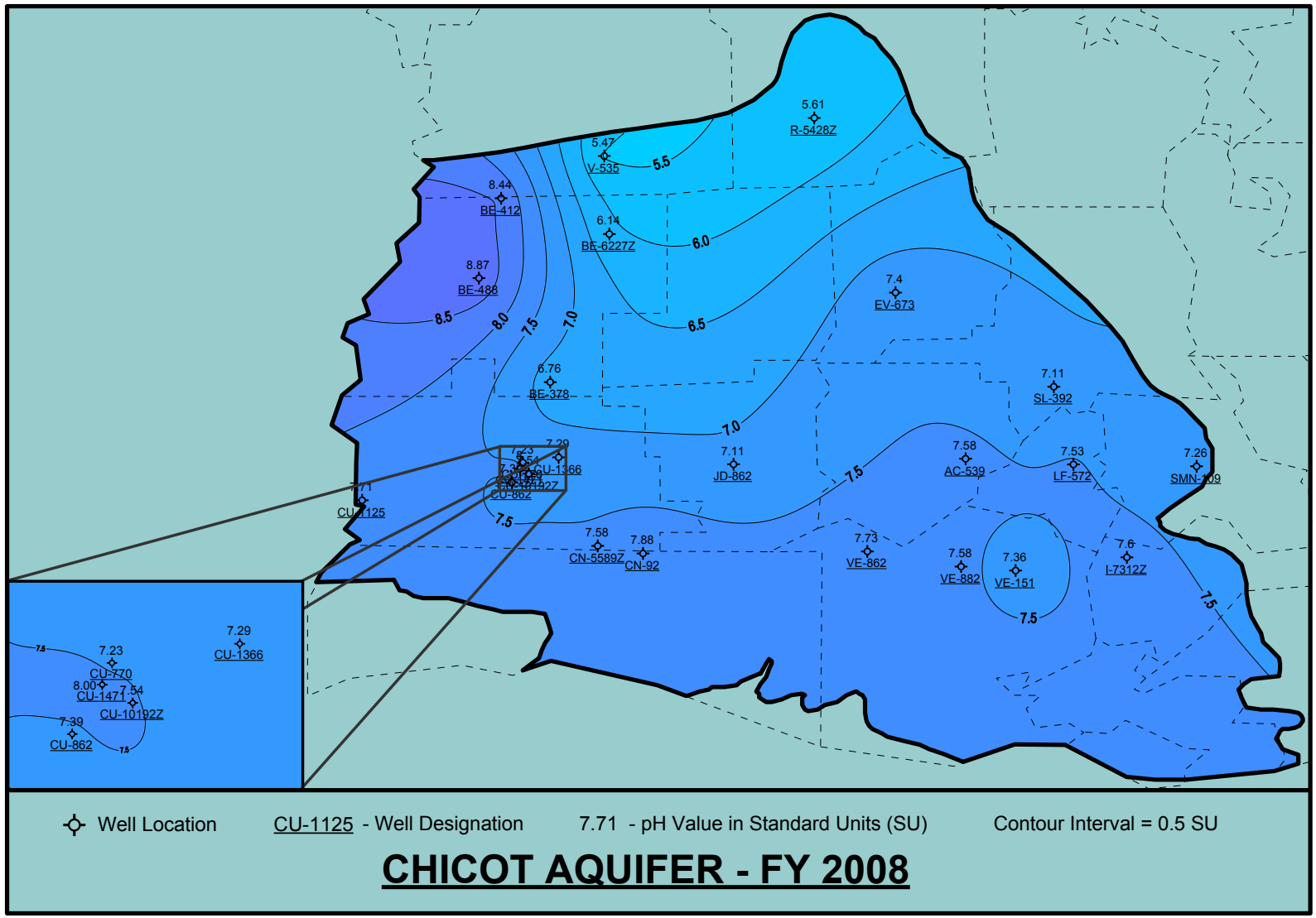


Figure 10-3: Map of TDS Lab Data

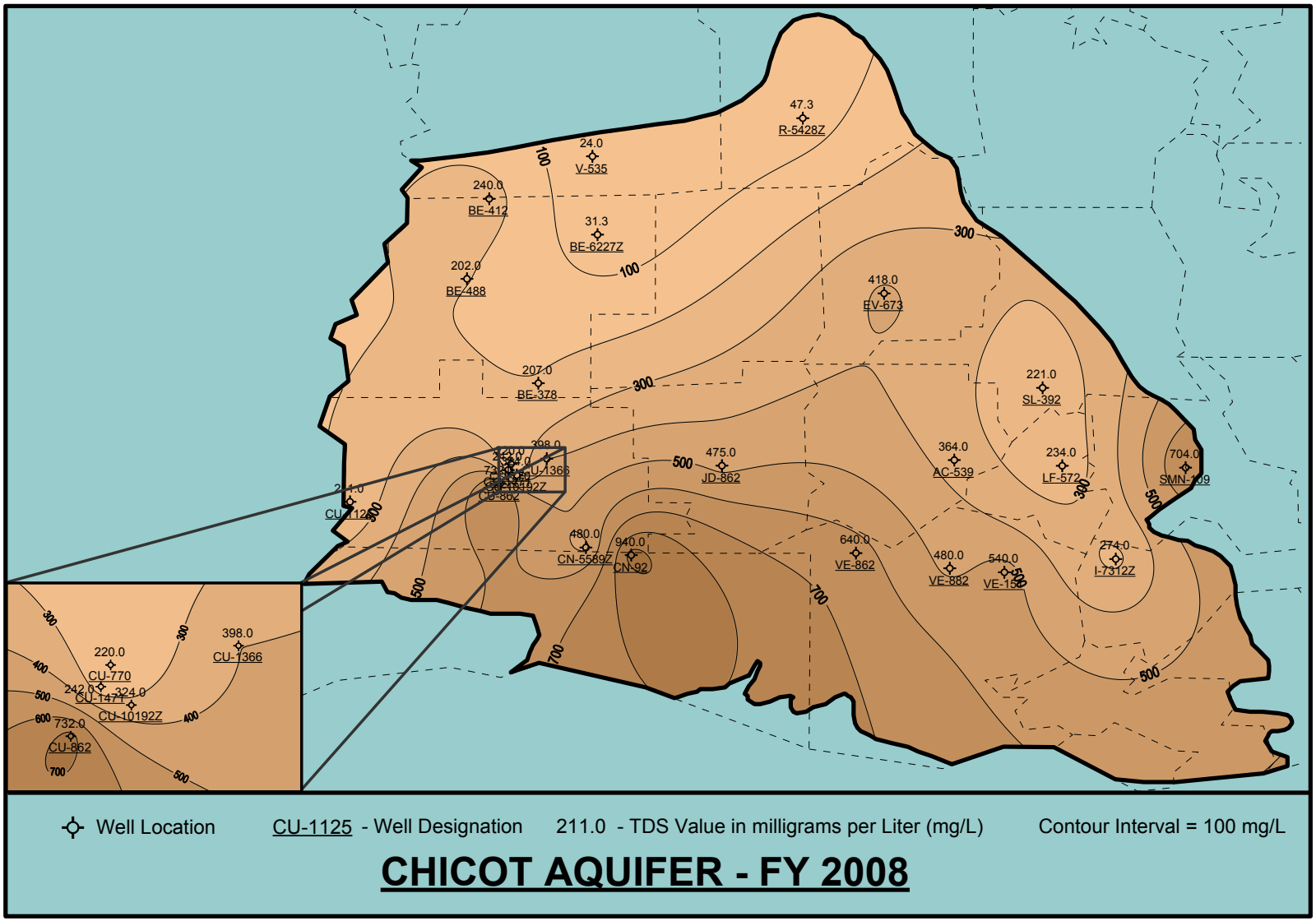


Figure 10-4: Map of Chloride Data

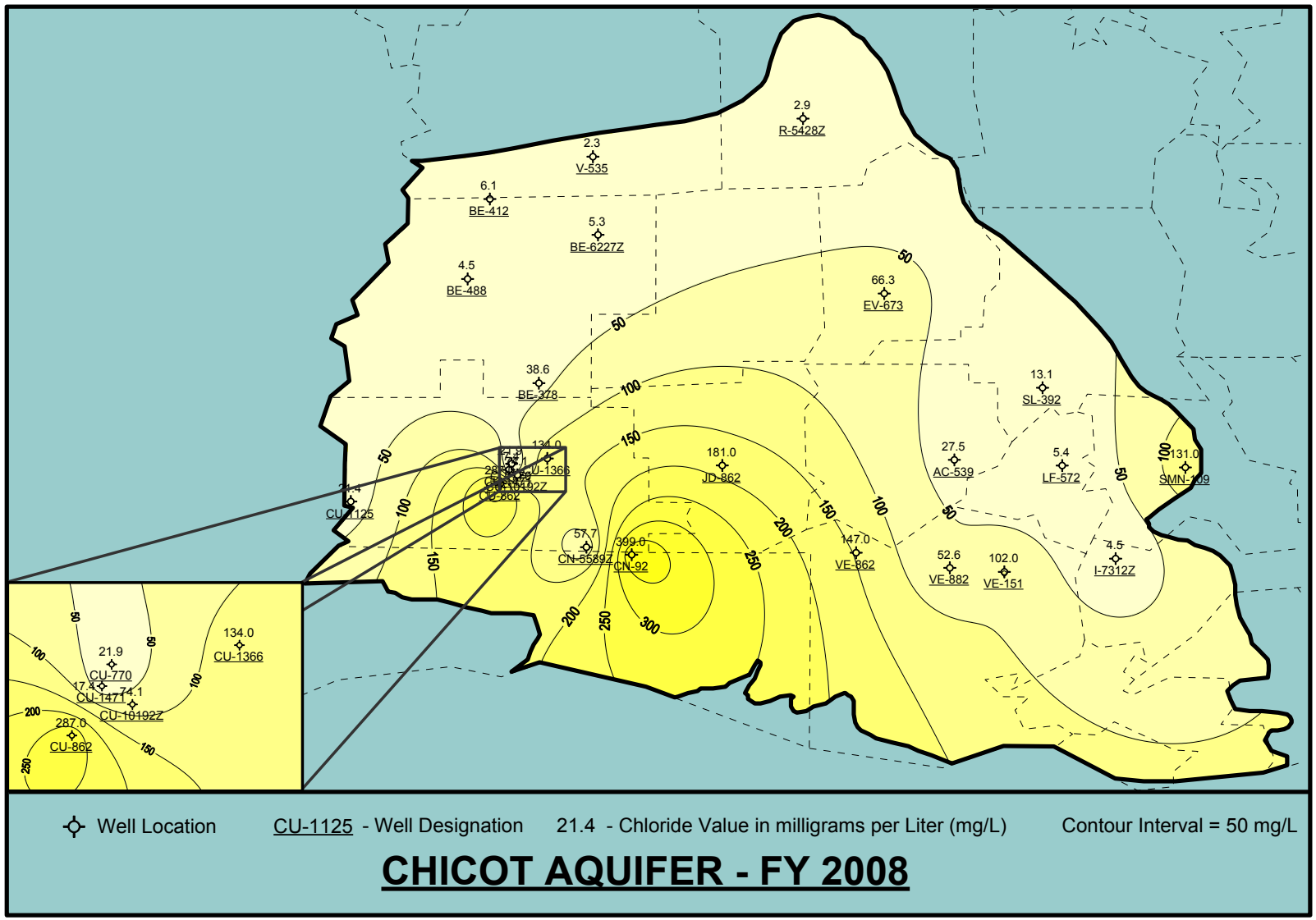


Figure 10-5: Map of Iron Data

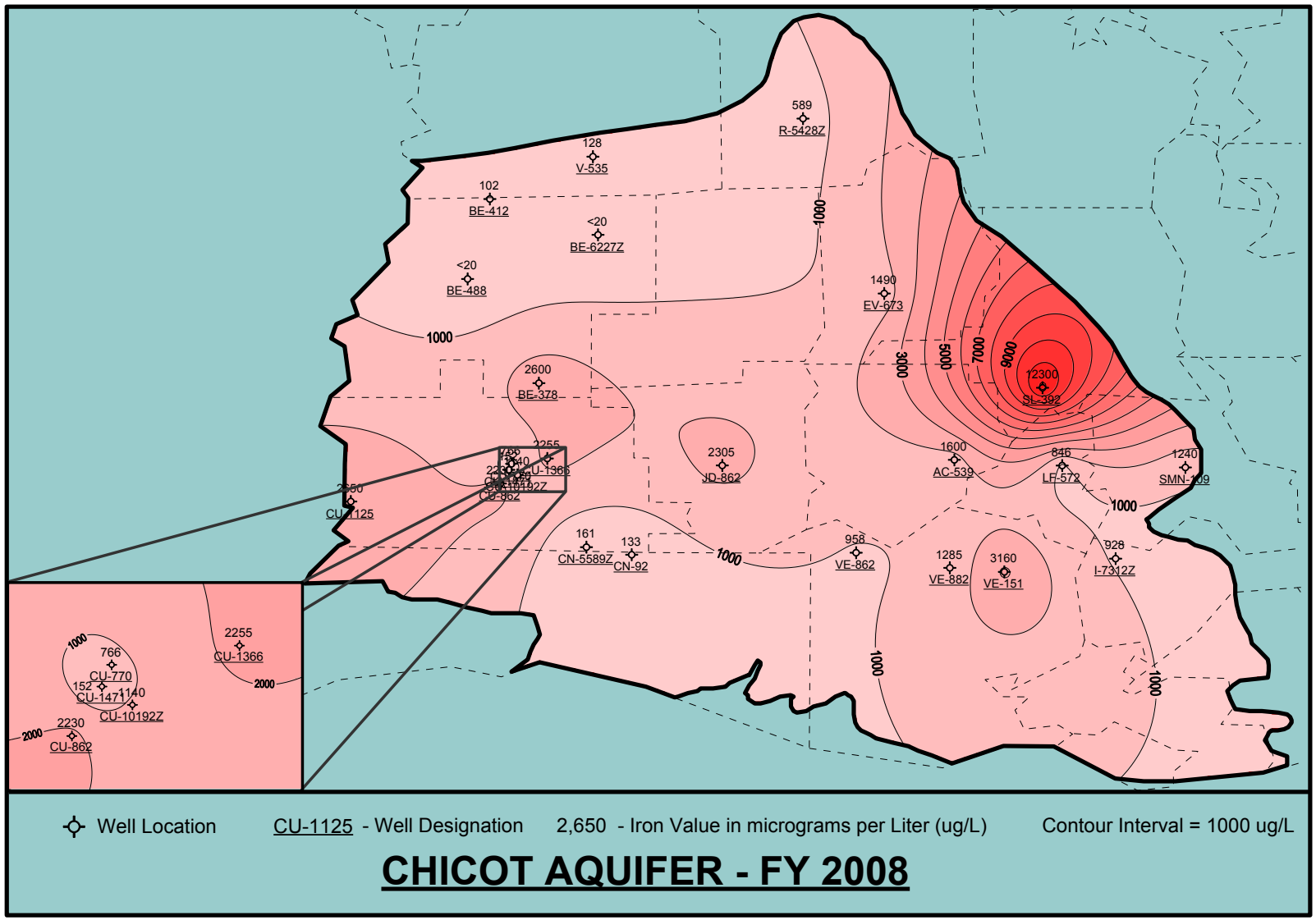


Chart 10-1: Temperature Trend

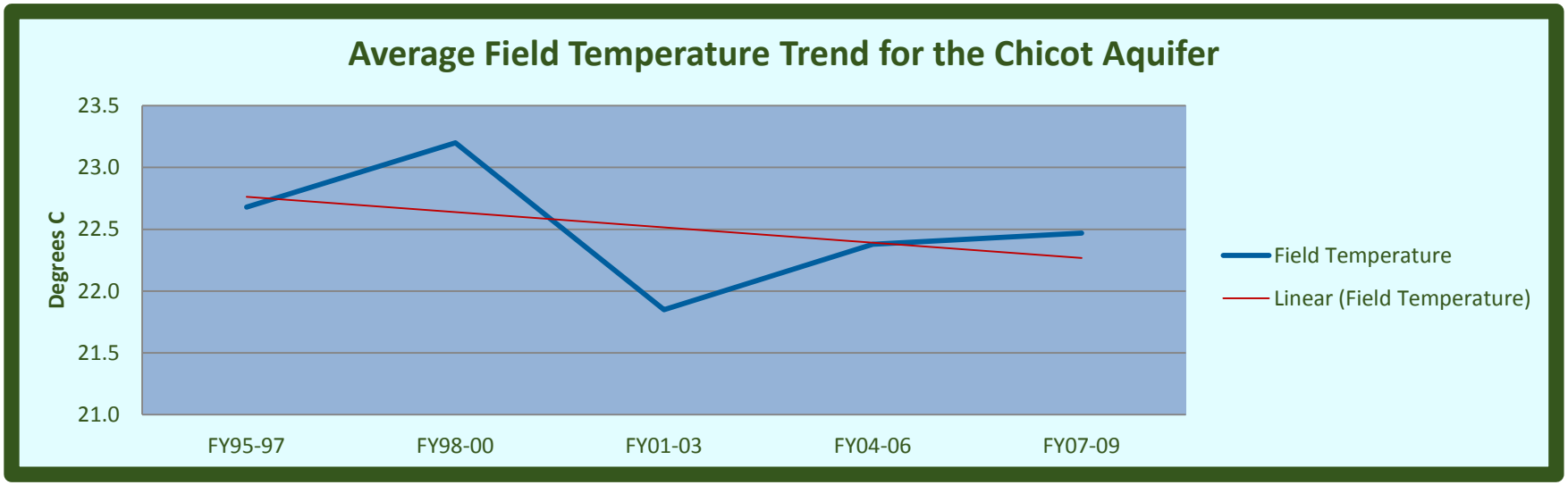


Chart 10-2: pH Trend

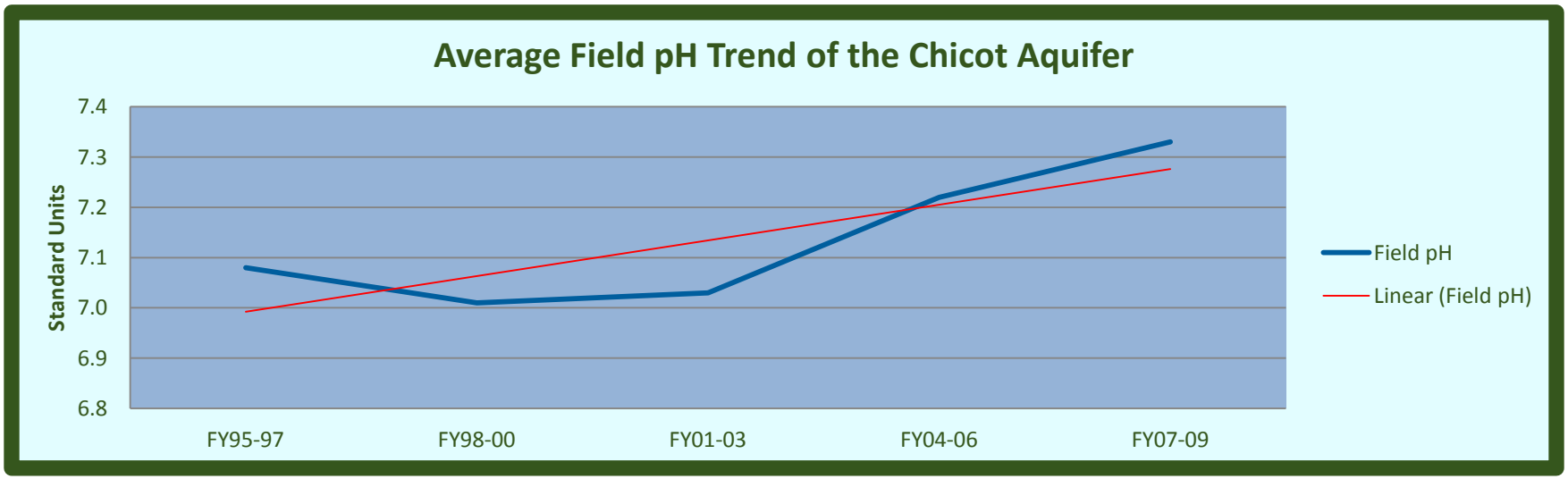


Chart 10-3: Field Specific Conductance Trend

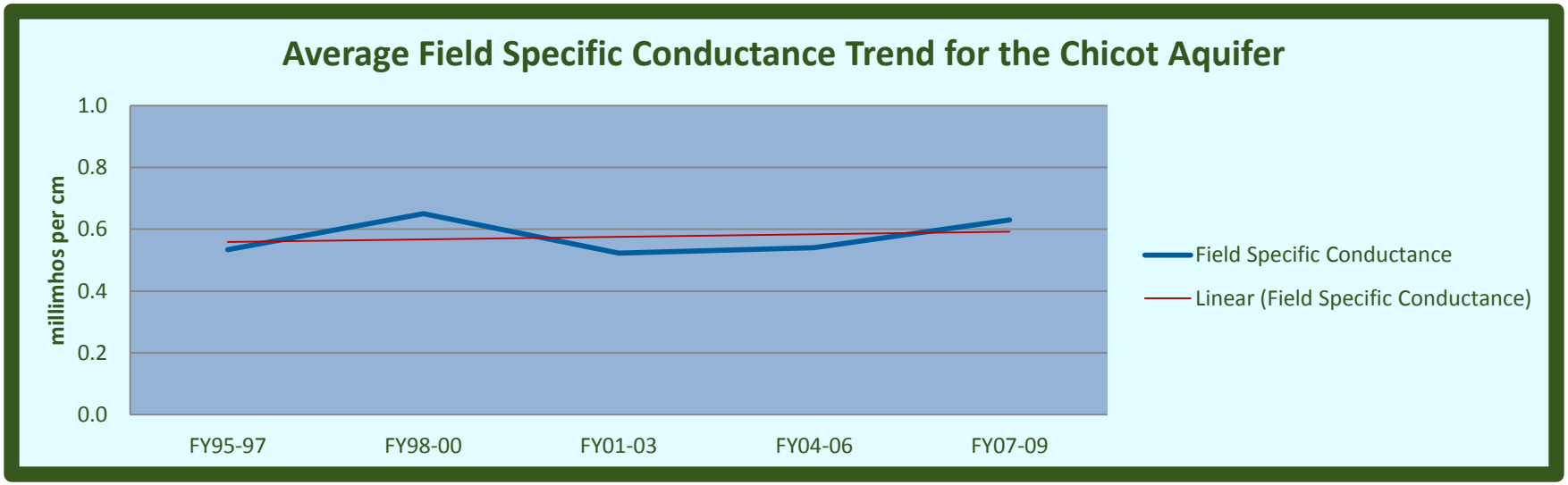


Chart 10-4: Lab Specific Conductance Trend

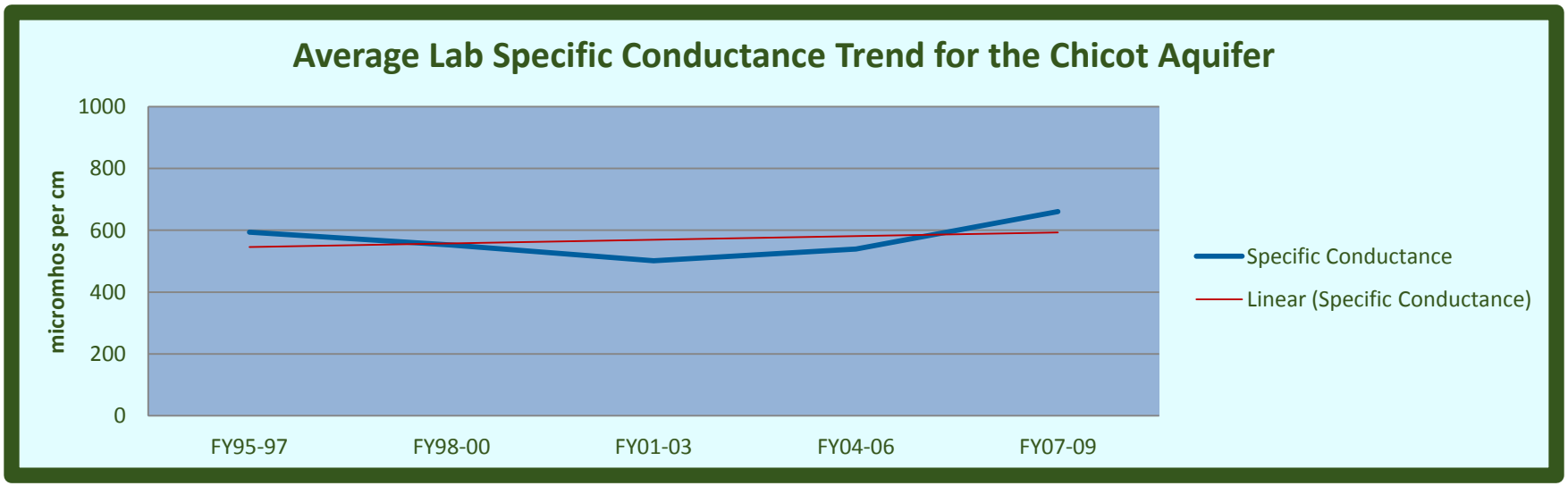


Chart 10-5: Field Salinity Trend

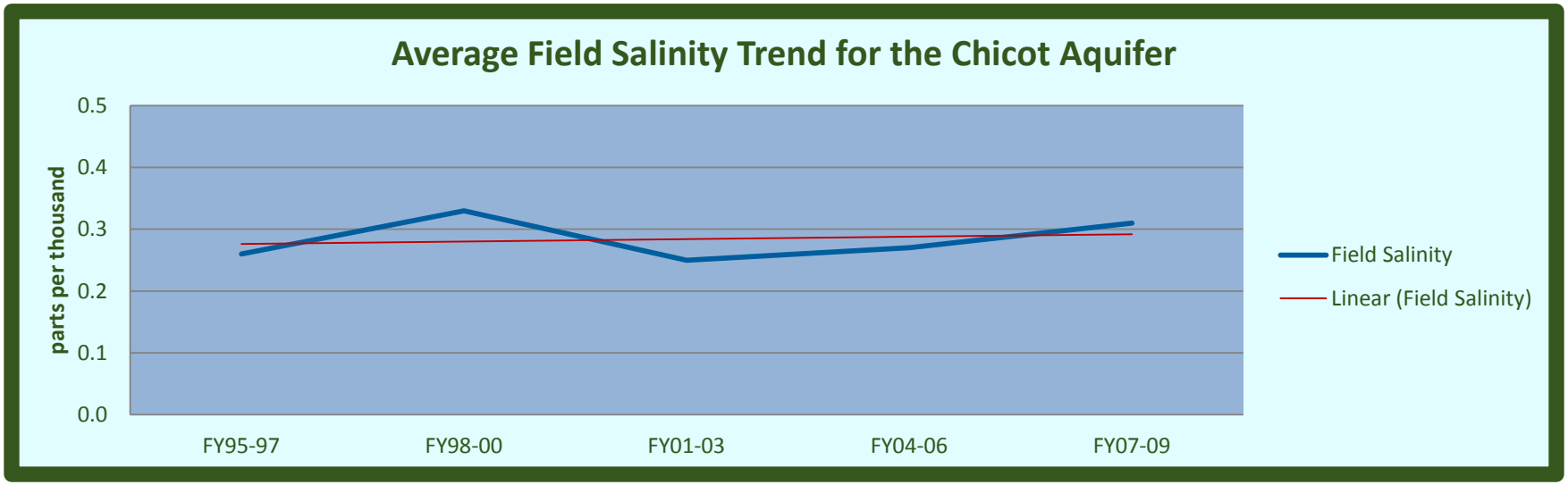


Chart 10-6: Alkalinity Trend

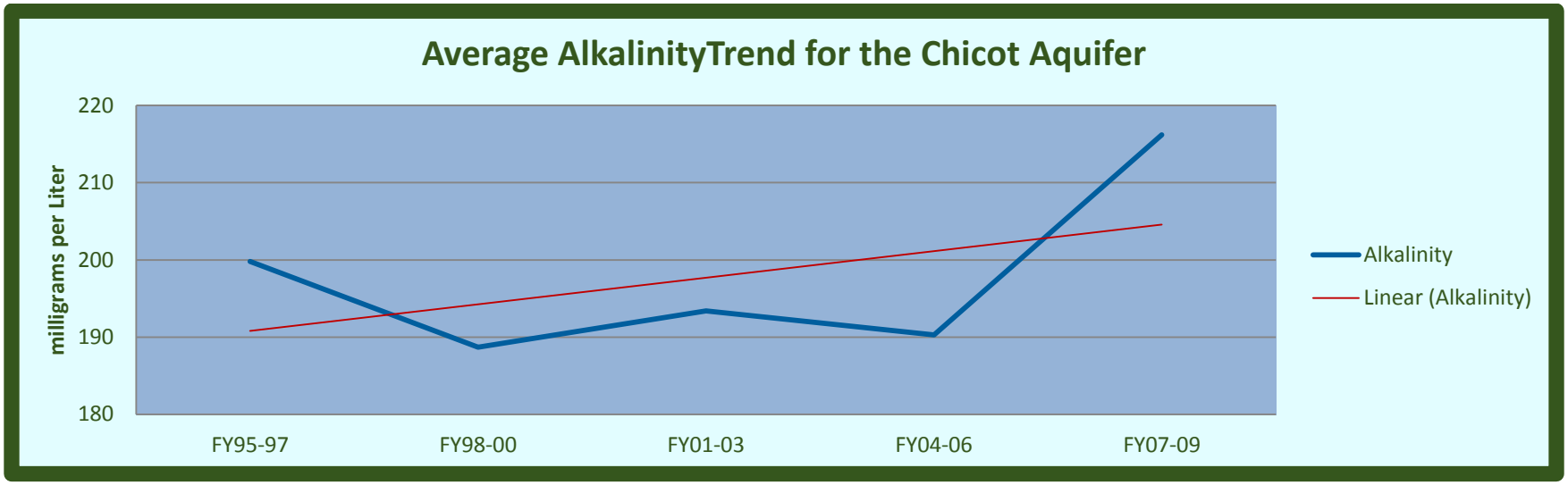


Chart 10-7: Chloride Trend

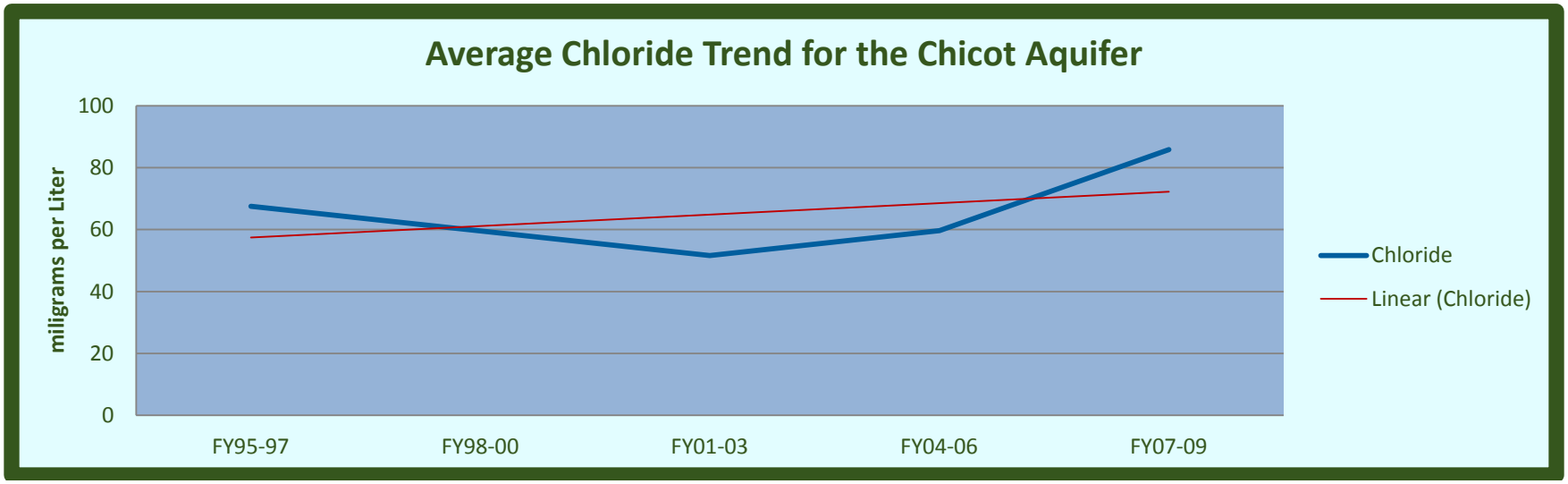


Chart 10-8: Color Trend

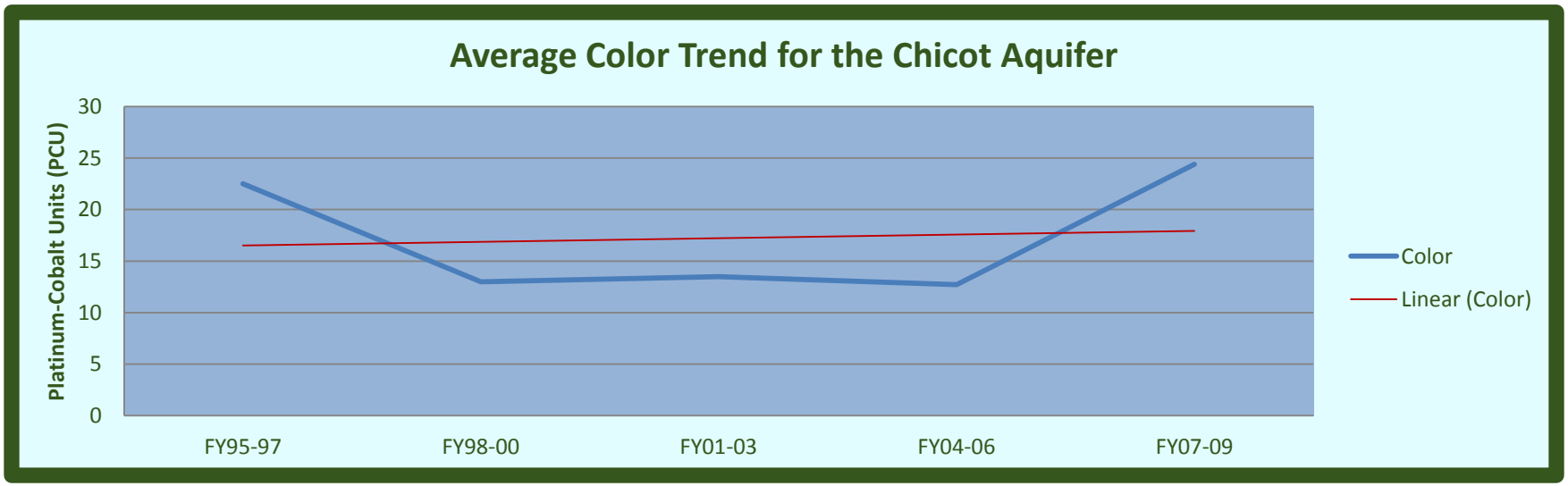


Chart 10-9: Sulfate (SO4) Trend

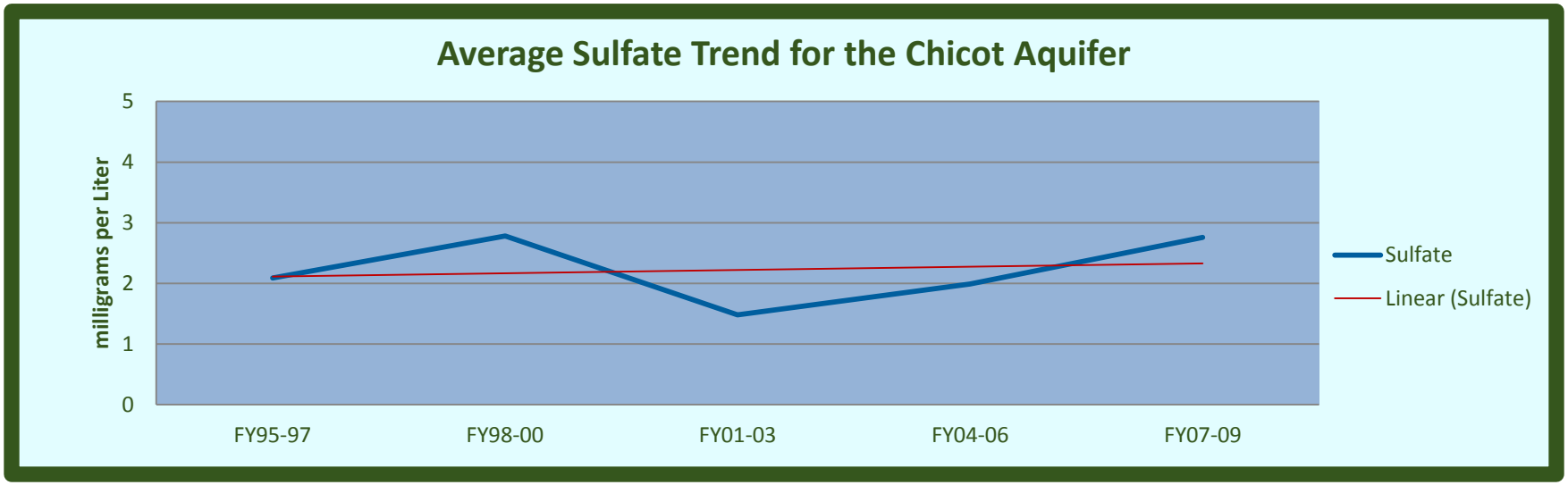


Chart 10-10: Total Dissolved Solids (TDS) Trend

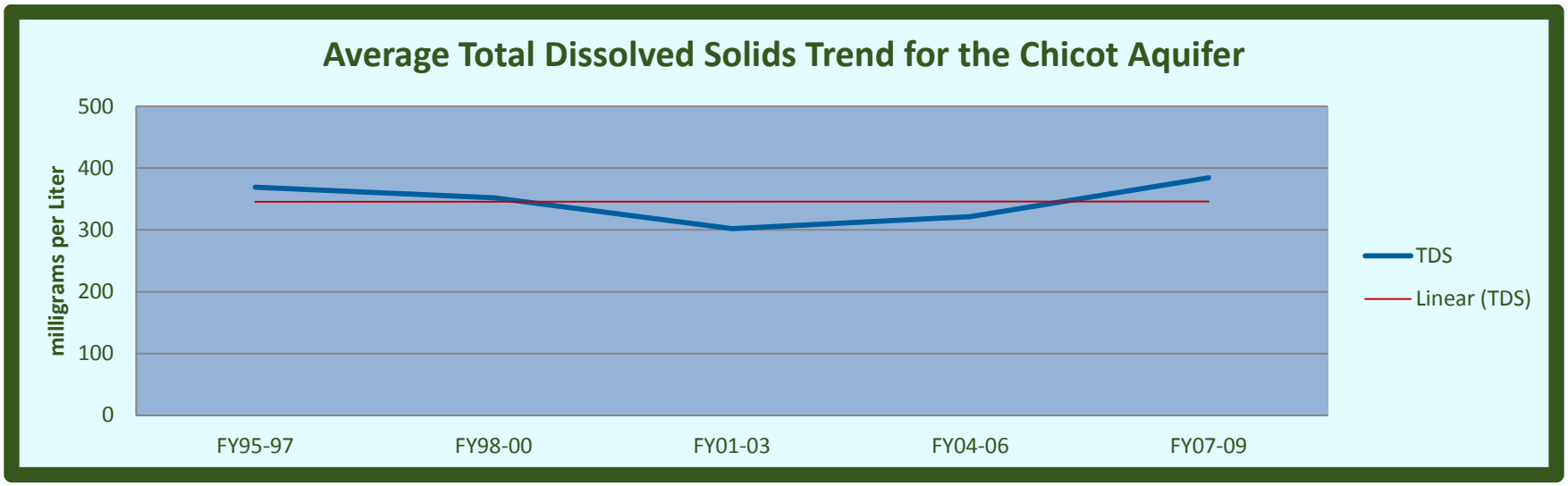


Chart 10-11: Ammonia (NH3) Trend

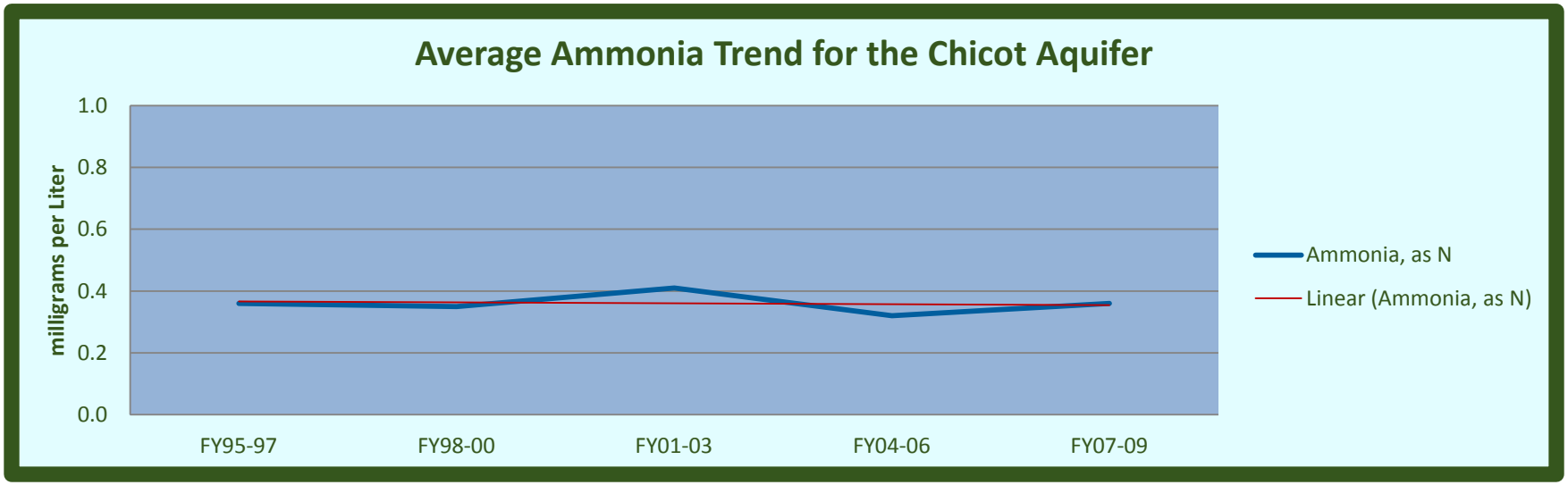


Chart 10-12: Hardness Trend

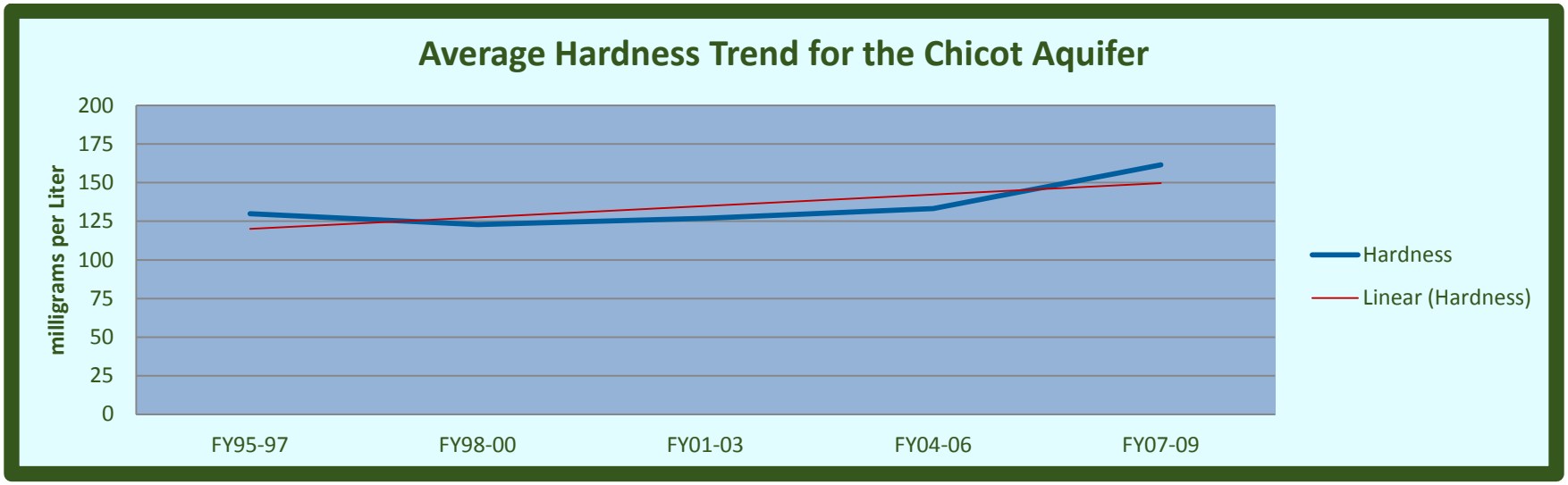


Chart 10-13: Nitrite – Nitrate Trend

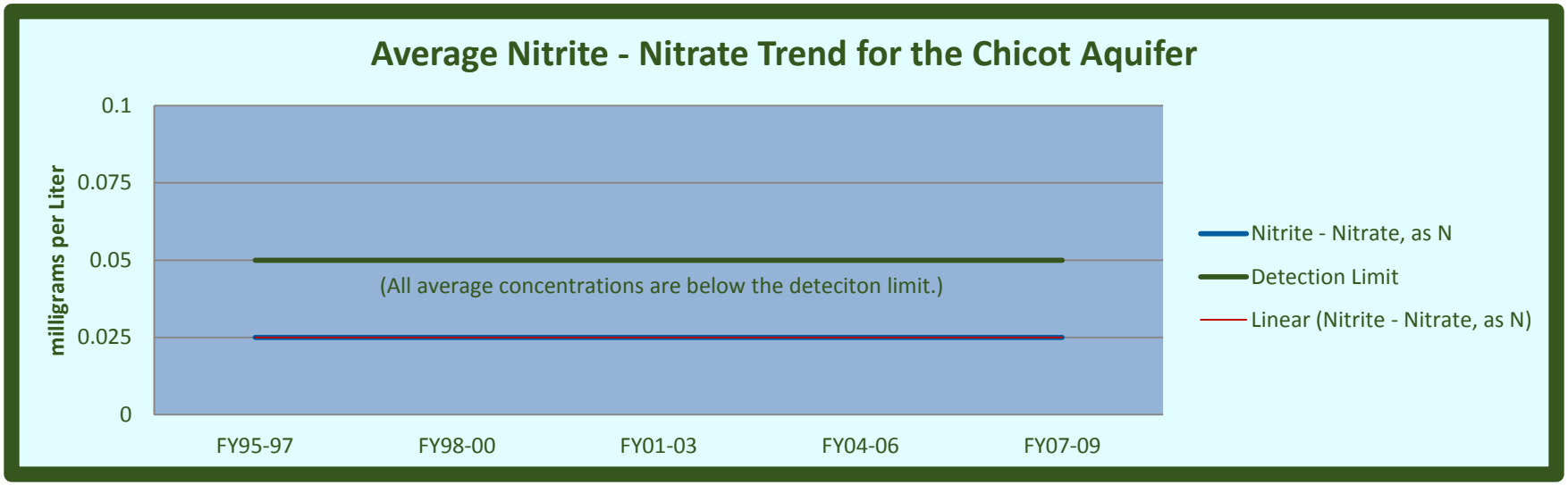


Chart 10-14: TKN Trend

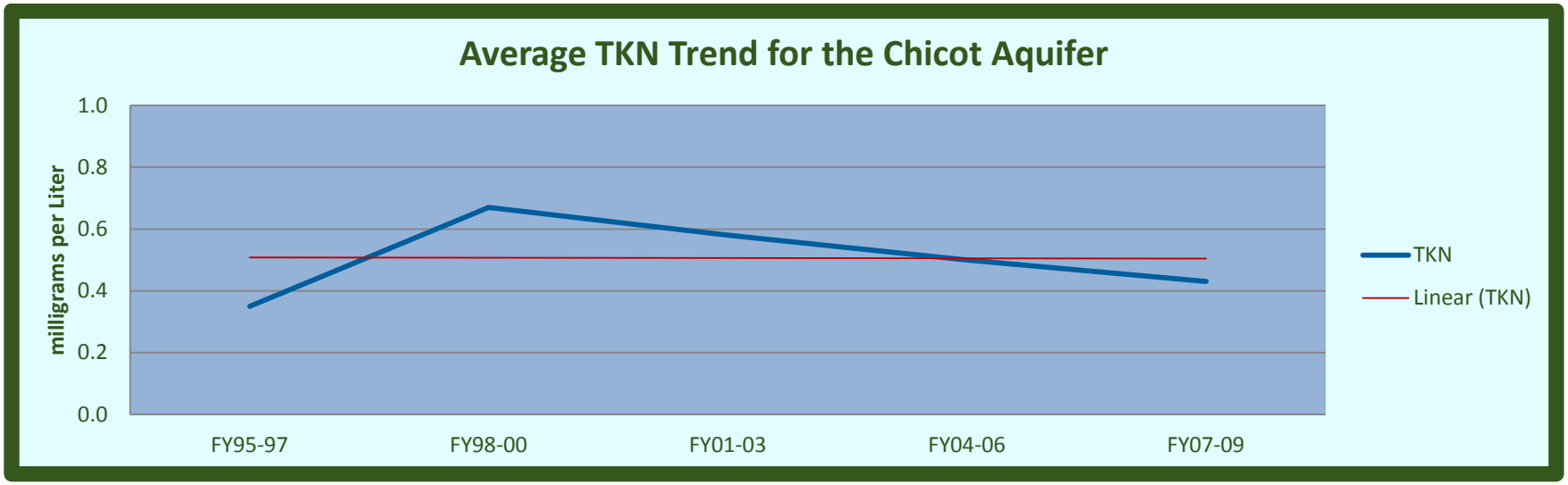


Chart 10-15: Total Phosphorus Trend

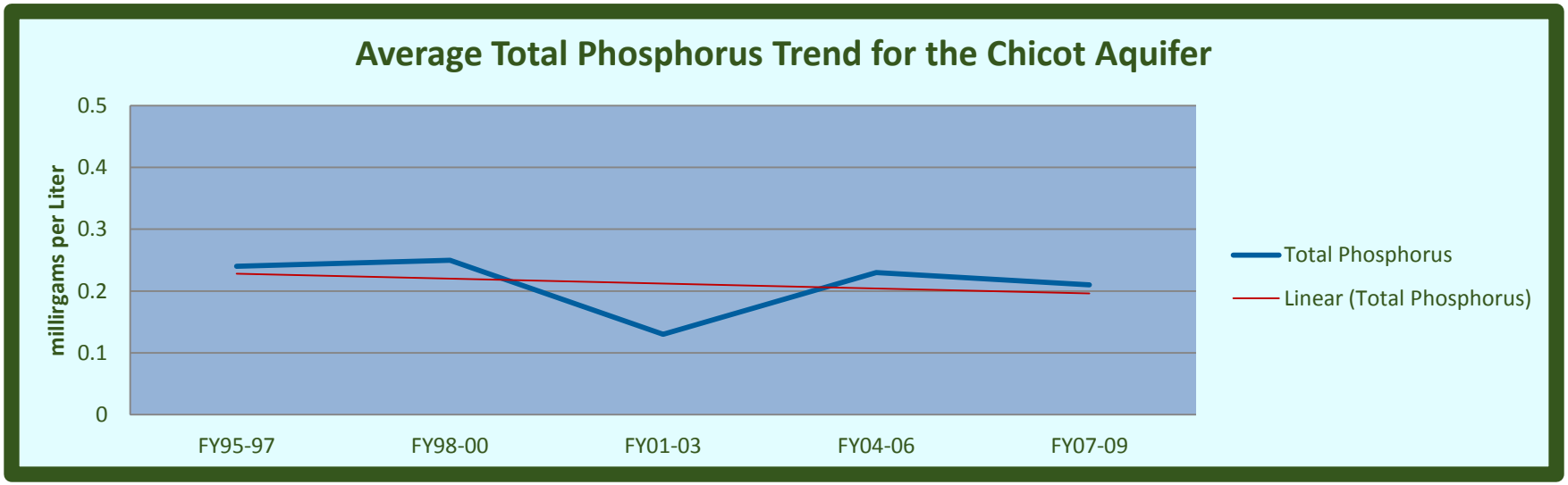


Chart 10-16: Iron Trend