CATAHOULA AQUIFER SUMMARY, 2013

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 5 TO THE 2015 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 groundwater produced from Louisiana's major fresh water 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 are monitored on a rotating basis, so that each well is 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 make up, in part, the ASSET Program's Triennial Summary Report.

Analytical and field data contained in this summary were collected from wells producing from the Catahoula aquifer, during the 2013 state fiscal year (July 1, 2012 - June 30, 2013). This summary will become Appendix 5 of ASSET Program Triennial Summary Report for 2015.

These data show that in April and May of 2013, five wells were sampled which produce from the Catahoula aquifer. All five wells are public supply wells are located in four parishes across the central area of the state.

Figure 5-1 shows the geographic locations of the Catahoula aquifer and the associated wells, whereas Table 5-1 lists the wells in the aquifer along with their total depths, use made of produced waters, and date sampled.

Well data for registered water wells were obtained from the Louisiana Department of Natural Resources water well registration data file.

GEOLOGY

The Catahoula formation consists primarily of sands with some silty to sandy clays and overlies the regional confining clays of the Vicksburg and Jackson groups. Within the Catahoula, fine to coarse sands are discontinuous and interbedded with silt and clay.

HYDROGEOLOGY

Recharge takes place primarily as a result of the direct infiltration of rainfall in interstream, upland outcrop area, movement of water through overlying terrace deposits, and leakage from other aquifers. Salt water ridges under the Red River and Little River valleys in central Louisiana divide the Catahoula aquifer. The hydraulic conductivity of the Catahoula varies between 20 and 260 feet/day.

The maximum depths of occurrence of fresh water in the Catahoula range from 250 feet above sea level, to 2,200 feet below sea level. The range of thickness of the fresh water interval in the

Catahoula is 50 to 450 feet. The depths of the Catahoula wells that were monitored in conjunction with the ASSET Program range from 352 to 910 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 5-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 5-3. These tables also show the field and analytical results determined for each analyte. For quality control, a duplicate sample was taken for each parameter at well V-434.

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 any detections from any of these three categories, if necessary, can be found in their respective sections. Tables 5-8, 5-9 and 5-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 5-4 and 5-5 provide a statistical overview of field and conventional data, and inorganic (total metals) data for the Catahoula aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2013 sampling. Tables 5-6 and 5-7 compare these same parameter averages to historical ASSET-derived data for the Catahoula aquifer, from fiscal years 1995, 1998, 2001, 2004, 2007, 2010, and 2013.

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

Due to the variability in the laboratory's reporting detection limits caused by dilution factors, whenever an analyte in question is not detected, the standard reporting detection limit value for each analytical method is used as the DL when performing statistical calculations.

Figures 5-2, 5-3, 5-4, and 5-5 respectively, represent the contoured values for pH, total dissolved solids, chloride, and iron. It should be noted that the contoured data represented in Figures 5-2 through 5-5 is generalized due to the limited number of data points (wells) available to produce these maps. Charts 5-1 through 5-16 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 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 5-2 and 5-3 show that only one secondary MCL (SMCL) was exceeded in two of the five wells sampled in the Catahoula aquifer.

Field and Conventional Parameters

Table 5-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 5-4 provides an overview of this data for the Catahoula aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 5-2 shows that no primary MCL was exceeded for field or conventional parameters for this reporting period. Those 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 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 5-2 shows that two wells exceeded the SMCL for total dissolved solids (TDS). Laboratory results override field results in exceedance determinations, thus only lab results will be counted in determining SMCL exceedance numbers for TDS. Following is a list of SMCL parameter exceedances with well number and results:

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

	LAB RESULTS	FIELD MEASURES
CT-118	553 mg/L	0.197 g/L
R-113	567 mg/L	0.242 g/L

Inorganic Parameters

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

Federal Primary Drinking Water Standards: A review of the analyses listed in Table 5-3 shows that no primary MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 5-3 shows that no secondary MCL was exceeded for total metals.

Volatile Organic Compounds

Table 5-8 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 VOC was detected at or above its detection limit during the FY 2013 sampling of the Catahoula aquifer.

Semi-Volatile Organic Compounds

Table 5-9 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.

No SVOC was detected at or above its detection limit during the FY 2013 sampling of the Catahoula aquifer.

Pesticides and PCBs

Table 5-10 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 2013 sampling of the Catahoula aquifer.

WATER QUALITY TRENDS AND COMPARISON TO HISTORICAL ASSET DATA

Analytical and field data show that the quality and characteristics of groundwater produced from the Catahoula aquifer exhibit some changes when comparing current data to that of the six previous sampling rotations (three, six, nine, twelve, fifteen, and eighteen years prior). These comparisons can be found in Tables 5-6 and 5-7, and in Charts 5-1 to 5-16 of this summary. Over the eighteen year period, nine analytes have shown a general increase in their average concentrations. These analytes are: pH, chloride, color, sulfate, hardness, TDS, ammonia, TKN, and total phosphorus. For this same time period, three analytes have demonstrated a decrease in their average concentrations, which are: temperature, iron, and copper. All other analytes have remained stable or below their respective detection limits.

The current number of wells with SMCL exceedances, and the current total number of SMCL exceedances are similar to the previous sampling event in FY 2010. Historical data show that in the FY 2010 sampling of the Catahoula aquifer there was only one SMCL exceedance in one well. The FY 2013 data also show that there was one exceedance for TDS in two wells.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is soft[1] and is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no ASSET well that was sampled during the Fiscal Year 2013 monitoring of the Catahoula aquifer exceeded an MCL. The data also show that this aquifer is of good quality when considering taste, odor or appearance guidelines, with only one SMCL exceeded in two wells.

Comparison to historical ASSET-derived data show only some change in the quality or characteristics of the Catahoula aquifer with nine parameters showing consistent increases in average concentration and three parameters decreasing in average concentration. Remaining parameters exhibited stable concentrations or remained below detection limits.

It is recommended that the wells assigned to the Catahoula aquifer be re-sampled as planned, in approximately three years. In addition, several wells should be added to the five 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 5-1: List of Wells Sampled, Catahoula Aquifer–FY 2013

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
CT-118	Catahoula	04/03/2013	City of Jonesville	762	Public Supply
LS-278	La Salle	04/03/2013	Rogers Water System	352	Public Supply
R-1113	Rapides	04/04/2013	Pollock Area Water System	852	Public Supply
R-1311	Rapides	05/28/2013	Lena Water System, Inc.	514	Public Supply
V-434	Vernon	05/28/2013	Town of Anacoco	910	Public Supply

Table 5-2: Summary of Field and Conventional Data, Catahoula Aquifer–FY 2013

Well ID	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† →					5	0.25/5	1	10	0.25	10	4	0.3	0.05	5	0.01	0.1	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
CT-118	20.84	7.09	0.303	0.14	0.197	110	19.1	4.7	306	7.99	553	4	< DL	0.32	< DL	< DL	0.82	0.09
LS-278	19.15	7.67	0.204	0.10	0.133	80	3.3	4.7	209	4.31	400	11	0.58	0.23	< DL	< DL	0.98	0.49
R-1113	23.50	8.44	0.372	0.18	0.242	140	34.9	4.7	374	0.27	567	< DL	< DL	0.24	< DL	< DL	0.90	0.44
R-1311	22.30	7.56	0.289	0.14	0.188	86	12.9	< DL	289	16.20	244	< DL	< DL	0.36	< DL	< DL	0.57	1.04
V-434	25.02	7.87	0.300	0.14	0.195	140	8.7	12.4	298	8.03	232	5	1.15	0.25	< DL	< DL	0.36	0.16
V-434*	25.02	7.87	0.300	0.14	0.195	124	8.6	12.4	296	7.89	248	< DL	0.95	0.28	< DL	< DL	0.42	0.16

†Detection limits vary due to dilution factor *Denotes Duplicate Sample Shaded cell exceed EPA Secondary Standards

Table 5-3: Summary of Inorganic (Total Metals) Data, Catahoula Aquifer–FY 2013

Well ID	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†	5	4	5	2	2	4	2	100	1	0.0002	3	5	1	2	6
CT-118	< DL	< DL	7.1	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	15.7
LS-278	< DL	< DL	< DL	< DL	< DL	< DL	11.3	284	< DL	< DL	< DL	< DL	< DL	< DL	30.2
R-1113	< DL	< DL	< DL	< DL	< DL	< DL	6.1	< DL	1.6	< DL	< DL	< DL	< DL	< DL	9.3
R-1311	< DL	< DL	20.5	< DL	< DL	< DL	2.2	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-434	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-434*	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	7.0

†Detection limits vary due to dilution factor *Denotes Duplicate Sample

Table 5-4: FY 2013 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (°C)	19.15	25.02	22.16
	pH (SU)	7.09	8.44	7.73
	Specific Conductance (mmhos/cm)	0.204	0.372	0.294
	Salinity (ppt)	0.10	0.18	0.14
	TDS (g/L)	0.133	0.242	0.191
LABORATORY	Alkalinity (mg/L)	96	140	113
	Chloride (mg/L)	3.3	34.9	14.6
	Color (PCU)	4.7	12.4	6.7
	Specific Conductance (umhos/cm)	209	374	295
	Sulfate (mg/L)	0.3	16.2	7.5
	TDS (mg/L)	232	567	374
	TSS (mg/L)	< DL	11	4
	Turbidity (NTU)	< DL	1.15	0.52
	Ammonia, as N (mg/L)	0.23	0.36	0.28
	Hardness (mg/L)	< DL	< DL	< DL
	Nitrite - Nitrate, as N (mg/L)	< DL	< DL	< DL
	TKN (mg/L)	0.36	0.98	0.68
	Total Phosphorus (mg/L)	0.09	1.04	0.40

Table 5-5: FY 2013 Inorganic (Total Metals) Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	< DL	< DL	< DL
Arsenic (ug/L)	< DL	< DL	< DL
Barium (ug/L)	< DL	20.5	6.3
Beryllium (ug/L)	< DL	< DL	< DL
Cadmium (ug/L)	< DL	< DL	< DL
Chromium (ug/L)	< DL	< DL	< DL
Copper (ug/L)	< DL	6.1	3.8
Iron (ug/L)	< DL	284	< DL
Lead (ug/L)	< DL	1.6	< DL
Mercury (ug/L)	< DL	< DL	< DL
Nickel (ug/L)	< DL	< DL	< DL
Selenium (ug/L)	< DL	< DL	< DL
Silver (ug/L)	< DL	< DL	< DL
Thallium (ug/L)	< DL	< DL	< DL
Zinc (ug/L)	< DL	30.2	10.7

Table 5-6: Triennial Field and Conventional Statistics, ASSET Wells

	PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
		FY 1995	FY 1998	FY 2001	FY 2004	FY 2007	FY 2010	FY 2013
FIELD	Temperature (^{O}C)	23.71	22.45	22.47	23.46	24.58	22.98	22.16
	pH (SU)	8.03	6.31	7.78	7.59	7.93	7.61	7.73
	Specific Conductance (mmhos/cm)	0.37	0.23	0.28	0.25	0.430	0.292	0.294
	Salinity (Sal.) (ppt)	0.16	0.11	0.18	0.12	0.20	0.14	0.14
	TDS (Total dissolved solids) (g/L)	-	-	-	0.16	0.28	0.19	0.191
LABORATORY	Alkalinity (Alk.) (mg/L)	122.76	109.64	135.55	131.80	134	118	113
	Chloride (Cl) (mg/L)	13.86	14.70	10.88	12.80	22.8	14.6	14.6
	Color (PCU)	6.6	5.0	6.2	5.5	< DL	7.0	6.7
	Specific Conductance (umhos/cm)	289	269	302	291	334	280	295
	Sulfate (SO4) (mg/L)	8.66	4.56	4.55	6.23	9.50	8.95	7.5
	TDS (Total dissolved solids) (mg/L)	245	265	258	195	240	236	374
	TSS (Total suspended solids) (mg/L)	< DL	5.7	< DL	< DL	< DL	< DL	4
	Turbidity (Turb.) (NTU)	6.4	< DL	1.7	1.5	1.1	< DL	0.52
	Ammonia, as N (NH3) (mg/L)	0.22	0.16	0.20	0.27	0.16	0.25	0.28
	Hardness (mg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
	Nitrite - Nitrate , as N (mg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
	TKN (mg/L)	0.50	0.18	0.38	0.41	0.22	0.65	0.68
	Total Phosphorus (P) (mg/L)	0.25	0.22	0.37	0.55	0.33	0.50	0.40

Table 5-7: Triennial Inorganic (Total Metals) Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
	FY 1995	FY 1998	FY 2001	FY 2004	FY 2007	FY 2010	FY 2013
Antimony (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Arsenic (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Barium (ug/L)	8.1	63.6	4.6	<200	29.0	7.0	6.3
Beryllium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cadmium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Chromium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Copper (ug/L)	84.1	< DL	5.5	< DL	3.3	3.2	3.8
Iron (ug/L)	1,076	413	232	268	327	< DL	< DL
Lead (ug/L)	23.2	< DL	46.7	< DL	< DL	< DL	< DL
Mercury (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Nickel (ug/L)	6.1	< DL	6.9	< DL	< DL	4.2	< DL
Selenium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Silver (ug/L)	< DL	< DL	< DL	-	< DL	< DL	< DL
Thallium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Zinc (ug/L)	177.4	42.2	64.9	< DL	329.5	20.3	10.7

Table 5-8: VOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
ETHYL BENZENE	624	0.5
CIS-1,3-DICHLOROPROPENE	624	0.5
TRANS-1,3-DICHLOROPROPENE	624	0.5
1,4-DICHLOROBENZENE	624	0.5
1,2-DICHLOROETHANE	624	0.5
TOLUENE	624	0.5
CHLOROBENZENE	624	0.5
DIBROMOCHLOROMETHANE	624	0.5
TETRACHLOROETHYLENE (PCE)	624	0.5
TRANS-1,2-DICHLOROETHENE	624	0.5
TERT-BUTYL METHYL ETHER	624	0.5
1,3-DICHLOROBENZENE	624	0.5
CARBON TETRACHLORIDE	624	0.5
CHLOROFORM	624	0.5
BENZENE	624	0.5
1,1,1-TRICHLOROETHANE	624	0.5
BROMOMETHANE	624	0.5
CHLOROMETHANE	624	0.5
CHLOROETHANE	624	0.5
VINYL CHLORIDE	624	0.5
METHYLENE CHLORIDE	624	0.5
BROMOFORM	624	0.5
BROMODICHLOROMETHANE	624	0.5
1,1-DICHLOROETHANE	624	0.5
1,1-DICHLOROETHENE	624	0.5
TRICHLOROFLUOROMETHANE (FREON-11)	624	0.5
1,2-DICHLOROPROPANE	624	0.5
1,1,2-TRICHLOROETHANE	624	0.5
TRICHLOROETHYLENE (TCE)	624	0.5
1,1,2,2-TETRACHLOROETHANE	624	0.5
1,2,3-TRICHLOROBENZENE	624	0.5
1,2-DICHLOROBENZENE	624	0.5
ETHYL BENZENE	624	0.5
CIS-1,3-DICHLOROPROPENE	624	0.5

Table 5-9: SVOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
1,2,4-TRICHLOROBENZENE	625	5
2,4,6-TRICHLOROPHENOL	625	5
2,4-DICHLOROPHENOL	625	5
2,4-DIMETHYLPHENOL	625	5
2,4-DINITROPHENOL	625	20
2,4-DINITROTOLUENE	625	5
2,6-DINITROTOLUENE	625	5
2-CHLORONAPHTHALENE	625	5
2-CHLOROPHENOL	625	5
2-NITROPHENOL	625	10
3,3'-DICHLOROBENZIDINE	625	5
4,6-DINITRO-2-METHYLPHENOL	625	10
4-BROMOPHENYL PHENYL ETHER	625	5
4-CHLORO-3-METHYLPHENOL	625	5
4-CHLOROPHENYL PHENYL ETHER	625	5
4-NITROPHENOL	625	20
ACENAPHTHENE	625	5
ACENAPHTHYLENE	625	5
ANTHRACENE	625	5
BENZIDINE	625	20
BENZO(A)ANTHRACENE	625	5
BENZO(A)PYRENE	625	5
BENZO(B)FLUORANTHENE	625	5
BENZO(G,H,I)PERYLENE	625	5
BENZO(K)FLUORANTHENE	625	5
BENZYL BUTYL PHTHALATE	625	5
BIS(2-CHLOROETHOXY) METHANE	625	5
HEXACHLOROCYCLOPENTADIENE	625	5
HEXACHLOROETHANE	625	5
INDENO(1,2,3-C,D)PYRENE	625	5
ISOPHORONE	625	5
NAPHTHALENE	625	5
NITROBENZENE	625	5
N-NITROSODIMETHYLAMINE	625	5
N-NITROSODI-N-PROPYLAMINE	625	5
N-NITROSODIPHENYLAMINE	625	5

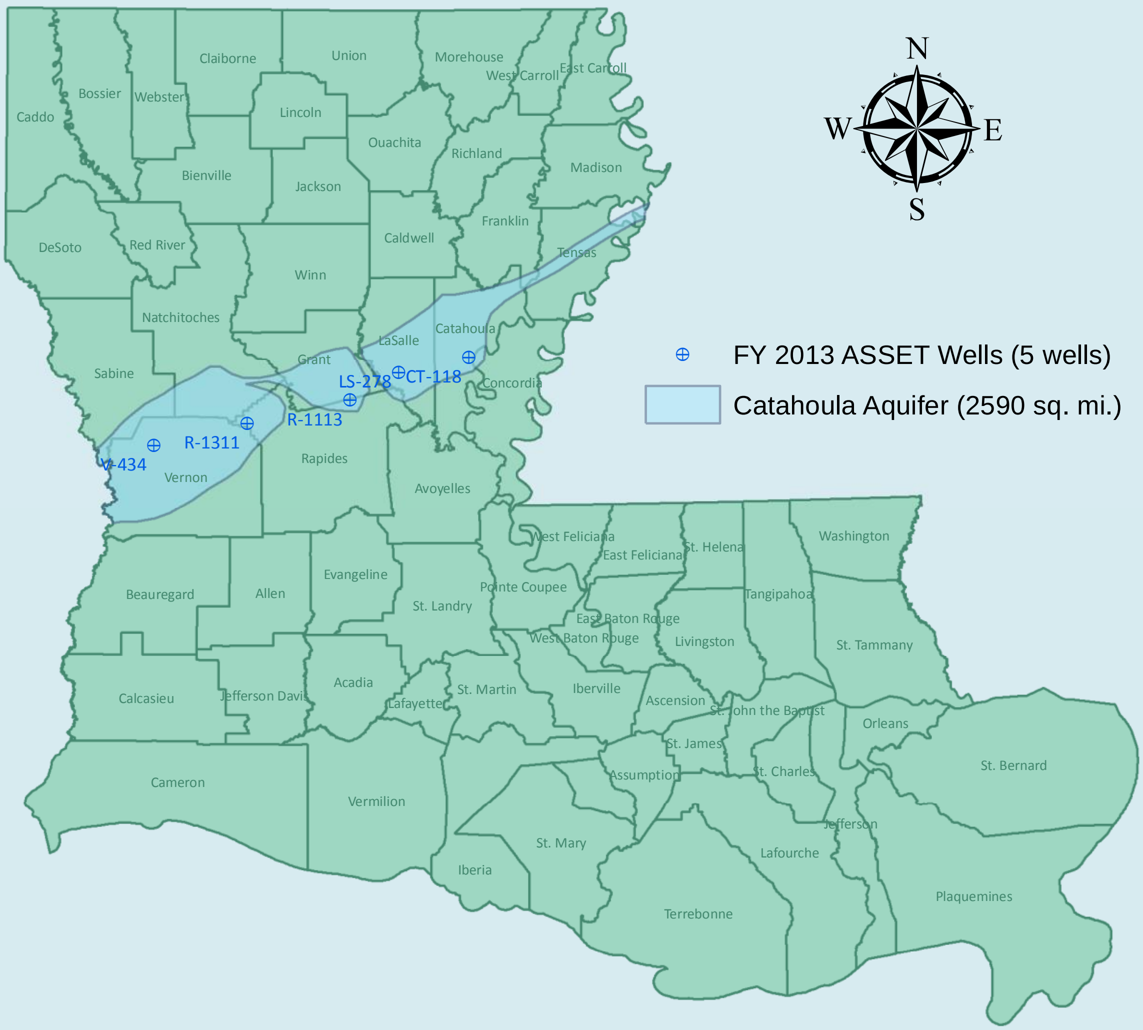
Table 5-9: SVOCs (Continued)

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
PENTACHLOROBENZENE	625	5
PENTACHLOROPHENOL	625	10
PHENANTHRENE	625	5
PHENOL	625	5
PYRENE	625	5
TETRACHLOROBENZENE(S), TOTAL	625	10

Table 5-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS (ug/L)
4,4'-DDD	8081	0.1
4,4'-DDE	8081	0.1
4,4'-DDT	8081	0.1
Aldrin	8081	0.05
Alpha-Chlordane	8081	0.05
alpha-BHC	8081	0.05
beta-BHC	8081	0.05
delta-BHC	8081	0.05
gamma-BHC	8081	0.05
Dieldrin	8081	0.1
Endosulfan I	8081	0.05
Endosulfan II	8081	0.1
Endosulfan Sulfate	8081	0.1
Endrin	8081	0.1
Endrin Aldehyde	8081	0.1
Endrin Ketone	8081	0.1
Heptachlor	8081	0.05
Heptachlor Epoxide	8081	0.05
Methoxychlor	8081	0.5
Toxaphene	8081	2
Gamma-Chlordane	8081	0.05
PCB-1016	8082	1
PCB-1221	8082	1
PCB-1232	8082	1
PCB-1242	8082	1
PCB-1248	8082	1
PCB-1254	8082	1
PCB-1260	8082	1

Figure 5-1: Location Plat, Catahoula 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 2013

Figure 5-2: Map of pH Data

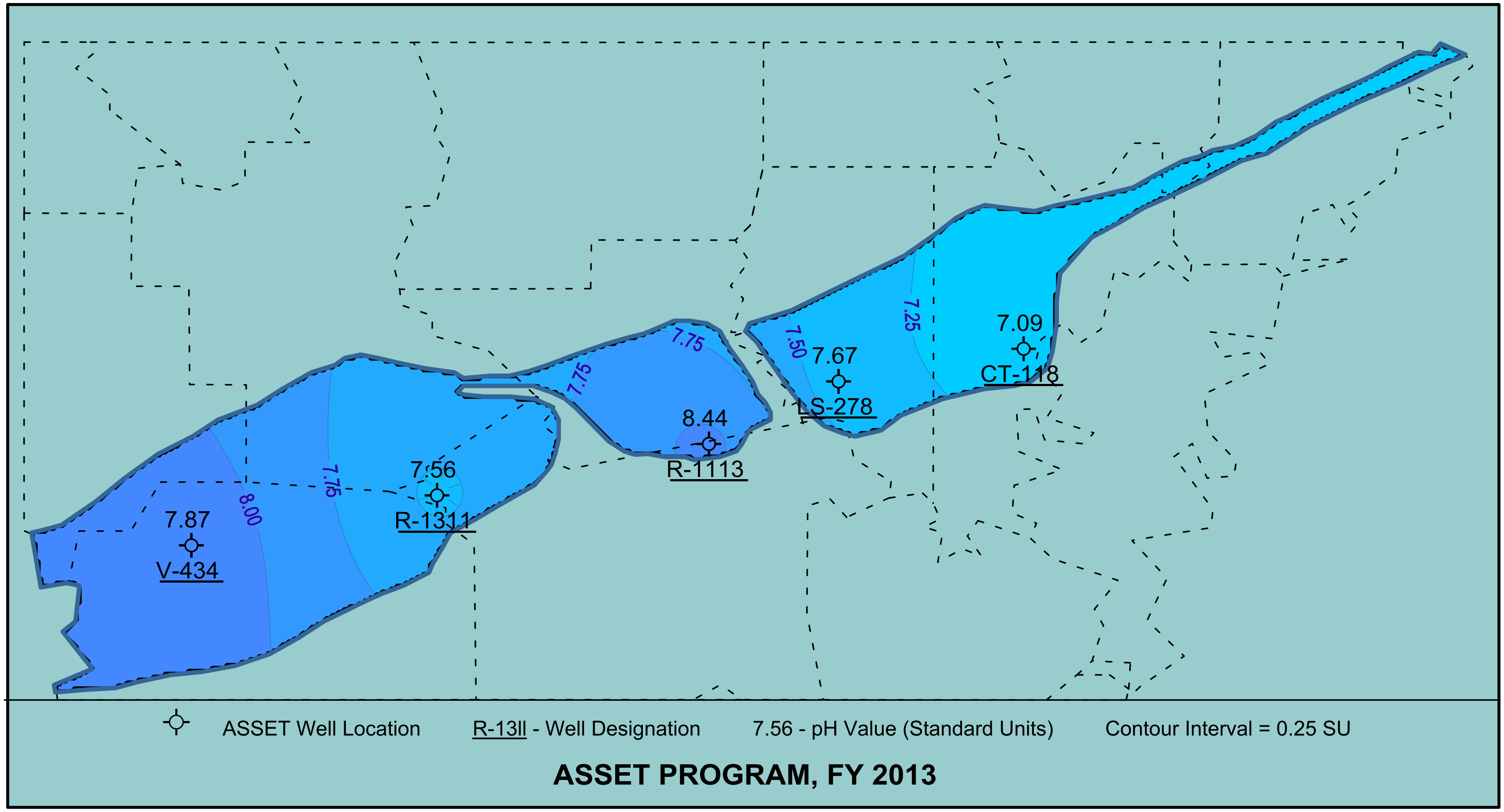


Figure 5-3: Map of TDS Lab Data

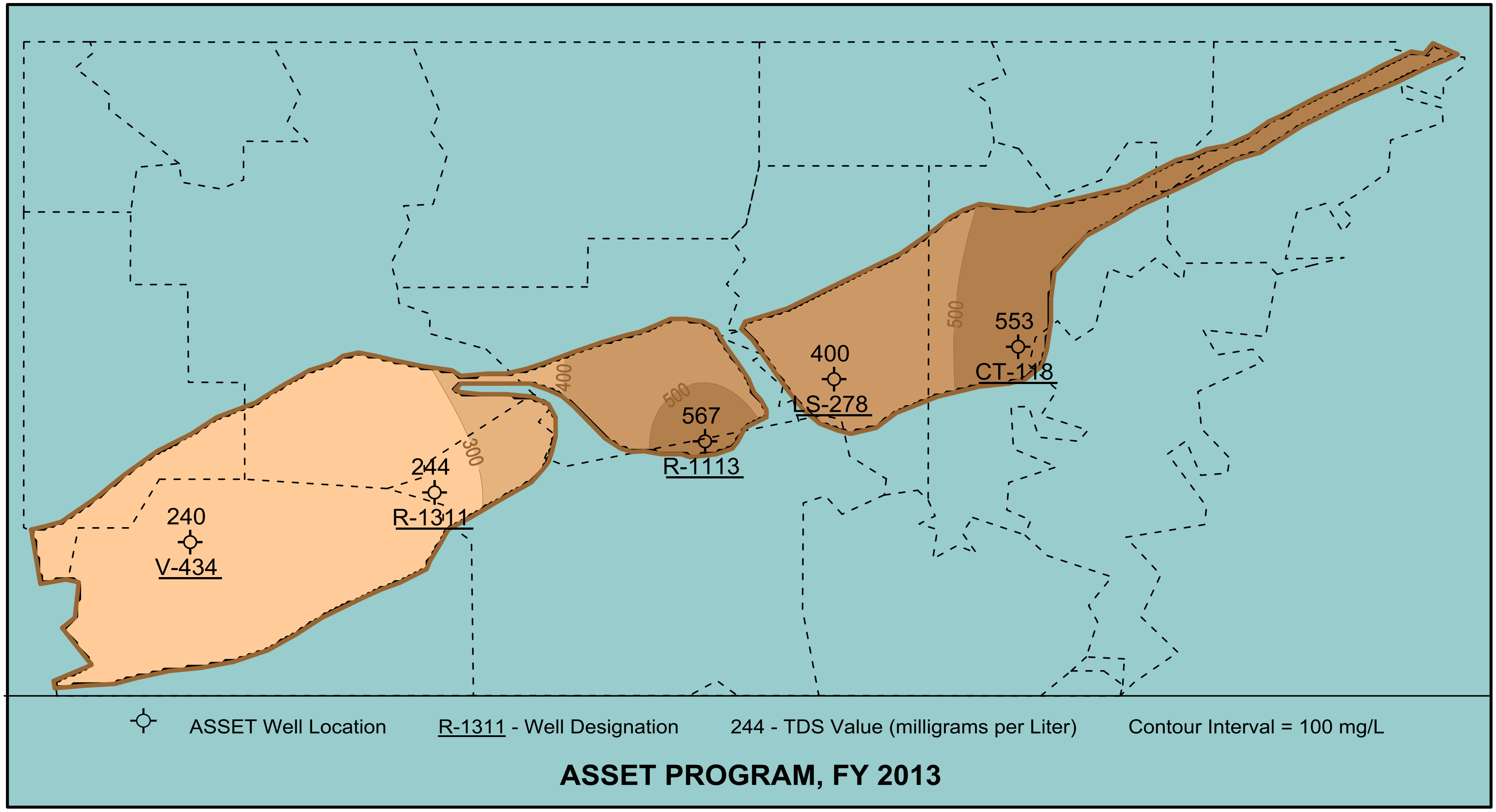


Figure 5-4: Map of Chloride Data

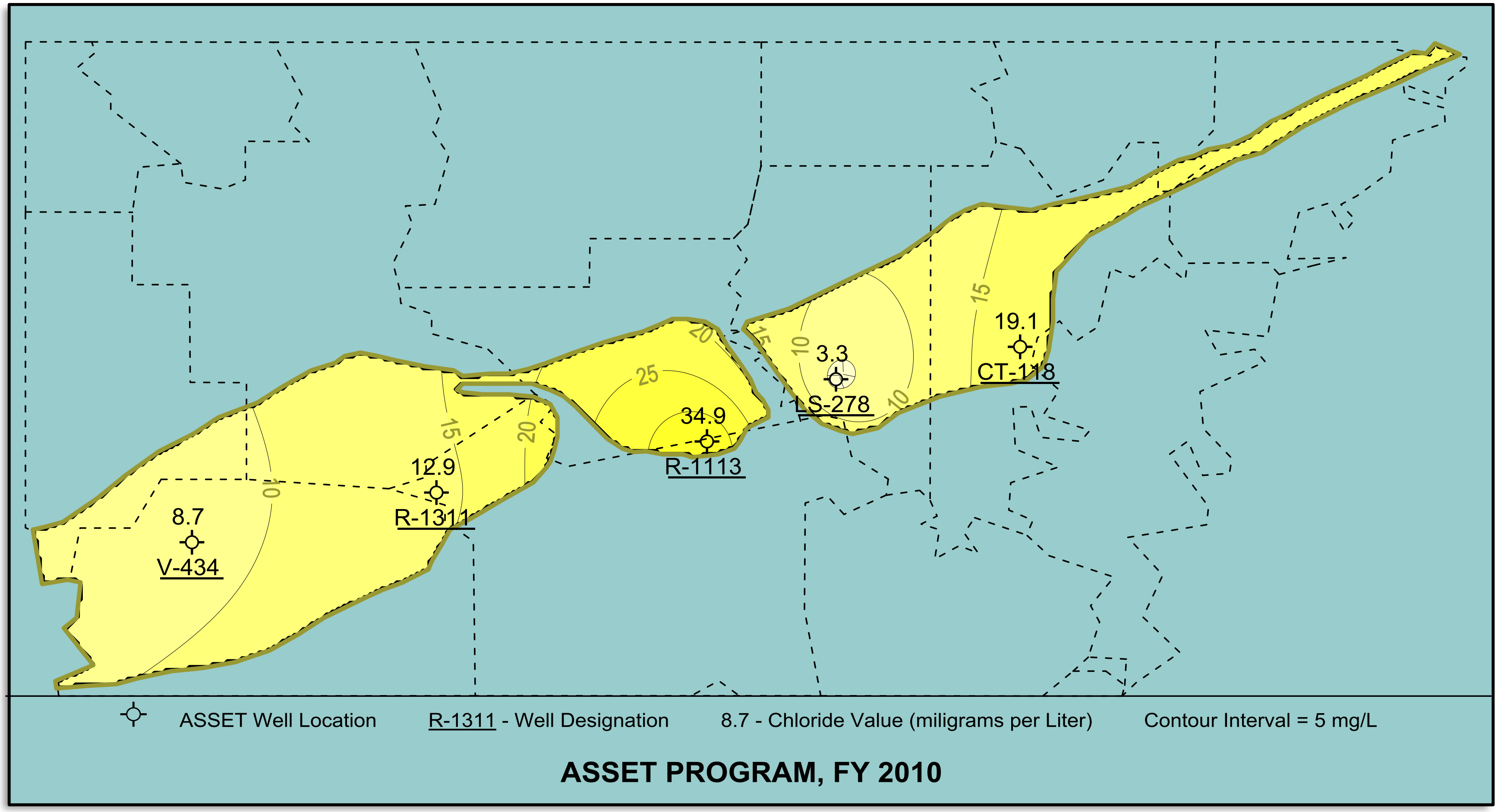


Figure 5-5: Map of Iron Data

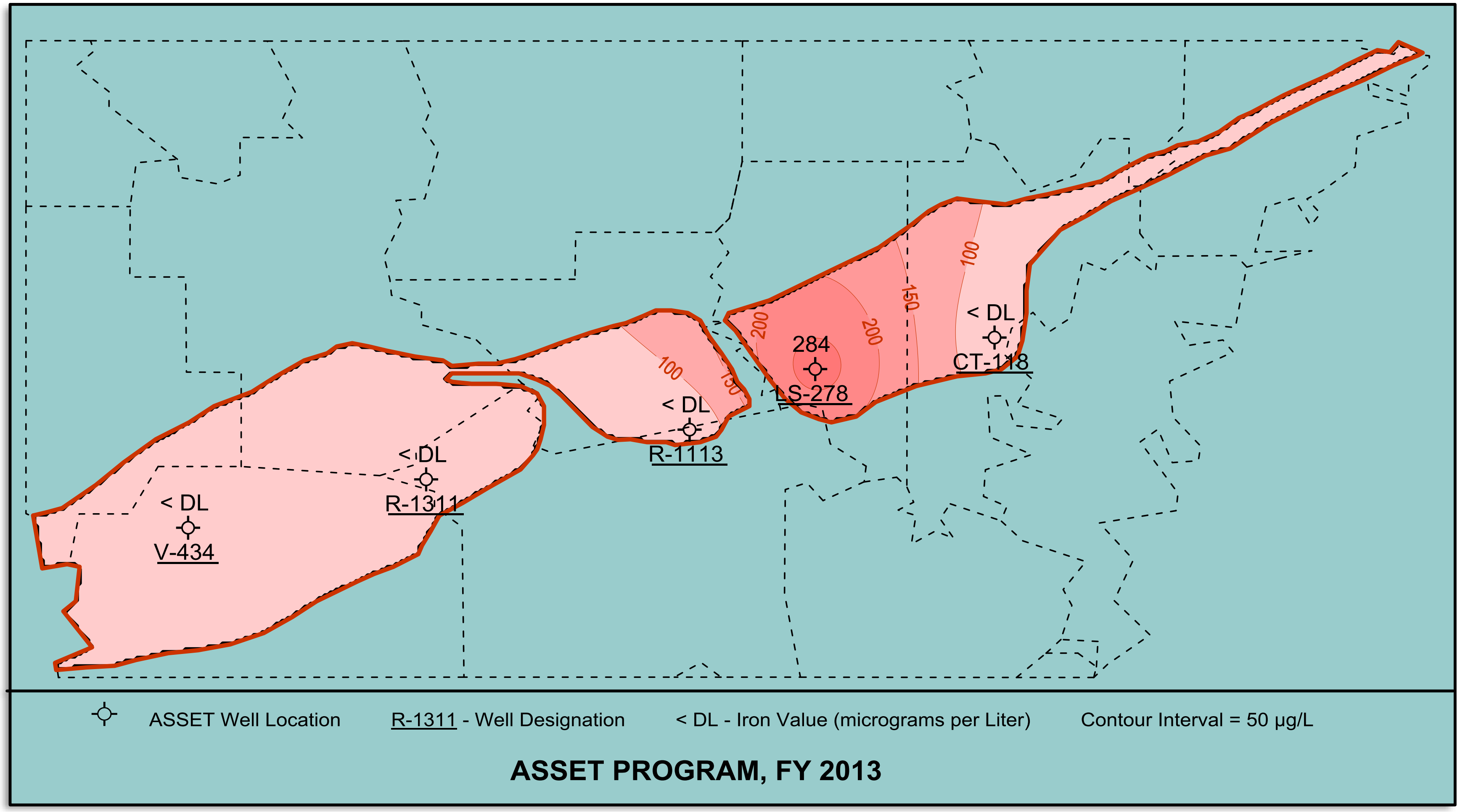


Chart 5-1: Temperature Trend

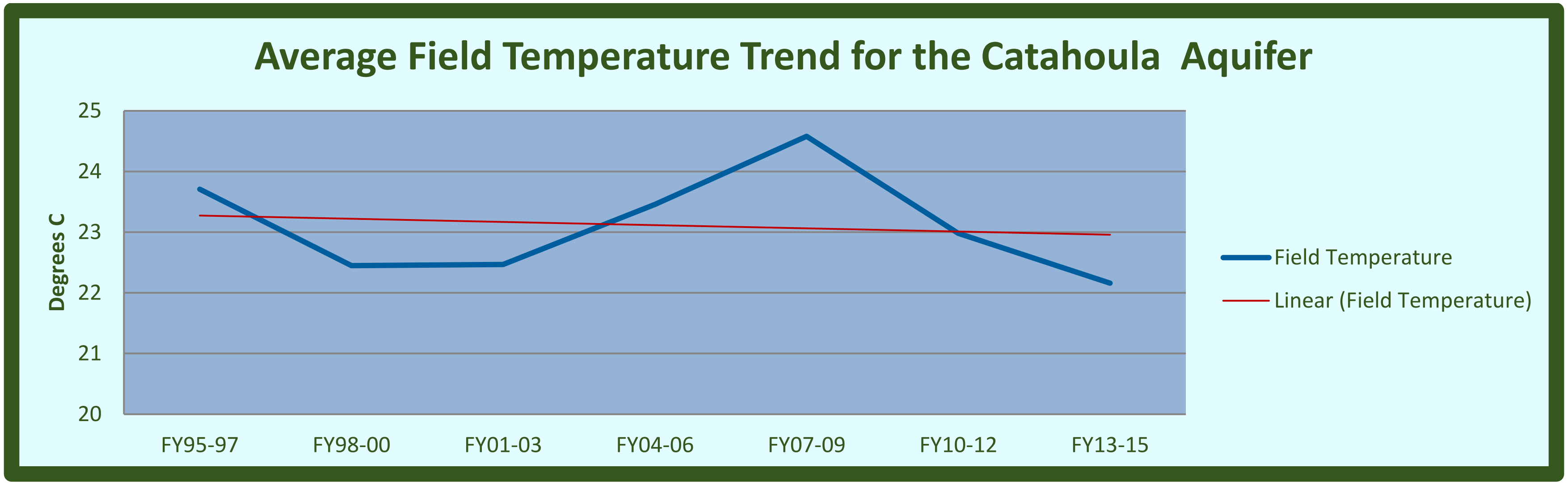


Chart 5-2: pH Trend

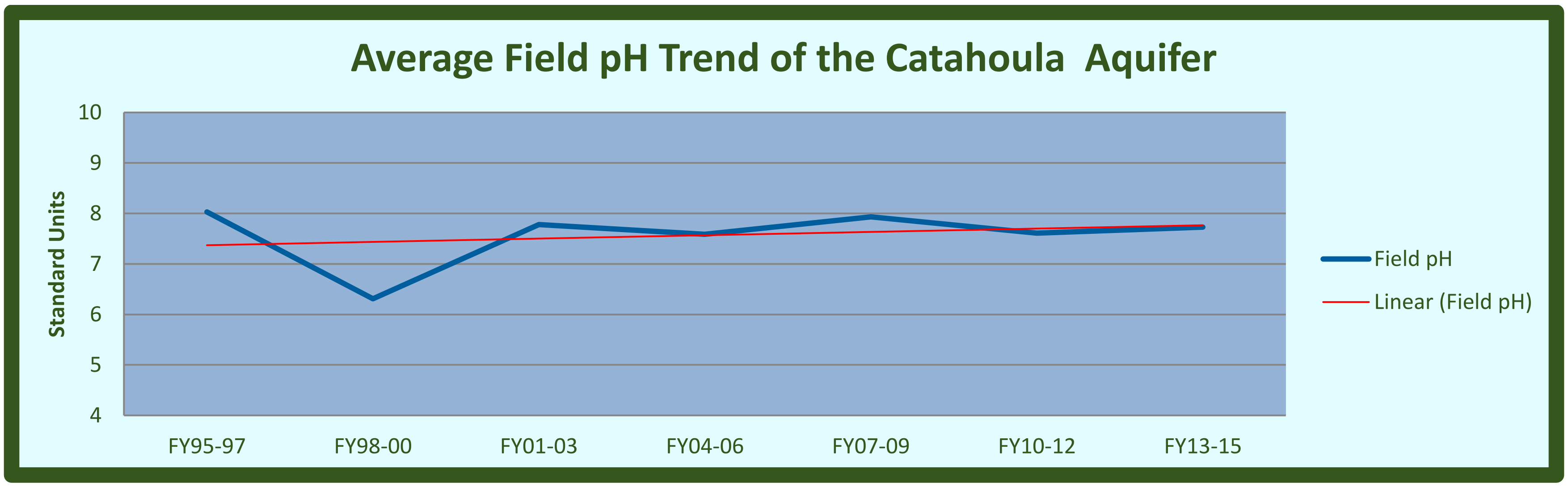


Chart 5-3: Field Specific Conductance Trend

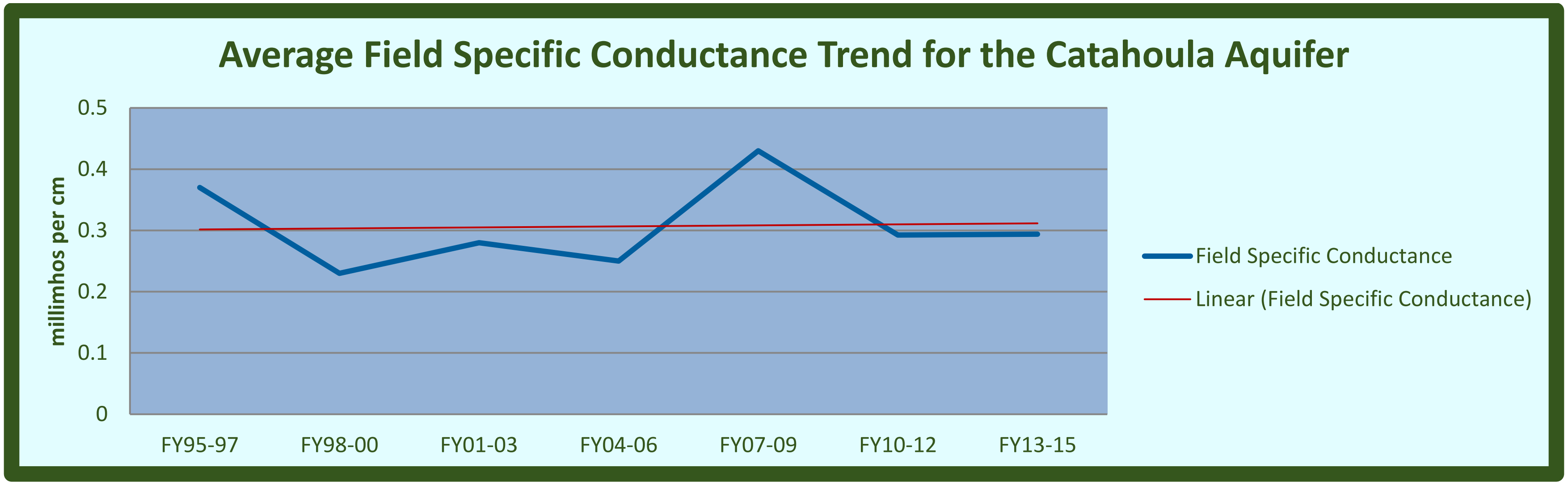


Chart 5-4: Lab Specific Conductance Trend

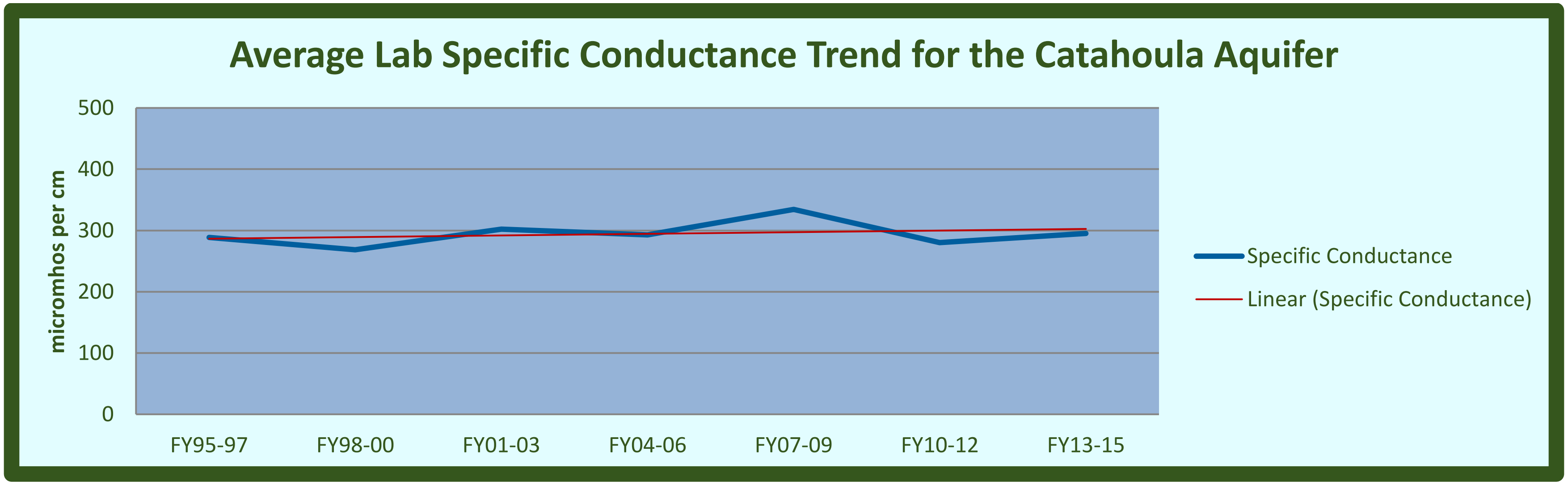


Chart 5-5: Field Salinity Trend

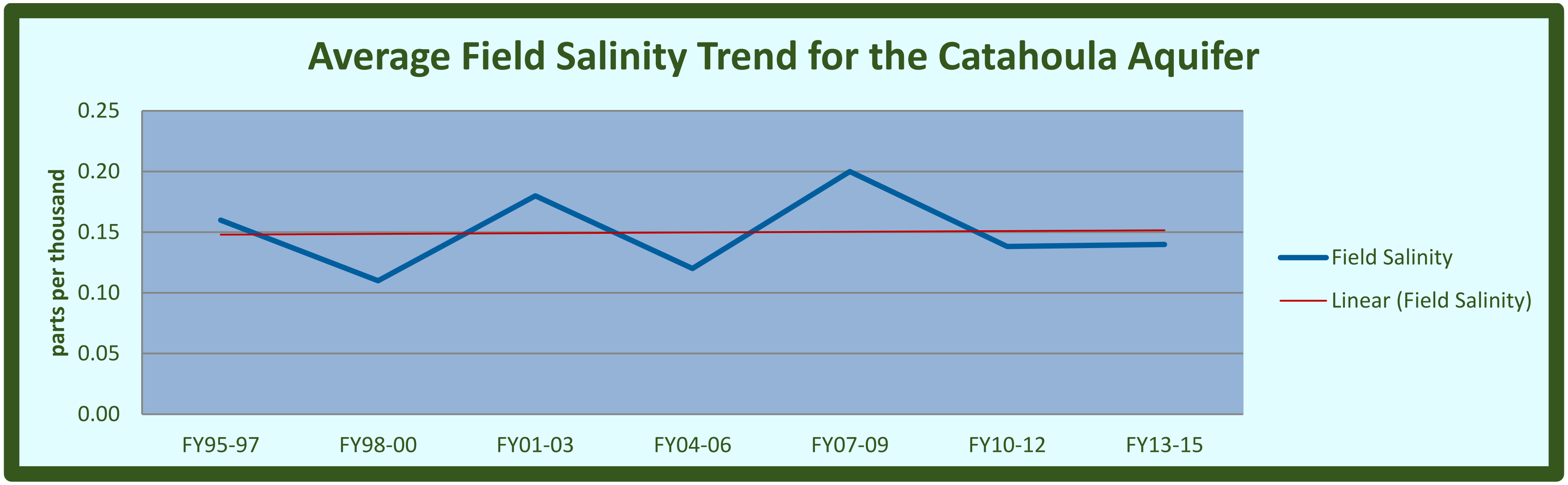


Chart 5-6: Chloride Trend

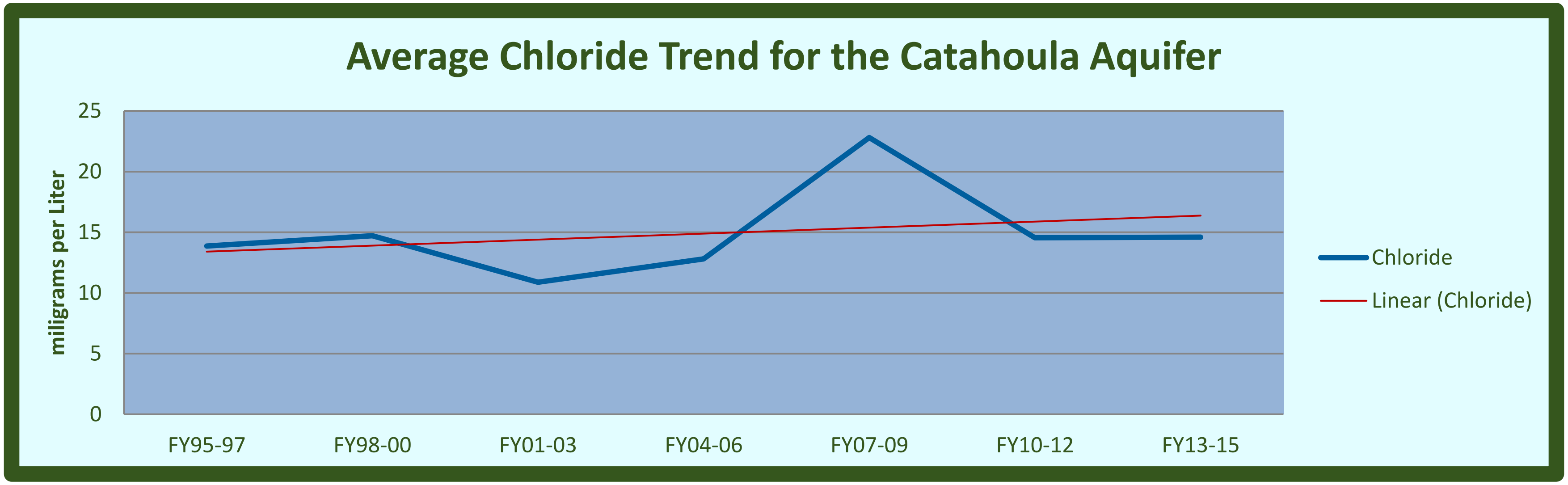


Chart 5-7: Alkalinity Trend

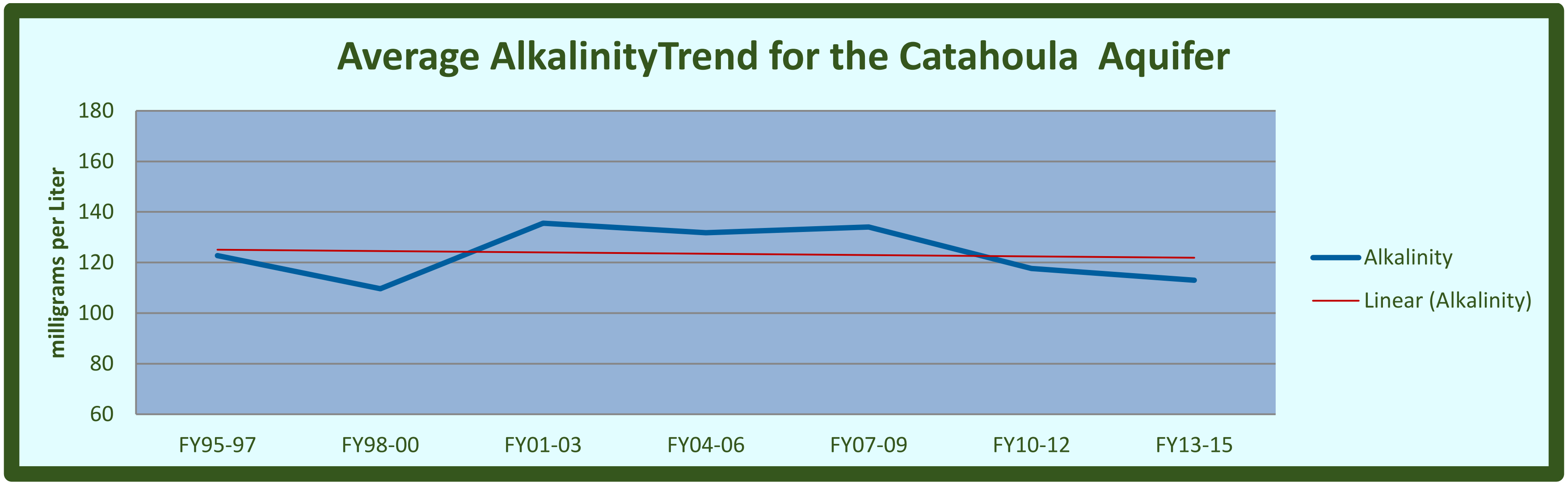


Chart 5-8: Color Trend

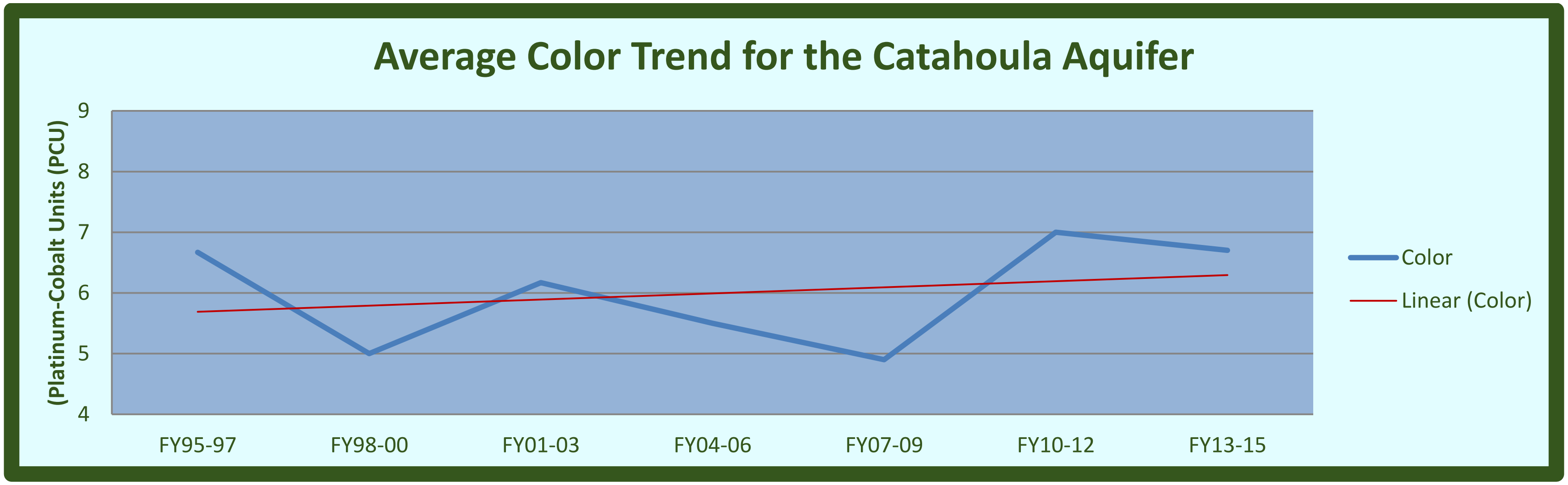


Chart 5-9: Sulfate Trend

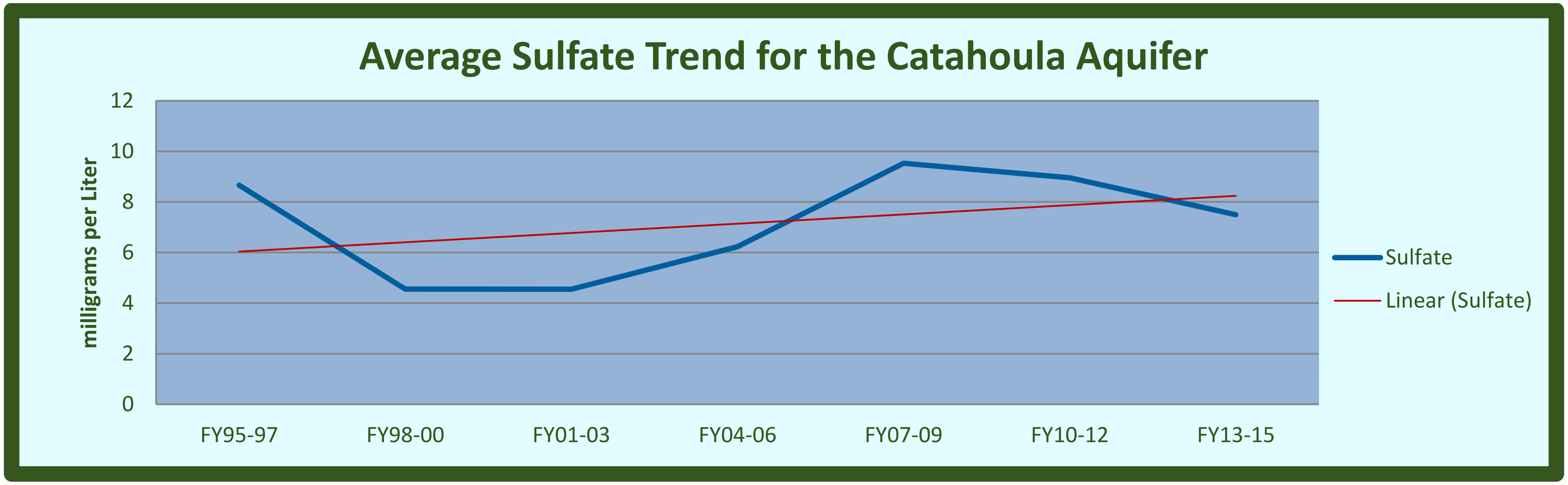


Chart 5-10: Total Dissolved Solids Trend

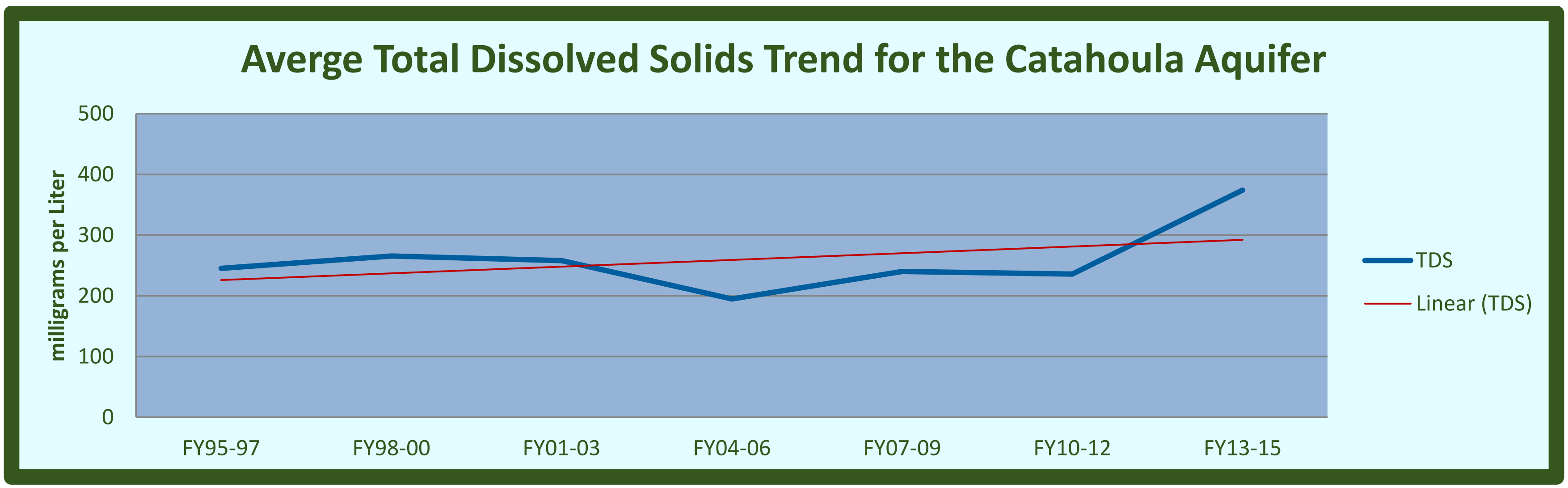


Chart 5-11: Hardness Trend

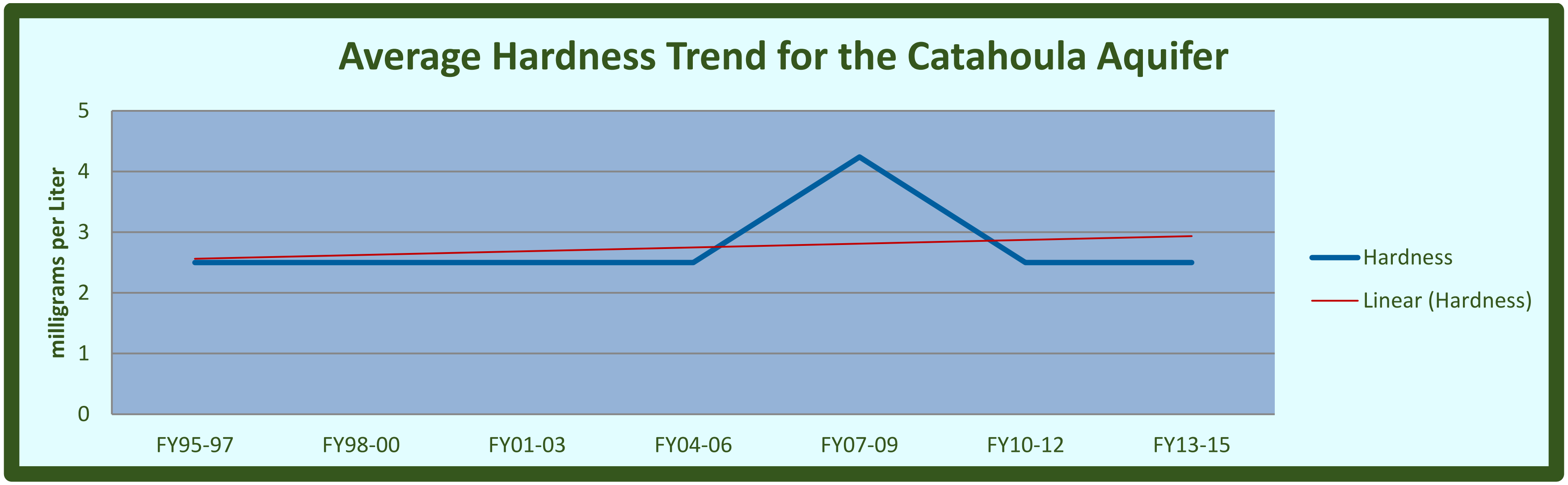


Chart 5-12: Ammonia (NH3) Trend

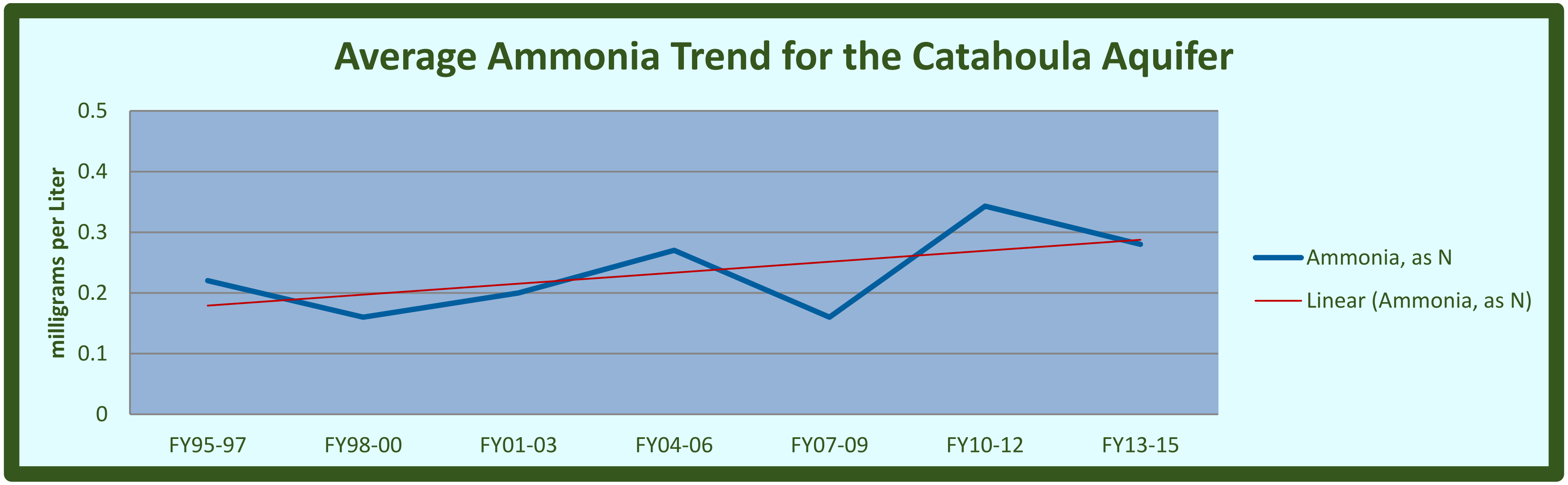


Chart 5-13: Nitrite – Nitrate Trend

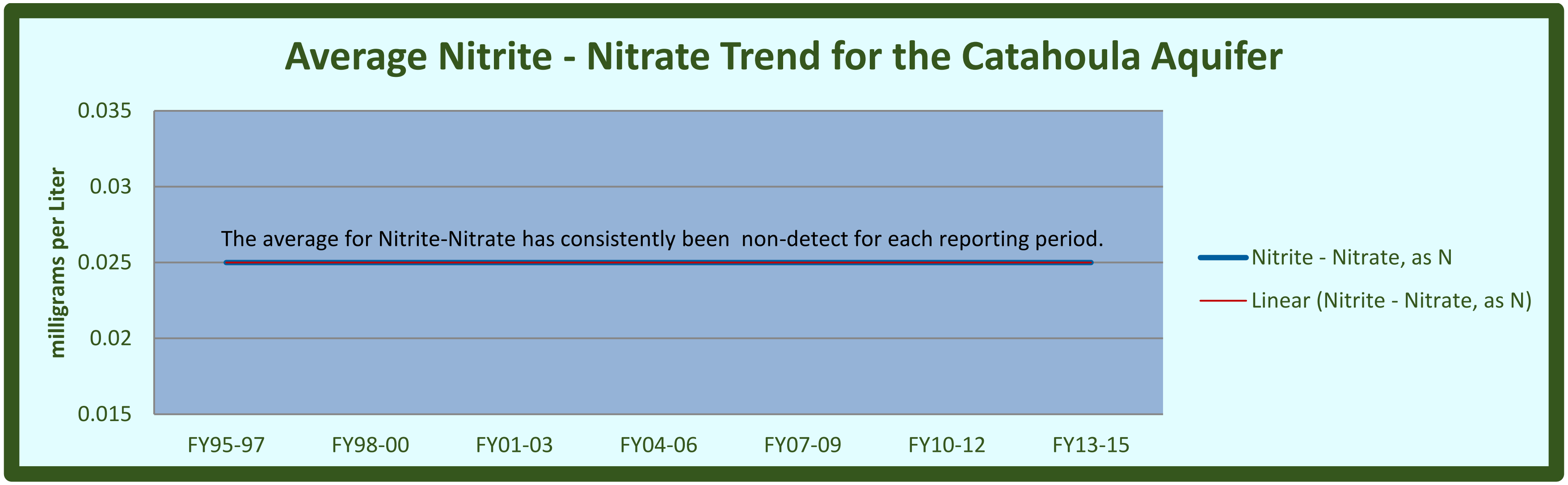


Chart 5-14: TKN Trend

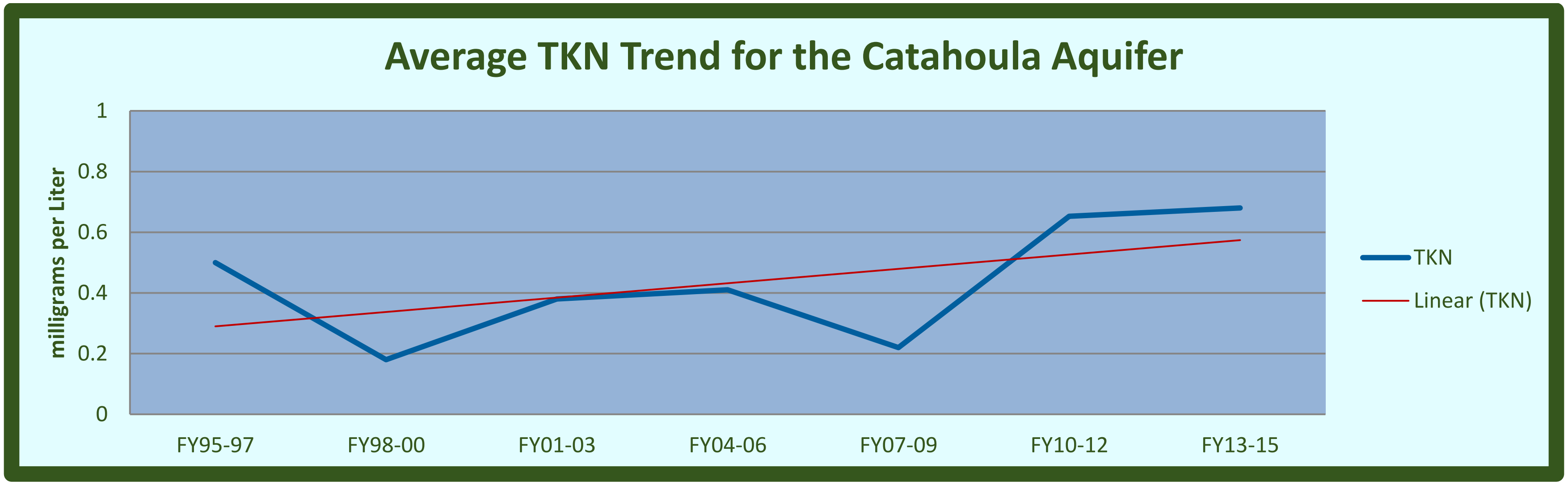


Chart 5-15: Total Phosphorus Trend

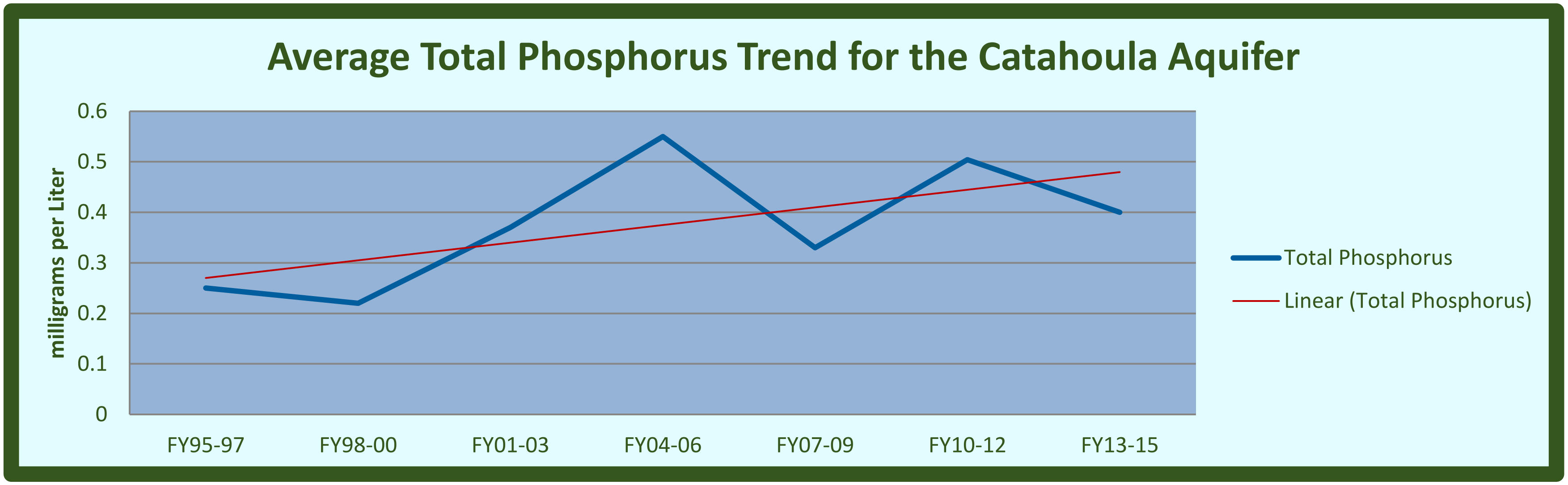


Chart 5-16: Iron Trend