CATAHOULA AQUIFER SUMMARY, 2007

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 5 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 fourteen aquifers and aquifer systems are monitored on a rotating basis, within a three-year period 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 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 Catahoula aquifer, during the 2007 state fiscal year (July 1, 2006 - June 30, 2007). This summary will become Appendix 5 of ASSET Program Triennial Summary Report for 2009.

These data show that in February 2007, four wells were sampled which produce from the Catahoula aquifer. All four 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 Transportation and Development's 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. Saltwater 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 freshwater 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 208 to 852 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 CT-119.

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 data for the Catahoula aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2007 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 and 2004.

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 values for a particular analyte are reported as non-detect, then the minimum, maximum, and average values are all reported as less than the DL. For contouring purposes, one-half the DL is also used for non-detects in the figures and charts referenced below.

Figures 5-2, 5-3, 5-4, and 5-5 respectively, represent the contoured values for pH, total dissolved solids (TDS), chloride (Cl), and iron. It should be noted that the contoured data represented in Figures 5-2 through 5-5 is very general 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 Office of Environmental Assessment does use 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 5-2 and 5-3 show that only one secondary MCL (SMCL) was exceeded in one of the four 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 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 5-2 shows that no secondary MCL was exceeded in this group of analytes.

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 one well exceeded the secondary MCL for iron:

Iron (SMCL = 300 ug/L):
SA-287 – 1,030 ug/L

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.

Toluene was originally detected in well SA-287 at a concentration of 56.2 ug/L (MCL = 1,000 ug/L). The well was subsequently resampled in July 2007, and toluene was not detected in the sample or the duplicate sample of this well. Therefore, it is the opinion of this Office that the toluene detected in well SA-287 was due to field or lab contamination and not due to contamination of the well. There were no other confirmed detections of VOCs during the FY 2007 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 2007 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 2007 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 ground water produced from the Catahoula 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 5-6 and 5-7, and in Charts 5-1 to 5-16 of this summary. Over the twelve-year period, 5 analytes have shown a general increase in their average concentrations, while 4 have demonstrated only a slight increase. These analytes are: temperature, sulfate, hardness, total phosphorus, and zinc; slight increase: pH, specific conductivity (field and lab), salinity, and chloride (Cl). For this same time period, 4 analytes have demonstrated a decrease in their average concentrations: color, total dissolved solids (TDS), TKN, and iron. Ammonia has shown no consistent change in its average concentration, while nitrite-nitrate has remained below its detection limit for this entire time period.

The current number of wells with secondary MCL exceedances, and the current total number of secondary exceedances are the same as the previous sampling event in FY 2004. Historical data show that in the FY 2004 sampling of the Catahoula aquifer there was only one secondary exceedance (iron) in one well. The FY 2007 data also show that iron was the only exceedance in a single well.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the ground water 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 2007 monitoring of the Catahoula aquifer exceeded a Primary MCL. The data also show that this aquifer is of good quality when considering taste, odor or appearance guidelines, with only one Secondary MCL exceeded in one well.

Comparison to historical ASSET-derived data show only some change in the quality or characteristics of the Catahoula aquifer, with 9 parameters showing consistent increases in average concentration (4 with only slight increases), 4 parameters decreasing in average concentration, one parameter showing no consistent change, and one parameter remaining below its detection limit over the previous twelve years.

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 four 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 2007

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
CT-119	CATAHOULA	2/26/2007	CITY OF JONESVILLE	800	PUBLIC SUPPLY
LS-278	LA SALLE	2/26/2007	ROGERS WATER SYSTEM	352	PUBLIC SUPPLY
R-1113	RAPIDES	2/26/2007	POLLOCK AREA WATER SYSTEM	852	PUBLIC SUPPLY
SA-287	SABINE	2/27/2007	HODGES GARDENS	208	PUBLIC SUPPLY

Table 5-2: Summary of Field and Conventional Data, Catahoula Aquifer–FY 2007

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 →					2.0	1.3	5	10	1.25/1.3	4	4	1	0.1	5.0	0.05	0.10	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
CT-119	23.69	7.68	0.344	0.16	0.22	120	21.4	<5	308	12	232	<4	<1	0.19	<5	<0.05	0.14	0.06
CT-119*	23.69	7.68	0.344	0.16	0.22	120	21.4	<5	309	12.2	231	<4	<1	0.21	<5	<0.05	0.3	0.05
LS-278	21.36	7.73	0.255	0.12	0.17	101	2.9	<5	203	5.2	178	<4	<1	0.14	<5	<0.05	0.31	0.43
R-1113	26.11	8.21	0.463	0.22	0.30	146	29.9	7	361	<1.3	258	<4	<1	0.22	<5	<0.05	0.31	0.39
SA-287	28.06	8.36	0.726	0.35	0.47	183	38.4	10	491	17.6	300	<4	3.5	<0.1	11.2	<0.05	<0.1	0.71

*Denotes Duplicate Sample

Table 5-3: Summary of Inorganic Data, Catahoula Aquifer–FY 2007

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	5	3	20	3	0.05	3	4	0.5	1	10
CT-119	<1	<3	8.1	<1	<0.5	<3	<3	205	<3	<0.05	<3	<4	<0.5	<1	<10
CT-119*	<1	<3	7.9	<1	<0.5	<3	<3	150	<3	<0.05	<3	<4	<0.5	<1	<10
LS-278	<1	<3	3	<1	<0.5	<3	10.3	204	<3	<0.05	<3	<4	<0.5	<1	15.4
R-1113	<1	<3	3	<1	<0.5	<3	<3	46.6	<3	<0.05	<3	<4	<0.5	<1	<10
SA-287	<1	3.3	123	<1	<0.5	<3	<3	1,030	<3	<0.05	<3	<4	<0.5	<1	1,617

*Denotes Duplicate Sample. Shaded cell exceed EPA Secondary Standards

Table 5-4: FY 2007 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	21.36	28.06	24.58
	pH (SU)	7.68	8.36	7.93
	Specific Conductance (mmhos/cm)	0.255	0.726	0.430
	Salinity (ppt)	0.12	0.35	0.20
	TDS (g/L)	0.166	0.472	0.280
LABORATORY	Alkalinity (mg/L)	101	183	134
	Chloride (mg/L)	2.9	38.4	22.8
	Color (PCU)	<5	10	<5
	Specific Conductance (umhos/cm)	203.0	491.0	334.4
	Sulfate (mg/L)	<1.3	17.6	9.5
	TDS (mg/L)	178.0	300.0	239.8
	TSS (mg/L)	<4	<4	<4
	Turbidity (NTU)	<1.0	3.5	1.1
	Ammonia, as N (mg/L)	<0.10	0.22	0.16
	Hardness (mg/L)	<5.0	11.2	<5.0
	Nitrite - Nitrate, as N (mg/L)	<0.05	<0.05	<0.05
	TKN (mg/L)	<0.10	0.31	0.22
	Total Phosphorus (mg/L)	<0.05	0.71	0.33

Table 5-5: FY 2007 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	<1	<1	<1
Arsenic (ug/L)	<3	3.3	<3
Barium (ug/L)	3	123	29
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	10.3	3.3
Iron (ug/L)	46.6	1,030.0	327.1
Lead (ug/L)	<3	<3	<3
Mercury (ug/L)	<0.05	<0.05	<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)	10.0	1,617.0	329.5

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

	PARAMETER	FY 1995 AVERAGE	FY 1998 AVERAGE	FY 2001 AVERAGE	FY 2004 AVVERAGE	FY 2007 AVERAGE
FIELD	Temperature (^{O}C)	23.71	22.45	22.47	23.46	24.58
	pH (SU)	8.03	6.31	7.78	7.59	7.93
	Specific Conductance (mmhos/cm)	0.37	0.23	0.28	0.25	0.430
	Salinity (ppt)	0.16	0.11	0.18	0.12	0.20
	TDS (g/L)	-	-	-	0.16	0.280
LABORATORY	Alkalinity (mg/L)	122.76	109.64	135.55	131.80	134
	Chloride (mg/L)	13.86	14.70	10.88	12.80	22.8
	Color (PCU)	6.67	5.00	6.17	5.50	<5
	Specific Conductance (umhos/cm)	288.67	268.51	302.33	292.80	334.4
	Sulfate (mg/L)	8.66	4.56	4.55	6.23	9.5
	TDS (mg/L)	245.33	265.43	257.83	194.80	239.8
	TSS (mg/L)	<4	5.71	<4	<4	<4
	Turbidity (NTU)	6.43	<1	1.72	1.48	1.1
	Ammonia, as N (mg/L)	0.22	0.16	0.20	0.27	0.16
	Hardness (mg/L)	<5	<5	<5	<5	<5.0
	Nitrite - Nitrate, as N (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05
	TKN (mg/L)	0.50	0.18	0.38	0.41	0.22
	Total Phosphorus (mg/L)	0.25	0.22	0.37	0.55	0.33

Table 5-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	FY 1995 AVERAGE	FY 1998 AVERAGE	FY 2001 AVERAGE	FY 2004 AVERAGE	FY 2007 AVERAGE
Antimony (ug/L)	<5	<5	<5	<30	<1
Arsenic (ug/L)	<5	<5	<5	<10	<3
Barium (ug/L)	8.06	63.6	4.6	<200	29
Beryllium (ug/L)	<5	<5	<5	<5	<1
Cadmium (ug/L)	<5	<5	<5	<5	<0.5
Chromium (ug/L)	<5	<5	<5	<10	<3
Copper (ug/L)	84.1	<5	5.5	<10	3.26
Iron (ug/L)	1,076.1	412.7	231.8	268	327.1
Lead (ug/L)	23.2	<5	46.7	<3	<3
Mercury (ug/L)	<0.05	<0.05	<0.05	<0.2	<0.05
Nickel (ug/L)	6.10	<5	6.88	<40	<3
Selenium (ug/L)	<5	<5	<5	<10	<4
Silver (ug/L)	<5	<5	<5	-	<0.5
Thallium (ug/L)	<5	<5	<5	<10	<1
Zinc (ug/L)	177.4	42.2	64.87	<20	329.5

Table 5-8: 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
Methyl-t-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
m- & p-Xylenes	624	4

Table 5-9: 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

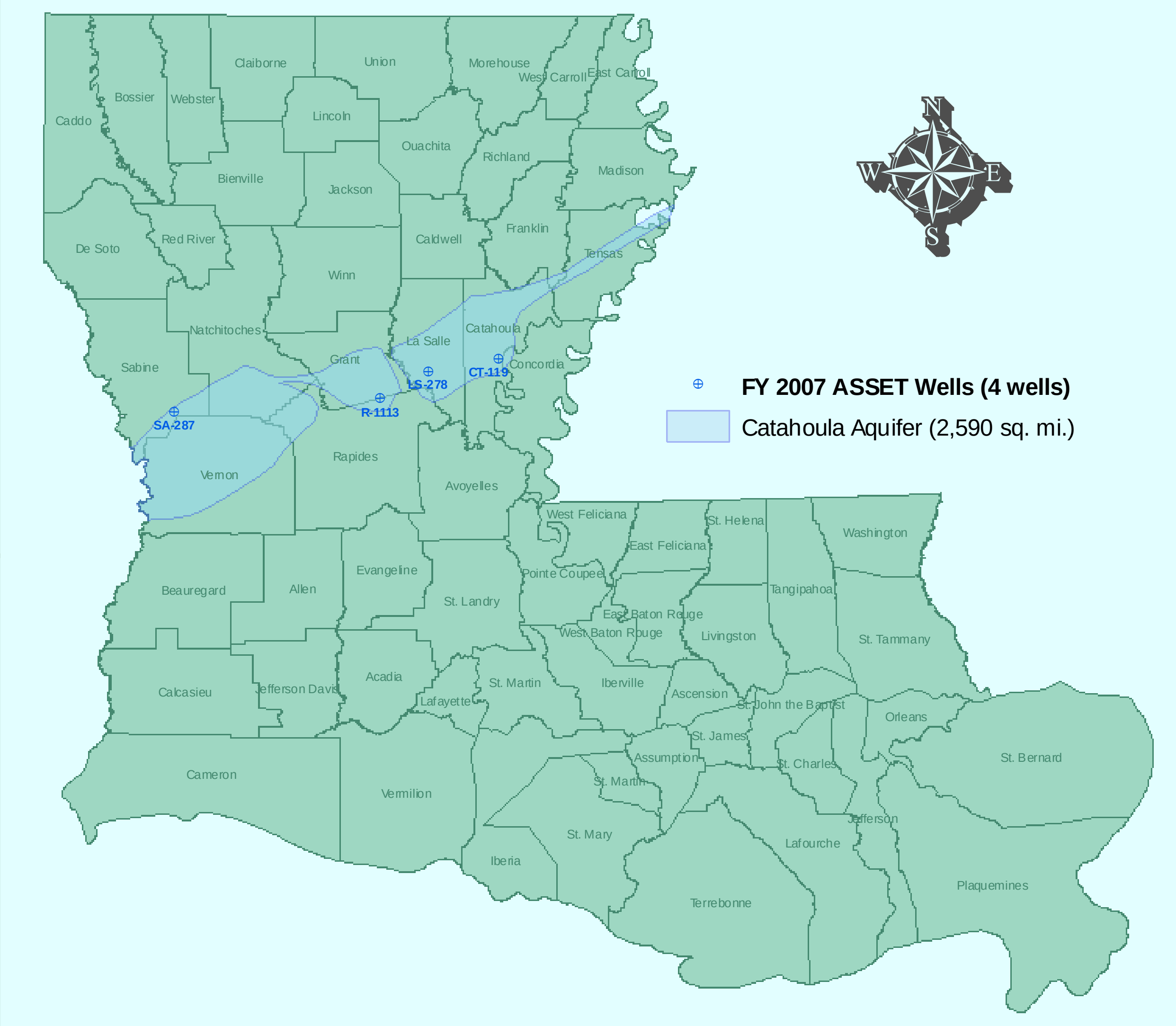
Table 5-9: SVOCs (Continued)

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 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.

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Figure 5-2: Map of pH Data

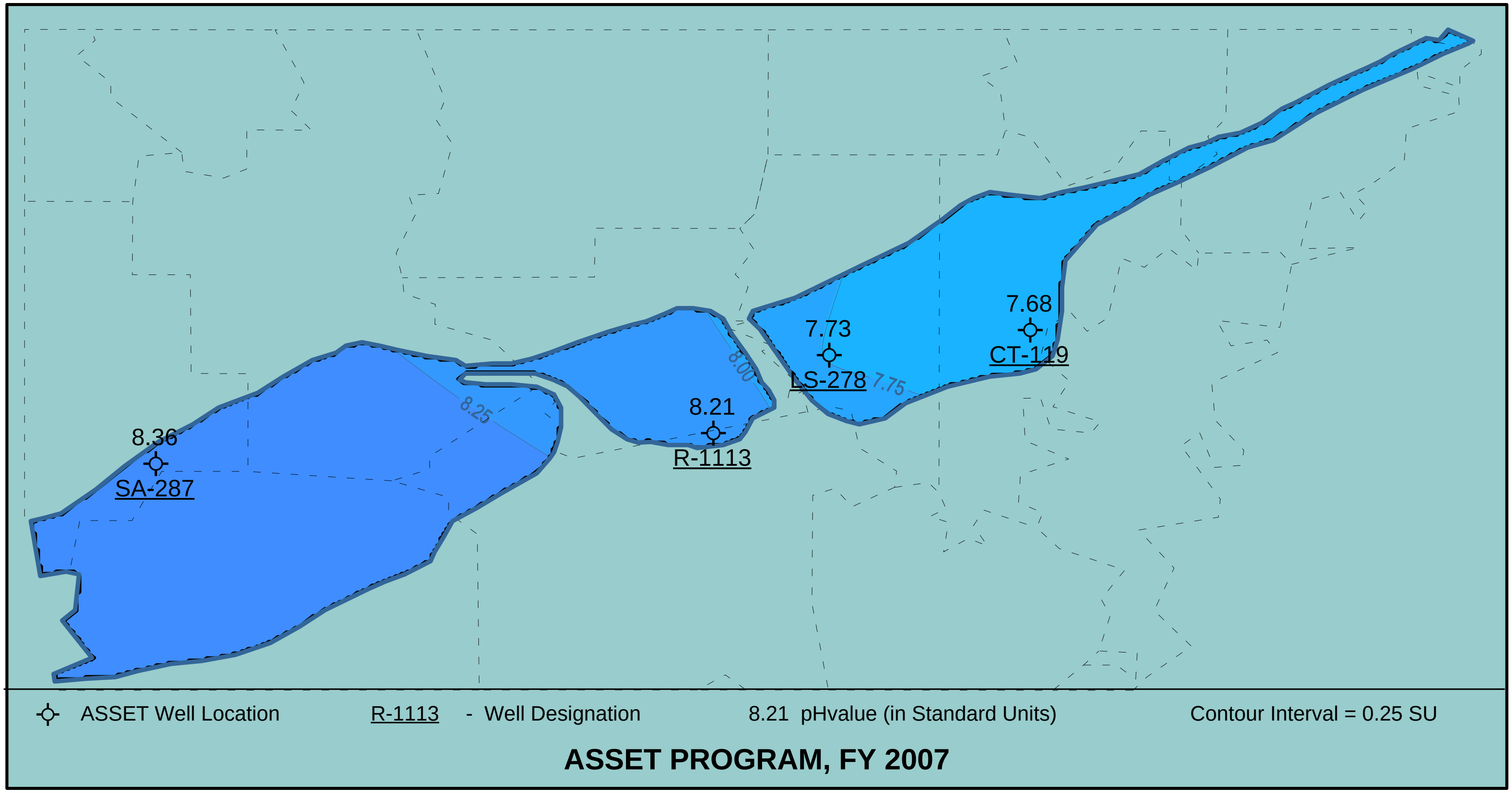


Figure 5-3: Map of TDS Lab Data

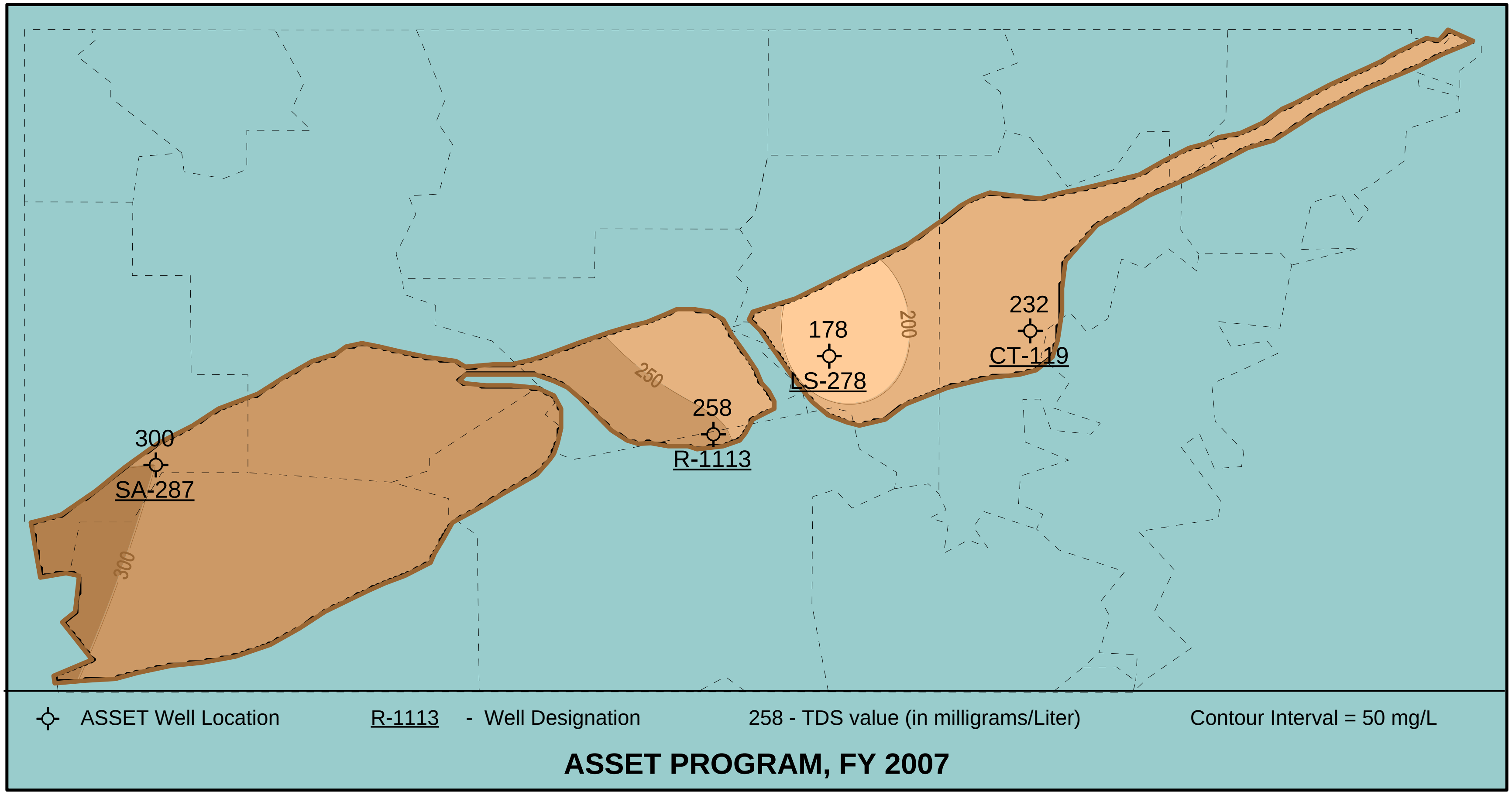


Figure 5-4: Map of Chloride Data

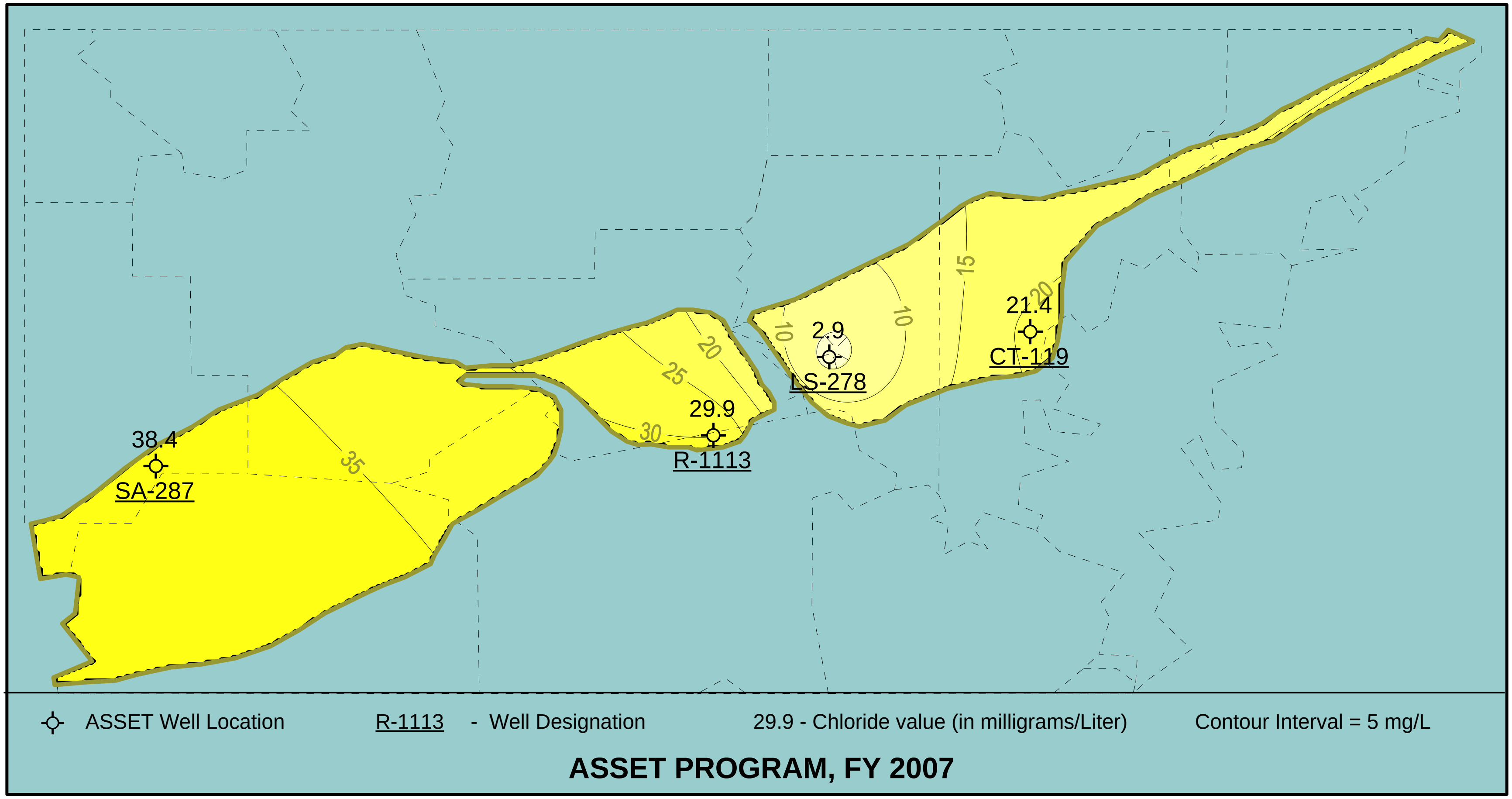
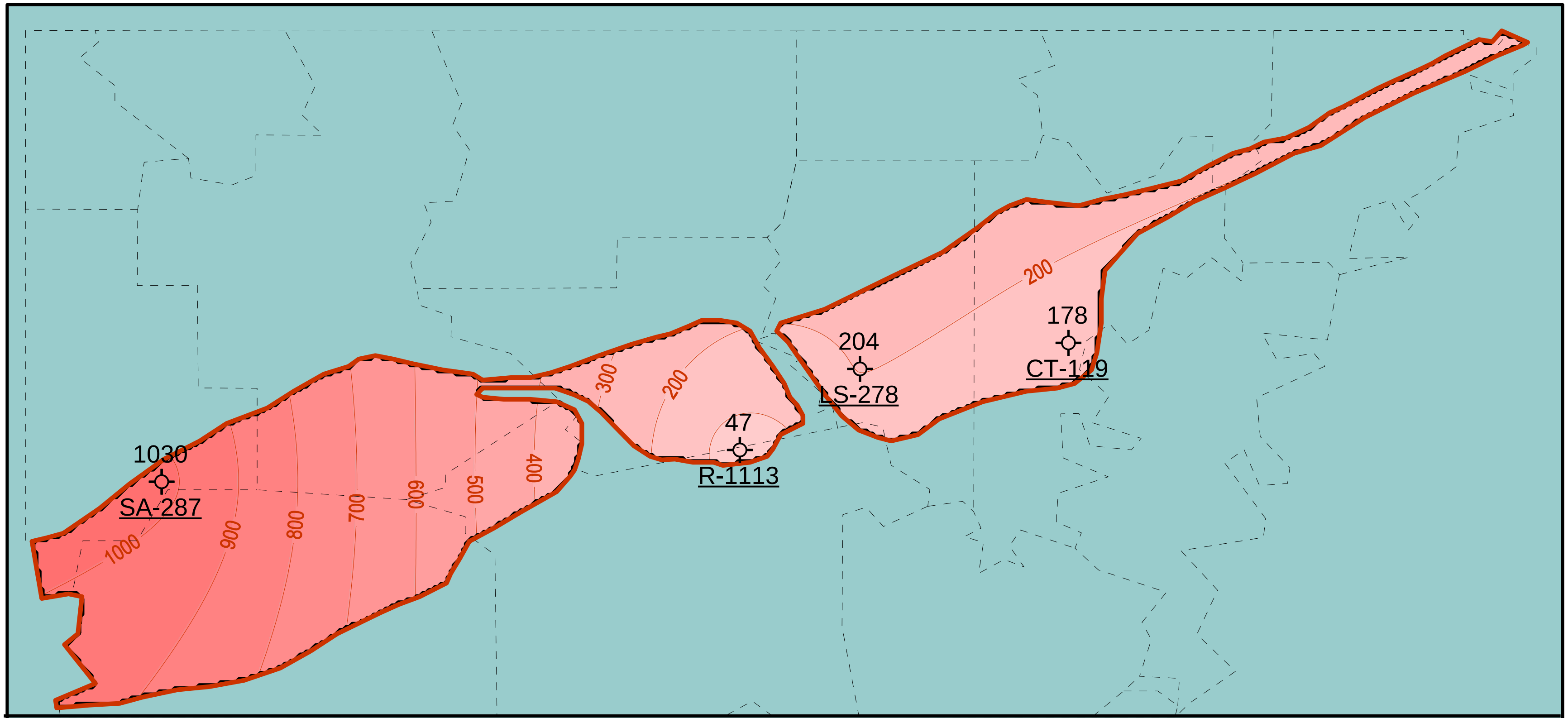


Figure 5-5: Map of Iron Data



ASSET Well Location   R-1113 - Well Designation   47- Iron value (in micrograms/Liter)   Contour Interval = 100 ug/L

ASSET PROGRAM, FY 2007

Chart 5-1: Temperature Trend

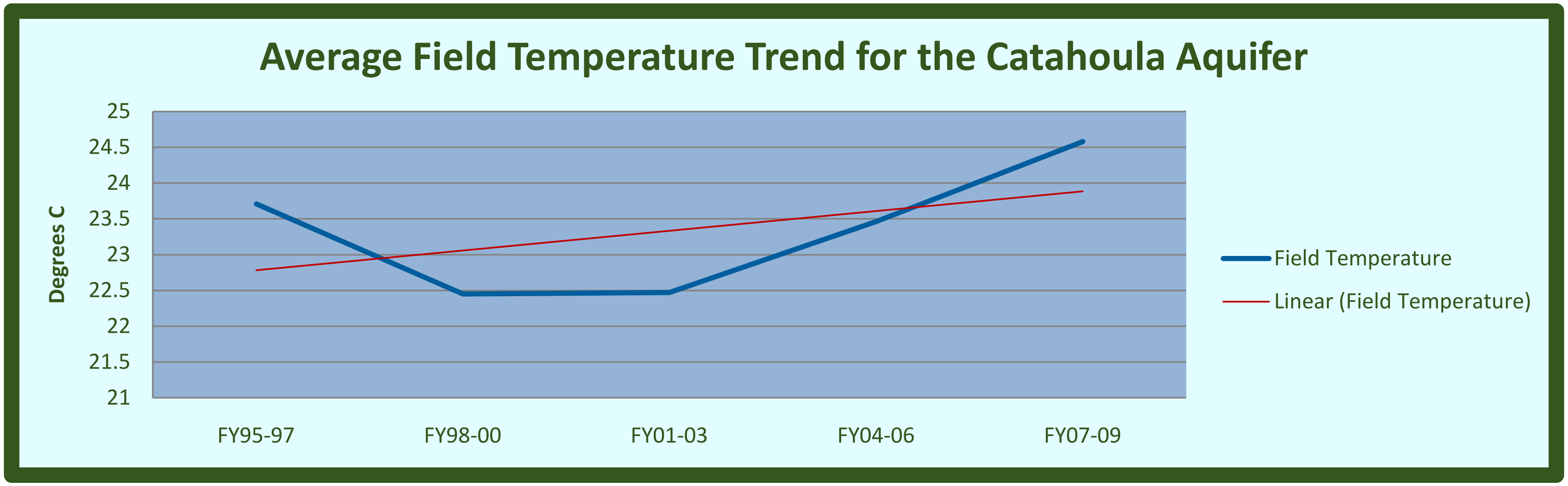


Chart 5-2: pH Trend

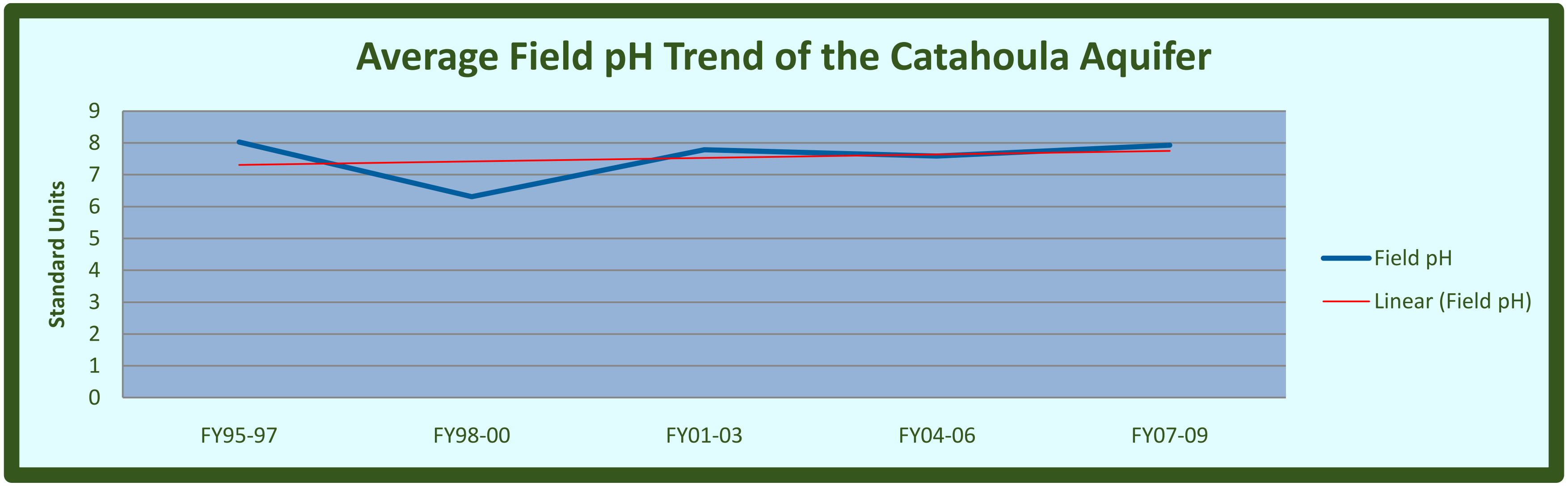


Chart 5-3: Field Specific Conductance Trend

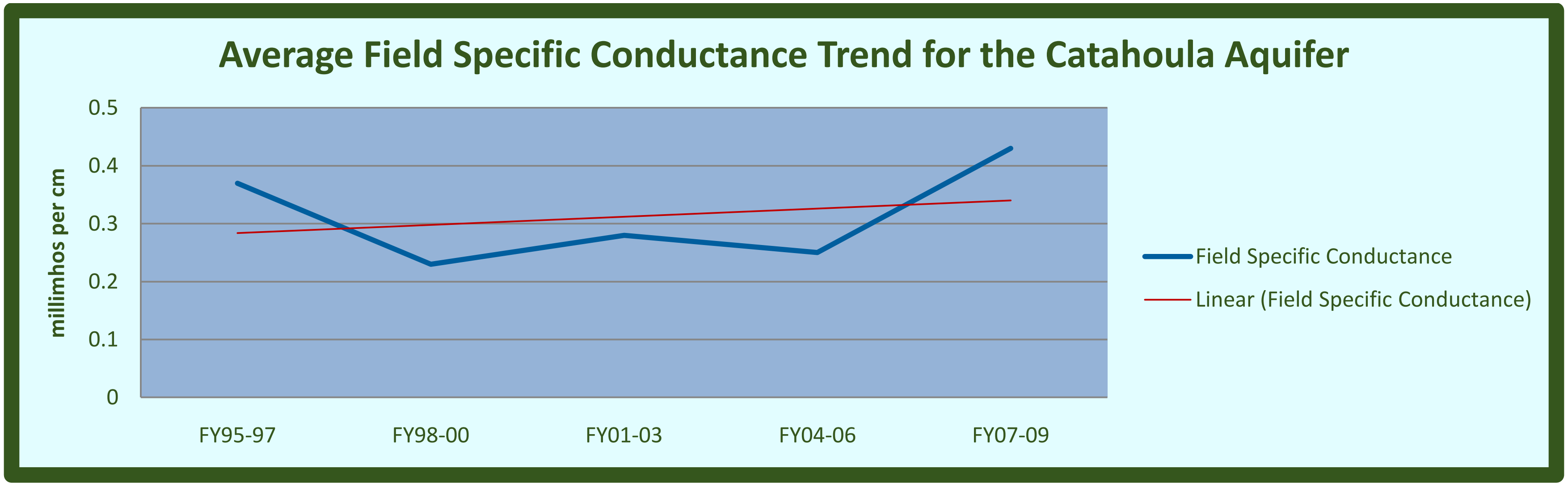


Chart 5-4: Lab Specific Conductance Trend

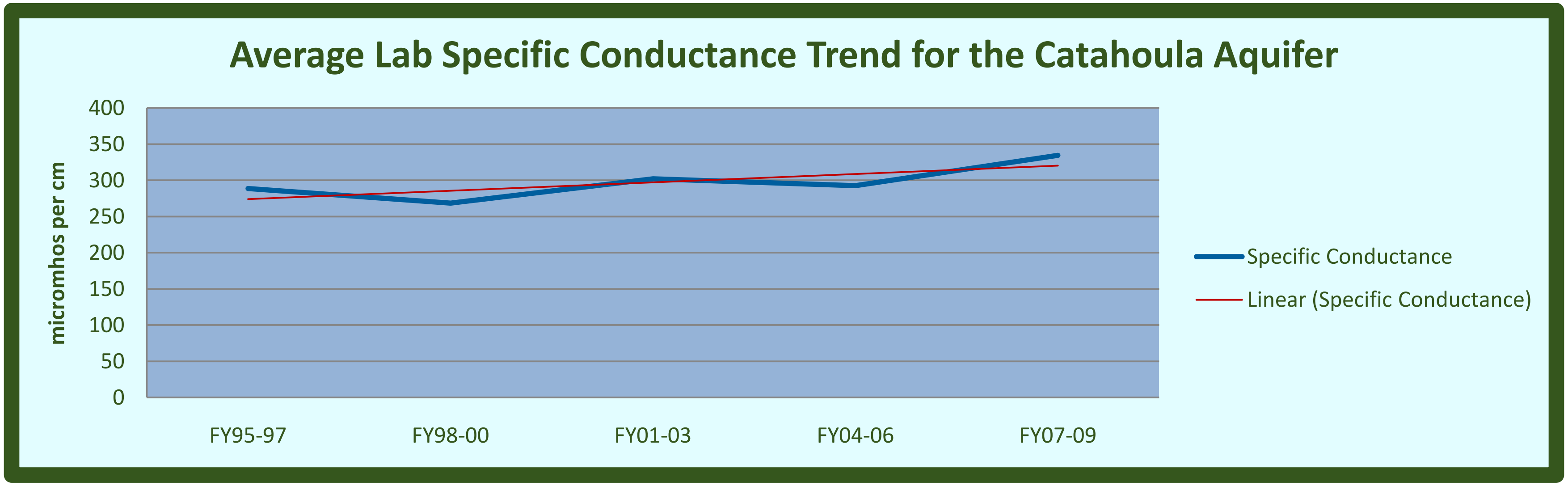


Chart 5-5: Field Salinity Trend

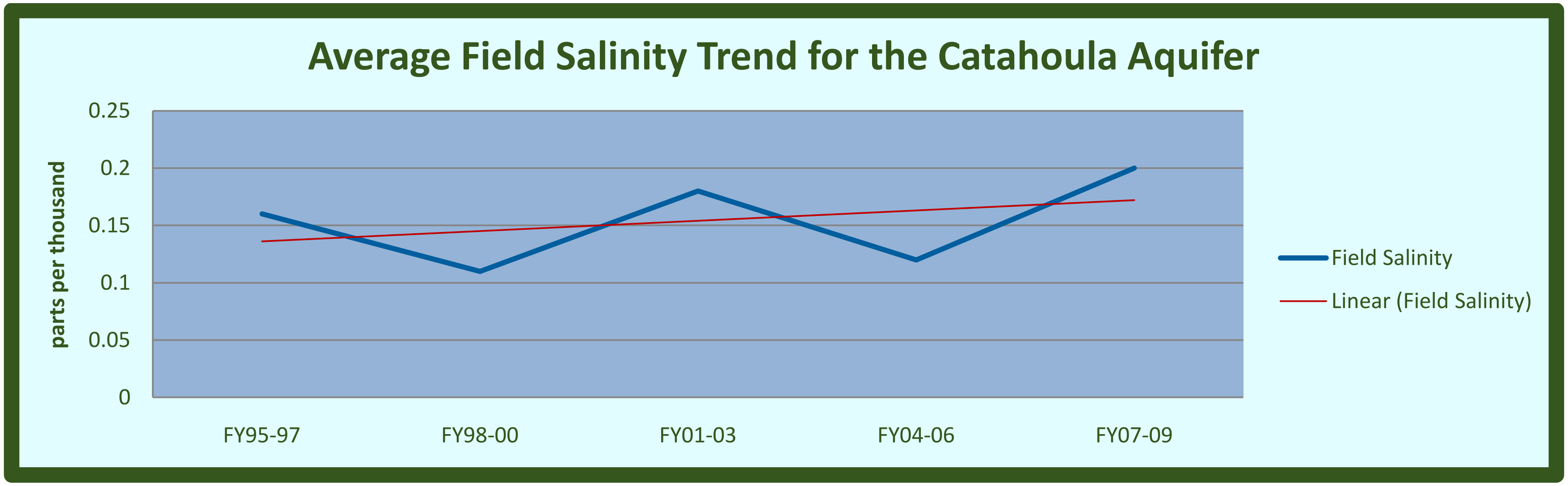


Chart 5-6: Alkalinity Trend

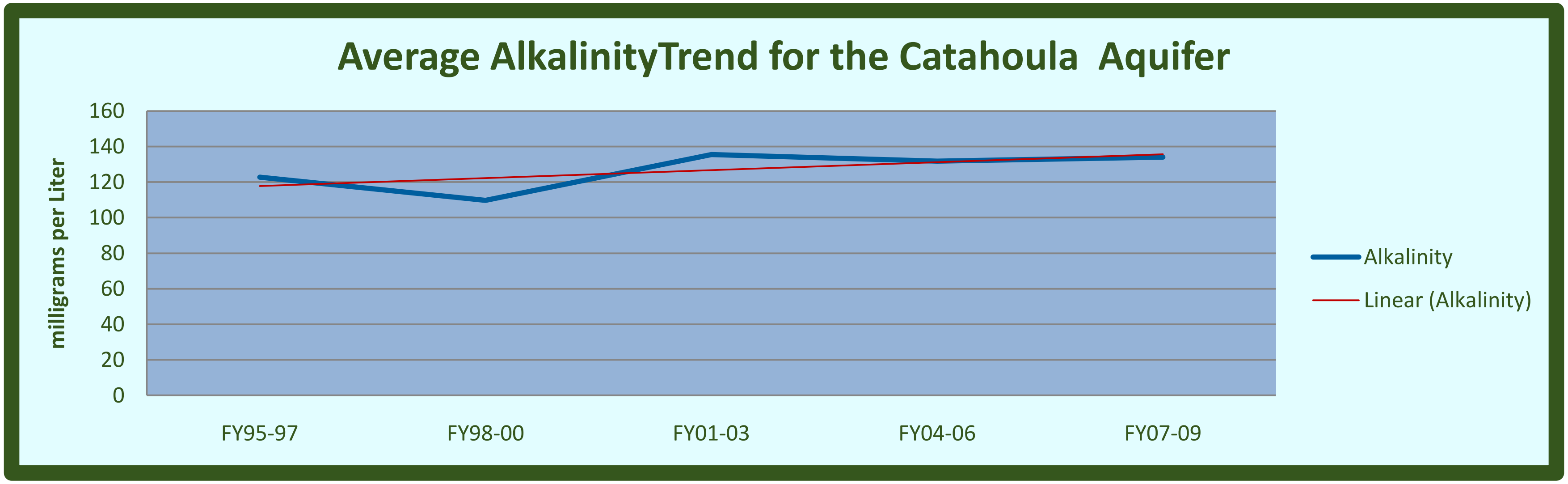


Chart 5-7: Chloride Trend

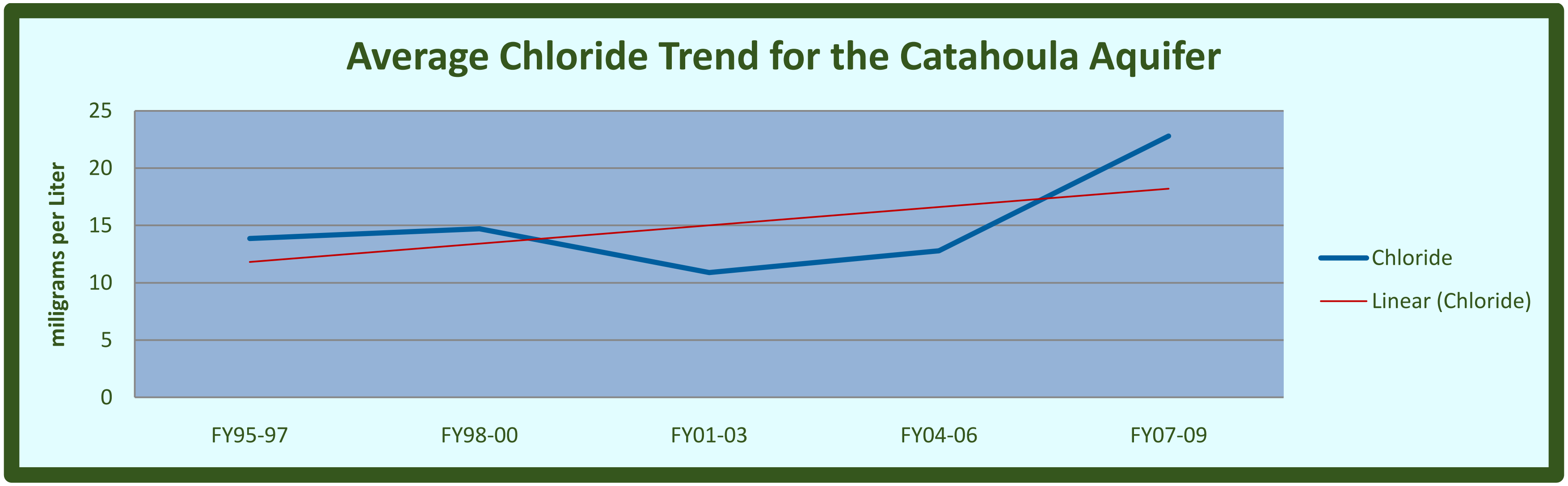


Chart 5-8: Color Trend

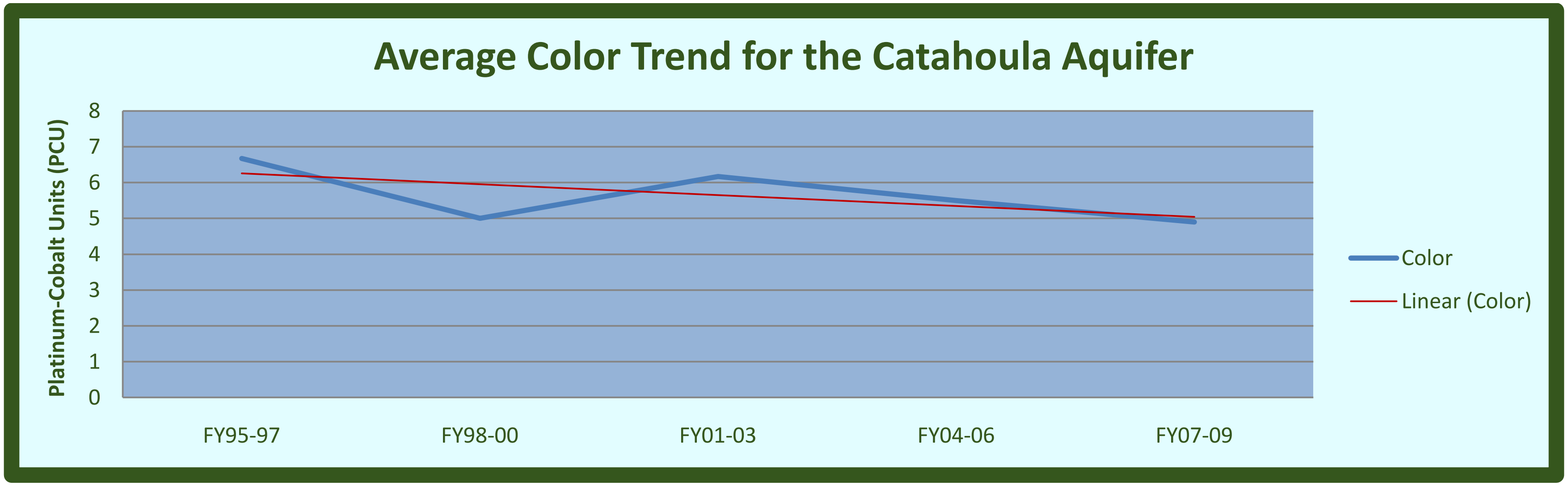


Chart 5-9: Sulfate (SO4) Trend

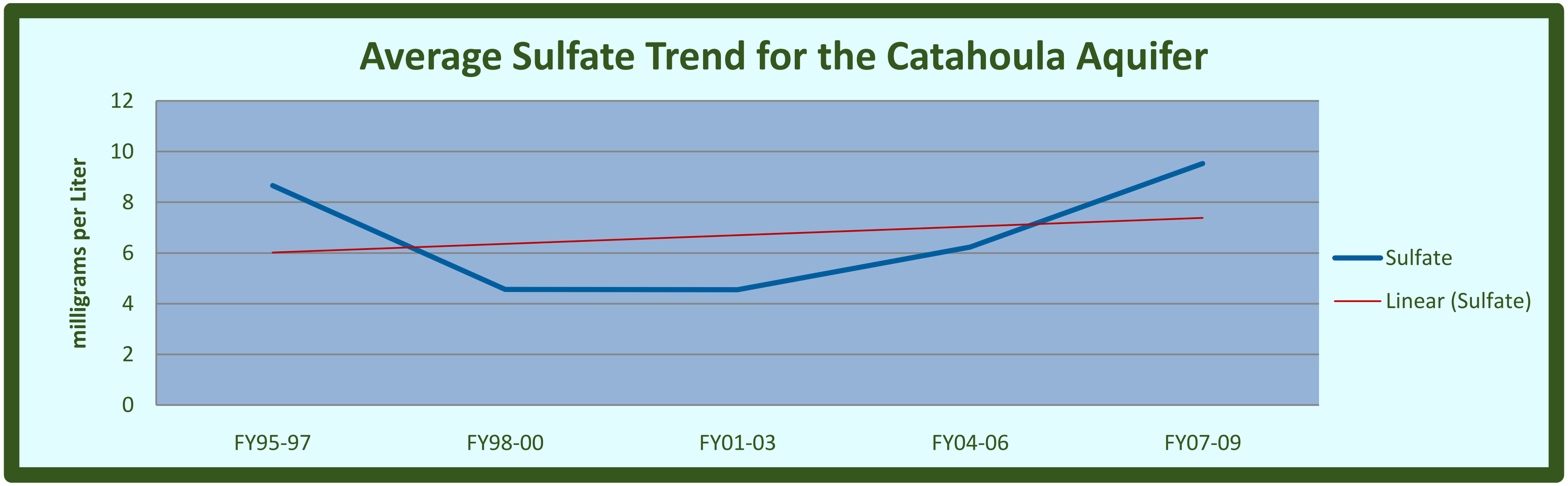


Chart 5-10: Total Dissolved Solids (TDS) Trend

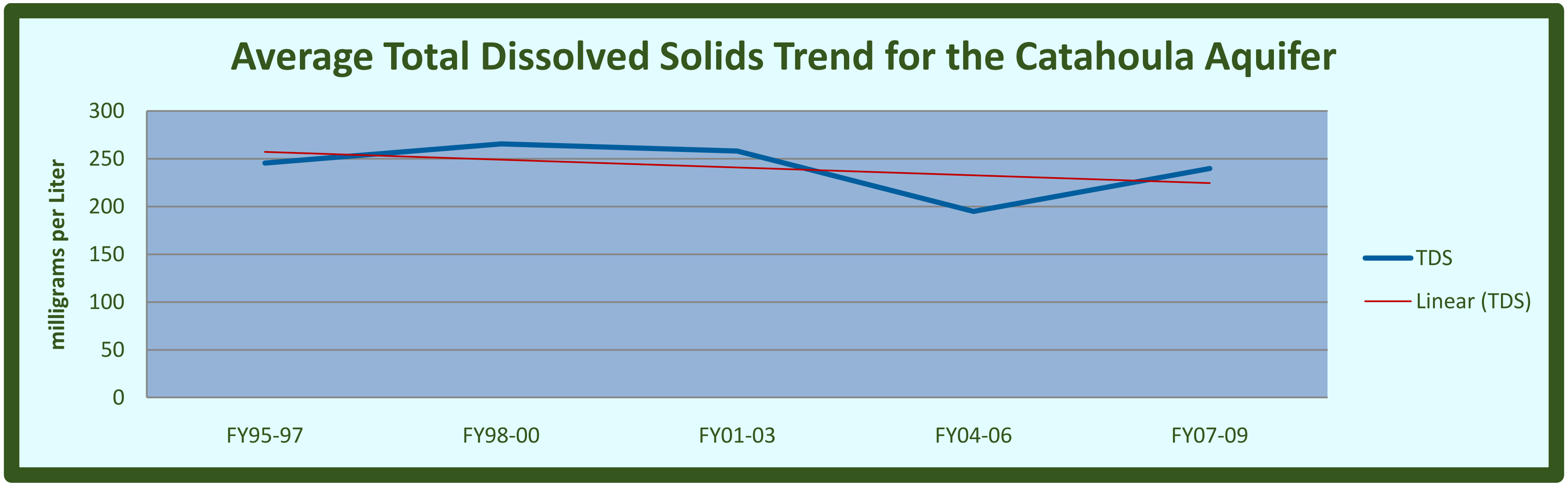


Chart 5-11: Ammonia (NH3) Trend

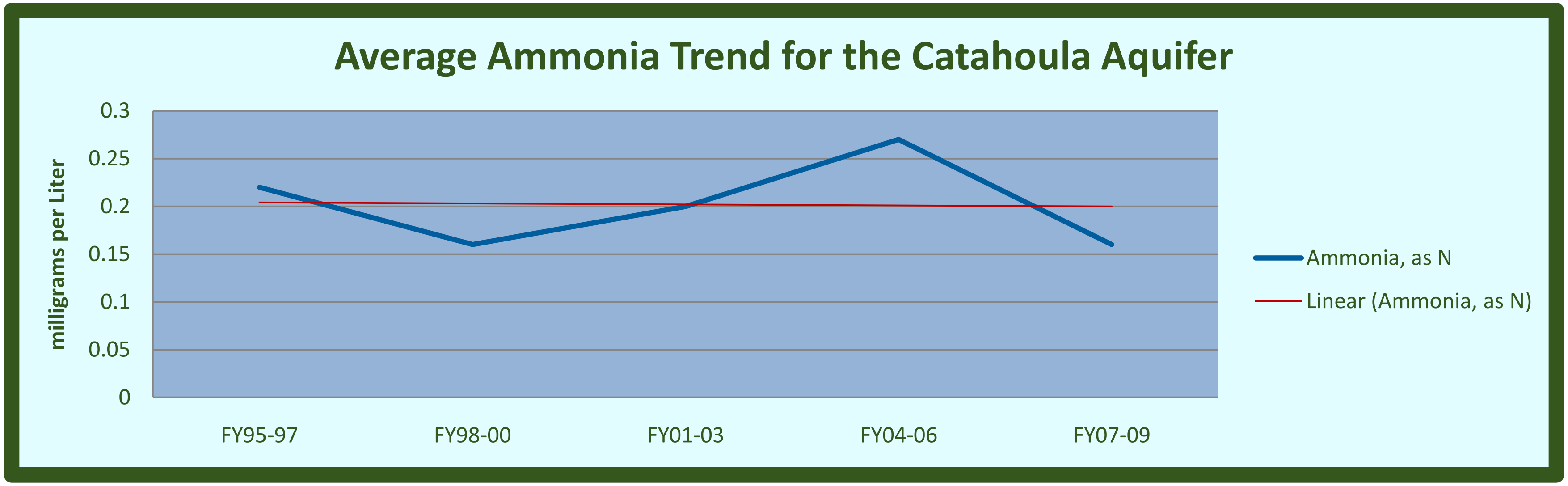


Chart 5-12: Hardness Trend

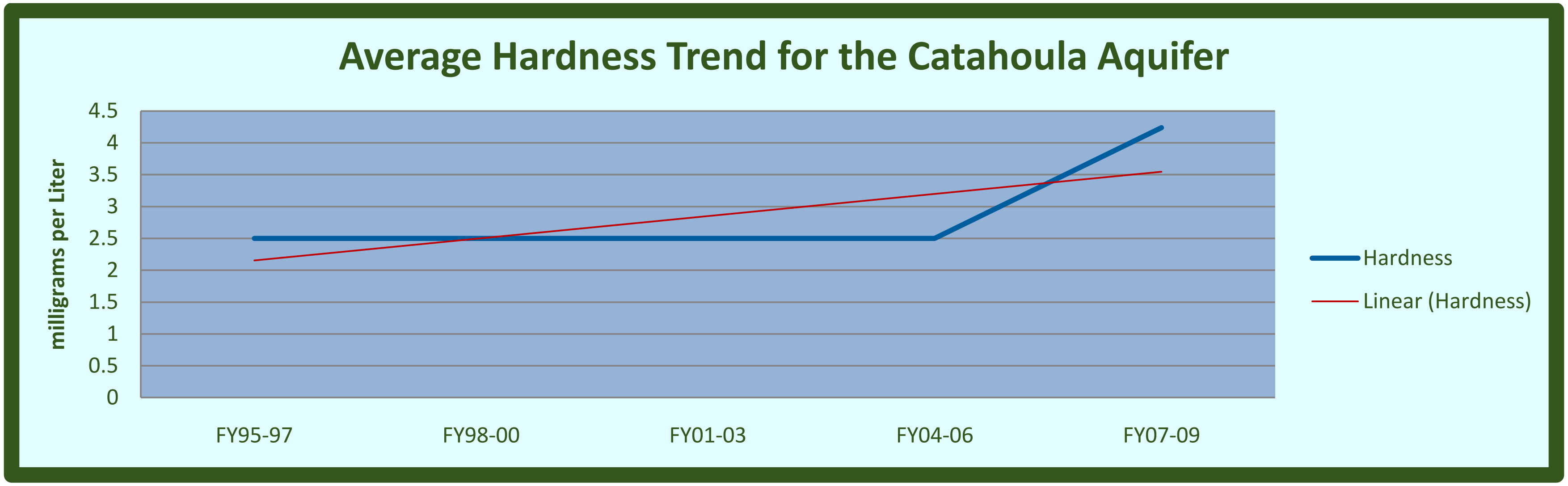


Chart 5-13: Nitrite – Nitrate Trend

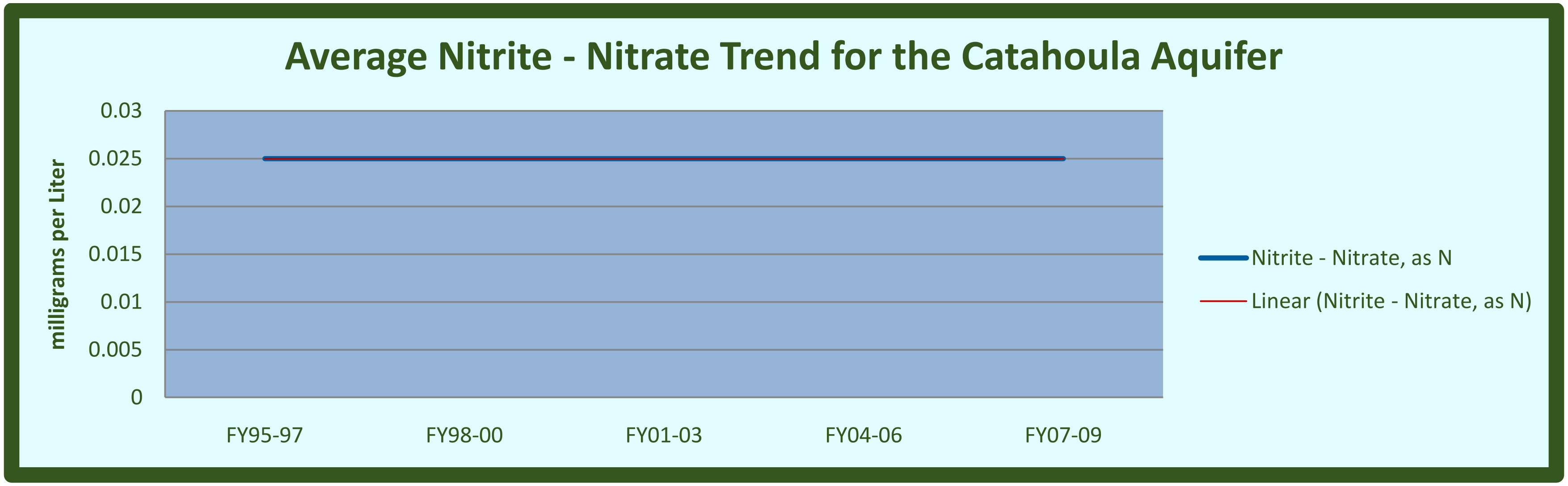


Chart 5-14: TKN Trend

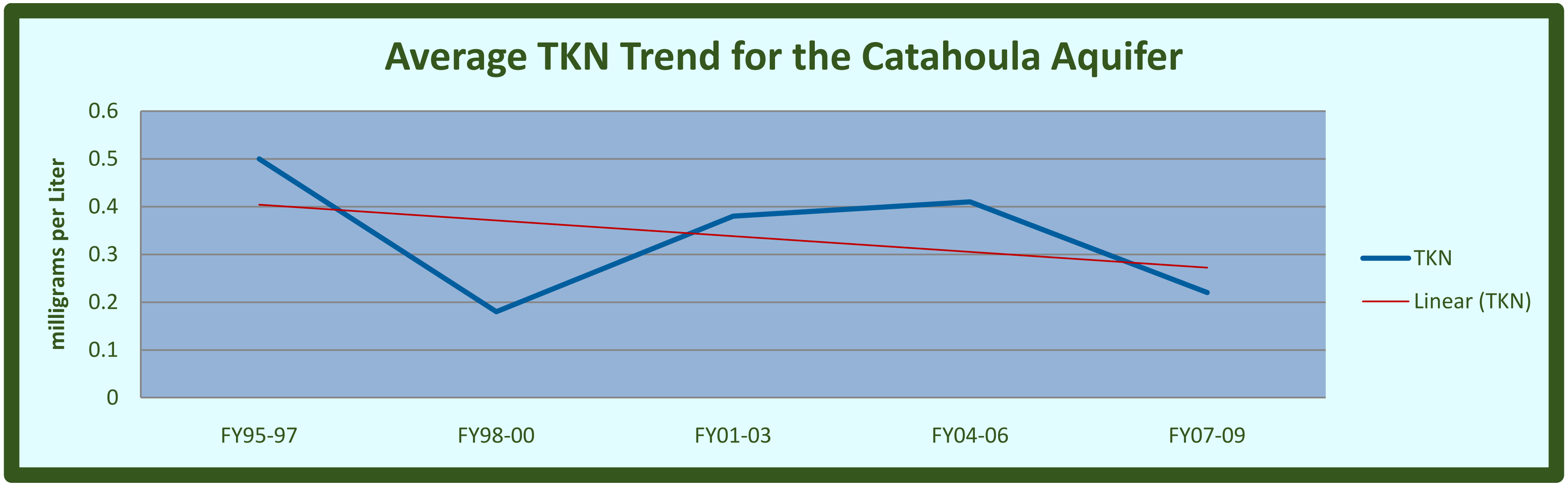


Chart 5-15: Total Phosphorus Trend

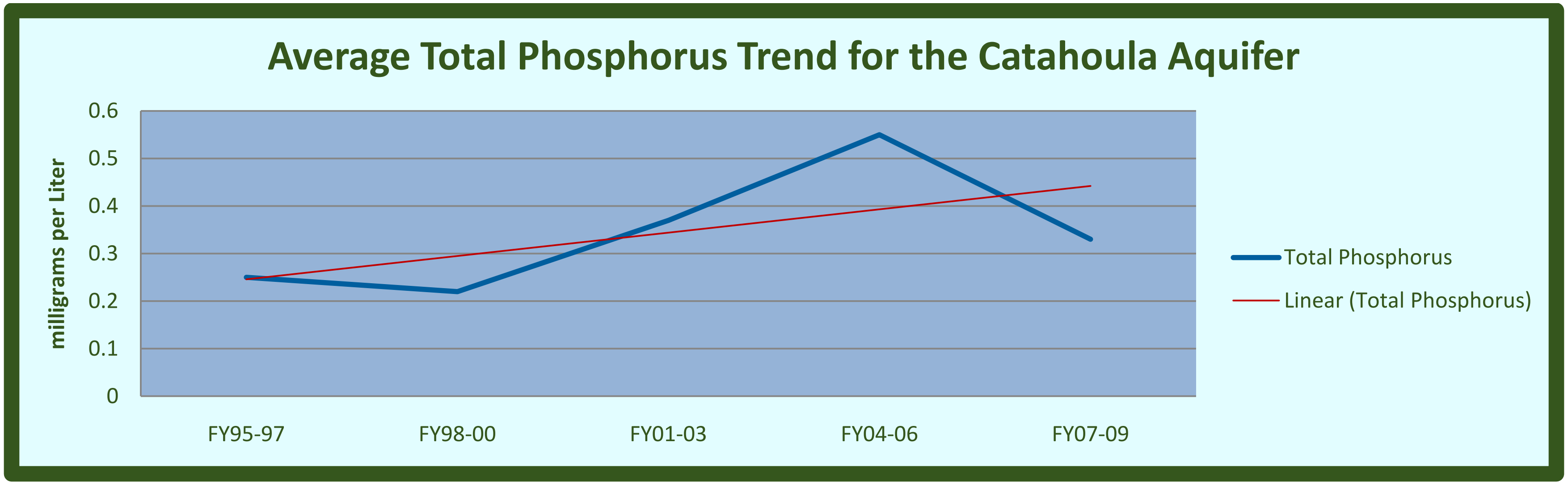


Chart 5-16: Iron Trend