CARNAHAN BAYOU AQUIFER SUMMARY, 2014

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 7 TO THE 2015 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 groundwater 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 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 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 Carnahan Bayou aquifer, during the 2014 state fiscal year (July 1, 2013 - June 30, 2014). This summary will become Appendix 7 of ASSET Program Triennial Summary Report for 2015.

These data show that from August through October of 2013, and in April 2014, 10 wells were sampled which produce from the Carnahan Bayou aquifer. Six of the ten are classified as public supply, two are classified as domestic, and one each is classified as an industrial use well and a power generation well. The wells are located in five parishes across the central area of the state.

Figure 7-1 shows the geographic locations of the Carnahan Bayou aquifer and the associated wells, whereas Table 7-1 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 Carnahan Bayou member consists of sands, silts, and clays, with some gravel. The Carnahan Bayou member, along with the Williamson Creek and Dough Hills, is grouped into the Jasper aquifer. The aquifer unit consists of fine to coarse sand, which may grade laterally and vertically to silt and clay.

HYDROGEOLOGY

Recharge takes place primarily as a result of the direct infiltration of rainfall in interstream, upland outcrop areas, movement of water through overlying terrace deposits, and leakage from other aquifers. The hydraulic conductivity of the Carnahan Bayou aquifer varies between 20 and 260 feet/day.

The maximum depths of occurrence of freshwater in the Carnahan Bayou aquifer range from 250 feet above sea level to 3,300 feet below sea level. The range of thickness of the fresh water interval in the Carnahan Bayou aquifer is 100 to 1,100 feet. The depths of the Carnahan Bayou aquifer wells that were monitored in conjunction with the ASSET Program range from 66 to 2,036 feet below land surface.

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 7-2. The inorganic parameters analyzed in the laboratory are listed in Table 7-3. These tables also show the field and analytical results determined for each analyte. For quality control, duplicate samples were taken for each parameter at wells CO-47, V-496, and V-656.

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 7-8, 7-9, and 7-10 list the target analytes for volatiles, semi-volatiles, and pesticides/PCBs, respectively.

Tables 7-4 and 7-5 provide a statistical overview of field and conventional data, and inorganic data for the Carnahan Bayou aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2014 sampling. Tables 7-6 and 7-7 compare these same parameter averages to historical ASSET-derived data for the Carnahan Bayou aquifer, from fiscal years 1995, 1998, 2001, 2004, 2007, and 2010.

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 7-2, 7-3, 7-4, and 7-5, respectively, represent the contoured data for pH, total dissolved solids, chloride and iron. Charts 7-1 through 7-16 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 7-2 and 7-3 show that one or more secondary MCLs (SMCLs) were exceeded in six of the 10 wells sampled in the Carnahan Bayou aquifer, with a total of eight SMCLs being exceeded.

Field and Conventional Parameters

Table 7-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 7-4 provides an overview of this data for the Carnahan Bayou aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 7-2 shows that no 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 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 7-2 shows that one well exceeded the SMCL for chloride and four wells exceeded the SMCL for total dissolved solids. Laboratory results override field results in exceedance determinations, thus only laboratory results will be counted in determining SMCL exceedance numbers for TDS (however, only one field reading supports lab results). Following is a list of SMCL parameter exceedances with well number and results:

Chloride (SMCL = 250 mg/L):

R-1210 – 324 mg/L

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
R-1001	680 mg/L	0.279 g/L
R-1172	596 mg/L	0.202 g/L
R-1210	1,220 mg/L	1.015 g/L
V-566	532 mg/L	0.132 g/L

Inorganic Parameters

Table 7-3 shows the inorganic parameters for which samples are collected at each well and the analytical results for those parameters. Table 7-5 provides an overview of inorganic data for the

Carnahan Bayou aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 7-3 shows that no MCL was exceeded for inorganics.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 7-3 shows that three wells exceeded the SMCL for iron:

Iron (SMCL = 300 µg/L):

CO-47 – 1,540 µg/L, Duplicate – 1,670 µg/L V-496 – 1,290 µg/L, Duplicate – 1,270 µg/L
V-566 – 3,050 µg/L

Volatile Organic Compounds

Table 7-8 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.

There was no confirmed detection of a VOC at or above its detection limit during the FY 2014 sampling of the Carnahan Bayou aquifer.

Semi-Volatile Organic Compounds

Table 7-9 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 was no confirmed detection of a SVOC at or above its detection limit during the FY 2014 sampling of the Carnahan Bayou aquifer.

Pesticides and PCBs

Table 7-10 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.

There was no confirmed detection of a pesticide or PCB at or above its detection limit during the FY 2014 sampling of the Carnahan Bayou 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 Carnahan Bayou aquifer exhibit some changes when comparing current data to that of the six previous sampling rotations (four, seven, ten, thirteen, sixteen, and nineteen years prior). These comparisons can be found in Tables 7-6 and 7-7, and in Charts 7-1 to 7-16 of this summary. Over the nineteen-year period, six analytes have shown a general increase in average concentration. These analytes are: pH, salinity, chloride, TDS, ammonia, and TKN. For this same period, nine analytes have demonstrated a decrease in average concentration: Temperature, alkalinity, color, hardness, iron, nitrite-nitrate, sulfate, barium, and zinc. The remaining analytes have shown no consistent change or have stayed at or below their respective detection limits.

In FY 2010, four wells reported five SMCL exceedances. For FY 2014, six wells reported eight SMCL exceedances.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is moderately hard[1]. The data also show that the groundwater 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 2014 monitoring of the Carnahan Bayou aquifer exceeded an MCL. The data also show that this aquifer is of good quality when considering taste, odor, or appearance guidelines, with only eight SMCLs exceeded in six wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Carnahan Bayou aquifer, with six parameters showing consistent increases in concentration, nine parameters decreasing in concentration, with the remaining parameters showing no consistent change over the previous 19 years.

It is recommended that the wells assigned to the Carnahan Bayou aquifer be re-sampled as planned, in approximately three years. In addition, several wells should be added to the 10 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 7-1: List of Wells Sampled, Carnahan Bayou Aquifer–FY 2014

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
BE-405	Beauregard	09/19/2013	Boise	1,016	Industrial
CO-47	Concordia	10/31/2013	City of Vidalia	310	Public Supply
G-5178Z	Grant	07/25/2013	Private Owner	165	Domestic
R-1001	Rapides	08/01/2013	Gardner Water System	1,080	Public Supply
R-1172	Rapides	08/01/2013	Cleco-Rodemacher	298	Power Generation
R-1210	Rapides	08/01/2013	City of Alexandria	2,036	Public Supply
V-496	Vernon	04/29/2014	U.S. Army/Fort Polk	1,415	Public Supply
V-566	Vernon	08/01/2013	Alco-Hutton VFD	143	Public Supply
V-656	Vernon	09/19/2013	East Central Vernon Water System	1,477	Public Supply
V-8102Z	Vernon	09/19/2013	Private Owner	66	Domestic

Table 7-2: Summary of Field and Conventional Data, Carnahan Bayou Aquifer–FY 2014

Well ID	pH SU	Sal. ppt	Sp. Cond. mmhos per cm	Temp Deg. C	TDS g/L	Alk mg/L	Cl mg/L	Color PCU	Hard. mg/L	Nitrite-Nitrate (as N) Mg/L	NH3 mg/L	Tot. P mg/L	Sp. Cond. µmmhos per cm	SO4 mg/L	TDS mg/L	TKN mg/l	TSS mg/L	Turb. NTU
LABORATORY DETECTION LIMITS† →						5	0.25/ 25	1	5	0.01	0.05	0.05	10	0.25/ 1.25	10	0.1	4	0.3
	FIELD PARAMETERS					LABORATORY PARAMETERS												
BE-405	8.79	0.18	0.371	24.96	0.241	164	7.2	< DL	48	< DL	0.27	< DL	363	7.7	208	0.35	< DL	< DL
CO-47	7.16	0.23	0.471	19.71	0.306	156	15.5	< DL	144	< DL	0.87	0.11	529	33.1	232	2.26	< DL	8.0
CO-47*	7.16	0.23	0.471	19.71	0.306	164	15.7	< DL	160	< DL	1.00	0.08	486	32.1	252	1.50	< DL	8.2
G-5178Z	7.53	0.04	0.084	20.89	0.055	28	6.6	8.6	< DL	0.025	0.07	0.73	88.7	5.8	120	0.24	< DL	0.4
R-1001	8.44	0.20	0.429	25.77	0.279	170	10.9	< DL	< DL	< DL	0.48	0.33	436	13.4	680	0.48	< DL	< DL
R-1172	8.11	0.15	0.311	20.44	0.202	96	13.3	< DL	< DL	< DL	0.46	0.20	318	17.5	596	0.52	< DL	< DL
R-1210	8.09	0.77	1.561	33.80	1.015	316	324.0	< DL	< DL	0.011	0.80	0.45	1,610	7.1	1,220	0.89	< DL	< DL
V-496	7.84	0.19	0.404	26.47	0.263	146	20.3	< DL	112	< DL	0.77	< DL	409	4.6	244	0.90	< DL	< DL
V-496*	7.84	0.19	0.404	26.47	0.263	172	20.1	1.0	112	< DL	0.79	0.06	408	4.6	288	0.81	< DL	< DL
V-566	6.71	0.10	0.203	25.02	0.132	46	18.4	< DL	60	< DL	0.21	0.43	202	9.8	532	0.26	< DL	< DL
V-656	8.44	0.15	0.315	28.62	0.205	152	11.3	7.0	< DL	< DL	0.32	0.39	301	0.6	204	0.25	< DL	< DL
V-656*	8.44	0.15	0.315	28.62	0.205	148	13.3	11.0	< DL	< DL	0.52	0.39	305	0.6	228	0.32	< DL	< DL
V-8102Z	7.14	0.09	0.190	30.46	0.124	52	15.5	< DL	80	< DL	< DL	1.16	187	8.0	264	0.16	< DL	< DL

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

Table 7-3: Summary of Inorganic Data, Carnahan Bayou Aquifer–FY 2014

Well ID	Antimony µg/L	Arsenic µg/L	Barium µg/L	Beryllium µg/L	Cadmium µg/L	Chromium µg/L	Copper µg/L	Iron µg/L	Lead µg/L	Mercury µg/L	Nickel µg/L	Selenium µg/L	Silver µg/L	Thallium µg/L	Zinc µg/L
Laboratory Detection Limits†	1/25	4/20	5/25	2/10	2/10	4/20	2/10	100/ 500	1/5	0.0002	1/5	1/5	1/5	2/10	6/30
BE-405	< DL	< DL	50.6	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
CO-47	< DL	< DL	316.0	< DL	< DL	< DL	< DL	1,540	< DL	< DL	< DL	< DL	< DL	< DL	< DL
CO-47*	< DL	< DL	328.0	< DL	< DL	< DL	< DL	1,670	< DL	< DL	< DL	< DL	< DL	< DL	< DL
G-5178Z	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	61.3
R-1001	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
R-1172	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
R-1210	< DL	< DL	51.3	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-496	< DL	< DL	120.0	< DL	< DL	< DL	8.2	1,290	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-496*	< DL	< DL	121.0	< DL	< DL	< DL	12.4	1,270	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-566	< DL	< DL	68.5	< DL	< DL	< DL	12.3	3050	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-656	< DL	< DL	< DL	< DL	< DL	< DL	3.3	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-656*	< DL	< DL	< DL	< DL	< DL	< DL	3.4	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-8102Z	< DL	< DL	91.2	< DL	< DL	< DL	11.6	< DL	3.8	< DL	< DL	< DL	< DL	< DL	22.5

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

Table 7-4: FY 2014 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	pH (SU)	6.71	8.79	7.82
	Salinity (ppt)	0.04	0.77	0.21
	Specific Conductance (mmhos/cm)	0.084	1.561	0.425
	Temperature (^{O}C)	19.71	33.80	25.46
	TDS (g/L)	0.055	1.015	0.277
LABORATORY	Alkalinity (mg/L)	28	316	139
	Chloride (mg/L)	6.6	324.0	37.9
	Color (PCU)	< DL	11.0	2.5
	Hardness (mg/L)	< DL	160	56
	Nitrite - Nitrate, as N (mg/L)	< DL	0.025	< DL
	Ammonia, as N (mg/L)	< DL	1.00	0.51
	Total Phosphorus (mg/L)	< DL	1.16	0.34
	Specific Conductance (µmhos/cm)	89	1,610	434
	Sulfate (mg/L)	0.6	33.1	11.1
	TDS (mg/L)	120	1,220	390
	TKN (mg/L)	0.16	2.26	0.68
	TSS (mg/L)	< DL	< DL	< DL
	Turbidity (NTU)	< DL	8.2	1.4

Table 7-5: FY 2014 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (µg/L)	< DL	< DL	< DL
Arsenic (µg/L)	< DL	< DL	< DL
Barium (µg/L)	< DL	328.0	89.2
Beryllium (µg/L)	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL
Chromium (µg/L)	< DL	< DL	< DL
Copper (µg/L)	< DL	12.4	4.5
Iron (µg/L)	< DL	3,050	709
Lead (µg/L)	< DL	3.8	< DL
Mercury (µg/L)	< DL	< DL	< DL
Nickel (µg/L)	< DL	< DL	< DL
Selenium (µg/L)	< DL	< DL	< DL
Silver (µg/L)	< DL	< DL	< DL
Thallium (µg/L)	< DL	< DL	< DL
Zinc (µg/L)	< DL	61.3	9.0

Table 7-6: 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 2014
FIELD	pH (SU)	6.90	7.11	7.66	7.57	7.61	7.61	7.82
	Salinity (ppt)	0.21	0.19	0.17	.23	0.23	0.22	0.21
	Specific Conductance (mmhos/cm)	0.468	0.389	0.346	0.480	0.480	0.463	0.425
	Temperature (^{O}C)	27.54	24.53	23.58	23.76	25.99	23.61	25.46
	TDS (g/L)	-	-	-	0.310	0.310	0.300	0.277
LABORATORY	Alkalinity (mg/L)	203	186	176	202	174	124	139
	Chloride (mg/L)	41.5	13.0	33.9	27.1	42.3	43.4	37.9
	Color (PCU)	16.4	9.2	5.3	6.8	Color data unusable	3.6	2.5
	Hardness (mg/L)	63	70	48	67	51	15	56
	Nitrite - Nitrate, as N (mg/L)	<0.05	0.11	< DL	0.06	< DL	0.01	< DL
	Ammonia, as N (mg/L)	0.41	0.38	0.32	0.43	0.33	0.37	0.51
	Total Phosphorus (mg/L)	0.27	0.33	0.36	0.25	0.32	< 0.3	0.34
	Specific Conductance (µmhos/cm)	492	406	443	471	478	384	434
	Sulfate (mg/L)	12.8	10.2	8.6	12.4	11.8	10.0	11.1
	TDS (mg/L)	327	247	326	303	312	359	390
	TKN (mg/L)	0.29	0.65	0.50	0.63	0.40	0.50	0.68
	TSS (mg/L)	5.1	< DL	< DL	< DL	5.3	< DL	< DL
	Turbidity (NTU)	4.8	11.6	5.8	4.3	9.1	1.5	1.4

Table 7-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
	FY 1995	FY 1998	FY 2001	FY 2004	FY 2007	FY 2010	FY 2014
Antimony (µg/L)	< DL	< DL	< DL	No inorganic statistics for this period. Program QC limits were exceeded.	< DL	< DL	< DL
Arsenic (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Barium (µg/L)	110.9	197.1	80.9		105.6	64.8	89.2
Beryllium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Chromium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Copper (µg/L)	5.5	7.5	5.7		5.9	15.5	4.5
Iron (µg/L)	1,068	1,542	532		960	226	709
Lead (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Mercury (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Nickel (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Selenium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Silver (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Thallium (µg/L)	< DL	< DL	< DL		< DL	< DL	< DL
Zinc (µg/L)	560.6	607.8	26.5		79.3	17.2	9.0

Table 7-8: VOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (µg/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 7-9: SVOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (µg/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

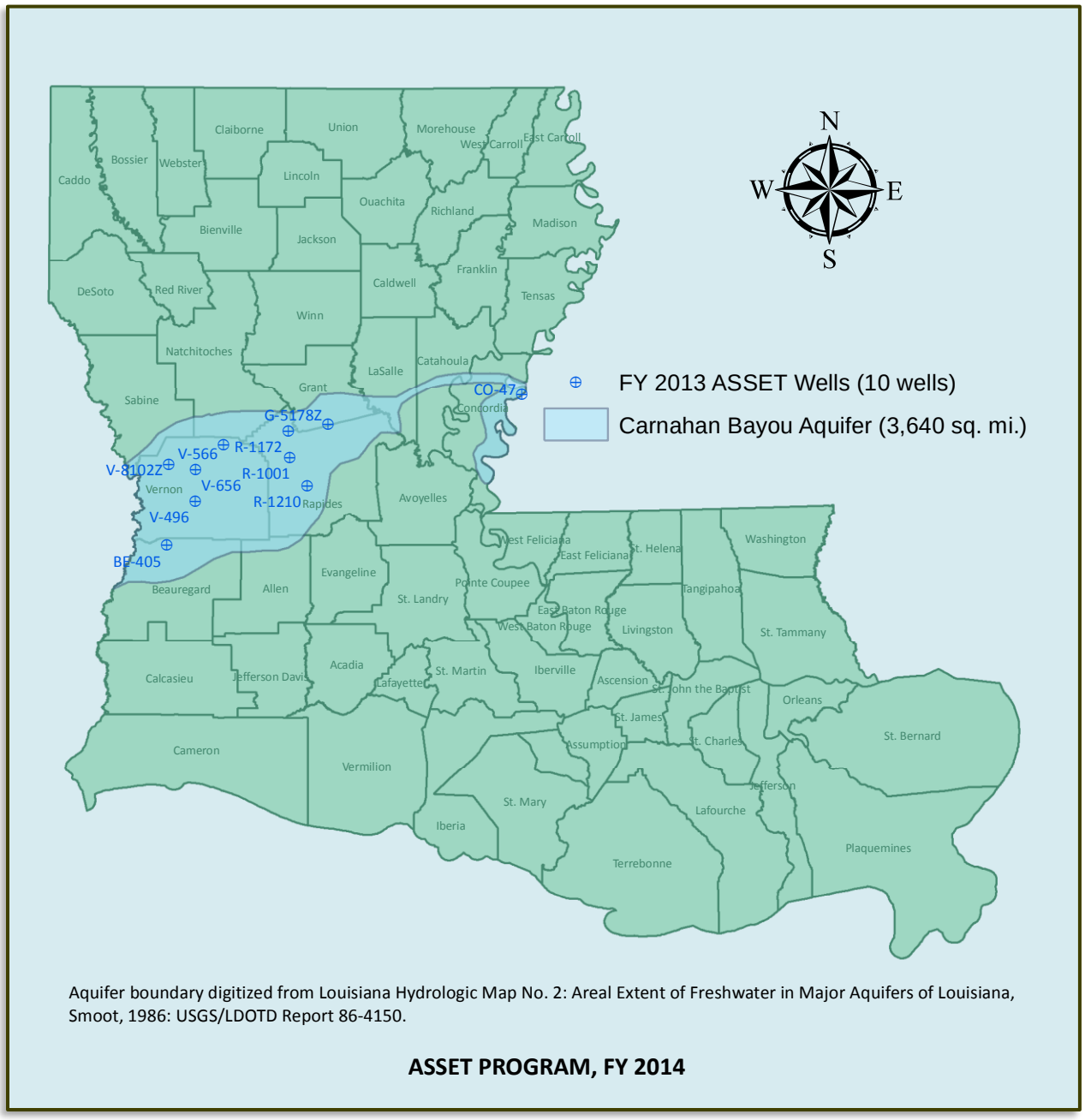
Table 7-9: SVOCs (Continued)

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

Table 7-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS (µg/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 7-1: Location Plat, Carnahan Bayou 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 7-2: Map of pH Data

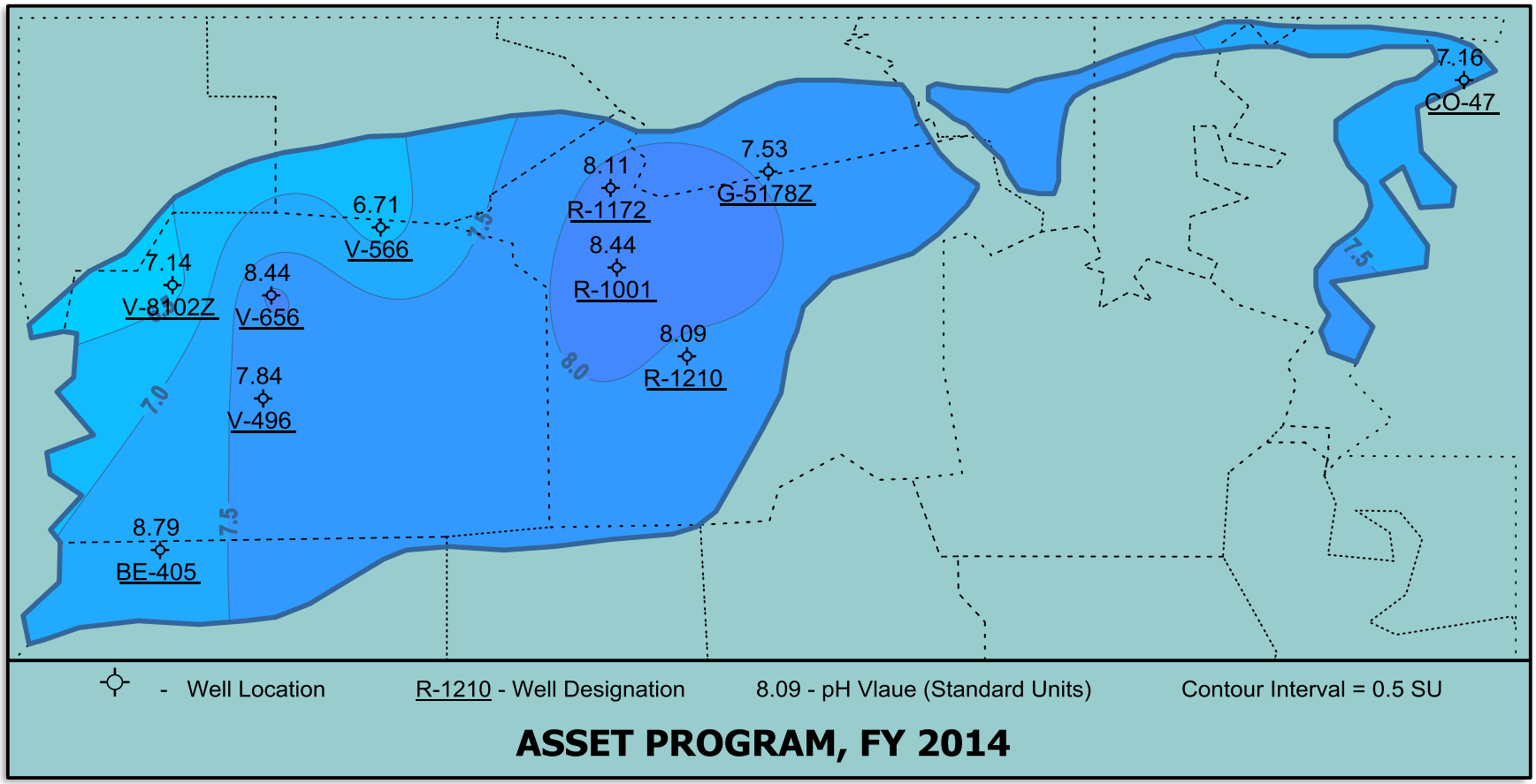

Figure 7-3: Map of TDS Lab Data

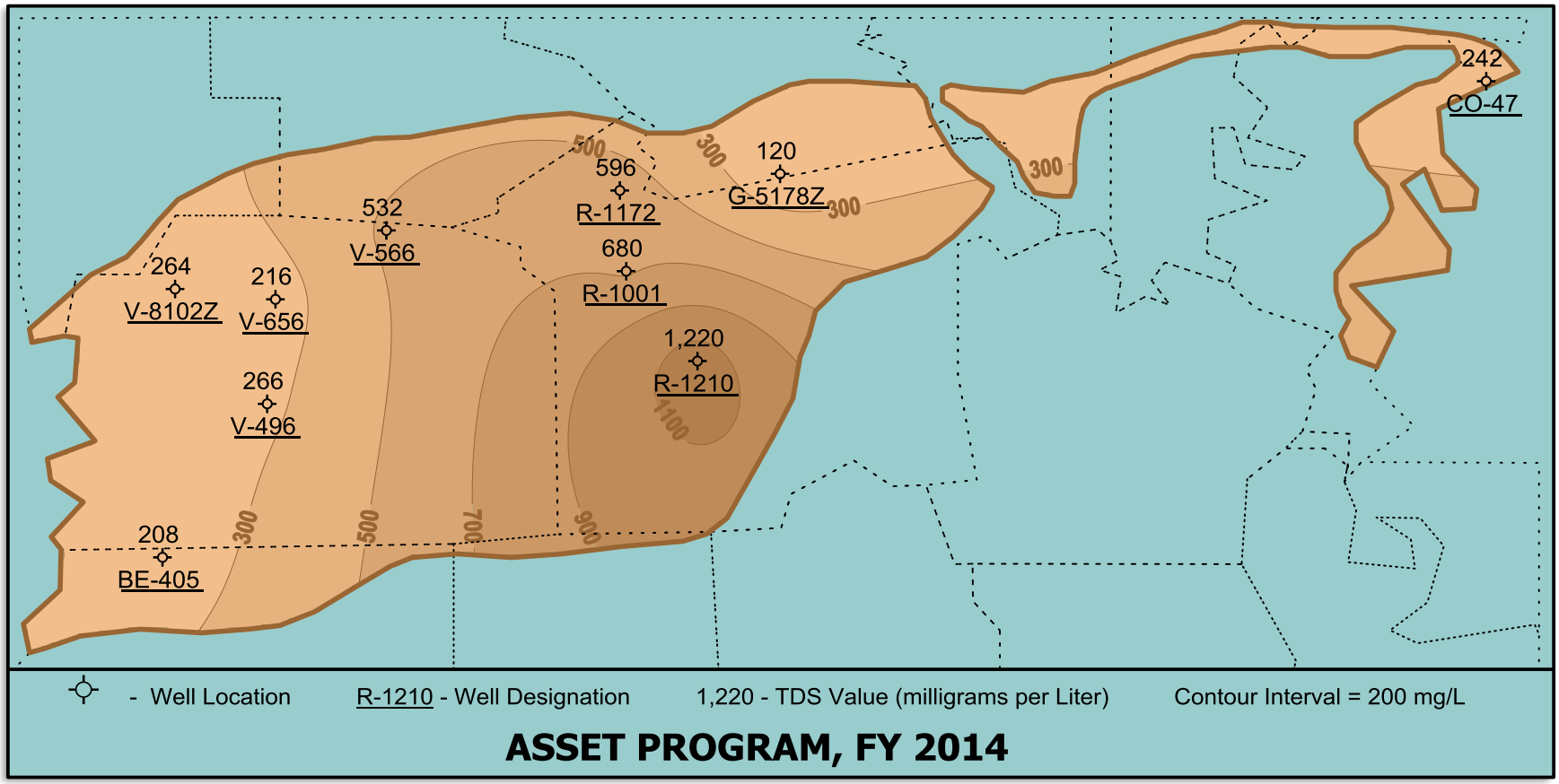

Figure 7-4: Map of Chloride Data

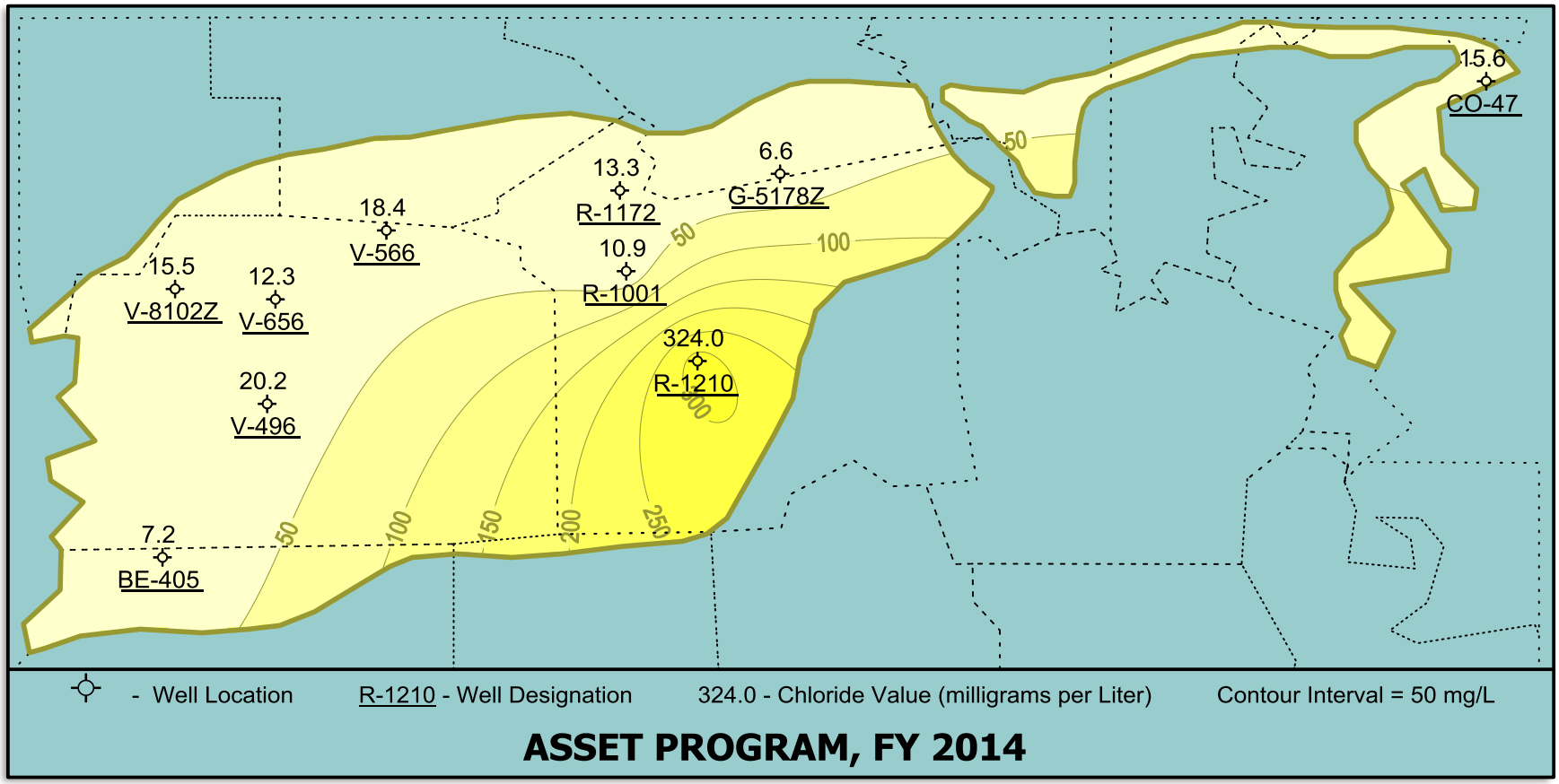

Figure 7-5: Map of Iron Data

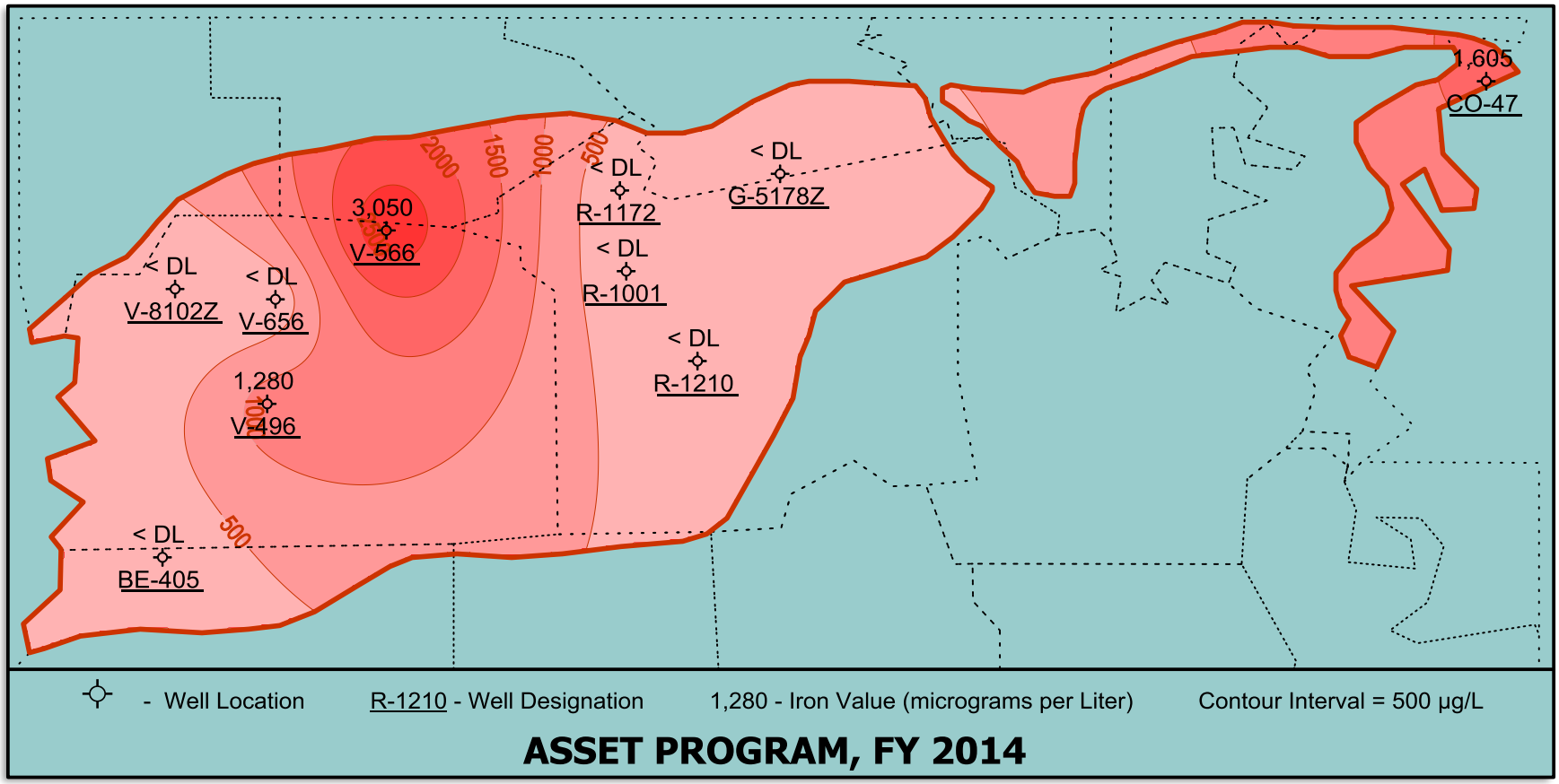

Chart 7-1: Temperature Trend

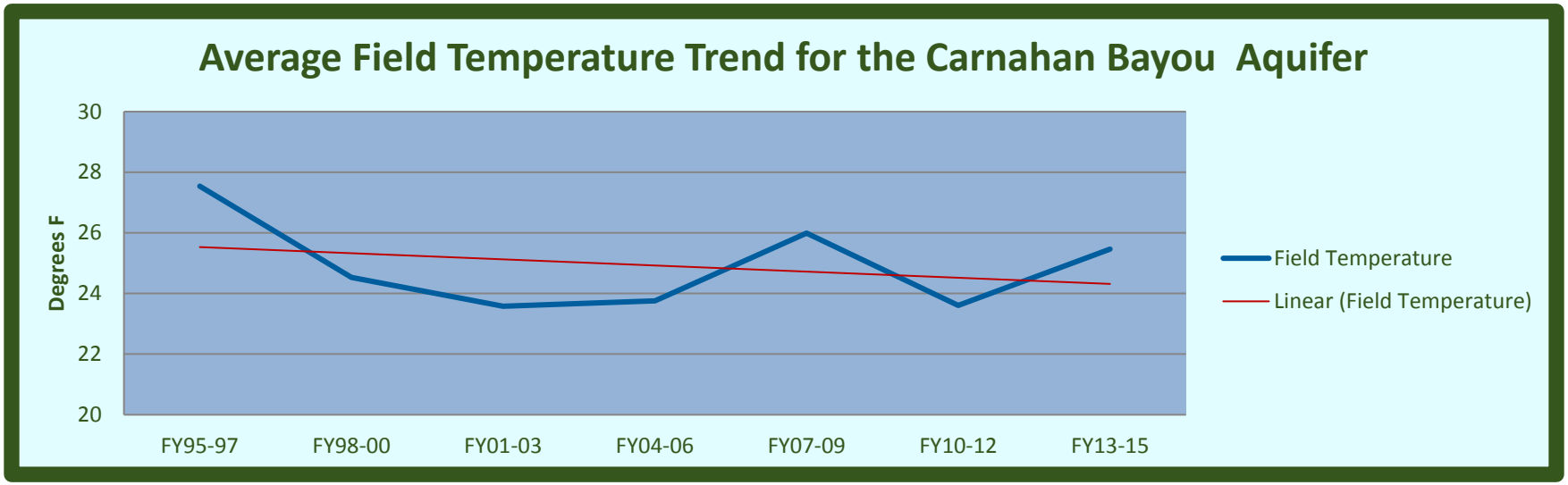

Chart 7-2: pH Trend

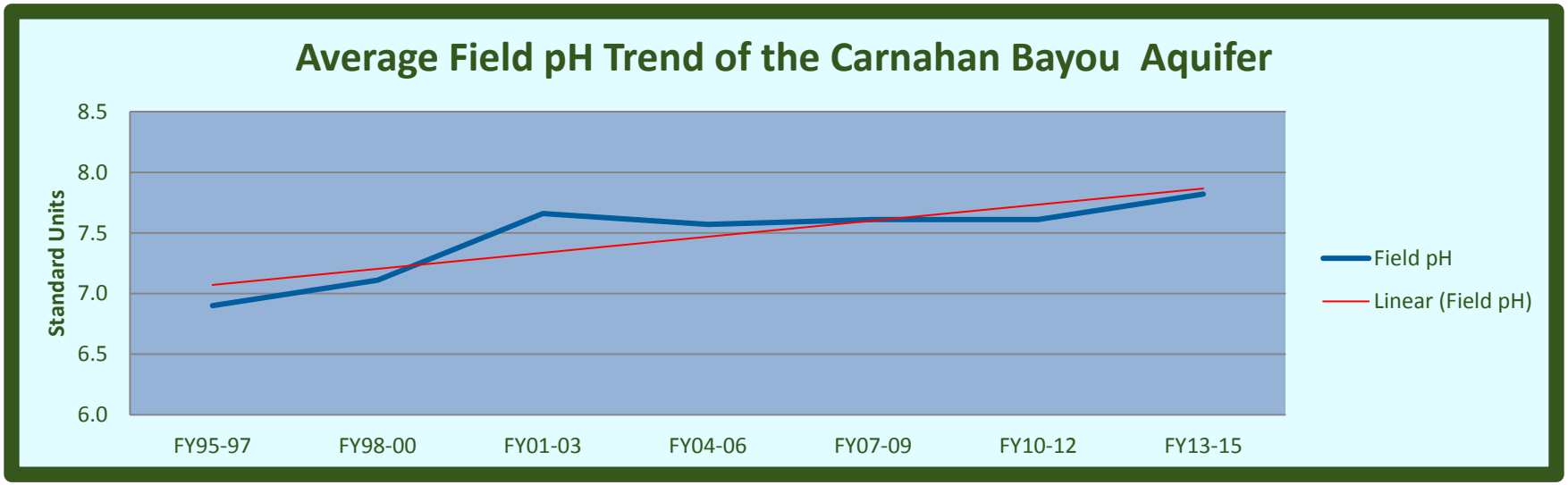

Chart 7-3: Field Specific Conductance Trend

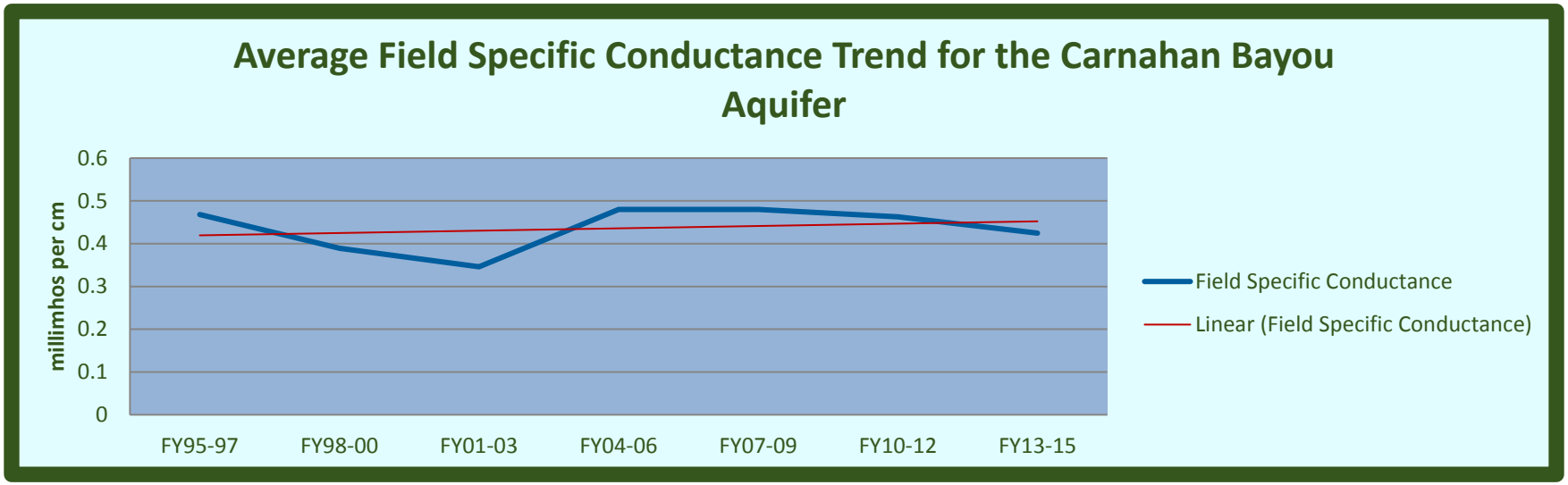

Chart 7-4: Lab Specific Conductance Trend

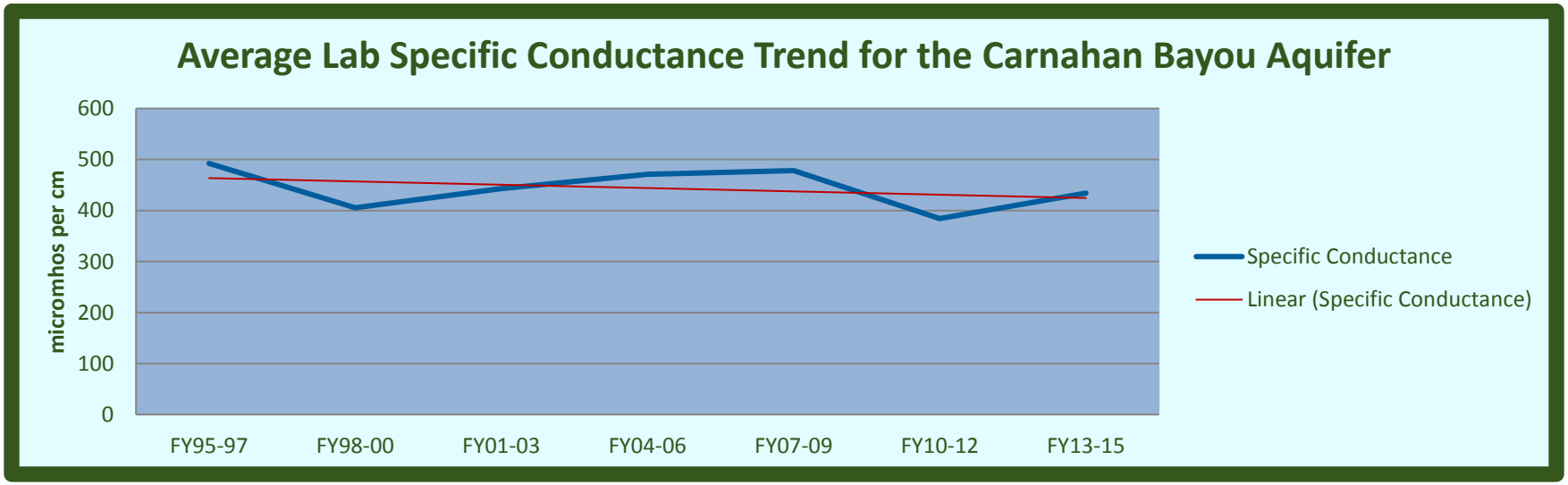

Chart 7-5: Field Salinity Trend

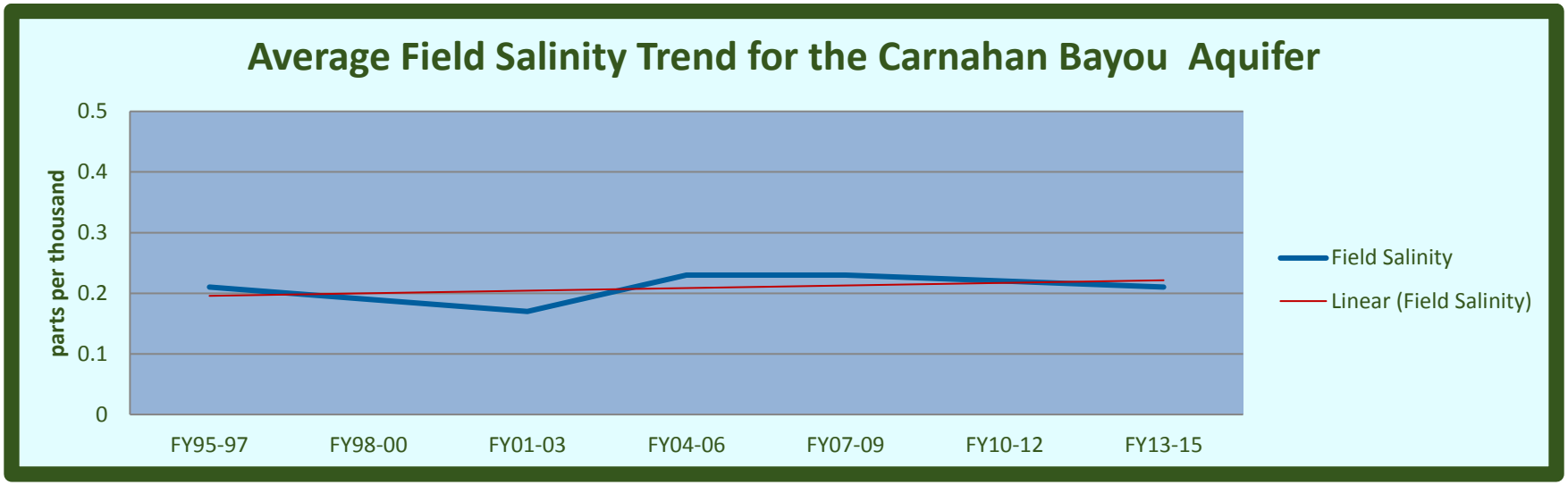

Chart 7-6: ChlorideTrend

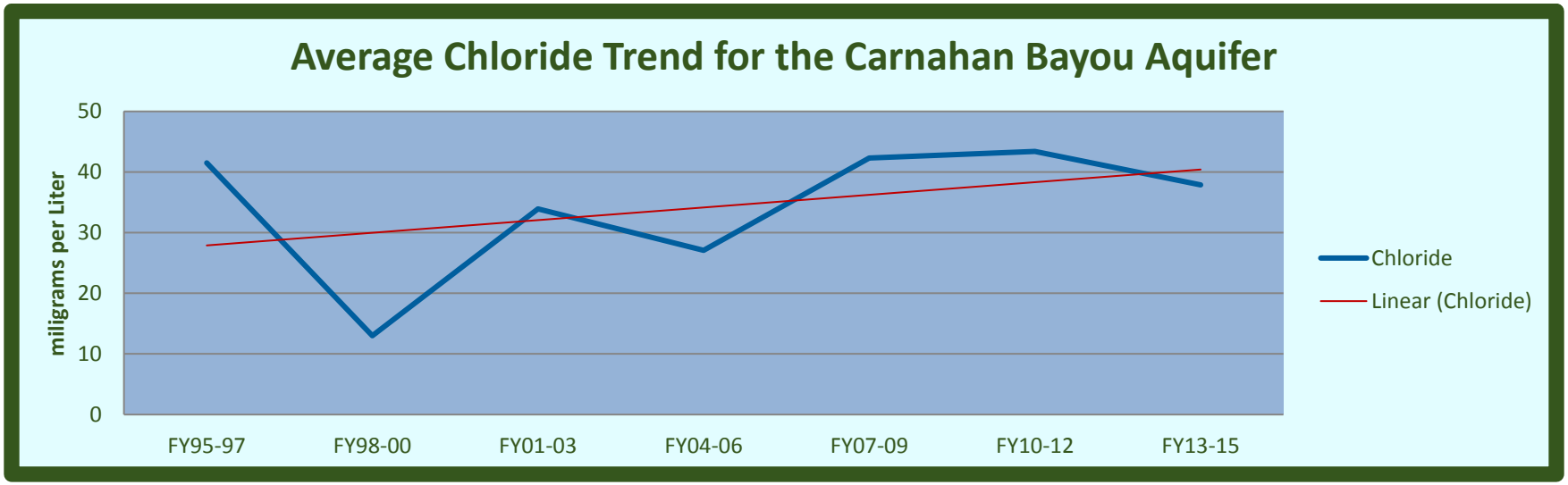

Chart 7-7: Alkalinity Trend

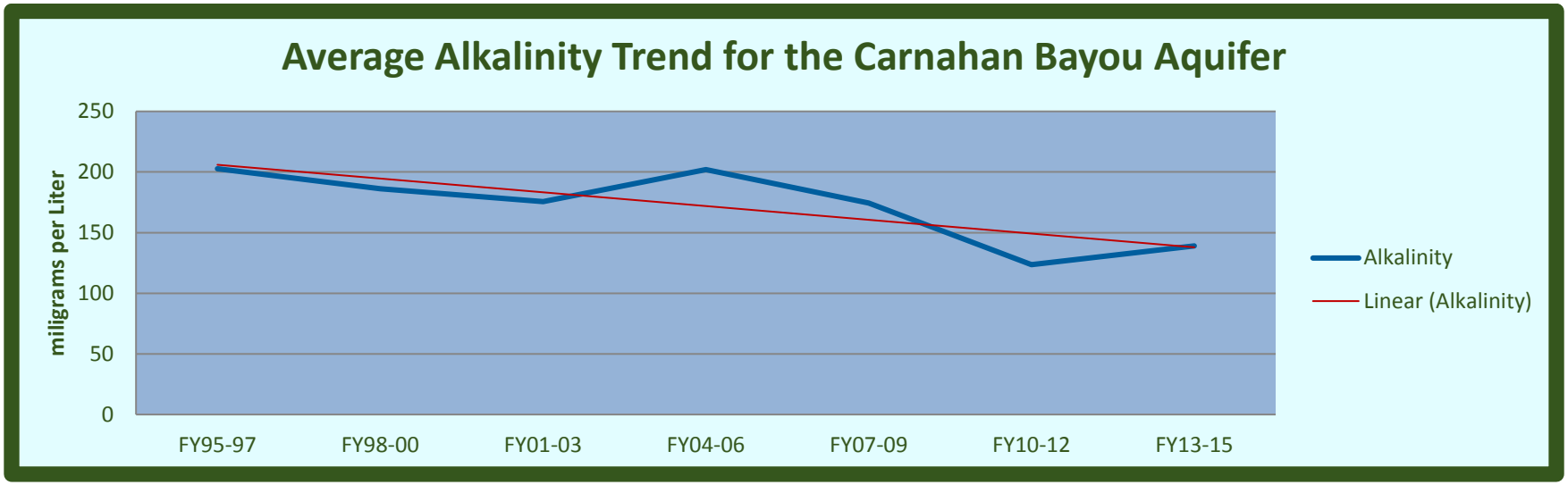

Chart 7-8: Color Trend

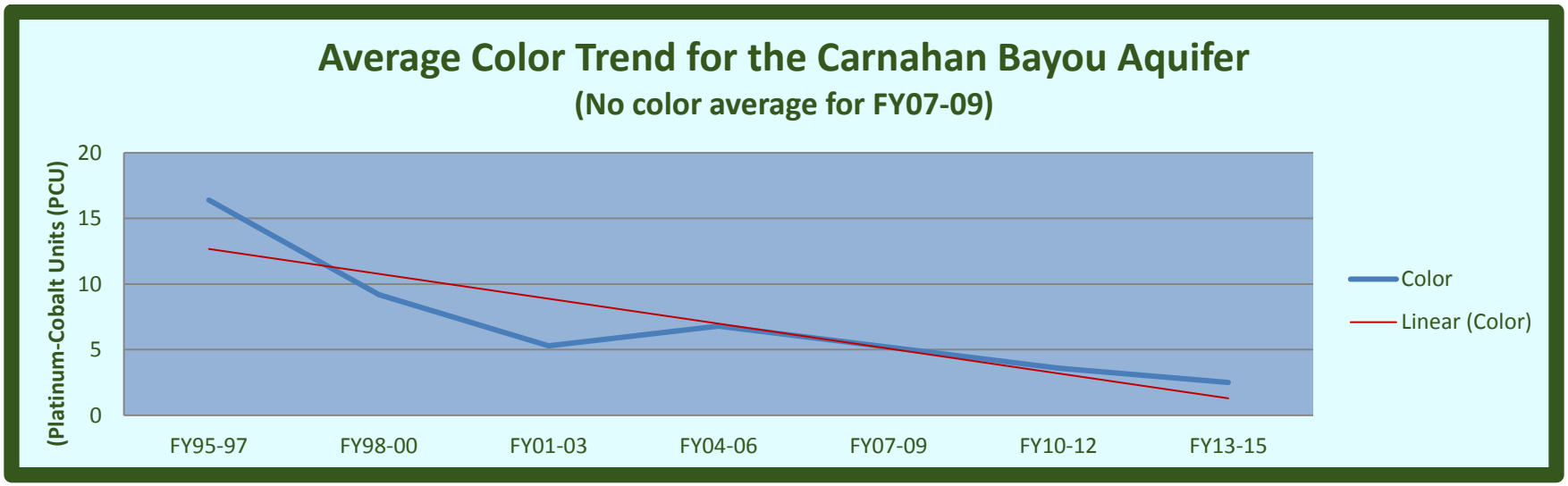

Chart 7-9: Sulfate Trend

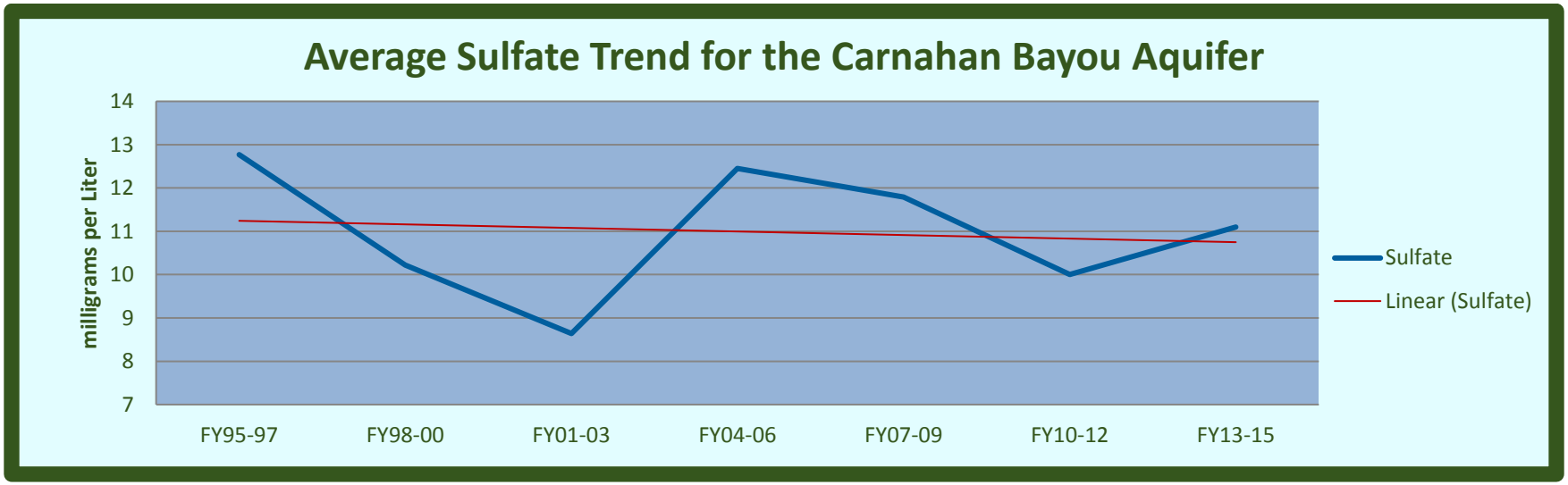

Chart 7-10: Total Dissolved Solids Trend

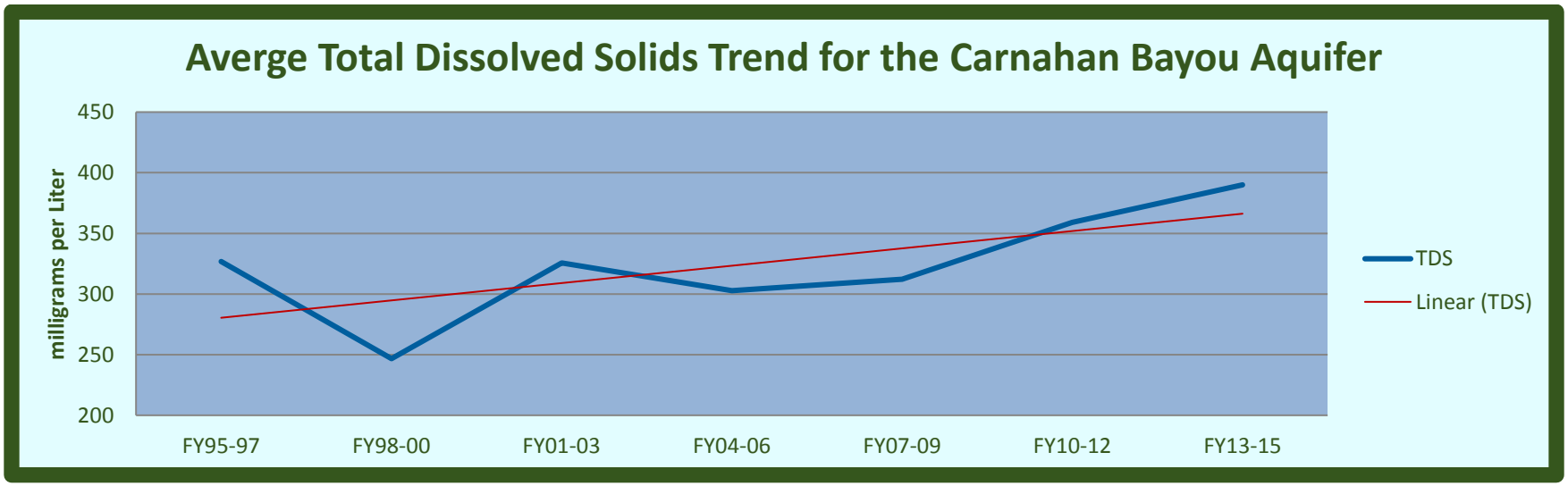

Chart 7-11: Hardness Trend

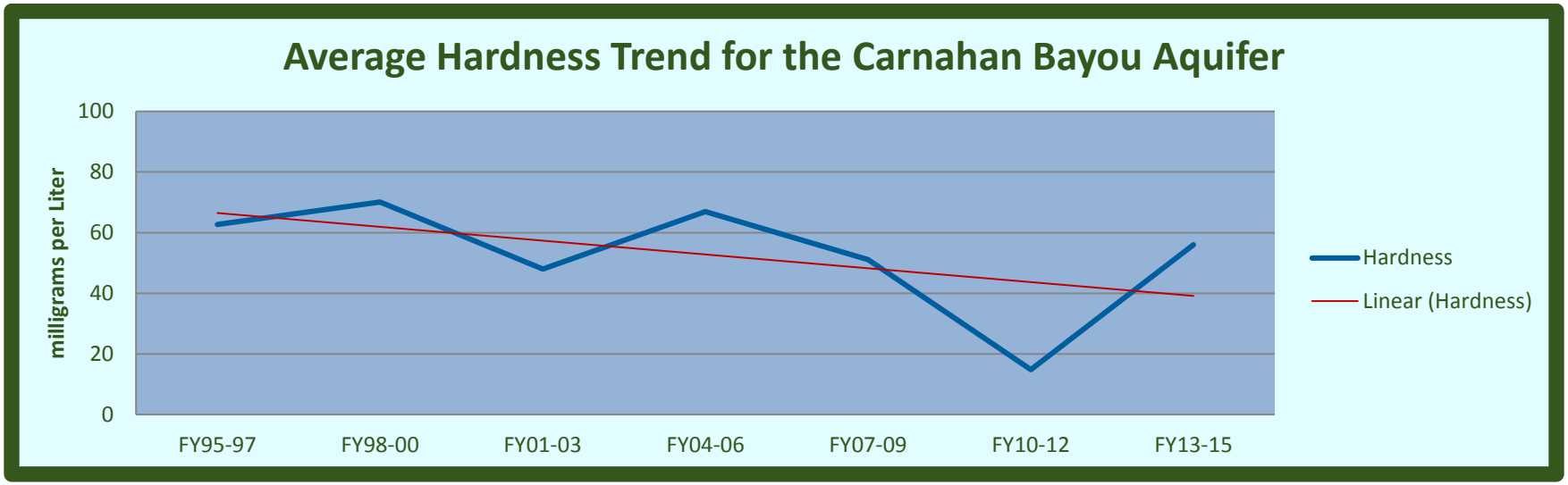

Chart 7-12: Ammonia (NH3) Trend

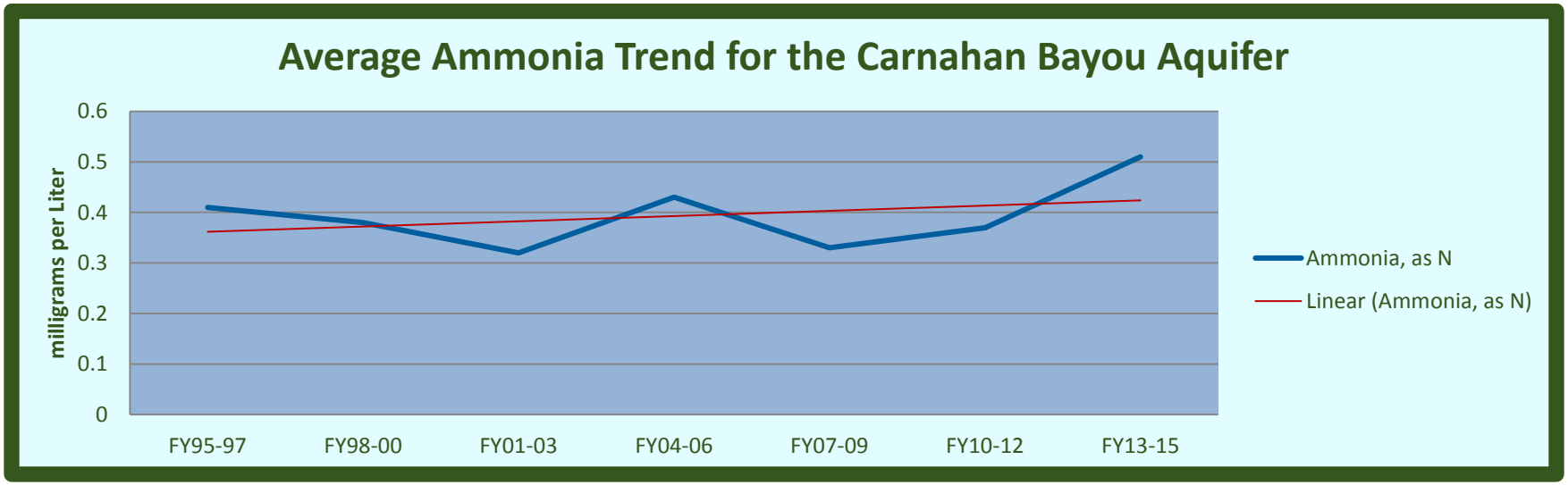

Chart 7-13: Nitrite – Nitrate Trend

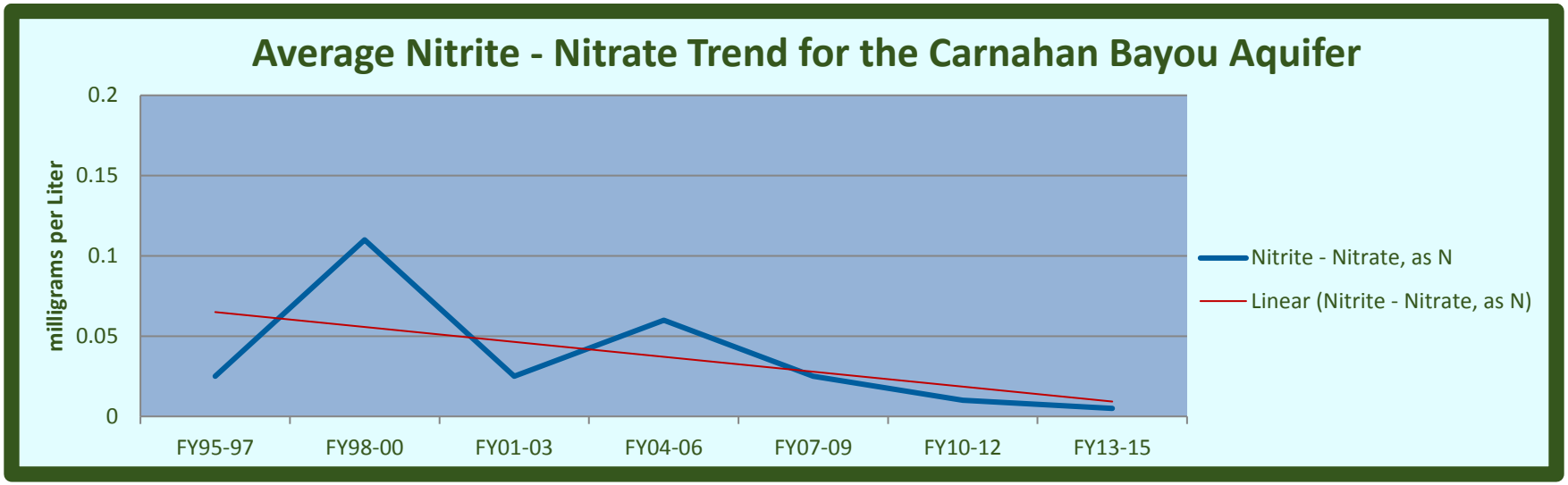

Chart 7-14: TKN Trend

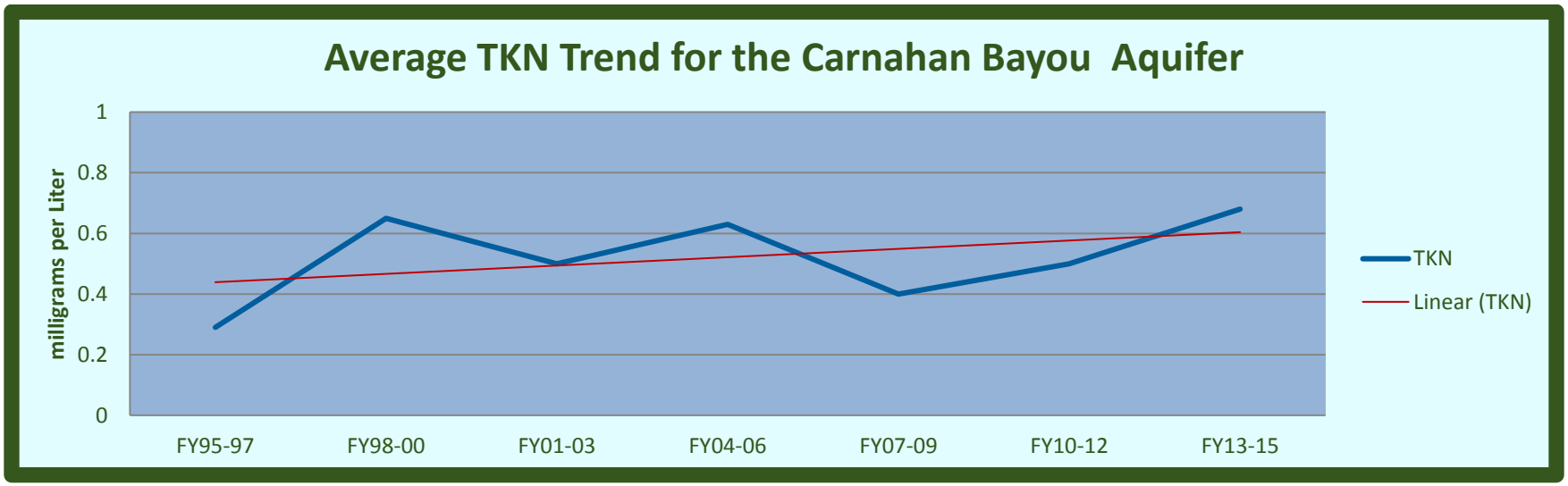

Chart 7-15: Total Phosphorus Trend

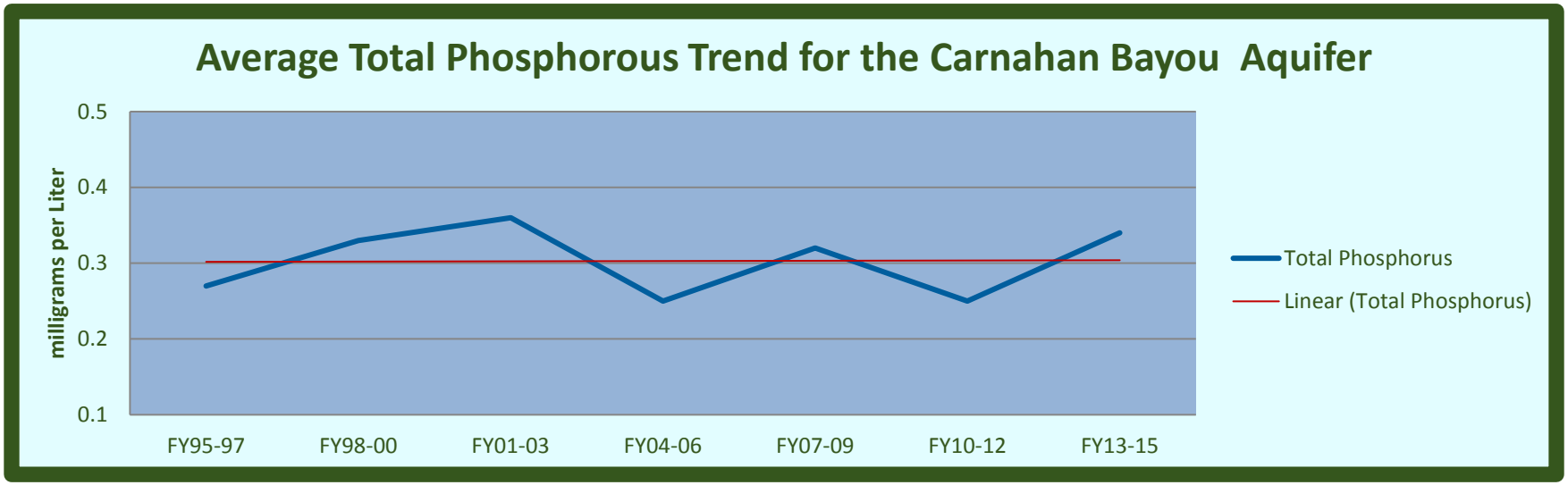

Chart 7-16: Iron Trend