SPARTA AQUIFER SUMMARY, 2013

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 1 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 Sparta aquifer, during the 2013 state fiscal year (July 1, 2012 - June 30, 2013). This summary will become Appendix I of ASSET Program Triennial Summary Report for 2015.

Fourteen Sparta aquifer wells were sampled from August of 2012 to June 2013. Eleven of the fourteen are classified as public supply, while the remaining three wells are classified as industrial use. The wells are located in ten parishes in the north-central area of the state.

Figure 1-1 shows the geographic locations of the Sparta aquifer and the associated wells, whereas Table 1-1 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 Sparta aquifer system is within the Eocene Sparta formation of the Claiborne group. The aquifer units consist of fine to medium sand with interbedded coarse sand, silty clay and lignite. Interconnected sands become more massive and coarsen slightly with depth and are laterally discontinuous. The Sparta aquifer is confined downdip by the clays of the overlying Cook Mountain formation and the clays and silty clays of the Cane River formation.

HYDROGEOLOGY

The Sparta aquifer is recharged through direct infiltration of rainfall, the movement of water through overlying terrace and alluvial deposits, and leakage from the Cockfield and Carrizo-Wilcox aquifers. The Sparta is pumped in a large area of north-central Louisiana and in a narrow

band through Natchitoches and Sabine Parishes. The two areas are separated by a saltwater ridge below the Red River valley. Groundwater movement is eastward toward the Mississippi River Valley and southward toward the Gulf of Mexico, except when altered by heavy pumping, and the hydraulic conductivity varies between 25 and 100 feet/day.

The maximum depths of occurrence of freshwater in the Sparta range from 200 feet above sea level to 1,700 feet below sea level. The range of thickness of the fresh water interval in the Sparta is 50 to 700 feet. The depths of the Sparta wells that were monitored in conjunction with the ASSET Program range from 153 to 773 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 1-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 1-3. 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 BI-212, MO-253, and SA-570.

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 1-8, 1-9 and 1-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 1-4 and 1-5 provide a statistical overview of field and conventional data, and inorganic data for the Sparta aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2013 sampling. Tables 1-6 and 1-7 compare these same parameter averages to historical ASSET-derived data for the Sparta 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 1-2, 1-3, 1-4, and 1-5, respectively, represent the contoured data for pH, total dissolved solids (TDS), chloride (Cl) and iron. Charts 1-1 through 1-16 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 also set Secondary MCLs (SMCLs), which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 1-2 and 1-3 show that one or more SMCLs were exceeded in 11 of the 14 wells sampled in the Sparta aquifer, with a total of 24 SMCLs being exceeded.

Field and Conventional Parameters

Table 1-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 1-4 provides an overview of this data for the Sparta aquifer, listing the minimum, average, and maximum results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 1-2 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 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 1-2 shows that seven wells exceeded the SMCL for pH, five wells exceeded the SMCL for total dissolved solids, two exceeded the SMCL for chloride and seven exceeded the SMCL for color. Laboratory results override field results in exceedance determination, thus only laboratory results will be counted in determining SMCL exceedance numbers for TDS. Following is a list of SMCL parameter exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 Standard Units):

CA-105 – 8.79 SU
MO-253 – 8.80 SU (Original and Duplicate)
OU-635 – 8.61 SU
UN-205 – 8.86 SU
L-32– 8.75 SU
OU-506 – 8.99 SU
SA-570 – 5.97 SU (Original and Duplicate)

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
CA-105	730 mg/L,	0.668 g/L
MO-253	1,200 mg/L, Duplicate – 1,250 mg/L	1.293 g/L (Original and Duplicate)
OU-506	580 mg/L	0.588 g/L
OU-635	1,020 mg/L	1.062 g/L
UN-205	917 mg/L	0.990 g/L

Chloride (SMCL = 250 mg/L):

MO-253 – 367 mg/L, Duplicate – 395 mg/L
OU-635 – 354 mg/L

Color (SMCL = 15 color units (PCU)):

BI-212 – 43.1 PCU, Duplicate < 1 PCU
CA-105 – 100 PCU
L-31 – 25 PCU
MO-253 – 43 PCU (Original and Duplicate)
OU-506 – 47 PCU
OU-635 – 34 PCU
W-237 – 86 PCU

Inorganic Parameters

Table 1-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 1-5 provides an overview of inorganic data for the Sparta aquifer, listing the minimum, average, and maximum results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 1-3 shows that no MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 1-3 shows that three wells exceeded the SMCL for iron:

Iron (SMCL = 300 ug/L):

BI-212 – 1,960 ug/L , Duplicate – 2,020 ug/L
CL-203 – 1,330 ug/L
SA-534 – 4,030 ug/L, Duplicate – 4,690 ug/L

Volatile Organic Compounds

Table 1-8 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 were no valid detection of a VOC at or above its detection limit during the FY 2013 sampling of the Sparta aquifer.

Semi-Volatile Organic Compounds

Table 1-9 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 Sparta aquifer.

Pesticides and PCBs

Table 1-10 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 Sparta 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 Sparta aquifer exhibit some trends 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 1-6 and 1-7, and in Charts 1-1 to 1-16 of this summary. Over the eighteen-year period, 11 analytes have shown a general increase in average concentration. These analytes are: pH, specific conductance (field and lab), salinity, alkalinity, chloride, total dissolved solids, ammonia, TKN, barium, iron, and zinc. For this same time period five analytes; temperature, color, hardness, nitrite-nitrate, and copper, have demonstrated a decrease in average concentration, while all other analytes have remained consistent for this time period.

The current number of wells with SMCL exceedances and the current total number of SMCL exceedances have decreased since the previous sampling event in FY 2010. Current sample results show that 11 wells reported one or more SMCL exceedance with a total of 24 SMCL exceedances. The FY 2010 sampling of the Sparta aquifer shows that 12 wells reported one or more SMCL exceedance with a total of 25 exceedances.

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 Sparta aquifer exceeded an MCL. The data also show that this aquifer is of fair quality when considering taste, odor, or appearance guidelines, with 24 SMCLs exceeded in 11 wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Sparta aquifer, with 11 parameters showing increases in concentration, five parameters

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

decreasing in concentration, and the remaining parameters showing no consistent change over the previous 18 years.

It is recommended that the wells assigned to the Sparta aquifer be resampled as planned, in approximately three years. In addition, several wells should be added to the 14 currently in place to increase the well density for this aquifer.

Table 1-1: List of Wells Sampled, Sparta Aquifer–FY 2013

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
BI-192	BIENVILLE	11/7/2012	LUCKY WATER SYSTEM	153	PUBLIC SUPPLY
BI-212	BIENVILLE	11/7/2012	ROCKTENN	490	INDUSTRIAL
CA-105	CALDWELL	8/15/2012	VIXEN WATER SYSTEM	525	PUBLIC SUPPLY
CL-203	CLAIBORNE	8/15/2012	TOWN OF HOMER	460	PUBLIC SUPPLY
L-31	LINCOLN	8/15/2012	CITY OF RUSTON	636	PUBLIC SUPPLY
L-32	LINCOLN	8/15/2012	CITY OF RUSTON	652	PUBLIC SUPPLY
MO-253	MOREHOUSE	8/15/2012	VILLAGE OF COLLINSTON	773	PUBLIC SUPPLY
OU-506	OUACHITA	8/15/2012	ANGUS CHEMICAL	506	INDUSTRIAL
OU-635	OUACHITA	8/15/2012	GRAPHIC PACKAGING INT'L INC.	726	INDUSTRIAL
SA-570	SABINE	6/24/2013	BOISE - FLORIEN	545	PUBLIC SUPPLY
UN-205	UNION	8/15/2012	D'ARBONNE WATER SYSTEM	725	PUBLIC SUPPLY
W-237	WINN	8/16/2012	TOWN OF WINNFIELD	430	PUBLIC SUPPLY
WB-241	WEBSTER	1/31/2013	TOWN OF SPRINGHILL	408	PUBLIC SUPPLY
WB-269	WEBSTER	1/31/2013	CITY OF MINDEN	280	PUBLIC SUPPLY

Table 1-2: Summary of Field and Conventional Data, Sparta Aquifer–FY 2013

Well ID	Temp Deg C	pH SU	Sp Cond mmhos/cm	Sal ppt	TDS g/L	Alk mg/L	NH3 mg/L	Cl mg/L	Color PCU	Sp Cond umhos/cm	Hard mg/L	Nitrite-Nitrate (as N) mg/L	SO4 mg/L	TDS mg/L	TSS mg/L	TKN mg/L	Tot P mg/L	Turb NTU
LABORATORY DETECTION LIMITS →						5	0.05	1.25	1	10	5	0.01/ 0.05	0.3	10	4	0.3	0.05	0.3
	FIELD PARAMETERS					LABORATORY PARAMETERS												
BI-192	18.03	6.67	0.023	0.01	0.015	< 5	< 0.05	1.9	< DL	124	< DL	1.05	0.5	190	< DL	1.53	< DL	0.89
BI-212	18.95	6.68	0.204	0.10	0.132	81	0.33	7.1	43.1	285	40	< DL	8.8	13	< DL	0.59	0.07	6.78
BI-212*	18.95	6.68	0.204	0.10	0.132	85	0.32	7.1	< DL	256	30	< DL	9.3	207	< DL	1.04	0.09	7.18
CA-105	21.6	8.79	1.028	0.51	0.668	560	0.73	20.8	100	986	< DL	< DL	< DL	730	< DL	0.77	0.84	< DL
CL-203	19.35	7.50	0.134	0.06	0.087	36	0.09	5.5	< DL	148	20	< DL	6.2	163	< DL	0.79	0.11	1.67
L-31	26.02	7.89	0.340	0.16	0.221	136	< DL	18.4	25	341	< DL	0.02	13.1	293	< DL	0.34	0.44	< DL
L-32	22.81	8.75	0.335	0.16	0.218	148	0.18	9.4	8	328	< DL	< DL	15.5	277	< DL	0.42	0.28	< DL
MO-253	23.66	8.80	1.990	1.01	1.293	420	0.98	367.0	43	1920	< DL	< DL	< DL	1,200	< DL	0.99	0.53	< DL
MO-253*	23.66	8.80	1.990	1.01	1.293	392	1.09	395.0	43	1890	< DL	< DL	< DL	1,250	< DL	1.28	0.52	< DL
OU-506	21.15	8.99	0.905	0.45	0.588	304	0.72	109.0	47	874	< DL	< DL	1.7	580	< DL	0.96	0.51	< DL
OU-635	23.14	8.61	1.633	0.82	1.062	288	0.93	354.0	34	1580	< DL	< DL	2.2	1,020	< DL	1.06	0.48	< DL
SA-570	22.21	5.97	0.195	0.09	0.127	44	0.25	11.8	9	196	100	< DL	20.6	248	6	0.52	0.25	2.14
SA-570*	22.21	5.97	0.195	0.09	0.127	34	0.23	11.8	12	195	52	< DL	20.6	256	< DL	0.44	0.30	2.15
UN-205	23.45	8.86	1.523	0.77	0.99	176	0.97	47.4	8	1460	< DL	< DL	< DL	917	< DL	1.03	0.16	< DL
W-237	21.29	8.47	0.635	0.31	0.412	280	0.38	14.9	86	613	< DL	< DL	5.8	473	11	0.56	0.65	5.86
WB-241	18.74	7.80	0.733	0.36	0.477	208	1.48	70.9	< DL	762	40	< DL	11.1	453	< DL	1.32	0.15	1.22
WB-269	18.02	7.27	0.247	0.12	0.161	46	0.13	30.1	< DL	288	18	0.65	10.9	263	< DL	0.53	0.12	< DL

*Denotes Duplicate Sample Shaded cells exceed EPA Secondary Standards

Table 1-3: Summary of Inorganic Data, Sparta 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†	5/25	4/20	5/25	2/10	2/10	4/20	2/10	100/ 500	1/5	0.0002	3/15	5/25	1/5	2/10	6/30
BI-192	< DL	< DL	29.1	< DL	< DL	< DL	< DL	272	< DL	< DL	< DL	< DL	< DL	< DL	11.4
BI-212*	< DL	< DL	74.2	< DL	< DL	< DL	2.23	1,960	< DL	< DL	< DL	< DL	< DL	< DL	< DL
BI-212	< DL	< DL	72.9	< DL	< DL	< DL	< DL	2,020	< DL	< DL	< DL	< DL	< DL	< DL	< DL
CA-105	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
CL-203	< DL	< DL	67.9	< DL	< DL	< DL	< DL	1,330	< DL	< DL	< DL	< DL	< DL	< DL	< DL
L-31	< DL	< DL	13.6	< DL	< DL	< DL	< DL	298	< DL	< DL	< DL	< DL	< DL	< DL	< DL
L-32	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	20.7
MO-253	< DL	< DL	25.6	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
MO-253*	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
OU-506	< DL	< DL	8.5	< DL	< DL	< DL	13.40	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
OU-635	< DL	< DL	34.0	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SA-570	< DL	< DL	106.0	< DL	< DL	< DL	< DL	4,030	< DL	< DL	8.76	< DL	< DL	< DL	1,100
SA-570*	< DL	< DL	112.0	< DL	< DL	< DL	< DL	4,690	< DL	< DL	9.13	< DL	< DL	< DL	1,250
UN-205	< DL	< DL	37.6	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
W-237	< DL	< DL	22.1	< DL	< DL	< DL	2.98	214	1.25	< DL	< DL	< DL	< DL	< DL	< DL
WB-241	< DL	< DL	222.0	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	31.7
WB-269	< DL	< DL	104.0	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL

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

Table 1-4: FY 2013 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	18.02	26.02	21.36
	pH (SU)	5.97	8.99	7.81
	Specific Conductance (mmhos/cm)	0.023	1.990	0.680
	Salinity (ppt)	0.01	1.01	0.34
	TDS (g/L)	0.015	1.293	0.461
LABORATORY	Alkalinity (mg/L)	< DL	560	193.9
	Chloride (mg/L)	1.89	395	77.3
	Color (PCU)	< DL	100	27.5
	Specific Conductance (umhos/cm)	124	1,920	705.8
	Sulfate (mg/L)	< DL	20.6	6.93
	TDS (mg/L)	13	1,250	496.5
	TSS (mg/L)	< DL	11	< DL
	Turbidity (NTU)	< DL	7.18	1.43
	Ammonia, as N (mg/L)	< DL	1.48	0.46
	Hardness (mg/L)	< DL	100	15.11
	Nitrite - Nitrate, as N (mg/L)	< DL	1.66	0.13
	TKN (mg/L)	< DL	1.05	0.84
	Total Phosphorus (mg/L)	< DL	0.82	0.33

Table 1-5: FY 2013 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	< DL	< DL	< DL
Arsenic (ug/L)	< DL	< DL	< DL
Barium (ug/L)	< DL	222.0	55.1
Beryllium (ug/L)	< DL	< DL	< DL
Cadmium (ug/L)	< DL	< DL	< DL
Chromium (ug/L)	< DL	< DL	< DL
Copper (ug/L)	< DL	13.4	< DL
Iron (ug/L)	< DL	4,690	898
Lead (ug/L)	< DL	1.25	< DL
Mercury (ug/L)	< DL	< DL	< DL
Nickel (ug/L)	< DL	9.1	< DL
Selenium (ug/L)	< DL	< DL	< DL
Silver (ug/L)	< DL	< DL	< DL
Thallium (ug/L)	< DL	< DL	< DL
Zinc (ug/L)	< DL	1,250	144

Table 1-6: 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)	23.10	23.65	23.49	23.50	23.78	22.92	21.36
	pH (SU)	7.23	7.76	7.86	7.45	8.02	7.86	7.81
	Specific Conductance (mmhos/cm)	0.650	0.650	0.654	0.650	0.890	0.710	0.680
	Salinity (Sal.) (ppt)	0.30	0.32	0.32	0.32	0.44	0.35	0.34
	TDS (Total dissolved solids) (g/L)	-	-	-	0.420	0.580	0.460	0.461
LABORATORY	Alkalinity (Alk.) (mg/L)	185.5	203.2	178.3	185.5	202.6	208.1	193.9
	Chloride (Cl) (mg/L)	85.8	89.0	90.0	94.2	126.5	97.7	77.3
	Color (PCU)	25.9	21.7	17.7	16.1	14.6	8.9	27.5
	Specific Conductance (umhos/cm)	619.1	687.7	660.0	646.9	794.5	692.5	705.8
	Sulfate (SO4) (mg/L)	6.55	8.21	7.42	9.30	6.22	7.97	6.93
	TDS (Total dissolved solids) (mg/L)	356.5	442.7	391.1	405.7	461.4	454.4	496.5
	TSS (Total suspended solids) (mg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
	Turbidity (Turb.) (NTU)	1.32	2.21	1.45	1.18	< DL	4.77	1.43
	Ammonia, as N (NH3) (mg/L)	0.34	0.46	0.33	0.48	0.44	< DL	0.46
	Hardness (mg/L)	21.7	10.0	13.6	15.9	13.2	12.2	15.11
	Nitrite - Nitrate , as N (mg/L)	0.28	0.32	0.30	0.31	0.17	0.26	0.13
	TKN (mg/L)	0.58	0.52	0.45	0.59	0.50	0.43	0.84
	Total Phosphorus (P) (mg/L)	0.36	0.31	0.31	0.35	0.29	0.34	0.33

Table 1-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
	FY 1995	FY 1998	FY 2001	FY 2004	FY 2007	FY 2010	FY 2013
Antimony (ug/L)	< DL	< DL	< DL	Invalid Data	< DL	< DL	< DL
Arsenic (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Barium (ug/L)	36.5	30.7	50.4	61.8	46.9	52.2	55.1
Beryllium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cadmium (ug/L)	< DL	1.00	< DL	< DL	< DL	< DL	< DL
Chromium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Copper (ug/L)	10.2	10.2	< 5	5.8	3.1	5.1	< DL
Iron (ug/L)	213	284	517	406	410	740	898
Lead (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Mercury (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Nickel (ug/L)	5.1	< DL	< DL	5.4	< DL	4.7	< DL
Selenium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Silver (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Thallium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Zinc (ug/L)	16.2	20.8	14.2	16.5	< DL	48.9	144

Table 1-8: 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 1-9: 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

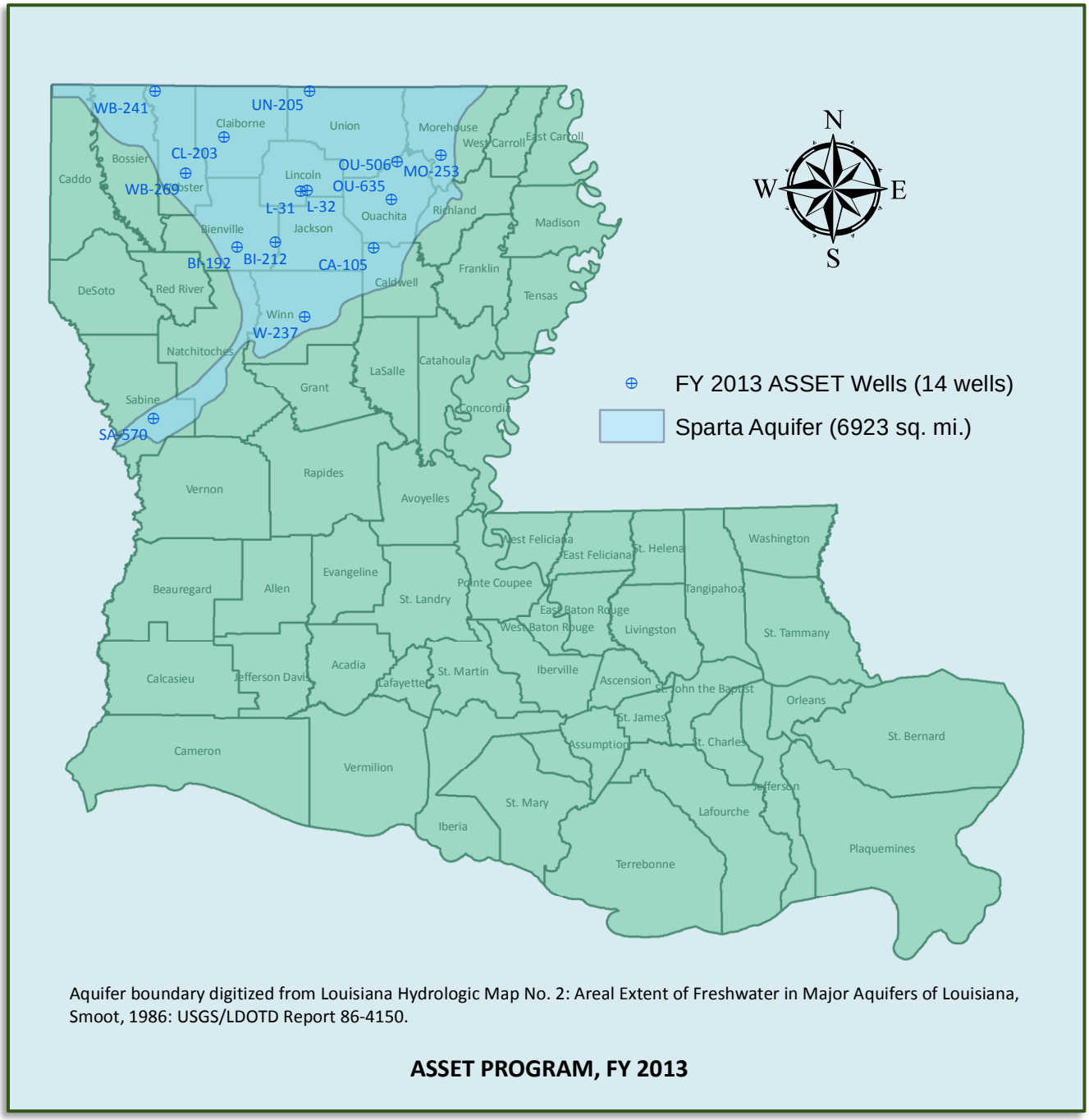
Table 1-9: SVOCs (Continued)

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

Table 1-10: 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 1-1: Location Plat, Sparta 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 1-2: Map of pH Data

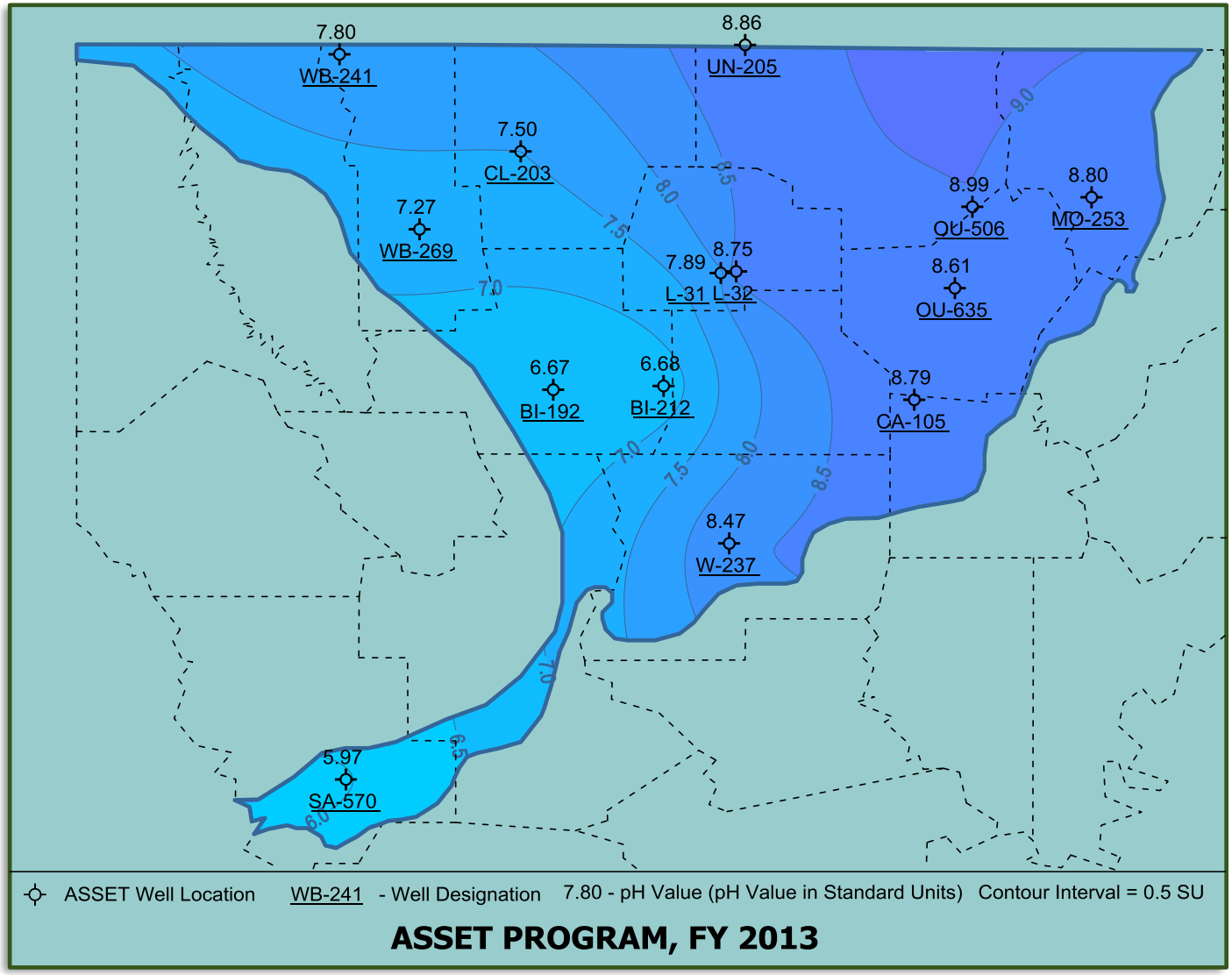

Figure 1-3: Map of TDS Lab Data

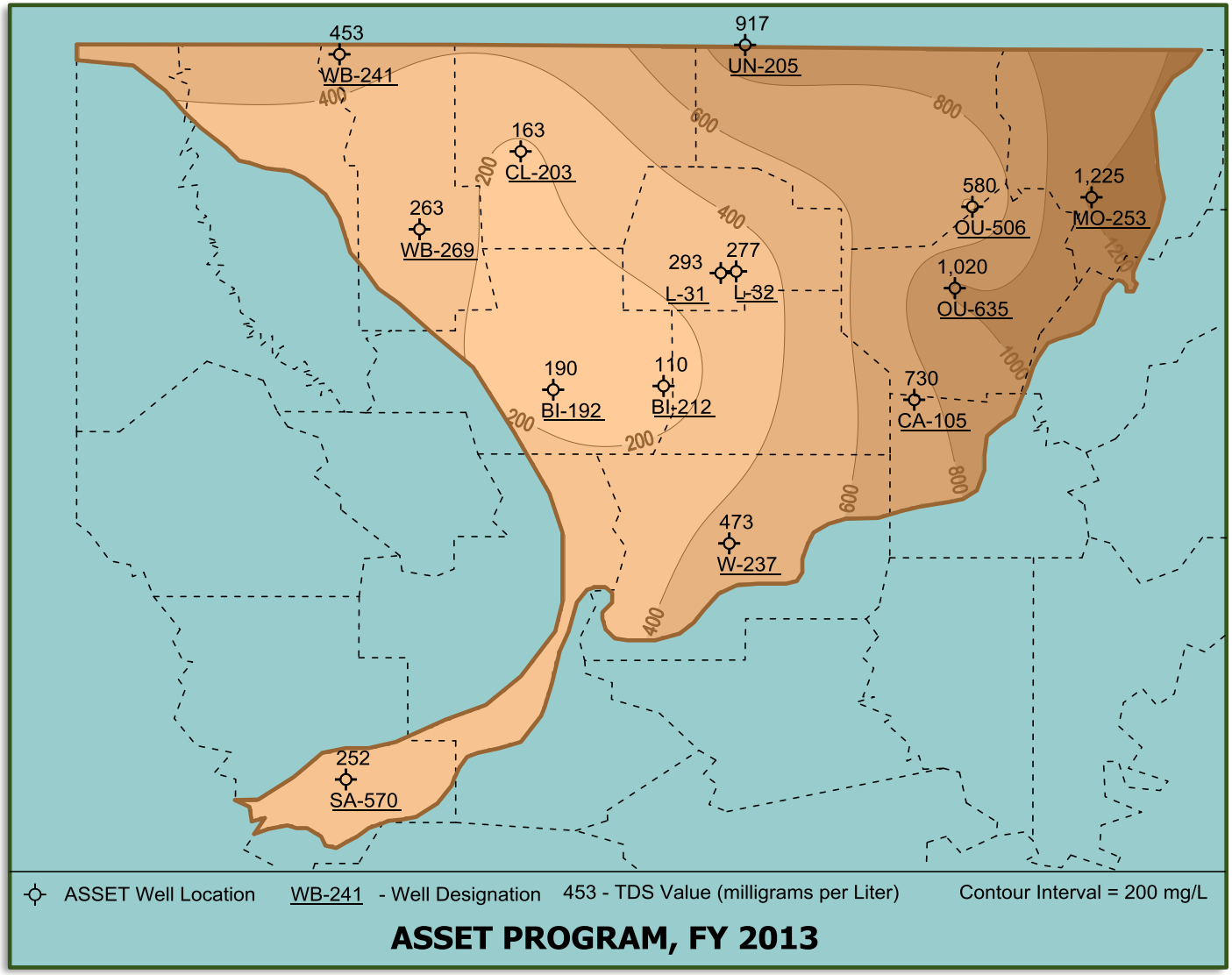

Figure 1-4: Map of Chloride Data

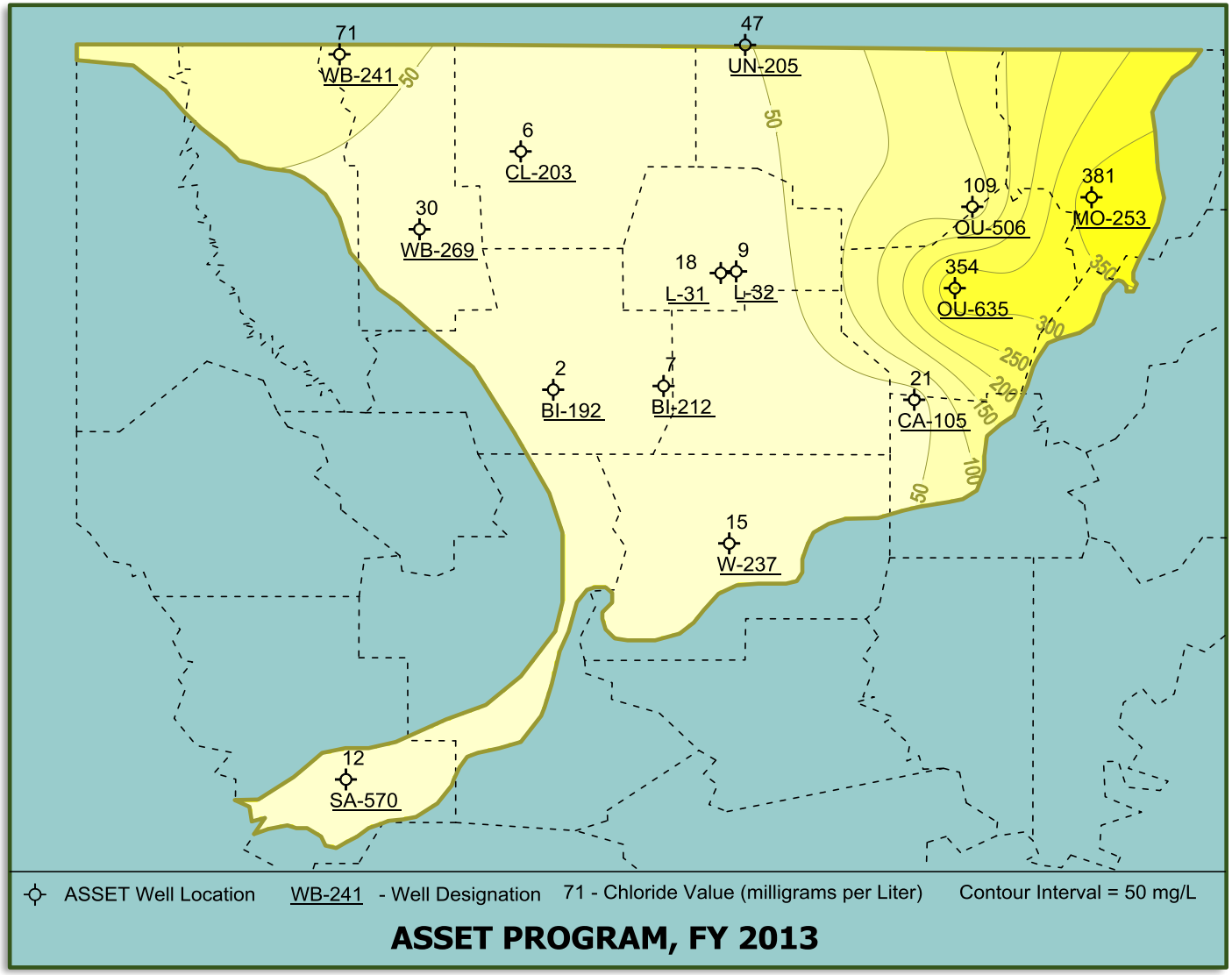

Figure 1-5: Map of Iron Data

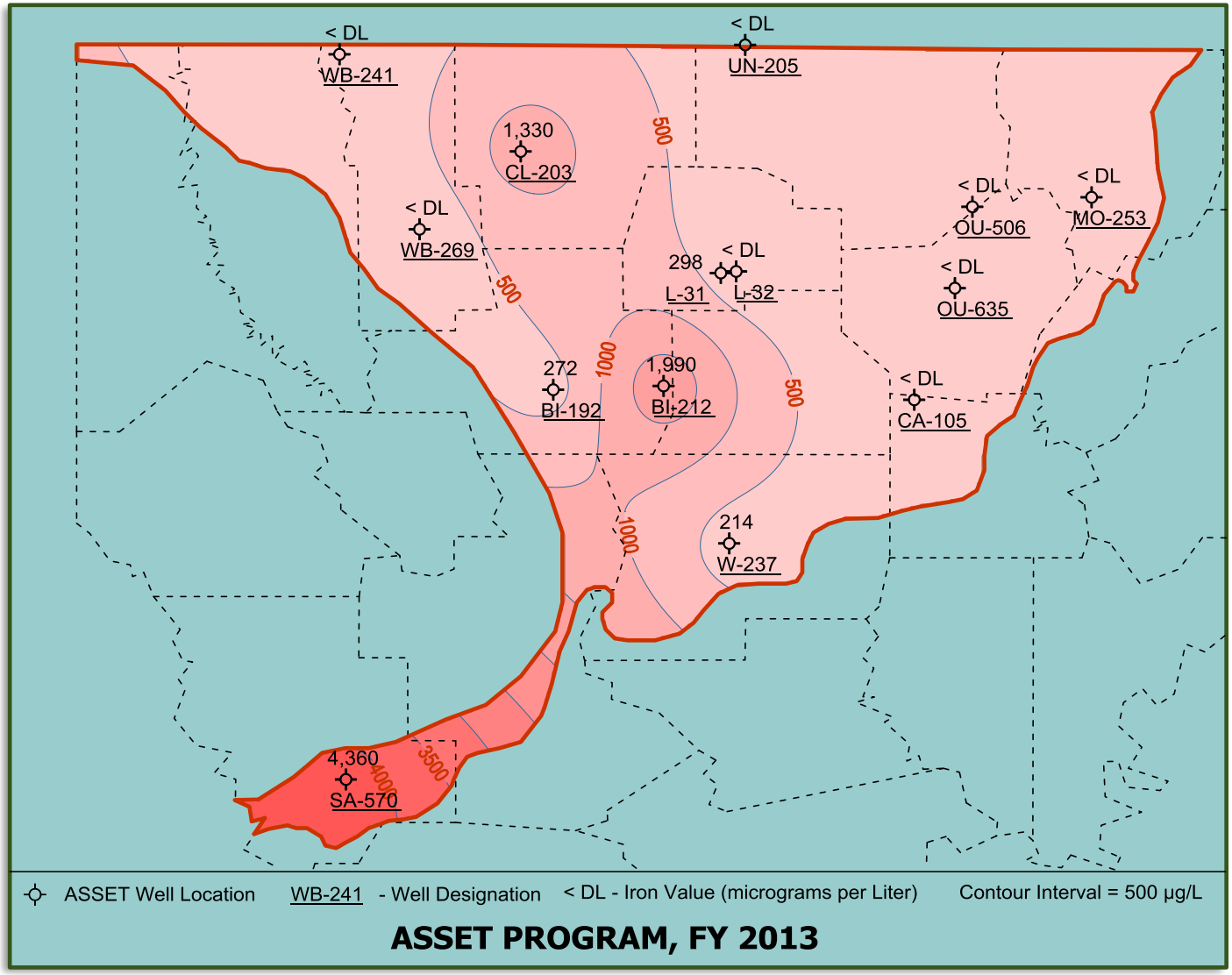

Chart 1-1: Temperature Trend

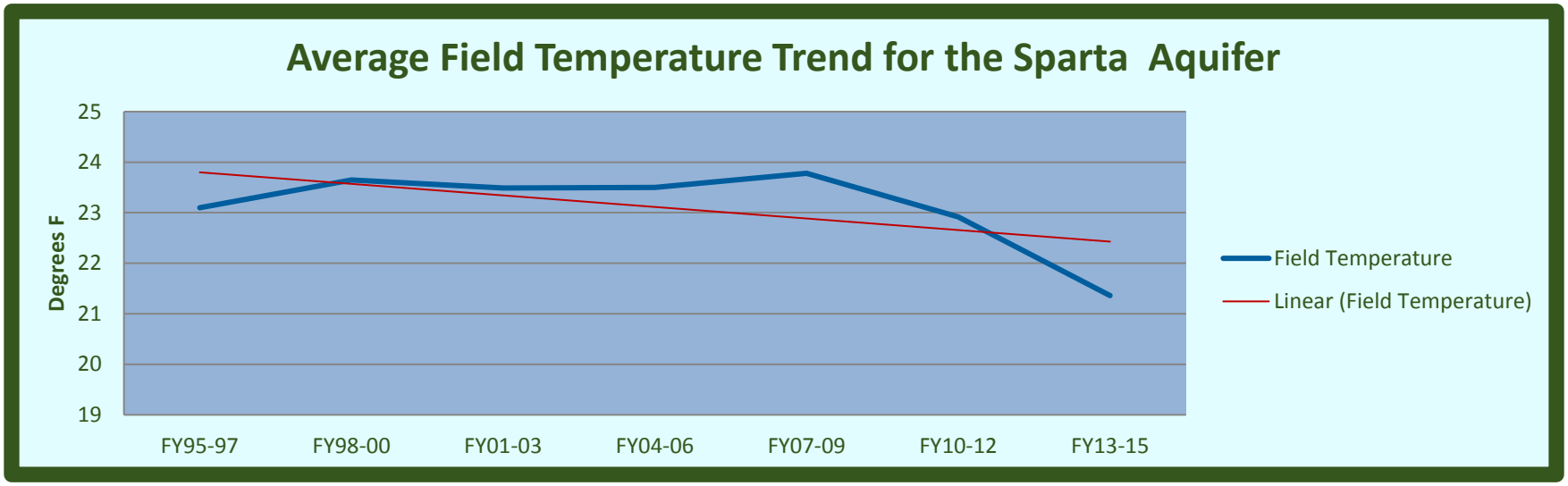

Chart 1-2: pH Trend

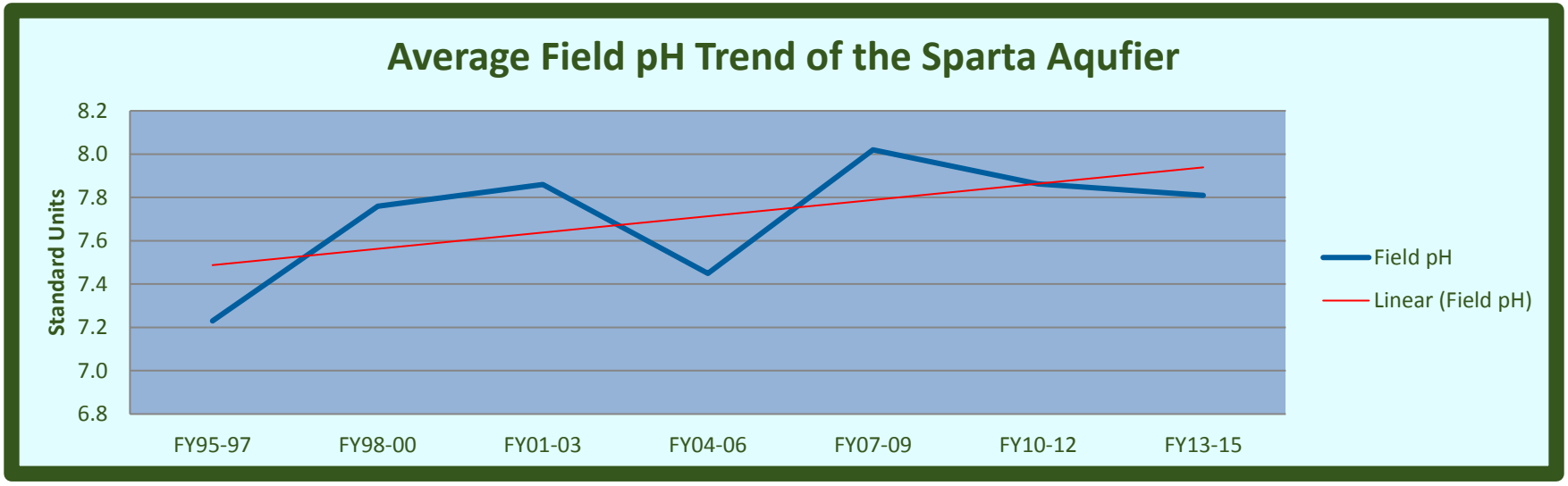

Chart 1-3: Field Specific Conductance Trend

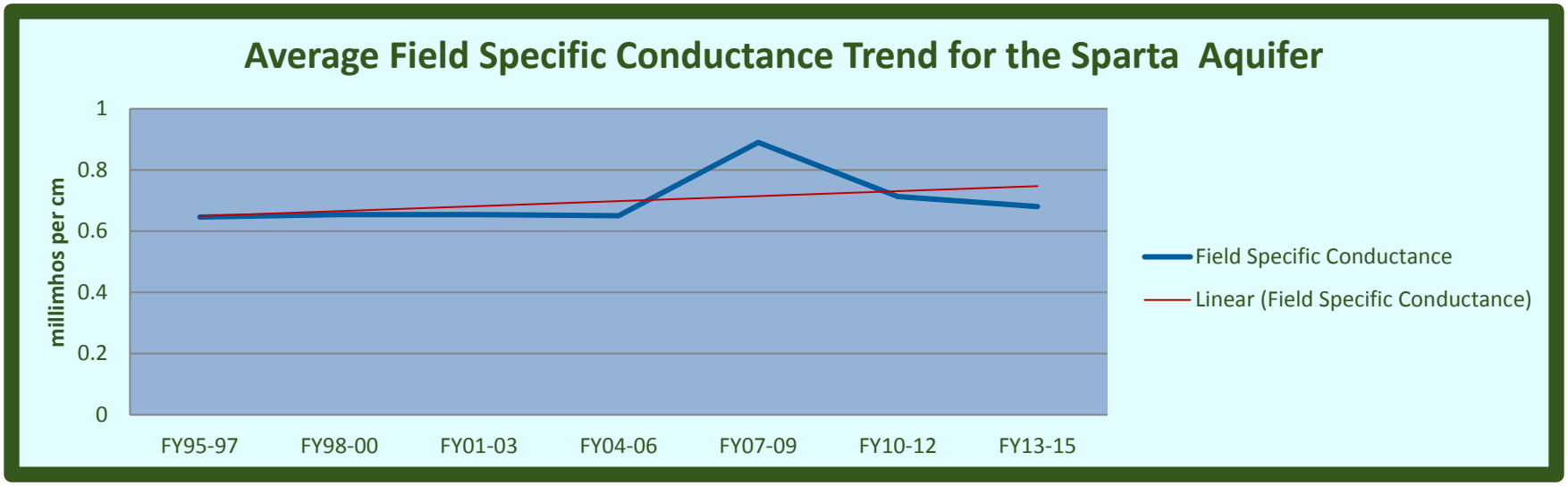

Chart 1-4: Lab Specific Conductance Trend

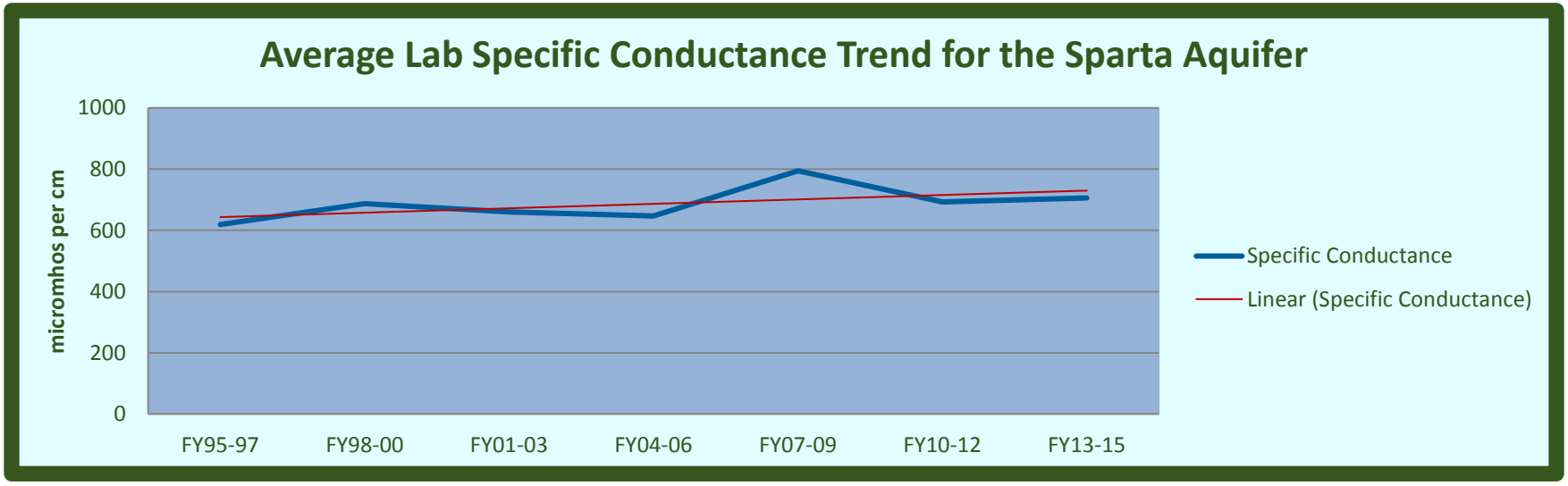

Chart 1-5: Field Salinity Trend

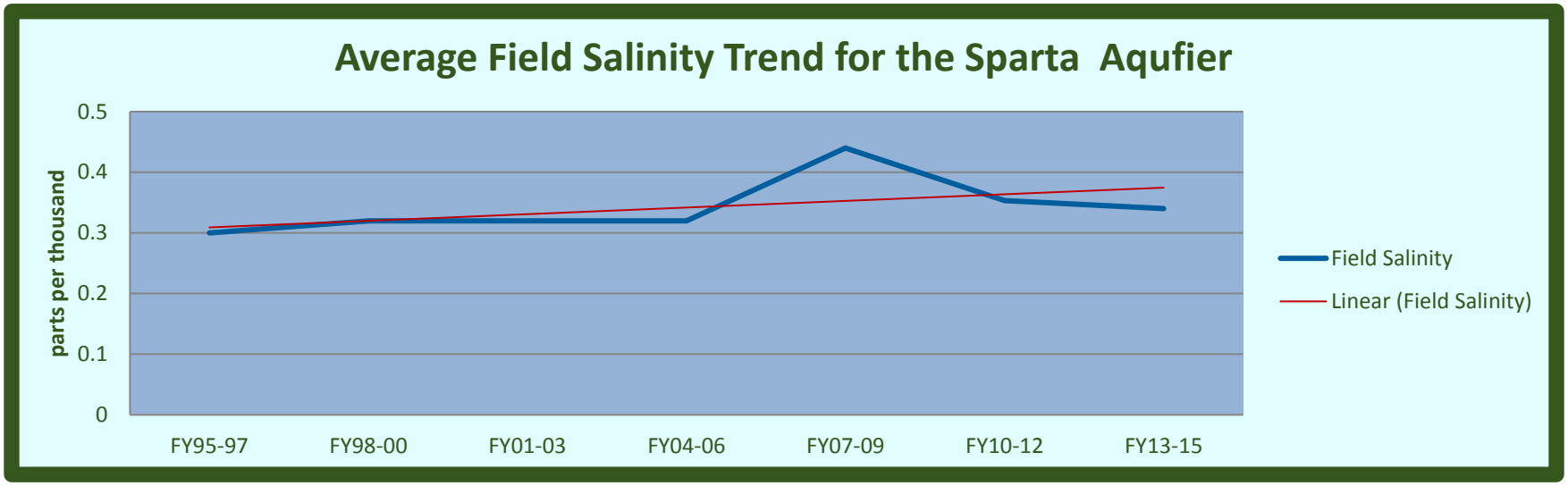

Chart 1-6: Chloride Trend

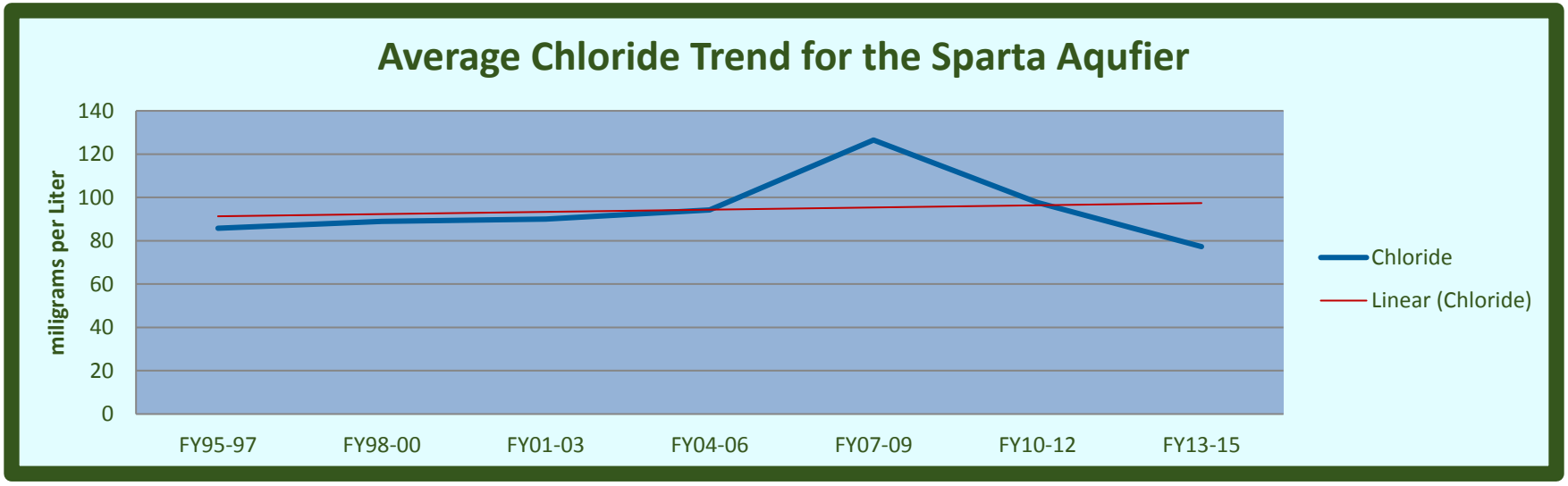

Chart 1-7: Alkalinity Trend

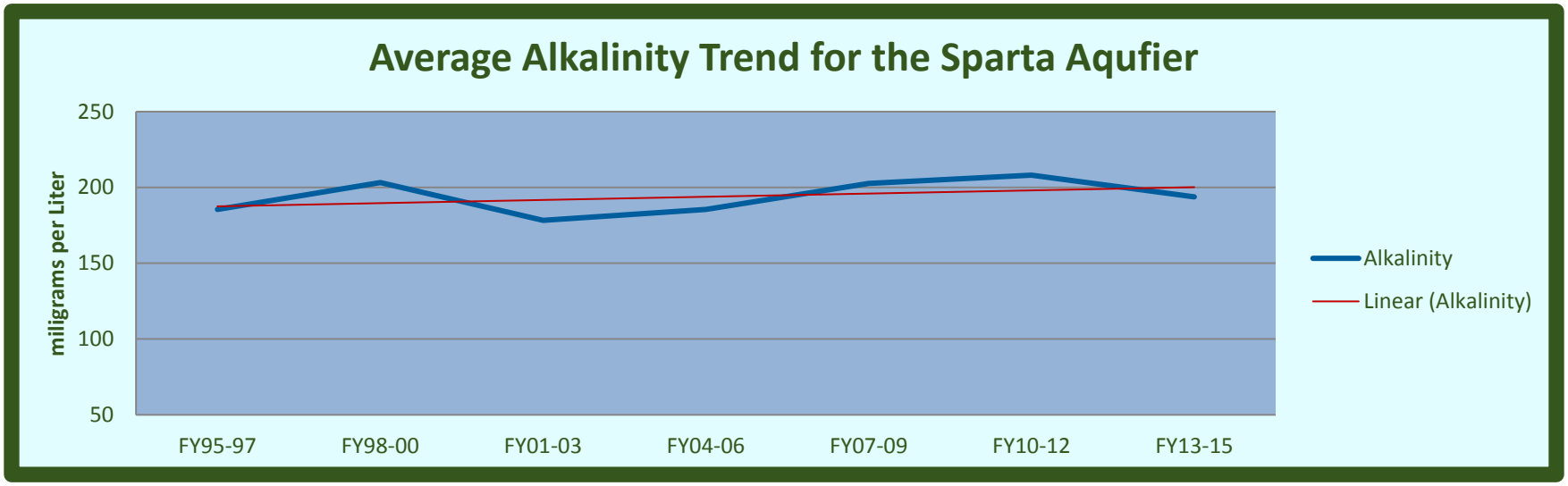

Chart 1-8: Color Trend

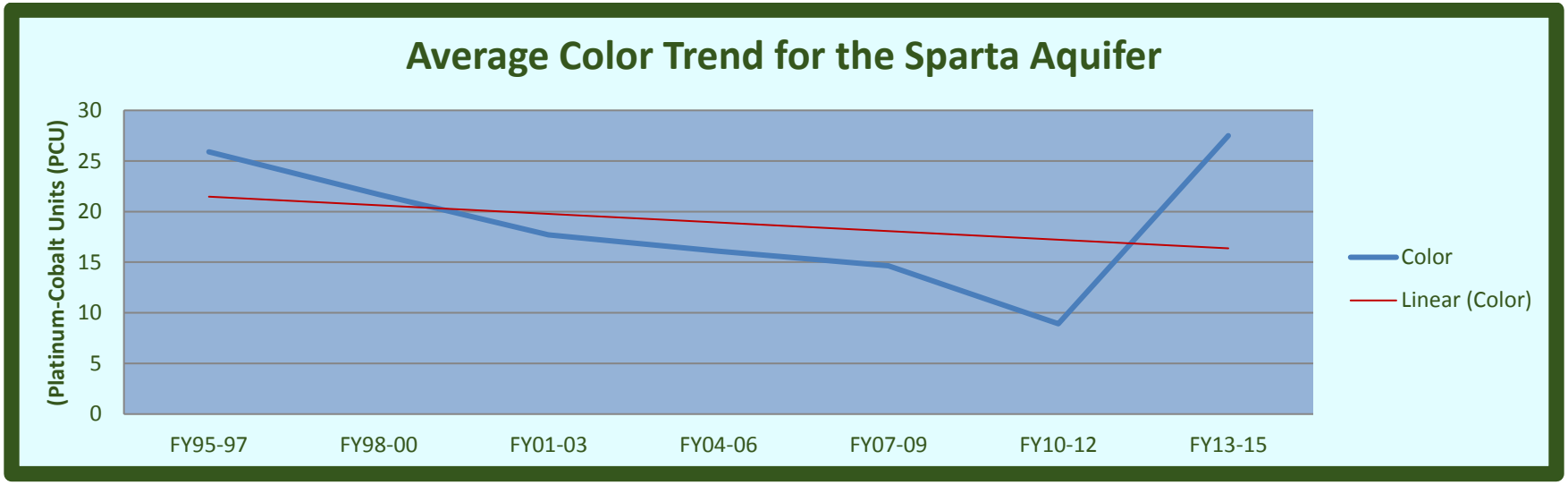

Chart 1-9: Sulfate (SO4) Trend

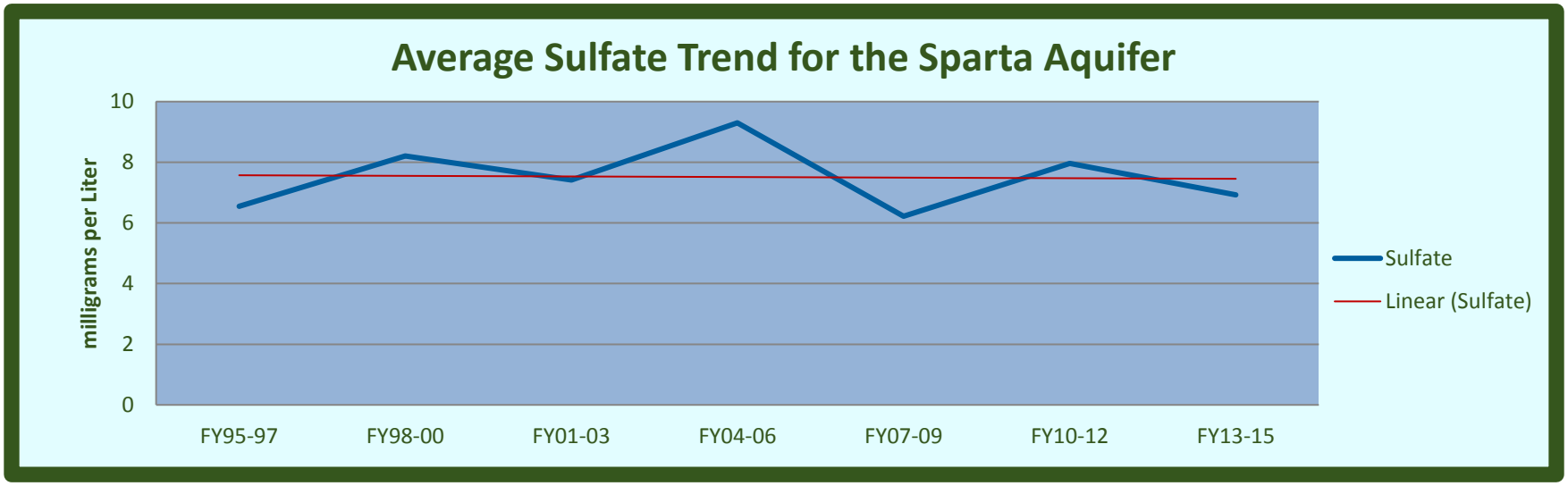

Chart 1-10: Total Dissolved Solids (TDS) Trend

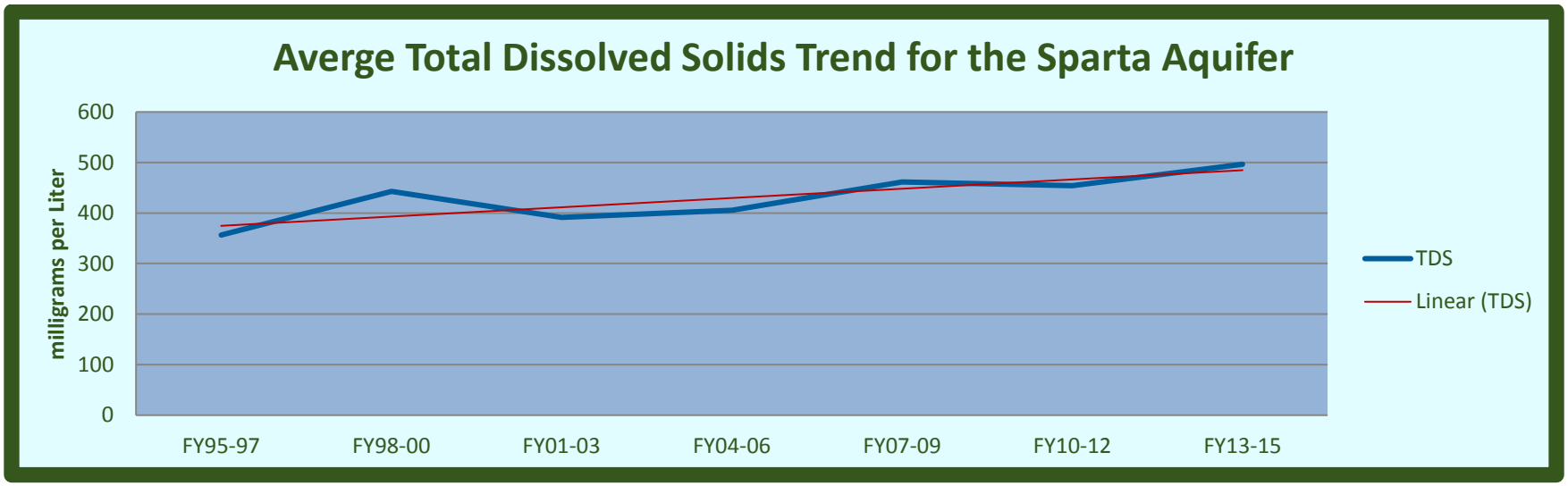

Chart 1-11: Hardness Trend

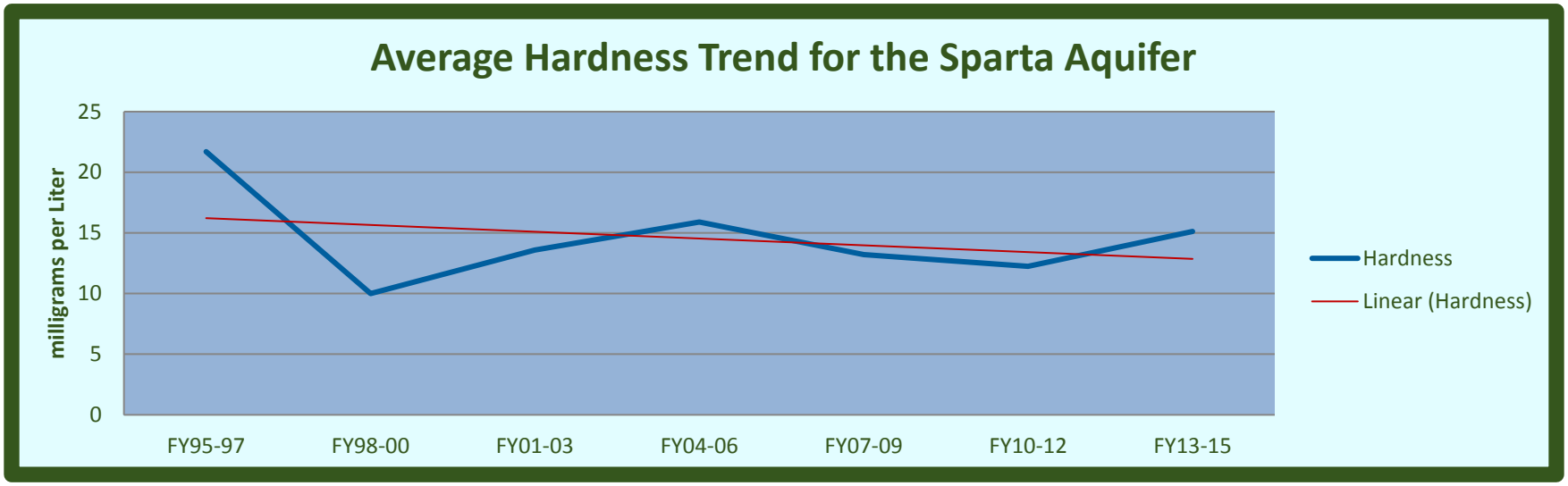

Chart 1-12: Ammonia (NH3) Trend

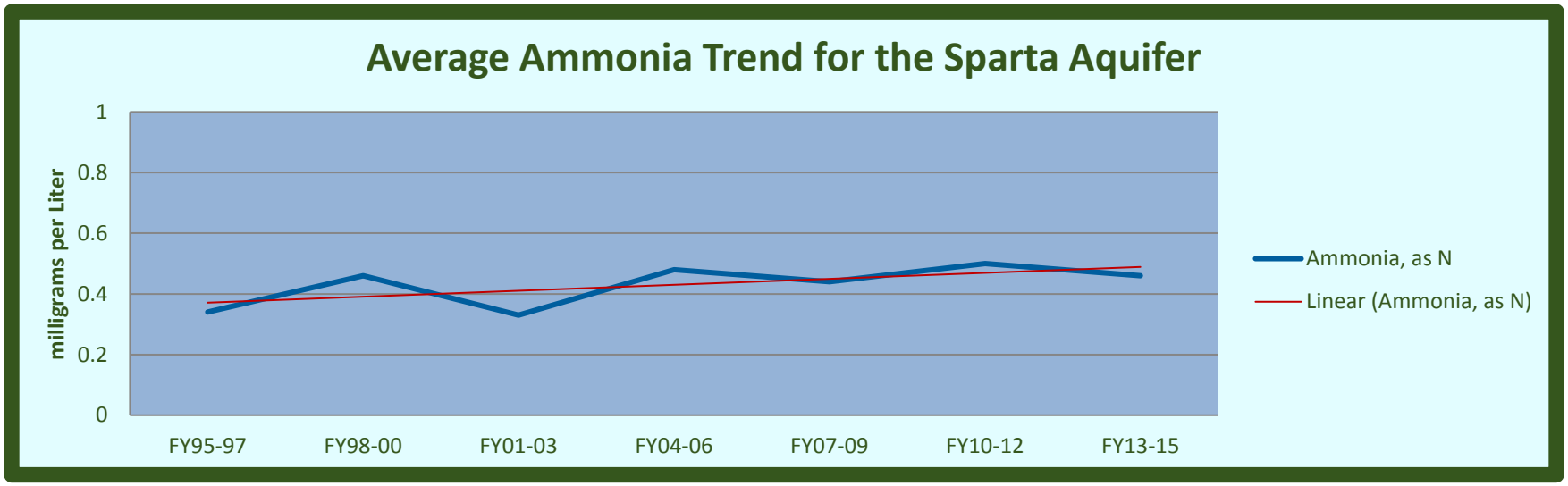

Chart 1-13: Nitrite – Nitrate Trend

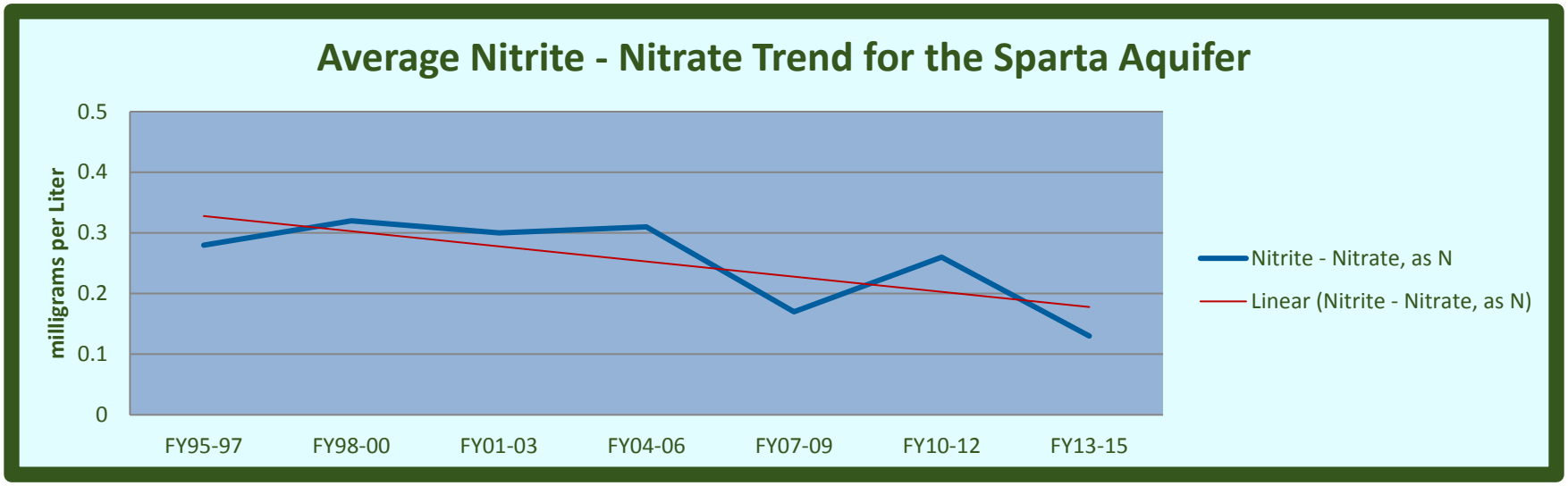

Chart 1-14: TKN Trend

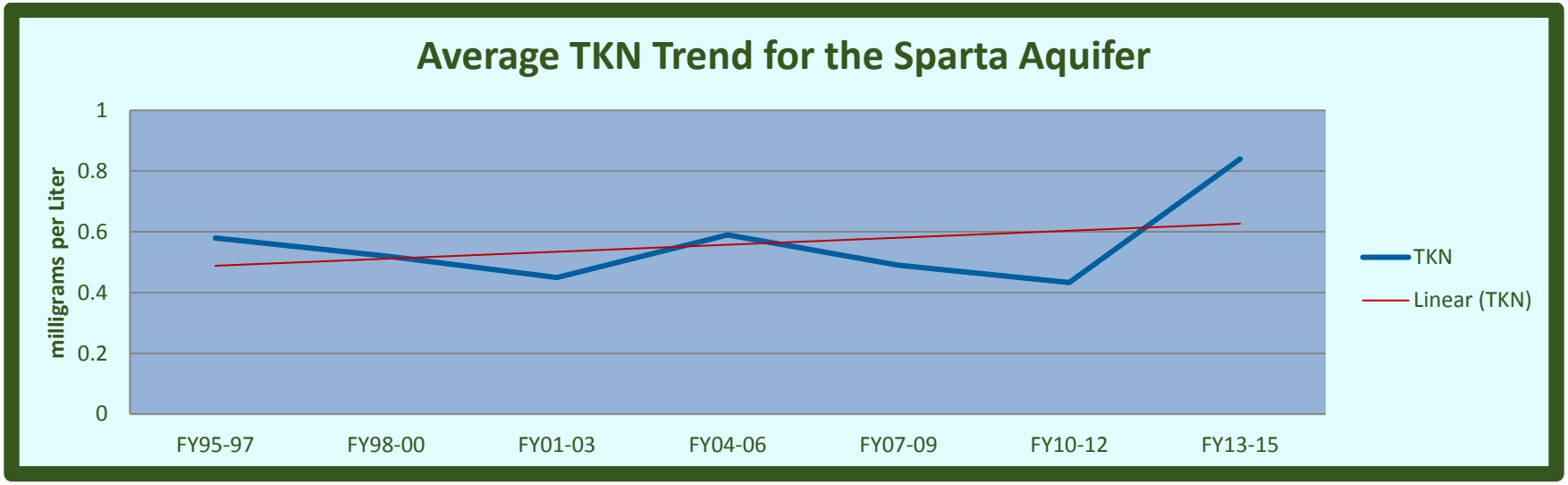

Chart 1-15: Total Phosphorus Trend

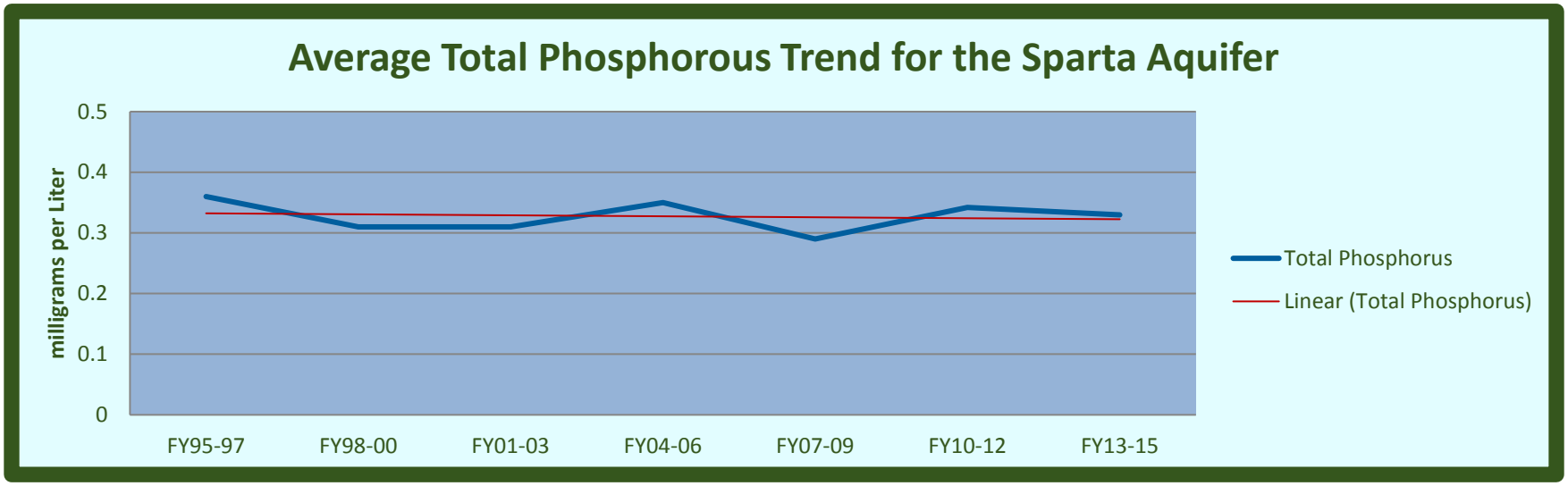

Chart 1-16: Iron Trend