EVANGELINE EQUIVALENT AQUIFER SYSTEM SUMMARY, 2015

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ LOUISIANA

APPENDIX 13 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 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 will 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 Evangeline Equivalent aquifer system during the 2015 state fiscal year (July 1, 2014 - June 30, 2015). This summary will become Appendix 13 to the ASSET Program Triennial Summary Report for 2015.

These data show that in February, March, and April of 2015, 15 wells were sampled which produce from the Evangeline Equivalent aquifer system. Seven of the wells are classified as public supply, while four are classified as domestic. Three wells are classified as industrial and one classified as irrigation. The wells are located in 11 parishes in southeast Louisiana.

Figure 13-1 shows the geographic locations of the Evangeline Equivalent aquifer system and the associated wells, whereas Table 13-1 lists the wells in the aquifer along with their total depths, use made of produced waters and date sampled.

Well data, including well location, aquifer assignment, and well use classification for registered water wells were obtained from the Louisiana Department of Natural Resources' water well registration data file.

GEOLOGY

The Evangeline Equivalent aquifer system is composed of the Pliocene aged aquifers of the Baton Rouge area and St. Tammany, Tangipahoa, and Washington Parishes. These Pliocene sediments outcrop in southwestern Mississippi. The sedimentary sequences that make up the aquifer system are subdivided into several aquifer units separated by confining beds.

Northward within southeast Louisiana, fewer units are recognized because some younger units pinch out updip and some clay layers present to the south disappear. Where clay layers are discontinuous or disappear, aquifer units coalesce. The aquifers consist of moderately to well sorted, fine to medium grained sands, with interbedded coarse sand, silt, and clay.

HYDROGEOLOGY

The deposits that constitute the individual aquifers are not readily differentiated at the surface and act as one hydraulic system that can be subdivided into several hydrologic zones in the subsurface. A zone or ridge of saline water occurs within the Pliocene sediments beneath the Mississippi River alluvial valley. Recharge occurs primarily by the direct infiltration of rainfall in interstream, upland outcrop areas, and by the movement of water between aquifers.

The hydraulic conductivity varies between 10-200 feet/day. The maximum depths of occurrence of freshwater in the Evangeline Equivalent range from 0 to 2,500 feet below sea level. The range of thickness of the fresh water interval in the Evangeline Equivalent is 50 to 1,500 feet. The depths of the Evangeline Equivalent wells that were monitored in conjunction with the ASSET Program range from 185 to 1,900 feet below ground surface.

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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 13-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 13-3. These tables also show the field and analytical results determined for each analyte. For quality control, duplicate samples were taken for each parameter at AV-680, TA-284, and WA-241.

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 13-8, 13-9 and 13-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 13-4 and 13-5 provide a statistical overview of field and conventional data, and inorganic data for the Evangeline Equivalent aquifer system, listing the minimum, maximum, and average results for these parameters collected in the FY 2015 sampling. Tables 13-6 and 13-7 compare these same parameter averages to historical ASSET-derived data for the Evangeline Equivalent aquifer system, from fiscal years 1997, 2000, 2003, 2006, 2009, and 2011.

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 determined to be < 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 13-2, 13-3, 13-4, and 13-5, respectively, represent the contoured data for pH, total dissolved solids, chloride and iron. Charts 13-1 through 13-16 represent the trend of the graphed parameter, based on the averaged value of that parameter for each three-year reporting period. Discussion of historical data and related trends is found in the **Water Quality Trends and Comparison to Historical ASSET Data** section.

INTERPRETATION OF DATA

Under the Federal Safe Drinking Water Act, EPA has established maximum contaminant levels (MCLs) for pollutants that may pose a health risk in public drinking water. An MCL is the highest level of a contaminant that EPA allows in public drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. While not all wells sampled were public supply wells, the ASSET Program uses the MCLs as a benchmark for further evaluation.

EPA has set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 13-2 and 13-3 show that 10 secondary MCLs (SMCL) were exceeded in nine of the wells sampled in the Evangeline Equivalent aquifer.

Field and Conventional Parameters

Table 13-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 13-4 provides an overview of this data for the Evangeline Equivalent aquifer system, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 13-2 shows that no MCL was exceeded for field or conventional parameters for this reporting period. Any ASSET well reporting turbidity levels greater than 1.0 NTU does 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 13-2 shows that seven wells exceeded the SMCL for pH and one well exceeded the SMCL for Color. Laboratory results take precedence over field results in total dissolved solids (TDS) exceedance determinations, thus only laboratory results are counted in determining SMCL exceedance numbers for TDS. Following is a list of SMCL exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 Standard Units):

EB-1003 – 8.81 SU
ST-532 – 8.94 SU
WA-241 – 5.42 SU (Original and Duplicate)
WF-DELEE – 5.78 SU
LI-299 – 8.76 SU
TA-286 – 5.95 SU
WBR-181 – 9.14 SU

Color (SMCL = 15 PCU):

ST-6711Z – 40 PCU

Inorganic Parameters

Table 13-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 13-5 provides an overview of inorganic data for the Evangeline Equivalent aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 13-3 shows that no MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 13-3 shows that 2 wells exceeded the SMCL for iron:

Iron (SMCL = 300 µg/L):

WA-241 – 1,710 µg/L, Duplicate – 1,720 µg/L   WA-5210Z – 605 µg/L

Volatile Organic Compounds

Table 13-8 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 confirmed VOC detections at or above its detection limit during the FY 2015 sampling of the Evangeline Equivalent aquifer.

Semi-Volatile Organic Compounds

Table 13-9 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 were no confirmed SVOC detections at or above its detection limit during the FY 2015 sampling of the Evangeline Equivalent aquifer.

Pesticides and PCBs

Table 13-10 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 were no confirmed Pesticide or PCB detections at or above its detection limit during the FY 2015 sampling of the Evangeline Equivalent 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 Evangeline Equivalent 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 13-6 and 13-7, and in Charts 13-1 to 13-16 of this summary.

Over the eighteen-year period three analytes, alkalinity, barium, and nitrite-nitrate have shown a general increase in average concentration. For this same period, eight analytes have demonstrated a decrease in average concentration, they are: chloride, color, iron, specific conductance (field and lab), temperature, total dissolved solids, TKN, and zinc. The remaining analytes were non-detect, or have been consistent with only minor fluctuations over the eighteen year period. The number of secondary exceedances in the Evangeline Equivalent aquifer system has decreased from 16 exceedances in FY 2012, to 10 exceedances in FY 2015.

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 2015 monitoring of the Evangeline Equivalent aquifer system exceeded an MCL. The data also show that this aquifer is of good quality when considering taste, odor, or appearance guidelines, with only 10 SMCLs exceedances in nine wells.

Comparison to historical ASSET-derived data shows only slight change in the quality or characteristics of the Evangeline Equivalent aquifer system, with three parameters showing consistent increases in concentration and eight decreasing in concentration over the previous 18 years.

It is recommended that the wells assigned to the Evangeline Equivalent aquifer system be re-sampled as planned, in approximately three years. In addition, several wells should be added to the 15 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 13-1: List of Wells Sampled–FY 2015
Evangeline Equivalent Aquifer System

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
AV-680	Avoyelles	4/1/2015	Avoyelles Water Commission	553	Public Supply
EB-1003	East Baton Rouge	2/19/2015	Baton Rouge Water Works	1,430	Public Supply
EF-MILEY	East Feliciana	2/11/2015	Private Owner	185	Domestic
LI-299	Livingston	2/19/2015	Ward 2 Water District	1,417	Public Supply
PC-325	Pointe Coupee	2/11/2015	Alma Plantation LTD	1,252	Industrial
SL-679	St. Landry	2/18/2015	Alon USA	1,152	Industrial
ST-532	St. Tammany	2/12/2015	Northlake Hospital	1,520	Public Supply
ST-6711Z	St. Tammany	4/2/2015	Private Owner	860	Domestic
TA-284	Tangipahoa	2/5/2015	City of Ponchatoula	608	Public Supply
TA-286	Tangipahoa	2/3/2015	Town of Kentwood	640	Public Supply
TA-10046Z	Tangipahoa	4/2/2015	Highway 51 MHP	590	Public Supply
WA-241	Washington	2/9/2015	Private Owner	400	Irrigation
WA-5210Z	Washington	2/5/2015	Private Owner	752	Domestic
WBR-181	West Baton Rouge	2/19/2015	Port of Greater Baton Rouge	1,900	Industrial
WF-DELEE	West Feliciana	3/31/2015	Private Owner	240	Domestic

Table 13-2: Summary of Field and Conventional Data–FY 2015
Evangeline Equivalent Aquifer System

Well ID	pH SU	Sal. ppt	Sp. Cond. mmhos/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. umhos/cm	SO4 mg/L	TDS mg/L	TKN mg/L	TSS mg/L	Turb. mg/L
	LABORATORY REPORTING LIMITS →					2	1	5	5	0.05	0.1	0.05	1	1	10	0.1	4	0.1
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AV-680	7.76	0.21	0.431	22.19	0.280	248	16.5	5	12	< DL	0.60	0.19	319	5.4	265	1.40	< DL	0.2
AV-680*	7.76	0.21	0.431	22.19	0.280	248	16.6	10	12	< DL	0.60	0.16	317	5.4	265	1.40	< DL	0.2
EB-1003	8.81	0.14	0.290	26.37	0.189	251	3.4	< DL	< DL	< DL	0.15	0.26	‡	9.3	145	0.42	< DL	0.2
EF-MILEY	7.44	0.03	0.063	18.51	0.041	20	3.8	< DL	10	0.25	< DL	< DL	55	< DL	85	0.32	< DL	0.4
LI-299	8.76	0.13	0.273	24.42	0.178	251	3.6	< DL	< DL	0.09	0.15	0.72	‡	8.1	155	0.58	< DL	0.6
PC-325	8.03	0.14	0.292	24.89	0.190	132	3.9	< DL	10	0.23	0.13	0.36	284	8.8	210	0.61	< DL	0.4
SL-679	7.78	0.17	0.363	25.68	0.236	272	3.6	< DL	< DL	0.21	0.27	0.36	319	11.1	165	0.66	6	0.3
ST-532	8.94	0.16	0.341	23.02	0.222	152	3.1	< DL	< DL	0.24	< DL	0.36	323	12.1	245	0.51	< DL	0.3
ST-6711Z	7.73	0.33	0.673	20.90	0.438	338	16.6	40	< DL	< DL	0.56	0.42	502	2.6	425	1.50	< DL	0.2
TA-10046Z	7.97	0.04	0.094	21.27	0.061	32	3.9	5	18	0.05	0.42	0.08	65	1.8	100	1.00	< DL	0.2
TA-284	8.26	0.13	0.281	23.13	0.183	124	3.0	< DL	6	< DL	< DL	0.26	283	8.8	240	0.21	< DL	0.5
TA-284*	8.26	0.13	0.281	23.13	0.183	126	2.9	< DL	< DL	< DL	< DL	0.26	286	8.7	225	0.11	< DL	0.3
TA-286	5.95	0.03	0.059	20.30	0.038	16	2.5	< DL	30	< DL	< DL	< DL	54	2.9	60	< DL	6	0.3
WA-241	5.42	0.04	0.090	19.62	0.059	21	3.3	< DL	20	< DL	0.10	0.06	84	9.8	45	0.13	< DL	6.0
WA-241*	5.42	0.04	0.090	19.62	0.059	23	3.4	< DL	20	< DL	< DL	0.06	82	9.6	25	0.32	< DL	2.9
WA-5210Z	7.88	0.07	0.160	21.46	0.104	62	3.2	< DL	48	< DL	< DL	0.23	158	8.7	165	0.29	< DL	0.2
WBR-181	9.14	0.14	0.300	23.73	0.195	376	2.9	< DL	< DL	0.21	0.48	0.31	257	9.0	160	0.46	< DL	0.3
WF-DELEE	5.78	0.04	0.088	19.53	0.057	19	9.5	5	16	0.95	0.27	0.07	86	< DL	120	1.10	< DL	0.2

*Denotes Duplicate Sample ‡ Data Not Reported from Lab Shaded cells exceed EPA Secondary Standards

Table 13-3: Summary of Inorganic Data–FY 2015
Evangeline Equivalent Aquifer System

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 Reporting Limits†	1	1	1	0.05/1	1	1	5	100	1	0.05	1	1	1	1	5
AV-680	< DL	< DL	77	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	44.2
AV-680*	< DL	< DL	80	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
EB-1003	< DL	< DL	16	< DL	< DL	< DL	6.9	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
EF-MILEY	< DL	< DL	79	< DL	< DL	< DL	108.0	< DL	3.1	< DL	1.10	< DL	< DL	< DL	51.2
LI-299	< DL	< DL	5	< DL	< DL	< DL	16.3	60	2.4	< DL	1.30	< DL	< DL	< DL	35.6
PC-325	< DL	< DL	6	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SL-679	< DL	< DL	15	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
ST-532	< DL	< DL	5	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
ST-6711Z	< DL	< DL	11	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
TA-10046Z	< DL	< DL	69	< DL	< DL	1.1	3.2	< DL	< DL	< DL	< DL	< DL	< DL	< DL	50.9
TA-284	< DL	< DL	16	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
TA-284*	< DL	< DL	16	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
TA-286	< DL	< DL	60	< DL	< DL	< DL	3.5	< DL	< DL	< DL	< DL	< DL	< DL	< DL	5.1
WA-241	< DL	< DL	82	< DL	< DL	< DL	21.8	1,710	3.4	< DL	9.80	< DL	< DL	< DL	72.3
WA-241*	< DL	< DL	82	< DL	< DL	< DL	7.6	1,720	1.2	< DL	6.00	< DL	< DL	< DL	39.4
WA-5210Z	< DL	< DL	66	< DL	< DL	< DL	< DL	605	< DL	< DL	< DL	< DL	< DL	< DL	< DL
WBR-181	< DL	< DL	2	< DL	< DL	< DL	11.9	54	1.0	< DL	< DL	< DL	< DL	< DL	< DL
WF-DELEE	< DL	< DL	39	< DL	< DL	< DL	< DL	247	< DL	< DL	< DL	< DL	< DL	< DL	53.4

*Denotes Duplicate Sample

Shaded cells exceed EPA Secondary Standards

Table 13-4: FY 2015 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	pH (SU)	5.42	9.14	7.62
	Salinity (ppt)	0.03	0.33	0.12
	Specific Conductance (mmhos/cm)	0.059	0.673	0.256
	Temperature (^{O}C)	18.51	26.37	22.22
	TDS (g/L)	0.038	0.438	0.166
LABORATORY	Alkalinity (mg/L)	16	376	150
	Chloride (mg/L)	2.5	16.6	5.9
	Color (PCU)	< DL	40	5
	Hardness (mg/L)	< DL	48	12
	Nitrite - Nitrate, as N (mg/L)	< DL	0.95	0.14
	Ammonia, as N (mg/L)	< DL	0.60	0.23
	Total Phosphorus (mg/L)	< DL	0.72	0.23
	Specific Conductance (µmhos/cm)	54	502	217
	Sulfate (mg/L)	< DL	12.1	6.8
	TDS (mg/L)	25	425	172
	TKN (mg/L)	< DL	1.50	0.62
	TSS (mg/L)	< DL	6	< DL
	Turbidity (NTU)	0.2	6.0	0.8

Table 13-5: FY 2015 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (µg/L)	< DL	< DL	< DL
Arsenic (µg/L)	< DL	< DL	< DL
Barium (µg/L)	1.9	81.9	40.3
Beryllium (µg/L)	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL
Chromium (µg/L)	< DL	1.1	< DL
Copper (µg/L)	< DL	108.0	10.8
Iron (µg/L)	< DL	1,720	261
Lead (µg/L)	< DL	3.4	1.0
Mercury (µg/L)	< DL	< DL	< DL
Nickel (µg/L)	< DL	9.80	1.40
Selenium (µg/L)	< DL	< DL	< DL
Silver (µg/L)	< DL	< DL	< DL
Thallium (µg/L)	< DL	< DL	< DL
Zinc (µg/L)	< DL	72.3	21.0

Table 13-6: Triennial Field and Conventional Statistics, ASSET Wells

	PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
		FY 1997	FY 2000	FY 2003	FY 2006	FY 2009	FY 2012	FY 2015
FIELD	pH (SU)	7.45	8.02	8.41	7.88	8.12	7.77	7.62
	Salinity (ppt)	0.14	0.12	0.12	0.13	0.12	0.12	0.12
	Specific Conductance (mmhos/cm)	0.330	0.240	0.270	0.280	0.260	0.250	0.256
	Temperature (^{O}C)	25.17	22.73	22.74	22.59	22.88	22.17	22.22
	Total dissolved solids (g/L)	-	-	-	0.180	0.170	0.160	0.166
LABORATORY	Alkalinity (mg/L)	125	110	118	120	126	112	150
	Chloride (mg/L)	13.7	8.3	7.3	11.8	8.4	6.8	5.9
	Color (PCU)	14.3	7.7	7.9	13.6	< DL	< DL	5
	Hardness (mg/L)	10	13	11	11	7	12	12
	Nitrite - Nitrate , as N (mg/L)	0.04	0.10	0.17	0.07	0.06	0.07	0.14
	Ammonia, as N (mg/L)	0.30	0.13	0.15	0.17	< DL	0.17	0.23
	Total Phosphorus (mg/L)	0.19	0.27	0.22	0.21	0.27	0.24	0.23
	Specific Conductance (umhos/cm)	277	250	237	269	248	249	217
	Sulfate (mg/L)	5.8	6.5	7.6	7.4	6.3	6.4	6.8
	Total dissolved solids (mg/L)	233	163	170	198	185	163	172
	TKN (mg/L)	1.14	0.27	0.24	0.23	0.35	< DL	0.62
	Total suspended solids (mg/L)	< DL	4.7	< DL	< DL	< DL	< DL	< DL
	Turbidity (NTU)	1.6	2.0	1.3	< DL	< DL	0.2	0.8

Table 13-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
	FY 1997	FY 2000	FY 2003	FY 2006	FY 2009	FY 2012	FY 2015
Antimony (µg/L)	11.5	< DL	< DL	< DL	< DL	< DL	< DL
Arsenic (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Barium (µg/L)	29.1	41.0	39.9	47.8	39.3	40.8	40.3
Beryllium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Chromium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Copper (µg/L)	12.9	9.0	6.7	< DL	< DL	6.2	10.8
Iron (µg/L)	331	943	204	265	174	152	261
Lead (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	1.0
Mercury (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Nickel (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	1.40
Selenium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Silver (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Thallium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Zinc (µg/L)	141.6	178.0	11.8	< DL	< DL	6.0	21.0

Table 13-8: VOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (µg/L)
1,1,1-TRICHLOROETHANE	624	0.50
1,1,2,2-TETRACHLOROETHANE	624	0.50
1,1,2-TRICHLOROETHANE	624	0.50
1,1-DICHLOROETHANE	624	0.50
1,1-DICHLOROETHENE	624	0.50
1,2-DICHLOROBENZENE	624	0.50
1,2-DICHLOROETHANE	624	0.50
1,2-DICHLOROPROPANE	624	0.50
1,3-DICHLOROBENZENE	624	0.50
1,4-DICHLOROBENZENE	624	0.50
BENZENE	624	0.50
BROMODICHLOROMETHANE	624	0.50
BROMOFORM	624	0.50
BROMOMETHANE	624	0.50
CARBON TETRACHLORIDE	624	0.50
CHLOROBENZENE	624	0.50
CHLOROETHANE	624	0.50
CHLOROFORM	624	0.50
CHLOROMETHANE	624	0.50
CIS-1,3-DICHLOROPROPENE	624	0.50
DIBROMOCHLOROMETHANE	624	0.50
ETHYL BENZENE	624	0.50
METHYLENE CHLORIDE	624	0.50
O-XYLENE (1,2-DIMETHYLBENZENE)	624	1.0
STYRENE	624	1.0
TERT-BUTYL METHYL ETHER	624	0.50
TETRACHLOROETHYLENE (PCE)	624	0.50
TOLUENE	624	0.50
TRANS-1,2-DICHLOROETHENE	624	0.50
TRANS-1,3-DICHLOROPROPENE	624	0.50
TRICHLOROETHYLENE (TCE)	624	0.50
TRICHLOROFLUOROMETHANE (FREON-11)	624	0.50
VINYL CHLORIDE	624	0.50
XYLENES, M & P	624	2.0

Table 13-9: SVOC Analytical Parameters

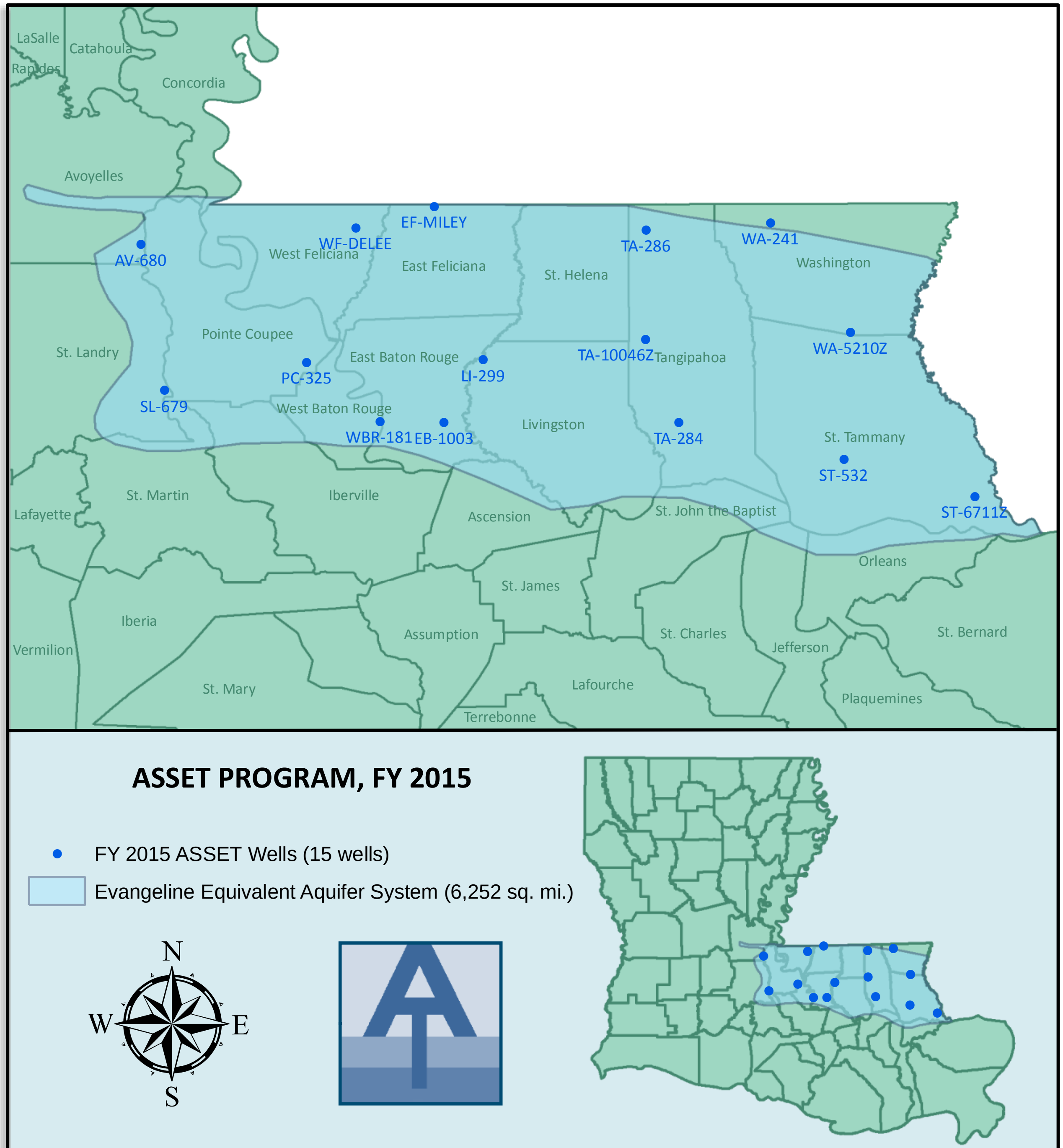
COMPOUND	METHOD	DETECTION LIMIT (µg/L)
1,2,3-TRICHLOROBENZENE	624	1.0
1,2,4-TRICHLOROBENZENE	625	10.0
2,4,6-TRICHLOROPHENOL	625	10.0
2,4-DICHLOROPHENOL	625	10.0
2,4-DIMETHYLPHENOL	625	10.0
2,4-DINITROPHENOL	625	10.0
2,4-DINITROTOLUENE	625	10.0
2,6-DINITROTOLUENE	625	10.0
2-CHLORONAPHTHALENE	625	10.0
2-CHLOROPHENOL	625	10.0
2-NITROPHENOL	625	10.0
3,3'-DICHLOROBENZIDINE	625	20.0
4,6-DINITRO-2-METHYLPHENOL	625	10.0
4-BROMOPHENYL PHENYL ETHER	625	10.0
4-CHLORO-3-METHYLPHENOL	625	10.0
4-CHLOROPHENYL PHENYL ETHER	625	10.0
4-NITROPHENOL	625	10.0
ACENAPHTHENE	625	10.0
ACENAPHTHYLENE	625	10.0
ANTHRACENE	625	10.0
BENZIDINE	625	30.0
BENZO(A)ANTHRACENE	625	10.0
BENZO(A)PYRENE	625	10.0
BENZO(B)FLUORANTHENE	625	10.0
BENZO(G,H,I)PERYLENE	625	10.0
BENZO(K)FLUORANTHENE	625	10.0
BENZYL BUTYL PHTHALATE	625	10.0
BIS(2-CHLOROETHOXY) METHANE	625	10.0
BIS(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER)	625	10.0
BIS(2-CHLOROISOPROPYL) ETHER	625	10.0
BIS(2-ETHYLHEXYL) PHTHALATE	625	10.0
CHRYSENE	625	10.0
DIBENZ(A,H)ANTHRACENE	625	10.0
DIETHYL PHTHALATE	625	10.0
DIMETHYL PHTHALATE	625	10.0
DI-N-BUTYL PHTHALATE	625	10.0
DI-N-OCTYLPHTHALATE	625	10.0

COMPOUND	METHOD	DETECTION LIMIT (µg/L)
FLUORANTHENE	625	10.0
FLUORENE	625	10.0
HEXACHLOROBENZENE	625	10.0
HEXACHLOROBUTADIENE	625	10.0
HEXACHLOROCYCLOPENTADIENE	625	10.0
HEXACHLOROETHANE	625	10.0
INDENO(1,2,3-C,D)PYRENE	625	10.0
ISOPHORONE	625	10.0
NAPHTHALENE	625	10.0
NITROBENZENE	625	10.0
N-NITROSODIMETHYLAMINE	625	10.0
N-NITROSODI-N-PROPYLAMINE	625	10.0
N-NITROSODIPHENYLAMINE	625	10.0
PENTACHLOROPHENOL	625	10.0
PHENANTHRENE	625	10.0
PHENOL	625	10.0
PYRENE	625	10.0

Table 13-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS (µg/L)
ALDRIN	608	0.050
ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	608	0.050
ALPHA ENDOSULFAN	608	0.050
ALPHA-CHLORDANE	608	0.050
BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	608	0.050
BETA ENDOSULFAN	608	0.10
CHLORDANE	608	0.50
DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	608	0.050
DIELDRIN	608	0.10
ENDOSULFAN SULFATE	608	0.10
ENDRIN	608	0.10
ENDRIN ALDEHYDE	608	0.10
ENDRIN KETONE	608	0.10
GAMMA-CHLORDANE	608	0.050
HEPTACHLOR	608	0.050
HEPTACHLOR EPOXIDE	608	0.050
METHOXYCHLOR	608	0.50
P,P'-DDD	608	0.10
P,P'-DDE	608	0.10
P,P'-DDT	608	0.10
PCB-1016 (AROCHLOR 1016)	608	1.0
PCB-1221 (AROCHLOR 1221)	608	1.0
PCB-1232 (AROCHLOR 1232)	608	1.0
PCB-1242 (AROCHLOR 1242)	608	1.0
PCB-1248 (AROCHLOR 1248)	608	1.0
PCB-1254 (AROCHLOR 1254)	608	1.0
PCB-1260 (AROCHLOR 1260)	608	1.0
TOXAPHENE	608	2.0

Figure 13-1: Location Plat, Evangeline Equivalent Aquifer System



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.

Figure 13-2: Map of pH Data

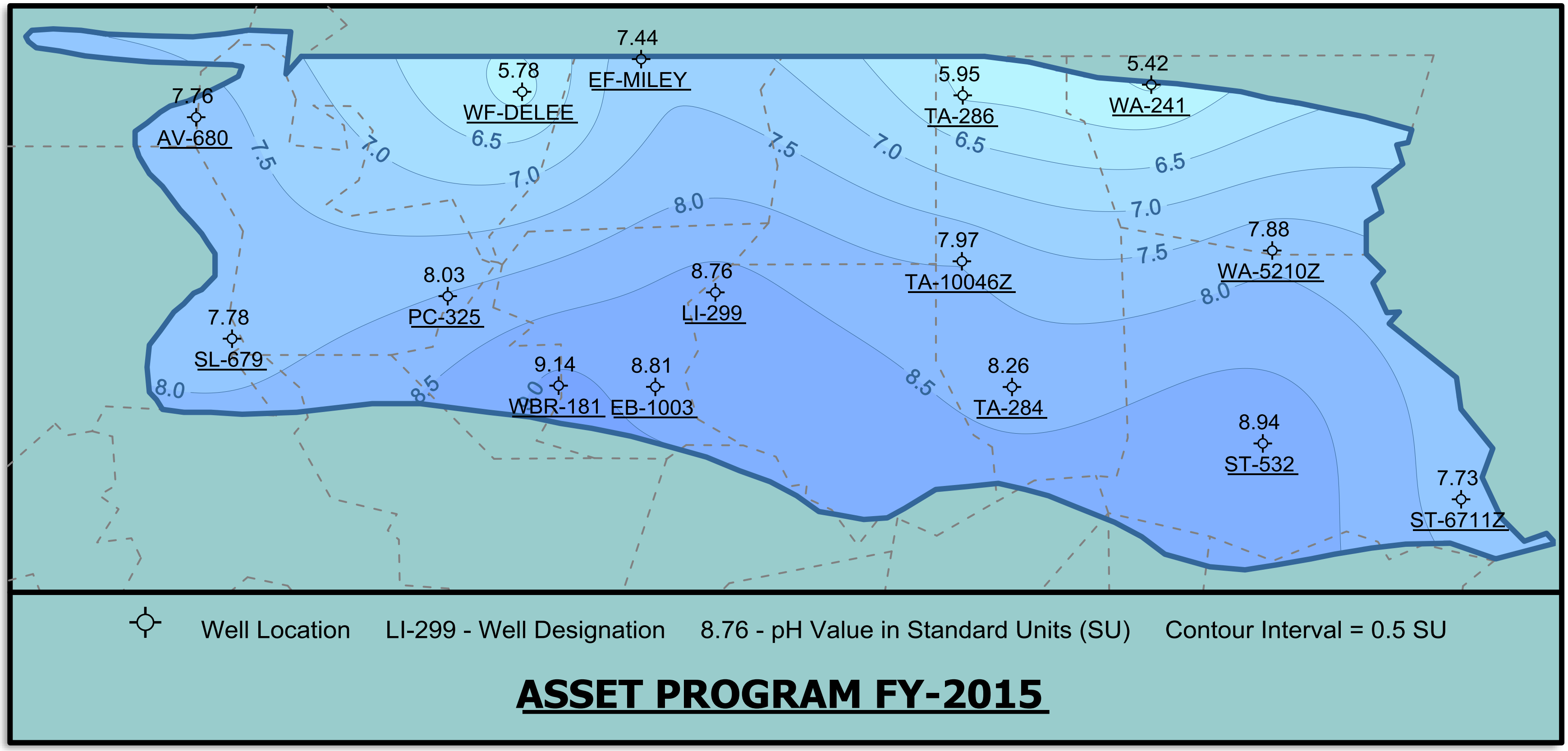


Figure 13-3: Map of TDS Lab Data

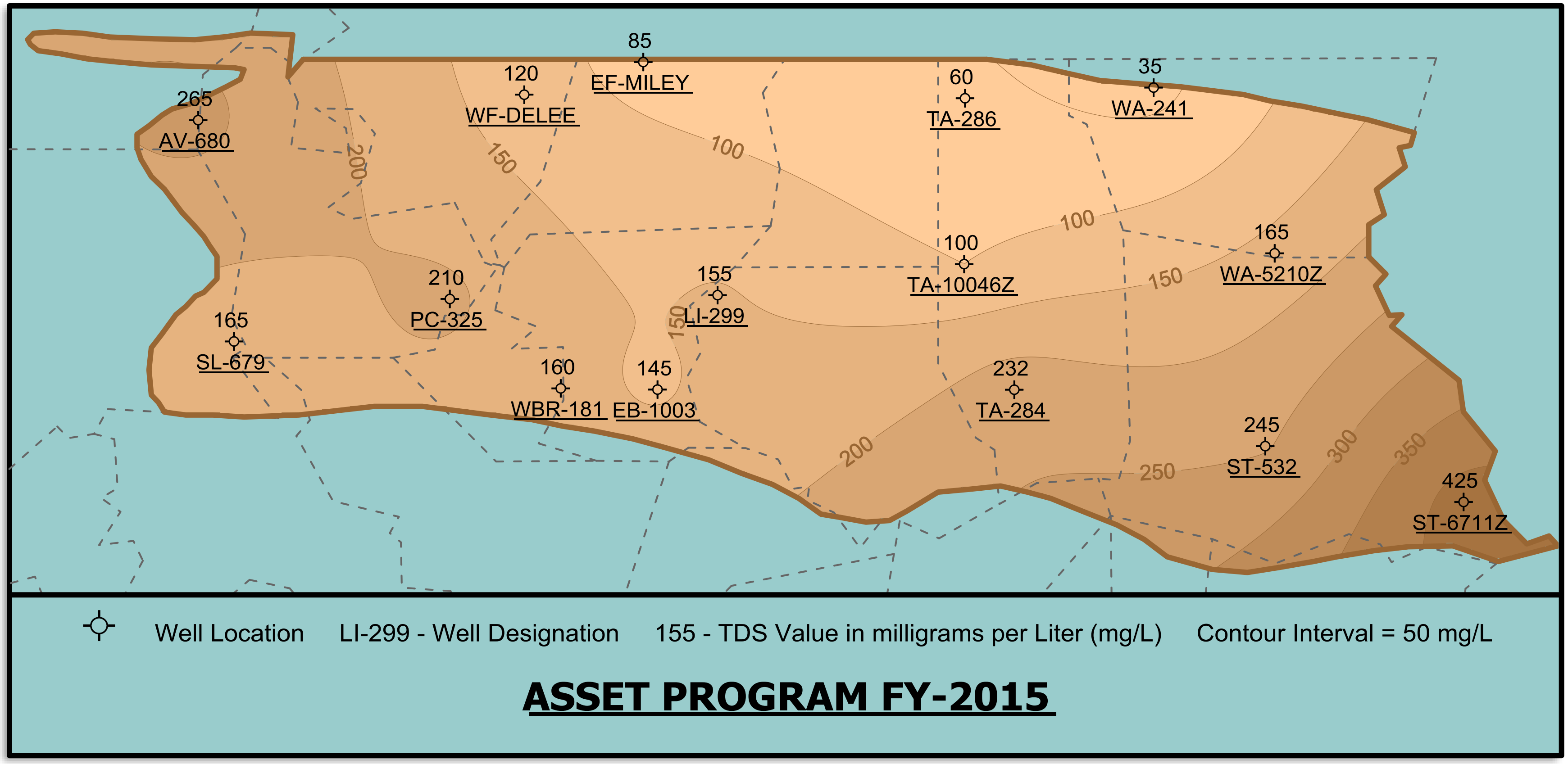


Figure 13-4: Map of Chloride Data

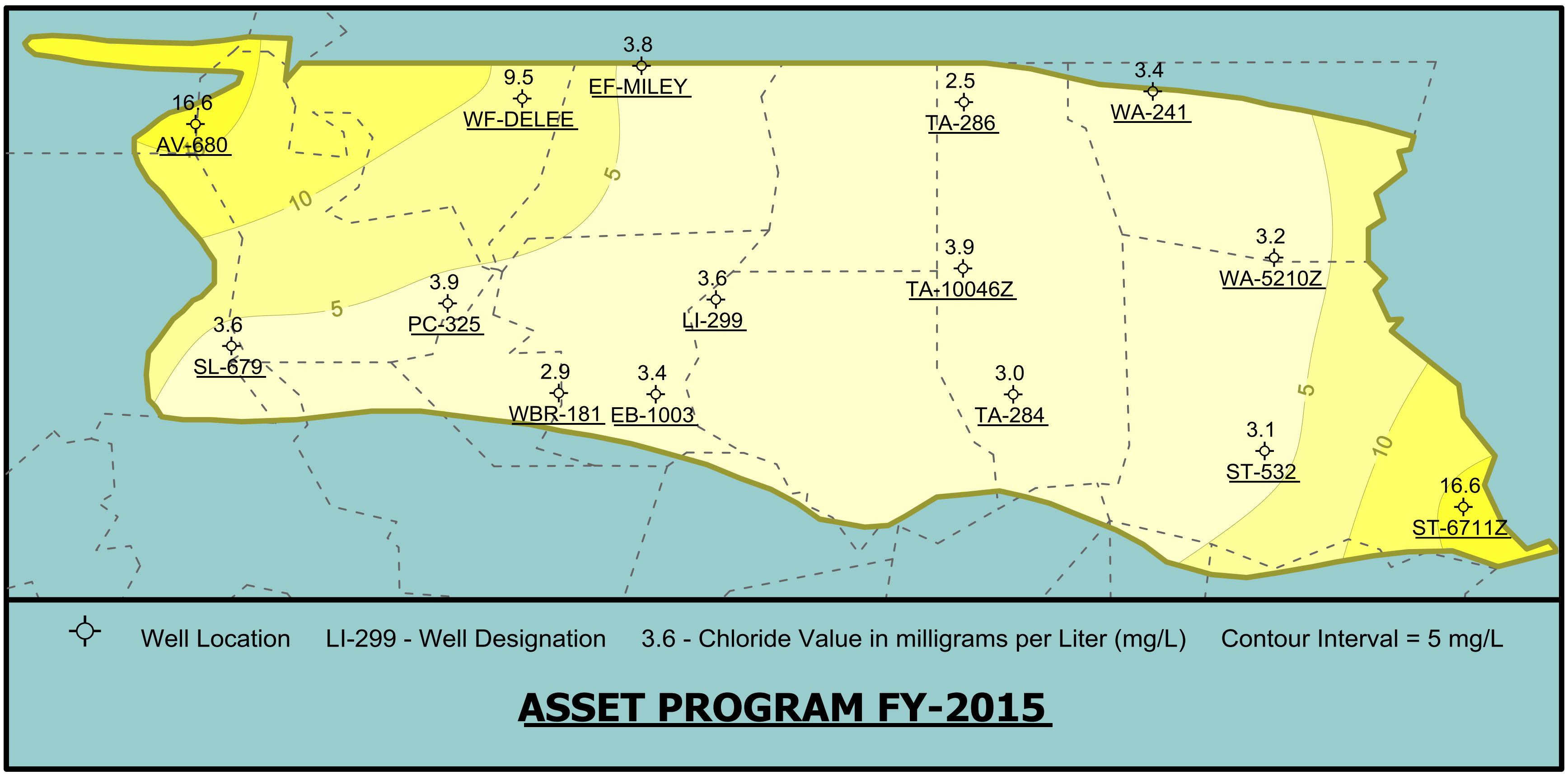


Figure 13-5: Map of Iron Data

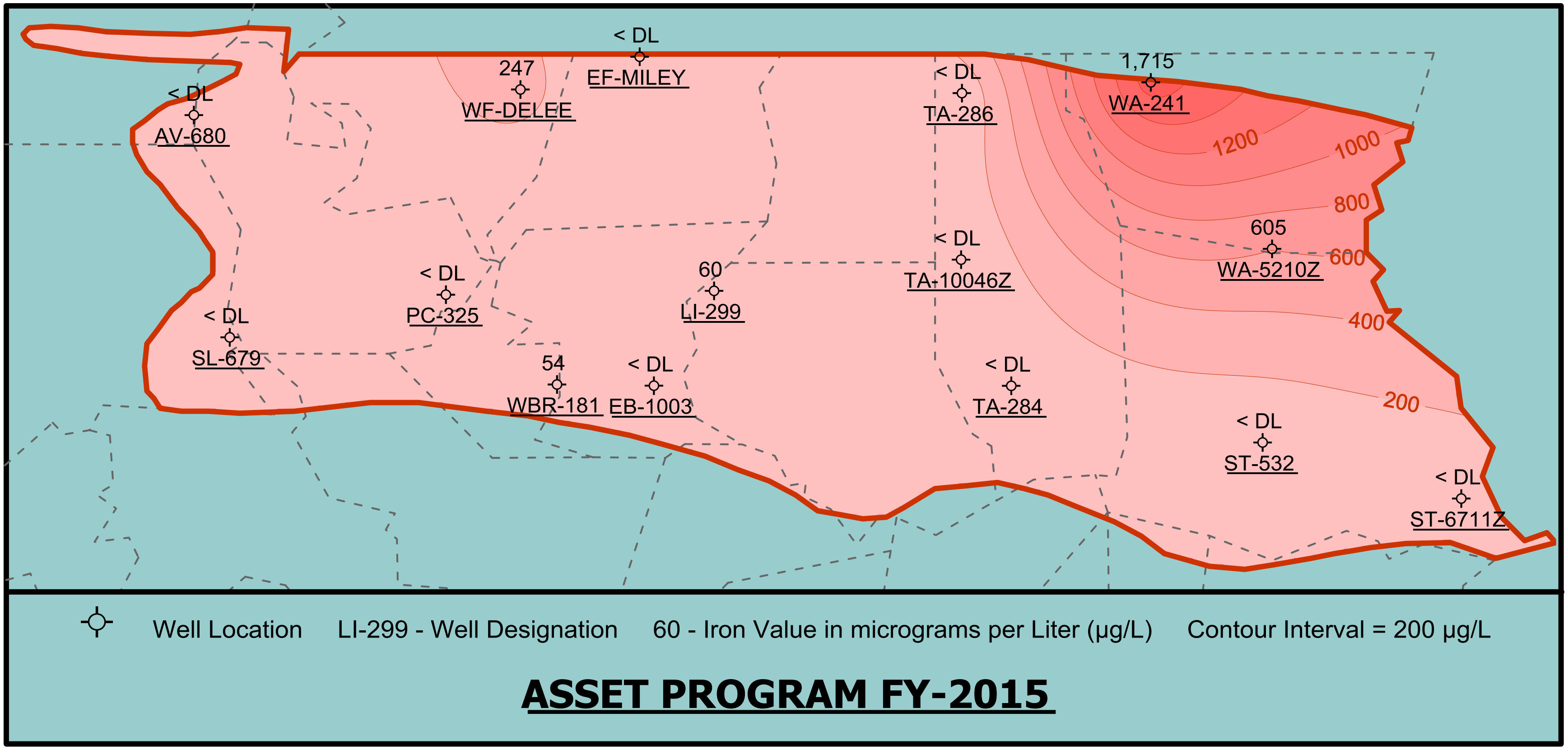


Chart 13-1: Temperature Trend

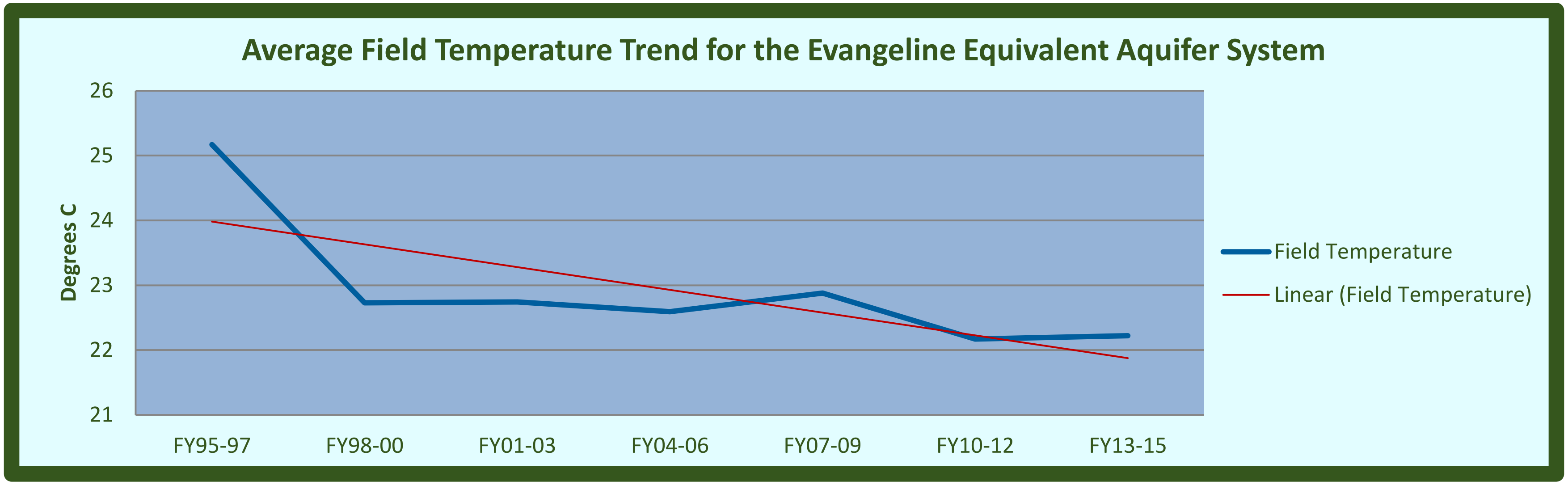


Chart 13-2: pH Trend

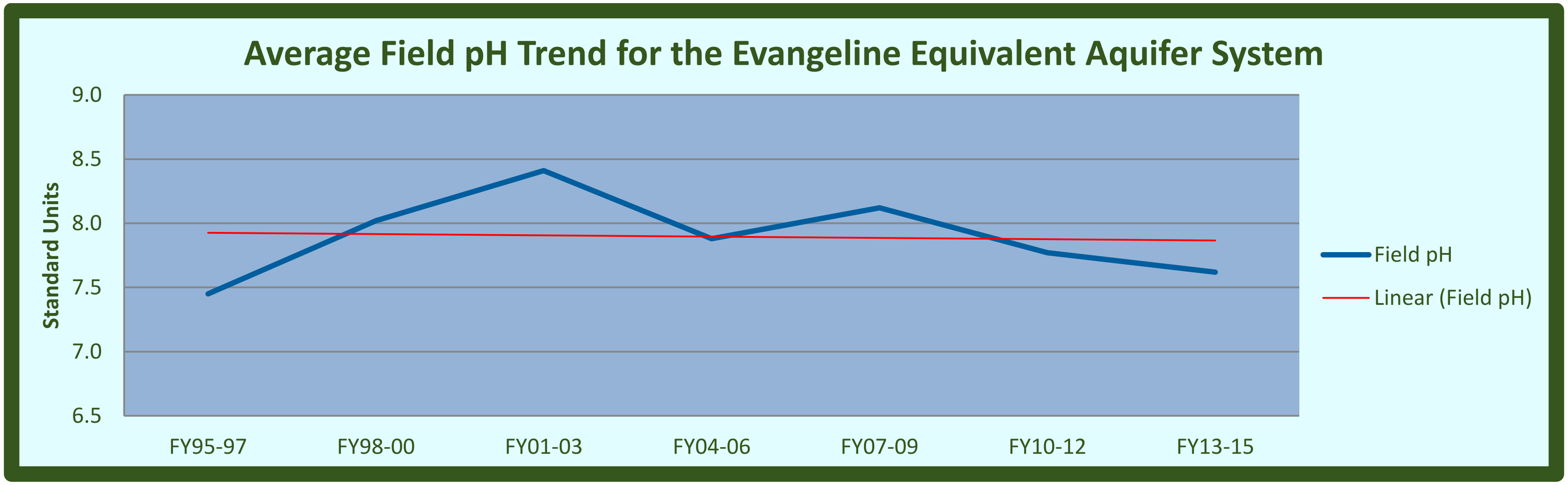


Chart 13-3: Field Specific Conductance Trend

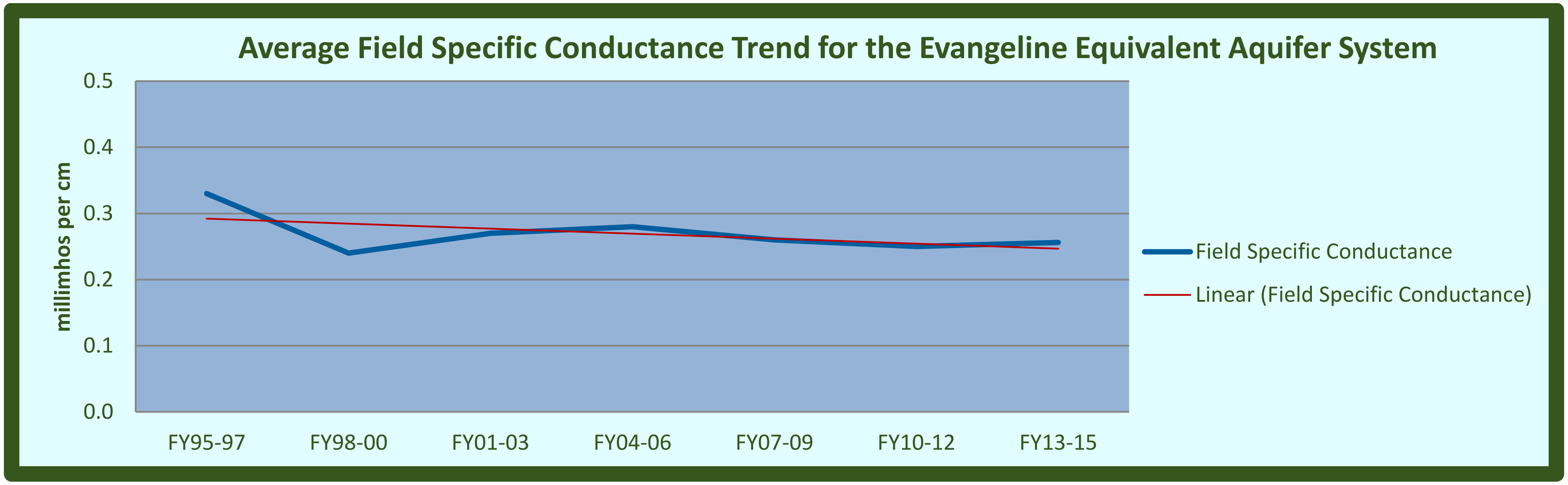


Chart 13-4: Lab Specific Conductance Trend

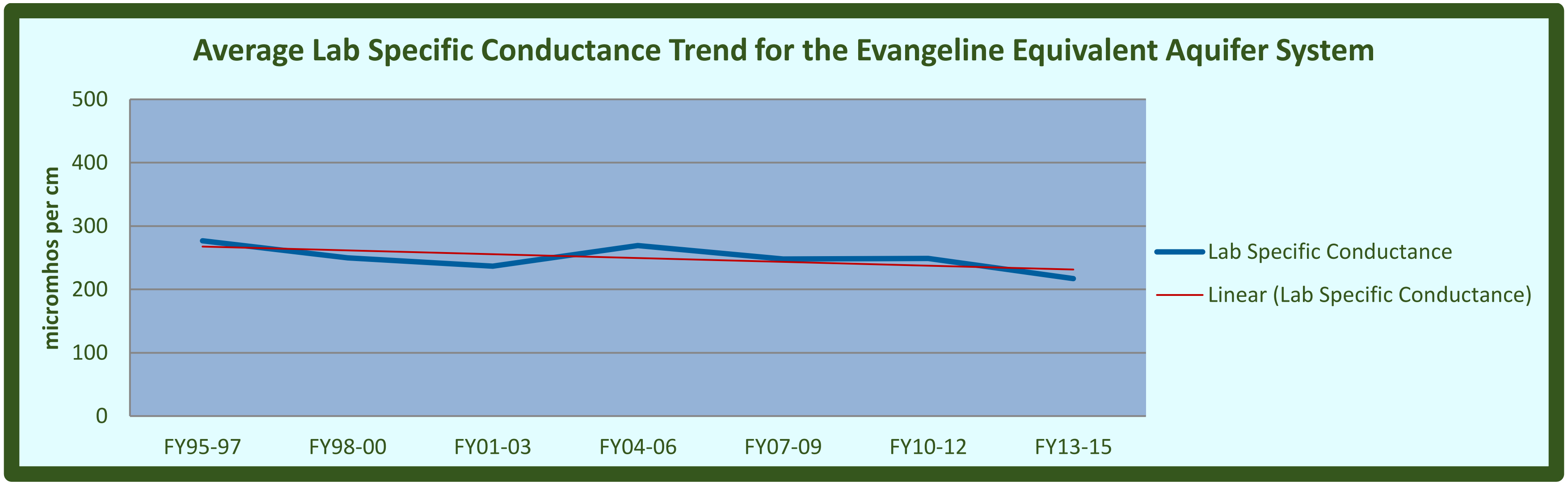


Chart 13-5: Field Salinity Trend

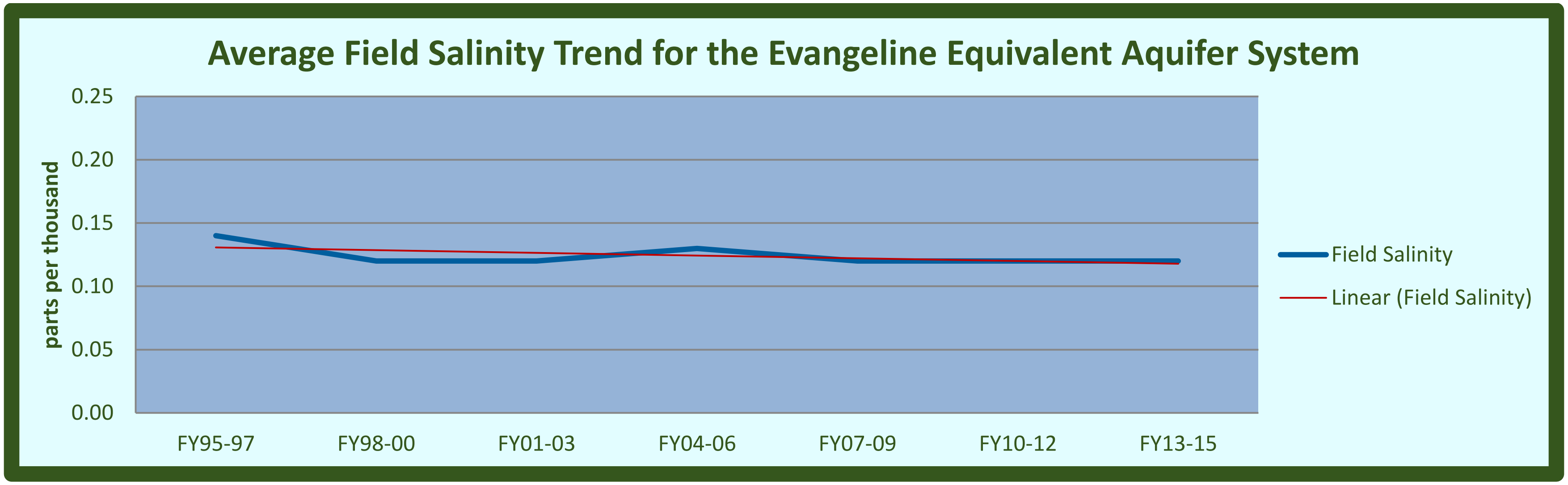


Chart 13-6: Chloride Trend

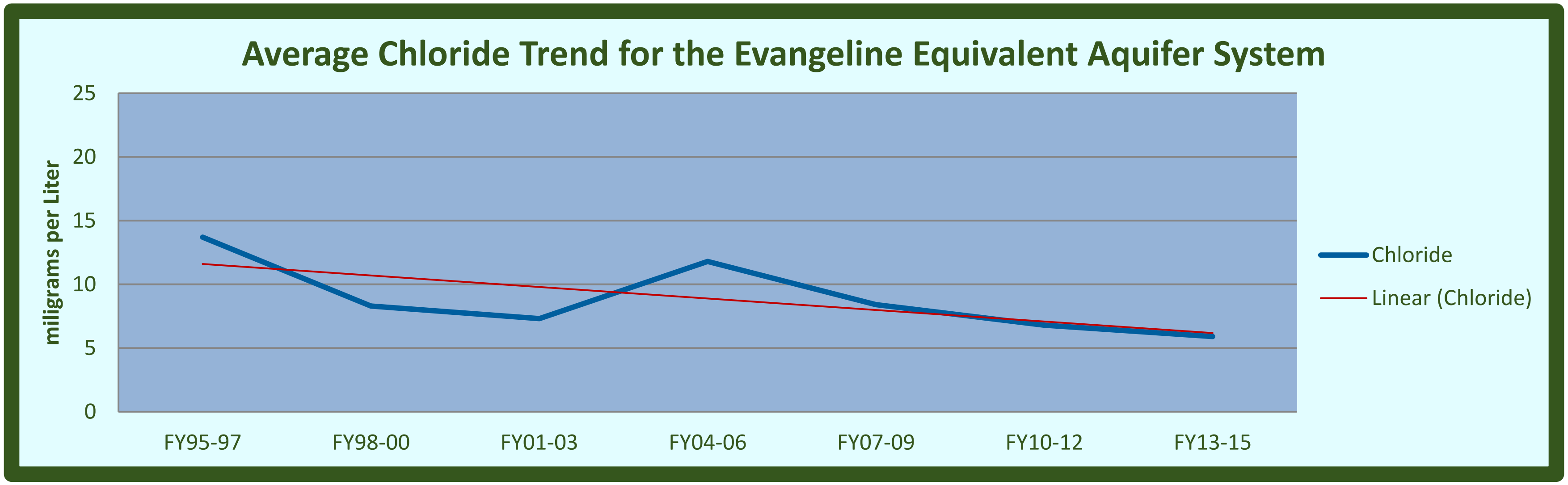


Chart 13-7: Alkalinity Trend

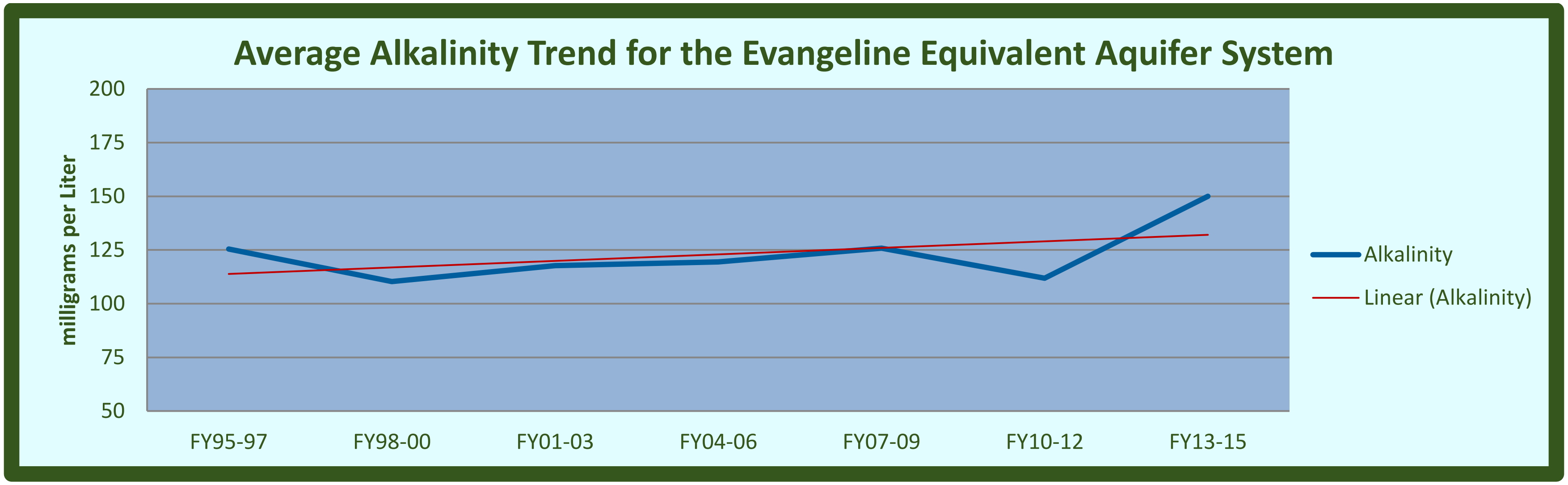


Chart 13-8: Color Trend

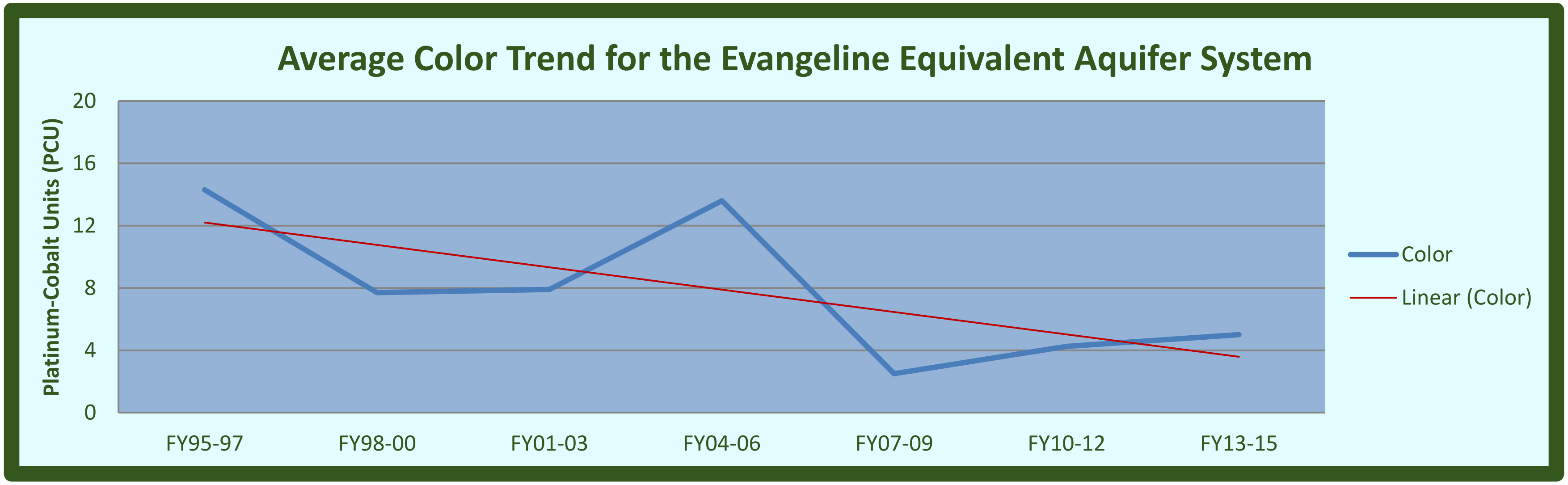


Chart 13-9: Sulfate Trend

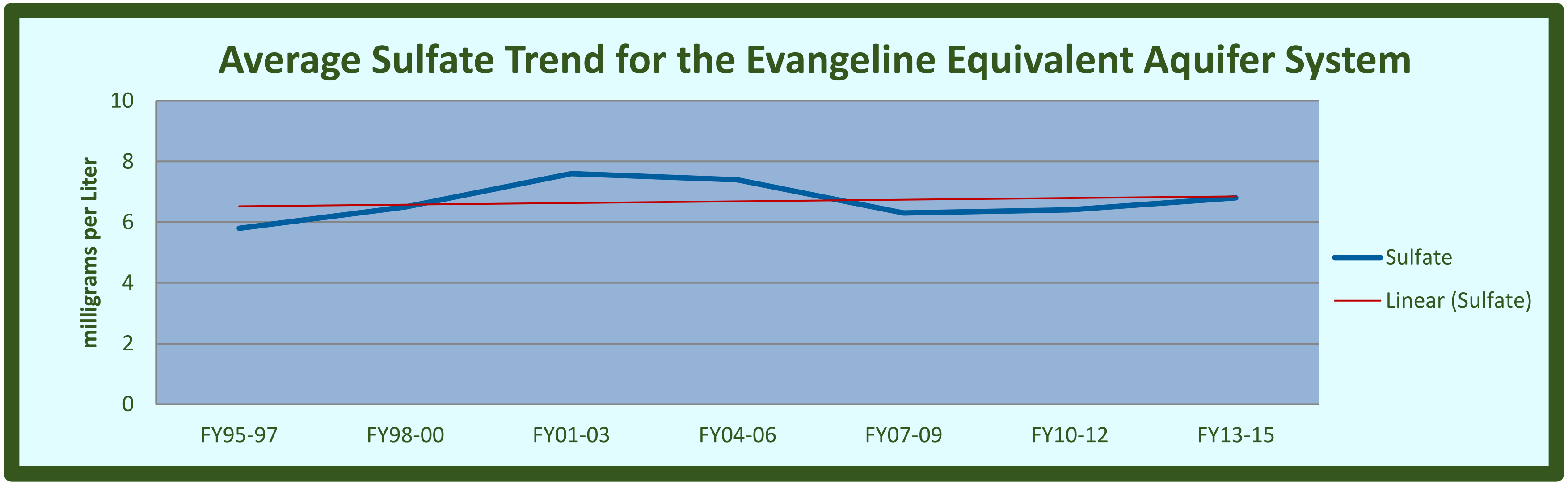


Chart 13-10: Total Dissolved Solids Trend

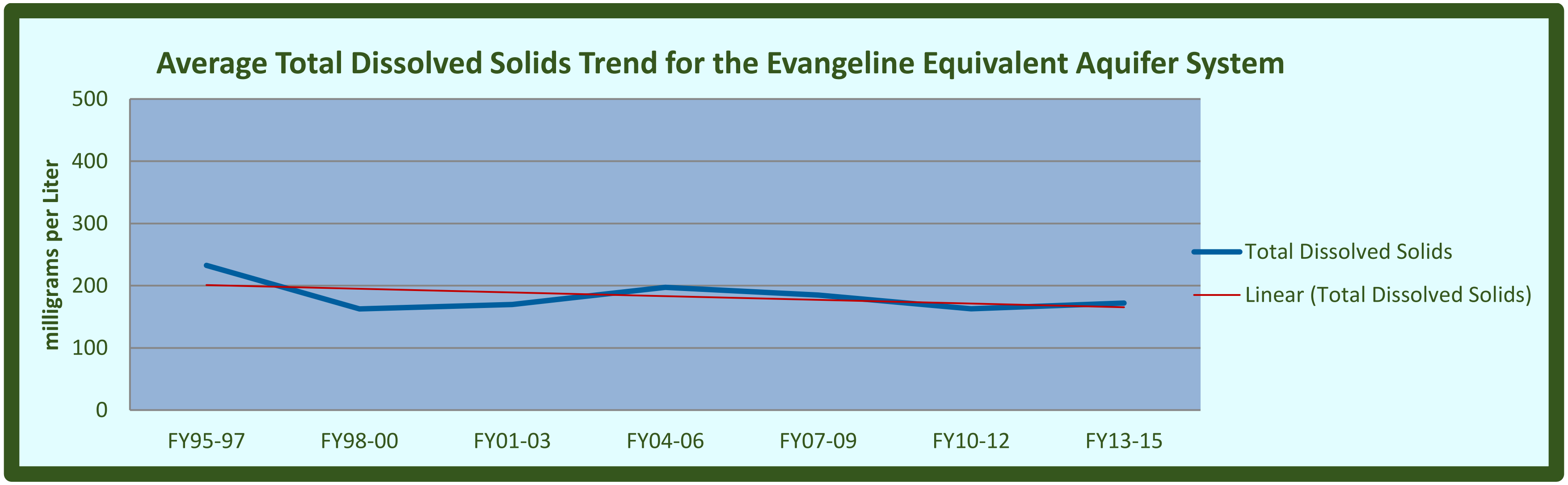


Chart 13-11: Hardness Trend

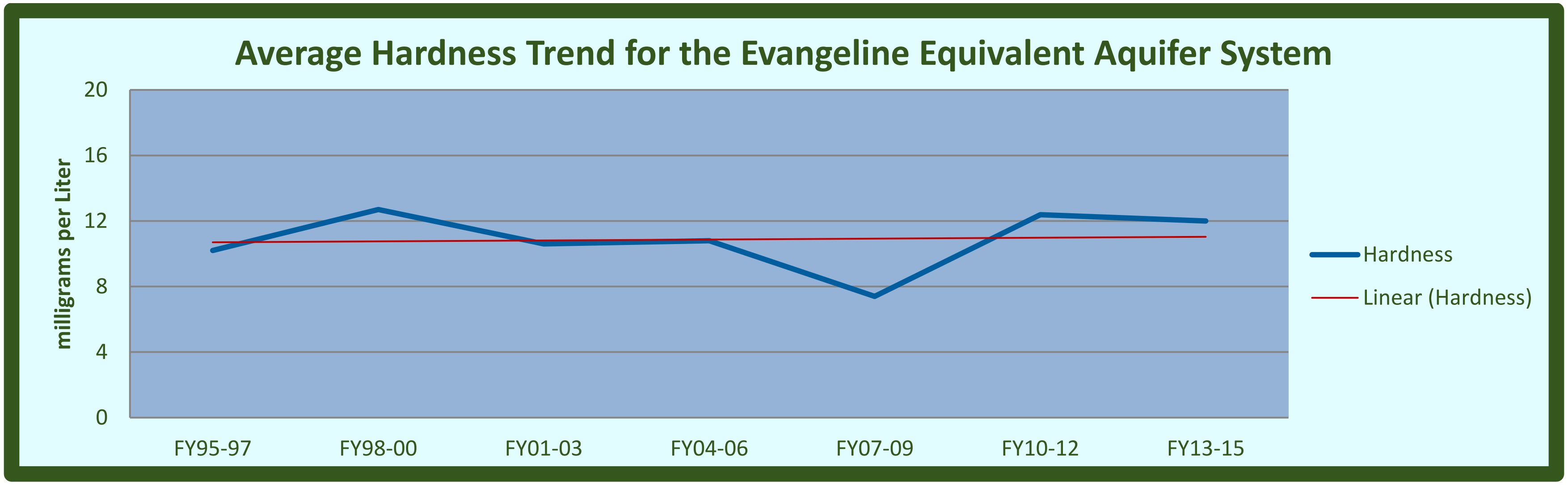


Chart 13-12: Ammonia Trend

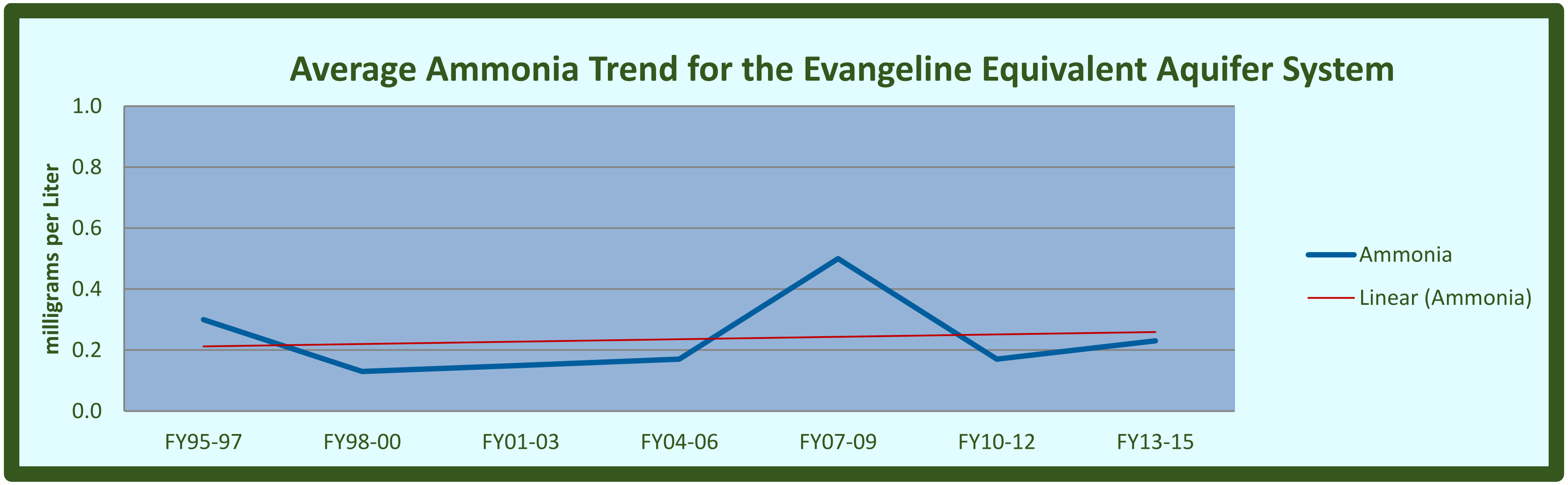


Chart 13-13: Nitrite – Nitrate Trend

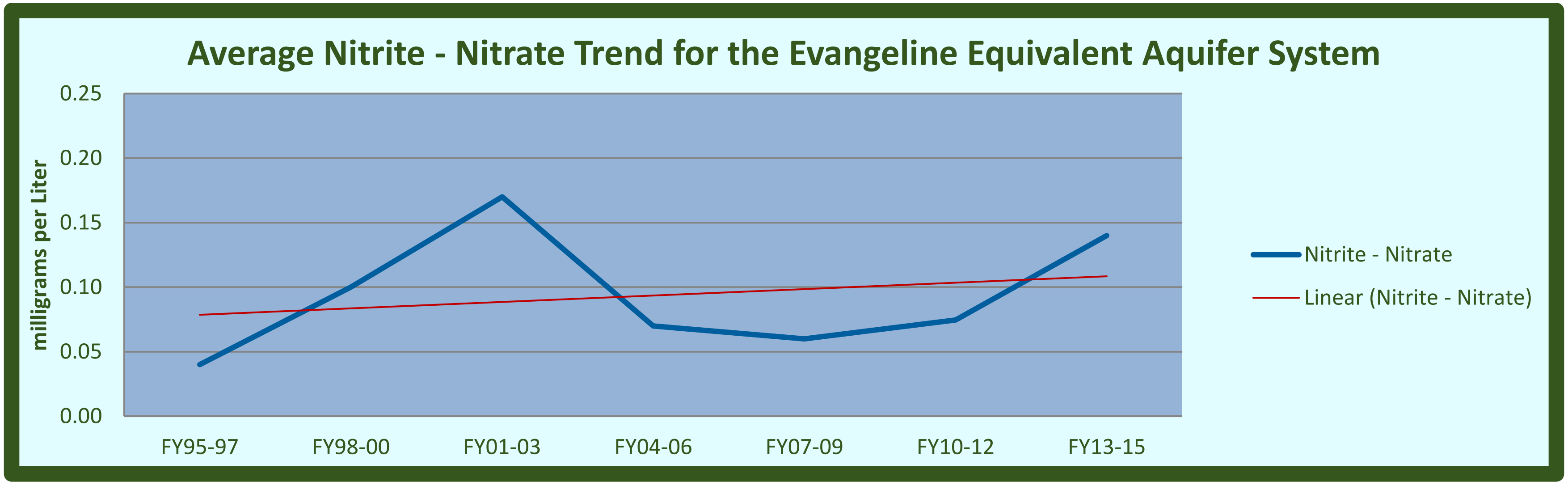


Chart 13-14: TKN Trend

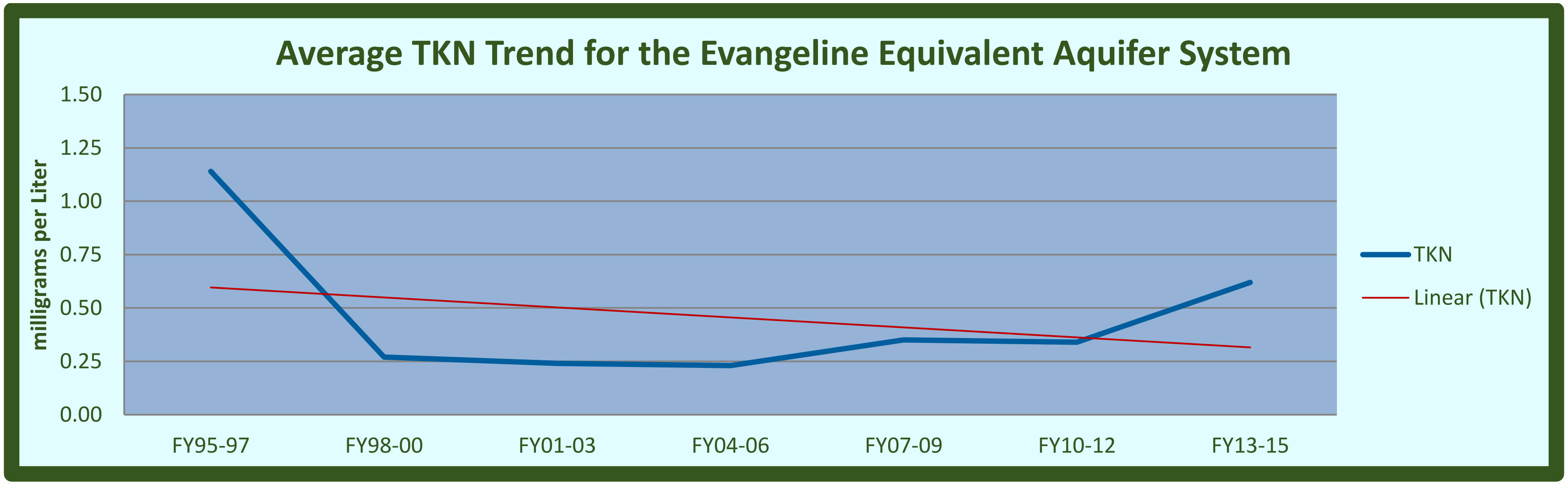


Chart 13-15: Total Phosphorus Trend

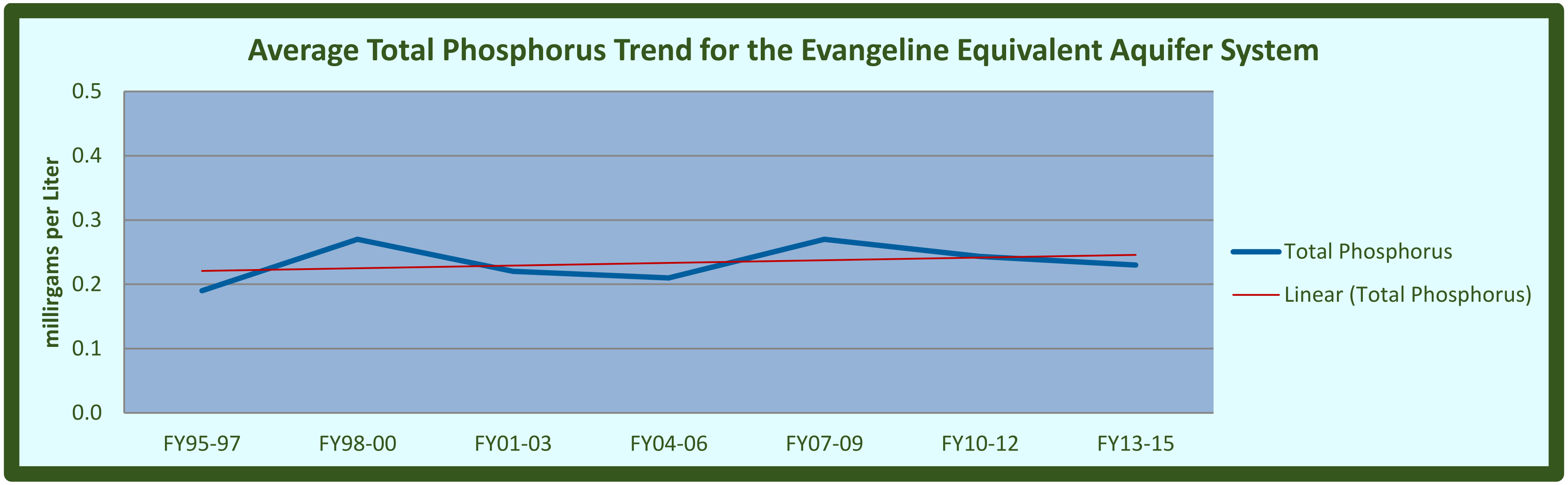


Chart 13-16: Iron Trend