EVANGELINE EQUIVALENT AQUIFER SYSTEM SUMMARY, 2009
AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 13 TO THE 2009 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 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 Evangeline Equivalent aquifer system during the 2009 state fiscal year (July 1, 2008 - June 30, 2009). This summary will become Appendix 13 to the ASSET Program Triennial Summary Report for 2009.

These data show that between January and April 2009, 15 wells were sampled which produce from the Evangeline Equivalent aquifer system. Six of the wells are classified as public supply, while five are classified as domestic. Three wells are classified as industrial and one classified as irrigation. The wells are located in eleven parishes in southeast and south central 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 and aquifer assignment, for registered water wells were obtained from the Louisiana Department of Transportation and Development’s 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 160 to 1900 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 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, EB-1003, and TA-284.

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 2009 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 and 2006.

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. One-half the DL is also used for non-detects in the figures and charts referenced below.

Figures 13-2, 13-3, 13-4, and 13-5, respectively, represent the contoured data for pH, total dissolved solids (TDS), chloride (Cl) 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 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 13-2 and 13-3 show that one or more secondary MCLs (SMCL) were exceeded in 9 of the 15 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 primary MCL was exceeded for field or conventional parameters for this reporting period. The ASSET wells reporting turbidity level greater than 1.0 NTU does 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 13-2 shows that 8 wells exceeded the SMCL for pH, and one well 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. Following is a list of SMCL parameter exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 Standard Units):

LI-299 – 8.54 SU
SL-679 – 8.89 SU
ST-6711Z – 9.01 SU
WA-241 – 6.49 SU
PC-325 – 8.66 SU
ST-532 – 9.23 SU
TA-284 – 8.81 SU (Original and Duplicate)
WBR-18 – 8.86 SU

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

SL-6711Z – 35 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 primary MCL was exceeded for total metals.

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

Iron (SMCL = 300 ug/L):
WA-241 – 1,780 ug/L
WA-5210Z – 612 ug/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.

No VOCs were detected at or above their respective detection limits during the FY 2009 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 2009 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.

No pesticide or PCB was detected at or above its detection limit during the FY 2009 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 ground water produced from the Evangeline Equivalent 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 13-6 and 13-7, and in Charts 13-1 to 13-16 of this summary. Over the twelve-year period 2 analytes, pH and barium, have shown a general increase in average concentration. For this same time period, 6 analytes have demonstrated a decrease in average concentration, they are: color, total dissolved solids, hardness, copper, iron, and zinc. Temperature and TKN initially decreased between 1997 and 2000, but has since remained fairly consistent. The remaining analytes have also been consistent with only minor fluctuations over the twelve year period. The number of secondary exceedances in the Evangeline Equivalent aquifer system has decreased from the previous sampling in FY 2006 of 16 SMCL exceedances, to 12 exceedances in FY 2009.

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 2009 monitoring of the Evangeline Equivalent aquifer system exceeded a Primary MCL. The data also show that this aquifer is of good quality when considering taste, odor, or appearance guidelines, with 12 Secondary MCLs exceeded in 9 wells.

Comparison to historical ASSET-derived data shows only slight change in the quality or characteristics of the Evangeline Equivalent aquifer system, with 2 parameters showing consistent increases in concentration and 6 parameters decreasing in concentration over the previous twelve 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 2009
Evangeline Equivalent Aquifer System

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
AV-680	AVOYELLES	4/1/2009	AVOYELLES WATER COMMISSION	553	PUBLIC SUPPLY
EB-1003	E BATON ROUGE	3/2/2009	BATON ROUGE WATER WORKS	1430	PUBLIC SUPPLY
EF-5045Z	E FELICIANA	3/3/2009	PRIVATE OWNER	160	DOMESTIC
LI-299	LIVINGSTON	3/2/2009	WARD 2 WATER DISTRICT	1417	PUBLIC SUPPLY
PC-325	POINTE COUPEE	3/2/2009	ALMA PLANTATION LTD	1252	INDUSTRIAL
SL-679	ST LANDRY	3/3/2009	ALON USA	1152	INDUSTRIAL
ST-532	ST TAMMANY	1/26/2009	SE LOUISIANA STATE HOSPITAL	1520	PUBLIC SUPPLY
ST-6711Z	ST TAMMANY	1/26/2009	PRIVATE OWNER	860	DOMESTIC
TA-284	TANGIPAHOA	1/27/2009	CITY OF PONCHATOULA	608	PUBLIC SUPPLY
TA-286	TANGIPAHOA	1/27/2009	TOWN OF KENTWOOD	640	PUBLIC SUPPLY
TA-6677Z	TANGIPAHOA	1/27/2009	PRIVATE OWNER	495	DOMESTIC
WA-241	WASHINGTON	1/27/2009	PRIVATE OWNER	400	IRRIGATION
WA-5210Z	WASHINGTON	1/26/2009	PRIVATE OWNER	752	DOMESTIC
WBR-181	W BATON ROUGE	3/2/2009	PORT OF GREATER BATON ROUGE	1900	INDUSTRIAL
WF-DELEE	W FELICIANA	3/16/2009	PRIVATE OWNER	240	DOMESTIC

Table 13-2: Summary of Field and Conventional Data-FY 2009
Evangeline Equivalent Aquifer System

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	1/5	10	1.25/5	4	4	0.4/1	0.1/1	5.0	0.01/ 0.05	0.1/0.3	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AV-680	21.72	7.86	0.418	0.20	0.27	194	33.1	2	424	<5	269	<4	1.07	R	<5	<0.01	R	0.21
AV-680*	21.72	7.86	0.418	0.20	0.27	200	30.1	<1	427	6.2	251	<4	1.06	R	<5	<0.01	R	0.21
EB-1003	26.23	7.88	0.287	0.14	0.19	156	1.7	<1	259	7.6	243	<4	1.5	<1	<5	<0.01	<0.3	0.29
EB-1003*	26.23	7.88	0.287	0.14	0.19	148	1.7	<1	259	7.5	236	<4	0.46	<1	<5	<0.01	0.91	0.32
EF-5045Z	17.20	7.05	0.048	0.02	0.03	20	1.8	7	43	<5	83	<4	<0.4	<1	14	0.033	<0.3	0.07
LI-299	24.99	8.54	0.269	0.13	0.18	126	1.7	<1	238	5.3	159	<4	0.97	<1	<5	<0.01	0.49	0.77
PC-325	24.69	8.66	0.283	0.13	0.18	152	1.7	<1	252	8.5	249	8	1.45	<1	<5	<0.01	0.7	0.46
SL-679	25.61	8.89	0.363	0.17	0.24	164	28.9	3	317	<5	233	5	<0.4	<1	<5	<0.01	<0.3	0.38
ST-532	27.71	9.23	0.347	0.16	0.23	167	2.6	5	329	11.9	220	<4	<1	0.12	<5	<0.05	0.24	0.34
ST-6711Z	21.47	9.01	0.658	0.32	0.43	347	15	35	652	3.3	404	<4	<1	0.4	<5	<0.05	0.42	0.46
TA-284	23.10	8.81	0.274	0.13	0.18	137	2.7	<5	272	9.6	185	<4	<1	0.11	<5	<0.05	0.14	0.32
TA-284*	23.10	8.81	0.274	0.13	0.18	137	2.7	<5	271	9.6	187	<4	<1	0.1	<5	<0.05	0.14	0.32
TA-286	21.17	6.84	0.050	0.02	0.03	15	2.7	<5	48.3	3.4	43.3	<4	<1	<0.1	9.9	<0.05	<0.1	<0.05
TA-6677Z	19.80	7.57	0.104	0.05	0.07	45.3	3.6	<5	103	3.6	96.7	<4	<1	<0.1	18.4	0.05	<0.1	<0.05
WA-241	19.45	6.49	0.082	0.04	0.05	23.8	2.6	<5	78.5	10.1	92	<4	<1	<0.1	20.2	<0.05	<0.1	0.06
WA-5210Z	21.52	7.80	0.153	0.07	0.10	62.8	3.1	<5	148	9.5	134	<4	<1	0.19	37.6	<0.05	0.25	0.28
WBR-181	27.06	8.86	0.301	0.14	0.20	156	1.7	2	266	8.1	188	<4	0.43	<1	<5	<0.01	1.54	0.38
WF-DELEE	19.01	8.17	0.077	0.04	0.05	16	13.1	<1	79.2	<5	56	<4	0.51	<1	<5	0.77	<0.3	<0.05

*Denotes Duplicate Sample Shaded cells exceed EPA Secondary Standards "R" = Data rejected, NH3 and TKN detected in Field Blank

Table 13-3: Summary of Inorganic Data-FY 2009
Evangeline Equivalent Aquifer System

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	1/5	3/4	5	1/2	2/0.5	3/4	2/3	20/100	1/2/3	0.0002/ 0.05	2/3	4/5	0.5/1	1/2	6/10
AV-680	<5	<4	79.7	<2	<2	<4	<2	<100	<1	<0.0002	<2	<5	<1	<2	R
AV-680*	<5	<4	74.5	<2	<2	<4	<2	<100	<1	<0.0002	<2	<5	<1	<2	R
EB-1003	<5	<4	17.9	<2	<2	<4	7.71	<100	<2	<0.0002	<2	<5	<1	<2	<6
EB-1003*	<5	<4	18.3	<2	<2	<4	<2	<100	<2	<0.0002	<2	<5	<1	<2	<6
EF-5045Z	<5	<4	65.6	<2	<2	<4	6.92	<100	<2	<0.0002	2.77	<5	<1	<2	7.63
LI-299	<5	<4	<5	<2	<2	<4	4.53	<100	<2	<0.0002	<2	<5	<1	<2	<6
PC-325	<5	<4	5.6	<2	<2	<4	<2	<100	<2	<0.0002	<2	<5	<1	<2	<6
SL-679	<5	<4	17.8	<2	<2	<4	<2	<100	<2	<0.0002	<2	<5	<1	<2	7.87
ST-532	<1	<3	5.8	<1	<0.5	<3	<3	<20	<3	<0.05	<3	<4	<0.5	<1	<10
ST-6711Z	<1	<3	11.5	<1	<0.5	<3	<3	<20	<3	<0.05	<3	<4	<0.5	<1	<10
TA-284	<1	<3	16.8	<1	<0.5	<3	<3	<20	<3	<0.05	<3	<4	<0.5	<1	<10
TA-284*	<1	<3	16.9	<1	<0.5	<3	<3	<20	<3	<0.05	<3	<4	<0.5	<1	<10
TA-286	<1	<3	64.3	<1	<0.5	<3	<3	<20	<3	<0.05	<3	<4	<0.5	<1	<10
TA-6677Z	<1	<3	110	<1	<0.5	<3	5.8	<20	<3	<0.05	<3	<4	<0.5	<1	<10
WA-241	<1	<3	86.3	<1	<0.5	<3	<3	1780	<3	<0.05	<3	<4	<0.5	<1	10.3
WA-5210Z	<1	<3	69.3	<1	<0.5	<3	<3	612	<3	<0.05	<3	<4	<0.5	<1	<10
WBR-181	<5	<4	<5	<2	<2	<4	<2	<100	<2	<0.0002	<2	<5	<1	<2	<6
WF-DELEE	<5	<4	41.6	<2	<2	<4	<2	235	<1	<0.0002	19.3	<5	<1	<2	29.4

*Denotes Duplicate Sample Shaded cells exceed EPA Secondary Standards "R" = Data rejected, zinc detected in Field Blank

Table 13-4: Field and Conventional Statistics, FY 2009 ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	17.20	27.71	22.88
	pH (SU)	6.49	9.23	8.12
	Specific Conductance (mmhos/cm)	0.048	0.658	0.26
	Salinity (ppt)	0.02	0.32	0.12
	TDS (g/L)	0.03	0.43	0.17
LABORATORY	Alkalinity (mg/L)	15.0	347.0	125.9
	Chloride (mg/L)	1.7	33.1	8.4
	Color (PCU)	<1	35	<5
	Specific Conductance (umhos/cm)	43	652	248
	Sulfate (mg/L)	3.3	11.9	6.3
	TDS (mg/L)	43.3	404.0	184.9
	TSS (mg/L)	<4	8	<4
	Turbidity (NTU)	<0.4	1.5	<1.0
	Ammonia, as N (mg/L)	<0.1	<1.0	<1.0
	Hardness (mg/L)	<5.0	37.6	7.4
	Nitrite - Nitrate, as N (mg/L)	<0.01	0.77	0.06
	TKN (mg/L)	<0.10	1.54	0.35
	Total Phosphorus (mg/L)	<0.05	0.77	0.27

Table 13-5: Inorganic Statistics, FY 2009 ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	<5	<5	<5
Arsenic (ug/L)	<4	<4	<4
Barium (ug/L)	<5	110	39
Beryllium (ug/L)	<2	<2	<2
Cadmium (ug/L)	<2	<2	<2
Chromium (ug/L)	<4	<4	<4
Copper (ug/L)	<3	7.71	<3
Iron (ug/L)	<100	1,780	174
Lead (ug/L)	<3	<3	<3
Mercury (ug/L)	<0.05	<0.05	<0.05
Nickel (ug/L)	<3	19.3	<3
Selenium (ug/L)	<5	<5	<5
Silver (ug/L)	<1	<1	<1
Thallium (ug/L)	<2	<2	<2
Zinc (ug/L)	<10	29.4	<10

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

	PARAMETER	FY 1997 AVERAGE	FY 2000 AVERAGE	FY 2003 AVERAGE	FY 2006 AVVERAGE	FY 2009 AVERAGE
FIELD	Temperature (^{O}C)	25.17	22.73	22.74	22.59	22.88
	pH (SU)	7.45	8.02	8.41	7.88	8.12
	Specific Conductance (mmhos/cm)	0.33	0.24	0.27	0.28	0.26
	Salinity (Sal.) (ppt)	0.14	0.12	0.12	0.13	0.12
	TDS (Total dissolved solids) (g/L)	-	-	-	0.18	0.17
LABORATORY	Alkalinity (Alk.) (mg/L)	125.4	110.3	117.7	119.5	125.9
	Chloride (Cl) (mg/L)	13.7	8.3	7.3	11.8	8.4
	Color (PCU)	14.3	7.7	7.9	13.6	<5.0
	Specific Conductance (umhos/cm)	276.7	249.7	236.6	269.1	248.1
	Sulfate (SO4) (mg/L)	5.8	6.5	7.6	7.4	6.3
	TDS (Total dissolved solids) (mg/L)	232.6	162.6	169.5	197.5	184.9
	TSS (Total suspended solids) (mg/L)	<4.0	4.7	<4.0	<4.0	<4.0
	Turbidity (Turb.) (NTU)	1.6	2.0	1.3	<1.0	<1.0
	Ammonia, as N (NH3) (mg/L)	0.30	0.13	0.15	0.17	<1.00
	Hardness (mg/L)	10.2	12.7	10.6	10.8	7.4
	Nitrite - Nitrate , as N (mg/L)	0.04	0.10	0.17	0.07	0.06
	TKN (mg/L)	1.14	0.27	0.24	0.23	0.35
	Total Phosphorus (P) (mg/L)	0.19	0.27	0.22	0.21	0.27

Table 13-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	FY 1997 AVERAGE	FY 2000 AVERAGE	FY 2003 AVERAGE	FY 2006 AVERAGE	FY 2009 AVERAGE
Antimony (ug/L)	11.5	<5	<5	<50	<5
Arsenic (ug/L)	<5	<5	<5	<20	<4
Barium (ug/L)	29.1	41.0	39.9	47.8	39.3
Beryllium (ug/L)	<1	<1	<1	<1	<2
Cadmium (ug/L)	<2	<2	<1	<1	<2
Chromium (ug/L)	<5	<5	<5	<5	<4
Copper (ug/L)	12.9	9.0	6.7	<10	<3
Iron (ug/L)	331.4	942.9	204.1	265.1	174.3
Lead (ug/L)	<10	<10	<10	<20	<3
Mercury (ug/L)	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel (ug/L)	<5	<5	<5	<5	<3
Selenium (ug/L)	<5	<5	<5	<5	<5
Silver (ug/L)	<2	<1	<1	<2.5	<1
Thallium (ug/L)	<2	<5	<5	<5	<2
Zinc (ug/L)	141.6	178.0	11.8	<10.0	<10.0

Table 13-8: 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
Methylt-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
Xylenes, m & p	624	4

Table 13-9: 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

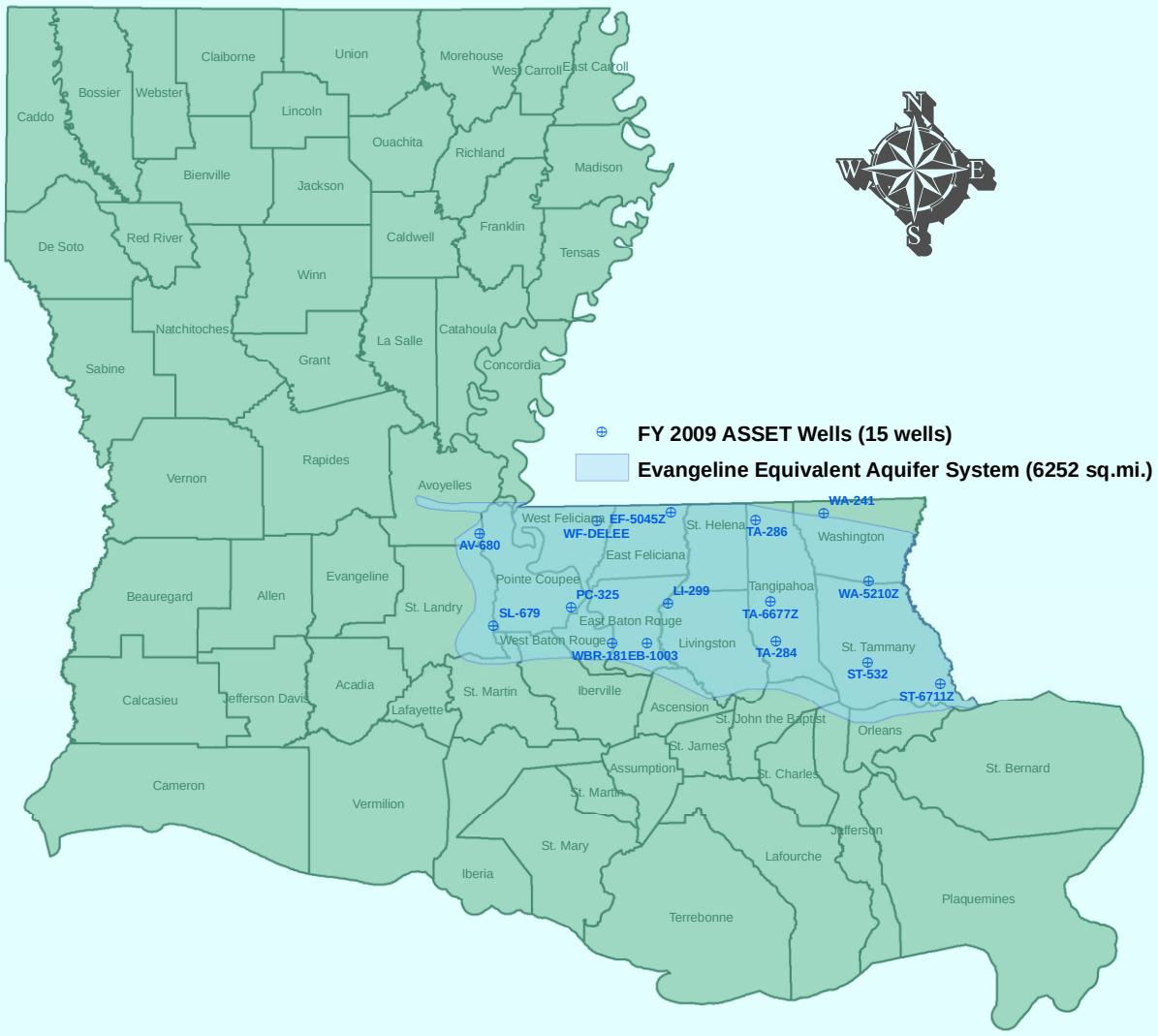
Table 13-9: SVOCs (Continued)

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 13-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS (ug/L)
4,4'-DDD	608	0.05
4,4'-DDE	608	0.05
4,4'-DDT	608	0.05
Aldrin	608	0.05
Alpha-Chlordane	608	0.05
alpha-BHC	608	0.05
beta-BHC	608	0.05
delta-BHC	608	0.05
gamma-BHC	608	0.05
Chlordane	608	0.2
Dieldrin	608	0.05
Endosulfan I	608	0.05
Endosulfan II	608	0.05
Endosulfan Sulfate	608	0.05
Endrin	608	0.05
Endrin Aldehyde	608	0.05
Endrin Ketone	608	0.05
Heptachlor	608	0.05
Heptachlor Epoxide	608	0.05
Methoxychlor	608	0.05
Toxaphene	608	2
Gamma-Chlordane	608	0.05
PCB-1016	608	1
PCB-1221	608	1
PCB-1232	608	1
PCB-1242	608	1
PCB-1248	608	1
PCB-1254	608	1
PCB-1260	608	1

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.

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Figure 13-2: Map of pH Data

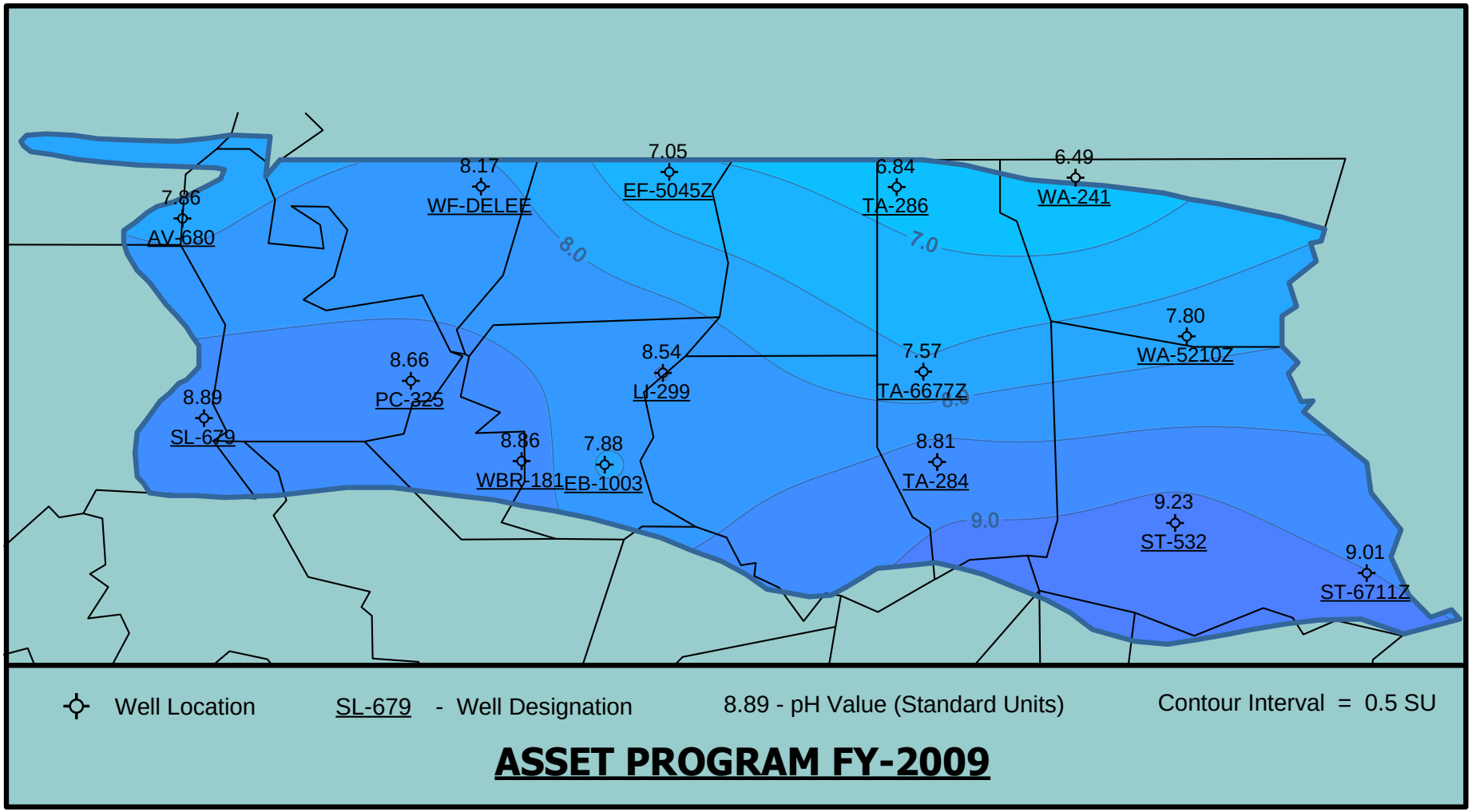

Figure 13-3: Map of TDS Lab Data

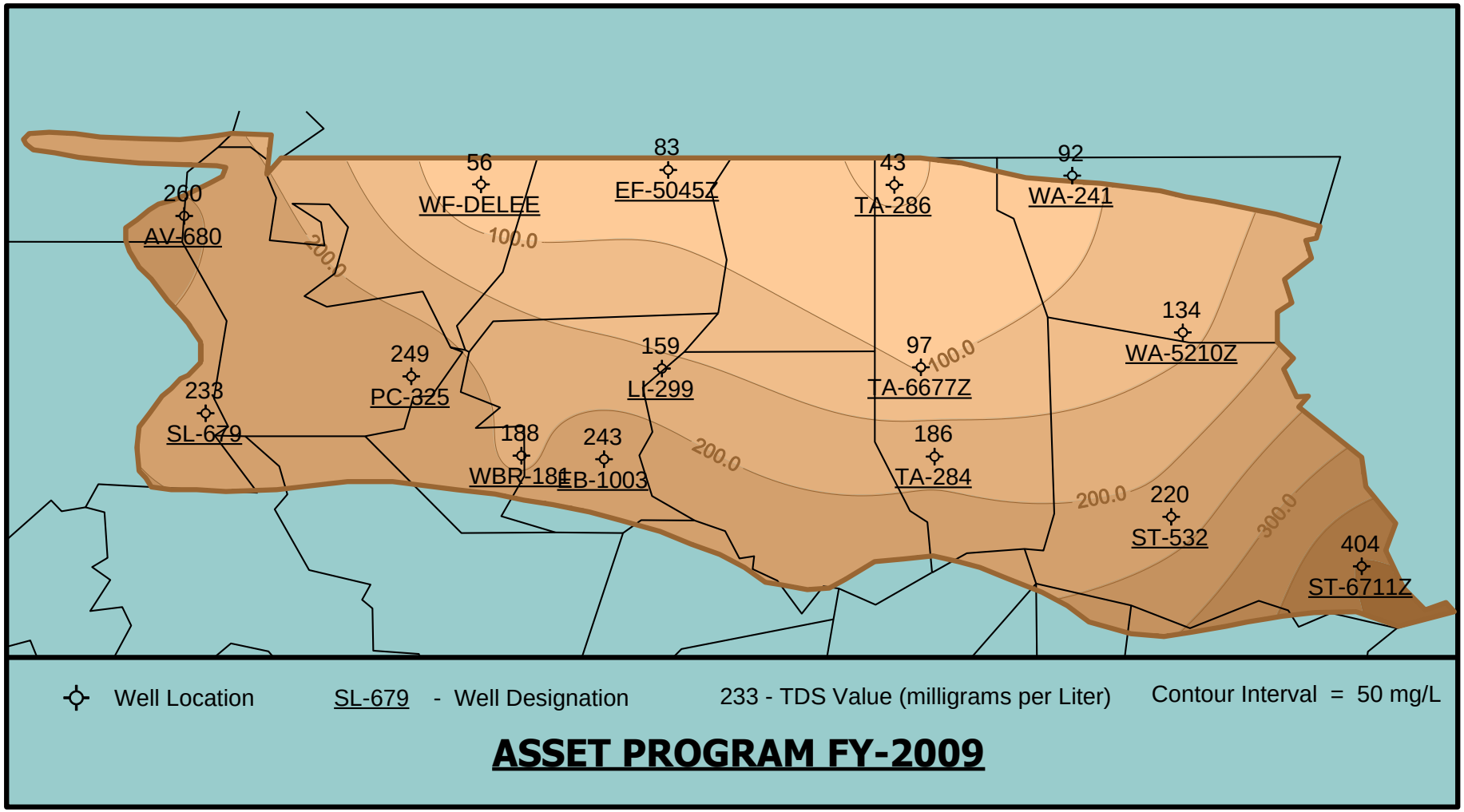

Figure 13-4: Map of Chloride Data

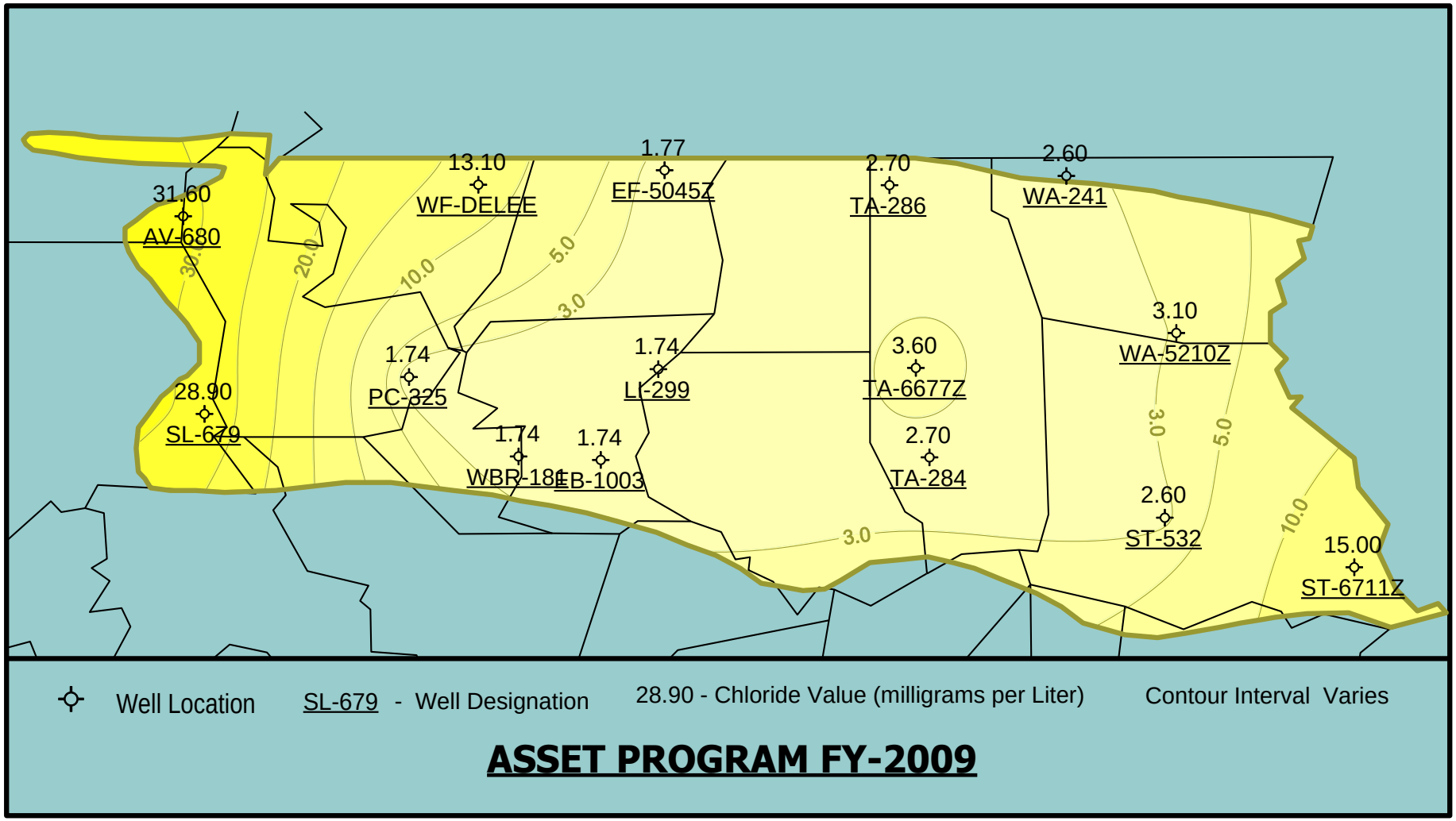

Figure 13-5: Map of Iron Data

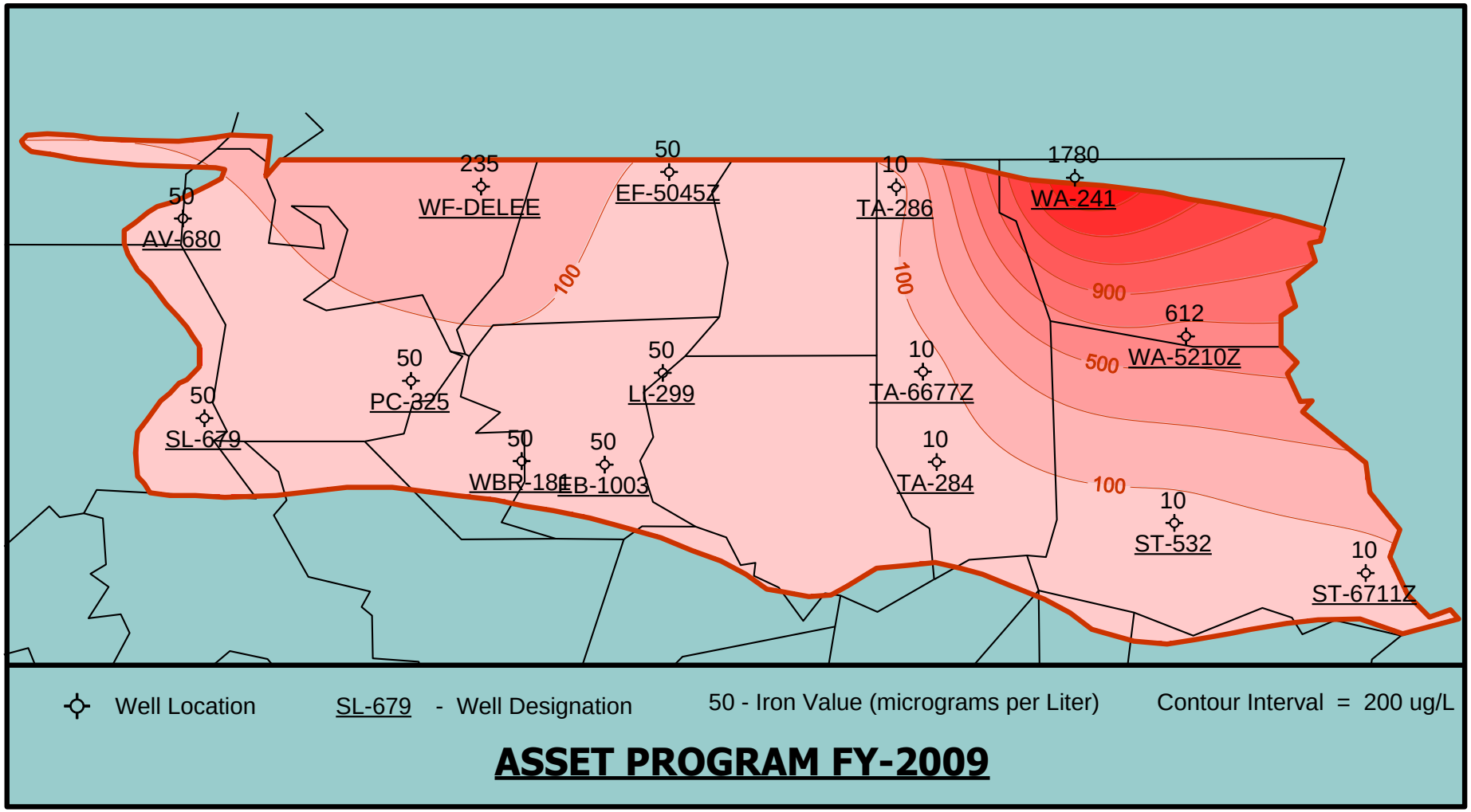

Chart 13-1: Temperature Trend

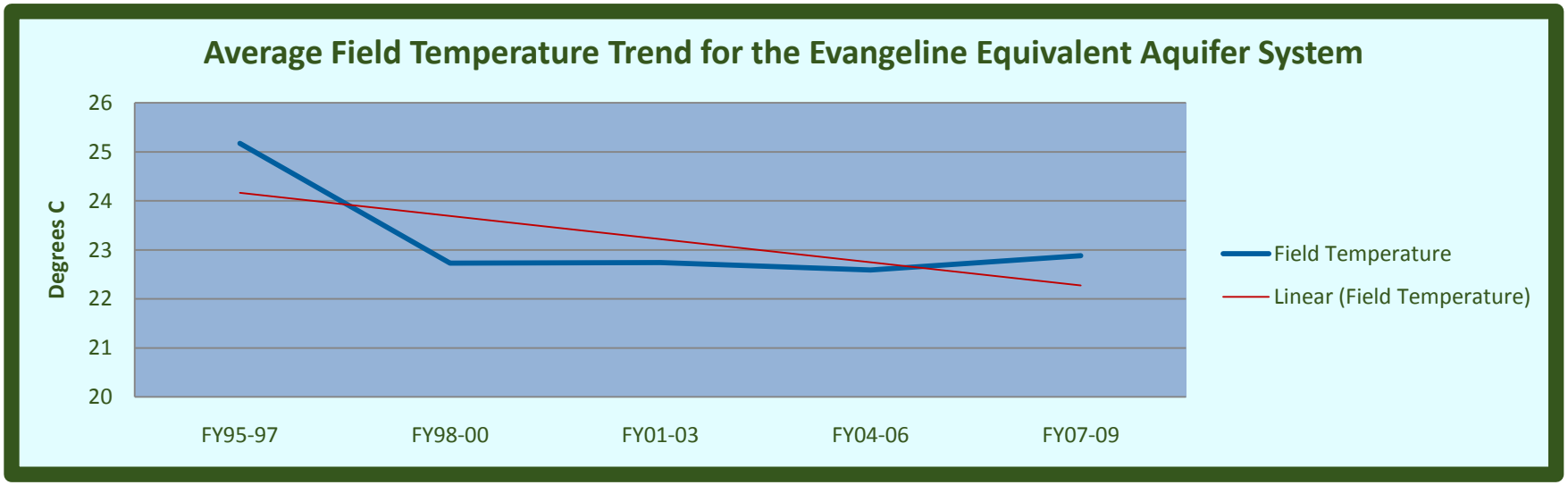

Chart 13-2: pH Trend

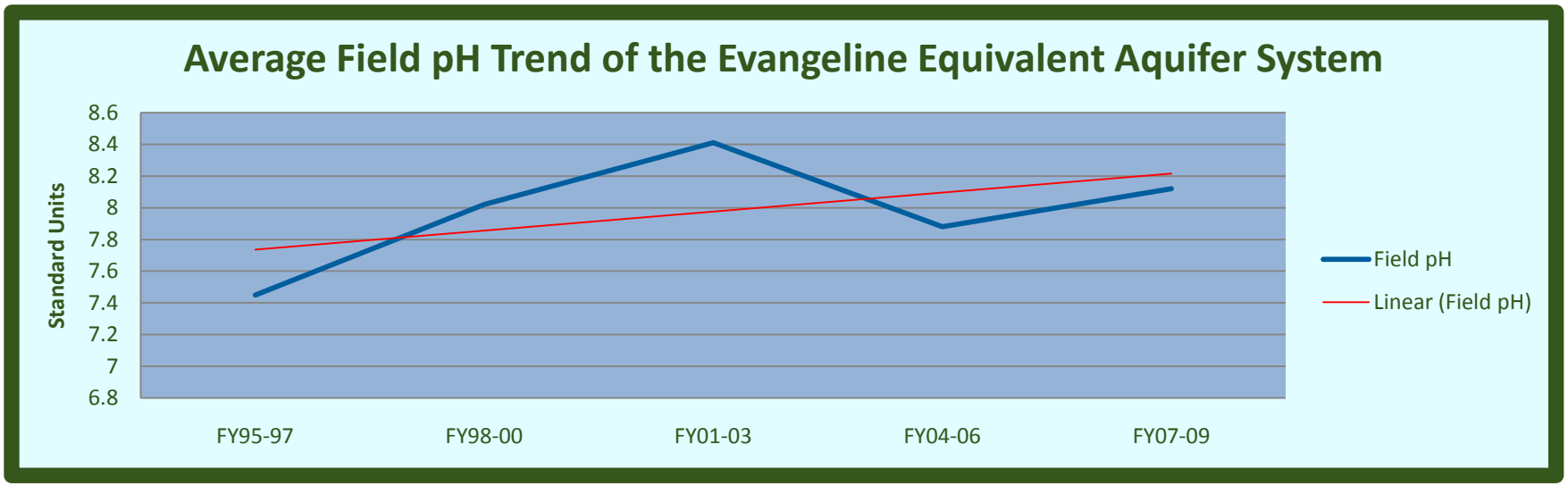

Chart 13-3: Field Specific Conductance Trend

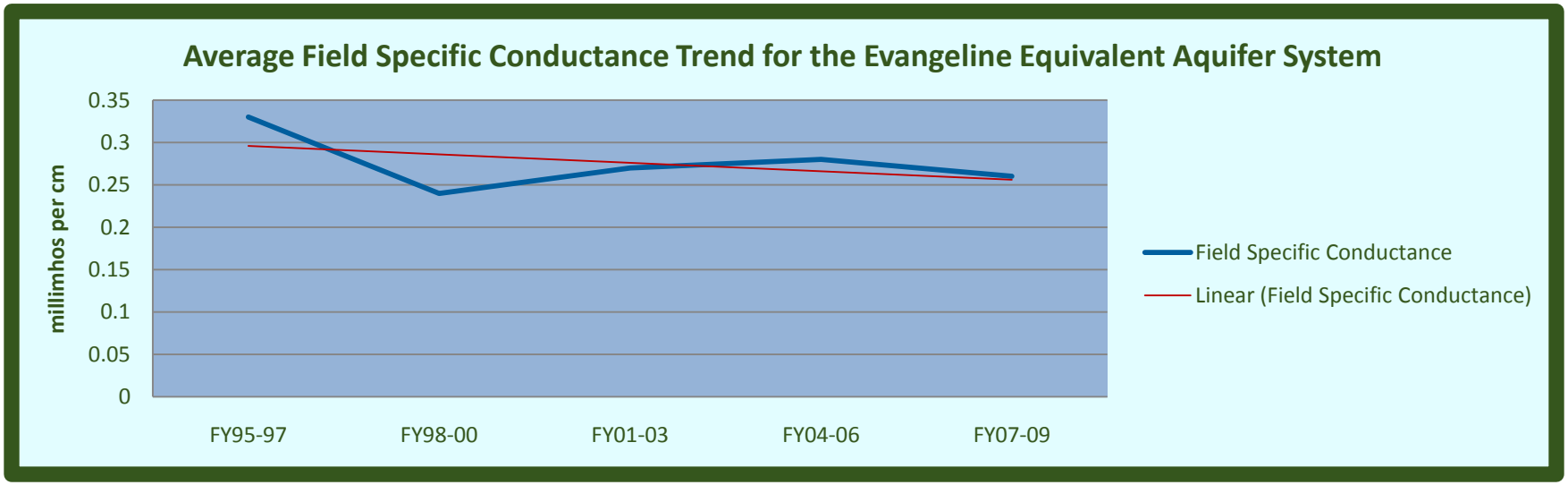

Chart 13-4: Lab Specific Conductance Trend

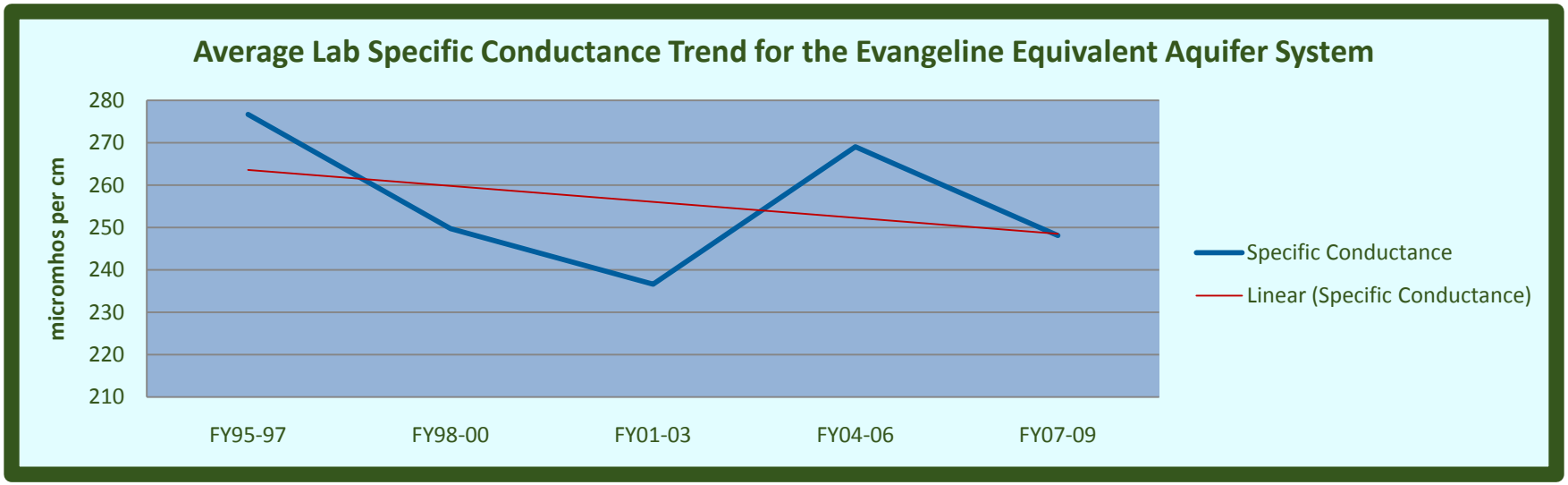

Chart 13-5: Field Salinity Trend

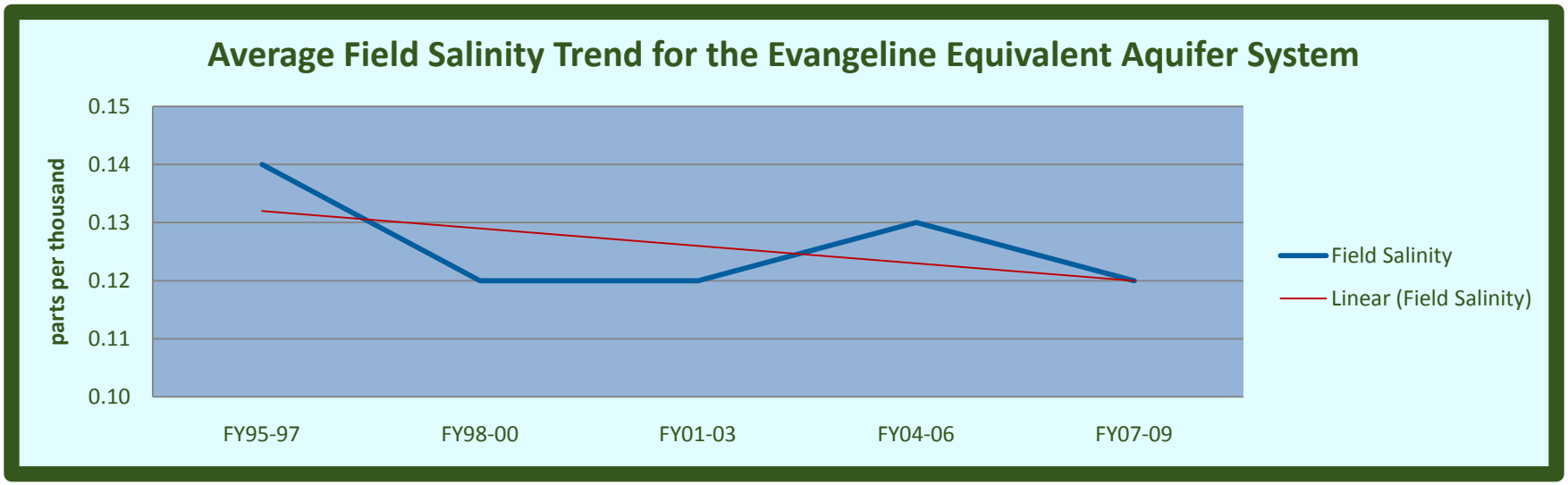

Chart 13-6: Alkalinity Trend

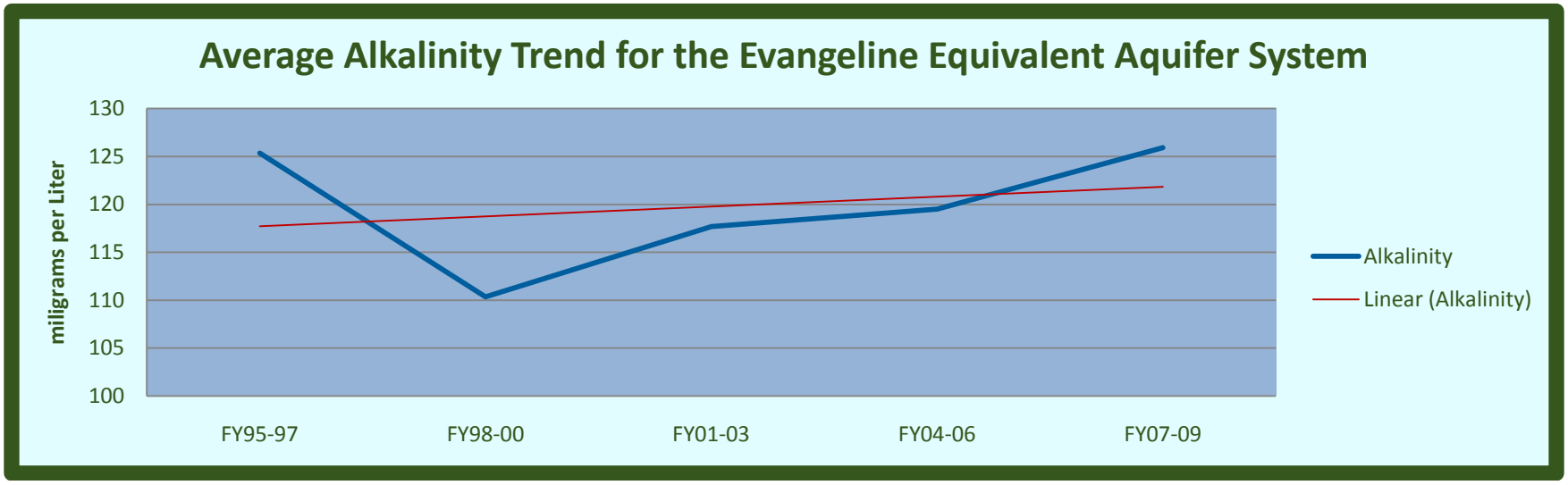

Chart 13-7: Chloride Trend

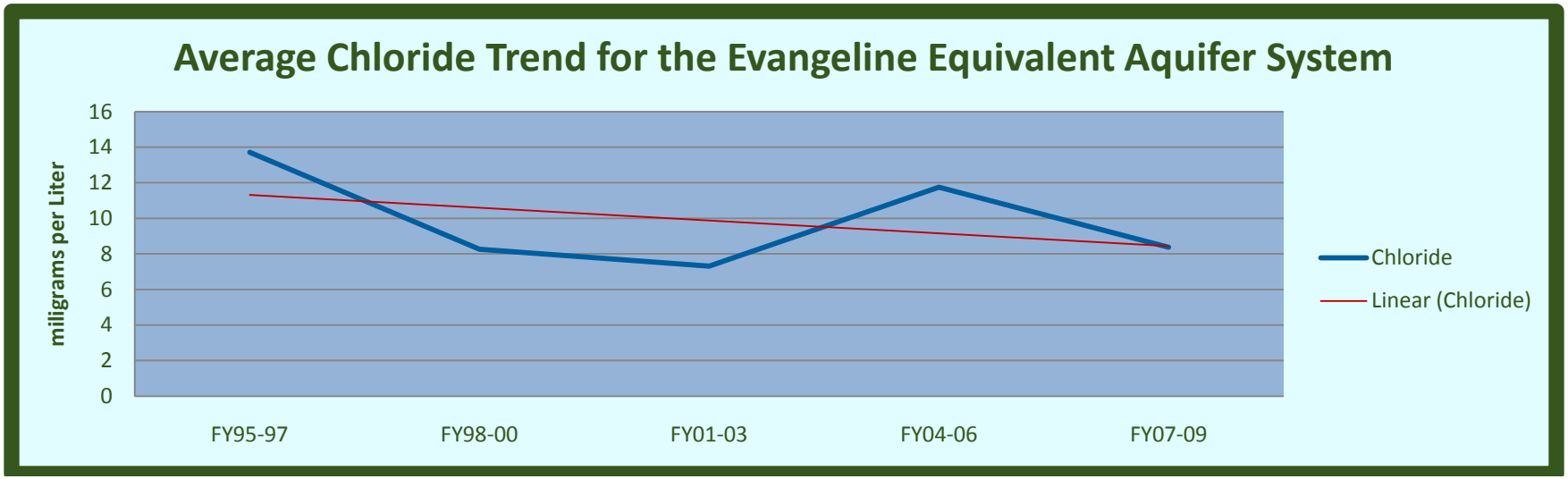

Chart 13-8: Color Trend

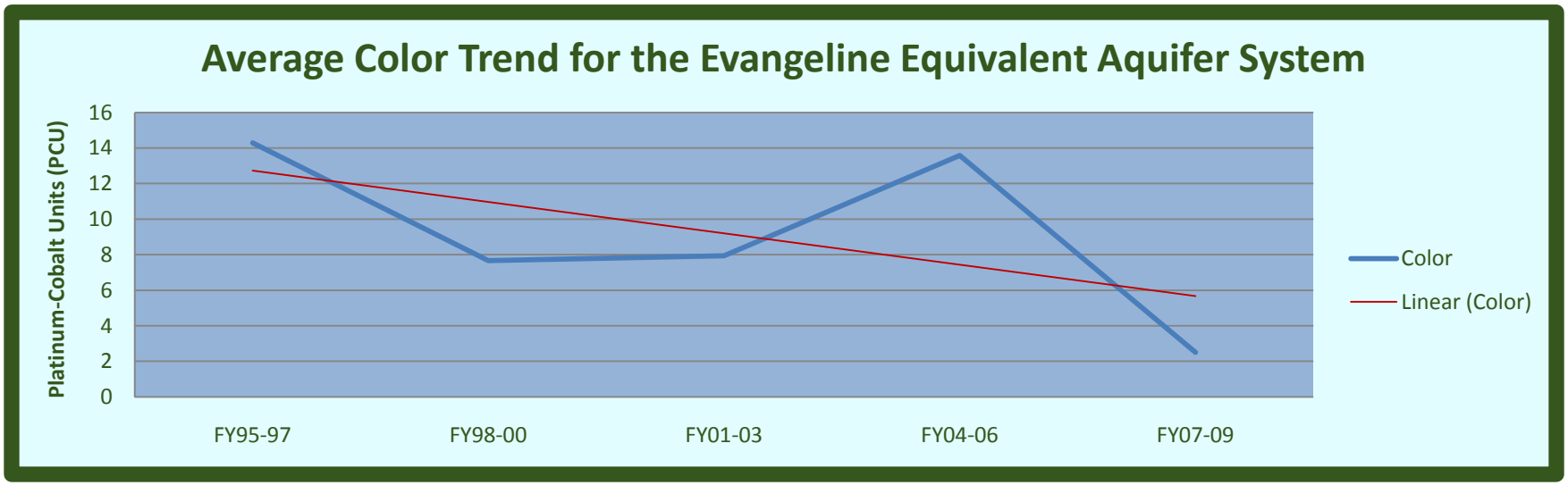

Chart 13-9: Sulfate (SO4) Trend

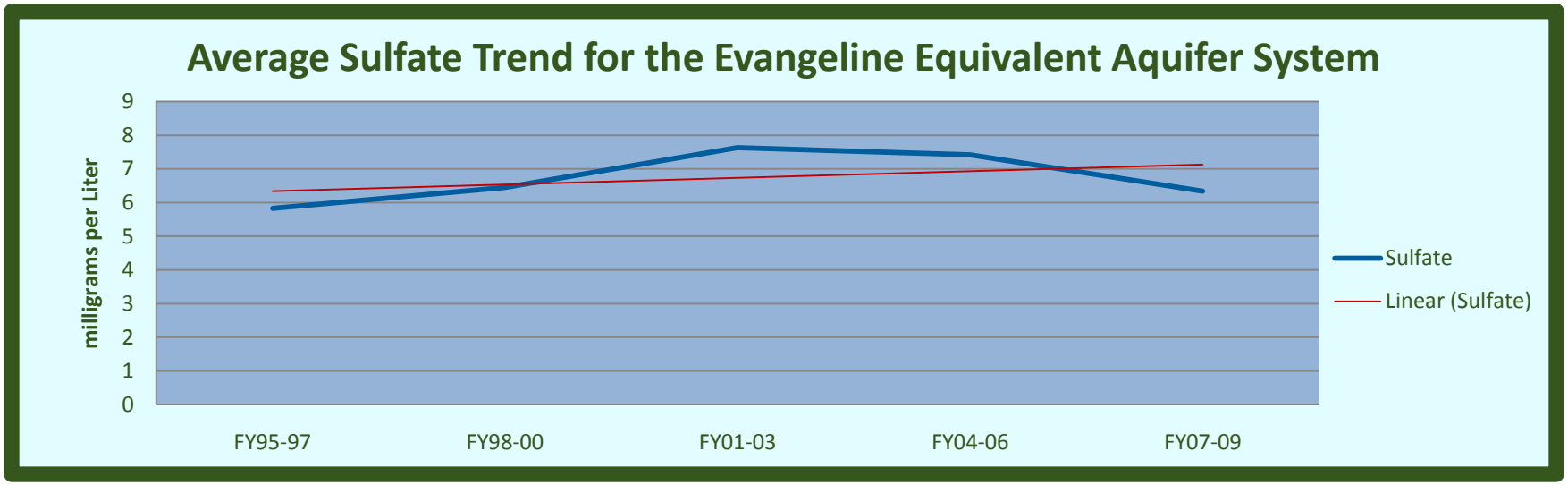

Chart 13-10: Total Dissolved Solids (TDS) Trend

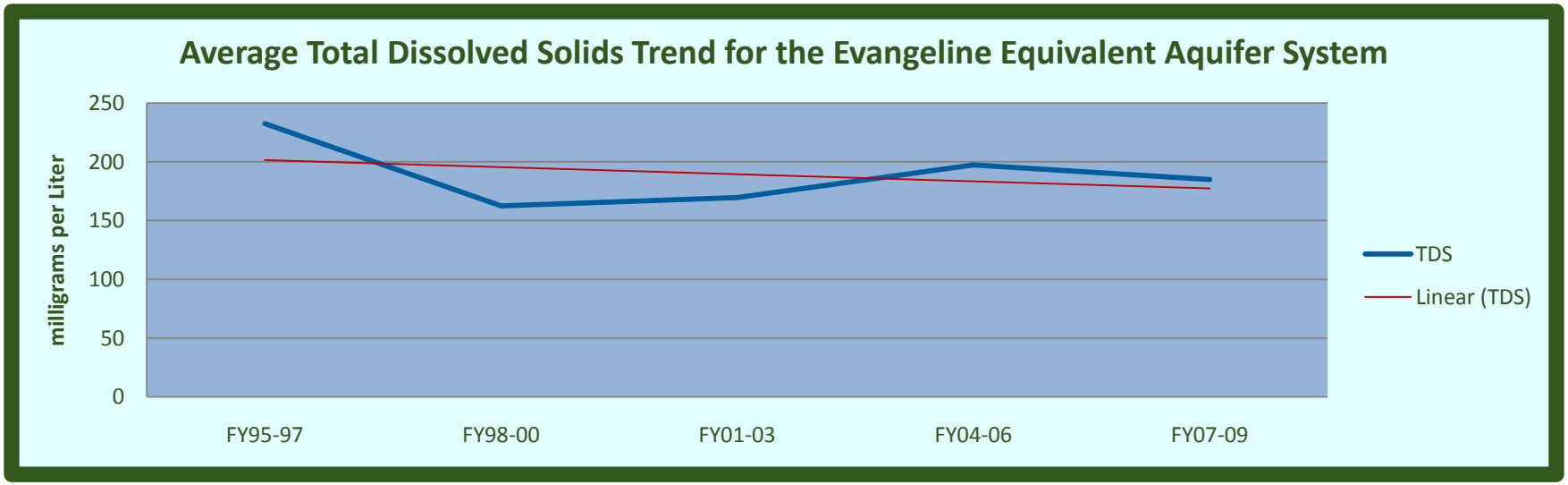

Chart 13-11: Ammonia (NH3) Trend

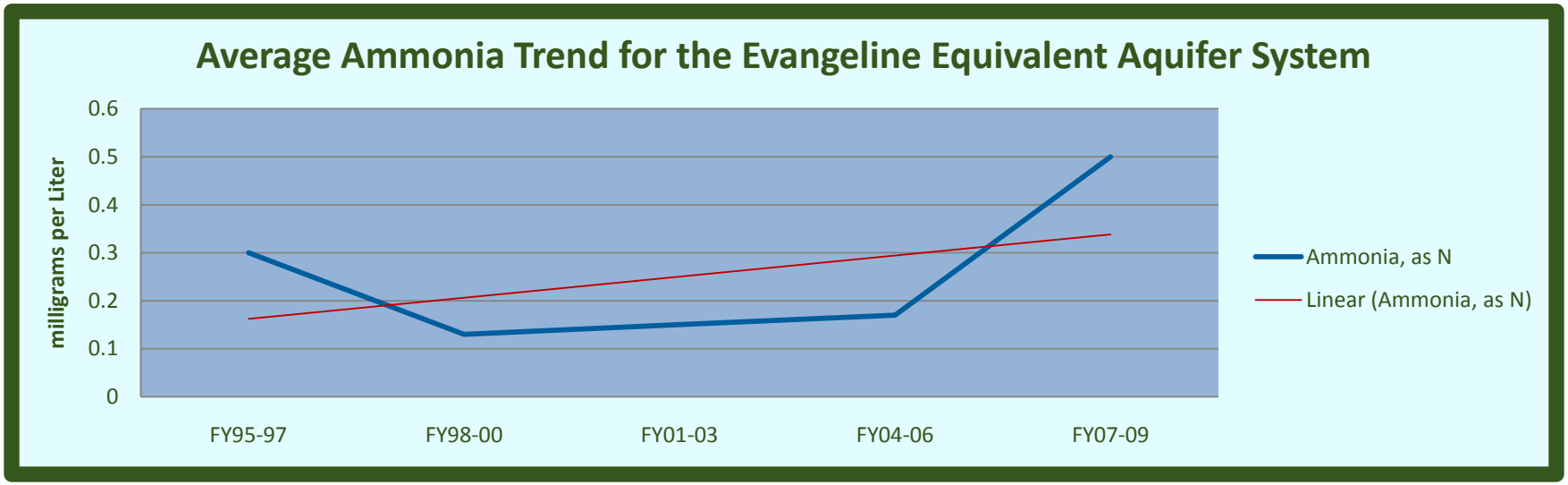

Chart 13-12: Hardness Trend

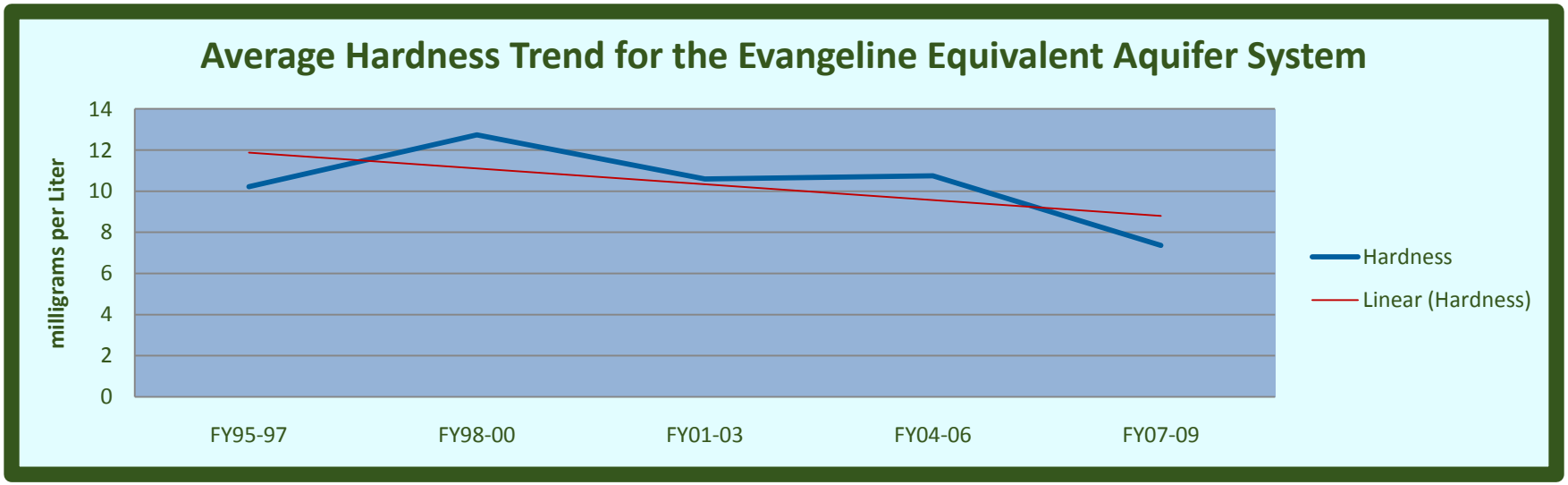

Chart 13-13: Nitrite – Nitrate Trend

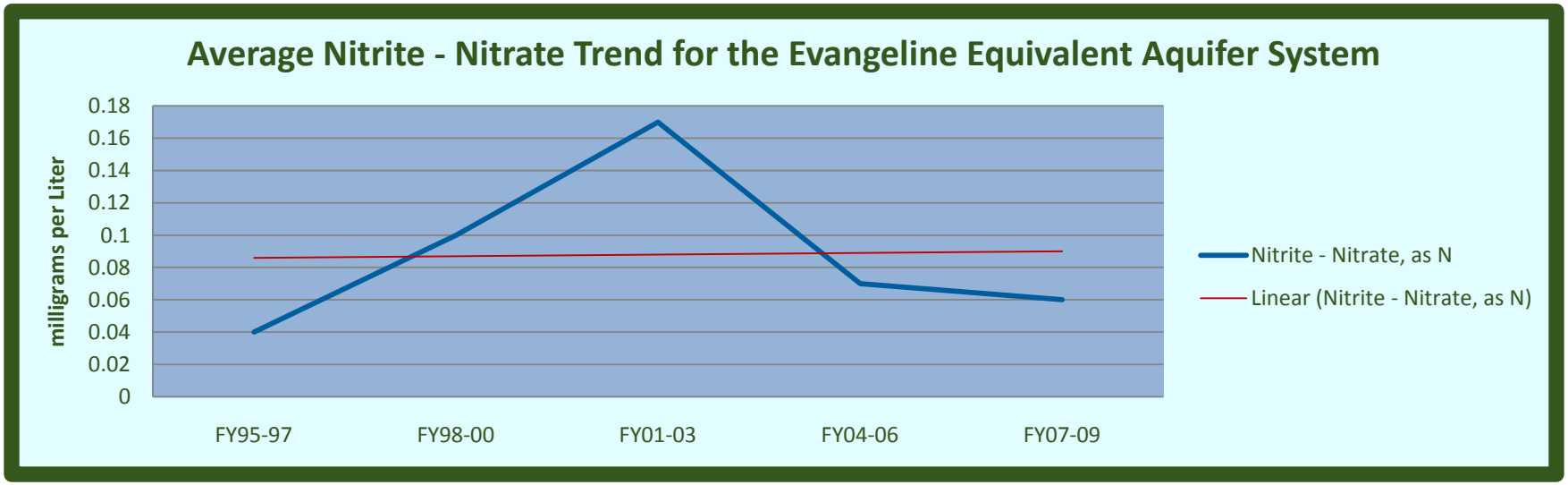

Chart 13-14: TKN Trend

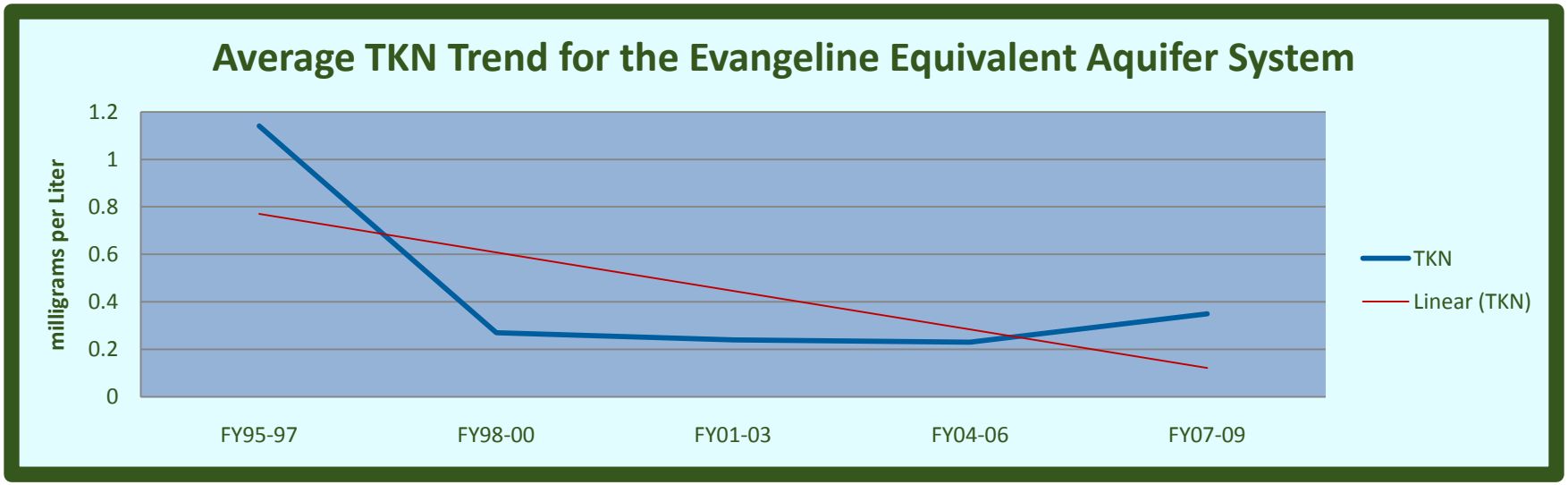

Chart 13-15: Total Phosphorus Trend

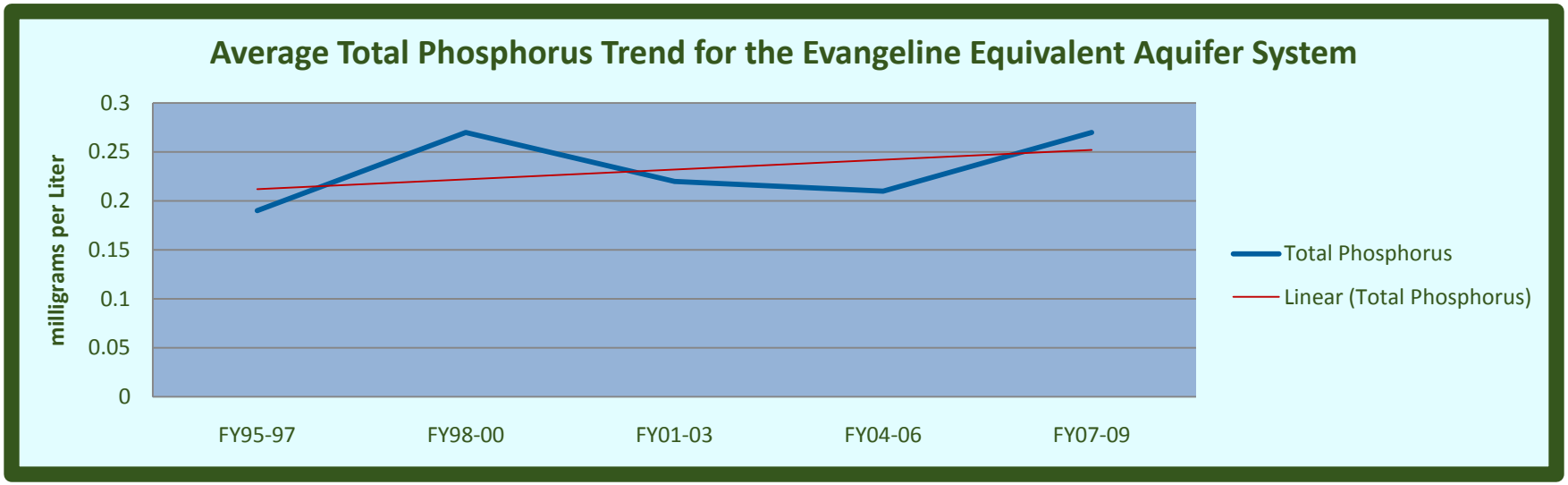

Chart 13-16: Iron Trend