EVANGELINE AQUIFER SUMMARY, 2010

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 4 TO THE 2012 TRIENNIAL SUMMARY REPORT

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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 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 2012.

Analytical and field data contained in this summary were collected from wells producing from the Evangeline aquifer, during the 2010 state fiscal year (July 1, 2009 - June 30, 2010). This summary will become Appendix 4 of ASSET Program Triennial Summary Report for 2012.

These data show that 12 Evangeline aquifer wells were sampled in January of 2010. Eight of these 12 are classified as public supply, while there are one each classified by the Louisiana Department of Transportation and Development (LDOTD) as irrigation, industrial, domestic, and other. The wells are located in 7 parishes from the central and southwest areas of the state.

Figure 4-1 shows the geographic locations of the Evangeline aquifer and the associated wells, whereas Table 4-1 lists the wells in the aquifer along with their total depths, use made of produced waters, and date sampled.

Well data for registered water wells were obtained from the Louisiana Department of Transportation and Development's Water Well Registration Data file.

GEOLOGY

The Evangeline aquifer is comprised of unnamed Pliocene sands and the Pliocene-Miocene Blounts Creek member of the Fleming formation. The Blounts Creek consists of sands, silts, and silty clays, with some gravel and lignite. The sands of the aquifer are moderately well to well sorted and fine to medium grained with interbedded coarse sand, silt, and clay. The mapped outcrop corresponds to the outcrop of the Blounts Creek member, but downdip, the aquifer thickens and includes Pliocene sand beds that do not outcrop. The confining clays of the Castor Creek member (Burkeville aquiclude) retard the movement of water between the Evangeline and the underlying Miocene aquifer systems. The Evangeline is separated in most areas from the overlying Chicot aquifer by clay beds; in some areas the clays are missing and the upper sands of the Evangeline are in direct contact with the lower sands and gravels of the Chicot.

HYDROGEOLOGY

Recharge to the Evangeline aquifer occurs by the direct infiltration of rainfall in interstream, upland outcrop areas and the movement of water through overlying terrace deposits, as well as leakage from other aquifers. Fresh water in the Evangeline is separated from water in stratigraphically equivalent deposits in southeast Louisiana by a saltwater ridge in the Mississippi River valley. The hydraulic conductivity of the Evangeline varies between 20 and 100 feet/day.

The maximum depths of occurrence of fresh water in the Evangeline range from 150 feet above sea level, to 2,250 feet below sea level. The range of thickness of the fresh water interval in the Evangeline is 50 to 1,900 feet. The depths of the Evangeline wells that were monitored in conjunction with the BMP range from 170 to 1,715 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 4-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 4-3. 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 AL-363 and EV-858.

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 4-8, 4-9 and 4-10 list the target analytes for volatiles, semi-volatiles, and pesticides/PCBs, respectively.

Tables 4-4 and 4-5 provide a statistical overview of field, conventional, and inorganic (total metals) data for the Evangeline aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2010 sampling. Tables 4-6 and 4-7 compare these same parameter averages to historical ASSET-derived data for the Evangeline 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 non-detects. Per Departmental policy concerning statistical analysis, one-half of the detection limit (DL) is used in place of zero when non-detects are encountered. However, the minimum value is reported as less than the DL, not one-half the DL. If all values for a particular analyte are reported as non-detect, then the minimum, maximum, and average values are all reported as less than the DL. For contouring purposes, one-half the DL is also used for non-detects in the figures and charts referenced below.

Figures 4-2, 4-3, 4-4, and 4-5, respectively, represent the contoured data for pH, total dissolved solids, chloride, and iron. Charts 4-1 through 4-16 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 4-2 and 4-3 show that at least one secondary MCL (SMCL) was exceeded in 5 of the 12 wells sampled in the Evangeline aquifer.

Field and Conventional Parameters

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

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 4-2 shows that no primary MCL was exceeded for field or conventional parameters for this reporting period. Those ASSET wells reporting turbidity levels greater than 1.0 NTU do not exceed the Primary MCL of 1.0, as this standard applies to public supply water wells that are under the direct influence of surface water. The Louisiana Department of Health and Hospitals has determined that no public water supply well in Louisiana was in this category.

Federal Secondary Drinking Water Standards: A review of the analysis listed in Table 4-2 shows that three wells exceeded the SMCL for pH, two wells exceeded the SMCL for total dissolved solids, and one well exceeded the SMCL for color. Laboratory results override field results in exceedance determinations, thus only lab 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):

AL-120 – 8.74 SU
AL-363 – 8.99 SU, Duplicate – 8.99 SU
BE-512 – 8.74 SU

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
AV-441	1,160 mg/L	0.752 g/L
EV-858	1,320 mg/L, Duplicate – 1,330 mg/L	0.850 g/L (Original and Duplicate)

Color (SMCL = 15 PCU):

EV-858 – 24 PCU, Duplicate – 24 PCU

Inorganic (Total Metals) Parameters

Table 4-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 4-5 provides an overview of inorganic data for the Evangeline aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 4-3 shows that no primary MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards: A review of the analyses listed on Table 4-3 shows that no SMCL was exceeded for total metals.

Volatile Organic Compounds

Table 4-8 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.

Chloromethane was detected in wells AL-363, AL-373, and AL-391 at <1.0 ug/L. Because chloromethane was detected at this low concentration, and due to there being no MCL established for this compound, and because chloroform is a common lab contaminant, these wells were not resampled to confirm the occurrence of chloroform. Well owners were given reports of these results and close attention will be given to the occurrence of this compound in upcoming regular sampling activities. In the FY 2007 sampling, well AL-373 reported a low level of chloroform at 2.06 ug/L, but was not detected in the current sampling. No other VOC was detected at or above its respective detection limit during the FY 2010 sampling of the Evangeline aquifer.

Semi-Volatile Organic Compounds

Table 4-9 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 detections of a SVOC at or above its detection limit during the FY 2010 sampling of the Evangeline aquifer.

Pesticides and PCBs

Table 4-10 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 detections of a pesticide or PCB at or above its detection limit during the FY 2010 sampling of the Evangeline 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 aquifer exhibit some changes when comparing current data to that of the five previous sampling rotations (three, six, nine, twelve, and fifteen years prior). These comparisons can be found in Tables 4-6 and 4-7, and in Charts 4-1 to 4-16 of this summary. Over the fifteen-year period data averages show that eight analytes have shown a general increase in concentration. These analytes are: pH, salinity, chloride, sulfate, TDS, ammonia, total phosphorous, and barium. For this same time period, the average concentrations for nine analytes have demonstrated a decrease. These are: temperature, specific conductance (field and lab), alkalinity, color, hardness, iron, copper, and zinc. The remaining analytes exhibit stable values or are non-detect.

The current number of wells with SMCL exceedances is less than the previous sampling event in FY 2007. In FY 2007, seven wells reported at least one SMCL exceedance with a total of seven exceedances. In FY 2010, five wells reported at least one exceedance with a total of six exceedances.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is generally soft[1] and is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no well that was sampled for this reporting period exceeded a primary MCL. The data also show that this aquifer is of good quality when considering taste, odor, or appearance guidelines. A comparison to historical ASSET data show that eight analytes have increased in their average concentrations and nine have decreased while all other analytes demonstrate only subtle fluctuations or have remained non-detect

It is recommended that the ASSET wells assigned to the Evangeline aquifer be re-sampled as planned in approximately three years. In addition, several wells should be added to the 12 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 4-1: List of Wells Sampled, Evangeline Aquifer–FY 2010

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
AL-120	ALLEN	1/19/2010	CITY OF OAKDALE	910	PUBLIC SUPPLY
AL-363	ALLEN	1/26/2010	WEST ALLEN PARISH WATER DIST.	1715	PUBLIC SUPPLY
AL-373	ALLEN	1/26/2010	TOWN OF OBERLIN	747	PUBLIC SUPPLY
AL-391	ALLEN	1/20/2010	FAIRVIEW WATER SYSTEM	800	PUBLIC SUPPLY
AV-441	AVOYELLES	1/20/2010	TOWN OF EVERGREEN	319	PUBLIC SUPPLY
BE-410	BEAUREGARD	1/26/2010	BOISE CASCADE	474	INDUSTRIAL
BE-512	BEAUREGARD	1/26/2010	SINGER WATER DISTRICT	918	PUBLIC SUPPLY
CU-1362	CALCASIEU	1/26/2010	LA WATER CO	635	PUBLIC SUPPLY
EV-858	EVANGELINE	1/19/2010	SAVOY SWORDS WATER SYSTEM	472	PUBLIC SUPPLY
R-1350	RAPIDES	1/19/2010	PRIVATE OWNER	180	IRRIGATION
V-5065Z	VERNON	3/17/2010	PRIVATE OWNER	170	DOMESTIC
V-668	VERNON	1/20/2010	LDWF/FORT POLK WMA HQ	280	OTHER

Table 4-2: Summary of Field and Conventional Data, Evangeline Aquifer–FY 2010

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	1.25	1	10	1/5	4	4	0.3	1	5	0.01	0.3	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AL-120	22.71	8.74	0.288	0.14	0.187	142	3.5	11	299	6.7	291	< 4	< 0.3	< 1	< 5	< 0.01	< 0.3	0.194
AL-363	20.42	8.99	0.490	0.24	0.318	246	3.5	5	464	< 5	459	< 4	< 0.3	< 1	< 5	< 0.01	< 0.3	0.445
AL-363*	20.42	8.99	0.490	0.24	0.318	250	3.5	6	482	< 5	477	< 4	< 0.3	< 1	< 5	< 0.01	< 0.3	0.463
AL-373	22.64	7.94	0.307	0.15	0.200	160	11.2	7	308	< 5	301	< 4	< 0.3	< 1	< 5	< 0.01	< 0.3	< 0.05
AL-391	21.52	8.09	0.227	0.11	0.148	120	7.9	7	233	5.4	228	< 4	< 0.3	< 1	< 5	< 0.01	0.35	0.096
AV-441	19.68	7.54	1.157	0.58	0.752	430	103.0	11	1,170	70.2	1,160	< 4	< 0.3	< 1	< 5	< 0.01	< 0.3	0.092
BE-410	25.31	8.37	0.374	0.18	0.243	82	5.2	< 1	179	< 5	162	< 4	< 0.3	< 1	< 5	0.054	< 0.3	0.116
BE-512	23.47	8.74	0.328	0.16	0.213	162	5.2	< 1	308	5.1	294	< 4	< 0.3	< 1	< 5	< 0.01	< 0.3	0.202
CU-1362	22.15	7.44	0.273	0.13	0.177	116	15.6	< 1	264	< 5	250	< 4	< 0.3	< 1	< 5	< 0.01	< 0.3	0.425
EV-858	20.83	7.63	1.308	0.66	0.850	370	205.0	24	1,320	< 5	1,320	< 4	0.36	< 1	< 5	< 0.01	< 0.3	0.417
EV-858*	20.83	7.63	1.308	0.66	0.850	372	210.0	24	1,360	< 5	1,330	< 4	0.35	< 1	< 5	< 0.01	< 0.3	0.355
R-1350	19.26	6.73	0.070	0.03	0.045	16	3.5	6	81	5.7	79	< 4	1.04	< 1	< 5	< 0.01	< 0.3	< 0.05
V-5065Z	18.02	7.57	0.077	0.04	0.050	30	4.7	9	77	1.0	69	< 4	< 0.3	< 0.05	< 5	0.037	< 0.3	< 0.05
V-668	22.71	7.36	0.034	0.01	0.022	6	3.4	4	38	< 5	35	< 4	< 0.3	< 1	< 5	< 0.01	0.42	0.080

*Denotes Duplicate Sample Shaded cells exceed EPA Secondary Standards

Table 4-3: Summary of Inorganic Data (Total Metals), Evangeline Aquifer–FY 2010

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	5	4	5	2	2	4	2	100	1	0.0002	3	5	1	2	6
AL-120	<5	< 4	8.3	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
AL-363	<5	< 4	9.2	< 2	< 2	< 4	3.69	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
AL-363*	<5	< 4	9.7	< 2	< 2	< 4	2.28	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
AL-373	<5	4.62	12.3	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
AL-391	<5	< 4	111.0	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
AV-441	<5	< 4	84.5	< 2	< 2	< 4	2.22	191	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
BE-410	<5	< 4	141.0	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
BE-512	<5	< 4	15.7	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	7.5
CU-1362	<5	< 4	168.0	< 2	< 2	< 4	2.67	227	< 1	< 0.0002	<3	< 5	< 1	< 2	11.6
EV-858	<5	< 4	425.0	< 2	< 2	< 4	16.40	225	< 1	< 0.0002	<3	< 5	< 1	< 2	15.4
EV-858*	<5	< 4	428.0	< 2	< 2	< 4	16.50	198	< 1	< 0.0002	<3	< 5	< 1	< 2	6.4
R-1350	<5	< 4	12.6	< 2	< 2	< 4	< 2	211	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6
V-5065Z	<5	< 4	70.3	< 2	< 2	< 4	6.92	< 100	< 1	< 0.0002	11.5	< 5	< 1	< 2	10.1
V-668	<5	< 4	39.3	< 2	< 2	< 4	4.08	< 100	< 1	< 0.0002	<3	< 5	< 1	< 2	< 6

*Denotes Duplicate Sample

Table 4-4: FY 2010 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	18.02	25.31	21.43
	pH (SU)	6.73	8.99	7.98
	Specific Conductance (mmhos/cm)	0.034	1.308	0.481
	Salinity (ppt)	0.01	0.66	0.24
	TDS (g/L)	0.02	0.85	0.31
LABORATORY	Alkalinity (mg/L)	6.0	430.0	178.7
	Chloride (mg/L)	3.4	210.0	41.8
	Color	<1	24.0	8.3
	Specific Conductance (umhos/cm)	38	1,360.0	470.2
	Sulfate (mg/L)	1.0	70.2	8.2
	TDS (mg/L)	35.0	1,330.0	461.1
	TSS (mg/L)	< 4	< 4	< 4
	Turbidity (NTU)	< 0.3	1.04	< 0.3
	Ammonia, as N (mg/L)	< 1	< 1	< 1
	Hardness (mg/L)	<5	<5	<5
	Nitrite - Nitrate, as N (mg/L)	< 0.010	0.054	0.010
	TKN (mg/L)	< 0.3	< 0.3	< 0.3
	Total Phosphorus (mg/L)	< 0.05	0.463	0.210

Table 4-5: FY 2010 Inorganic (Total Metals) Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	<5	<5	<5
Arsenic (ug/L)	<4	4.62	<4
Barium (ug/L)	8	428	110
Beryllium (ug/L)	<2	<2	<2
Cadmium (ug/L)	<2	<2	<2
Chromium (ug/L)	<4	<4	<4
Copper (ug/L)	<2	16.50	4.34
Iron (ug/L)	<100	227	107
Lead (ug/L)	<1	<1	<1
Mercury (ug/L)	<0.0002	<0.0002	<0.0002
Nickel (ug/L)	<3	11.50	<3
Selenium (ug/L)	<5	<5	<5
Silver (ug/L)	<1	<1	<1
Thallium (ug/L)	<2	<2	<2
Zinc (ug/L)	<6	15.4	<6

Table 4-6: 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
FIELD	Temperature (^{O}C)	23.71	22.87	21.33	22.69	22.44	21.43
	pH (SU)	7.14	7.08	7.05	7.54	8.06	7.98
	Specific Conductance (mmhos/cm)	0.50	0.50	0.30	0.32	0.46	0.48
	Salinity (Sal.) (ppt)	0.22	0.21	0.14	0.15	0.22	0.24
	TDS (Total dissolved solids) (g/L)	-	-	-	0.21	0.30	0.31
LABORATORY	Alkalinity (Alk.) (mg/L)	205.8	192.8	176.7	137.2	175.8	178.7
	Chloride (Cl) (mg/L)	15.2	27.0	38.3	18.1	37.3	41.8
	Color (PCU)	23.3	6.7	8.2	7.5	-	8.3
	Specific Conductance (umhos/cm)	489.6	453.8	446.1	322.3	445.7	470.2
	Sulfate (SO4) (mg/L)	4.71	4.40	5.73	5.43	5.4	8.2
	TDS (Total dissolved solids) (mg/L)	308.4	324.8	263.7	209.4	289	461.1
	TSS (Total suspended solids) (mg/L)	<4	<4	<4	<4	<4	< 4
	Turbidity (Turb.) (NTU)	<1	<1	<1	1.04	<1	< 0.3
	Ammonia, as N (NH3) (mg/L)	0.20	0.16	0.22	0.15	0.20	< 1
	Hardness (mg/L)	16.1	11.1	31.9	22.6	27.9	<5
	Nitrite - Nitrate , as N (mg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	0.01
	TKN (mg/L)	0.72	0.16	0.69	0.28	0.25	< 0.3
	Total Phosphorus (P) (mg/L)	0.16	0.15	0.17	0.10	0.16	0.21

Table 4-7: Triennial Inorganic (Total Metals) Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR					
	FY 1995	FY 1998	FY 2001	FY 2004	FY 2007	FY 2010
Antimony (ug/L)	<5	-	<5	<5	<1	<5
Arsenic (ug/L)	<5	<5	<5	<5	<3	<4
Barium (ug/L)	62.7	41.4	127.0	85.4	127.9	110.0
Beryllium (ug/L)	<2	<2	<2	<1	<1	<2
Cadmium (ug/L)	<2	<2	<2	<1	<0.5	<2
Chromium (ug/L)	<5	<5	<5	<5	<3	<4
Copper (ug/L)	25.1	48.6	7.9	6.6	3.4	4.3
Iron (ug/L)	203.1	104.5	160.7	267.4	178.0	107.0
Lead (ug/L)	<10	<10	<10	<10	<3	<1
Mercury (ug/L)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.0002
Nickel (ug/L)	8.1	<5	<5	<5	<3	<3
Selenium (ug/L)	<5	<5	<5	<5	<4	<5
Silver (ug/L)	<1	1.19	<1	<1	<0.5	<1
Thallium (ug/L)	<5	<5	<5	<5	<1	<2
Zinc (ug/L)	134.2	106.6	15.2	26.8	15.5	<6

Table 4-8: 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 4-9: 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
N-NITROSODIPHENYLAMINE	625	5

Table 4-9: SVOCs (Continued)

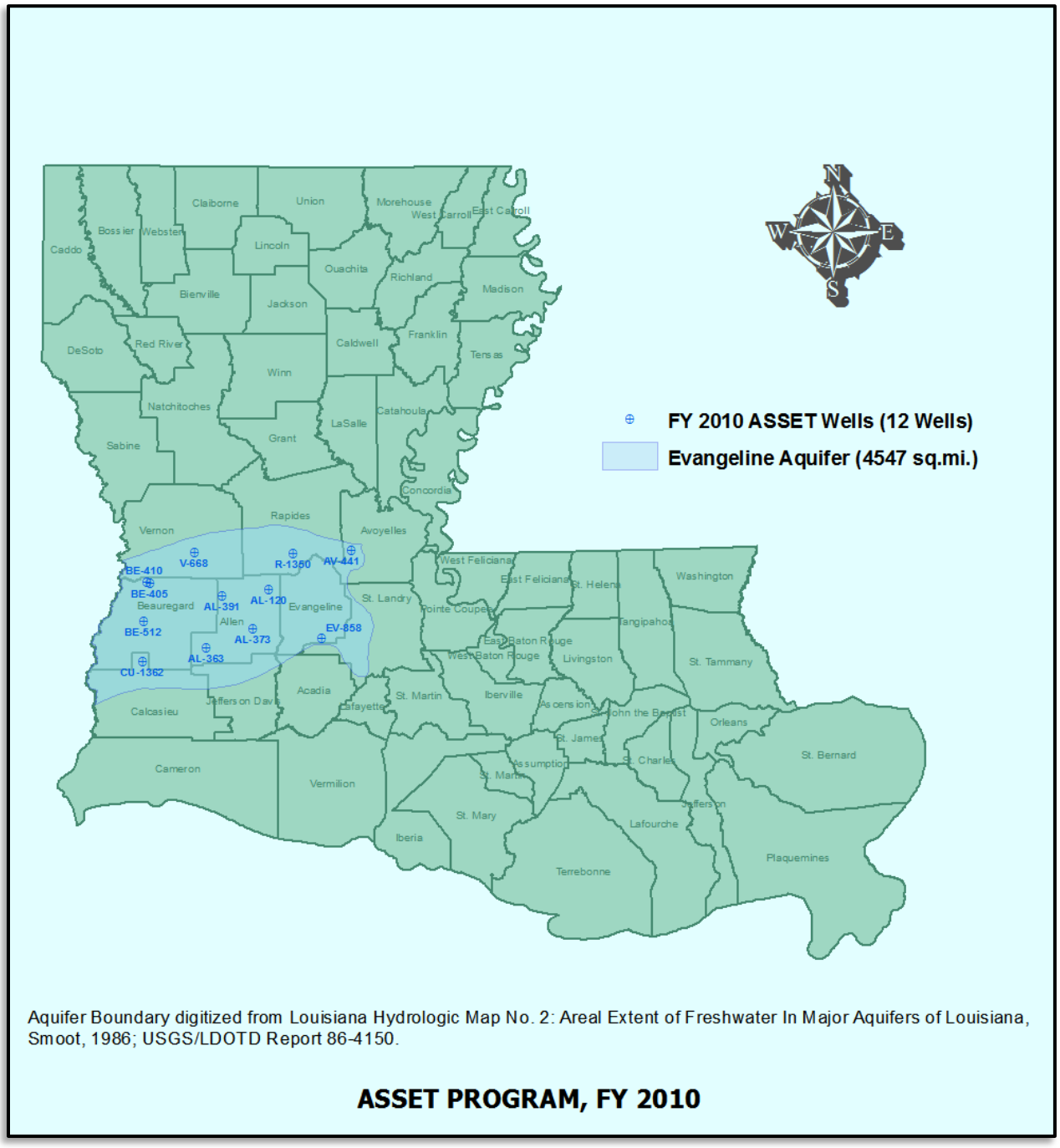
COMPOUND	METHOD	DETECTION LIMIT (ug/L)
PENTACHLOROBENZENE	625	5
PENTACHLOROPHENOL	625	10
PHENANTHRENE	625	5
PHENOL	625	5
PYRENE	625	5
TETRACHLOROBENZENE(S), TOTAL	625	10

.

Table 4-10: 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 4-1: Location Plat, Evangeline 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 4-2: Map of pH Data

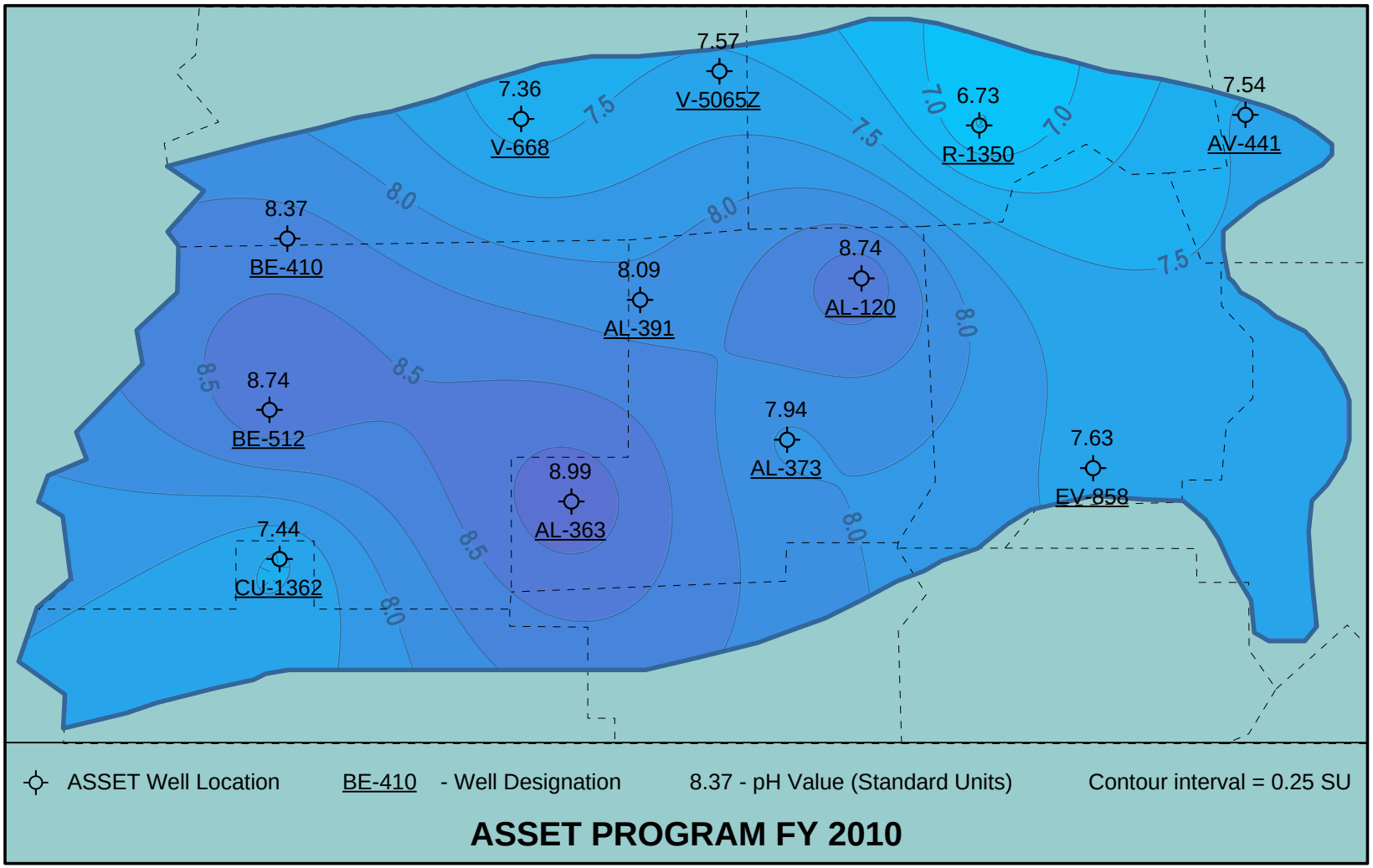

Figure 4-3: Map of TDS Lab Data

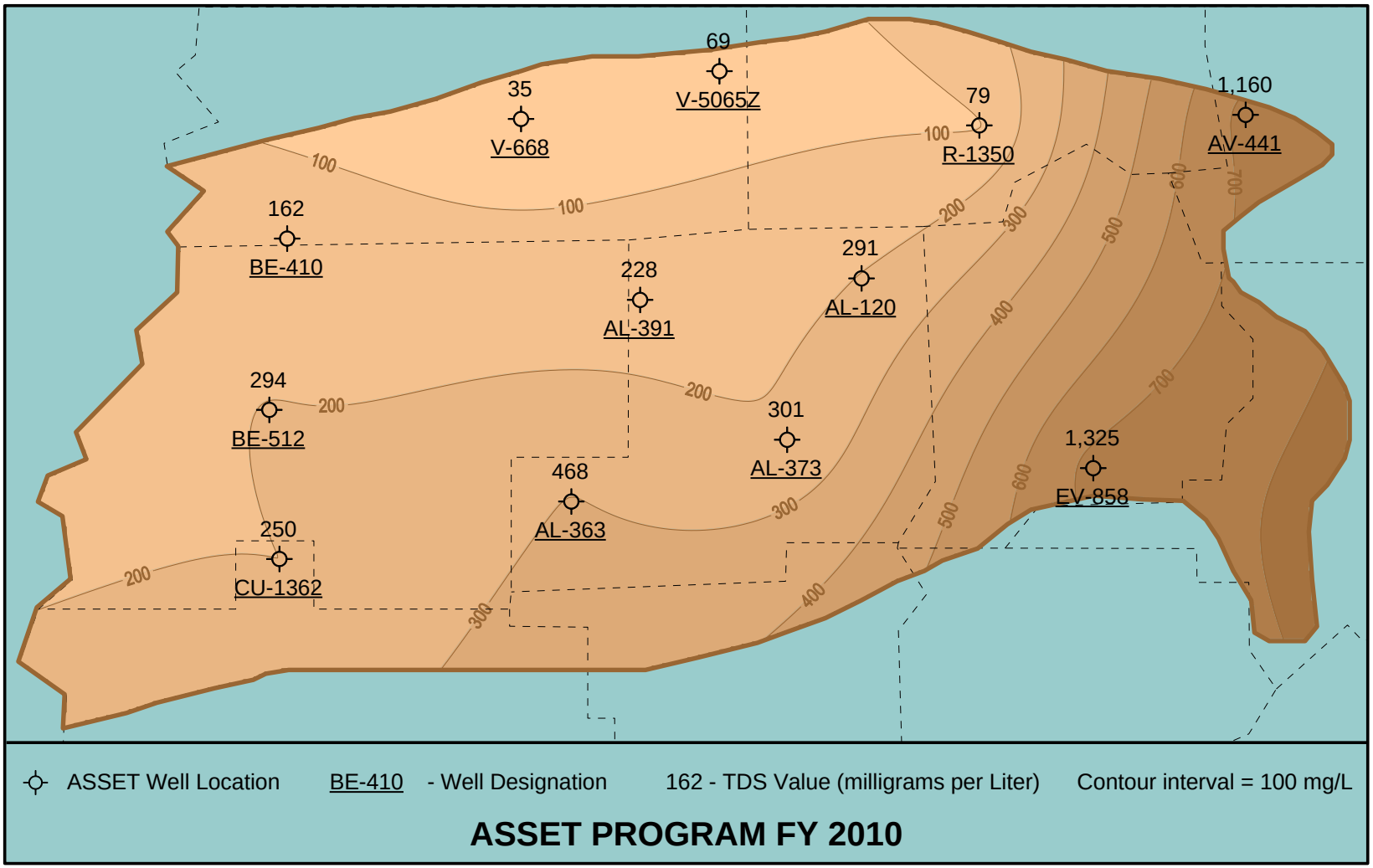

Figure 4-4: Map of Chloride Data

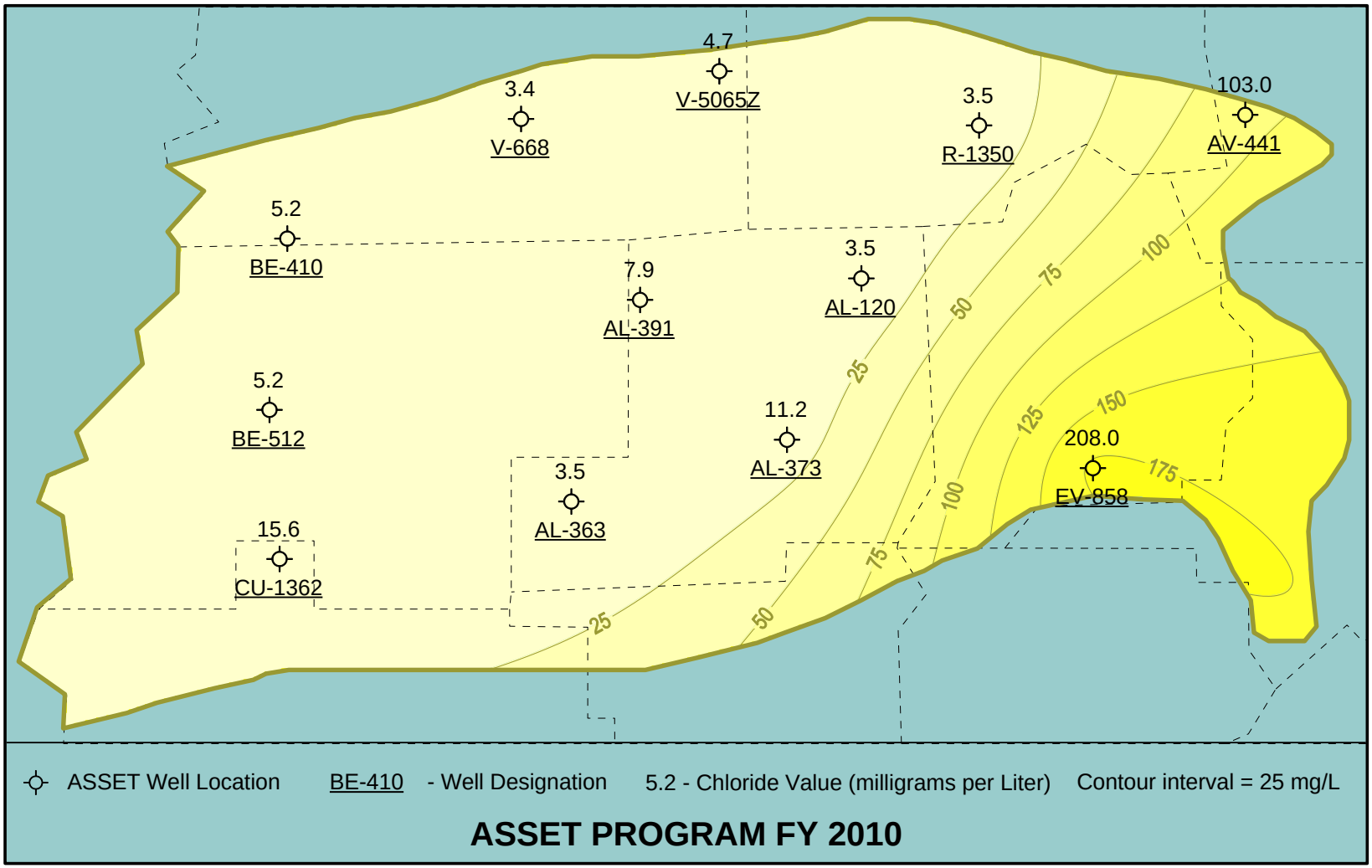

Figure 4-5: Map of Iron Data

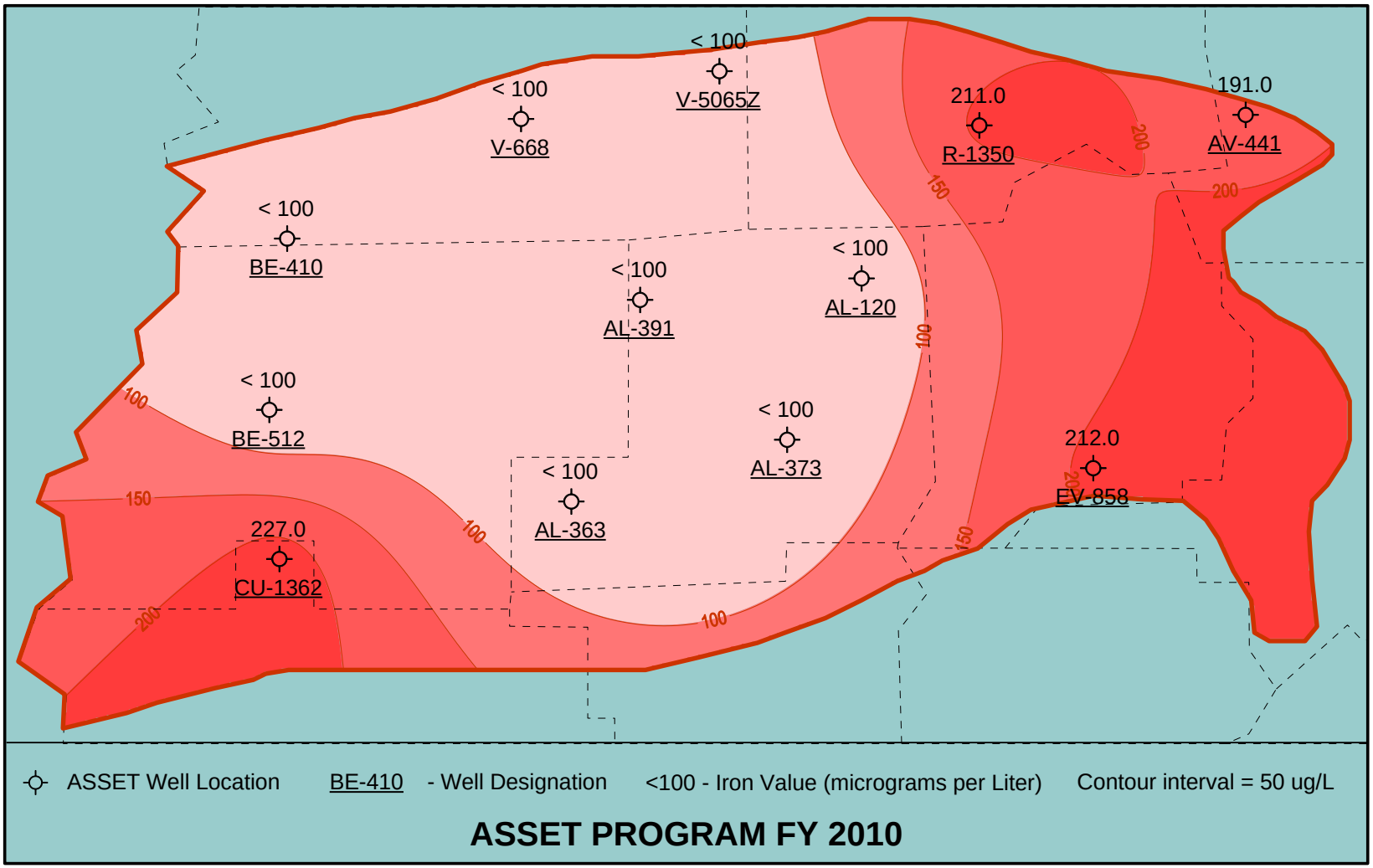

Chart 4-1: Temperature Trend

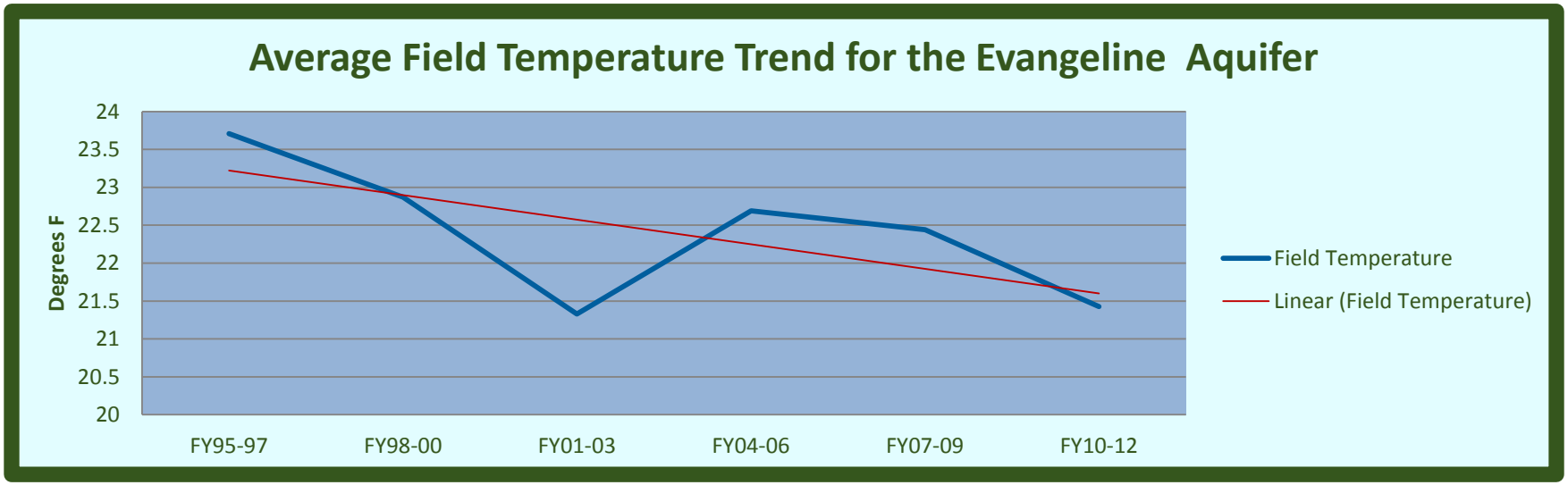

Chart 4-2: pH Trend

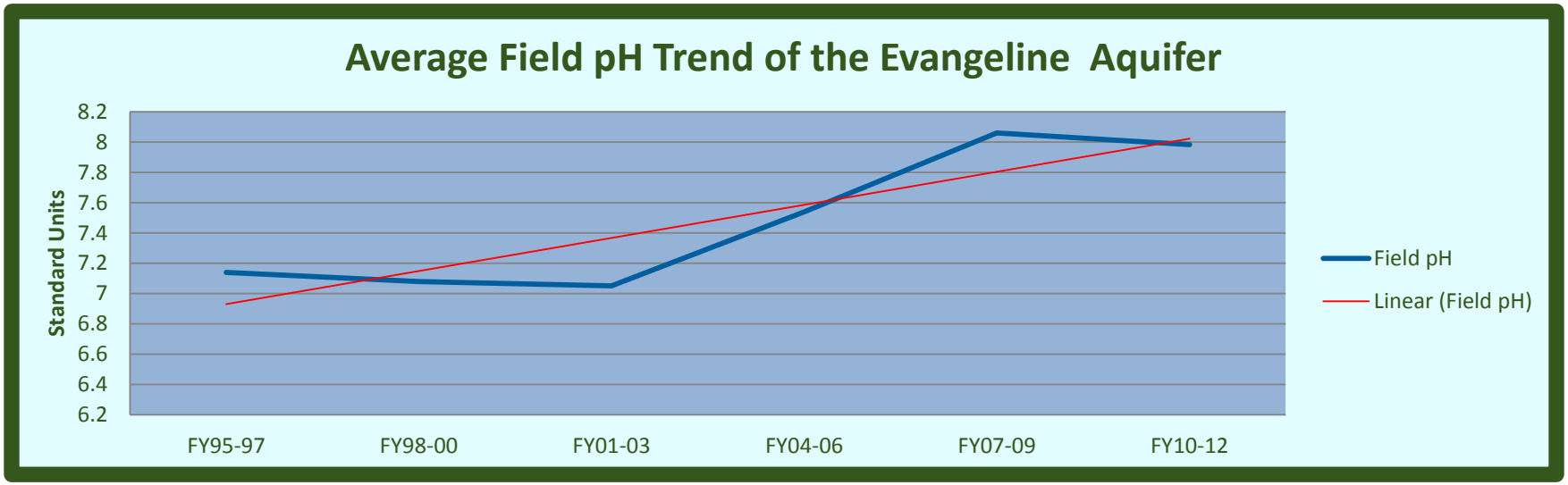

Chart 4-3: Field Specific Conductance Trend

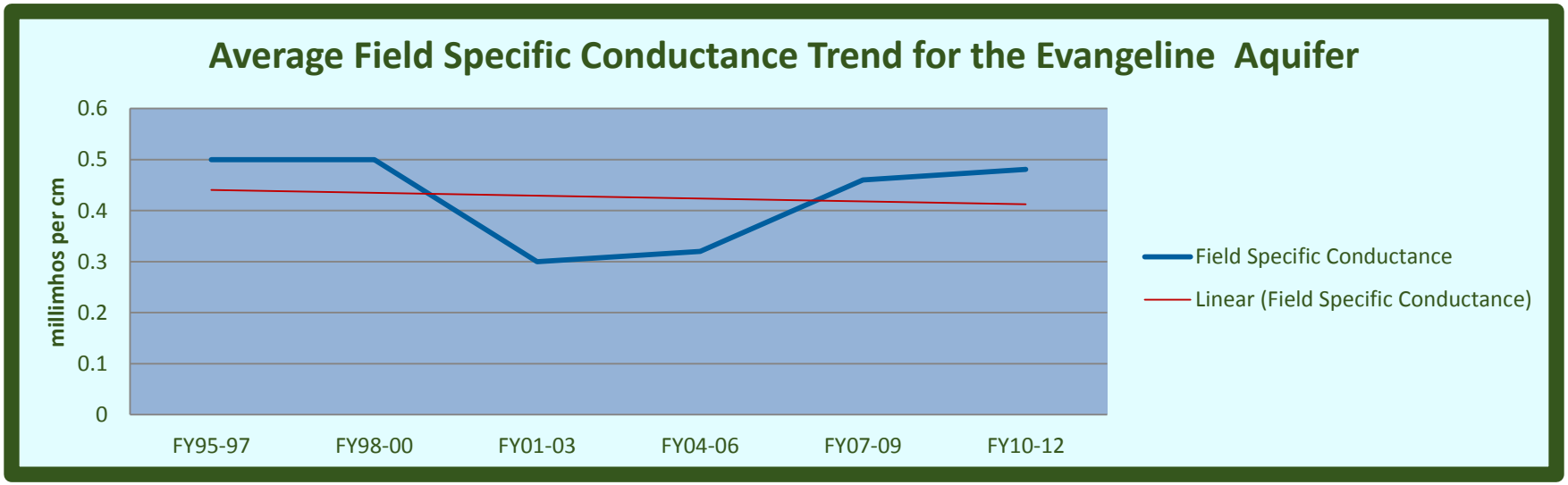

Chart 4-4: Lab Specific Conductance Trend

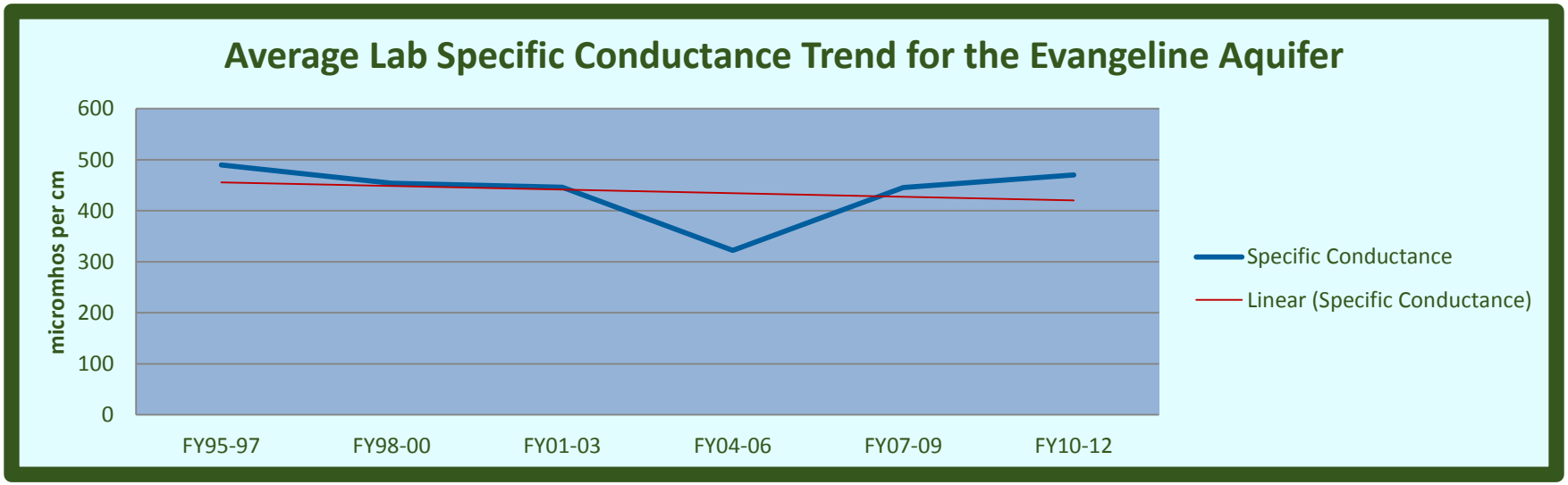

Chart 4-5: Field Salinity Trend

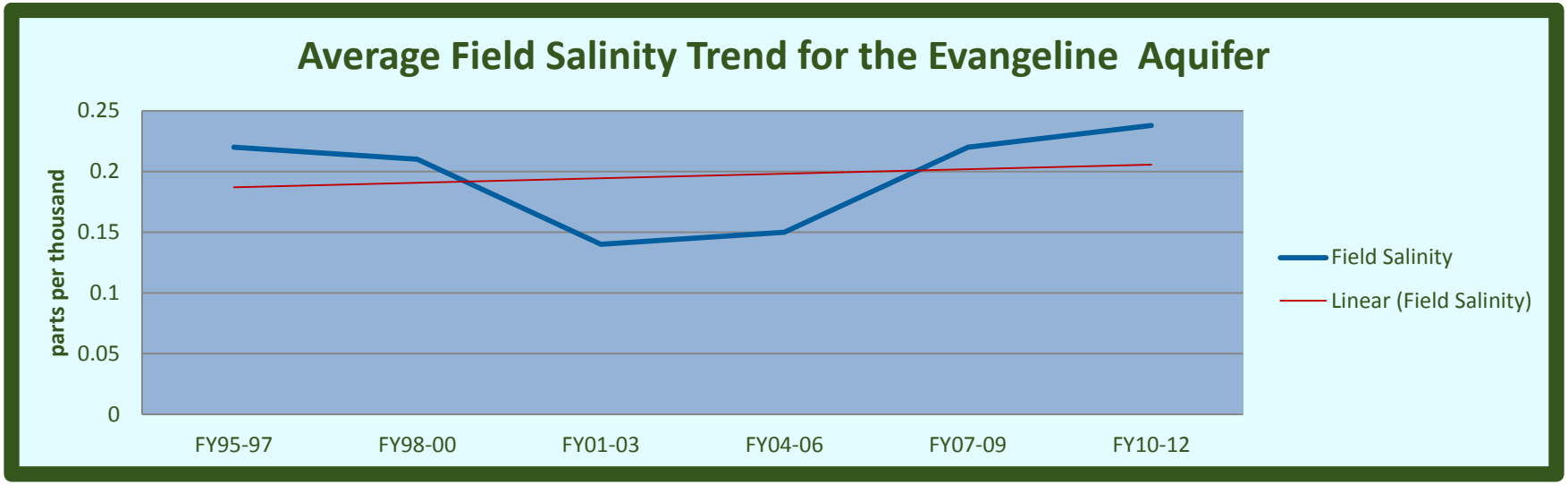

Chart 4-6: Alkalinity Trend

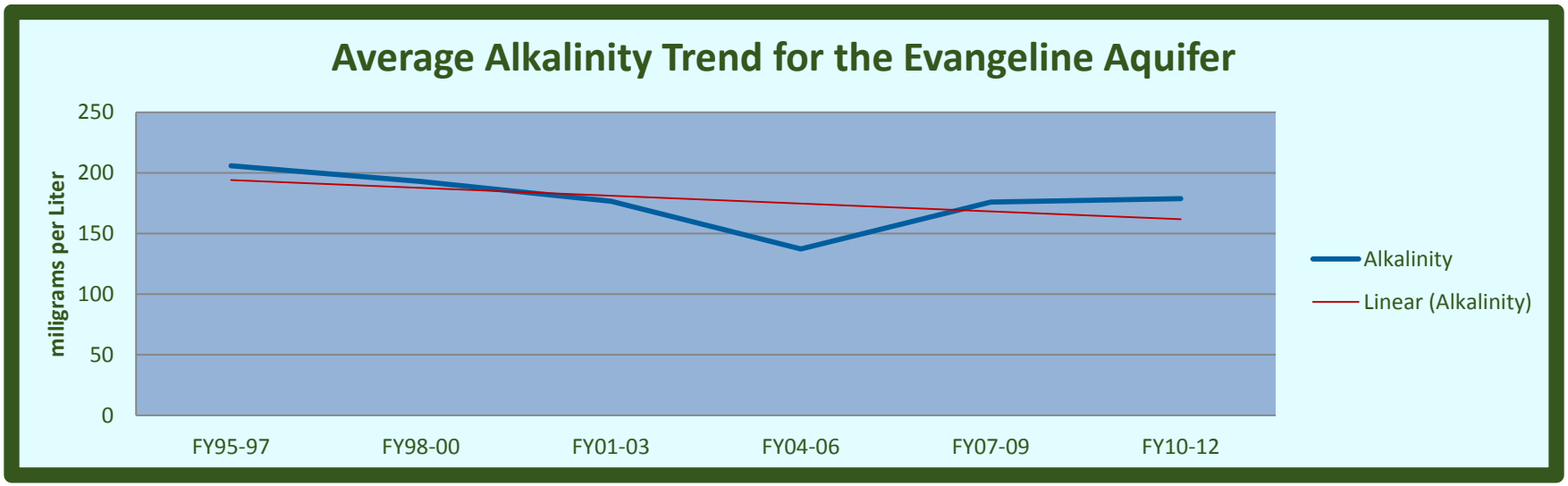

Chart 4-7: Chloride Trend

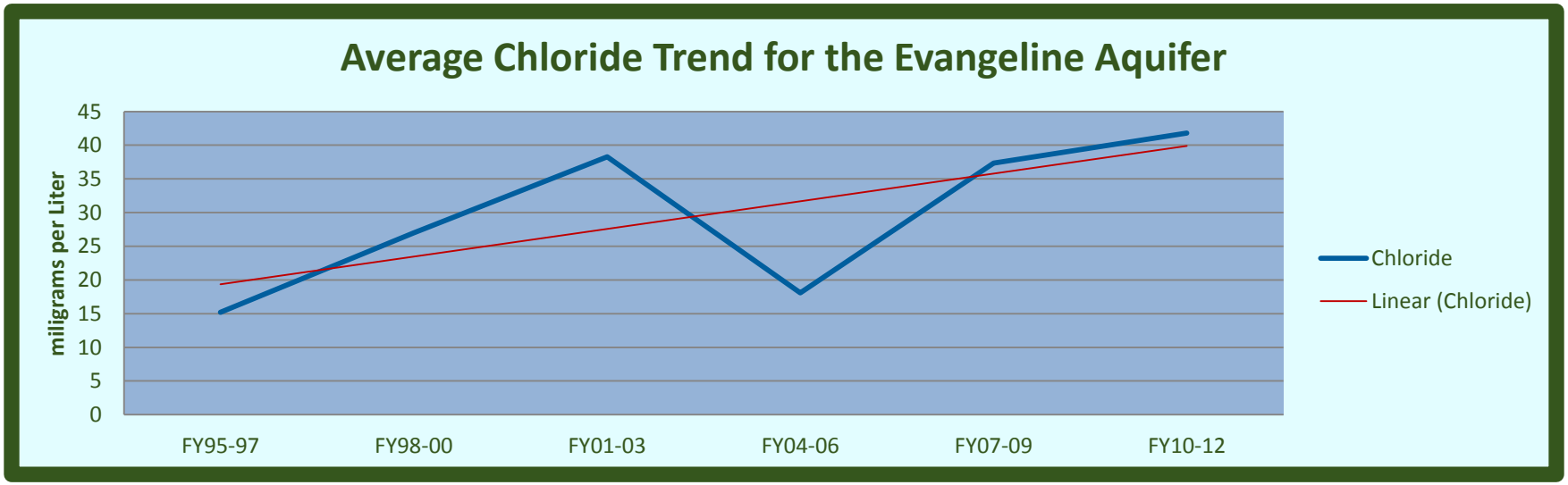

Chart 4-8: Color Trend

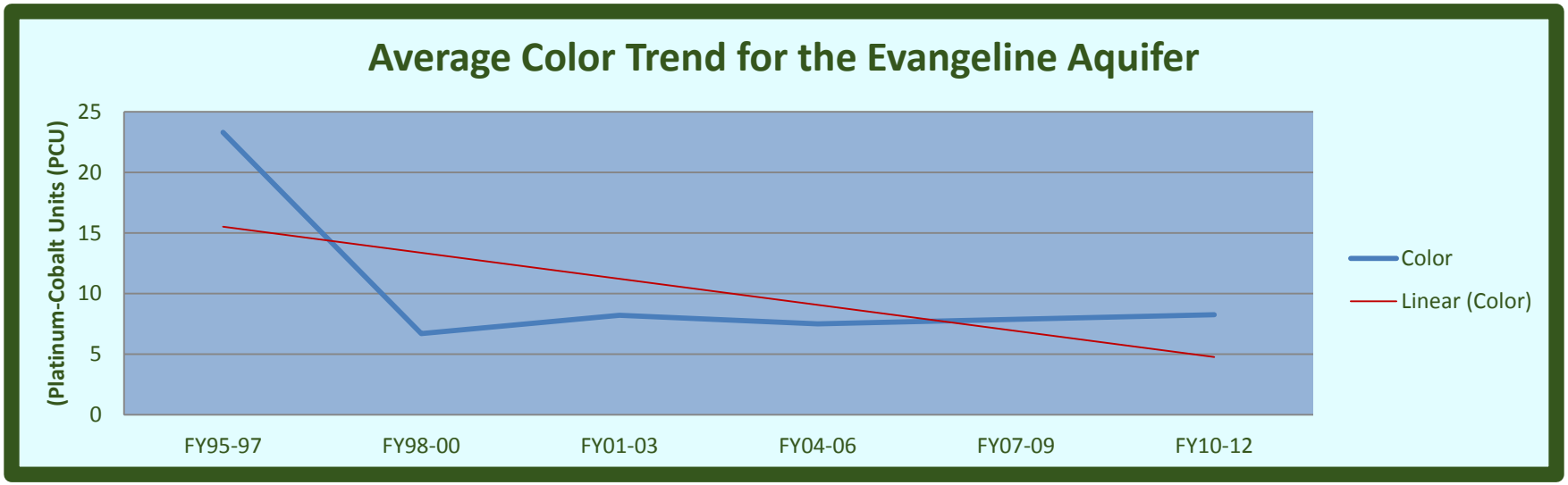

Chart 4-9: Sulfate Trend

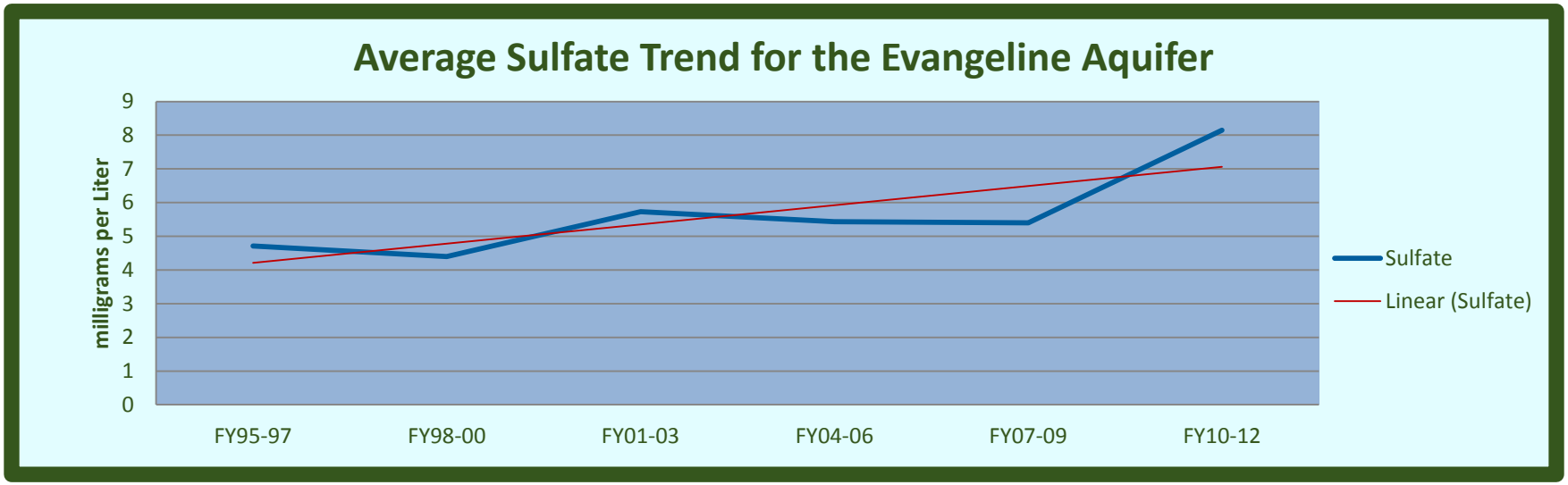

Chart 4-10: Total Dissolved Solids Trend

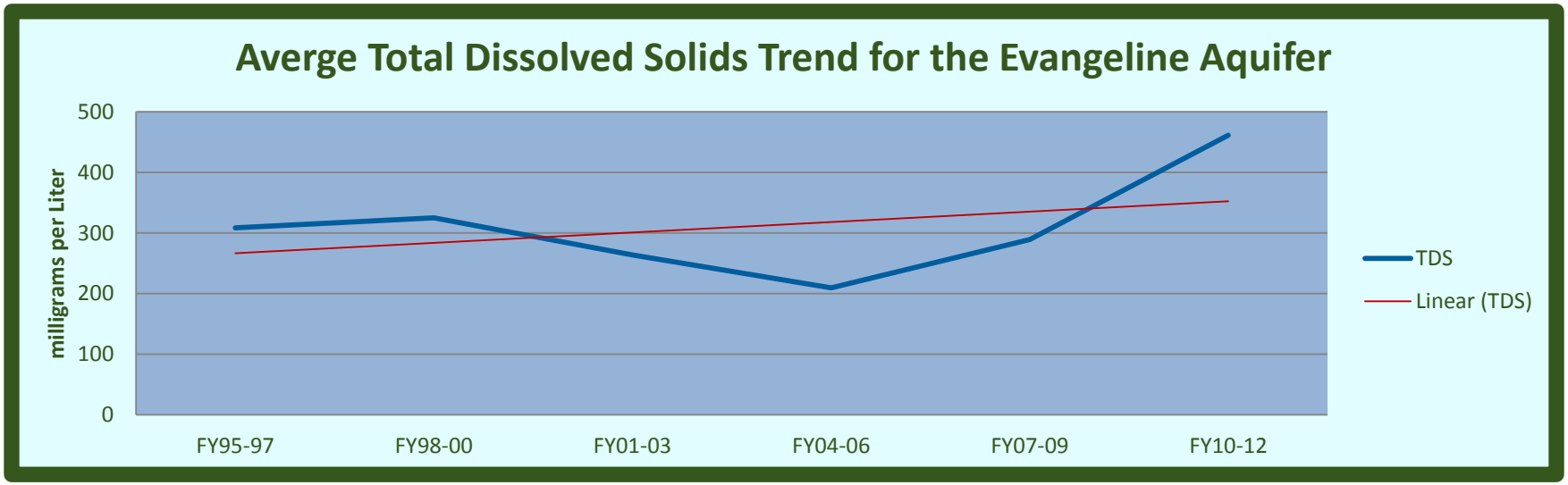

Chart 4-11: Ammonia Trend

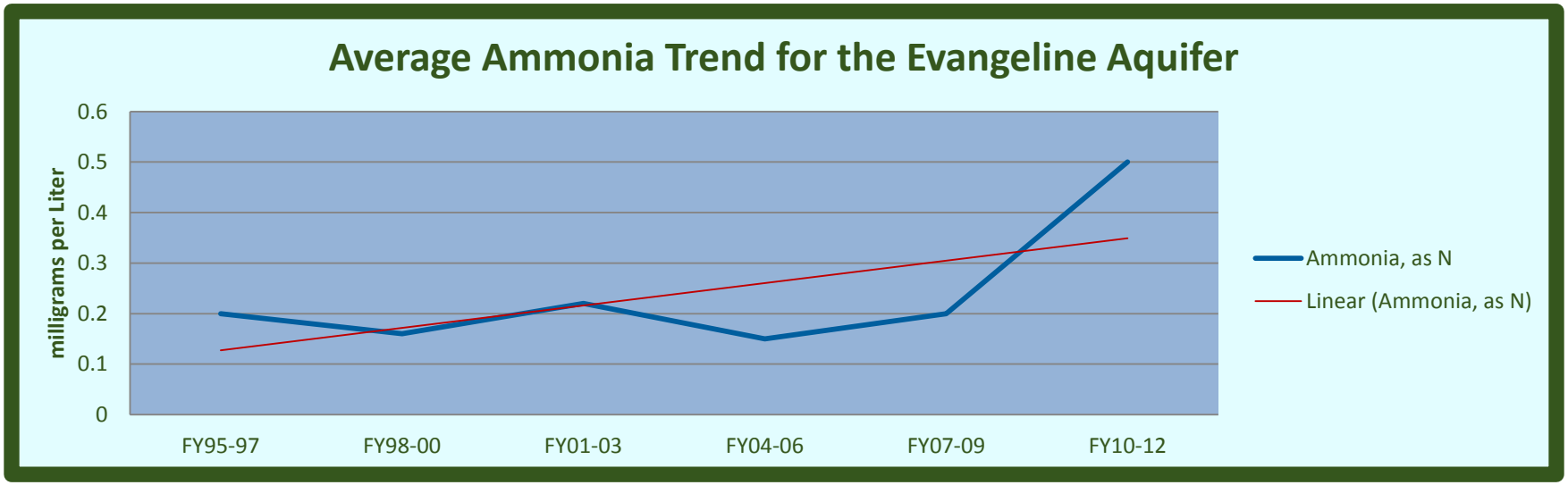

Chart 4-12: Hardness Trend

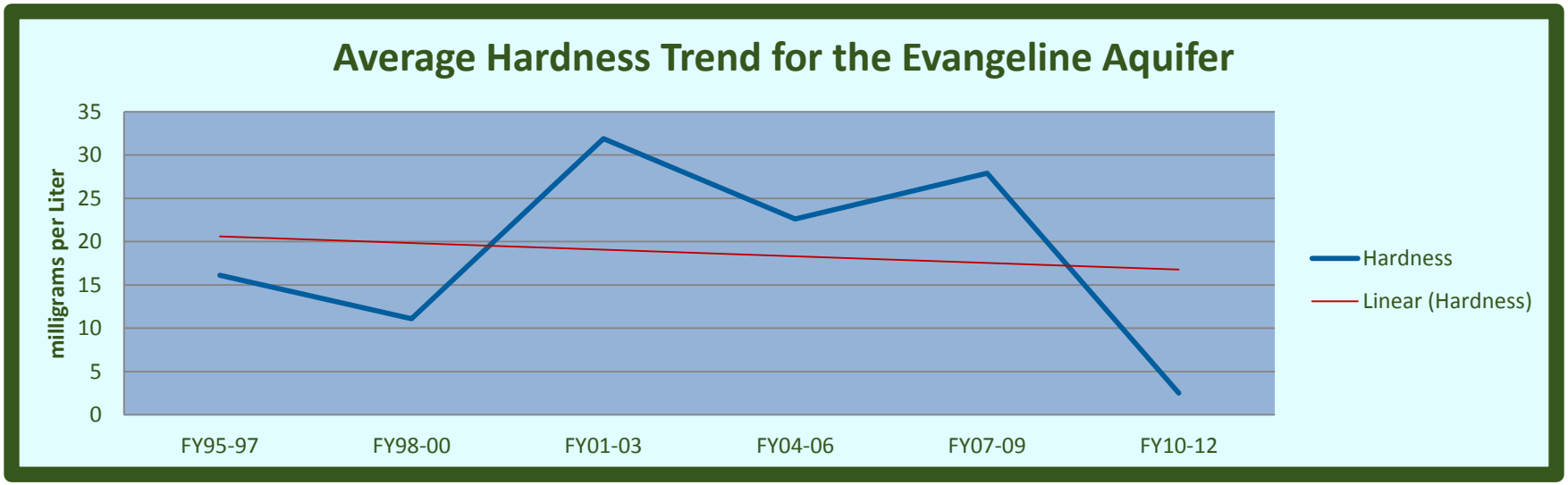

Chart 4-13: Nitrite – Nitrate Trend

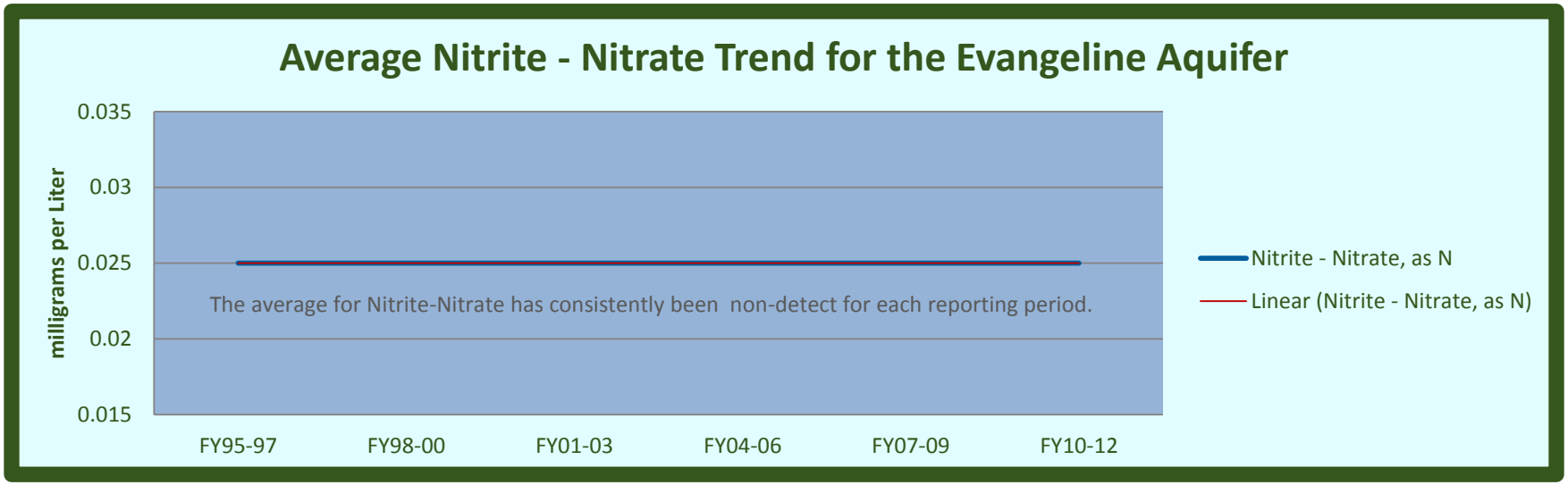

Chart 4-14: TKN Trend

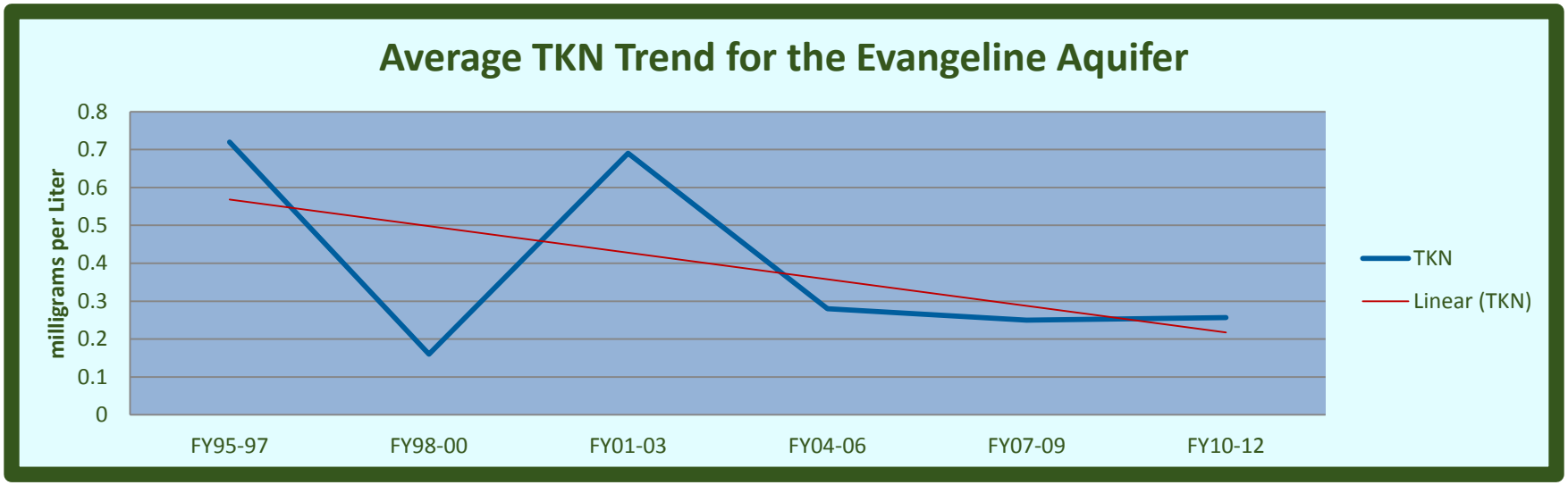

Chart 4-15: Total Phosphorus Trend

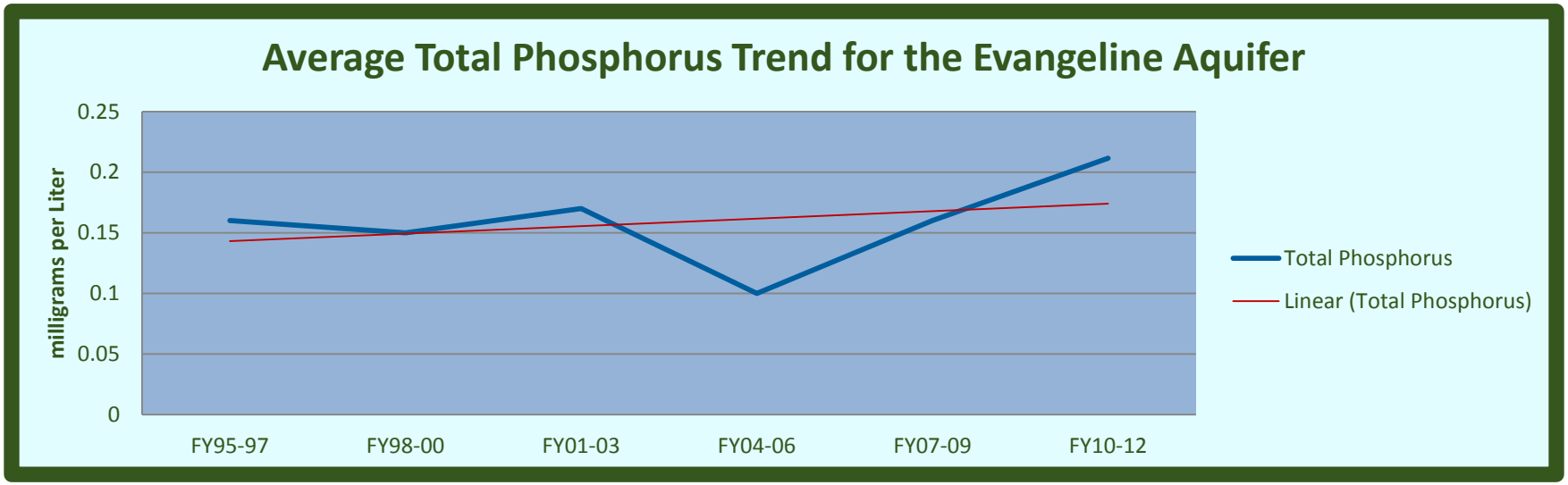

Chart 4-16: Iron Trend