EVANGELINE AQUIFER SUMMARY, 2013

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 4 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 Evangeline aquifer, during the 2013 state fiscal year (July 1, 2012 - June 30, 2013). This summary will become Appendix 4 of ASSET Program Triennial Summary Report for 2015.

These data show that 12 Evangeline aquifer wells were sampled in April, May, and September, 2013. Eight of these 12 are classified as public supply, while there are one each classified by the Louisiana Department of Natural Resources as irrigation, industrial, domestic, and other. The wells are located in seven 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 sampled 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 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 ASSET Program 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 well CU-1362.

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 2013 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 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 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 eight 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 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 four wells exceeded the SMCL for pH, three wells exceeded the SMCL for total dissolved solids, and two wells 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 – 8.92 SU	AL-363 – 9.11
AL-391 – 8.98 SU	BE-512 – 8.94 SU

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
AV-363	672 mg/L	0.326 g/L
AV-4441	1,420 mg/L	0.791 g/L
EV-858	712 mg/L	0.900 g/L

Color (SMCL = 15 PCU):

AL-363 – 43 PCU EV-858 – 27.7 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 two wells exceeded SMCL for iron.

Iron (SMCL = 300 µg/L):

CU-1362 – 310 µg/L, Duplicate - 311 µg/L R-135 – 565 µg/L

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.

There were no confirmed detections of a VOC at or above its detection limit during the FY 2013 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 2013 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 2013 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 show the same 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 4-6 and 4-7, and in Charts 4-1 to 4-16 of this summary. Over the eighteen-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, TKN, iron, copper, and zinc. The remaining analytes exhibit stable values or are non-detect. The parameter averages listed as decreasing or increasing are the same parameters as in the previous sampling in FY 2010.

The current number of wells with SMCL exceedances has increased from the previous sampling event in FY 2010. In FY 2010, five wells reported at least one SMCL exceedance with a total of six exceedances. In FY 2013, eight wells reported at least one exceedance with a total of 11 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 2013

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
AL-120	ALLEN	05/30/2013	CITY OF OAKDALE	910	PUBLIC SUPPLY
AL-363	ALLEN	05/09/2013	WEST ALLEN PARISH WATER DIST.	1715	PUBLIC SUPPLY
AL-373	ALLEN	08/14/2013	TOWN OF OBERLIN	747	PUBLIC SUPPLY
AL-391	ALLEN	05/10/2013	FAIRVIEW WATER SYSTEM	800	PUBLIC SUPPLY
AV-441	AVOYELLES	04/04/2013	TOWN OF EVERGREEN	319	PUBLIC SUPPLY
BE-410	BEAUREGARD	05/09/2013	BOISE CASCADE	474	INDUSTRIAL
BE-512	BEAUREGARD	05/09/2013	SINGER WATER DISTRICT	918	PUBLIC SUPPLY
CU-1362	CALCASIEU	09/09/2013	LA WATER CO	635	PUBLIC SUPPLY
EV-858	EVANGELINE	05/08/2013	SAVOY SWORDS WATER SYSTEM	472	PUBLIC SUPPLY
R-1350	RAPIDES	05/30/2013	PRIVATE OWNER	180	IRRIGATION
V-5065Z	VERNON	05/30/2013	PRIVATE OWNER	170	DOMESTIC
V-668	VERNON	05/28/2013	LDWF/FORT POLK WMA HQ	280	OTHER

Table 4-2: Summary of Field and Conventional Data, Evangeline Aquifer–FY 2013

Well ID	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† →						5	0.25/ 2.5	1	10	0.25/2.5	4	4	0.3	0.05	5	0.01	0.1	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AL-120	22.25	8.92	0.304	0.14	0.198	152	4.1	< DL	312	< DL	168	< DL	< DL	0.10	< DL	< DL	0.36	0.15
AL-363	25.32	9.11	0.502	0.24	0.326	282	3.8	43.0	535	1.98	672	< DL	< DL	0.14	< DL	< DL	0.16	0.46
AL-373	22.22	7.96	0.324	0.15	0.211	155	8.7	9.0	329	< DL	204	< DL	< DL	0.14	< DL	< DL	0.21	0.31
AL-391	19.14	8.98	0.237	0.11	0.154	118	5.0	5.0	243	0.30	244	< DL	< DL	0.28	32	< DL	0.34	< DL
AV-441	18.73	7.50	1.217	0.61	0.791	428	111.0	4.7	1,230	49.80	1,420	< DL	0.45	0.73	60	< DL	0.54	0.15
BE-410	20.60	8.13	0.182	0.09	0.119	72	5.6	< DL	209	2.31	172	< DL	< DL	< DL	60	0.04	0.11	0.10
BE-512	22.83	8.94	0.333	0.16	0.216	146	5.1	< DL	363	5.23	192	< DL	< DL	0.09	< DL	< DL	0.14	0.09
CU-1362	21.71	8.18	0.276	0.13	0.180	86	14.6	9.0	307	1.70	140	< DL	< DL	0.16	20	< DL	0.15	0.36
CU-1362*	21.71	8.18	0.276	0.13	0.180	84	14.5	5.0	307	1.69	156	< DL	< DL	0.16	32	< DL	0.16	0.33
EV-858	20.44	7.10	1.385	0.70	0.900	384	215.0	27.7	1,470	< DL	712	< DL	< DL	0.78	88	< DL	0.74	0.48
R-1350	18.98	7.29	0.072	0.03	0.047	14	3.9	< DL	734	5.27	124	< DL	0.47	0.13	20	< DL	0.24	< DL
V-5065Z	23.28	6.77	0.036	0.02	0.024	30	6.2	< DL	79	1.56	96	< DL	< DL	0.32	16	0.03	0.38	0.15
V-668	20.77	7.31	0.077	0.04	0.050	6	3.1	< DL	38	< DL	35	< DL	< DL	< DL	< DL	0.02	0.11	< DL

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

Table 4-3: Summary of Inorganic Data (Total Metals), Evangeline 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
AL-120	< DL	< DL	8.8	< DL	< DL	< DL	3.66	< DL	< DL	< DL	< DL	< DL	< DL	< DL	7.9
AL-363	< DL	< DL	9.4	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
AL-373	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
AL-391	< DL	< DL	101.0	< DL	< DL	< DL	< DL	229	< DL	< DL	< DL	< DL	< DL	< DL	< DL
AV-441	< DL	< DL	77.1	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
BE-410	< DL	< DL	139.0	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
BE-512	< DL	< DL	14.9	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
CU-1362	< DL	< DL	160.0	< DL	< DL	< DL	< DL	310	< DL	< DL	< DL	< DL	< DL	< DL	11.7
CU-1362*	< DL	< DL	163.0	< DL	< DL	< DL	< DL	311	< DL	< DL	< DL	< DL	< DL	< DL	9.9
EV-858	< DL	< DL	428.0	< DL	< DL	< DL	14.80	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
R-1350	< DL	< DL	13.3	< DL	< DL	< DL	< DL	565	< DL	< DL	< DL	< DL	< DL	< DL	< DL
V-5065Z	< DL	< DL	70.2	< DL	< DL	< DL	6.95	< DL	< DL	< DL	< DL	< DL	< DL	< DL	7.0
V-668	< DL	< DL	38.4	< DL	< DL	< DL	10.20	< DL	< DL	< DL	< DL	< DL	< DL	< DL	6.4

† Detection limits vary due to dilution factor *Denotes Duplicate Sample

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

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	18.73	25.32	21.38
	pH (SU)	6.77	9.11	8.03
	Specific Conductance (mmhos/cm)	0.036	1.385	0.402
	Salinity (ppt)	0.02	0.70	0.20
	TDS (g/L)	0.02	0.90	0.26
LABORATORY	Alkalinity (mg/L)	6.0	428.0	150.5
	Chloride (mg/L)	3.1	215.0	30.8
	Color	< DL	43.0	8.2
	Specific Conductance (umhos/cm)	34	1,470	423
	Sulfate (mg/L)	< DL	49.8	5.5
	TDS (mg/L)	40	1,420	334
	TSS (mg/L)	< DL	< DL	< DL
	Turbidity (NTU)	< DL	0.47	< DL
	Ammonia, as N (mg/L)	< DL	< DL	< DL
	Hardness (mg/L)	< DL	< DL	< DL
	Nitrite - Nitrate, as N (mg/L)	< DL	0.04	0.01
	TKN (mg/L)	< DL	< DL	< DL
	Total Phosphorus (mg/L)	< DL	0.463	0.21

Table 4-5: FY 2013 Inorganic (Total Metals) Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	< DL	< DL	< DL
Arsenic (ug/L)	< DL	< DL	< DL
Barium (ug/L)	< DL	428	94.3
Beryllium (ug/L)	< DL	< DL	< DL
Cadmium (ug/L)	< DL	< DL	< DL
Chromium (ug/L)	< DL	< DL	< DL
Copper (ug/L)	< DL	14.8	3.43
Iron (ug/L)	< DL	565	144
Lead (ug/L)	< DL	< DL	< DL
Mercury (ug/L)	< DL	< DL	< DL
Nickel (ug/L)	< DL	< DL	< DL
Selenium (ug/L)	< DL	< DL	< DL
Silver (ug/L)	< DL	< DL	< DL
Thallium (ug/L)	< DL	< DL	< DL
Zinc (ug/L)	< DL	11.7	< DL

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	FY 2013
FIELD	Temperature (^{O}C)	23.71	22.87	21.33	22.69	22.44	21.43	21.38
	pH (SU)	7.14	7.08	7.05	7.54	8.06	7.98	8.03
	Specific Conductance (mmhos/cm)	0.50	0.50	0.30	0.32	0.46	0.48	0.402
	Salinity (Sal.) (ppt)	0.22	0.21	0.14	0.15	0.22	0.24	0.20
	TDS (Total dissolved solids) (g/L)	-	-	-	0.21	0.30	0.31	0.26
LABORATORY	Alkalinity (Alk.) (mg/L)	205.8	192.8	176.7	137.2	175.8	178.7	150.5
	Chloride (Cl) (mg/L)	15.2	27.0	38.3	18.1	37.3	41.8	30.8
	Color (PCU)	23.3	6.7	8.2	7.5	-	8.3	8.2
	Specific Conductance (umhos/cm)	490	454	446	322	446	470	423
	Sulfate (SO4) (mg/L)	4.7	4.4	5.7	5.4	5.4	8.2	5.5
	TDS (Total dissolved solids) (mg/L)	308	323	264	209	289	461	334
	TSS (Total suspended solids) (mg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
	Turbidity (Turb.) (NTU)	< DL	< DL	< DL	1.04	< DL	< DL	< DL
	Ammonia, as N (NH3) (mg/L)	0.20	0.16	0.22	0.15	0.20	< DL	< DL
	Hardness (mg/L)	16.1	11.1	31.9	22.6	27.9	< DL	< DL
	Nitrite - Nitrate , as N (mg/L)	< DL	< DL	< DL	< DL	< DL	0.01	0.01
	TKN (mg/L)	0.72	0.16	0.69	0.28	0.25	< DL	< DL
	Total Phosphorus (P) (mg/L)	0.16	0.15	0.17	0.10	0.16	0.21	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	FY 2013
Antimony (ug/L)	< DL	-	< DL	< DL	< DL	< DL	< DL
Arsenic (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Barium (ug/L)	62.7	41.4	127.0	85.4	127.9	110.0	94.3
Beryllium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cadmium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Chromium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Copper (ug/L)	25	49	7.9	6.6	3.4	4.3	3.43
Iron (ug/L)	203	105	161	267	178	107	144
Lead (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Mercury (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Nickel (ug/L)	8.1	< DL	< DL	< DL	< DL	< DL	< DL
Selenium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Silver (ug/L)	< DL	1.19	< DL	< DL	< DL	< DL	< DL
Thallium (ug/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Zinc (ug/L)	134.2	106.6	15.2	26.8	15.5	< DL	< DL

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)

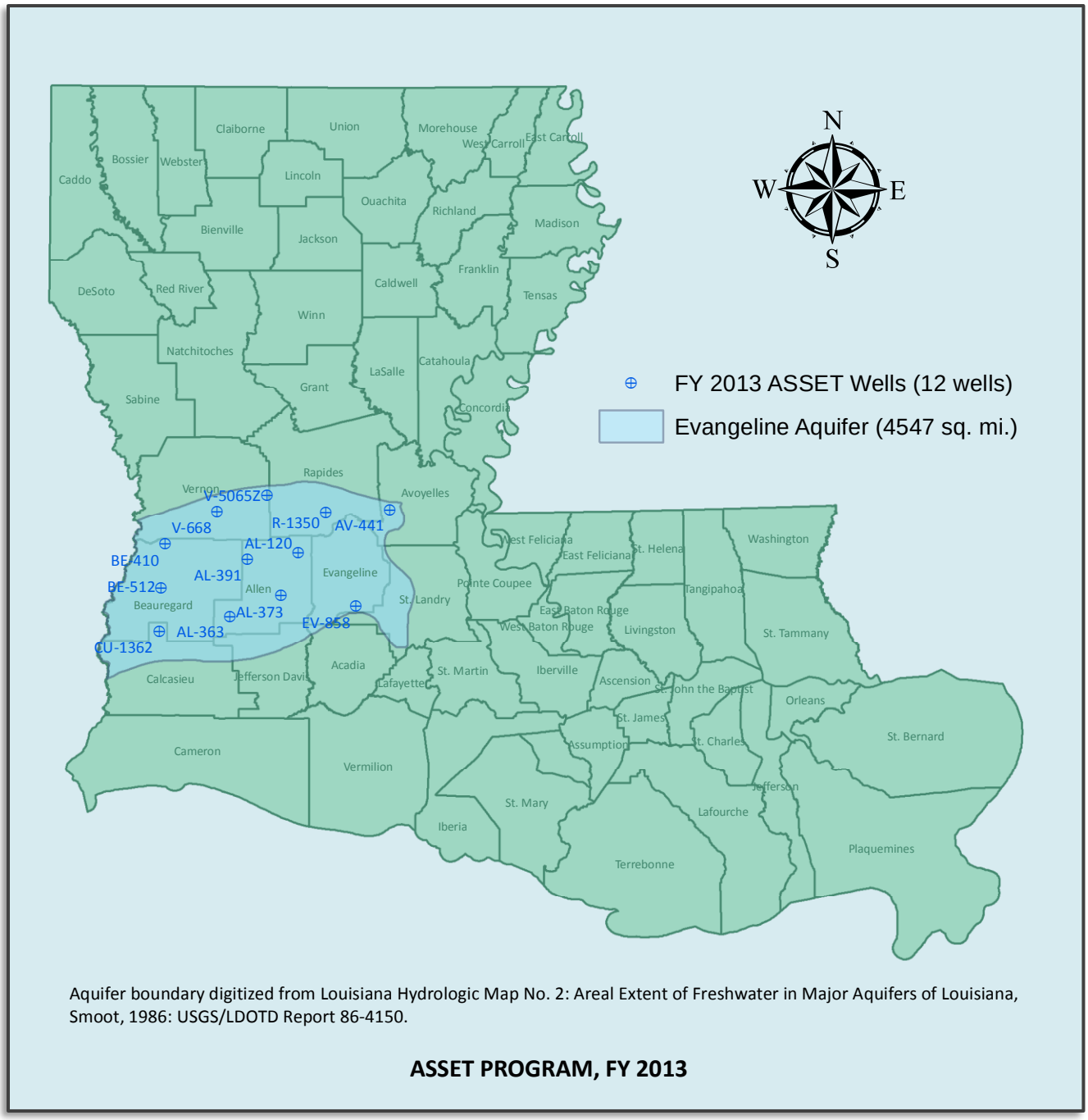
COMPOUND	METHOD	DETECTION LIMIT (ug/L)
PENTACHLOROBENZENE	625	5
PENTACHLOROPHENOL	625	10
PHENANTHRENE	625	5
PHENOL	625	5
PYRENE	625	5
TETRACHLOROBENZENE(S), TOTAL	625	10

.

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.

ASSET PROGRAM, FY 2013

Figure 4-2: Map of pH Data

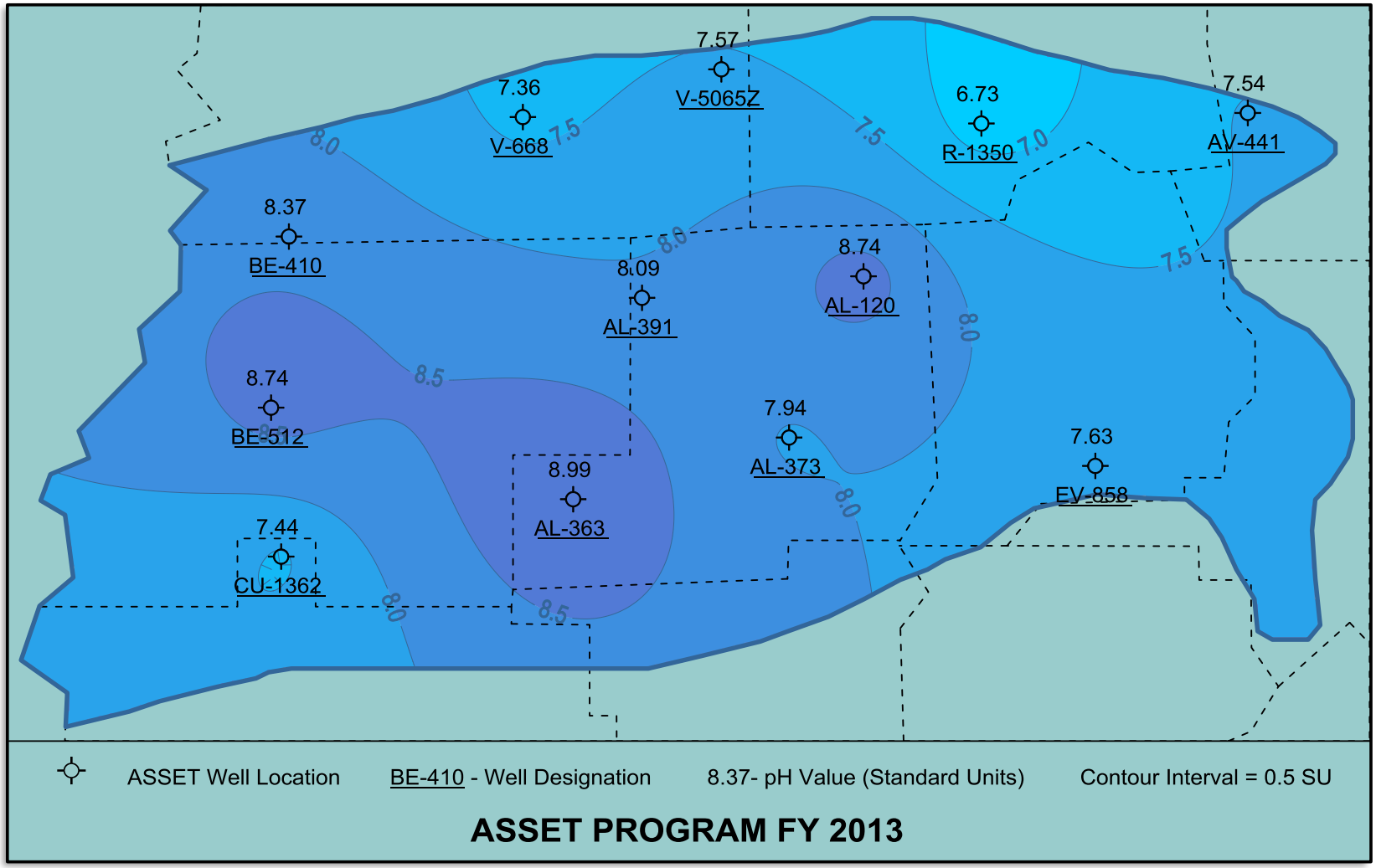


Figure 4-3: Map of TDS Lab Data

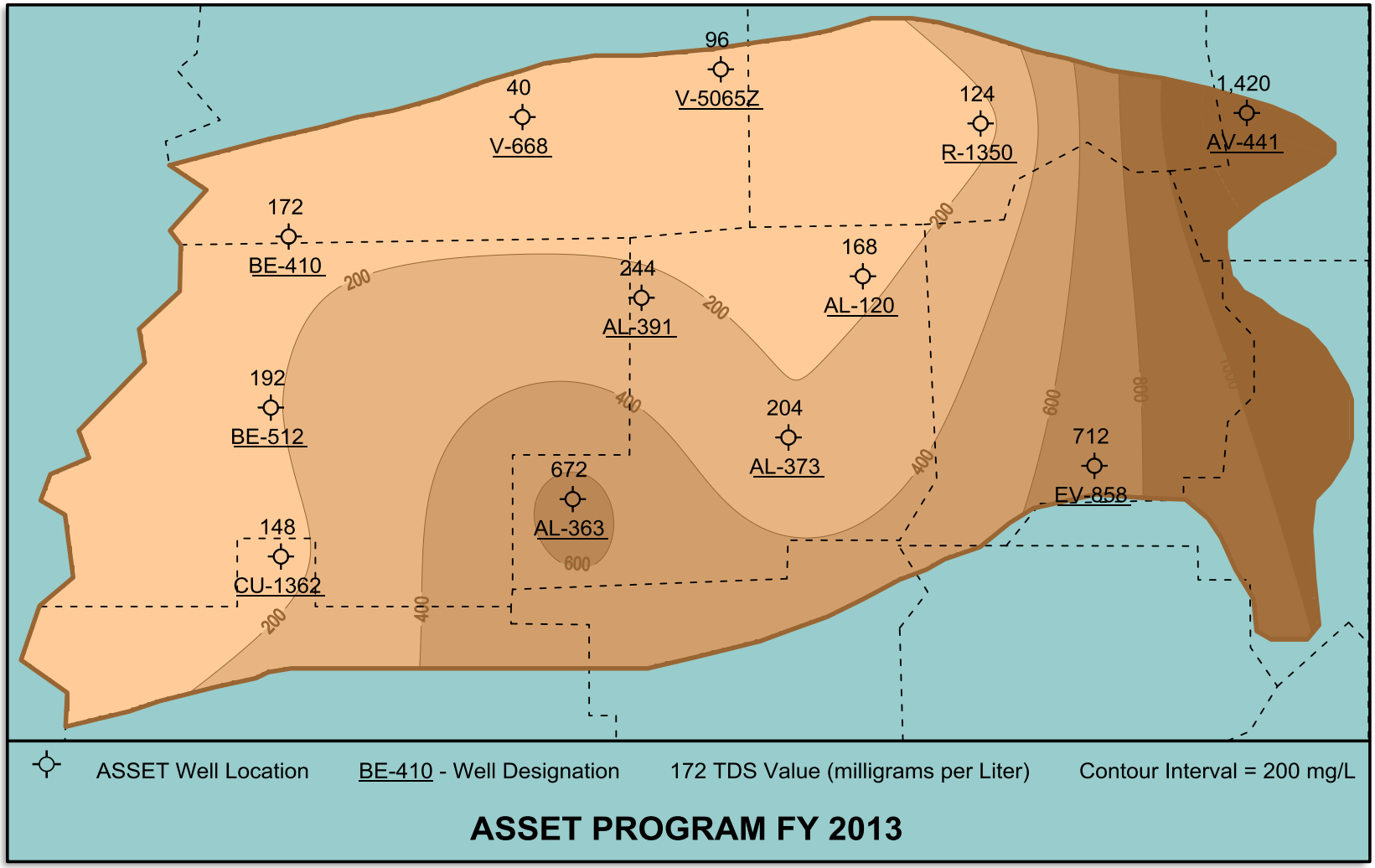


Figure 4-4: Map of Chloride Data

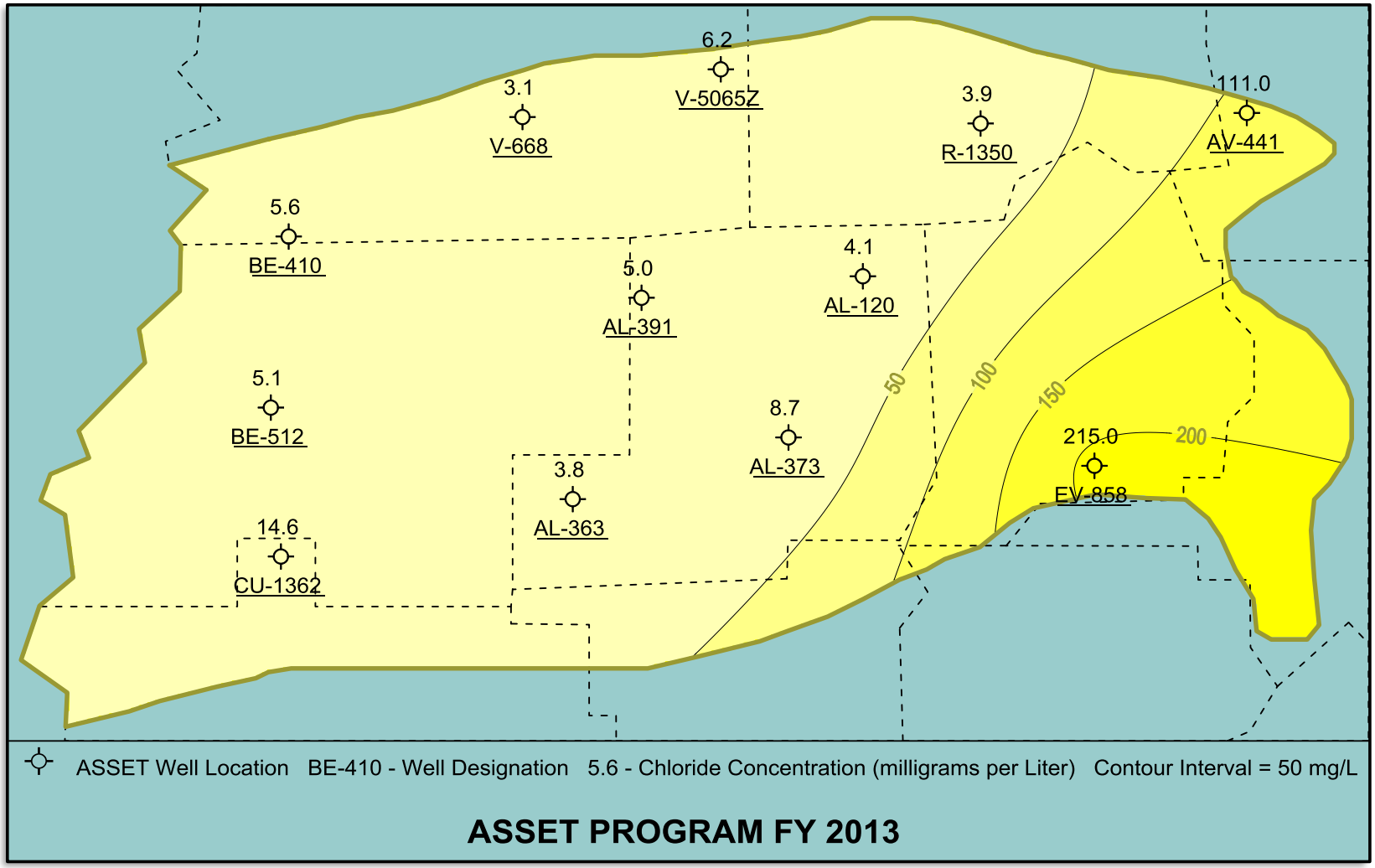


Figure 4-5: Map of Iron Data

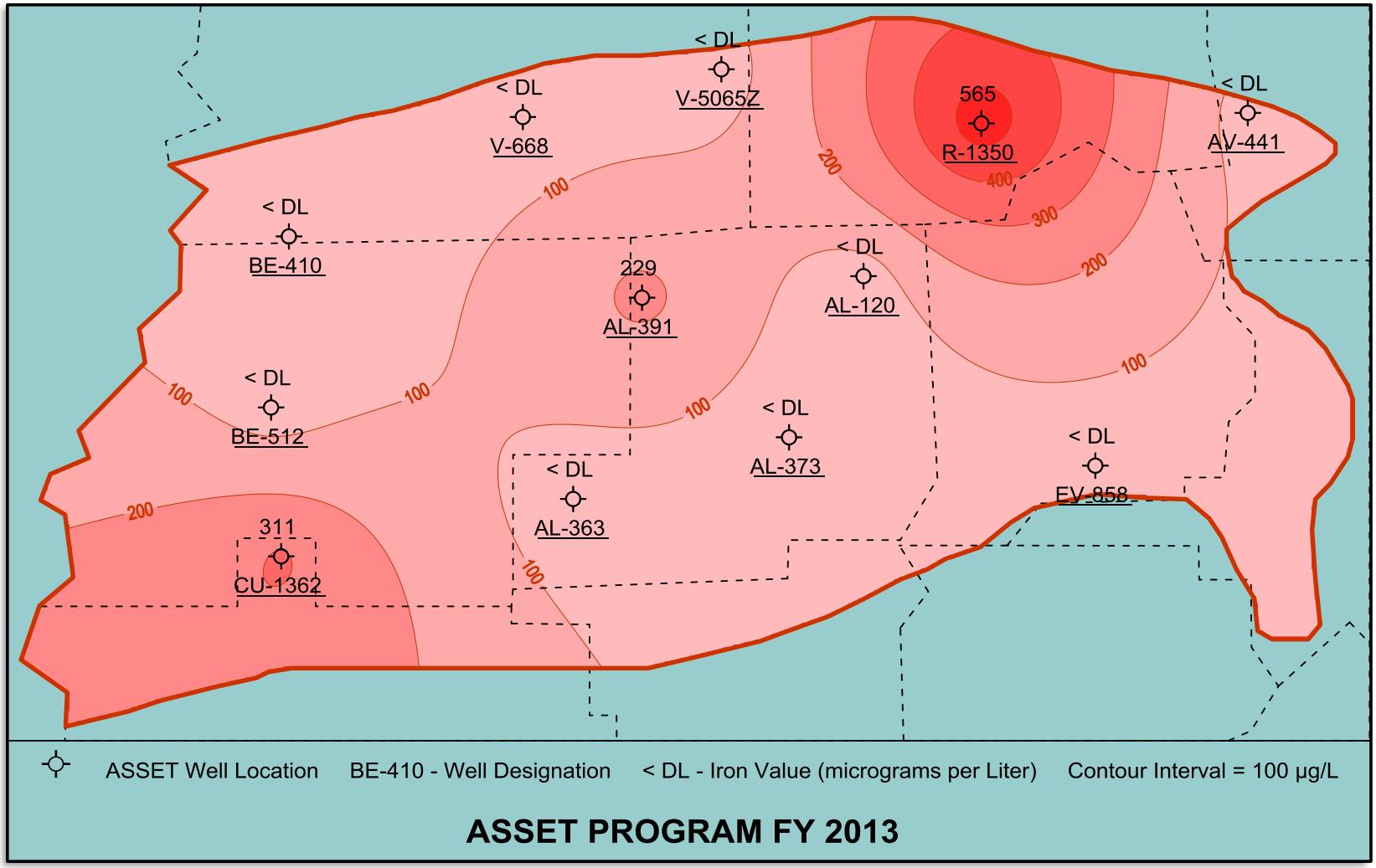


Chart 4-1: Temperature Trend

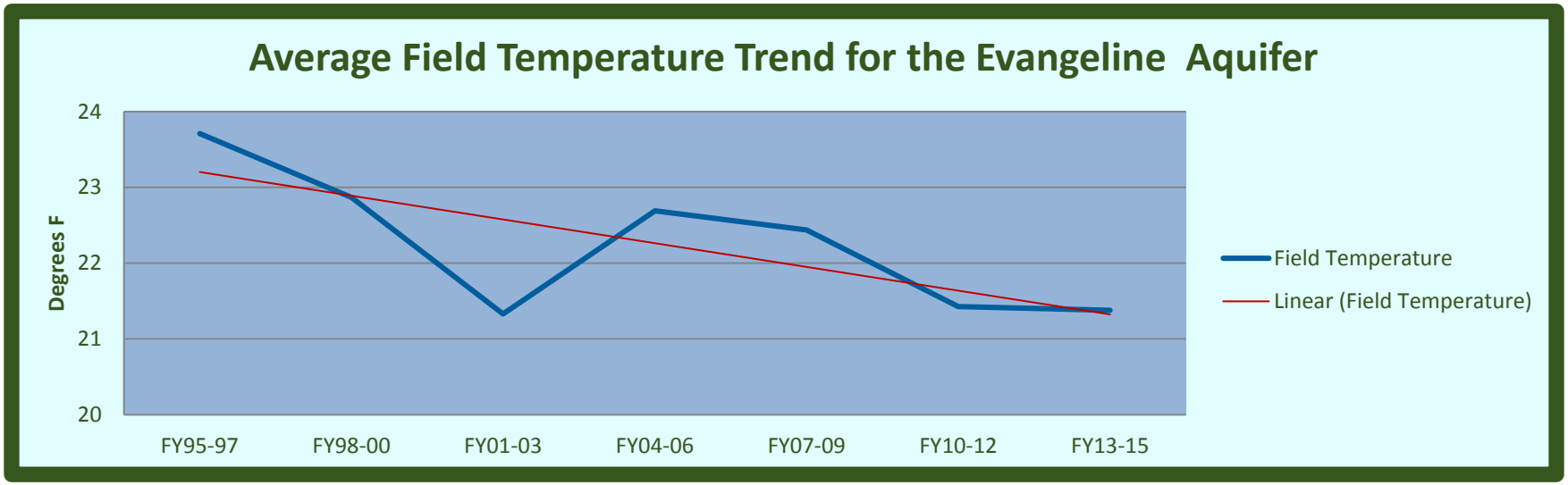


Chart 4-2: pH Trend

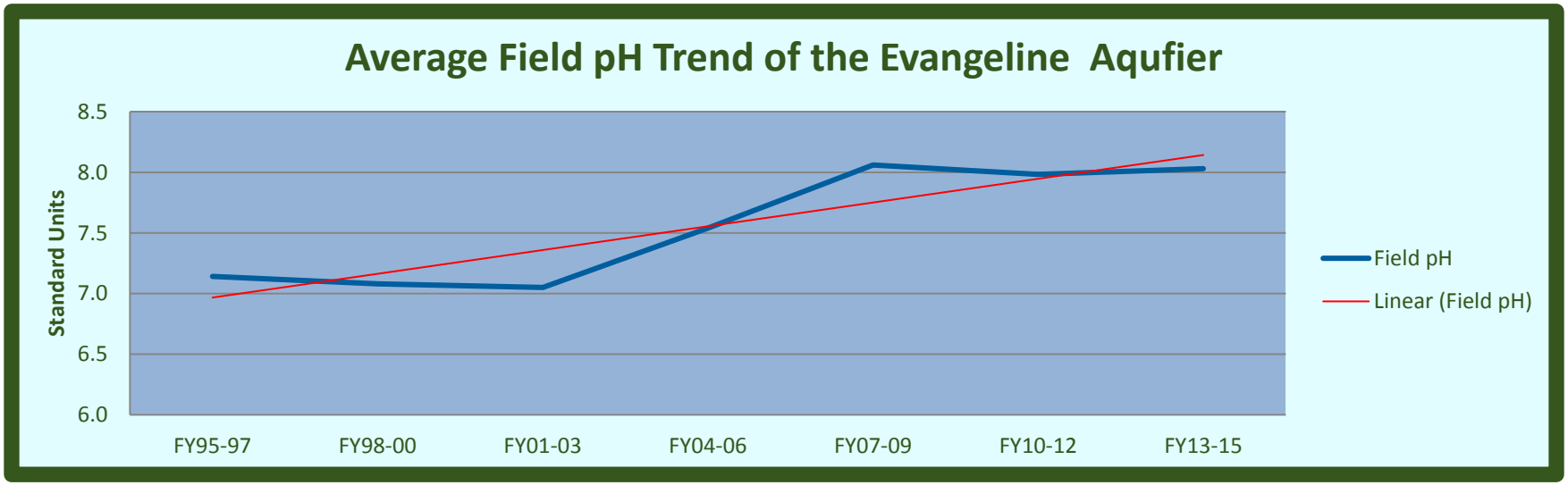


Chart 4-3: Field Specific Conductance Trend

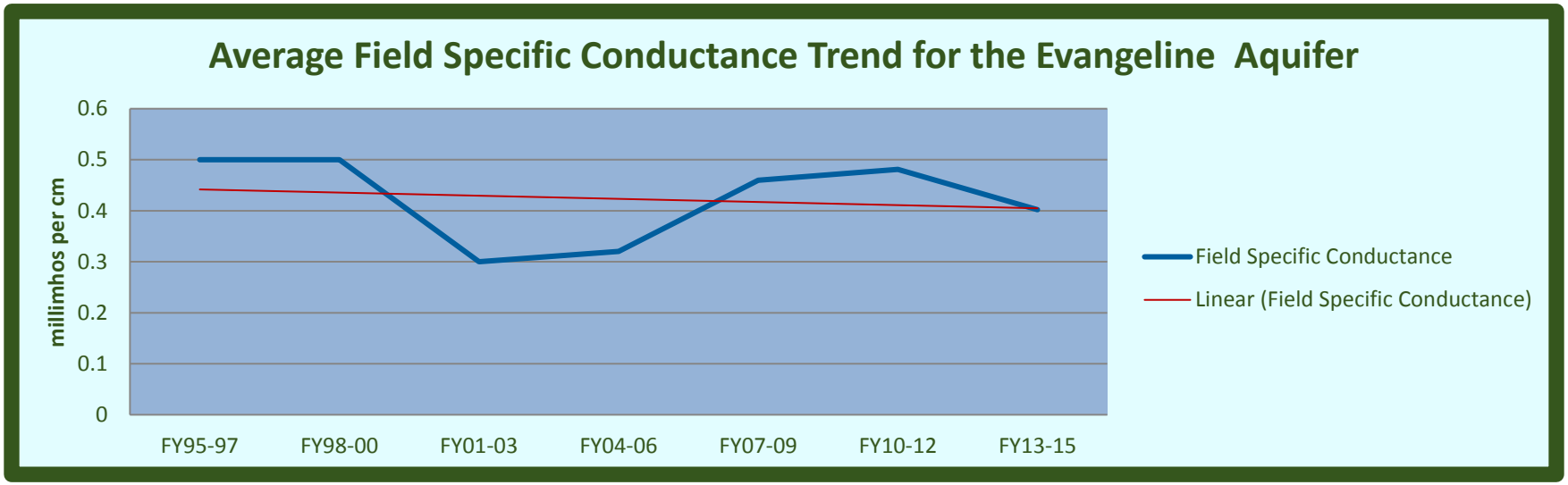


Chart 4-4: Lab Specific Conductance Trend

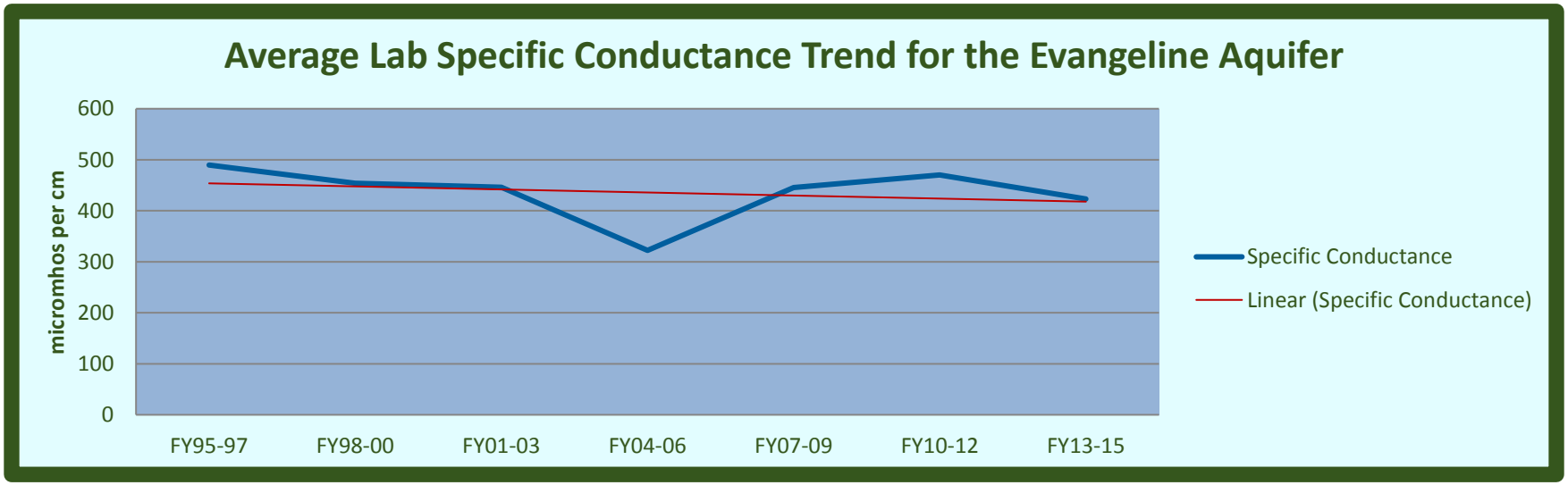


Chart 4-5: Field Salinity Trend

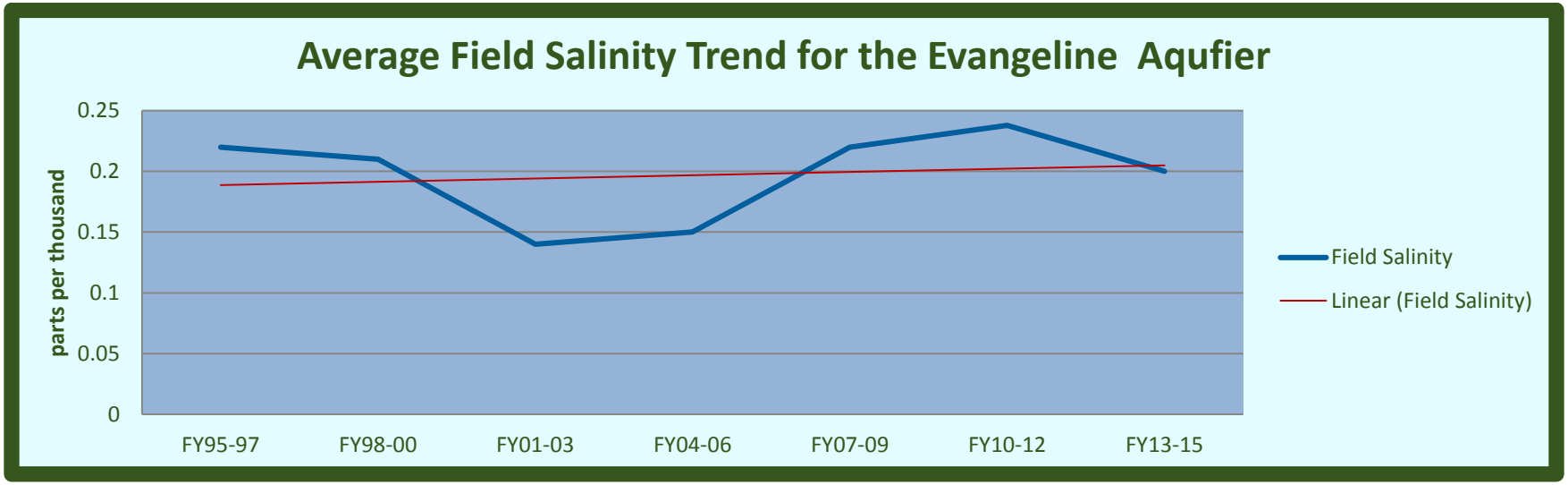


Chart 4-6: Chloride Trend

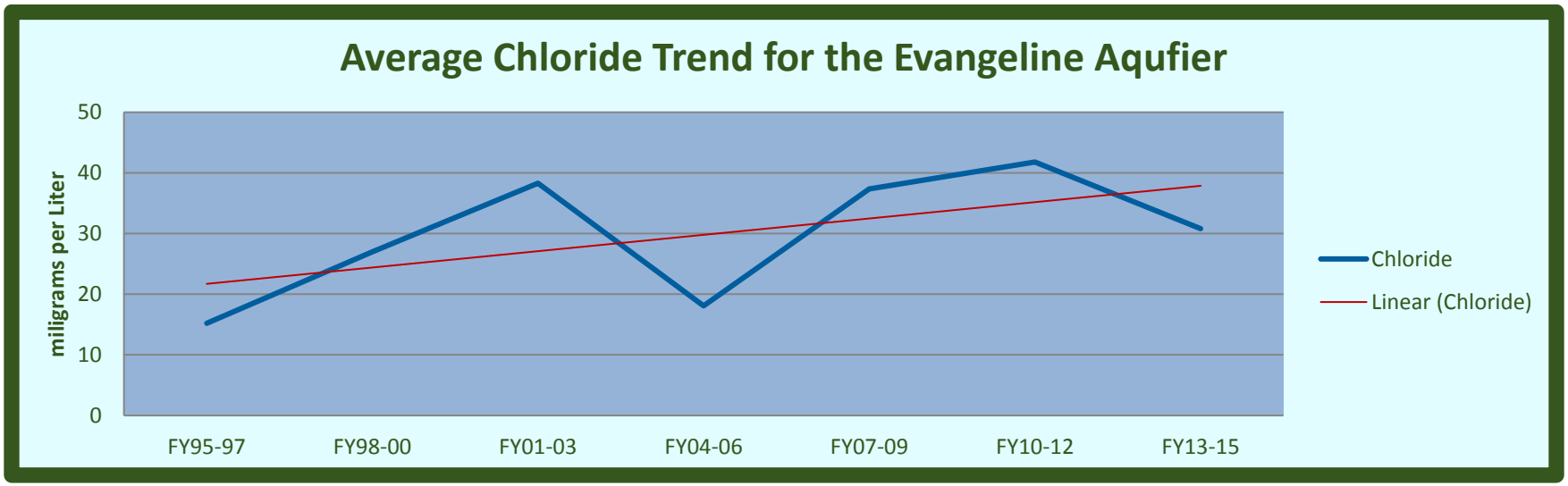


Chart 4-7: Alkalinity Trend

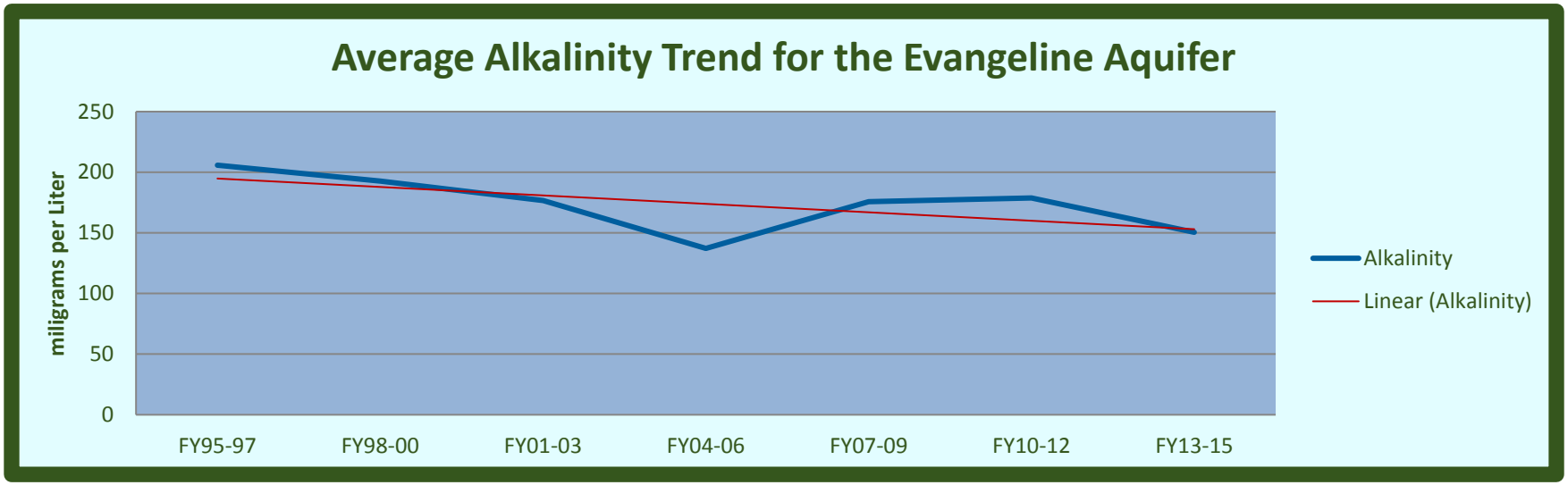


Chart 4-8: Color Trend

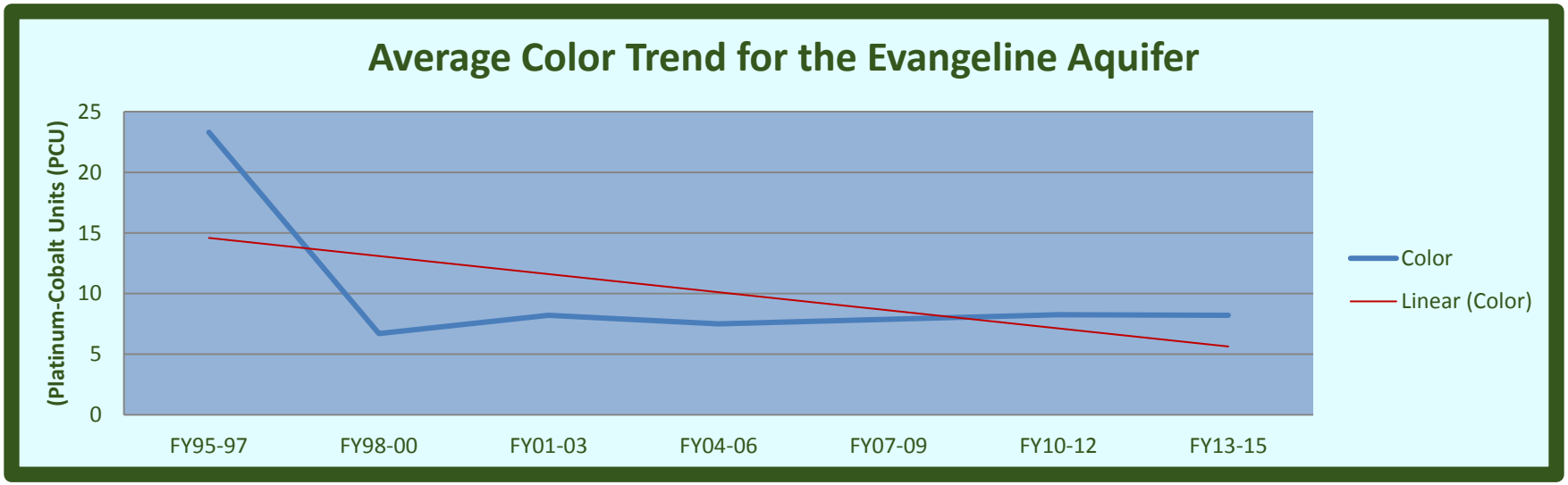


Chart 4-9: Sulfate Trend

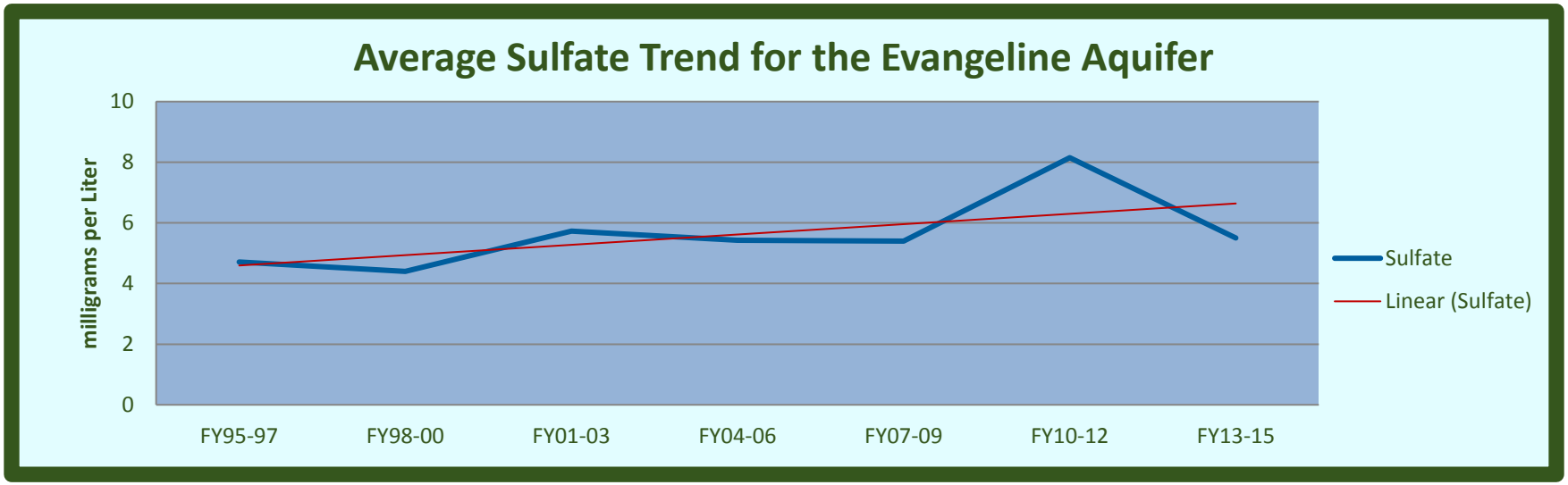


Chart 4-10: Total Dissolved Solids Trend

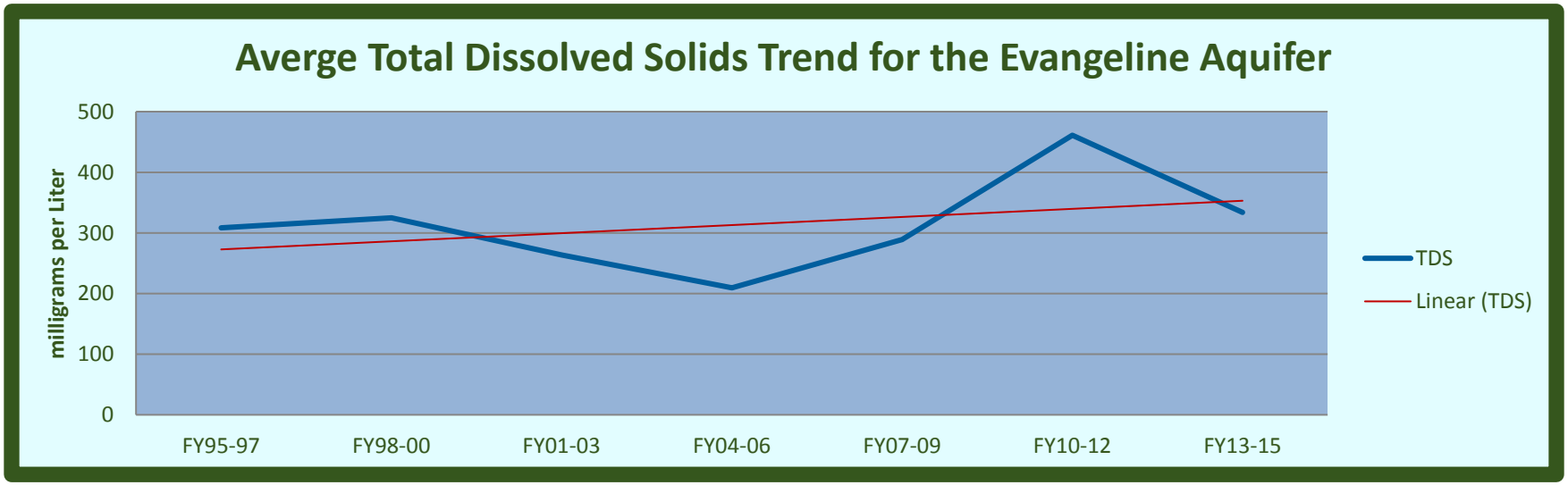


Chart 4-11: Hardness Trend

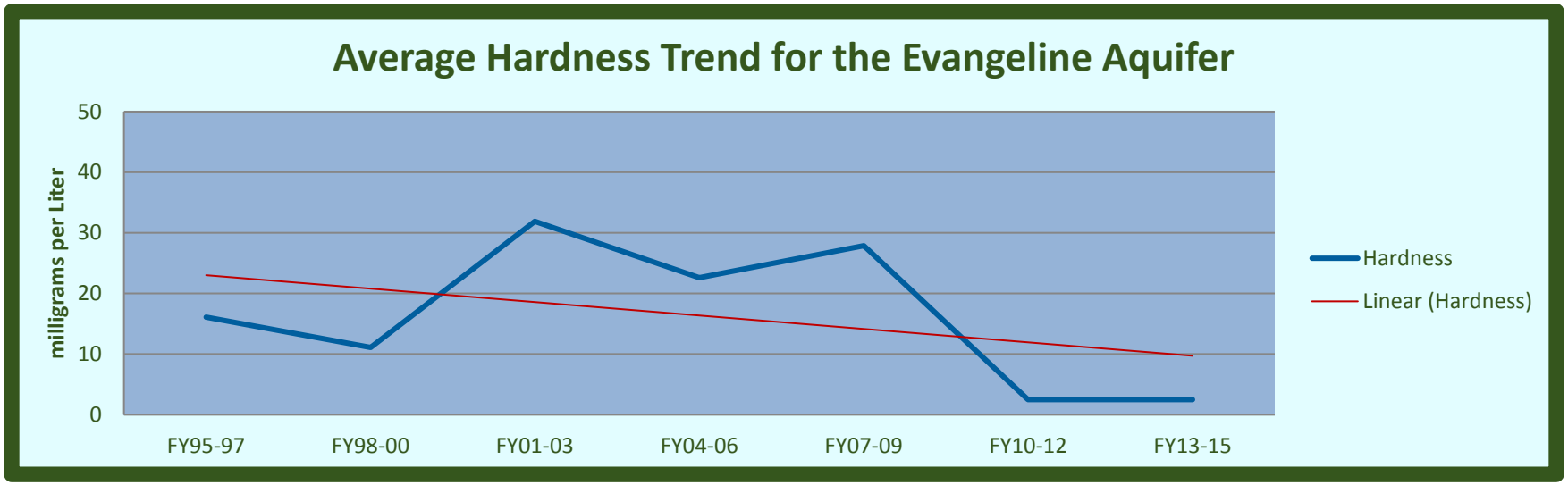


Chart 4-12: Ammonia (NH3) Trend

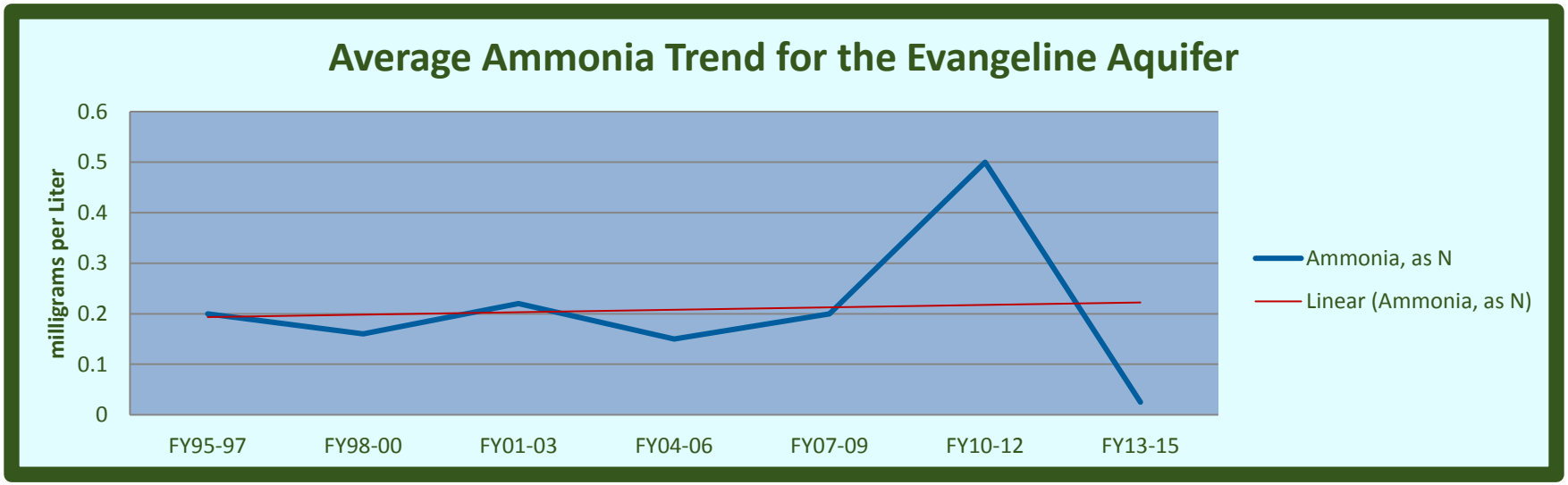


Chart 4-13: Nitrite – Nitrate Trend

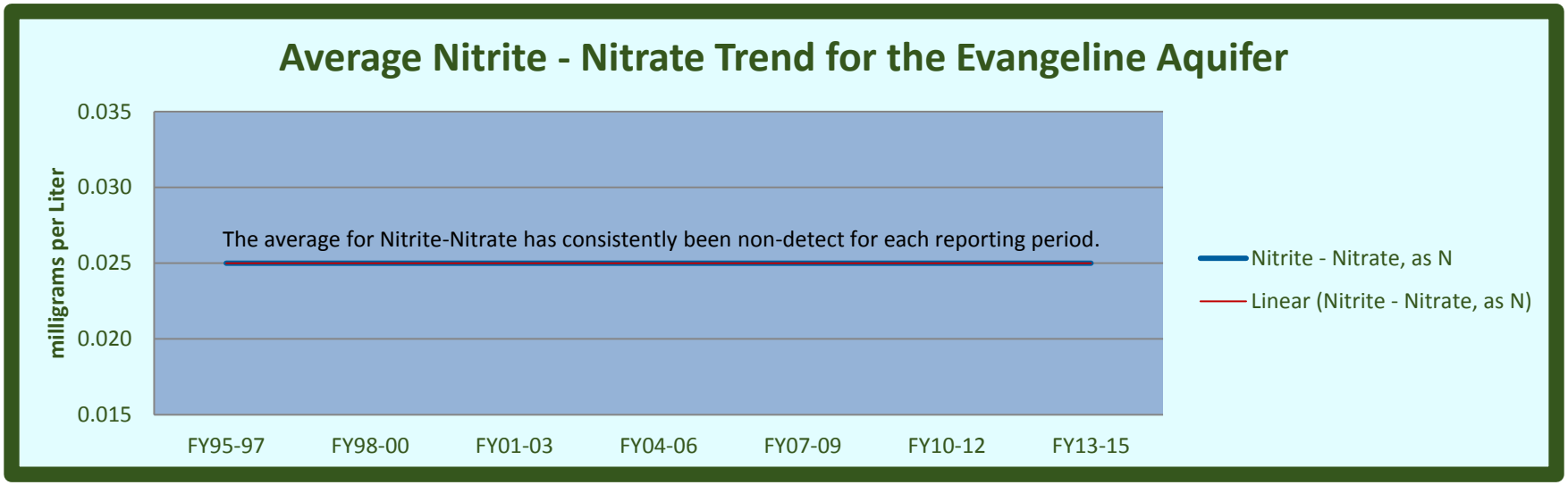


Chart 4-14: TKN Trend

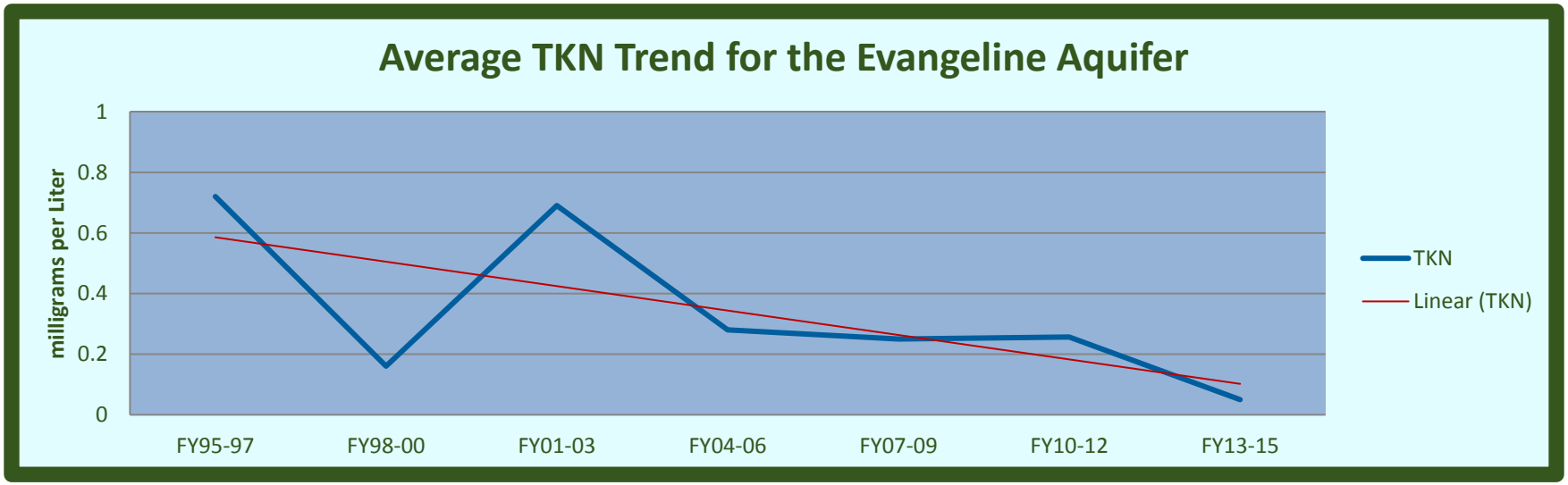


Chart 4-15: Total Phosphorus Trend

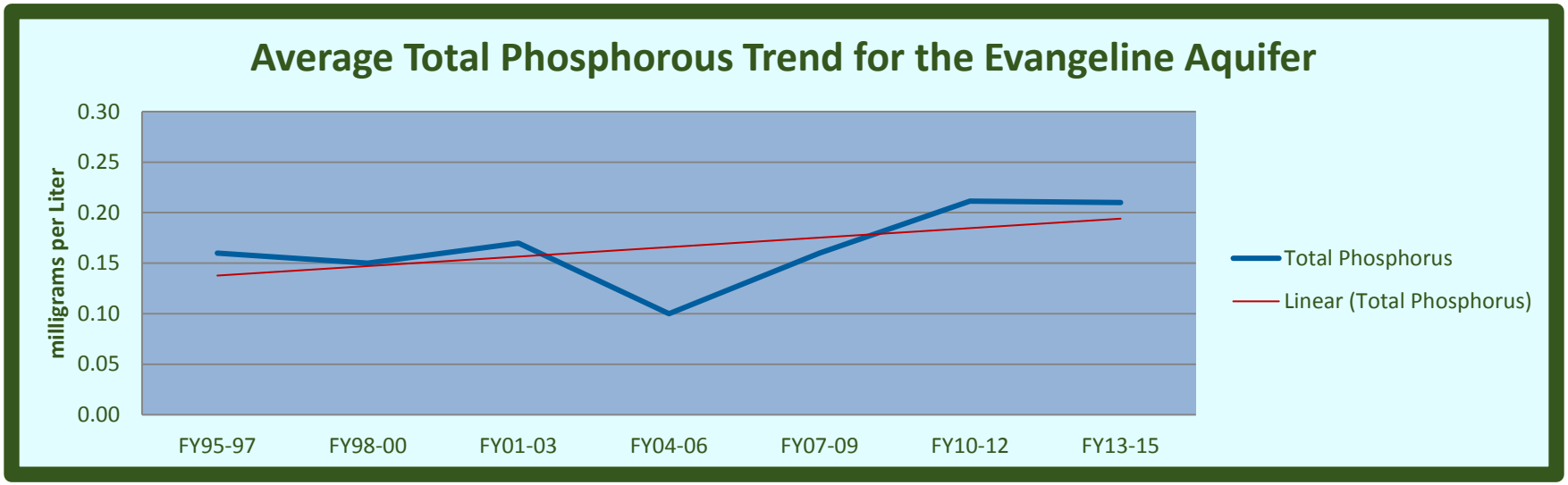


Chart 4-16: Iron Trend