WILLIAMSON CREEK AQUIFER SUMMARY, 2012

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 11 TO THE 2012 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 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 2012.

Analytical and field data contained in this summary were collected from wells producing from the Williamson Creek aquifer during the 2012 state fiscal year (July 1, 2011 - June 30, 2012). This summary will become Appendix II of ASSET Program Triennial Summary Report for 2012.

These data show that in July 2011, seven wells were sampled which produce from the Williamson Creek aquifer. Three of these seven are classified as public supply, while two are classified as domestic and two are industrial. The wells are located in four parishes in central and southwest areas of the state.

Figure 11-1 shows the geographic locations of the Williamson Creek aquifer and the associated wells, whereas Table 11-1 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 Natural Resources Water Well Registration Data file.

GEOLOGY

The Williamson Creek member consists of sands, silts, silty clays, and some gravel. The Williamson Creek member, along with the Carnahan Bayou and Dough Hills, are grouped into the Jasper aquifer. The aquifer unit consists of fine to coarse sand, which may grade laterally and vertically to silt and clay.

HYDROGEOLOGY

Recharge takes place primarily as a result of direct infiltration of rainfall in interstream, upland outcrop areas, movement of water through overlying terrace deposits, and leakage from other aquifers. The hydraulic conductivity of the Williamson Creek varies between 20-260 feet/day.

The maximum depths of occurrence of freshwater in the Williamson Creek range from 175 feet above sea level, to 2,450 feet below sea level. The range of thickness of the fresh water interval in the Williamson Creek is 50 to 1,250 feet. The depths of the Williamson Creek wells that were monitored in conjunction with the ASSET Program range from 190 to 1,657 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 11-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 11-3. These tables also show the field and analytical results determined for each analyte. For quality control, duplicate samples were taken for each parameter at CO-163.

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 11-8, 11-9 and 11-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 11-4 and 11-5 provide a statistical overview of field and conventional data, and inorganic data for the Williamson Creek aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2012 sampling. Tables 11-6 and 11-7 compare these same parameter averages to historical ASSET-derived data for the Williamson Creek aquifer, from fiscal years 1997, 2000, 2003, 2006, and 2009.

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 11-2, 11-3, 11-4, and 11-5, respectively, represent the contoured data for pH, total dissolved solids (TDS), chloride and iron. Charts 11-1 through 11-16 represent the trend of the graphed parameter, based on the averaged value of that parameter for each three-year reporting period. Discussion of historical data and related trends is found in the **Water Quality Trends and Comparison to Historical ASSET Data** section.

INTERPRETATION OF DATA

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

EPA has set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 11-2 and 11-3 show that only three secondary MCLs (SMCLs) were exceeded in three of the seven wells sampled in the Williamson Creek aquifer.

Field and Conventional Parameters

Table 11-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 11-4 provides an overview of this data for the Williamson Creek aquifer, listing the minimum, maximum, and average results for these parameters.

<u>Federal Primary Drinking Water Standards:</u> A review of the analysis listed in Table 11-2 shows that no primary MCL was exceeded for field or conventional parameters for this reporting period. The ASSET well 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.

<u>Federal Secondary Drinking Water Standards:</u> A review of the analysis listed in Table 11-2 shows that one well exceeded the SMCL for pH. 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):

BE-407 – 8.56 SU

Inorganic Parameters

Table 11-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 11-5 provides an overview of inorganic data for the Williamson Creek aquifer, listing the minimum, maximum, and average results for these parameters.

<u>Federal Primary Drinking Water Standards:</u> A review of the analyses listed on Table 11-3 shows that no primary MCL was exceeded for total metals.

<u>Federal Secondary Drinking Water Standards:</u> Laboratory data contained in Table 11-3 shows that 2 wells exceeded the secondary MCL for iron:

Iron (SMCL = 300 ug/L):

CO-163 – 1,050 µg/L, Duplicate – 1,150 µg/L R-1362 – 453 µg/L

Volatile Organic Compounds

Table 11-8 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 2012 sampling of the Williamson Creek aquifer.

Semi-Volatile Organic Compounds

Table 11-9 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 2012 sampling of the Williamson Creek aquifer.

Pesticides and PCBs

Table 11-10 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 2012 sampling of the Williamson Creek 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 Williamson Creek 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 11-6 and 11-7, and in Charts 11-1 to 11-16 of this summary. Over the fifteen-year period, eight analytes have shown a general increase in average concentration. These analytes are: alkalinity, ammonia, chloride, pH, salinity, specific conductance (field and lab), total dissolved solids, and total Kjeldahl nitrogen. For this same time period, four analytes have demonstrated a decrease in average concentration: color, sulfate, total phosphorus, and zinc. All other analyte averages have remained consistent, or have been non-detect over this time period. The number of secondary exceedances in the Williamson Creek aquifer continued to remain low. The previous sampling in FY 2009 showed only one SMCL exceedance while there were three exceedances in the FY 2012 sampling.

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 2012 monitoring of the Williamson Creek aquifer exceeded a Primary MCL. The data also show that this aquifer is of good quality when considering taste, odor, or appearance guidelines, with only three Secondary MCL exceedances.

As noted below Table 11-2, certain conventional water quality data reported from the lab was rejected and the remainder of the laboratory derived conventional water quality data is suspect and should not be used without other supporting data for decision making.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Williamson Creek aquifer, with eight parameters showing consistent increases in concentration, four parameters decreasing in concentration, and the remaining parameters showing no consistent change over the previous fifteen years.

It is recommended that the wells assigned to the Williamson Creek aquifer be re-sampled as planned, in approximately three years. In addition, several wells should be added to the seven 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 11-1: List of Wells Sampled, Williamson Creek Aquifer – FY 2012

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
BE-407	BEAUREGARD	7/20/2011	BOISE CASCADE	1,657	INDUSTRIAL
CO-163	CONCORDIA	7/18/2011	U. S. ARMY CORPS OF ENG.	513	PUBLIC SUPPLY
R-932	RAPIDES	7/18/2011	CITY OF ALEXANDRIA	466	PUBLIC SUPPLY
R-1362	RAPIDES	7/18/2011	INTERNATIONAL PAPER CO.	402	INDUSTRIAL
V-420	VERNON	7/20/2011	U.S. ARMY/FORT POLK	920	PUBLIC SUPPLY
V-5858Z	VERNON	7/18/2011	PRIVATE OWNER	248	DOMESTIC
V-8681Z	VERNON	7/20/2011	PRIVATE OWNER	190	DOMESTIC

Table 11-2: Summary of Field and Conventional Data, Williamson Creek Aquifer – FY 2012

Well ID	pH SU	Sal. ppt	Sp. Cond. mmhos/cm	Temp Deg. C	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	0.25	10	4	0.3	0.05	5	0.01	0.10	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
BE-407	8.56	0.20	0.431	29.69	0.280	210	7.6	< 1	†R	8.48	274	< 4	< 0.3	0.42	< 5	< 0.01	0.50	0.17
CO-163	7.31	0.30	0.617	20.77	0.401	156	92.9	10	607	< 0.25	338	†R	10.7	0.59	40	< 0.01	0.65	0.21
CO-163*	7.31	0.30	0.617	20.77	0.401	156	99.3	11	614	< 0.25	402	†R	10.9	0.58	22	< 0.01	0.55	0.20
R-932	8.16	0.23	0.471	21.60	0.306	224	13.9	1	461	0.96	336	< 4	< 0.3	0.31	22	< 0.01	0.40	0.06
R-1362	6.66	0.18	0.372	19.91	0.242	86	56.2	< 1	367	8.32	230	4	< 0.3	0.26	24	< 0.01	0.33	< 0.05
V-420	7.22	0.12	0.255	24.36	0.166	92	21.1	< 1	†R	4.73	154	< 4	< 0.3	0.19	< 5	< 0.01	0.40	0.19
V-5858Z	8.02	0.23	0.486	24.54	0.316	156	55.6	< 1	477	2.80	245	< 4	< 0.3	0.10	130	0.16	0.24	< 0.05
V-8681Z	7.42	0.07	0.151	21.08	0.098	62	5.8	< 1	†R	4.36	71	< 4	< 0.3	0.13	< 5	< 0.01	0.43	0.60

*Denotes Duplicate Sample   Shaded cells exceed EPA Secondary Standards

†R - Data rejected due to detections in Field Blank and reported laboratory values being one to two orders of magnitude greater than historical values, as well as one to two orders of magnitude greater than other wells sampled at the same time period for the Williamson Creek Aquifer. Additionally, all water quality laboratory parameters reported in this table are suspect and should **not** be used without other supporting data for decision making.

Table 11-3: Summary of Inorganic Data, Williamson Creek Aquifer – FY 2012

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 Detection Limits	5	4		2	2	4	2	100	1	0.0002	3	5	1	2	6
BE-407	< 5	< 4	36.6	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
CO-163	< 5	< 4	107.0	< 2	< 2	< 4	2.79	1,050	3.0	< 0.0002	< 3	< 5	< 1	< 2	169
CO-163*	< 5	< 4	103.0	< 2	< 2	< 4	2.84	1,160	3.1	< 0.0002	< 3	< 5	< 1	< 2	161
R-932	< 5	< 4	53.6	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
R-1362	< 5	< 4	65.2	< 2	< 2	< 4	< 2	453	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
V-420	< 5	< 4	50.1	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
V-5858Z	< 5	< 4	327.0	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	5.6	< 5	< 1	< 2	< 6
V-8681Z	< 5	< 4	41.5	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6

*Denotes Duplicate Sample   Shaded cells exceed EPA Secondary Standards

Table 11-4: FY 2012 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	19.91	29.69	22.84
	pH (SU)	6.66	8.56	7.58
	Specific Conductance (mmhos/cm)	0.151	0.617	0.420
	Salinity (ppt)	0.07	0.30	0.20
	TDS (g/L)	0.098	0.40	0.28
LABORATORY	Alkalinity (mg/L)	62.0	224.0	142.8
	Chloride (mg/L)	5.8	99.3	44.1
	Color (PCU)	< 1	11.0	3.1
	Specific Conductance (umhos/cm)	367	614	505
	Sulfate (mg/L)	< 0.25	8.50	3.74
	TDS (mg/L)	71.0	402.0	256.0
	TSS (mg/L)	< 4	< 4	< 4
	Turbidity (NTU)	< 0.3	10.90	2.81
	Ammonia, as N (mg/L)	0.10	0.59	0.32
	Hardness (mg/L)	< 5	130.0	30.7
	Nitrite - Nitrate, as N (mg/L)	< 0.01	0.16	0.02
	TKN (mg/L)	0.24	0.65	0.43
	Total Phosphorus (mg/L)	< 0.05	0.60	0.18

Table 11-5: FY 2012 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (µg/L)	< 5	< 5	< 5
Arsenic (µg/L)	< 4	< 4	< 4
Barium (µg/L)	36.6	327.0	98.0
Beryllium (µg/L)	< 2	< 2	< 2
Cadmium (µg/L)	< 2	< 2	< 2
Chromium (µg/L)	< 4	< 4	< 4
Copper (µg/L)	< 2	2.84	< 2
Iron (µg/L)	< 100	1,160	364
Lead (µg/L)	< 1	3.05	1.13
Mercury (µg/L)	< 0.0002	< 0.0002	< 0.0002
Nickel (µg/L)	< 3	5.6	< 3
Selenium (µg/L)	< 5	< 5	< 5
Silver (µg/L)	< 1	< 1	< 1
Thallium (µg/L)	< 2	< 2	< 2
Zinc (µg/L)	< 6	169.0	43.5

Table 11-6: 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
FIELD	Temperature (^{O}C)	23.82	23.12	24.00	25.27	24.19	22.84
	pH (SU)	6.86	7.83	7.54	Not Available	7.68	7.58
	Specific Conductance (mmhos/cm)	0.369	0.424	0.384	0.440	0.380	0.420
	Salinity (ppt)	0.18	0.20	0.18	0.21	0.18	0.20
	Total Dissolved Solids (g/L)	-	-	-	-	0.25	0.28
LABORATORY	Alkalinity (mg/L)	136.1	150.3	139.6	153.8	158.1	142.8
	Chloride (mg/L)	38.7	37.0	32.3	41.5	36.0	44.1
	Color (PCU)	12.1	< 5	< 5	14.7	< 5	3.1
	Specific Conductance (umhos/cm)	386	399	370	441	411	505
	Sulfate (mg/L)	7.15	4.61	4.61	8.02	6.62	3.74
	Total Dissolved Solids (mg/L)	211.3	272.7	235.7	284.8	260.0	256.0
	Total Suspended Solids (mg/L)	<4	<4	<4	<4	<4	< 4
	Turbidity (NTU)	1.25	6.03	1.23	2.60	<1	2.81
	Ammonia, as N (mg/L)	0.36	0.19	0.25	0.33	0.31	0.32
	Hardness (mg/L)	30.8	39.5	34.9	34.5	38.6	30.7
	Nitrite - Nitrate, as N (mg/L)	<0.05	0.15	<0.05	<0.05	<0.05	0.02
	Total Kjehldahl Nitrogen, as N (mg/L)	0.32	0.40	0.39	0.70	0.30	0.43
	Total Phosphorus (mg/L)	0.30	0.20	0.18	0.15	0.15	0.18

Table 11-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR					
	FY 1997	FY 2000	FY 2003	FY 2006	FY 2009	FY 2012
Antimony (µg/L)	<5	<5	<5	<10	<1	< 5
Arsenic (µg/L)	<5	<5	<5	<10	<3	< 4
Barium (µg/L)	48.2	112.5	89.6	92.0	90.2	98.0
Beryllium (ug/L)	<1	<1	<1	<1	<1	< 2
Cadmium (ug/L)	<1	<1	<1	<1	<0.5	< 2
Chromium (µg/L)	<5	<5	<5	<5	<3	< 4
Copper (µg/L)	9.70	<5	<5	<10	<3	< 2
Iron (µg/L)	466	115	380	642	162	364
Lead (µg/L)	<10	<10	<10	<10	<3	1.13
Mercury (µg/L)	<0.05	<0.05	<0.05	<0.05	<0.05	< 0.0002
Nickel (µg/L)	9.2	<5	<5	<5	<3	< 3
Selenium (µg/L)	<5	<5	<5	<5	<4	< 5
Silver (µg/L)	<1	<1	<1	<10	<0.5	< 1
Thallium (µg/L)	<5	<5	<5	<5	<1	< 2
Zinc (µg/L)	298.0	245.2	107.2	114.1	63.7	43.5

Table 11-8: VOC Analytical Parameters

VOLATILE ORGANIC COMPOUND	METHOD	DETECTION LIMIT (µg/L)
1,1,1-TRICHLOROETHANE	624	0.5
1,1,2,2-TETRACHLOROETHANE	624	0.5
1,1,2-TRICHLOROETHANE	624	0.5
1,1-DICHLOROETHANE	624	0.5
1,1-DICHLOROETHENE	624	0.5
1,2,3-TRICHLOROBENZENE	624	0.5
1,2-DICHLOROBENZENE	624	0.5
1,2-DICHLOROETHANE	624	0.5
1,2-DICHLOROPROPANE	624	0.5
1,3-DICHLOROBENZENE	624	0.5
1,4-DICHLOROBENZENE	624	0.5
BENZENE	624	0.5
BROMODICHLOROMETHANE	624	0.5
BROMOFORM	624	0.5
BROMOMETHANE	624	0.5
CARBON TETRACHLORIDE	624	0.5
CHLOROBENZENE	624	0.5
CHLOROETHANE	624	0.5
CHLOROFORM	624	0.5
CHLOROMETHANE	624	0.5
CIS-1,3-DICHLOROPROPENE	624	0.5
DIBROMOCHLOROMETHANE	624	0.5
ETHYL BENZENE	624	0.5
METHYLENE CHLORIDE	624	0.5
O-XYLENE (1,2-DIMETHYLBENZENE)	624	0.5
STYRENE	624	0.5
TERT-BUTYL METHYL ETHER	624	0.5
TETRACHLOROETHYLENE (PCE)	624	0.5
TOLUENE	624	0.5
TRANS-1,2-DICHLOROETHENE	624	0.5
TRANS-1,3-DICHLOROPROPENE	624	0.5
TRICHLOROETHYLENE (TCE)	624	0.5
TRICHLOROFLUOROMETHANE (FREON-11)	624	0.5
VINYL CHLORIDE	624	0.5
XYLENES, M & P	624	1

Table 11-9: SVOC Analytical Parameters

SEMI VOLATILE ORGANIC COMPOUND	METHOD	DETECTION LIMIT (µg/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
BIS(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER)	625	5
BIS(2-CHLOROISOPROPYL) ETHER	625	5
BIS(2-ETHYLHEXYL) PHTHALATE	625	5
CHRYSENE	625	5
DIBENZ(A,H)ANTHRACENE	625	5
DIETHYL PHTHALATE	625	5
DIMETHYL PHTHALATE	625	5
DI-N-BUTYL PHTHALATE	625	5
DI-N-OCTYLPHTHALATE	625	5
FLUORANTHENE	625	5

SEMI VOLATILE ORGANIC COMPOUND	METHOD	DETECTION LIMIT (µg/L)
FLUORENE	625	5
HEXACHLOROBENZENE	625	5
HEXACHLOROBUTADIENE	625	5
HEXACHLOROCYCLOPENTADIENE	625	10
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	10
N-NITROSODIPHENYLAMINE	625	5
PENTACHLOROPHENOL	625	10
PHENANTHRENE	625	5
PHENOL	625	5
PYRENE	625	5
PYRIDINE	625	5

Table 11-10: Pesticides and PCBs

PESTICIDE/PCB COMPOUND	METHOD	DETECTION LIMIT (µg/L)
ALDRIN	608	0.05
ALPHA BHC	608	0.05
ALPHA ENDOSULFAN	608	0.05
ALPHA-CHLORDANE	608	0.05
BETA BHC	608	0.05
BETA ENDOSULFAN	608	0.05
CHLORDANE	608	0.2
DELTA BHC	608	0.05
DIELDRIN	608	0.05
ENDOSULFAN SULFATE	608	0.05
ENDRIN	608	0.05
ENDRIN ALDEHYDE	608	0.05
ENDRIN KETONE	608	0.05
GAMMA BHC (LINDANE)	608	0.05
GAMMA-CHLORDANE	608	0.05
HEPTACHLOR	608	0.05
HEPTACHLOR EPOXIDE	608	0.05
METHOXYCHLOR	608	0.05
P,P'-DDD	608	0.05
P,P'-DDE	608	0.05
P,P'-DDT	608	0.05
PCB-1016 (AROCHLOR 1016)	608	0.5
PCB-1221 (AROCHLOR 1221)	608	0.5
PCB-1232 (AROCHLOR 1232)	608	0.5
PCB-1242 (AROCHLOR 1242)	608	0.5
PCB-1248 (AROCHLOR 1248)	608	0.5
PCB-1254 (AROCHLOR 1254)	608	0.5
PCB-1260 (AROCHLOR 1260)	608	0.5
TOXAPHENE	608	3

Figure 11-1: Location Plat, Williamson Creek Aquifer

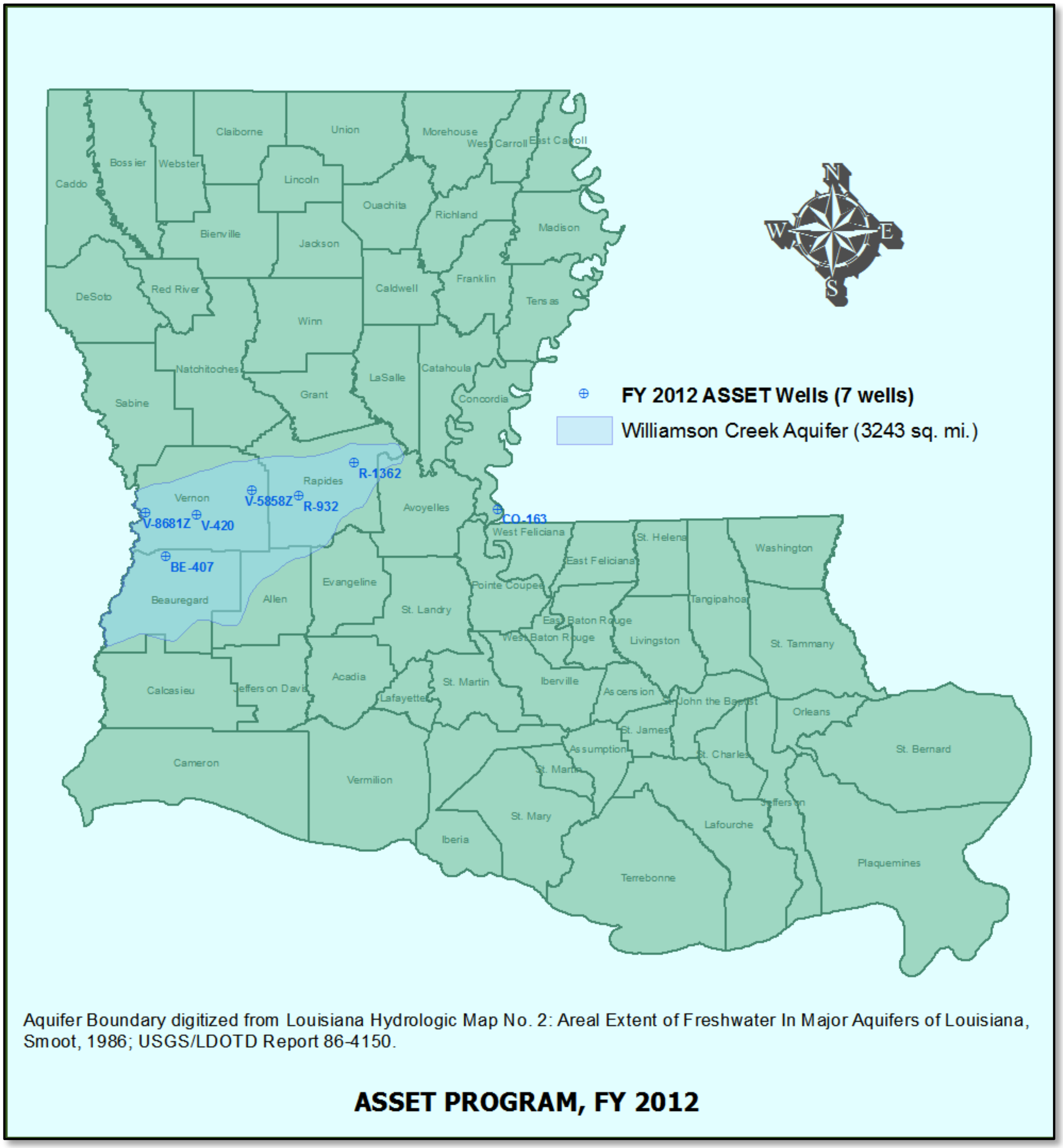

Figure 11-2: Map of pH Data

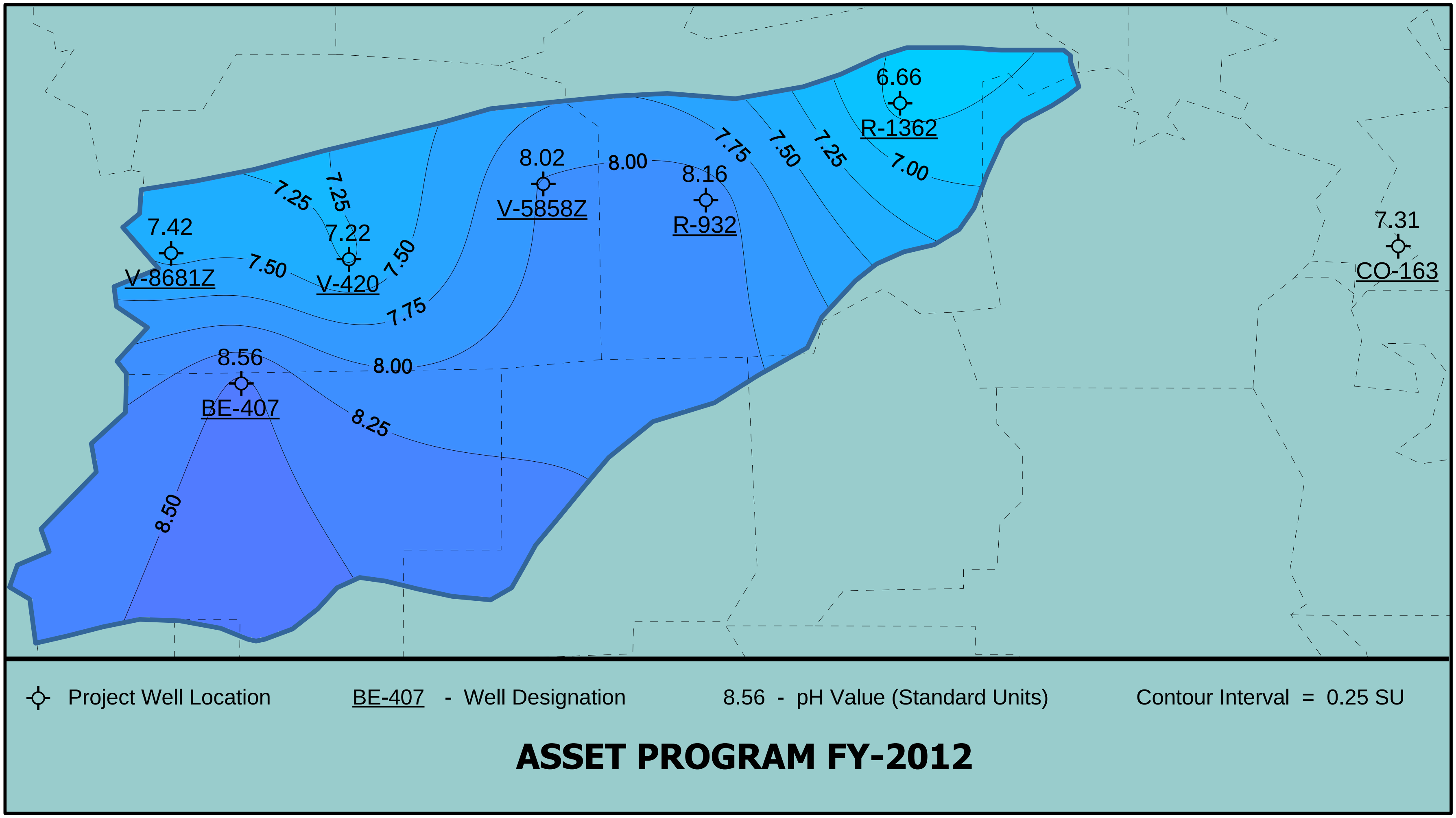

Figure 11-3: Map of TDS Lab Data

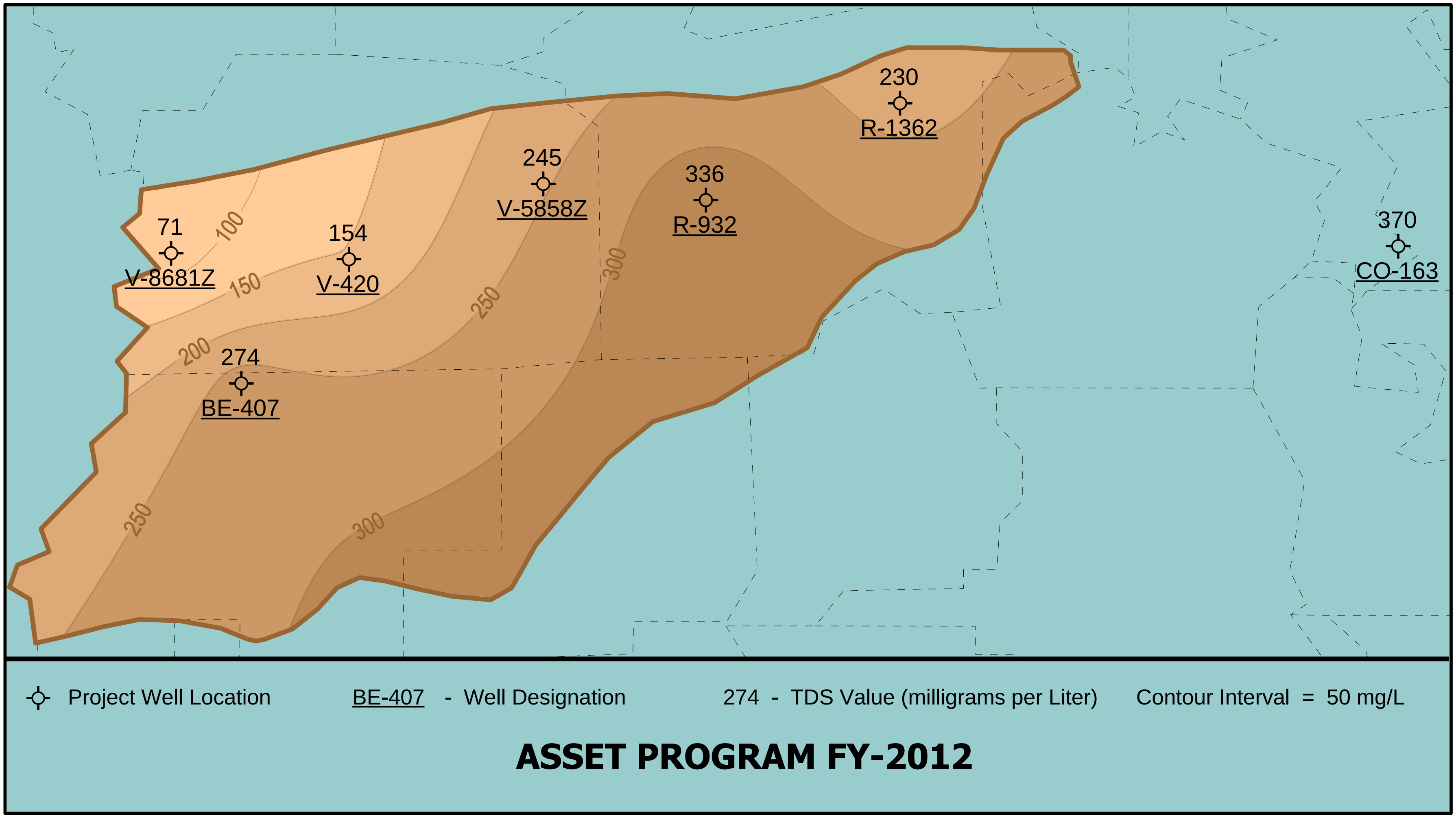

Figure 11-4: Map of Chloride Lab Data

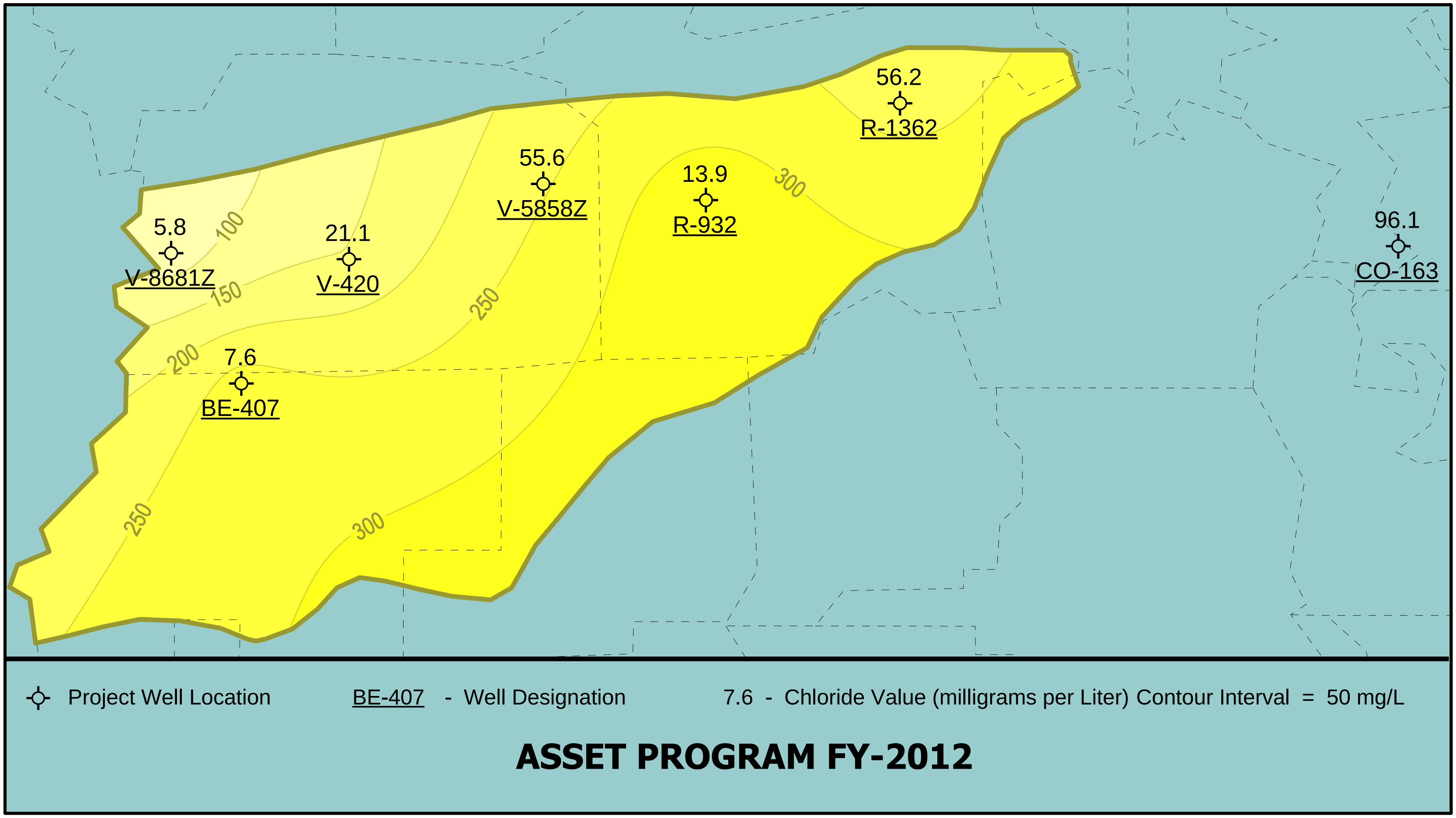

Figure 11-5: Map of Iron Data

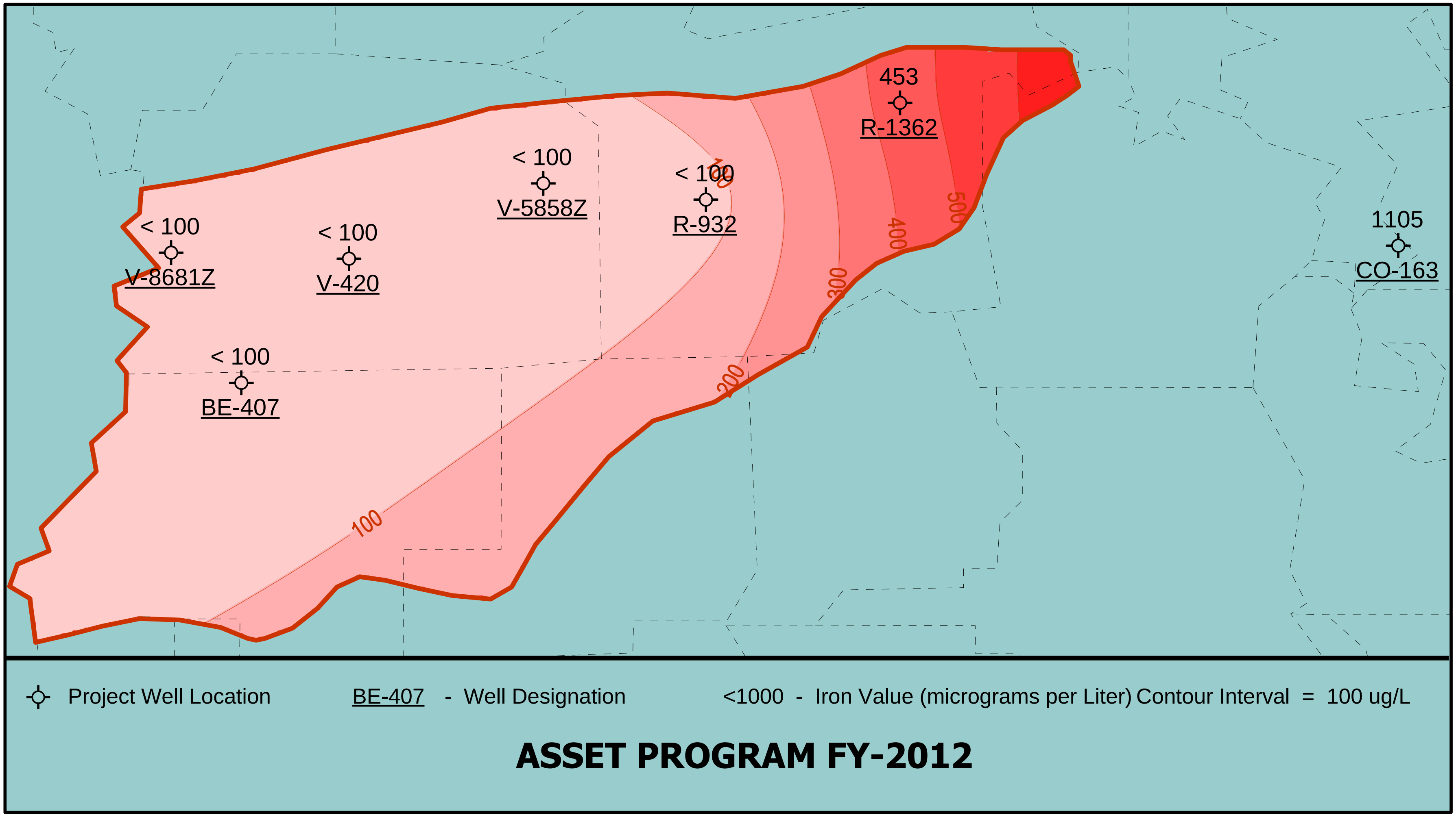

Chart 11-1: Field Temperature Trend

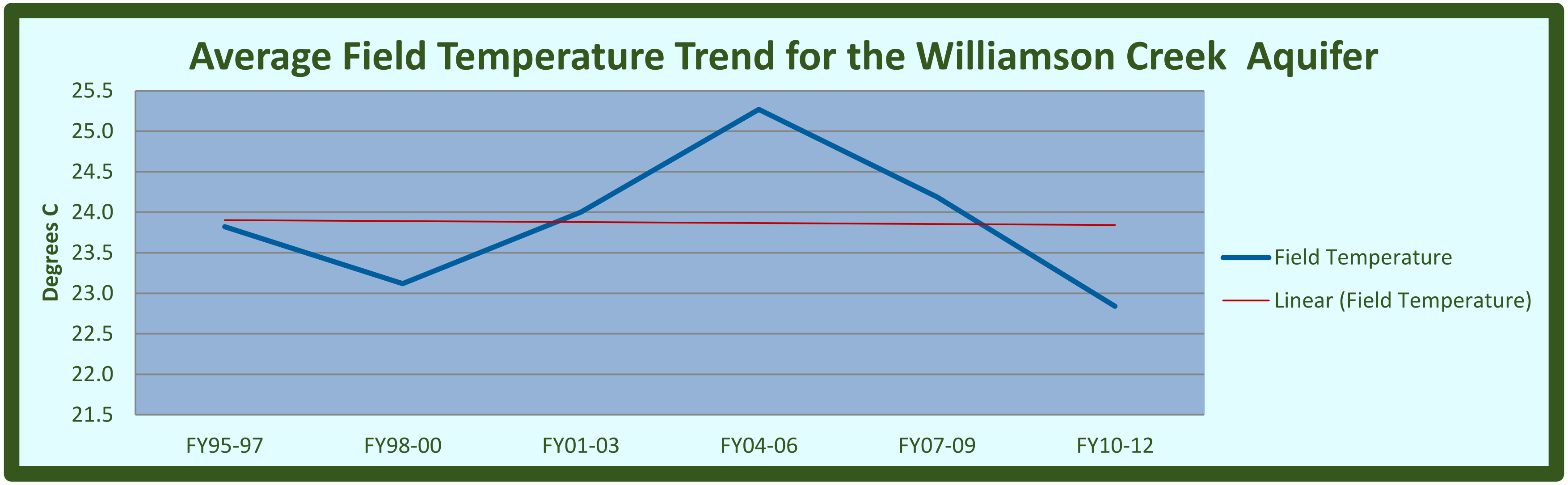

Chart 11-2: Field pH Trend

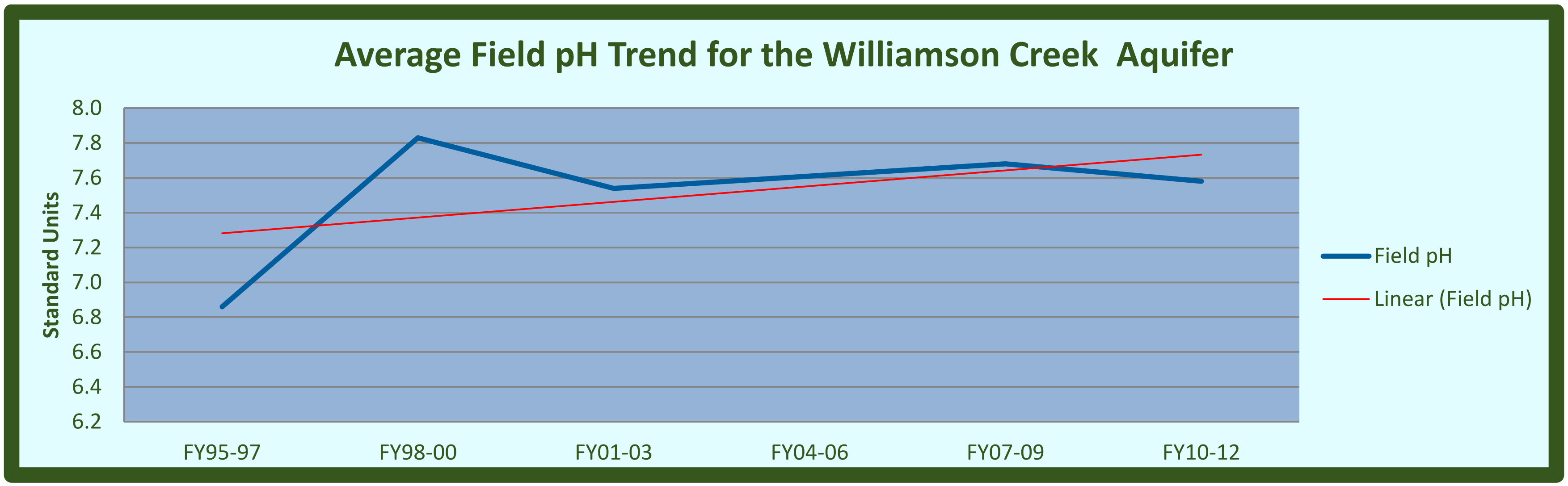

Chart 11-3: Field Specific Conductance Trend

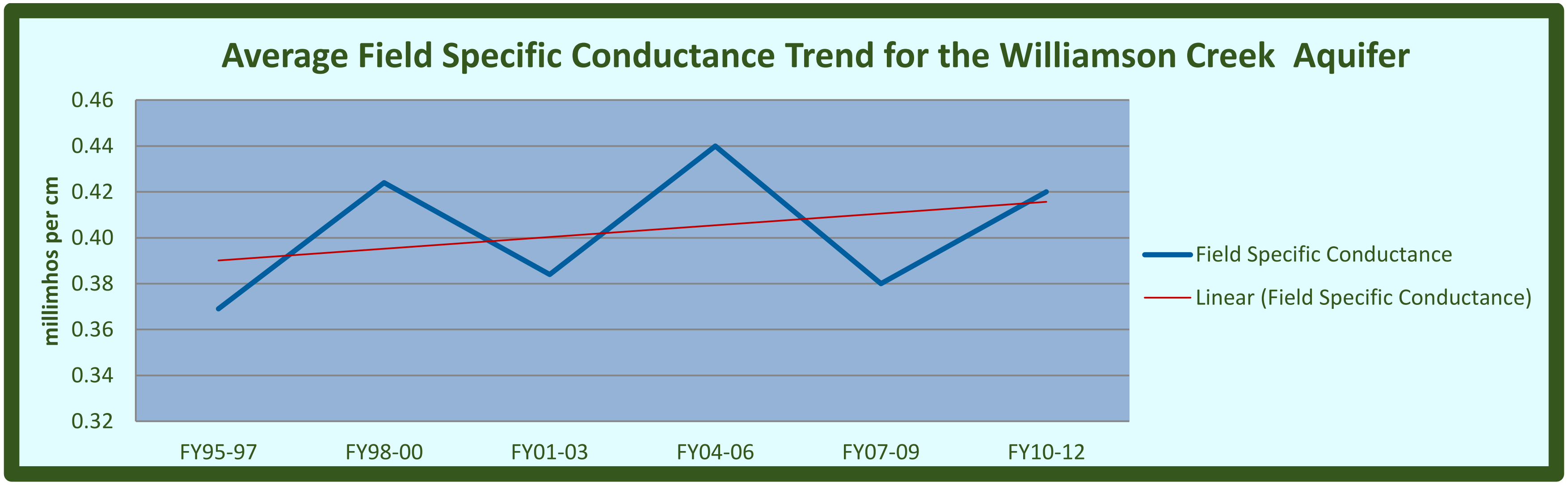

Chart 11-4: Lab Specific Conductance Trend

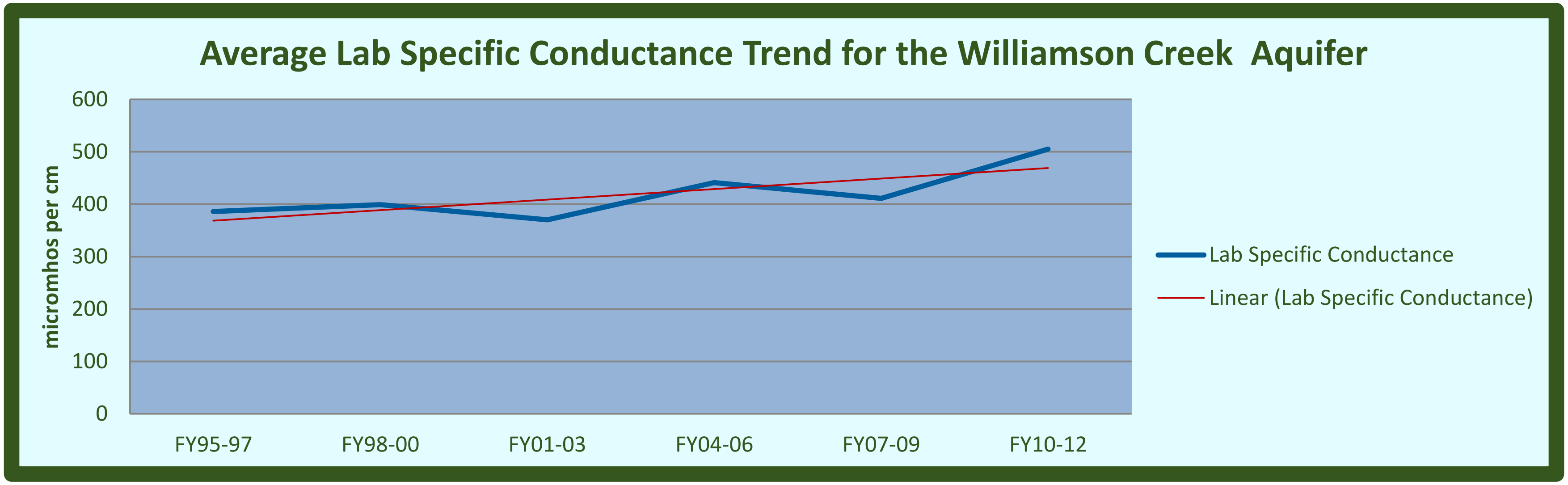

Chart 11-5: Field Salinity Trend

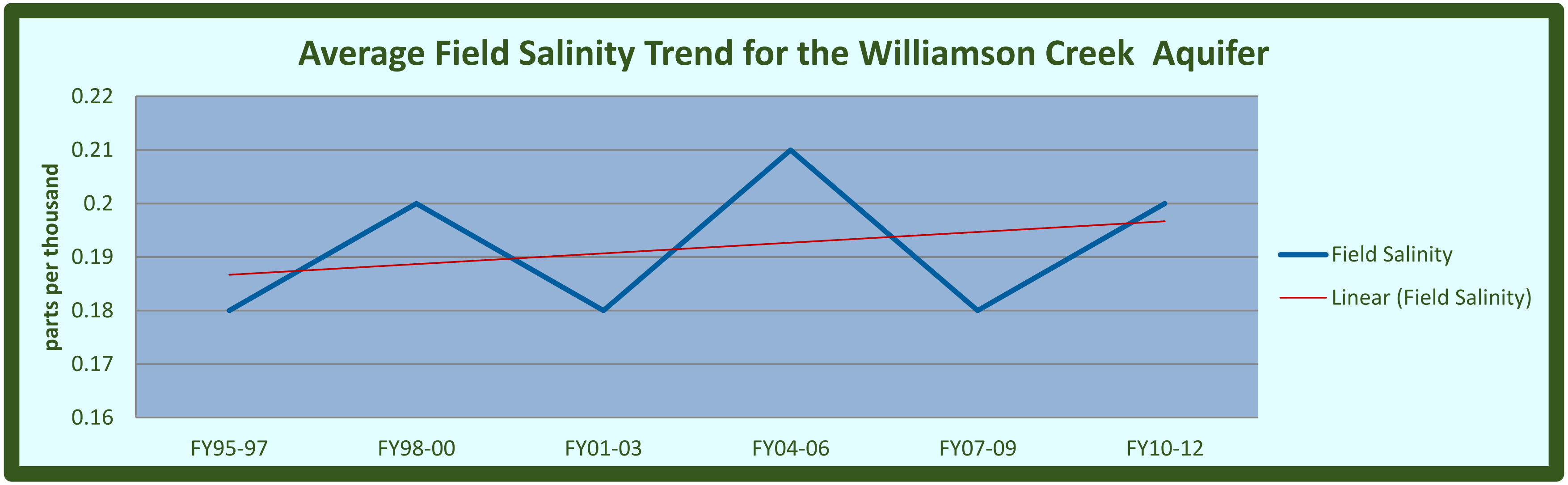

Chart 11-6: Alkalinity Trend

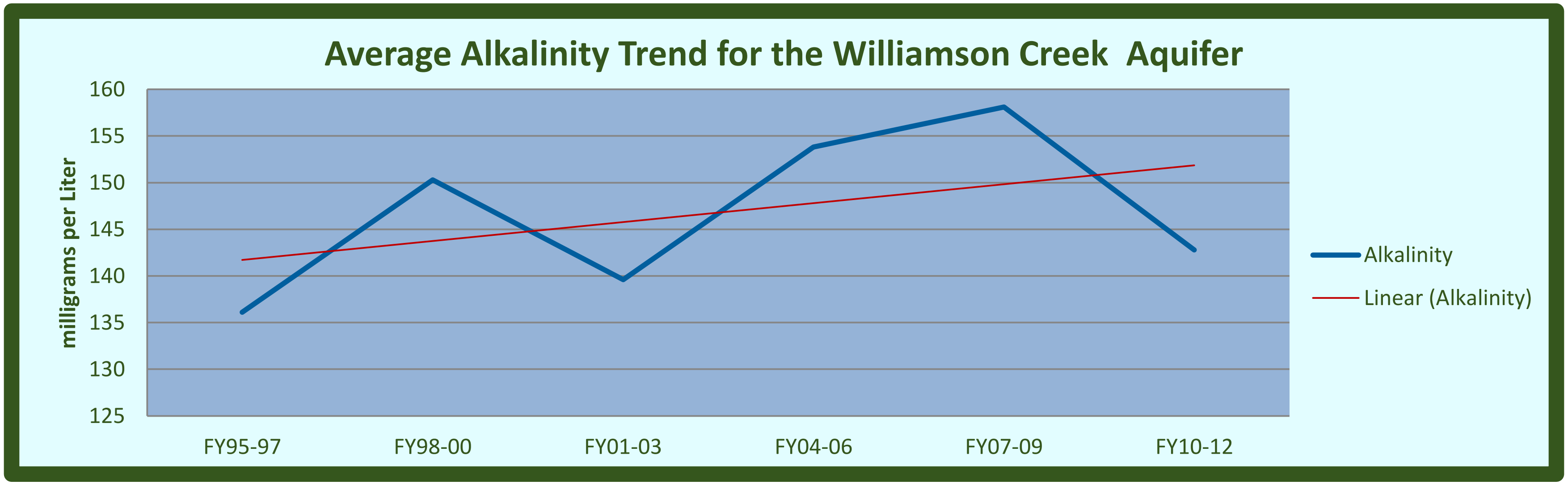

Chart 11-7: Chloride Trend

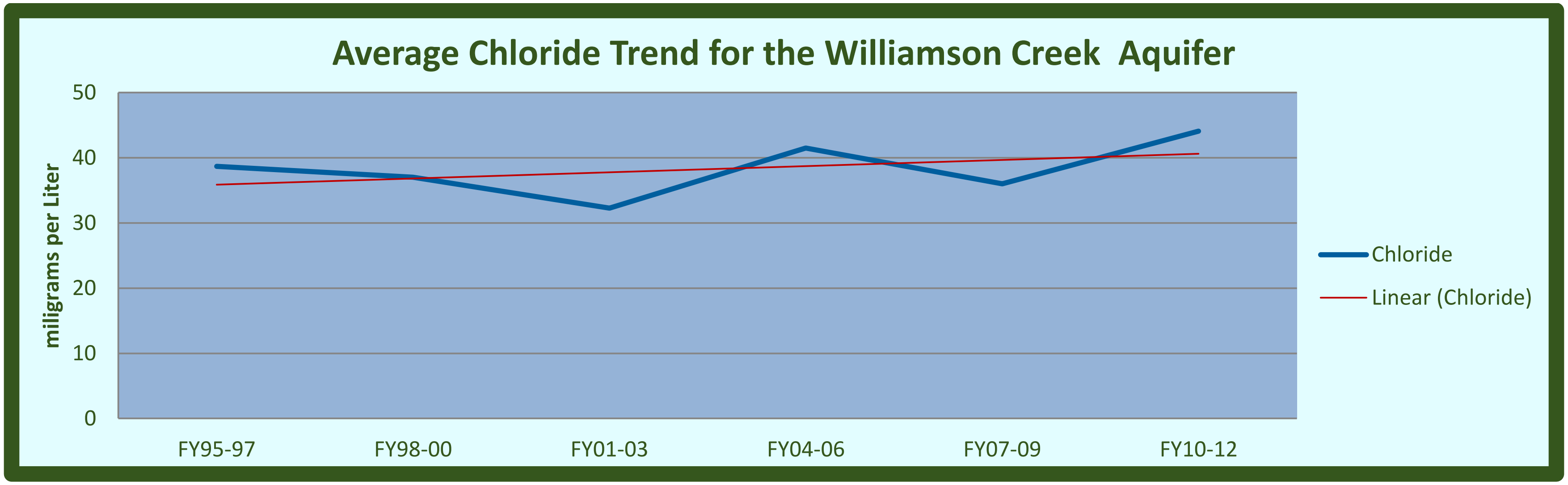

Chart 11-8: Color Trend

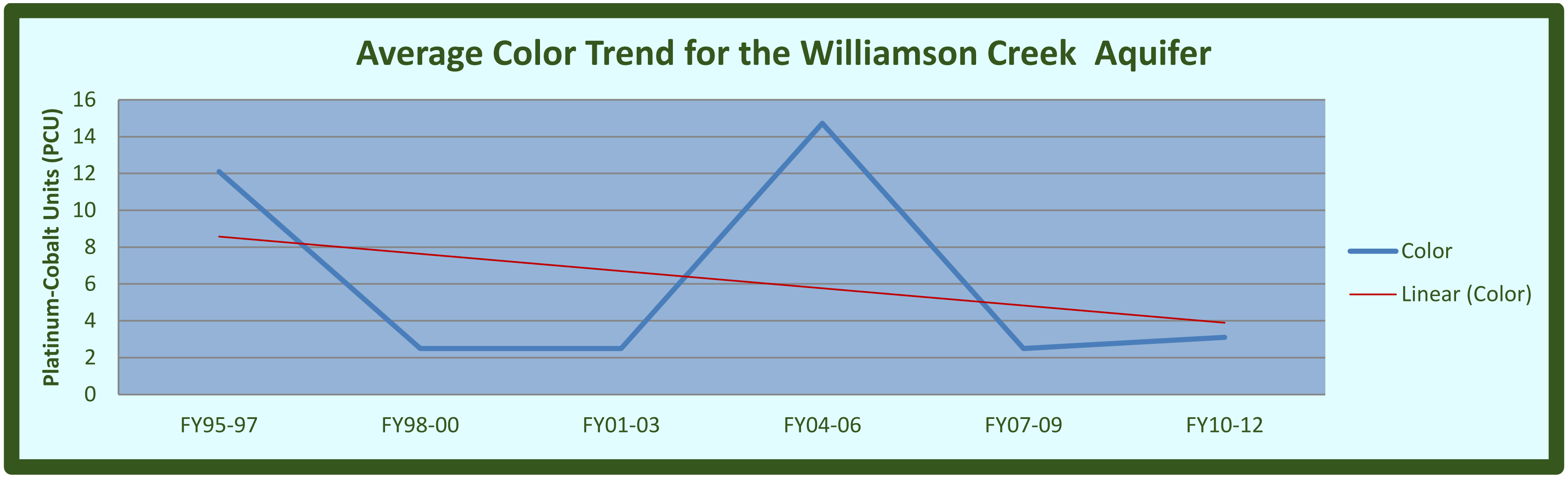

Chart 11-9: Sulfate Trend

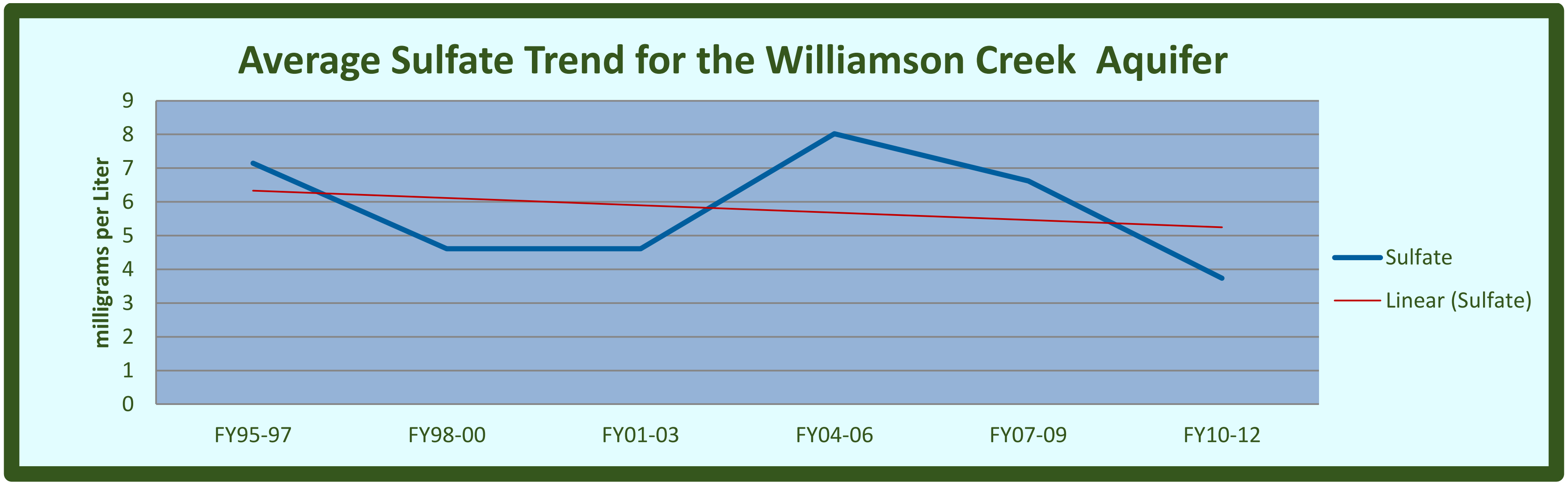

Chart 11-10: Total Dissolved Solids Trend

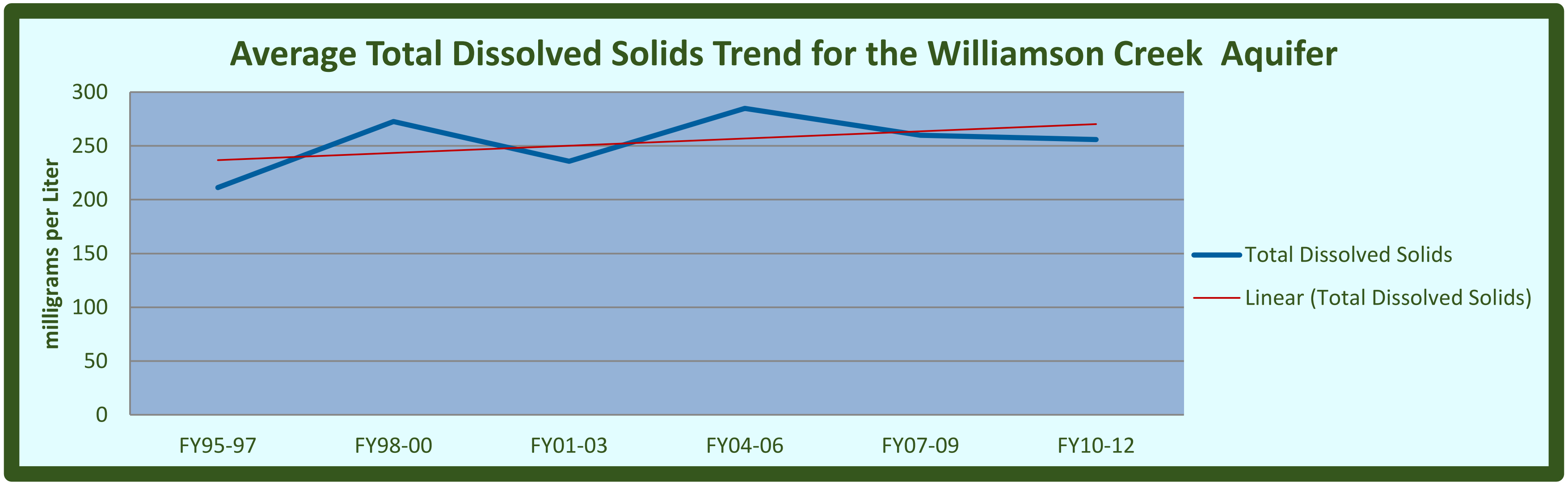

Chart 11-11: Ammonia Trend

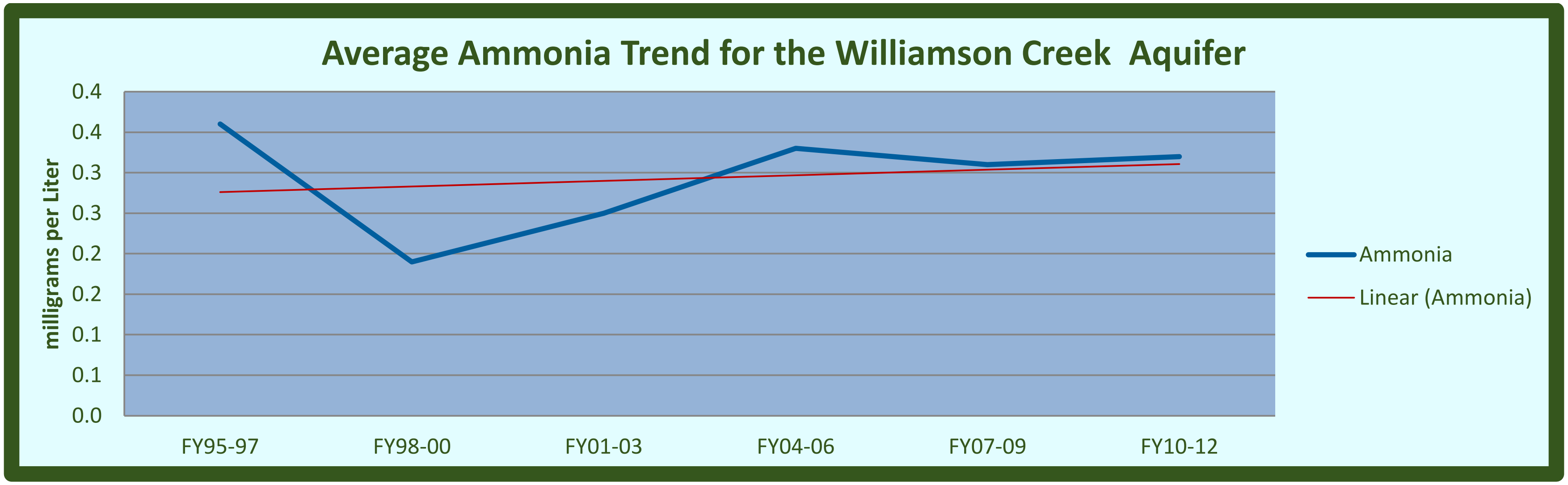

Chart 11-12: Hardness Trend

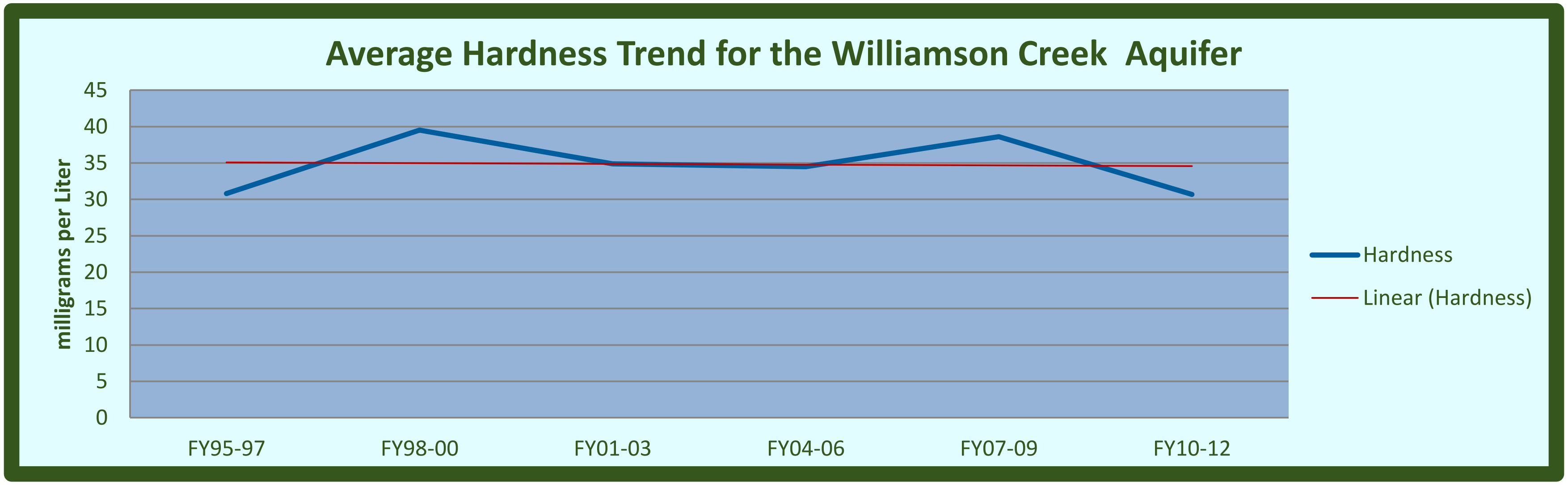

Chart 11-13: Nitrite – Nitrate Trend

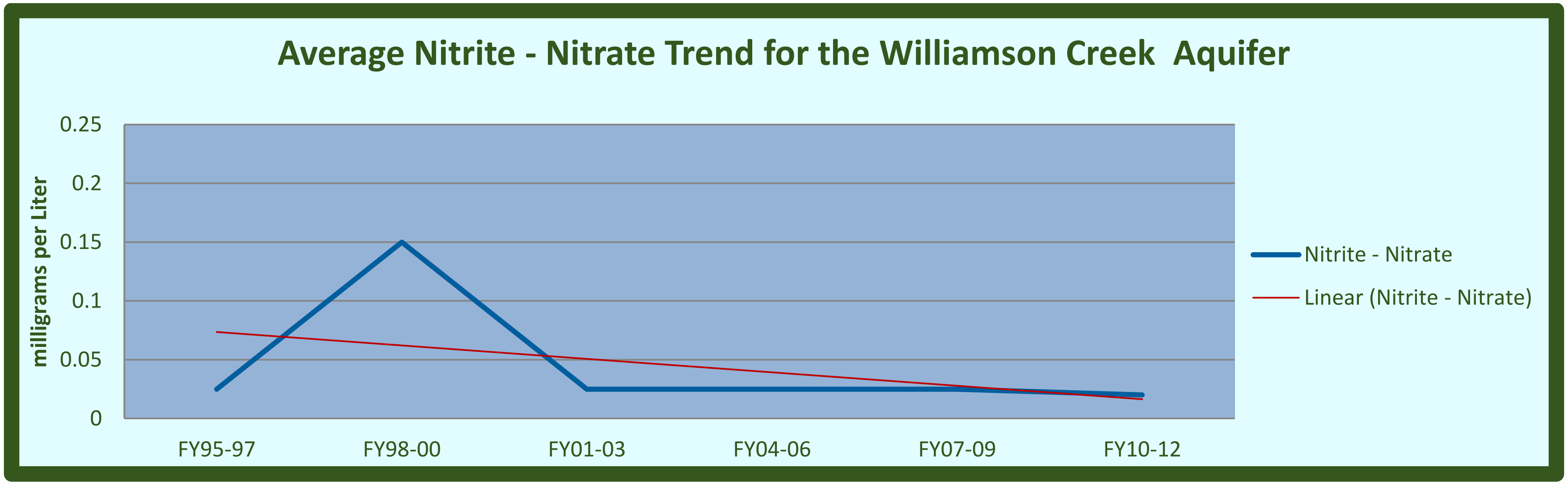

Chart 11-14: TKN Trend

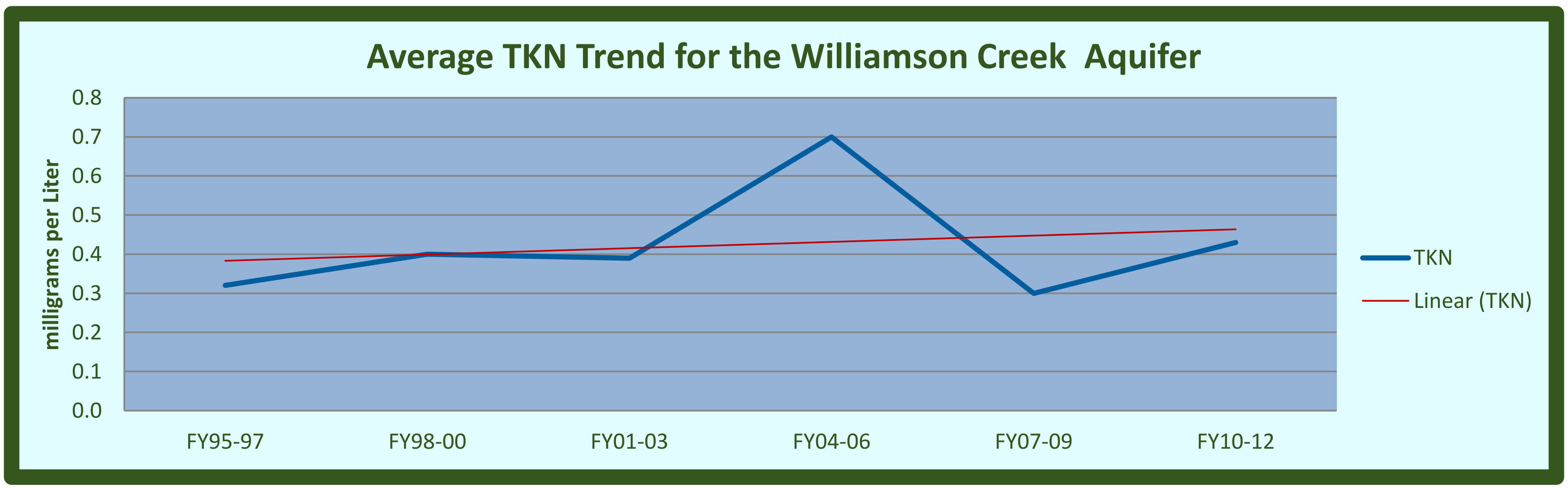

Chart 11-15: Total Phosphorus Trend

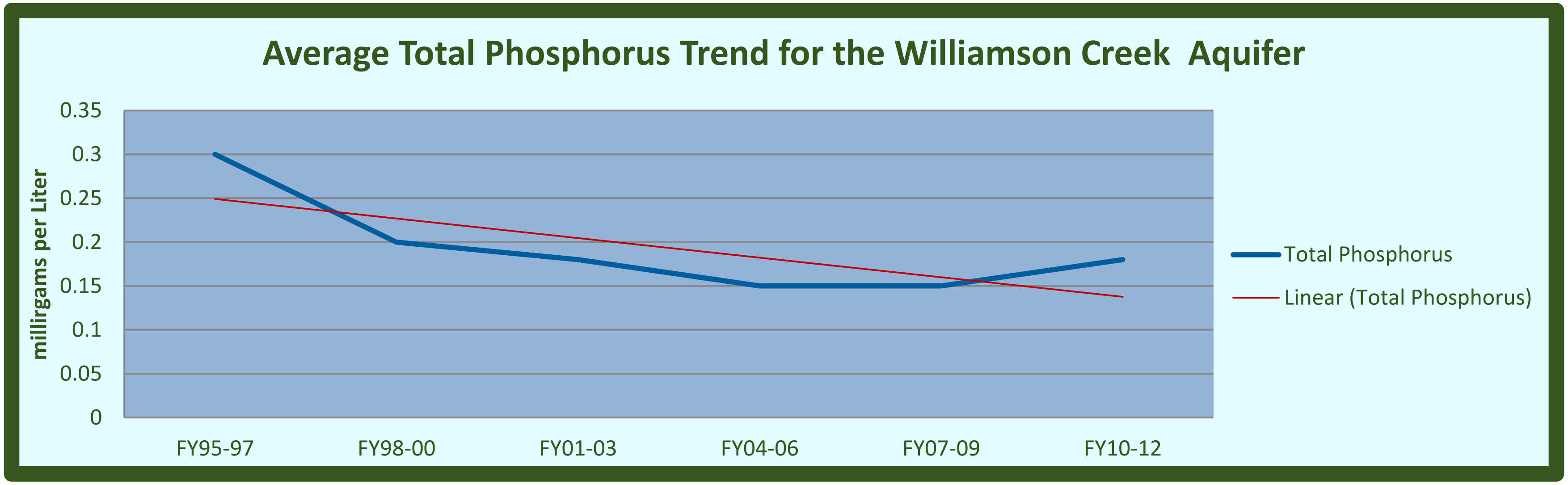

Chart 11-16: Iron Trend