JASPER EQUIVALENT AQUIFER SYSTEM SUMMARY, 2015
AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 14 TO THE 2015 TRIENNIAL SUMMARY REPORT

PARTIAL FUNDING PROVIDED BY THE CWA

ASSET
AQUIFER SAMPLING AND ASSESSMENT PROGRAM

Contents

BACKGROUND

The Louisiana Department of Environmental Quality's (LDEQ) Aquifer Sampling and Assessment (ASSET) Program 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 and associated wells are monitored every three years.

In order to better assess the water quality of a particular aquifer, an attempt is made to sample all ASSET Program wells producing from it in a narrow time frame. To more conveniently and economically promulgate those data collected, a summary report on each aquifer is prepared separately. Collectively, these aquifer summaries will make up, in part, the ASSET Program's Triennial Summary Report.

Analytical and field data contained in this summary were collected from wells producing from the Jasper Equivalent aquifer system during the 2015 state fiscal year (July 1, 2014 - June 30, 2015). This summary will become Appendix 14 of the ASSET Program Triennial Summary Report for 2015.

These data show that in May and June of 2015, 15 wells were sampled which produce from the Jasper Equivalent aquifer system. Of these 15 wells, twelve are classified as public supply, and one each of irrigation, industrial and domestic classification. The wells are located in nine parishes in southeast Louisiana.

Figure 14-1 shows the geographic locations of the Jasper Equivalent aquifer system and the associated wells, whereas Table 14-1 lists the wells monitored 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 Jasper Equivalent aquifer system is composed of the Miocene aged aquifers of the Florida Parishes and Pointe Coupee Parish. These Miocene 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 fine to coarse sand and gravel, with grain size increasing and sorting decreasing with depth.

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 Miocene 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 Jasper Equivalent aquifer system range from 500 to 3,200 feet below sea level. The range of thickness of the fresh water interval in the Jasper Equivalent aquifer system is 1,600 to 2,350 feet. The depths of the wells that were monitored in conjunction with the ASSET Program range from 960 to 2,700 feet below ground surface.

PROGRAM PARAMETERS

The field parameters checked at each ASSET well and the list of conventional parameters analyzed in the laboratory are shown in Table 14-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 14-3. These tables also show the field and analytical results determined for each analyte. For quality control, duplicate samples were taken for each parameter at ST-FOLSOM and WF-264.

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 detections (if any), from any of these three categories, can be found in their respective sections. Tables 14-8, 14-9 and 14-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 14-4 and 14-5 provide a statistical overview of field and conventional data and inorganic data for the Jasper Equivalent aquifer system, listing the minimum, maximum, and average results for these parameters collected in the FY 2015 sampling. Tables 14-6 and 14-7 compare these same parameter averages to historical ASSET-derived data for the Jasper Equivalent aquifer system, from fiscal years 1997, 2000, 2003, 2006, 2009, and 2011.

The average values listed in the above referenced tables are determined using all valid, reported results, including those reported as non-detect, or less than the detection limit (< DL). Per Departmental policy concerning statistical analysis (including contouring purposes), one-half the DL is used in place of zero when non-detects are encountered. However, the minimum value is reported < DL, not one-half the DL. If all values for a particular analyte are determined to be < DL, then the minimum, maximum, and average values are all reported as < DL.

Due to the variability in the laboratory's reporting detection limits caused by dilution factors, whenever an analyte in question is not detected, the standard reporting detection limit value for each analytical method is used as the DL when performing statistical calculations.

Figures 14-2, 14-3, 14-4, and 14-5 respectively, represent the contoured data for pH, total dissolved solids, chloride, and iron. Charts 14-1 through 14-16 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 14-2 and 14-3 show that 14 secondary MCLs (SMCLs) were exceeded in 10 of the 15 wells sampled in the Jasper Equivalent aquifer system.

Field and Conventional Parameters

Table 14-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 14-6 provides an overview of field and conventional parameter data averages for the Jasper Equivalent aquifer system, including six previous sampling event averages.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 14-2 shows that no MCL was exceeded for field or conventional parameters for this reporting period.

Federal Secondary Drinking Water Standards: A review of the analysis listed in Table 14-2 shows that 10 wells exceeded the SMCL for pH, two wells exceeded the SMCL for color, and one well exceeded the SMCLs for chloride and TDS. Following is a list of SMCL exceedances with well number and results:

pH (SMCL = 6.5 – 8.5 Standard Units):

EB-630 – 8.94 SU
LI-185 – 8.57 SU
SH-104 – 8.60 SU
TA-560 – 8.79 SU
WA-248 – 8.58 SU
EB-770 – 8.89 SU
LI-229 – 8.86 SU
ST-FOLSOM – 9.01 SU (Original and Duplicate)
TA-826 – 9.08 SU

Chloride (SMCL = 250 mg/L):

EB-630 – 255.0 mg/L

Color (SMCL = 15 PCU):

PC-275 – 25 PCU
WA-248 - 30 PCU

TDS (SMCL = 500 mg/L or 0.5 g/L):

EB-630 – 635 mg/L (lab); 0.815 g/L (field)

Inorganic Parameters

Table 14-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 14-7 provides an overview of inorganic parameter data averages for the Jasper Equivalent aquifer system, including six previous sampling event averages.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 14-3 shows that no MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 14-3 shows that the SMCL for iron was exceeded in well WA-248 at 456 µg/L (SMCL = 300 µg/L).

Volatile Organic Compounds

Table 14-6 shows the volatile organic compound (VOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however, any detection of a VOC would be discussed in this section.

There were no confirmed VOC detections at or above its detection limit during the FY 2015 sampling of the Jasper Equivalent aquifer system.

Semi-Volatile Organic Compounds

Table 14-7 shows the semi-volatile organic compound (SVOC) parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however any detection of a SVOC would be discussed in this section.

There were no confirmed SVOC detections at or above its detection limit during the FY 2015 sampling of the Jasper Equivalent aquifer system.

Pesticides and PCBs

Table 14-8 shows the pesticide and PCB parameters for which samples are collected at each well. Due to the number of analytes in this category, analytical results are not tabulated; however any detection of a pesticide or PCB would be discussed in this section.

There were no confirmed Pesticide or PCB at or above its detection limit during the FY 2015 sampling of the Jasper Equivalent aquifer system.

WATER QUALITY TRENDS AND COMPARISON TO HISTORICAL ASSET DATA

Analytical and field data show that the quality and characteristics of groundwater produced from the Jasper Equivalent aquifer system show some change when comparing current data to that of the five previous sampling rotations (three, six, nine, twelve, fifteen and eighteen years prior). These comparisons can be found in Tables 14-6 and 14-7, and in Charts 14-1 to 14-16 of this summary.

Over the eighteen-year period, nine analytes have shown a general increase in average concentration. These analytes are: alkalinity, ammonia, chloride, hardness, iron, pH, sulfate, TKN, and total phosphorus. For this same period, five analytes have shown a general decrease. These analytes are barium, color, nitrite-nitrate, temperature, and total dissolved solids. All other analyte averages have remained consistent or have been non-detect for this period. The number of secondary exceedances in the Jasper Equivalent aquifer system has changed from the previous sampling in FY 2012. There were 11 wells with one SMCL exceedance (pH) in FY 2012, while there were 10 wells with one or more SMCL exceedances in FY 2015 for a total of 15 SMCL exceedances.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is soft[1] and is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no ASSET well that was sampled during the Fiscal Year 2015 monitoring of the Jasper 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 14 SMCLs exceeded in 10 wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Jasper Equivalent aquifer system, with nine parameters showing consistent increases in average concentrations and five parameters decreasing in average concentration with the remainder of the analyte averages staying consistent over the previous eighteen year period.

It is recommended that the wells assigned to the Jasper 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 14-1: List of Wells Sampled – FY 2015

Jasper Equivalent Aquifer System

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
EB-630	East Baton Rouge	6/16/2015	Baton Rouge Water Company	2,253	Public Supply
EB-770	East Baton Rouge	6/16/2015	City of Zachary	2,080	Public Supply
EF-272	East Feliciana	6/15/2015	Louisiana. War Vets Home	1,325	Public Supply
LI-185	Livingston	6/16/2015	City of Denham Springs	2,610	Public Supply
LI-229	Livingston	6/16/2015	Ward 2 Water District	1,826	Public Supply
LI-257	Livingston	6/15/2015	Village of Albany	1,842	Public Supply
PC-275	Point Coupee	6/15/2015	Private Owner	1,912	Domestic
SH-104	St. Helena	6/15/2015	Cal Maine Foods	1,652	Industrial
ST-995	St. Tammany	5/27/2015	Insta-Gator	2,290	Irrigation
ST-1135	St. Tammany	5/28/2015	Lakeshore Estates	2,605	Public Supply
ST-FOLSOM	St. Tammany	5/27/2015	Village of Folsom	2,265	Public Supply
TA-560	Tangipahoa	5/28/2015	Town of Roseland	2,032	Public Supply
TA-826	Tangipahoa	5/28/2015	City of Ponchatoula	2,015	Public Supply
WA-248	Washington	5/28/2015	Town of Franklinton	2,700	Public Supply
WF-264	West Feliciana	6/15/2015	West Feliciana Parish Utilities	960	Public Supply

Table 14-2: Summary of Field and Conventional Data – FY 2015

Jasper Equivalent Aquifer System

Well ID	pH SU	Sal. ppt	Sp. Cond. mmhos/cm	Temp Deg. C	TDS g/L	Alk mg/L	Cl mg/L	Color PCU	Hard. mg/L	Nitrite-Nitrate (as N) mg/L	NH3 mg/L	Tot. P mg/L	Sp. Cond. umhos/cm	SO4 mg/L	TDS mg/L	TKN mg/L	TSS mg/L	Turb. mg/L
	LABORATORY REPORTING LIMITS† →					2	1/10	5	5	0.05	0.1	0.05	1	1	10	0.1	4	0.1
	FIELD PARAMETERS					LABORATORY PARAMETERS												
EB-630	8.94	0.61	1.254	33.62	0.815	205	255.0	5	24	< DL	0.40	0.22	1,220	9.5	635	0.63	< DL	1.1
EB-770	8.89	0.17	0.359	29.51	0.233	205	3.1	5	8	< DL	0.28	0.26	354	10.2	180	0.50	< DL	0.5
EF-272	8.36	0.16	0.344	26.15	0.224	172	4.0	5	< DL	< DL	0.42	0.37	374	8.6	190	0.55	< DL	0.3
LI-185	8.57	0.13	0.283	32.84	0.184	154	3.6	< DL	16	< DL	0.39	0.24	274	9.9	165	0.30	< DL	0.6
LI-229	8.86	0.15	0.319	26.94	0.208	154	3.4	5	6	< DL	0.28	0.24	313	9.9	175	0.38	< DL	0.4
LI-257	8.33	0.12	0.251	28.82	0.163	585	3.2	< DL	< DL	< DL	0.26	0.27	268	10.4	140	0.35	< DL	0.3
PC-275	7.93	0.32	0.665	23.79	0.432	287	26.8	25	< DL	< DL	0.75	0.43	688	7.1	350	0.99	< DL	0.6
SH-104	8.60	0.20	0.414	27.06	0.269	185	3.5	< DL	< DL	< DL	0.26	0.48	441	9.2	220	0.53	< DL	0.3
ST-1135	7.22	0.25	0.526	37.25	0.342	262	11.2	15	8	< DL	1.50	0.28	431	11.7	280	1.20	< DL	0.4
ST-995	8.36	0.09	0.199	25.58	0.129	98	3.2	5	12	< DL	0.26	0.59	169	8.6	145	0.56	< DL	0.4
ST-FOLSOM	8.80	0.13	0.272	29.40	0.177	172	3.4	5	8	< DL	0.78	0.21	217	9.4	135	0.70	4	0.4
ST-FOLSOM*	8.80	0.13	0.272	29.40	0.177	133	3.3	10	8	< DL	0.25	0.22	224	9.4	145	0.81	< DL	0.6
TA-560	8.79	0.11	0.228	29.11	0.148	107	3.2	5	< DL	< DL	0.24	0.64	194	8.2	155	0.54	< DL	0.4
TA-826	9.08	0.16	0.339	30.28	0.221	142	3.0	10	12	< DL	0.41	0.29	295	10.5	190	0.67	< DL	0.5
WA-248	8.58	0.18	0.376	26.46	0.245	185	10.9	30	10	0.09	0.40	0.57	336	8.2	230	0.84	< DL	0.6
WF-264	8.10	0.14	0.289	24.48	0.188	185	2.4	< DL	22	< DL	0.35	0.16	302	9.1	155	0.62	< DL	0.6
WF-264*	8.10	0.14	0.289	24.48	0.188	185	3.3	5	22	< DL	0.57	0.12	304	9.2	165	0.53	< DL	0.4

† Detection limits vary due to dilution factor   * Duplicate Sample   Exceeds EPA secondary standard (SMCL)

Table 14-3: Summary of Inorganic Data – FY 2015

Jasper Equivalent Aquifer System

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	1	1	0.5	0.5	1	3	50	1	0.2	1	1	0.5	0.5	5
EB-630	< DL	< DL	76	< DL	< DL	< DL	14.6	182	< DL	< DL	< DL	< DL	< DL	< DL	< DL
EB-770	< DL	< DL	5	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
EF-272	< DL	< DL	7	< DL	< DL	< DL	8.1	< DL	1.3	< DL	< DL	< DL	< DL	< DL	9.3
LI-185	< DL	< DL	17	< DL	< DL	< DL	< DL	< DL	1.4	< DL	< DL	< DL	< DL	< DL	< DL
LI-229	< DL	< DL	10	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
LI-257	< DL	< DL	7	< DL	< DL	< DL	< DL	56	< DL	< DL	< DL	< DL	< DL	< DL	< DL
PC-275	< DL	< DL	9	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SH-104	< DL	< DL	3	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
ST-1135	< DL	< DL	14	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
ST-995	< DL	< DL	9	< DL	< DL	< DL	4	54.8	< DL	< DL	< DL	< DL	< DL	< DL	< DL
ST-FOLSOM	< DL	< DL	2	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
ST-FOLSOM*	< DL	< DL	3	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
TA-560	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
TA-826	< DL	< DL	22	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
WA-248	< DL	< DL	5	< DL	< DL	< DL	< DL	456	< DL	< DL	< DL	< DL	< DL	< DL	< DL
WF-264	< DL	< DL	45	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
WF-264*	< DL	< DL	44	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL

* Duplicate Sample   Exceeds EPA secondary standard (SMCL)

Table 14-4: FY 2015 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	pH (SU)	7.22	9.08	8.49
	Salinity (ppt)	0.09	0.61	0.19
	Specific Conductance (mmhos/cm)	0.199	1.254	0.393
	Temperature (^{O}C)	23.79	37.25	28.54
	TDS (g/L)	0.129	0.815	0.255
LABORATORY	Alkalinity (mg/L)	98	585	201
	Chloride (mg/L)	2.4	255.0	20.4
	Color (PCU)	< DL	30	8
	Hardness (mg/L)	< DL	24	10
	Nitrite - Nitrate, as N (mg/L)	< DL	0.09	< DL
	Ammonia, as N (mg/L)	0.24	1.50	0.46
	Total Phosphorus (mg/L)	0.12	0.64	0.33
	Specific Conductance (µmhos/cm)	169	1,220	377
	Sulfate (mg/L)	7.1	11.7	9.4
	TDS (mg/L)	135	635	215
	TKN (mg/L)	0.30	1.20	0.63
	TSS (mg/L)	< DL	4	< DL
	Turbidity (NTU)	0.3	1.1	0.5

Table 14-5: FY 2015 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (µg/L)	< DL	< DL	< DL
Arsenic (µg/L)	< DL	< DL	< DL
Barium (µg/L)	< DL	76	17
Beryllium (µg/L)	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL
Chromium (µg/L)	< DL	< DL	< DL
Copper (µg/L)	< DL	14.6	< DL
Iron (µg/L)	< DL	456	63
Lead (µg/L)	< DL	1.4	< DL
Mercury (µg/L)	< DL	< DL	< DL
Nickel (µg/L)	< DL	< DL	< DL
Selenium (µg/L)	< DL	< DL	< DL
Silver (µg/L)	< DL	< DL	< DL
Thallium (µg/L)	< DL	< DL	< DL
Zinc (µg/L)	< DL	9.3	< DL

Table 14-6: Triennial Field and Conventional Statistics, ASSET Wells

	PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
		FY 1997	FY 2000	FY 2003	FY 2006	FY 2009	FY 2012	FY 2015
FIELD	pH (SU)	7.64	Invalid Data	8.67	8.67	8.12	8.76	8.49
FIELD	Salinity (ppt)	0.17	0.18	0.17	0.18	0.16	0.17	0.19
FIELD	Specific Conductance (mmhos/cm)	0.350	0.380	0.370	0.368	0.330	0.366	0.393
FIELD	Temperature (^{O}C)	29.00	28.84	28.13	29.16	27.62	27.00	28.54
FIELD	Total dissolved solids (g/L)	-	-	-	0.180	0.170	0.238	0.255
LABORATORY	Alkalinity (mg/L)	137	167	163	165	164	156	201
LABORATORY	Chloride (mg/L)	12.1	17.9	14.4	24.5	6.4	14.0	20.4
LABORATORY	Color (PCU)	8	6	10	9	2	6	8
LABORATORY	Hardness (mg/L)	7	6	11	6	5	8	10
LABORATORY	Nitrite - Nitrate , as N (mg/L)	< DL	< DL	0.06	< DL	< DL	< DL	< DL
LABORATORY	Ammonia, as N (mg/L)	0.31	0.27	0.24	0.29	0.89	0.22	0.46
LABORATORY	Total Phosphorus (mg/L)	0.20	0.28	0.32	0.26	0.41	0.51	0.33
LABORATORY	Specific Conductance (umhos/cm)	335	394	343	397	309	327	377
LABORATORY	Sulfate (mg/L)	8.8	7.3	8.1	8.3	9.4	8.0	9.4
LABORATORY	Total dissolved solids (mg/L)	258	251	221	250	279	220	215
LABORATORY	TKN (mg/L)	0.19	0.47	0.33	0.43	1.55	< DL	0.63
LABORATORY	Total suspended solids (mg/L)	4.1	8.6	< DL	< DL	< DL	< DL	< DL
LABORATORY	Turbidity (NTU)	< DL	1.1	1.1	< DL	< DL	0.2	0.5

Table 14-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
	FY 1997	FY 2000	FY 2003	FY 2006	FY 2009	FY 2012	FY 2015
Antimony (μg/L)	7.78	< DL	< DL	< DL	< DL	< DL	< DL
Arsenic (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Barium (μg/L)	24	12	22	14	14	12	17
Beryllium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cadmium (μg/L)	1.13	1.02	< DL	< DL	< DL	< DL	< DL
Chromium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Copper (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Iron (μg/L)	28	28	86	31	< DL	< DL	63
Lead (μg/L)	< DL	< DL	< DL	< DL	< DL	0.64	< DL
Mercury (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Nickel (μg/L)	< DL	< DL	< DL	< DL	7.79	< DL	< DL
Selenium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Silver (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Thallium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Zinc (μg/L)	< DL	22.9	56.8	< DL	10.3	3.0	< DL

Table 14-8: VOC Analytical Parameters

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

Table 14-9: SVOC Analytical Parameters

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

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

Table 14-10: Pesticides and PCBs

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

Figure 14-1: Location Plat, Jasper Equivalent Aquifer System

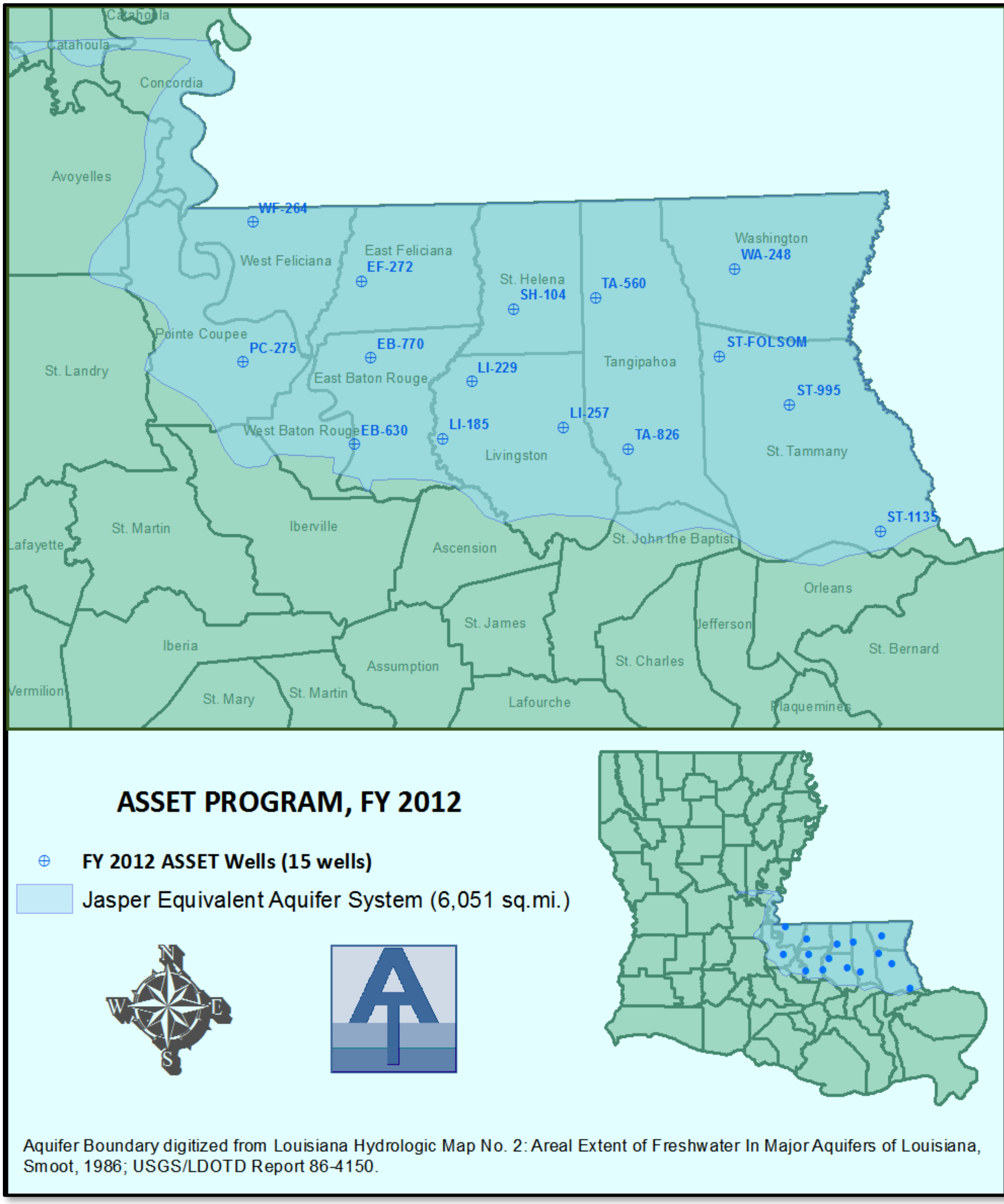

Figure 14-2: Map of pH Data

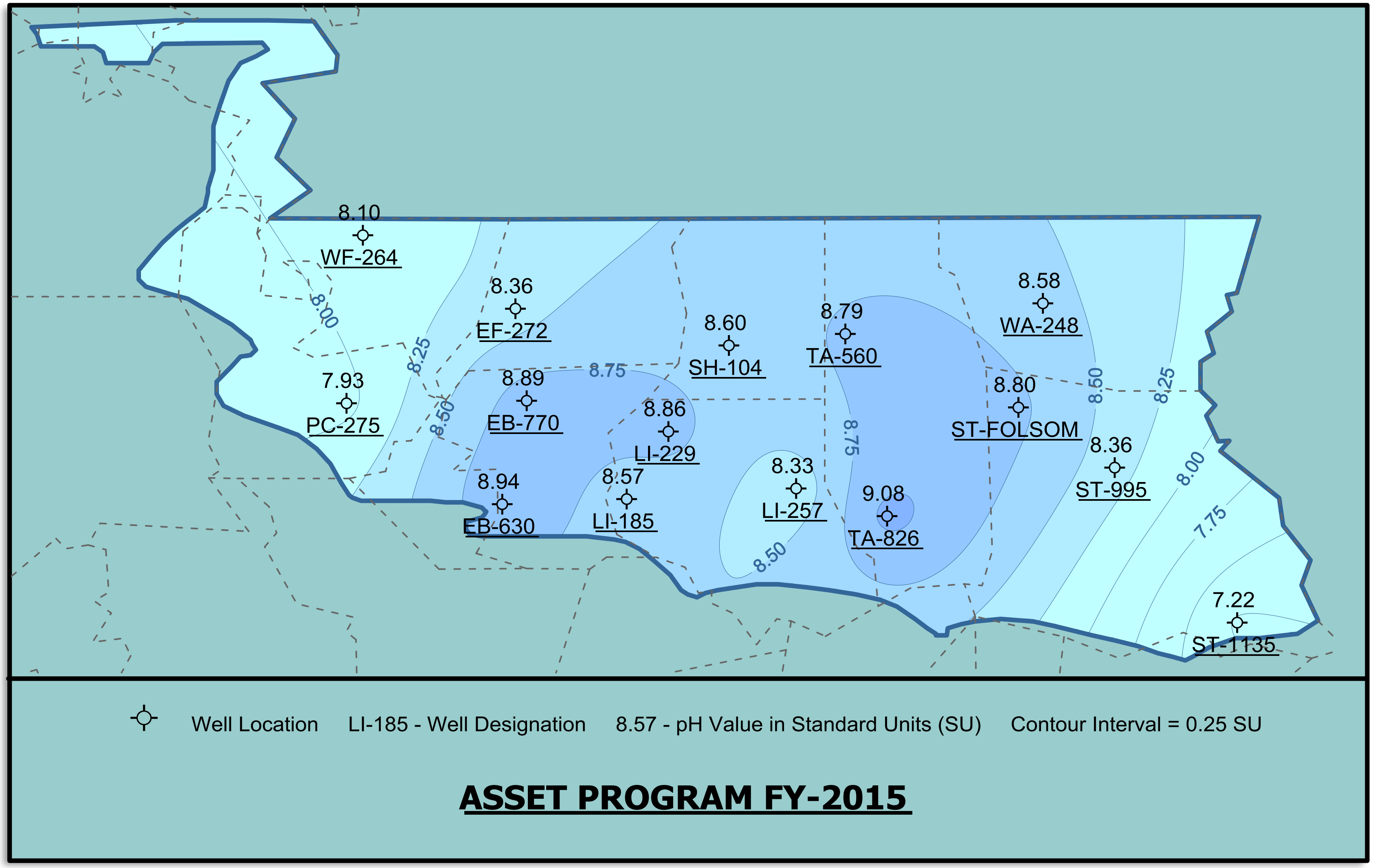

Figure 14-3: Map of TDS Lab Data

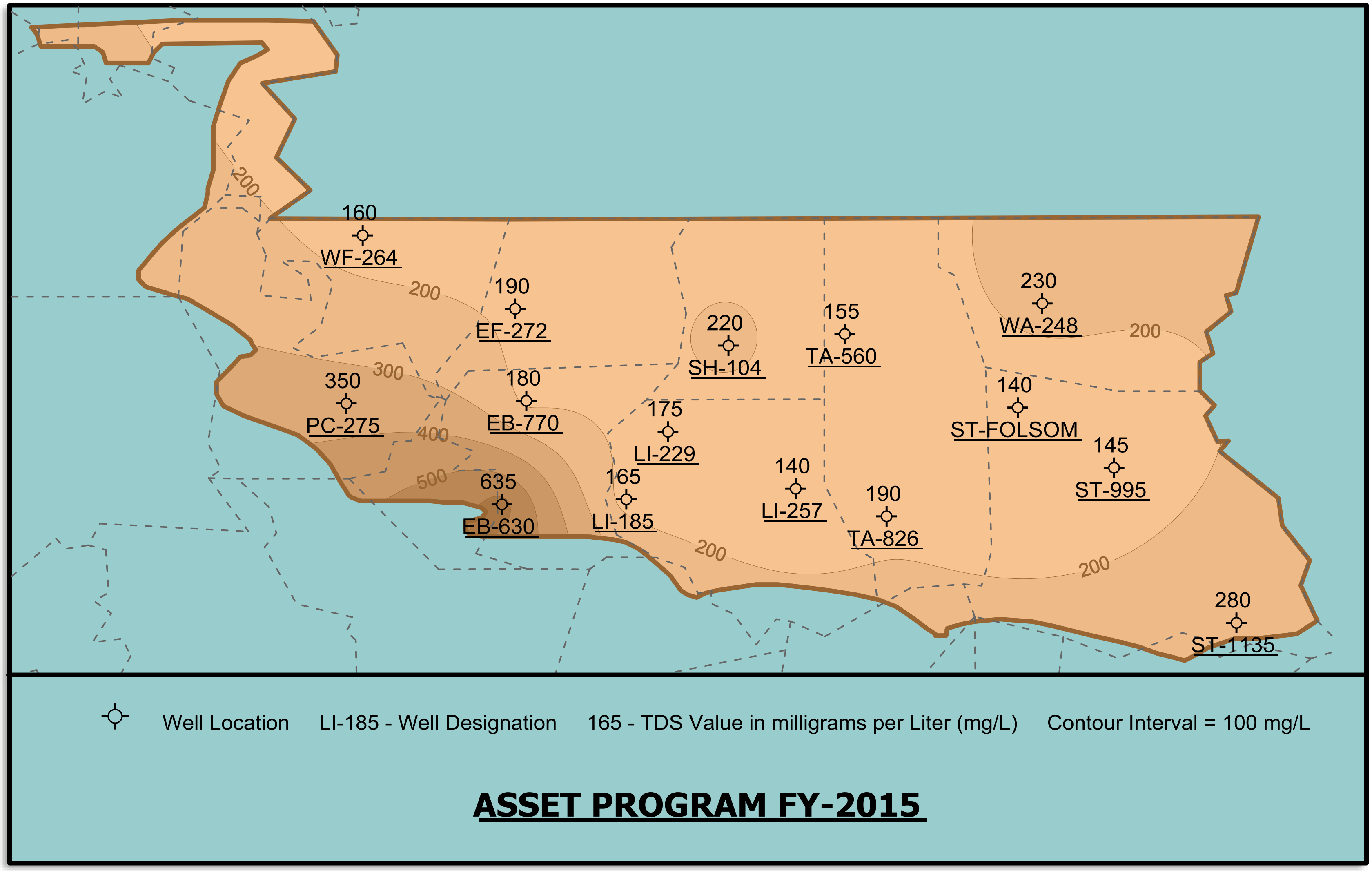

Figure 14-4: Map of Chloride Data

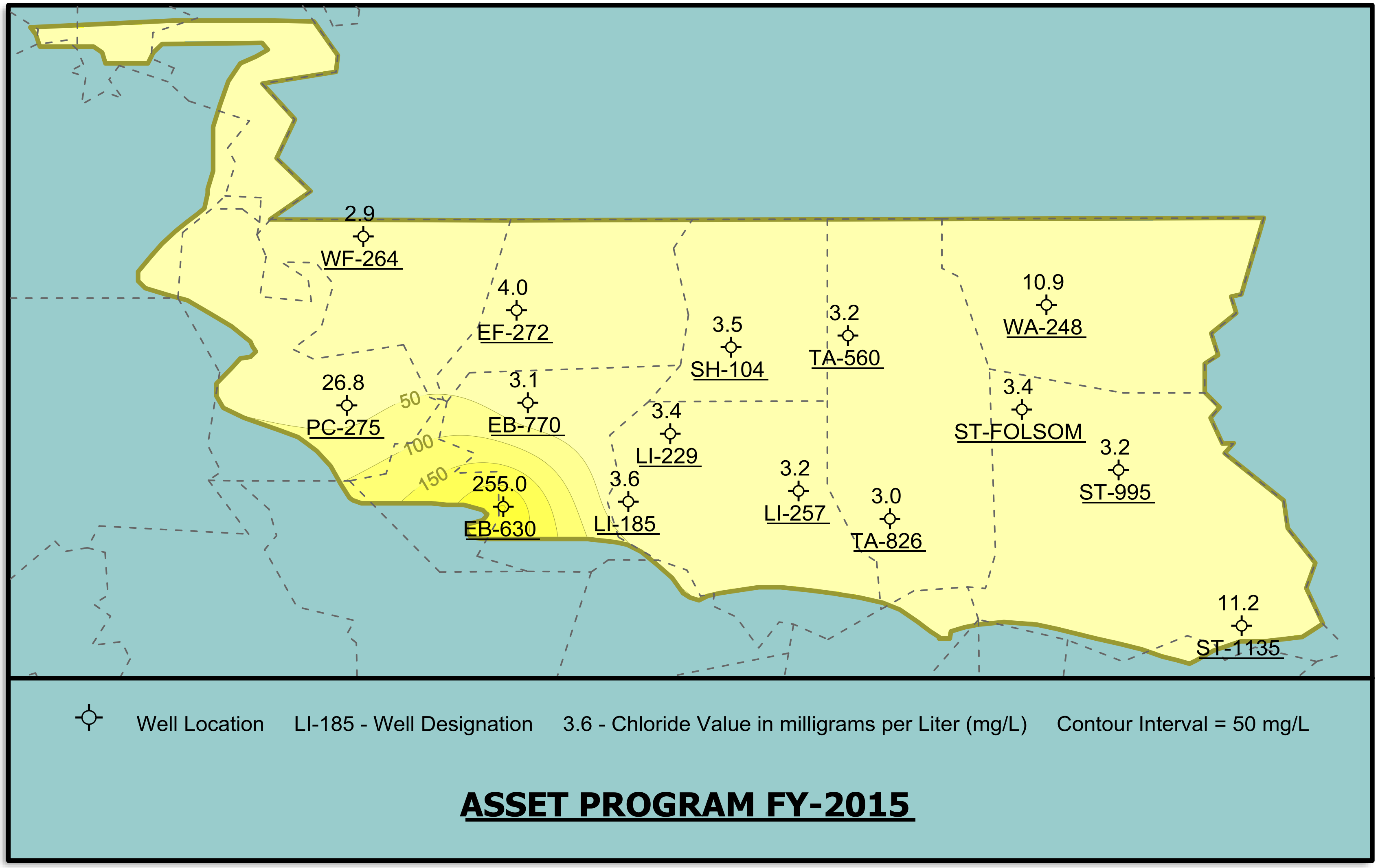

Figure 14-5: Map of Iron Data

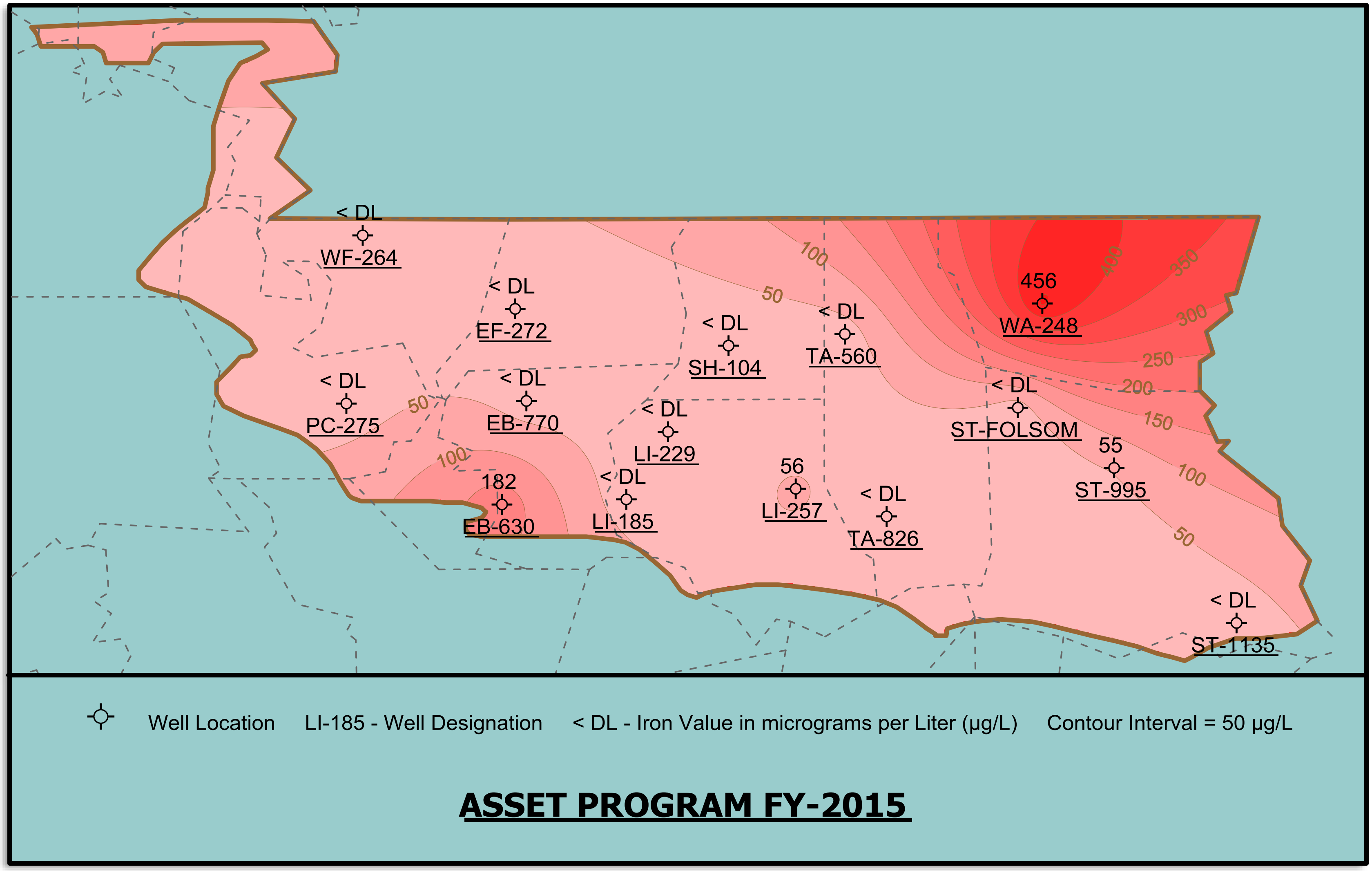

Chart 14-1: Temperature Trend

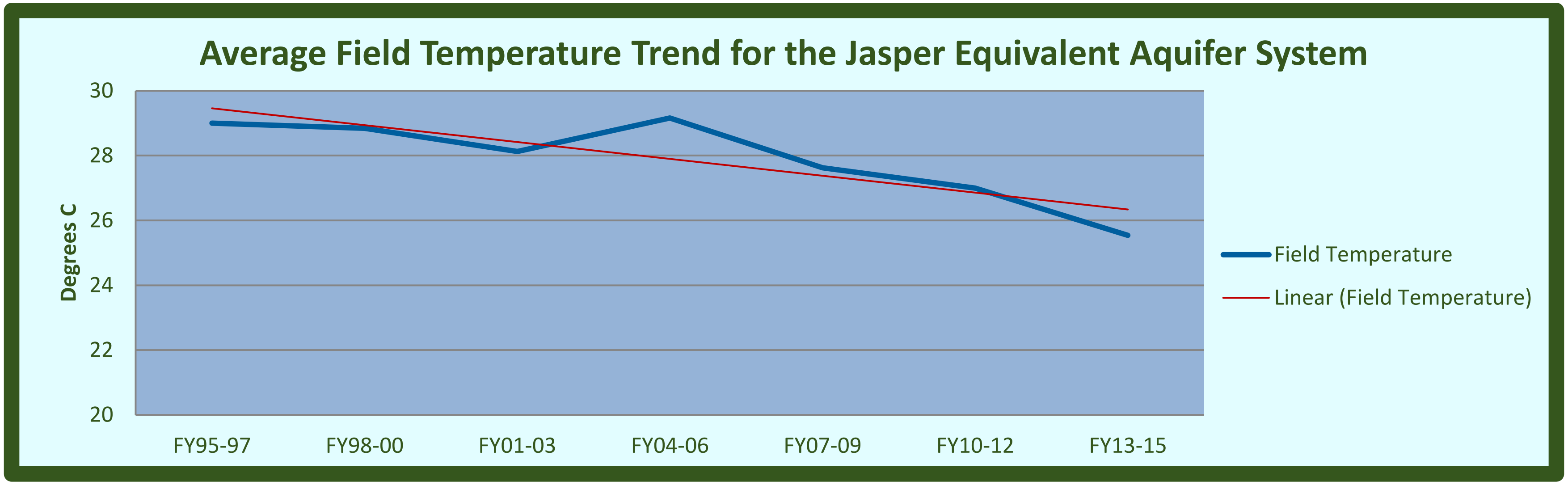

Chart 14-2: pH Trend

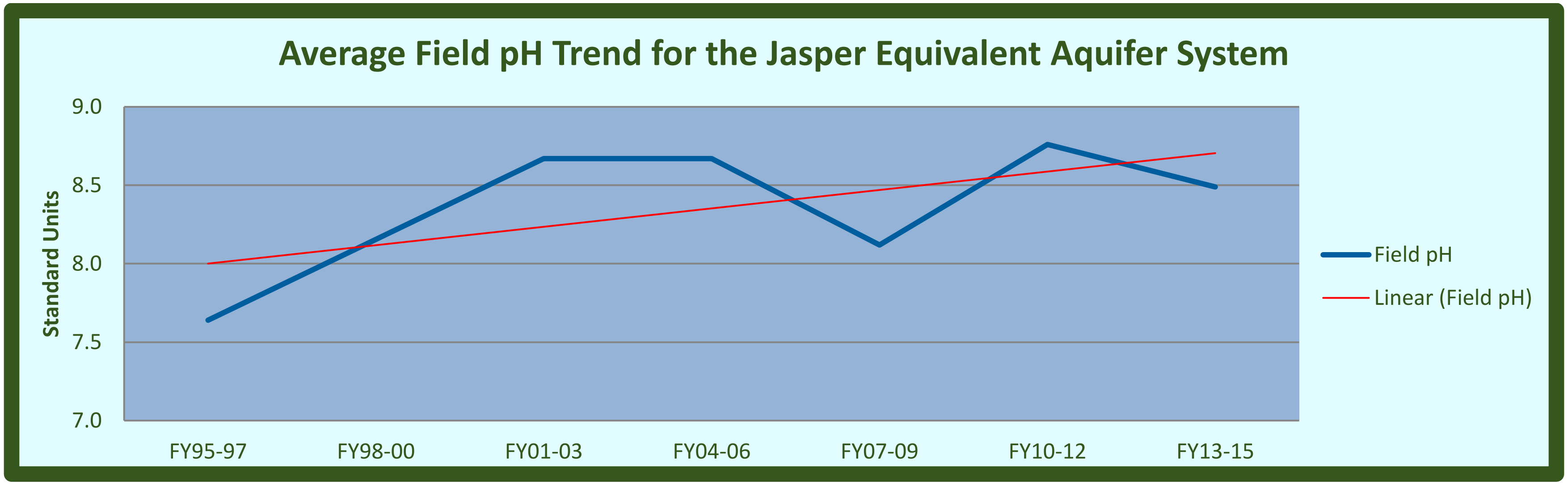

Chart 14-3: Field Specific Conductance Trend

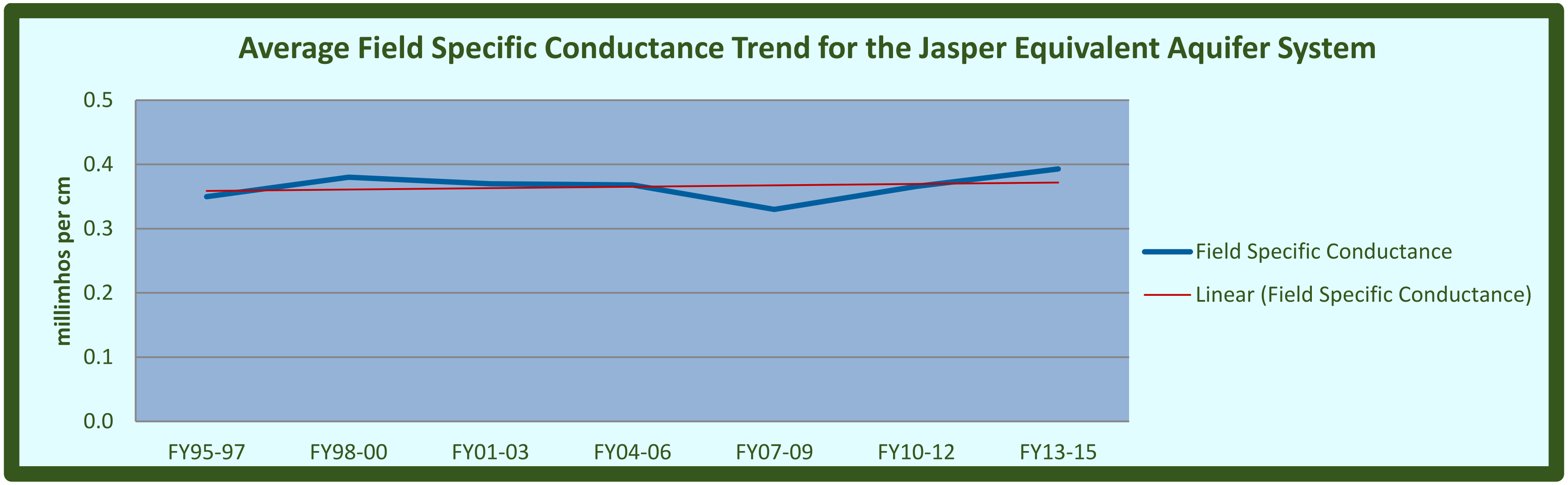

Chart 14-4: Lab Specific Conductance Trend

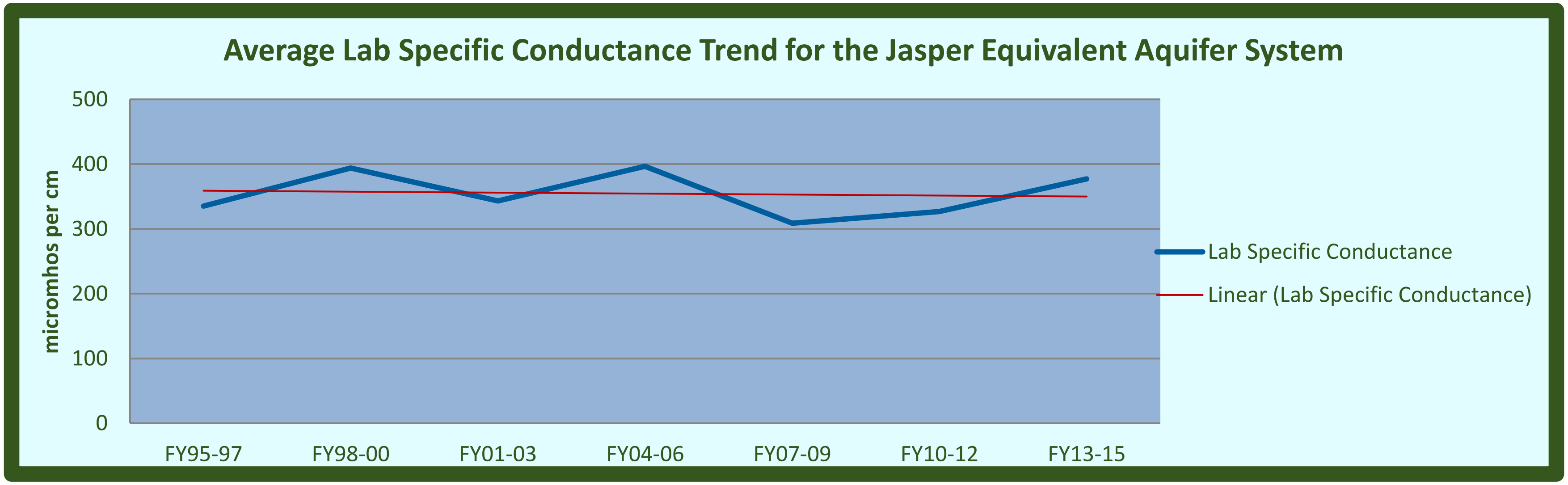

Chart 14-5: Field Salinity Trend

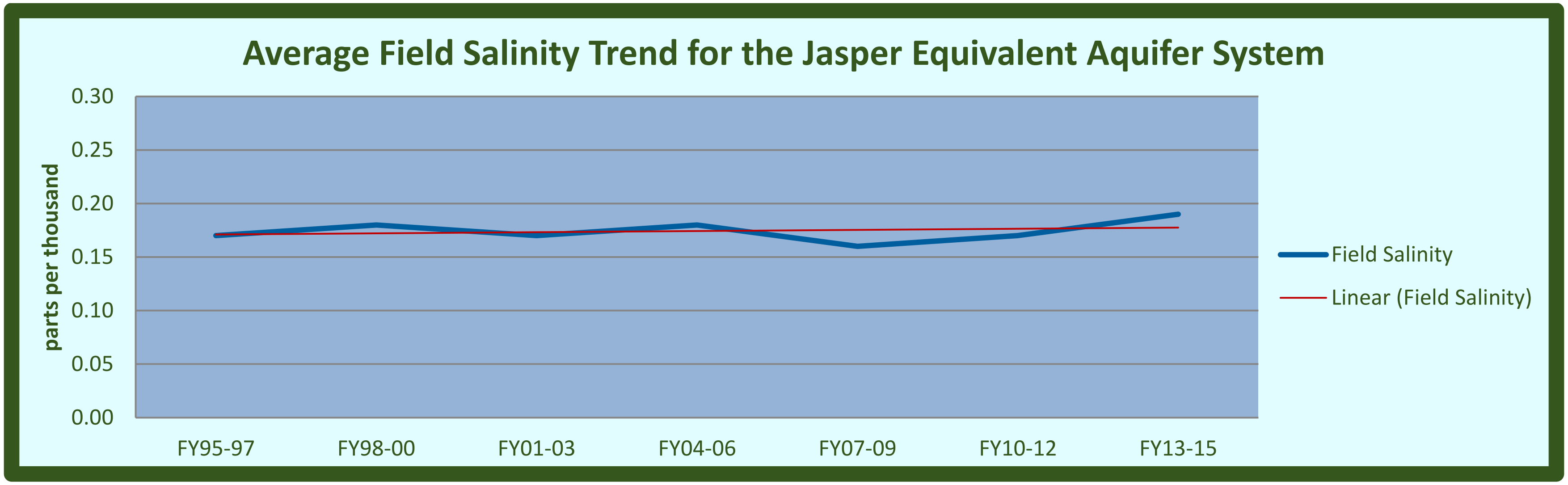

Chart 14-6: Chloride Trend

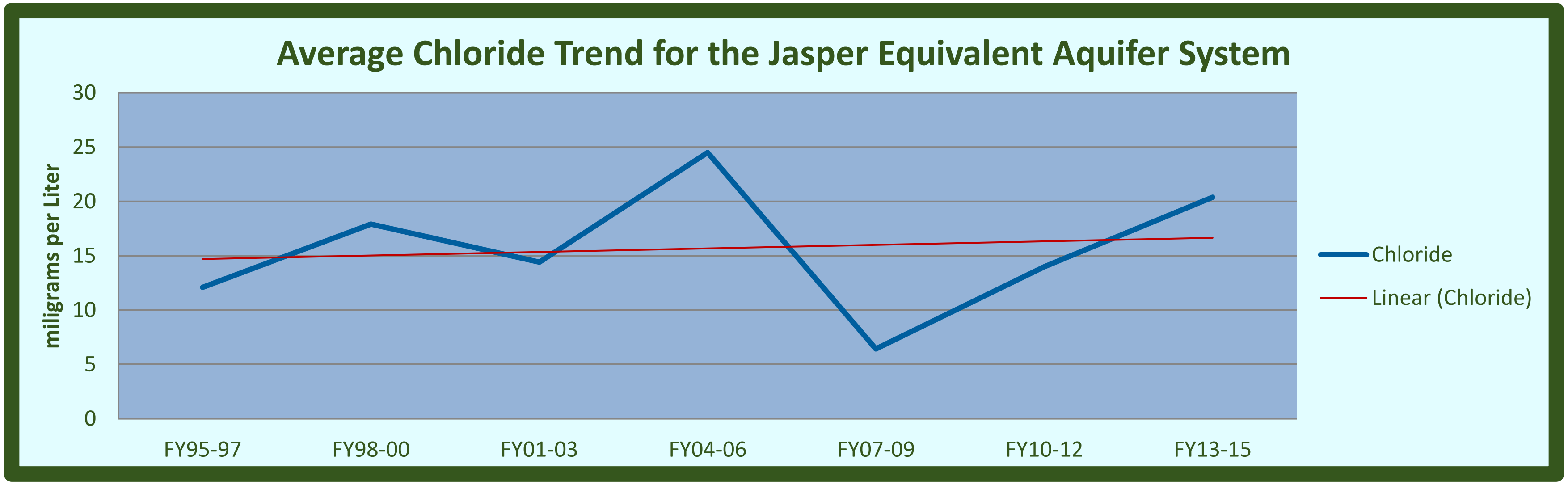

Chart 14-7: Alkalinity Trend

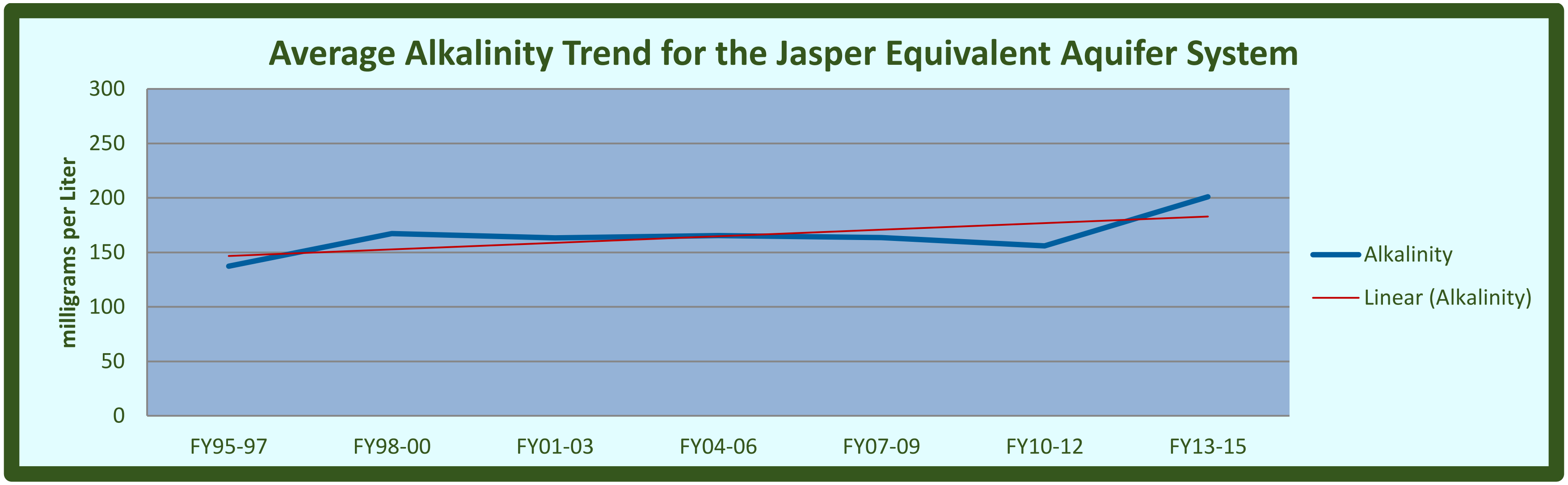

Chart 14-8: Color Trend

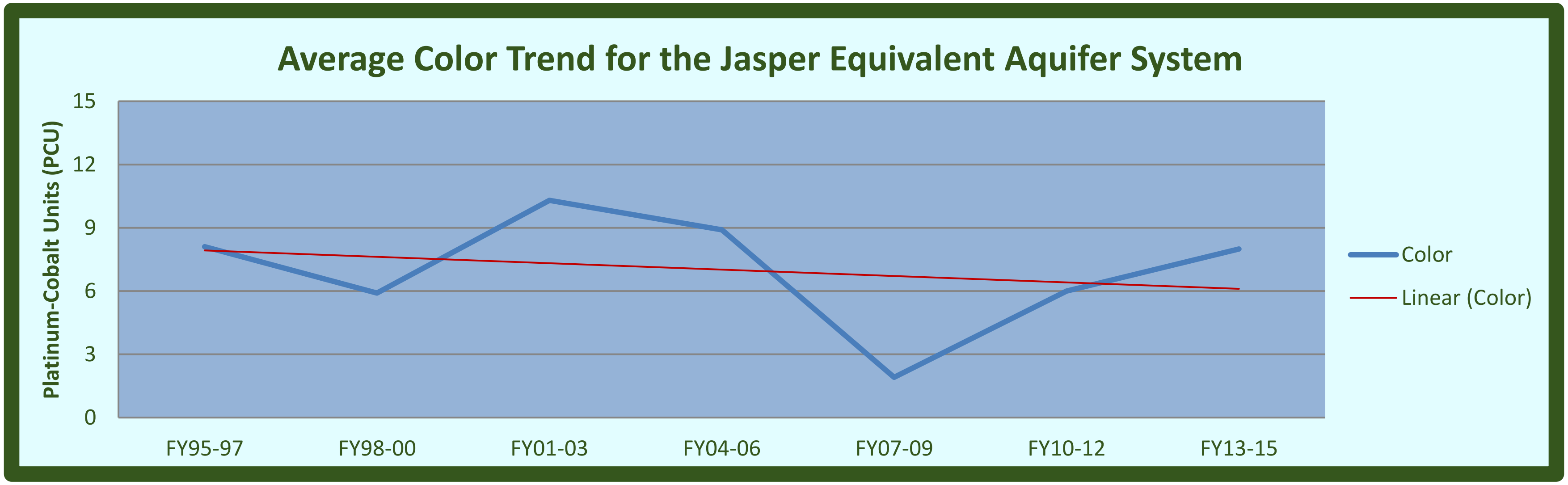

Chart 14-9: Sulfate Trend

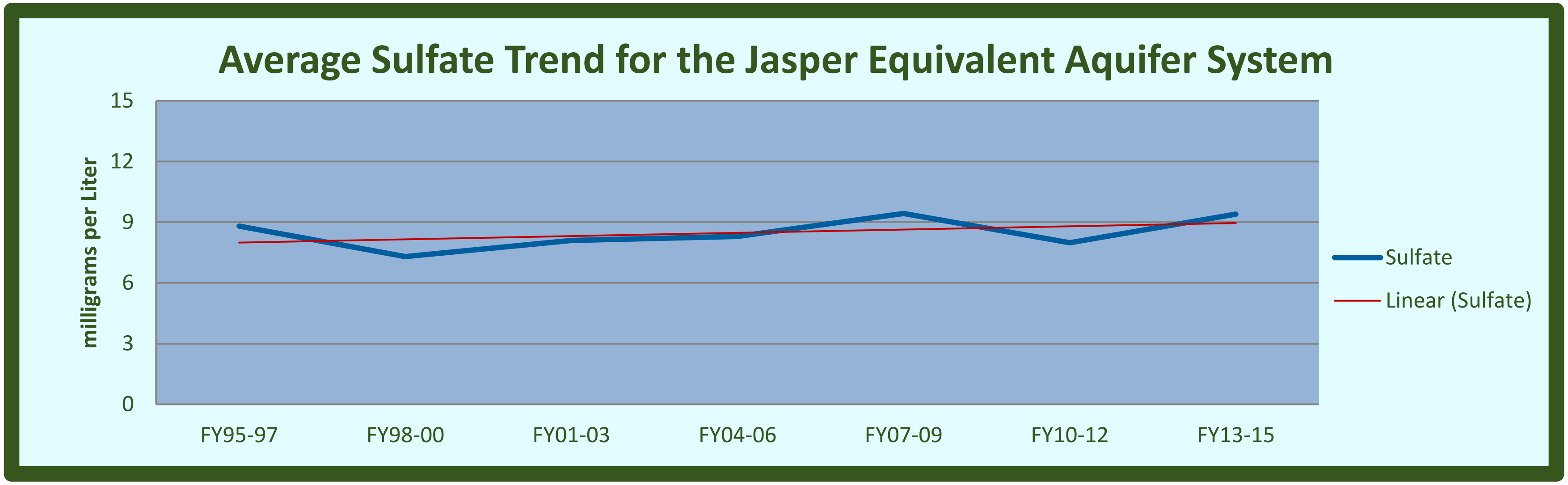

Chart 14-10: Total Dissolved Solids Trend

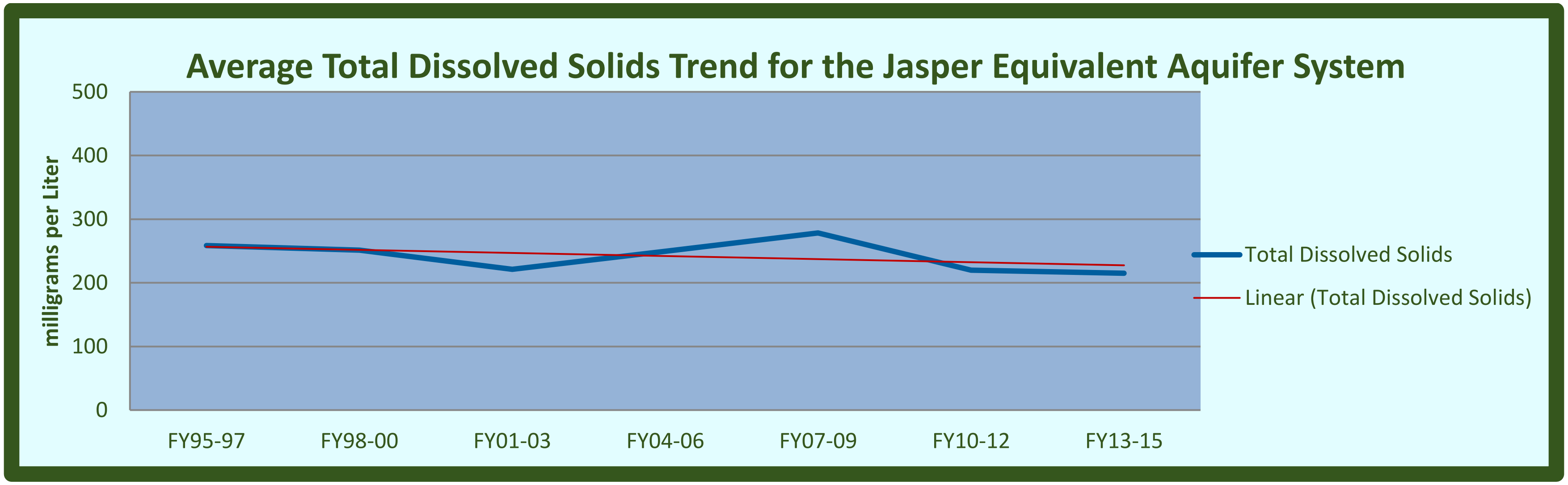

Chart 14-11: Hardness Trend

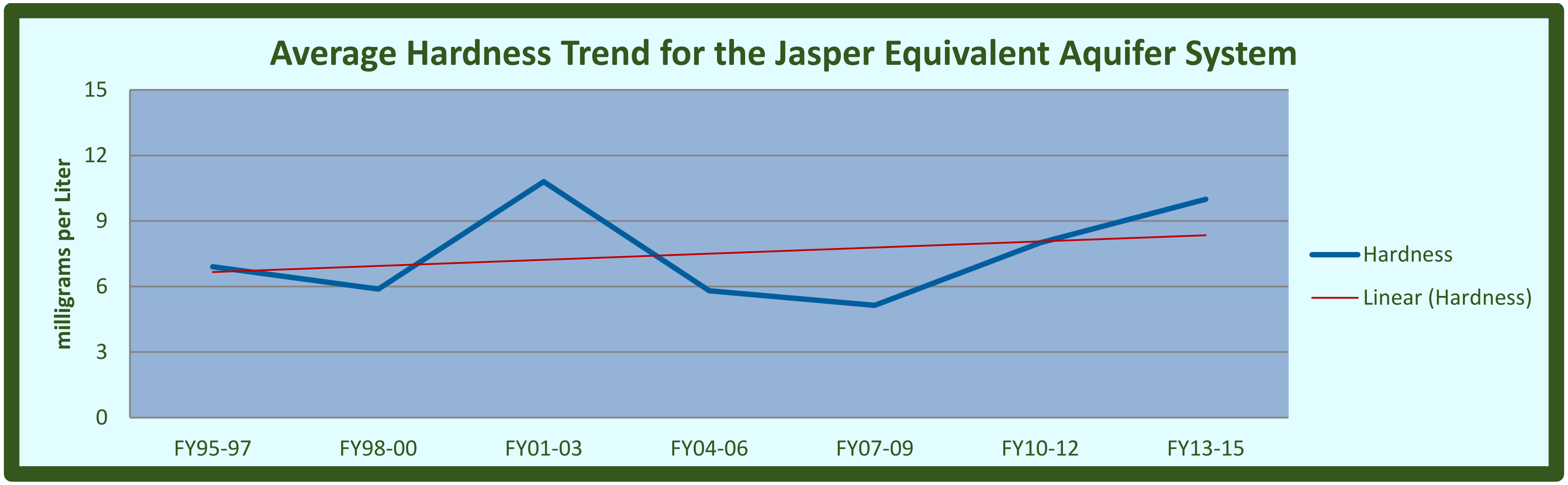

Chart 14-12: Ammonia Trend

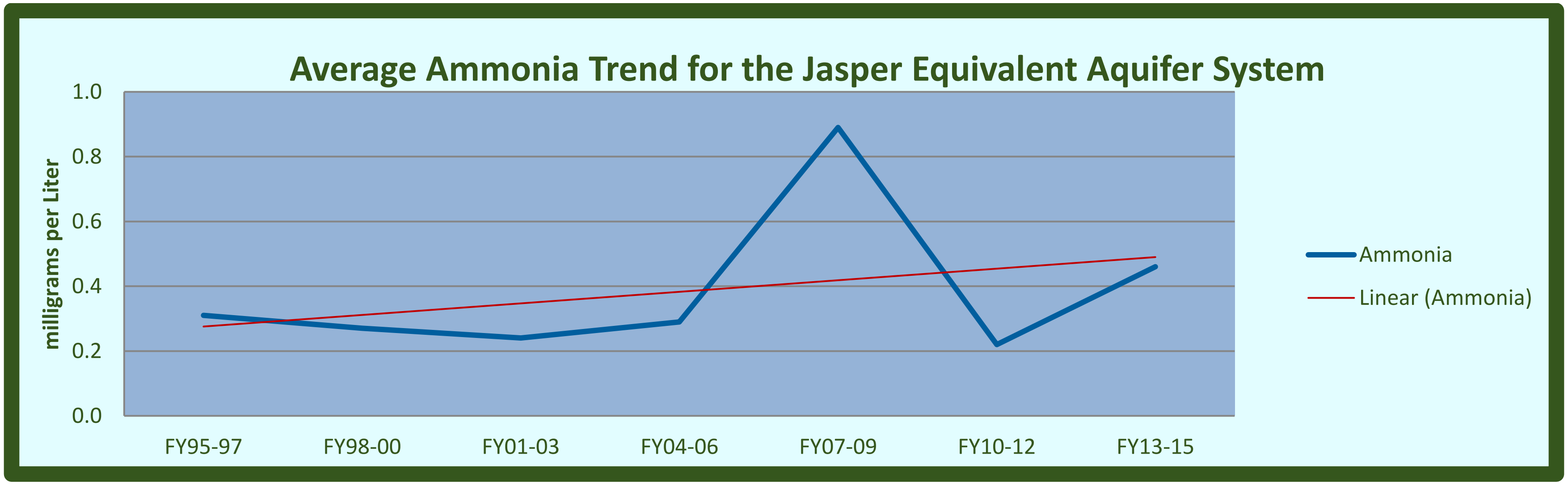

Chart 14-13: Nitrite - Nitrate Trend

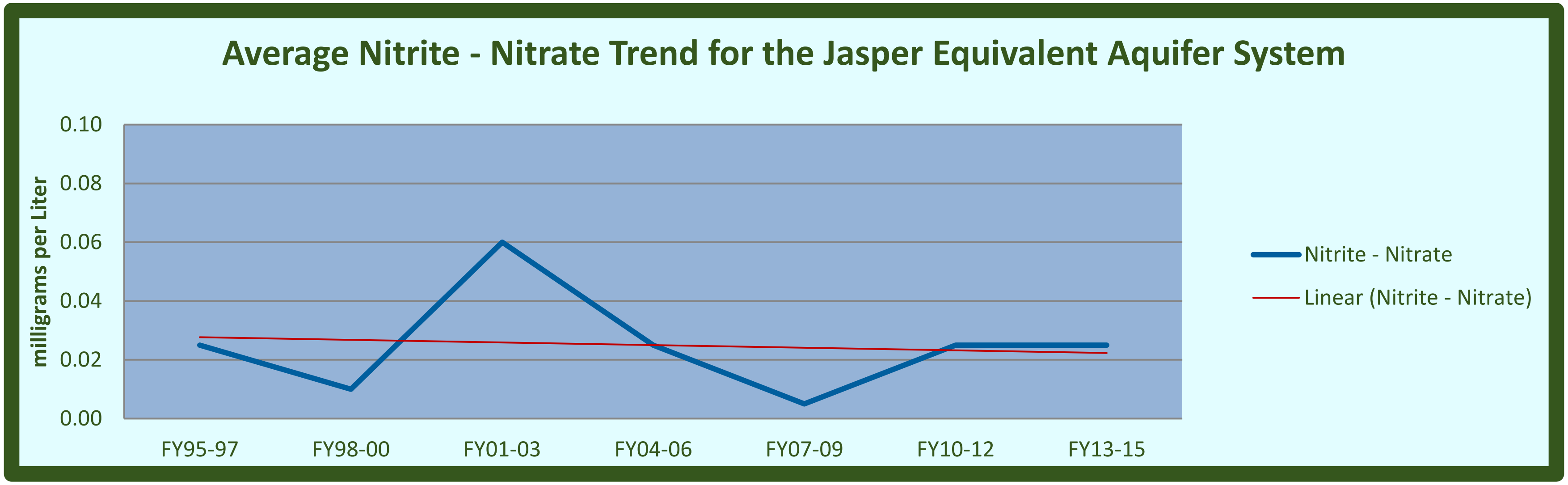

Chart 14-14: TKN Trend

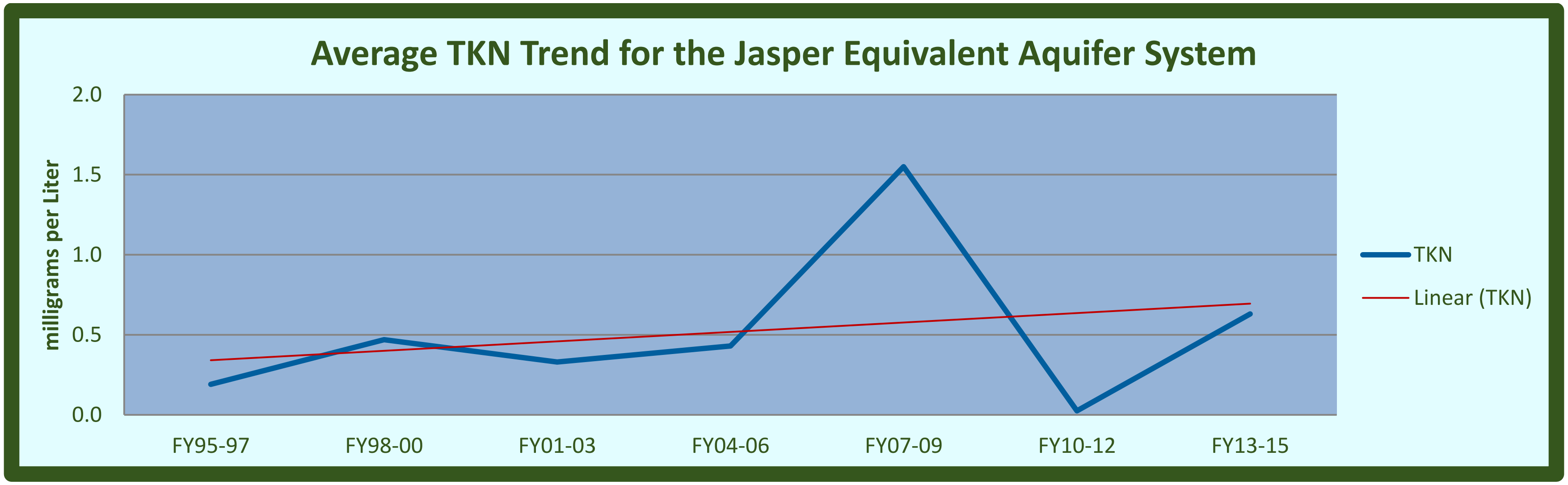

Chart 14-15: Total Phosphorus Trend

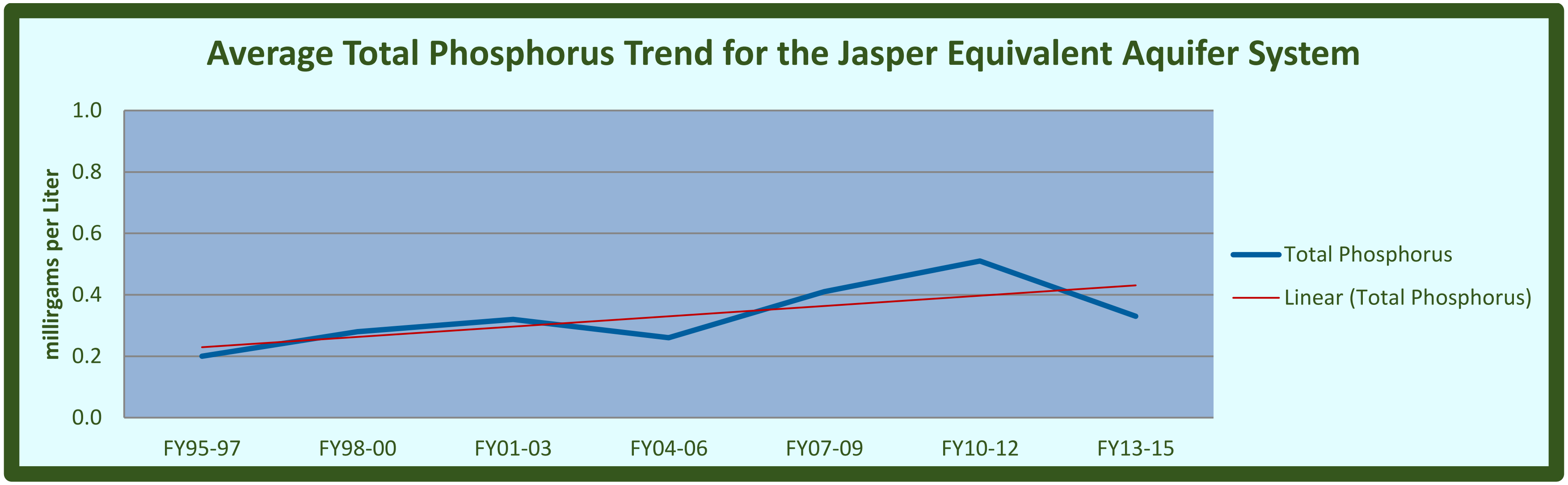

Chart 14-16: Iron Trend