COCKFIELD AQUIFER SUMMARY, 2014

AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 9 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 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 Cockfield aquifer, during the 2014 state fiscal year (July 1, 2013 - June 30, 2014). This summary will become Appendix 9 of ASSET Program Triennial Summary Report for 2015.

These data show that beginning in February and continuing through April of 2014, 13 wells were sampled which produce from the Cockfield aquifer. Nine of these 13 are classified as public supply, three are classified as domestic use, and one is classified as irrigation. The wells are located in 10 parishes in the northeast and north-central to western Louisiana.

Figure 9-1 shows the geographic locations of the Cockfield aquifer and the associated wells, whereas Table 9-1 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 Natural Resource's Water Well Registration Data file.

GEOLOGY

The Cockfield aquifer is within the Eocene Cockfield formation of the Claiborne Group, which consists of sands, silts, clays, and some lignite. The aquifer units consist of fine sand with interbedded silt, clay, and lignite, becoming more massive and containing less silt and clay with depth. Beneath the Ouachita River, the Cockfield aquifer has been eroded by the ancestral Ouachita River and replaced by alluvial sands and gravels. The regional confining clays of the overlying Vicksburg and Jackson Groups confine the Cockfield.

HYDROGEOLOGY

In the Mississippi River valley, the Cockfield is overlain by and hydraulically connected to the alluvial aquifers. Recharge to the Cockfield aquifer occurs primarily by the direct infiltration of rainfall in interstream, upland outcrop-subcrop areas, the movement of water through the alluvial and terrace deposits, and vertical leakage from the underlying Sparta aquifer. The Cockfield contains fresh water in north-central and northeast Louisiana in a narrowing diagonal band extending toward Sabine Parish. Saltwater ridges under the Red River valley and the eastern Ouachita River valley divide areas containing fresh water in the Cockfield aquifer. The hydraulic conductivity varies between 25 and 100 feet/day.

The maximum depths of occurrence of freshwater in the Cockfield range from 200 feet above sea level, to 2,150 feet below sea level. The range of thickness of the fresh water interval in the Cockfield is 50 to 600 feet. The depths of the Cockfield wells that were monitored in conjunction with the ASSET Program range from 80 to 445 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 9-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 9-3. 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 CA-35, SA-BYRD, and WC-187.

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

Tables 9-4 and 9-5 provide a statistical overview of field and conventional data, and inorganic data for the Cockfield aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2014 sampling. Tables 9-6 and 9-7 compare these same parameter averages to historical ASSET-derived data for the Cockfield aquifer, from fiscal years 1996, 1999, 2002, 2005, 2008, 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 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 9-2, 9-3, 9-4, and 9-5, respectively, represent the contoured data for pH, total dissolved solids (TDS), chloride (Cl), and iron. Charts 9-1 through 9-16 represent the trend of the graphed parameter, based on the averaged value of that parameter for each three-year reporting period.

Discussion of historical data and related trends is found in the **Water Quality Trends and Comparison to Historical ASSET Data** section.

INTERPRETATION OF DATA

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

EPA has set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 9-2 and 9-3 show that one or more secondary MCLs (SMCLs) were exceeded in nine of the 13 wells sampled in the Cockfield aquifer, with 17 SMCLs being exceeded.

Field and Conventional Parameters

Table 9-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 9-4 provides an overview of this data for the Cockfield aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 9-2 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 is in this category.

Federal Secondary Drinking Water Standards: A review of the analysis listed in Table 9-2 shows that three wells exceeded the SMCL for pH, four wells exceeded the SMCL for color, and four wells exceeded the SMCL for total dissolved solids (TDS). Laboratory results override field results in exceedance determination, thus only laboratory results are 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):

UN-5332Z	6.15 SU	W-192	8.54 SU
W-198	8.53 SU		

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

NA-5449Z	25 PCU	SA-BYRD	40 PCU, Duplicate – 35 PCU
UN-5332Z	53 PCU	W-198	30 PCU

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
NA-5449Z	540 mg/L	0.546 g/L
SA-BYRD	785 mg/L, Duplicate – 820 mg/L	0.788 g/L (Original and Duplicate)
WC-192	535 mg/L	0.580 g/L
WC-187	868 mg/L, Duplicate – 865 mg/L	0.864 g/L (Original and Duplicate)

Inorganic Parameters

Table 9-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Note that the analytical results ammonia and TKN were rejected for five wells, as these parameters did not meet quality control requirements. Table 9-5 provides an overview of inorganic data for the Cockfield aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 9-3 shows that no primary MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 9-3 shows that six wells exceeded the secondary MCL for iron:

Iron (SMCL = 300 ug/L):

CA-35	2,420 µg/L, Duplicate – 2,610 µg/L	MO-479	2,080 µg/L
RI-450	739 µg/L	SA-BYRD	997 µg/L, Duplicate – 1,020 µg/L
UN-5332Z	3,780 µg/L	WC-187	599 µg/L, Duplicate – 665 µg/L

Volatile Organic Compounds

Table 9-8 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.

The domestic use well, SA-BYRD, reported PCE (perchloroethylene) at 0.75 and 0.72 µg/L in the original and duplicate samples. PCE was detected in this well in ASSET monitoring activities in 2008 at 4.41 µg/L, but was below < DL in 2011, and all detections of PCE were below the drinking water standard of 5.0 µg/L. As with the previous sampling, close attention will be given to this well in future ASSET operations. No other wells had confirmed detections of a VOC at or above its detection limit during the FY 2014 sampling of the Cockfield aquifer.

Semi-Volatile Organic Compounds

Table 9-9 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 2014 sampling of the Cockfield aquifer.

Pesticides and PCBs

Table 9-10 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 2014 sampling of the Cockfield 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 Cockfield aquifer exhibit some changes 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 9-6 and 9-7, and in Charts 9-1 to 9-16 of this summary. Over the eighteen-year period, nine analytes have shown a general increase in average concentration. These analytes are pH, specific conductance (field and lab), salinity, chloride, alkalinity, TDS, hardness, nitrite-nitrate, and barium. For this same period, the following eight analytes have demonstrated a decrease in average concentration: temperature, color, sulfate, ammonia, TKN, total phosphorus, iron, and copper.

The current number of wells with secondary MCL exceedances and the current total number of secondary exceedances have decreased since the previous sampling event in FY 2011. Current sample results show that nine wells reported one or more secondary exceedances with 17 SMCL exceedances. The FY 2011 sampling of the Cockfield aquifer shows that 13 wells reported one or more SMCL exceedances with 22 exceedances.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the ground water produced from this aquifer is hard[1], but is of good quality when considering short or long-term health risk guidelines given that no primary MCL was exceeded. The data also show that this aquifer is of poor quality when considering taste, odor, or appearance guidelines, with 17 Secondary MCLs exceeded in nine of the 13 wells sampled.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Cockfield aquifer, with nine parameters showing consistent increases in concentration, eight parameters decreasing in concentration, while remaining parameters have shown no consistent change or have remained below detection levels over the eighteen-year period.

It is recommended that the wells assigned to the Cockfield aquifer be re-sampled as planned, in approximately three years, with close attention given to the occurrence of VOCs in domestic well SA-BYRD. In addition, several wells should be added to the 13 currently in place to increase the well density for this aquifer.

---

[1] Classification based on hardness scale from: Peavy, H. S. et al. *Environmental Engineering*. New York: McGraw-Hill, 1985.

Table 9-1: List of Wells Sampled, Cockfield Aquifer–FY 2014

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
CA-35	Caldwell	03/19/2014	City Of Columbia	298	Public Supply
EC-233	East Carroll	02/17/2014	Town Of Lake Providence	371	Public Supply
MO-479	Morehouse	02/17/2014	Bayou Bonne Idee Water System	258	Public Supply
NA-5449Z	Natchitoches	04/15/2014	Private Owner	170	Domestic
OU-FRITH	Ouachita	02/18/2014	Private Owner	80	Domestic
RI-127	Richland	02/18/2014	Delhi Water Works	416	Public Supply
RI-450	Richland	02/18/2014	River Road Waterworks	283	Public Supply
SA-BYRD	Sabine	04/15/2014	Private Owner	150	Domestic
UN-5332Z	Union	06/16/2014	Private Owner	160	Irrigation
W-192	Winn	03/17/2014	Red Hill Water System	210	Public Supply
W-198	Winn	03/17/2014	Atlanta Water System	445	Public Supply
WC-187	West Carroll	02/17/2014	New Carroll Water System	110	Public Supply
WC-487	West Carroll	02/17/2014	Town Of Oak Grove	396	Public Supply

Table 9-2: Summary of Field and Conventional Data, Cockfield Aquifer–FY 2014

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	0.25/ 1/10	1/5	5	0.01/0.05	0.05/1	0.05	1/10	0.25/ 1/5	10	0.1	4	0.1/ 0.3
	FIELD PARAMETERS					LABORATORY PARAMETERS												
CA-35	6.69	0.18	0.385	18.83	0.250	152	30.2	< DL	110	0.06	< DL	0.21	387	64.8	285	< DL	< DL	3.3
CA-35*	6.69	0.18	0.385	18.83	0.250	78	30.9	< DL	108	< DL	< DL	0.17	393	65.8	205	0.12	5	3.5
EC-233	7.24	0.39	0.794	20.01	0.516	341	43.3	10	218	< DL	R	0.17	794	< DL	452	R	< DL	0.7
MO-479	7.19	0.31	0.643	19.91	0.418	280	25.9	10	340	< DL	R	0.12	653	5.3	362	R	< DL	17.8
NA-5449Z	8.84	0.41	0.839	19.50	0.546	372	2.6	25	< DL	< DL	0.54	0.94	743	12.0	540	0.73	< DL	1.0
OU-FRITH	8.07	0.24	0.503	17.59	0.327	280	2.9	10	80	< DL	R	< DL	491	< DL	320	R	< DL	0.4
RI-127	7.98	0.42	0.852	21.60	0.554	368	66.5	10	10	< DL	0.86	0.25	847	< DL	498	0.95	< DL	0.2
RI-450	7.54	0.22	0.464	20.10	0.301	201	7.6	5	220	< DL	R	0.08	458	< DL	272	R	< DL	4.2
SA-BYRD	7.36	0.61	1.212	10.53	0.788	448	16.7	40	180	0.15	0.73	0.12	1,050	18.8	785	0.72	4	8.2
SA-BYRD*	7.36	0.61	1.212	10.53	0.788	456	52.5	35	200	0.16	0.76	0.14	1,020	137	820	0.76	< DL	8.2
UN-5332Z	6.15	0.08	0.770	20.62	0.117	70	3.2	53	80	< DL	0.16	0.68	181	1.0	192	0.33	4	2.4
W-192	8.54	0.44	0.893	19.60	0.580	324	78.3	10	‡	< DL	0.49	0.42	913	50.0	535	0.80	< DL	0.6
W-198	8.53	0.19	0.389	21.72	0.253	190	13.9	30	‡	< DL	< DL	1.90	421	< DL	230	0.15	< DL	0.2
WC-187	7.42	0.67	1.329	19.22	0.864	289	245.0	15	520	0.12	< DL	0.08	1,320	12.4	868	< DL	< DL	3.6
WC-187*	7.42	0.67	1.329	19.22	0.864	289	245.0	5	520	0.14	R	0.05	1,340	12.4	865	R	< DL	3.6
WC-487	7.56	0.42	0.846	19.65	0.550	394	77.7	10	360	0.06	< DL	0.13	845	< DL	472	< DL	< DL	0.8

†Detection limits vary due to dilution factor * Denotes duplicate sample ‡ Not analyzed by lab R - Data Rejected Shaded cells exceed EPA Secondary Standards

Table 9-3: Summary of Inorganic Data, Cockfield Aquifer–FY 2014

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 Reporting Limits†	1/5	1/4	1/5	1/2	1/2	1/4	3	50/ 100	1	0.0002/ 0.05/0.2	1/3	1/5	0.5/1	0.5/2	5/6
CA-35	< DL	< DL	123	< DL	< DL	83.6	4.6	2,420	< DL	< DL	62.7	< DL	< DL	< DL	585.0
CA-35*	< DL	< DL	122	< DL	< DL	79.0	13.0	2,610	1.7	< DL	60.5	< DL	< DL	< DL	727.0
EC-233	< DL	< DL	284	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
MO-479	< DL	< DL	344	< DL	< DL	< DL	< DL	2,080	< DL	< DL	< DL	< DL	< DL	< DL	19.8
NA-5449Z	< DL	< DL	16	< DL	< DL	< DL	5.1	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
OU-FRITH	< DL	< DL	145	< DL	< DL	< DL	< DL	101	< DL	< DL	< DL	< DL	< DL	< DL	< DL
RI-127	< DL	< DL	42	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
RI-450	< DL	< DL	177	< DL	< DL	< DL	< DL	739	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SA-BYRD	< DL	< DL	50	< DL	< DL	< DL	49.3	997	1.3	< DL	< DL	< DL	< DL	< DL	439.0
SA-BYRD*	< DL	< DL	51	< DL	< DL	1.2	50.1	1,020	1.3	< DL	< DL	< DL	< DL	< DL	441.0
UN-5332Z	< DL	< DL	131	< DL	< DL	< DL	< DL	3,780	< DL	< DL	< DL	< DL	< DL	< DL	6.5
W-192	< DL	< DL	12	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
W-198	< DL	< DL	4	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
WC-187	< DL	5.1	231	< DL	< DL	< DL	< DL	599	< DL	< DL	< DL	1.39	< DL	< DL	< DL
WC-187*	< DL	5.3	237	< DL	< DL	< DL	36.7	665	5.7	< DL	< DL	1.39	< DL	< DL	21.7
WC-487	< DL	< DL	350	< DL	< DL	< DL	< DL	78	< DL	< DL	< DL	< DL	< DL	< DL	7.4

†Detection limits vary due to dilution factor *Denotes Duplicate Sample. Exceeds EPA Secondary Standards.

Table 9-4: FY 2014 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	pH (SU)	6.15	8.84	7.54
	Salinity (ppt)	0.08	0.67	0.38
	Specific Conductance (mmhos/cm)	0.180	1.329	0.770
	Temperature (^{O}C)	10.53	21.72	18.59
	TDS (g/L)	0.117	0.864	0.498
LABORATORY	Alkalinity (mg/L)	70	456	283
	Chloride (mg/L)	2.6	245.0	58.9
	Color (PCU)	< DL	53	17
	Hardness (mg/L)	< DL	520	211
	Nitrite - Nitrate, as N (mg/L)	< DL	0.16	0.06
	Ammonia, as N (mg/L)	< DL	0.86	0.55
	Total Phosphorus (mg/L)	< DL	1.90	0.34
	Specific Conductance (μmhos/cm)	181	1,340	741
	Sulfate (mg/L)	< DL	137.0	23.9
	TDS (mg/L)	192	868	481
	TKN (mg/L)	< DL	0.65	0.43
	TSS (mg/L)	< DL	5	< DL
	Turbidity (NTU)	0.2	17.8	3.7

Table 9-5: FY 2014 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (μg/L)	< DL	< DL	< DL
Arsenic (μg/L)	< DL	5.3	1.1
Barium (μg/L)	4	350	145
Beryllium (μg/L)	< DL	< DL	< DL
Cadmium (μg/L)	< DL	< DL	< DL
Chromium (μg/L)	< DL	83.6	10.6
Copper (μg/L)	< DL	50.1	10.9
Iron (μg/L)	< DL	3,780	951
Lead (μg/L)	< DL	5.7	1.0
Mercury (μg/L)	< DL	< DL	< DL
Nickel (μg/L)	< DL	62.7	8.1
Selenium (μg/L)	< DL	1.39	< DL
Silver (μg/L)	< DL	< DL	< DL
Thallium (μg/L)	< DL	< DL	< DL
Zinc (μg/L)	< DL	727.0	141.7

Table 9-6: Triennial Field and Conventional Statistics, ASSET Wells

	PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
		FY 1996	FY 1999	FY 2002	FY 2005	FY 2008	FY 2011	FY 2014
FIELD	pH (SU)	6.77	6.99	7.39	7.46	7.38	7.17	7.54
	Salinity (ppt)	0.27	0.30	0.32	0.35	0.32	0.33	0.38
	Specific Conductance (mmhos/cm)	0.564	0.613	0.647	0.700	0.650	0.668	0.770
	Temperature (^{O}C)	19.91	19.76	20.30	19.82	19.90	18.08	18.59
	TDS (g/L)	-	-	-	0.460	0.430	0.430	0.498
LABORATORY	Alkalinity (mg/L)	219	224	262	294	257	258	283
	Chloride (mg/L)	35.9	52.0	42.2	52.5	48.6	41.3	58.9
	Color (PCU)	38	12	12	11	15	16	17
	Hardness (mg/L)	115	79	90	140	112	130	211
	Nitrite - Nitrate, as N (mg/L)	0.11	0.08	0.30	0.50	0.44	0.60	0.06
	Ammonia, as N (mg/L)	0.66	0.50	0.62	0.36	0.40	0.51	0.55
	Total Phosphorus (mg/L)	0.32	0.59	0.30	0.30	0.38	0.36	0.34
	Specific Conductance (μmhos/cm)	561	619	643	737	641	590	741
	Sulfate (mg/L)	33.4	35.5	98.9	21.9	22.0	22.2	23.9
	TDS (mg/L)	320	430	396	438	402.	485	481
	TKN (mg/L)	0.80	0.71	0.94	0.47	0.53	0.54	0.43
	TSS (mg/L)	5	< DL	< DL	< DL	< DL	< DL	2
	Turbidity (NTU)	7.1	9.7	4.7	5.4	3.9	6.3	3.7

Table 9-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR						
	FY 1996	FY 1999	FY 2002	FY 2005	FY 2008	FY 2011	FY 2014
Antimony (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Arsenic (μg/L)	5.4	< DL	< DL	< DL	< DL	< DL	1.1
Barium (μg/L)	121	124	141	162	112	144	145
Beryllium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cadmium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Chromium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	10.6
Copper (μg/L)	39.6	5.9	11.8	8.3	5.1	4.0	10.9
Iron (μg/L)	1,836	1,623	1,320	1,084	1,324	1,470	951
Lead (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	1.0
Mercury (μg/L)	< DL	< DL	< DL	< DL	0.08	< DL	< DL
Nickel (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	8.1
Selenium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Silver (μg/L)	< DL	< DL	< DL	4.72	< DL	< DL	< DL
Thallium (μg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Zinc (μg/L)	117.5	34.1	30.7	< DL	25.6	93.8	141.7

Table 9-8: VOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/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	1.5
DIBROMOCHLOROMETHANE	624	0.5
ETHYL BENZENE	624	0.5
METHYLENE CHLORIDE	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

Table 9-9: SVOC Analytical Parameters

COMPOUND (SVOC)	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
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

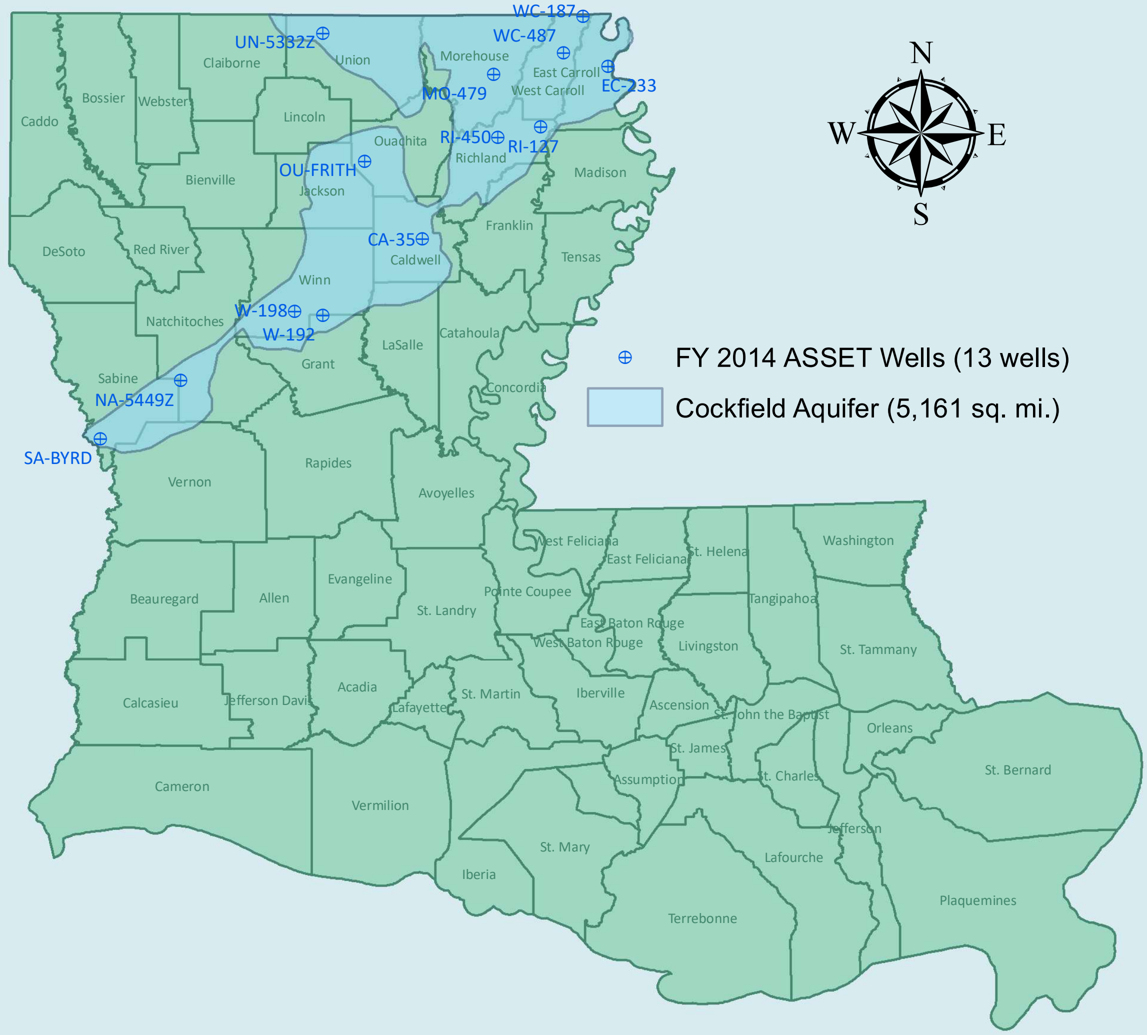
COMPOUND (SVOC)	METHOD	DETECTION LIMIT (ug/L)
FLUORANTHENE	625	5
FLUORENE	625	5
HEXACHLOROBENZENE	625	5
HEXACHLOROBUTADIENE	625	5
HEXACHLOROCYCLOPENTADIENE	625	10
HEXACHLOROETHANE	625	5
INDENO(1,2,3-C,D)PYRENE	625	5
ISOPHORONE	625	5
NAPHTHALENE	625	5
NITROBENZENE	625	5
N-NITROSODIMETHYLAMINE	625	5
N-NITROSODI-N-PROPYLAMINE	625	10
N-NITROSODIPHENYLAMINE	625	5
PENTACHLOROPHENOL	625	10
PHENANTHRENE	625	5
PHENOL	625	5
PYRENE	625	5

Table 9-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS (ug/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	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 9-1: Location Plat, Cockfield 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 2014

Figure 9-2: Map of pH Data

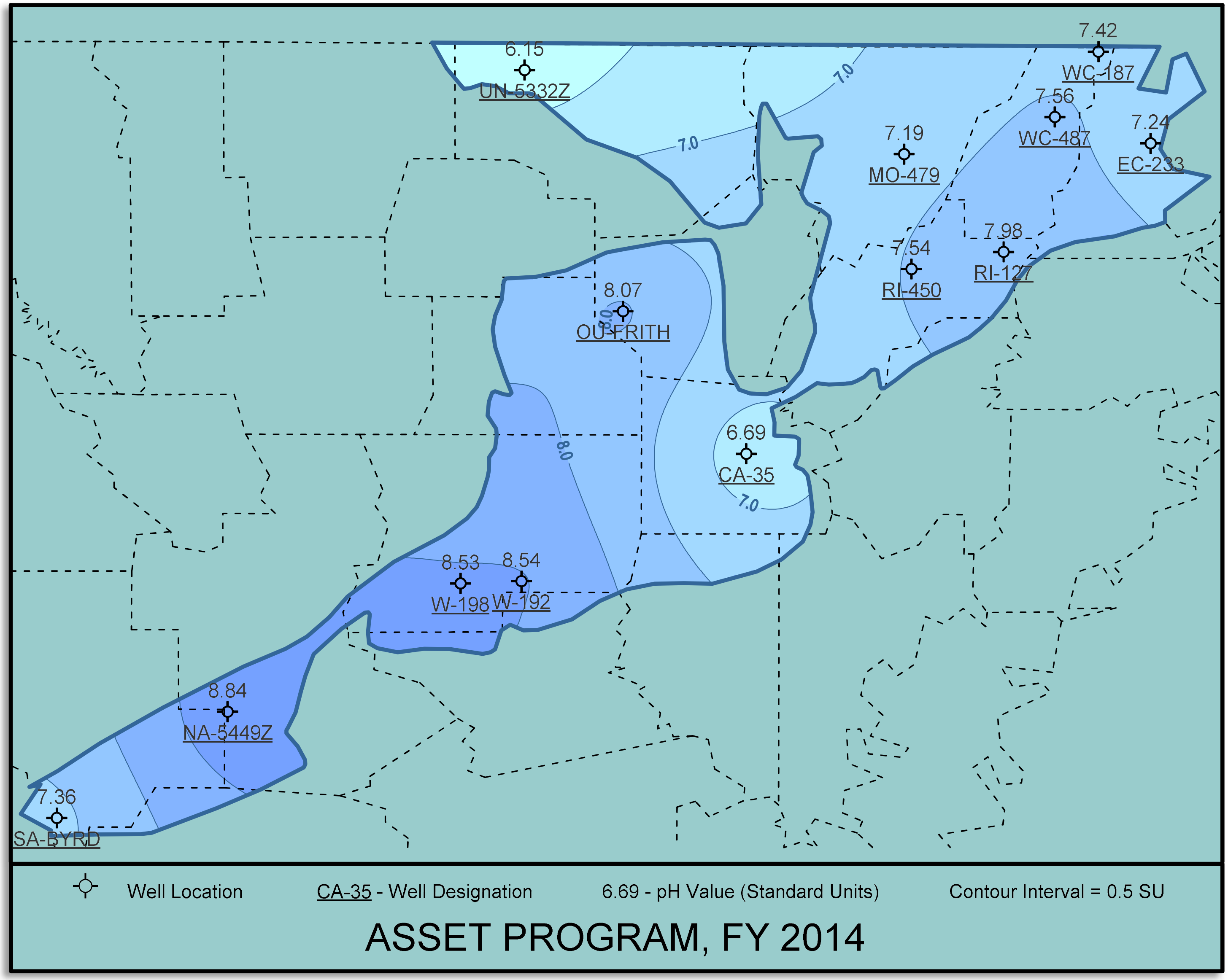


Figure 9-3: Map of TDS Lab Data

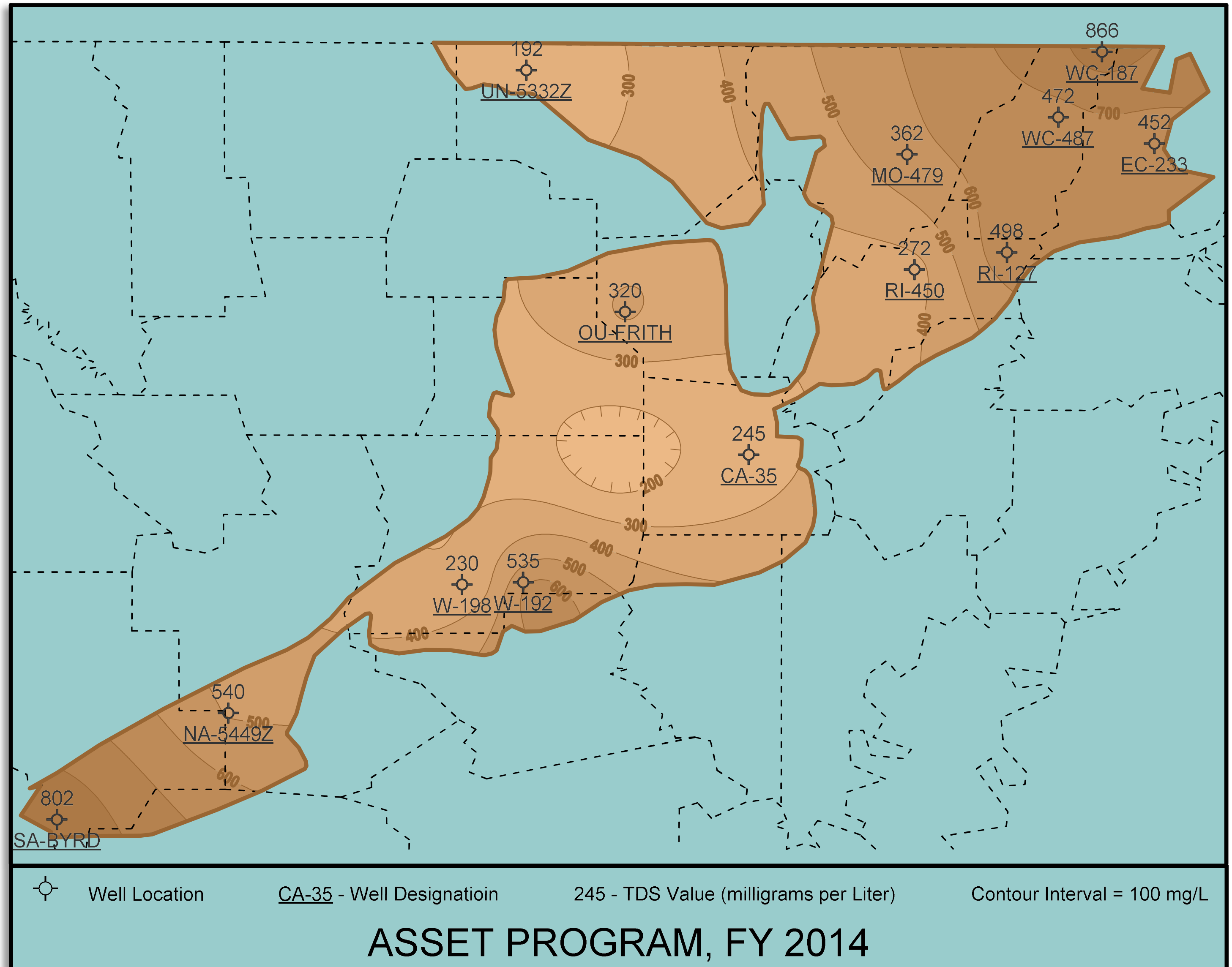


Figure 9-4: Map of Chloride Data

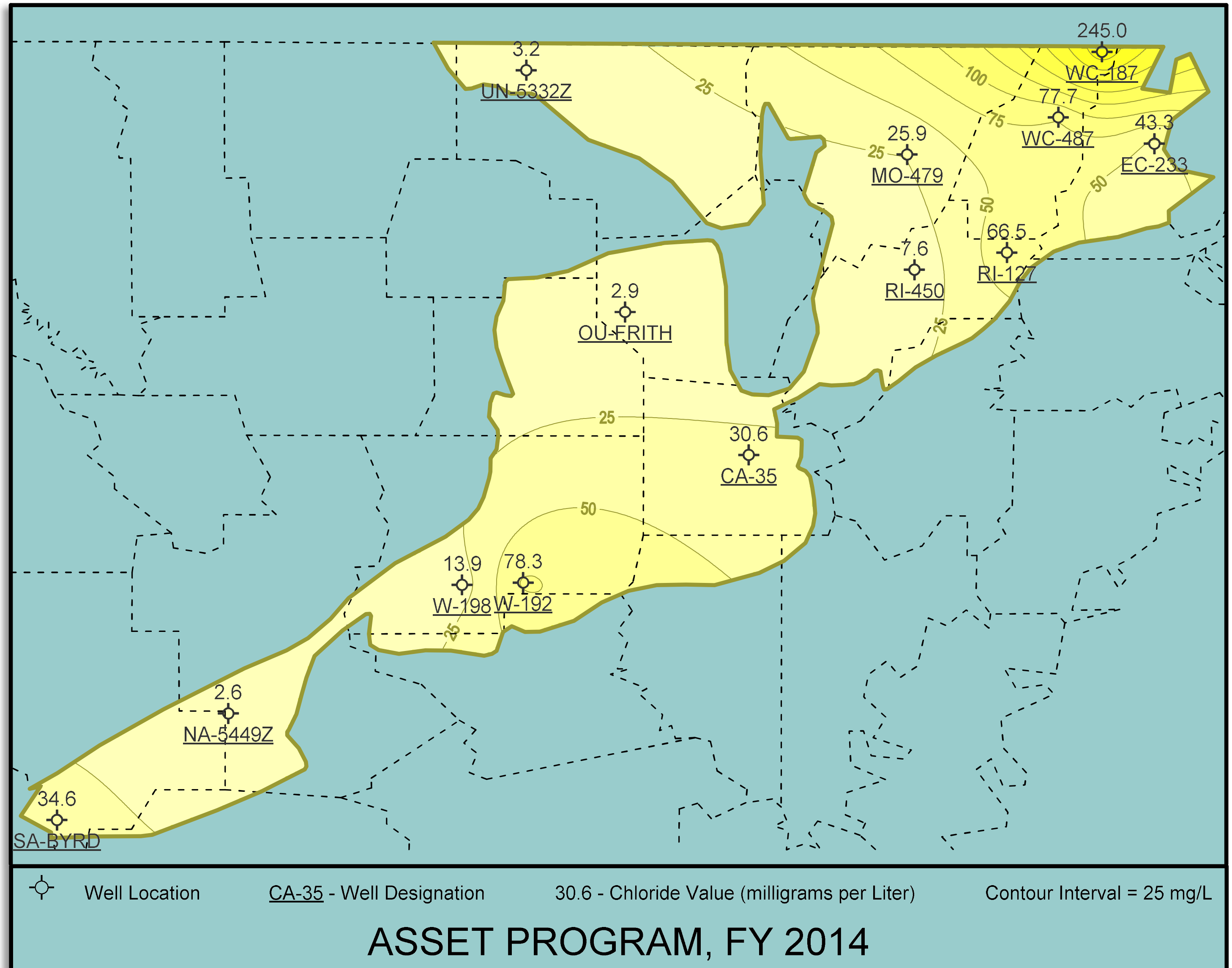


Figure 9-5: Map of Iron Data

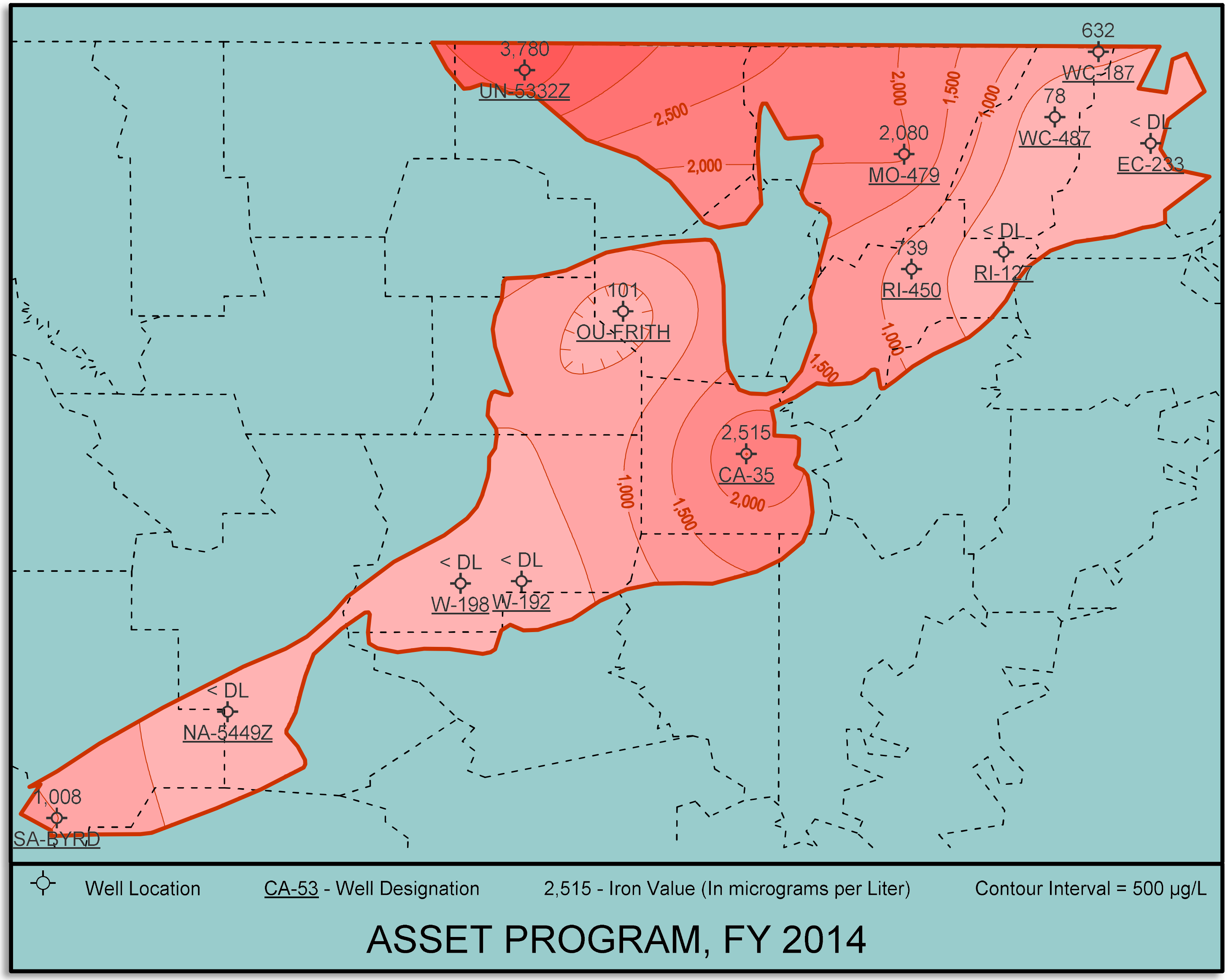


Chart 9-1: Temperature Trend

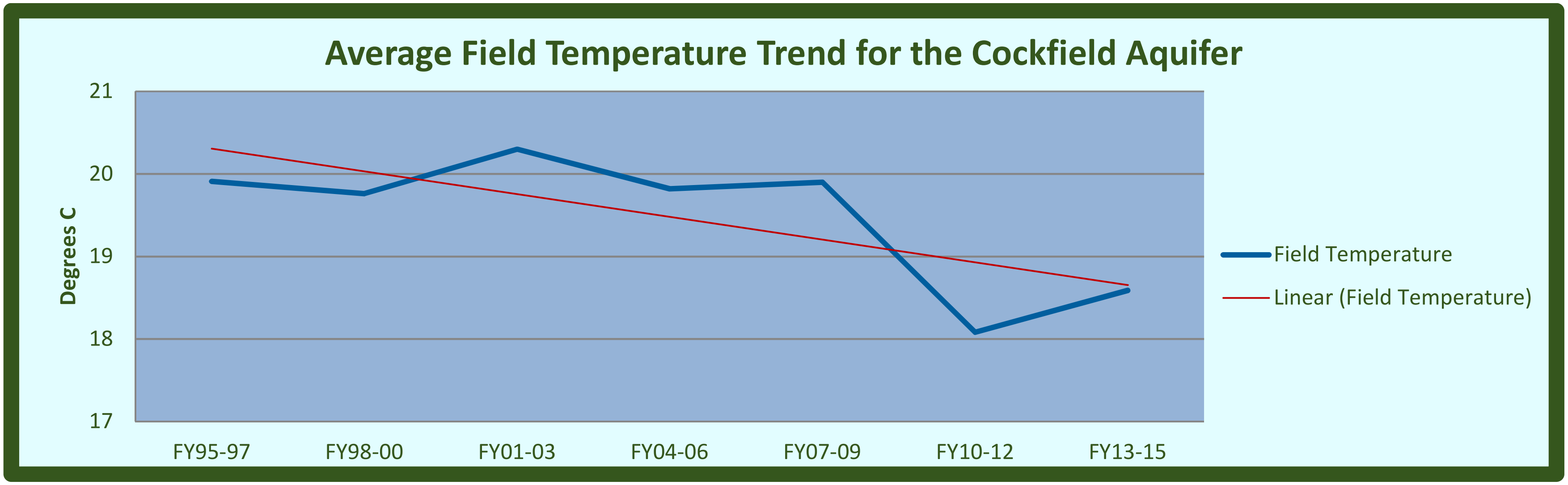


Chart 9-2: pH Trend

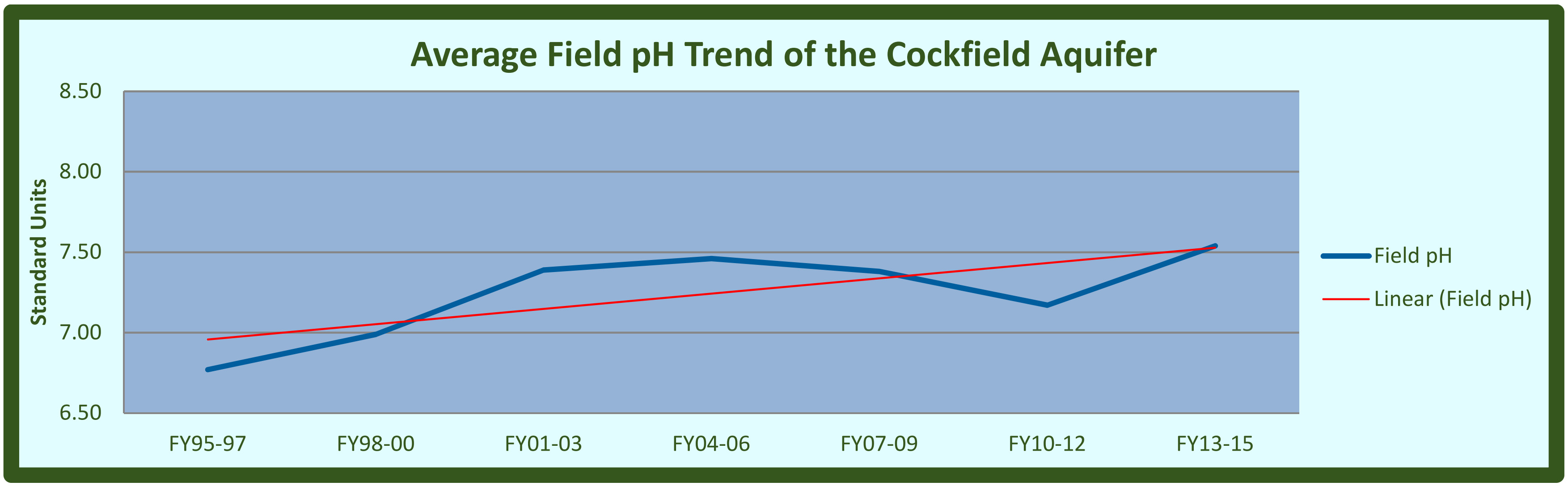


Chart 9-3: Field Specific Conductance Trend

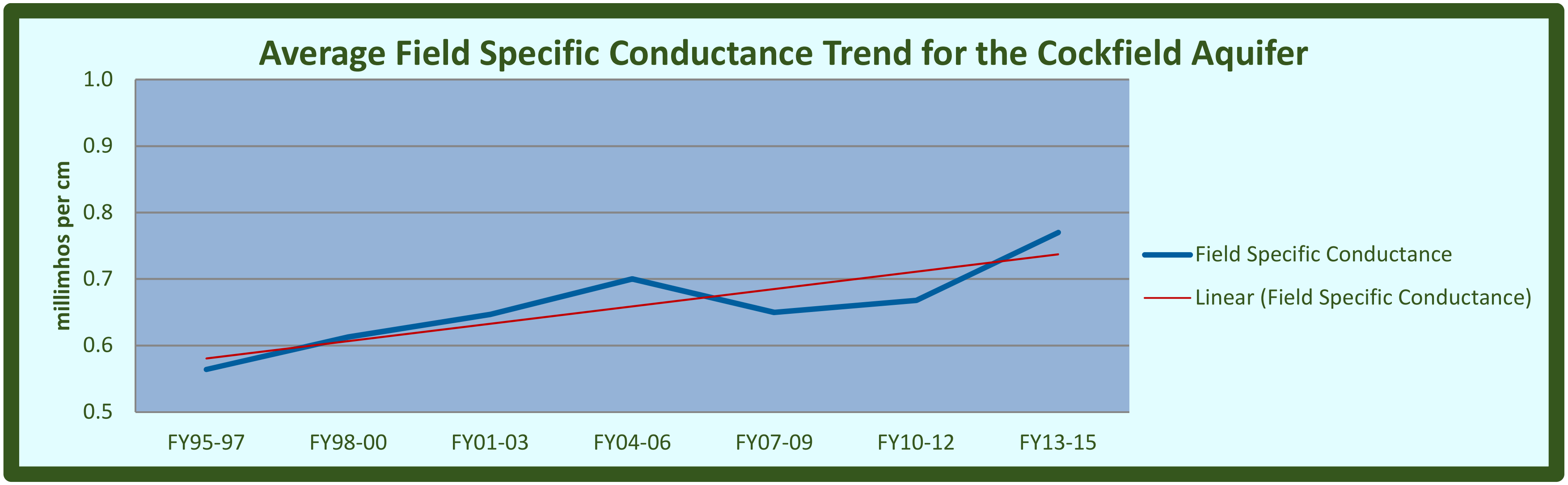


Chart 9-4: Lab Specific Conductance Trend

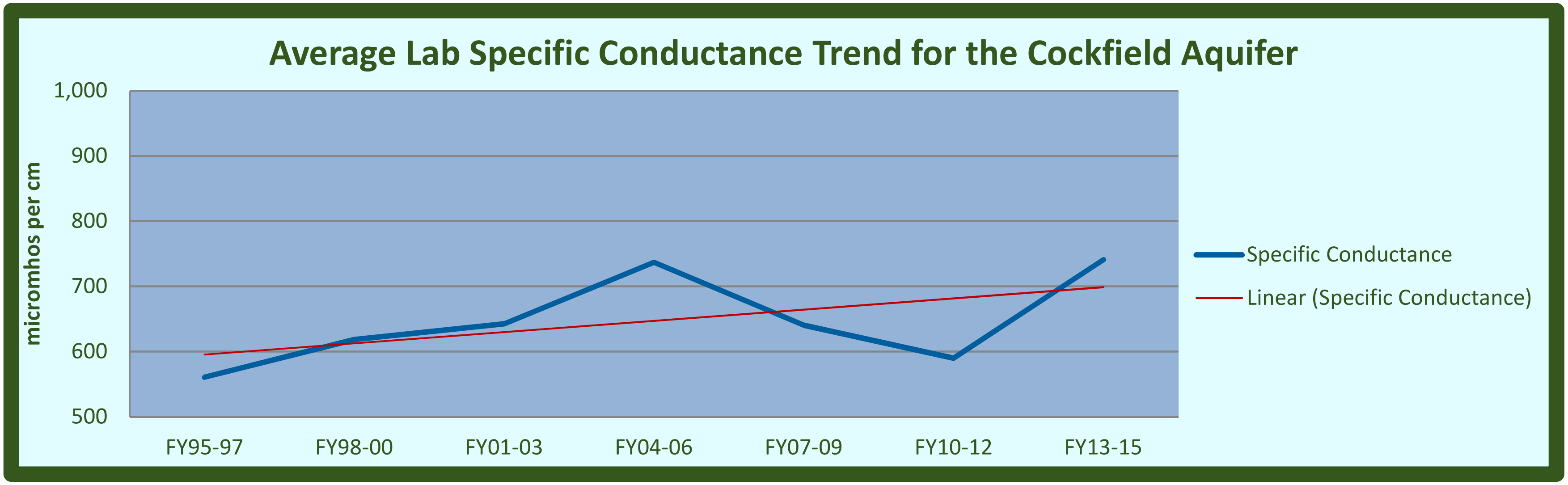


Chart 9-5: Field Salinity Trend

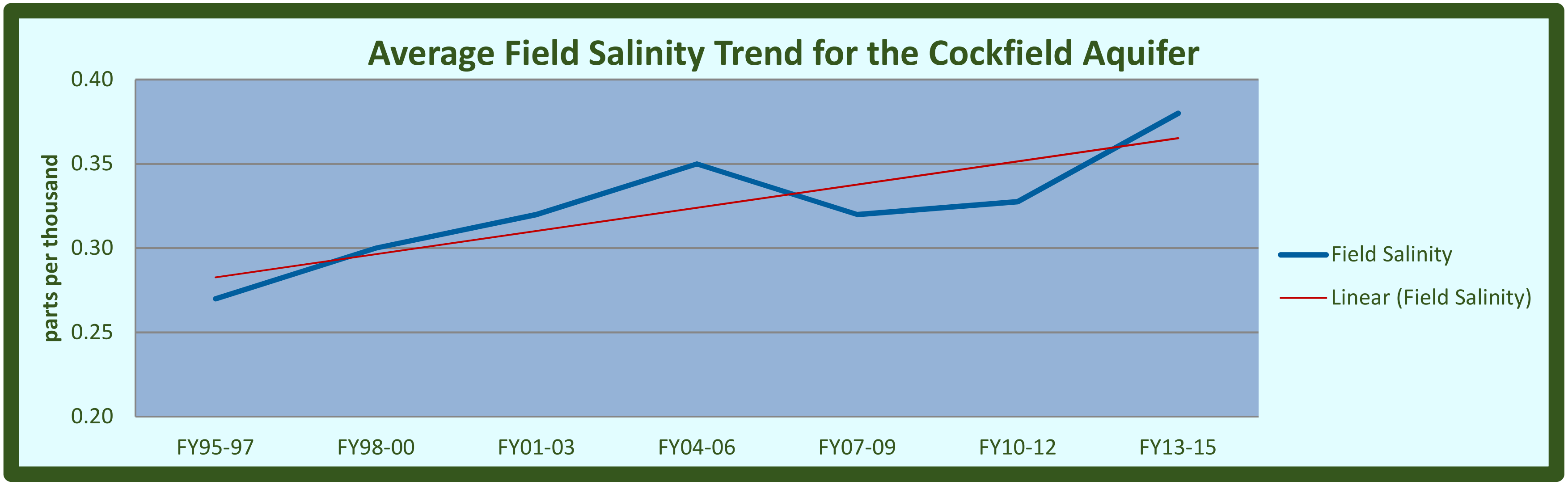


Chart 9-6 Chloride Trend

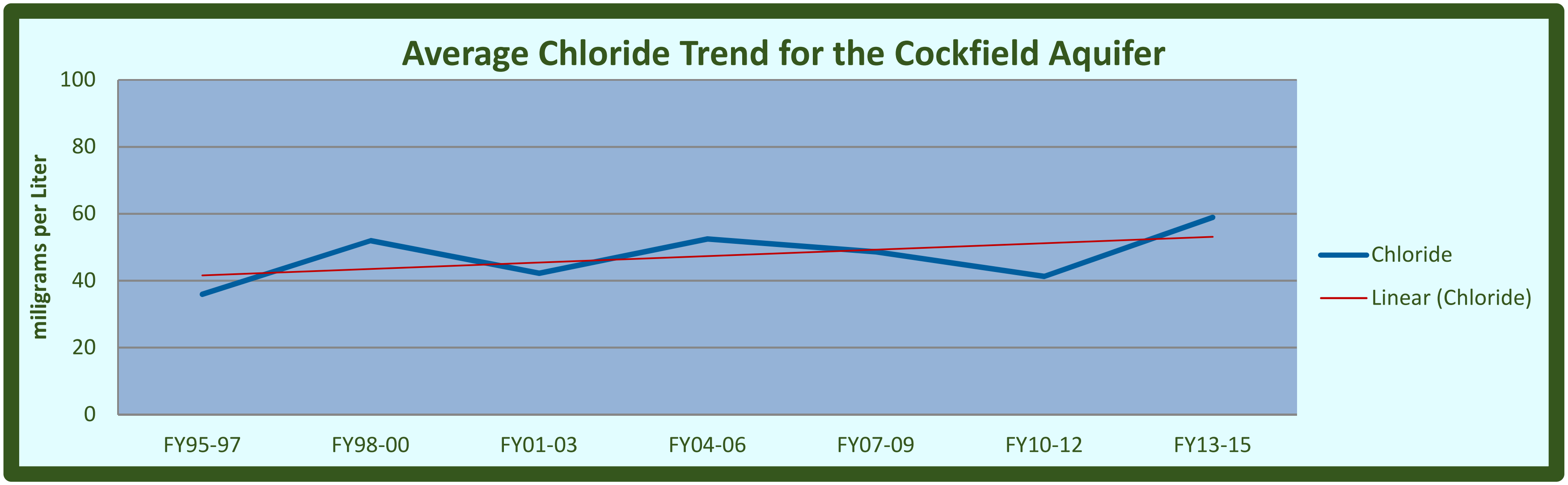


Chart 9-7: Alkalinity Trend

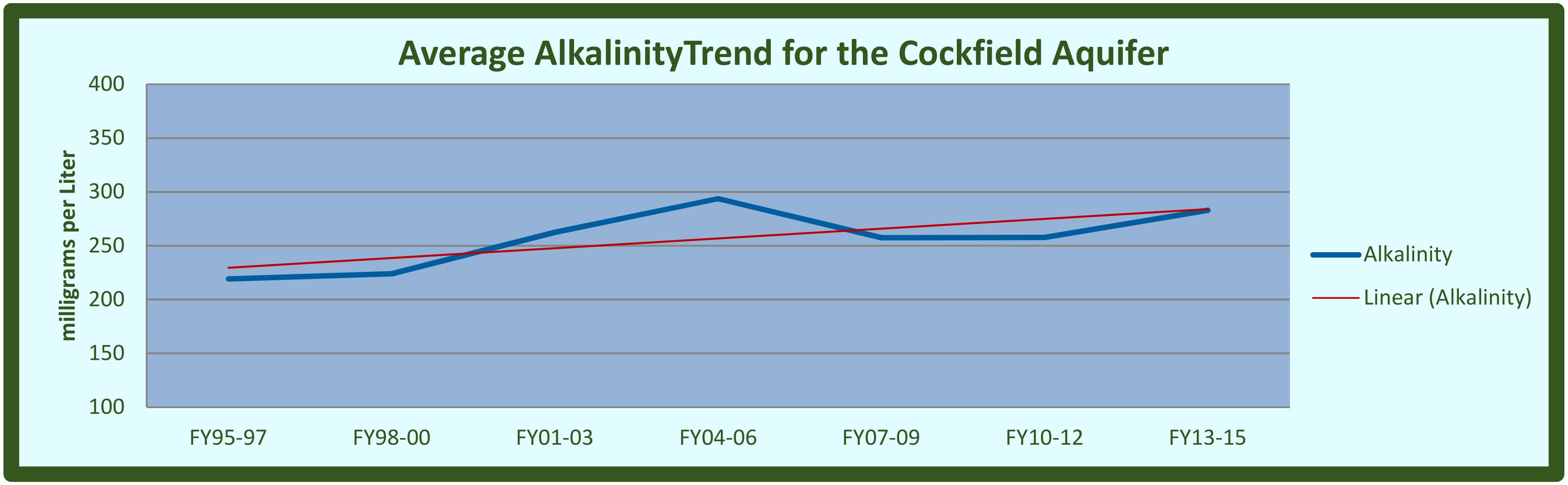


Chart 9-8: Color Trend

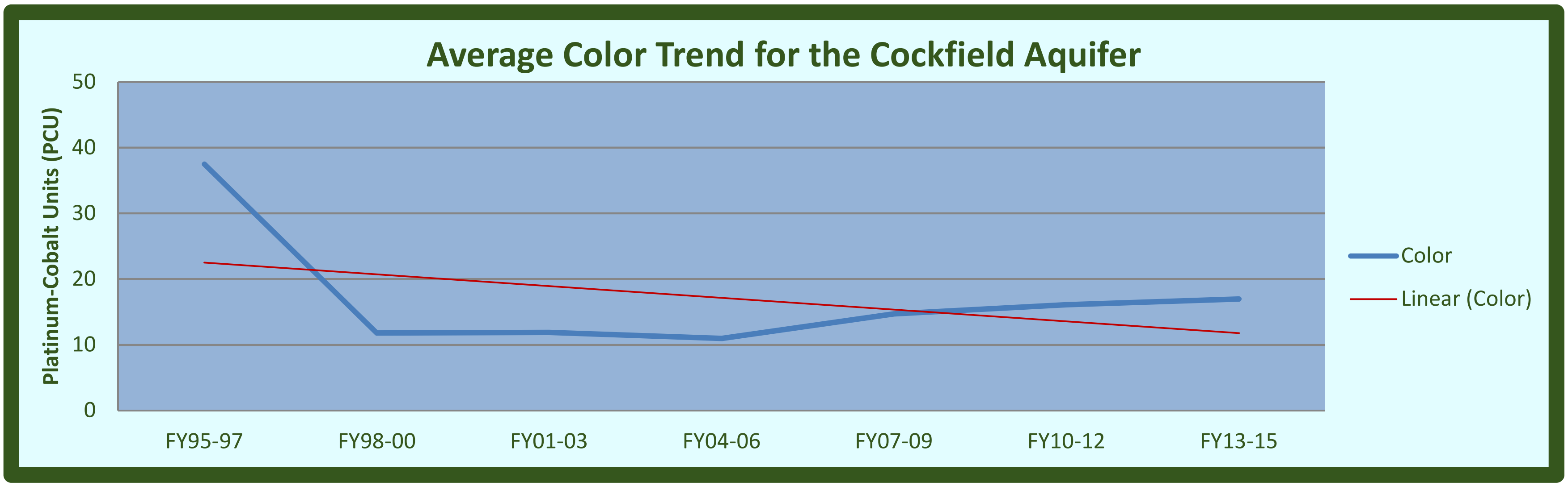


Chart 9-9: Sulfate Trend

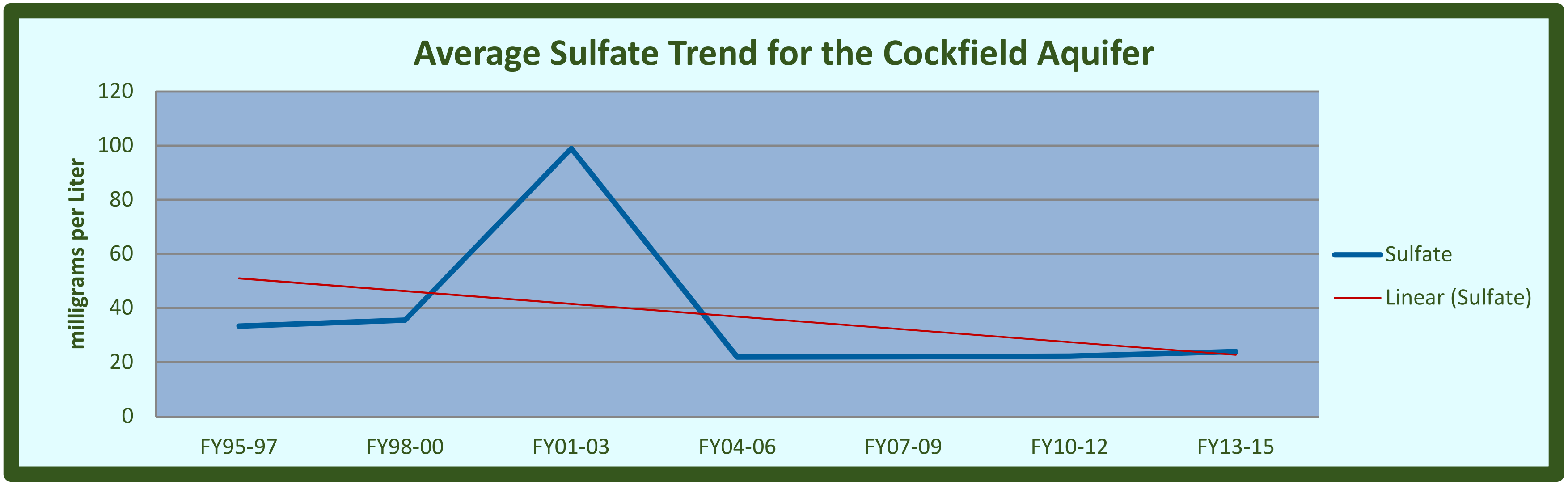


Chart 9-10: Total Dissolved Solids Trend

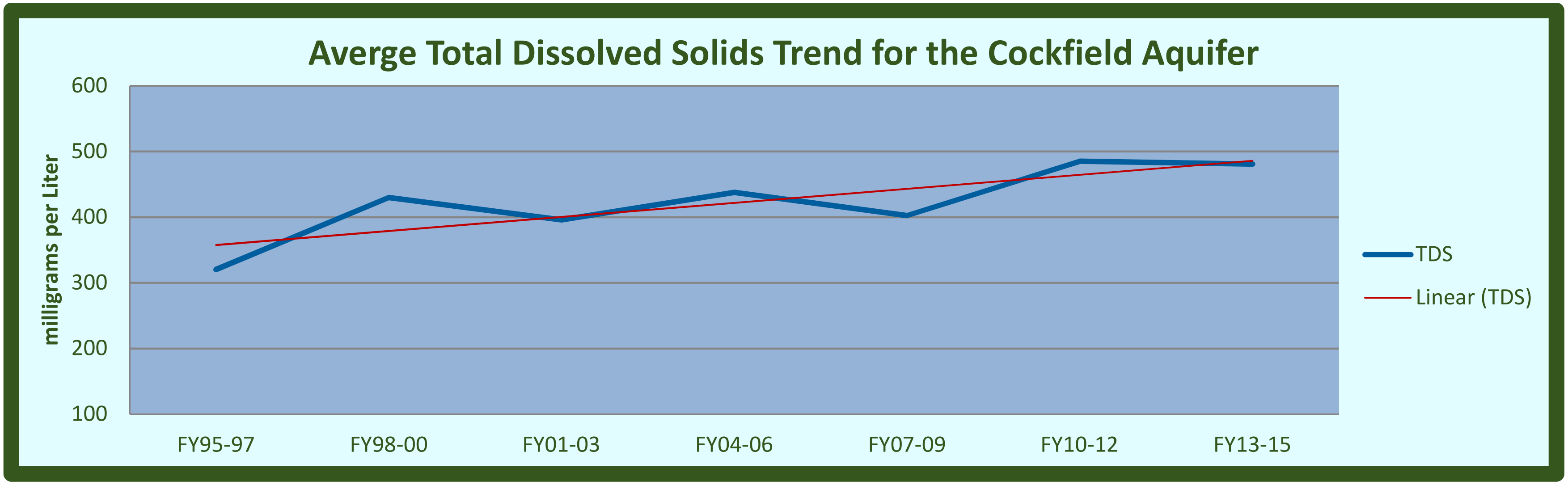


Chart 9-11: Hardness Trend

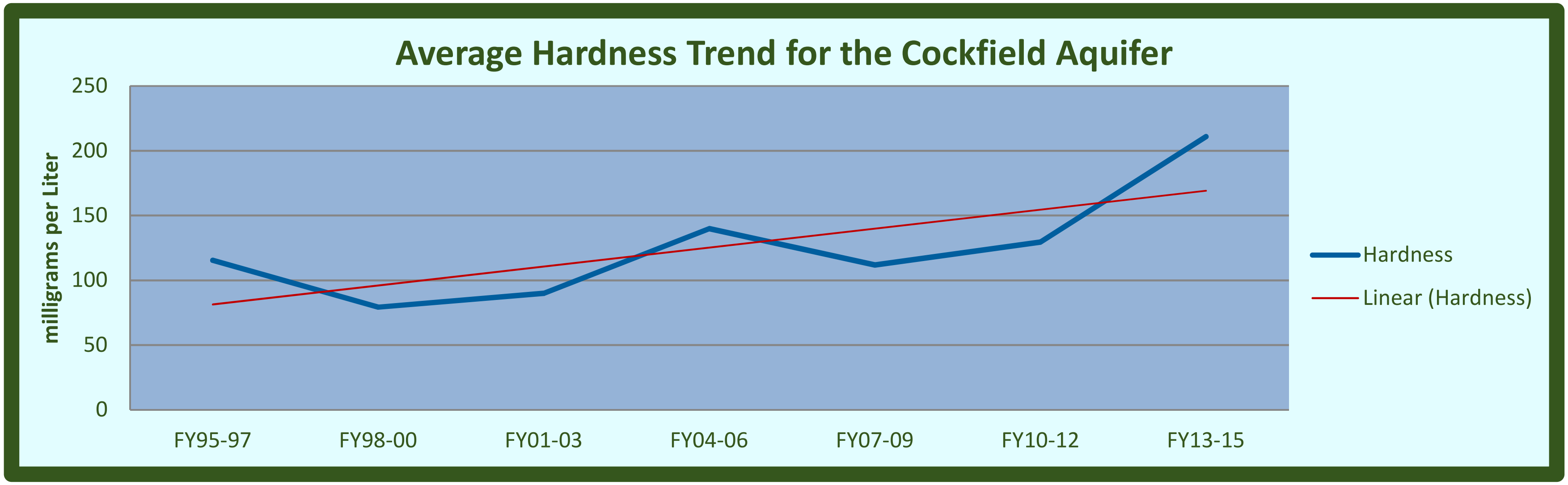


Chart 9-12: Ammonia Trend

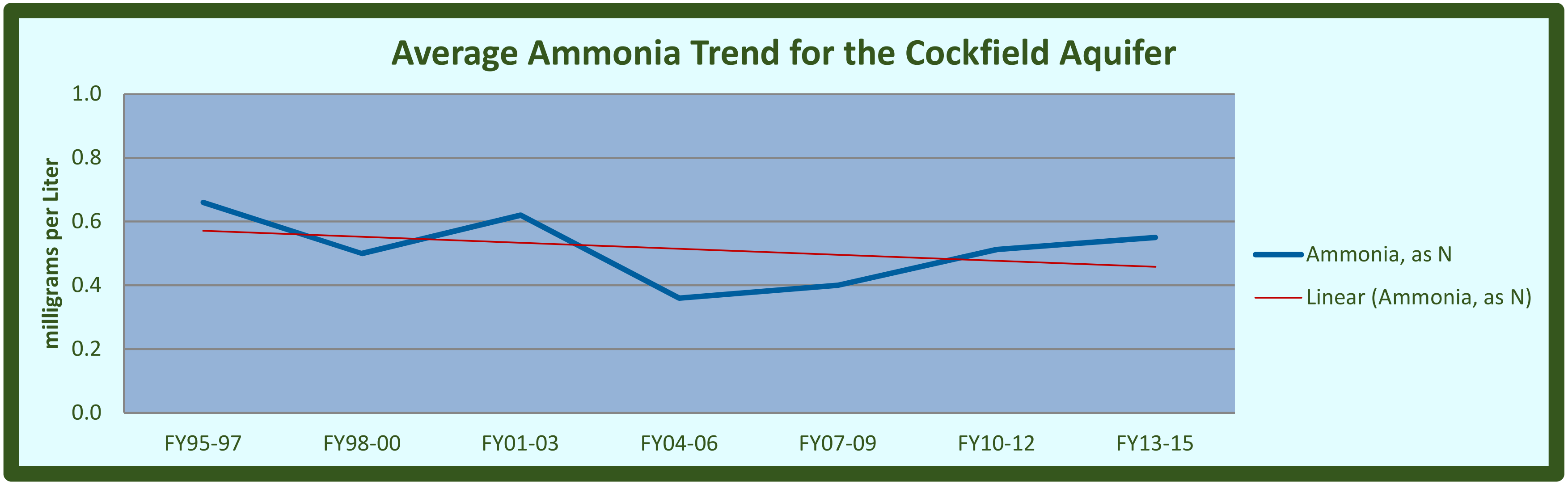


Chart 9-13: Nitrite – Nitrate Trend

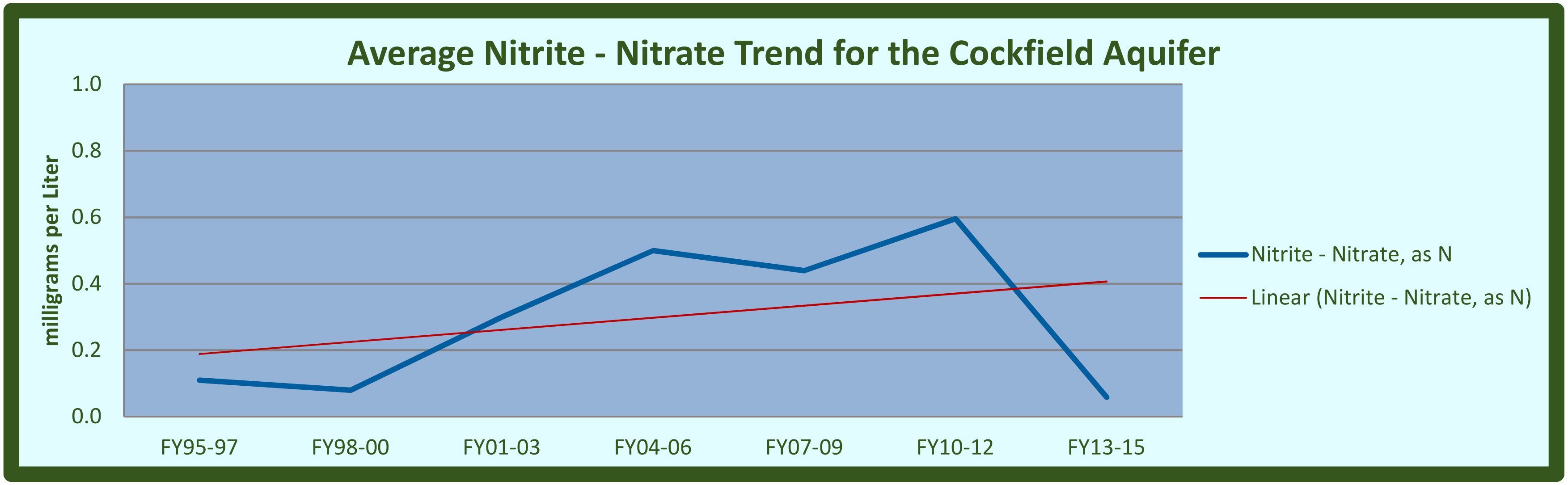


Chart 9-14: TKN Trend

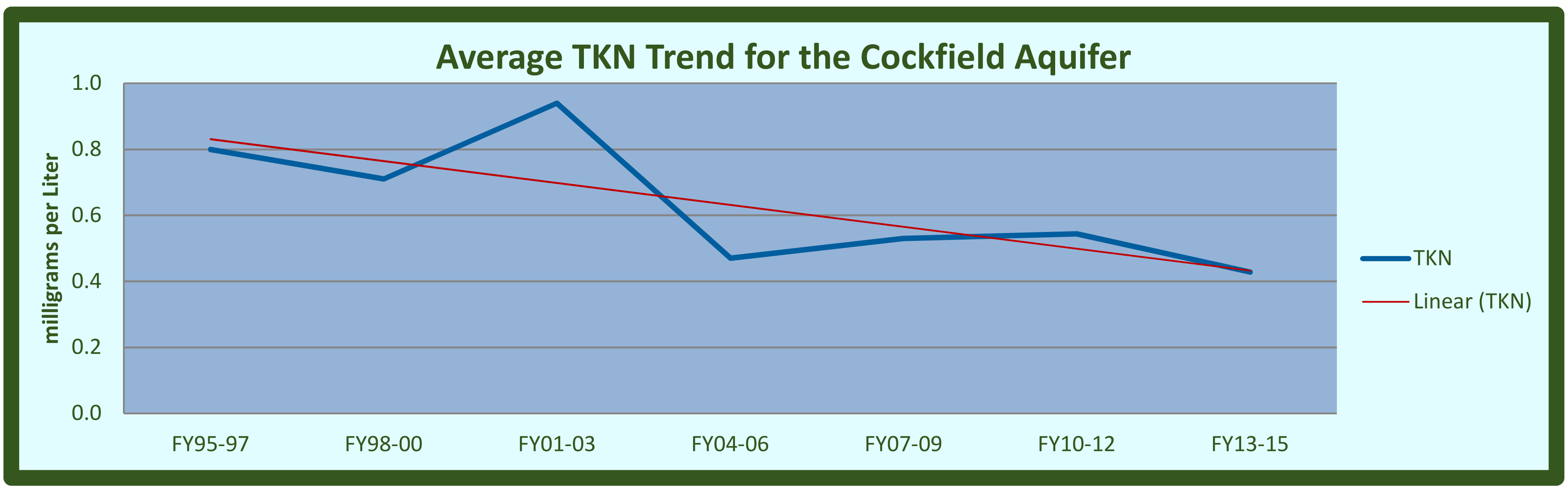


Chart 9-15: Total Phosphorus Trend

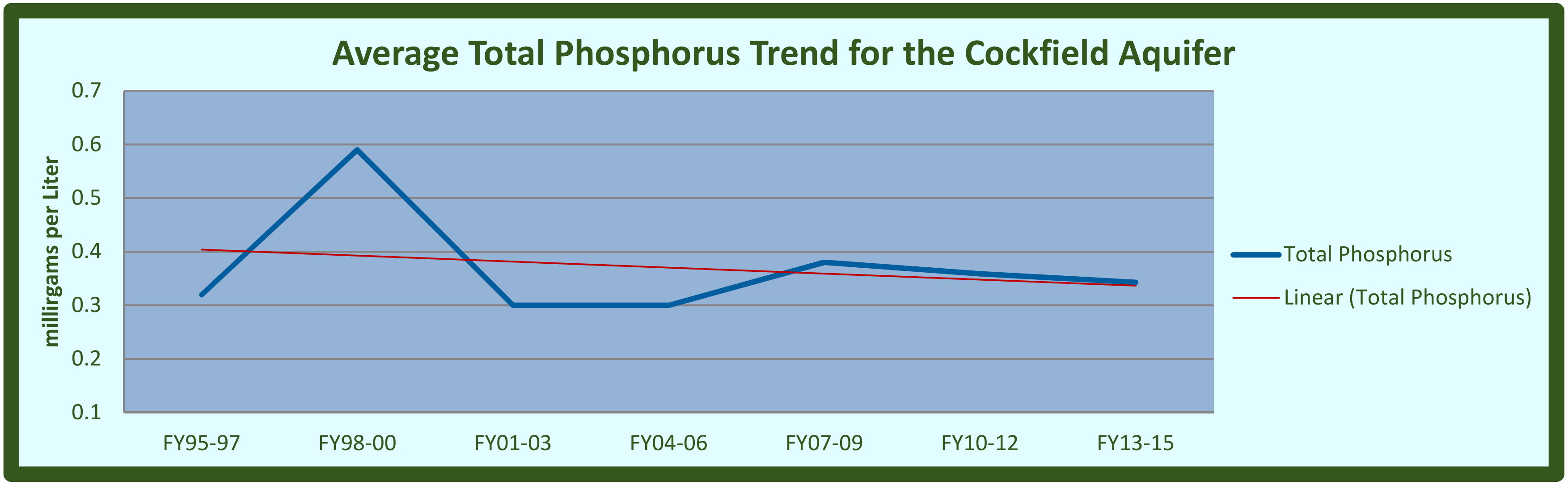


Chart 9-16: Iron Trend