

CHICOT EQUIVALENT AQUIFER SUMMARY, 2018 AQUIFER SAMPLING AND ASSESSMENT PROGRAM



APPENDIX 12 TO THE 2018 TRIENNIAL SUMMARY REPORT
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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 across the state. The sampling process is designed so that all 14 aquifers 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 Chicot Equivalent aquifer during the 2018 state fiscal year (July 1, 2017 - June 30, 2018). This summary will become Appendix 12 of the ASSET Program Triennial Summary Report for 2018.

These data show that between October 2017 and June 2018, 24 wells were sampled which produce from the Chicot Equivalent aquifer. Nine wells are classified as domestic, nine are classified as industrial, five are classified as public supply, and one monitoring well. The wells are located in 12 parishes in southeast Louisiana.

Figure 12-1 shows the geographic locations of the Chicot Equivalent aquifer and the associated wells, whereas Table 12-1 lists the wells monitored along with their total depths, use made of produced waters and date sampled.

Well data, including well location, aquifer assignment, and well use classification for registered water wells were obtained from the Louisiana Department of Natural Resources' water well registration data file.

GEOLOGY

The Chicot Equivalent aquifer is composed of the Pleistocene aged aquifers of the New Orleans area, the Baton Rouge area, and St. Tammany, Tangipahoa, and Washington Parishes. The aquifers are in Pleistocene aged alluvial and terrace deposits. 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 are moderately well, to well sorted, and consist of fine sand near the top, grading to coarse sand and gravel in lower parts and are generally confined by silt and clay layers.

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. The Mississippi River Valley is entrenched into the Pleistocene strata in the western part of the system, resulting in water movement between the river, the shallow sands, and the Pleistocene aquifers. Recharge occurs primarily by the direct infiltration of rainfall in interstream, upland outcrop areas, by the movement of water between aquifers, and between the aquifers and the Mississippi River. The hydraulic conductivity varies between 10-200 feet/day.

The maximum depths of occurrence of freshwater in the Chicot Equivalent aquifer range from 350 feet above sea level, to 1,100 feet below sea level. The range of thickness of the fresh water interval in the Chicot Equivalent aquifer is 50 to 1,100 feet. The depths of the Chicot Equivalent aquifer wells that were monitored in conjunction with ASSET range from 90 to 775 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 12-2. The inorganic parameters analyzed in the laboratory are listed in Table 12-3. These tables also show the field and analytical results determined for each analyte. For quality control, duplicate samples were taken for each parameter from wells AN-321, LI-7945Z, SC-179, and ST-11516Z.

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 12-8, 12-9 and 12-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 12-4 and 12-5 provide a statistical overview of field and conventional data, and inorganic data for the Chicot Equivalent aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2018 sampling. Tables 12-6 and 12-7 compare these same parameter averages to historical ASSET-derived data for the Chicot Equivalent aquifer, from fiscal years 1997, 2000, 2003, 2006, 2009, 2012, and 2015.

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, 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.

Charts 12-1 through 12-18 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 primary 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 also set secondary standards, which are defined as non-enforceable taste, odor, or appearance guidelines. Field and laboratory data contained in Tables 12-2 and 12-3 show that five parameters exceeded secondary MCLs (SMCL) in 18 of the 24 wells sampled in the Chicot Equivalent aquifer.

Field and Conventional Parameters

Table 12-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 12-6 provides an overview of field and conventional parameter data averages for the Chicot Equivalent aquifer, including the seven previous sampling event averages.

Federal Primary Drinking Water Standards: A review of the data listed in Table 12-2 shows that no primary MCL was exceeded for field or conventional parameters for this reporting period. 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 data listed in Table 12-2 shows that six wells exceeded the SMCL for pH, five wells exceeded the SMCL for chloride, seven wells exceeded the SMCL for color, and seven wells exceeded the SMCL for total dissolved solids. Laboratory results override field results in exceedance determination, thus only laboratory results are 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):

AN-6297Z	8.86 SU
AN-9183Z	6.26 SU
EB-991B	8.75 SU
SH-77	5.73 SU

TA-7627Z 4.92 SU
 WA-5311Z 5.35 SU

Chloride (SMCL = 250 mg/L):

AN-321 335.0 mg/L (Duplicate – 342.0 mg/L)
 AN-6297Z 632.0 mg/L
 JF-224 279.0 mg/L
 SC-179 417.0 mg/L (Duplicate – 415.0 mg/L)
 SJB-173 348.0 mg/L

Color (SMCL = 15 PCU):

AN-6297Z 22 PCU
 EB-34 16 PCU
 JF-224 146 PCU
 SC-179 54 PCU (Duplicate – 60 PCU)
 SJ-226 19 PCU
 SJB-173 50 PCU
 ST-SMMHP 30 PCU

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

	<u>LAB RESULTS (in mg/L)</u>	<u>FIELD MEASURES (in g/L)</u>
AN-316	525 mg/L	0.571 g/L
AN-321	765 mg/L (Duplicate – 800 mg/L)	0.917 g/L (Original and Duplicate)
AN-500	580 mg/L	0.465 mg/L
AN-6297Z	1,260 mg/L	-
JF-224	815 mg/L	0.930 g/L
SC-179	1,020 mg/L (Duplicate – 1,100 mg/L)	1.262 g/L (Original and Duplicate)
SJB-173	935 mg/L	1.092 g/L

Inorganic Parameters

Table 12-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 12-7 provides an overview of inorganic parameter data averages for the Chicot Equivalent aquifer, including the seven previous sampling event averages.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 10-3 shows that no MCL was exceeded for inorganics.

Federal Secondary Drinking Water Standards: A review of the analysis listed in Table 12-3 shows that nine wells exceeded the secondary MCL for iron:

Iron (SMCL = 300 µg/L):

AN-6297Z 860 µg/L
 EB-34 6,430 µg/L
 EB-1231 426 µg/L
 EB-8599Z 361 µg/L
 SC-179 336 µg/L (Duplicate – 321 µg/L)
 SH-77 594 µg/L
 SJ-226 1,900 µg/L
 SJB-173 750 µg/L
 ST-11516Z 522 µg/L (Duplicate – 528 µg/L)

Volatile Organic Compounds

Table 12-8 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.

Four wells had low level detections of volatile organic compounds, all of which were well below any existing drinking water limits. Well AN-500, and industrial well, reported chloroform at 1.0 µg/L and chloromethane at 0.94 µg/L. Domestic well SH-5333Z reported chloroform at 0.68 µg/L, and domestic well ST-11516Z reported chloromethane at 2.2 µg/L. Public supply well SH-77 reported toluene at 0.95 µg/L. Of these VOCs detected, toluene is the only compound with a MCL established, at 1,000 µg/L. There were no other confirmed detections of VOCs at or above their respective detection limits during the FY 2018 sampling of the Chicot Equivalent aquifer.

Semi-Volatile Organic Compounds

Table 12-9 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.

One well, AN-500, reported a detection of the SVOC, Bis(2-Chloroethyl) ether at 27 µg/L. There is no drinking water limit established for this compound. There were no other confirmed detections of SVOCs at or above their respective detection limits during the FY 2018 sampling of the Chicot Equivalent aquifer.

Pesticides and PCBs

Table 12-10 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 2018 sampling of the Chicot Equivalent 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 Chicot Equivalent aquifer exhibit some changes when comparing current data to that of the six previous sampling rotations. These comparisons can be found in Tables 12-6 and 12-7, and in Charts 12-1 to 12-18 of this summary. Increasing or decreasing trend statements made here are based on an R-square value (slope) of 0.03 or greater. An R-square value of less than 0.03 is considered to have only a slight or no change.

Over the 21-year period, five analytes have shown a general increase in average concentration, (pH, field total dissolved solids, hardness, total phosphorus, and iron), while 11 analytes have shown a general decrease in average concentration, (temperature, field and lab specific conductance, salinity, chloride, lab total dissolved solids, alkalinity, sulfate, color, ammonia, nitrite-nitrate, and total Kjeldahl nitrogen). All other analyte averages have remained consistent or have been non-detect for this period.

The number of secondary exceedances in the Chicot Equivalent aquifer has increased since the previous sampling in FY 2015. In FY 2015 there were 25 SMCL exceedances, whereas in FY 2018 there were 34 SMCL exceedances. Industrial well, SJ-266, continues to report similar concentrations of arsenic for FY 2018, at 7.8 µg/L. Previously arsenic was reported at 10 µg/L.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is soft¹ and is of good quality given that no primary MCL was exceeded in any of the wells sampled in FY 2018. The data also show that this aquifer is of fair quality when considering taste, odor, or appearance guidelines, with 34 SMCLs exceeded in 18 wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the Chicot Equivalent aquifer, with five parameters with an increasing trend in average concentrations and eleven parameters with a decreasing trend in average concentration. The remainder of the analyte averages staying consistent over the 21-year period.

Close attention will continue to be given to the occurrence of arsenic in well SJ-226, and to those wells reporting volatile and semi-volatile organic compounds. It is recommended that the wells assigned to the Chicot Equivalent aquifer be re-sampled as planned, in approximately three years. In addition, several wells should be added to the 24 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 12-1: List of Wells Sampled, Chicot Equivalent Aquifer – FY 2018

Well ID	Parish	Date	Owner	Depth (Feet)	Well Use
AN-266	Ascension	2/20/2018	City of Gonzales	548	Public Supply
AN-316	Ascension	6/13/2018	Westlake Vinyls	478	Industrial
AN-321	Ascension	6/13/2018	Rubicon, Inc.	523	Industrial
AN-337	Ascension	6/13/2018	BASF Corp.	459	Public Supply
AN-500	Ascension	6/13/2018	Lion Copolymer	480	Industrial
AN-6297Z	Ascension	6/14/2018	Oxy Chemical	294	Monitor
AN-9183Z	Ascension	2/20/2018	Private Owner	630	Domestic
EB-1231	East Baton Rouge	11/14/2017	Georgia Pacific Corp.	280	Industrial
EB-34	East Baton Rouge	10/31/2017	ExxonMobil USA	453	Industrial
EB-8599Z	East Baton Rouge	11/14/2017	Private Owner	180	Domestic
EB-991B	East Baton Rouge	10/31/2017	Baton Rouge Water Works	565	Public Supply
EF-5329Z	East Feliciana	11/13/2017	Private Owner	97	Domestic
JF-224	Jefferson	3/13/2018	Entergy	775	Industrial
LI-5477Z	Livingston	2/20/2018	Private Owner	106	Domestic
LI-7945Z	Livingston	2/21/2018	French Settlement Water System	455	Public Supply
SC-179	St. Charles	3/13/2018	Union Carbide	460	Industrial
SH-5333Z	St. Helena	4/25/2018	Private Owner	230	Domestic
SH-77	St. Helena	6/27/2018	Transco	170	Public Supply
SJ-226	St. James	3/13/2018	Noranda Alumina, LLC	248	Industrial
SJB-173	St. John the Baptist	3/13/2018	DuPont	425	Industrial
ST-11516Z	St. Tammany	6/7/2018	Louisiana State Parks	340	Domestic
ST-SMMHP	St. Tammany	6/7/2018	Southern Manor MHP	483	Public Supply
TA-7627Z	Tangipahoa	5/31/2018	Global Wildlife Center	120	Domestic
WA-5295Z	Washington	6/28/2018	Private Owner	100	Domestic
WA-5311Z	Washington	6/27/2018	Private Owner	90	Domestic

Table 12-2: Summary of Field and Conventional Data – FY 2018 Chicot Equivalent Aquifer

Well ID	pH	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 µmhos/cm	SO4 mg/L	TDS mg/L	TKN mg/L	TSS mg/L	Turb NTU
	Laboratory Reporting Limits →					2	1	5	5	0.05	0.1	0.05	1	1	10	0.1	4	0.1
	Field Parameters					Laboratory Parameters												
AN-266	7.00	0.16	0.345	20.89	0.224	166	19.4	10	36	< DL	0.29	55.10	352	3.1	185	0.32	4	0.25
AN-316	7.58	0.43	0.879	20.75	0.571	142	181.0	10	70	< DL	0.45	0.20	803	< DL	525	0.52	5	0.61
AN-321	7.68	0.71	1.410	19.80	0.917	152	335.0	9	62	< DL	0.52	0.28	1400	< DL	765	0.67	< DL	0.35
AN-321*	7.68	0.71	1.410	19.80	0.917	152	342.0	8	62	< DL	0.50	0.26	1410	< DL	800	0.52	< DL	0.29
AN-337	7.72	0.22	0.466	18.83	0.303	155	52.9	13	40	< DL	0.82	0.20	479	< DL	275	0.85	5	1.00
AN-500	7.46	0.35	0.715	20.36	0.465	135	52.0	10	34	0.08	< DL	0.20	443	1.8	580	0.21	4	0.32
AN-6297Z	8.86	NR	0.002	25.56	NR	183	632.0	22	166	< DL	2.00	0.24	2320	< DL	1260	1.10	< DL	3.00
AN-9183Z	6.26	0.22	0.451	18.12	0.293	182	43.7	< DL	< DL	< DL	0.16	0.05	469	2.8	240	0.25	4	0.19
EB-1231	8.35	0.12	0.247	16.69	0.161	65	60.9	5	66	< DL	< DL	< DL	258	10.5	250	< DL	< DL	0.77
EB-34	7.64	0.13	0.271	18.75	0.176	138	10.5	16	54	< DL	0.23	0.44	260	1.3	170	0.33	< DL	14.50
EB-8599Z	8.15	0.09	0.197	14.94	0.128	69	15.8	< DL	54	< DL	< DL	< DL	204	2.9	245	< DL	< DL	1.40
EB-991B	8.75	0.13	0.264	19.44	0.171	130	5.2	< DL	10	< DL	< DL	0.11	260	10.7	140	0.36	< DL	0.33
EF-5329Z	7.19	0.02	0.053	16.61	0.034	14	6.3	< DL	12	0.24	< DL	< DL	56.3	1.2	200	0.11	< DL	0.16
JF-224	8.36	0.72	1.431	19.42	0.930	318	279.0	146	24	< DL	0.89	0.70	1380	< DL	815	1.50	< DL	0.67
LI-5477Z	7.43	0.20	0.413	18.56	0.269	212	9.1	< DL	50	< DL	0.51	0.16	419	< DL	215	0.34	4	0.68
LI-7945Z	7.95	0.15	0.319	19.78	0.208	146	14.3	< DL	10	< DL	0.21	0.18	330	5.7	185	0.24	< DL	0.34
LI-7945Z*	7.95	0.15	0.319	19.78	0.208	138	14.2	< DL	12	< DL	0.23	0.22	331	5.8	180	0.41	< DL	< DL
SC-179	7.90	0.99	1.942	18.87	1.262	420	417.0	54	68	< DL	2.40	0.56	1940	< DL	1020	2.60	< DL	0.46
SC-179*	7.90	0.99	1.942	18.87	1.262	410	415.0	60	70	< DL	2.30	0.64	1950	< DL	1100	2.80	< DL	0.24
SH-5333Z	6.96	0.03	0.074	14.38	0.048	20	8.7	< DL	10	0.06	< DL	< DL	78.5	< DL	20	0.61	< DL	0.29
SH-77	5.73	0.03	0.072	18.45	0.047	33	2.4	< DL	24	0.16	< DL	< DL	112	< DL	15	0.54	< DL	4.90
SJ-226	7.12	0.33	0.677	15.42	0.440	< DL	85.1	19	192	< DL	1.00	0.91	652	9.4	380	1.40	4	8.10
SJB-173	7.43	0.85	1.680	18.02	1.092	218	348.0	50	158	< DL	1.70	0.36	1680	< DL	935	2.20	< DL	0.65
ST-11516Z	7.89	0.14	0.294	18.89	0.191	131	9.0	< DL	16	< DL	0.22	0.33	301	1.8	190	0.52	< DL	0.38
ST-11516Z*	7.89	0.14	0.294	18.89	0.191	133	9.1	10	16	< DL	0.21	0.41	306	4.0	185	0.60	4	1.10
ST-SMMHP	8.42	0.30	0.615	17.83	0.400	285	18.5	30	< DL	< DL	0.22	0.45	619	6.7	350	0.64	< DL	0.34
TA-7627Z	4.92	0.01	0.031	17.83	0.020	8	3.7	< DL	< DL	< DL	< DL	< DL	33	< DL	15	0.17	< DL	0.29
WA-5295Z	6.90	0.01	0.033	20.92	0.022	9	2.4	10	< DL	< DL	< DL	< DL	34	< DL	< DL	0.60	< DL	0.27
WA-5311Z	5.35	0.01	0.024	18.40	0.016	< DL	3.8	< DL	< DL	0.13	< DL	< DL	23	< DL	10	0.59	< DL	0.40

* Duplicate Sample

NR – Field Measure Not Recorded

Exceed EPA Secondary Standards



Table 12-3: Summary of Inorganic Data – FY 2015 Chicot Equivalent Aquifer

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	1	1	0.5	1	1	3	50	1	0.2	1	1	0.5	0.5	5
AN-266	< DL	< DL	114.0	< DL	< DL	< DL	< DL	144	< DL	< DL	< DL	< DL	< DL	< DL	6.3
AN-316	< DL	< DL	316.0	< DL	< DL	< DL	< DL	246	< DL	< DL	< DL	< DL	< DL	< DL	< DL
AN-321	< DL	< DL	261.0	< DL	< DL	< DL	< DL	149	< DL	< DL	< DL	< DL	< DL	< DL	8.0
AN-321*	< DL	< DL	269.0	< DL	< DL	< DL	< DL	148	< DL	< DL	< DL	< DL	< DL	< DL	7.6
AN-337	< DL	< DL	85.6	< DL	< DL	< DL	4.1	111	1.7	< DL	< DL	< DL	< DL	< DL	219.0
AN-500	< DL	< DL	111.0	< DL	< DL	< DL	< DL	78	< DL	< DL	< DL	< DL	< DL	< DL	6.4
AN-6297Z	< DL	< DL	583.0	< DL	< DL	< DL	< DL	860	< DL	< DL	< DL	< DL	< DL	< DL	< DL
AN-9183Z	< DL	< DL	37.9	< DL	< DL	< DL	126.0	< DL	5.0	< DL	< DL	< DL	< DL	< DL	27.8
EB-1231	< DL	< DL	136.0	< DL	< DL	< DL	< DL	426	< DL	< DL	< DL	< DL	< DL	< DL	5.1
EB-34	< DL	1.0	140.0	< DL	< DL	< DL	< DL	6430	< DL	< DL	< DL	< DL	< DL	< DL	5.5
EB-8599Z	< DL	< DL	218.0	< DL	< DL	< DL	< DL	361	< DL	< DL	< DL	< DL	< DL	< DL	< DL
EB-991B	< DL	< DL	29.8	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
EF-5329Z	< DL	< DL	23.9	< DL	< DL	< DL	5.2	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
JF-224	< DL	< DL	136.0	< DL	< DL	< DL	< DL	291	< DL	< DL	< DL	< DL	< DL	< DL	7.6
LI-5477Z	< DL	1.1	90.6	< DL	< DL	< DL	3.6	< DL	< DL	< DL	< DL	< DL	< DL	< DL	5.5
LI-7945Z	< DL	< DL	53.8	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	6.7
LI-7945Z*	< DL	< DL	53.5	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SC-179	< DL	< DL	112.0	< DL	< DL	< DL	< DL	336	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SC-179*	< DL	< DL	112.0	< DL	< DL	< DL	< DL	321	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SH-5333Z	< DL	< DL	74.5	< DL	< DL	< DL	163.0	< DL	11.5	< DL	1.5	< DL	< DL	< DL	21.7
SH-77	< DL	< DL	39.1	< DL	< DL	< DL	5.2	594	< DL	< DL	< DL	< DL	< DL	< DL	561.0
SJ-226	< DL	7.8	318.0	< DL	< DL	< DL	< DL	1900	< DL	< DL	< DL	< DL	< DL	< DL	< DL
SJB-173	< DL	< DL	390.0	< DL	< DL	< DL	4.0	750	< DL	< DL	1.6	< DL	< DL	< DL	13.6
ST-11516Z	< DL	< DL	65.6	< DL	< DL	< DL	3.9	522	< DL	< DL	< DL	< DL	< DL	< DL	6.9
ST-11516Z*	< DL	< DL	66.5	< DL	< DL	< DL	4.4	528	< DL	< DL	< DL	< DL	< DL	< DL	< DL
ST-SMMHP	< DL	< DL	7.7	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
TA-7627Z	< DL	< DL	13.4	< DL	< DL	< DL	5.4	< DL	1.1	< DL	< DL	< DL	< DL	< DL	< DL
WA-5295Z	< DL	< DL	65.3	< DL	< DL	1.2	8.0	< DL	1.1	< DL	< DL	< DL	< DL	< DL	< DL
WA-5311Z	< DL	< DL	14.8	< DL	< DL	1.1	4.6	< DL	5.5	< DL	< DL	< DL	< DL	< DL	14.4

* Duplicate Sample

Exceed EPA Secondary Standards



Table 12-4: FY 2015 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	pH (SU)	4.92	8.86	7.46
	Salinity (ppt)	0.01	0.99	0.30
	Specific Conductance (mmhos/cm)	0.002	1.942	0.582
	Temperature (°C)	14.38	25.56	18.88
	Total Dissolved Solids (g/L)	0.016	1.262	0.392
LABORATORY	Alkalinity (mg/L)	< DL	420	144
	Chloride (mg/L)	2.4	632.0	117.1
	Color (PCU)	< DL	146	18
	Hardness (mg/L)	< DL	192	46
	Nitrite - Nitrate, as N (mg/L)	< DL	0.24	< DL
	Ammonia, as N (mg/L)	< DL	2.40	0.53
	Total Phosphorus (mg/L)	< DL	55.10	2.14
	Specific Conductance (µmhos/cm)	23	2320	652
	Sulfate (mg/L)	< DL	10.7	2.4
	Total Dissolved Solids (mg/L)	< DL	1260	388
	Total Kjeldahl Nitrogen (mg/L)	< DL	2.80	0.73
	Total Suspended Solids (mg/L)	< DL	5	< DL
	Turbidity (NTU)	< DL	14.50	1.50

Table 12-5: FY 2015 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (µg/L)	< DL	< DL	< DL
Arsenic (µg/L)	< DL	7.8	< DL
Barium (µg/L)	13.4	583.0	135.8
Beryllium (µg/L)	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL
Chromium (µg/L)	< DL	1.2	< DL
Copper (µg/L)	< DL	163.0	12.5
Iron (µg/L)	< DL	6430	499
Lead (µg/L)	< DL	11.5	1.29
Mercury (µg/L)	< DL	< DL	< DL
Nickel (µg/L)	< DL	1.6	< DL
Selenium (µg/L)	< DL	< DL	< DL
Silver (µg/L)	< DL	< DL	< DL
Thallium (µg/L)	< DL	< DL	< DL
Zinc (µg/L)	< DL	561.0	34.0

Table 12-6: 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	FY 2018
FIELD	pH (SU)	7.09	7.23	7.16	7.16	7.28	7.21	7.18	7.46
	Salinity (ppt)	0.32	0.30	0.33	0.27	0.29	0.24	0.27	0.30
	Specific Conductance (mmhos/cm)	0.618	0.692	0.669	0.540	0.590	0.470	0.600	0.582
	Temperature (°C)	21.17	21.90	21.86	22.40	21.69	21.15	22.24	18.88
	Total Dissolved Solids (g/L)	-	-	-	0.350	0.380	0.320	0.391	0.392
LABORATORY	Alkalinity (mg/L)	161	166	158	151	151	134	146	144
	Chloride (mg/L)	108.6	125.3	120.2	104.1	99.0	112.8	91.3	117.1
	Color (PCU)	18	22	18	18	17	9	13	18
	Hardness (mg/L)	46	49	46	45	47	107	79	46
	Nitrite - Nitrate, as N (mg/L)	0.15	0.15	0.14	0.16	0.12	0.19	0.14	< DL
	Ammonia, as N (mg/L)	0.58	0.51	0.70	0.58	0.50	0.56	0.42	0.53
	Total Phosphorus (mg/L)	0.21	0.22	0.14	0.21	0.21	0.45	0.20	2.14
	Specific Conductance (µmhos/cm)	624	712	653	630	582	565	550	652
	Sulfate (mg/L)	3.2	2.7	2.7	2.9	2.5	2.6	2.6	2.4
	Total Dissolved Solids (mg/L)	394	416	365	372	334	388	347	388
	Total Kjeldahl Nitrogen (mg/L)	0.89	0.73	0.94	0.67	0.56	0.78	0.64	0.73
	Total Suspended Solids (mg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
	Turbidity (NTU)	< DL	< DL	1.9	2.2	1.6	2.4	2.1	1.50

Table 12-7: 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	FY 2018
Antimony (µg/L)	5.3	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Arsenic (µg/L)	< DL	< DL	< DL	< DL	< DL	0.97	< DL	< DL
Barium (µg/L)	107	141	146	131	123	< DL	146	135.8
Beryllium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Cadmium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Chromium (µg/L)	< DL	< DL	< DL	< DL	< DL	0.7	0.6	< DL
Copper (µg/L)	19.6	10.8	15.4	< DL	7.9	17.6	25.5	12.5
Iron (µg/L)	230	371	641	849	888	443	478	499
Lead (µg/L)	< DL	< DL	< DL	< DL	< DL	1.45	0.80	1.29
Mercury (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Nickel (µg/L)	< DL	< DL	< DL	< DL	3.8	0.7	0.79	< DL
Selenium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Silver (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Thallium (µg/L)	< DL	< DL	< DL	< DL	< DL	< DL	< DL	< DL
Zinc (µg/L)	32.2	32.0	37.9	21.3	21.7	37.4	30.9	34.0

Table 12-8: Volatile Organic Compound List

VOC ANALYTICAL PARAMETERS	METHOD	REPORTING 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	1.0
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	1.0
DIBROMOCHLOROMETHANE	624	0.50
ETHYL BENZENE	624	0.50
METHYLENE CHLORIDE	624	1.0
O-XYLENE (1,2-DIMETHYLBENZENE)	624	0.50
STYRENE	624	0.50
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	1.0

Table 12-9: Semi-Volatile Organic Compound List

SVOC ANALYTICAL PARAMETERS	METHOD	REPORTING LIMIT (µg/L)
1,2,4-TRICHLOROBENZENE	625	5.0
2,4,6-TRICHLOROPHENOL	625	5.0
2,4-DICHLOROPHENOL	625	5.0
2,4-DIMETHYLPHENOL	625	5.0
2,4-DINITROPHENOL	625	20.0
2,4-DINITROTOLUENE	625	5.0
2,6-DINITROTOLUENE	625	5.0
2-CHLORONAPHTHALENE	625	5.0
2-CHLOROPHENOL	625	5.0
2-NITROPHENOL	625	5.0
3,3'-DICHLOROBENZIDINE	625	5.0
4,6-DINITRO-2-METHYLPHENOL	625	10.0
4-BROMOPHENYL PHENYL ETHER	625	5.0
4-CHLORO-3-METHYLPHENOL	625	5.0
4-CHLOROPHENYL PHENYL ETHER	625	5.0
4-NITROPHENOL	625	20.0
ACENAPHTHENE	625	0.20
ACENAPHTHYLENE	625	0.20
ANTHRACENE	625	0.20
BENZIDINE	625	20.0
BENZO(A)ANTHRACENE	625	0.20
BENZO(A)PYRENE	625	0.20
BENZO(B)FLUORANTHENE	625	0.20
BENZO(G,H,I)PERYLENE	625	0.20
BENZO(K)FLUORANTHENE	625	0.20
BENZYL BUTYL PHTHALATE	625	5.0
BIS(2-CHLOROETHOXY) METHANE	625	5.0
BIS(2-CHLOROETHYL) ETHER (2-CHLOROETHYL ETHER)	625	5.0
BIS(2-ETHYLHEXYL) PHTHALATE	625	5.0
CHRYSENE	625	0.20
DIBENZ(A,H)ANTHRACENE	625	0.20
DIETHYL PHTHALATE	625	5.0
DIMETHYL PHTHALATE	625	5.0
DI-N-BUTYL PHTHALATE	625	5.0
DI-N-OCTYLPHTHALATE	625	5.0
FLUORANTHENE	625	0.20
FLUORENE	625	0.20
HEXACHLOROBENZENE	625	5.0

SVOC ANALYTICAL PARAMETERS	METHOD	REPORTING LIMIT (µg/L)
HEXACHLOROBUTADIENE	625	5.0
HEXACHLOROCYCLOPENTADIENE	625	10.0
HEXACHLOROETHANE	625	5.0
INDENO(1,2,3-C,D)PYRENE	625	0.20
ISOPHORONE	625	5.0
NAPHTHALENE	625	0.20
NITROBENZENE	625	5.0
N-NITROSODIMETHYLAMINE	625	5.0
N-NITROSODI-N-PROPYLAMINE	625	5.0
N-NITROSODIPHENYLAMINE	625	5.0
PENTACHLOROPHENOL	625	5.00
PHENANTHRENE	625	0.20
PHENOL	625	5.0
PYRENE	625	0.20

Table 12-10: Pesticide and PCB List

PESTICIDE/PCB ANALYTICAL PARAMETERS	METHOD	REPORTING LIMIT (µg/L)
ALDRIN	608	0.025
ALPHA BHC (ALPHA HEXACHLOROCYCLOHEXANE)	608	0.025
ALPHA ENDOSULFAN	608	0.025
ALPHA-CHLORDANE	608	0.025
BETA BHC (BETA HEXACHLOROCYCLOHEXANE)	608	0.025
BETA ENDOSULFAN	608	0.025
CHLORDANE	608	0.20
DELTA BHC (DELTA HEXACHLOROCYCLOHEXANE)	608	0.025
DIELDRIN	608	0.025
ENDOSULFAN SULFATE	608	0.025
ENDRIN	608	0.025
ENDRIN ALDEHYDE	608	0.025
ENDRIN KETONE	608	0.025
GAMMA-CHLORDANE	608	0.025
HEPTACHLOR	608	0.025
HEPTACHLOR EPOXIDE	608	0.025
METHOXYCHLOR	608	0.25
P,P'-DDD	608	0.025
P,P'-DDE	608	0.025
P,P'-DDT	608	0.025
PCB-1016 (AROCHLOR 1016)	608	0.80
PCB-1221 (AROCHLOR 1221)	608	0.80
PCB-1232 (AROCHLOR 1232)	608	0.80
PCB-1242 (AROCHLOR 1242)	608	0.80
PCB-1248 (AROCHLOR 1248)	608	0.80
PCB-1254 (AROCHLOR 1254)	608	0.80
PCB-1260 (AROCHLOR 1260)	608	0.80
TOXAPHENE	608	1.0

Figure 12-1: Location Plat, Chicot Equivalent Aquifer

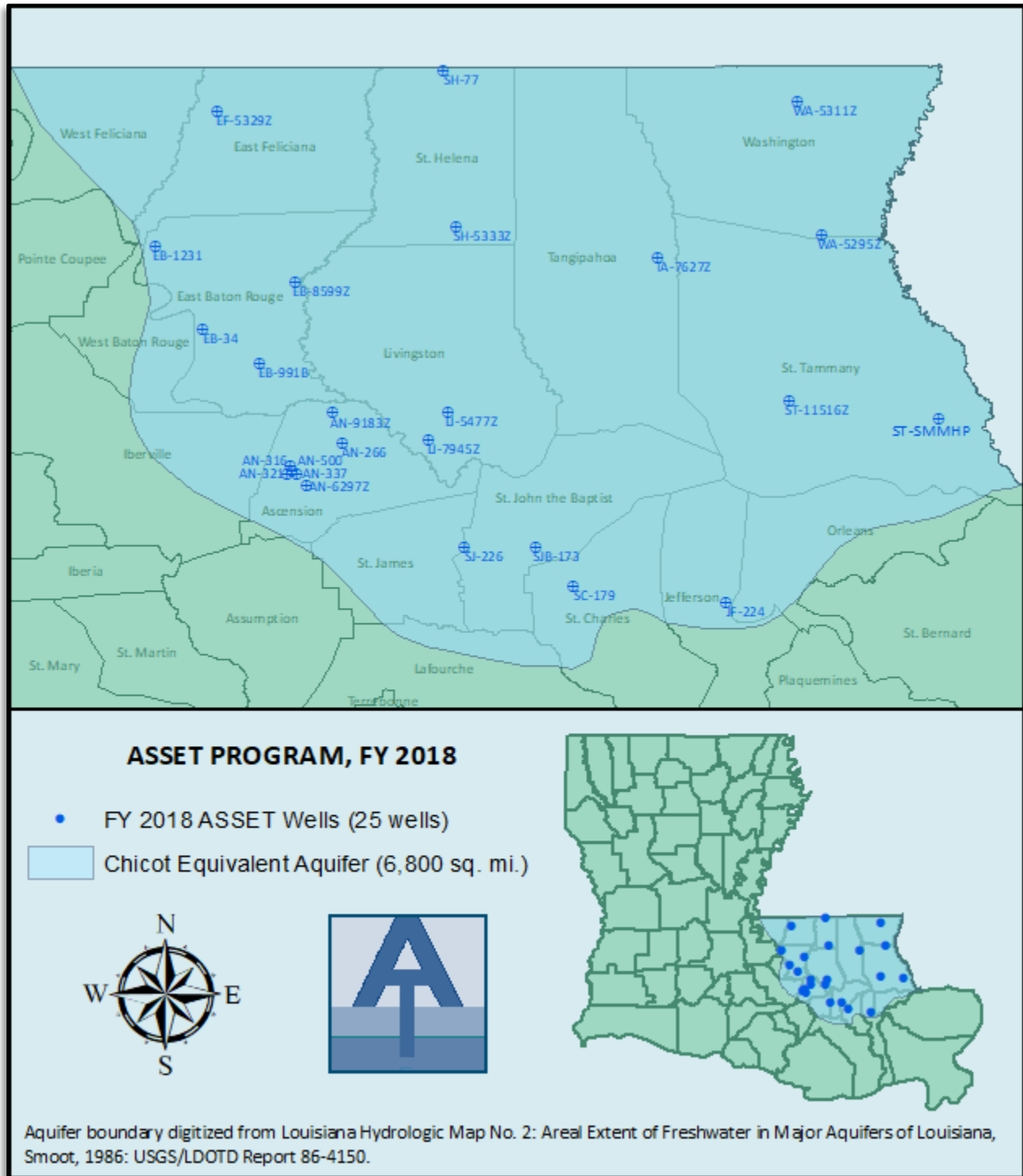


Chart 12-1: Temperature Trend

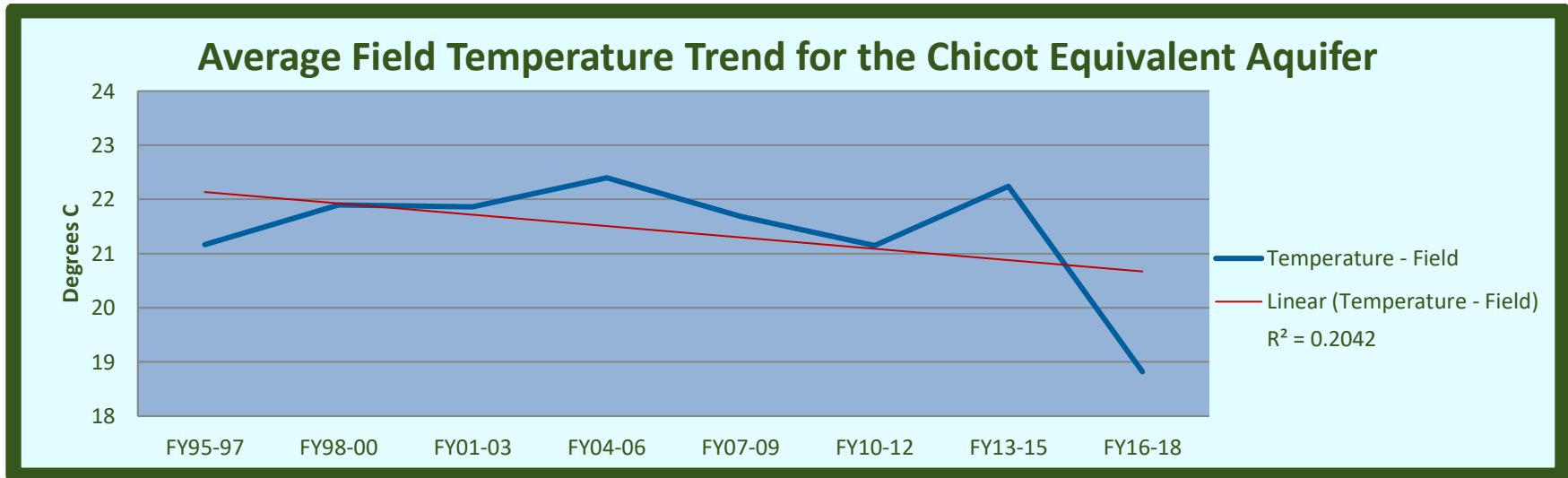


Chart 12-2: pH Trend

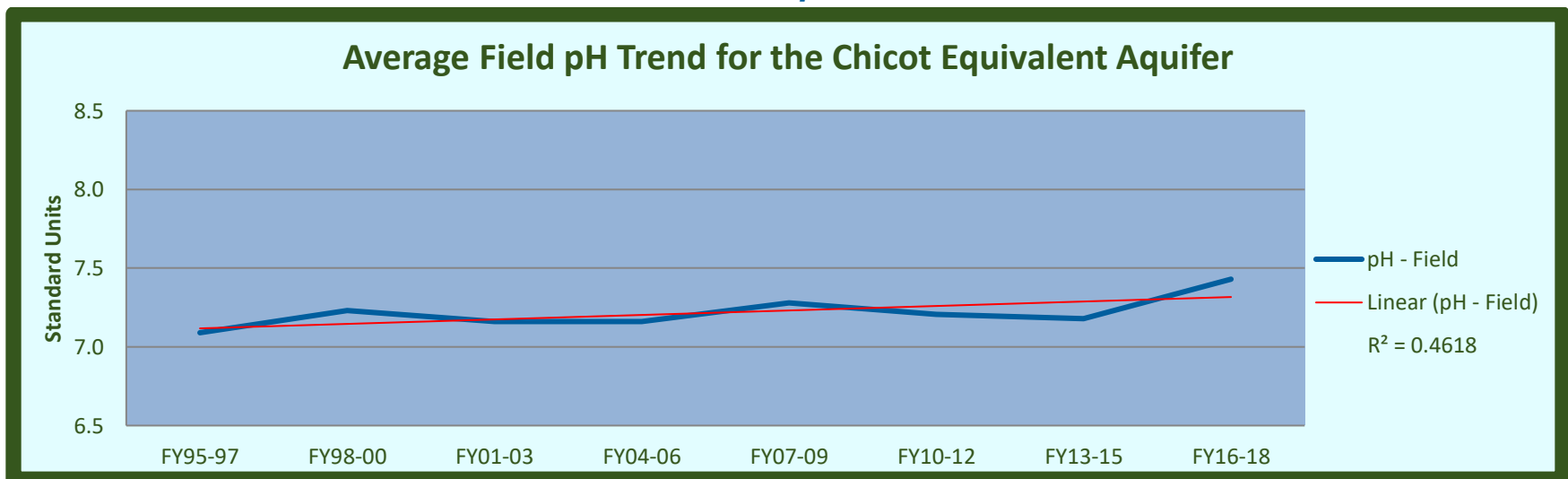


Chart 12-3: Specific Conductance Trend

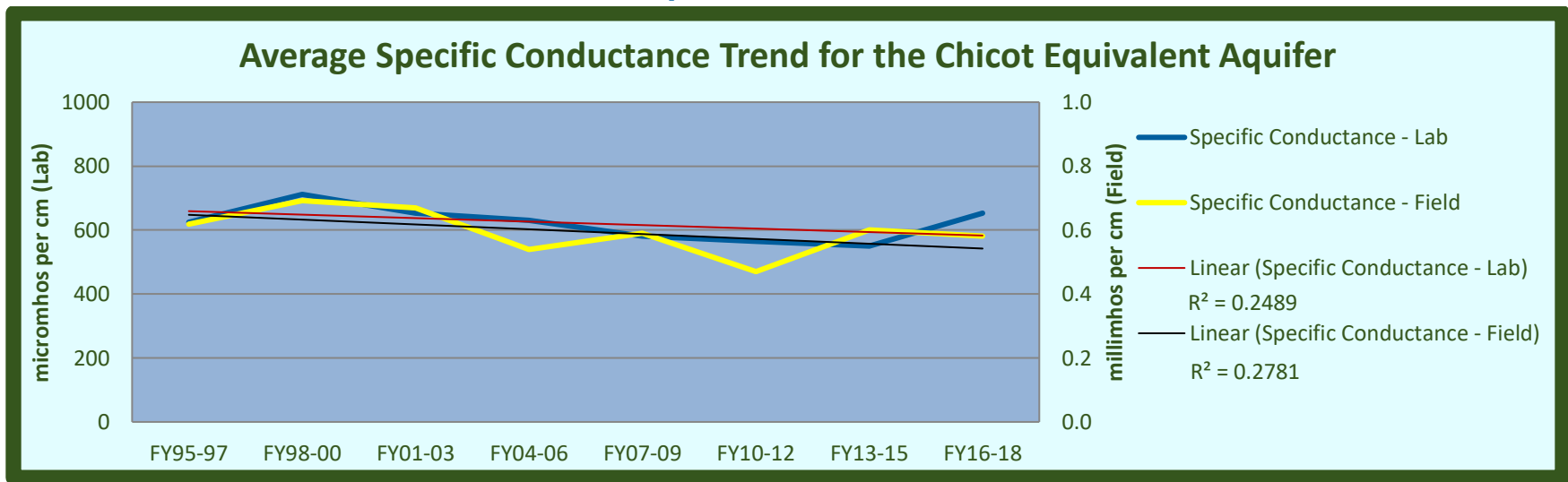


Chart 12-4: Field Salinity Trend

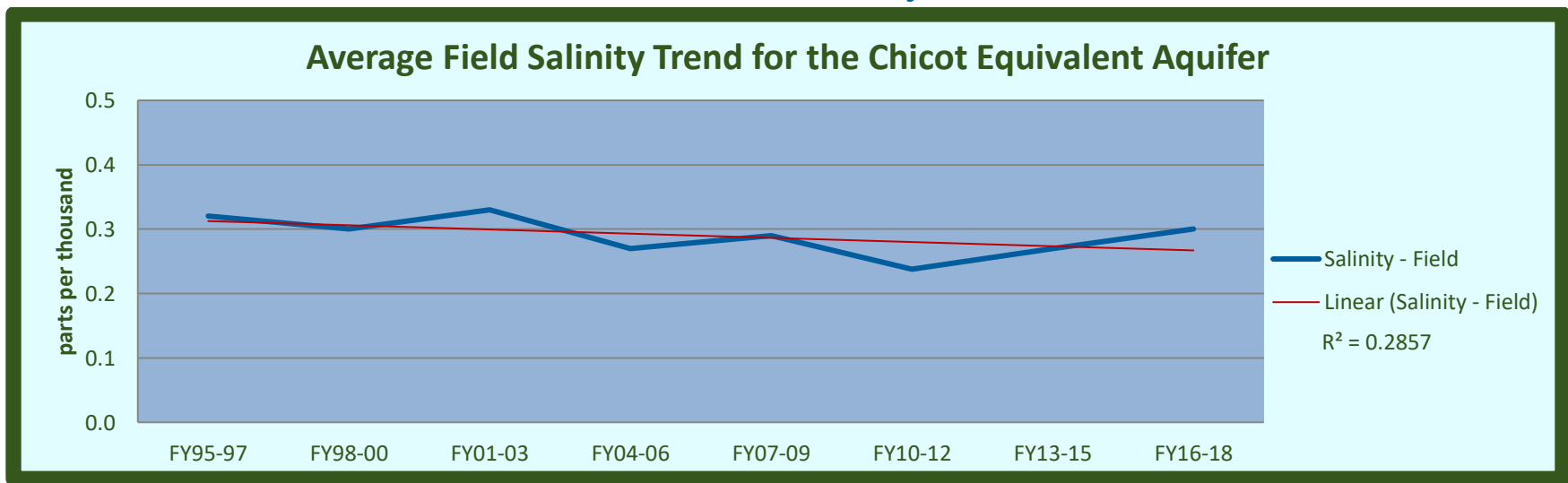


Chart 12-5: Chloride Trend

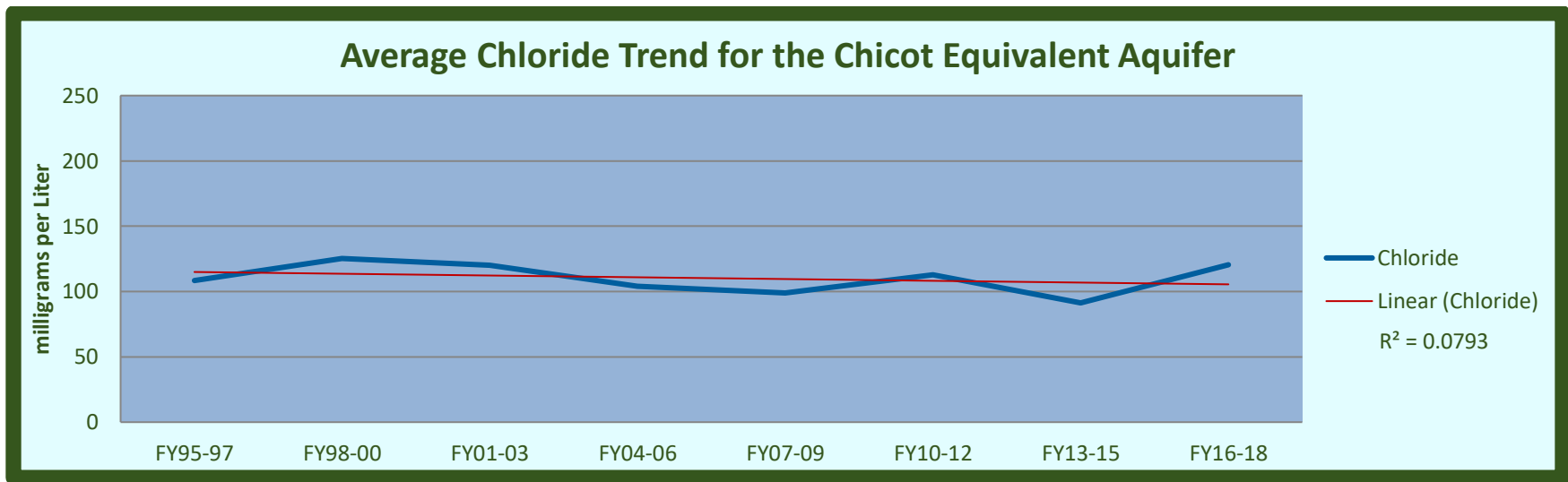


Chart 12-6: Total Dissolved Solids Trend

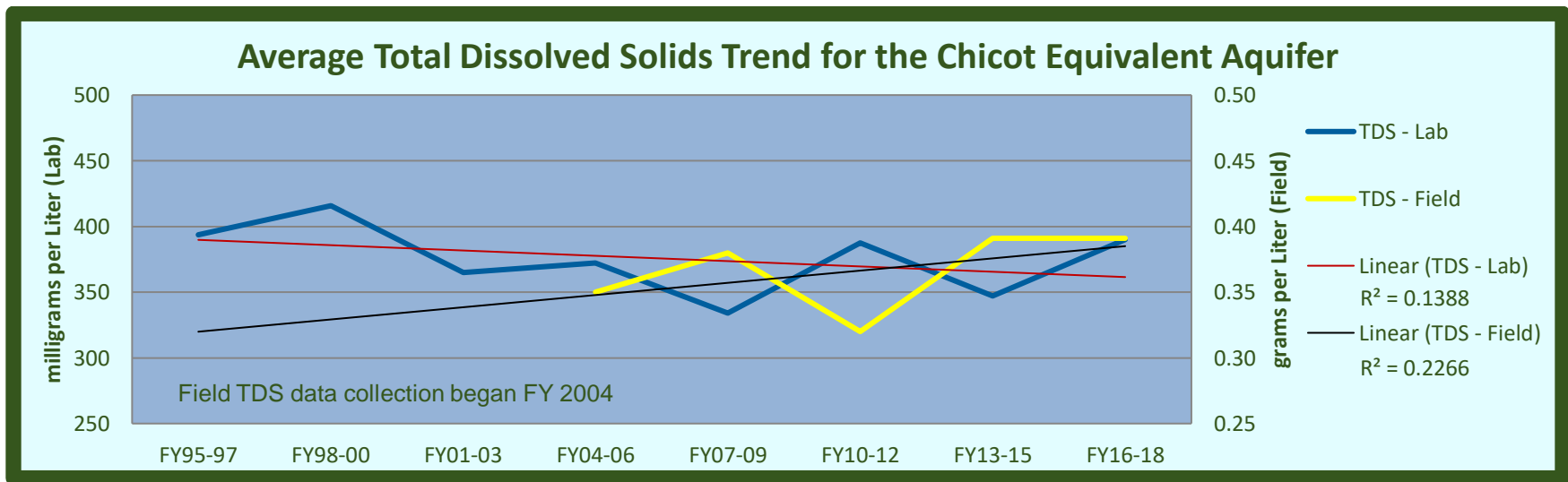


Chart 12-7: Alkalinity Trend

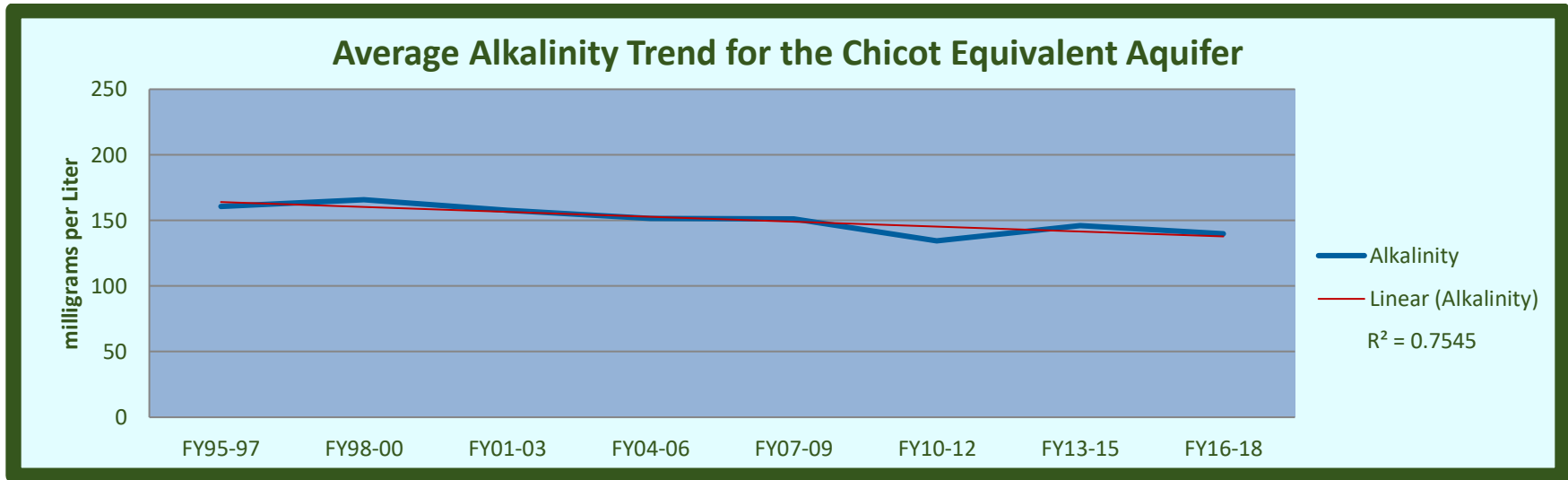


Chart 12-8: Hardness Trend

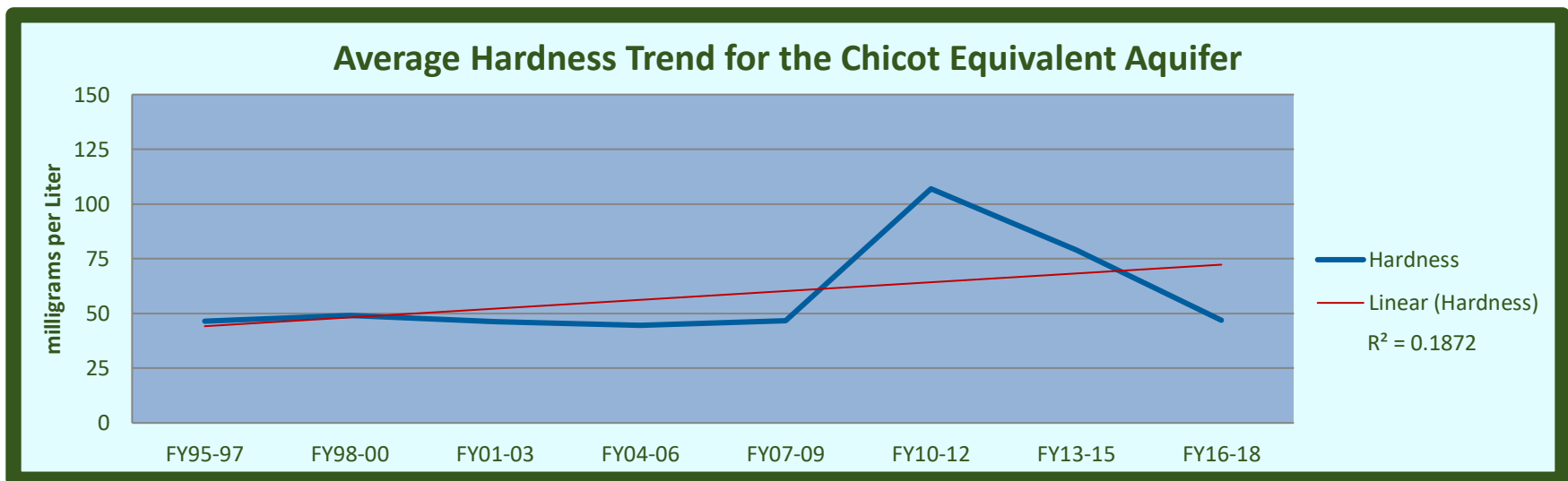


Chart 12-9: Sulfate Trend

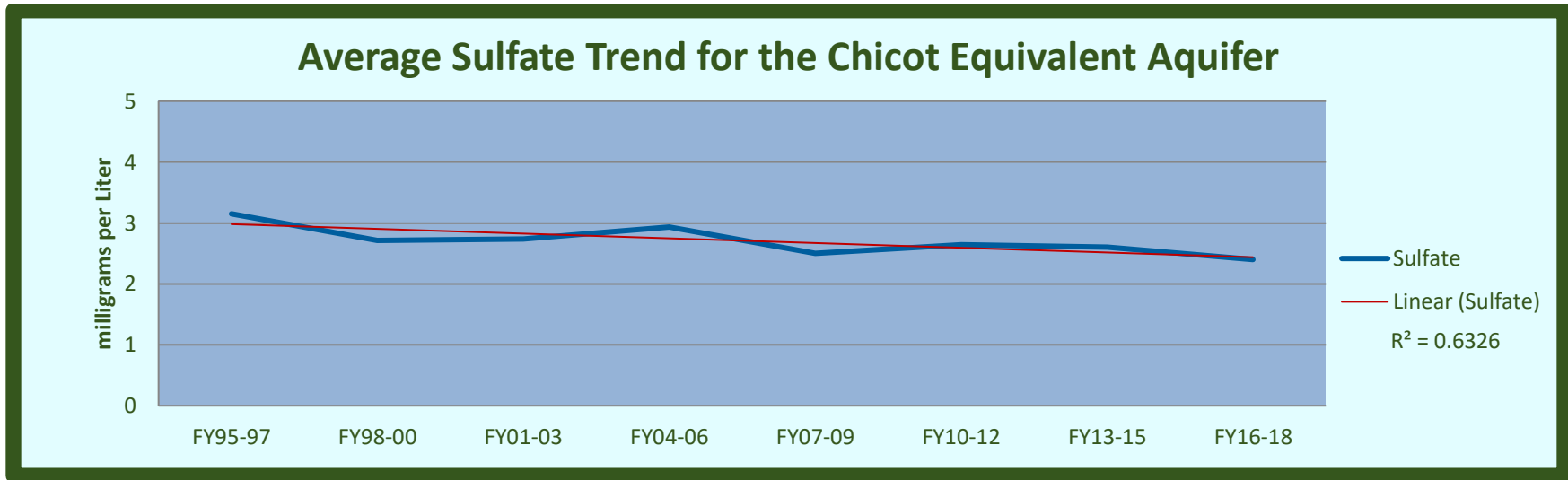


Chart 12-10: Color Trend

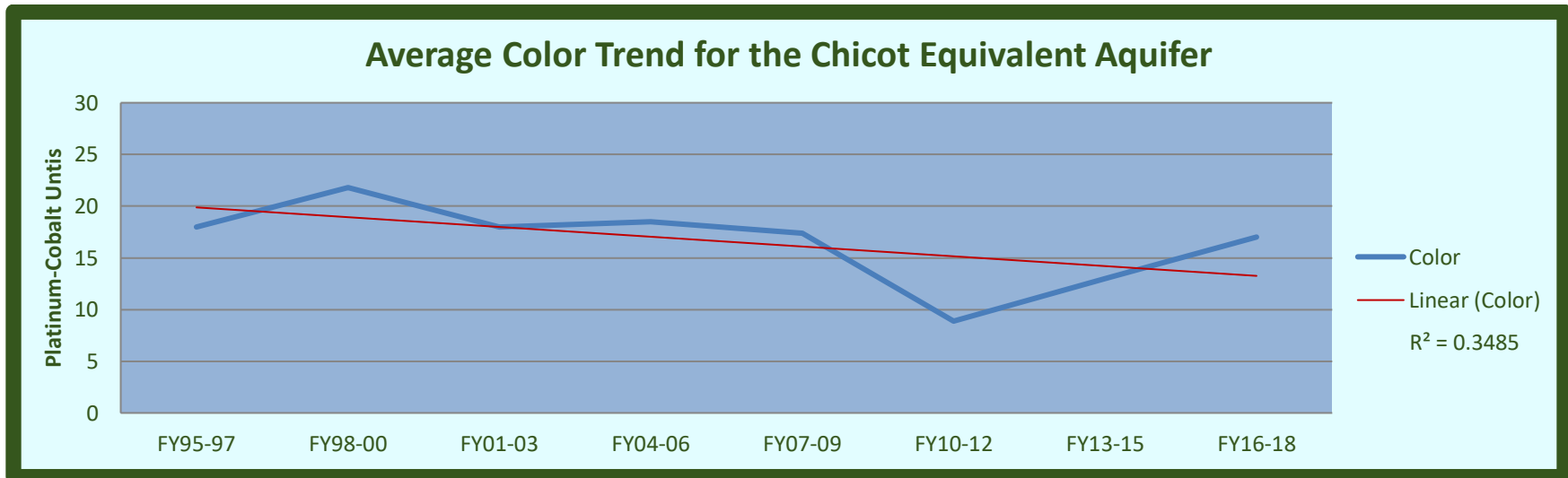


Chart 12-11: Ammonia Trend

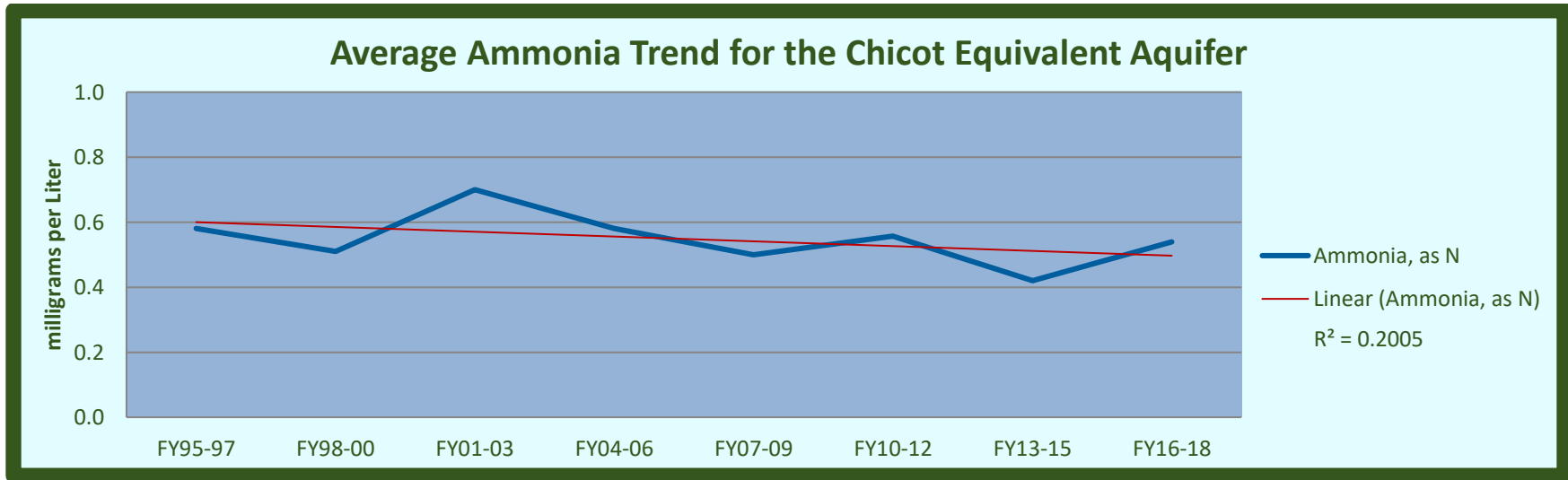


Chart 12-12: Nitrite - Nitrate Trend

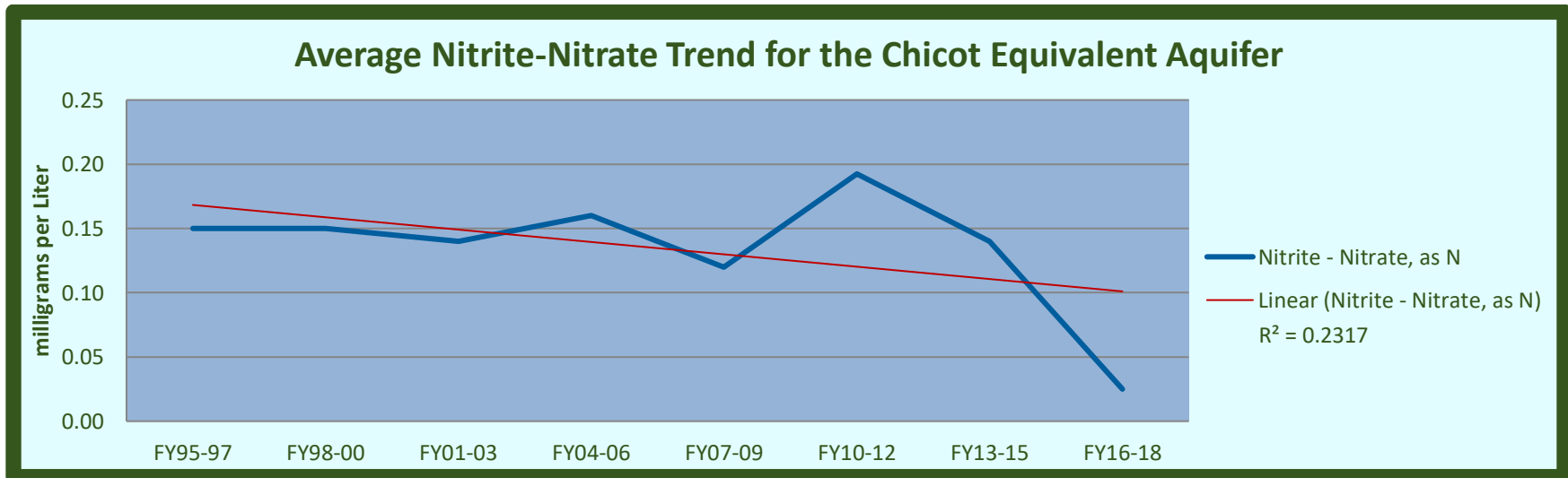


Chart 12-13: Total Kjeldahl Nitrogen Trend

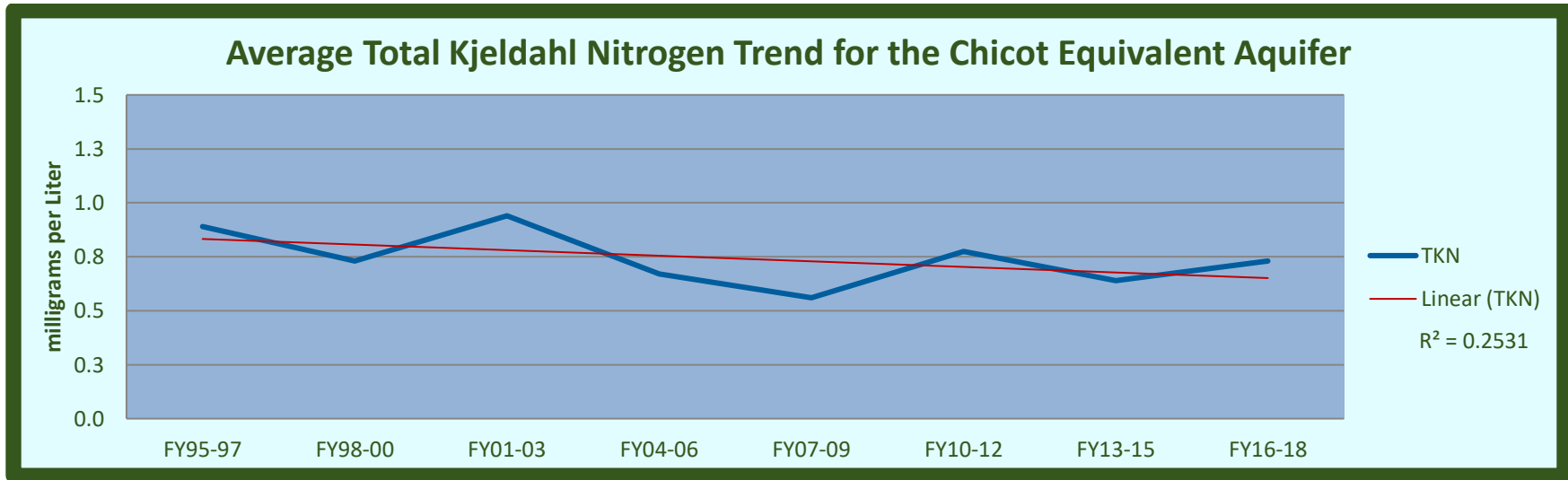


Chart 12-14: Total Phosphorus Trend

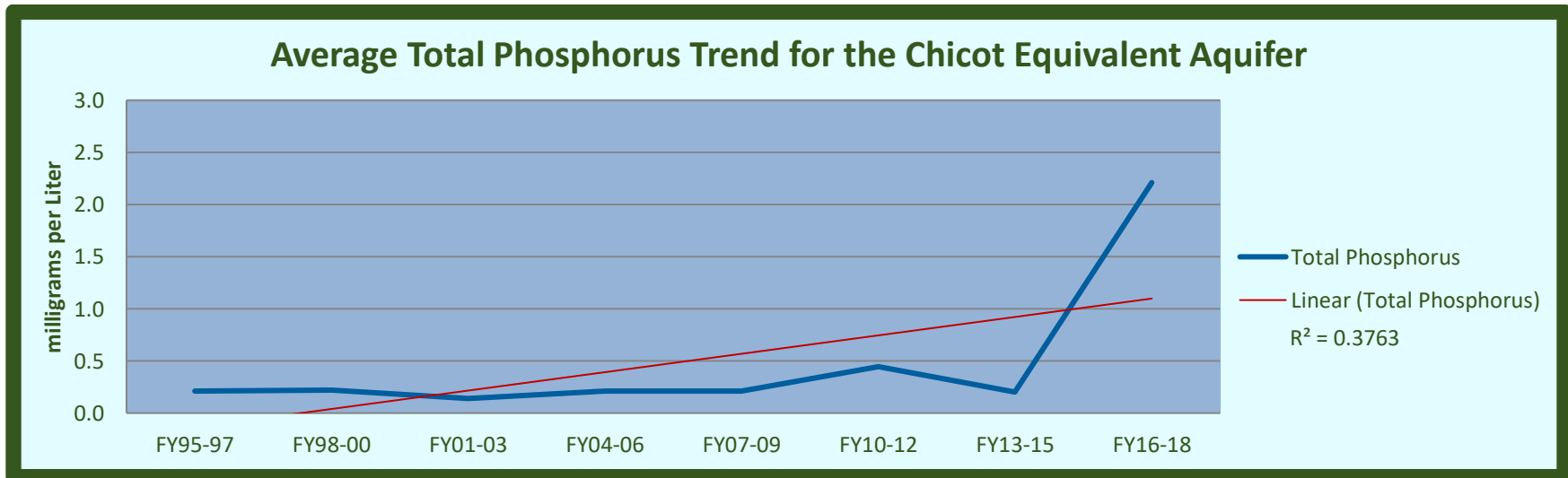


Chart 12-15: Barium Trend

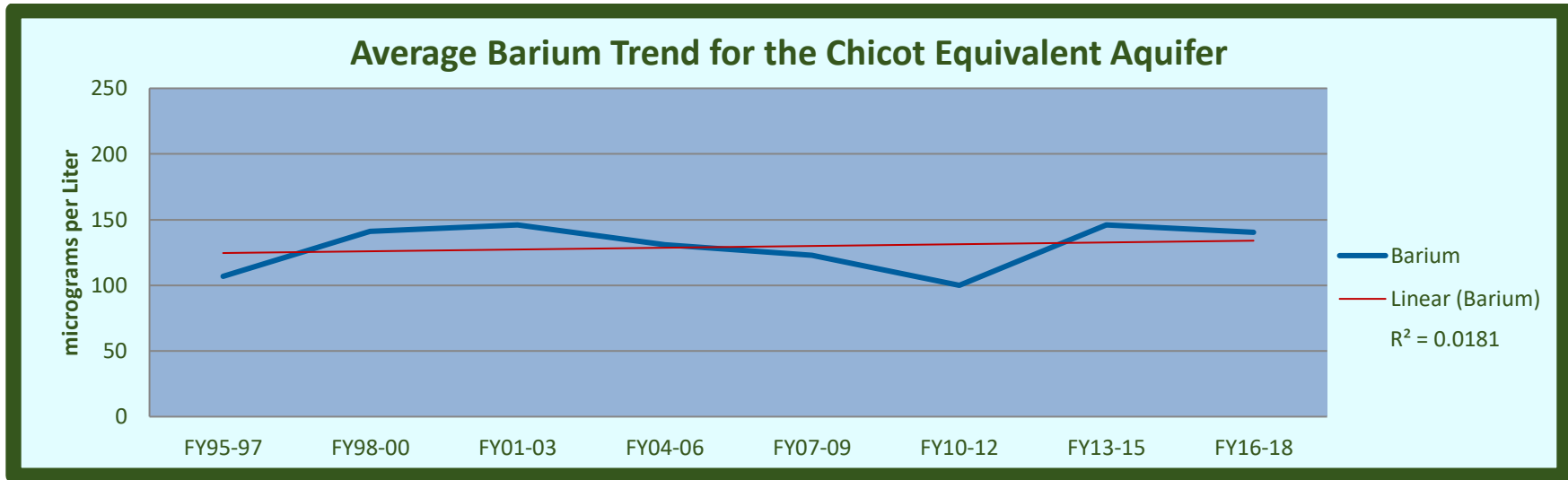


Chart 12-16: Copper Trend

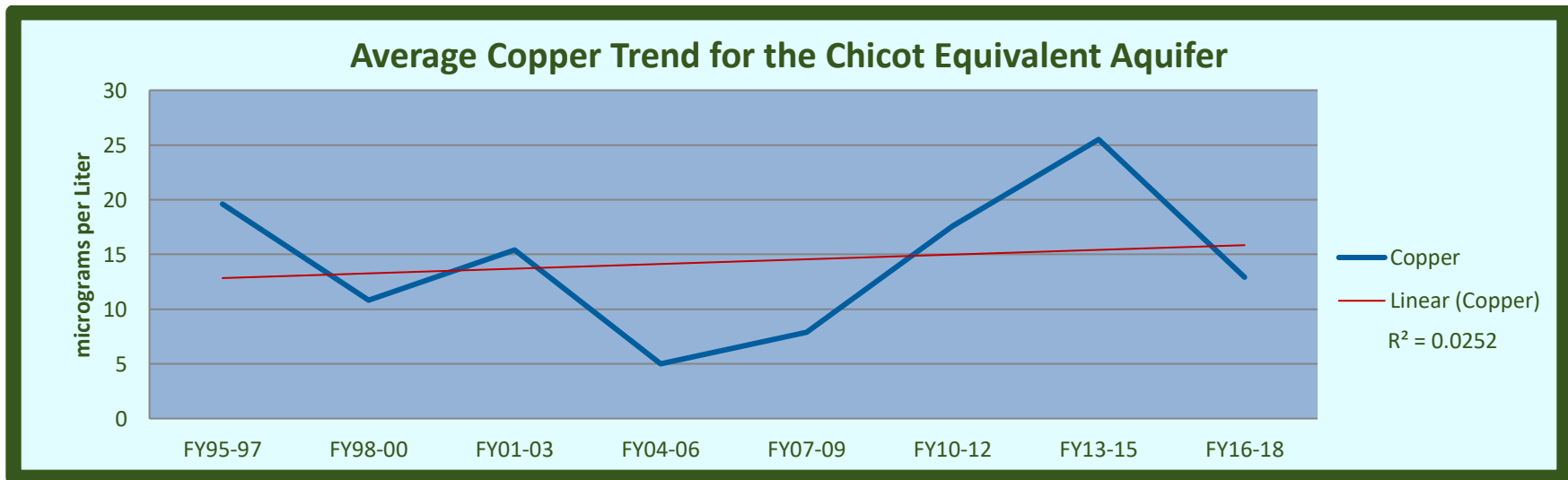


Chart 12-17: Iron Trend

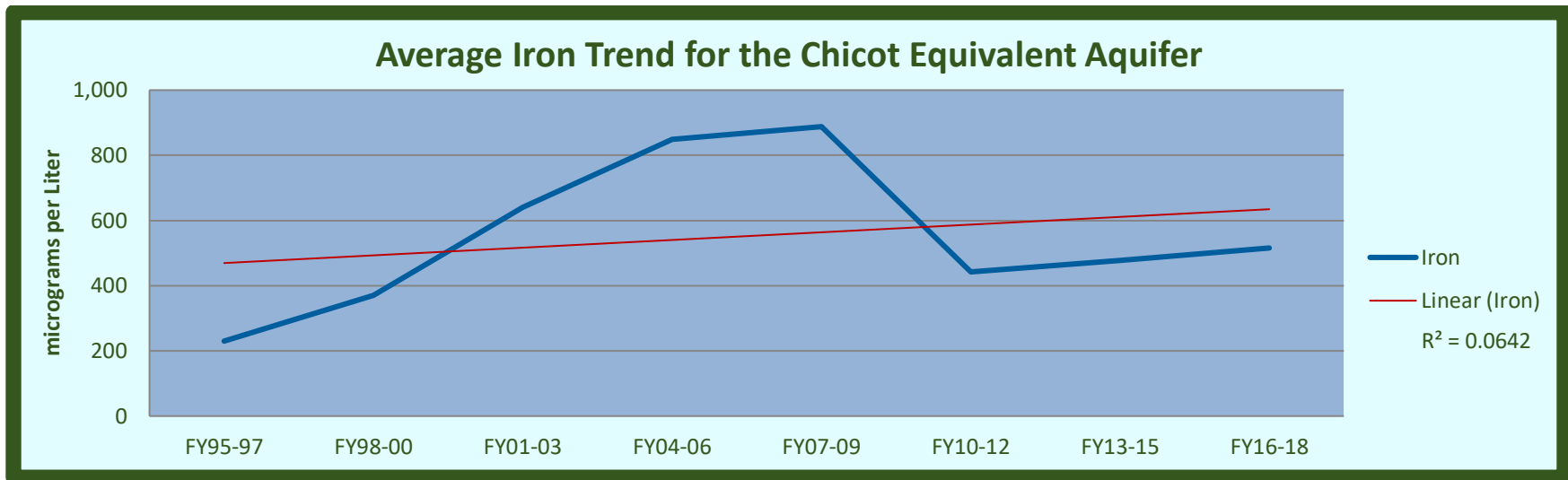


Chart 12-18: Zinc Trend

