MISSISSIPPI RIVER ALLUVIAL AQUIFER SUMMARY, 2011
AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 8 TO THE 2012 TRIENNIAL SUMMARY REPORT
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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 fourteen aquifers and aquifer systems are monitored on a rotating basis, within a three-year period so that each well is monitored every three years.

In order to better assess the water quality of a particular aquifer, an attempt is made to sample all ASSET Program wells producing from it in a narrow time frame. To more conveniently and economically promulgate those data collected, a summary report on each aquifer is prepared separately. Collectively, these aquifer summaries will make up, in part, the ASSET Program's Triennial Summary Report for 2012.

Analytical and field data contained in this summary were collected from wells producing from the Mississippi River Alluvial aquifer, during the 2011 state fiscal year (July 1, 2010 - June 30, 2011). This summary will become Appendix 8 of the ASSET Program Triennial Summary Report for 2012.

These data show that from July to September 2010 and in February 2011, 23 wells were sampled which produce from the Mississippi River Alluvial aquifer. Eight of these 23 wells are classified as domestic, 7 are classified as irrigation, 7 as public supply, and one as an industrial use well. The wells are located in fourteen parishes along or near the Mississippi River.

Figure 8-1 shows the geographic locations of the Mississippi River Alluvial aquifer and the associated wells, whereas Table 8-1 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 Resources' Water Well Registration Data file.

GEOLOGY

Mississippi River alluvium consists of fining upward sequences of gravel, sand, silt, and clay. The aquifer is poorly to moderately well sorted, with fine-grained to medium-grained sand near the top, grading to coarse sand and gravel in the lower portions. It is confined by layers of silt and clay of varying thicknesses and extent. The Mississippi River Alluvial aquifer consists of two distinct components; valley trains and meander-belt deposits which are closely related hydrologically.

HYDROGEOLOGY

The Mississippi River Alluvial aquifer is hydraulically connected with the Mississippi River and its major streams. Recharge is accomplished by direct infiltration of rainfall in the river valley, lateral and upward movement of water from adjacent and underlying aquifers, and overbank stream flooding. The amount of recharge from rainfall depends on the thickness and permeability of the silt and clay layers overlying it. Water levels fluctuate seasonally in response to precipitation trends and river stages. Water levels are generally within 30 to 40 feet of the land surface, and movement is downgradient and toward rivers and streams. Natural discharge occurs by seepage of water into the Mississippi River and its streams, but some water moves into the aquifer when stream stages are above aquifer water levels. The hydraulic conductivity varies between 10 and 530 feet/day.

The maximum depths of occurrence of freshwater in the Mississippi River Alluvial range from 20 feet below sea level, to 500 feet below sea level. The range of thickness of the fresh water interval in the Mississippi River Alluvial is 50 to 500 feet. The depths of the Mississippi River Alluvial aquifer wells that were monitored in conjunction with ASSET program range from 30 feet to 352 feet below land surface, with an average depth of 129 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 8-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 8-3. 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 CT-DENNIS, IB-5427Z, TS-61, TS-FORTENB, and WC-91. The reported iron value in the original sample of well IB-5427Z was out of range at a value of more than four times greater than the accompanying duplicate sample (3,690ug/L; 873ug/L). Review of iron values for this well show that the 873 ug/L value is consistent with historical values. Considering this information, it was determined that the out of range value be rejected, as denoted by the “R” in Table 8-3.

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

Tables 8-4 and 8-5 provide a statistical overview of field and conventional, and inorganic data for the Mississippi River Alluvial aquifer, listing the minimum, maximum, and average results for these parameters collected in the FY 2011 sampling. Tables 8-6 and 8-7 compare these same parameter averages to historical ASSET-derived data for the Mississippi River Alluvial aquifer, from fiscal years 1996, 1999, 2002, 2005, and 2008.

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

Figures 8-2, 8-3, 8-4, and 8-5 respectively, represent the contoured values for pH, total dissolved solids, chloride, and iron. Charts 8-1 through 8-16 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 primary standards, or 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 does use the 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 8-2 and 8-3 show that one or more secondary MCLs (SMCLs) were exceeded in 19 of the 23 wells sampled in the Mississippi River Alluvial aquifer, with a total of 33 SMCLs being exceeded.

Field and Conventional Parameters

Table 8-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 8-4 provides an overview of this data for the Mississippi River Alluvial aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 8-2 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 and Hospitals 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 8-2 shows that one well exceeded the SMCL for chloride, one well exceeded the SMCL for color, and fourteen wells exceeded the SMCL for total dissolved solids (TDS). Laboratory results override field results in exceedance determinations, thus only lab results will be counted in determining

SMCL exceedance numbers for TDS. Following is a list of SMCL parameter exceedances with well number and results:

Chloride (SMCL = 250 mg/L):

FR-1358 – 509 mg/L

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

SMN-33 – 16 PCU

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
AV-126	589 mg/L	0.526 g/L
AV-462	1,060 mg/L	0.873 g/L
AV-5135Z	876 mg/L	0.686 g/L
CO-YAKEY	811 mg/L	0.751 g/L
CT-489	609 mg/L	0.579 g/L
EB-885	599 mg/L	0.514 g/L
EC-370	508 mg/L	0.491 g/L (<SMCL)
FR-1358	1,510 mg/L	1.262 g/L
IB-COM	1,090 mg/L	0.892 g/L
MA-206	527 mg/L	0.563 g/L
PC-5515Z	661 mg/L	0.580 g/L
TS-61	649 mg/L, Duplicate – 651 mg/L	0.612 g/L (Original and Duplicate)
TS-FORTENB	390 mg/L, Duplicate – 386 mg/L (< SMCL)	0.530 g/L (Original and Duplicate)
WC-527	812 mg/L	0.767 g/L
WC-91	652 mg/L, Duplicate – 639 mg/L	0.611 g/L (Original and Duplicate)

Inorganic Parameters

Table 8-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 8-5 provides an overview of inorganic data for the Mississippi River Alluvial aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed on Table 8-3 shows that the Primary MCL for arsenic was exceeded in 5 of the 23 wells sampled for this time period:

Arsenic (MCL = 10 ug/L):

EB-885 – 38.0 ug/L
IB-5427Z – 67.7 ug/L, Duplicate 41.8 ug/L
TS-FORTENB – 15.3 ug/L, Duplicate – 14.4 ug/L
IB-363 – 35.2 ug/L
MA-206 – 12.6 ug/L

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 8-3 shows that 18 wells exceeded the secondary MCL for iron:

Iron (SMCL = 300 ug/L)

AV-126 – 12,600 ug/L
CO-YAKEY – 12,900 ug/L
EB-885 – 3,990 ug/L
FR-1358 – 5,470 ug/L
IB-5427Z – 873 ug/L
MA-206 – 15,300 ug/L
PC-5515Z – 5,780 ug/L
AV-462 – 4,990 ug/L
CT-489 – 7,850 ug/L
EC-370 – 15,300 ug/L
IB-363 – 1,890 ug/L
IB-COM – 2,840 ug/L
MO-871 – 6,060 ug/L
SMN-33 – 1,840 ug/L

TS-61 – 9,700 ug/L, Duplicate – 9,340 ug/L
WC-91 – 672 ug/L, Duplicate – 650 ug/L
TS-FORTENB – 8,430 ug/L, Duplicate – 8,050 ug/L
WC-527 – 2,590 ug/L

Volatile Organic Compounds

Table 8-8 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.

Chloroform, a common lab contaminant, was reported in one domestic-use well at just over the detection level. Chloroform, with a detection level of 0.5 ug/L, was reported in well CT-DENNIS at 0.67 ug/L in the sample and duplicate collected from this well. Close attention will be given this well in future monitoring even though there is no MCL established for chloroform and the reported value for it is at a very low level. No other VOC was detected at or above its detection limit during the FY 2011 sampling of the Mississippi River Alluvial aquifer.

Semi-Volatile Organic Compounds

Table 8-9 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 any SVOC at or above its detection limit during the FY 2011 sampling of the Mississippi River Alluvial aquifer.

Pesticides and PCBs

Table 8-10 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 2011 sampling of the Mississippi River Alluvial 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 Mississippi River Alluvial aquifer exhibit some fluctuations when comparing current data to that of the five previous sampling rotations (three, six, nine, twelve, and fifteen years prior). These comparisons can be found in Tables 8-6 and 8-7, and in Charts 8-1 to 8-16[1] of this summary. Over the fifteen-year period, 8 analytes have shown a slight to general increase in concentration. These analytes are: hardness, iron, pH, salinity, specific conductance (field), sulfate, turbidity and zinc. For this same time period, 8 analytes have demonstrated a nominal decrease in concentrations, which are: alkalinity, ammonia, color, copper, nitrite-nitrate, TKN,

[1] Charts were not created for total suspended solids, copper, or zinc.

total dissolved solids, and total suspended solids. All remaining analytes were stable or continue to be non-detect.

The number of wells with secondary MCL exceedances for FY 2011 is the same as the previous sampling event in FY 2008. Sample results for FY 2008 and FY 2011 show that 19 wells reported one or more secondary exceedances, with a total of 33 SMCLs being exceeded.

Also, as in FY 2008, 10 of the 23 wells sampled in FY 2011 reported detections for arsenic, with 6 wells exceeding the primary MCL of 10 ug/L in FY 2008 and 5 wells exceeding the primary MCL in FY 2011.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the ground water produced from the Mississippi River Alluvial aquifer is hard.[2] The primary MCL for arsenic was the only short-term or long-term health risk guideline that was exceeded; however, this exceedance occurred in 5 of the 23 wells sampled in this aquifer. The data also show that this aquifer is of poor quality when considering taste, odor, or appearance guidelines, with 33 secondary MCLs exceeded in 19 wells.

Comparison to historical ASSET-derived data shows only moderate fluctuations in the quality or characteristics of the Mississippi River Alluvial aquifer, with 8 parameters showing increases in concentration and 8 parameters decreasing in concentration. This historical comparison shows that the number of wells with secondary MCL exceedances and the total number of secondary MCL exceedances are unchanged.

The occurrence of arsenic in the Mississippi River Alluvial aquifer has been established by historical activities of this program, with current sampling results supporting those previous findings. Sampling results for this reporting period, FY 2011, show that a total of 10 wells reported detections of arsenic, while 5 of those 10 exceeded the primary MCL for arsenic (10 ug/L). As a standard procedure of the ASSET Program, all well owners receive the results of their well sampling, while those well owners with primary MCL exceedances are given additional information about the particular compound, its health effects and possible treatment methods.

It is recommended that the wells assigned to the Mississippi River Alluvial aquifer be re-sampled as planned, in approximately three years, with continued attention given to the occurrence of arsenic in this aquifer. In addition, several wells should be added to those currently in place to increase the well density for this aquifer.

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

Table 8-1: List of Wells Sampled, Mississippi River Alluvial Aquifer–FY 2011

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
AV-126	Avoyelles	7/7/2010	Hamburg Mills	155	Domestic
AV-462	Avoyelles	7/7/2010	La Delta Plantation	110	Irrigation
AV-5135Z	Avoyelles	7/7/2010	Private Owner	110	Domestic
CO-YAKEY	Concordia	7/29/2010	Private Owner	150	Domestic
CT-489	Catahoula	7/29/2010	La Delta Plantation	144	Irrigation
CT-DENNIS	Catahoula	7/29/2010	Private Owner	30	Domestic
EB-885	East Baton Rouge	7/8/2010	La State University	352	Irrigation
EC-370	East Carroll	9/27/2010	Hollybrook Land	119	Irrigation
FR-1358	Franklin	9/16/2010	Macon Ridge Research Station	60	Irrigation
IB-363	Iberville	7/8/2010	Syngenta Crop Protection, Inc.	225	Industrial
IB-5427Z	Iberville	7/8/2010	Private Owner	160	Domestic
IB-COM	Iberville	7/8/2010	Private Owner	185	Domestic
MA-206	Madison	9/27/2010	Tallulah Water Service	130	Public Supply
MO-871	Morehouse	7/27/2010	Private Owner	80	Irrigation
PC-5515Z	Pointe Coupee	9/15/2010	Private Owner	156	Domestic
RI-469	Richland	9/16/2010	Liddieville Water System	90	Public Supply
RI-48	Richland	7/27/2010	Rayville Water Department	115	Public Supply
RI-730	Richland	7/27/2010	Start Water System	101	Public Supply
SMN-33	St. Martin	7/7/2010	LDOTD/Lafayette District	125	Public Supply
TS-61	Tensas	9/16/2010	Town of St. Joseph	140	Public Supply
TS-FORTENB	Tensas	2/9/2011	Private Owner	33	Domestic
WC-527	West Carroll	7/27/2010	Private Owner	85	Irrigation
WC-91	West Carroll	9/27/2010	New Carroll Water Association	115	Public Supply

Table 8-2: Summary of Field and Conventional Data, Mississippi River Alluvial Aquifer–FY 2011

DOTD Well Number	Temp Deg. C	pH SU	Sp. Cond. mmhos/cm	Sal. ppt	TDS g/L	Alk mg/L	Cl mg/L	Color PCU	Sp. Cond. umhos/cm	SO4 mg/L	TDS mg/L	TSS mg/L	Turb. NTU	NH3 mg/L	Hard. mg/L	Nitrite-Nitrate (as N) mg/L	TKN mg/L	Tot. P mg/L
	LABORATORY DETECTION LIMITS →					2.0	1.25	1	10	0.25/1.25	4	4	0.3	0.05	5.0	0.01	0.10	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AV-126	24.00	7.04	0.809	0.40	0.526	96	18.3	12	688	10.6	589	24	158.0	0.60	280	< 0.01	1.010	1.00
AV-462	18.94	7.10	1.343	0.67	0.873	46	62.8	9	1,190	182.0	1,060	5	55.2	0.19	296	< 0.01	0.588	0.35
AV-5135Z	19.97	6.92	1.056	0.52	0.686	6	84.0	5	933	73.0	876	< 4	< 0.3	0.29	376	< 0.01	0.803	0.15
CO-YAKEY	19.81	7.49	1.155	0.58	0.751	550	46.0	9	982	< 1.25	811	38	184.0	3.42	339	< 0.01	4.570	1.15
CT-489	19.64	7.41	0.891	0.44	0.579	440	24.4	3	752	1.27	609	19	86.4	1.40	326	< 0.01	1.820	1.24
CT-DENNIS	21.21	7.06	0.213	0.10	0.138	86	11.5	< 1	197	3.55	121	< 4	< 0.3	< 0.05	< 5	0.172	0.189	< 0.05
CT-DENNIS*	21.21	7.06	0.213	0.10	0.138	80	11.6	< 1	196	3.53	117	< 4	< 0.3	< 0.05	< 5	0.153	0.192	< 0.05
EB-885	19.58	7.61	0.791	0.39	0.514	44	10.3	11	703	< 0.25	599	7	40.0	2.24	380	< 0.01	2.570	0.35
EC-370	18.12	7.13	0.756	0.37	0.491	342	12.3	< 5‡	598	1.05	508	42	101.0	1.12	396	< 0.01	0.970	1.11
FR-1358	19.01	6.95	1.942	0.99	1.262	328	509.0	< 1	1,870	11.5	1,510	12	55.5	0.32	600	0.034	0.766	0.35
IB-363	17.56	7.66	0.584	0.28	0.380	36	NO DATA	12	532	15.5	463	4	16.9	1.54	180	< 0.01	2.290	0.67
IB-5427Z	18.25	8.02	0.390	0.19	0.253	38	24.2	10	355	16.2	284	11	15.9	1.34	< 5	< 0.01	1.740	1.29
IB-5427Z*	18.25	8.02	0.390	0.19	0.253	36	24.3	8	356	16.3	290	13	20.7	1.32	< 5	< 0.01	1.550	1.25
IB-COM	21.50	7.61	1.372	0.69	0.892	32	NO DATA	6	1,200	< 0.25	1090	9	32.5	0.15	404	< 0.01	1.080	0.17
MA-206	19.72	7.30	0.867	0.43	0.563	420	10.2	< 5	693	0.276	527	32	149.0	1.64	396	< 0.01	1.260	1.22
MO-871	18.70	7.14	0.677	0.33	0.440	270	37.2	< 1	591	27.7	442	21	47.8	0.24	290	< 0.01	0.373	0.39
PC-5515Z	19.45	7.16	0.893	0.44	0.580	422	44.6	7	761	< 0.25	661	7	61.8	0.24	400	< 0.01	0.993	0.47
RI-469	21.80	7.24	0.207	0.10	0.135	52	30.0	< 1	247	4.37	219	< 4	< 0.3	< 0.05	34	3.040	0.617	0.21
RI-48	19.40	7.52	0.641	0.31	0.417	250	41.0	4	579	19.7	471	< 4	< 0.3	< 0.05	71	0.573	0.114	0.15
RI-730	19.42	7.64	0.449	0.22	0.292	134	32.9	< 1	413	26.7	251	< 4	1.0	< 0.05	82	1.570	0.138	0.11
SMN-33	17.31	7.59	0.478	0.23	0.311	46	23.4	16	428	< 0.25	472	< 4	5.4	1.18	< 5	< 0.01	0.940	0.35
TS-61	19.05	7.42	0.942	0.47	0.612	514	24.3	3	745	< 0.25	649	16	123.0	1.19	600	< 0.01	2.790	0.68
TS-61*	19.05	7.42	0.942	0.47	0.612	508	24.2	5	788	< 0.25	651	15	124.0	1.12	610	< 0.01	2.880	0.67
TS-FORTENB	15.21	7.21	0.820	0.40	0.530	448	12.9	4	687	< 0.25	390	22	79.4	1.65	322	< 0.01	1.710	1.04
TS-FORTENB*	15.21	7.21	0.820	0.40	0.530	440	12.9	5	674	< 0.25	386	21	76.2	1.63	326	< 0.01	1.950	1.12
WC-527	18.34	7.43	1.180	0.59	0.767	460	87.9	< 1	1,090	43.1	812	4	30.8	0.20	396	0.138	0.235	0.14
WC-91	17.98	7.21	0.940	0.47	0.611	306	103.0	< 1	795	9.5	652	< 4	7.1	0.26	279	0.018	0.291	0.08
WC-91*	17.98	7.21	0.940	0.47	0.611	296	103.0	< 1	802	9.5	639	< 4	7.1	0.28	279	0.019	0.274	0.08

*Denotes Duplicate Sample ‡Reported from a Dilution Shaded cells exceed EPA Secondary Standards

Table 8-3: Summary of Inorganic Data, Mississippi River Alluvial Aquifer–FY 2011

DOTD 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	**5**	**4**	**2**	**2**	**2**	**4**	**2**	**100**	**1**	**0.0002**	**3**	**5**	**1**	**2**	**6**
AV-126	< 5	< 4	456	< 2	< 2	20.8	< 2	12,600	< 1	< 0.0002	12.0	< 5	< 1	< 2	91.5
AV-462	< 5	< 4	88	< 2	< 2	< 4	< 2	4,990	< 1	< 0.0002	9.5	< 5	< 1	< 2	9.2
AV-5135Z	< 5	< 4	178	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	15.1	< 5	< 1	< 2	15.1
CO-YAKEY	< 5	< 4	818	< 2	< 2	< 4	4.6	12,900	< 1	< 0.0002	< 3	< 5	< 1	< 2	15.3
CT-489	< 5	< 4	389	< 2	< 2	< 4	< 2	7,850	< 1	< 0.0002	< 3	< 5	< 1	< 2	18.7
CT-DENNIS	< 5	< 4	57	< 2	< 2	< 4	2.62	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	56.3
CT-DENNIS*	< 5	< 4	58	< 2	< 2	< 4	2.52	< 100	< 1	< 0.0002	4.9	< 5	< 1	< 2	79.2
EB-885	< 5	38.0	698	< 2	< 2	< 4	6.08	3,990	< 1	< 0.0002	3.1	< 5	< 1	< 2	11.1
EC-370	< 5	< 4	569	< 2	< 2	< 4	< 2	15,300	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
FR-1358	< 5	4.92	302	< 2	< 2	< 4	2.36	5,470	< 1	< 0.0002	16.1	< 5	< 1	< 2	96.0
IB-363	< 5	35.2	429	< 2	< 2	< 4	< 2	1,890	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
IB-5427Z	< 5	67.7	293	< 2	< 2	< 4	4.31	R	< 1	< 0.0002	< 3	< 5	< 1	< 2	8.1
IB-5427Z*	< 5	41.8	201	< 2	< 2	< 4	< 2	873	< 1	< 0.0002	16.0	< 5	< 1	< 2	24.0
IB-COM	< 5	6.5	705	< 2	< 2	< 4	< 2	2,840	< 1	< 0.0002	4.4	< 5	< 1	< 2	59.0
MA-206	< 5	12.6	640	< 2	< 2	< 4	< 2	15,300	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
MO-871	< 5	6.25	320	< 2	< 2	< 4	< 2	6,060	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
PC-5515Z	< 5	5.8	1,330	< 2	< 2	< 4	< 2	5,780	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
RI-469	< 5	< 4	32	< 2	< 2	7.5	2.26	< 100	< 1	< 0.0002	16.9	< 5	< 1	< 2	356.0
RI-48	< 5	< 4	93	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	6.1	< 5	< 1	< 2	9.5
RI-730	< 5	< 4	113	< 2	< 2	< 4	< 2	197	< 1	< 0.0002	3.9	< 5	< 1	< 2	8.0
SMN-33	< 5	< 4	628	< 2	< 2	< 4	< 2	1,840	< 1	< 0.0002	< 3	< 5	< 1	< 2	9.0
TS-61	< 5	< 4	766	< 2	< 2	< 4	5.74	9,700	1.1	< 0.0002	< 3	< 5	< 1	< 2	12.3
TS-61*	< 5	< 4	752	< 2	< 2	< 4	5.67	9,340	1.1	< 0.0002	3.7	< 5	< 1	< 2	25.3
TS-FORTENB	< 5	15.3	338	< 2	< 2	< 4	11.50	8,430	< 1	< 0.0002	< 3	< 5	< 1	< 2	401.0
TS-FORTENB*	< 5	14.4	338	< 2	< 2	< 4	11.20	8,050	< 1	< 0.0002	< 3	< 5	< 1	< 2	401.0
WC-527	< 5	< 4	390	< 2	< 2	< 4	< 2	2,590	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
WC-91	< 5	7.3	148	< 2	< 2	< 4	< 2	672	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
WC-91*	< 5	7.6	151	< 2	< 2	< 4	< 2	650	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6

*Denotes Duplicate Sample   R = Data Rejected   Exceeds EPA Primary Standard   Exceeds EPA Secondary Standards

Table 8-4: FY 2011 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	15.21	24.00	19.13
	pH (SU)	6.92	8.02	7.35
	Specific Conductance (mmhos/cm)	0.207	1.942	0.811
	Salinity (ppt)	0.10	0.99	0.40
	TDS (g/L)	0.14	1.26	0.53
LABORATORY	Alkalinity (mg/L)	6.0	550.0	240.2
	Chloride (mg/L)	10.2	509.0	54.9
	Color (PCU)	< 1	16.0	4.9
	Specific Conductance (umhos/cm)	196.0	1,870.0	708.8
	Sulfate (mg/L)	< 1.25	182.0	17.0
	TDS (mg/L)	117	1,510	577
	TSS (mg/L)	< 4	42.0	12.1
	Turbidity (NTU)	< 0.3	184.0	52.8
	Ammonia, as N (mg/L)	< 0.05	3.42	0.85
	Hardness (mg/L)	<5	610.00	294.0
	Nitrite - Nitrate, as N (mg/L)	< 0.01	3.04	0.21
	TKN (mg/L)	0.11	4.57	1.24
	Total Phosphorus (mg/L)	< 0.05	1.29	0.57

Table 8-5: FY 2011 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	< 5	< 5	< 5
Arsenic (ug/L)	< 4	67.7	10.5
Barium (ug/L)	32.0	1,330.0	402.9
Beryllium (ug/L)	< 2	< 2	< 2
Cadmium (ug/L)	< 2	< 2	< 2
Chromium (ug/L)	< 4	20.8	<4
Copper (ug/L)	< 2	11.5	< 2
Iron (ug/L)	<100	15,300	5,045
Lead (ug/L)	< 1	1.10	< 1
Mercury (ug/L)	< 0.0002	< 0.0002	< 0.0002
Nickel (ug/L)	< 3	16.9	5.1
Selenium (ug/L)	< 5	< 5	< 5
Silver (ug/L)	< 1	< 1	< 1
Thallium (ug/L)	< 2	< 2	< 2
Zinc (ug/L)	< 6	401.0	61.8

Table 8-6: 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
FIELD	Temperature (^{O}C)	19.09	20.60	20.13	19.62	20.40	19.13
	pH (SU)	6.70	6.63	6.91	6.98	7.22	7.35
	Specific Conductance (mmhos/cm)	0.76	0.79	0.81	0.80	0.890	0.811
	Salinity (Sal.) (ppt)	0.35	0.39	0.41	0.40	0.44	0.40
	TDS (Total dissolved solids) (g/L)	-	-	-	0.52	0.580	0.53
LABORATORY	Alkalinity (Alk.) (mg/L)	306.0	328.7	316.1	347.2	336.1	240.21
	Chloride (Cl) (mg/L)	68.2	55.2	44.8	48.6	75.2	54.9
	Color (PCU)	26.0	16.1	47.7	38.0	17.2	4.9
	Specific Conductance (umhos/cm)	768.6	804.1	769.4	766.2	871.6	708.8
	Sulfate (SO4) (mg/L)	7.7	25.2	24.8	22.5	30.9	17.0
	TDS (Total dissolved solids) (mg/L)	674.3	494.9	481.7	489.0	521	577
	TSS (Total suspended solids) (mg/L)	18.8	15.4	12.5	16.4	14	12.1
	Turbidity (Turb.) (NTU)	46.32	62.12	57.86	75.25	61	52.84
	Ammonia, as N (NH3) (mg/L)	1.26	1.00	0.95	1.10	0.85	0.85
	Hardness (mg/L)	299.7	309.6	304.1	297.5	341.2	294.0
	Nitrite - Nitrate , as N (mg/L)	0.31	0.29	0.72	0.19	0.29	0.21
	TKN (mg/L)	1.34	1.43	1.27	1.36	0.99	1.24
	Total Phosphorus (P) (mg/L)	0.49	0.54	0.54	0.59	0.48	0.57

Table 8-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	AVERAGE VALUES BY FISCAL YEAR					
	FY 1996	FY 1999	FY 2002	FY 2005	FY 2008	FY 2011
Antimony (ug/L)	<5	<5	<5	<60	<1	< 5
Arsenic (ug/L)	12.68	14.55	9.21	14.31	9.54	10.5
Barium (ug/L)	473.5	412.3	403.9	524.5	403.9	402.9
Beryllium (ug/L)	<5	<5	<5	<5	<1	< 2
Cadmium (ug/L)	<5	<5	<5	<5	<0.5	< 2
Chromium (ug/L)	<5	<5	<5	<10	<3	<4
Copper (ug/L)	9.86	8.55	6.18	<10	<3	< 2
Iron (ug/L)	5,022	4,690	6,008.1	8,726	5,985	5,045
Lead (ug/L)	<10	<10	<10	<10	<3	< 1
Mercury (ug/L)	<0.05	<0.05	<0.05	<0.2	<0.05	< 0.0002
Nickel (ug/L)	<5	<5	<5	<40	<3	5.1
Selenium (ug/L)	<5	<5	<5	<35	<4	< 5
Silver (ug/L)	<5	<5	<5	<10	<0.50	< 1
Thallium (ug/L)	<5	<5	<5	<5	<1	< 2
Zinc (ug/L)	43.5	177.2	48.3	29.6	28.0	61.8

Table 8-8: VOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
1,1-Dichloroethane	624	2 / 0.5
1,1-Dichloroethene	624	2 / 0.5
1,1,1-Trichloroethane	624	2 / 0.5
1,1,2- Trichloroethane	624	2 / 0.5
1,1,2,2-Tetrachloroethane	624	2 / 0.5
1,2-Dichlorobenzene	624	2 / 0.5
1,2-Dichloroethane	624	2 / 0.5
1,2-Dichloropropane	624	2 / 0.5
1,2,3-Trichlorobenzene	624	2 / 0.5
1,3-Dichlorobenzene	624	2 / 0.5
1,4-Dichlorobenzene	624	2 / 0.5
Benzene	624	2 / 0.5
Bromoform	624	2 / 0.5
Carbon Tetrachloride	624	2 / 0.5
Chlorobenzene	624	2 / 0.5
Dibromochloromethane	624	2 / 0.5
Chloroethane	624	2 / 0.5
trans-1,2-Dichloroethene	624	2 / 0.5
cis-1,3-Dichloropropene	624	2 / 0.5
Bromodichloromethane	624	2 / 0.5
Methylene Chloride	624	2 / 0.5
Ethyl Benzene	624	2 / 0.5
Bromomethane	624	2 / 0.5
Chloromethane	624	2 / 0.5
o-Xylene	624	2 / 0.5
Styrene	624	2 / 0.5
Methyl-t-Butyl Ether	624	2 / 0.5
Tetrachloroethene	624	2 / 0.5
Toluene	624	2 / 0.5
trans-1,3-Dichloropropene	624	2 / 0.5
Trichloroethene	624	2 / 0.5
Trichlorofluoromethane	624	2 / 0.5
Chloroform	624	2 / 0.5
Vinyl Chloride	624	2 / 0.5
m- & p-Xylenes	624	2 / 1

Table 8-9: SVOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
1,2,4-Trichlorobenzene	625	5
2-Chloronaphthalene	625	5
2-Chlorophenol	625	5
2-Methyl-4,6-dinitrophenol	625	10
2-Nitrophenol	625	10
2,4-Dichlorophenol	625	5
2,4-Dimethylphenol	625	5
2,4-Dinitrophenol	625	20
2,4-Dinitrotoluene	625	4
2,4,6-Trichlorophenol	625	5
2,6-Dinitrotoluene	625	5
3,3'-Dichlorobenzidine	625	5
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]pyrene	625	5
Benzo[k]fluoranthene	625	5
Benzo[a]anthracene	625	5
Benzo[b]fluoranthene	625	5
Benzo[g,h,i]perylene	625	5
Bis(2-chloroethoxy)methane	625	5
Bis(2-ethylhexyl)phthalate	625	5
Bis(2-chloroethyl)ether	625	5
Bis(2-chloroisopropyl)ether	625	5
Butylbenzylphthalate	625	5
Chrysene	625	5
Dibenzo[a,h]anthracene	625	5
Diethylphthalate	625	5
Dimethylphthalate	625	5
Di-n-butylphthalate	625	5
Di-n-octylphthalate	625	5
Fluoranthene	625	5

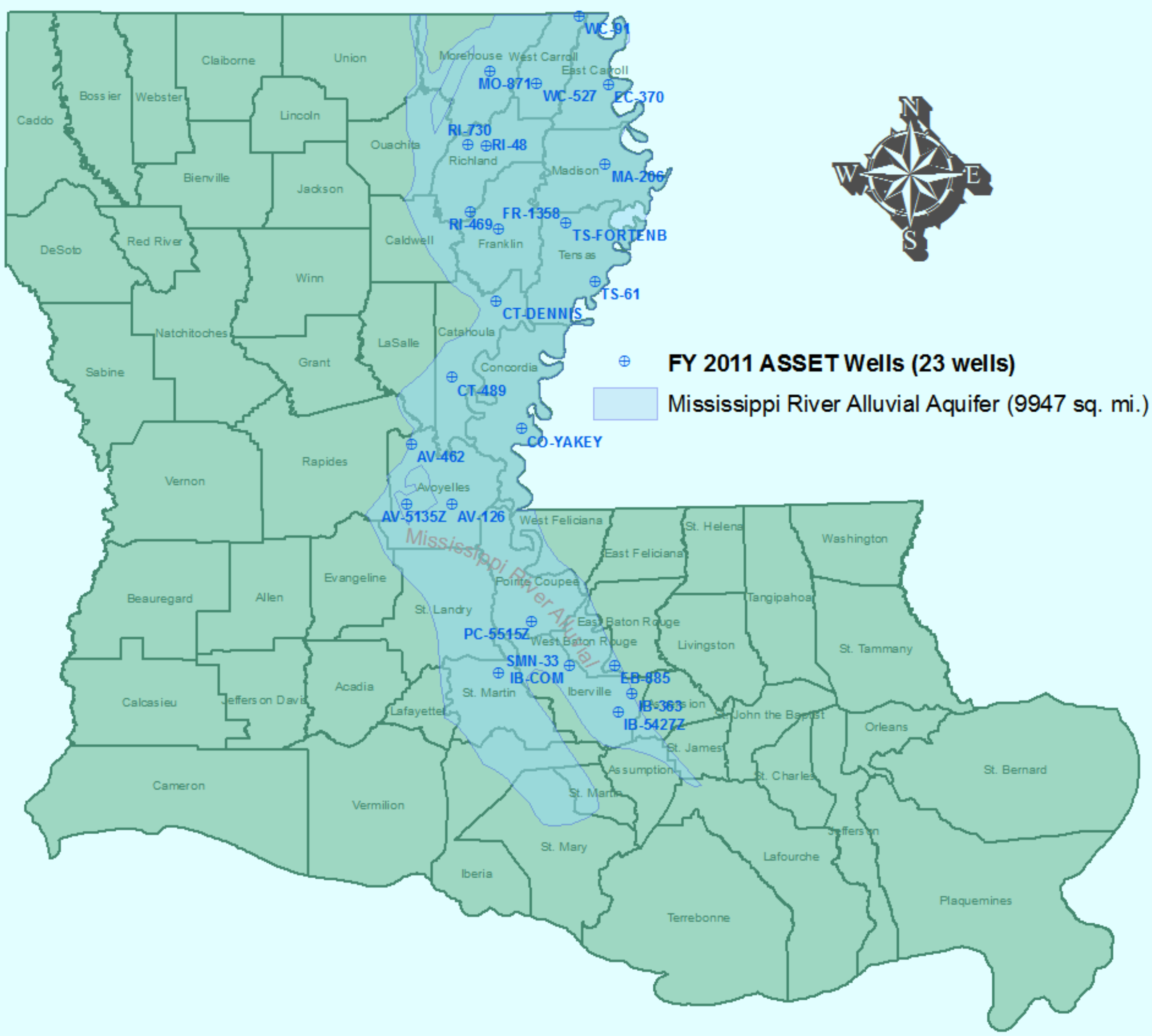
Table 8-9: SVOCs (Continued)

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
Fluorene	625	5
Hexachlorobenzene	625	5
Hexachlorobutadiene	625	5
Hexachlorocyclopentadiene	625	10
Hexachloroethane	625	5
Indeno[1,2,3-cd]pyrene	625	5
Isophorone	625	5
Naphthalene	625	5
Nitrobenzene	625	5
N-Nitrosodimethylamine	625	5
N-Nitrosodiphenylamine	625	5
N-nitroso-di-n-propylamine	625	10
Pentachlorophenol	625	10
Phenanthrene	625	5
Phenol	625	5
Pyrene	625	5

Table 8-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS (ug/L)
4,4'-DDD	608	0.05
4,4'-DDE	608	0.05
4,4'-DDT	608	0.05
Aldrin	608	0.05
Alpha-Chlordane	608	0.05
alpha-BHC	608	0.05
beta-BHC	608	0.05
delta-BHC	608	0.05
gamma-BHC	608	0.05
Chlordane	608	0.2
Dieldrin	608	0.05
Endosulfan I	608	0.05
Endosulfan II	608	0.05
Endosulfan Sulfate	608	0.05
Endrin	608	0.05
Endrin Aldehyde	608	0.05
Endrin Ketone	608	0.05
Heptachlor	608	0.05
Heptachlor Epoxide	608	0.05
Methoxychlor	608	0.05
Toxaphene	608	3
Gamma-Chlordane	608	0.05
PCB-1016	608	0.5
PCB-1221	608	0.5
PCB-1232	608	0.5
PCB-1242	608	0.5
PCB-1248	608	0.5
PCB-1254	608	0.5
PCB-1260	608	0.5

Figure 8-1: Location Plat, Mississippi River Alluvial 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.

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Figure 8-2: Map of pH Data

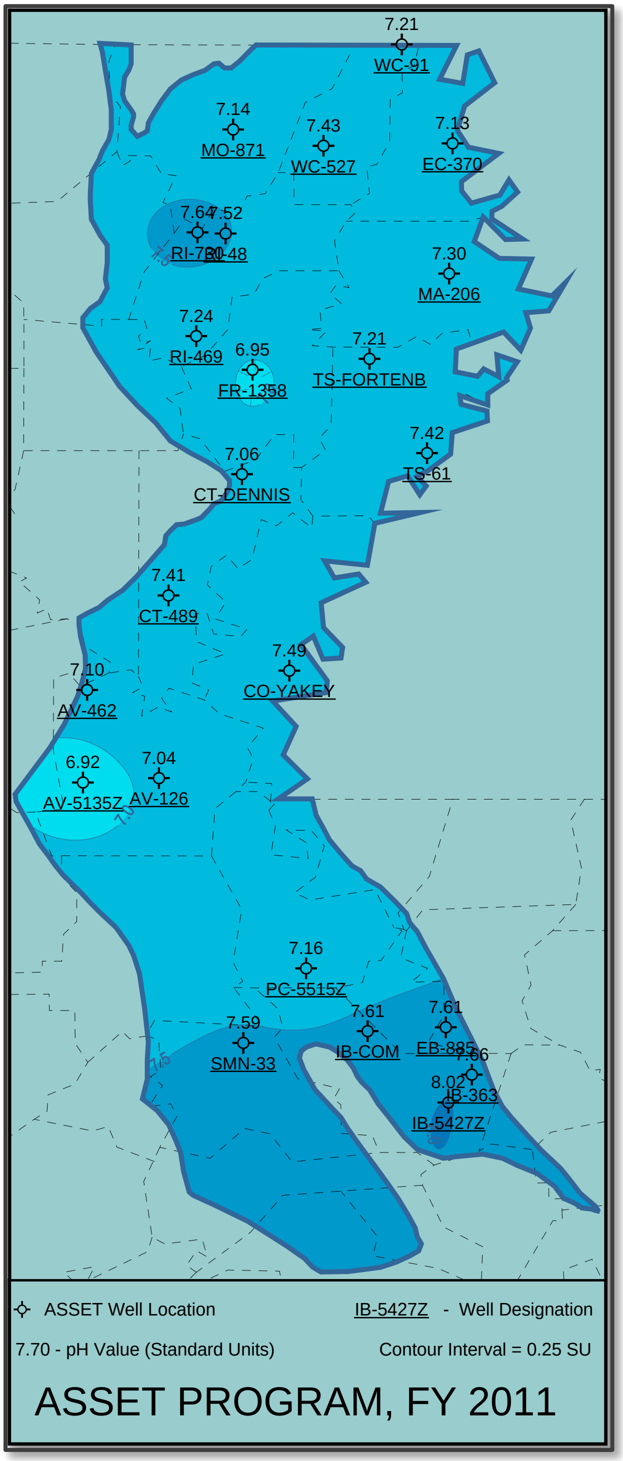

Figure 8-3: Map of TDS Data

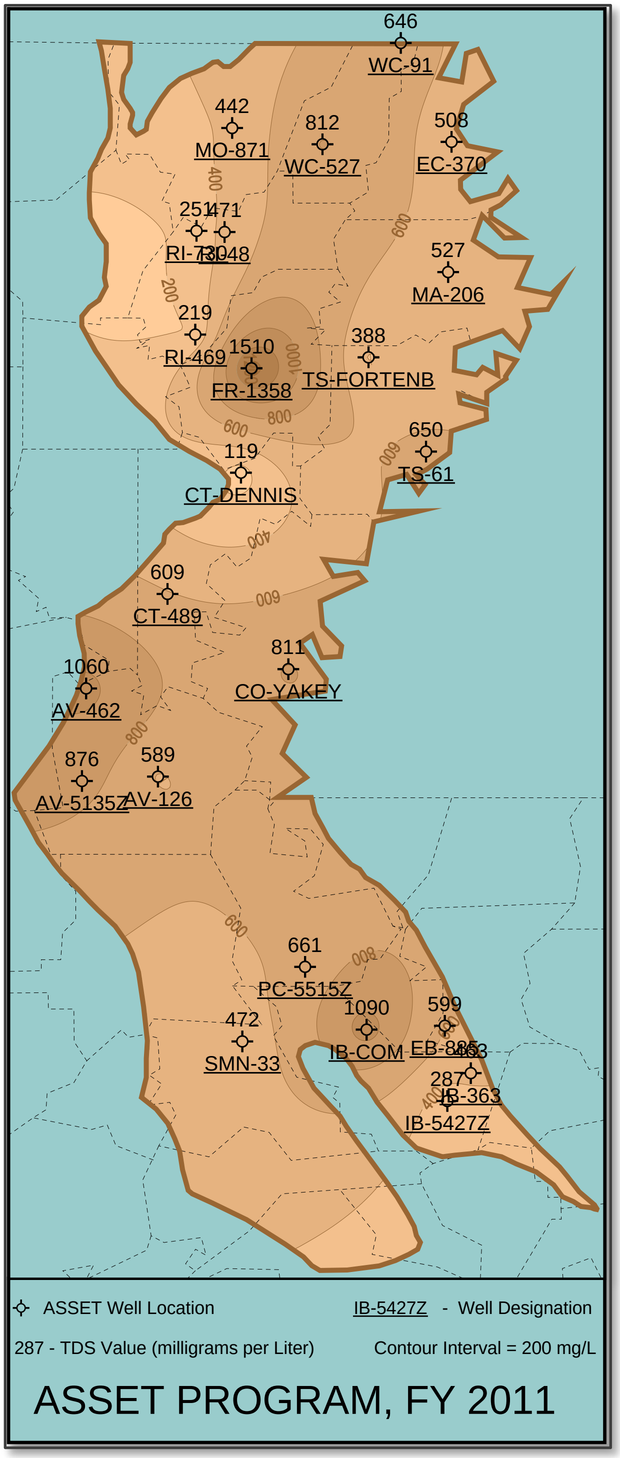

Figure 8-4: Map of Chloride Data

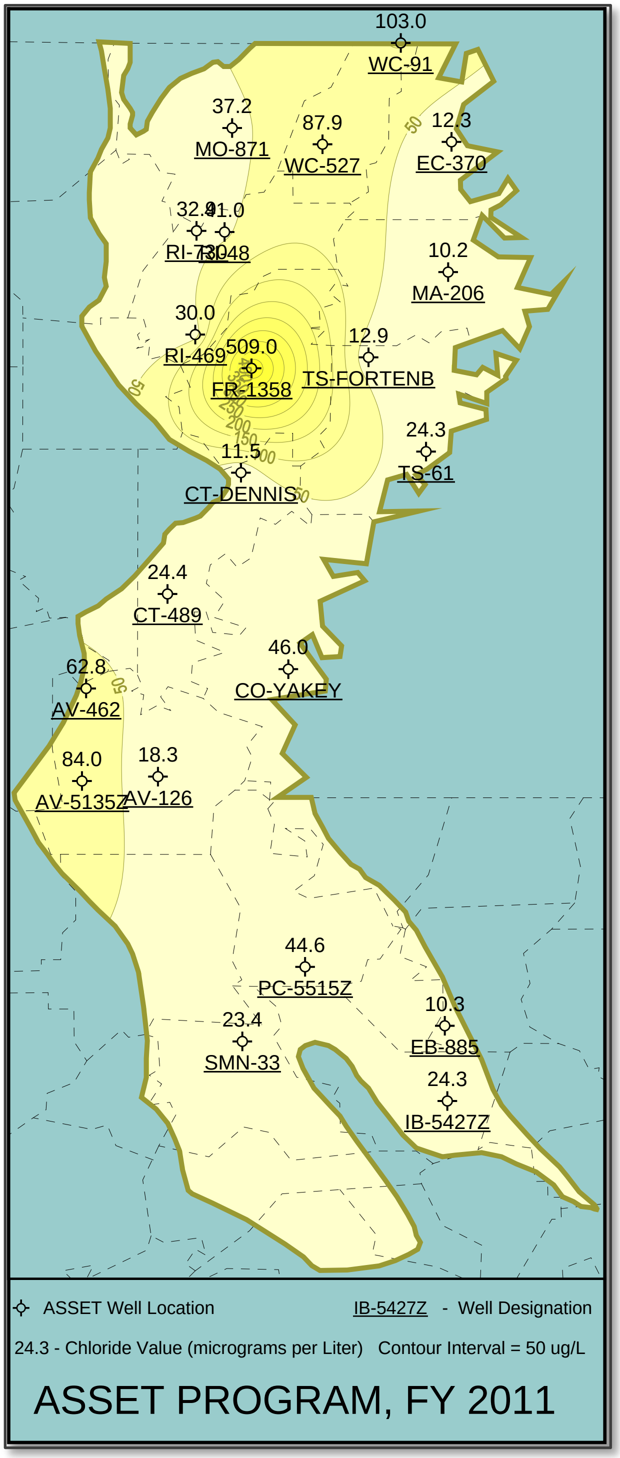

Figure 8-5: Map of Iron Data

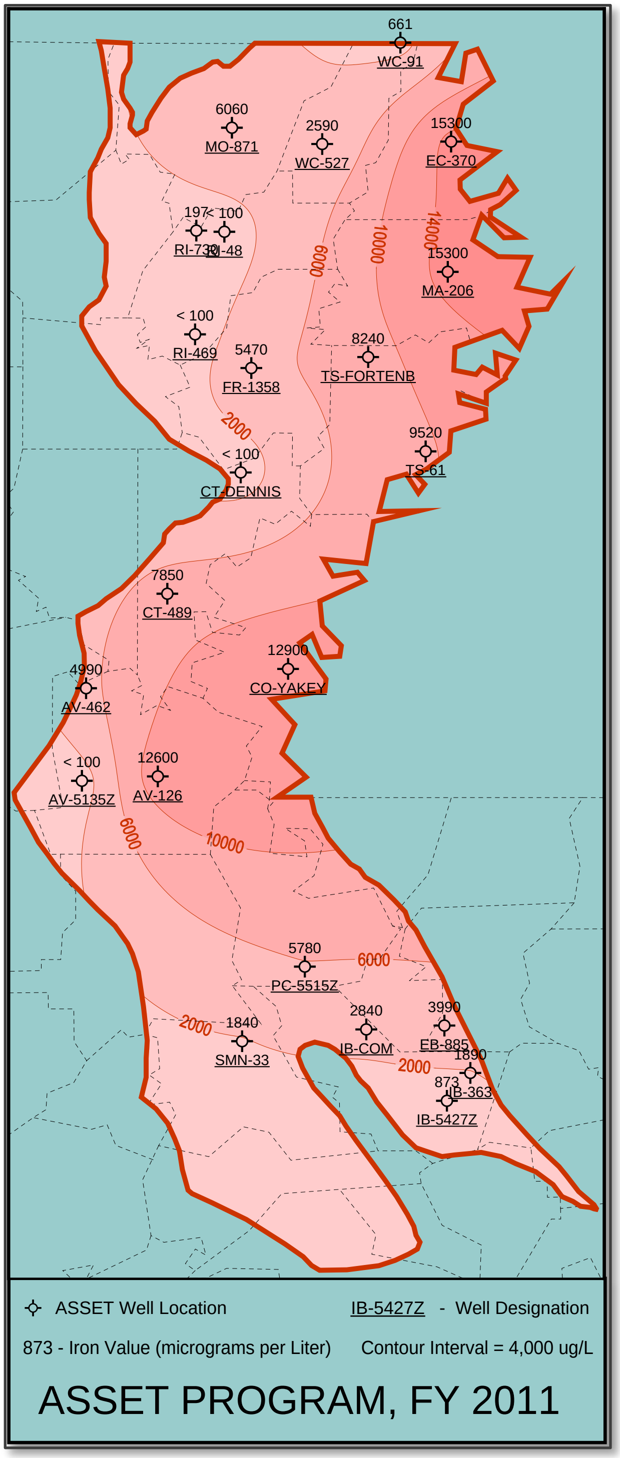

Chart 8-1: Temperature Trend

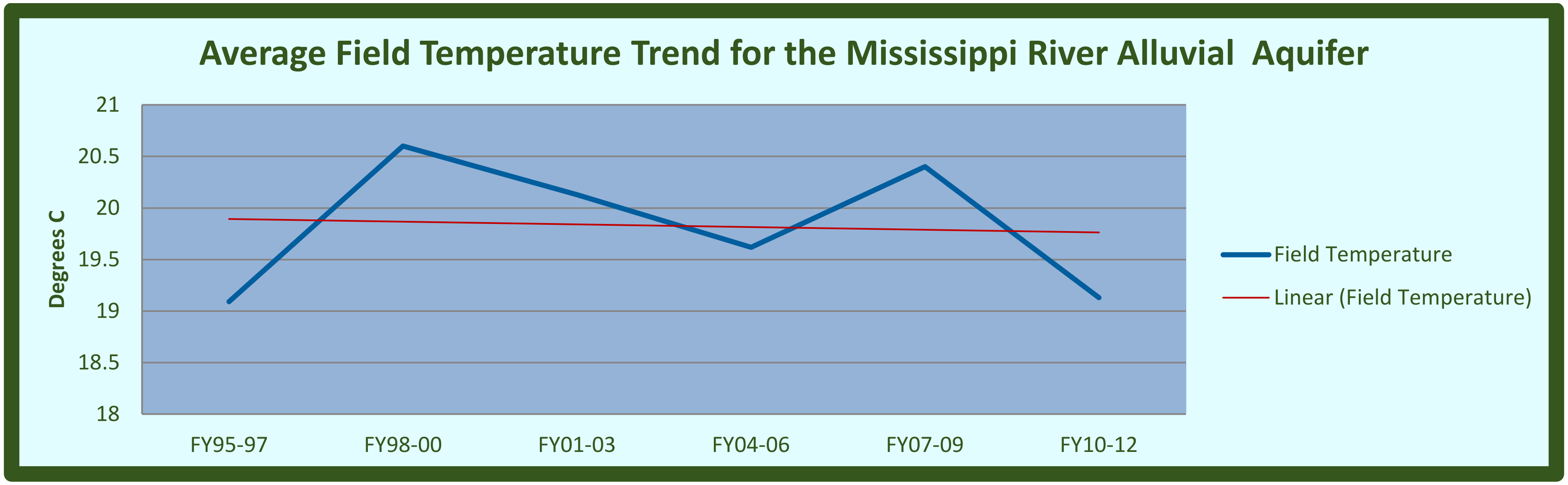

Chart 8-2: pH Trend

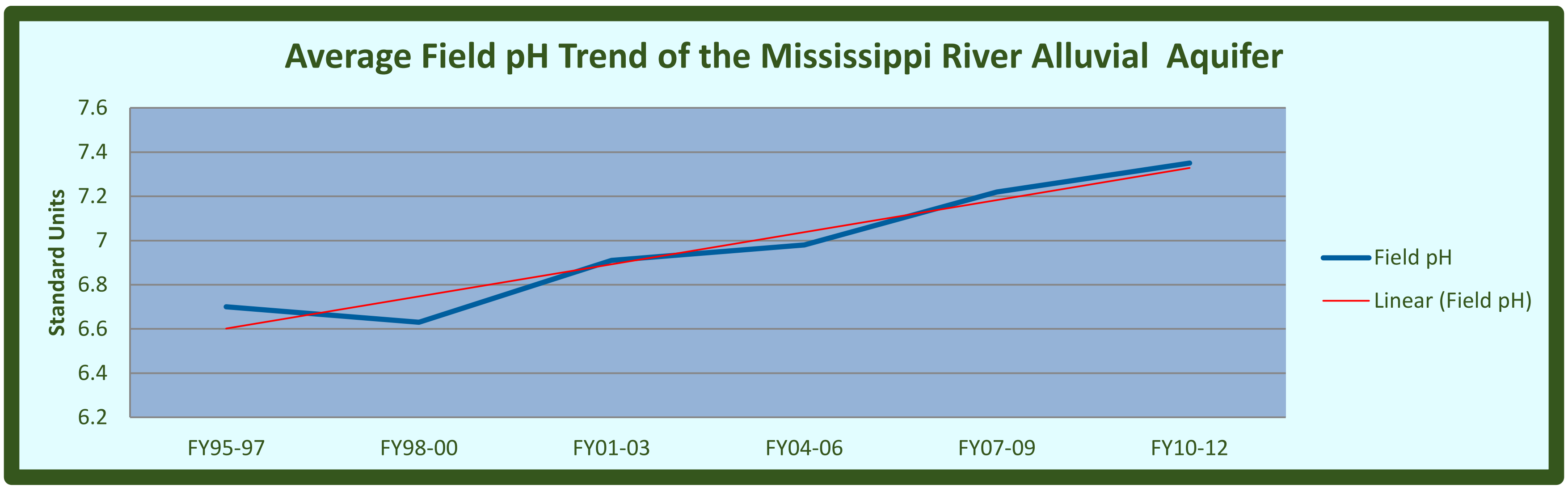

Chart 8-3: Field Specific Conductance Trend

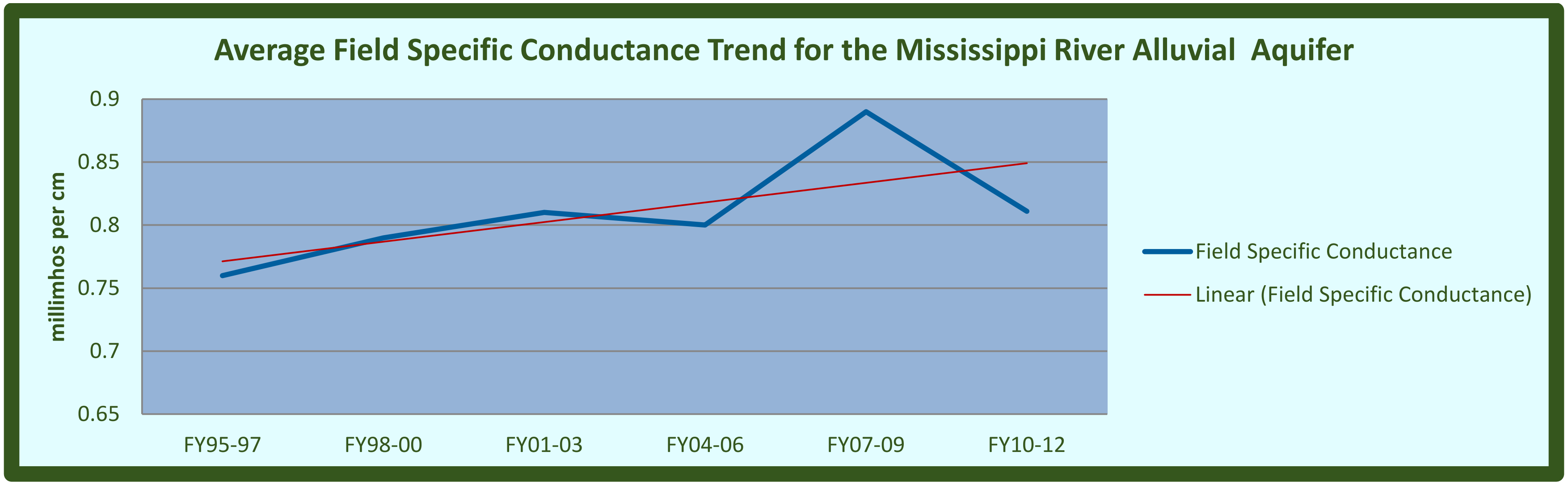

Chart 8-4: Lab Specific Conductance Trend

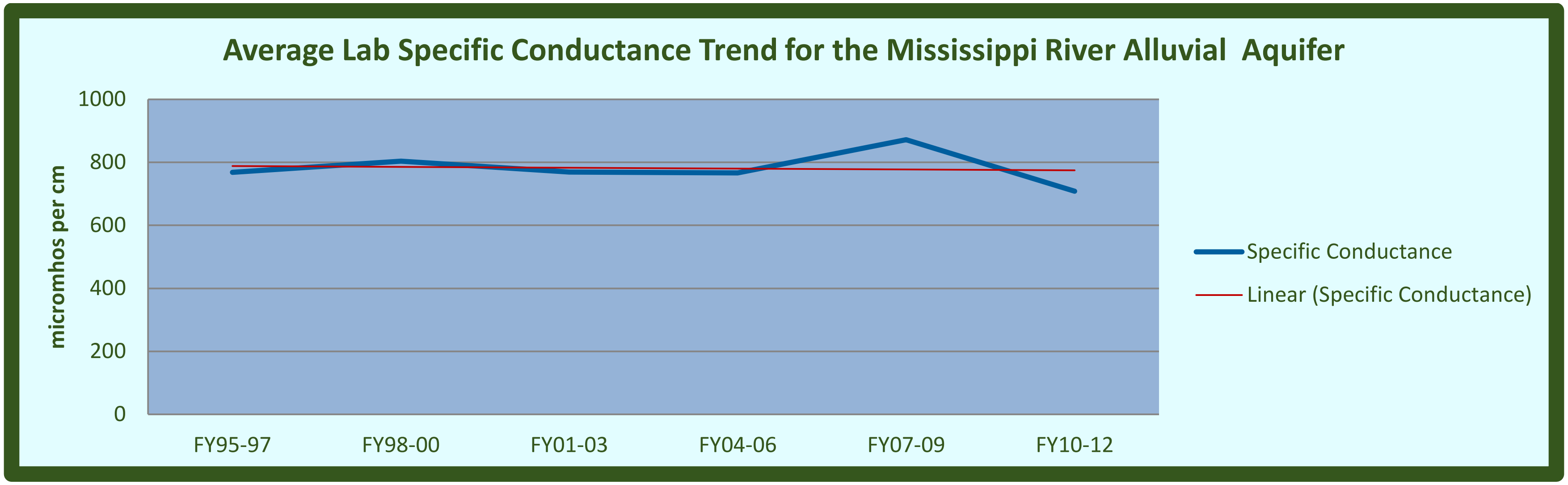

Chart 8-5: Field Salinity Trend

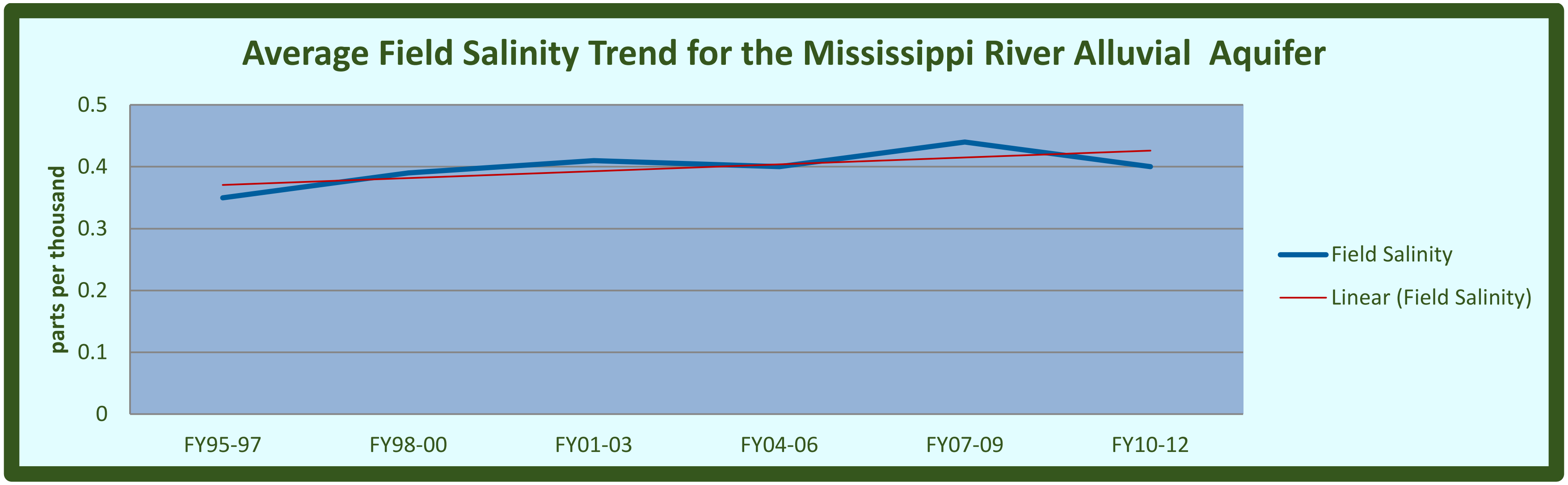

Chart 8-6: Alkalinity Trend

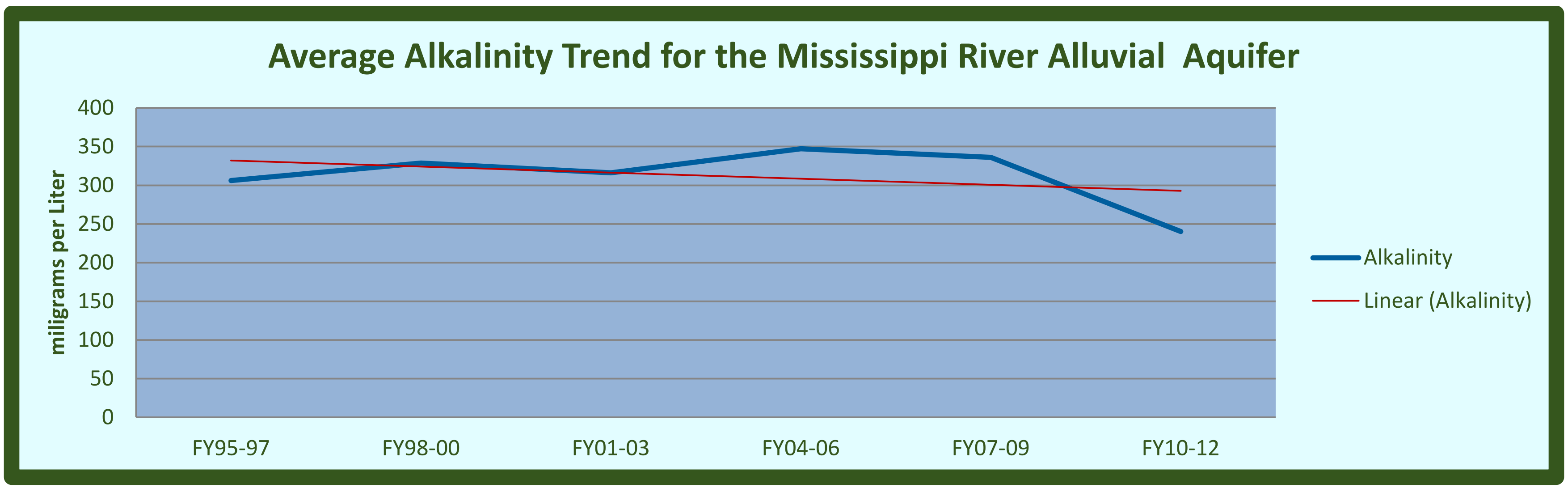

Chart 8-7: Chloride Trend

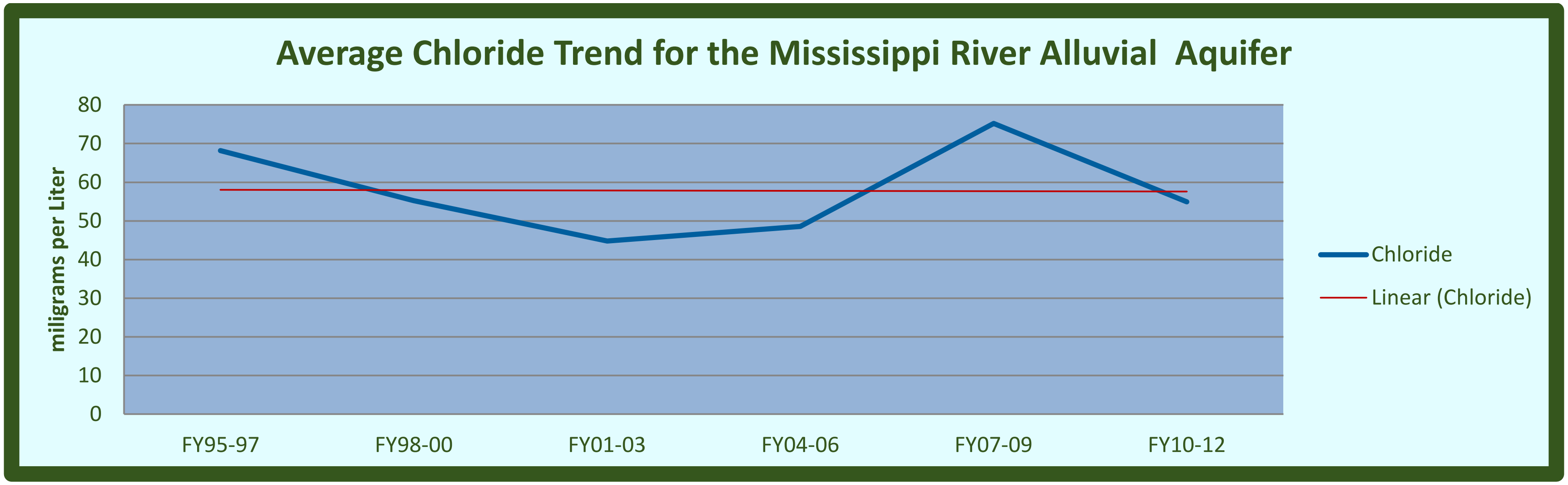

Chart 8-8: Color Trend

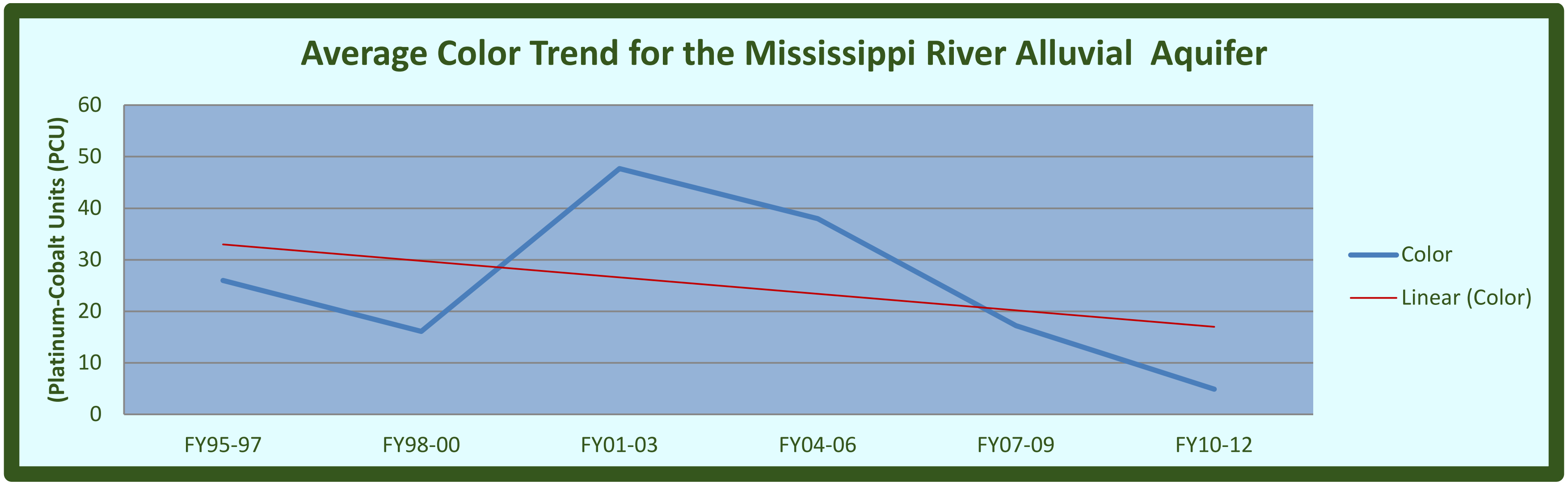

Chart 8-9: Sulfate Trend

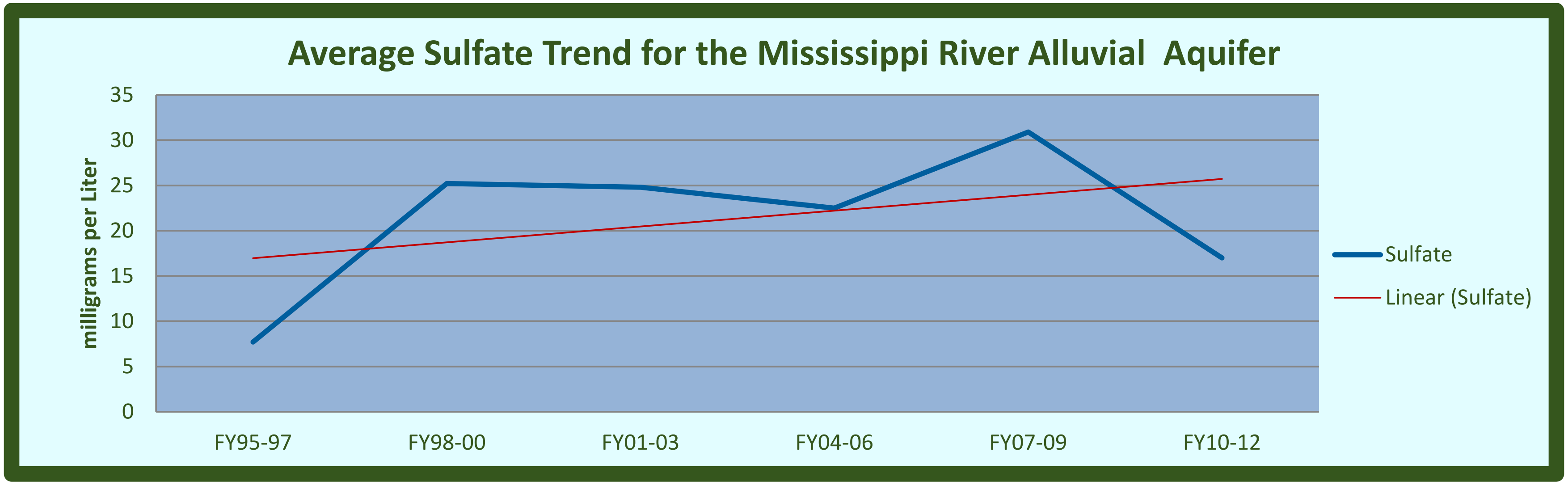

Chart 8-10: Total Dissolved Solids Trend

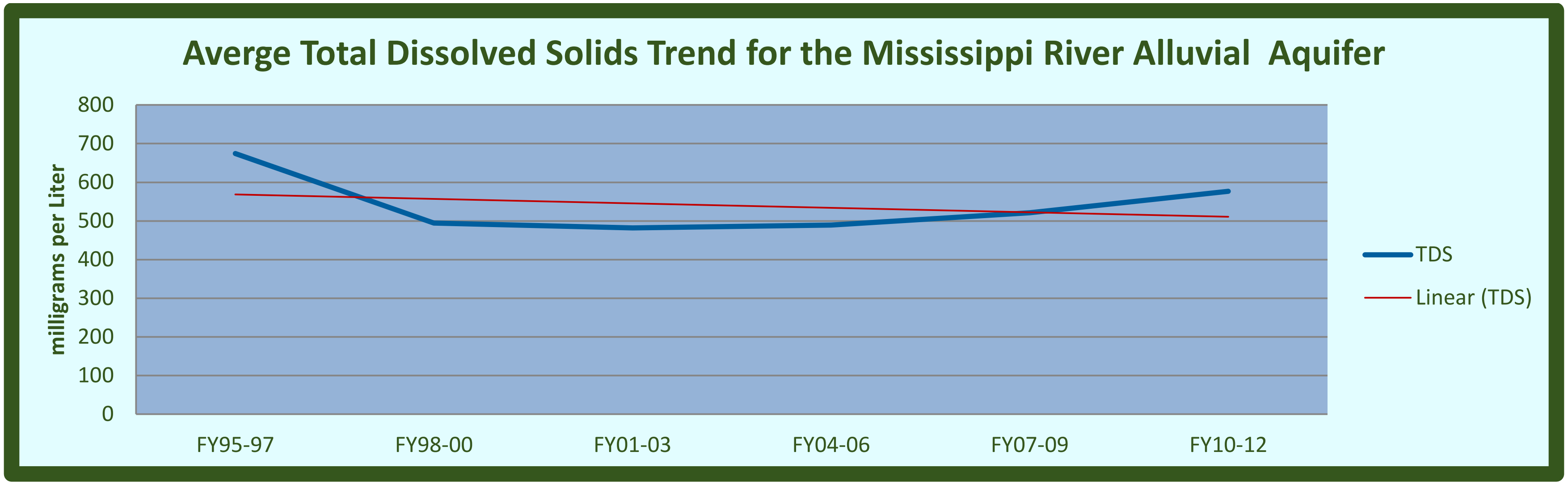

Chart 8-11: Ammonia Trend

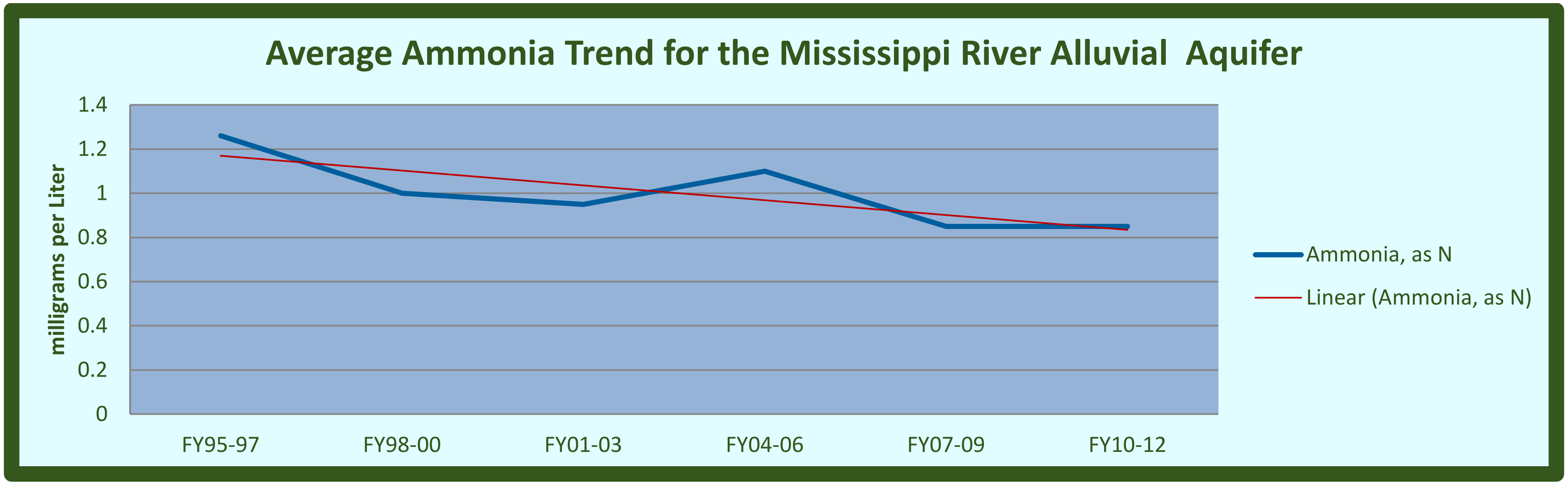

Chart 8-12: Hardness Trend

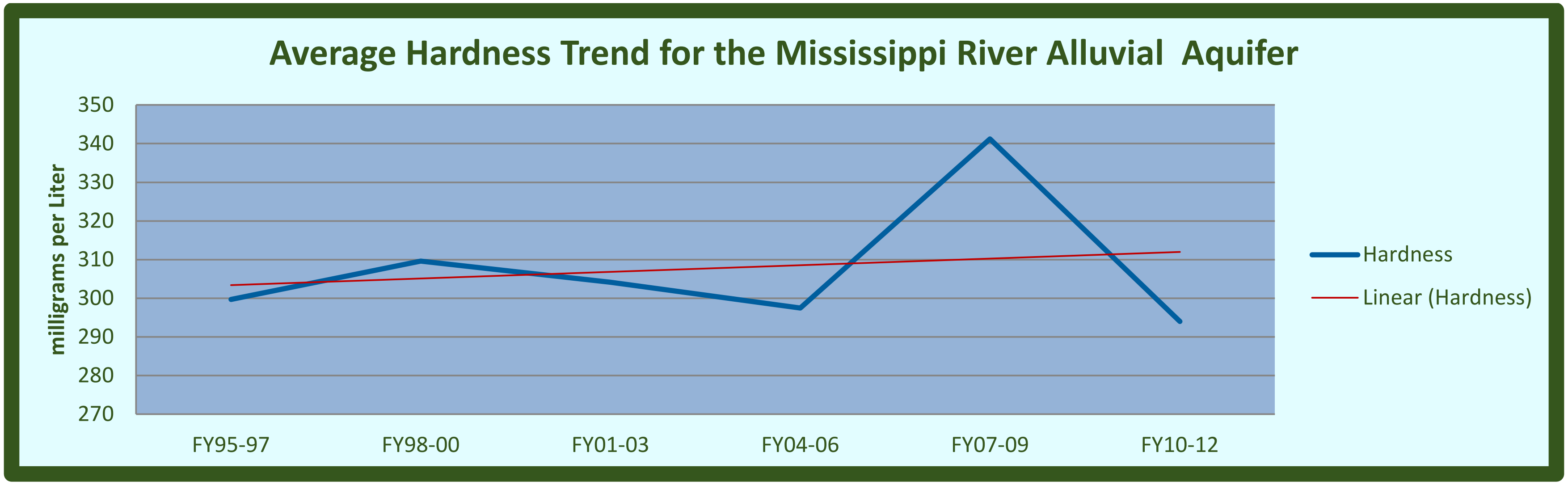

Chart 8-13: Nitrite – Nitrate Trend

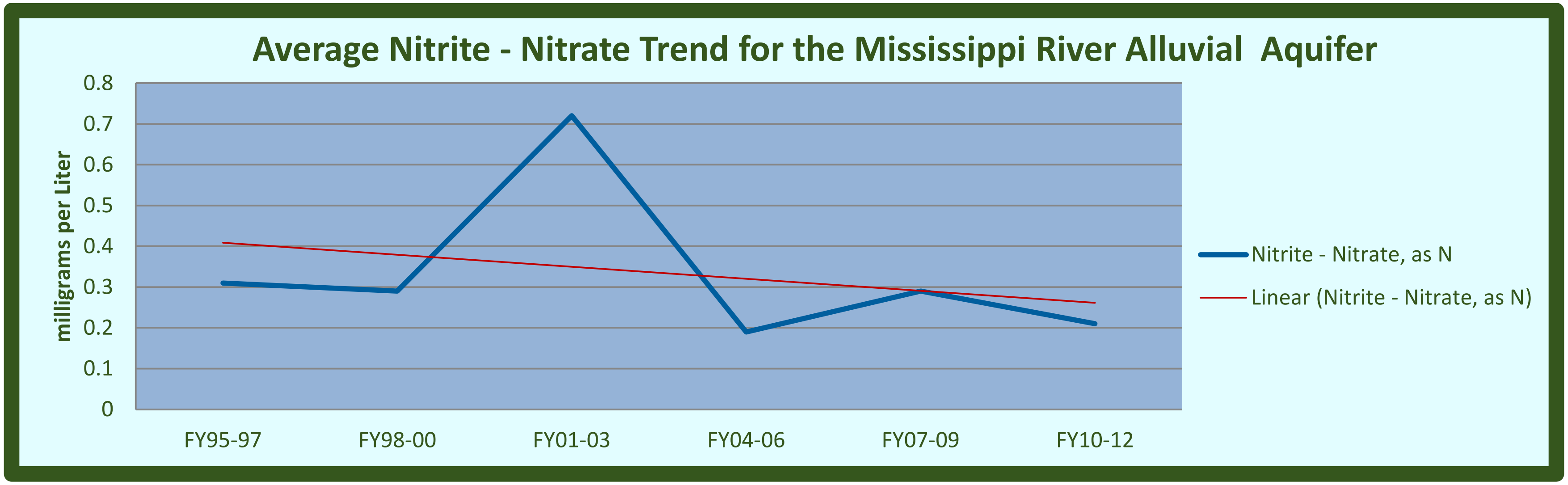

Chart 8-14: TKN Trend

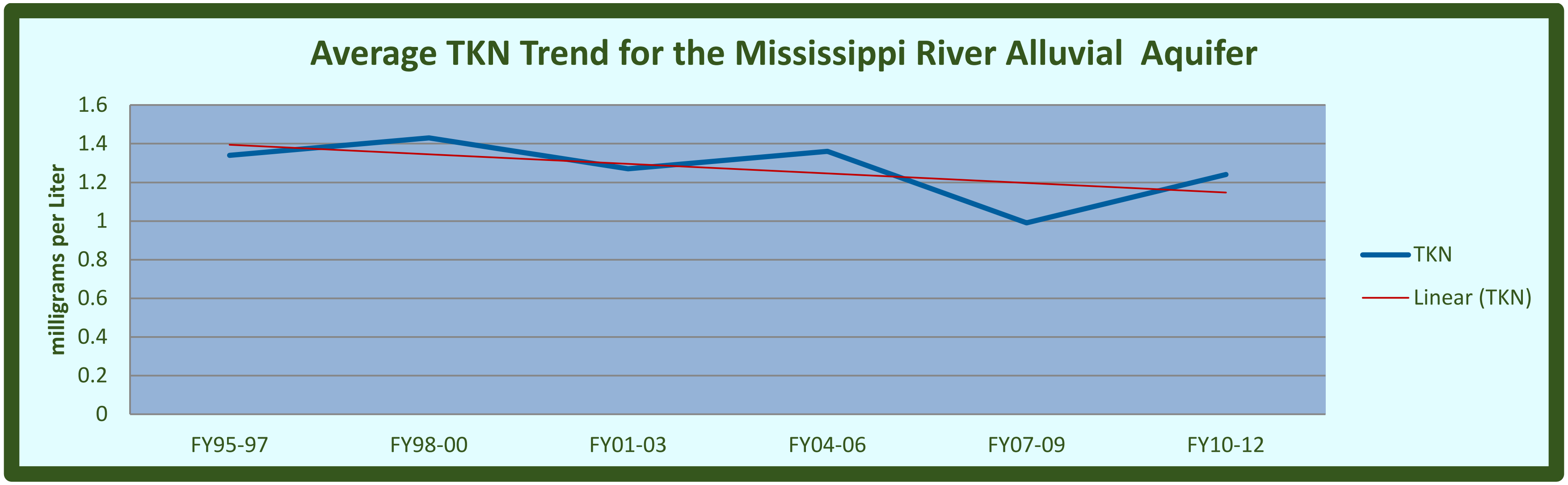

Chart 8-15: Total Phosphorus Trend

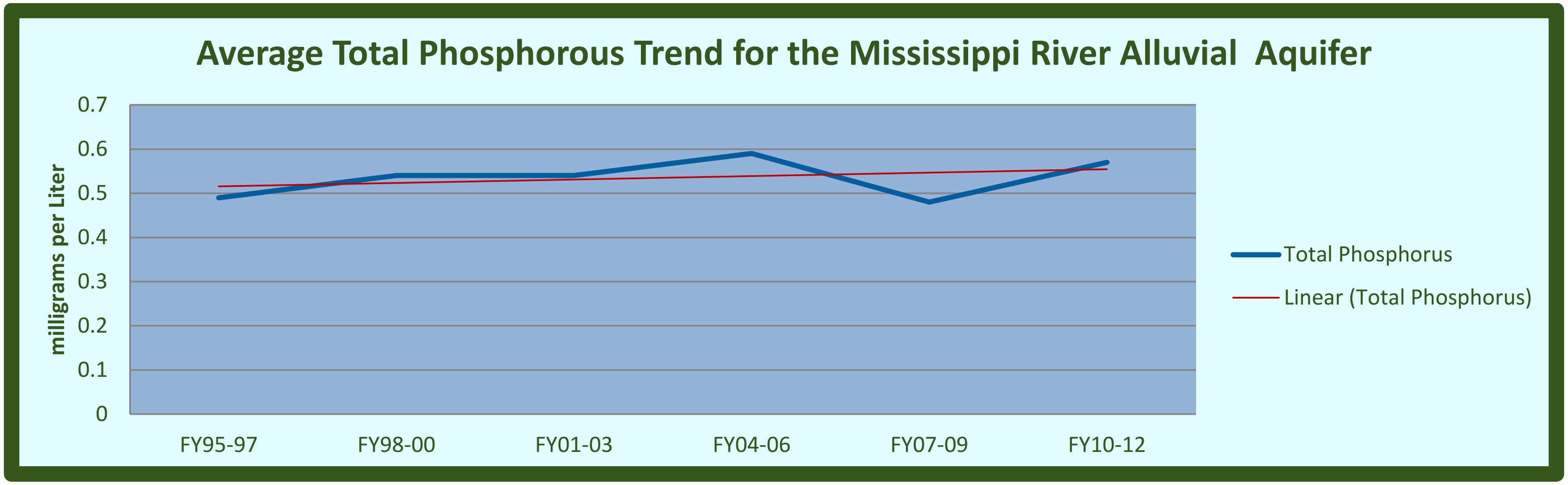

Chart 8-16: Iron Trend