MISSISSIPPI RIVER ALLUVIAL AQUIFER SUMMARY, 2008
AQUIFER SAMPLING AND ASSESSMENT PROGRAM

DEQ
LOUISIANA

APPENDIX 8 TO THE 2009 TRIENNIAL SUMMARY REPORT

PARTIAL FUNDING PROVIDED BY THE CWA

ASSET
AQUIFER SAMPLING AND ASSESSMENT PROGRAM

Contents

BACKGROUND

The Louisiana Department of Environmental Quality's (LDEQ) Aquifer Sampling and Assessment Program (ASSET) is an ambient monitoring program established to determine and monitor the quality of ground water produced from Louisiana's major freshwater aquifers. The ASSET Program samples approximately 200 water wells located in 14 aquifers and aquifer systems across the state. The sampling process is designed so that all fourteen aquifers and aquifer systems are monitored on a rotating basis, within a three-year period so that each well is monitored every three years.

In order to better assess the water quality of a particular aquifer, an attempt is made to sample all ASSET Program wells producing from it in a narrow time frame. To more conveniently and economically promulgate those data collected, a summary report on each aquifer is prepared separately. Collectively, these aquifer summaries will make up, in part, the ASSET Program's Triennial Summary Report for 2009.

Analytical and field data contained in this summary were collected from wells producing from the Mississippi River Alluvial aquifer, during the 2008 state fiscal year (July 1, 2007 - June 30, 2008). This summary will become Appendix 8 of ASSET Program Triennial Summary Report for 2009.

These data show that from July to September 2007 and in January 2008, twenty-three (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 Transportation and Development's 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 to 352 feet below land surface.

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 AV-462, IB-COM, MA-206, RI-48, and SMN-33.

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 2008 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, and 2005.

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 average values for pH, total dissolved solids (TDS), chloride (Cl), 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 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 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 was 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 pH, one well exceeded the SMCL for chloride, one well exceeded the SMCL for sulfate, 3 wells exceeded the SMCL for color (11 wells were not analyzed for color) and 9 wells exceeded the SMCL for total dissolved solids. 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:

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pH (SMCL = 6.5 – 8.5 Standard Units):

AV-126 – 8.52 SU

Chloride (SMCL = 250 mg/L):

FR-1358 – 602 mg/L

Sulfate (SMCL = 250 mg/L):

AV-462 – 263 mg/L, Duplicate – 260 mg/L

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

AV-126 – 110 PCU
CT-241 – 50 PCU
FR-1358 – 40 PCU
(Eleven wells were not analyzed for color.)

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
AV-126	464 mg/L (<SMCL)	0.55 g/L
AV-462	1,012 mg/L, Duplicate – 1,000 mg/L	1.04 g/L (Original and Duplicate)
AV-5135Z	638 mg/L	0.72 g/L
CO-YAKEY	648 mg/L	0.75 g/L
CT-241	534 mg/L	0.63 g/L
EB-885	476 mg/L (<SMCL)	0.51 g/L
FR-1358	1,314 mg/L	1.45 g/L
IB-COM	754 mg/L, Duplicate – 750 mg/L	0.91 g/L (Original and Duplicate)
SL-5477Z	538 mg/L	0.64 g/L
TS-60	524 mg/L	0.56 g/L
TS-FORTENB	482 mg/L (< SMCL)	0.55 g/L
WC-527	704 mg/L	0.76 g/L
WC-91	482 mg/L (<SMCL)	0.57 g/L

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. There were several values for mercury in this table that were not used due to the laboratory reporting mercury in the field blank. Because of this, all mercury data associated with this field blank was rejected, as noted in Table 8-3.

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 6 of the 23 wells sampled for this time period:

Arsenic (MCL = 10 ug/L):

EB-885 – 36.2 ug/L
IB-5427Z – 36.8 ug/L
SL-5477Z – 65.2 ug/L
IB-363 – 32.6 ug/L
MA-206 – 11.6 ug/L, Duplicate – 12.2 ug/L
TS-FORTENB – 14.4 ug/L
MA-206 was resampled on 11/28/2007: results were 12.3 ug/L (Duplicate – 11.9 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 – 12,700 ug/L
CO-YAKEY – 15,300 ug/L
EB-885 – 4,180 ug/L
FR-1358 – 5,400 ug/L
IB-5427Z – 778 ug/L
MA-206 – 11,400 ug/Lm, Duplicate – 11,500 ug/L
SL-5477Z – 22,700 ug/L
TS-60 – 8,850 ug/L
WC-527 – 3,630 ug/L
AV-462 – 5,030 ug/L, Duplicate – 5,010 ug/L
CT-241 – 9,740 ug/L
EC-370 – 17,400 ug/L
IB-363 – 1,990 ug/L
IB-COM – 4,160 ug/L, Duplicate – 4,110 ug/L
MO-871 – 5,760 ug/L
SMN-33 – 2,010 ug/L, Duplicate – 2,020 ug/L
TS-FORTENB – 12,600 ug/L
WC-91 – 720 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.

No VOC was detected at or above its detection limit during the FY 2008 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 2008 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 2008 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 ground water produced from the Mississippi River Alluvial aquifer exhibit some changes when comparing current data to that of the four previous sampling rotations (three, six, nine and twelve years prior). These comparisons can be found in Tables 8-6 and 8-7, and in Charts 8-1 to 8-16 of this summary. Over the twelve-year period, 7 analytes have shown a general increase in concentration. These analytes are: pH, temperature, specific conductance (field and lab), salinity, sulfate (SO_4), hardness, and iron. For this same time period, 10 analytes have demonstrated a decrease in concentrations, which are: chloride (Cl), color, total dissolved solids (TDS), ammonia (NH_3), nitrite-nitrate, TKN, barium, copper, zinc, and to a lesser degree, total phosphorus.

The number of wells with secondary MCL exceedances for FY 2008 is practically the same as the previous sampling event in FY 2005. Sample results for FY 2008 show that 19 wells reported one or more secondary exceedances, while the FY 2005 sampling of the Mississippi River Alluvial aquifer shows that 20 wells reported one or more SMCL exceedances. The total number of secondary exceedances, however, has decreased since the last sampling of this aquifer. Fiscal year 2008 sample results show that a total of 33 SMCLs were exceeded, while the FY 2005 sampling reported a total of 55 secondary exceedances.

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the ground water produced from the Mississippi River Alluvial aquifer is very hard.[1] The Primary MCL for arsenic was the only short-term or long-term health risk guideline that was exceeded; however, this exceedance occurred in 6 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 some change in the quality or characteristics of the Mississippi River Alluvial aquifer, with 7 parameters showing consistent increases in concentration and 10 parameters decreasing in concentration. This comparison also shows a smaller total number of secondary standards exceeded for this reporting period, with 33 SMCLs exceeded, while there were 55 SMCLs exceeded in the previous sampling in FY 2005.

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 2008, show that a total of 10 wells reported detections of arsenic, while 6 of those 10 exceeded the Safe Drinking Water standard for arsenic (10 ug/L). As a standard procedure of the ASSET Program, all well owners receive the results of their wells 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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[1] 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 2008

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
AV-126	AVOYELLES	1/8/2008	PRIVATE OWNER	155	DOMESTIC
AV-462	AVOYELLES	8/20/2007	PRIVATE OWNER	110	IRRIGATION
AV-5135Z	AVOYELLES	8/20/2007	PRIVATE OWNER	110	DOMESTIC
CO-YAKEY	CONCORDIA	8/21/2007	PRIVATE OWNER	150	DOMESTIC
CT-241	CATAHOULA	8/21/2007	PRIVATE OWNER	134	IRRIGATION
CT-DENNIS	CATAHOULA	9/17/2007	PRIVATE OWNER	30	DOMESTIC
EB-885	EAST BATON ROUGE	7/24/2007	PRIVATE OWNER	352	IRRIGATION
EC-370	EAST CARROLL	8/27/2007	PRIVATE OWNER	119	IRRIGATION
FR-1358	FRANKLIN	9/17/2007	PRIVATE OWNER	60	IRRIGATION
IB-363	IBERVILLE	7/24/2007	SYNGENTA CROP PROTECTION, INC.	225	INDUSTRIAL
IB-5427Z	IBERVILLE	7/23/2007	PRIVATE OWNER	160	DOMESTIC
IB-COM	IBERVILLE	1/7/2008	PRIVATE OWNER	185	DOMESTIC
MA-206	MADISON	8/27/2007	TALLULAH WATER SERVICE	130	PUBLIC SUPPLY
MO-871	MOREHOUSE	8/28/2007	PRIVATE OWNER	80	IRRIGATION
RI-469	RICHLAND	9/17/2007	LIDDIEVILLE WATER SYSTEM	90	PUBLIC SUPPLY
RI-48	RICHLAND	9/17/2007	RAYVILLE WATER DEPARTMENT	115	PUBLIC SUPPLY
RI-730	RICHLAND	8/28/2007	START WATER SYSTEM	101	PUBLIC SUPPLY
SL-5477Z	ST LANDRY	7/24/2007	PRIVATE OWNER	110	DOMESTIC
SMN-33	ST MARTIN	7/23/2007	LDOTD/LAFAYETTE DISTRICT	125	PUBLIC SUPPLY
TS-60	TENSAS	9/17/2007	TOWN OF ST. JOSEPH	140	PUBLIC SUPPLY
TS-FORTENB	TENSAS	9/17/2007	PRIVATE OWNER	UNKNOWN	DOMESTIC
WC-527	WEST CARROLL	8/27/2007	PRIVATE OWNER	85	IRRIGATION
WC-91	WEST CARROLL	8/27/2007	NEW CARROLL WTR. ASSN.	115	PUBLIC SUPPLY

Table 8-2: Summary of Field and Conventional Data, Mississippi River Alluvial Aquifer–FY 2008

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	1.3	5	10	1.25/1.3	4	4	1	0.1	5.0	0.05	0.10	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AV-126	20.10	8.52	0.845	0.42	0.55	407	25.8	‡110	762	16.3	464	25	91	0.5	457	<0.05	0.5	0.92
AV-462	20.69	7.40	1.601	0.81	1.04	428	110	<5	1557	‡263	1012	9	63.4	0.18	511	<0.05	0.3	0.24
AV-462*	20.69	7.40	1.601	0.81	1.04	429	110	<5	1556	‡260	1000	13	63.8	0.15	509	<0.05	0.28	0.25
AV-5135Z	21.54	7.02	1.111	0.55	0.72	335	101	<5	1086	85.3	638	<4	<1	0.12	417	<0.05	0.2	0.14
CO-YAKEY	23.91	7.09	1.153	0.57	0.75	607	28	15	1121	<1.25	648	39	207	3.32	491	<0.05	‡4.26	1.07
CT-241	20.41	7.18	0.97	0.48	0.63	490	22.3	50	918	<1.25	534	24	102	1.27	425	<0.05	1.42	0.89
CT-DENNIS	21.28	6.66	0.198	0.09	0.13	82.9	11	<5	199	4.2	160	<4	<1	<0.1	78.1	0.09	<0.1	<0.05
EB-885	20.82	7.21	0.78	0.38	0.51	427	11.6	NO DATA	785	<1.25	476	10	46.4	2.08	357	<0.05	2.11	0.26
EC-370	19.71	6.89	0.757	0.37	0.49	406	10	NO DATA	724	1.5	416	38	143	0.94	400	<0.05	1.19	1.08
FR-1358	20.45	6.73	2.228	1.14	1.45	292	‡602	40	2370	13.4	1314	9	34.9	0.28	468	0.15	‡0.5	0.35
IB-363	18.98	7.74	0.645	0.31	0.42	232	52.8	NO DATA	638	18	360	5.5	14.4	1.22	215	<0.05	1.32	0.59
IB-5427Z	21.66	7.70	0.39	0.19	0.25	149	23.5	NO DATA	367	15	220	<4	1.7	1.07	146	<0.05	1.14	0.35
IB-COM	20.85	7.13	1.392	0.70	0.91	336	‡246	10	1307	<1.25	754	7	44.8	0.27	376	<0.05	0.27	0.15
IB-COM*	20.85	7.13	1.392	0.70	0.91	338	‡243	10	1312	<1.25	750	8	50.6	0.32	377	<0.05	0.34	0.15
MA-206	20.24	6.92	0.738	0.36	0.48	400	13.9	NO DATA	729	4.4	430	28	115	0.66	369	<0.05	0.97	0.95
MA-206*	20.24	6.92	0.738	0.36	0.48	406	13.9	NO DATA	734	4.4	438	27	123	0.67	371	<0.05	0.99	0.94
MO-871	19.49	6.92	0.672	0.33	0.44	250	42.9	NO DATA	649	35.1	394	11	10.4	0.13	296	<0.05	0.27	0.32
RI-469	20.29	7.14	0.253	0.12	0.16	56.7	31.4	<5	261	4.7	184	<4	<1	<0.1	85.1	4.94‡	<0.1	0.2
RI-48	20.27	7.29	0.636	0.31	0.41	269	37.9	<5	644	25.1	390	<4	1	<0.1	262	0.28	0.15	0.17
RI-48*	20.27	7.29	0.636	0.31	0.41	269	37.9	<5	644	25.1	390	<4	1.4	<0.1	261	0.28	0.15	0.16
RI-730	20.10	7.49	0.457	0.22	0.30	151	34.5	NO DATA	453	28.9	300	<4	<1	<0.1	183	1.44	<0.1	0.11
SL-5477Z	21.27	6.92	0.984	0.49	0.64	470	25.4	NO DATA	907	<1.25	538	56	235	5.98	389	<0.05	‡6.11	‡1.89
SMN-33	18.66	7.68	0.507	0.25	0.33	234	21.4	NO DATA	498	<1.25	292	6	11.8	0.94	222	<0.05	1.07	0.32
SMN-33*	18.66	7.68	0.507	0.25	0.33	236	21.4	NO DATA	497	<1.25	294	6.5	12.7	0.92	222	‡<0.1	1.1	0.32
TS-60	19.67	6.73	0.856	0.42	0.56	447	34.1	<5	863	<1.25	524	21	104	0.92	391	<0.05	1.12	0.55
TS-FORTENB	20.72	6.98	0.838	0.41	0.55	451	16.3	<5	811	<1.25	482	29	180	1.32	383	<0.05	1.33	0.77
WC-527	19.79	7.02	1.168	0.58	0.76	499	77.5	NO DATA	1141	42.1	704	7	36.7	0.18	504	0.21	0.3	0.19
WC-91	19.57	7.27	0.88	0.43	0.57	312	101	NO DATA	872	12.6	482	<4	6.5	0.2	387	<0.05	0.31	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 2008

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	1	3	2	1	0.5	5	3	20	3	0.05	3	4	0.5	1	10
AV-126	<1	<3	454	<1	<0.5	<3	<3	12,70	<3	0.06	<3	<4	<0.5	<1	82.4
AV-462	<1	<3	61.9	<1	<0.5	<3	<3	5,030	<3	<0.05	<3	<4	<0.5	<1	<10
AV-462*	<1	<3	61.6	<1	<0.5	<3	<3	5,010	<3	<0.05	<3	<4	<0.5	<1	<10
AV-5135Z	<1	<3	174	<1	<0.5	<3	<3	87.9	<3	<0.05	<3	<4	<0.5	<1	<10
CO-YAKEY	<1	<3	866	<1	<0.5	<3	<3	15,30	<3	0.07	<3	<4	<0.5	<1	<10
CT-241	<1	6.7	416	<1	<0.5	<3	<3	9,740	<3	<0.05	<3	<4	<0.5	<1	<10
CT-DENNIS	<1	<3	62.6	<1	<0.5	<3	9.8	49.8	<3	R	<3	<4	<0.5	<1	<10
EB-885	<1	36.2	691	<1	<0.5	<3	<3	4,180	<3	<0.05	<3	<4	<0.5	<1	<10
EC-370	<1	<3	634	<1	<0.5	<3	<3	17,40	<3	<0.05	<3	<4	<0.5	<1	<10
FR-1358	<1	<3	309	<1	<0.5	<3	<3	5,400	<3	R	<3	<4	<0.5	<1	<10
IB-363	<1	32.6	432	<1	<0.5	<3	<3	1,990	<3	<0.05	<3	<4	<0.5	<1	<10
IB-5427Z	<1	36.8	190	<1	<0.5	<3	<3	778	<3	<0.05	<3	<4	<0.5	<1	<10
IB-COM	<1	5.9	727	<1	<0.5	<3	<3	4,160	<3	0.12	<3	<4	<0.5	<1	65
IB-COM*	<1	6.1	720	<1	<0.5	<3	<3	4,110	<3	0.08	<3	<4	<0.5	<1	65.4
MA-206	<1	11.6	500	<1	<0.5	<3	<3	11,40	<3	<0.05	<3	<4	<0.5	<1	<10
MA-206*	<1	12.2	502	<1	<0.5	<3	<3	11,50	<3	<0.05	<3	<4	<0.5	<1	<10
MO-871	<1	3.8	316	<1	<0.5	<3	<3	5,760	<3	0.05	<3	<4	<0.5	<1	<10
RI-469	<1	<3	33.6	<1	<0.5	3.9	<3	<20	<3	R	<3	<4	<0.5	<1	260
RI-48	<1	<3	90.1	<1	<0.5	<3	<3	119	<3	R	<3	<4	<0.5	<1	<10
RI-48*	<1	<3	89.7	<1	<0.5	<3	<3	118	<3	R	<3	<4	<0.5	<1	<10
RI-730	<1	<3	116	<1	<0.5	<3	<3	219	<3	0.14	<3	<4	<0.5	<1	<10
SL-5477Z	<1	65.2	867	<1	<0.5	<3	<3	22,70	<3	<0.05	<3	<4	<0.5	<1	<10
SMN-33	<1	<3	642	<1	<0.5	<3	<3	2,010	<3	<0.05	<3	<4	<0.5	<1	<10
SMN-33*	<1	<3	647	<1	<0.5	<3	<3	2,020	<3	<0.05	<3	<4	<0.5	<1	<10
TS-60	<1	<3	755	<1	<0.5	<3	<3	8,850	<3	R	<3	<4	<0.5	<1	<10
TS-FORTENB	<1	14.4	379	<1	<0.5	<3	16.6	12,60	<3	R	<3	<4	<0.5	<1	198
WC-527	<1	<3	419	<1	<0.5	<3	<3	3,630	<3	0.05	<3	<4	<0.5	<1	<10
WC-91	<1	6.4	154	<1	<0.5	<3	<3	720	<3	0.07	<3	<4	<0.5	<1	<10

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

Table 8-4: FY 2008 Field and Conventional Statistics, ASSET Wells

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	18.66	23.91	20.40
	pH (SU)	6.66	8.52	7.22
	Specific Conductance (mmhos/cm)	0.198	2.228	0.890
	Salinity (ppt)	0.09	1.14	0.44
	TDS (g/L)	0.129	1.448	0.580
LABORATORY	Alkalinity (mg/L)	56.7	607.0	336.1
	Chloride (mg/L)	10.0	602.0	75.2
	Color (PCU)	<5	110	17.2
	Specific Conductance (umhos/cm)	199	2,370	871.6
	Sulfate (mg/L)	<1.25	263.0	30.9
	TDS (mg/L)	160	1,314	521
	TSS (mg/L)	<4	56	14
	Turbidity (NTU)	<1	235	61
	Ammonia, as N (mg/L)	<0.1	5.98	0.85
	Hardness (mg/L)	78.1	511.0	341.2
	Nitrite - Nitrate, as N (mg/L)	<0.05	4.94	0.29
	TKN (mg/L)	<0.1	6.11	0.99
	Total Phosphorus (mg/L)	<0.05	1.89	0.48

Table 8-5: FY 2008 Inorganic Statistics, ASSET Wells

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	<1	<1	<1
Arsenic (ug/L)	<3	65.2	9.54
Barium (ug/L)	33.6	867.0	403.9
Beryllium (ug/L)	<1	<1	<1
Cadmium (ug/L)	<0.5	<0.5	<0.5
Chromium (ug/L)	<3	3.9	<3
Copper (ug/L)	<3	16.6	<3
Iron (ug/L)	<20	22,700	5,985
Lead (ug/L)	<3	<3	<3
Mercury (ug/L)	<0.05	0.14	<0.05
Nickel (ug/L)	<3	<3	<3
Selenium (ug/L)	<4	<4	<4
Silver (ug/L)	<0.5	<0.5	<0.5
Thallium (ug/L)	<1	<1	<1
Zinc (ug/L)	<10	260	28

Table 8-6: Triennial Field and Conventional Statistics, ASSET Wells

	PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE	FY 2005 AVVERAGE	FY 2008 AVERAGE
FIELD	Temperature (^{O}C)	19.09	20.60	20.13	19.62	20.40
	pH (SU)	6.70	6.63	6.91	6.98	7.22
	Specific Conductance (mmhos/cm)	0.76	0.79	0.81	0.80	0.890
	Salinity (ppt)	0.35	0.39	0.41	0.40	0.44
	TDS (g/L)	-	-	-	0.52	0.580
LABORATORY	Alkalinity (ppm)	306.0	328.7	316.1	347.2	336.1
	Chloride (ppm)	68.2	55.2	44.8	48.6	75.2
	Color (PCU)	26.0	16.1	47.7	38.0	17.2
	Specific Conductance (umhos/cm)	768.6	804.1	769.4	766.2	871.6
	Sulfate (ppm)	7.7	25.2	24.8	22.5	30.9
	TDS (ppm)	674.3	494.9	481.7	489.0	521
	TSS (ppm)	18.8	15.4	12.5	16.4	14
	Turbidity (NTU)	46.32	62.12	57.86	75.25	61
	Ammonia, as N (ppm)	1.26	1.00	0.95	1.10	0.85
	Hardness (ppm)	299.7	309.6	304.1	297.5	341.2
	Nitrite - Nitrate , as N (ppm)	0.31	0.29	0.72	0.19	0.29
	TKN (ppm)	1.34	1.43	1.27	1.36	0.99
	Total Phosphorus (ppm)	0.49	0.54	0.54	0.59	0.48

Table 8-7: Triennial Inorganic Statistics, ASSET Wells

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE	FY 2005 AVERAGE	FY 2008 AVERAGE
Antimony (ppb)	<5	<5	<5	<60	<1
Arsenic (ppb)	12.68	14.55	9.21	14.31	9.54
Barium (ppb)	473.5	412.3	403.9	524.5	403.9
Beryllium (ppb)	<5	<5	<5	<5	<1
Cadmium (ppb)	<5	<5	<5	<5	<0.5
Chromium (ppb)	<5	<5	<5	<10	<3
Copper (ppb)	9.86	8.55	6.18	<10	<3
Iron (ppb)	5,022	4,690	6,008.1	8,726	5,985
Lead (ppb)	<10	<10	<10	<10	<3
Mercury (ppb)	<0.05	<0.05	<0.05	<0.2	<0.05
Nickel (ppb)	<5	<5	<5	<40	<3
Selenium (ppb)	<5	<5	<5	<35	<4
Silver (ppb)	<5	<5	<5	<10	<0.50
Thallium (ppb)	<5	<5	<5	<5	<1
Zinc (ppb)	43.5	177.2	48.3	29.6	28.0

Table 8-8: VOC Analytical Parameters

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

Table 8-9: SVOC Analytical Parameters

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
1,2-Dichlorobenzene	625	10
1,2,3-Trichlorobenzene	625	10
1,2,3,4-Tetrachlorobenzene	625	10
1,2,4-Trichlorobenzene	625	10
1,2,4,5-Tetrachlorobenzene	625	10
1,3-Dichlorobenzene	625	10
1,3,5-Trichlorobenzene	625	10
1,4-Dichlorobenzene	625	10
2-Chloronaphthalene	625	10
2-Chlorophenol	625	20
2-Methyl-4,6-dinitrophenol	625	20
2-Nitrophenol	625	20
2,4-Dichlorophenol	625	20
2,4-Dimethylphenol	625	20
2,4-Dinitrophenol	625	20
2,4-Dinitrotoluene	625	10
2,4,6-Trichlorophenol	625	20
2,6-Dinitrotoluene	625	10
3,3'-Dichlorobenzidine	625	10
4-Bromophenyl phenyl ether	625	10
4-Chloro-3-methylphenol	625	20
4-Chlorophenyl phenyl ether	625	10
4-Nitrophenol	625	20
Acenaphthene	625	10
Acenaphthylene	625	10
Anthracene	625	10
Benzidine	625	20
Benzo[a]pyrene	625	10
Benzo[k]fluoranthene	625	10
Benzo[a]anthracene	625	10
Benzo[b]fluoranthene	625	10
Benzo[g,h,i]perylene	625	10
Bis(2-chloroethoxy)methane	625	10
Bis(2-ethylhexyl)phthalate	625	10
Bis(2-chloroethyl)ether	625	10
Bis(2-chloroisopropyl)ether	625	10

Table 8-9: SVOCs (Continued)

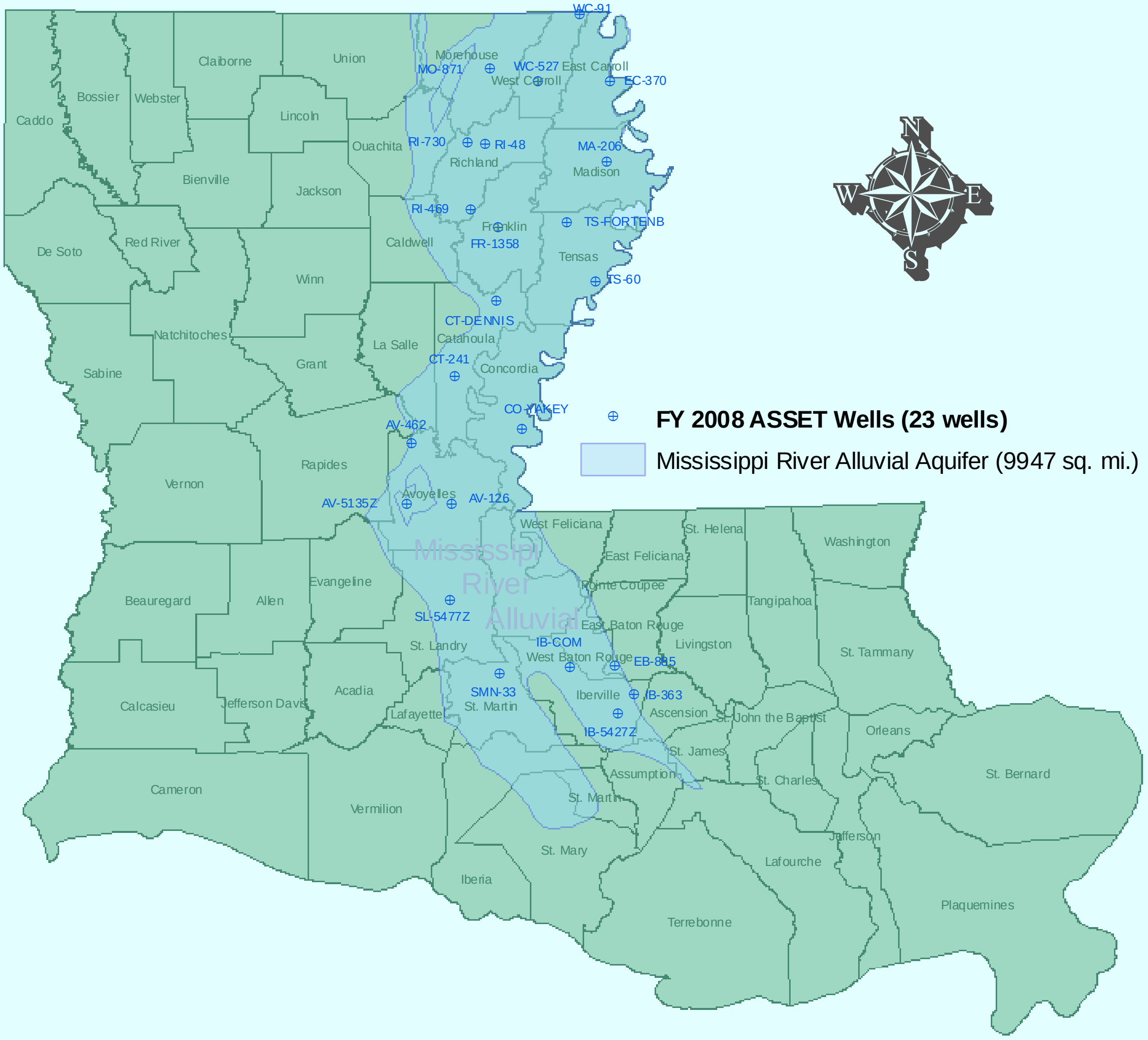
COMPOUND	METHOD	DETECTION LIMIT (ug/L)
Butylbenzylphthalate	625	10
Chrysene	625	10
Dibenzo[a,h]anthracene	625	10
Diethylphthalate	625	10
Dimethylphthalate	625	10
Di-n-butylphthalate	625	10
Di-n-octylphthalate	625	10
Fluoranthene	625	10
Fluorene	625	10
Hexachlorobenzene	625	10
Hexachlorobutadiene	625	10
Hexachlorocyclopentadiene	625	10
Hexachloroethane	625	10
Indeno[1,2,3-cd]pyrene	625	10
Isophorone	625	10
Naphthalene	625	10
Nitrobenzene	625	10
N-Nitrosodimethylamine	625	10
N-Nitrosodiphenylamine	625	10
N-nitroso-di-n-propylamine	625	10
Pentachlorobenzene	625	10
Pentachlorophenol	625	20
Phenanthrene	625	10
Phenol	625	20
Pyrene	625	10

Table 8-10: Pesticides and PCBs

COMPOUND	METHOD	DETECTION LIMITS* (ug/L)
4,4'-DDD	608	0.05/0.1
4,4'-DDE	608	0.05/0.1
4,4'-DDT	608	0.05/0.1
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	0.05/0.1
Endosulfan I	608	0.05
Endosulfan II	608	0.05/0.1
Endosulfan Sulfate	608	0.05/0.1
Endrin	608	0.05/0.1
Endrin Aldehyde	608	0.05/0.1
Endrin Ketone	608	0.05/0.1
Heptachlor	608	0.05
Heptachlor Epoxide	608	0.05
Methoxychlor	608	0.05/0.5
Toxaphene	608	2
Gamma-Chlordane	608	0.05
PCB-1016	608	1
PCB-1221	608	1
PCB-1232	608	1
PCB-1242	608	1
PCB-1248	608	1
PCB-1254	608	1
PCB-1260	608	1

*Multiple detection limits due to multiple labs performing analyses.

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

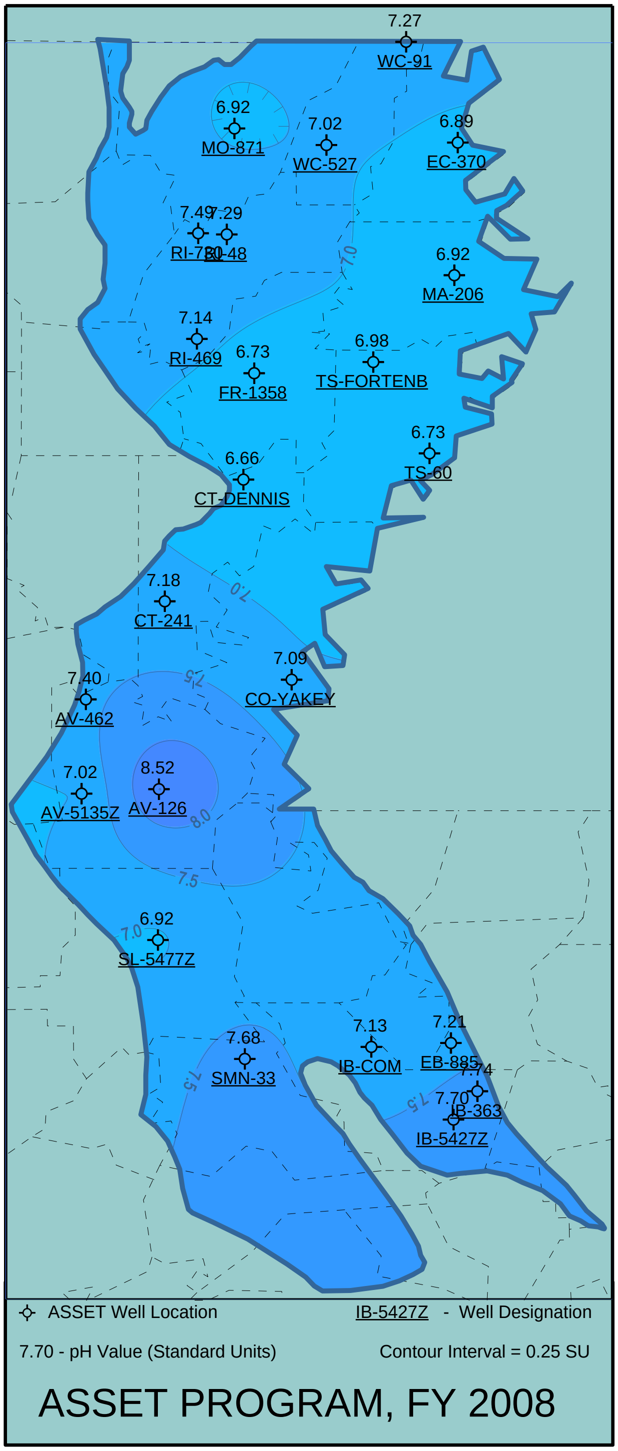

Figure 8-3: Map of TDS Data

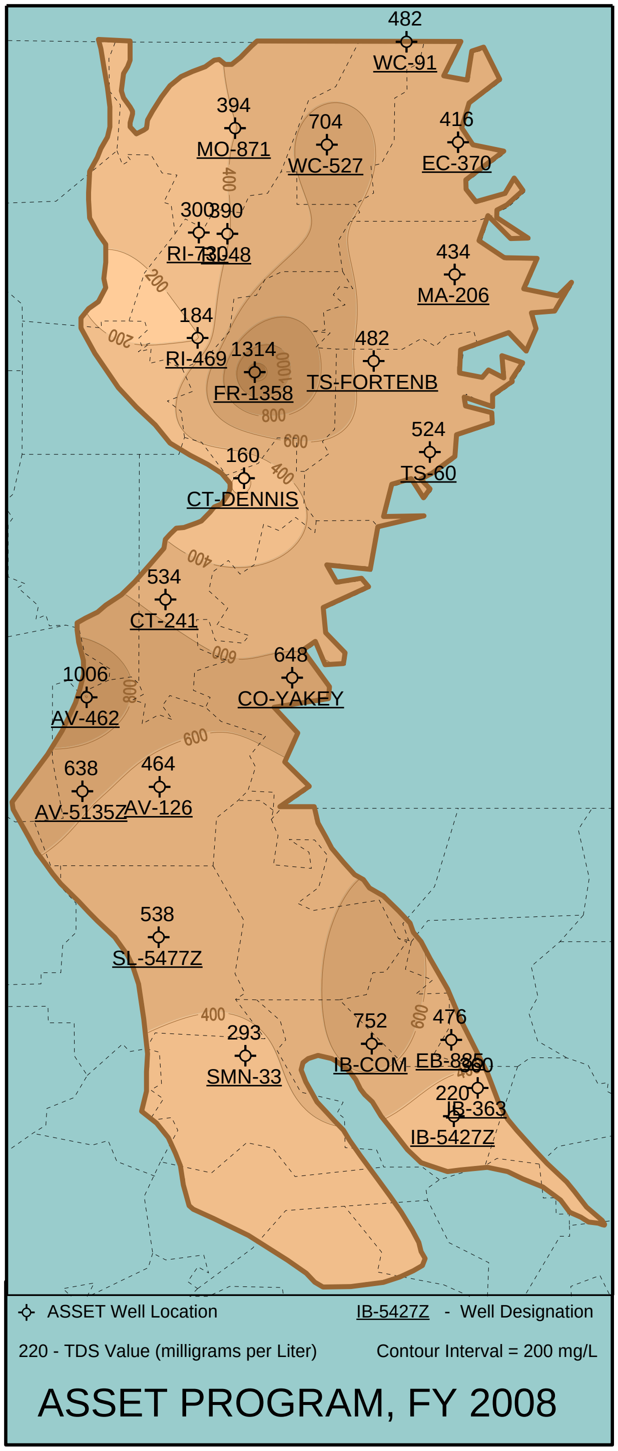

Figure 8-4: Map of Chloride Data

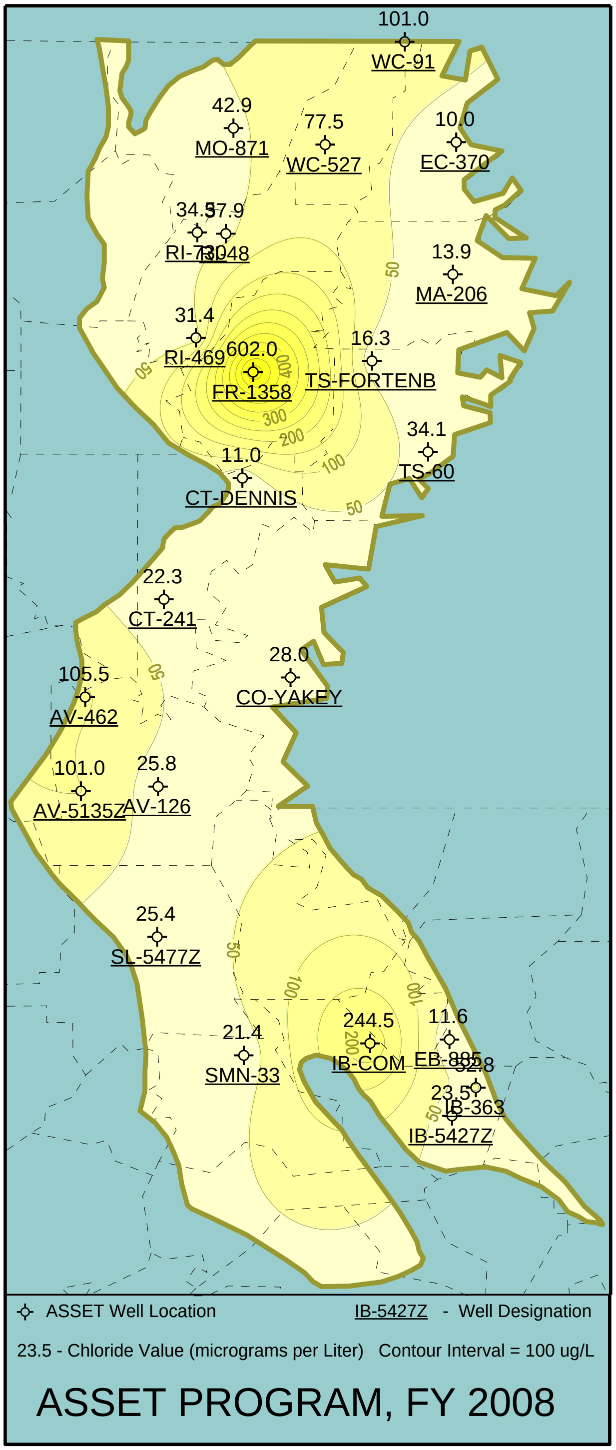

Figure 8-5: Map of Iron Data

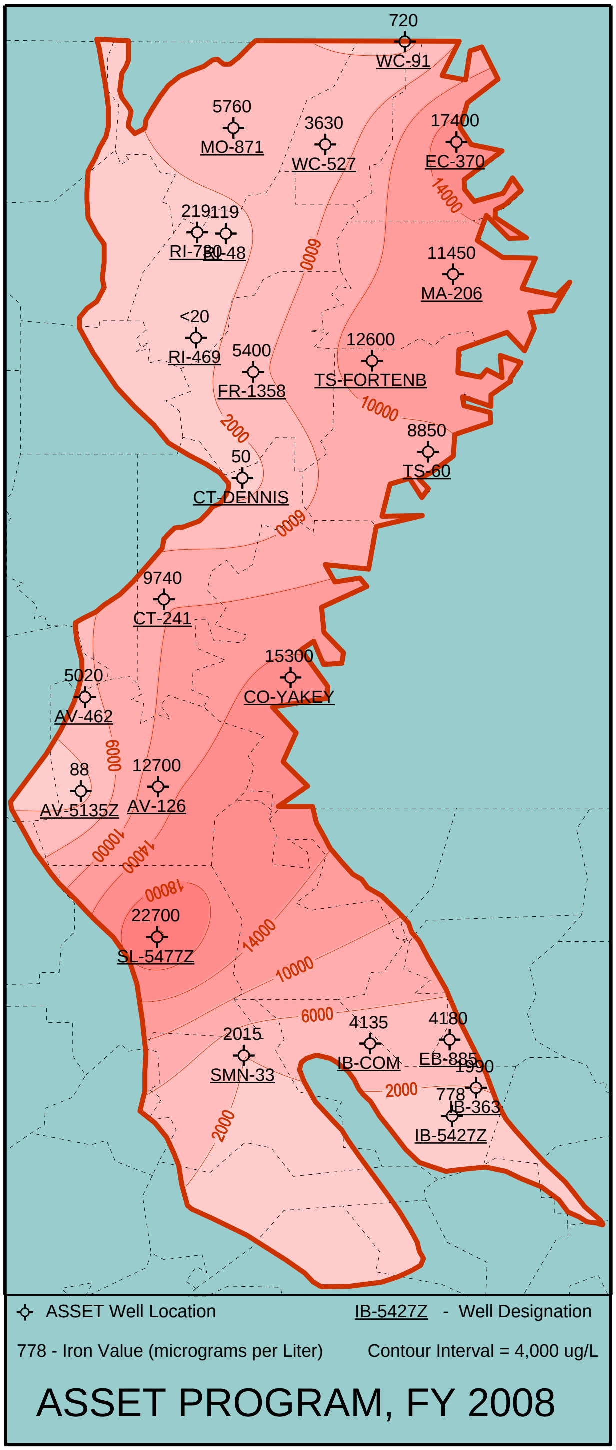

Chart 8-1: Temperature Trend

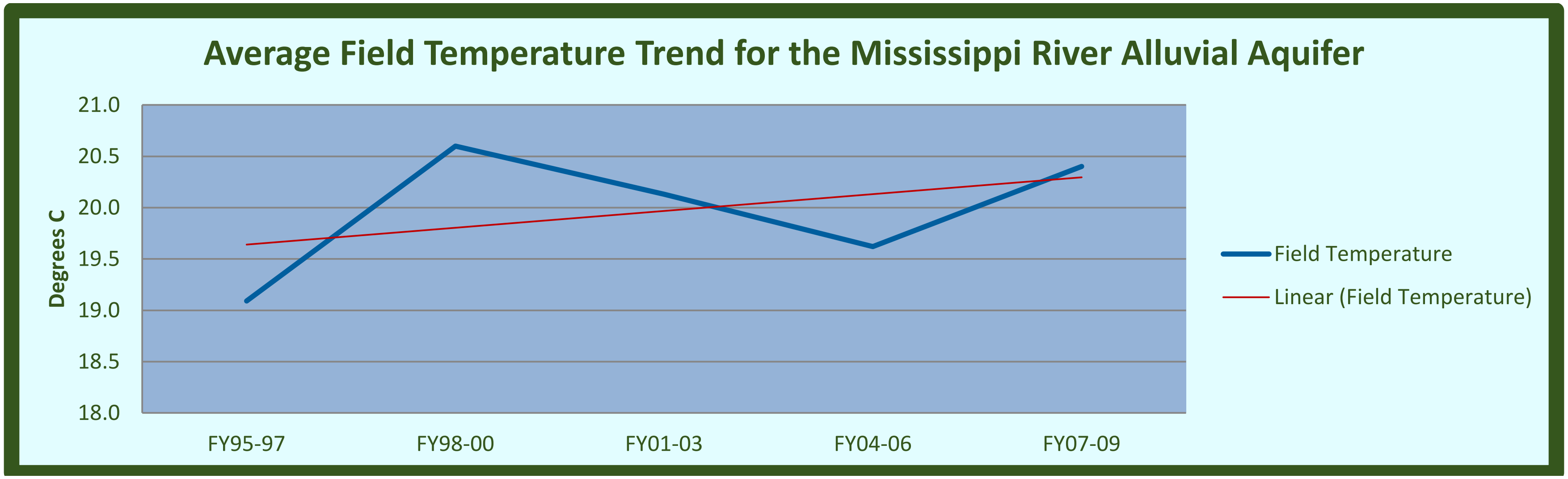

Chart 8-2: pH Trend

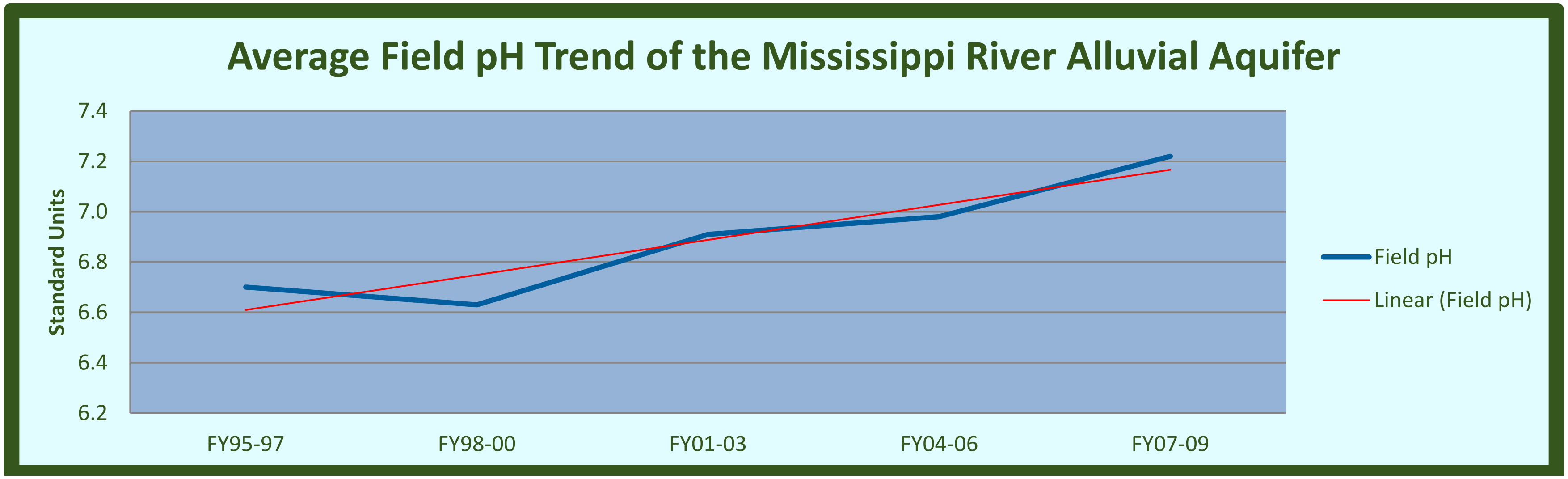

Chart 8-3: Field Specific Conductance Trend

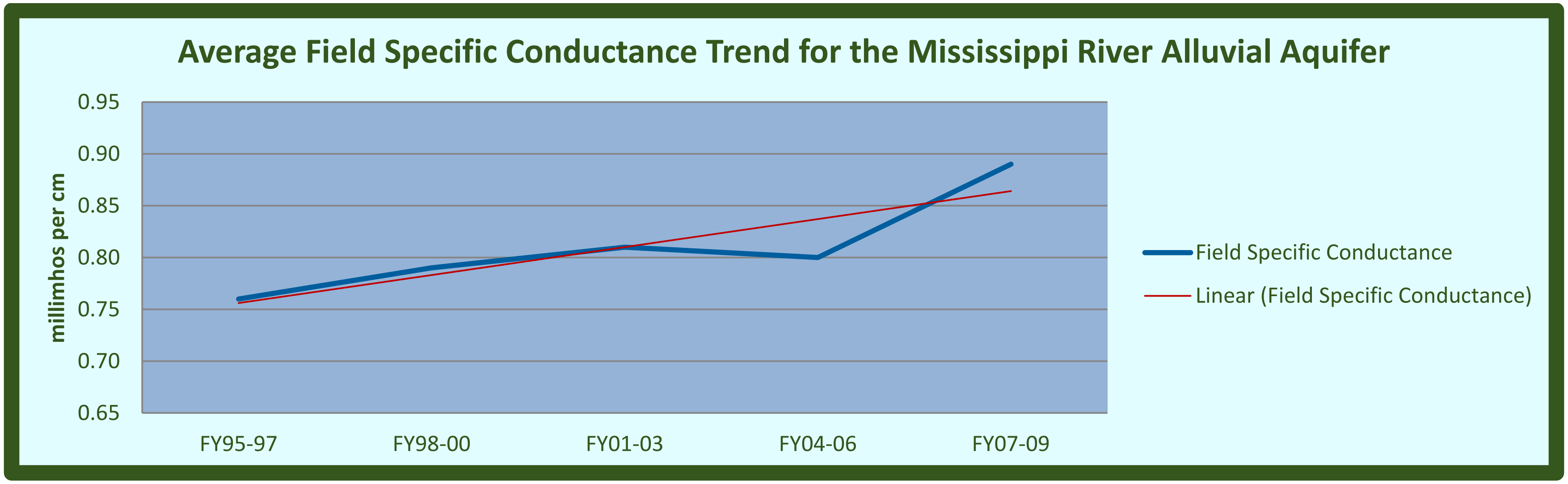

Chart 8-4: Lab Specific Conductance Trend

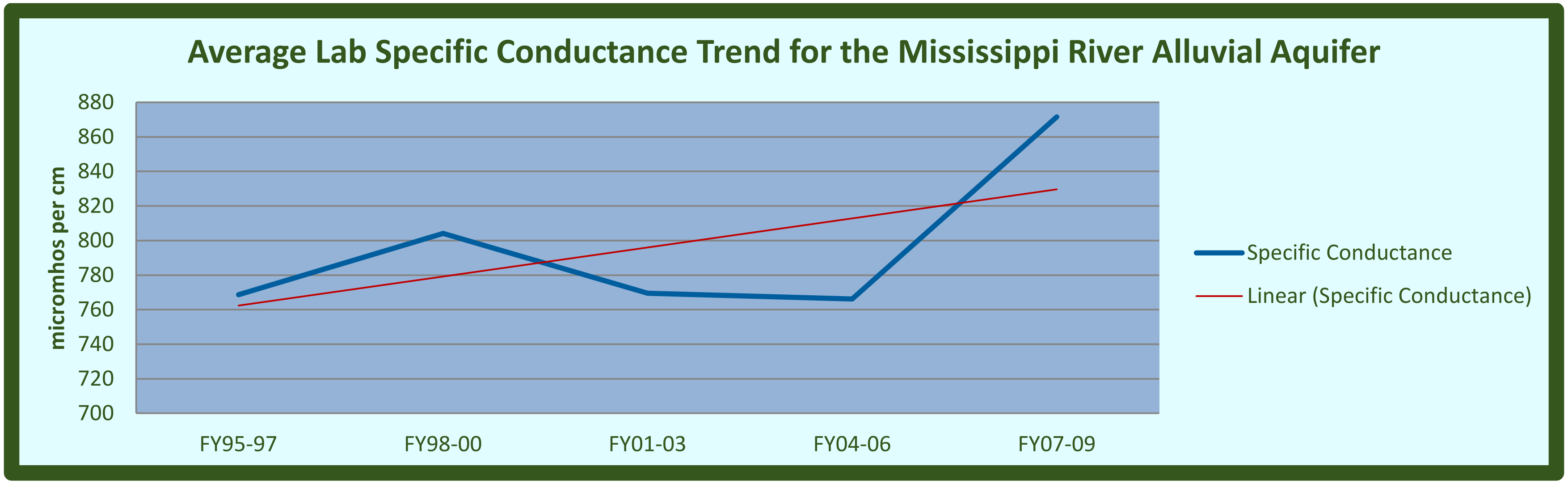

Chart 8-5: Field Salinity Trend

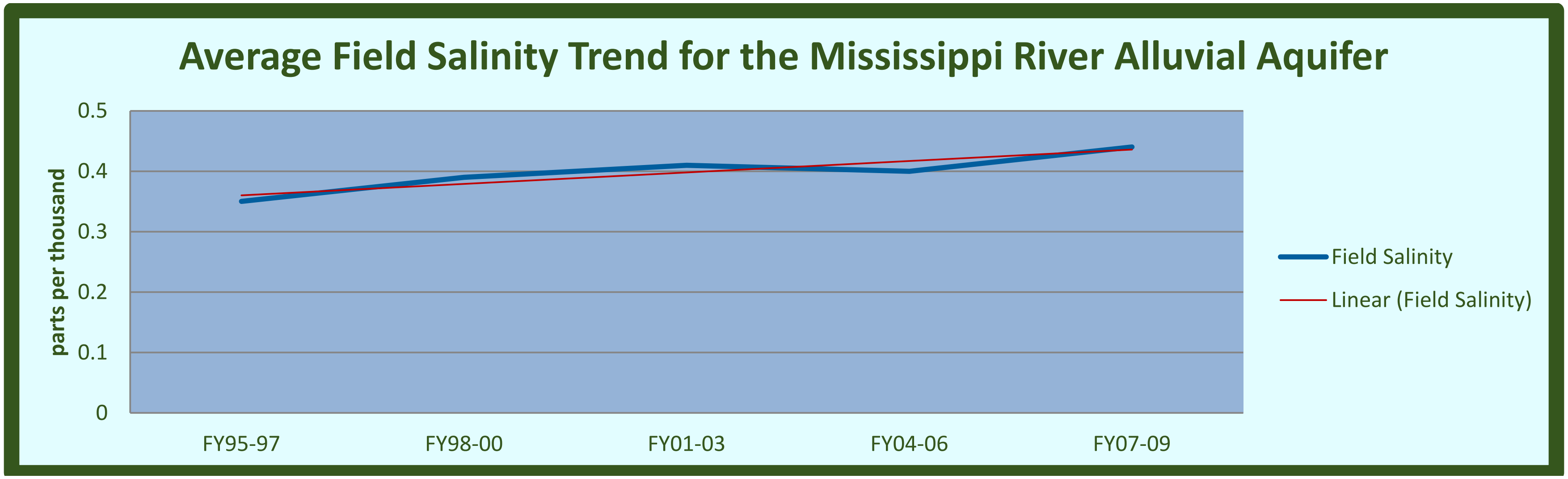

Chart 8-6: Alkalinity Trend

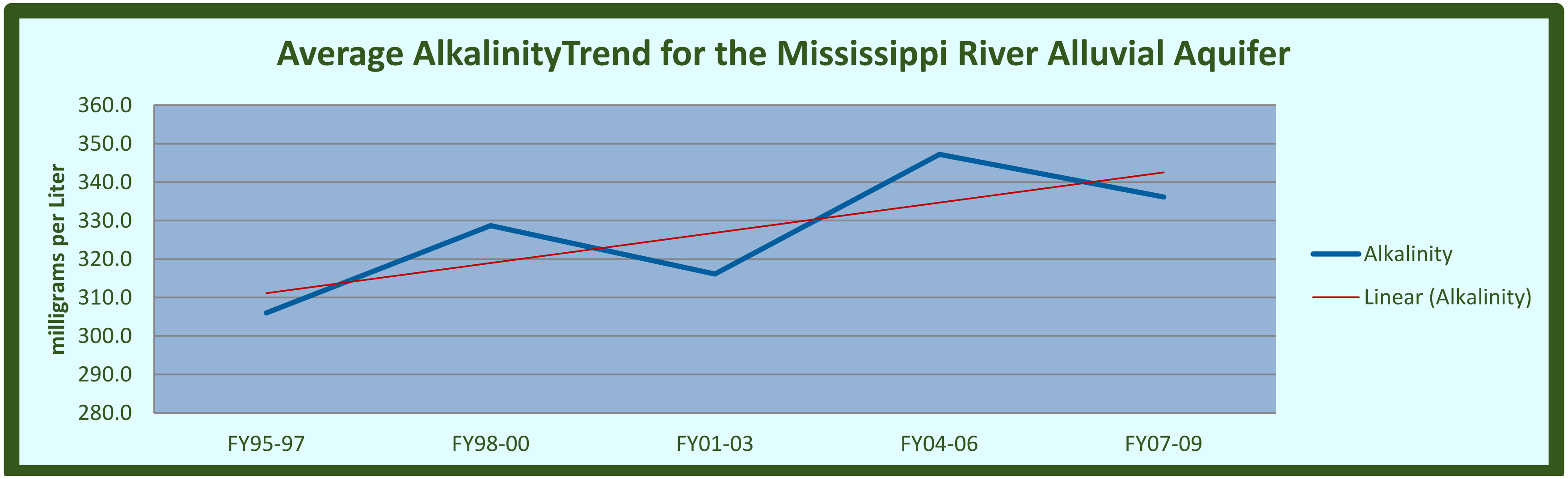

Chart 8-7: Chloride Trend

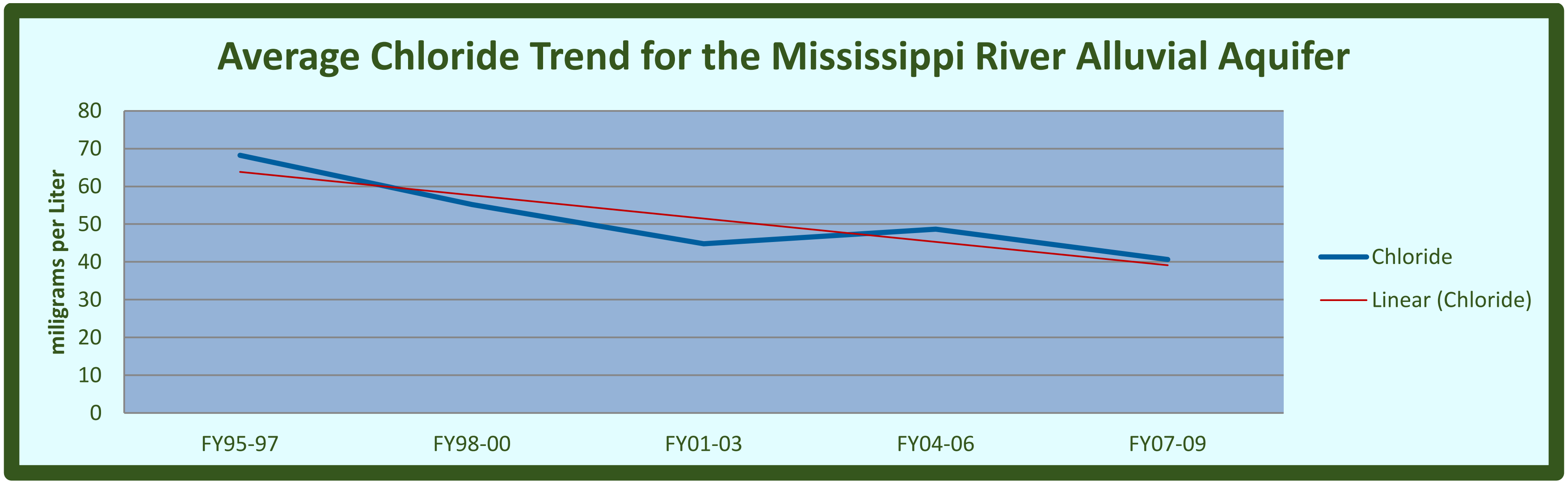

Chart 8-8: Color Trend

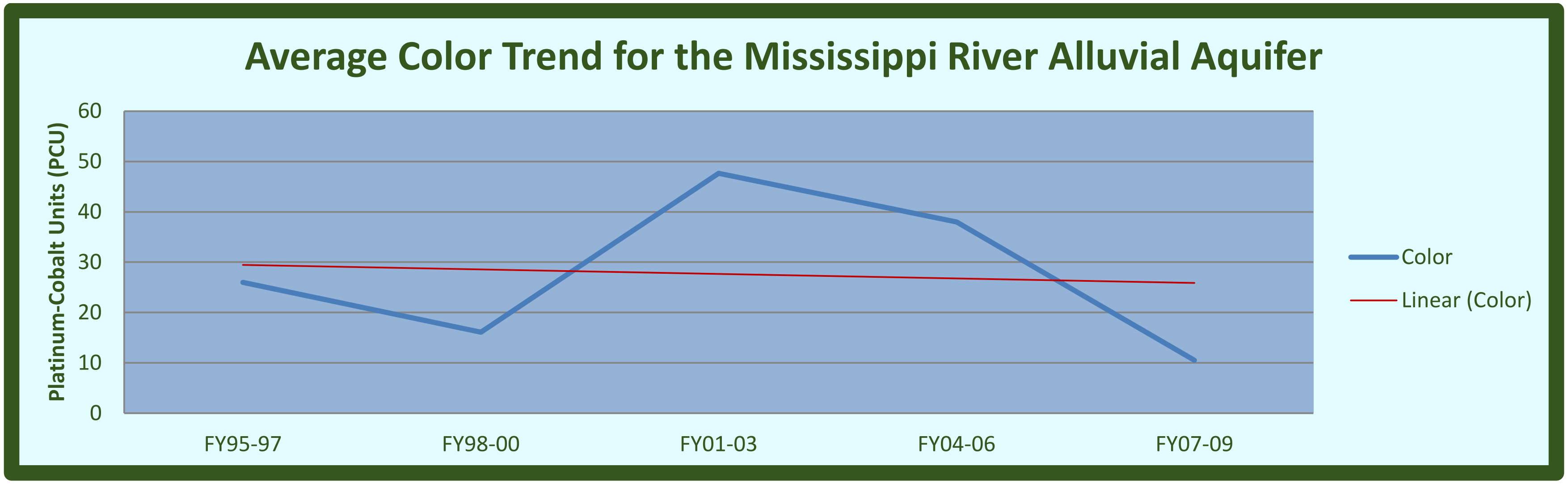

Chart 8-9: Sulfate (SO4) Trend

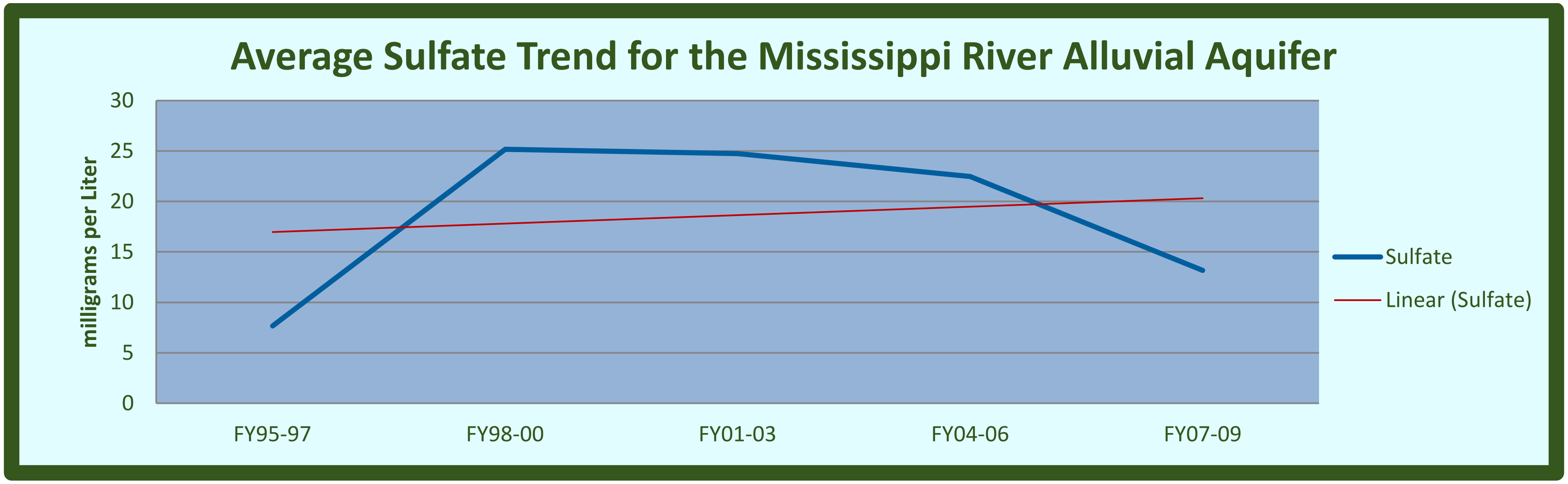

Chart 8-10: Total Dissolved Solids (TDS) Trend

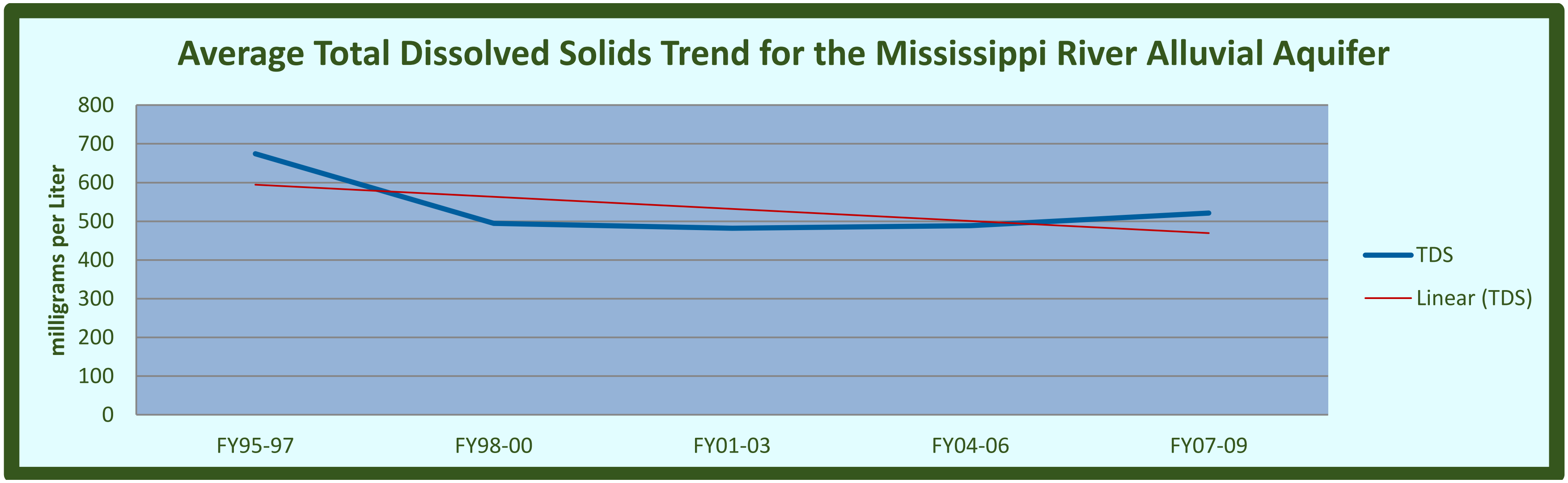

Chart 8-11: Ammonia (NH3) Trend

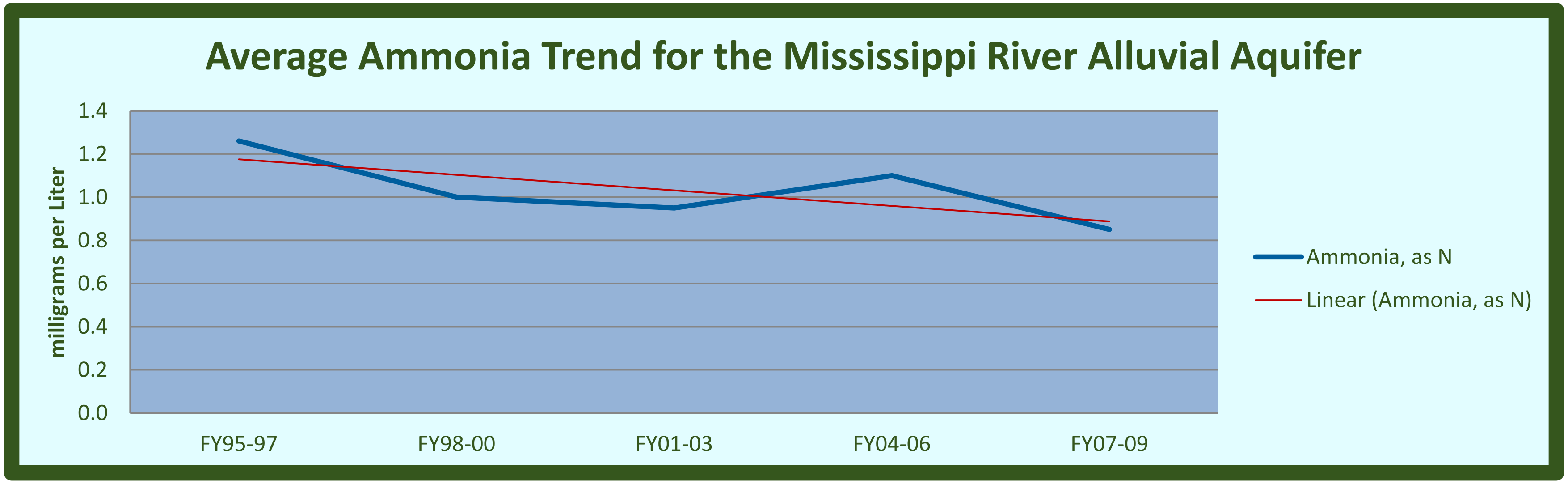

Chart 8-12: Hardness Trend

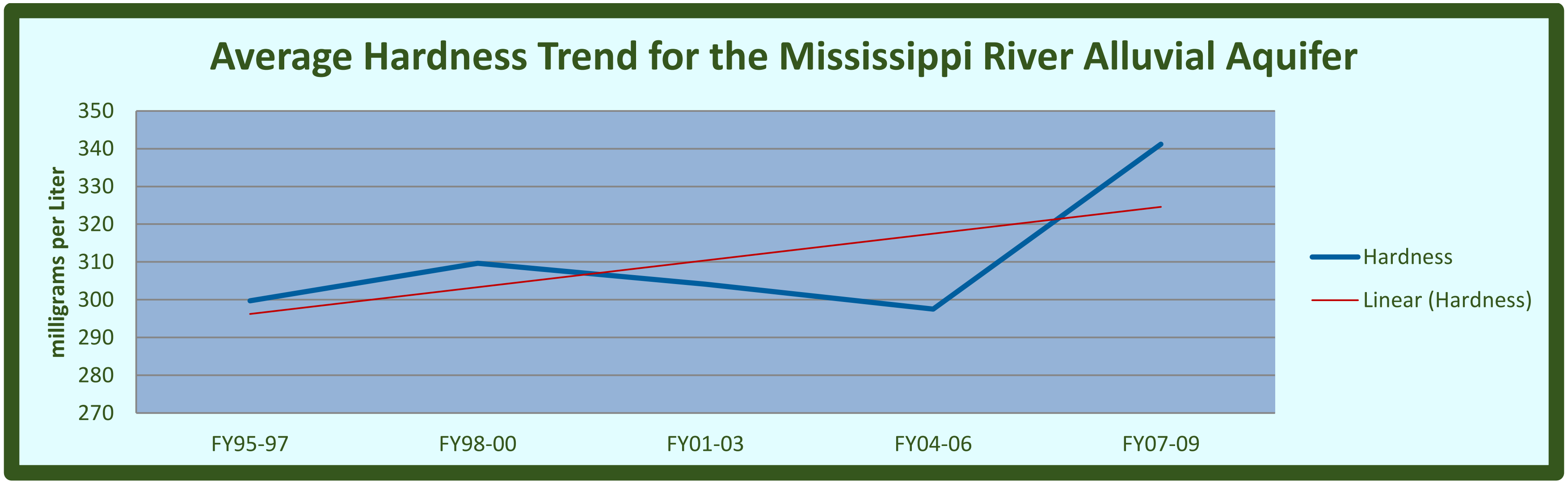

Chart 8-13: Nitrite – Nitrate Trend

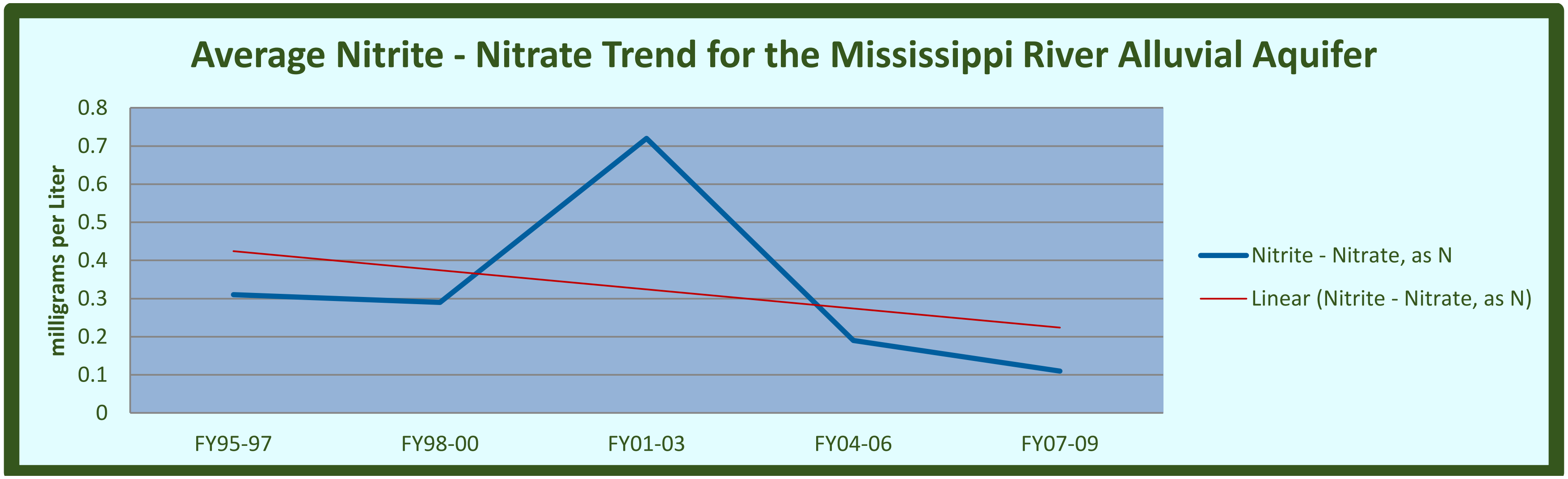

Chart 8-14: TKN Trend

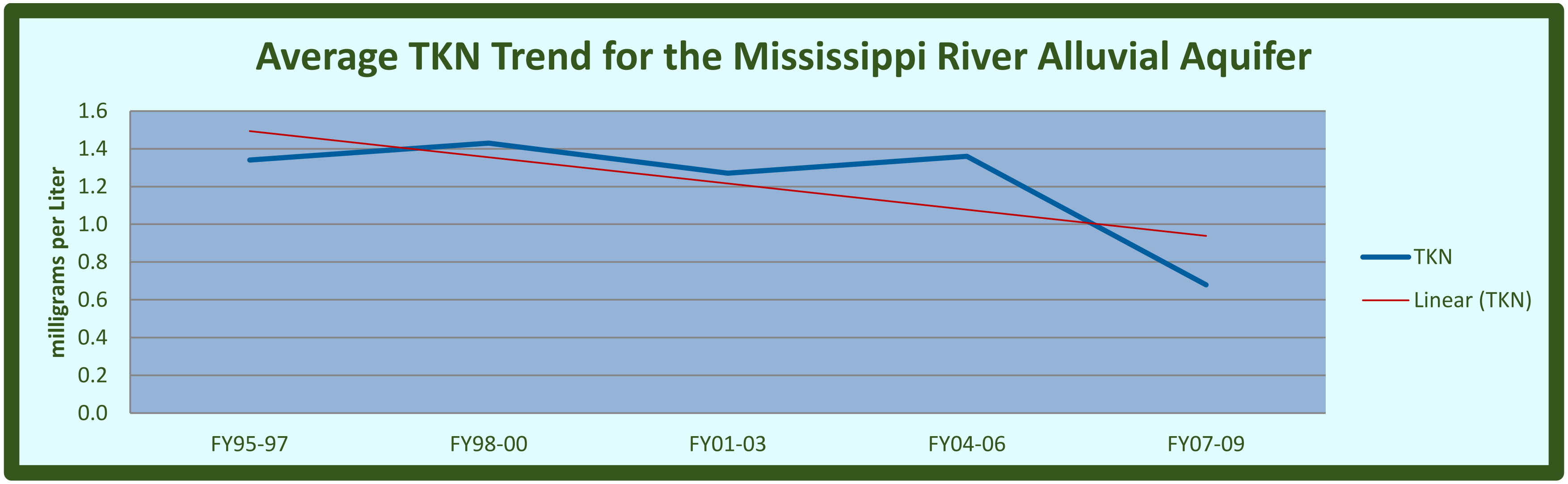

Chart 8-15: Total Phosphorus Trend

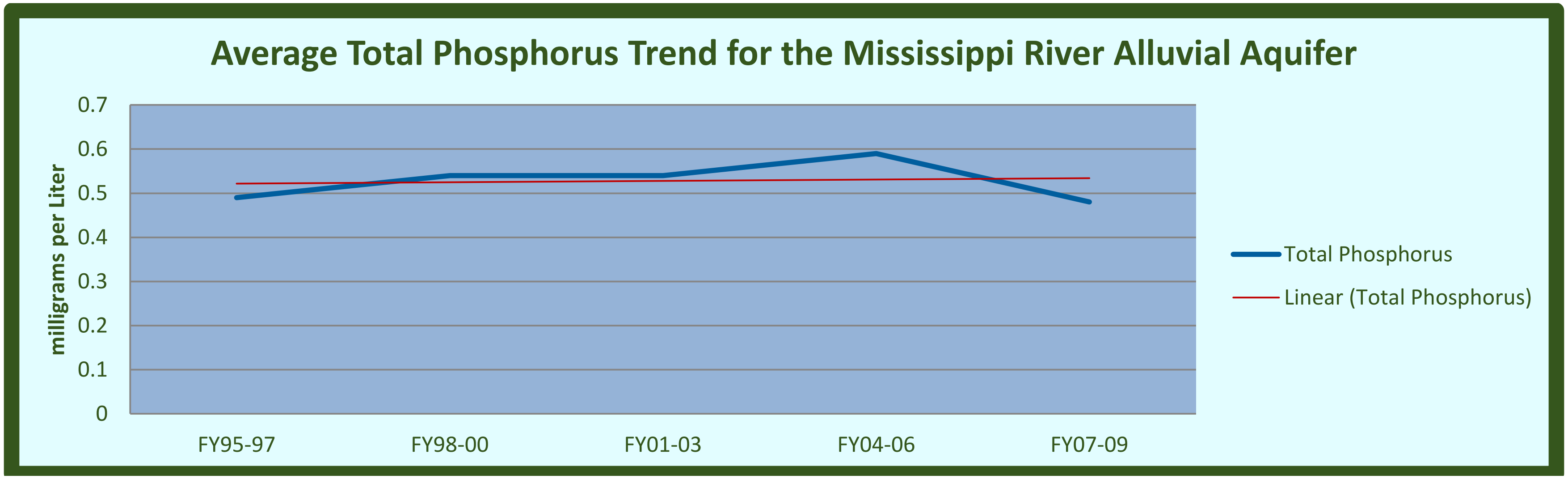

Chart 8-16: Iron Trend