

# **NORTH LOUISIANA TERRACE AQUIFER SUMMARY, 2010 AQUIFER SAMPLING AND ASSESSMENT PROGRAM**



**APPENDIX 6 TO THE 2012 TRIENNIAL SUMMARY REPORT  
PARTIAL FUNDING PROVIDED BY THE CWA**



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## 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 North Louisiana Terrace aquifer, during the 2010 state fiscal year (July 1, 2009 - June 30, 2010). This summary will become Appendix 6 of ASSET Program Triennial Summary Report for 2012.

These data show that in March and May 2010, 11 wells were sampled which produce from the North Louisiana Terrace aquifer. Seven of these wells are classified as public supply, three as domestic, and one as industrial. The wells are located in 7 parishes in the central, northeast, and northwest areas of the state.

Figure 6-1 shows the geographic locations of the North Louisiana Terrace aquifer and the associated wells, whereas Table 6-1 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

The Pleistocene Terrace aquifers that make up the North Louisiana Terrace aquifer occur as blanket terrace deposits in central Louisiana and as erosional remnants of dissected terraces northward. The Prairie, intermediate, and high terraces typically consist of unconsolidated, fining upward sequences of gravel, sand, silt, and clay and are overlain by Holocene alluvium in the valleys of the larger streams. The older terraces generally have a coarser texture and the fine-grained top stratum is often eroded. The aquifer deposits are typically poorly to well sorted and consist of coarse sand and gravel in the lower parts grading to fine sand toward the top. The North Louisiana Terrace is unconfined in most areas, but may be confined by silt and clay locally.

## HYDROGEOLOGY

Recharge is primarily from the direct infiltration of rainfall in interstream, upland outcrop areas and can be relatively rapid where the overlying silts and clays are thin or missing. Water in the terrace aquifers moves downgradient and laterally and is discharged into streams that have eroded valleys into the aquifer units. Water levels typically reflect variations in precipitation and seasonal withdrawals by wells. The hydraulic conductivity of the North Louisiana Terrace varies between 150 and 270 feet/day.

The maximum depths of occurrence of freshwater in the North Louisiana Terrace range from 100 feet above sea level, to 100 feet below sea level. The range of thickness of the fresh water interval in the North Louisiana Terrace is 50 to 150 feet. The depths of the North Louisiana Terrace wells that were monitored in conjunction with the BMP range from 49 to 158 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 6-2. The inorganic (total metals) parameters analyzed in the laboratory are listed in Table 6-3. 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 BO-7896Z and MO-364.

In addition to the field, conventional, and inorganic (total metals) 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 6-8, 6-9 and 6-10 list the target analytes for volatiles, semi-volatiles and pesticides/PCBs, respectively.

Tables 6-4 and 6-5 provide a statistical overview of field and conventional data, and inorganic data for the North Louisiana Terrace aquifer, listing the minimum, maximum, and average results for these parameters. Tables 6-6 and 6-7 compare these same parameter averages to historical ASSET-derived data for the North Louisiana Terrace aquifer, from fiscal years 1995, 1998, 2001, 2004, and 2007.

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 6-2, 6-3, 6-4, and 6-5 respectively, represent the contoured data for pH, total dissolved solids, chloride, and iron. Charts 6-1 through 6-16 represent the trend of the graphed parameter,

based on the averaged value of that parameter for each three-year reporting period. Discussion of historical data and related trends is found in the **Water Quality Trends and Comparison to Historical ASSET Data** section.

## INTERPRETATION OF DATA

Under the Federal Safe Drinking Water Act, EPA has established maximum contaminant levels (MCLs) for pollutants that may pose a health risk in public drinking water. An MCL is the highest level of a contaminant that EPA allows in public drinking water. MCLs ensure that drinking water does not pose either a short-term or long-term health risk. While not all wells sampled were public supply wells, the ASSET Program 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 6-2 and 6-3 show that one or more secondary MCL (SMCL) was exceeded in eight of the 11 wells sampled in the North Louisiana Terrace aquifer, with a total of 15 SMCLs exceeded.

### *Field and Conventional Parameters*

Table 6-2 shows the field and conventional parameters for which samples are collected at each well and the analytical results for those parameters. Table 6-4 provides an overview of this data for the North Louisiana Terrace aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analysis listed in Table 6-2 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 6-2 shows that four wells exceeded the SMCL for pH<sup>1</sup>, one well exceeded the SMCL for color, while two wells had unsupported exceedances for color. Duplicate sample results of the two wells were below the SMCL. Two wells exceeded the SMCL for total dissolved solids (TDS), and one well exceeded the SMCL for chloride. 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:

#### **pH (SMCL = 6.5 – 8.5 Standard Units):**

G-342 – 5.65 SU  
LS-264 – 6.31 SU

G-432 – 6.03 SU  
OU-5524Z – 5.95 SU

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<sup>1</sup> pH was recorded for only nine of the 11 wells due to meter being inoperable.

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

	LAB RESULTS (in mg/L)	FIELD MEASURES (in g/L)
BO-7896Z	685 mg/L, Duplicate – 689 mg/L	N/A
MO-364	1,500 mg/L, Duplicate – 1,510 mg/L	1.067 g/L (Original & Duplicate)

**Color (SMCL = 15 PCU)**

BO-7896Z	– 25 PCU, Duplicate – 9 PCU (<SMCL)	G-432 – 16
MO-364	– 16 PCU, Duplicate – 14 PCU (<SMCL)	

**Chloride (SMCL = 250 mg/L):**

MO-364	– 311 mg/L, Duplicate – 323 mg/L
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***Inorganic Parameters***

Table 6-3 shows the inorganic (total metals) parameters for which samples are collected at each well and the analytical results for those parameters. Table 6-5 provides an overview of inorganic data for the North Louisiana Terrace aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards: A review of the analyses listed in Table 6-3 shows that no primary MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards: Laboratory data contained in Table 6-3 shows that five wells exceeded the secondary MCL for iron:

**Iron (SMCL = 300 ug/L):**

BO-578	– 560 ug/L	BO-7896Z	– 2,520 ug/L, Duplicate – 2,420 ug/L
MO-364	– 1,760 ug/L, Duplicate – 1,470 ug/L	OU-5524Z	– 320 ug/L
RR-254	– 1,480 ug/L		

***Volatile Organic Compounds***

Table 6-8 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.

Chloromethane was reported in three wells and in the field blank prepared for quality control. Because chloromethane is a common lab contaminant, and because of its occurrence in the field blank, it is determined that these results are due to lab contamination and not contamination of the wells.

No other VOC was detected at or above its detection limit during the FY 2010 sampling of the North Louisiana Terrace aquifer.

***Semi-Volatile Organic Compounds***

Table 6-9 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.

No SVOC was detected at or above its detection limit during the FY 2010 sampling of the North Louisiana Terrace aquifer.

## ***Pesticides and PCBs***

Table 6-10 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 2010 sampling of the North Louisiana Terrace 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 North Louisiana Terrace aquifer exhibit some changes 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 6-6 and 6-7, and in Charts 6-1 to 6-16 of this summary. Over the fifteen year period, nine analytes have shown a general increase in their average concentrations. These analytes are: alkalinity, barium, chloride, hardness, salinity, specific conductance (lab and field), TDS, and TKN. For this same time period, eight analytes have demonstrated a decrease in their average concentrations: ammonia, color, iron, nitrite-nitrate, sulfate, temperature, total phosphorus, and zinc.

Current sample results show that seven wells reported one or more SMCL exceedances with a total of 15 exceedances. Historical data show that in the FY 2007 sampling of the North Louisiana Terrace aquifer, there were nine wells with one or more SMCL exceedances for a total of 11 SMCL exceedances also.

## SUMMARY AND RECOMMENDATIONS

In summary, the data show that the groundwater produced from this aquifer is moderately hard<sup>2</sup> and is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no ASSET well that was sampled during the Fiscal Year 2010 monitoring of the North Louisiana Terrace aquifer exceeded an MCL. The data also show that this aquifer is of fair to good quality when considering taste, odor or appearance guidelines, with 15 SMCLs exceeded in seven wells.

Comparison to historical ASSET-derived data shows some change in the quality or characteristics of the North Louisiana Terrace aquifer, with nine parameters showing consistent increases in average concentration, eight parameters decreasing in average concentration, while remaining parameters show no consistent change or remained below detection limits.

It is recommended that the wells assigned to the North Louisiana Terrace aquifer be resampled as planned, in approximately three years. In addition, several wells should be added to the 11 currently in place to increase the well density for this aquifer.

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

**Table 6-1: List of Wells Sampled, North Louisiana Terrace Aquifer–FY 2010**

DOTD Well Number	Parish	Date	Owner	Depth (Feet)	Well Use
BI-208	Bienville	3/29/2010	Private Owner	100	Domestic
BO-434	Bossier	5/18/2010	Red Chute Utilities	94	Public Supply
BO-578	Bossier	3/29/2010	Village Water System	85	Public Supply
BO-7896Z	Bossier	5/18/2010	Private Owner	96	Domestic
G-342	Grant	3/30/2010	Vanguard Synfuels, LLC	49	Industrial
G-432	Grant	3/30/2010	Central Grant Water System	158	Public Supply
LS-264	La Salle	3/30/2010	City of Jena	105	Public Supply
MO-124	Morehouse	3/4/2010	Texas Gas	133	Public Supply
MO-364	Morehouse	3/4/2010	People Water Service	154	Public Supply
OU-5524Z	Ouachita	3/4/2010	Private Owner	95	Domestic
RR-254	Red River	3/29/2010	East Cross Water System	93	Public Supply



**Table 6-2: Summary of Field and Conventional Data, North Louisiana Terrace Aquifer–FY 2010**

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	0.25	1	10	0.25/0.5	10	4	0.3	0.05	5	0.01	0.3	0.05
	FIELD PARAMETERS					LABORATORY PARAMETERS												
BI-208	17.9	6.52	0.094	0.04	0.061	10	10.3	7	92.4	1.61	106	< 4	< 0.3	< 0.05	< 5	< 0.01	< 0.3	< 0.05
BO-434	Field Parameters Not Measured					100	10.6	< 1	247	4.39	243	< 4	< 0.3	< 0.05	48	0.261	< 0.3	0.354
BO-578	18.7	7.60	0.413	0.2	0.268	172	24.2	4	380	< 0.25	209	4	3.5	0.356	80	< 0.01	0.541	0.285
BO-7896Z	Field Parameters Not Measured					328	55.7	25	762	13.20	685	7	22	0.234	390	< 0.01	0.405	0.442
BO-7896Z*	Field Parameters Not Measured					334	55.4	9	753	13.10	689	8	23.4	0.214	410	< 0.01	< 0.3	0.419
G-342	18.62	5.65	0.093	0.04	0.060	8	9.2	< 1	93.9	3.30	88	< 4	< 0.3	< 0.05	< 5	3.87	< 0.3	< 0.05
G-432	18.24	6.03	0.045	0.02	0.029	8	3.4	16	46.7	0.56	39	12	< 0.3	< 0.05	< 5	0.422	< 0.3	< 0.05
LS-264	17.92	6.31	0.121	0.06	0.079	20	11.9	6	120	9.87	97	15	< 0.3	< 0.05	< 5	0.738	< 0.3	< 0.05
MO-124	19.04	6.59	0.265	0.13	0.172	80	29.3	14	262	< 0.5	236	< 4	1.8	< 0.05	48	0.773	0.393	0.129
MO-364	20.3	6.71	1.642	0.83	1.067	266	311.0	16	1,570	88.00	1,500	7	3.5	< 0.05	296	< 0.01	< 0.3	0.227
MO-364*	20.3	6.71	1.642	0.83	1.067	248	323.0	14	1,590	97.30	1,510	6	3.0	< 0.05	322	< 0.01	0.399	0.240
OU-5524Z	18.11	5.95	0.130	0.06	0.084	30	17.4	< 1	123	1.52	102	28	1.7	< 0.05	< 5	0.178	< 0.3	0.157
RR-254	17.94	7.40	0.176	0.08	0.114	38	16.5	10	158	9.08	150	< 4	2.1	< 0.05	< 5	< 0.01	0.653	0.118

\*Denotes Duplicate Sample

Shaded cells exceed EPA Secondary Standards



**Table 6-3: Summary of Inorganic (Total Metals) Data, North Louisiana Terrace Aquifer–FY 2010**

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	5	2	2	4	2	100	1	0.0002	3	5	1	2	6
BI-208	< 5	< 4	68.8	< 2	< 2	< 4	4.3	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
BO-434	< 5	< 4	74.8	< 2	< 2	< 4	< 2	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
BO-578	< 5	< 4	228.0	< 2	< 2	< 4	< 2	560	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
BO-7896Z	< 5	< 4	554.0	< 2	< 2	< 4	< 2	2,520	1.1	< 0.0002	5.85	< 5	< 1	< 2	< 6
BO-7896Z*	< 5	< 4	504.0	< 2	< 2	< 4	< 2	2,420	1.1	< 0.0002	< 3	< 5	< 1	< 2	13.3
G-342	< 5	< 4	89.1	< 2	< 2	< 4	4.3	< 100	1.1	< 0.0002	< 3	< 5	< 1	< 2	< 6
G-432	< 5	< 4	38.9	< 2	< 2	< 4	6.2	< 100	6.6	< 0.0002	< 3	< 5	< 1	< 2	21.8
LS-264	< 5	< 4	52.3	< 2	< 2	< 4	3.1	< 100	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
MO-124	< 5	< 4	101.0	< 2	< 2	< 4	5.6	133	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6
MO-364	< 5	< 4	757.0	< 2	< 2	< 4	16.1	1,760	1.4	< 0.0002	3.07	< 5	< 1	< 2	14.7
MO-364*	< 5	< 4	789.0	< 2	< 2	< 4	29.8	1,470	2.6	< 0.0002	< 3	< 5	< 1	< 2	22.1
OU-5524Z	< 5	< 4	47.8	< 2	< 2	< 4	15.1	320	1.5	< 0.0002	< 3	< 5	< 1	< 2	< 6
RR-254	< 5	< 4	23.9	< 2	< 2	< 4	< 2	1,480	< 1	< 0.0002	< 3	< 5	< 1	< 2	< 6

\*Denotes Duplicate Sample.

Shaded cell exceed EPA Secondary Standards



**Table 6-4: FY 2010 Field and Conventional Statistics, ASSET Wells**

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
<b>FIELD</b>	Temperature (°C)	17.90	20.30	18.71
	pH (SU)	5.65	7.60	6.55
	Specific Conductance (mmhos/cm)	0.045	1.642	0.462
	Salinity (ppt)	0.02	0.83	0.23
	TDS (g/L)	0.03	1.07	0.30
<b>LABORATORY</b>	Alkalinity (mg/L)	8.00	334.00	126.31
	Chloride (mg/L)	3.38	323.00	67.53
	Color (PCU)	< 1	25.00	9.42
	Specific Conductance (umhos/cm)	46.70	1590.00	476.77
	Sulfate (mg/L)	< 0.25	97.30	18.64
	TDS (mg/L)	39.00	1510.00	434.92
	TSS (mg/L)	< 4	28.00	7.46
	Turbidity (NTU)	< 0.3	23.40	4.75
	Ammonia, as N (mg/L)	< 0.05	0.08	< 0.05
	Hardness (mg/L)	<5	410.00	123.77
	Nitrite - Nitrate, as N (mg/L)	< 0.01	3.870	0.483
	TKN (mg/L)	< 0.3	0.65	0.28
	Total Phosphorus (mg/L)	< 0.3	0.44	0.19

**Table 6-5: FY 2010 Inorganic (Total Metals) Statistics, ASSET Wells**

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ug/L)	< 5	< 5	< 5
Arsenic (ug/L)	< 4	< 4	< 4
Barium (ug/L)	< 5	789.0	256.0
Beryllium (ug/L)	< 2	< 2	< 2
Cadmium (ug/L)	< 2	< 2	< 2
Chromium (ug/L)	< 4	< 4	< 4
Copper (ug/L)	< 2	29.8	6.9
Iron (ug/L)	<100	2,520	839
Lead (ug/L)	< 1	6.6	1.4
Mercury (ug/L)	< 0.0002	< 0.0002	< 0.0002
Nickel (ug/L)	< 3	5.85	< 3
Selenium (ug/L)	< 5	< 5	< 5
Silver (ug/L)	< 1	< 1	< 1
Thallium (ug/L)	< 2	< 2	< 2
Zinc (ug/L)	< 6	22.1	7.6

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

PARAMETER		AVERAGE VALUES BY FISCAL YEAR					
		FY 1995	FY 1998	FY 2001	FY 2004	FY 2007	FY 2010
FIELD	Temperature (°C)	20.18	19.79	18.97	19.43	19.43	18.71
	pH (SU)	6.27	5.88	6.81	6.51	6.19	6.55
	Specific Conductance (mmhos/cm)	0.28	0.26	0.32	0.55	0.32	0.46
	Salinity (Sal.) (ppt)	0.12	0.13	0.15	0.27	0.16	0.23
	TDS (Total dissolved solids) (g/L)	-	-	-	0.36	0.21	0.30
LABORATORY	Alkalinity (Alk.) (mg/L)	81.70	69.60	97.68	112.42	75.16	126.31
	Chloride (Cl) (mg/L)	22.68	20.99	25.03	80.74	44.31	67.53
	Color (PCU)	17.69	6.43	8.75	<5	-	9.42
	Specific Conductance (umhos/cm)	278.00	268.06	352.94	558.24	315.19	476.77
	Sulfate (SO4) ( mg/L)	25.95	32.62	41.53	38.32	12.98	18.64
	TDS (Total dissolved solids) (mg/L)	219.54	192.43	239.04	331.35	201.72	434.92
	TSS (Total suspended solids) (mg/L)	6.62	<4	<4	7.73	<4	7.46
	Turbidity (Turb.) (NTU)	11.08	9.49	3.09	35.05	1.44	4.75
	Ammonia, as N (NH3) (mg/L)	0.19	0.25	0.18	0.18	<0.10	< 0.05
	Hardness (mg/L)	48.57	64.02	89.65	152.26	75.16	123.77
	Nitrite - Nitrate , as N (mg/L)	0.67	1.27	0.68	0.43	0.88	0.48
	TKN (mg/L)	0.69	0.36	0.24	0.25	0.11	0.28
	Total Phosphorus (P) (mg/L)	0.24	0.14	0.15	0.15	0.12	0.19

**Table 6-7: Triennial Inorganic (Total Metals) Statistics, ASSET Wells**

PARAMETER	AVERAGE VALUES BY FISCAL YEAR					
	FY 1995	FY 1998	FY 2001	FY 2004	FY 2007	FY 2010
Antimony (ug/L)	<5	<5	<5	<60	<1	< 5
Arsenic (ug/L)	<5	<5	<5	<10	<3	< 4
Barium (ug/L)	117.25	90.54	93.86	202.23	166.59	256
Beryllium (ug/L)	<5	<5	<1	<5	<1	< 2
Cadmium (ug/L)	<5	<5	<1	<5	<0.5	< 2
Chromium (ug/L)	<5	<5	<5	<10	<3	< 4
Copper (ug/L)	6.57	55.75	11.77	27.52	16.41	6.88
Iron (ug/L)	2,244	1,077	522	3,624	453	839
Lead (ug/L)	<10	<10	<10	3.64	3.24	1.43
Mercury (ug/L)	0.07	<0.05	<0.05	<0.2	<0.05	< 0.0002
Nickel (ug/L)	7.18	3.44	6.89	<40	<3	< 3
Selenium (ug/L)	<5	<5	<5	<10	<4	< 5
Silver (ug/L)	<5	<5	<1	-	<0.5	< 1
Thallium (ug/L)	<5	<5	<5	<10	<1	< 2
Zinc (ug/L)	25.03	46.36	119.17	33.8	11.09	7.61

**Table 6-8: VOC Analytical Parameters**

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
ETHYL BENZENE	624	0.5
CIS-1,3-DICHLOROPROPENE	624	0.5
TRANS-1,3-DICHLOROPROPENE	624	0.5
1,4-DICHLOROBENZENE	624	0.5
1,2-DICHLOROETHANE	624	0.5
TOLUENE	624	0.5
CHLOROBENZENE	624	0.5
DIBROMOCHLOROMETHANE	624	0.5
TETRACHLOROETHYLENE (PCE)	624	0.5
TRANS-1,2-DICHLOROETHENE	624	0.5
TERT-BUTYL METHYL ETHER	624	0.5
1,3-DICHLOROBENZENE	624	0.5
CARBON TETRACHLORIDE	624	0.5
CHLOROFORM	624	0.5
BENZENE	624	0.5
1,1,1-TRICHLOROETHANE	624	0.5
BROMOMETHANE	624	0.5
CHLOROMETHANE	624	0.5
CHLOROETHANE	624	0.5
VINYL CHLORIDE	624	0.5
METHYLENE CHLORIDE	624	0.5
BROMOFORM	624	0.5
BROMODICHLOROMETHANE	624	0.5
1,1-DICHLOROETHANE	624	0.5
1,1-DICHLOROETHENE	624	0.5
TRICHLOROFLUOROMETHANE (FREON-11)	624	0.5
1,2-DICHLOROPROPANE	624	0.5
1,1,2-TRICHLOROETHANE	624	0.5
TRICHLOROETHYLENE (TCE)	624	0.5
1,1,2,2-TETRACHLOROETHANE	624	0.5
1,2,3-TRICHLOROBENZENE	624	0.5
1,2-DICHLOROBENZENE	624	0.5
ETHYL BENZENE	624	0.5
CIS-1,3-DICHLOROPROPENE	624	0.5

**Table 6-9: SVOC Analytical Parameters**

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
1,2,4-TRICHLOROBENZENE	625	5
2,4,6-TRICHLOROPHENOL	625	5
2,4-DICHLOROPHENOL	625	5
2,4-DIMETHYLPHENOL	625	5
2,4-DINITROPHENOL	625	20
2,4-DINITROTOLUENE	625	5
2,6-DINITROTOLUENE	625	5
2-CHLORONAPHTHALENE	625	5
2-CHLOROPHENOL	625	5
2-NITROPHENOL	625	10
3,3'-DICHLORO BENZIDINE	625	5
4,6-DINITRO-2-METHYLPHENOL	625	10
4-BROMOPHENYL PHENYL ETHER	625	5
4-CHLORO-3-METHYLPHENOL	625	5
4-CHLOROPHENYL PHENYL ETHER	625	5
4-NITROPHENOL	625	20
ACENAPHTHENE	625	5
ACENAPHTHYLENE	625	5
ANTHRACENE	625	5
BENZIDINE	625	20
BENZO(A)ANTHRACENE	625	5
BENZO(A)PYRENE	625	5
BENZO(B)FLUORANTHENE	625	5
BENZO(G,H,I)PERYLENE	625	5
BENZO(K)FLUORANTHENE	625	5
BENZYL BUTYL PHTHALATE	625	5
BIS(2-CHLOROETHOXY) METHANE	625	5
HEXACHLOROCYCLOPENTADIENE	625	5
HEXACHLOROETHANE	625	5
INDENO(1,2,3-C,D)PYRENE	625	5
ISOPHORONE	625	5
NAPHTHALENE	625	5
NITROBENZENE	625	5
N-NITROSODIMETHYLAMINE	625	5
N-NITROSODI-N-PROPYLAMINE	625	5
N-NITROSODIPHENYLAMINE	625	5

**Table 6-9: SVOCs (Continued)**

COMPOUND	METHOD	DETECTION LIMIT (ug/L)
PENTACHLOROBENZENE	625	5
PENTACHLOROPHENOL	625	10
PHENANTHRENE	625	5
PHENOL	625	5
PYRENE	625	5
TETRACHLOROBENZENE(S), TOTAL	625	10

**Table 6-10: Pesticides and PCBs**

COMPOUND	METHOD	DETECTION LIMITS (ug/L)
4,4'-DDD	8081	0.1
4,4'-DDE	8081	0.1
4,4'-DDT	8081	0.1
Aldrin	8081	0.05
Alpha-Chlordane	8081	0.05
alpha-BHC	8081	0.05
beta-BHC	8081	0.05
delta-BHC	8081	0.05
gamma-BHC	8081	0.05
Dieldrin	8081	0.1
Endosulfan I	8081	0.05
Endosulfan II	8081	0.1
Endosulfan Sulfate	8081	0.1
Endrin	8081	0.1
Endrin Aldehyde	8081	0.1
Endrin Ketone	8081	0.1
Heptachlor	8081	0.05
Heptachlor Epoxide	8081	0.05
Methoxychlor	8081	0.5
Toxaphene	8081	2
Gamma-Chlordane	8081	0.05
PCB-1016	8082	1
PCB-1221	8082	1
PCB-1232	8082	1
PCB-1242	8082	1
PCB-1248	8082	1
PCB-1254	8082	1
PCB-1260	8082	1

Figure 6-1: Location Plat, North Louisiana Terrace Aquifer

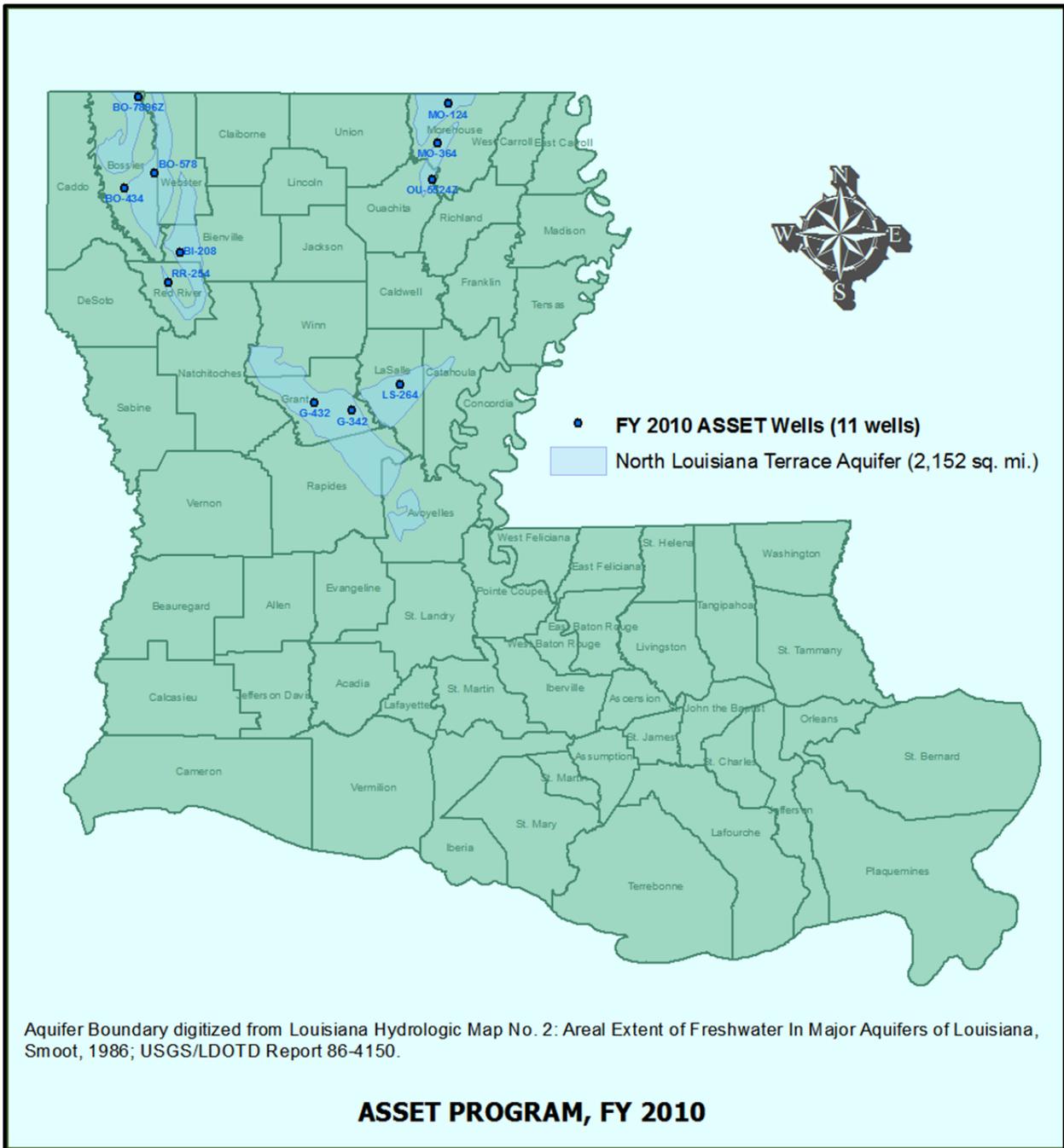


Figure 6-2: Map of pH Data

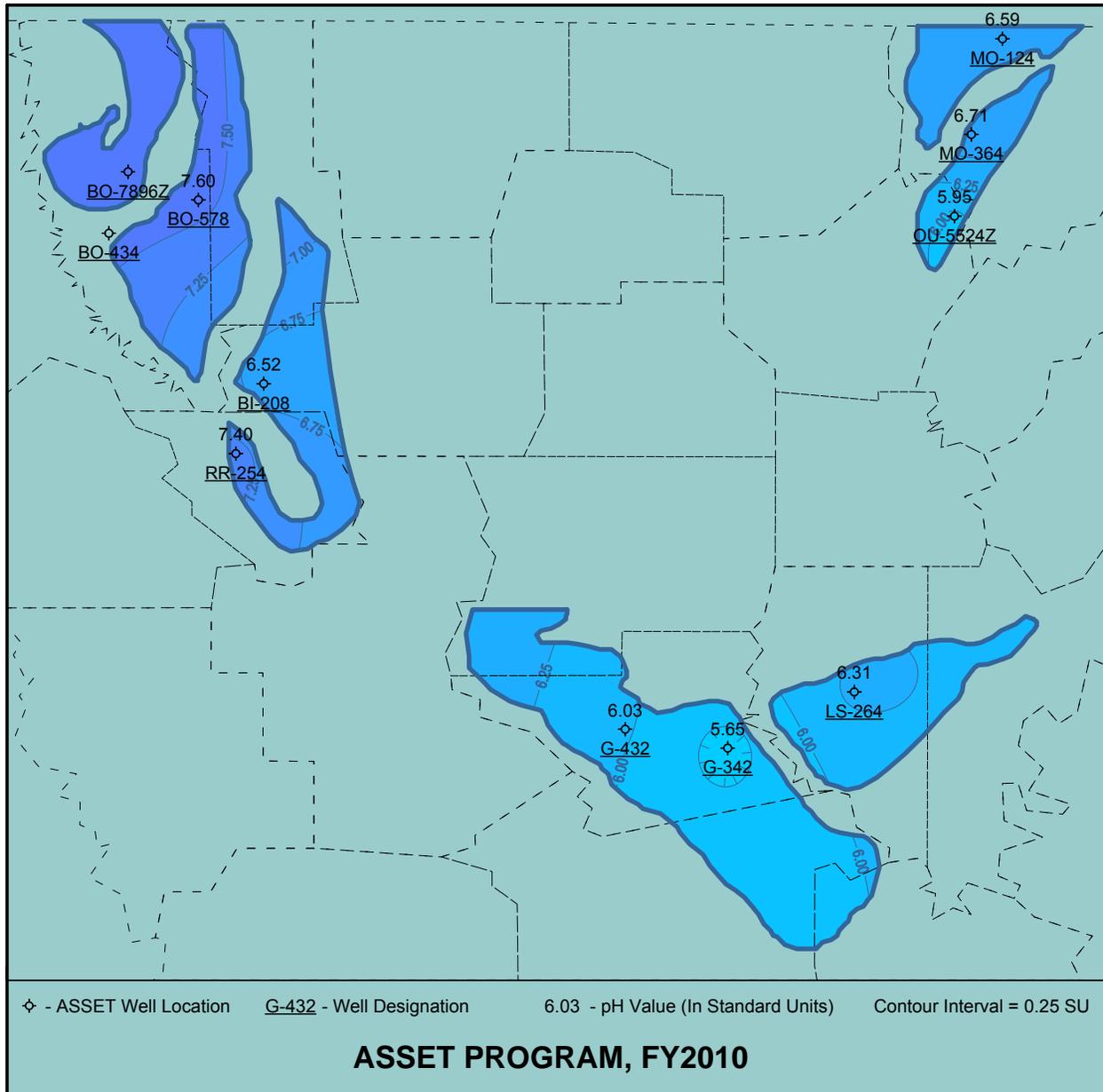
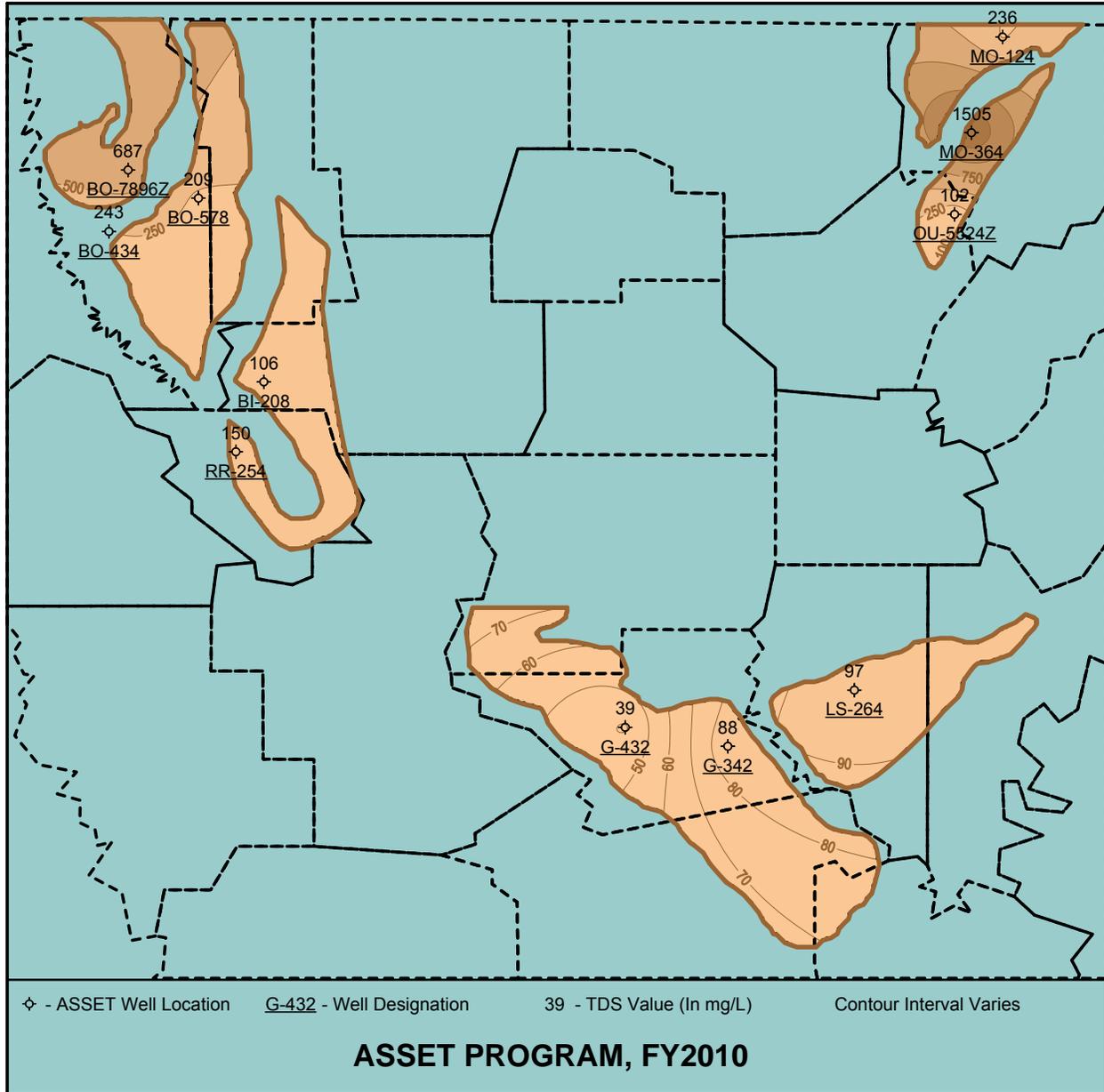


Figure 6-3: Map of TDS Lab Data



**Figure 6-4: Map of Chloride Data**

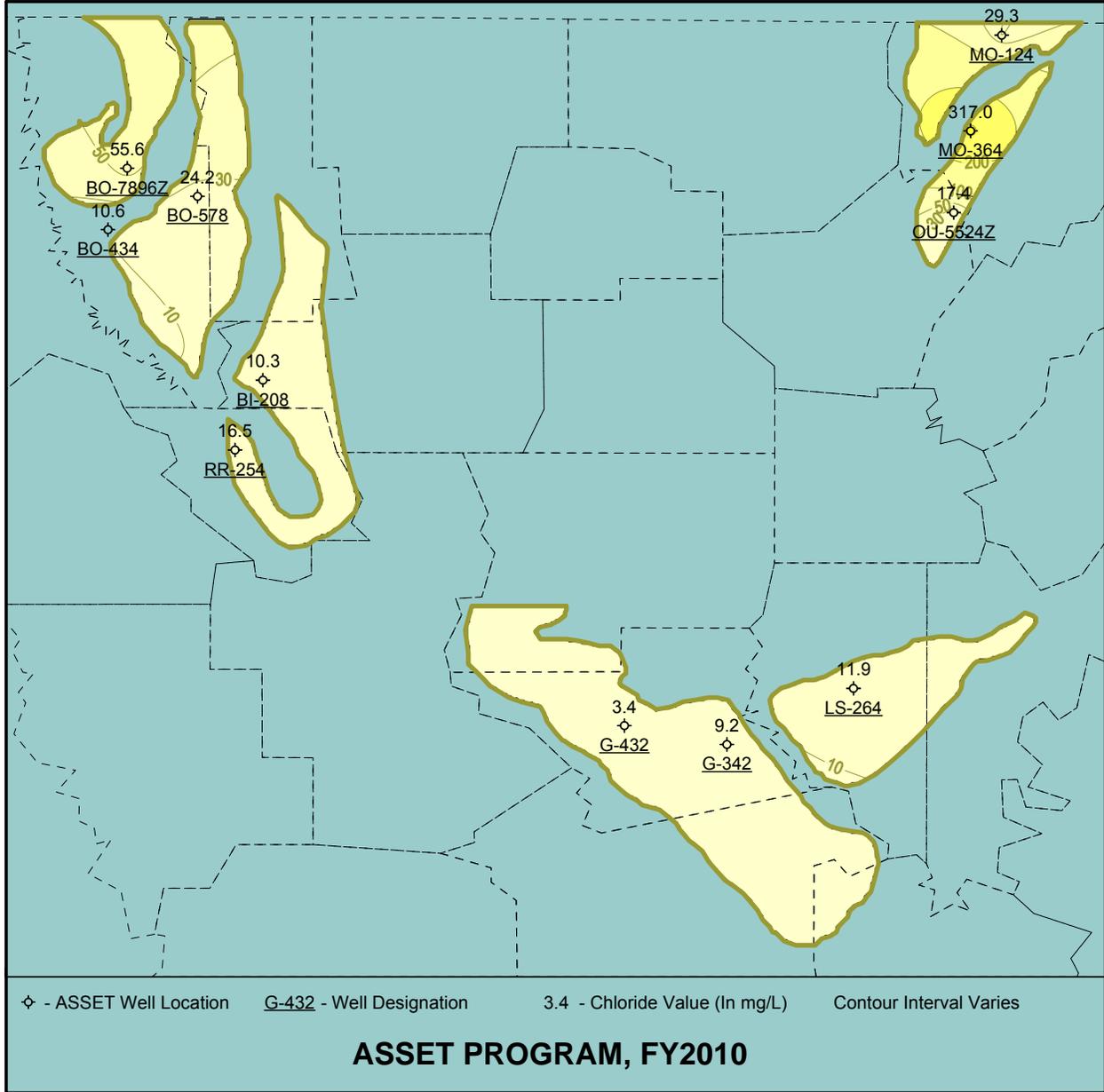
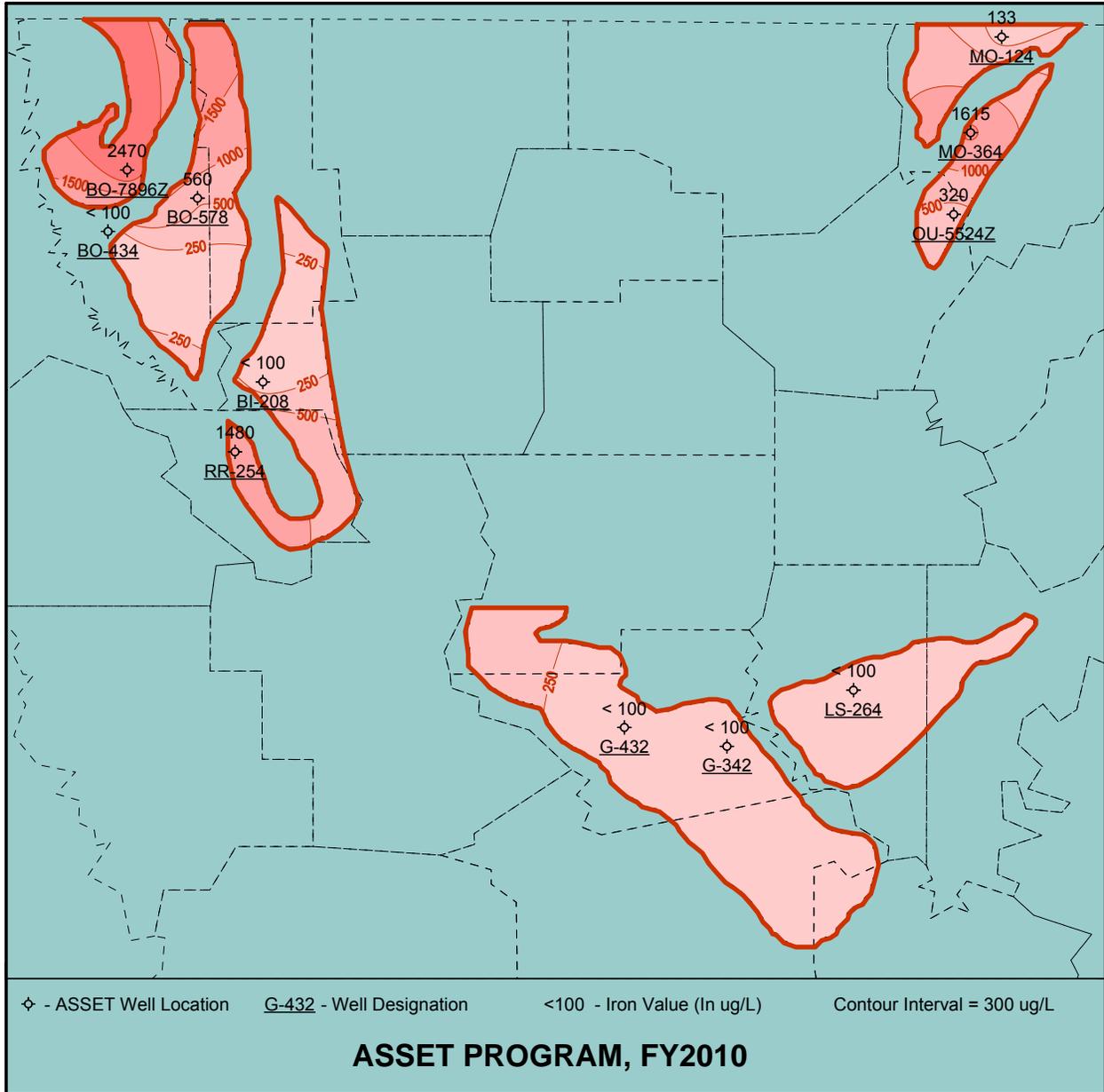
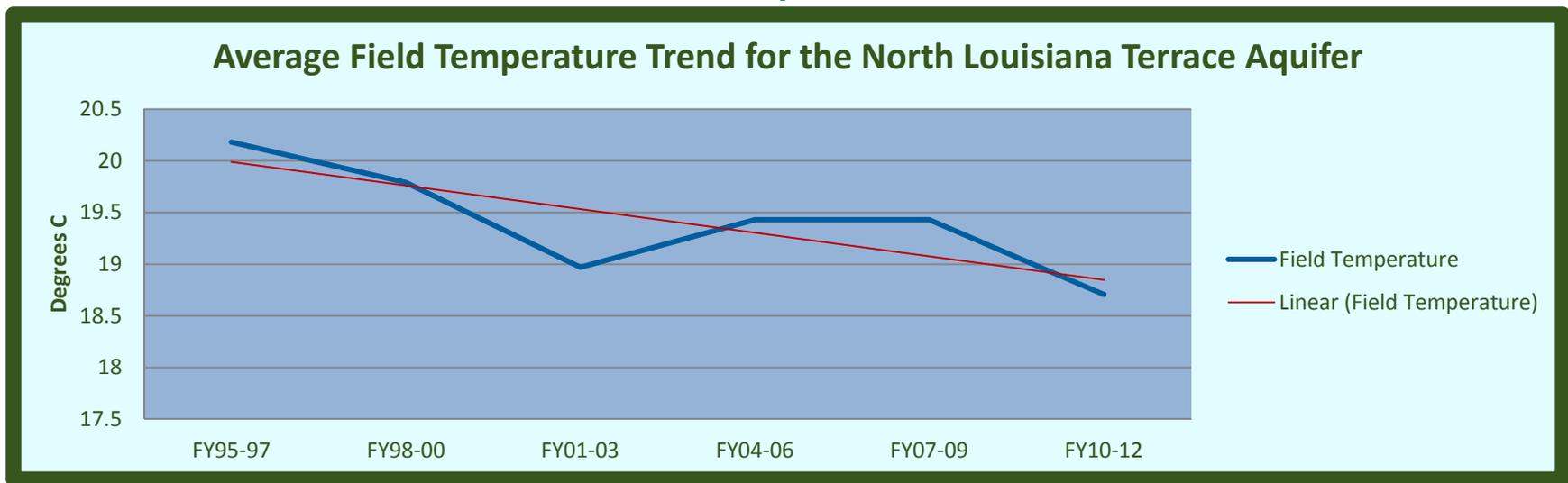


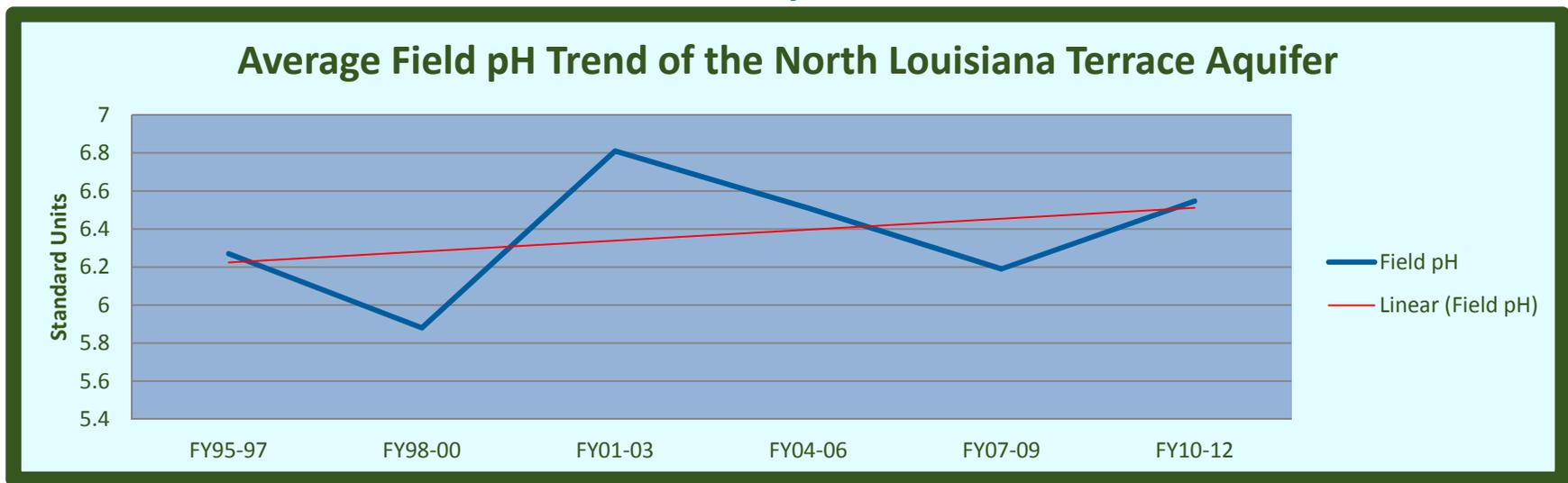
Figure 6-5: Map of Iron Data



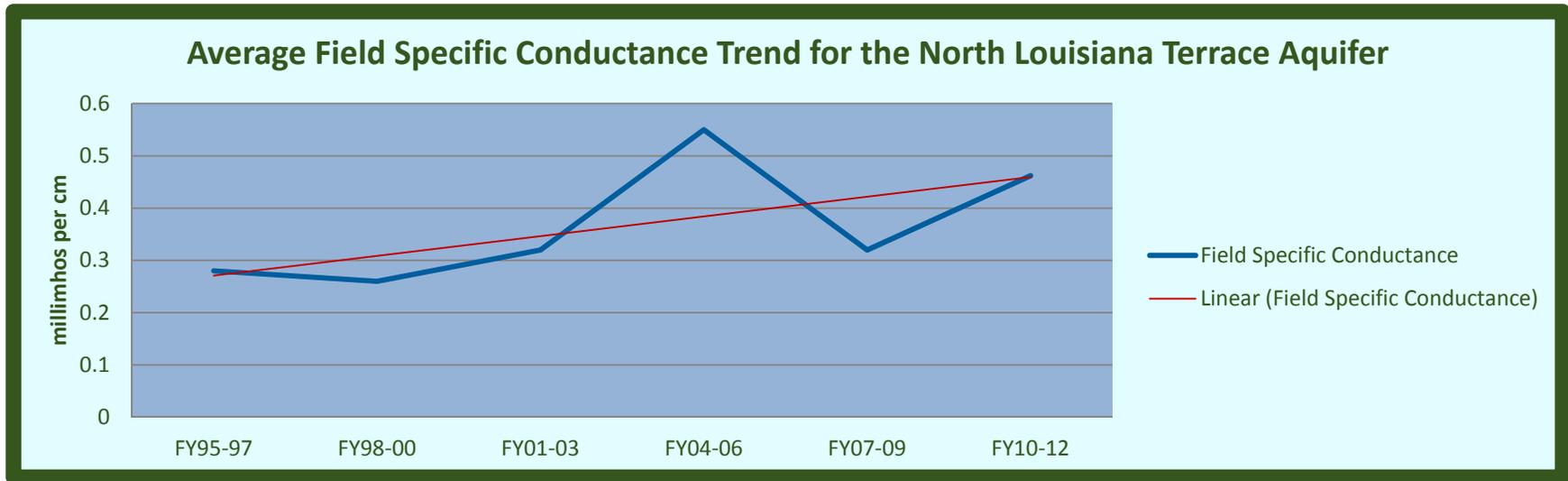
**Chart 6-1: Temperature Trend**



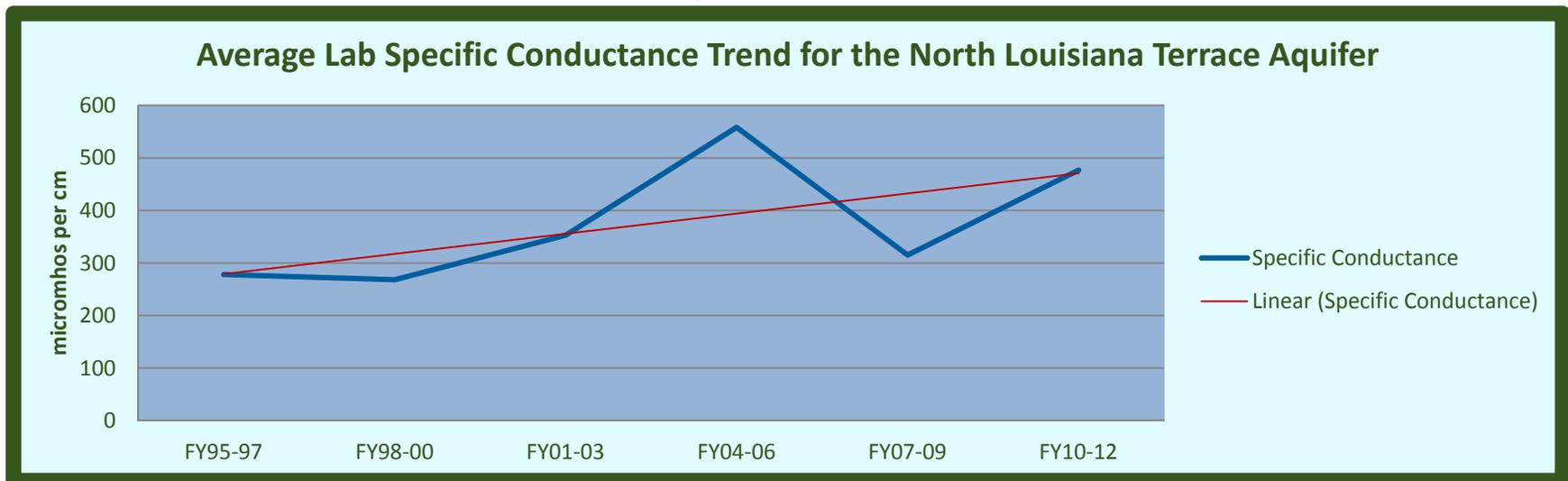
**Chart 6-2: pH Trend**



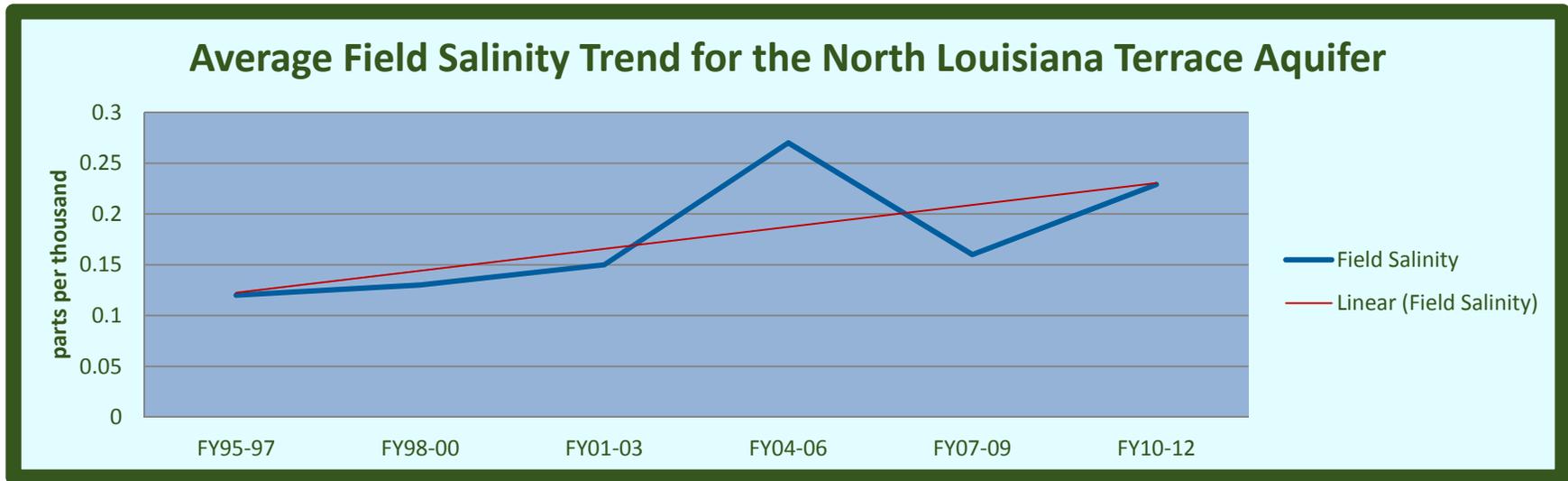
**Chart 6-3: Field Specific Conductance Trend**



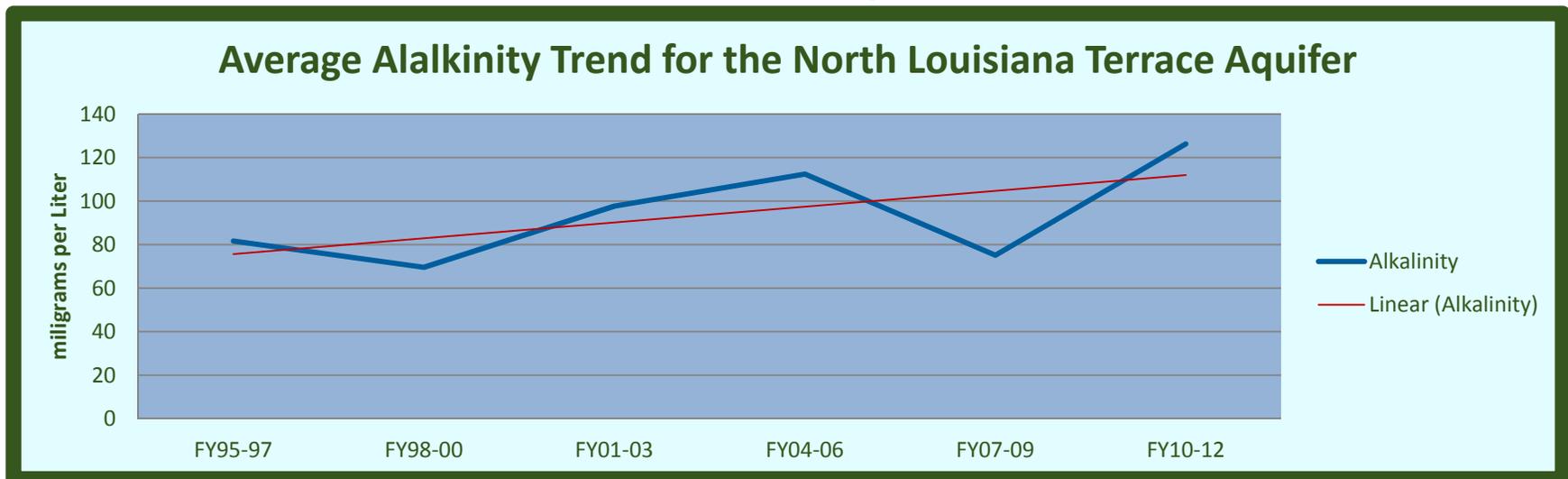
**Chart 6-4: Lab Specific Conductance Trend**



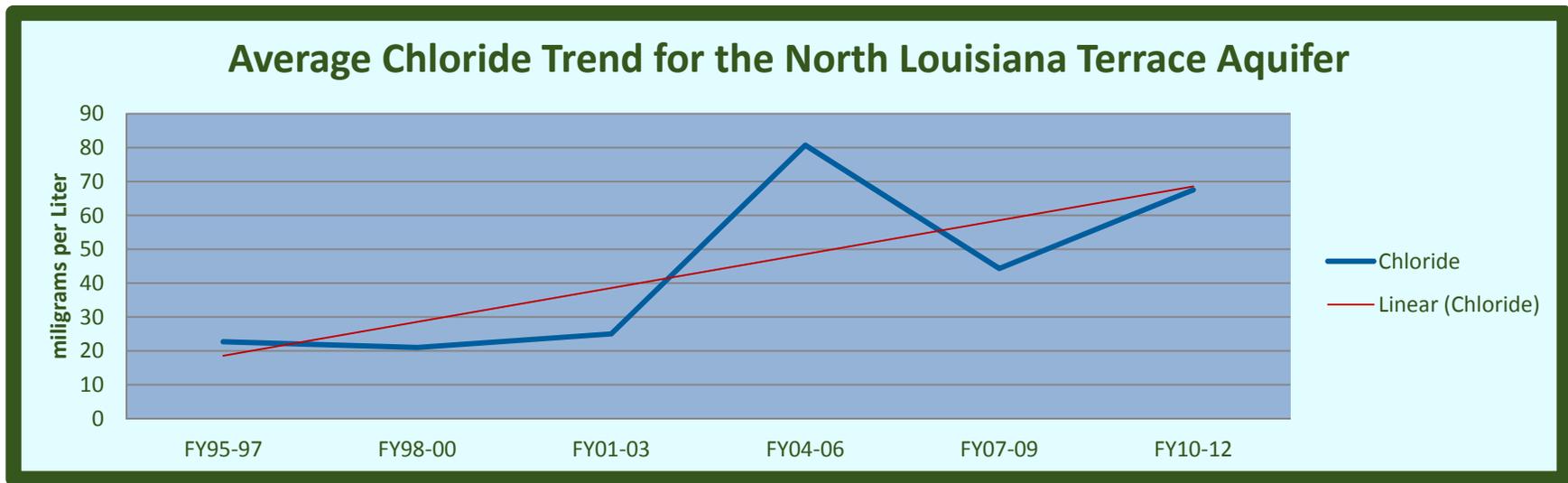
**Chart 6-5: Field Salinity Trend**



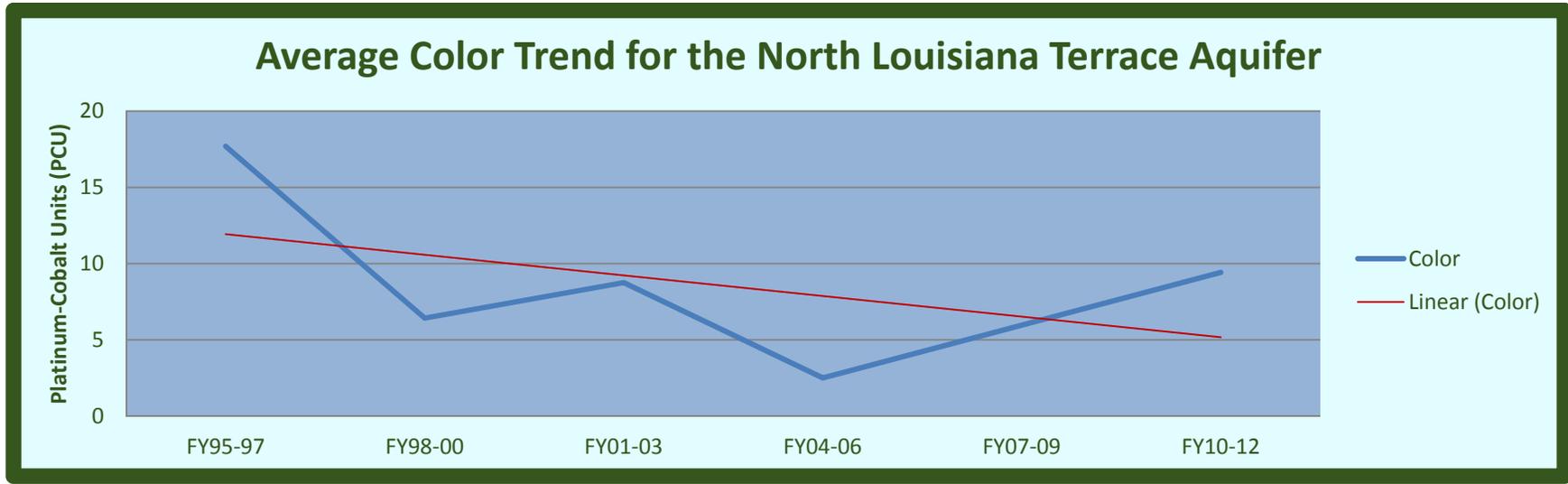
**Chart 6-6: Alkalinity Trend**



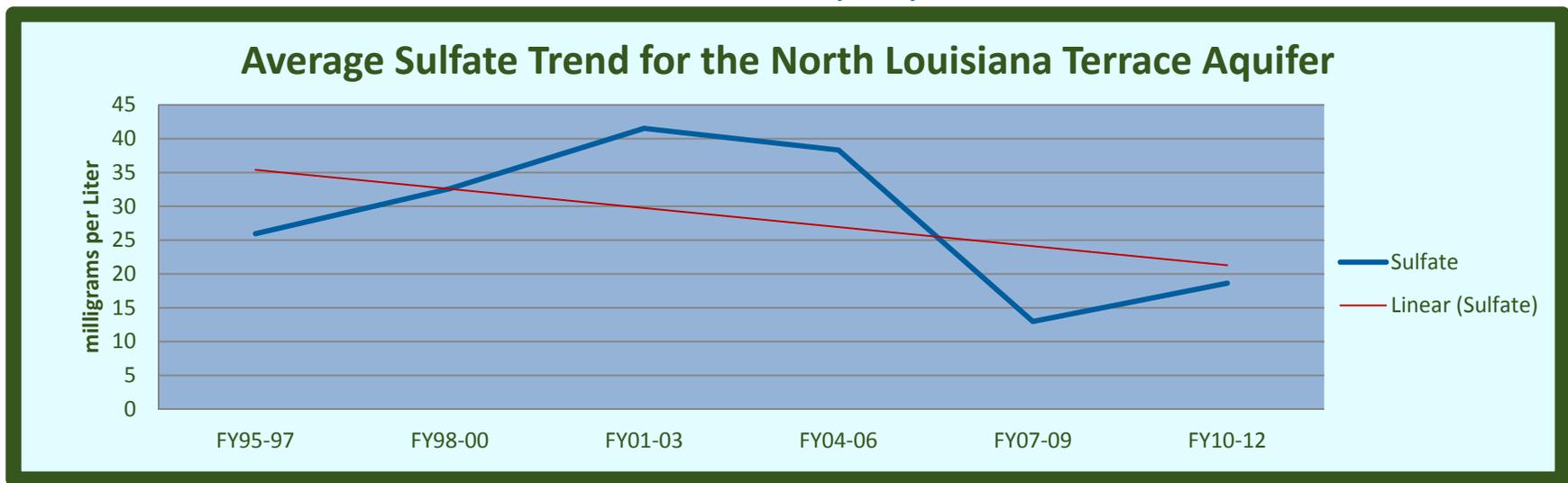
**Chart 6-7: Chloride Trend**



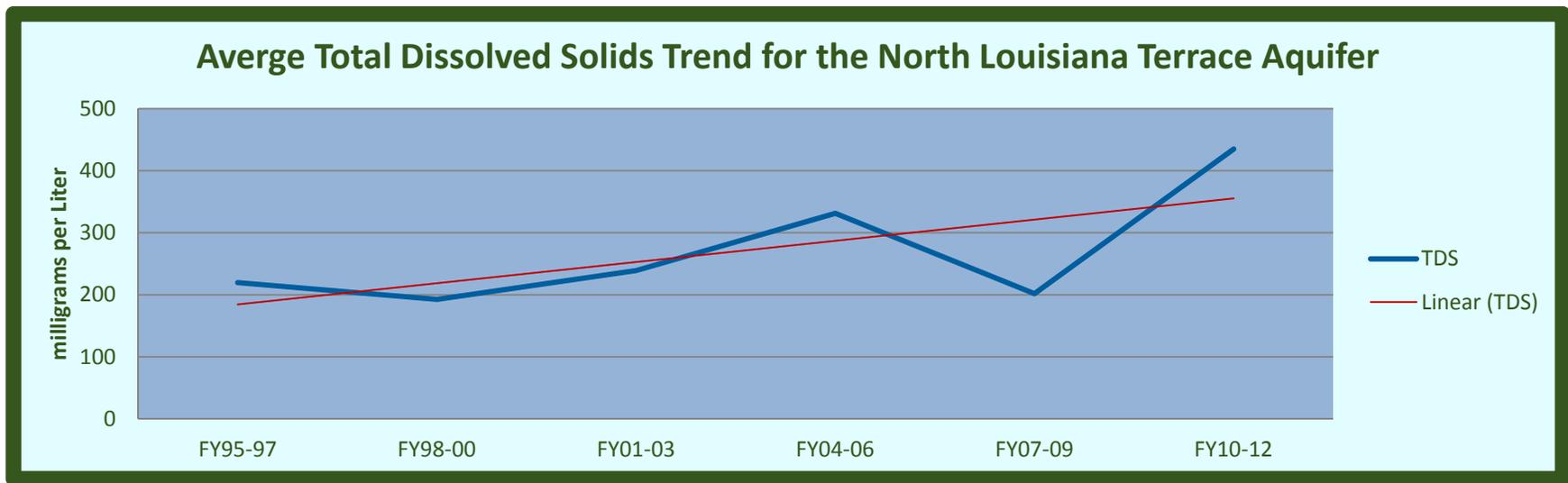
**Chart 6-8: Color Trend**



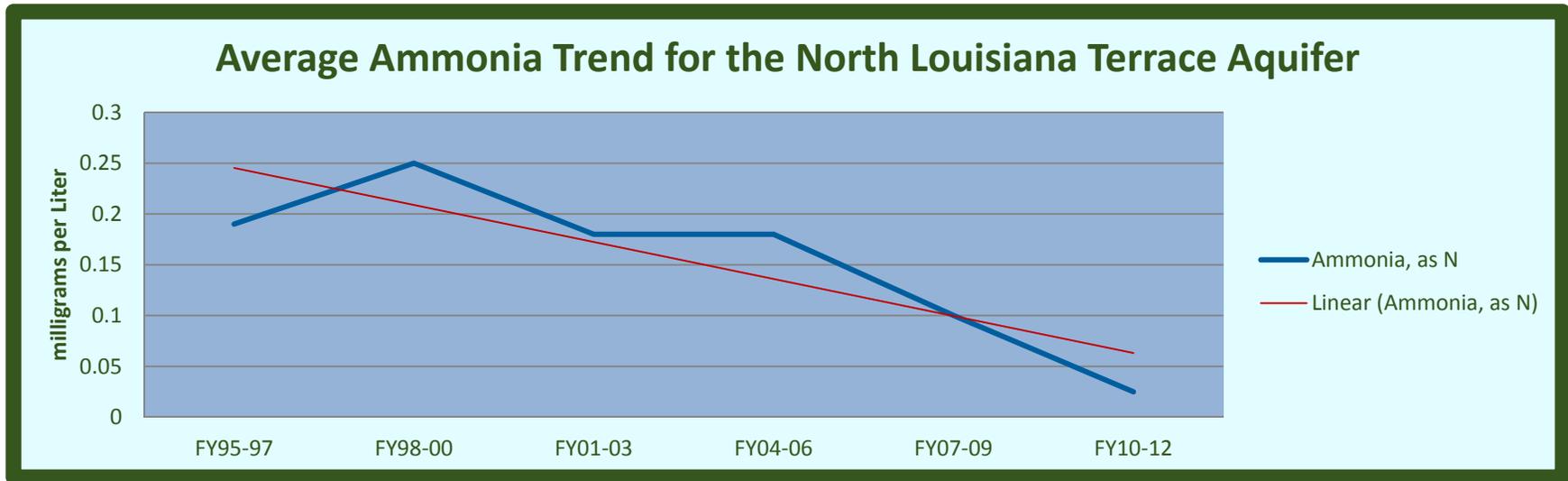
**Chart 6-9: Sulfate (SO4) Trend**



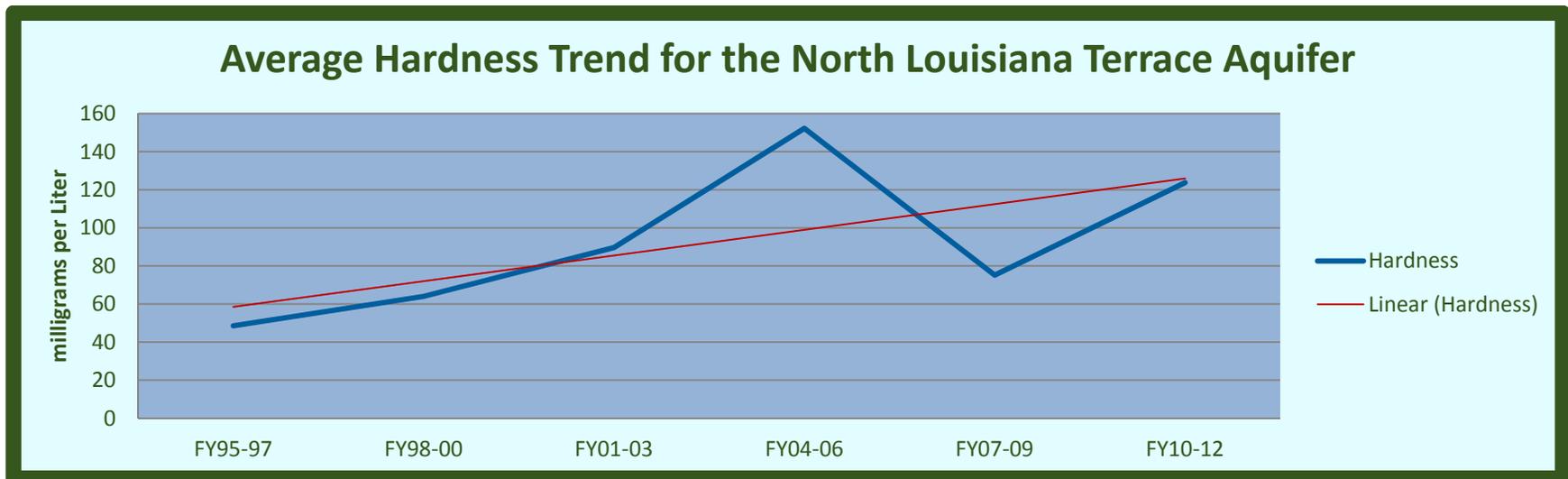
**Chart 6-10: Total Dissolved Solids (TDS) Trend**



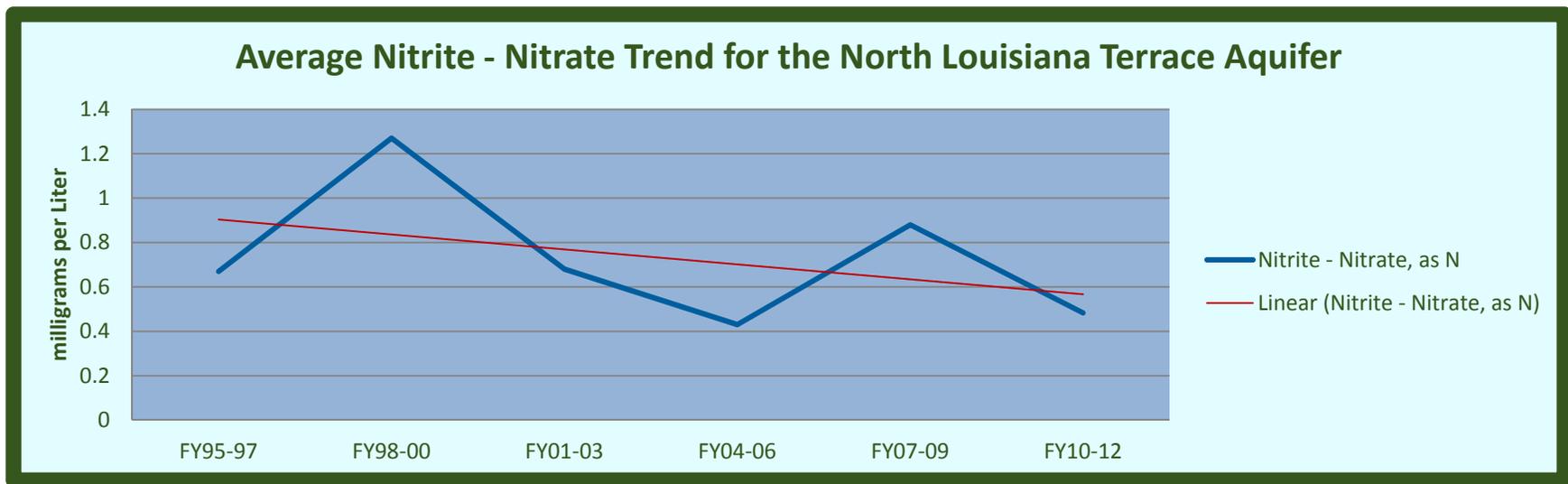
**Chart 6-11: Ammonia (NH3) Trend**



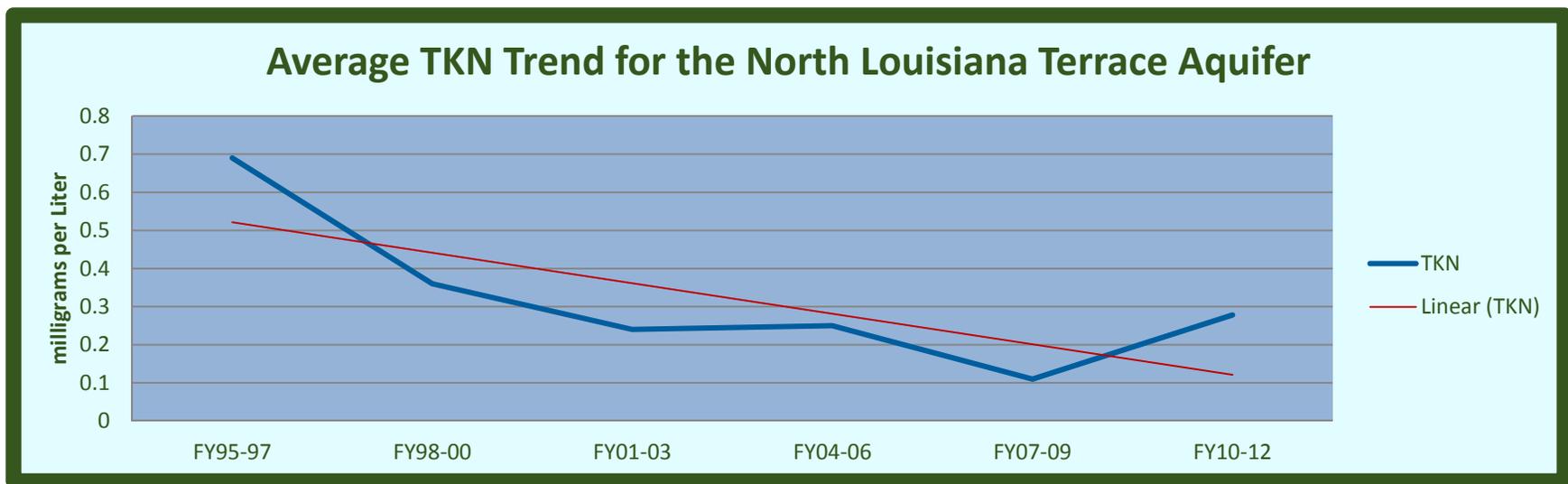
**Chart 6-12: Hardness Trend**



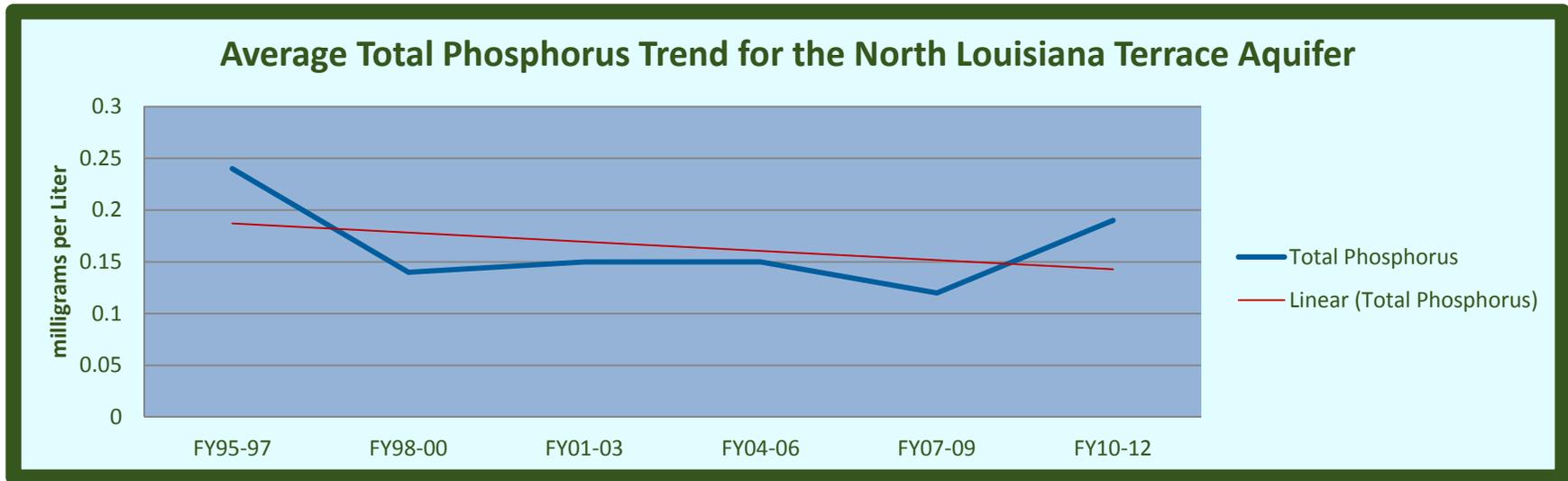
**Chart 6-13: Nitrite – Nitrate Trend**



**Chart 6-14: TKN Trend**



**Chart 6-15: Total Phosphorus Trend**



**Chart 6-16: Iron Trend**

