MISSISSIPPI RIVER ALLUVIAL AQUIFER SUMMARY

BASELINE MONITORING PROGRAM, FY 2005

APPENDIX 8

OF THE

TRIENNIAL SUMMARY REPORT

FOR THE

WATER QUALITY ASSESSMENT DIVISION

OF THE

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PARTIAL FUNDING PROVIDED THROUGH CWA

MISSISSIPPI RIVER ALLUVIAL AQUIFER SUMMARY

BACKGROUND

In order to better assess the water quality of a particular aquifer at a given point in time, an attempt was made to sample all Baseline Monitoring Program (BMP) wells producing from a common aquifer in a narrow time frame. Also, to more conveniently and economically promulgate those data collected from a particular aquifer, a summary report on each aquifer sampled was prepared separately. Collectively, these aquifer summaries will make up part of the Triennial Summary Report for the Baseline Monitoring Program.

Figure 8-1 shows the geographic locations of the Mississippi River Alluvial aquifer and the associated wells, whereas Table 8-2 lists the wells in the aquifer along with their total depths and the use made of produced waters and date sampled.

From August 2004 through June 2005, twenty-four wells were sampled which produce from the Mississippi River Alluvial aquifer. Eight of the wells are classified as public supply wells, eight are classified as irrigation wells, seven are classified as domestic wells, and one is classified as an industrial use well. The wells are located in fifteen parishes situated along or near the Mississippi River.

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 10-530 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 wells that were monitored in conjunction with the BMP range from 30 to 352 feet.

INTERPRETATION OF DATA

FIELD, WATER QUALITY, AND NUTRIENTS PARAMETERS

Table 8-3 lists the field parameters that are checked and the water quality and nutrients parameters that are sampled for at each well. It also shows the field results and the water quality and nutrients analytical results for each well. Table 8-5 lists the minimum, maximum, and average results for the field data, water quality data, and nutrients data for the Mississippi River Alluvial aquifer.

Federal Primary Drinking Water Standards

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, this Office does use the MCLs as a benchmark for further evaluation.

A review of the analyses listed on Table 8-3 shows that no primary MCL was exceeded for field, water quality, or nutrients parameters.

Federal Secondary Drinking Water Standards

EPA has set secondary standards that are defined as non-enforceable taste, odor, or appearance guidelines.

Field and laboratory data contained in Table 8-3 show that the following secondary MCLs (SMCL)s were exceeded:

pH – SMCL > 8.5 or <6.5 Standard Units (SU)
EC-370 – 6.47 SU

Color – SMCL = 15 Platinum-Cobalt Units (PCU)
AV-462 – 20 PCU
AV-CHAT – 220 PCU
CO-YAKEY – 60 PCU
CT-489 – 100 PCU, duplicate – 110 PCU
IB-363 – 21 PCU
IB-COM – 16 PCU
MA-28 – 25 PCU, duplicate - 25 PCU
MO-871 – 100 PCU
OU-483 – 20 PCU
SL-5477Z – 220 PCU
SMN-33 – 16 PCU, duplicate 17 PCU

Total Dissolved Solids (TDS) – SMCL = 500 parts per million (ppm)
AV-462 – 896 ppm
AV-5135Z – 665 ppm
AV-CHAT – 618 ppm
CO-YAKEY – 676 ppm
CT-489 – 606ppm, duplicate 604 ppm
FR-1458 – 650 ppm
IB-COM – 765 ppm
MA-28 – 542 ppm, duplicate, 542ppm
OU-483 – 566 ppm
SL-5477Z – 563 ppm
TS-60 – 520 ppm
WC-527 – 682 ppm

Comparison To Historical Data

Table 8-7 lists the current field, water quality, and nutrients data averages alongside those parameters' data averages for the three previous sampling rotations (three, six and nine years prior). A comparison of these averages show that color and sulfate have consistently increased; alkalinity has increased to a lesser degree; chloride has consistently decreased; TDS decreased from the FY 1996 average but has remained consistent since; while turbidity and nitrite-nitrate have fluctuated over the nine year monitoring period.

INORGANIC PARAMETERS

Table 8-4 shows the inorganic (total metals) parameters that were sampled and the analytical results for those parameters for each well. Table 8-6 lists the minimum, maximum, and average results for the inorganic data for the Mississippi River Alluvial aquifer.

Federal Primary Drinking Water Standards

The metals data listed on Table 8-4 shows that for the MCL standards in place at the time of sampling, only one well exceeded a Primary Drinking Water Standard for inorganics (metals), as follows:

Arsenic – MCL = 50 parts per billion (ppb) prior to January 23, 2006
SL-5477Z – 58.4 ppb, duplicate 62 ppb

The following wells will exceed the new more restrictive MCL of 10 ppb for arsenic beginning January 23, 2006:
EB-885 – 35.8 ppb, resample 21.9 ppb
FR-1458 – 13.1 ppb (however resample results are 7.1ppb, duplicate 6.7 ppb)
IB-363 – 34.4 ppb
IB-5427Z – 31.3 ppb, duplicate 39.3 ppb

Please see the Summary and Recommendations for further discussion of arsenic results.

Federal Secondary Drinking Water Standards

Laboratory data contained in Table 8-4 show that the following secondary SMCL was exceeded:

Iron – SMCL = 300 ppb
AV-462 – 5,190 ppb
AV-CHAT – 12,800 ppb, resample w/split 13,400 / 13,300 ppb
CO-YAKEY – 16,900 ppb, resample w/split 16,400 / 16,400 ppb
CT-489 – 10,200 ppb, duplicate 10,900 ppb
EB-885 – 3,780 ppb, resample w/split 4,070 / 3,760 ppb
EC-370– 17,600 ppb, duplicate 17,400 ppb
FR-1458 – 8,450 ppb, resample w/split 8,060 / 7,960 ppb, duplicate resample w/split 7,920 / 7,800 ppb
IB-COM – 4,720 ppb, resample w/split 3,440 / 3,340 ppb
IB-363 – 1,840 ppb
IB-5427Z – 753 ppb, resample w/split 876 / 747 ppb
MA-28 – 14,400 ppb, duplicate 14,700 ppb
MO-871 – 6,330 ppb
OU-483 – 11,800 ppb
SL-5477Z – 21,700 ppb, resample w/split 23,600 / 23,200 ppb

SMN-33 – 1,920 ppb, duplicate 1,940 ppb, resample w/split 2,100 / 2,020 ppb
TS-60 – 10,800 ppb, resample w/split 6,390 / 7,990 ppb
TS-FORTENB – 983 ppb
WC-91 – 695 ppb
WC-527 – 3,590 ppb

Comparison To Historical Data

Table 8-8 lists the current inorganic data averages alongside the inorganic data averages for the three previous sampling rotations (three, six and nine years prior). A comparison of these averages shows that the barium and iron averages have increased, while the arsenic and zinc averages have fluctuated over the nine year monitoring period. All other averages have remained at or below detection limits.

Discussion of Non-reportable Inorganic Values

Samples were collected and analyzed for the Mississippi River Alluvial aquifer during a time period that the LDEQ laboratory was in the process of relocating to its new facility. Due to this, a contract lab was used for some of the analysis of this aquifer's samples. Review of the contract lab's data revealed that several inorganic parameters reported detections, namely selenium, thallium and lead. Per Baseline Monitoring Program standard procedures, several of these wells were selected for resampling, and samples were collected along with split samples, once the LDEQ lab was back online. Samples were sent to the LDEQ and splits were sent to the contract lab. Resulting sample analysis and analysis performed on field blanks, duplicates and lab blanks collected during this resampling activity revealed inconsistencies with the contract lab's analysis. Based on this information, the selenium, thallium and lead analysis reported by the contract lab were determined to be invalid and were not used in the production of this summary. It should also be noted that some arsenic and mercury data was not reported due to these inorganic compounds being detected in their respective Field Blanks.

VOLATILE ORGANIC COMPOUNDS

Table 8-9 shows the volatile organic compounds (VOC) for which samples were collected and analyzed. Due to the large number of analytes in this category, a total list of the analytical results for each analyte is not provided, however any detection of a VOC would be discussed in this section.

Methyl-t-butyl ether (MTBE) was detected in the analysis of the samples taken from well FR-1458. The regular-scheduled sampling of the well exhibited a concentration of 7.1 ppb. It should also be noted that the MTBE has no primary MCL.

No other VOC was detected during the FY 2005 sampling of the Mississippi River Alluvial Aquifer.

SEMIVOLATILE ORGANIC COMPOUNDS

Table 8-10 shows the semivolatile organic compounds (SVOC) for which samples were collected and analyzed. Due to the large number of analytes in this category, a total list of the analytical results for each analyte is not provided, however any detection of an SVOC would be discussed in this section.

Laboratory data show that several of the Mississippi River Alluvial wells that were sampled during FY 2005 exhibited values for various phthalate compounds. Laboratory analyses from duplicate samples, field blanks, and laboratory blanks also detected phthalate concentrations during the sampling of this aquifer. Subsequent routine sampling did not detect phthalates in wells originally reporting phthalate concentrations. Therefore, it is the opinion of this office that the phthalate concentrations exhibited in

the FY 2005 Mississippi River Alluvial sample analyses are due to field or laboratory contamination, not contamination of the aquifer.

Taking into consideration the invalid phthalate concentrations, no semivolatile organic compounds were detected during the FY 2005 sampling of the Mississippi River Alluvial aquifer.

PESTICIDES AND PCBS

Table 8-11 shows the pesticide and PCB parameters for which samples were collected and analyzed. Due to the large number of analytes in this category, a total list of the analytical results for each analyte is not provided, however any detection of a pesticide or PCB would be discussed in this section.

No pesticide or PCB was detected during the 2005 sampling of the Mississippi River Alluvial aquifer.

COMMON WATER CHARACTERISTICS

Table 8-1 below highlights some of the more common water characteristics that are considered when studying ground water quality. The minimum, maximum, and average values that were found during the current sampling of the Mississippi River Alluvial aquifer for pH, TDS, hardness, chloride, iron, and nitrite-nitrate are listed in the table. Figures 8-2, 8-3, and 8-4 respectively, represent the contoured data for TDS, chloride, and iron. Due to equipment malfunction, several of the wells have no pH data for the current round of sampling; therefore a contour map of the pH data was not included in this summary. The data average for hardness shows that the ground water produced from this aquifer is very hard[1].

Table 8-1 Common Water Characteristics

Fiscal Year 2005

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	6.62	7.44	6.98
TDS (ppm)	178	896	488.96
Hardness (ppm)	<5	530	297.50
Chloride (ppm)	8.6	246	48.64
Iron (ppb)	<100	23,600	7,767.25
Nitrite-Nitrate (ppm)	<0.05	3.08	0.19

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

SUMMARY AND RECOMMENDATIONS

In summary, the data show that the ground water produced from the Mississippi River Alluvial aquifer is very hard. The Primary MCL for arsenic was the only short-term or long-term health risk guideline that was exceeded, and the exceedance occurred only in one well. However, several wells exceeded the January 2006 MCL for arsenic (10 ppb). It should also be noted that MTBE, which has no primary MCL, was found in one of the wells that was sampled. A discussion of the arsenic and MTBE concentrations follows below. The data also show that this aquifer is of poor quality when considering taste, odor, or appearance guidelines with several wells exceeding the SMCLs for color, TDS, and iron. One well exceeded the lower limit for pH. A comparison of present and historical BMP data averages shows that over the nine-year period, FY96 to FY05, color, sulfate, barium and iron have all increased while chloride has decreased. The averages for turbidity, nitrate-nitrite, arsenic and zinc have fluctuated with no definite trend. The other data averages have not changed significantly since the FY96 sampling.

Analyses of Project well SL-5477Z show a maximum arsenic concentration of 72.2 ppb, which is above the pre-January 2006 MCL of 50 ppb established for arsenic. The existence of arsenic in SL-5477Z, a domestic well, has been established through previous sampling events. The well owner has been kept aware of this and all previous arsenic concentrations and has been given information about arsenic, its health affects, and treatment methods.

The following wells did not exceed the pre-January 2006 MCL for arsenic; however they will exceed the future MCL of 10 ppb, which will go into effect on January 23, 2006.

EB-885 – 35.8 ppb; (resample with split: 44.4 / 21.9 ppb)
*FR-1458 – 13.1 ppb; (resample and duplicate with split: 7.1 / <10; 6.2 / <10ppb)
IB-363 – 34.4 ppb
IB-5427Z – 31.3 ppb; (resample with split: 39.1 / 29.8 ppb)
SL-5477Z – 58.4 ppb; (resample with split: 72.2 / 62 ppb)

The existence of arsenic in these wells has been established through previous sampling events and the well owners have all been made aware of these and previous concentrations. EB-885 is used as an irrigation well at the LSU Aquiculture Center; IB-363 is an industrial use well that is not used for drinking water; the owner of IB-5427Z, a domestic well, has been given a much information about arsenic, its health affects, and treatment methods.

*Subsequent resampling of well FR-1458 (a public supply well) indicates that arsenic levels are less than 10 ppb (the 2006 MCL).

MTBE (which currently does not have an MCL) was detected in well FR-1458 at 7.1 ppb. Since the time of sampling, this well has been taken off-line and is scheduled to be plugged and abandoned.

It is recommended that the Project wells assigned to the Mississippi River Alluvial aquifer be re-sampled as planned in approximately three years. It is also important that close attention be 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.

TABLE 8-2 List of Wells Sampled

DOTD Well Name	PARISH	SAMPLE DATE	Owner	Depth (in feet)	Well Use
AV-462	AVOYELLES	8/31/2004	PRIVATE OWNER	110	IRRIGATION
AV-5135Z	AVOYELLES	8/10/2004	PRIVATE OWNER	110	DOMESTIC
AV-CHAT	AVOYELLES	8/10/2004	PRIVATE OWNER	75	IRRIGATION
CO-YAKEY	CONCORDIA	8/31/2004	PRIVATE OWNER	150	DOMESTIC
CT-489	CATAHOULA	8/31/2004	PRIVATE OWNER	144	IRRIGATION
CT-DENNIS	CATAHOULA	8/30/2004	PRIVATE OWNER	30	DOMESTIC
EB-885	E BATON ROUGE	9/1/2004	PRIVATE OWNER	352	IRRIGATION
EC-370	E CARROLL	6/27/2005	PRIVATE OWNER	119	IRRIGATION
FR-1458	FRANKLIN	8/30/2004	CITY OF WINNSBORO	82	PUBLIC SUPPLY
IB-363	IBERVILLE	8/11/2004	SYNGENTA CROP PROTECTION, INC.	225	INDUSTRIAL
IB-5427Z	IBERVILLE	8/9/2004	PRIVATE OWNER	160	DOMESTIC
IB-COM	IBERVILLE	8/9/2004	PRIVATE OWNER	185	DOMESTIC
MA-28	MADISON	12/13/2004	TALLULAH WATER SERVICE	128	PUBLIC SUPPLY
MO-871	MOREHOUSE	12/14/2004	PRIVATE OWNER	80	IRRIGATION
OU-483	OUACHITA	2/21/2005	PRIVATE OWNER	83	IRRIGATION
RI-469	RICHLAND	8/30/2004	LIDDIEVILLE WATER SYSTEM	90	PUBLIC SUPPLY
RI-48	RICHLAND	2/21/2005	RAYVILLE WATER DEPARTMENT	115	PUBLIC SUPPLY
RI-730	RICHLAND	12/14/2004	START WATER SYSTEM	101	PUBLIC SUPPLY
SL-5477Z	ST LANDRY	8/10/2004	PRIVATE OWNER	110	DOMESTIC
SMN-33	ST MARTIN	8/9/2004	LDOTD/LAFAYTTE DISTRICT	125	PUBLIC SUPPLY
TS-60	TENSAS	8/30/2004	TOWN OF ST. JOSEPH	140	PUBLIC SUPPLY
TS-FORTENB	TENSAS	12/13/2004	PRIVATE OWNER	UNKNOWN	DOMESTIC
WC-527	W CARROLL	12/13/2004	PRIVATE OWNER	85	IRRIGATION
WC-91	W CARROLL	2/22/2005	NEW CARROLL WTR. ASSN.	115	PUBLIC SUPPLY

TABLE 8-3 Summary of Water Quality Data

Well Name	pH SU	Sal. ppt	Sp. Cond. mmhos/cm	TDS g/L	Temp. Deg. C	Alk. ppm	NH3 ppm	Cl ppm	Color PCU	Hard. ppm	Nitrite-Nitrate (as N) ppm	TKN ppm	Tot. P ppm	Sp. Cond. umhos/cm	SO4 ppm	TDS ppm	TSS ppm	Turb. NTU
LABORATORY DETECTION LIMITS →						2.0	0.1	1.3	5.0	5.0	0.05	0.1	0.05	10	1.3/1.25	4.0	4.0	1.0
	FIELD PARAMETERS					LABORATORY PARAMETERS												
AV-462	7.20	0.64	1.28	0.83	20.31	441	0.16	76.6	20	519	<0.05	0.3	0.24	1280	186	896	12	55
AV-5135Z	DATA NOT COLLECTED					<2	0.23	106	10	†420	<0.05	0.49	0.15	<10	89.1	665	<4	<1
AV-CHAT						540	1.33	32.7	220	†436	<0.05	1.33	1.03	998	<1.3	618	28	120
CO-YAKEY	7.05	0.56	1.12	0.73	20.71	616	3.7	31.1	60	†507	<0.05	4.1	1.03	1112	<1.3	676	39	200
CT-489	6.94	0.46	0.94	0.61	20.33	473	2.14	51.2	100	400	<0.05	2.73	1.13	972	18.6	606	19.5	90
CT-489*	6.94	0.46	0.94	0.61	20.33	472	2.38	53.6	110	†408	<0.05	2.69	1.16	988	19.7	604	20	85
CT-DENNIS	6.62	0.01	0.03	0.02	23.55	85.9	<0.1	10.6	<5	70.8	0.07	<0.1	<0.05	209	4.3	187	<4	1.6
EB-885	7.15	0.38	0.78	0.50	21.18	449	1.9	10.2	10	400	<0.05	2.1	0.18	770	<1.25	486	6.5	40
EC-370	6.47	0.37	0.76	0.49	19.66	398	0.88	8.8	7	<5	<0.05	1.13	1.12	714	<1.3	422	36	190
EC-370*	6.47	0.37	0.76	0.49	19.66	397	0.87	8.6	7	<5	<0.05	1.05	1.12	716	<1.3	424	35	200
FR-1458	7.06	0.55	1.09	0.71	20.93	336	0.33	142	10	340	<0.05	0.44	0.31	1083	39.3	650	14	50
IB-363	DATA NOT COLLECTED					228	1.35	53.1	21	†198	<0.05	1.77	0.5	602	21.9	357	<4	13
IB-5427Z						154	1.17	23.6	12	139	<0.05	1.25	0.34	372	17.8	228	<4	3.9
IB-COM						341	0.41	246	16	†388	<0.05	0.62	0.19	1356	<1.3	765	9.5	55
MA-28	6.91	0.47	0.94	0.61	18.91	484	1.45	29.6	25	377	<0.05	1.83	1.18	921	16.9	542	35	160
MA-28*	6.91	0.47	0.94	0.61	18.91	473	1.43	30	25	377	<0.05	1.78	1.25	919	17.2	542	38	160
MO-871	6.78	0.33	0.67	0.44	17.43	269	0.19	41.7	100	326	<0.05	0.32	0.2	682	27.8	396	9	13
OU-483	6.86	0.48	0.96	0.62	14.75	429	0.57	51.6	20	434	<0.05	0.79	0.44	984	43	566	24	110
RI-469	6.66	0.12	0.24	0.16	20.09	63.6	<0.1	28.2	5	79.2	3.08	<0.1	0.13	246	<1.3	178	<4	<1
RI-48	7.05	0.29	0.6	0.39	20.08	263	<0.1	36.6	<5	253	0.37	<0.1	0.18	624	22.7	362	<4	<1
RI-730	7.10	0.20	0.4	0.26	19.17	144	<0.1	28.2	<5	159	1	<0.1	0.11	420	26.9	250	<4	<1
SL-5477Z	DATA NOT COLLECTED					482	6.54	27	220	413	<0.05	7.86	1.96	900	<1.25	563	56	280
SMN-33						243	0.96	22.8	16	†209	<0.05	1.23	0.28	488	<1.25	293	<4	12
SMN-33*						244	0.96	22.4	17	†210	<0.05	1.13	0.28	492	<1.25	293	<4	13
TS-60	7.44	0.43	0.86	0.56	19.80	466	1.12	23.5	10	396	<0.05	1.12	0.65	837	<1.25	520	22.5	100
TS-FORTENB	6.79	0.41	0.82	0.53	18.72	433	<0.1	14.5	10	377	0.27	1.11	1.05	792	16.7	476	27	110
WC-527	6.93	0.57	1.13	0.74	18.72	478	0.2	78.4	<5	530	<0.05	0.44	0.22	1152	42.7	682	8.7	37
WC-91	7.17	0.38	0.77	0.50	19.06	317	0.15	73.2	<5	355	<0.05	0.24	0.12	820	11.3	444	<4	6.5

* Denotes duplicate sample.

† Lab results estimated due to matrix interference

TABLE 8-4 Summary of Inorganic Data

(Contract Lab Data – sample dates 8/9/04 – 9/1/04)

WELL NAME	Antimony ppb	Arsenic ppb	Barium ppb	Beryllium ppb	Cadmium ppb	Chromium ppb	Copper ppb	Iron ppb	Lead ppb	Mercury ppb	Nickel ppb	Selenium ppb	Silver ppb	Thallium ppb	Zinc ppb
Laboratory Detection Limits	60	10	200	5	5	10	10	100	--	0.2	40	10	--	10	20
AV-462	<60	<10	<200	<5	<5	<10	<10	5,190	DATA INVALID / NOT REPORTED	<0.2	<40	DATA INVALID / NOT REPORTED	NOT ANALYZED	DATA INVALID / NOT REPORTED	<20
AV-5135Z	<60	<10	<200	<5	<5	<10	<10	104		<0.2	<40				<20
AV-CHAT	<60	<10	993	<5	<5	<10	<10	12,800		<0.2	<40				<20
CO-YAKEY	<60	<10	918	<5	<5	<10	<10	16,900		<0.2	<40				<20
CT-489	<60	<10	448	<5	<5	<10	<10	10,200		<0.2	<40				<20
CT-489*	<60	<10	475	<5	<5	<10	<10	10,900		<0.2	<40				<20
CT-DENNIS	<60	<10	<200	<5	<5	<10	<10	126		<0.2	<40				<20
EB-885	<60	35.8	688	<5	<5	<10	<10	3,780		<0.2	<40				<20
FR-1458	<60	13.1	<200	<5	<5	<10	<10	8,450		<0.2	<40				<20
IB-363	<60	34.4	389	<5	<5	<10	<10	1,840		<0.2	<40				<20
IB-5427Z	<60	31.3	<200	<5	<5	<10	<10	753		<0.2	<40				<20
IB-COM	<60	<10	637	<5	<5	<10	<10	4,720		<0.2	<40				71.9
RI-469	<60	<10	<200	<5	<5	<10	<10	<100		<0.2	<40				63.9
SL-5477Z	<60	58.4	838	<5	<5	<10	<10	21,700		<0.2	<40				<20
SMN-33	<60	<10	605	<5	<5	<10	<10	1,920		<0.2	<40				43.2
SMN-33*	<60	<10	613	<5	<5	<10	<10	1,940		<0.2	<40				41
TS-60	<60	<10	789	<5	<5	<10	<10	10,800		<0.2	<40				<20

* Denotes duplicate sample

TABLE 8-4 (Cont'd)

(LDEQ Lab Data – sample dates 12/13/04 – 6/27/05)

WELL NAME	Antimony ppb	Arsenic ppb	Barium ppb	Beryllium ppb	Cadmium ppb	Chromium ppb	Copper ppb	Iron ppb	Lead ppb	Mercury ppb	Nickel ppb	Selenium ppb	Silver ppb	Thallium ppb	Zinc ppb
Laboratory Detection Limits	10	10	1	1	1	5	10	100	10	0.05	5	5	10	5	10
EC-370	<10	<10	668	<1	<1	<5	<10	17,600	<10	<0.05	<5	<5	<10	<5	<10
EC-370*	<10	<10	658	<1	<1	<5	<10	17,400	<10	<0.05	<5	<5	<10	<5	<10
WC-91	<10	<10	158	<1	<1	<5	<10	695	<10	<0.05	<5	<5	<10	<5	<10
OU-483	<10	<10	616	<1	<1	<5	<10	11,800	<10	<0.05	<5	<5	<10	<5	74.8
RI-48	<10	<10	98.2	<1	<1	<5	<10	119	<10	<0.05	<5	<5	<10	<5	<10
MA-28	Data Not Reported: Antimony and Arsenic detected in Field Blank		73.7	<1	<1	<5	45.3	14,400	11	<0.05	<5	<5	<10	<5	17.4
MA-28*			75.3	<1	<1	<5	123	14,700	17.1	<0.05	<5	<5	<10	<5	34.2
MO-871			392	<1	<1	<5	<10	6,330	<10	<0.05	<5	<5	<10	<5	<10
RI-730			118	<1	<1	<5	<10	265	<10	<0.05	<5	<5	<10	<5	<10
TS-FORTENB			45.6	<1	<1	<5	<10	983	<10	<0.05	<5	<5	<10	<5	374
WC-527			420	<1	<1	<5	<10	3,590	<10	<0.05	<5	<5	<10	<5	<10

TABLE 8-4 (Cont'd)

(LDEQ and Contract Lab Data – Resample data: 11/3-11/5/04)

WELL NAME	LAB	Antimony ppb	Arsenic ppb	Barium ppb	Beryllium ppb	Cadmium ppb	Chromium ppb	Copper ppb	Iron ppb	Lead ppb	Mercury ppb	Nickel ppb	Selenium ppb	Silver ppb	Thallium ppb	Zinc ppb
Laboratory Detection Limits	LDEQ	5	5	1	1	1	5	5	100	10		5	5	1	5	10
	Contract	60	10	200	5	5	10	10	100	‡		40	‡	--	‡	20
AV-CHAT	LDEQ	<5	<5	1,080	<1	<1	<5	<5	13,400	<10	DATA NOT REPORTED: Mercury detected in Field Blank	<5	<5	<1	<5	<10
AV-CHAT	Contract	<60	<10	1,030	<5	<5	<10	<10	13,300	‡		<40	‡	--	‡	<20
CO-YAKEY	LDEQ	<5	8.5	975	<1	<1	<5	<5	16,400	<10		<5	<5	<1	<5	17.7
CO-YAKEY	Contract	<60	<10	915	<5	<5	<10	<10	16,400	‡		<40	‡	--	‡	<20
EB-885	LDEQ	<5	44.4	<1	<1	<1	<5	<5	4,070	<10		<5	<5	<1	<5	<10
EB-885	Contract	<60	21.9	<1	<5	<5	<10	<10	3,760	‡		<40	‡	--	‡	<20
FR-1458	LDEQ	<5	7.1	198	<1	<1	<5	<5	8,060	<10		<5	<5	<1	<5	<10
FR-1458	Contract	<60	<10	<200	<5	<5	<10	<10	7,960	‡		<40	‡	--	‡	<20
FR-1458*	LDEQ	<5	6.2	197	<1	<1	<5	<5	7,920	<10		<5	<5	<1	<5	<10
FR-1458*	Contract	<60	<10	<200	<5	<5	<10	<10	7,800	‡		<40	‡	--	‡	<20
IB-5427Z	LDEQ	<5	39.1	198	<1	<1	<5	<5	876	<10		<5	<5	<1	<5	<10
IB-5427Z	Contract	<60	29.8	<200	<5	<5	<10	<10	747	‡		<40	‡	--	‡	<20
IB-COM	LDEQ	<5	9.4	786	<1	<1	<5	<5	3,440	<10		<5	<5	<1	<5	73.1
IB-COM	Contract	<60	<10	738	<5	<5	<10	<10	3,340	‡		<40	‡	--	‡	66.6
SL-5477Z	LDEQ	<5	72.2	919	<1	<1	<5	<5	23,600	<10		<5	<5	<1	<5	<10
SL-5477Z	Contract	<60	62	864	<5	<5	<10	<10	23,200	‡		<40	‡	--	‡	<20
SMN-33	LDEQ	<5	<5	680	<1	<1	<5	<5	2,100	<10		<5	<5	<1	<5	39.5
SMN-33	Contract	<60	<10	671	<5	<5	<10	<10	2,020	‡		<40	‡	--	‡	50.3
TS-60	LDEQ	<5	<5	780	<1	<1	<5	<5	6,390	<10		<5	<5	<1	<5	<10
TS-60	Contract	<60	<10	774	<5	<5	<10	<10	7,990	‡		<40	‡	--	‡	<20

* Denotes duplicate sample
-- Analysis Not Performed
‡ - DATA INVALID / NOT REPORTED

Table 8-5 Water Quality Statistics

Fiscal Year 2005

	PARAMETER	MINIMUM	MAXIMUM	AVERAGE
FIELD	Temperature (^{O}C)	14.75	23.55	19.62
	pH (SU)	6.62	7.44	6.98
	Specific Conductance (mmhos/cm)	0.03	1.28	0.80
	Salinity (ppt)	0.01	0.64	0.40
	TDS (g/L)	0.02	0.83	0.52
LABORATORY	Alkalinity (ppm)	2	616	347.16
	Chloride (ppm)	8.6	246	48.64
	Color (PCU)	5	220	37.98
	Specific Conductance (umhos/cm)	10	1356	766.21
	Sulfate (ppm)	1.25	186	22.46
	TDS (ppm)	178	896	488.96
	TSS (ppm)	4	56	16.42
	Turbidity (NTU)	1	280	75.25
	Ammonia, as N (ppm)	0.1	6.54	1.10
	Hardness (ppm)	5	530	297.50
	Nitrate - Nitrite, as N (ppm)	0.05	3.08	0.19
	TKN (ppm)	0.1	7.86	1.36
	Total Phosphorous (ppm)	0.05	1.96	0.59

Table 8-6 Inorganic Statistics

Fiscal Year 2005

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ppb)	<60	<60	<60
Arsenic (ppb)	<10	72.2	14.31
Barium (ppb)	<1	1,080	524.5
Beryllium (ppb)	<5	<5	<5
Cadmium (ppb)	<5	<5	<5
Chromium (ppb)	<10	<10	<10
Copper (ppb)	<10	123	<10
Iron (ppb)	<100	23,600	8,726
Lead (ppb)	<10	17.1	<10
Mercury (ppb)	<0.2	<0.2	<0.2
Nickel (ppb)	<40	<40	<40
Selenium (ppb)	<35	<35	<35
Silver (ppb)	<10	<10	<10
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	<10	374	29.6

Table 8-7 Three-year Water Quality Statistics

	PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE	FY 2005 AVERAGE
FIELD	Temperature (^{O}C)	19.09	20.60	20.13	19.62
	pH (SU)	6.70	6.63	6.91	6.98
	Specific Conductance (mmhos/cm)	0.76	0.79	0.81	0.80
	Field Salinity (ppt)	0.35	0.39	0.41	0.40
LABORATORY	Alkalinity (ppm)	306.01	328.69	316.11	347.16
	Chloride (ppm)	68.19	55.18	44.81	48.64
	Color (ppm)	26.00	16.10	47.66	37.98
	Specific Conductance (umhos/cm)	768.60	804.12	769.41	766.21
	Sulfate (ppm)	7.66	25.17	24.75	22.46
	TDS (ppm)	674.32	494.88	481.66	488.96
	TSS (ppm)	18.75	15.36	12.46	16.42
	Turbidity (NTU)	46.32	62.12	57.86	75.25
	Ammonia, as N (ppm)	1.26	1.00	0.95	1.10
	Hardness (ppm)	299.70	309.65	304.13	297.50
	Nitrate - Nitrite, as N (ppm)	0.31	0.29	0.72	0.19
	TKN (ppm)	1.34	1.43	1.27	1.36
	Total Phosphorous (ppm)	0.49	0.54	0.54	0.59

Table 8-8 Three-year Inorganic Statistics

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE	FY 2005 AVERAGE
Antimony (ppb)	<5	<5	<5	<60
Arsenic (ppb)	12.68	14.55	9.21	14.31
Barium (ppb)	473.52	412.27	403.98	524.5
Beryllium (ppb)	<5	<5	<5	<5
Cadmium (ppb)	<5	<5	<5	<5
Chromium (ppb)	<5	<5	<5	<10
Copper (ppb)	9.86	8.55	6.18	<10
Iron (ppb)	5,022.06	4,689.87	6,008.07	8,726
Lead (ppb)	<10	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05	<0.2
Nickel (ppb)	<5	<5	<5	<40
Selenium (ppb)	<5	<5	<5	<35
Silver (ppb)	<5	<5	<5	<10
Thallium (ppb)	<5	<5	<5	<5
Zinc (ppb)	43.50	177.23	48.25	29.6

Table 8-9 List of VOC Analytical Parameters

BASELINE MONITORING PROGRAM

VOLATILE ORGANICS BY EPA METHOD 624

COMPOUND	DETECTION LIMIT (ppb)
1,1-DICHLOROETHANE	2
1,1-DICHLOROETHENE	2
1,1,1-TRICHLOROETHANE	2
1,1,2-TRICHLOROETHANE	2
1,1,2,2-TETRACHLOROETHANE	2
1,2-DICHLOROBENZENE	2
1,2-DICHLOROETHANE	2
1,2-DICHLOROPROPANE	2
1,3-DICHLOROBENZENE	2
1,4-DICHLOROBENZENE	2
BENZENE	2
BROMOFORM	2
CARBON TETRACHLORIDE	2
CHLOROBENZENE	2
DIBROMOCHLOROMETHANE	2
CHLOROETHANE	2
TRANS-1,2-DICHLOROETHENE	2
CIS-1,3-DICHLOROPROPENE	2
BROMODICHLOROMETHANE	2
METHYLENE CHLORIDE	2
ETHYLBENZENE	2
BROMOMETHANE	2
CHLOROMETHANE	2
METHYLENE CHLORIDE	2
O-XYLENE	2
STYRENE	2
METHYL-t-BUTYL ETHER	2
TETRACHLOROETHENE	2
TOLUENE	2
TRANS-1,3-DICHLOROPROPENE	2
TRICHLOROETHENE	2
TRICHLOROFLUOROMETHANE	2
CHLOROFORM	2
VINYL CHLORIDE	2

Table 8-10 List of Semi-volatile Analytical Parameters

BASELINE MONITORING PROGRAM

SEMIVOLATILE ORGANICS BY EPA METHOD 625

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

Table 8-10 (Cont'd)
Semivolatile Parameters

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

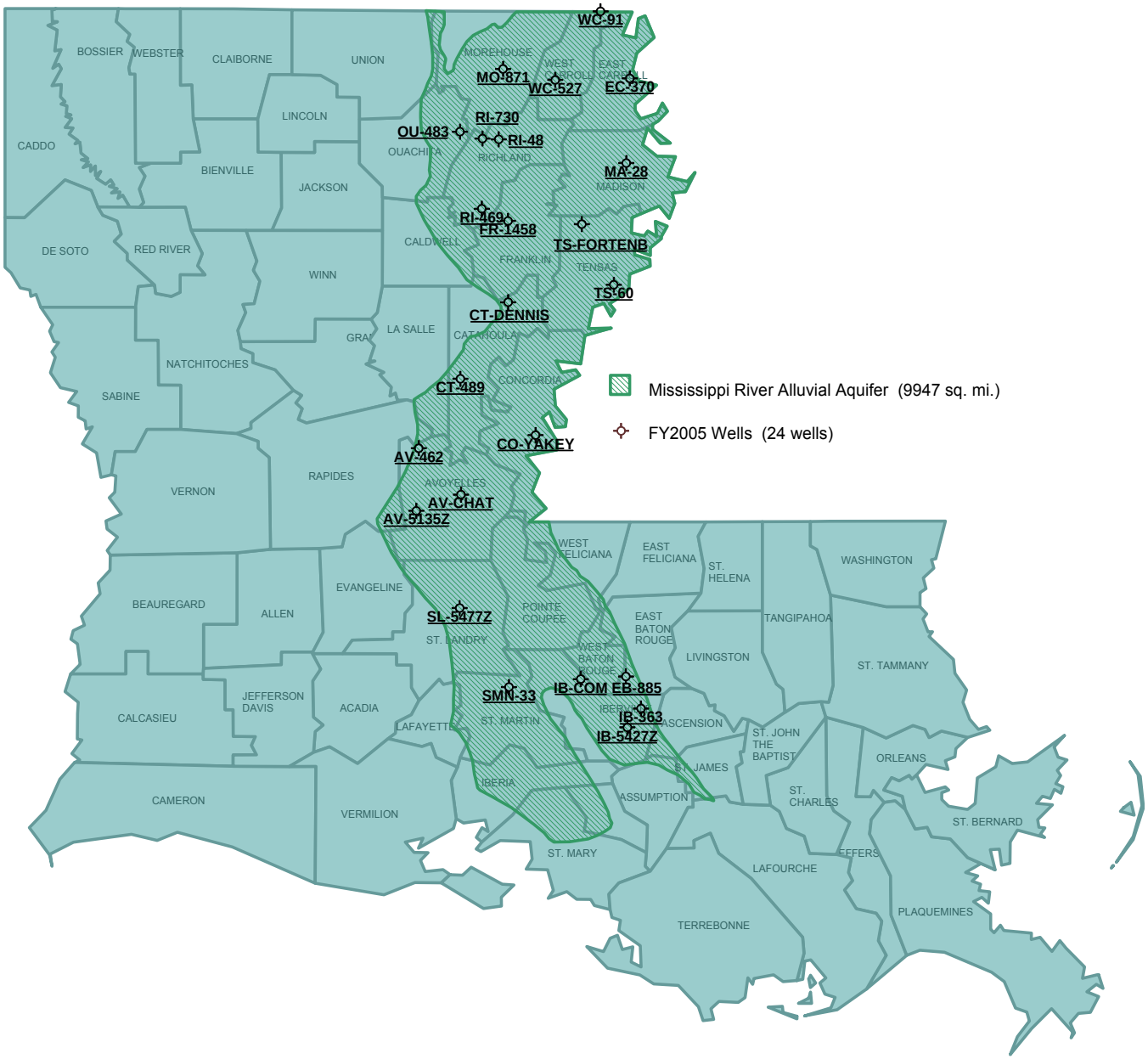
Table 8-11 List of Pesticide and PCB Analytical Parameters

BASELINE MONITORING PROJECT

SEMIVOLATILE ORGANICS BY EPA METHOD 625

COMPOUND	DETECTION LIMIT (ppb)
4,4'-DDD	2
4,4'-DDE	2
4,4'-DDT	2
Aldrin	2
alpha-BHC	2
beta-BHC	2
delta-BHC	2
gamma-BHC (Lindane)	2
Chlordane	2
Dieldrin	2
Endosulfan I	2
Endosulfan II	2
Endosulfan sulfate	2
Endrin	2
Endrin aldehyde	2
Heptachlor	2
Heptachlor epoxide	2
Toxaphene	75
Aroclor-1016	10
Aroclor-1221	10
Aroclor-1232	10
Aroclor-1242	10
Aroclor-1248	10
Aroclor-1254	10
Aroclor-1260	10

BASELINE MONITORING PROGRAM WELLS OF THE 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.

Figure 8-1 Location Plat, Mississippi River Alluvial Aquifer and Wells

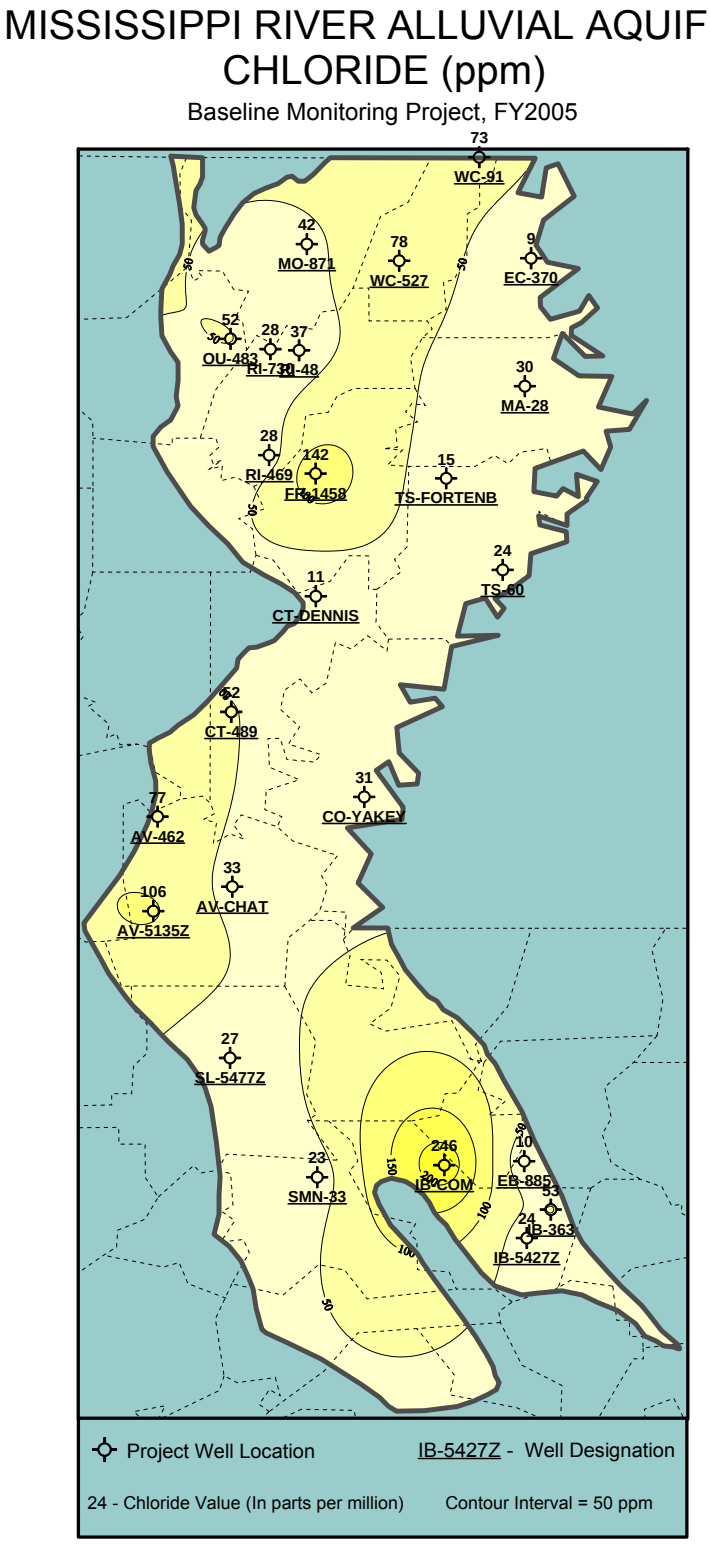


Figure 8-2 Map of Chloride Data

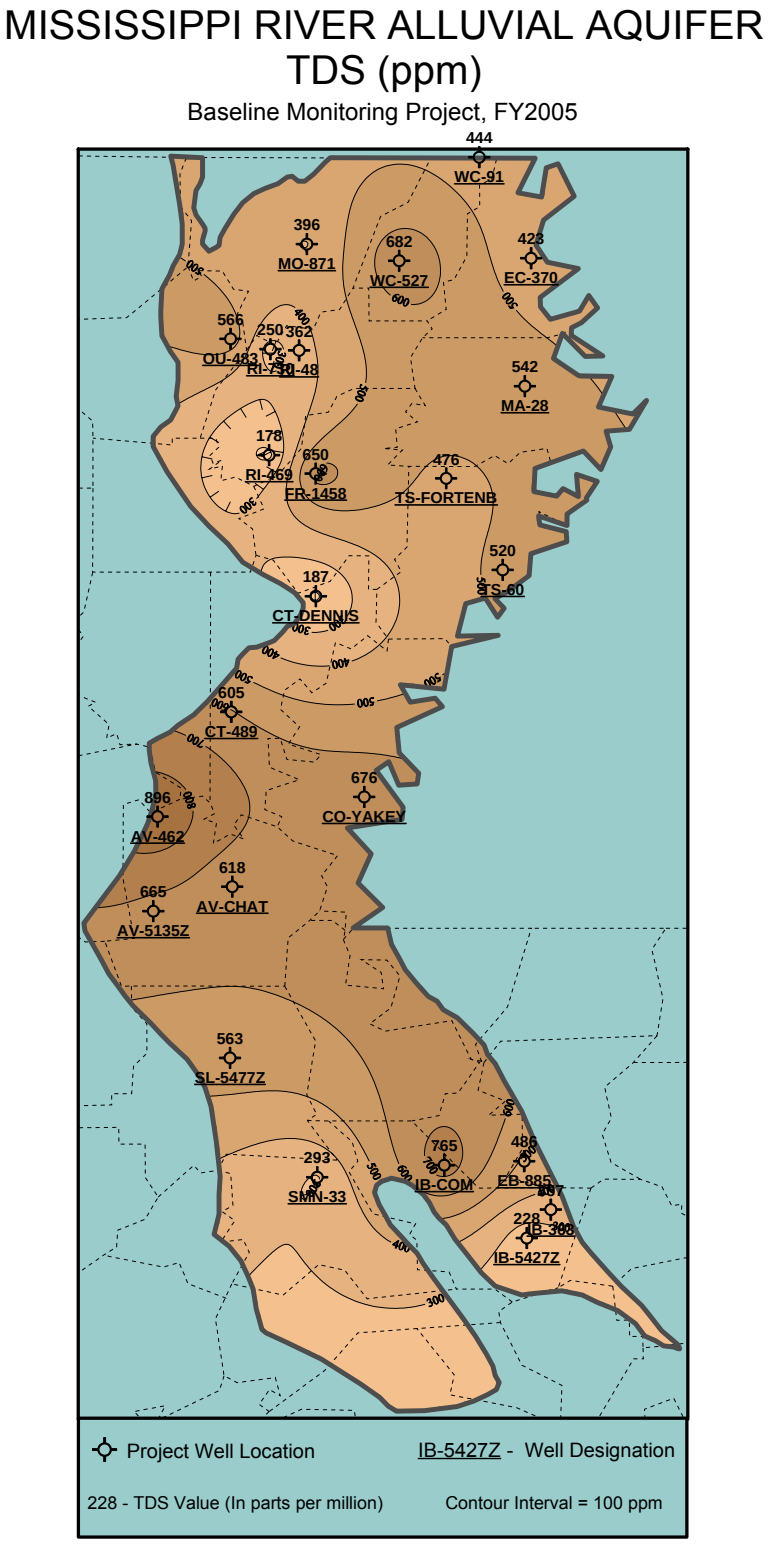


Figure 8-3 Map of TDS Data

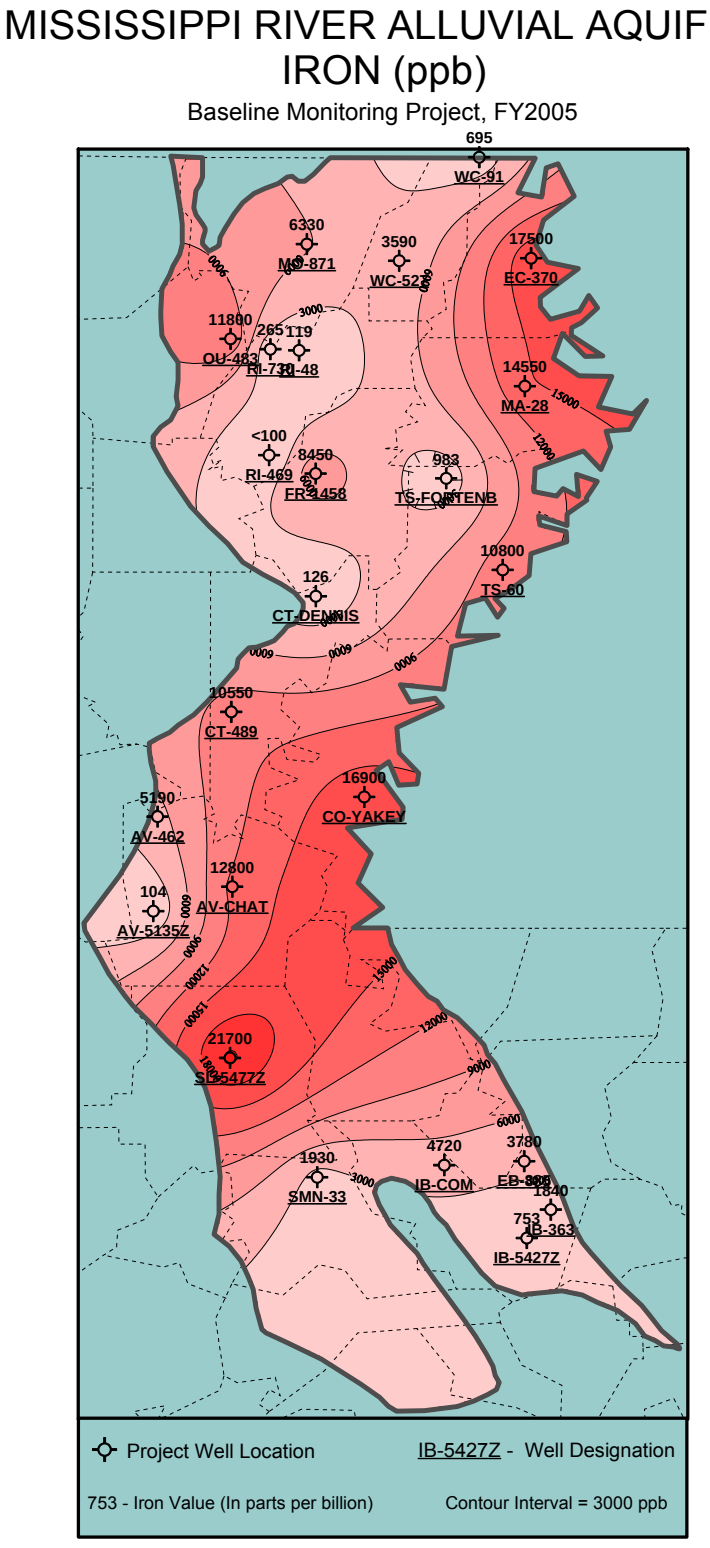


Figure 8-4 Map of Iron Data