MISSISSIPPI RIVER ALLUVIAL AQUIFER SUMMARY

BASELINE MONITORING PROJECT, FY 2002

APPENDIX 8

OF THE

TRIENNIAL SUMMARY REPORT, 2003

FOR THE

ENVIRONMENTAL EVALUATION DIVISION

OF

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PARTIAL FUNDING PROVIDED THROUGH 106 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 during the project year to sample all Baseline Monitoring Project (Project or 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 Project Triennial Summary Report.

Figure 8-1 shows the geographic locations of the Mississippi River Alluvial aquifer and the associated Project 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 July through November of 2001, twenty-five wells were sampled which produce from the Mississippi River Alluvial aquifer. Ten of the wells are classified as public supply wells, eight are classified as irrigation wells, and seven are classified as domestic wells. 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.

Chloride – SMCL = 250 ppm

IB-COM – 337 ppm

Color – SMCL = 15 PCU

AV-CHAT – 120 PCU
AV-DELTA – 80 PCU, duplicate – 80 PCU
CT-241 – 60 PCU
EB-885 – 20 PCU
EC-370 – 80 PCU
FR-368 – 40 PCU
IB-COM – 70 PCU
IB-289 – 55 PCU
IB-5427Z – 20 PCU
MA-28 – 120 PCU
MO-871 – 80 PCU
OU-134 – 80 PCU
SL-5477Z – 190 PCU
SMN-33 – 50 PCU
TS-FORTENB – 49, duplicate – 48 PCU
TS-60 – 80 PCU

Sulfate – SMCL = 250 ppm

AV-DELTA – 271 ppm

Total Dissolved Solids (TDS) – SMCL = 500 ppm

AV-DELTA – 1,018 ppm, duplicate – 1,036 ppm
AV-5135Z – 658 ppm
CT-241 – 540 ppm
FR-368 – 830 ppm
MA-28 – 544 ppm
TS-60 – 504 ppm
WC-91 – 568 ppm
AV-CHAT – 590 ppm
CO-YAKEY – 656 ppm
EC-370 – 708 ppm
IB-COM – 684 ppm
SL-5477Z – 594 ppm
WC-BRAN – 790 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 two previous sampling rotations (three and six years prior). A comparison of these averages show that specific conductivity has consistently increased over the six year period and that TSS has increased by 205.8 ppm from fiscal year (FY) 1999 to FY 2002. The other water quality characteristics of ground water produced from the Mississippi River Alluvial aquifer has not changed significantly since the FY 1996 sampling.

INORGANIC PARAMETERS

Table 8-4 shows the inorganic (total metals) parameters that are sampled for 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 only the following MCL was exceeded.

Arsenic – MCL = 50 ppb

SL-5477Z – 61 ppb

Please see the Summary and Recommendations for further discussion of this.

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

EB-885 – 28.7 ppb
IB-289 – 28.4 ppb
IB-5427Z – 40.7 ppb, duplicate – 37.1 ppb
TS-FORTENB – 11.1 ppb, duplicate – 11.6 ppb

Please see the Summary and Recommendations for further discussion of this.

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-DELTA – 6,500 ppb, duplicate – 6,560 ppb
AV-CHAT – 12,400 ppb
CO-YAKEY – 15,200 ppb
CO-47 – 2,130 ppb
CT-241 – 9,910 ppb
EB-885 – 1,400 ppb
EC-370 – 14,600 ppb
FR-368 – 5,290 ppb
IB-COM – 2,470 ppb
IB-289 – 2,110 ppb
IB-5427Z – 871 ppb, duplicate – 827 ppb
MA-28 – 14,700 ppb
MO-871 – 5,920 ppb
OU-134 – 6,260 ppb
RI-730 – 303 ppb
SL-5477Z – 19,900 ppb
SMN-33 – 1,930 ppb
TS-60 – 8,870 ppb
TS-FORTENB – 10,100 ppb, duplicate – 10,200 ppb
WC-BRAN – 2,810 ppb
WC-91 – 557 ppb

Comparison To Historical Data

Table 8-8 lists the current inorganic data averages alongside the inorganic data averages for the two previous sampling rotations (three and six years prior). A comparison of these averages shows that the zinc and iron averages have fluctuated, while the barium average has steadily decreased. All other averages were fairly consistent.

VOLATILE ORGANIC COMPOUNDS

Table 8-9 shows the volatile organic compound (VOC) parameters that are sampled for. 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 Project well RI-48. The regular-scheduled sampling of the well exhibited concentrations of 2.7 ppb in both the initial and the duplicate sample. A subsequent resampling of the well revealed concentrations of 3.2 ppb and 4.1 ppb for MTBE. Please see the Summary and Recommendations for further discussion of this. It should also be noted that the MTBE has no primary MCL.

Chloromethane was detected in the analysis of the samples taken from Project well CT-241. The regular-scheduled sampling of the well exhibited a concentration of 1.9 ppb. A resampling of the well could not be conducted because the well was inoperable. However, as soon as it is operating again a resample will be taken and the sample results will be discussed in an addendum to this aquifer summary. It should also be noted that the chloromethane has no primary MCL.

No other VOC was detected during the FY 2002 sampling of the Mississippi River Alluvial Aquifer.

SEMIVOLATILE ORGANIC COMPOUNDS

Table 8-10 shows the semivolatile organic compound parameters that are sampled for. 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 semivolatile would be discussed in this section. Please note that different laboratories were used to analyze the semivolatiles during the current sampling of the Mississippi River Alluvial aquifer. Table 8-10 shows the analytes, along with their practicable quantitation limits (PQLs), that were analyzed by LDEQ's Laboratory Services Division. There are some slight differences between this list and the list of analytes and PQLs from the other laboratories that were used. Any further information on this can obtained directly from the BMP staff.

Laboratory data show that several of the Mississippi River Alluvial wells that were sampled during FY 2002 exhibited values for phthalates, specifically di-n-butylphthalate, bis(2-ethylhexyl)phthalate, di-n-octylphathalate, and diethylphthalate. Laboratory analyses from well samples, field blanks, and laboratory blanks have consistently exhibited phthalate concentrations in the last several rounds of sampling of the different aquifers that are monitored by the BMP. Therefore, it is the opinion of this office that the phthalate concentrations exhibited in the FY 2002 Mississippi River Alluvial sample analyses are due to laboratory contamination, not contamination of the aquifer.

Taking into consideration the invalid phthalate concentrations, no semivolatile organic compounds were detected during the FY 2002 sampling of the Mississippi River Alluvial aquifer.

PESTICIDES AND PCBS

Table 8-11 shows the pesticide and PCB parameters that are sampled for. 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. Please note that different laboratories were used to analyze the pesticides and PCBs during the current sampling of the Mississippi River Alluvial aquifer. Table 8-11 shows the analytes, along with their PQLs, that were analyzed by LDEQ's Laboratory Services Division. There are some slight differences between this list and the list of analytes and PQLs from the other laboratories that were used. Any further information on this can obtained directly from the BMP staff.

No pesticide or PCB was detected during the 2002 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 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	6.76	7.21	6.98.0
TDS (ppm)	159	1018	506.0
Hardness (ppm)	62	563	325.6
Chloride (ppm)	9.0	337.0	59.5
Iron (ppb)	<20	19,900	6,009
Nitrite-Nitrate (ppm)	<0.05	9.91	0.63

[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 future MCL for arsenic. 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 this paragraph. 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. A comparison of present and historical BMP data averages shows that over a six-year period, FY 1996 to present, specific conductivity averages have steadily increased, TSS averages increased from 16.3 ppm to 221.7 ppm, zinc and iron averages have fluctuated, while the barium average has steadily decreased. The other data averages have not changed significantly since the FY 1996 sampling.

Analyses of Project well SL-5477Z showed an arsenic concentration of 61 ppb, which is above the 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 current MCL for arsenic, however they did exceed the future MCL of 10 ppb, which will go into effect on January 23, 2006.

EB-885 – 28.7 ppb
IB-289 – 28.4 ppb
IB-5427Z – 40.7 ppb, duplicate – 37.1 ppb
TS-FORTENB – 11.1 ppb, duplicate – 11.6 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. IB-289 is the only public supply well out of the four wells listed above. The owner of IB-5427Z, a domestic well, has been given a good deal of information about arsenic, its health affects, and treatment methods. EB-885 is used as an irrigation well at the LSU Aquiculture Center and TS-FORTENB is a seldom used well located at a hunting camp in Tensas Parish.

MTBE was detected in the analysis of the samples taken from Project well RI-48. The regular-scheduled sampling of the well exhibited concentrations of 2.7 ppb in both the initial and the duplicate sample. A subsequent resampling of the well revealed concentrations of 3.2 ppb and 4.1 ppb for MTBE. LDEQ has been overseeing a ground water remediation project at this site since 1992, and as part of the remediation effort monitoring wells and well RI-48 have been monitored quarterly for BTEX, but not for MTBE. As of this time, there have been no BTEX detections for well RI-48.

Chloromethane was detected in the analysis of the samples taken from Project well CT-241. The regular-scheduled sampling of the well exhibited a concentration of 1.9 ppb. A resampling of the well could not be conducted because the well was inoperable. However, as soon as it is operating again a resample will be taken and the sample results will be discussed in an addendum to this aquifer summary. It should also be noted that the chloromethane has no primary MCL.

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

PROJECT NUMBER	PARISH	WELL NUMBER	DATE SAMPLED	OWNER	DEPTH (Feet)	WELL USE
199321	CONCORDIA	CO-47	07/09/2001	CITY OF VIDALIA	310	PUBLIC SUPPLY
199519	CONCORDIA	CO-YAKEY	07/09/2001	PRIVATE OWNER	150	DOMESTIC
199207	CATAHOULA	CT-241	07/09/2001	LA DELTA PLANTATION	134	IRRIGATION
199517	AVOYELLES	AV-CHAT	07/10/2001	PRIVATE OWNER	75	IRRIGATION
199518	AVOYELLES	AV-5135Z	07/10/2001	PRIVATE OWNER	110	DOMESTIC
199802	AVOYELLES	AV-DELTA	07/10/2001	LA DELTA PLANTATION	135	IRRIGATION
199804	MOREHOUSE	MO-871	08/06/2001	PRIVATE OWNER	80	IRRIGATION
199603	EAST CARROLL	EC-370	08/06/2001	HOLLYBROOK LAND	119	IRRIGATION
199209	WEST CARROLL	WC-91	08/06/2001	N.E.W. CARROLL WTR. ASSN.	110	PUBLIC SUPPLY
199605	WEST CARROLL	WC-BRAN	08/06/2001	PRIVATE OWNER	80	IRRIGATION
199210	RICHLAND	RI-48	08/07/2001	RAYVILLE WATER DEPARTMENT	115	PUBLIC SUPPLY
199604	OUACHITA	OU-134	08/07/2001	PRIVATE OWNER	74	IRRIGATION
199803	IBERVILLE	IB-289	09/10/2001	IBERVILLE WTR. DIST. #2	209	PUBLIC SUPPLY
199522	EAST BATON ROUGE	EB-885	09/10/2001	LA STATE UNIVERSITY	352	IRRIGATION
199520	IBERVILLE	IB-5427Z	09/10/2001	PRIVATE OWNER	160	DOMESTIC
199204	ST LANDRY	SL-5477Z	09/11/2001	PRIVATE OWNER	110	DOMESTIC
199524	ST MARTIN	SMN-33	09/11/2001	LDOTD/LAFAYTTE DISTRICT	125	PUBLIC SUPPLY
199521	IBERVILLE	IB-COM	09/11/2001	PRIVATE OWNER	185	DOMESTIC
199601	CATAHOULA	CT-DENNIS	10/01/2001	PRIVATE OWNER	30	DOMESTIC
198805	FRANKLIN	FR-368	10/01/2001	CITY OF WINNSBORO	79	PUBLIC SUPPLY
199401	RICHLAND	RI-469	10/01/2001	LIDDIEVILLE WATER SYSTEM	90	PUBLIC SUPPLY
199310	TENSAS	TS-60	10/02/2001	TOWN OF ST. JOSEPH	140	PUBLIC SUPPLY
199322	MADISON	MA-28	10/02/2001	TALLULAH WATER SERVICE	128	PUBLIC SUPPLY
200110	RICHLAND	RI-730	10/29/2001	START WATER SYSTEM	101	PUBLIC SUPPLY
199602	TENSAS	TS-FORTENB	11/14/2001	PRIVATE OWNER	UNKNOWN	DOMESTIC

TABLE 8-3 Summary of Water Quality Data

WELL NUMBER	COND. mmhos/cm	pH SU	SAL. ppt	TEMP. °C	ALK. ppm	Cl ppm	COLOR PCU	COND. umhos/cm	SO_4 ppm	TDS ppm	TSS ppm	TURB. NTU	NH_3 (as N) ppm	HARD. ppm	NITRITE-NITRATE (as N) ppm	TKN ppm	TOT. P ppm
	FIELD PARAMETERS				*LABORATORY PARAMETERS*												
AV-5135Z	1.059	6.97	0.52	21.40	334.0	104.00	<5.0	1103.0	75.80	658.0	<4.0	0.6	0.28	424.0	0.19	0.34	0.11
AV-CHAT	1.022	7.04	0.51	20.72	539.0	14.50	120.0	1024.0	<1.25	590.0	33.0	150.0	1.12	421.0	0.10	1.21	1.15
AV-DELTA	1.526	6.99	0.77	20.57	440.0	43.60	80.0	1581.0	101.00	1018.0	14.7	75.0	0.28	563.0	0.12	0.34	0.31
AV-DELTA*	1.526	6.99	0.77	20.57	446.0	116.00	80.0	1581.0	271.00	1036.0	14.0	75.0	0.14	556.0	0.10	0.46	0.29
CO-47	0.495	7.2	0.24	19.63	221.0	15.00	15.0	507.0	30.20	306.0	<4.0	14.1	0.70	205.0	<0.05	0.83	0.15
CO-YAKEY	NO DATA				597.0	30.70	15.0	1112.0	<1.25	656.0	38.7	160.0	3.09	503.0	<0.05	3.18	1.28
CT-241					484.0	21.50	60.0	904.0	<1.25	540.0	24.0	100.0	1.26	392.0	0.12	1.36	0.85
CT-DENNIS	0.203	6.83	0.10	19.93	81.8	9.00	<5.0	185.0	4.80	159.0	<4.0	<1.0	<0.10	62.0	0.09	0.20	<0.05
EB-885	NO DATA				249.0	28.10	20.0	586.0	5.80	368.0	<4.0	3.1	0.41	296.0	9.91	1.57	0.24
EC-370					389.0	9.60	80.0	694.0	<1.25	708.0	29.2	165.0	0.84	404.0	<0.05	0.93	1.12
FR-368	1.513	6.94	0.76	19.03	371.0	248.00	40.0	1464.0	13.40	830.0	13.0	60.0	0.35	418.0	<0.05	0.82	0.29
IB-289	NO DATA				244.0	18.10	55.0	510.0	11.20	296.0	5.0	16.0	1.62	234.0	<0.05	2.75	0.36
IB-5427Z					150.0	23.4	20.0	374.0	14.90	199.0	<4.0	3.6	1.23	136.0	<0.05	1.27	0.40
IB-5427Z*					149.0	22.20	15.0	370.0	14.50	192.0	<4.0	3.1	1.25	136.0	<0.05	1.93	0.41
IB-COM					332.0	337.00	70.0	1369.0	<1.25	684.0	<4.0	24.0	0.46	375.0	<0.05	0.48	0.16
MA-28	0.934	7.11	0.46	19.62	486.0	38.70	120.0	896.0	<1.25	544.0	33.5	185.0	1.79	377.0	<0.05	1.81	1.25
MO-871	NO DATA				257.0	39.30	80.0	623.0	29.70	388.0	7.2	32.0	0.17	289.0	<0.05	0.22	0.28
OU-134					281.0	26.70	80.0	580.0	6.00	368.0	16.0	68.0	0.88	227.0	<0.05	0.29	1.16
RI-469	0.245	6.76	0.12	20.13	58.7	30.40	<5.0	238.0	3.90	190.0	<4.0	<1.0	<0.10	68.6	3.23	0.26	0.08
RI-469*	0.245	6.76	0.12	20.13	58.8	30.40	<5.0	237.0	4.00	179.0	<4.0	<1.0	<0.10	66.1	3.20	0.30	0.07
RI-48	NO DATA				245.0	40.50	<5.0	607.0	27.90	392.0	<4.0	<1.0	0.10	240.0	0.68	<0.10	0.16
RI-48*					247.0	40.50	<5.0	612.0	28.00	384.0	<4.0	<1.0	<0.10	241.0	0.69	<0.10	0.19
RI-730	0.374	6.84	0.18	19.55	134.0	28.70	<5.0	382.0	25.00	240.0	<4.0	1.7	0.14	145.0	0.81	0.49	0.17
RI-730*	0.374	6.84	0.18	19.55	133.0	28.70	<5.0	381.0	25.40	233.0	<4.0	1.3	0.10	148.0	0.83	0.29	0.19

* Denotes duplicate sample.

TABLE 8-3 (Cont'd)

WELL NUMBER	COND. mmhos/cm	pH SU	SAL. ppt	TEMP. ^{O}C	ALK. ppm	Cl ppm	COLOR PCU	COND. umhos/cm	SO_4 ppm	TDS ppm	TSS ppm	TURB. NTU	NH_3 (as N) ppm	HARD. ppm	NITRITE-NITRATE (as N) ppm	TKN ppm	TOT. P ppm
	FIELD PARAMETERS				*LABORATORY PARAMETERS*												
SL-5477Z	NO DATA				458.0	31.60	190.0	865.0	<1.25	594.0	36.0	190.0	6.62	328.0	<0.05	6.65	2.70
SMN-33	NO DATA				239.0	22.20	50.0	492.0	<1.25	338.0	<4.0	13.0	1.22	208.0	0.07	1.87	0.35
TS-60	0.838	7.21	0.41	19.50	446.0	31.40	80.0	805.0	<1.25	504.0	5024.0	120.0	1.22	371.0	<0.05	1.35	0.61
TS-FORTENB	0.787	6.76	0.39	20.53	420.0	16.70	49.0	726.0	1.40	456.0	19.5	95.0	1.25	336.0	0.20	1.12	1.05
TS-FORTENB*	0.787	6.76	0.39	20.53	418.0	17.20	48.0	721.0	1.50	434.0	22.0	100.0	1.40	338.0	0.15	3.35	1.01
WC-91	NO DATA				319.0	136.00	10.0	992.0	14.80	568.0	<4.0	5.4	0.13	395.0	0.07	0.21	0.10
WC-BRAN					480.0	143.00	10.0	1291.0	46.80	790.0	6.0	34.0	0.27	541.0	<0.05	0.27	0.19

* Denotes duplicate sample.

TABLE 8-4 Summary of Inorganic Data

WELL NUMBER	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
AV-5135Z	<5.0	<5.0	164.0	<1.0	<1.0	<5.0	<5.0	86.4	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	14.5
AV-CHAT	<5.0	<5.0	985.0	<1.0	<1.0	<5.0	<5.0	12,400.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
AV-DELTA	<5.0	<5.0	51.0	<1.0	<1.0	<5.0	<5.0	6,500.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
AV-DELTA*	<5.0	<5.0	51.6	<1.0	<1.0	<5.0	<5.0	6,560.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CO-47	<5.0	<5.0	332.0	<1.0	<1.0	<5.0	<5.0	2,130.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CO-YAKEY	<5.0	<5.0	852.0	<1.0	<1.0	<5.0	<5.0	15,200.0	<10.0	<0.05	5.5	<5.0	<1.0	<5.0	<10.0
CT-241	<5.0	<5.0	390.0	<1.0	<1.0	<5.0	<5.0	9,910.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	230.0
CT-DENNIS	<5.0	<5.0	59.8	<1.0	<1.0	<5.0	<5.0	49.2	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
EB-885	<5.0	28.7	374.0	<1.0	<1.0	<5.0	20.8	1,400.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	19.2
EC-370	<5.0	<5.0	566.0	<1.0	<1.0	<5.0	<5.0	14,600.0	<10.0	NOT REPORTED	<5.0	<5.0	<1.0	<5.0	<10.0
FR-368	<5.0	<5.0	198.0	<1.0	<1.0	<5.0	<5.0	5,290.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
IB-289	<5.0	28.4	451.0	<1.0	<1.0	<5.0	<5.0	2,110.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
IB-5427Z	<5.0	40.7	183.0	<1.0	<1.0	<5.0	<5.0	871.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	12.2
IB-5427Z*	<5.0	37.1	184.0	<1.0	<1.0	<5.0	<5.0	827.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
IB-COM	<5.0	<5.0	677.0	<1.0	<1.0	<5.0	<5.0	2,470.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	30.7
MA-28	<5.0	<5.0	688.0	<1.0	<1.0	<5.0	<5.0	14,700.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
MO-871	<5.0	<5.0	325.0	<1.0	<1.0	<5.0	<5.0	5,920.0	<10.0	NOT REPORTED	<5.0	<5.0	<1.0	<5.0	<10.0
OU-134	<5.0	<5.0	302.0	<1.0	<1.0	<5.0	<5.0	6,260.0	<10.0		<5.0	<5.0	<1.0	<5.0	<10.0
RI-469	<5.0	<5.0	27.1	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
RI-469*	<5.0	<5.0	26.7	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
RI-48	<5.0	<5.0	79.7	<1.0	<1.0	<5.0	<5.0	120.0	<10.0	NOT REPORTED	<5.0	<5.0	<1.0	<5.0	<10.0
RI-48*	<5.0	<5.0	80.0	<1.0	<1.0	<5.0	<5.0	113.0	<10.0		<5.0	<5.0	<1.0	<5.0	<10.0
RI-730	<5.0	<5.0	100.0	<1.0	<1.0	<5.0	<5.0	303.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
RI-730*	<5.0	<5.0	98.3	<1.0	<1.0	<5.0	<5.0	269.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0

* Denotes duplicate sample.

TABLE 8-4 (Cont'd)

WELL NUMBER	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
SL-5477Z	<5.0	61.0	775.0	<1.0	<1.0	<5.0	<5.0	19,900.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
SMN-33	<5.0	<5.0	627.0	<1.0	<1.0	<5.0	<5.0	1,930.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	15.4
TS-60	<5.0	<5.0	697.0	<1.0	<1.0	<5.0	<5.0	8,870.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
TS-FORTENB	<5.0	11.1	406.0	<1.0	<1.0	<5.0	72.6	10,100.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	741.0
TS-FORTENB*	<5.0	11.6	407.0	<1.0	<1.0	<5.0	12.5	10,200.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	596.0
WC-91	<5.0	6.1	145.0	<1.0	<1.0	<5.0	<5.0	557.0	<10.0	NOT REPORTED	<5.0	<5.0	<1.0	<5.0	14.9
WC-BRAN	<5.0	<5.0	341.0	<1.0	<1.0	<5.0	<5.0	2,810.0	<10.0		<5.0	<5.0	<1.0	<5.0	<10.0

* Denotes duplicate sample.

Table 8-5 Water Quality Statistics

Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	6.76	7.21	6.98.0
Temperature ^{O}C	19.03	21.40	20.11
Sp. Conductivity (mmhos/cm) (Field)	0.203	1.56	0.862
Salinity (ppt)	0.10	0.77	0.43
TSS (ppm)	<4	5,024.0	221.7
TDS (ppm)	159	1018	506.0
Alkalinity (ppm)	58.7	597.0	338.4
Hardness (ppm)	62	563	325.6
Turbidity (NTU)	<1	190.0	63.1
Sp. Conductivity (umhos/cm) (Lab)	185.0	1581.0	813.7
Color (PCU)	<5	190.0	52.3
Chloride (ppm)	9.0	337.0	59.5
Sulfate (ppm)	<1.25	9.91	0.63
Nitrite-Nitrate, as N (ppm)	<0.05	9.91	0.63
Phosphorus (ppm)	<0.05	2.70	0.60
TKN (ppm)	<0.1	6.65	1.22
Ammonia (ppm)	<0.1	6.62	1.02

Table 8-6 Inorganic Statistics

Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	<5	61.00	9.21
Barium (ppb)	27.10	985.00	403.98
Beryllium (ppb)	<5	<5	<5
Cadmium (ppb)	<5	<5	<5
Chromium (ppb)	<5	<5	<5
Copper (ppb)	<5	72.60	6.18
Iron (ppb)	<20	19,900	6,009
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	<5	5.50	<5
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<5	<5	<5
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	<10	741.00	48.25

Table 8-7 Three-year Water Quality Statistics

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE
PH (SU)	6.69	6.65	6.98
Temperature ^{O}C	18.92	20.51	20.11
Sp. Conductivity (mmhos/cm) (Field)	0.761	0.819	0.862
Salinity (ppt)	0.35	0.40	0.43
TSS (ppm)	16.3	15.9	221.7
TDS (ppm)	672.4	504.5	506.0
Alkalinity (ppm)	311.1	338.4	338.4
Hardness (ppm)	306.3	319.3	325.6
Turbidity (NTU)	45.27	64.90	63.14
Sp. Conductivity (umhos/cm) (Lab)	767.6	828.2	813.7
Color (PCU)	25.8	15.8	52.3
Chloride (ppm)	64.3	58.1	59.5
Sulfate (ppm)	9.46	24.49	16.38
Nitrite-Nitrate, as N (ppm)	0.20	0.18	0.63
Phosphorus (ppm)	0.48	0.55	0.60
TKN (ppm)	1.30	1.47	1.22
Ammonia (ppm)	1.09	1.02	1.02

Table 8-8 Three-year Inorganic Statistics

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

Table 8-9 List of VOC Analytical Parameters

BASELINE MONITORING PROJECT
VOLATILE ORGANICS BY EPA METHOD 624

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

PQL = Practical Quantitation Limit
ppb = parts per billion

Table 8-10 List of Semi-volatile Analytical Parameters

BASELINE MONITORING PROJECT

SEMIVOLATILE ORGANICS BY EPA METHOD 625

COMPOUND	PQL (ppb)
N-Nitrosodimethylamine	2
Phenol	2
Bis(2-chloroethyl)ether	2
2-Chlorophenol	2
1,3-Dichlorobenzene	2
1,4-Dichlorobenzene	2
1,2-Dichlorobenzene	2
Bis(2-chloroisopropyl)ether	6
N-Nitroso-di-n-propylamine	4
Hexachloroethane	2
Nitrobenzene	2
Isophorone	2
2-Nitrophenol	6
1,3,5-Trichlorobenzene	2
2,4-Dimethylphenol	4
Bis(2-chloroethoxy)methane	2
2,4-Dichlorophenol	4
1,2,4-Trichlorobenzene	2
Naphthalene	2
1,2,3-Trichlorobenzene	2
Hexachlorobutadiene	2
4-Chloro-3-methylphenol	4
1,2,4,5-Tetrachlorobenzene	2
Hexachlorocyclopentadiene	6
2,4,6-Trichlorophenol	6
2-Chloronaphthalene	2
1,2,3,4-Tetrachlorobenzene	2
Dimethylphthalate	2
Acenaphthylene	2
2,6-Dinitrotoluene	4
Acenaphthene	2
2,4-Dinitrophenol	12
4-Nitrophenol	6
Pentachlorobenzene	2
2,4-Dinitrotoluene	6
Diethylphthalate	2
Fluorene	2
4-Chlorophenyl phenyl ether	2
4,6-Dinitro-2-methylphenol	12

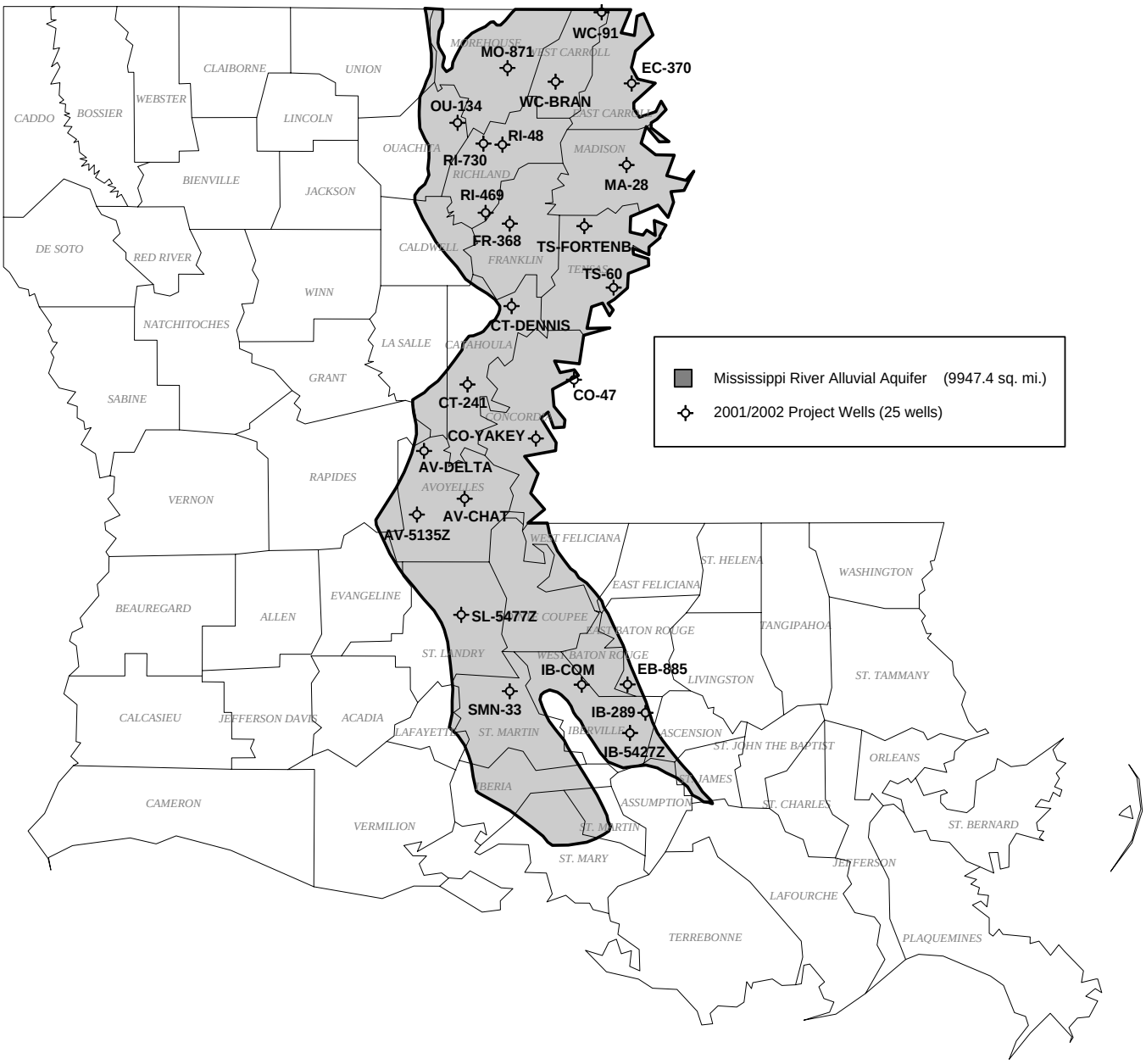
Table 8-10 (Cont'd)
Semivolatile Parameters

COMPOUND	PQL (ppb)
N-Nitrosodiphenylamine	2
4-Bromophenyl phenyl ether	2
Hexachlorobenzene	2
Pentachlorophenol	10
Phenathrene	2
Anthracene	2
Di-n-butylphthalate	2
Fluoranthene	2
Benzidine	20
Pyrene	2
Butylbenzylphthalate	2
3,3'-Dichlorobenzidine	10
Benzo(a)anthracene	6
Chrysene	4
Bis(2-ethylhexyl)phthalate	2
Di-n-octylphthalate	2
Benzo(b)fluoranthene	6
Benzo(k)fluoranthene	6
Benzo(a)Pyrene	6
Indeno(1,2,3-cd)pyrene	6
Dibenz(a,h)anthracene	6
Benzo(g,h,i)perylene	6

Table 8-11 List of Pesticide and PCB Analytical Parameters
BASELINE MONITORING PROJECT
SEMIVOLATILE ORGANICS BY EPA METHOD 625

COMPOUND	PQL (ppb)
Alpha BHC	2
Beta BHC	2
Gamma BHC	2
Delta BHC	2
Heptachlor	2
Aldrin	2
Heptachlor epoxide	2
Chlordane	2
Endosulfan I	2
4,4'-DDE	2
Dieldrin	2
4,4'DDD	2
Endrin	2
Toxaphene	40
Endosulfan II	2
Endrin Aldehyde	2
4,4'DDT	2
Endosulfan Sulfate	2
Methoxychlor	2
Endrin Ketone	2
PCB 1221/ PCB 1232	10
PCB 1016/ PCB 1242	10
PCB 1254	10
PCB 1248	10
PCB 1260	10

BASELINE MONITORING PROJECT WELLS OF THE MISSISSIPPI RIVER ALLUVIAL AQUIFER



Aquifer bondary digitized from Louisiana Hydrologic Map No. 2: Areal extent of Freshwater in Major Aquifers of Louisiana. Smoot, 1988; USGS/LDOTD Report 86-4150

Figure 8-1 Location Plat, Mississippi River Alluvial Aquifer

MISSISSIPPI RIVER ALLUVIAL AQUIFER
TDS (ppm)
Baseline Monitoring Project, FY01-02

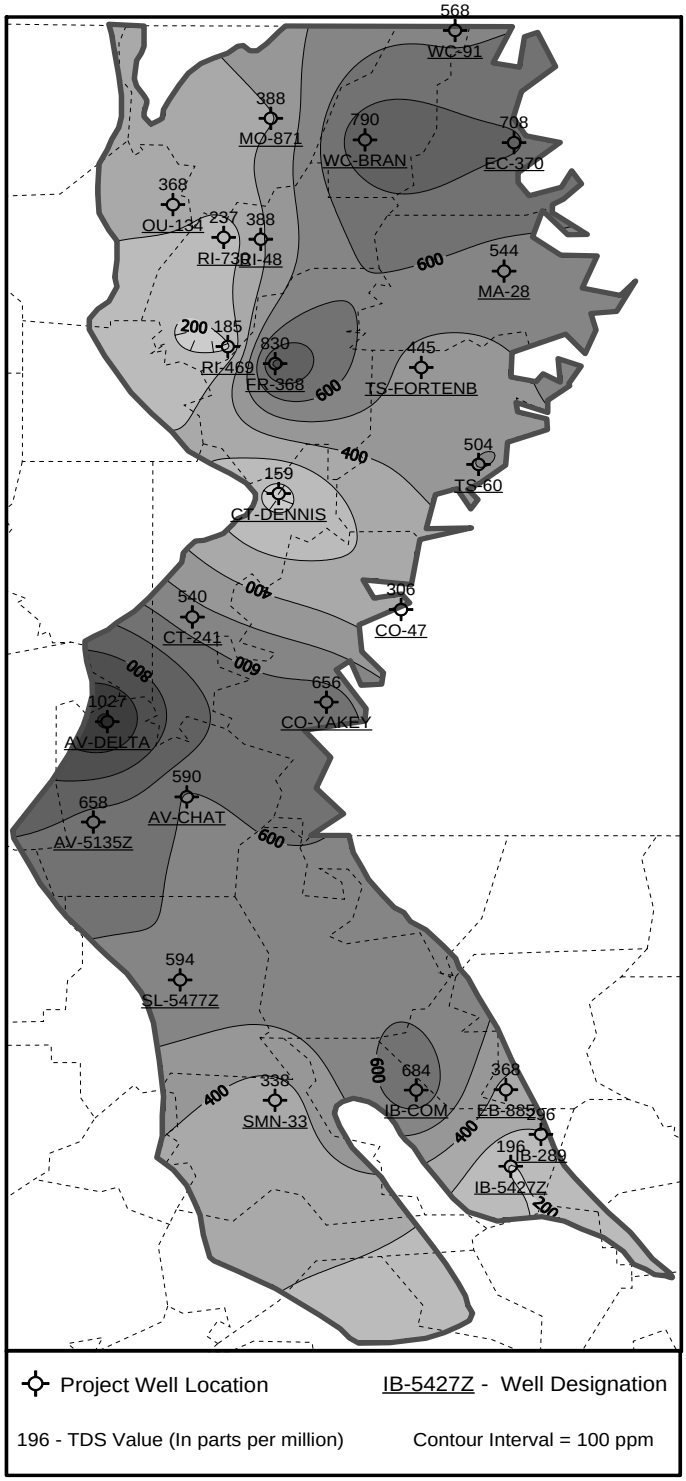


Figure 8-2 Map of TDS Data

MISSISSIPPI RIVER ALLUVIAL AQUIFER
CHLORIDE (ppm)

Baseline Monitoring Project, FY01-02

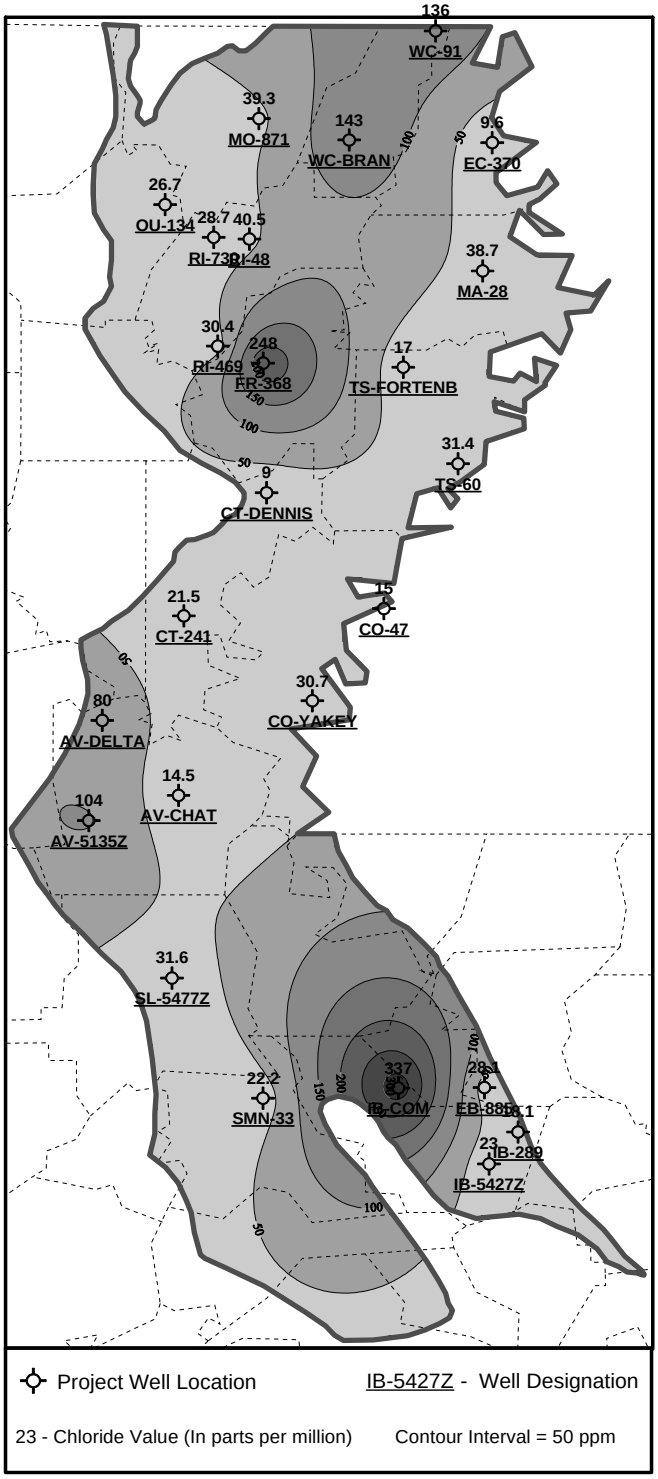


Figure 8-3 Map of Chloride Data

MISSISSIPPI RIVER ALLUVIAL AQUIFER
IRON (ppb)
Baseline Monitoring Project, FY01-02

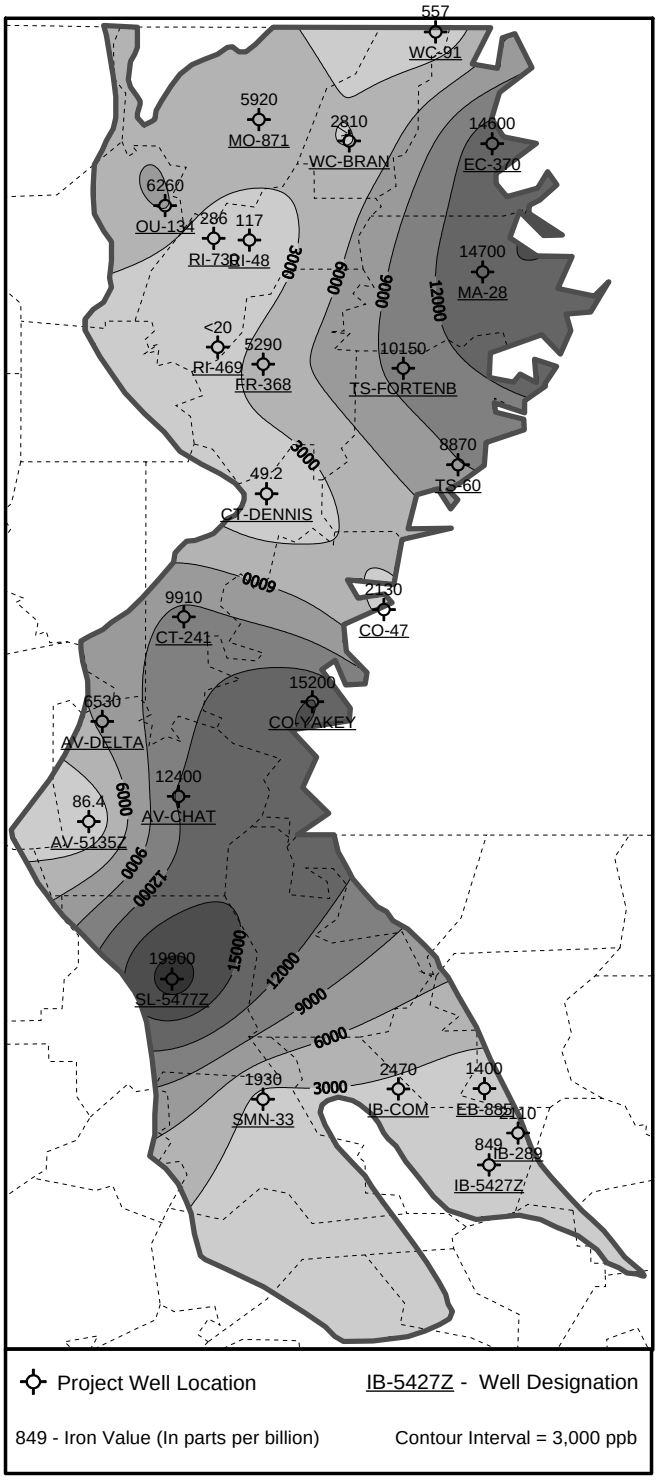


Figure 8-4 Map of Iron Data