CARRIZO-WILCOX AQUIFER SUMMARY

BASELINE MONITORING PROJECT, FY 2001

APPENDIX 2

OF THE

TRIENNIAL SUMMARY REPORT, 2003

FOR THE

ENVIRONMENTAL EVALUATION DIVISION

OF

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PARTIAL FUNDING PROVIDED THROUGH 106 CWA

CARRIZO-WILCOX AQUIFER SUMMARY

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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 2-1 shows the geographic locations of the Carrizo-Wilcox aquifer and the associated Project wells, whereas Table 2-2 lists the wells in the aquifer along with their total depths and the use made of produced waters and date sampled.

In September and October of 2000, twelve wells were sampled which produce from the Carrizo-Wilcox aquifer. Five of the twelve are classified as public supply, four are classified as industrial, two are classified as irrigation, and the remaining well is classified as a domestic well. The wells are located in six parishes in the northwest area of the state.

Well data for registered water wells were obtained from the Louisiana Department of Transportation and Development's Water Well Registration Data file.

GEOLOGY

The Carrizo-Wilcox aquifer system consists of the Carrizo Sand of the Eocene Claiborne group and the undifferentiated Wilcox group of Eocene and Paleocene age. The Wilcox deposits, outcropping in northwestern Louisiana, are the oldest deposits in the state containing fresh water. The Carrizo is discontinuous and consists of well-sorted, fine to medium grained, cross-bedded sands, with some silt and lignite. Well yields are restricted because the sand beds are typically thin, lenticular and fine textured. The system is confined downdip by the clays and silty clays of the overlying Cane River formation and the regionally confining clays of the underlying Midway group.

HYDROGEOLOGY

Primary recharge of the Carrizo-Wilcox aquifer occurs from direct infiltration of rainfall in interstream, upland outcrop-subcrop areas. Water also moves between overlying alluvial and terrace aquifers, the Sparta aquifer, and the Carrizo-Wilcox aquifer, according to hydraulic head differences. Water level fluctuations are mostly seasonal, and the hydraulic conductivity varies between 2-40 feet/day.

The maximum depths of occurrence of freshwater in the Carrizo-Wilcox range from 200 feet above sea level, to 1,100 feet below sea level. The range of thickness of the fresh water interval in the Carrizo-Wilcox is 50 to 850 feet. The depths of the Carrizo-Wilcox wells that were monitored in conjunction with the BMP range from 97 to 543 feet.

INTERPRETATION OF DATA

FIELD, WATER QUALITY, AND NUTRIENTS PARAMETERS

Table 2-3 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 2-5 provides an overview of field data, water quality data, and nutrients data for the Carrizo-Wilcox aquifer, listing the minimum, maximum, and average results for these parameters.

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 2-3 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 2-3 show the following secondary MCLs (SMCL) were exceeded.

Color – SMCL = 15 PCU

BO-467 – 160 PCU, duplicate – 150 PCU
BI-236 – 80 PCU

pH – SMCL = 6.5 – 8.5 standard units (S.U.)

BO-275 – 8.64 S.U.
SA-534 – 6.34 S.U.
RR-5070Z – 5.61 S.U.

Total Dissolved Solids (TDS) – SMCL = 500 ppm

BI-236 – 694 ppm
DS-327 – 666 ppm
CD-639 – 688 ppm
DS-363 – 548 ppm

Comparison To Historical Data

Table 2-7 lists the current field, water quality, and nutrients data averages alongside those parameters' data averages of the two previous sampling rotations (three and six years prior). A comparison of these averages show that the water quality characteristics of ground water produced from the Carrizo-Wilcox aquifer has not changed significantly since the 1995 fiscal year (FY) sampling.

INORGANIC PARAMETERS

Table 2-4 shows the inorganic (total metals) parameters that are sampled for and the analytical results for those parameters for each well. Table 2-6 provides an overview of inorganic data for the Carrizo-Wilcox aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards

A review of the analyses listed on Table 2-4 shows that no primary MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards

Laboratory data contained in Table 2-4 show the following secondary MCLs (SMCL) were exceeded.

Iron – SMCL = 300 ppb
BO-467 – 15,400 ppb, duplicate – 14,900 ppb CD-630 – 525.5 ppb

Silver – SMCL = 100 ppb
CD-642 – 184 ppb

Comparison To Historical Data

Table 2-8 lists the current inorganic data averages alongside the inorganic data averages of the two previous sampling rotations (three and six years prior). A comparison of these averages show that while there are some general fluctuations over the six-year period, for the most part, the inorganic characteristics of ground water produced from the Carrizo-Wilcox aquifer has not changed significantly since the FY 1995 sampling.

VOLATILE ORGANIC COMPOUNDS

Table 2-9 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.

No VOC was detected during the 2001 sampling of the Carrizo-Wilcox aquifer.

SEMIVOLATILE ORGANIC COMPOUNDS

Table 2-10 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.

Federal Primary Drinking Water Standards

Laboratory data show that six wells exceeded the MCL of 6 parts per billion (ppb) for bis(2-ethylhexyl)phthalate (BEHP). However, every well that was sampled in the Carrizo-Wilcox, as well as every field and laboratory blank that was analyzed, exhibited values for BEHP. Therefore, it is this Office's opinion that the values exhibited for BEHP are due to laboratory or field contamination and are considered invalid.

Taking into consideration the invalid BEHP concentrations, no primary MCL was exceeded for the semivolatile parameters.

Federal Secondary Drinking Water Standards

None of the semivolatiles sampled have current SMCLs.

Detection of Semivolatiles With No Standards

Six of the wells sampled in the Carrizo-Wilcox, all during the month of October, exhibited values for di-n-octylphthalate, and one well sampled showed a detection of di-n-butylphthalate. Since so many wells exhibited phthalates, and since these detections are most likely related to the BEHP detections discussed above, it is this Office's opinion that these detections are due to field or laboratory contamination, and are therefore considered invalid. No other semivolatile organic compounds were detected in the sampling of the Carrizo-Wilcox aquifer.

PESTICIDES AND PCBS

Table 2-11 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.

No pesticide or PCB was detected during the 2001 sampling of the Carrizo-Wilcox aquifer.

COMMON WATER CHARACTERISTICS

Table 2-1 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 Carrizo-Wilcox aquifer for pH, TDS, hardness, chloride, iron, and nitrite-nitrate are listed in the table. Figures 2-2, 2-3, 2-4, and 2-5 respectively, represent the contoured data for pH, TDS, chloride, and iron. The data average for hardness shows that the ground water produced from this aquifer is generally soft[1].

Table 2-1 Common Water Characteristics

Fiscal Year 2001

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
pH (SU)	5.61	8.64	7.87
TDS (ppm)	181.0	694.0	449.6
Hardness (ppm)	<5	122.0	31.3
Chloride (ppm)	11.5	190.0	69.7
Iron (ppb)	10.00	15400	1352.83
Nitrite-Nitrate, as N (ppm)	<0.02	0.57	0.07

[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 this aquifer is generally soft, and is of good quality when considering short-term or long-term health risk guidelines. Laboratory data show that no project well that was sampled during the Fiscal Year 2001 monitoring of the Carrizo-Wilcox exceeded a primary MCL. The data also show that this aquifer is of fairly good quality when considering taste, odor, or appearance guidelines. A comparison to historical BMP data show that while there are some general fluctuations, for the most part, the characteristics of the ground water produced from the Carrizo-Wilcox aquifer has not changed significantly since the FY 1995 sampling.

It is recommended that the Project wells assigned to the Carrizo-Wilcox aquifer be re-sampled as planned in approximately three years. In addition, several wells should be added to the twelve currently in place to increase the well density for this aquifer.

Table 2-2 List of Project Wells Sampled

PROJECT NUMBER	PARISH	WELL NUMBER	DATE SAMPLED	OWNER	DEPTH (Feet)	WELL USE
199305	BIENVILLE	BI-236	10/02/2000	ALBERTA WATER SYSTEM	410	PUBLIC SUPPLY
198801	BOSSIER	BO-275	10/31/2000	VILLAGE WATER SYSTEM	308	PUBLIC SUPPLY
200022	BOSSIER	BO-467	09/11/2000	CALUMET REFINERY	97	INDUSTRIAL
198603	CADDO	CD-453	09/11/2000	CITY OF VIVIAN	228	PUBLIC SUPPLY
199116	CADDO	CD-630	09/11/2000	PRIVATE OWNER	240	IRRIGATION
199114	CADDO	CD-639	09/12/2000	BOX COMPANY	200	INDUSTRIAL
199113	CADDO	CD-642	09/12/2000	LOUISIANA LIFT	210	INDUSTRIAL
198804	DE SOTO	DS-327	10/02/2000	CITY OF MANSFIELD	243	PUBLIC SUPPLY
198605	DE SOTO	DS-363	10/02/2000	CITY OF MANSFIELD	280	PUBLIC SUPPLY
199306	RED RIVER	RR-5070Z	10/02/2000	PRIVATE OWNER	105	DOMESTIC
199216	SABINE	SA-502	10/03/2000	PRIVATE OWNER	213	IRRIGATION
199704	SABINE	SA-534	10/03/2000	BOISE CASCADE	543	INDUSTRIAL

Table 2-3 Summary of Field, Water Quality, and Nutrients Data

WELL NUMBER	COND. mmhos/cm	pH SU	SAL. ppt	TEMP. OC	ALK. ppm	Cl ppm	COLOR PCU	COND. umhos/cm	SO4 ppm	TDS ppm	TSS ppm	TURB. NTU	NH3 (as N) ppm	HARD. ppm	NITRITE-NITRATE (as N) ppm	TKN ppm	TOT. P ppm
BI-236	1.151	8.33	0.57	24.31	602.0	25.30	80.0	1162.0	<1.25	694.0	<4.0	3.3	0.50	<5.0	0.03	0.72	0.84
BO-275	0.619	8.64	0.30	21.28	245.0	38.20	3.0	633.0	18.90	352.0	<4.0	2.3	1.18	28.4	<0.02	1.36	0.21
BO-467	NO DATA				72.1	28.90	160.0	323.9	37.50	246.0	<4.0	7.4	0.17	<5.0	0.03	0.23	0.37
BO-467*	NO DATA				73.1	28.40	150.0	322.7	37.50	254.0	<4.0	NOT REPORTED	0.19	<5.0	0.03	0.23	0.37
CD-453	1079	8.32	0.54	20.72	296.0	160.00	16.0	1111.0	29.80	620.0	<4.0	1.9	1.04	16.5	<0.02	1.10	0.40
CD-630	NO DATA				202.0	18.20	1.0	441.4	6.90	270.0	<4.0	3.1	0.31	122.0	0.03	0.44	0.18
CD-639	1226	8.36	0.61	22.68	351.0	190.00	8.0	1239.0	<1.25	688.0	<4.0	<1.0	0.99	11.4	<0.02	1.01	0.21
CD-642	524	8.43	0.25	20.74	231.0	25.50	1.0	527.4	2.90	312.0	<4.0	1.2	0.72	11.6	0.03	0.76	0.11
DS-327	1.101	7.74	0.55	21.08	258.0	94.40	<1.0	1129.0	147.00	666.0	<4.0	2.6	1.31	69.6	0.04	1.44	0.14
DS-363	0.928	8.5	0.46	20.88	375.0	79.30	11.0	940.0	<1.25	548.0	<4.0	1.6	0.51	<5.0	0.03	0.94	0.26
RR-5070Z	0.508	5.61	0.24	22.01	20.5	142.00	<1.0	513.0	3.90	354.0	<4.0	1.0	<0.10	86.6	0.57	0.53	0.08
SA-502	0.757	8.46	0.37	21.92	285.0	22.70	5.0	768.0	75.40	464.0	<4.0	1.8	0.73	<5.0	0.03	0.95	0.24
SA-534	0.191	6.34	0.09	24.20	55.4	11.50	3.0	189.0	19.90	181.0	<4.0	<1.0	0.15	19.2	0.06	0.38	0.11
SA-534*	0.191	6.34	0.09	24.20	53.8	11.50	1.0	189.0	20.40	184.0	<4.0	<1.0	0.11	18.7	0.03	0.38	0.12

* Denotes duplicate sample.

Table 2-4 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
BI-236	<5.0	<5.0	11.7	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
BO-275	<5.0	<5.0	111.5	<1.0	<1.0	<5.0	<5.0	129.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	59.3
BO-467	<5.0	<5.0	49.5	<1.0	<1.0	<5.0	<5.0	15400.0	<10.0	<0.05	19.5	<5.0	<1.0	<2.0	196.0
BO-467*	<5.0	<5.0	48.8	<1.0	<1.0	<5.0	<5.0	14900.0	<10.0	<0.05	19.1	<5.0	<1.0	<2.0	184.0
CD-453	<5.0	<5.0	30.2	<1.0	<1.0	<5.0	<5.0	42.7	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
CD-630	<5.0	<5.0	165.0	<1.0	<1.0	<5.0	<5.0	525.5	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	92.9
CD-639	<5.0	<5.0	37.5	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	0.05	<5.0	<5.0	<1.0	<2.0	<10.0
CD-642	<5.0	<5.0	19.5	<1.0	<1.0	<5.0	<5.0	26.0	<10.0	0.06	102.0	<5.0	184.0	<2.0	<10.0
DS-327	<5.0	<5.0	89.4	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	151.0
DS-363	<5.0	<5.0	9.2	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
RR-5070Z	<5.0	<5.0	220.0	<1.0	1.7	<5.0	55.1	50.8	<10.0	<0.05	9.2	<5.0	<1.0	<2.0	191.0
SA-502	<5.0	<5.0	25.0	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
SA-534	<5.0	<5.0	80.4	<1.0	2.5	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
SA-534*	<5.0	<5.0	79.9	<1.0	2.4	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<1.0

* Denotes duplicate sample.

Table 2-5 Field, Water Quality, and Nutrients Statistics
Fiscal Year 2001

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
pH (SU)	5.61	8.64	7.87
Temperature ^{O}C	20.72	24.31	21.98
Sp. Conductivity (mmhos/cm) (Field)	0.191	1.226	0.808
Salinity (ppt)	0.09	0.61	0.40
TSS (ppm)	<4	<4	<4
TDS (ppm)	181.0	694.0	449.6
Alkalinity (ppm)	20.5	602.0	249.4
Hardness (ppm)	<5	122.0	31.3
Turbidity (NTU)	<1	7.40	2.27
Sp. Conductivity (umhos/cm) (Lab)	189.0	1239.0	748.1
Color (PCU)	<5	160.0	24.1
Chloride (ppm)	11.5	190.0	69.7
Sulfate (ppm)	<1.25	147.00	28.67
Nitrite-Nitrate, as N (ppm)	<0.02	0.57	0.07
Phosphorus (ppm)	0.08	0.84	0.26
TKN (ppm)	0.23	1.44	0.82
Ammonia (ppm)	<0.1	1.31	0.64

Table 2-6 Inorganic Statistics
Fiscal Year 2001

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	<5	<5	<5
Barium (ppb)	<10	220.00	69.48
Beryllium (ppb)	<2	<2	<2
Cadmium (ppb)	<2	2.46	<2
Chromium (ppb)	<5	<5	<5
Copper (ppb)	<5	55.10	6.88
Iron (ppb)	10.00	15400.00	1352.83
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	0.06	<0.05
Nickel (ppb)	<5	102.00	12.77
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<1	184.00	15.79
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	<10	196.00	60.43

Table 2-7 Three-year Field, Water Quality, and Nutrients Statistics

PARAMETER	FY 1995 AVERAGE	FY 1998 AVERAGE	FY 2001 AVERAGE
pH (SU)	7.53	7.65	7.87
Temperature ^{O}C	21.44	21.30	21.98
Sp. Conductivity (mmhos/cm) (Field)	0.676	0.732	0.808
Salinity (ppt)	0.35	0.36	0.40
TSS (ppm)	<4	4.9	<4
TDS (ppm)	434.7	435.7	449.6
Alkalinity (ppm)	267.2	251.5	249.4
Hardness (ppm)	52.4	42.2	31.3
Turbidity (NTU)	2.56	5.16	2.27
Sp. Conductivity (umhos/cm) (Lab)	726.4	772.4	748.1
Color (PCU)	25.8	13.8	24.1
Chloride (ppm)	59.2	71.6	69.7
Sulfate (ppm)	30.14	30.47	28.67
Nitrite-Nitrate, as N (ppm)	0.08	0.07	0.07
Phosphorus (ppm)	0.29	0.24	0.26
TKN (ppm)	0.78	0.96	0.82
Ammonia (ppm)	0.42	0.64	0.64

Table 2-8 Three-year Inorganic Statistics

PARAMETER	FY 1995 AVERAGE	FY 1998 AVERAGE	FY 2001 AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	5.13	<5	<5
Barium (ppb)	51.90	75.03	69.48
Beryllium (ppb)	<2	<2	<2
Cadmium (ppb)	<2	<2	<2
Chromium (ppb)	<5	<5	<5
Copper (ppb)	31.56	24.70	6.88
Iron (ppb)	1521.84	1896.85	1352.83
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	13.08	<5	12.77
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<1	1.13	15.79
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	33.45	164.01	60.43

Table 2-9 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	5
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 2-10 List of Semi-volatile Analytical Parameters
BASELINE MONITORING PROJECT

SEMIVOLATILE ORGANICS BY EPA METHOD 625

COMPOUND	PQL (ppb)
N-Nitrosodimethylamine	2
Chlorobenzene	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
2,4-Dimethylphenol	4
2-Nitrophenol	6
1,3,5-Trichlorobenzene	2
Bis(2-chloroethoxy)methane	2
1,2,4-Trichlorobenzene	2
Naphthalene	2
2,4-Dichlorophenol	4
Hexachlorobutadiene	2
1,2,3-Trichlorobenzene	2
4-Chloro-3-methylphenol	4
Hexachlorocyclopentadiene	6
1,2,4,5-Tetrachlorobenzene	2
2,4,6-Trichlorophenol	6
1,2,3,4-Tetrachlorobenzene	2
2-Chloronaphthalene	2
Dimethylphthalate	2
2,6-Dinitrotoluene	4
Acenaphthylene	2
4-Nitrophenol	6
2,4-Dinitrophenol	12
Acenaphthene	2
Pentachlorobenzene	2
2,4-Dinitrotoluene	6
Diethylphthalate	2
4-Chlorophenyl phenyl ether	2
Fluorene	2

Table 2-10 (Cont'd)
Semivolatile Parameters

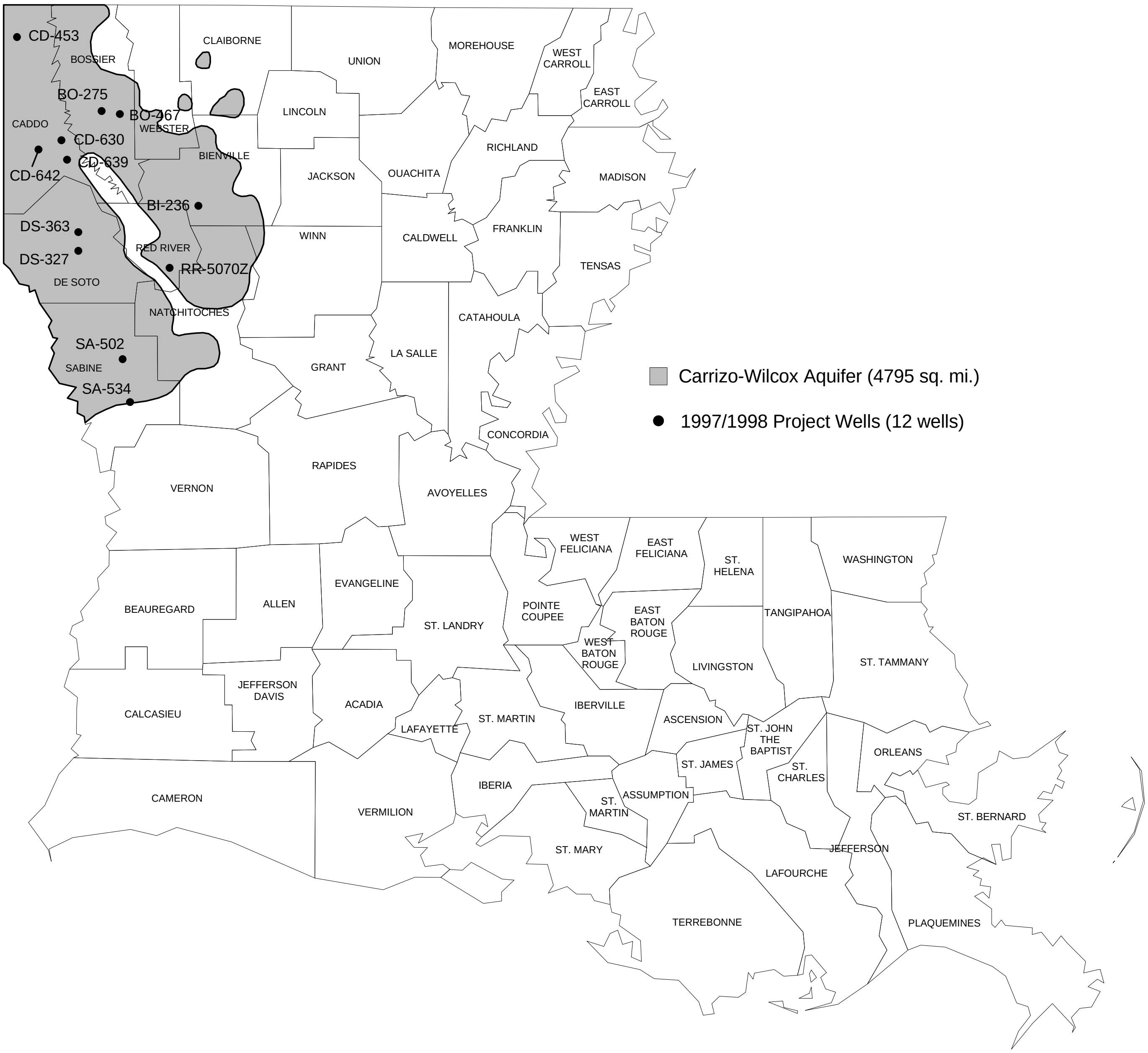
COMPOUND	PQL (ppb)
4,6-Dinitro-2-methylphenol	12
N-Nitrosodiphenylamine/Dipheny	2
4-Bromophenyl phenyl ether	2
Hexachlorobenzene	2
Pentachlorophenol	10
Phenathrene	2
Anthracene	2
Di-n-butylphthalate	2
Fluoranthene	2
Benzidine	20
Pyrene	2
Butylbenzylphthalate	2
Bis(2-ethylhexyl)phthalate	2
3,3'-Dichlorobenzidine	10
Benzo(a)anthracene	6
Chrysene	4
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 2-11 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	2
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 CARRIZO-WILCOX 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.

03/27/2001

Figure 2-1 Location Plat, Carrizo-Wilcox Aquifer

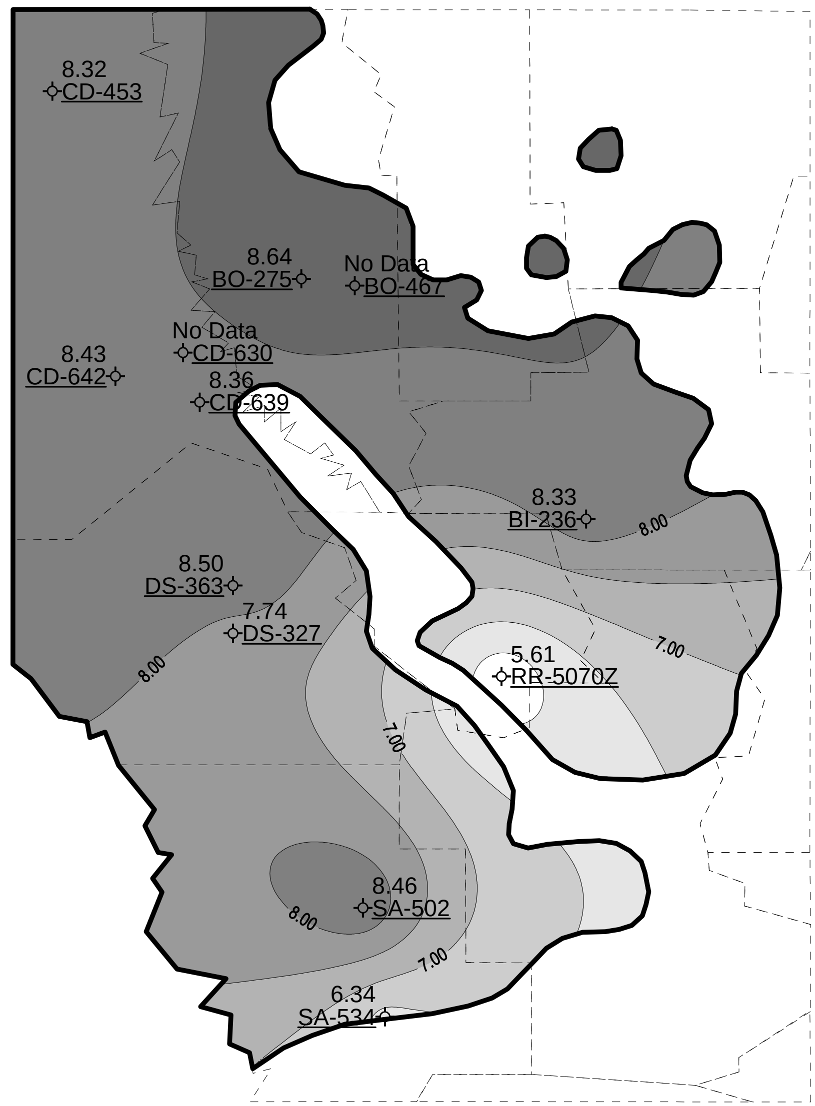
CARRIZO-WILCOX AQUIFER
pH (SU)

Baseline Monitoring Project
FY00-01

CD-453 Project Well Location and Designation

8.32 pH Value (in Standard Units)

Contour Interval = 0.5 SU



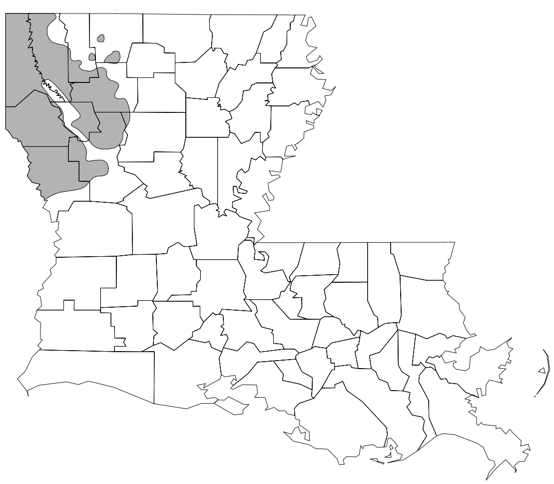


Figure 2-2 Map of pH Data

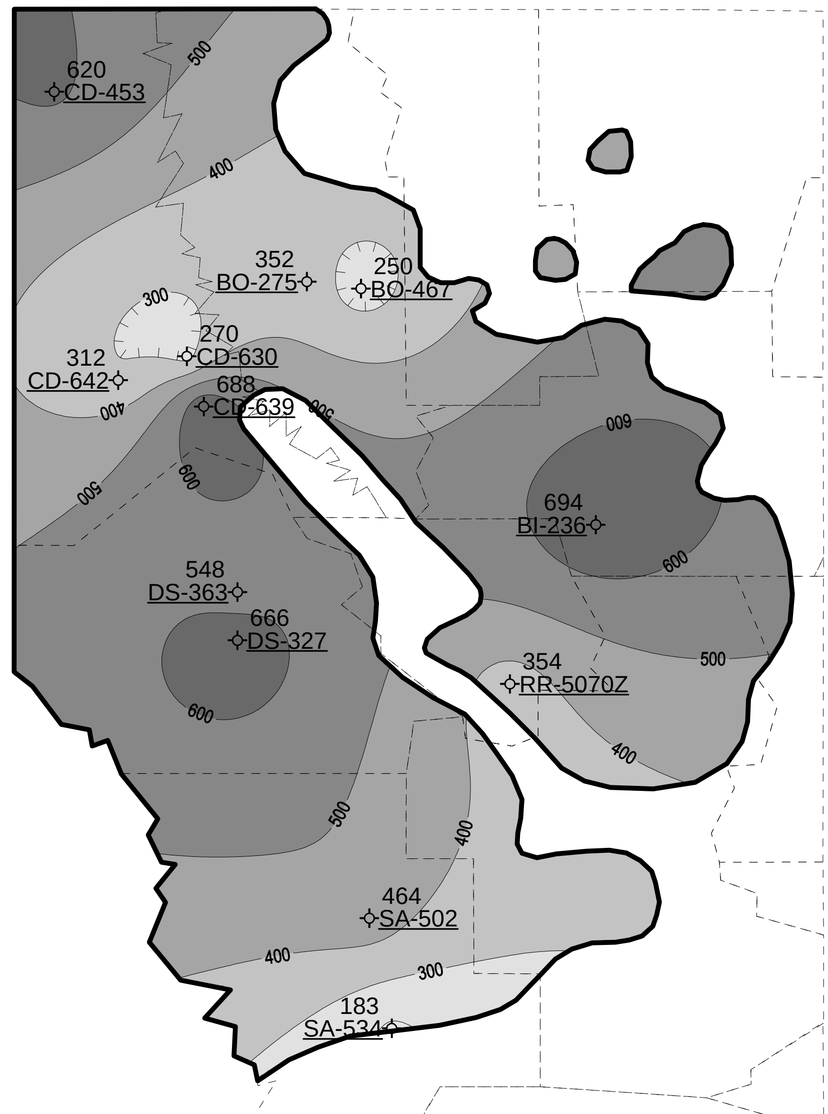
CARRIZO-WILCOX AQUIFER TDS (PARTS PER MILLION)

Baseline Monitoring Project FY00-01

CD-453 Project Well Location and Designation

620 TDS Value (in parts per million)

Contour Interval = 100 ppm



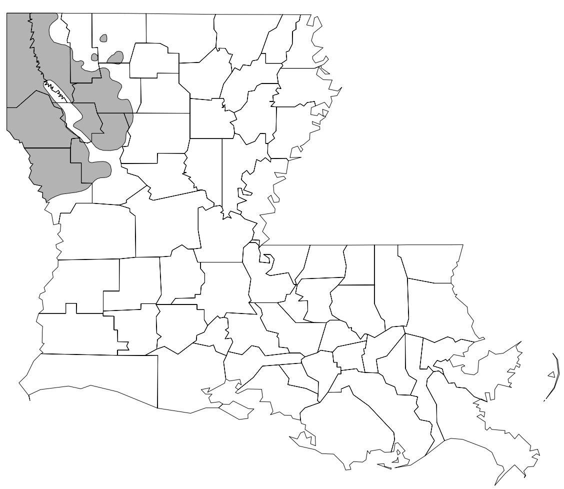


Figure 2-3 Map of TDS Data

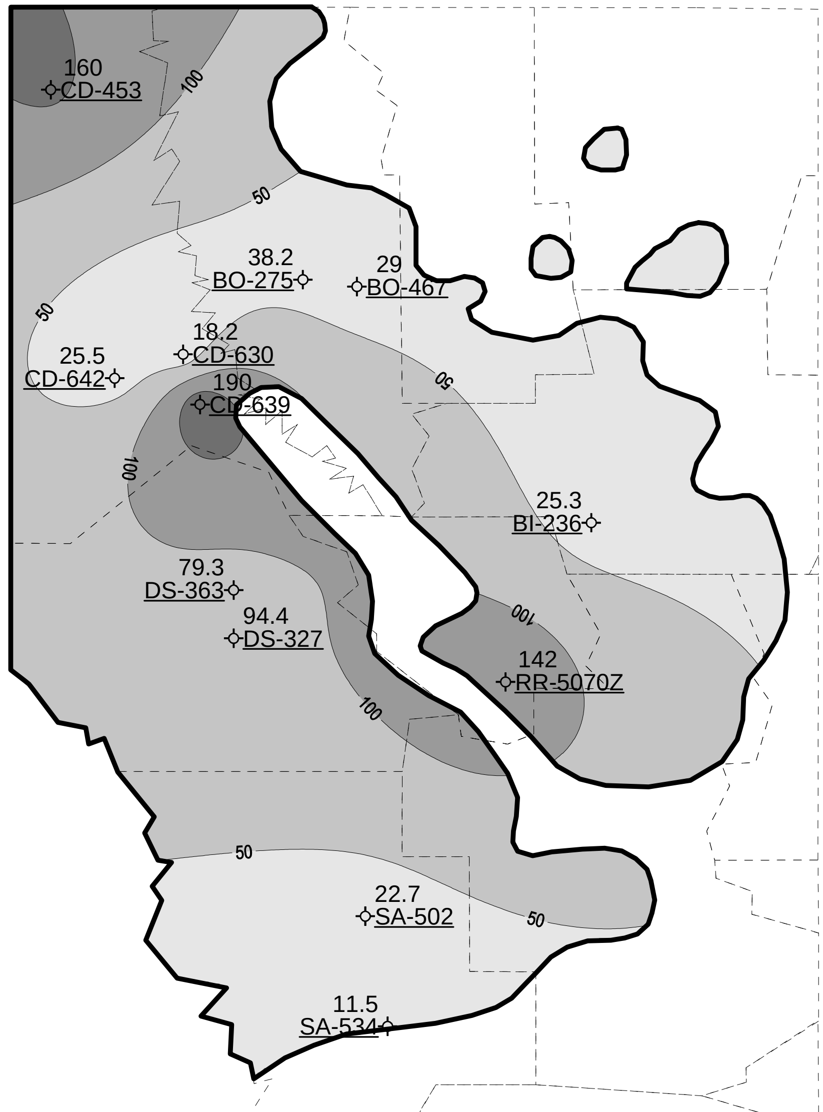
CARRIZO-WILCOX AQUIFER CHLORIDE (PARTS PER MILLION)

Baseline Monitoring Project
FY00-01

CD-453 Project Well Location and Designation

160 Chloride Value (in parts per million)

Contour Interval = 50 ppm



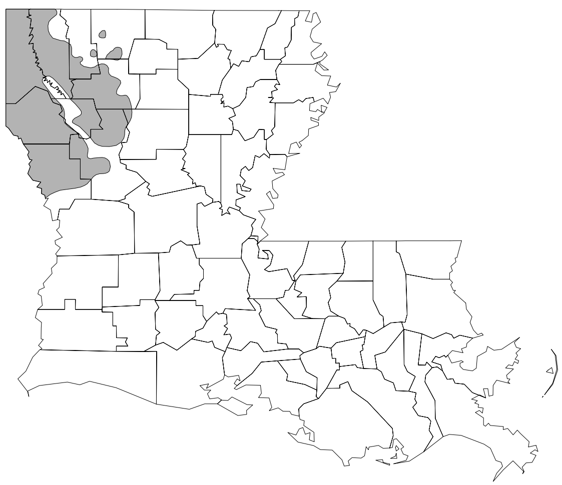


Figure 2-4 Map of Chloride Data

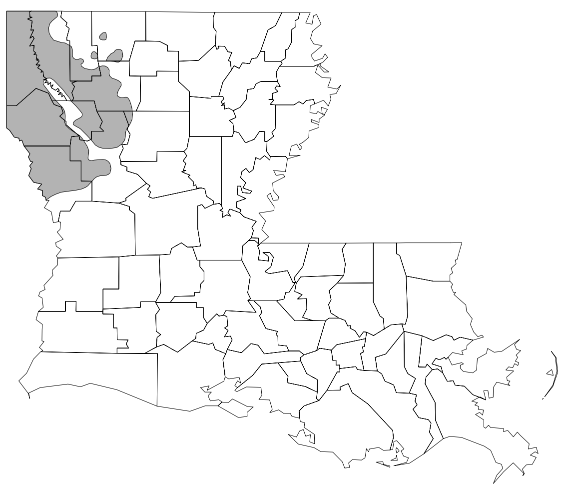
CARRIZO-WILCOX AQUIFER IRON (PARTS PER BILLION)

Baseline Monitoring Project FY00-01

CD-453 Project Well Location and Designation

42.7 Iron Value (in parts per billion)

Contour Interval = 3000 ppb



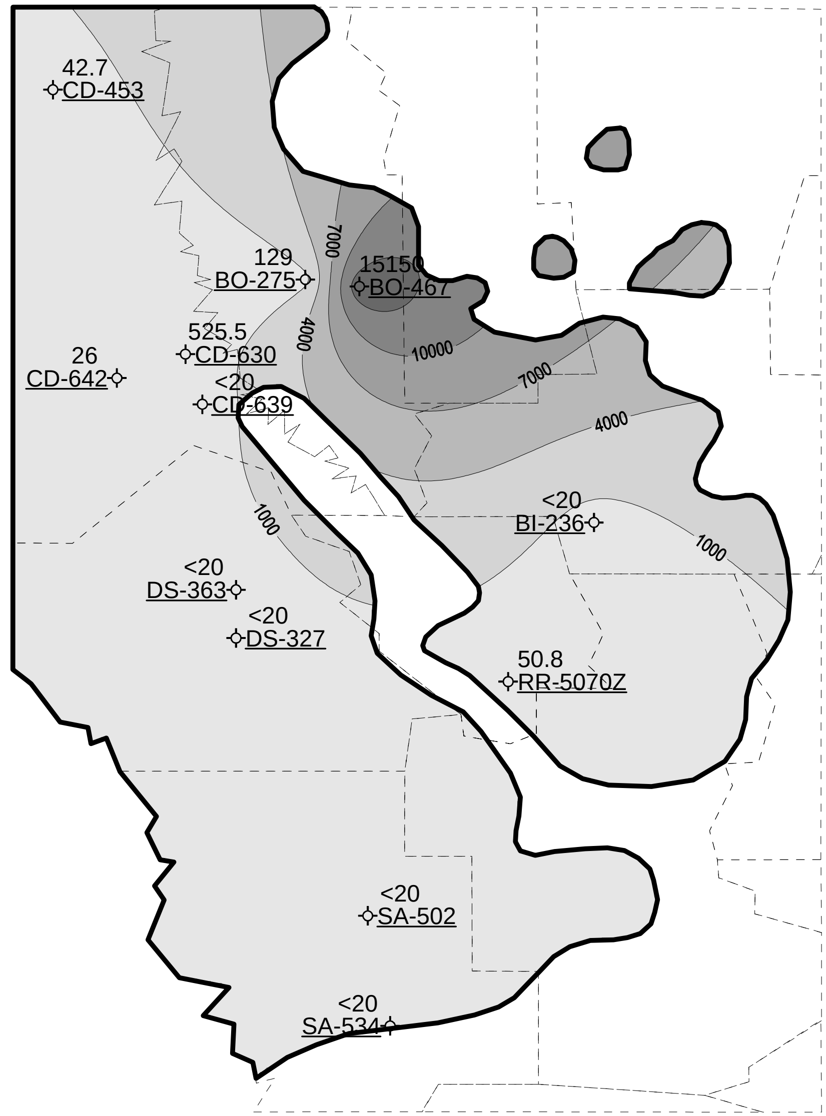


Figure 2-5 Map of Iron Data