APPENDIX 1

CARRIZO-WILCOX AQUIFER SUMMARY

BASELINE MONITORING PROJECT, EPA FY'98

(July 1997 Through June 1998)

PART II

OF

TRIENNIAL SUMMARY REPORT

FOR THE

WATER QUALITY MANAGEMENT DIVISION

OF

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PARTIAL FUNDING PROVIDED THROUGH CWA 106 GRANT

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 project wells producing from a common aquifer in a narrow time frame. Also, to more conveniently and economically promulgate those data collected, these aquifer summaries will make up the project Triennial Summary Report.

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

These data show that from September through October 1997, 12 wells were sampled which produce from the Carrizo-Wilcox Aquifer. Of these 12 wells, five are classified as Public Supply, four are Industrial, two are used for Irrigation, and one is a Domestic well. The wells are located in six parishes in the northwest area of the state.

PROJECT FIELD AND ANALYTICAL PARAMETERS

The field parameters checked at each sampling site and the list of water quality analytical parameters are shown in Table II-2. Those project inorganic (total metals) parameters analyzed in the laboratory are listed in Table II-3. These tables also show the field and analytical results determined for each analyte.

In addition to the above mentioned Water Quality analytical parameters, a list of project analytical parameters include three orther categories of compounds: Volatiles, Semi-volatiles, and Pesticides/PCB's. As no compound from either of these three categories of compounds was detected in any of the 12 Carrizo-Wilcox water wells sampled, tables were not prepared. However, in order for the reader to be aware of the total list of analytes, Tables II-4, II-5, and II-6 were included in this report. The tables list the project analytes along with their Practical Quantitation Limits (PQLs) used during processing.

DISCUSSION OF WATER QUALITY DATA

FEDERAL PRIMARY DRINKING WATER STANDARDS: Laboratory data show that one project water well of the Carrizo-Wilcox aquifer exceeded the Maximum Contaminant Level for Thallium (MCL = 2.0 ppb). Sample analysis from the Red River parish well RR-5070Z, a domestic use well, reported Thallium concentrations of 13.3 parts per billion (ppb). This well has not been re-sampled, but plans are being made to do so, to confirm the presence of thallium. No other project well producing from the Carrizo-Wilcox Aquifer exceeded the Federal Primary MCL for any analyte.

Those project wells reporting Turbidity levels of >1 NTU, do not exceed the MCL of 1.0, as this primary standard applies to surface water systems only.

FEDERAL SECONDARY DRINKING WATER STANDARDS: Secondary standards are defined as non-enforceable taste, odor or appearance guidelines. Field and laboratory data contained in Tables II-2 and II-3 show that from two to five project wells sampled in the Carrizo-Wilcox Aquifer exceeded the Secondary Maximum Contaminant Levels (SMCL) for four separate analytes in this category.

pH (SMCL=6.5 SU to 8.5 SU) Two wells, BO-233 and SA-534 reported pH below the 6.5 lower limit, with values of 6.23 and 6.26 respectively.

TDS (SMCL=500 ppm) The following five wells exceeded this secondary standard: BI-236, CD-453, CD-639, DS-327 and DS-363 with respective values of 696, 556, 636, 674 and 532 ppm. Duplicate samples of wells BI-236 and CD-453 reported values of 702 and 572 ppm respectively.

COLOR (SMCL=15 PCU) Four wells and two duplicates exceeded the secondary standard for color with the following reported levels: BI-236, 50 NTU; BI-236 duplicate, 50 NTU; BO-233, 20 NTU; CD-453, 20 NTU; CD-453 duplicate, 20 NTU; and SA-534, 20 NTU.

IRON (SMCL=300 ppb) The following three wells exceeded this secondary standard:
BO-233, 19,700 ppb; CD-630, 621 ppb; and SA-534, 1,784 ppb.

SELECTED WATER QUALITY MAPS
For the readers convenience, maps showing the contoured values for pH, TDS, Chloride and Iron are included in this summary report in Figures II-2 through II-5.

SUMMARY AND RECOMMENDATIONS

In summary, the included data show the water produced from the Carrizo-Wilcox Aquifer project wells to be of good quality with the exception of the one Red River parish well with the unconfirmed detection of Thallium.

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 12 currently sampled to increase the well density for this aquifer.

TABLE II-1 List of Project Well Sampled

WILCOX AQUIFER PROJECT WELLS							
PROJECT NUMBER	*PARISH*	*PARISH WELL NO.*	*DATE SAMPLED*	*WELL OWNER*	*DEPTH* (feet)	*WELL USE*	*AQUIFER*
9305	BIENVILLE	BI-236	10/14/1997	ALBERTA WATER SYSTEM	410	PUBLIC SUPPLY	CARRIZO-WILCOX
9117	BOSSIER	BO-233	09/08/1997	CALUMET REFINERY	80	INDUSTRIAL	CARRIZO-WILCOX
8801	BOSSIER	BO-275	09/08/1997	VILLAGE WATER SYSTEM	308	PUBLIC SUPPLY	CARRIZO-WILCOX
8603	CADDO	CD-453	09/08/1997	CITY OF VIVIAN	228	PUBLIC SUPPLY	CARRIZO-WILCOX
9116	CADDO	CD-630	09/09/1997	WILLIS KNIGHTON MEDICAL CENTER	240	IRRIGATION	CARRIZO-WILCOX
9114	CADDO	CD-639	09/09/1997	BOX COMPANY	200	INDUSTRIAL	CARRIZO-WILCOX
9113	CADDO	CD-642	09/09/1997	CLARKLIFT CO.	210	INDUSTRIAL	CARRIZO-WILCOX
8804	DE SOTO	DS-327	10/13/1997	CITY OF MANSFIELD	243	PUBLIC SUPPLY	CARRIZO-WILCOX
8605	DE SOTO	DS-363	10/13/1997	CITY OF MANSFIELD	280	PUBLIC SUPPLY	CARRIZO-WILCOX
9306	RED RIVER	RR-5070Z	10/14/1997	PRIVATE OWNER	105	DOMESTIC	CARRIZO-WILCOX
9216	SABINE	SA-502	10/14/1997	PRIVATE OWNER	213	IRRIGATION	CARRIZO-WILCOX
9704	SABINE	SA-534	10/13/1997	BOISE CASCADE	543	INDUSTRIAL	CARRIZO-WILCOX

TABLE II-2 Summary of Water Quality Data

WILCOX AQUIFER
WATER QUALITY PARAMETERS

FIELD PARAMETERS

WELL NUMBER	*TEMP* ^{o}C	*pH* SU	*COND.* mmhos/cm	*SAL.* ppt	*TSS* ppm	*TDS* ppm	*ALK.* ppm	*HARD.* ppm	*TURB.* NTU	*COND.* umhos/cm	*COLOR* PCU	*Cl* ppm	*SO_4* ppm	*NITRITE-NITRATE* (as N) ppm	*TOT. P* ppm	*TKN* ppm	*TOC* ppm	*NH_3* (as N) ppm
BI-236	23.55	8.47	1.130	0.56	<4.0	696.0	609.0	<8.0	1.2	1,194.0	50.0	24.30	<0.04	<0.050	0.95	0.82	5.90	0.62
BI-236*	23.55	8.47	1.130	0.56	4.0	702.0	614.0	<8.0	1.2	1,195.0	50.0	24.10	<0.04	<0.050	0.86	0.96	5.00	0.61
BO-233	21.57	6.23	0.380	0.18	36.0	138.0	65.6	93.6	45.0	370.0	20.0	44.90	31.60	0.030	0.61	0.68	4.10	0.40
BO-275	21.45	8.11	0.623	0.30	<4.0	380.0	251.0	30.0	1.4	658.0	5.0	49.40	23.20	0.030	0.13	1.48	<4.00	1.20
CD-453	21.06	8.49	0.983	0.49	<4.0	556.0	282.0	11.9	2.4	1,022.0	20.0	130.00	39.40	0.030	0.42	1.13	<4.00	1.00
CD-453*	21.06	8.49	0.983	0.49	<4.0	572.0	283.0	12.0	2.5	1,027.0	20.0	126.00	38.60	0.020	0.43	1.21	<4.00	0.90
CD-630	21.61	7.22	0.438	0.21	3.0	294.0	204.0	138.0	6.2	458.0	5.0	25.60	6.60	0.020	0.17	0.66	<4.00	0.30
CD-639	21.33	8.48	1.203	0.60	<4.0	636.0	356.0	11.4	0.6	1,262.0	5.0	186.00	<0.04	0.030	0.19	1.10	<4.00	0.90
CD-642	20.76	8.28	0.508	0.25	<4.0	404.0	231.0	11.8	0.8	533.0	5.0	33.70	2.80	0.030	0.07	1.25	<4.00	0.70
DS-327	20.53	7.22	1.100	0.55	<4.0	674.0	268.0	72.6	1.4	1,192.0	10.0	104.00	161.00	<0.050	0.10	1.29	<4.00	NO DATA
DS-363	20.27	8.40	0.917	0.45	<4.0	532.0	381.0	<8.0	1.0	978.0	10.0	77.40	<0.04	<0.050	0.10	1.00	<4.00	0.77
RR-5070Z	18.78	6.70	0.568	0.27	<4.0	332.0	29.2	108.0	0.4	615.0	5.0	150.00	3.90	0.570	<0.05	0.11	<4.00	0.09
SA-502	21.01	7.98	0.745	0.36	<4.0	436.0	288.0	<8.0	1.3	785.0	10.0	20.90	74.80	<0.050	0.09	1.06	<4.00	0.81
SA-534	23.71	6.26	0.192	0.09	<4.0	150.0	53.6	17.0	0.2	202.0	20.0	12.60	22.30	<0.050	<0.05	0.98	<4.00	0.30

* Denotes Duplicate Sample

TABLE II-3 Summary of Inorganic Data

WILCOX AQUIFER INORGANIC (TOTAL METALS) PARAMETERS															
WELL NUMBER	*ARSENIC* ppb	*SILVER* ppb	*BARIUM* ppb	*BERYLLIUM* ppb	*CADMIUM* ppb	*CHROMIUM* ppb	*COPPER* ppb	*IRON* ppb	*MERCURY* ppb	*NICKEL* ppb	*ANTIMONY* ppb	*SELENIUM* ppb	*LEAD* ppb	*THALLIUM* ppb	*ZINC* ppb
BI-236	<5.0	<2.0	9.2	<1.0	<2.0	<5.0	6.7	16.4	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	21.40
BI-236*	<5.0	<2.0	7.8	<1.0	<2.0	<5.0	9.1	10.0	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	45.30
BO-233	5.6	<2.0	149.2	<1.0	2.5	<5.0	<5.0	19,700.0	<0.05	<5.0	5.4	<5.0	<10.0	<5.0	327.70
BO-275	<5.0	<2.0	96.1	<1.0	<2.0	<5.0	13.2	42.7	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	14.30
CD-453	<5.0	<2.0	30.9	<1.0	<2.0	<5.0	49.2	247.0	<0.05	<5.0	5.4	<5.0	<10.0	<5.0	11.20
CD-453*	<5.0	<2.0	31.5	<1.0	<2.0	<5.0	30.4	152.0	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	<10.00
CD-630	<5.0	<2.0	171.2	<1.0	<2.0	<5.0	6.9	621.0	<0.05	<5.0	<10.0	<5.0	<10.0	<5.0	317.00
CD-639	<5.0	<2.0	31.0	<1.0	<2.0	<5.0	50.8	<20.0	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	106.10
CD-642	<5.0	<2.0	19.4	<1.0	<2.0	<5.0	<5.0	19.0	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	723.60
DS-327	<5.0	<2.0	44.0	<1.0	<2.0	<5.0	13.6	73.2	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	194.10
DS-363	<5.0	<2.0	42.5	<1.0	<2.0	<5.0	10.6	74.3	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	131.30
RR-5070Z	<5.0	<2.0	201.4	<1.0	<2.0	<5.0	83.5	89.2	<0.05	8.9	<5.0	<5.0	<10.0	13.3	<10.00
SA-502	<5.0	<5.0	33.7	<1.0	<2.0	<5.0	51.0	85.4	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	32.80
SA-534	<5.0	<2.0	71.8	<1.0	<2.0	<5.0	5.9	1,784.0	<0.05	8.0	<5.0	<5.0	<10.0	<5.0	83.60

* Denotes Duplicate Sample.

TABLE II-4 List of VOC Analytical Parameters

BASELINE MONITORING PROJECT

VOLATILE ORGANICS BY EPA METHOD 8260

COMPOUNDS	PQL (ppb)
DICHLOROFLUOROMETHANE	10
CHLOROMETHANE	10
VINYL CHLORIDE	10
BROMOMETHANE	10
CHLOROETHANE	10
TRICHLOROFLUOROMETHANE	10
1,1-DICHLOROETHENE	10
METHYLENE CHLORIDE	10
TRANS-1,2-DICHLOROETHENE	10
1,1-DICHLOROETHANE	10
2,2 DICHLOROPROPANE	10
CIS-1,2 DICHLOROETHENE	10
BROMOCHLOROMETHANE	10
CHLOROFORM	10
1,1,1-TRICHLOROETHANE	10
1,1 DICHLOROPROPENE	10
CARBON TETRACHLORIDE	10
BENZENE	10
1,2-DICHLOROETHANE	10
TRICHLOROETHENE	10
1,2-DICHLOROPROPANE	10
BROMODICHLOROMETHANE	10
DIBROMOMETHANE	10
CIS-1,3-DICHLOROPROPENE	10
TOLUENE	10
TRANS-1,3-DICHLOROPROPENE	10
1,1,2-TRICHLOROETHANE	10
1,3--DICHLOROPROPANE	10
TETRACHLOROETHENE	10
1,2-DIBROMOETHANE	10
DIBROMOCHLOROMETHANE	10
CHLOROBENZENE	10
ETHYLBENZENE	10
1,1,1,2-TETRACHLOROETHANE	10
P&M XYLENE	10
O-XYLENE	10
STYRENE	10
BROMOFORM	10
ISOPROPYLBENZENE	10
1,1,2,2-TETRACHLOROETHANE	10

TABLE II-4 (Cont=d)
Volatile Organic (VOC) Parameters

COMPOUNDS	PQL (ppb)
1,2,3,-TRICHLOROPROPANE	10
BROMOBENZENE	10
n-PROPYLBENZENE	10
2-CHLOROTOLUENE	10
4-CHLOROTOLUENE	10
1,3,5-TRIMETHYLBENZENE	10
TERT-BUTYLBENZENE	10
1,2,4-TRIMETHYLBENZENE	10
SEC-BUTYLBENZENE	10
P-ISOPRPYLTOLUENE	10
1,3-DICHLOROBENZENE	10
1,4-DICHLOROBENZENE	10
n-BUTYLBENZENE	10
1,2-DIBROMO-3-CHLOROPROPANE	10
NAPHTHALENE	10
1,2,4-TRICHLOROBENZENE	10
HEXACHLOROBUTADIENE	10
1,2-DICHLOROBENZENE	10
1,2,3-TRICHLOROBENZENE	10

PQL = Practical Quantitation Limit
ppb = parts per billion

TABLE II-5 List of Semi-volatile Analytical Parameters
BASELINE MONITORING PROJECT

SEMIVOLATILE ORGANICS BY EPA METHOD 8270

COMPOUNDS	PQL (ppb)
N-Nitrosodimethylamine	10
2-Picoline	10
Methyl methanasulfonate	10
Ethyl methanesulfonate	20
Phenol	10
Aniline	10
Bis(2-chloroethyl)ether	10
2-Chlorophenol	10
1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	10
Benzyl alcohol	20
1,2-Dichlorobenzene	10
2-Methylphenol	10
Bis(2-chloroisopropyl)ether	10
4-Methylphenol	10
N-Nitroso-di-n-propylamine	10
Hexachloroethane	10
Acetophenone	10
Nitrobenzene	10
N-Nitrosopiperidine	20
Isophorone	10
2,4-Dimethylphenol	10
2-Nitrophenol	10
Benzoic acid	50
Bis(2-chloroethoxy)methane	10
2,4-Dichlorophenol	10
a,a-Dimethylphenethylamine	10
1,2,4-trichlorobenzene	10
Benzidine	50
Pyrene	10
p-Dimethylaminoazobenzene	10
Butylbenzylphthalate	10
Bis(2-ethylhexyl)phthalate	10

TABLE II-5 (Cont=d)
Semivolatile Parameters

COMPOUNDS	PQL (ppb)
3,3'-Dichlorobenzidine	20
Benzo(a)anthracene	10
Chrysene	10
Di-n-octylphthalate	10
7,12-Dimetnylbenz(a)anthracine	10
Benzo(b)fluoranthene	20
Benzo(k)fluoranthene	10
Benzo(a)pyrene	10
3-Methylcholanthrene	10
Dibenz(a,j)acridine	10
Indeno(1,2,3-cd)pyrene	10
Dibenz(a,h)anthracene	10
Benzo(g,h,i)perylene	10
Napthalene	10
4-Chloroaniline	10
2,6-Dichlorophenol	10
Hexachlorobutadiene	10
N-Nitrose-di-n-butylamine	10
4-Chloro-3-methylphenol	20
2-Methylnapthalene	10
Hexachlorocyclopentadiene	10
1,2,4,5-Tetrachlorobenzene	10
2,4,6-Trichlorophenol	10
2,4,5-Trichlorophenol	10
2-Chloronapthalene	10
1-Chloronapthalene	10
2-Nitroaniline	50
Dimethylphthalate	10
2,6-Dinitrotoluene	10
Acenaphthylene	10
3-Nitroaniline	50
4-Nitrophenol	50
2,4-Dinitrophenol	50
Acenaphthene	10

TABLE II-5 (Cont=d)
Semivolatile Parameters

COMPOUNDS	PQL (ppb)
2,4-Dinitrotoluene	10
Pentachlorobenzene	10
Dibenzofuran	10
1-Naphthylamine	10
Diethylphthalate	10
2,3,4,6-Tetrachlorophenol	10
2-Naphthylamine	10
4-Chlorophenyl phenyl ether	10
4-Nitroaniline	50
Fluorene	10
4,6-Dinitro-2-methylphenol	50
4-Aminobiphenyl	20
1,2-Diphenylhydrazine	10
Phenacetin	20
4-Bromophenyl phenyl ether	10
Hexachlorobenzene	10
Pronamide	10
N-Nitrosodiphenylamine/Diphenylamine	10
Pentachlorophenol	50
Pentachloronitrobenzene	20
Phenathrene	10
Anthracene	10
Di-n-butylphthalate	10
Fluoranthene	10

TABLE II-6 List of Pesticide and PCB Analytical Parameters
BASELINE MONITORING PROJECT

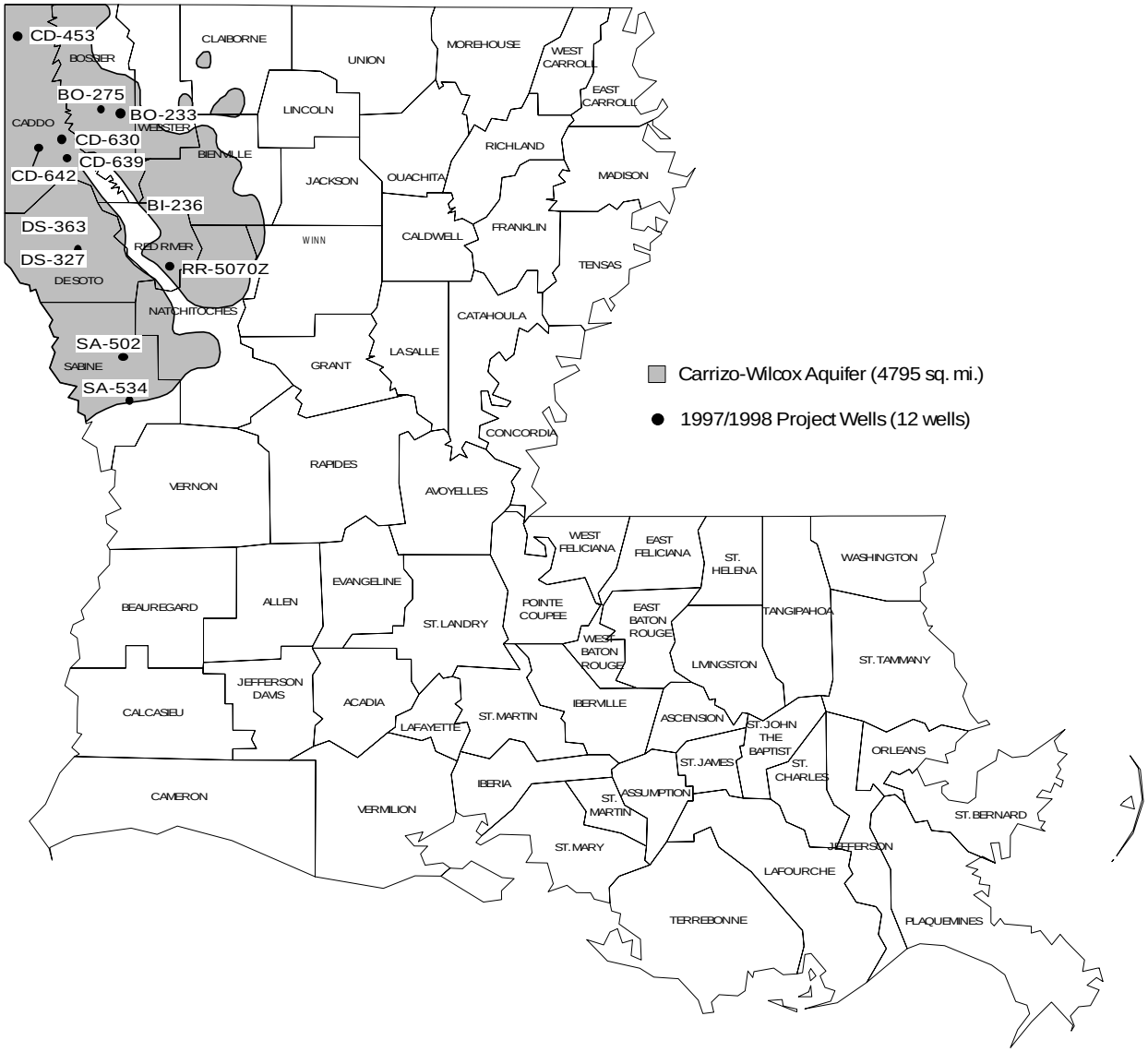
SEMIVOLATILE ORGANICS BY EPA METHOD 8270

COMPOUNDS	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	75
Endosulfan II	2
Endrin Aldehyde	2
4,4'DDT	2
Endosulfan Sulfate	2
Methoxychlor	2
Endrin Ketone	2

SEMIVOLATILE ORGANICS BY EPA METHOD 8270

COMPOUNDS	PQL (ppb)
PCB 1221/ PCB 1232	10
PCB 1016/ PCB1242	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.

04/21/1998

Figure II-1 Location Plat, Carrizo-Wilcox Aquifer

CARRIZO-WILCOX AQUIFER
pH (SU)

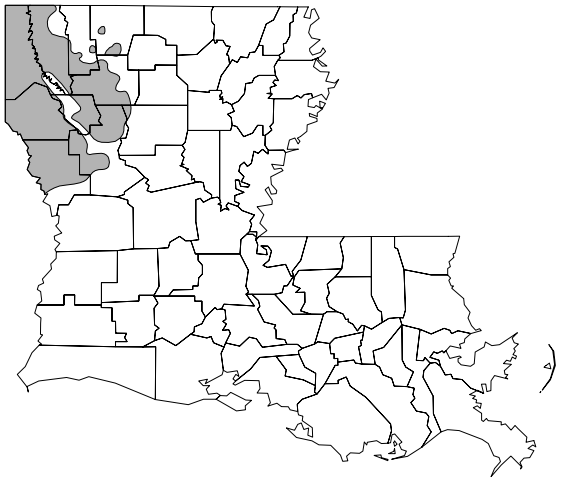
Baseline Monitoring Project
FY97-98

CD-453 Project Well Location and Designation

8.49 pH Value (in Standard Units)

Contour Interval = 0.5 SU

Contour map generated using Surfer for Windows v6.04
04/20/1998



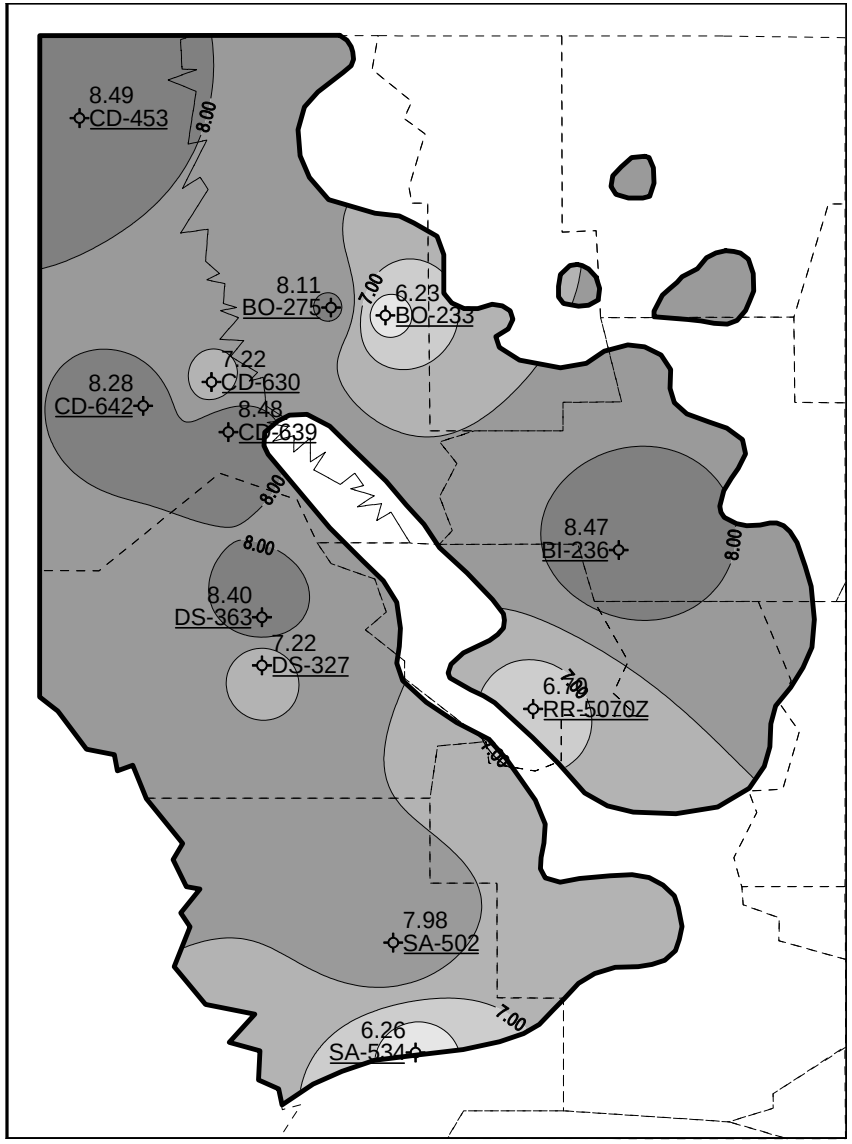


Figure II-2 Map of pH Data

CARRIZ0-WILCOX AQUIFER TDS (PPM)

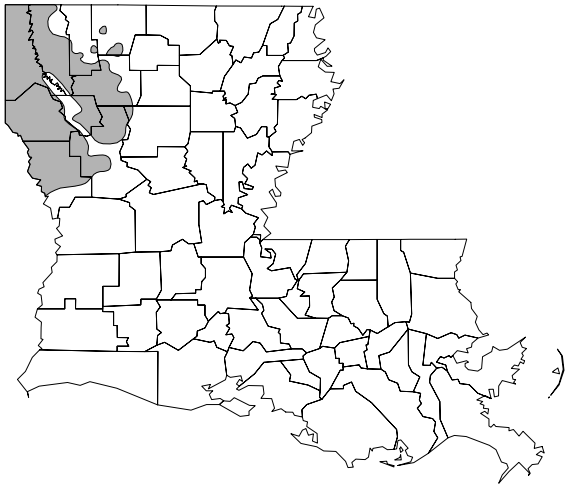
Baseline Monitoring Project
FY97-98

CD-453 Project Well Location and Designation

556 TDS Value (in Parts per Million)

Contour Interval = 100 ppm

Contour map generated using Surfer for Windows v6.04
04/20/1998



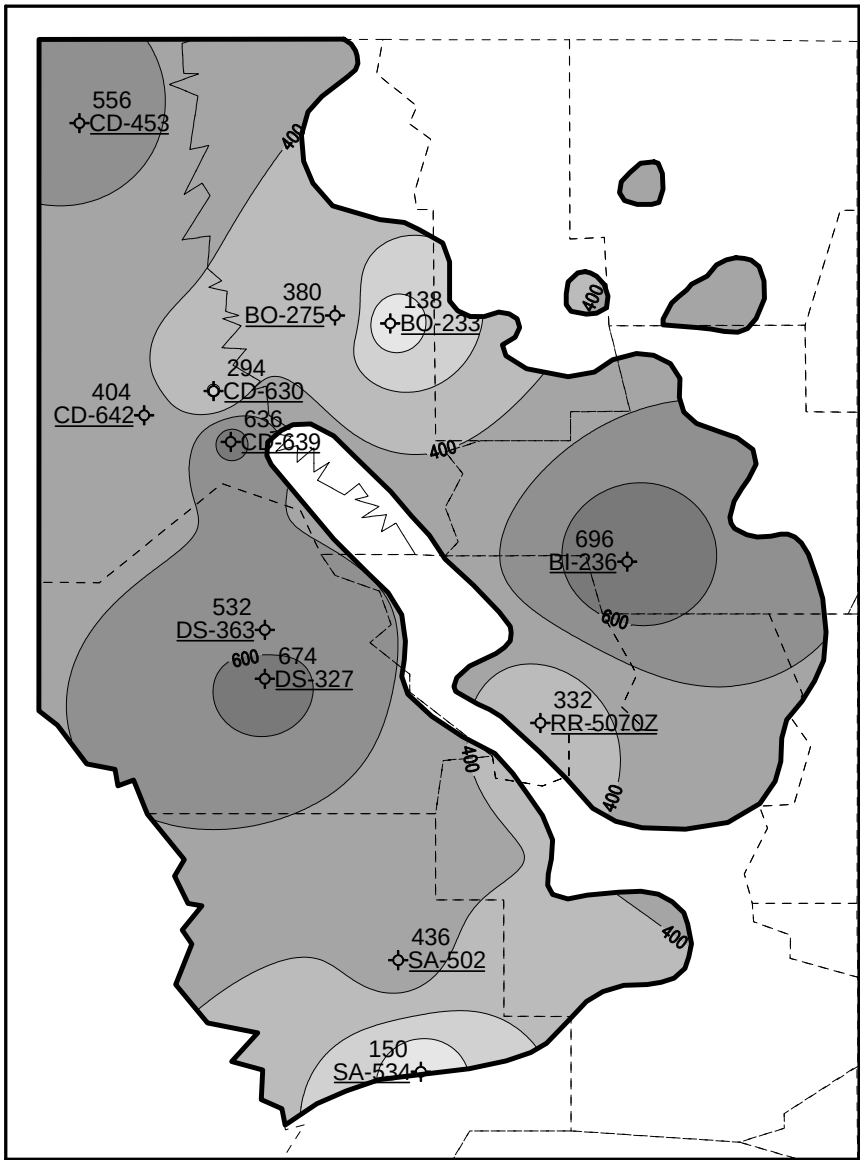


Figure II-3 Map of TDS Data

CARRIZO-WILCOX AQUIFER
CHLORIDE (PPM)

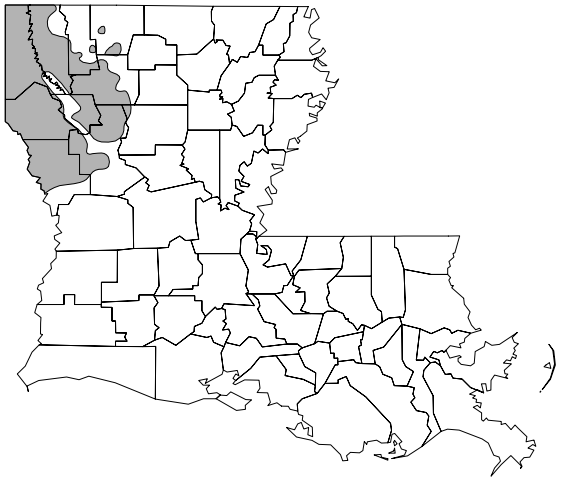
Baseline Monitoring Project
FY97-98

CD-453 Project Well Location and Designation

130.0 Chloride Value (in Parts per Million)

Contour Interval = 50 ppm

Contour map generated using Surfer for Windows v6.04
04/20/1998



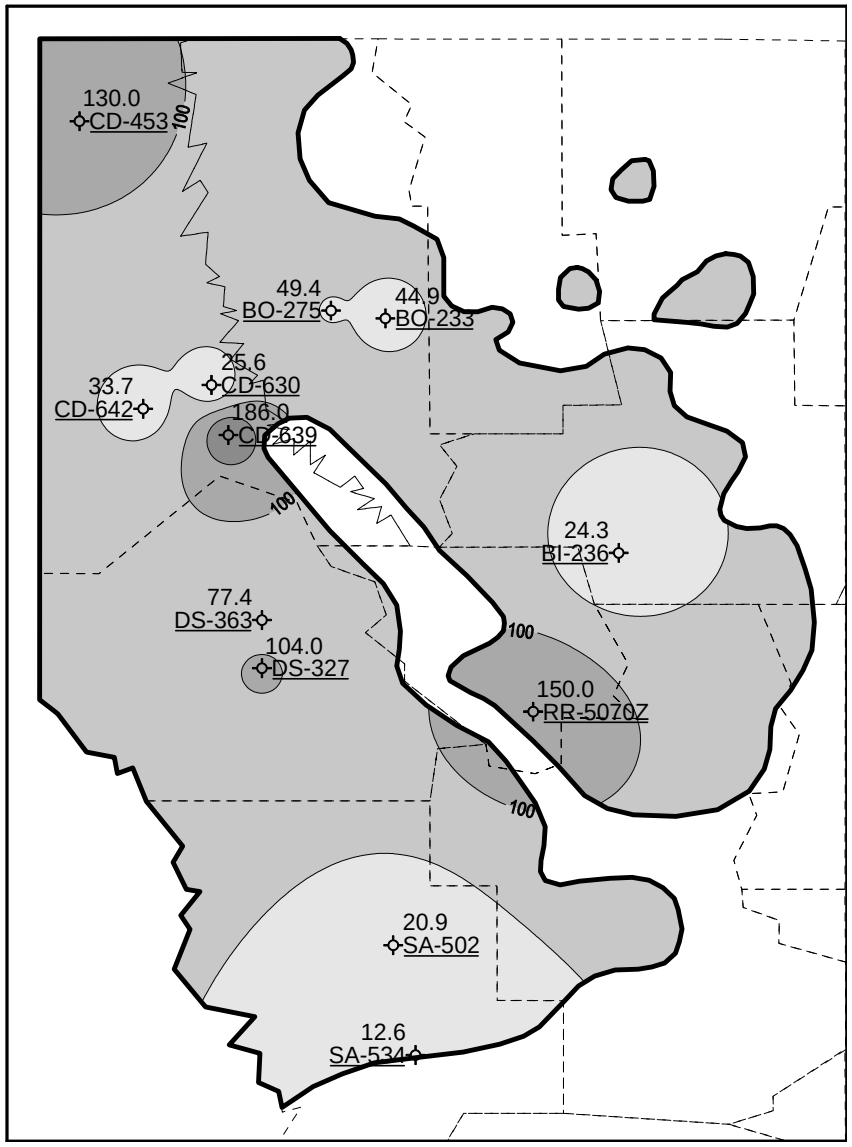


Figure II-4 Map of Chloride Data

CARRIZO-WILCOX AQUIFER
IRON (PPB)

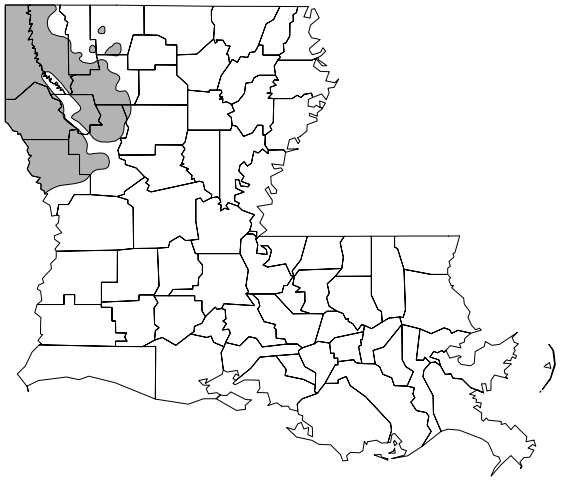
Baseline Monitoring Project
FY97-98

CD-453 Project Well Location and Designation

247.0 Iron Value (in Parts per Billion)

Contour Interval Varies

Contour map generated using Surfer for Windows v6.04
04/20/1998



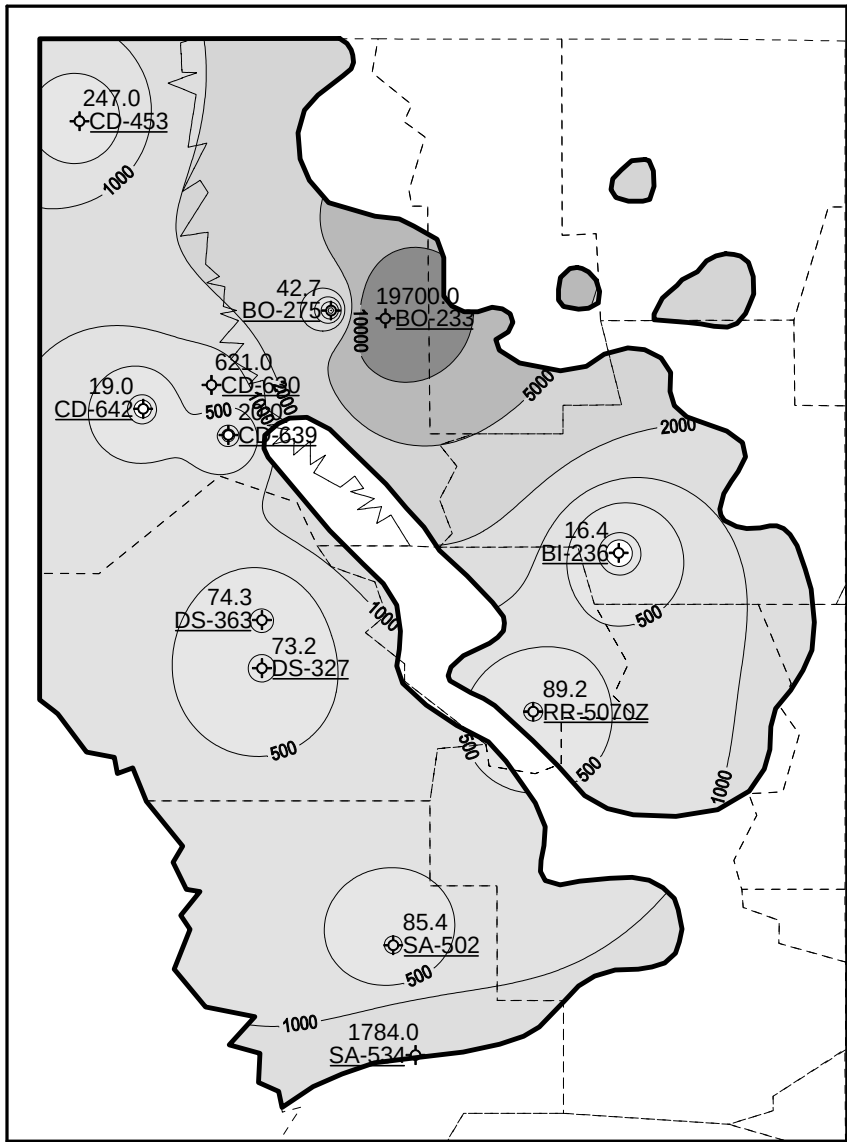


Figure II-5 Map of Iron Data