CATAHOULA AQUIFER SUMMARY

BASELINE MONITORING PROJECT, FY 2001

APPENDIX 5

OF THE

TRIENNIAL SUMMARY REPORT, 2003

FOR THE

ENVIRONMENTAL EVALUATION DIVISION

OF

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PARTIAL FUNDING PROVIDED THROUGH 106 CWA

CATAHOULA 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 from a particular aquifer, a summary report on each aquifer sampled was prepared separately. Collectively, these aquifer summaries will make up the project Triennial Summary Report.

Figure 5-1 shows the geographic locations of the Catahoula aquifer and the associated project wells, whereas Table 5-2 lists the wells in the aquifer along with their total depths and the use made of produced waters and date sampled.

These data show that in February of 2001, six wells were sampled which produce from the Catahoula aquifer. Four of the six wells are classified as public supply, the remaining two are classified as domestic wells. The wells are located in five parishes in the central 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 Catahoula Formation consists primarily of sands with some silty to sandy clays and overlies the regional confining clays of the Vicksburg and Jackson groups. Within the Catahoula, fine to coarse sands are discontinuous and interbedded with silt and clay.

HYDROGEOLOGY

Recharge takes place primarily as a result of the direct infiltration of rainfall in interstream, upland outcrop area, movement of water through overlying terrace deposits, and leakage from other aquifers. Saltwater ridges under the Red River and Little River valleys in central Louisiana divide the Catahoula aquifer. The hydraulic conductivity of the Catahoula varies between 20-260 feet/day.

The maximum depths of occurrence of freshwater in the Catahoula range from 250 feet above sea level, to 2,200 feet below sea level. The range of thickness of the fresh water interval in the Catahoula is 50 to 450 feet. The depths of the Catahoula wells that were monitored in conjunction with the BMP range from 125 to 1,477 feet.

INTERPRETATION OF DATA

FIELD, WATER QUALITY, AND NUTRIENTS PARAMETERS

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

Federal Primary Drinking Water Standards

Under the Federal Safe Drining 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 in Table 5-3 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 5-3 show that the following secondary MCLs (SMCLs) were exceeded:

PH – SMCL = 6.5 – 8.5 SU
SA-429 – 8.66 SU

Total Dissolved Solids (TDS) – SMCL = 500
G-5196Z – 570 ppm

Comparison to Historical Data

Table 5-7 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 the most notable change in the water quality characteristics of ground water produced from the Catahoula aquifer is the increase in hardness and specific conductivity.

INORGANIC PARAMETERS

Table 5-4 shows the inorganic (total metals) parameters that are sampled for and the analytical results for those parameters for each well. Table 5-6 provides an overview of inorganic data for the Catahoula aquifer, listing the minimum, maximum, and average results for these parameters.

Federal Primary Drinking Water Standards

A review of the analyses listed in Table 5-4 show that no primary MCL was exceeded for total metals.

Federal Secondary Drinking Water Standards

Laboratory data contained in Table 5-4 show that the following secondary MCL (SMCL) was exceeded:

Iron – SMCL = 300 ppb
G-5196Z – 762 ppb
SA-429 – 595 ppb

Comparison to Historical Data

Table 5-8 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 data shows general fluctuations in the average concentrations of barium and zinc, while the average concentration for copper decreased.

VOLATILE ORGANIC COMPOUNDS

Table 5-9 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 Catahoula aquifer.

SEMIVOLATILE ORGANIC COMPOUND

Table 5-10 show 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 compound would be discussed in this section.

Federal Primary Drinking Water Standards

Laboratory data show that no primary MCL was exceeded for semivolatile compound group of parameters. However, bis(2-ethylhexyl)phthalate (BEHP) was reported in three of the six wells sampled (3, 4, and 4 ppb), in the field blank (4 ppb), and in the two lab blanks (3 and 5 ppb). Taking into consideration that the field blank and lab blanks are as high or higher than any of the reported well concentrations, it is the opinion of this Office that the reported values for BEHP are due to laboratory contamination and are considered invalid.

Federal Secondary Drinking Water Standards

No semivolatile currently sampled have SMCLs established for them.

Detection of Semivolatiles with No Standards

There were no detections of semivolatiles that fit under this category.

PESTICIDES AND PCBS

Table 5-11 shows the pesticide and PCB parameters that are sample 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 Catahoula aquifer.

COMMON WATER CHARACTERISTICS

Table 5-1 below highlights some of the more common water characteristics that are considred when studying ground water quality. The minimum, maximum, and average values that were found during the current sampling of the Catahoula aquifer for pH, TDS, hardness, chloride, iron, and nitrite-nitrate are listed in the table. Figures 5-2 through 5-5 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 soft[1].

Table 5-1 Common Water Characteristics
Fiscal Year 2001

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	7.08	8.66	7.75
TDS (ppm)	217	570	317
Hardness (ppm)	<5	96.5	18.2
Chloride (ppm)	3.7	37.5	16.5
Iron (ppb)	36.7	762	318.67
Nitrite-Nitrate (ppm)	<0.05	<0.05	<0.05

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

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

Table 5-2 List of Project Wells Sampled

PROJECT NUMBER	PARISH	WELL NUMBER	DATE SAMPLED	OWNER	DEPTH (FEET)	WELL USE
199507	CATAHOULA	CT-119	02/05/2001	CITY OF JONESVILLE	800	PUBLIC SUPPLY
199311	GRANT	G-295	02/05/2001	POLLOCK AREA WATER SYSTEM	188	PUBLIC SUPPLY
200105	GRANT	G-5196Z	02/05/2001	PRIVATE OWNER	125	DOMESTIC
199508	LA SALLE	LS-278	02/05/2001	ROGERS WATER SYSTEM	352	PUBLIC SUPPLY
200104	SABINE	SA-429	02/19/2001	PRIVATE OWNER	356	DOMESTIC
199801	VERNON	V-656	02/05/2001	EAST CENTRAL VERNON WATER SYS.	1477	PUBLIC SUPPLY

Table 5-3 Summary Water Quality Parameters

WELL NUMBER	TEMP. °C	PH SU	SP. COND. MMHOS/CM	SAL. PPT	TSS PPM	TDS PPM	ALK. PPM	HARD. PPM	TURB. NTU	SP. COND. UMHOS/CM	COLOR PCU	CL PPM	SO_4 PPM	TOT. P PPM	TKN PPM	NH_3 (AS N) PPM	NITRITE-NITRATE (AS N) PPM
	FIELD PARAMETERS				*LABORATORY PARAMETERS*												
CT-119	22.50	7.08	0.298	No Data	<4.0	267.0	116.0	<5.0	<1.0	315.0	5.0	21.50	13.90	0.06	0.37	0.22	<0.05
G-295	19.32	7.84	0.335		4.5	288.0	173.0	<5.0	<1.0	362.0	5.0	10.90	<1.25	0.67	0.41	0.31	<0.05
G-5196Z	17.35	7.22	0.758		5.0	570.0	362.0	96.5	11.0	815.0	5.0	37.50	16.90	0.14	0.70	0.68	<0.05
LS-278	20.80	7.43	0.195		4.0	217.0	98.0	<5.0	<1.0	210.0	7.0	3.70	5.80	0.36	0.31	<0.10	<0.05
LS-278*	20.80	7.43	0.195		4.3	215.0	98.3	<5.0	<1.0	211.0	5.0	3.70	5.70	0.42	0.40	0.13	<0.05
SA-429	21.69	8.66	0.381	0.18	<4.0	268.0	176.0	<5.0	7.8	386.0	5.0	16.00	<1.25	0.38	0.39	0.28	<0.05
V-656	29.72	8.25	0.303	No Data	<4.0	292.0	152.0	<5.0	<1.0	330.0	10.0	9.50	<1.25	0.34	0.39	0.23	<0.05

* Denotes duplicate sample.

Table 5-4 Summary of Inorganic Data

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
CT-119	<5.0	<5.0	8.3	<1.0	1.6	<5.0	7.6	208.7	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	12.0
G-295	<5.0	<5.0	8.1	<1.0	<1.0	<5.0	<5.0	39.6	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	20.1
G-5196Z	<5.0	<5.0	156.5	<1.0	<1.0	<5.0	<5.0	762.0	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	655.0
LS-278	<5.0	<5.0	3.7	<1.0	1.4	<5.0	7.4	270.0	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	36.5
LS-278*	<5.0	<5.0	3.3	<1.0	1.2	Not Reported	10.3	241.0	<0.05	<5.0	<5.0	<5.0	<10.0	<5.0	21.4
SA-429	<5.0	<5.0	2.4	<1.0	<1.0	<5.0	<5.0	595.0	<0.05	24.4	<5.0	<5.0	<10.0	<5.0	267.0
V-656	<5.0	<5.0	1.5	<1.0	<1.0	<5.0	<5.0	36.7	<0.05	Not Reported	<5.0	<5.0	<10.0	<5.0	32.2

* Denotes duplicate sample.

Table 5-5 Water Quality Statistics

Fiscal Year 2001

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	7.08	8.66	7.75
Temperature ^{O}C	17.35	29.72	21.90
Sp. Conductivity (mmhos/cm) (Field)	0.195	0.758	0.378
Salinity (ppt)	0.18	0.18	0.18
TSS (ppm)	<4	5.0	<4
TDS (ppm)	217	570	317
Alkalinity (ppm)	98.0	362.0	179.5
Hardness (ppm)	<5	96.5	18.2
Turbidity (NTU)	<1	11.00	3.47
Sp. Conductivity (umhos/cm) (Lab)	210	815	403
Color (PCU)	5.0	10.0	6.2
Chloride (ppm)	3.7	37.5	16.5
Sulfate (ppm)	<1.25	16.90	6.41
Nitrite-Nitrate, as N (ppm)	<0.05	<0.05	<0.05
Phosphorus (ppm)	0.06	0.67	0.33
TKN (ppm)	0.31	0.70	0.43
Ammonia (ppm)	<0.1	0.68	0.30

Table 5-6 Inorganic Statistics

Fiscal Year 2001

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	<5	<5	<5
Barium (ppb)	1.5	156.50	30.08
Beryllium (ppb)	<5	<5	<5
Cadmium (ppb)	<5	<5	<5
Chromium (ppb)	<5	<5	<5
Copper (ppb)	<5	10.3	<5
Iron (ppb)	36.70	762.00	318.67
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	<5	24.40	6.88
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<5	<5	<5
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	12.00	655.00	170.47

Table 5-7 Three-year Water Quality Statistics

PARAMETER	FY 1995 AVERAGE	FY 1998 AVERAGE	FY 2001 AVERAGE
PH (SU)	NA	6.43	7.75
Temperature ^{O}C	NA	22.61	21.90
Sp. Conductivity (mmhos/cm) (Field)	NA	0.256	0.378
Salinity (ppt)	NA	0.12	0.18
TSS (ppm)	<4	6.3	<4
TDS (ppm)	252.3	278	317
Alkalinity (ppm)	128.2	123.2	179.5
Hardness (ppm)	<5	<5	18.2
Turbidity (NTU)	1.23	<1	3.47
Sp. Conductivity (umhos/cm) (Lab)	297.7	299	403
Color (PCU)	7.5	5.0	6.2
Chloride (ppm)	15.8	16.3	16.5
Sulfate (ppm)	7.33	4.43	6.41
Nitrite-Nitrate, as N (ppm)	<0.05	<0.05	<0.05
Phosphorus (ppm)	0.35	0.25	0.33
TKN (ppm)	0.58	0.21	0.43
Ammonia (ppm)	0.25	0.18	0.30

Table 5-8 Three-year Inorganic Statistics

PARAMETER	FY 1995 AVERAGE	FY 1998 AVERAGE	FY 2001 AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	<5	<5	<5
Barium (ppb)	8.43	71.30	30.08
Beryllium (ppb)	<5	<5	<5
Cadmium (ppb)	<5	<5	<5
Chromium (ppb)	<5	<5	<5
Copper (ppb)	83.7	<5	<5
Iron (ppb)	388.33	340.62	318.67
Lead (ppb)	32.17	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	7.23	<5	6.88
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<5	<5	<5
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	250.47	44.53	170.47

Table 5-9 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 5-10 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

Table 5-10 (Cont'd)
Semivolatile Parameters

COMPOUND	PQL (ppb)
Fluorene	2
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

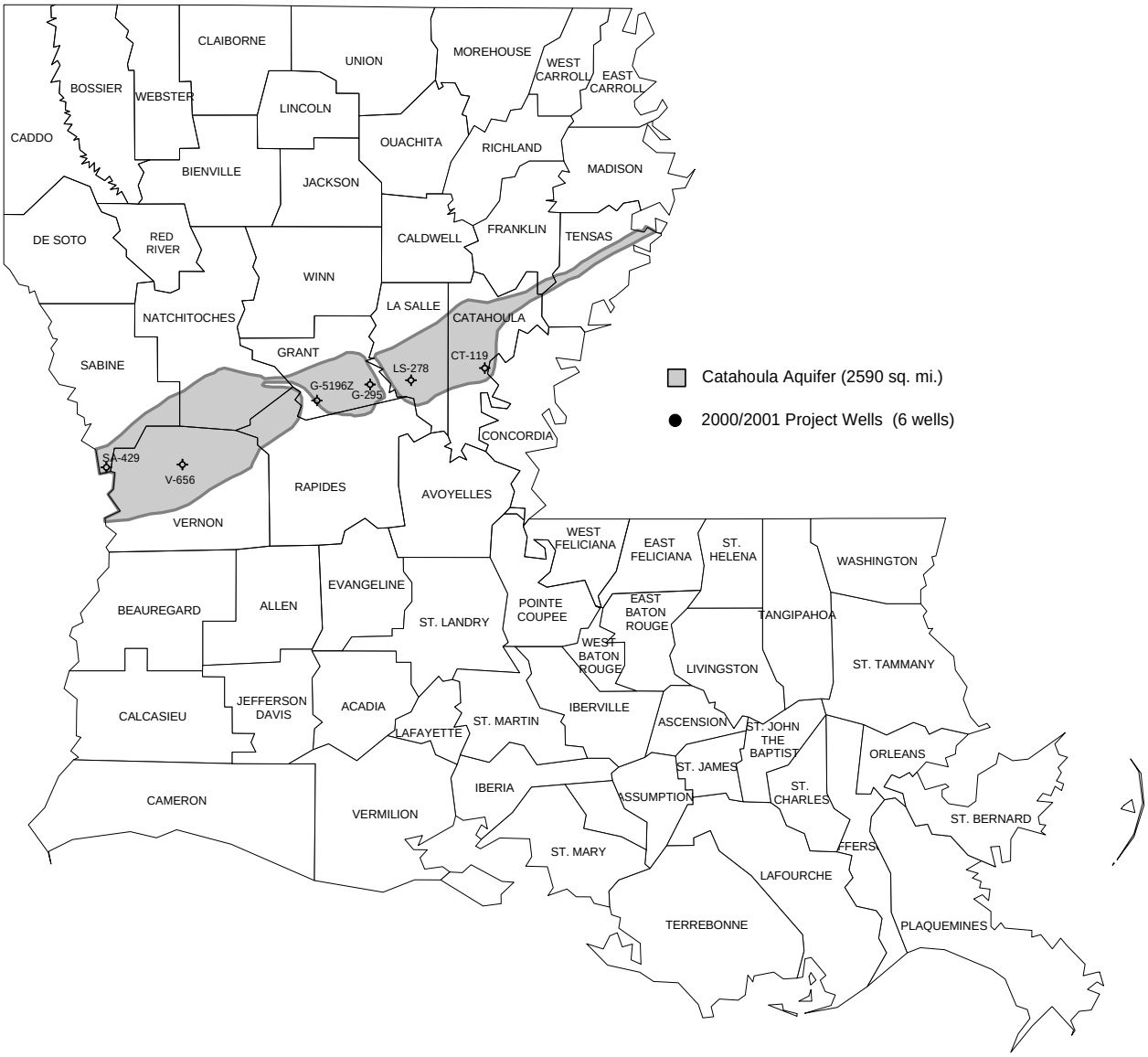
Table 5-11 List of Pesticide and PCB Analytical Parameters

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 CATAHOULA 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.

08/27/2001

Figure 5-1 Location Plat, Catahoula Aquifer

CATAHOULA AQUIFER - pH (SU)

Baseline Monitoring Project
FY00-01

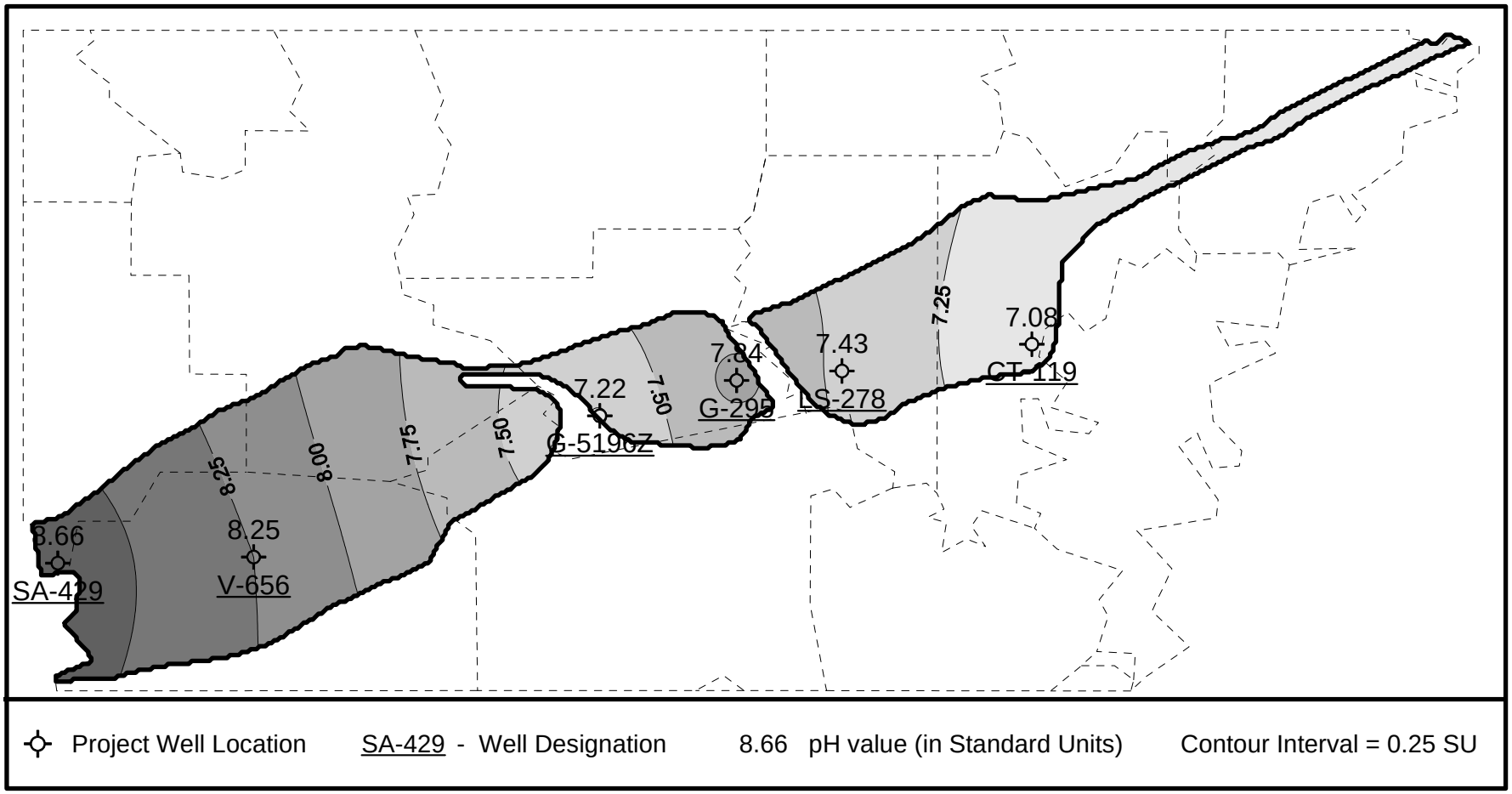


Figure 5-2 Map of pH Data

CATAHOULA AQUIFER - TDS (PPM)

Baseline Monitoring Project
FY00-01

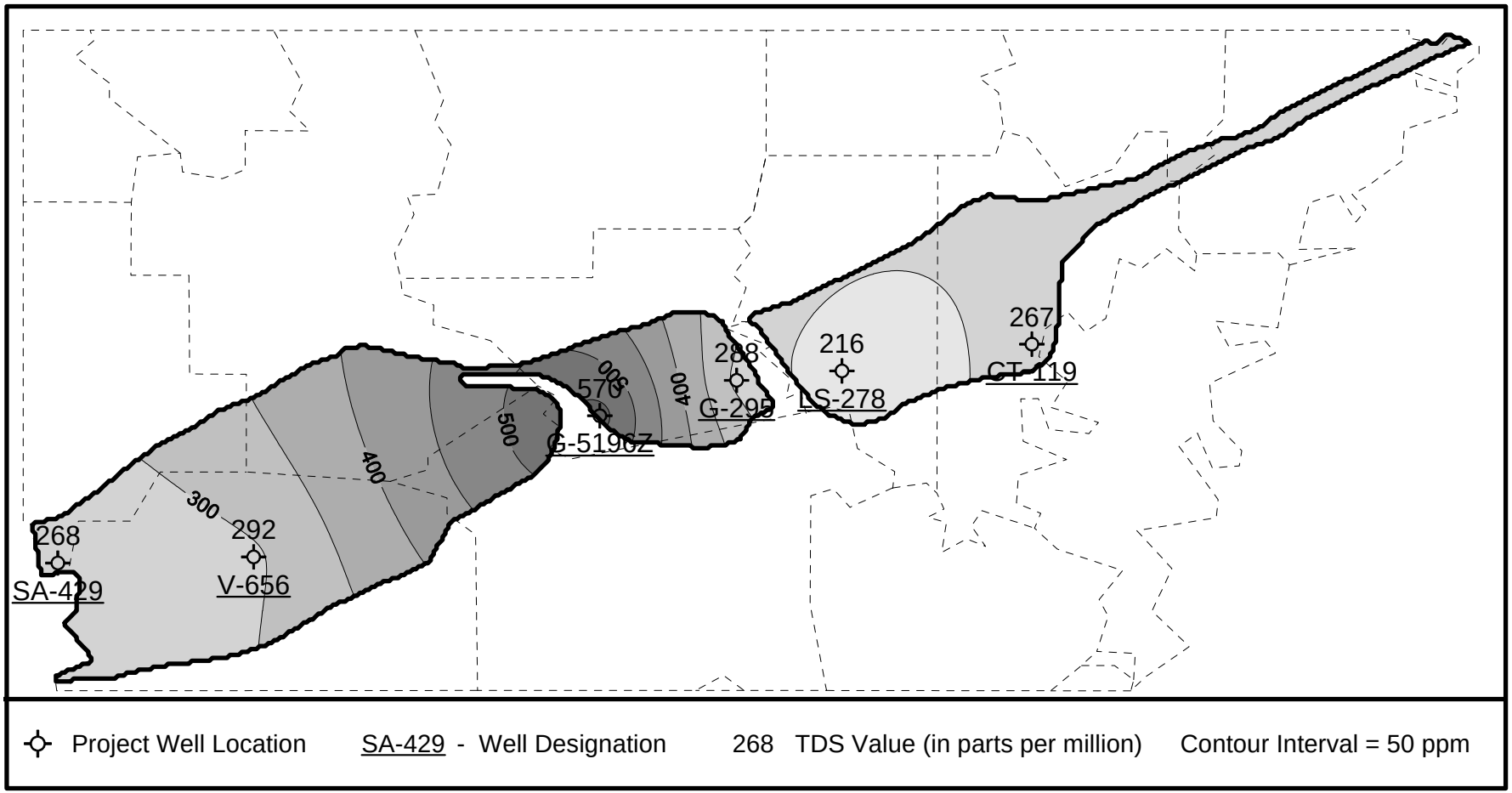


Figure 5-3 Map of TDS Data

CATAHOULA AQUIFER - CHLORIDE (PPM)

Baseline Monitoring Project
FY00-01

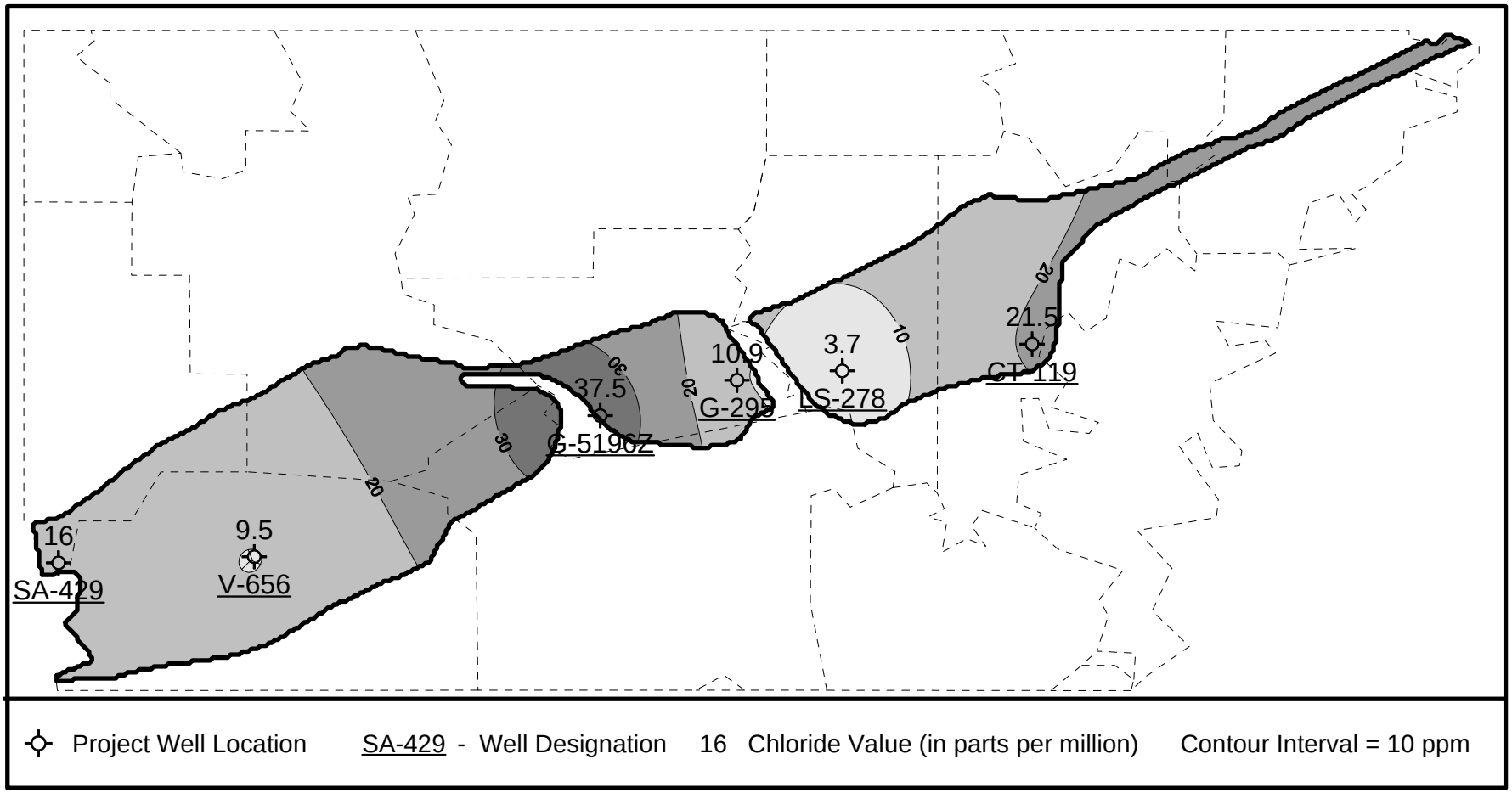


Figure 5-4 Map of Chloride Data

CATAHOULA AQUIFER - IRON (PPB)

Baseline Monitoring Project
FY00-01

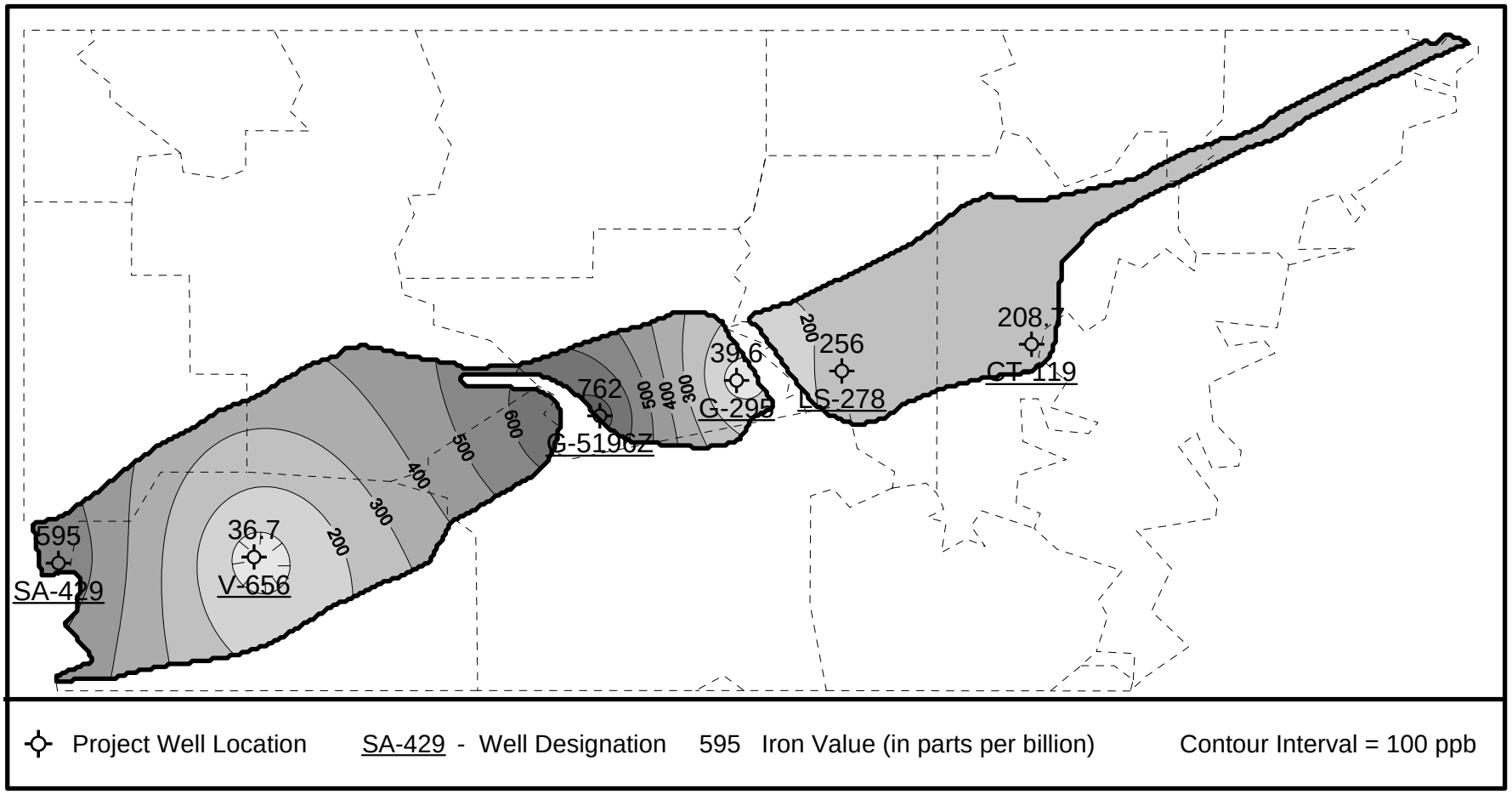


Figure 5-5 Map of Iron Data