CHICOT AQUIFER SUMMARY

BASELINE MONITORING PROJECT, FY 2002

APPENDIX 10

OF THE

TRIENNIAL SUMMARY REPORT, 2003

FOR THE

ENVIRONMENTAL EVALUATION DIVISION

OF

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PARTIAL FUNDING PROVIDED THROUGH 106 CWA

CHICOT 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 10-1 shows the geographic locations of the Chicot aquifer and the associated Project wells, whereas Table 10-2 lists the wells in the aquifer along with their total depths and the use made of produced waters and date sampled.

From February through October of 2002, twenty-six wells were sampled which produce from the Chicot aquifer. Twelve of the wells are classified as public supply wells, five are industrial wells, four are classified as domestic wells, four are observation wells, and one is classified as an irrigation well. The wells are located in fourteen parishes, mainly in southwest Louisiana.

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

GEOLOGY

The Chicot aquifer system consists of fining upward sequences of gravels, sands, silts, and clays of the Pleistocene Prairie, intermediate, and high terrace deposits of southwestern Louisiana. The medium to coarse-grained sand and gravel aquifer units dip and thicken toward the Gulf, thin slightly toward the west into Texas, and thicken toward the east where it is overlain by alluvium of the Atchafalaya and Mississippi rivers. The aquifers are confined, have a finer texture, and are increasingly subdivided by silts and clays southward from the northern limit of the outcrop area in southern Vernon and Rapides parishes.

In the Lake Charles area, the Chicot is divided into the shallow alluvial sands, the "200-foot" sand, the "500-foot" sand, and the "700-foot" sand. East of Calcasieu parish the Chicot is divided into the "upper sand" (in hydraulic connection to the Atchafalaya sand, Abbeville sand, and "200-foot" sand) and the "lower sand" ("700-foot" sand). The "500-foot" sand is largely isolated except where it merges with the "700-foot" sand north of Calcasieu Parish. Fresh water in the Chicot and other southwestern Louisiana aquifers is separated from fresh water in southeast Louisiana by a saltwater ridge along the western edge of the Mississippi River valley. Salt water occurs within the Chicot along the coast and in isolated bodies north of the coast.

HYDROGEOLOGY

Recharge to the Chicot occurs primarily through the direct infiltration of rainfall in the interstream, upland outcrop-subcrop areas. Recharge also occurs by water movement from the Atchafalaya alluvium, downward infiltration through the clays south of the primary recharge outcrop area, upward movement from the underlying Evangeline aquifer, and inflow from the Vermilion and Calcasieu rivers. Water movement is generally toward the pumping centers at Lake Charles and Eunice. There is little movement of water from the west because of pumping in the Orange, Texas area. The hydraulic conductivity varies between 40-220 feet/day.

The maximum depths of occurrence of freshwater in the Chicot range from 100 feet above sea level, to 1,000 feet below sea level. The range of thickness of the fresh water interval in the Chicot is 50 to 1,050 feet. The depths of the Chicot wells that were monitored in conjunction with the BMP range from 66 to 701 feet.

INTERPRETATION OF DATA

FIELD, WATER QUALITY, AND NUTRIENTS PARAMETERS

Table 10-3 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 10-5 lists the minimum, maximum, and average results for the field data, water quality data, and nutrients data for the Chicot 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 10-3 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 10-3 show that the following secondary MCLs (SMCL)s were exceeded.

Color – SMCL = 15 PCU

BE-378 – 29 PCU
JD-862 – 32 PCU
VE-650 – 55 PCU
I-5050Z – 35 PCU
SL-392 – 100 PCU

pH – SMCL = 6.5 – 8.5 S.U.

BE-412 – 5.50 S.U.
R-5428Z – 5.81 S.U.
BE-488 – 6.12 S.U.
V-535 – 5.41 S.U.

Total Dissolved Solids (TDS) – SMCL = 500 ppm

JD-862 – 530 ppm
VE-862 – 592 ppm
SMN-109 – 672 ppm, duplicate – 686 ppm

Comparison To Historical Data

Table 10-7 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). For the most part the averages are consistent. Field conductivity has fluctuated, while lab conductivity has consistently decreased, as have the averages for TSS.

INORGANIC PARAMETERS

Table 10-4 shows the inorganic (total metals) parameters that are sampled for and the analytical results for those parameters for each well. Table 10-6 lists the minimum, maximum, and average results for the inorganic data for the Chicot aquifer.

Federal Primary Drinking Water Standards

Chromium was detected in the sample analyses of Project well BE-378, an industrial supply well, at a concentration of 13.4 ppb. This concentration is well below the primary MCL of 100 ppb that has been established for chromium. A lead concentration of 29.8 ppb, which is above the lead action level of 15 ppb, was also detected. Neither of these analytes was detected in the subsequent resampling of the well. However, since both of these analytes have occurred sporadically in this well's sample results, close attention will be paid to them during the next regularly scheduled sampling, and the original sample results are accepted as being valid. The well owner has been made aware of this. It should also be noted that mercury was detected in the resample analyses at a concentration of 0.06 ppb, which is just above mercury's detection level of 0.05 ppb and below its primary MCL of 2 ppb. Because this concentration is so close to the detection level and since it has never occurred in this well before, it is this Office's opinion that it is due to laboratory or field contamination.

A further review of the analyses listed on Table 10-4 shows that no primary MCL was exceeded for inorganic parameters.

Federal Secondary Drinking Water Standards

Laboratory data contained in Table 10-4 show that the following secondary SMCL was exceeded.

Iron – SMCL = 300 ppb

AC-539 – 1,720 ppb
BE-378 – 2,790 ppb
CU-1023 – 993 ppb, duplicate – 988 ppb
CU-1125 – 1,190 ppb, duplicate – 1,200 ppb
EV-673 – 1,027 ppb, duplicate – 902 ppb
JD-862 – 2,560 ppb
SMN-109 – 1,190 ppb, duplicate – 1,230 ppb
V-535 – 368 ppb
VE-862 – 1,030 ppb
VE-6936Z – 2,940 ppb
AC-6919Z – 1,210 ppb
CU-699 – 804 ppb
CU-1060 – 517 ppb
CU-1436 – 1,770 ppb
I-5050Z – 6,470 ppb
LF-572 – 752 ppb, duplicate – 719 ppb
SL-392 – 12, 600 ppb
VE-650 – 3,690 ppb
VE-882 – 1,320 ppb

Federal Lead Action Level

Under the Federal Safe Drinking Water Act, EPA has established a lead action level of 15 ppb for public drinking water. This action level is the highest level of lead that EPA allows in public drinking water. The action level ensures that drinking water does not pose either a short-term or long-term health risk due to lead contamination. While not all wells sampled were public supply wells, this Office does use the lead action level as a benchmark for further evaluation of lead results.

As mentioned above, lead was detected in BE-378, an industrial well, at a concentration of 29.8 ppb, a concentration that is above the lead action level of 15 ppb. Lead was not detected in the subsequent resampling of the well, but since it has been detected in the well intermittently close attention will be paid to the lead results from the next regularly scheduled sampling. Also as mentioned above, the well owner has been notified.

Lead was also detected at 14.7 ppb in the sample results from Project well V-535. This concentration is consistent with previous sampling results from 1999 and 1996 that showed lead levels of 14.2 ppb and 11.3 ppb respectively. It is therefore the opinion of this Office that the existence of lead in the well has been established. Also note that all of these concentrations have been below the lead action level of 15 ppb. The owner of this well, which is a public supply well that serves a fire station, has been notified of these lead concentrations every time they were detected.

Other than well BE-378, no well exceeded the lead action level of 15 ppb.

Comparison To Historical Data

Table 10-8 lists the current inorganic data averages alongside the inorganic data averages for the two previous sampling rotations (three and six years prior). A comparison shows that the barium, copper, and iron averages have fluctuated slightly. The zinc average decreased between FY 1996 and FY 1999, but has changed little since then, comparatively. All other averages were consistently below detection levels.

VOLATILE ORGANIC COMPOUNDS

Table 10-9 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.

Bromoform was detected in the duplicate sample from well EV-673 at a concentration just below the practical quantitation limit. However it was not detected in the results from the initial sample (only in the duplicate) and it was detected in the field blank. Also, bromoform is a chlorination byproduct, and chlorination byproducts have been detected intermittently in recent Baseline Monitoring Project sampling. It is this Office's opinion that theses detections are due to field or laboratory contamination. Due to all these factors, it also is the opinion of this Office that the bromoform concentration exhibited in the sample analyses of well EV-673 is due to field/laboratory contamination, not contamination of the well.

Taking into account the invalid bromoform results from EV-673, no VOC was detected during the FY 2002 sampling of the Chicot Aquifer.

SEMIVOLATILE ORGANIC COMPOUNDS

Table 10-10 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 Chicot aquifer. Table 10-10 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 Chicot wells that were sampled during FY 2002 exhibited values for bis(2-ethylhexyl)phthalate. 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 bis(2-ethylhexyl)phthalate concentrations exhibited in the FY 2002 Chicot sample analyses are due to laboratory contamination, not contamination of the aquifer.

Seven of the Chicot wells that were sampled during FY 2002 exhibited isophorone concentrations. However, three of those wells were resampled and isophorone was not detected in the resample analyses. For the four wells that weren't resampled, isophorone was detected in their concurrent field and laboratory blanks. It is therefore the opinion of this Office that all these isophorone concentrations are due to laboratory contamination, not contamination of the aquifer.

Taking into consideration the invalid phthalate and isophorone concentrations, no semivolatile organic compounds were detected during the FY 2002 sampling of the Chicot aquifer.

PESTICIDES AND PCBS

Table 10-11 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 2002 sampling of the Chicot aquifer.

COMMON WATER CHARACTERISTICS

Table 10-1 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 Chicot aquifer for pH, TDS, hardness, chloride, iron, and nitrite-nitrate are listed in the table. Figures 10-2, 10-3, 10-4, and 10-5 respectively, represent the contoured data for pH, TDS, chloride, and iron. The data values that are contoured and reported in the contour maps are derived from the initial current sampling of each well with any duplicate samples or resamples averaged into them. The data average for hardness shows that the ground water produced from this aquifer is moderately hard[1].

Table 10-1 Common Water Characteristics
Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	5.41	7.92	7.03
TDS (ppm)	21.3	672.0	302.0
Hardness (ppm)	5.0	305.0	127.0
Chloride (ppm)	3.1	208.0	51.6
Iron (ppb)	<20	12,600.00	1,794.94
Nitrite-Nitrate (ppm)	<0.05	0.12	<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 the Chicot aquifer is moderately hard and that no primary MCL was exceeded. This aquifer is of questionable quality when considering taste, odor, or appearance guidelines, mainly because several wells exceeded the secondary MCL for iron. Lead was detected in two Chicot aquifer wells, BE-378 and V-535. It was detected in BE-378, which is an industrial well, at 29.8 ppb, a concentration that is above the lead action level of 15 ppb. However, it was not detected in the resample. A review of previous sampling results found that lead has been detected in this well intermittently so close attention will be paid to the lead results from the next regularly scheduled sampling. The well owner has been notified of this. Lead was detected in well V-535 at 14.7 ppb, a concentration that is consistent with previous sampling results from 1999 and 1996 that showed lead levels of 14.2 ppb and 11.3 ppb respectively. It is therefore the opinion of this Office that the existence of lead in well V-535 has been established. Also note that all of the lead concentrations found in V-535 have been below the lead action level of 15 ppb. The owner of this well, which is a public supply well that serves a fire station, has been notified of these lead concentrations every time they were detected. Other than well BE-378, no well exceeded the lead action level of 15 ppb during the current round of sampling. A comparison of present and historical BMP data averages shows that for the most part the data averages are consistent. Field conductivity has fluctuated, while lab conductivity has consistently decreased, as have the averages for TSS. Also, barium, copper, and iron averages have fluctuated slightly while the zinc average decreased between FY 1996 and FY 1999, but has changed little since then, comparatively.

It is recommended that the Project wells assigned to the Chicot aquifer be resampled 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 10-2 List of Project Wells Sampled

PROJECT NUMBER	PARISH	WELL NUMBER	DATE SAMPLED	OWNER	DEPTH (Feet)	WELL USE
199616	ACADIA	AC-539	02/04/2002	CITY OF RAYNE	251	PUBLIC SUPPLY
199102	ACADIA	AC-6919Z	02/04/2002	PRIVATE OWNER	UNKNOWN	IRRIGATION
199618	ALLEN	AL-141	04/09/2002	TOWN OF OBERLIN	155	PUBLIC SUPPLY
198404	BEAUREGARD	BE-378	05/06/2002	TRANSCONTINENTAL GAS	172	INDUSTRIAL
199120	BEAUREGARD	BE-412	04/08/2002	BOISE CASCADE	202	INDUSTRIAL
199619	BEAUREGARD	BE-486	04/09/2002	EAST BEAUREGARD HIGH SCHOOL	150	PUBLIC SUPPLY
199620	BEAUREGARD	BE-488	04/09/2002	SINGER WATER DISTRICT	262	PUBLIC SUPPLY
200204	CAMERON	CN-5589Z	05/07/2002	PRIVATE OWNER	140	DOMESTIC
199018	CALCASIEU	CU-1023	10/08/2002	PPG INDUSTRIES	701	INDUSTRIAL
199015	CALCASIEU	CU-1060	05/06/2002	PPG INDUSTRIES	200	PUBLIC SUPPLY
199622	CALCASIEU	CU-1125	05/07/2002	LDOTD	570	PUBLIC SUPPLY
200205	CALCASIEU	CU-1436	05/06/2002	PPG INDUSTRIES	530	INDUSTRIAL
199020	CALCASIEU	CU-699	05/06/2002	CITGO PETROLEUM REFINING	530	INDUSTRIAL
198406	CALCASIEU	CU-771	03/05/2002	USGS	241	OBSERVATION
200208	EVANGELINE	EV-673	07/30/2002	CITY OF MAMOU	247	PUBLIC SUPPLY
199316	IBERIA	I-5050Z	02/04/2002	PRIVATE OWNER	188	DOMESTIC
200206	JEFFERSON DAVIS	JD-862	05/06/2002	CITY OF WELSH	697	PUBLIC SUPPLY
199409	LAFAYETTE	LF-572	02/05/2002	CITY OF LAFAYETTE	570	PUBLIC SUPPLY
199621	RAPIDES	R-5428Z	04/28/2002	PRIVATE OWNER	85	DOMESTIC
198410	ST. LANDRY	SL-392	03/04/2002	USGS	126	OBSERVATION
198412	ST. MARTIN	SMN-109	03/04/2002	USGS	375	OBSERVATION
199314	VERNON	V-535	04/08/2002	MARLOW FIRE STATION	66	PUBLIC SUPPLY
198413	VERMILION	VE-650	03/04/2002	USGS	205	OBSERVATION
199103	VERMILION	VE-6936Z	02/04/2002	PRIVATE OWNER	125	DOMESTIC
198622	VERMILION	VE-862	02/04/2002	TOWN OF GUEYDAN	249	PUBLIC SUPPLY
199617	VERMILION	VE-882	02/04/2002	CITY OF KAPLAN	279	PUBLIC SUPPLY

Table 10-3 Summary of Water Quality 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
	FIELD PARAMETERS				*WATER QUALITY PARAMETERS*								*NUTRIENTS*				
AC-539	0.64	7.53	0.31	21.46	313.0	28.00	5.0	632.0	<1.25	344.0	4.0	13.0	1.32	212.0	<0.05	1.52	0.07
AC-6919Z	0.766	7.48	0.37	22.14	229.0	109.00	<5.0	753.0	<1.25	398.0	<4.0	5.6	1.03	162.0	<0.05	1.22	<0.05
AL-141	0.319	7.31	0.15	23.24	145.0	8.80	6.0	303.0	2.30	207.0	<4.0	4.3	0.10	<10.0	<0.05	0.38	0.23
BE-378	0.263	7.18	0.12	25.43	82.5	34.30	29.0	262.0	<1.25	165.0	<4.0	11.0	0.11	28.6	0.05	0.46	0.26
BE-412	0.051	5.5	0.02	20.16	14.1	5.80	<5.0	51.9	<1.25	48.7	<4.0	<1.0	<0.10	<10.0	0.08	<0.10	<0.05
BE-486	0.148	6.7	0.07	18.30	31.4	27.30	<5.0	156.0	<1.25	121.0	<4.0	2.2	<0.10	29.3	0.05	<0.10	<0.05
BE-488	0.071	6.12	0.03	20.93	26.5	5.90	<5.0	72.8	<1.30	68.0	<4.0	<1.0	<0.10	12.7	0.06	<0.10	<0.05
CN-5589Z	0.776	7.51	0.38	22.97	365.0	53.60	<5.0	792.0	<1.25	424.0	<4.0	<1.0	0.85	196.0	0.06	0.89	0.14
CU-1023	0.875	6.58	0.43	24.90	180.0	165.00	5.0	855.0	<1.30	480.0	<4.0	4.1	0.21	103.0	<0.05	1.12	0.28
CU-1023*	0.875	6.58	0.43	24.90	174.0	167.00	5.0	860.0	<1.30	464.0	<4.0	3.9	0.20	103.0	<0.05	1.13	0.28
CU-1060	0.36	7.15	0.17	22.21	176.0	16.70	5.0	361.0	1.50	232.0	<4.0	3.5	0.14	112.0	<0.05	0.16	0.20
CU-1125	0.336	7.59	0.16	22.68	147.0	23.40	<5.0	335.0	1.40	217.0	<4.0	3.2	0.12	60.4	<0.05	0.15	0.18
CU-1125*	0.336	7.59	0.16	22.68	148.0	23.30	<5.0	342.0	1.50	223.0	<4.0	3.3	0.19	61.0	<0.05	0.20	0.19
CU-1436	0.556	7.11	0.27	24.60	152.0	87.50	14.0	564.0	2.10	330.0	<4.0	11.0	0.13	122.0	<0.05	0.21	0.25
CU-699	0.62	7.43	0.30	24.06	191.0	88.10	5.0	605.0	<1.25	358.0	<4.0	4.1	<0.10	148.0	<0.05	0.16	0.15
CU-771	0.399	7.92	0.19	21.77	204.0	15.30	<5.0	396.0	2.00	248.0	<4.0	<1.0	0.31	104.0	<0.05	0.37	0.08
EV-673	0.734	7.35	0.36	21.62	277.0	69.80	<5.0	679.0	3.00	444.0	<4.0	4.5	0.21	146.0	<0.05	0.26	0.22
EV-673*	0.734	7.35	0.36	21.62	278.0	71.10	<5.0	686.0	2.90	446.0	<4.0	3.5	0.25	146.0	<0.05	0.33	0.22
I-5050Z	0.472	7.05	0.23	20.04	244.0	5.70	35.0	446.0	<1.25	278.0	14.5	75.0	0.10	206.0	<0.05	0.39	<0.05
JD-862	0.896	6.58	0.44	24.41	125.0	208.00	32.0	889.0	<1.25	530.0	<4.0	10.0	0.30	166.0	0.05	0.36	0.27
LF-572	0.377	7.57	0.18	19.88	191.0	5.60	8.0	372.0	5.60	236.0	<4.0	3.7	0.22	175.0	<0.05	0.85	0.07
LF-572*	0.377	7.57	0.18	19.88	193.0	5.60	7.0	372.0	5.50	237.0	<4.0	3.5	0.14	175.0	<0.05	0.43	<0.05
R-5428Z	0.35	5.81	0.02	20.57	8.7	3.30	<5.0	33.4	<1.25	46.7	<4.0	1.3	<0.10	<10.0	0.12	<0.10	<0.05
R-5428Z*	0.035	5.81	0.02	20.57	8.7	3.20	<5.0	33.7	<1.30	50.7	<4.0	1.3	<0.10	<10.0	0.12	<0.10	<0.05

* Denotes duplicate sample.

Table 10-3 Summary of Water Quality Data (continued)

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
	FIELD PARAMETERS				*WATER QUALITY PARAMETERS*								*NUTRIENTS*				
SL-392	0.38	7.2	0.18	21.38	153.0	19.60	100.0	345.0	9.20	233.0	23.3	120.0	<0.10	173.0	<0.05	<0.10	0.14
SMN-109	1.11	7.17	0.55	21.59	456.0	116.00	10.0	1100.0	<1.25	672.0	4.0	11.0	0.81	305.0	<0.05	0.81	0.14
SMN-109*	1.11	7.17	0.55	21.59	458.0	117.00	10.0	1104.0	<1.25	686.0	<4.0	11.0	0.83	306.0	<0.05	0.83	0.14
V-535	0.022	5.41	0.01	19.20	4.2	3.10	<5.0	22.2	<1.30	21.3	4.0	1.7	<0.10	<10.0	0.07	<0.10	<0.05
VE-650	0.47	7.1	0.23	21.77	255.0	7.80	55.0	455.0	<1.25	297.0	11.5	24.0	0.75	199.0	0.06	0.98	0.29
VE-6936Z	0.67	7.15	0.33	20.01	301.0	39.70	6.0	647.0	<1.25	402.0	5.5	26.0	0.45	191.0	<0.05	0.66	0.23
VE-862	1.131	7.61	0.56	21.87	385.0	146.00	5.0	1134.0	<1.25	592.0	<4.0	6.0	2.15	226.0	<0.05	2.37	0.06
VE-882	0.799	7.6	0.39	20.78	373.0	47.50	5.0	780.0	<1.25	458.0	<4.0	11.0	1.08	204.0	<0.05	1.40	0.06

* Denotes duplicate sample.

Table 10-4 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
AC-539	<5.0	<5.0	556.0	<1.0	<1.0	<5.0	<5.0	1,720.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	20.3
AC-6919Z	<5.0	<5.0	577.0	<1.0	<1.0	<5.0	43.7	1,210.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	16.2
AL-141	<5.0	<5.0	10.7	<1.0	<1.0	<5.0	44.0	263.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	15.2
BE-378	<5.0	<5.0	43.8	<1.0	<1.0	13.4	268.0	2,790.0	29.8	<0.05	<5.0	<5.0	<1.0	<5.0	349.0
BE-378**	<5.0	<5.0	113.0	<1.0	<1.0	<5.0	10.9	2,569.0	<10.0	NR***	<5.0	<5.0	<1.0	<5.0	30.5
BE-412	<5.0	<5.0	102.0	<1.0	<1.0	<5.0	<5.0	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
BE-486	<5.0	<5.0	154.0	<1.0	<1.0	<5.0	<5.0	231.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	35.8
BE-488	<5.0	<5.0	73.0	<1.0	<1.0	<5.0	15.3	111.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
CN-5589Z	<5.0	<5.0	459.0	<1.0	<1.0	<5.0	33.6	156.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	12.8
CU-1023	<5.0	<5.0	339.0	<1.0	<1.0	<5.0	<5.0	993.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CU-1023*	<5.0	<5.0	342.0	<1.0	<1.0	<5.0	<5.0	988.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CU-1060	<5.0	<5.0	229.0	<1.0	<1.0	<5.0	<5.0	517.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	89.1
CU-1125	<5.0	<5.0	187.0	<1.0	<1.0	<5.0	7.7	1,190.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	105.0
CU-1125*	<5.0	<5.0	188.0	<1.0	<1.0	<5.0	<5.0	1,200.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	85.8
CU-1436	<5.0	<5.0	280.0	<1.0	<1.0	<5.0	<5.0	1,770.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CU-699	<5.0	<5.0	311.0	<1.0	<1.0	<5.0	<5.0	804.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CU-771	<5.0	<5.0	283.0	<1.0	<1.0	<5.0	<5.0	72.3	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	45.0
EV-673	<5.0	<5.0	301.0	<1.0	<1.0	<5.0	7.9	1,027.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	23.9
EV-673*	<5.0	<5.0	298.0	<1.0	<1.0	<5.0	6.4	902.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	20.7
I-5050Z	<5.0	7.0	175.0	<1.0	<1.0	<5.0	6.4	6,470.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	235.0
JD-862	<5.0	<5.0	747.0	<1.0	<1.0	<5.0	<5.0	2,560.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
LF-572	<5.0	<5.0	198.0	<1.0	<1.0	<5.0	10.2	752.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	23.4
LF-572*	<5.0	<5.0	194.0	<1.0	<1.0	<5.0	<5.0	719.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	14.7
R-5428Z	<5.0	<5.0	13.7	<1.0	<1.0	<5.0	27.6	110.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	14.2
R-5428Z*	<5.0	<5.0	13.9	<1.0	<1.0	<5.0	26.8	109.0	<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	13.5

* Denotes duplicate sample.
** Denotes resample.
*** Not reported.

Table 10-4 Summary of Inorganic Data (continued)

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-392	<5.0	<5.0	262.0	<1.0	<1.0	<5.0	<5.0	12,600.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	9.8
SMN-109	<5.0	<5.0	717.0	<1.0	<1.0	<5.0	<5.0	1,190.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	629.0
SMN-109*	<5.0	<5.0	743.0	<1.0	<1.0	<5.0	<5.0	1,230.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	651.0
V-535	<5.0	<5.0	26.8	<1.0	<1.0	<5.0	165.0	368.0	14.7	<0.05	<5.0	<5.0	<1.0	<2.0	263.0
VE-650	<5.0	<5.0	133.0	<1.0	<1.0	<5.0	<5.0	3,690.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	1310.0
VE-6936Z	<5.0	<5.0	227.0	<1.0	<1.0	<5.0	18.2	2,940.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	29.9
VE-862	<5.0	<5.0	933.0	<1.0	<1.0	<5.0	<5.0	1,030.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	16.4
VE-882	<5.0	<5.0	568.0	<1.0	<1.0	<5.0	<5.0	1,320.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	30.3

* Denotes duplicate sample.

Table 10-5 Water Quality Statistics

Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	5.41	7.92	7.03
Temperature ^{O}C	18.30	25.43	21.85
Sp. Conductivity (mmhos/cm) (Field)	0.022	1.131	0.523
Salinity (ppt)	0.01	0.56	0.25
TSS (ppm)	<4	23.3	4.0
TDS (ppm)	21.3	672.0	302.0
Alkalinity (ppm)	4.2	456.0	193.4
Hardness (ppm)	<10.0	305.0	127.0
Turbidity (NTU)	<1	120.00	13.78
Sp. Conductivity (umhos/cm) (Lab)	22.2	1,134.0	501.6
Color (PCU)	<5	100.0	13.5
Chloride (ppm)	3.1	208.0	51.6
Sulfate (ppm)	<1.25	9.20	1.48
Nitrite-Nitrate, as N (ppm)	<0.05	0.12	<0.05
Phosphorus (ppm)	<0.05	0.29	0.13
TKN (ppm)	<0.1	2.37	0.58
Ammonia (ppm)	<0.1	2.15	0.41

Table 10-6 Inorganic Statistics

Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	<5	7.00	<5
Barium (ppb)	10.70	933.00	297.00
Beryllium (ppb)	<1	<1	<1
Cadmium (ppb)	<1	<1	<1
Chromium (ppb)	<5	13.40	<5
Copper (ppb)	<5	268.00	25.69
Iron (ppb)	<20	12,600.00	1,794.94
Lead (ppb)	<10	29.80	<10
Mercury (ppb)	<0.05	0.06	<0.05
Nickel (ppb)	<5	<5	<5
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<1	<1	<1
Thallium (ppb)	<2	<5	<5
Zinc (ppb)	<10	1,310.00	123.47

Table 10-7 Three-year Water Quality Statistics

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE
PH (SU)	7.08	7.01	7.03
Temperature ^{O}C	22.68	23.20	21.85
Sp. Conductivity (mmhos/cm) (Field)	0.534	0.650	0.523
Salinity (ppt)	0.26	0.33	0.25
TSS (ppm)	19.5	5.4	4.0
TDS (ppm)	369.1	351.9	302.0
Alkalinity (ppm)	199.8	188.7	193.4
Hardness (ppm)	129.9	122.8	127.0
Turbidity (NTU)	13.80	14.63	13.78
Sp. Conductivity (umhos/cm) (Lab)	593.9	552.5	501.6
Color (PCU)	22.5	13.0	13.5
Chloride (ppm)	67.5	59.6	51.6
Sulfate (ppm)	2.09	2.78	1.48
Nitrite-Nitrate, as N (ppm)	<0.05	<0.05	<0.05
Phosphorus (ppm)	0.24	0.25	0.13
TKN (ppm)	0.35	0.67	0.58
Ammonia (ppm)	0.36	0.35	0.41

Table 10-8 Three-year Inorganic Statistics

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	<5	<5	<5
Barium (ppb)	277.61	311.96	297.00
Beryllium (ppb)	<5	<5	<1
Cadmium (ppb)	<5	<5	<1
Chromium (ppb)	<5	<5	<5
Copper (ppb)	14.38	35.83	25.69
Iron (ppb)	1,823.53	1,970.59	1,794.94
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	<1
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	346.69	152.28	123.47

Table 10-9 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 10-10 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 10-10 (Cont'd)
Semivolatile Parameters

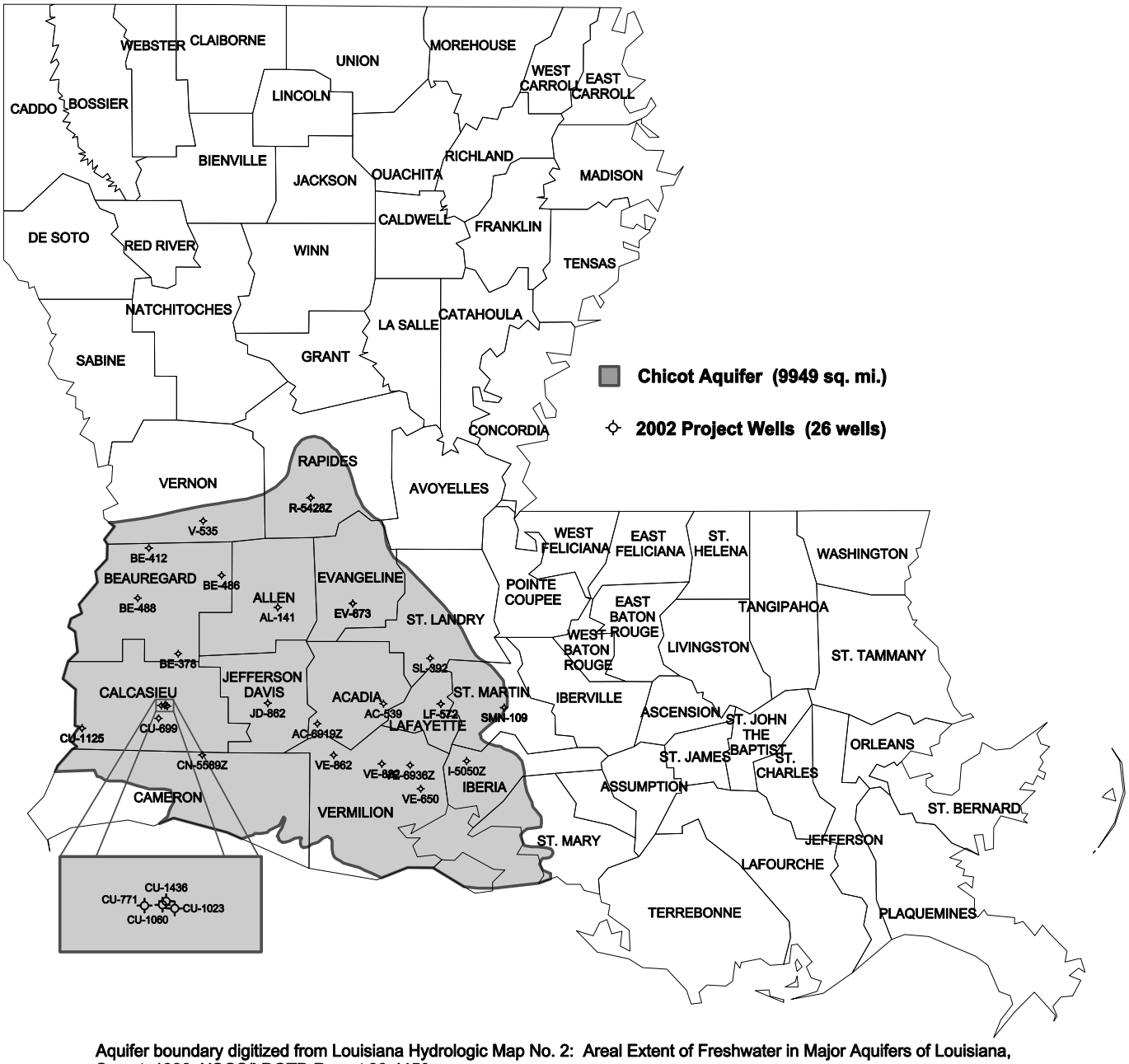
COMPOUND	PQL (ppb)
N-Nitrosodiphenylamine	2
4-Bromophenyl phenyl ether	2
Hexachlorobenzene	2
Pentachlorophenol	10
Phenathrene	2
Anthracene	2
Di-n-butylphthalate	2
Fluoranthene	2
Benzidine	20
Pyrene	2
Butylbenzylphthalate	2
3,3'-Dichlorobenzidine	10
Benzo(a)anthracene	6
Chrysene	4
Bis(2-ethylhexyl)phthalate	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 10-11 List of Pesticide and PCB Analytical Parameters

EPA METHOD 8080

COMPOUND	PQL (ppb)
Aldrin	0.0500
Alpha BHC	0.0500
Beta BHC	0.0500
Delta BHC	0.0500
Gamma BHC	0.0500
Chlordane	0.500
4,4'-DDD	0.100
4,4'-DDE	0.100
4,4'-DDT	0.100
Dieldrin	0.100
Endosulfan I	0.0500
Endosulfan II	0.100
Endosulfan Sulfate	0.100
Endrin	0.100
Endrin Aldehyde	0.100
Heptachlor	0.0500
Heptachlor epoxide	0.0500
Toxaphene	5.00
Aroclor-1016	1.00
Aroclor-1221	1.00
Aroclor-1232	1.00
Aroclor-1242	1.00
Aroclor-1248	1.00
Aroclor-1254	1.00
Aroclor-1260	1.00

BASELINE MONITORING PROJECT WELLS OF THE CHICOT 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 10-1 Location Plat, Chicot Aquifer

CHICOT AQUIFER - pH (SU)

Baseline Monitoring Project, FY 2002

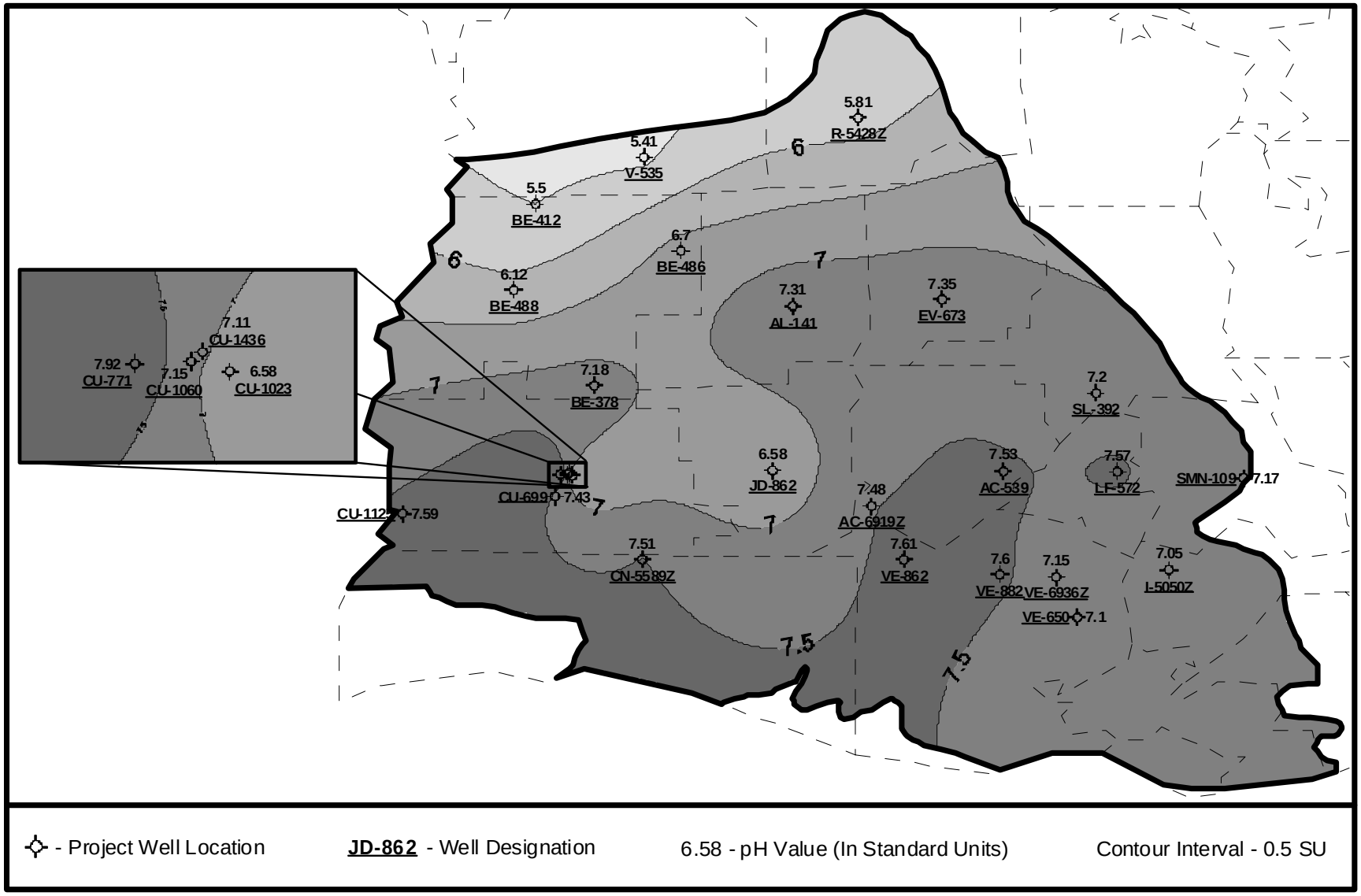


Figure 10-2 Map of pH Data

CHICOT AQUIFER - TDS (PPM)

Baseline Monitoring Project, FY 2002

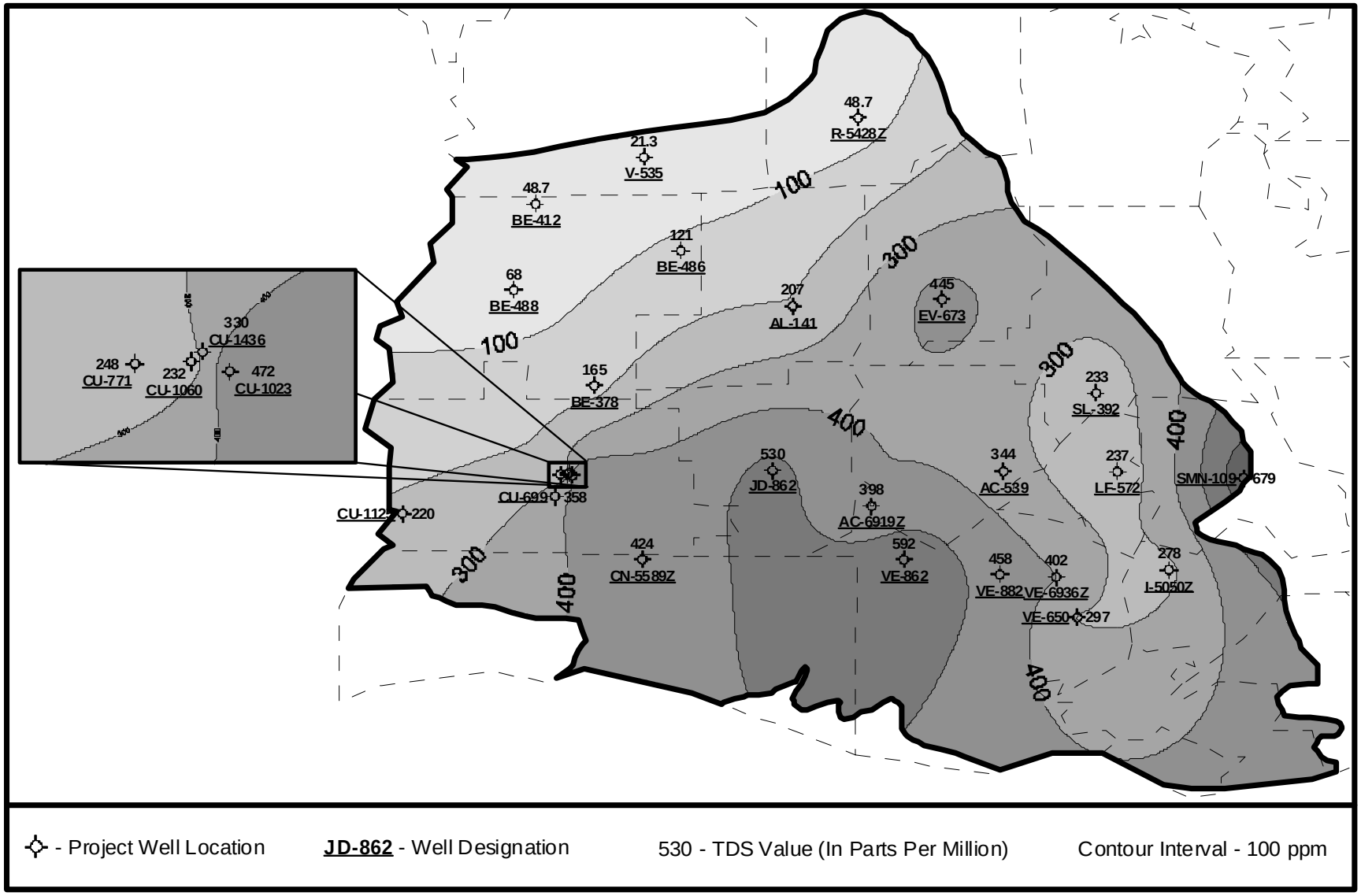


Figure 10-3 Map of TDS Data

CHICOT AQUIFER - Chloride (ppm)

Baseline Monitoring Project, FY 2002

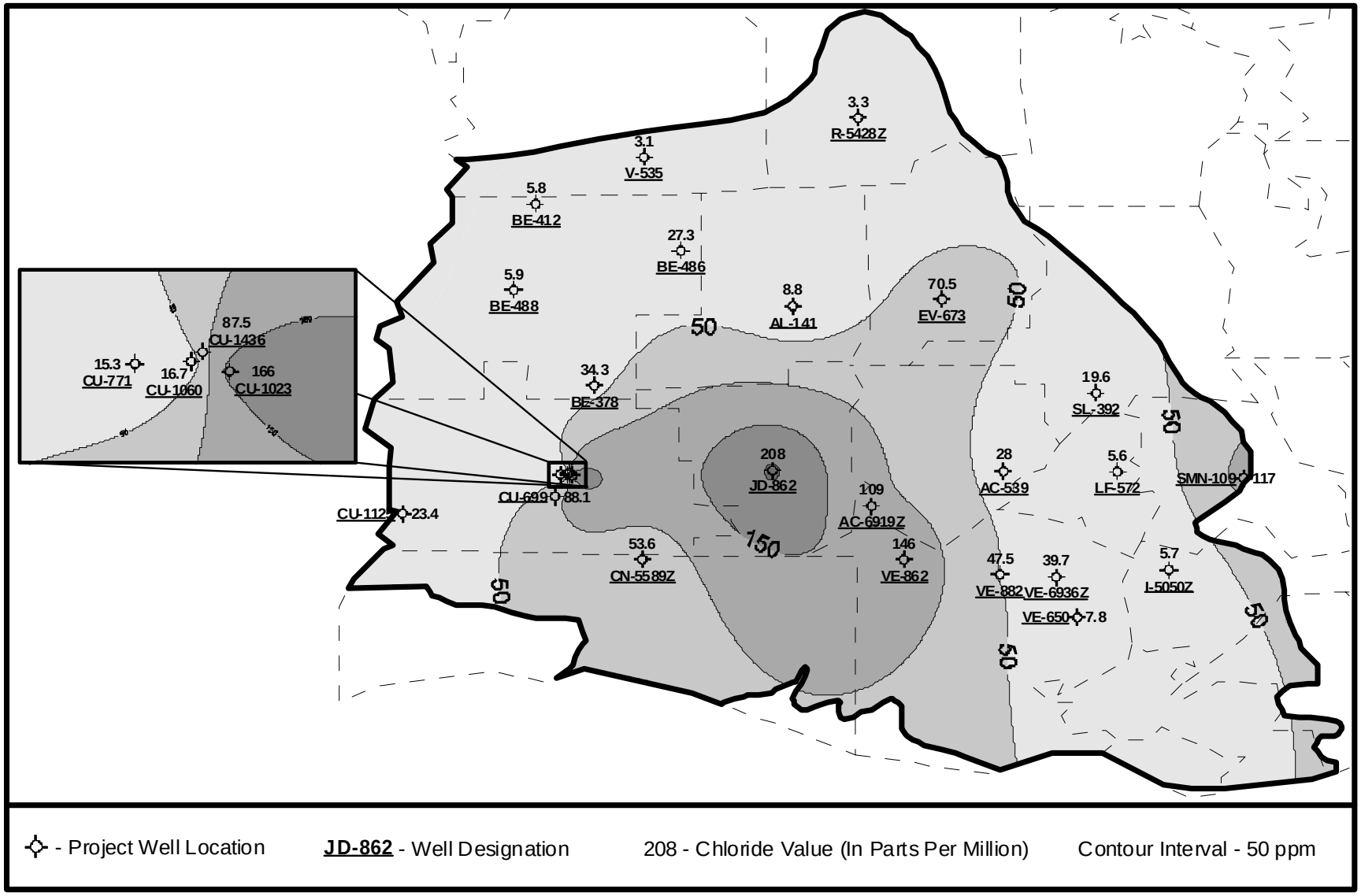


Figure 10-4 Map of Chloride Data

CHICOT AQUIFER - Iron (ppb)

Baseline Monitoring Project, FY 2002

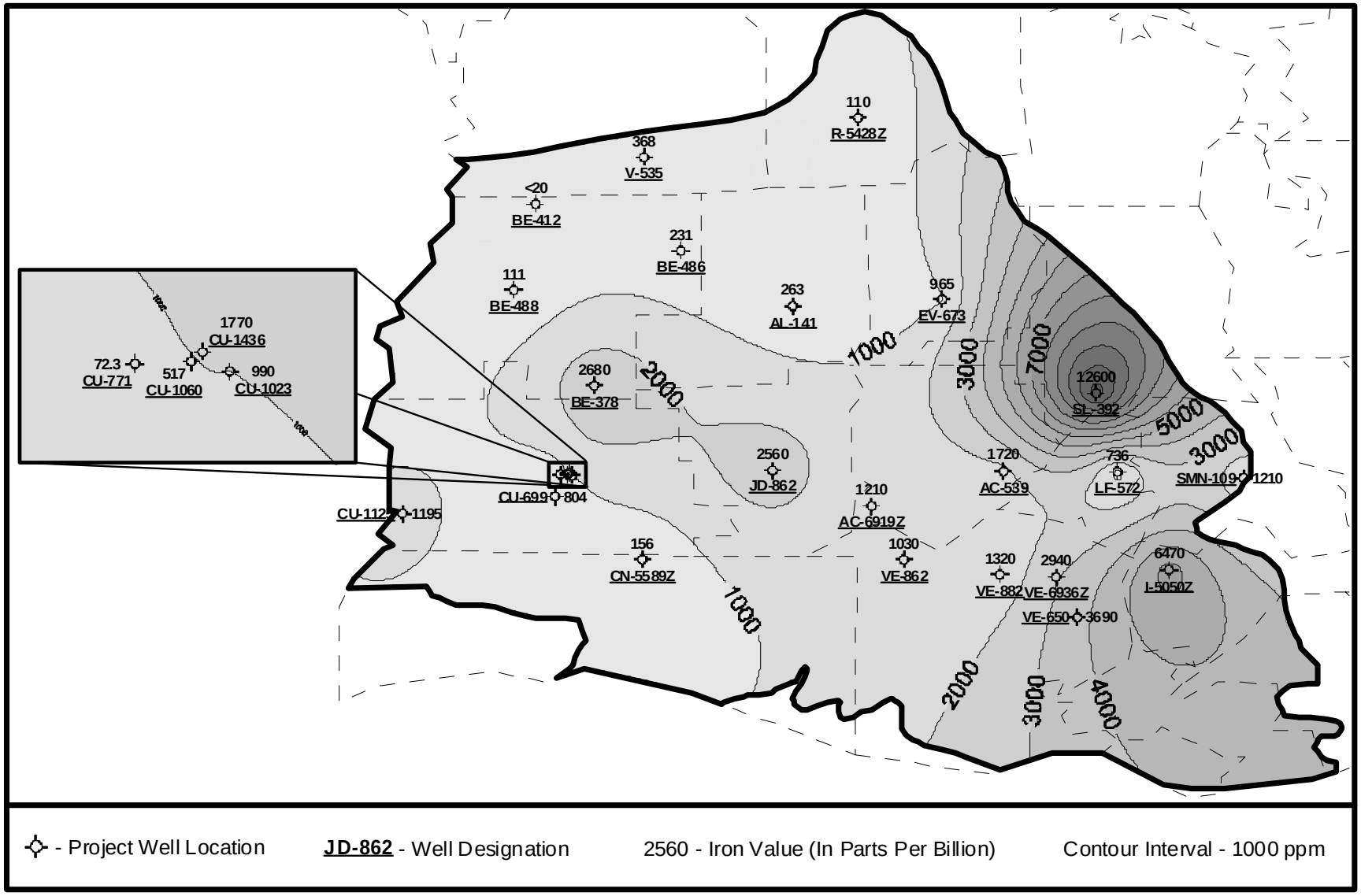


Figure 10-5 Map of Iron Data