COCKFIELD AQUIFER SUMMARY

BASELINE MONITORING PROJECT, FY 2002

APPENDIX 9

OF THE

TRIENNIAL SUMMARY REPORT, 2003

FOR THE

ENVIRONMENTAL EVALUATION DIVISION

OF

LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PARTIAL FUNDING PROVIDED THROUGH 106 CWA

COCKFIELD 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 9-1 shows the geographic locations of the Cockfield aquifer and the associated Project wells, whereas Table 9-2 lists the wells in the aquifer along with their total depths and the use made of produced waters and date sampled.

From October of 2001 through April of 2002, thirteen wells were sampled which produce from the Cockfield aquifer. Eight of the wells are classified as public supply wells, four are classified as domestic wells, and one is classified as an irrigation well. The wells are located in ten parishes located from northeast and north-central to western 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 Cockfield aquifer is within the Eocene Cockfield formation of the Claiborne Group, which consists of sands, silts, clays, and some lignite. The aquifer units consist of fine sand with interbedded silt, clay, and lignite, becoming more massive and containing less silt and clay with depth. Beneath the Ouachita River, the Cockfield aquifer has been eroded by the ancestral Ouachita River and replaced by alluvial sands and gravels. The regional confining clays of the overlying Vicksburg and Jackson Groups confine the Cockfield.

HYDROGEOLOGY

In the Mississippi River valley, the Cockfield is overlain by and hydraulically connected to the alluvial aquifers. Recharge to the Cockfield aquifer occurs primarily by the direct infiltration of rainfall in interstream, upland outcrop-subcrop areas, the movement of water through the alluvial and terrace deposits, and vertical leakage from the underlying Sparta aquifer. The Cockfield contains fresh water in north-central and northeast Louisiana in a narrowing diagonal band extending toward Sabine Parish. Saltwater ridges under the Red River valley and the eastern Ouachita River valley divide areas containing fresh water in the Cockfield aquifer. The hydraulic conductivity varies between 25-100 feet/day.

The maximum depths of occurrence of freshwater in the Cockfield range from 200 feet above sea level, to 2,150 feet below sea level. The range of thickness of the fresh water interval in the Cockfield is 50 to 600 feet. The depths of the Cockfield wells that were monitored in conjunction with the BMP range from 80 to 445 feet.

INTERPRETATION OF DATA

FIELD, WATER QUALITY, AND NUTRIENTS PARAMETERS

Table 9-3 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 9-5 lists the minimum, maximum, and average results for the field data, water quality data, and nutrients data for the Cockfield 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 9-3 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 9-3 show that the following secondary MCLs (SMCL)s were exceeded.

Color – SMCL = 15 PCU

SA-BYRD – 45 PCU, duplicate – 45 PCU
W-192 – 20 PCU
W-198 – 45 PCU

Sulfate – SMCL = 250 ppm

RI-127 – 886 ppm

Total Dissolved Solids (TDS) – SMCL = 500 ppm

NA-5614Z – 582 ppm
SA-BYRD – 754 ppm, duplicate – 736 ppm
W-192 – 529 ppm

Comparison To Historical Data

Table 9-7 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 shows that the sulfate average has increased 63.41 ppm from FY 1999 to FY 2002. The other water quality characteristics of ground water produced from the Cockfield aquifer, while displaying some slight changes, have not changed significantly since the FY 1996 sampling.

INORGANIC PARAMETERS

Table 9-4 shows the inorganic (total metals) parameters that are sampled for and the analytical results for those parameters for each well. Table 9-6 lists the minimum, maximum, and average results for the inorganic data for the Cockfield aquifer.

Federal Primary Drinking Water Standards

A review of the analyses listed on Table 9-4 shows that no primary MCL was exceeded for inorganic parameters.

Federal Secondary Drinking Water Standards

Laboratory data contained in Table 9-4 show that the following secondary SMCL was exceeded.

Iron – SMCL = 300 ppb

CA-35 – 5,460 ppb, duplicate – 5,430 ppb
NA-5614Z – 434 ppb
SA-BYRD – 1,070 ppb, duplicate – 1,060 ppb
W-5099Z – 1,510 ppb
MO-479 – 1,930 ppb
RI-450 – 724 ppb
UN-167 – 4,360 ppb

Also note that a concentration of 5.5 ppb for antimony was exhibited in the sample analyses for Project well WC-487. A resample of the well was not attained, however, antimony will be looked at closely upon the next regularly scheduled sampling of this well.

Comparison To Historical Data

Table 9-8 lists the current inorganic data averages alongside the inorganic data averages for the two previous sampling rotations (three and six years prior). A comparison of these averages shows that the copper average has fluctuated, while the iron average has steadily decreased. Zinc decreased by 83.41 ppb from FY 1996 to FY 1999, but has changed little since then. All other averages were consistent.

VOLATILE ORGANIC COMPOUNDS

Table 9-9 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.

Trichloroethene was detected in SA-BYRD at 3.4 ppb in the initial sample and 3.3 ppb in the duplicate sample. However, trichloroethene was not detected in subsequent resampling, therefore the original concentrations are considered to be due to field or laboratory contamination, not contamination of the aquifer.

Taking into account the invalid trichloroethene results, no VOC was detected during the FY 2002 sampling of the Cockfield Aquifer.

SEMIVOLATILE ORGANIC COMPOUNDS

Table 9-10 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 Cockfield aquifer. Table 9-10 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 Cockfield wells that were sampled during FY 2002 exhibited values for phthalates, specifically di-n-butylphthalate and 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 phthalate concentrations exhibited in the FY 2002 Cockfield sample analyses are due to laboratory contamination, not contamination of the aquifer.

In the semivolatile laboratory analyses for Project wells EC-233 and RI-127 phenol was assigned values of 2 ppb and 1 ppb respectively. However, both of these values were below the detection limit of 10 ppb under which phenol analyzed for these two samples. Also, subsequent resampling did not yield any phenol results, therefore the original results are considered to be due to field or laboratory contamination, not contamination of the aquifer.

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

PESTICIDES AND PCBS

Table 9-11 shows the pesticide and PCB parameters that are sampled for. Due to the large number of analytes in this category, a total list of the analytical results for each analyte is not provided, however any detection of a pesticide or PCB would be discussed in this section. Please note that different laboratories were used to analyze the pesticides and PCBs during the current sampling of the Cockfield aquifer. Table 9-11 shows the analytes, along with their PQLs, that were analyzed by LDEQ's Laboratory Services Division. There are some slight differences between this list and the list of analytes and PQLs from the other laboratories that were used. Any further information on this can obtained directly from the BMP staff.

Endrine aldehyde was detected in CA-35 at 0.130 ppb in the duplicate sample that was taken from that well. However, endrine aldehyde was not detected in subsequent resampling, therefore the 0.130 ppb concentration is considered to be due to field or laboratory contamination, not contamination of the aquifer.

Taking in account the invalid endrine aldehyde result, no pesticide or PCB was detected during the 2002 sampling of the Cockfield aquifer.

COMMON WATER CHARACTERISTICS

Table 9-1 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 Cockfield aquifer for pH, TDS, hardness, chloride, iron, and nitrite-nitrate are listed in the table. Figures 9-2, 9-3, 9-4, and 9-5 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 moderately hard[1].

Table 9-1 Common Water Characteristics
Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	5.81	8.73	7.39
TDS (ppm)	90.0	754.0	396.0
Hardness (ppm)	<5	306.0	89.9
Chloride (ppm)	3.2	90.9	42.2
Iron (ppb)	<20	5,460.00	1,319.52
Nitrite-Nitrate (ppm)	<0.05	3.51	0.30

[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 Cockfield aquifer is moderately hard, that no Primary MCL was exceeded, and that this aquifer is of fair quality when considering taste, odor, or appearance guidelines. A comparison of present and historical BMP data averages shows that the sulfate average has increased 63.41 ppm from FY 1999 to FY 2002. It also shows that the copper average has fluctuated, while the iron average has steadily decreased, and that the zinc average decreased by 83.41 ppb from FY 1996 to FY 1999, but has changed little since then. The other data averages, while displaying some slight changes, have not changed significantly since the FY 1996 sampling.

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

Table 9-2 List of Project Wells Sampled

PROJECT NUMBER	PARISH	WELL NUMBER	DATE SAMPLED	OWNER	DEPTH (FEET)	WELL USE
200112	CALDWELL	CA-35	12/05/2001	CITY OF COLUMBIA	298	PUBLIC SUPPLY
198610	EAST CARROLL	EC-233	10/30/2001	TOWN OF LAKE PROVIDENCE	371	PUBLIC SUPPLY
199608	MOREHOUSE	MO-479	10/30/2001	BAYOU BONNE IDEE WATER SYSTEM	258	PUBLIC SUPPLY
200201	NATCHITOCHES	NA-5614Z	01/14/2002	PRIVATE OWNER	176	DOMESTIC
200203	OUACHITA	OU-FRITH	04/23/2002	PRIVATE OWNER	80	DOMESTIC
199309	RICHLAND	RI-127	10/30/2001	DELHI WATER WORKS	416	PUBLIC SUPPLY
200111	RICHLAND	RI-450	12/05/2001	RIVER ROAD WATERWORKS	283	PUBLIC SUPPLY
200202	SABINE	SA-BYRD	02/19/2002	PRIVATE OWNER	150	DOMESTIC
199307	UNION	UN-167	01/15/2002	PRIVATE OWNER	110	IRRIGATION
199215	WINN	W-192	01/14/2002	RED HILL WATER SYSTEM	210	PUBLIC SUPPLY
199612	WINN	W-198	01/14/2002	ATLANTA WATER SYSTEM	445	PUBLIC SUPPLY
199611	WINN	W-5099Z	01/14/2002	PRIVATE OWNER	138	DOMESTIC
199805	WEST CARROLL	WC-487	10/30/2001	TOWN OF OAK GROVE	396	PUBLIC SUPPLY

Table 9-3 Summary of Water Quality Data

WELL NUMBER	COND. mmhos/cm	pH SU	SAL. ppt	TEMP. °C	ALK. ppm	Cl ppm	COLOR PCU	COND. umhos/cm	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***				
CA-35	0.309	6.32	0.15	19.78	75.6	18.40	<5.0	283.0	40.20	223.0	<4.0	1.2	0.20	66.4	<0.05	1.04	0.37
CA-35*	0.309	6.32	0.15	19.78	74.0	18.60	<5.0	278.0	40.00	216.0	<4.0	1.2	0.19	71.3	<0.05	0.79	0.34
EC-233	0.784	7.69	0.38	19.90	387.0	73.20	<5.0	792.0	<1.25	480.0	<4.0	<1.0	1.33	124.0	<0.05	<0.10	0.19
MO-479	0.643	7.28	0.31	19.31	318.0	31.10	6.0	654.0	9.10	390.0	<4.0	20.0	0.36	306.0	<0.05	0.36	0.16
NA-5614Z	0.957	7.27	0.47	19.86	181.0	79.20	<5.0	957.0	150.00	582.0	9.0	3.6	0.95	<10.0	<0.05	2.19	0.34
OU-FRITH	No Data				364.0	3.20	10.0	634.0	<1.25	388.0	10.0	6.6	0.60	35.4	<0.05	0.69	0.10
OU-FRITH*					363.0	3.20	10.0	643.0	<1.25	384.0	12.5	6.7	0.60	36.1	<0.05	0.80	0.12
RI-127	0.842	7.94	0.41	21.71	367.0	84.50	11.0	828.0	886.00	496.0	<4.0	2.4	1.08	<5.0	<0.05	1.03	0.33
RI-450	0.47	6.97	0.23	20.27	245.0	5.90	<5.0	449.0	<1.25	266.0	<4.0	5.1	0.22	210.0	<0.05	0.79	0.11
SA-BYRD	1.211	8.11	0.60	21.58	503.0	40.80	45.0	1191.0	90.90	754.0	<4.0	7.3	0.91	43.8	0.10	1.22	0.15
SA-BYRD*	1.211	8.11	0.60	21.58	504.0	41.00	45.0	1209.0	93.30	736.0	<4.0	6.6	0.94	43.3	0.10	1.13	0.18
UN-167	0.11	5.81	0.05	18.73	8.2	9.30	<5.0	109.0	10.70	90.0	<4.0	11.0	<0.10	23.3	3.51	0.23	<0.05
W-192	0.902	8.73	0.45	20.01	334.0	69.50	20.0	912.0	39.50	529.0	<4.0	<1.0	0.84	<10.0	<0.05	1.17	0.27
W-198	0.398	8.4	0.19	22.13	200.0	11.00	45.0	398.0	1.30	254.0	<4.0	<1.0	0.40	<10.0	<0.05	1.91	1.53
W-5099Z	0.37	6.76	0.18	19.80	74.9	31.00	<5.0	369.0	55.80	254.0	<4.0	2.0	0.48	99.5	<0.05	0.75	0.23
WC-487	0.772	7.43	0.38	20.52	353.0	90.90	<5.0	780.0	<1.25	442.0	<4.0	<1.0	0.60	243.0	<0.05	0.81	0.12

* Denotes duplicate sample.

Table 9-4 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
CA-35	<5.0	<5.0	121.0	<1.0	<1.0	<5.0	<5.0	5,460.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
CA-35*	<5.0	<5.0	121.0	<1.0	<1.0	<5.0	<5.0	5,430.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
EC-233	<5.0	<5.0	264.0	<1.0	<1.0	<5.0	<5.0	170.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
MO-479	<5.0	<5.0	302.0	<1.0	<1.0	<5.0	<5.0	1,930.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
NA-5614Z	<5.0	<5.0	31.2	<1.0	<1.0	<5.0	14.9	434.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	24.8
OU-FRITH	<5.0	<5.0	109.0	<1.0	<1.0	<5.0	Data Unusable		<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	<10.0
OU-FRITH*	<5.0	<5.0	115.0	<1.0	<1.0	<5.0			<10.0	<0.05	<5.0	<5.0	<1.0	<2.0	28.9
RI-127	<5.0	<5.0	26.8	<1.0	<1.0	<5.0	<5.0	71.4	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
RI-450	<5.0	<5.0	147.0	<1.0	<1.0	<5.0	<5.0	724.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	<10.0
SA-BYRD	<5.0	<5.0	56.1	<1.0	<1.0	<5.0	52.9	1,070.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	235.0
SA-BYRD*	<5.0	<5.0	56.0	<1.0	<1.0	<5.0	50.5	1,060.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	220.0
UN-167	<5.0	<5.0	192.0	<1.0	<1.0	<5.0	<5.0	4,360.0	<10.0	<0.05	5.0	<5.0	<1.0	<5.0	19.1
W-192	<5.0	<5.0	11.4	<1.0	<1.0	<5.0	40.1	<20.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	36.7
W-198	<5.0	<5.0	5.2	<1.0	<1.0	<5.0	<5.0	46.2	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	14.0
W-5099Z	<5.0	<5.0	282.0	<1.0	<1.0	<5.0	6.1	1,510.0	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	19.0
WC-487	5.5	<5.0	284.0	<1.0	<1.0	<5.0	9.7	48.6	<10.0	<0.05	<5.0	<5.0	<1.0	<5.0	20.1

* Denotes duplicate sample.

Table 9-5 Water Quality Statistics

Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
PH (SU)	5.81	8.73	7.39
Temperature ^{O}C	18.73	22.13	20.30
Sp. Conductivity (mmhos/cm) (Field)	0.110	1.211	0.647
Salinity (ppt)	0.05	0.60	0.32
TSS (ppm)	<4	10.0	<4
TDS (ppm)	90.0	754.0	396.0
Alkalinity (ppm)	8.2	503.0	262.4
Hardness (ppm)	<5	306.0	89.9
Turbidity (NTU)	<1	20.0	4.71
Sp. Conductivity (umhos/cm) (Lab)	109.0	1,191.0	642.8
Color (PCU)	<5	45.0	11.9
Chloride (ppm)	3.2	90.9	42.2
Sulfate (ppm)	<1.25	886.00	98.92
Nitrite-Nitrate, as N (ppm)	<0.05	3.51	0.30
Phosphorus (ppm)	<0.05	1.53	0.30
TKN (ppm)	<0.1	2.19	0.94
Ammonia (ppm)	<0.1	1.33	0.62

Table 9-6 Inorganic Statistics

Fiscal Year 2002

PARAMETER	MINIMUM	MAXIMUM	AVERAGE
Antimony (ppb)	<5	5.50	<5
Arsenic (ppb)	<5	<5	<5
Barium (ppb)	5.20	302.00	140.90
Beryllium (ppb)	<5	<5	<5
Cadmium (ppb)	<5	<5	<5
Chromium (ppb)	<5	<5	<5
Copper (ppb)	<5	52.90	11.77
Iron (ppb)	<20	5,460.00	1,319.52
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	<5	5.00	<5
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<5	<5	<5
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	<10	235.00	30.67

Table 9-7 Three-year Water Quality Statistics

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE
PH (SU)	6.77	6.99	7.39
Temperature ^{O}C	19.91	19.76	20.30
Sp. Conductivity (mmhos/cm) (Field)	0.564	0.613	0.647
Salinity (ppt)	0.27	0.30	0.32
TSS (ppm)	5.3	<4	<4
TDS (ppm)	320.3	429.7	396.0
Alkalinity (ppm)	219.2	223.9	262.4
Hardness (ppm)	115.3	79.3	89.9
Turbidity (NTU)	7.14	9.74	4.71
Sp. Conductivity (umhos/cm) (Lab)	560.7	618.8	642.8
Color (PCU)	37.5	11.8	11.9
Chloride (ppm)	35.9	52.0	42.2
Sulfate (ppm)	33.36	35.51	98.92
Nitrite-Nitrate, as N (ppm)	0.11	0.08	0.30
Phosphorus (ppm)	0.32	0.59	0.30
TKN (ppm)	0.80	0.71	0.94
Ammonia (ppm)	0.66	0.50	0.62

Table 9-8 Three-year Inorganic Statistics

PARAMETER	FY 1996 AVERAGE	FY 1999 AVERAGE	FY 2002 AVERAGE
Antimony (ppb)	<5	<5	<5
Arsenic (ppb)	5.43	<5	<5
Barium (ppb)	121.30	124.47	140.90
Beryllium (ppb)	<5	<5	<5
Cadmium (ppb)	<5	<5	<5
Chromium (ppb)	<5	<5	<5
Copper (ppb)	39.62	5.86	11.77
Iron (ppb)	1,835.77	1,623.16	1,319.52
Lead (ppb)	<10	<10	<10
Mercury (ppb)	<0.05	<0.05	<0.05
Nickel (ppb)	<5	<5	<5
Selenium (ppb)	<5	<5	<5
Silver (ppb)	<5	<5	<5
Thallium (ppb)	<5	<5	<5
Zinc (ppb)	117.49	34.08	30.67

Table 9-9 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 9-10 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

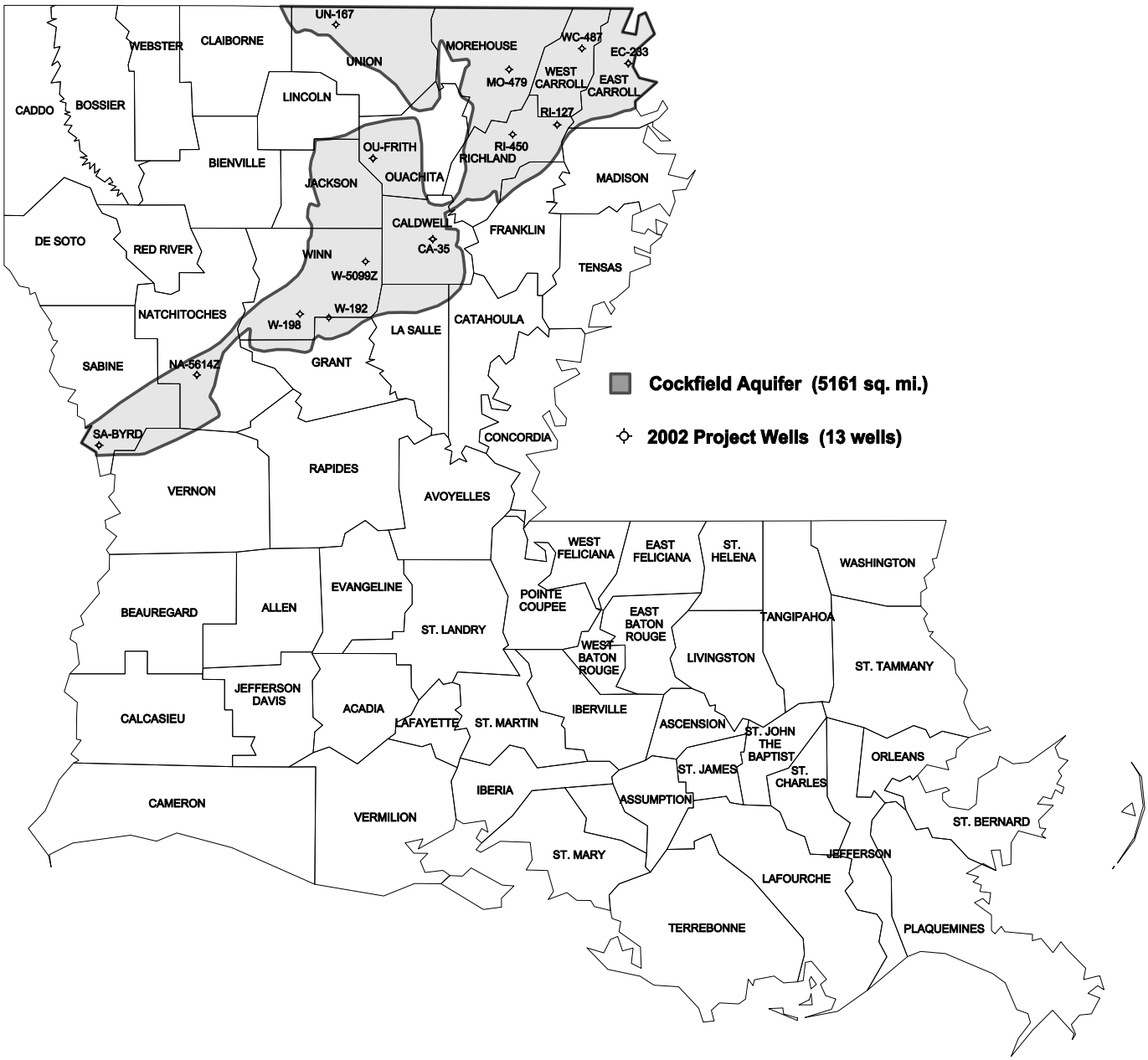
Table 9-10 (Cont'd)
Semivolatile Parameters

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 9-11 List of Pesticide and PCB Analytical Parameters
BASELINE MONITORING PROJECT
SEMIVOLATILE ORGANICS BY EPA METHOD 625

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

BASELINE MONITORING PROJECT WELLS OF THE COCKFIELD 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 9-1 Location Plat, Cockfield Aquifer

COCKFIELD AQUIFER - pH (SU)

Baseline Monitoring Project, FY 2002

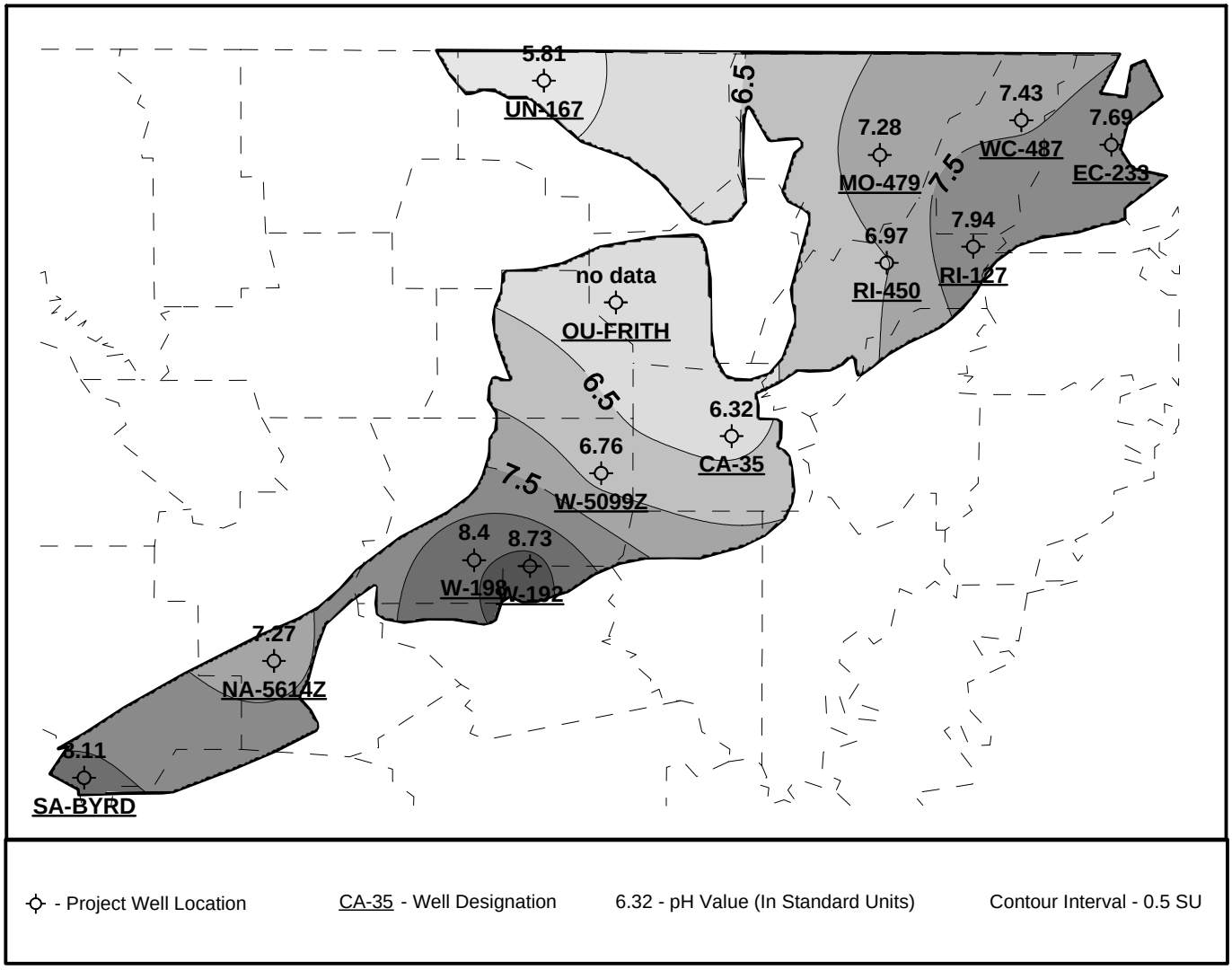


Figure 9-2 Map of pH Data

COCKFIELD AQUIFER - TDS (ppm)

Baseline Monitoring Project, FY 2002

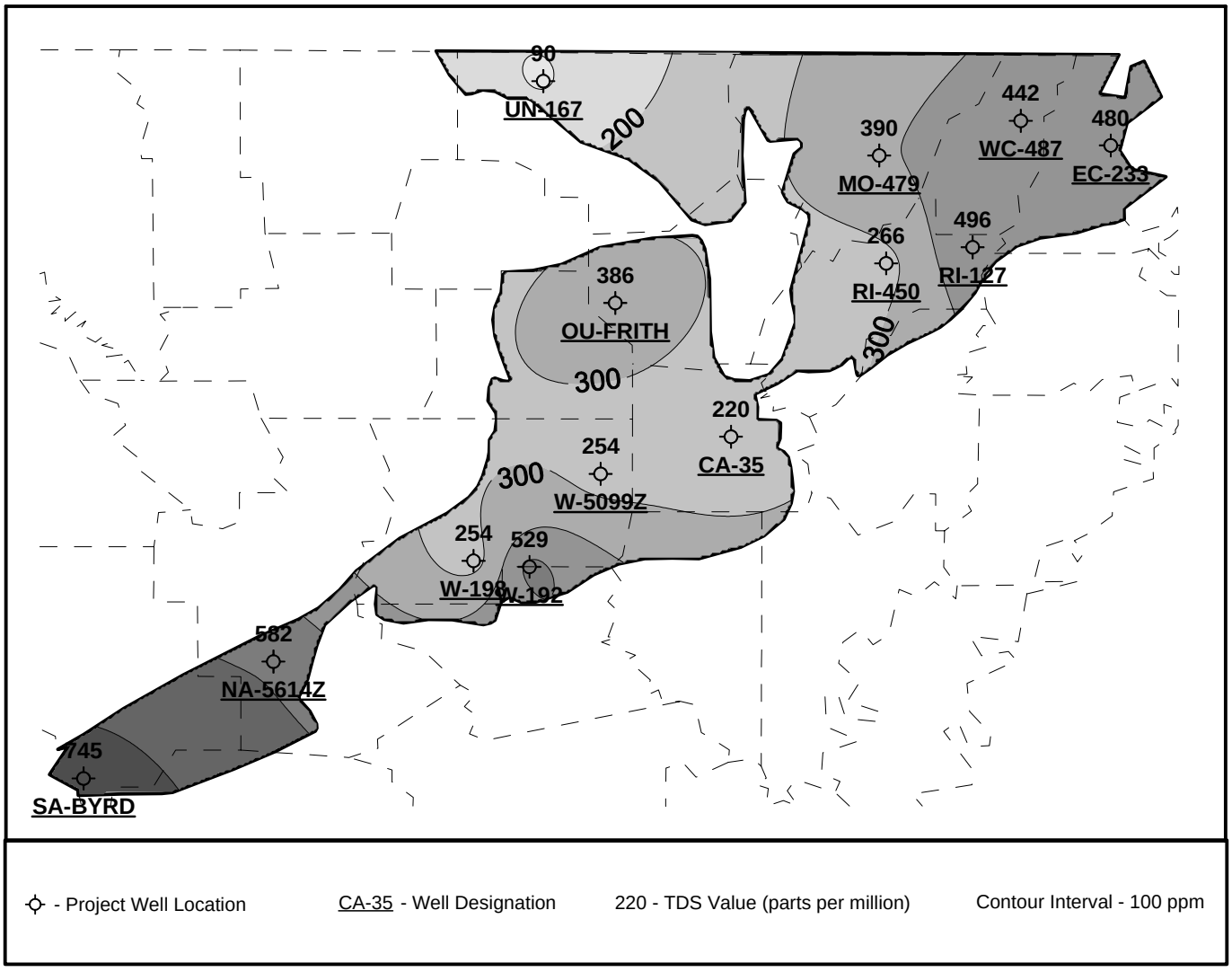


Figure 9-3 Map of TDS Data

COCKFIELD AQUIFER - Chloride (ppm)

Baseline Monitoring Project, FY 2002

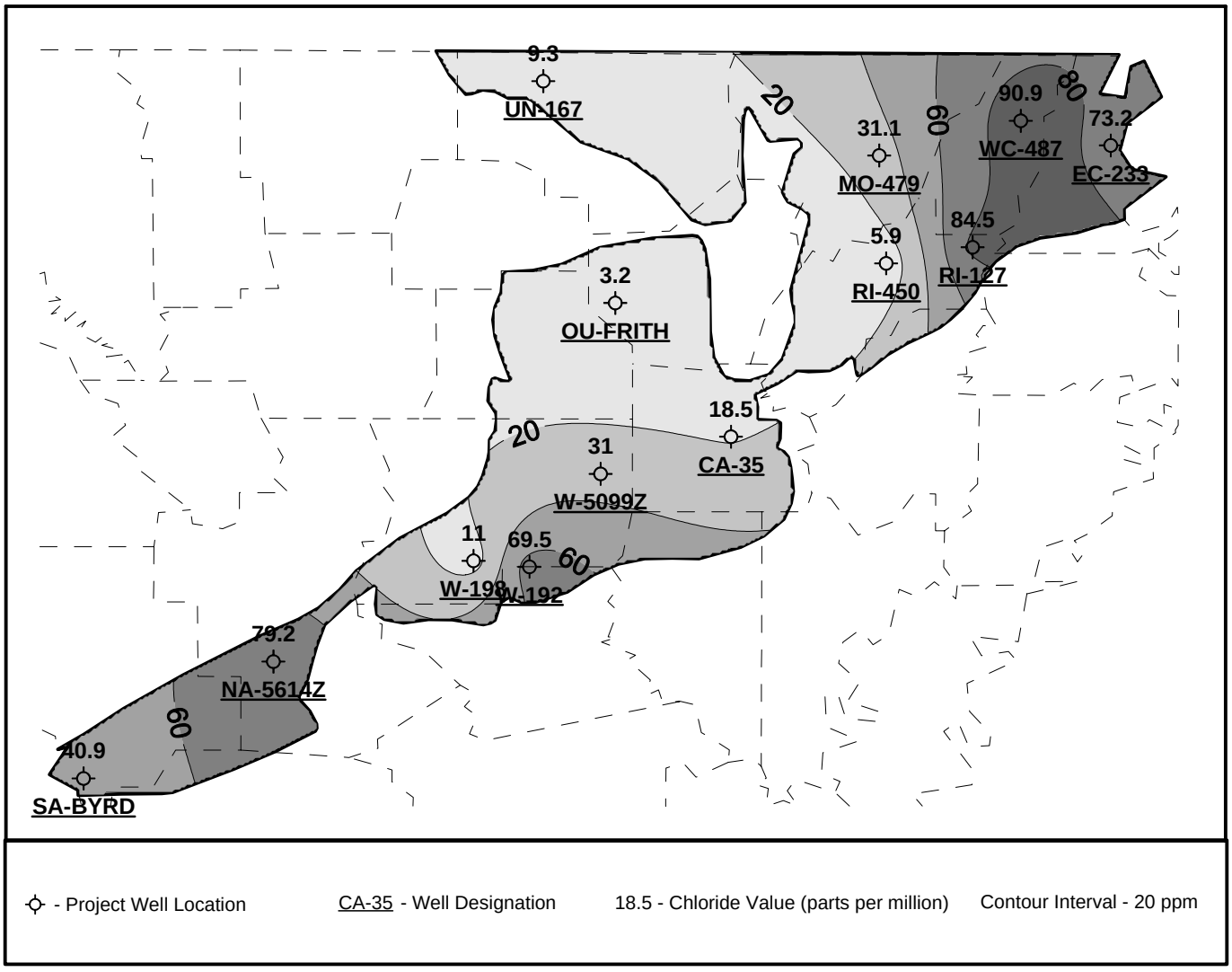


Figure 9-4 Map of Chloride Data

COCKFIELD AQUIFER - Iron (ppb)

Baseline Monitoring Project, FY 2002

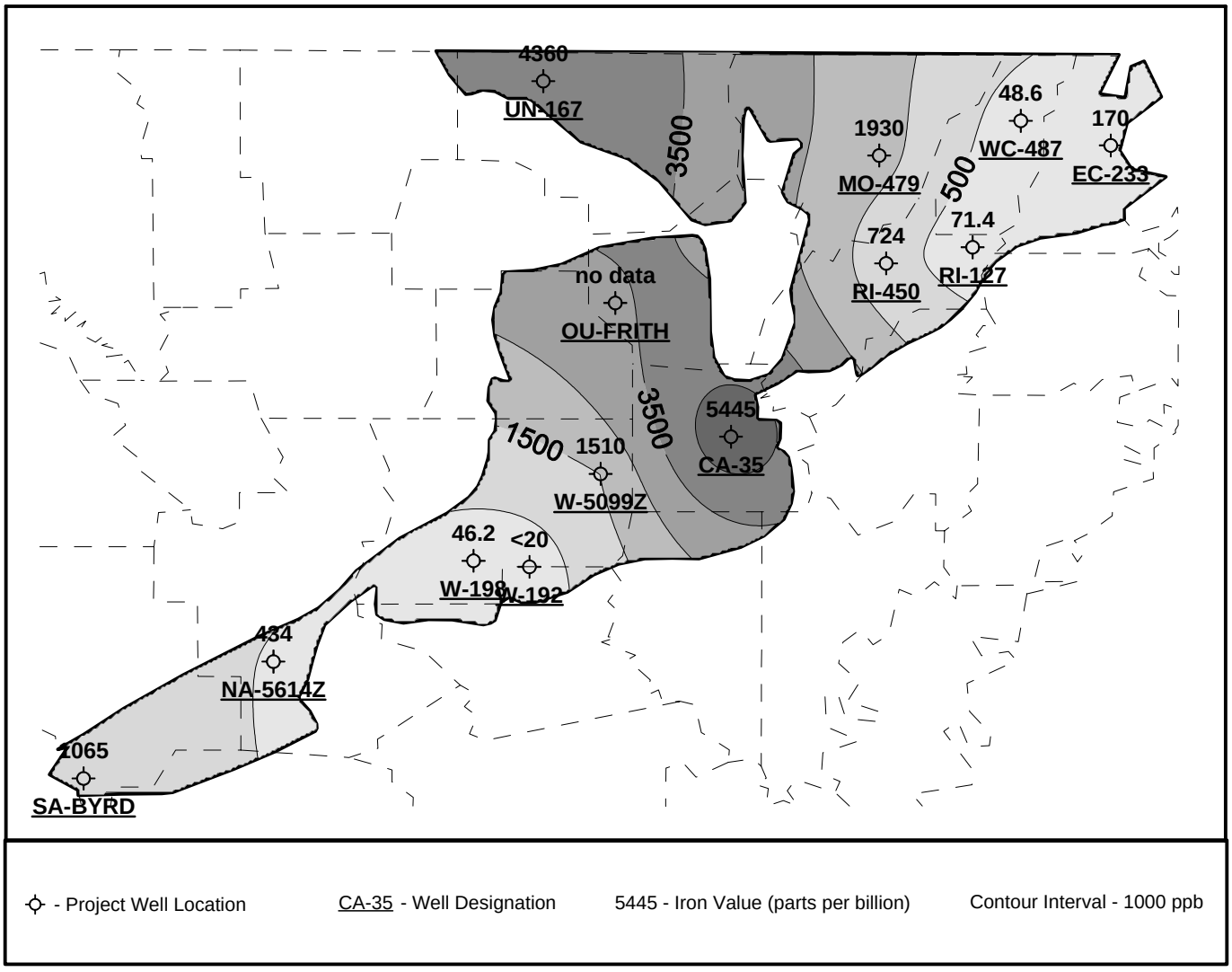


Figure 9-5 Map of Iron Data