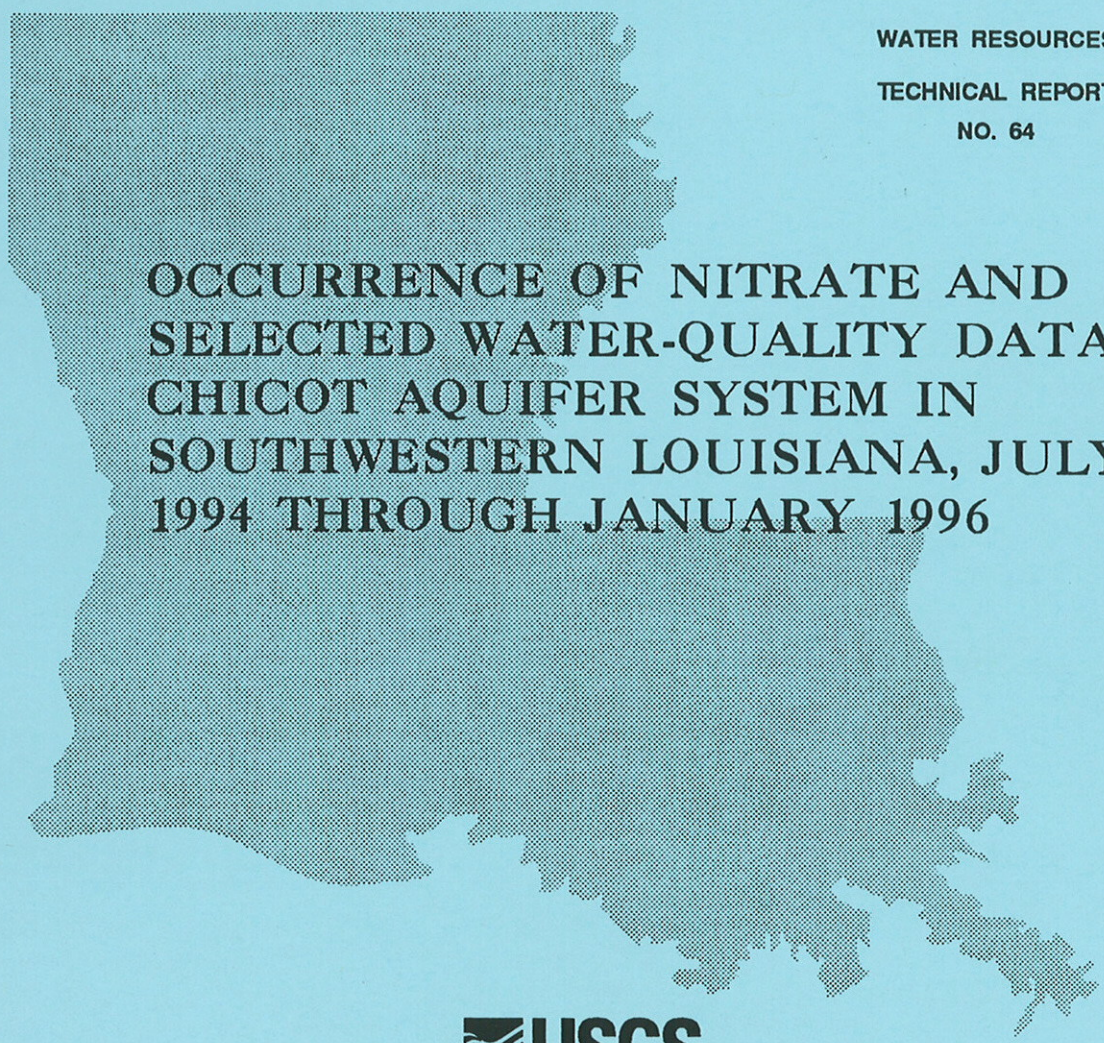
STATE OF LOUISIANA

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

PUBLIC WORKS AND FLOOD CONTROL DIRECTORATE

WATER RESOURCES SECTION



WATER RESOURCES

TECHNICAL REPORT

NO. 64

OCCURRENCE OF NITRATE AND SELECTED WATER-QUALITY DATA, CHICOT AQUIFER SYSTEM IN SOUTHWESTERN LOUISIANA, JULY 1994 THROUGH JANUARY 1996

USGS

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Prepared by
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
In cooperation with
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

1998

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CONVERSION FACTORS, VERTICAL DATUM, AND ABBREVIATED WATER-QUALITY UNITS

Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
foot per mile (ft/mi)	0.3048	meter per mile (m/mi)
gallon per day (gal/d)	0.003785	cubic meters per day
mile (mi)	1.609	kilometer
million gallons per day (Mgal/d)	3,785	cubic meter per day

Temperature in degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) as follows: °F = 1.8 (°C) + 32

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called Sea Level Datum of 1929.

Abbreviated water-quality units:
microsiemens per centimeter at 25 degrees Celsius (µS/cm)
micrograms per liter (µg/L)
milligrams per liter (mg/L)

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By B. Pierre Sargent and Benton D. McGee

ABSTRACT

The Chicot aquifer system, in southwestern Louisiana, contains the most intensely pumped aquifers in the State. Water samples were collected from 160 shallow domestic-supply wells during July 1994 through January 1996 for analysis of nitrates and other selected water-quality properties and constituents. A total of 150 wells were completed in the Chicot aquifer system and the remaining 10 were completed in hydraulically connected adjacent aquifers. These wells are primarily used for drinking water and are located in the rural parts of the study area, not served by a public water-supply system.

Nitrate has been identified as the most common identifiable contaminant in ground water. Nitrate in ground water may originate from septic/sewer systems, livestock activities, crop fertilizers, and from the decay of natural organic material. Shallow wells are more susceptible to nitrate contamination, due in part to the increased probability of dissolved oxygen occurring at shallow depths and a short distance for nitrate to percolate through the subsurface to contaminate a well.

Ground-water samples were analyzed for nitrogen constituents as well as other selected constituents. Concentrations of nitrate as nitrogen greater than 0.02 mg/L (milligrams per liter) were present in 51 (32 percent) of the 160 wells sampled. Eight of the 51 samples had nitrate as nitrogen concentrations greater than 1.0 mg/L and none of the concentrations were above 10 mg/L. The 8 wells sampled with concentrations of nitrate greater than 1.0 mg/L, had well depths ranged from 36 to 120 feet. These wells were shallower than the median well depth of 155 feet for the 160 wells sampled. The results support the concept that shallow wells are more susceptible to nitrate contamination.

The U.S. Environmental Protection Agency has established a maximum contaminant level of 10 mg/L for nitrate in drinking water. None of the water samples collected had a concentration above this level, which indicates no widespread occurrence of high (>10.0 mg/L) nitrate concentrations in the Chicot aquifer system at this time.

Concentrations of other nitrogen species were very low. Dissolved nitrite as nitrogen did not exceed the detection limit of 0.01 mg/L in any sample. Dissolved ammonia concentrations ranged from less than 0.01 to 3.7 mg/L with a median of 0.2 mg/L. Dissolved ammonia plus organic nitrogen concentrations ranged from less than 0.2 to 7.9 mg/L with a median of 0.2 mg/L.

Other selected water-quality properties and constituents included specific conductance, pH, water temperature, hardness, and alkalinity. The specific conductance values ranged from 23 to 3,450 µS/cm (microsiemens per centimeter at 25 degrees Celsius), and the median value was 455 µS/cm. Values for pH ranged from 4.8 to 8.2 with a median of 7.2. The water temperatures ranged from 15.5 to 26.5 degrees Celsius with a median of 21.0 degrees Celsius. Total hardness as calcium carbonate concentrations ranged from 1 to 690 mg/L with a median concentration of 125 mg/L. At least 25 percent of the samples would be classified as soft, another 25 percent classified as very hard, and the remaining 50 percent classified as moderately hard to hard. Total alkalinity as calcium carbonate ranged from 6 to 501 mg/L with a medium of 200 mg/L. Dissolved solids concentrations ranged from 24 to 2,260 mg/L. In 90 percent of the samples the dissolved solids concentration were less than the SMCL of 500 mg/L.

INTRODUCTION

The Atlantic and Gulf Coastal Plain physiographic province is one of the most important regions of this country with regard to well yields and ground-water use (Heath, 1984, p. 52). This province is an area characterized by swamps and marshes in coastal areas and rolling uplands farther inland. It is underlain by unconsolidated sediments that consist principally of sand, silt, and clay, transported by ancient streams from adjoining uplands. The sediments reach a thickness of more than 39,000 ft in southern Louisiana. These sediments were deposited on floodplains and as deltas where streams reached the ocean and were reworked by waves and ocean currents. As a result, sediments are complexly interbedded to the extent that most named geologic and hydrogeologic units, into which they have been divided, contain sublayers of the different sediment types.

The Chicot aquifer system, located within the Atlantic and Gulf Coastal Plain physiographic province in southwestern Louisiana, contains the most intensely pumped aquifers in Louisiana (Stuart and others, 1994, p. 29). The aquifer system extends westward into Texas and no farther eastward than the Atchafalaya River. The aquifers, which are composed of coarse-grained sand and gravel, range in thickness from 50 to 1,050 ft and can yield large quantities of water to wells (Stuart and others, 1994, p. 29). With the assumption that one individual uses 80 gal/d of water, an estimated 145,375 people utilized the Chicot aquifer system for rural domestic water supply in 1994 (Lovelace and Johnson, 1996, p.90). The aquifer system also is used for irrigation purposes and has supplied 74 percent of the ground water used for rice irrigation (Lovelace and Johnson, 1996, p. 15). Total withdrawal from the Chicot aquifer system in 1994 was 554.53 Mgal/d (Lovelace and Johnson, 1996, p. 90). Freshwater, which to be considered suitable for drinking has a chloride concentration[1] of less than 250 mg/L, generally is present throughout the areal extent of the aquifers. However, along the coast there are areas where vertically all of the water in the Chicot aquifer system contains chloride concentrations greater than 250 mg/L (Stuart and others, 1994, p. 10).

The potential contamination of ground water by nitrates is of concern in agricultural areas, especially to users who have shallow wells and use ground water as their drinking water supply. Contamination is possible because of the sandy nature of an aquifer, numerous shallow wells that allow introduction of contaminants, and the readily available sources of contamination, such as septic systems, livestock activities, fertilizers applied to crops, and decaying natural organic material. The ingestion of high concentrations of nitrates, especially by infants, causes a condition known as methemoglobinemia, often called "blue-baby syndrome." In this condition, nitrate depletes oxygen in the blood stream (Stuart and others, 1995, p. 285-286). Because of these health concerns, nitrate concentrations in ground water have been extensively studied and monitored throughout the United States. The U.S. Environmental Protection Agency (1976) has established a maximum contaminant level[2] (MCL) of 10 mg/L. Concentrations of nitrate as nitrogen in water from aquifers in Louisiana (Whitfield, 1980, p. 18) in some places exceed this maximum contaminant level.

In southwestern Louisiana, data are needed to better describe the occurrence of nitrate in ground water. Thus, based on the public health issue and the lack of current information, the U.S. Geological Survey (USGS), in cooperation with the Louisiana Department of Transportation and Development (DOTD), began a study in 1992 to assess the nitrate concentration in shallow water of the Chicot aquifer system.

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[1]Concentrations of chloride greater than 250 mg/L exceed the secondary maximum contaminant level (SMCL) for drinking water (U.S. Environmental Protection Agency, 1977, 1992). SMCL's are established for contaminants that can adversely affect the aesthetic quality of drinking water. At high concentrations or values, health implications as well as aesthetic degradation may also exist. SMCL's are not federally enforceable, but are intended as guidelines for the states.

[2]Primary drinking-water regulations maximum contaminant level (MCL): Enforceable, health-based regulation that is to be set as close to the maximum contaminant level goal as is feasible. The definition of feasible means the use of best technology, treatment techniques, and other means that the Administrator of the U.S. Environmental Protection Agency finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are generally available (taking cost into consideration).

Purpose and Scope

This report documents the occurrence of nitrate as nitrogen and presents data for selected water-quality properties and constituents in water from wells completed in the Chicot aquifer system in southwestern Louisiana. Data were collected from 160 wells during July 1994 through January 1996. A discussion also is included on the nitrogen cycle and sources of nitrate in ground water.

All water samples were collected from shallow domestic-supply wells. These wells are primarily used for drinking water and are located in the rural parts of the study area, not served by a public water-supply system. In the southernmost part of the aquifer system, along the Gulf of Mexico, saltwater intrusion limits the number of domestic-supply wells (Stuart and others, 1994, p. 30). Only two water samples were collected from wells in Cameron Parish, which borders the Gulf of Mexico, because the area is affected by saltwater intrusion and is sparsely populated.

Nine of the wells sampled were completed either in the upland terrace aquifer or the Williamson Creek aquifer (Jasper aquifer system) in areas where these aquifers are stratigraphically adjacent to the recharge area of the Chicot aquifer system. Water from these wells probably is hydraulically connected to the Chicot aquifer system (J.K. Lovelace, U.S. Geological Survey, oral commun., 1997), and as the areal distribution of the wells sampled is improved by adding these nearby wells, the results of analyses from these nine wells are included in this report.

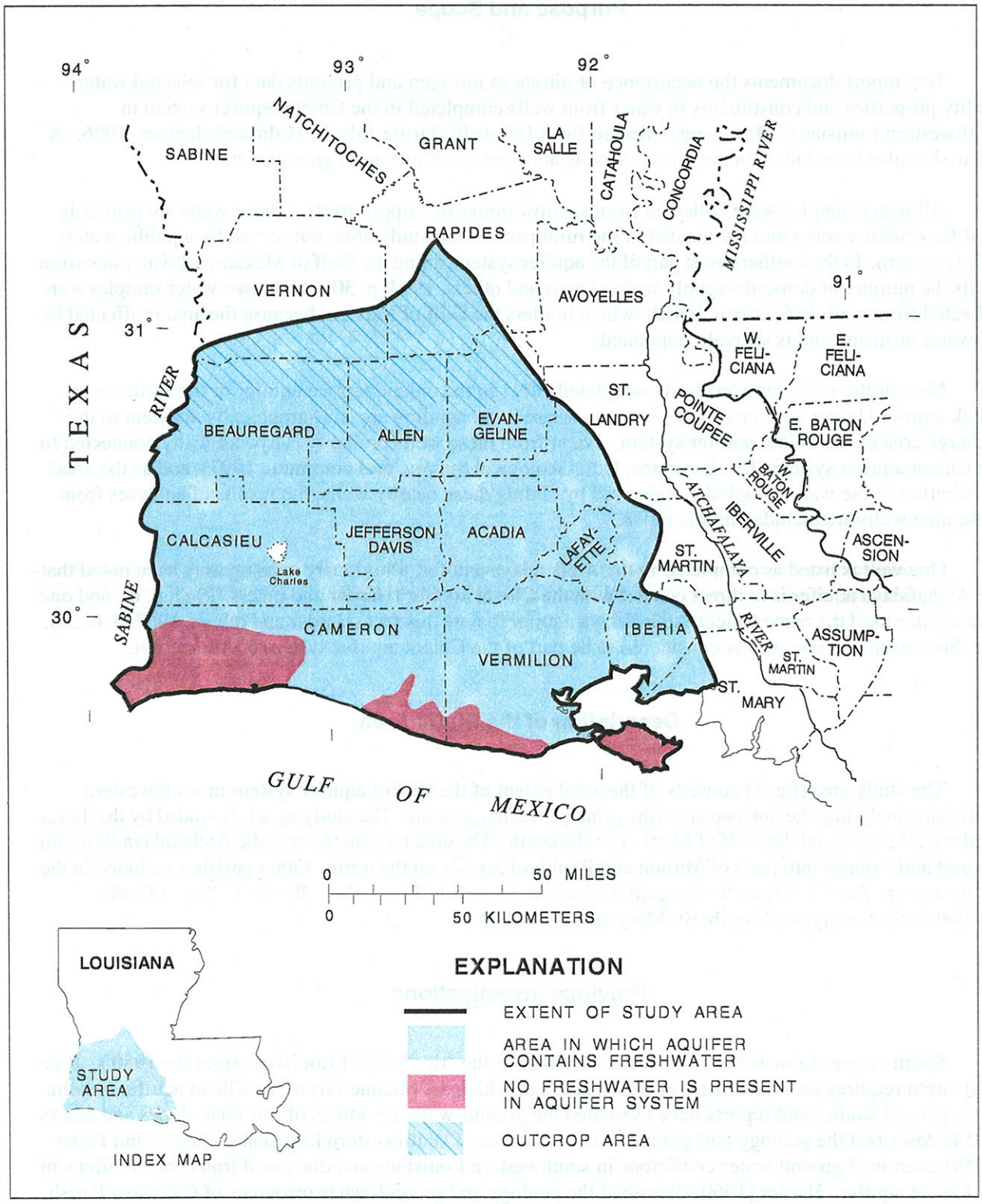
One well is listed as completed in the Atchafalaya aquifer. Previously investigators have noted that the Atchafalaya aquifer is in direct contact with the Chicot aquifer (Harder and others, 1967, p. 6), and one investigator used the name Chicot-Atchafalaya aquifer to note this fact (Harder and others, 1967, p. 6, 28). For this reason, the one well is considered to be part of the Chicot aquifer system for this report.

Description of the Study Area

The study area (fig. 1) consists of the areal extent of the Chicot aquifer system in southwestern Louisiana, including the outcrop area (the principle recharge area). The study area is bounded by the Texas border on the west and the Gulf of Mexico on the south. The area terminates near the Atchafalaya River on the east and extends into parts of Vernon and Rapides Parishes on the north. Other parishes included in the study area are Acadia, Allen, Beauregard, Calcasieu, Cameron, Evangeline, Iberia, Jefferson Davis, Lafayette, St. Landry, St. Martin, St. Mary, and Vermilion.

Previous Investigations

Southwestern Louisiana has been characterized as the "rice belt" of Louisiana since the 1950's. Rice cultivation requires great quantities of water, much of which are obtained from the Chicot aquifer system. Thus, several studies and reports have evaluated the ground-water resources of this area. Jones and others (1954) described the geology and ground-water resources of southwestern Louisiana. Turcan and Fader (1959) examined ground-water conditions in southwestern Louisiana and discussed iron concentrations in the Chicot aquifer. Harder (1960) described the geology and ground-water resources of Calcasieu Parish, Louisiana. Harder (1961) provided water-level data and contour maps for southwestern Louisiana and discussed ground-water withdrawals. Whitman and Kilburn (1963) reviewed the ground-water conditions for the years 1961 and 1962. Fendick and Nyman (1987) and Walters (1996) mapped the potentiometric surface and documented water-level changes. Nyman and others (1990) simulated ground-water flow in the Chicot aquifer system using a digital ground-water flow model.



Louisiana Department of Transportation and Development-U.S. Geological Survey Water Resources Cooperative Program

Figure 1. Study area in southwestern Louisiana (Modified from Smoot, 1988; Stuart and others, 1994, p. 29).

In addition to water-level changes, saltwater encroachment and water quality also are concerns to water users of the Chicot aquifer system. Harder and others (1967) reviewed water levels and saltwater encroachment in southwestern Louisiana. Nyman (1984) reported on the occurrence of high concentrations of chloride in the Chicot aquifer system in the southwestern part of the State. Nyman (1984, 1989) delineated and mapped the chemical characteristics of ground water in southwestern Louisiana. Dial and Huff (1989) investigated the occurrence of minor elements in ground water throughout the State of Louisiana, including the Chicot aquifer system. Tomaszewski (1992) summarized water-quality data for aquifers throughout the State.

Acknowledgments

The authors gratefully acknowledge the assistance of the city and parish officials who granted access to water wells and allowed their wells to be sampled for this study. The authors also thank the private well owners who provided access to their wells for sampling and water-level measurement. Special appreciation is given to Zahir "Bo" Bolourchi, Chief of the Water Resources Section, Louisiana Department of Transportation and Development, for assistance provided during the study and during preparation of the report. In addition, DOTD provided well-location and well-construction information.

HYDROGEOLOGY

The Chicot aquifer system, located within the Atlantic and Gulf Coastal Plain physiographic province, is a Quaternary-age deltaic sequence consisting mostly of thick sand and gravel deposits that dip and thicken southward from southern Vernon and Rapides Parishes. The aquifer system is underlain by the Evangeline aquifer of Pliocene and Miocene age (fig. 2). It thins slightly to the west and continues into Texas. In the east, the aquifer system thickens in an eastwardly direction where it is cut by or overlain by alluvium of the Atchafalaya River, referred to in this report as the Atchafalaya aquifer (Nyman, 1984, p. 4). The Chicot aquifer system thickens gulfward but becomes increasingly subdivided by clays and individual sand beds that thin and become finer textured. Throughout most of southwestern Louisiana, the uppermost layer of the Chicot aquifer system is a thick clay layer that acts as a surficial confining unit (Walters, 1996). This surficial confining unit contains sand and silt as well as clay.

In the outcrop area of the study area, Pleistocene terrace deposits form the upland terrace aquifer. The upland terrace aquifer ranges from 0 to 150 ft in thickness and averages about 45 ft (Snider and Sanford, 1981, p. 7). Also, in the northern part of the study area, the Tertiary-age, Evangeline aquifer and Jasper aquifer system are near the surface. The Jasper aquifer system has two aquifer units, the Carnahan Bayou aquifer and the Williamson Creek aquifer (Stuart and others, 1994, p. 33).

In the northern half of the study area, which includes the outcrop area, the Chicot aquifer system is comprised of a single undifferentiated sand referred to in this report as the massive sand; downdip, the sand unit divides into two or more sand layers separated by clay beds. Separation of these units is based on differences in permeability, water levels, and stratigraphic position. East of Calcasieu Parish the massive sand of the Chicot aquifer system has been divided into two units called the upper sand and lower sand; in Calcasieu and Cameron Parishes, the massive sand has been divided into three units called the "200-foot" sand, "500-foot" sand, and "700-foot" sand (fig. 2). In the study area the upper sand is connected to the "200-foot" sand and Atchafalaya aquifer; together these units constitute essentially one hydrogeologic unit (Nyman, 1984, p. 4). In some areas, the upper sand is connected to shallow sands that occur within the surficial confining unit. The "200-foot" sand is present at depths between 140 and 270 ft below land surface, is generally 100-ft thick, and dips southward at a rate of a few feet per mile (Jones, 1950, p. 2). The "500-foot" sand is largely isolated except where it merges with the "700-foot" sand toward the outcrop area (Nyman, 1984, p. 4).

<table>
<tr><td rowspan="3">SYSTEM</td><td rowspan="3">SERIES</td><td colspan="4">HYDROGEOLOGIC UNIT</td></tr>
<tr><td colspan="4">Central and southwestern Louisiana</td></tr>
<tr><td rowspan="2">Aquifer system or confining unit</td><td colspan="3">Aquifer or confining unit</td></tr>
<tr><td>Lake Charles area</td><td>East of Lake Charles</td><td>Outcrop area</td></tr>
<tr><td rowspan="5">Quaternary</td><td>Holocene</td><td rowspan="5">Chicot aquifer system</td><td>Shallow sand or surficial confining unit</td><td>Atchafalaya aquifer, shallow sand, or surficial confining unit</td><td rowspan="4">Massive sand, upland terrace aquifer, or surficial confining unit</td></tr>
<tr><td rowspan="4">Pleistocene</td><td>"200-foot" sand</td><td>Upper sand</td></tr>
<tr><td>"500-foot" sand</td><td rowspan="2">Lower sand</td></tr>
<tr><td>"700-foot" sand</td></tr>
<tr><td rowspan="3">Tertiary</td><td>Pliocene
? </td><td colspan="4">Evangeline aquifer</td></tr>
<tr><td rowspan="2">Miocene</td><td colspan="4">Castor Creek confining unit</td></tr>
<tr><td>Jasper aquifer system</td><td colspan="3">Williamson Creek aquifer
Dough Hills confining unit
Carnahan Bayou aquifer</td></tr>
</table>

Louisiana Department of Transportation and Development-U.S. Geological Survey Water Resources Cooperative Program

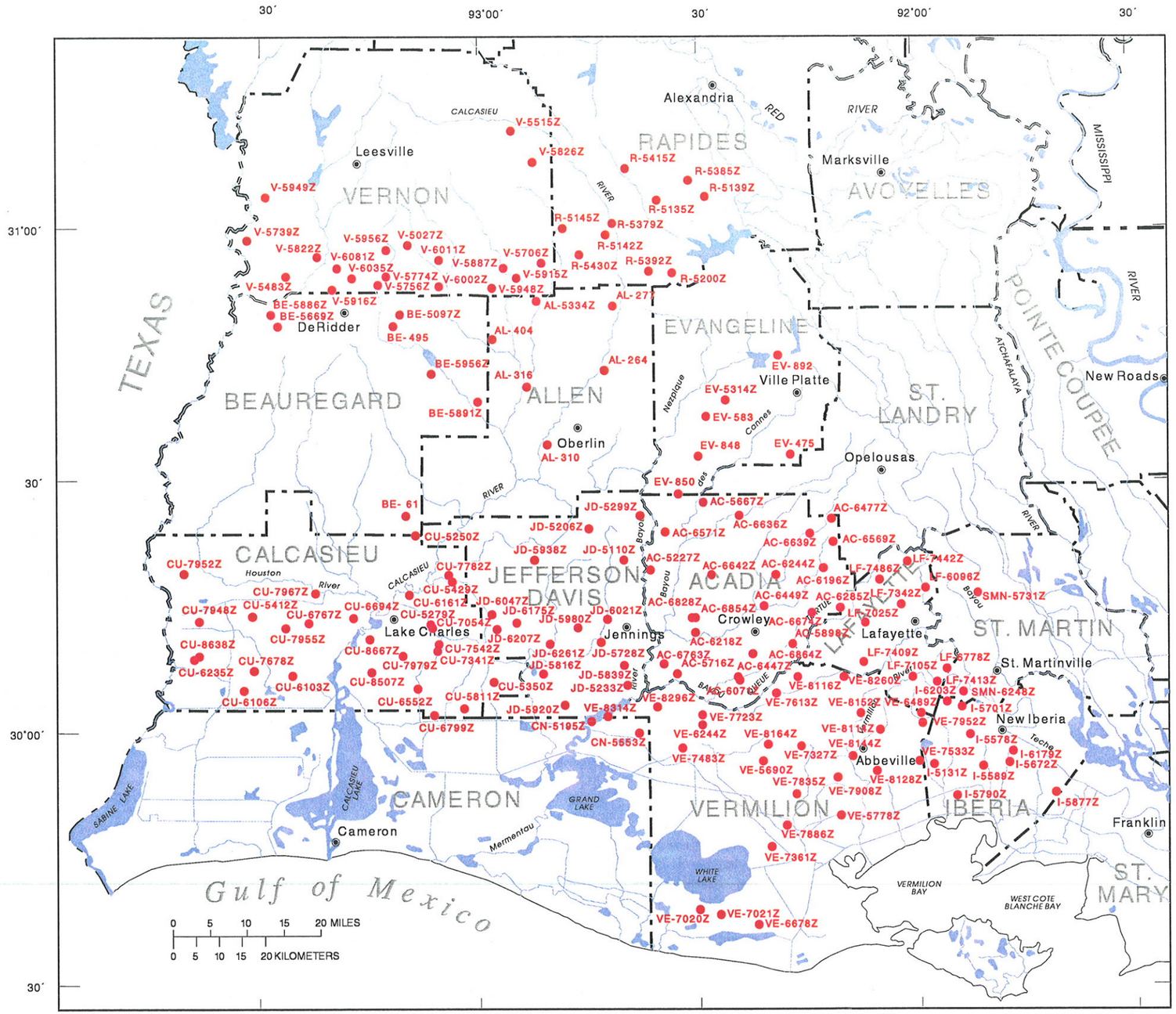
Modified from Lovelace and Lovelace, 1995

Figure 2. Partial column of hydrogeologic units in central and southwestern Louisiana.

Typically, coastal aquifers contain saltwater in coastal areas, but saltwater may also be present inland (Stuart and others, 1994, p. 10). The aquifers of the Chicot aquifer system contain saltwater or are vulnerable to saltwater intrusion in the vicinity of the coast. Saltwater occurs in the basal part of the upper sand along the coast and extends inland at distances that range from a few miles to more than 20 mi (Whitman and Kilburn, 1963, p. 11).

DATA COLLECTION

Well selection emphasis was on sampling shallow domestic-supply wells completed in the Chicot aquifer system and located in rural areas in southwestern Louisiana. These wells have a higher potential for contamination by nitrates than public-supply wells because typically they are situated near septic systems, farming operations and other potential nitrate sources. An effort was made to select a well for sampling in each township-range in the study area. When multiple wells were available, the most accessible shallow well was selected for sampling. Well depths ranged from 36 to 540 ft below land surface, with a median depth of 155 ft. Construction information on the wells from which water samples were collected is listed in appendix 1, and the location of the wells sampled is shown in figure 3.



Louisiana Department of Transportation and Development-U.S. Geological Survey Water Resources Cooperative program.

Figure 3. Wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana.

One hundred and fifty-one wells selected for sampling were completed in five aquifers within the Chicot aquifer system. The breakdown for these wells with regard to aquifer designation is as follows: 68 wells were completed in the upper sand; 51 wells were completed in the massive sand; 25 wells were completed in the "200-foot" sand; 6 wells were completed in the shallow sand; and 1 well was completed in the Atchafalaya aquifer. The 9 border wells that were not completed in a Chicot aquifer system include 8 wells completed in the upland terrace aquifer and 1 well completed in the Williamson Creek aquifer.

All wells were sampled in accordance with established USGS standard methods and techniques, as described by Brown and others (1970). Before sampling, wells were pumped until the specific conductance, pH, and temperature of the water stabilized. Samples were collected at a spigot in the plumbing system as close as possible to the well to ensure that the water samples were representative of water in the aquifer and not representative of conditions in a pressure or treatment tank. Possible sources of nitrate in the vicinity of each well sampled, the type of well, and the condition of the annular space at the surface were observed and noted to provide additional understanding of the sampling results.

Water samples collected for the determination of nitrate and selected constituents were analyzed in accordance with standard methods of the USGS (Fishman, 1993). For each well, specific conductance, pH, temperature, and alkalinity were determined in the field using procedures described by Wood (1976). The data are stored in the USGS water-quality database. Dissolved oxygen concentrations were not measured as part of this study because the common submersible well-pump setup for domestic water use typically would result in an aerated sample.

Concentrations of nitrogen as nitrite plus nitrate and as nitrite in the water samples were determined by quantitative chemical analysis at the USGS laboratory in Denver. The difference between these two laboratory-reported concentrations was used to calculate the concentration of nitrate as nitrogen. Many of the nitrate concentrations presented in this report are not in the USGS water-quality data base because a calculated concentration for nitrate as nitrogen is not reported when one or both concentrations used in the calculation are less than the analytical detection limit. For this report, nitrate concentrations are calculated in the following manner: if the laboratory-reported nitrite concentration is at or less than the detection limit and the laboratory-reported nitrite plus nitrate concentrations is also at or less than the detection limit, a concentration for nitrate as nitrogen is reported as the detection limit (given as the larger value). If one concentration is at or greater than the detection limit and the other is not, then the smaller concentration is subtracted from the larger concentration, and the result is reported with or without the less-than sign, depending upon the larger concentration. When the reported nitrite plus nitrate as nitrogen concentration is greater than 1.0 mg/L, and the reported nitrite as nitrogen concentration is less than the detection limit, the nitrate concentration is reported as the same concentration as nitrite plus nitrate to the nearest tenth decimal. If a water sample had a reported nitrate as nitrogen concentration greater than 10 mg/L, the well would be resampled for verification. Table 1 summarizes the calculation and reporting of concentrations of nitrate as nitrogen used in this report.

NITROGEN IN GROUND WATER

The nitrogen cycle primarily involves microorganisms and some abiotic processes. Atmospheric nitrogen is present as N_2 (nitrogen gas). Oxidized and reduced forms of nitrogen rarely are formed on the earth's surface, but are formed by nonbiological processes such as lightning and photochemical activity in the upper atmosphere. The altered nitrogen compounds are then brought to the earth's surface by precipitation. Once on the earth's surface, microorganisms control the processes that "fix" the nitrogen. Nitrogen fixation is the production of organic nitrogen from N_2 as well as the oxidation or reduction of nitrogen compounds. These basic processes constitute the nitrogen cycle (Chapelle, 1993).

Nitrite concentrations are typically low in ground-water, and nitrate has been referred to as the most common identifiable contaminant in ground water (Freeze and Cherry, 1979, p. 387). Concentrations of nitrogen in ground-water systems are affected by three factors (Chapelle, 1993): (1) Organic nitrogen conversion to N_2, (2) oxidation of organic nitrogen to nitrate (nitrification) under aerobic conditions, and (3) reduction of nitrate (denitrification) to nitrite as nitrogen under anaerobic conditions. Nitrate concentrations tend to accumulate in ground water under aerobic conditions; conversely, nitrate concentrations in ground water decrease under anaerobic conditions.

Table 1. *Calculation of concentrations of nitrate as nitrogen*
[mg/L, milligrams per liter]

Reporting level	Scenario	Dissolved nitrite plus nitrate as nitrogen (mg/L)	Dissolved nitrite as nitrogen (mg/L)	Dissolved nitrate as nitrogen (calculated mg/L)
If <1.0	Both reported concentrations are less than detection limits	<A	<B	Use the larger value of A or B
	Example:	<0.02	<0.01	<0.02
	One reported concentrations is greater than detection limit, and the other is less than detection limit	A	<B	A - B = C
	Example:	0.33	<0.01	0.32
If >1.0	Reported nitrite plus nitrate concentrations is greater than 1.0 mg/L, and reported nitrite concentrations is less than detection limit	A.X (X is the tenth decimal)	<B	A . X - B = A . X
	Example:	7.8	<0.01	7.8

In addition to natural sources of nitrate such as the decomposition of naturally occurring organic material, anthropogenic activities may be sources of nitrate in shallow ground water. Animal feces and manure contribute substantial amounts of nitrate to shallow ground-water flow systems, especially those systems that are in close proximity and well connected, hydraulically, to the land surface. Nitrate from these sources may originate from feedlots, poultry farms, and animal-processing industries. Municipal sewerage disposal systems and septic tanks also are potential sources of nitrate in local ground water. Nitrogen fertilizers are a common source of nitrate contamination in ground water, especially in agricultural areas where fertilizers are used to enhance crop yields. Municipal wastes in landfills may be sources of nitrate to ground water. Nitrogen from organic sources and anaerobic ground-water conditions are prevalent in and around landfills. Under such conditions, nitrite may be the dominant form of nitrogen. If nitrite is exposed to aerobic conditions, nitrite concentrations could decrease and nitrate concentrations could increase. Shallow wells are more susceptible to nitrate contamination, due in part to increased probability of dissolved oxygen occurring at shallow depths and because nitrate does not have far to percolate through the subsurface to contaminate a well.

OCCURRENCE OF NITRATE IN THE CHICOT AQUIFER SYSTEM

Dissolved nitrate as nitrogen generally is the expected form of nitrogen in ground water. However, to better understand the occurrence of dissolved nitrate in water from the Chicot aquifer system, other forms (species) of dissolved nitrogen are discussed. Data for the following dissolved nitrogen species are included in appendix 2: nitrate as nitrogen, nitrite as nitrogen, nitrite plus nitrate as nitrogen, ammonia as nitrogen, and ammonia plus organic nitrogen as nitrogen.

A statistical summary of the concentrations of nitrogen species in water from the wells sampled is presented in table 2. Water from 51 (32 percent) of the 160 wells sampled had dissolved nitrate concentrations greater than 0.02 mg/L. Eight of those 51 samples had dissolved nitrate concentrations greater than 1.0 mg/L; the maximum concentration was 7.8 mg/L. As none of the water samples collected had a concentration above the MCL of 10 mg/L, no widespread occurrence of high (>10.0 mg/L) nitrate concentrations in the Chicot aquifer system is indicated.

Table 2. *Statistical summary of nitrogen species concentrations in water from wells sampled in southwestern Louisiana, July 1994 through January 1996*

[Concentrations are in milligrams per liter. <, actual concentration is known to be less than that shown]

Constituent	Number of samples	Concentrations at indicated percentile[1]						
		0 (minimum)	10	25	50 (median)	75	90	100 (maximum)
Dissolved nitrite plus nitrate (as nitrogen)	160	<0.02	<0.02	<0.02	<0.02	0.03	0.35	7.8
Dissolved nitrite (as nitrogen)	160	<.01	<.01	<.01	<.01	<.01	<.01	.01
Dissolved nitrate (as nitrogen)	160	.01	<.02	<.02	<.02	.03	.35	7.8
Dissolved ammonia (as nitrogen)	151	<.01	.01	.02	.20	.74	2.0	3.7
Dissolved ammonia plus organic nitrogen (as nitrogen)	152	<.2	<.2	<2	.20	.72	1.8	7.9

[1]Concentrations below which lies indicated percentage of observations.

The well names, depth of wells, and nitrate concentrations greater than 1.0 mg/L are listed in table 3. Those depths ranged from 36 to 120 ft (table 3), all shallower than the median well depth of 155 ft for the 160 wells sampled (appendix 1). These results support the concept that shallow wells are more susceptible to nitrate contamination. Nitrate concentrations were highest in water from wells that were less than 120 ft deep; these wells would be considered most vulnerable to local land use activities.

Table 3. *Concentrations of dissolved nitrate as nitrogen greater than 1.0 milligram per liter in water from wells sampled in southwestern Louisiana, July 1994 through January 1996*

Well name	Well depth (feet)	Dissolved nitrate as nitrogen (milligrams per liter)
Ac-6196Z	38	7.8
Al-316	80	1.1
Lf-7413Z	70	1.7
Lf-7442Z	110	1.1
V-5706Z	120	1.6
V-5739Z	36	1.4
V-5887Z	100	3.0
V-6081Z	70	5.6

Concentrations of other nitrogen species also varied (table 2). Nitrite concentrations were below or at the detection limit for all samples. Thus nitrite plus nitrate percentiles mirror the dissolved nitrate percentiles. Dissolved ammonia concentrations ranged from less than 0.01 to 3.7 mg/L and had a median concentration of 0.2 mg/L. Dissolved ammonia plus organic nitrogen concentrations ranged from less than 0.2 to 7.9 mg/L and had a median concentration of 0.2 mg/L. Water from well Ac-6571Z in Acadia Parish had the highest concentration (7.9 mg/L) for dissolved ammonia plus organic nitrogen.

SELECTED WATER-QUALITY DATA

Water-quality data for the 160 wells sampled from July 1994 through January 1996 are presented in appendix 2. In addition, results of two previous analyses for wells Al-264 and Al-310 in Allen Parish are included in appendix 2 for comparison purposes. Analyses for five duplicate water samples that were collected for quality-control purposes also are included in appendix 2. The following properties and constituents are included in appendix 2: specific conductance, pH, temperature, hardness, dissolved solids, calcium, magnesium, sodium, potassium, alkalinity as calcium carbonate, sulfate, chloride, fluoride, silica, phosphorus, iron, and manganese. The U. S. Environmental Protection Agency (1976, 1977, 1979, 1992) has published secondary maximum contaminant levels (SMCL's) for these constituents in drinking water.

A statistical summary of values for specific conductance, pH, water temperature, total hardness as calcium carbonate, total alkalinity as calcium carbonate, and dissolved solids is presented in table 4. Specific conductance ranged from 23 to 3,450 µS/cm (microsiemens per centimeter at 25 degrees Celsius) with a median of 455 µS/cm. Values for pH ranged from 4.8 to 8.2 with a median of 7.2; and water temperature ranged from 15.5 to 26.5 °C with a median of 21.0 °C.

Table 4. *Statistical summary of selected properties and constituents in water from wells sampled in southwestern Louisiana, July 1994 through January 1996*

[Except as noted, values are in milligrams per liter]

Property or constituent	Number of samples	Value at indicated percentile[1]						
		0 (minimum)	10	25	50 (median)	75	90	100 (maximum)
Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	160	23	45	133	455	686	873.5	3,450
pH, in standard units	160	4.8	5.4	6.3	7.2	7.5	7.6	8.2
Water temperature, in degrees Celsius	159	15.5	19.5	20.5	21.0	22.0	23.0	26.5
Hardness, total (as $CaCO_3$)	160	1	7	27	125	185	225	690
Alkalinity, total (as $CaCO_3$)	151	6	14	43	200	280	348	501
Dissolved solids, residue at 180 degrees Celsius	160	24	60	121	266	400	485	2,260

[1]Value below which lies indicated percentage of observations.

Total hardness as calcium carbonate ranged from 1 to 690 mg/L with a median of 125 mg/L. The USGS classifies a hardness (mg/L of calcium carbonate) of 0-60 as soft, 61-120 as moderately hard, 121-180 as hard, and greater than 180 as very hard (Hem, 1985, p. 159). At least 25 percent of the water samples would be classified as soft, another 25 percent would be classified as very hard, and the remaining 50 percent classified as moderately hard to hard. Total alkalinity as calcium carbonate ranged from 6 to 501 mg/L with a median of 200 mg/L.

Dissolved solids concentrations ranged from 24 to 2,260 mg/L. In 90 percent of the samples, the dissolved solids concentrations were less than the SMCL of 500 mg/L. On a freshwater-saltwater continuum, the USGS classifies water with concentrations of less than 1,000 mg/L dissolved solids as being fresh (Hem, 1985, p. 157). Water with dissolved solids concentrations in the 1,000-3,000 mg/L range is classified as slightly saline. Only water from well Ve-7361Z in Vermilion Parish would be classified as slightly saline because its dissolved solids concentration was 2,260 mg/L.

None of the analyses provided as quality-control checks indicated substantial differences with the water-quality data. The analyses from 1969 and 1976 for wells Al-264 and Al-310, respectively, provided for comparison purposes showed concentrations that generally were similar to the results of analyses for water samples that were collected in December 1995. However, iron concentrations in water from well Al-264 changed from 8,100 to 200 µg/L with other constituents also showing variations in concentration between the two analyses. In water from well Al-310 iron concentrations changed from 3,100 to 5,100 µg/L and again differences in concentrations of other constituents also varied. The mixed results, with some constituents showing no variation and others changing a great deal, is believed to be natural variation over the time period that elapsed between collection of the two samples.

Analyses of the seven duplicate samples, four from wells in Beauregard Parish and three from a well in Vernon Parish, indicated good agreement with the first samples. Differences in values were typically no greater than seven percent, although for low concentration values, a small variation can produce a large percent difference. For example, two dissolved solids concentrations at one well differed by 12 mg/L, which represents at least a 25 percent difference between the two values of 36 and 48 mg/L. The results of analyses for these quality-control samples are in appendix 2.

SUMMARY

The Chicot aquifer system in southwestern Louisiana contains the most intensely pumped aquifers in the State. Water samples were collected from 160 shallow domestic-supply wells during July 1994 through January 1996 for analysis of nitrates and other selected water-quality properties and constituents. A total of 150 wells were completed in the Chicot aquifer system and the remaining 10 were completed in hydraulically connected adjacent aquifers. These wells are primarily used for drinking water and are located in the rural parts of the study area, not served by a public water-supply system.

Nitrate has been identified as the most common identifiable contaminant in ground water. Nitrate in ground water may originate from septic/sewer systems, livestock activities, crop fertilizers, and from the decay of natural organic material. Shallow wells are more susceptible to nitrate contamination, due in part to the increased probability of dissolved oxygen occurring at shallow depths and a short distance for nitrate to percolate through the subsurface to contaminate a well.

Ground-water samples were analyzed for nitrogen constituents and other selected constituents. Concentrations of nitrate as nitrogen greater than 0.02 mg/L (milligrams per liter) were present in 51 (32 percent) of the 160 wells sampled. Eight of the 51 samples had nitrate as nitrogen concentrations greater than 1.0 mg/L and none of the concentrations were above 10 mg/L. The 8 wells sampled with concentrations of nitrate greater than 1.0 mg/L had well depths ranging from 36 to 120 feet. These wells were shallower than the median well depth of 155 feet for the 160 wells sampled. The results support the concept that shallow wells are more susceptible to nitrate contamination.

The U.S. Environmental Protection Agency has established a maximum contaminant level of 10 mg/L for nitrate in drinking water. None of the water samples collected had a concentration above this level, which indicates no widespread occurrence of high (>10.0 mg/L) nitrate concentrations in the Chicot aquifer system at this time.

Concentrations of other nitrogen species were very low. Dissolved nitrite as nitrogen did not exceed the detection limit of 0.01 mg/L in any sample. Dissolved ammonia concentrations ranged from less than 0.01 to 3.7 mg/L with a median of 0.2 mg/L. Dissolved ammonia plus organic nitrogen concentrations ranged from less than 0.2 to 7.9 mg/L with a median of 0.2 mg/L.

Other selected water-quality properties and constituents included specific conductance, pH, water temperature, hardness, and alkalinity. The specific conductance values ranged from 23 to 3,450 µS/cm (microsiemens per centimeter at 25 degrees Celsius), and the median value was 455 µS/cm. Values for pH ranged from 4.8 to 8.2 with a median of 7.2. The water temperatures ranged from 15.5 to 26.5 °C (degrees Celsius) with a median of 21.0 °C. Total hardness as calcium carbonate ranged from 1 to 690 mg/L with a median of 125 mg/L. At least 25 percent of the samples would be classified as soft, another 25 percent classified as very hard, and the remaining 50 percent classified as moderately hard to hard. Total alkalinity as calcium carbonate ranged from 6 to 501 mg/L with a medium of 200 mg/L. Dissolved solids concentrations ranged from 24 to 2,260 mg/L. In 90 percent of the samples the dissolved solids concentrations were less than the SMCL of 500 mg/L.

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APPENDIX 1

Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana

[Aquifer code: 112CHCT, Chicot aquifer system, undifferentiated; 112CHCTU, Chicot aquifer system, upper sand; 11202LC, "200-foot" sand, Lake Charles area; 112CHCTS, Chicot aquifer system, shallow sand; 112UPTC, upland terrace aquifer; 112ACFL, Atchafalaya aquifer; 122WMCK, Williamson Creek aquifer. --, no data available. Casing material: P, polyvinyl chloride or other plastic; R, stainless steel.]

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
Acadia Parish												
Ac-5227Z	301957092363901	301957	923639	112CHCT	04-27-83	30	160	--	4	P	55	04-27-83
Ac-5667Z	302802092293101	302802	922931	112CHCT	08-23-85	25	160	154	2	P	90	08-23-85
Ac-5716Z	300731092330401	300731	923304	112CHCTU	12-19-85	10	165	154	2	P	34	12-19-85
Ac-5898Z	301103092171701	301103	921717	112CHCTU	04-10-92	25	150	159	2	P	65	04-10-92
Ac-6071Z	300638092243701	300638	922437	112CHCTU	11-04-87	15	160	144	2	P	45	11-04-87
Ac-6196Z	301955092125901	301955	921259	112CHCTS	07-29-92	35	160	18	4	P	14	07-29-92
Ac-6218Z	301230092304501	301230	923045	112CHCTU	10-14-86	20	160	150	2	P	52	10-14-86
Ac-6244Z	301918092192801	301918	921928	112CHCTU	11-19-88	30	165	163	2	P	54	11-19-88
Ac-6285Z	301511092103701	301511	921037	112CHCTU	06-22-89	20	150	174	4	P	60	06-22-89
Ac-6447Z	300704092244701	300704	922447	112CHCTU	06-19-90	10	160	189	2	P	58	06-19-90
Ac-6449Z	301532092210601	301532	922106	112CHCTU	10-12-89	25	160	139	2	P	65	10-12-89
Ac-6477Z	302555092114801	302555	921148	112CHCT	07-03-90	45	160	190	2	P	85	07-03-90
Ac-6569Z	302313092112901	302313	921129	112CHCT	11-15-90	40	165	190	4	P	75	11-15-90
Ac-6571Z	302427092343801	302427	923438	112CHCT	11-01-90	30	150	159	4	P	70	11-01-90
Ac-6636Z	302624092243202	302624	922432	112CHCT	12-30-90	30	160	144	2	P	78	12-30-90
Ac-6639Z	302415092144601	302415	921446	112CHCT	01-02-91	40	160	184	2	P	73	01-02-91
Ac-6642Z	301912092282101	301912	922821	112CHCTU	01-03-91	30	160	129	2	P	71	01-03-91
Ac-6674Z	301439092143601	301439	921436	112CHCTU	12-20-90	30	165	134	2	P	60	12-20-90
Ac-6763Z	300845092345401	300845	923454	112CHCTU	05-14-91	10	150	145	2	P	40	05-14-91
Ac-6828Z	301412092310601	301412	923106	112CHCTU	10-22-91	22	160	160	2	P	45	10-22-91
Ac-6854Z	301416092303301	301416	923033	112CHCTU	03-25-93	25	160	141	2	P	54	03-25-93
Ac-6864Z	300956092224101	300956	922241	112CHCTU	04-26-93	20	165	177	2	P	50	04-26-93

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana--Continued

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
Allen Parish												
Al- 264	304344092424201	304344	924242	112CHCT	08-19-65	95	100	90	2	P	--	--
Al- 277	305127092413201	305127	924132	112CHCT	03-01-73	123	90	80	2	P	25.73	03-01-73
Al- 310	303453092503701	303453	925037	112CHCT	10-13-75	60	230	210	6	R	35.43	10-13-75
Al- 316	304147092532201	304147	925322	112CHCT	06-04-88	71	80	70	2	P	20	06-04-88
Al- 404	304721092581201	304721	925812	112CHCT	05-09-90	130	115	95	4	P	36	05-09-90
Al-5334Z	305156092515801	305156	925158	112CHCT	07-13-90	140	80	70	2	P	27	07-13-90
Beauregard Parish												
Be-61	302630093101101	302630	931011	112CHCT	12-10-45	66	370	--	10	--	49.67	01-23-50
Be- 495	304903093115302	304903	931153	112CHCT	03-23-88	172	140	120	4	P	45	03-23-88
Be-5097Z	305028093105901	305028	931059	112CHCT	03-31-83	160	125	120	2	P	12	03-31-83
Be-5669Z	304903093274701	304903	932747	112CHCT	05-26-92	189	110	100	2	P	21	05-26-92
Be-5886Z	305021093284701	305021	932847	112CHCT	09-06-92	137	70	50	4	P	36	09-06-92
Be-5891Z	304001093001701	304001	930017	112CHCT	09-15-92	80	80	70	2	P	18	09-15-92
Be-5956Z	304324093063001	304324	930630	112CHCT	10-29-92	130	120	110	2	P	40	10-29-92
Calcasieu Parish												
Cu-5250Z	302403093084601	302403	930846	11202LC	07-05-83	20	140	128	2	P	45	07-05-83
Cu-5279Z	301326093064601	301326	930646	11202LC	09-27-83	20	105	100	2	P	28	09-27-83
Cu-5350Z	300636092581501	300636	925815	112CHCTU	11-08-83	20	219	--	2	P	45	11-08-83
Cu-5412Z	301426093310701	301426	933107	11202LC	10-02-91	21	165	160	2	P	45	10-02-91
Cu-5429Z	301838093034601	301838	930346	11202LC	02-16-84	20	180	175	2	P	62	02-16-84

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana--Continued

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
Calcasieu Parish--continued												
Cu-5811Z	300331093021601	300331	930216	11202LC	05-09-85	10	350	340	4	P	48	05-09-85
Cu-6103Z	300717093254701	300717	932547	11202LC	04-02-86	20	285	279	2	P	51	04-02-86
Cu-6106Z	300527093321701	300527	933217	11202LC	04-28-86	10	159	154	2	P	27	04-28-86
Cu-6161Z	301658093094602	301658	930946	11202LC	05-27-86	15	165	160	2	P	45	05-27-86
Cu-6235Z	300912093390401	300912	933904	11202LC	07-15-86	12	170	160	2	P	22	07-15-86
Cu-6552Z	300544093083001	300544	930830	11202LC	08-05-87	8	180	40	2	P	64	08-05-87
Cu-6694Z	301415093171901	301415	931719	11202LC	03-04-88	15	155	150	2	P	68	03-04-88
Cu-6767Z	301332093232701	301332	932327	11202LC	05-09-88	15	350	340	2	P	67	05-09-88
Cu-6799Z	300243093062202	300243	930622	11202LC	04-09-88	12	300	40	2	P	41	04-09-88
Cu-7054Z	301306093063601	301306	930636	11202LC	03-01-89	20	295	285	2	P	60	03-01-89
Cu-7341Z	301020093055201	301020	930552	11202LC	01-30-90	20	225	40	2	P	50	01-30-90
Cu-7542Z	301108093054601	301108	930546	11202LC	06-20-90	21	210	200	4	P	89	06-20-90
Cu-7678Z	300755093310301	300755	933103	11202LC	12-06-90	8	315	310	2	P	42	12-06-90
Cu-7782Z	301920093041501	301920	930415	11202LC	03-12-91	10	165	160	4	P	55	03-12-91
Cu-7948Z	301340093382601	301340	933826	11202LC	08-01-91	22	250	240	2	P	34	08-01-91
Cu-7952Z	301924093403502	301924	934035	11202LC	08-09-91	25	205	205	2	P	28	08-09-91
Cu-7955Z	301306093263902	301306	932639	11202LC	08-11-91	15	350	350	2	P	60	08-11-91
Cu-7967Z	301707093223202	301707	932232	11202LC	09-24-91	19	220	210	2	P	70	09-24-91
Cu-7979Z	300949093103502	300949	931035	11202LC	09-14-91	21	205	40	2	P	70	09-14-91
Cu-8507Z	300749093145801	300749	931458	11202LC	11-02-92	10	230	225	2	P	62	11-02-92
Cu-8638Z	300943093381902	300943	933819	11202LC	03-10-93	12	185	180	2	P	20	03-10-93
Cu-8667Z	301138093151601	301138	931516	112CHCTS	04-27-93	15	80	75	2	--	20	04-27-93

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana--Continued

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
Cameron Parish												
Cn-5195Z	300156092445601	300156	924456	112CHCTU	10-13-87	5	160	150	2	P	30	10-13-87
Cn-5553Z	300031092382401	300031	923824	112CHCTU	07-11-90	6	230	220	4	P	35	07-11-90
Evangeline Parish												
Ev- 475	303330092172501	303330	921725	112CHCT	12-04-90	53	160	154	2	P	90	12-04-90
Ev- 583	303808092285801	303808	922858	112CHCT	07-09-92	55	200	194	2	P	98	07-09-92
Ev- 848	303332092300501	303332	923005	112CHCT	10-09-90	54	165	160	2	P	98	10-09-90
Ev- 850	302858092325101	302858	923251	112CHCT	08-22-88	40	185	175	4	P	85	08-22-88
Ev- 892	304525092185701	304525	921857	112CHCT	02-08-90	60	190	170	6	R	75	02-08-90
Ev-5314Z	304010092261601	304010	922616	112CHCT	08-03-88	--	180	--	--	--	--	--
Iberia Parish												
I-5131Z	295634091575301	295634	915753	112CHCTU	11-11-91	5	180	170	2	--	10	11-11-91
I-5578Z	300007091530601	300007	915306	112CHCTU	05-21-87	15	80	70	2	P	18	05-21-87
I-5589Z	295611091511602	295611	915116	112CHCTU	02-13-92	5	260	250	2	P	10	02-13-92
I-5672Z	295639091474001	295639	914740	112CHCTU	05-09-92	15	210	205	2	P	8	05-09-92
I-5701Z	300319091535901	300319	915359	112CHCTU	03-04-92	25	224	218	2	P	20	03-04-92
I-5790Z	295248091545701	295248	915457	112CHCTU	09-08-88	5	270	260	2	P	17	09-08-88
I-5877Z	295258091411901	295258	914119	112CHCTU	03-02-92	8	360	350	2	P	11	03-02-92
I-6179Z	295801091470702	295801	914707	112CHCTU	08-24-91	15	260	254	2	P	8	08-24-91
I-6203Z	300401091555901	300401	915559	112CHCTU	10-21-91	30	130	124	2	P	25	10-21-91

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana--Continued

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
					Jefferson Davis Parish							
JD-5110Z	302102092401701	302102	924017	112CHCT	10-11-82	20	180	174	2	P	78	10-11-82
JD-5206Z	302454092445801	302454	924458	112CHCT	01-02-84	29	165	160	2	P	81	01-02-84
JD-5233Z	300607092395001	300607	923950	112CHCTU	10-22-91	11	146	136	2	P	35	10-22-91
JD-5299Z	302619092375701	302619	923757	112CHCT	03-08-84	29	191	185	2	P	68	03-08-84
JD-5728Z	301115092433001	301115	924330	112CHCTU	05-27-87	10	200	194	2	P	55	05-27-87
JD-5816Z	300733092513101	300733	925131	112CHCTU	06-30-88	5	150	145	4	P	45	06-30-88
JD-5839Z	300826092401701	300826	924017	112CHCTU	09-19-88	10	140	130	2	P	30	09-19-88
JD-5920Z	300351092483001	300351	924830	112CHCTU	01-31-92	6	225	220	2	P	40	01-31-92
JD-5938Z	302109092523101	302109	925231	112CHCT	07-25-89	35	145	140	4	P	60	07-25-89
JD-5980Z	301305092464301	301305	924643	112CHCTU	12-19-89	17	145	140	2	P	58	12-19-89
JD-6021Z	301402092423501	301402	924235	112CHCTU	11-09-89	15	220	210	10	P	59	11-09-89
JD-6047Z	301442092582301	301442	925823	112CHCTU	08-22-90	29	200	190	2	P	70	08-22-90
JD-6175Z	301341092550301	301341	925503	112CHCTU	09-15-92	17	165	160	2	P	70	09-15-92
JD-6207Z	301258092574401	301258	925744	112CHCTU	10-28-92	20	235	230	2	P	70	10-28-92
JD-6261Z	301109092503201	301109	925032	112CHCTU	09-23-93	13	145	140	2	P	60	09-23-93
					Lafayette Parish							
Lf-6096Z	301731091584801	301731	915848	112CHCTU	01-10-92	15.	70	65	2	P	20	01-15-92
Lf-6778Z	300751091560002	300751	915600	112CHCTU	05-15-90	35	130	124	2	P	33	05-15-90
Lf-7025Z	301328092072001	301328	920720	112CHCTU	05-07-90	30	100	94	2	P	50	05-07-90
Lf-7105Z	300700092004801	300700	920048	112CHCTU	05-30-91	25	90	84	2	P	35	05-30-91
Lf-7342Z	301536092021501	301536	920215	112CHCTU	11-16-92	45	105	100	2	P	48	11-16-92
Lf-7409Z	300841092072901	300841	920729	112CHCTU	01-02-93	25	120	115	2	P	38	01-02-93

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana--Continued

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
Lafayette Parish--continued												
Lf-7413Z	300617091573101	300617	915731	112CHCTU	02-04-93	20	70	65	2	P	22	02-04-93
Lf-7442Z	302046092012502	302046	920125	112CHCTU	02-19-93	50	110	104	2	P	50	02-19-93
Lf-7486Z	301836092051901	301836	920519	112CHCTU	04-23-93	25	90	40	2	P	35	04-23-93
Rapides Parish												
R-5135Z	310400092352101	310400	923521	112CHCT	05-19-86	160	100	90	2	P	40	05-19-86
R-5139Z	310413092284901	310413	922849	112UPTC	05-06-86	180	112	92	4	P	56	05-06-86
R-5142Z	305945092422201	305945	924222	112CHCT	04-10-86	165	100	90	2	P	30	04-10-86
R-5145Z	310040092482701	310040	924827	112CHCT	06- -86	180	95	85	2	P	25	06- -86
R-5200Z	305510092331901	305510	923319	112CHCT	06-23-87	140	97	87	2	P	40	06-23-87
R-5379Z	310106092413901	310106	924139	112CHCT	06-18-89	150	97	77	4	P	24	06-18-89
R-5385Z	310613092305701	310613	923057	112UPTC	08-07-89	120	79	69	2	P	11	08-07-89
R-5392Z	305523092363401	305523	923634	112CHCT	11-17-91	163	92	82	2	P	36	11-17-91
R-5415Z	310740092394001	310740	923940	112UPTC	10-26-89	200	110	100	2	P	46	10-26-89
R-5430Z	305727092460601	305727	924606	112CHCT	06-19-92	150	100	90	2	P	6	06-19-92
St. Martin Parish												
SMn-5731Z	301652091514101	301652	915141	112ACFL	03-15-92	16	160	150	4	P	40	06-15-92
SMn-6248Z	300504091534801	300504	915348	112CHCTU	04-03-86	25	170	164	2	P	35	04-03-86
Vermilion Parish												
Ve-5690Z	295659092213101	295659	922131	112CHCTU	04-29-85	0	126	116	2	P	35	04-29-85
Ve-5778Z	295027092105902	295027	921059	112CHCTU	09-13-91	5	390	380	2	P	14	09-13-91
Ve-6244Z	300127092294901	300127	922949	112CHCTU	11-03-86	8	182	176	2	P	30	11-03-86

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana--Continued

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
Vermilion Parish--continued												
Ve-6489Z	300239091593801	300239	915938	112CHCTU	02-19-86	20	103	97	3	P	35	02-19-86
Ve-6678Z	293741092221902	293741	922219	112CHCTU	04-01-88	5	530	520	2	P	6	04-01-88
Ve-7020Z	293925092302501	293925	923025	112CHCT	11-22-88	--	490	480	2	P	--	--
Ve-7021Z	293851092272401	293851	922724	112CHCTU	11-24-88	5	540	530	2	P	--	--
Ve-7327Z	295850092160901	295850	921609	112CHCTU	04-26-90	12	130	120	2	P	26	04-26-90
Ve-7361Z	294647092201801	294647	922018	112CHCTU	05-03-90	7	230	220	2	P	14	05-07-90
Ve-7483Z	295837092322901	295837	923229	112CHCTU	10-29-90	5	160	150	4	P	30	10-29-90
Ve-7533Z	295652092000101	295652	920001	112CHCTU	07-30-90	5	160	150	2	P	15	07-30-90
Ve-7613Z	300508092194001	300508	921940	112CHCTU	04-14-91	15	195	189	2	P	44	04-17-91
Ve-7723Z	300239092294001	300239	922940	112CHCTU	08-20-91	9	170	160	2	P	30	08-20-91
Ve-7835Z	295312092170101	295312	921701	112CHCTU	03-12-92	6	126	116	2	P	12	03-12-92
Ve-7886Z	294929092182601	294929	921826	112CHCTU	05-22-92	3	80	70	2	P	5	05-22-92
Ve-7908Z	295504092111201	295504	921112	112CHCTS	06-01-92	9	120	115	2	P	12	06-01-92
Ve-7952Z	300126091593001	300126	915930	112CHCTU	10-31-90	10	74	68	2	P	74	10-31-90
Ve-8114Z	300045092052702	300045	920527	112CHCTS	01-14-93	10	126	116	2	P	20	01-14-93
Ve-8116Z	300704092163701	300704	921637	112CHCTU	02-20-93	20	190	185	2	P	50	02-20-93
Ve-8128Z	295546092060001	295546	920600	112CHCTS	03-11-93	12	200	195	2	P	20	03-11-93
Ve-8144Z	295737092092001	295737	920920	112CHCTS	03-10-93	10	90	80	2	P	22	03-10-93
Ve-8152Z	300236092080302	300236	920803	112CHCTU	04-14-93	15	120	115	2	P	27	04-14-93
Ve-8164Z	295900092205302	295900	922053	112CHCTU	04-21-93	11	86	76	2	P	24	04-21-93
Ve-8260Z	300658092102601	300658	921026	112CHCTU	07-09-93	21	106	100	2	P	45	07-09-93
Ve-8296Z	300333092355501	300333	923555	112CHCTU	08-24-93	9	165	160	4	P	40	08-24-93
Ve-8314Z	300225092424202	300225	924242	112CHCTU	09-17-93	6	170	160	4	P	35	09-17-93

Appendix 1. Description of wells sampled for nitrate and selected water-quality properties and constituents, southwestern Louisiana--Continued

Well name	Identification number	Latitude (degrees)	Longitude (degrees)	Aquifer code	Date well constructed	Altitude of land surface (feet above sea level)	Depth of well[1] (feet)	Bottom of casing[1] (feet)	Diameter of interval (inches)	Casing material	Water level (feet below LSD[2])	Date water level measured
Vernon Parish												
V-5027Z	305832093094401	305832	930944	112CHCT	03-15-85	260	125	115	2	P	29	03-15-85
V-5483Z	305449093264201	305449	932642	112UPTC	06-11-88	200	95	85	2	P	31	06-11-88
V-5515Z	311212092553001	311212	925530	112UPTC	02-03-88	260	95	85	2	P	43	02-03-88
V-5706Z	305632092511501	305632	925115	112CHCT	07-15-89	170	120	110	2	P	--	--
V-5739Z	305905093314801	305905	933148	112UPTC	03-06-90	10	36	26	4	P	6	03-06-90
V-5756Z	305353093134801	305353	931348	112CHCT	02-13-90	180	120	110	2	P	--	--
V-5774Z	305453093125001	305453	931250	112CHCT	04-19-90	200	125	115	2	P	28	04-19-90
V-5822Z	305713093222001	305713	932220	112UPTC	06-19-90	155	100	90	2	P	15	06-19-90
V-5826Z	310828092522601	310828	925226	112UPTC	08-24-90	245	65	55	2	P	35	08-24-90
V-5887Z	305554092564101	305554	925641	112CHCT	04-17-92	150	100	90	2	P	6	04-17-92
V-5915Z	305445092545001	305445	925450	112CHCT	03-16-92	150	100	90	2	P	33	03-16-92
V-5916Z	305314093201601	305314	932016	112CHCT	03-13-92	200	130	120	2	P	42	03-13-92
V-5948Z	305337092581201	305337	925812	112CHCT	08-03-92	150	120	110	2	P	27	08-03-92
V-5949Z	310417093292701	310417	932927	122WMCK	07-23-92	165	130	120	2	P	27	07-23-92
V-5956Z	305808093124601	305808	931246	112CHCT	06-11-91	255	170	160	2	P	65	06-11-91
V-6002Z	305339093053501	305339	930535	112CHCT	07-29-91	160	135	115	2	P	10	07-29-91
V-6011Z	305649093053501	305649	930535	112CHCT	10-03-91	200	110	100	2	P	30	10-03-91
V-6035Z	305436093173701	305436	931737	112CHCT	09-15-92	180	140	130	2	P	11	09-15-92
V-6081Z	305556093193301	305556	931933	112CHCT	02-22-93	205	70	60	2	P	10	02-22-93

[1] Referenced to land surface.

[2] Land surface datum.

APPENDIX 2

Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana
[Concentrations are in milligrams per liter, except as noted. <, less than indicated value; --, no data available.]

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, ortho, dissolved (as P)
				Acadia Parish				
Ac-5667Z	02-27-95	<.02	<.01	<.02	.35	.32	.24	.05
Ac-5716Z	02-14-95	<.02	<.01	<.02	1.5	1.4	.21	.03
Ac-5898Z	02-14-95	<.02	<.01	<.02	3.0	2.9	.39	.08
Ac-6071Z	02-27-95	<.02	<.01	<.02	3.7	3.5	.39	.09
Ac-6218Z	02-14-95	<.02	<.01	<.02	.83	.80	.19	.02
Ac-6244Z	02-15-95	<.02	<.01	<.02	1.5	1.5	.40	.03
Ac-6285Z	02-27-95	<.02	<.01	<.02	1.4	1.3	.24	.10
Ac-6447Z	02-14-95	<.02	<.01	<.02	2.6	2.5	.30	.04
Ac-6449Z	02-15-95	<.02	<.01	<.02	2.0	1.8	.19	.03
Ac-6477Z	02-13-95	<.02	<.01	<.02	.65	.62	.26	.07
Ac-6569Z	02-13-95	<.02	<.01	<.02	.96	.94	.37	.02
Ac-6571Z	02-14-95	<.02	<.01	<.02	8.2	7.9	.96	.19
Ac-6636Z	02-27-95	<.02	<.01	<.02	1.4	2.0	.50	.10
Ac-6639Z	02-13-95	<.02	<.01	<.02	.65	.59	.30	.01
Ac-6642Z	02-14-95	<.02	<.01	<.02	.99	.95	.28	.03
Ac-6674Z	02-27-95	<.02	<.01	<.02	.36	.36	.25	.02
Ac-6763Z	02-14-95	<.02	<.01	<.02	3.0	3.0	.33	.11
Ac-6828Z	02-28-95	<.02	<.01	<.02	.94	.91	.22	.10
Ac-6854Z	02-14-95	<0.02	<0.01	<0.02	0.96	0.96	0.24	0.01
Ac-6864Z	02-14-95	<.02	<.01	<.02	2.5	2.5	.26	.05

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phosphorus, dissolved (as P)	Phosphorus, ortho, dissolved (as P)
				Allen Parish				
Al- 264	[1]07-01-69	--	--	--	--	--	--	--
	12-05-95	<.02	<.01	<.02	.22	.22	.35	.24
Al- 277	12-05-95	<.02	<.01	<.02	.01	<.20	.04	.04
Al- 310	[1]09-15-75	--	--	--	--	--	--	--
	12-06-95	<.02	<.01	<.02	.02	<.20	.16	.16
Al- 316	12-05-95	1.1	<.01	1.1	.02	<.20	<.02	.01
Al- 404	12-05-95	.11	<.01	.12	.01	<.20	<.02	.01
Al-5334Z	12-05-95	.32	<.01	.33	.01	<.20	<.02	.01
				Beauregard Parish				
Bc-61	07-27-94	<.02	<.01	<.02	--	--	--	--
Be-495	07-27-94	.06	<.01	.07	--	--	--	--
Be-5097Z	07-18-95	.66	<.01	.67	.02	<.20	.03	.03
	[1]07-18-95	.65	<.01	.66	.02	<.20	.03	.03
Be-5669Z	07-18-95	.62	<.01	.63	.02	<.20	.04	<.01
	[1]07-18-95	.63	<.01	.64	.02	<.20	.03	<.01
Bc-5886Z	07-19-95	.14	<.01	.15	.02	<.20	<.02	<.01
Be-5891Z	07-18-95	.29	<.01	.30	.02	<.20	<.02	<.01
	[1]07-18-95	.29	<.01	.30	.02	<.20	<.02	<.01
Be-5956Z	07-18-95	.02	<.01	.03	.02	<.20	.26	.26
	[1]07-18-95	.02	<.01	.03	.02	<.20	.26	.26

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, ortho, dissolved (as P)
				Calcasieu Parish				
Cu-5250Z	03-28-95	<0.02	<0.01	<0.02	0.11	<0.20	0.20	0.23
Cu-5279Z	03-28-95	<.02	<.01	<.02	.24	.26	.10	.07
Cu-5350Z	03-28-95	<.02	<.01	<.02	.18	<.20	.22	.09
Cu-5412Z	03-29-95	<.02	<.01	<.02	.15	<.20	.24	.27
Cu-5429Z	03-28-95	<.02	<.01	<.02	.16	.29	.03	<.01
Cu-5811Z	07-26-94	<.02	<.01	<.02	--	--	--	--
Cu-6103Z	03-29-95	.08	<.01	.09	.24	.24	.14	.12
Cu-6106Z	03-29-95	.01	<.01	.02	.47	.49	.16	.18
Cu-6161Z	03-28-95	<.02	<.01	<.02	.19	<.20	.10	.12
Cu-6235Z	03-29-95	<.02	<.01	<.02	.40	.38	.17	.19
Cu-6552Z	03-28-95	<.02	<.01	<.02	.38	.39	.13	.13
Cu-6694Z	03-27-95	.01	<.01	.02	.25	.26	.13	.14
Cu-6767Z	03-29-95	<.02	.01	<.02	.26	.30	.17	.20
Cu-6799Z	03-28-95	<.02	<.01	<.02	.37	.37	.14	.15
Cu-7054Z	07-27-94	.01	<.01	.02	--	--	--	--
Cu-7341Z	03-28-95	<.02	<.01	<.02	.18	<.20	.19	.20
Cu-7542Z	07-26-94	.87	<.01	.88	--	--	--	--
Cu-7678Z	03-29-95	<.02	<.01	<.02	.30	.33	.19	.18
Cu-7782Z	07-27-94	<.02	<.01	<.02	--	--	--	--
Cu-7948Z	03-29-95	<.02	<.01	<.02	.14	<.20	.32	.33
Cu-7952Z	03-29-95	.04	<.01	.05	.17	<.20	.26	.28
Cu-7955Z	03-27-95	<0.02	<0.01	<0.02	0.15	<0.20	0.14	0.17

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, ortho, dissolved (as P)
				Calcasieu Parish--continued				
Cu-7967Z	03-27-95	<.02	<.01	<.02	.05	<.20	.20	.15
Cu-7979Z	03-28-95	<.02	<.01	<.02	.22	.22	.14	.14
Cu-8507Z	03-28-95	<.02	<.01	<.02	.34	.33	.16	.18
Cu-8638Z	03-29-95	<.02	<.01	<.02	.37	.40	.18	.18
Cu-8667Z	03-28-95	<.02	<.01	<.02	.54	.53	.22	.25
				Cameron Parish				
Cn-5195Z	05-09-95	<.02	<.01	<.02	.39	.35	.19	.16
Cn-5553Z	05-09-95	<.02	<.01	<.02	1.2	1.2	.21	.18
				Evangeline Parish				
Ev- 475	01-23-96	<.02	<.01	<.02	.89	.90	.23	.19
Ev- 583	01-24-96	.02	<.01	.03	.10	<.20	.08	.10
Ev- 848	01-24-96	<.02	<.01	<.02	.38	.40	.24	.21
Ev- 850	01-24-96	.02	<.01	.03	1.2	1.2	.26	.26
Ev- 892	12-05-95	<.02	<.01	<.02	.03	<.20	.23	.01
Ev-5314Z	01-24-96	<.02	<.01	<.02	.14	<.20	.14	.11
				Iberia Parish				
I-5131Z	06-20-95	<.02	<.01	<.02	.71	.68	.15	.06
I-5578Z	06-20-95	<.02	<.01	<.02	.02	<.20	.09	.10

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, ortho, dissolved (as P)
				Iberia Parish--continued				
I-5589Z	06-20-95	<.02	<.01	<.02	.57	.58	.12	.06
I-5672Z	06-20-95	<.02	<.01	<.02	.67	.73	.16	.02
I-5701Z	06-20-95	<0.02	<0.01	<0.02	0.02	<0.20	0.14	0.12
I-5790Z	06-21-95	<.02	<.01	<.02	.24	.28	.21	.05
I-5877Z	06-20-95	<.02	<.01	<.02	1.0	.97	.08	.07
I-6179Z	06-20-95	<.02	<.01	<.02	3.0	2.8	.21	.02
I-6203Z	06-21-95	.59	<.01	.60	.01	<.20	.27	.26
				Jefferson Davis Parish				
JD-5110Z	03-01-95	<.02	.01	<.02	.07	<.20	.17	.05
JD-5206Z	03-01-95	<.02	<.01	<.02	.01	<.20	.68	.70
JD-5233Z	02-28-95	<.02	<.01	<.02	.41	.38	.21	.15
JD-5299Z	03-01-95	.01	<.01	.02	.04	<.20	.05	.05
JD-5728Z	02-28-95	.03	<.01	.04	.18	<.20	.13	.11
JD-5816Z	02-28-95	<.02	<.01	<.02	.14	<.20	.29	.17
JD-5839Z	02-28-95	<.02	<.01	<.02	.35	.33	.18	.11
JD-5920Z	02-28-95	<.02	<.01	<.02	.30	.28	.23	.17
JD-5938Z	03-15-95	<.02	<.01	<.02	.08	<.20	.40	.39
JD-5980Z	02-28-95	<.02	.01	<.02	.12	<.20	.32	.23
JD-6021Z	02-28-95	<.02	<.01	<.02	.15	<.20	.26	.28
JD-6047Z	02-28-95	<.02	<.01	<.02	.26	.26	.34	.01

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, ortho, dissolved (as P)
Jefferson Davis Parish--continued								
JD-6175Z	02-28-95	<.02	.01	<.02	.11	<.20	.23	.12
JD-6207Z	02-28-95	<.02	<.01	<.02	.21	.22	.28	.18
JD-6261Z	02-28-95	<.02	<.01	<.02	.12	<.20	.34	.18
Lafayette Parish								
Lf-6096Z	03-14-95	<0.02	<0.01	<0.02	0.03	<0.20	0.09	0.09
Lf-6778Z	03-14-95	.81	<.01	.82	.01	<.20	.36	.38
Lf-7025Z	03-13-95	<.02	<.01	<.02	.26	.23	.55	.19
Lf-7105Z	03-14-95	<.02	<.01	<.02	.04	<.20	.41	.42
Lf-7342Z	03-13-95	.46	<.01	.47	.05	<.20	.63	.56
Lf-7409Z	03-13-95	<.02	<.01	<.02	.15	<.20	.23	.10
Lf-7413Z	03-14-95	1.7	<.01	1.7	.01	<.20	.14	.13
Lf-7442Z	03-13-95	1.1	<.01	1.1	.01	<.20	.23	.24
Lf-7486Z	03-14-95	<.02	<.01	<.02	.04	<.20	.23	.28
Rapides Parish								
R-5135Z	08-16-95	.36	.01	.37	.03	<.20	<.02	<.01
R-5139Z	08-16-95	.19	.01	.20	.01	.20	.02	.01
R-5142Z	08-16-95	.10	.01	.11	.01	.20	.02	.02
R-5145Z	08-16-95	.03	.01	.04	.01	.20	.02	.02
R-5200Z	08-16-95	.11	.01	.12	.01	.20	.02	.01

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, ortho, dissolved (as P)
Rapides Parish--continued								
R-5379Z	08-16-95	.13	.01	.14	.01	.20	.02	.01
R-5385Z	08-16-95	.06	.01	.07	.01	.20	.02	.01
R-5392Z	08-16-95	.18	<.01	.19	<.01	<.20	.14	.18
R-5415Z	08-16-95	.08	.01	.09	.01	.20	.02	.02
R-5430Z	08-16-95	.01	.01	.02	.01	.20	.13	.11
St. Martin Parish								
SMn-5731Z	03-14-95	<0.02	<0.01	<0.02	2.0	1.9	0.85	0.02
SMn-6248Z	03-14-95	<.02	<.01	<.02	.20	<.20	.41	.41
Vermilion Parish								
Ve-5690Z	06-05-95	<.02	<.01	<.02	1.4	1.3	.39	.17
Ve-5778Z	06-06-95	<.02	<.01	<.02	.79	.71	.25	.02
Ve-6244Z	06-06-95	<.02	<.01	<.02	2.8	2.7	.37	.12
Ve-6489Z	06-07-95	.28	<.01	.29	.02	<.20	.43	.42
Ve-6678Z	06-06-95	<.02	<.01	<.02	1.8	1.7	.20	.14
Ve-7020Z	06-06-95	<.02	<.01	<.02	2.2	2.0	.22	.13
Ve-7021Z	06-06-95	<.02	<.01	<.02	1.7	1.6	.34	.27
Ve-7327Z	06-05-95	<.02	<.01	<.02	.95	.93	.44	.05
Ve-7361Z	06-06-95	<.02	<.01	<.02	2.0	1.8	.27	<.01
Ve-7483Z	06-06-95	<.02	<.01	<.02	3.0	2.8	.33	.10

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phos-phorus, dissolved (as P)	Phos-phorus, ortho, dissolved (as P)
				Vermilion Parish--continued				
Ve-7533Z	06-07-95	<.02	<.01	<.02	.78	.73	.42	.14
Ve-7613Z	06-05-95	<.02	<.01	<.02	2.5	2.3	.29	.08
Ve-7723Z	06-06-95	<.02	<.01	<.02	3.2	3.0	.35	.08
Ve-7835Z	06-05-95	<.02	<.01	<.02	1.5	1.4	.54	.04
Ve-7886Z	06-05-95	<.02	<.01	<.02	.69	.71	.53	.05
Ve-7908Z	06-06-95	<.02	<.01	<.02	.59	.59	.39	.02
Ve-7952Z	06-07-95	<.02	<.01	<.02	.12	<.20	.56	.56
Ve-8114Z	06-07-95	<.02	<.01	<.02	.10	<.20	.28	.02
Ve-8116Z	06-20-95	<.02	<.01	<.02	2.0	1.7	.23	.08
Ve-8128Z	06-07-95	<0.02	<0.01	<0.02	0.21	<0.20	0.30	0.05
Ve-8144Z	06-06-95	<.02	<.01	<.02	.64	.61	.40	.02
Ve-8152Z	06-07-95	<.02	<.01	<.02	.21	.21	.42	.09
Ve-8164Z	06-05-95	<.02	<.01	<.02	1.8	1.7	.32	.18
Ve-8260Z	06-20-95	<.02	<.01	<.02	.37	.38	.11	.11
Ve-8296Z	06-06-95	<.02	<.01	<.02	1.6	1.4	.16	.02
Ve-8314Z	06-06-95	<.02	<.01	<.02	.36	.37	.20	.09
				Vernon Parish				
V-5027Z	07-28-94	.01	<.01	.02	--	--	--	--
V-5483Z	07-19-95	.07	<.01	.08	.02	<.20	.03	<.01
V-5515Z	08-15-95	.01	<.01	.02	.01	<.20	<.02	.01

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Nitrogen, nitrate, dissolved (as N)	Nitrogen, nitrite, dissolved (as N)	Nitrogen, nitrite plus nitrate dissolved (as N)	Nitrogen, ammonia, dissolved (as N)	Nitrogen, ammonia plus organic, dissolved (as N)	Phosphorus, dissolved (as P)	Phosphorus, ortho, dissolved (as P)
				Vernon Parish--continued				
V-5706Z	07-19-95	1.6	<.01	1.6	.02	<.20	.12	.08
V-5739Z	08-15-95	1.4	.01	1.4	.01	.20	.02	.01
V-5756Z	07-28-94	<.02	<.01	<.02	--	--	--	--
V-5774Z	07-19-95	.25	<.01	.26	.03	<.20	.10	.10
V-5822Z	08-15-95	.41	.01	.42	.01	.20	.02	.01
V-5826Z	08-15-95	.28	.01	.29	.01	.20	.02	.01
V-5887Z	07-19-95	3.0	<.01	3.0	.02	<.20	<.02	.01
V-5915Z	07-19-95	.03	<.01	.04	.02	<.20	<.02	.01
V-5916Z	07-19-95	<.02	<.01	<.02	.02	<.20	<.02	.01
	[1]07-19-95	<.02	<.01	<.02	.02	<.20	<.02	.01
V-5948Z	07-19-95	0.01	<0.01	0.02	0.02	<0.20	0.09	0.07
V-5949Z	08-15-95	.01	.01	.02	.02	.20	.19	.19
	[1]08-15-95	.01	.01	.02	.02	.20	.17	.19
V-5956Z	08-15-95	.03	.01	.04	.01	.20	.02	.01
	[1]08-15-95	.01	.01	.02	.01	.20	.02	.01
V-6002Z	07-19-95	.03	<.01	.04	.02	<.20	.02	.02
V-6011Z	07-19-95	<.02	<.01	<.02	.02	<.20	<.02	.01
V-6035Z	07-19-95	<.02	<.01	<.02	.02	<.20	<.02	.01
V-6081Z	08-15-95	5.6	<.01	5.6	.01	<.20	<.02	<.01

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Acadia Parish				
Ac-5227Z	02-14-95	380	7.5	19.5	120	35	8.8
Ac-5667Z	02-27-95	452	7.4	20.5	160	44	11
Ac-5716Z	02-14-95	814	7.5	20.0	200	55	16
Ac-5898Z	02-14-95	620	7.4	21.0	190	48	17
Ac-6071Z	02-27-95	705	7.5	22.0	220	56	20
Ac-6196Z	02-13-95	631	7.0	19.5	240	60	22
Ac-6218Z	02-14-95	692	7.5	21.0	200	53	16
Ac-6244Z	02-15-95	743	7.4	21.5	230	57	21
Ac-6285Z	02-27-95	564	7.4	21.5	210	51	20
Ac-6447Z	02-14-95	673	7.5	21.5	220	57	20
Ac-6449Z	02-15-95	685	7.5	20.5	210	54	18
Ac-6477Z	02-13-95	551	7.3	20.0	250	60	25
Ac-6569Z	02-13-95	688	7.1	21.5	250	67	21
Ac-6571Z	02-14-95	1,320	7.3	21.0	370	87	38
Ac-6636Z	02-27-95	608	7.5	21.0	170	43	14
Ac-6639Z	02-13-95	592	7.2	21.0	270	70	22
Ac-6642Z	02-14-95	714	7.4	21.0	200	54	16
Ac-6674Z	02-27-95	650	7.3	21.5	220	62	17
Ac-6763Z	02-14-95	672	7.6	21.5	140	38	11

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Acadia Parish--continued				
Ac-6828Z	02-28-95	638	7.5	21.5	150	42	12
Ac-6854Z	02-14-95	999	7.4	21.0	270	70	22
Ac-6864Z	02-14-95	666	7.5	21.5	220	56	20
			Allen Parish				
Al-264	[1]07-01-69	117	6.8	20.5	34	9.0	2.8
	12-05-95	237	6.4	21.5	5	1.6	.36
Al-277	12-05-95	89	6.0	21.5	11	2.7	1.1
Al-310	[1]09-15-75	--	6.1	20.0	20	4.9	1.9
	12-06-95	121	6.1	19.5	22	6.0	1.8
Al-316	12-05-95	64	4.9	17.5	9	2.3	.84
Al-404	12-05-95	36	5.0	20.5	6	1.2	.68
Al-5334Z	12-05-95	46	5.3	18.0	6	1.4	.51
			Beauregard Parish				
Be-61	07-27-94	227	6.4	26.0	57	14	5.4
Be-495	07-27-94	104	6.1	22.5	25	6.2	2.2
Be-5097Z	07-18-95	37	5.3	20.5	8	1.8	.75
	[1]07-18-95	37	5.3	20.5	8	1.8	.75

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Beauregard Parish--continued				
Be-5669Z	07-18-95	31	5.2	21.0	7	1.6	.82
	[1]07-18-95	31	5.2	21.0	7	1.5	.81
Be-5886Z	07-19-95	27	4.9	20.5	4	.79	.56
Be-5891Z	07-18-95	27	5.1	19.5	4	.90	.44
	[1]07-18-95	27	5.1	19.5	4	.90	.44
Be-5956Z	07-18-95	102	5.7	20.5	21	5.2	2.0
	[1]07-18-95	102	5.7	20.5	21	5.2	2.0
			Calcasieu Parish				
Cu-5250Z	03-28-95	418	7.1	21.0	120	30	12
Cu-5279Z	03-28-95	1,180	7.3	22.0	230	54	24
Cu-5350Z	03-28-95	739	7.5	22.0	140	34	13
Cu-5412Z	03-29-95	316	7.2	20.0	83	23	6.3
Cu-5429Z	03-28-95	636	7.8	18.5	130	35	11
Cu-5811Z	07-26-94	944	7.4	24.5	88	24	6.9
Cu-6103Z	03-29-95	388	7.8	21.5	110	34	7.1
Cu-6106Z	03-29-95	761	7.7	20.5	73	17	7.4
Cu-6161Z	03-28-95	408	7.5	20.5	100	28	8.1
Cu-6235Z	03-29-95	419	7.6	20.5	47	12	4.1
Cu-6552Z	03-28-95	578	7.8	19.5	120	35	9.0

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Calcasieu Parish--continued				
Cu-6694Z	03-27-95	434	7.7	23.0	80	21	6.7
Cu-6767Z	03-29-95	324	7.3	21.5	88	25	6.3
Cu-6799Z	03-28-95	619	7.8	22.0	130	34	9.8
Cu-7054Z	07-27-94	692	7.3	23.0	92	22	8.9
Cu-7341Z	03-28-95	362	7.5	23.5	100	29	6.7
Cu-7542Z	07-26-94	837	7.1	23.0	160	41	14
Cu-7678Z	03-29-95	407	8.2	21.5	46	13	3.2
Cu-7782Z	07-27-94	912	6.7	21.5	200	50	18
Cu-7948Z	03-29-95	293	7.3	21.5	66	18	5.0
Cu-7952Z	03-29-95	300	7.5	20.5	66	18	5.0
Cu-7955Z	03-27-95	349	7.5	23.0	110	35	6.6
Cu-7967Z	03-27-95	290	6.9	21.5	86	22	7.5
Cu-7979Z	03-28-95	595	7.5	22.0	160	41	13
Cu-8507Z	03-28-95	586	7.9	22.5	72	17	7.1
Cu-8638Z	03-29-95	403	8.0	20.5	49	13	4.0
Cu-8667Z	03-28-95	511	7.5	20.5	130	29	13
			Cameron Parish				
Cn-5195Z	05-09-95	573	7.4	22.0	130	16	22
Cn-5553Z	05-09-95	751	7.5	22.5	170	49	12

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Evangeline Parish				
Ev- 475	01-23-96	695	7.1	21.0	310	60	40
Ev- 583	01-24-96	328	7.0	18.0	110	27	9.8
Ev- 848	01-24-96	509	7.3	18.0	160	43	13
Ev- 850	01-24-96	502	7.2	20.5	160	46	12
Ev- 892	12-05-95	434	6.8	20.5	150	40	13
Ev-5314Z	01-24-96	629	7.0	21.0	170	46	13
			Iberia Parish				
I-5131Z	06-20-95	544	7.2	21.5	190	47	17
I-5578Z	06-20-95	534	7.2	23.0	220	62	15
I-5589Z	06-20-95	556	7.3	21.5	200	52	18
I-5672Z	06-20-95	938	7.1	21.5	440	110	40
I-5701Z	06-20-95	441	7.3	21.0	180	52	13
I-5790Z	06-21-95	496	7.2	22.0	210	59	14
I-5877Z	06-20-95	700	7.4	22.5	260	66	22
I-6179Z	06-20-95	908	7.0	22.0	410	110	34
I-6203Z	06-21-95	266	6.2	21.5	1	0.21	0.05

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Jefferson Davis Parish				
JD-5110Z	03-01-95	366	7.3	16.0	100	23	11
JD-5206Z	03-01-95	405	8.0	15.5	2	.45	.11
JD-5233Z	02-28-95	638	7.6	22.0	150	41	11
JD-5299Z	03-01-95	264	7.6	19.5	75	18	7.3
JD-5728Z	02-28-95	544	7.6	20.0	160	39	15
JD-5816Z	02-28-95	451	7.4	21.5	140	34	13
JD-5839Z	02-28-95	558	7.6	22.0	170	47	12
JD-5920Z	02-28-95	541	7.7	21.0	170	44	14
JD-5938Z	03-15-95	308	6.9	19.0	52	12	5.4
JD-5980Z	02-28-95	420	7.1	21.0	120	27	13
JD-6021Z	02-28-95	448	7.1	21.0	120	28	12
JD-6047Z	02-28-95	1,080	7.2	20.0	160	38	15
JD-6175Z	02-28-95	503	7.1	21.5	150	36	15
JD-6207Z	02-28-95	1,040	7.5	20.5	150	37	14
JD-6261Z	02-28-95	424	7.2	21.5	120	30	12
			Lafayette Parish				
Lf-6096Z	03-14-95	438	7.1	19.5	220	52	22
Lf-6778Z	03-14-95	144	6.4	20.5	46	12	3.9
Lf-7025Z	03-13-95	458	7.2	21.0	170	48	13

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Lafayette Parish--continued				
Lf-7105Z	03-14-95	244	7.1	20.5	92	21	9.6
Lf-7342Z	03-13-95	137	6.4	20.5	43	11	3.7
Lf-7409Z	03-13-95	473	7.2	20.5	170	48	12
Lf-7413Z	03-14-95	117	6.1	20.5	29	6.8	3.0
Lf-7442Z	03-13-95	113	6.1	20.5	29	7.0	2.8
Lf-7486Z	03-14-95	435	7.1	21.0	100	25	10
			Rapides Parish				
R-5135Z	08-16-95	59	5.7	21.5	7	1.6	.75
R-5139Z	08-16-95	39	5.9	19.5	5	1.4	.45
R-5142Z	08-16-95	44	5.6	20.5	7	1.8	.64
R-5145Z	08-16-95	95	6.4	23.5	15	3.7	1.4
R-5200Z	08-16-95	131	5.5	22.0	30	7.9	2.5
R-5379Z	08-16-95	49	5.4	--	7	1.8	.70
R-5385Z	08-16-95	33	5.4	19.5	7	1.8	.63
R-5392Z	08-16-95	135	6.3	21.0	37	8.6	3.7
R-5415Z	08-16-95	42	5.4	20.0	11	2.8	.87
R-5430Z	08-16-95	126	6.1	26.5	25	5.7	2.5

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			St. Martin Parish				
SMn-5731Z	03-14-95	591	7.1	19.5	280	73	24
SMn-6248Z	03-14-95	236	6.8	20.5	84	19	8.9
			Vermilion Parish				
Ve-5690Z	06-05-95	838	7.3	22.0	150	36	14
Ve-5778Z	06-06-95	658	7.2	23.0	210	56	16
Ve-6244Z	06-06-95	840	7.5	22.5	190	50	16
Ve-6489Z	06-07-95	228	6.5	21.5	71	18	6.3
Ve-6678Z	06-06-95	1,100	7.5	23.5	180	43	18
Ve-7020Z	06-06-95	1,610	7.6	22.5	170	40	17
Ve-7021Z	06-06-95	1,140	7.6	23.5	130	31	12
Ve-7327Z	06-05-95	825	7.2	21.5	180	46	17
Ve-7361Z	06-06-95	3,450	7.1	21.5	690	180	58
Ve-7483Z	06-06-95	938	7.5	22.5	210	55	18
Ve-7533Z	06-07-95	490	7.0	22.0	170	42	17
Ve-7613Z	06-05-95	687	7.4	22.0	160	40	15
Ve-7723Z	06-06-95	827	7.5	22.0	200	52	17
Ve-7835Z	06-05-95	885	7.2	21.5	220	59	18
Ve-7886Z	06-05-95	792	7.2	21.5	230	59	19

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Vermilion Parish--continued				
Ve-7908Z	06-06-95	793	7.2	21.0	190	47	18
Ve-7952Z	06-07-95	236	6.5	21.0	75	18	7.3
Ve-8114Z	06-07-95	603	7.0	21.5	160	39	16
Ve-8116Z	06-20-95	705	7.3	22.0	190	45	18
Ve-8128Z	06-07-95	509	7.2	21.5	170	47	12
Ve-8144Z	06-06-95	862	7.1	20.0	220	57	18
Ve-8152Z	06-07-95	608	7.0	21.5	140	38	11
Ve-8164Z	06-05-95	859	7.3	21.5	160	38	15
Ve-8260Z	06-20-95	599	7.2	22.0	150	43	11
Ve-8296Z	06-06-95	950	7.5	22.0	240	65	20
Ve-8314Z	06-06-95	760	7.5	22.0	140	35	12
			Vernon Parish				
V-5027Z	07-28-94	46	6.1	24.0	9	2.3	.82
V-5483Z	07-19-95	23	5.1	20.5	4	1.2	.34
V-5515Z	08-15-95	280	6.3	21.0	120	41	4.2
V-5706Z	07-19-95	76	5.5	24.0	10	2.2	1.2
V-5739Z	08-15-95	39	5.0	21.0	11	2.4	1.1
V-5756Z	07-28-94	52	5.8	20.5	9	2.5	.72

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Specific conductance, in microsiemens per centimeter at 25 degrees Celsius	pH, in standard units	Water temperature, in degrees Celsius	Hardness, total (as $CaCO_3$)	Calcium, dissolved (as Ca)	Magnesium, dissolved (as Mg)
			Vernon Parish--continued				
V-5774Z	07-19-95	103	6.3	21.5	18	4.3	1.8
V-5822Z	08-15-95	28	5.1	21.5	4	.95	.32
V-5826Z	08-15-95	38	5.1	20.5	6	1.4	.65
V-5887Z	07-19-95	55	5.3	20.0	12	3.2	.97
V-5915Z	07-19-95	55	5.4	19.5	7	1.8	.57
V-5916Z	07-19-95	55	5.5	21.0	10	2.5	1.0
	[1]07-19-95	55	5.5	21.0	11	2.6	1.0
V-5948Z	07-19-95	68	5.7	20.5	11	2.7	1.0
V-5949Z	08-15-95	94	5.8	22.5	13	4.4	.43
	[1]08-15-95	94	5.8	22.5	--	4.5	.40
V-5956Z	08-15-95	42	5.4	23.0	10	3.0	.67
	[1]08-15-95	42	5.4	23.0	--	3.0	.70
V-6002Z	07-19-95	56	5.8	20.5	11	2.6	1.0
V-6011Z	07-19-95	40	5.3	20.5	8	2.2	.66
V-6035Z	07-19-95	31	5.3	21.0	6	1.8	.45
V-6081Z	08-15-95	74	4.8	19.5	18	3.2	2.5

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
					Acadia Parish						
Ac-5227Z	02-14-95	31	1.1	151	<0.20	30	0.26	46	242	840	210
Ac-5667Z	02-27-95	41	1.4	193	<.20	31	.20	43	264	1,700	140
Ac-5716Z	02-14-95	96	2.5	276	<.20	100	.16	33	468	1,500	100
Ac-5898Z	02-14-95	64	2.1	310	<.20	22	.17	38	372	1,500	62
Ac-6071Z	02-27-95	79	2.7	355	<.20	24	.11	37	408	1,600	110
Ac-6196Z	02-13-95	63	.80	199	1.3	64	.31	27	420	6	<1
Ac-6218Z	02-14-95	72	2.1	264	<.20	70	.19	34	404	2,200	130
Ac-6244Z	02-15-95	69	2.2	323	<.20	29	.17	36	410	2,500	87
Ac-6285Z	02-27-95	49	2.7	297	<.20	16	.15	37	324	670	100
Ac-6447Z	02-14-95	68	2.7	348	<.20	24	.13	30	408	1,600	100
Ac-6449Z	02-15-95	74	2.5	321	<.20	26	.14	34	408	3,400	83
Ac-6477Z	02-13-95	38	1.7	322	<.20	12	.22	34	362	1,500	160
Ac-6569Z	02-13-95	49	2.6	327	3.9	24	.18	36	390	2,200	150
Ac-6571Z	02-14-95	140	3.9	484	<.20	170	<.10	33	766	2,000	84
Ac-6636Z	02-27-95	72	1.8	250	<.20	53	.17	40	346	1,900	120
Ac-6639Z	02-13-95	44	1.7	306	.53	45	.21	35	402	2,300	170
Ac-6642Z	02-14-95	75	2.0	259	<.20	76	.17	36	420	2,200	210
Ac-6674Z	02-27-95	65	1.6	122	1.8	31	.23	32	378	2,200	160
Ac-6763Z	02-14-95	88	2.4	226	<.20	83	.15	40	398	1,100	84
Ac-6828Z	02-28-95	86	1.8	243	<.20	65	.18	38	364	1,400	80

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
					Acadia Parish--continued						
Ac-6854Z	02-14-95	110	2.8	290	<0.20	160	0.19	34	568	3,400	230
Ac-6864Z	02-14-95	66	2.6	330	<.20	24	.13	31	402	1,700	130
					Allen Parish						
Al- 264	[1]07-01-69	11	1.5	49	1.4	6.9	.10	40	116	8,100	230
	12-05-95	50	.82	97	1.7	11	.39	47	192	200	7
Al- 277	12-05-95	13	1.0	24	.71	11	<.10	22	92	3	1
Al- 310	[1]09-15-75	19	2.2	44	5.2	5.2	1.8	49	119	3,100	440
	12-06-95	11	1.4	27	3.2	5.6	.12	32	94	5,100	590
Al- 316	12-05-95	5.1	2.4	8	.26	7.1	<.10	17	52	210	4
Al- 404	12-05-95	3.7	1.1	9	<.20	5.6	<.10	22	44	5	<1
Al-5334Z	12-05-95	5.5	1.7	14	.34	3.9	<.10	35	64	<3	<1
					Beauregard Parish						
Be-61	07-27-94	22	1.8	--	3.9	19	.17	61	172	--	--
Be-495	07-27-94	10	1.6	--	1.8	6.5	<.10	50	108	--	--
Be-5097Z	07-18-95	4.9	1.1	11	.42	4.8	<.10	17	36	3	3
	[1]07-18-95	4.1	1.1	11	.43	4.7	<.10	17	48	3	3
Be-5669Z	07-18-95	2.8	1.2	9	.31	3.6	<.10	17	54	4	2
	[1]07-18-95	2.7	1.3	9	.31	3.7	<.10	17	48	3	2
Be-5886Z	07-19-95	3.2	.85	10	.46	4.0	<.10	14	30	11	7

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
Beauregard Parish--continued											
Be-5891Z	07-18-95	3.1	1.5	9	.25	3.6	<.10	15	30	4	3
	[1]07-18-95	3.0	1.6	9	.23	3.5	<.10	15	42	4	2
Be-5956Z	07-18-95	12	1.3	34	1.2	13	<.10	51	106	5	1
	[1]07-18-95	13	1.4	34	1.2	13	<.10	50	114	6	2
Calcasieu Parish											
Cu-5250Z	03-28-95	45	1.6	170	5.5	33	0.19	38	266	630	420
Cu-5279Z	03-28-95	190	2.0	391	74	130	.45	24	726	240	300
Cu-5350Z	03-28-95	120	1.3	254	48	65	.20	31	478	910	180
Cu-5412Z	03-29-95	37	2.0	131	2.5	23	.16	47	228	1,000	340
Cu-5429Z	03-28-95	84	2.1	187	<.20	96	.15	19	356	7,700	190
Cu-5811Z	07-26-94	170	2.0	--	<.20	170	.13	32	532	--	--
Cu-6103Z	03-29-95	45	1.4	196	<.20	14	<.10	27	250	67	110
Cu-6106Z	03-29-95	160	1.4	362	7.4	39	.62	23	484	110	90
Cu-6161Z	03-28-95	53	1.4	200	<.20	19	.12	30	260	240	100
Cu-6235Z	03-29-95	84	.89	202	<.20	20	.17	18	262	260	52
Cu-6552Z	03-28-95	88	1.6	275	<.20	34	<.10	27	372	250	89
Cu-6694Z	03-27-95	73	1.2	213	1.5	18	<.10	16	260	110	100
Cu-6767Z	03-29-95	35	2.0	134	<.20	24	.18	39	220	3,600	340
Cu-6799Z	03-28-95	96	1.5	278	<.20	42	.13	26	398	160	32
Cu-7054Z	07-27-94	130	1.3	--	.38	33	.28	19	418	--	--

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
					Calcasieu Parish--continued						
Cu-7341Z	03-28-95	43	1.9	168	1.5	15	.13	40	256	310	250
Cu-7542Z	07-26-94	130	1.6	--	39	70	.16	24	502	--	--
Cu-7678Z	03-29-95	81	.90	204	.12	15	.12	15	258	34	46
Cu-7782Z	07-27-94	110	2.5	--	<.20	160	.18	42	509	--	--
Cu-7948Z	03-29-95	40	1.9	126	.25	20	.24	45	208	530	280
Cu-7952Z	03-29-95	44	1.5	142	2.3	12	.24	28	198	50	150
Cu-7955Z	03-27-95	31	2.0	157	2.8	19	0.11	51	240	310	210
Cu-7967Z	03-27-95	27	2.1	114	2.9	22	.20	52	196	2,900	290
Cu-7979Z	03-28-95	73	2.0	215	31	51	.16	40	388	400	270
Cu-8507Z	03-28-95	120	1.2	285	<.20	28	.12	19	370	89	93
Cu-8638Z	03-29-95	80	.88	202	<.20	15	.14	18	254	55	63
Cu-8667Z	03-28-95	69	2.0	220	1.4	38	.24	23	312	43	110
					Cameron Parish						
Cn-5195Z	05-09-95	68	2.6	206	<.20	62	.17	36	312	340	120
Cn-5553Z	05-09-95	94	2.3	233	<.20	100	.14	26	404	570	73
					Evangeline Parish						
Ev- 475	01-23-96	38	2.0	369	<.20	7.9	.31	30	394	2,000	150
Ev- 583	01-24-96	27	1.1	124	2.1	24	.22	42	206	2,000	200
Ev- 848	01-24-96	39	1.5	183	<.20	40	.22	47	288	2,900	290

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
Evangeline Parish--continued											
Ev- 850	01-24-96	39	1.4	175	<.20	49	.20	48	298	1,800	340
Ev- 892	12-05-95	21	1.0	167	4.9	21	.20	21	252	4,200	290
Ev-5314Z	01-24-96	74	1.4	220	31	44	.50	36	376	1,800	280
Iberia Parish											
I-5131Z	06-20-95	45	1.3	259	<.20	10	.19	30	302	1,200	230
I-5578Z	06-20-95	26	2.0	260	<.20	8.7	.23	34	312	140	280
I-5589Z	06-20-95	34	1.4	258	<.20	14	.23	32	308	1,000	190
I-5672Z	06-20-95	38	1.8	501	<.20	8.6	.16	34	500	2,300	450
I-5701Z	06-20-95	18	1.4	214	.77	6.7	.22	41	262	520	120
I-5790Z	06-21-95	35	1.6	252	<0.20	14	0.24	36	308	1,800	320
I-5877Z	06-20-95	49	2.2	311	<.20	27	.12	34	388	770	96
I-6179Z	06-20-95	32	3.1	458	<.20	9.6	.15	40	486	2,900	310
I-6203Z	06-21-95	60	.21	115	1.8	10	.37	36	178	5	2
Jefferson Davis Parish											
JD-5110Z	03-01-95	36	1.4	128	.34	36	.32	45	218	5,100	400
JD-5206Z	03-01-95	100	.41	203	.24	12	.70	19	262	68	2
JD-5233Z	02-28-95	85	1.5	200	<.20	89	.13	40	360	820	90
JD-5299Z	03-01-95	27	1.4	100	1.9	24	.33	47	172	390	400
JD-5728Z	02-28-95	63	1.3	222	6.4	50	.26	30	308	200	220

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
Jefferson Davis Parish--continued											
JD-5816Z	02-28-95	47	1.2	177	<.20	44	.21	42	262	990	170
JD-5839Z	02-28-95	56	1.6	197	.27	66	.13	42	318	910	130
JD-5920Z	02-28-95	53	1.3	201	<.20	53	.14	31	304	450	150
JD-5938Z	03-15-95	40	1.3	100	2.6	29	.25	50	206	3,300	360
JD-5980Z	02-28-95	45	1.4	154	5.9	43	.26	50	246	2,400	250
JD-6021Z	02-28-95	52	1.6	151	3.8	56	.23	51	266	1,600	390
JD-6047Z	02-28-95	160	2.3	184	<.20	250	.19	45	596	2,000	250
JD-6175Z	02-28-95	44	1.5	141	16	64	.24	48	302	2,600	300
JD-6207Z	02-28-95	160	2.1	202	1.2	230	.23	41	582	840	170
JD-6261Z	02-28-95	43	1.4	147	6.6	43	.22	48	250	1,900	280
Lafayette Parish											
Lf-6096Z	03-14-95	6.8	1.4	230	6.3	2.8	.28	41	276	590	980
Lf-6778Z	03-14-95	10	2.7	66	1.6	2.3	0.24	43	114	3	<1
Lf-7025Z	03-13-95	27	1.8	230	<0.20	7.3	0.21	33	260	1,400	290
Lf-7105Z	03-14-95	14	1.7	--	.42	3.3	.31	39	160	90	490
Lf-7342Z	03-13-95	11	.80	66	5.3	5.2	.28	47	116	4,200	<1
Lf-7409Z	03-13-95	33	1.7	235	<.20	9.3	.19	34	276	1,200	280
Lf-7413Z	03-14-95	11	1.2	43	1.7	5.2	.12	39	102	12	<1
Lf-7442Z	03-13-95	11	1.6	42	1.7	4.7	.21	35	100	40	1
Lf-7486Z	03-14-95	54	1.2	212	<.20	12	.42	32	260	2,400	370

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
					Rapides Parish						
R-5135Z	08-16-95	3.4	2.0	30	.33	3.5	<.10	20	62	9	2
R-5139Z	08-16-95	4.6	1.2	13	.20	3.2	<.10	23	48	13	1
R-5142Z	08-16-95	5.3	1.1	16	<.20	3.8	<.10	32	58	8	<1
R-5145Z	08-16-95	13	.90	27	1.0	12	<.10	43	94	4	1
R-5200Z	08-16-95	12	1.8	18	<.20	29	<.10	35	124	20	2
R-5379Z	08-16-95	5.4	1.1	18	.21	5.9	<.10	20	44	920	81
R-5385Z	08-16-95	3.6	1.3	18	.33	2.5	<.10	24	52	4	<1
R-5392Z	08-16-95	12	.74	43	.63	15	<.10	54	140	13	<1
R-5415Z	08-16-95	3.9	1.3	17	.54	3.7	<.10	25	48	4	<1
R-5430Z	08-16-95	16	1.2	46	.68	12	<.10	52	118	5	4
					St. Martin Parish						
SMn-5731Z	03-14-95	19	3.3	339	<.20	5.1	.16	38	356	6,200	92
SMn-6248Z	03-14-95	12	1.2	116	<.20	3.1	.23	49	160	3,900	200
					Vermilion Parish						
Ve-5690Z	06-05-95	130	2.4	363	<0.20	47	0.20	33	466	920	64
Ve-5778Z	06-06-95	52	1.6	303	<.20	23	.17	34	358	1,100	160
Ve-6244Z	06-06-95	100	2.7	371	<.20	39	.10	32	454	980	76
Ve-6489Z	06-07-95	17	1.3	85	1.8	14	.30	21	150	3	660
Ve-6678Z	06-06-95	160	2.3	352	<.20	130	<.10	25	582	400	34

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
					Vermilion Parish--continued						
Ve-7020Z	06-06-95	280	3.1	354	<.20	290	<.10	25	838	410	69
Ve-7021Z	06-06-95	200	2.2	345	<.20	150	.10	27	600	380	32
Ve-7327Z	06-05-95	110	1.9	352	<.20	39	.26	30	454	1,400	120
Ve-7361Z	06-06-95	400	4.5	295	<.20	940	.12	34	2,260	4,400	190
Ve-7483Z	06-06-95	110	3.1	395	<.20	57	<.10	31	502	1,000	91
Ve-7533Z	06-07-95	28	1.2	234	<.20	9.9	.26	38	258	920	340
Ve-7613Z	06-05-95	76	1.3	312	<.20	26	.15	33	378	1,300	41
Ve-7723Z	06-06-95	98	2.9	372	<.20	35	.10	32	450	1,100	110
Ve-7835Z	06-05-95	96	2.2	347	<.20	62	.19	35	478	1,500	140
Ve-7886Z	06-05-95	68	1.8	289	<.20	70	.19	37	422	2,200	300
Ve-7908Z	06-06-95	94	2.2	320	<.20	51	.29	34	426	2000	160
Ve-7952Z	06-07-95	16	1.1	107	<.20	5.8	.25	43	152	34	1,000
Ve-8114Z	06-07-95	62	1.9	266	<.20	25	.35	37	338	2,000	220
Ve-8116Z	06-20-95	74	2.4	308	.27	21	.19	31	374	1,600	47
Ve-8128Z	06-07-95	38	1.3	231	<.20	16	.23	35	286	1,200	130
Ve-8144Z	06-06-95	88	1.6	280	<.20	95	.22	30	458	1,700	200
Ve-8152Z	06-07-95	74	1.2	265	<.20	26	0.35	29	346	1,600	210
Ve-8164Z	06-05-95	130	1.3	353	<0.20	52	0.17	29	468	620	77
Ve-8260Z	06-20-95	67	2.2	262	<.20	26	.23	32	338	1,300	170
Ve-8296Z	06-06-95	90	2.6	306	<.20	110	.11	30	498	1,200	90
Ve-8314Z	06-06-95	100	1.5	228	<.20	91	.15	36	412	730	66

Appendix 2. Nitrate concentrations and selected water-quality properties and constituents in water from wells sampled in southwestern Louisiana--Continued

Well name	Date sampled	Sodium, dissolved (as Na)	Potassium, dissolved (as K)	Alkalinity, total (as $CaCO_3$)	Sulfate, dissolved (as SO_4)	Chloride, dissolved (as Cl)	Fluoride, dissolved (as F)	Silica, dissolved (as SiO_2)	Dissolved solids, residue at 180 degrees Celsius	Iron, dissolved (in micrograms per liter as Fe)	Manganese, dissolved (in micrograms per liter as Mn)
					Vernon Parish						
V-5027Z	07-28-94	4.6	1.2	--	5.2	4.1	<.10	58	90	--	--
V-5483Z	07-19-95	2.3	.76	9	.42	3.8	<.10	12	24	3	2
V-5515Z	08-15-95	13	1.2	122	1.0	12	.23	34	184	4	12
V-5706Z	07-19-95	12	.68	21	.33	9.2	<.10	46	104	<3	2
V-5739Z	08-15-95	2.1	1.0	8	4.9	2.8	<.10	10	38	13	20
V-5756Z	07-28-94	6.0	1.4	--	.82	4.2	<.10	35	67	--	--
V-5774Z	07-19-95	13	1.6	28	3.6	14	<.10	32	94	10	30
V-5822Z	08-15-95	3.6	1.0	11	.67	3.8	<.10	17	34	4	1
V-5826Z	08-15-95	4.5	1.1	13	.37	5.8	<.10	21	48	3	2
V-5887Z	07-19-95	4.7	1.9	11	.54	5.5	<.10	21	66	3	2
V-5915Z	07-19-95	9.1	1.2	24	.56	4.6	<.10	34	70	44	4
V-5916Z	07-19-95	6.6	2.2	23	.55	4.6	<.10	34	80	4	2
	[1]07-19-95	6.8	2.1	23	.53	4.5	<.10	35	76	4	1
V-5948Z	07-19-95	10	1.2	29	.66	5.7	<.10	46	94	4	1
V-5949Z	08-15-95	14	2.6	34	7.5	4.2	.10	69	124	35	56
	[1]08-15-95	14	2.5	34	7.5	4.1	<.10	70	132	37	54
V-5956Z	08-15-95	3.2	2.4	18	1.1	3.6	<.10	64	98	<3	<1
	[1]08-15-95	3.2	2.3	18	1.1	3.9	<.10	63	102	4	1
V-6002Z	07-19-95	7.8	1.5	28	0.39	3.6	<0.10	46	86	3	1
V-6011Z	07-19-95	4.1	1.4	12	3.9	3.9	<.10	48	78	27	13
V-6035Z	07-19-95	3.0	1.9	14	.47	3.7	<.10	18	44	3	1
V-6081Z	08-15-95	4.2	1.3	6	.21	5.9	<.10	10	72	5	15

[1]Second or duplicate sample for comparison or quality-control purposes.