United States Department of the Interior
Geological Survey

SOFT-WATER ZONE IN THE CHICOT AQUIFER, BAYOU TECHE AREA, LOUISIANA

By R. L. Hosman

Open-file report
74-65

Prepared in cooperation with the
Louisiana Department of Public Works

Baton Rouge, La.

1974

STATE OF LOUISIANA

Edwin W. Edwards, Governor

DEPARTMENT OF PUBLIC WORKS

Roy Aguillard, Director
Hu B. Myers, Assistant Director
D. V. Cresap, Chief Engineer
E. J. Taylor, Hydraulic Engineer

UNITED STATES GEOLOGICAL SURVEY

V. E. McKelvey, Director
J. S. Cragwall, Jr., Chief Hydrologist
Alfred Clebsch, Jr., Regional Hydrologist
A. N. Cameron, District Chief

CONTENTS

ILLUSTRATIONS

TABLES

SOFT-WATER ZONE IN THE CHICOT AQUIFER, BAYOU TECHE AREA, LOUISIANA

By R. L. Hosman

ABSTRACT

Test drilling in the vicinity of Bayou Teche in St. Martin Parish in southern Louisiana has disclosed a zone of soft water in the basal unit of the Chicot aquifer; the Chicot aquifer system blankets all southwestern Louisiana. Fresh water, which is defined as containing 250 milligrams per liter chloride or less, in the Chicot aquifer is characteristically hard and high in iron concentration; in this area the hardness is generally 200-300 milligrams per liter. The soft-water zone, containing water with a hardness of less than 60 milligrams per liter, is anomalous and occurs in an area where the basal part of the aquifer is separated from the main body of the aquifer by a thick clay layer. The zone has been mapped in parts of St. Martin and adjoining Lafayette Parishes.

Although the exact areal extent of the zone cannot be determined with available data, it appears to be sufficiently large that the soft water should prove to be an important asset to the area. The water could be used by itself or mixed with either hard or slightly salty water (more than 250 milligrams per liter chloride) to provide a blend that would require little or no treatment for most purposes. Because of the proximity of salty water in much of the area, careful planning and monitoring will be necessary to maintain the soft-water zone as a dependable supply of usable water. The soft water appears to be an exhaustible supply; however, its useful life as a resource can be maximized by proper management.

INTRODUCTION

The area described in this report is mostly in St. Martin Parish in the vicinity of Bayou Teche from Cecilia to St. Martinville. Most of the population of the parish is concentrated in towns, plantations, and farms along the Teche. The economy, historically agricultural, is becoming more industrialized, especially in the St. Martinville area.

A total of eight municipal water-supply systems in the area of study--four in St. Martin, three in Lafayette, and one in St. Landry Parish--depend upon ground water for their source of supply. The systems in St. Martin Parish are for the towns of Cecilia, Breaux Bridge, St. Martinville, and Henderson-Nina. Those in Lafayette Parish are for Lafayette, Broussard, and Youngsville. Arnaudville, in St. Landry Parish, also uses ground water for its supply. All systems utilize water from the Chicot aquifer.

The Chicot aquifer, of Pleistocene age, blankets all southwestern Louisiana. The base of the aquifer dips generally southward (fig. 1), and the aquifer thickens in that direction. The aquifer is about 600 feet (180 meters) thick at the northern edge of the area of this report and about 1,000 feet (300 meters) thick in the southern part. The upper 50 to 100 feet (15 to 30 meters) of Pleistocene sediments is generally clay. This clay is the upper confining bed for the Chicot aquifer, and the water is under artesian conditions.

Considered regionally, the Chicot functions as a single vast aquifer system. However, in a sizable area in the Bayou Teche vicinity it is divided into two distinct hydrologic units (fig. 2). The two aquifer units are sufficiently separated by a clay unit to allow differences in water levels and, more important, in water quality. Both aquifer units are thick sands, generally graveliferous in the lower part and grading finer upward. The upper sand ranges in thickness from less than 300 feet (90 meters) to more than 600 feet (180 meters); the lower sand (fig. 3) ranges in thickness from less than 50 feet (15 meters) to more than 300 feet (90 meters). They are separated by a clay that ranges in thickness from a few feet to more than 400 feet (120 meters). Although the clay is irregular in thickness, it appears to thin and pinch out to the west and northwest and is absent locally in at least two areas east of Bayou Teche. The altitude of the top of the basal sand unit ranges from less than 500 feet (150 meters) below sea level in the northern part of the area to more than 900 feet (275 meters) below sea level in the southern part (fig. 4). Because ground elevations in the area range between 10 and 25 feet (3 and 8 meters) above sea level, the contours in figure 4 essentially represent depths to the top of the basal Chicot sand unit.

The Evangeline aquifer of Miocene and Pliocene age immediately underlies the basal sand unit of the Chicot aquifer (fig. 2). The Evangeline aquifer is a thick sequence of alternating sands and clays; the sands are interconnected to varying degrees and are considered to be one aquifer system. The basal sand unit of the Chicot is generally separated from uppermost sands in the Evangeline by varying thicknesses of Pliocene clay. Under natural conditions, water levels in the Evangeline in the area studied are higher than those in the Chicot aquifer. Fresh water[1/] in the Evangeline is typically soft and has a very low iron concentration, generally less than 1 mg/l (milligram per liter). However, the Evangeline contains only salty water in the area of this report.

Fresh water in the Chicot aquifer is characteristically a hard, calcium bicarbonate type and is commonly high in iron concentration;[2/] this is the type of water contained in the upper part of the Chicot aquifer in the Bayou Teche area. All the previously mentioned municipal water supplies were originally from wells in the upper part of the Chicot and thus have sustained high treatment costs.

[1/] In this report, fresh water is defined as that containing 250 mg/l or less of chloride.

[2/] In this report, hardness is classified as follows: Water having a hardness of 0-60 mg/l is considered soft, 61-120 mg/l is moderately hard, 121-180 mg/l is hard, and more than 180 mg/l is very hard. In Louisiana, water that is hard or very hard and (or) contains an iron concentration exceeding 0.3 mg/l generally is treated for public-supply use.

The Louisiana Department of Public Works conducts a statewide test-drilling program to provide data that will aid the formation of water districts in undeveloped areas or will guide the expansion or improvement of existing supplies. Although the basal Chicot sand unit has not been developed as a source of supply, electrical logs of oil-test holes show it to contain fresh water in part of the area in the vicinity of Bayou Teche. In response to a long-standing need for better quality water in the area, and based on the possibilities indicated by the electrical-log data, the Department of Public Works began a local test-drilling program in the Bayou Teche area in 1971. Test wells were drilled in the vicinities of the towns of Breaux Bridge, Arnaudville, Cecilia, Parks, and St. Martinville (St. Martin Parish Industrial Park). (See table 1 for a summary of the data obtained by test drilling.)

Results of the test drilling disclosed three types of water in the basal unit of the Chicot aquifer instead of two types as previously had been assumed. Prior data--electrical logs of oil-test holes and sparse chemical analyses--showed fresh water in the basal unit of the Chicot becoming salty to the east and to the south. The fresh water probably was assumed to be similar in quality to water in the upper unit of the Chicot--hence, the apparent lack of interest in developing the lower sand. Recent test drilling showed the assumption to be only partly true. In addition to the two known types, a zone of fresh water of anomalous quality was found to exist in an area that may exceed 100 square miles (260 square kilometers) in size; this water is a soft, sodium bicarbonate type, and is low in iron concentration. The contrast in hardness is striking, less than 60 mg/l for the soft water and 200-300 mg/l for the hard. (See table 2 for chemical analyses of water from test wells.) Laterally, the soft-water zone lies between typical hard water in the Chicot and the salty water in the basal unit of the Chicot aquifer downdip (fig. 5).

The purpose of this report is to describe the anomalous zone of fresh water in the basal unit of the Chicot in the Bayou Teche area as completely as possible, based on the limited available data. The information hopefully furnishes a basis that will help guide development of the zone as well as give direction to further exploration that will lead to more precise delineation of its extent. The report was prepared as part of the continuing program of water-resources investigation conducted by the U.S. Geological Survey in cooperation with the Louisiana Department of Public Works.

SOFT-WATER ZONE

Although the presence of the soft-water zone has been established, its extent cannot be accurately determined without additional test drilling to obtain chemical-quality data. Because the fresh soft water grades laterally and downward to salty water in parts of the area, complete understanding of fresh-salt water relations is essential to definition of the soft-water zone. Numerous electrical logs of oil tests in the area are available; but because of apparent abrupt changes in the texture and lithology of the basal unit of the Chicot, electrical resistivity from geophysical logs alone will not suffice as an indicator of fresh or salty water. Therefore, the size and shape of the soft-water zone as postulated in this report become more tentative with distance from test wells and may require substantial revision as additional water-quality information becomes available.

The surface outline of the zone containing the soft water appears to be a very irregularly shapped band. (See fig. 1.) At its probable northernmost limit, just north of Cecilia, it is about 1 mile wide (1.6 kilometers). The band extends southward and widens, possibly to as much as 6 miles (9.6 kilometers) in the vicinity of Parks. South of Parks the zone narrows somewhat and turns westward in the vicinity of St. Martinville. The zone appears to extend into southern Lafayette Parish at least as far as the town of Broussard where the basal unit of the Chicot aquifer contains soft water. It probably extends westward or southwestward beyond Broussard but cannot be traced in these directions; however, continuity with the zone at St. Martinville cannot be confirmed with available data.

In much of the area the soft water is underlain by salty water in the lower part of the basal sand unit (figs. 1-5). The salty water appears to follow the deeper parts of the aquifer, which would be expected because salty water has greater density than does fresh water. The basal sand unit contains salty water throughout its thickness to the east and south of the soft-water zone and in what appears to be an isolated area just north of St. Martinville. Northwest of the soft-water zone, water in the basal sand unit is of the type generally considered to be characteristic of the Chicot aquifer--hard and high in iron concentration. West of the town of Parks, the boundary between hard and soft water is indefinite, but it probably extends westward in the approximate latitude of Parks.

South of Parks a sand containing soft water occurs within the clay that separates the basal and upper units of the Chicot (fig. 2, well SMn-122). The hydraulic relations of this sand to other sands are not clear, but it probably is in contact with or interfingers with the basal unit of the Chicot aquifer. The sand appears to be of limited areal extent.

A fairly simple explanation for the presence of the soft-water zone in the Chicot aquifer may exist. In a small area immediately west of the town of St. Martinville the clay underlying the basal sand is absent, and the sand appears to be in contact with sand in the upper part of the Evangeline aquifer system. Through this contact a hydraulic connection between the aquifers may exist that allows exchange of water between them.

The chemical quality of the soft water in the basal unit of the Chicot is essentially the same as that considered to be characteristic of fresh water in the Evangeline. This water apparently moved upward from the Evangeline aquifer into the Chicot when natural head differences became sufficient to cause such movement. After entering the basal Chicot sand unit, the water appears to have moved westward and north-northeastward under the influence of head and permeability differences.

The upper sand in the Evangeline now contains only salty water in this area and can no longer furnish fresh water to the Chicot. Some of the salty water now in the basal unit of the Chicot probably originated in the Evangeline.

The fresh soft water in the basal Chicot sand unit probably is an exhaustible supply that will be replaced by hard or salty water as it is removed. Also, the salty water that underlies much of the soft-water zone can cone upward in response to pumping; thus, heavy withdrawals can cause deterioration in water quality as well as hasten depletion of the supply. However, dependable long-term supplies of usable water should be available if planning is based on moderate pumping rates and proper well spacing. Well yields ranging from a few tens of gallons per minute to several hundred gallons per minute should be possible, depending upon the thickness of sand and the proximity of salty water in the basal unit of the Chicot. Based on aquifer characteristics of the Chicot elsewhere, well yields of 1,000 gallons per minute (65 liters per second) or more may be available locally. However, such withdrawals probably would cause deterioration and hastened depletion of the supply.

Assuming the soft-water zone is at least 75 square miles (200 square kilometers) in extent, a minimum of 600 billion gallons (15 million cubic meters) of soft water is probably in storage. Although these estimates are considered to be conservative, because the zone is expected to prove to be considerably larger than estimated above, all the soft water is not recoverable. Location of major pumping centers with respect to salty water and to one another will determine how much of the supply can be withdrawn or how much can be withdrawn at any given location.

FINDINGS AND CONCLUSIONS

The soft-water zone underlies much of the more heavily populated parts of the Bayou Teche locale. Two areas in the soft-water zone appear especially promising for future development: (1) southwest of Parks and (2) north of St. Martinville. The latter area may be found to extend west or southwest beyond Broussard in Lafayette Parish. In fact, the two areas may be found to be continuous when additional information becomes available. In much of these two areas the fresh soft water is not underlain by salty water, and salt-water encroachment is not an immediate threat.

The area north and east of Parks may prove to have good potential for development. On the basis of electrical-log interpretation, the basal sand unit appears to contain fresh water from top to bottom in at least part of the area.

The soft-water zone in the basal Chicot sand can be a considerable asset to the Bayou Teche area; however, development of supplies from this source must be prudently planned and managed if its potential is to be realized. Controlled pumping designed to cope with salt-water encroachment is one means whereby the useful life of the resource can be extended. If tests show the different types of water to be chemically compatible, blending of fresh or even slightly salty water from the basal Chicot sand with water from the upper unit of the Chicot aquifer could also have beneficial effects. First, it would lessen the drain on the soft-water supply in the basal sand unit by whatever amount is pumped from the upper part of the aquifer. Second, a potable blend of water that would require little or no treatment for most uses could be produced, even though one or both of the contributing types might need treatment if used by itself.

Blending could enable use of slightly saline water from the basal sand that probably would not be used otherwise, except possibly for industrial cooling. Mixing soft water, moderately high in chloride concentration and low in iron concentration, with the hard, low-chloride, high-iron water of the Chicot could produce a blend needing no treatment for these properties to meet requirements for public-supply use in Louisiana with the possible exception of removal of small concentrations of iron.

The chemical quality of a blend of waters in this case is simple to predict and control, as the resulting concentration of constituents will be in direct proportion to the quantities of each water contributed to the blend. A blend containing equal quantities of the different types of water found in the Chicot aquifer in the Bayou Teche area would have an average chemical composition of the contributing types. For example, mixing water from the upper Chicot unit with a hardness of 250 mg/l, a chloride concentration of 10 mg/l, and an iron concentration of 1.5 mg/l with an equal amount of water from the basal Chicot unit with a hardness of 20 mg/l, a chloride concentration of 300 mg/l, and an iron concentration of 0.10 mg/l would produce a blend with a hardness of 135 mg/l, a chloride concentration of 155 mg/l, and an iron concentration of 0.8 mg/l. This example shows how a blend might be produced that would be far less costly to treat than either of its components treated separately.

Much additional test-well data are needed to enable accurate determination of the extent of the soft-water zone. Data are needed not only to fill gaps in present coverage but also to establish empirical relationships that will enable fuller utilization of available electrical logs of oil-test holes. The largest area with no data is the area roughly between Cecilia and Parks. Almost as large is the area northwest of St. Martinville, where neither the extent of the isolated salt-water zone nor the areal distribution of hard and soft fresh water is known. Considerable test drilling west-southwest of Broussard may be required if the soft-water zone is to be traced to its limits in that direction. Chemical-quality data from virtually anywhere in the soft-water zone will be beneficial in providing additional background to facilitate interpretation of electrical logs. Electrical properties of the basal sand appear to change abruptly, and electrical-log interpretations cannot be extrapolated for any distance with confidence.

The soft-water zone in the basal unit of the Chicot aquifer can be a long-term asset to the Bayou Teche area, even though it is a limited resource. The longevity of the supply will depend upon how it is developed. Maximum use of the supply is possible by planned pumping so that salt-water encroachment into the zone is minimized. Conservation could prolong the availability of the resource by withdrawing no more of the soft water than is necessary to maintain an acceptable blend with water from the upper unit of the Chicot; this practice could conserve the fresh soft water by enabling the use of slightly salty water that also occurs in the basal Chicot sand unit.

Table 1.--Summary of data for water-test holes in the Bayou Teche area

[The following data are available for all wells: chemical analysis, driller's or geologist's log, electrical log, mechanical analysis of sand samples, sand samples (location shown in fig. 1). To convert feet to meters, multiply by 0.3048]

Well No.	Area	Location			Test hole depth (ft)	Depth of interval screened (ft)	Water level, in feet below land surface datum	Date	Basal sand		Depth to base of fresh water (ft)	Remarks
		Sec.	T. (S.)	R. (E.)					Thick-ness (ft)	Depth to top (ft)		
ST. MARTIN PARISH												
SMn-112---	Breaux Bridge----	105	9	6	726	635-645	16.8	11-31-71	138	560	698	
SMn-113A--	Arnaudville------	48	8	6	804	470-480	10.4	1-28-72	173	532	705	Clay, 658-673 feet.
SMn-113B--	-----do----------	48	8	6	804	574-584	9.4	1-25-72	173	532	705	Do.
SMn-113C--	-----do----------	48	8	6	804	684-690	9.8	5-15-72	173	532	705	Do.
SMn-114A--	Cecilia----------	55	8	6	707	454-464	11.4	4- 7-72	90	610	700	
SMn-114B--	-----do----------	55	8	6	707	667-677	10.7	3-21-72	90	610	700	
SMn-115A--	Parks------------	80	9	6	870	470-480	19.6	8-17-72	178	685	830	
SMn-115B--	-----do----------	80	9	6	870	752-762	22.0	8-22-72	178	685	830	
SMn-115C--	-----do----------	80	9	6	870	806-816	22.0	8-15-72	178	685	830	
SMn-116---	Cecilia----------	55	8	6	854	684-694	14.1	8-29-72	108	650	700	
SMn-117A--	St. Martinville--	74	10	6	956	796-806	18.1	10-16-72	198	754	884	Clay, 808-845 feet.

Table 1.--Summary of data for water-test holes in the Bayou Teche area--Continued

Well No.	Area	Location			Test hole depth (ft)	Depth of interval screened (ft)	Water level, in feet below land surface datum	Date	Basal sand		Depth to base of fresh water (ft)	Remarks
		Sec.	T. (S.)	R. (E.)					Thick-ness (ft)	Depth to top (ft)		
ST. MARTIN PARISH--Continued												
SMn-117B--	St. Martinville--	74	10	6	956	849-859	18.0	10-10-72	198	754	884	Clay, 808-845 feet.
SMn-118A--	-----do----------	69	10	6	894	814-824	22.9	10-26-72	120	768	395	
SMn-118B--	-----do----------	69	10	6	894	868-878	23.3	10-24-72	120	768	395	
SMn-119---	-----do----------	15	10	6	891	848-858	12.0	11- 7-72	187	688	368	Clay, 723-728 and 742-750 feet.
SMn-120---	-----do----------	78	10	6	914	880-890	10.0	7- 6-73	232	670	380	Clay, 708-714 and 784-789 feet.
SMn-121---	Parks------------	9	10	6	895	815-825	9.8	7-20-73	140	695	835	
SMn-122A--	-----do----------	64	10	6	873	639-649	7.7	9-15-73	135	715	850	
SMn-122B--	-----do----------	64	10	6	873	815-825	11.5	9- 4-73	135	715	850	
LAFAYETTE PARISH												
Lf-564A---	Broussard--------	28	10	5	1,030	699-720	35.5	10-18-68	86	847	933	
Lf-564B---	-----do----------	28	10	5	1,030	887-907	33.3	10-14-68	86	847	933	

Table 2.--Chemical analyses of water from test wells in the Bayou Teche area

[Location of wells shown in fig. 1. To convert feet to meters, multiply by 0.3048]

Well No.	Area	Location Sec.	Location T. (S.)	Location R. (E.)	Date of collection	Depth of screened interval, in feet	Temperature (°F)	Temperature (°C)	Silica (SiO_2), dissolved	Iron (Fe), dissolved	Manganese (Mn), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate (NO_3), dissolved	Dissolved solids, calculated	Hardness (Ca, Mg) as $CaCO_3$	Specific conductance (micromhos/cm at 25°C)	pH, field (units)	Color (platinum-cobalt units)
									Milligrams per liter																
ST. MARTIN PARISH																									
SMn-112	Breaux Bridge	105	9	6	11-13-71	635-645	65	18.5	41	2.9	0.18	68	25	110	2.4	600	2.0	14	0.1	0.1	554	270	864	6.7	15
SMn-113A	Arnaudville	48	8	6	1-28-72	470-480	71	21.5	35	1.5	.08	69	23	60	1.8	480	.0	8.6	.1	.0	432	270	671	7.1	5
SMn-113B	do	48	8	6	1-25-72	574-584	72	22.0	34	1.2	.08	61	19	85	1.9	450	.7	40	.2	.1	462	230	746	7.0	20
SMn-113C	do	48	8	6	5-15-72	684-690	71	21.5	34	1.6	.11	52	18	130	2.4	470	1.4	74	.2	.1	545	210	941	7.0	5
SMn-114A	Cecilia	55	8	6	4- 7-72	454-464	72	22.0	40	1.6	.08	78	27	25	2.2	440	.8	6.9	.2	.0	397	310	637	7.1	0
SMn-114B	do	55	8	6	3-21-72	667-677	72	22.0	35	.38	.06	3.4	.1	380	1.3	630	.2	220	.6	.1	952	9	1,550	8.2	20
SMn-115A	Parks	80	9	6	8-17-72	470-480	71	21.5	34	2.8	.25	77	24	14	2.6	390	.2	5.4	.1	.0	349	290	588	6.8	5
SMn-115B	do	80	9	6	8-22-72	752-762	73	23.0	28	.17	.04	6.2	.6	160	2.2	360	.8	55	.3	.0	432	18	714	8.1	5

Table 2.--Chemical analyses of water from test wells in the Bayou Teche area--Continued

Well No.	Area	Location: Sec.	Location: T. (S.)	Location: R. (E.)	Date of collection	Depth of screened interval, in feet	Temperature (°F)	Temperature (°C)	Silica (SiO_2), dissolved	Iron (Fe), dissolved	Manganese (Mn), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate (NO_3), dissolved	Dissolved solids, calculated	Hardness (Ca, Mg) as $CaCO_3$	Specific conductance (micromhos/cm at 25°C)	pH, field (units)	Color (platinum-cobalt units)
									Milligrams per liter																
									ST. MARTIN PARISH--Continued																
SMn-115C------	Parks ------------------	80	9	6	8-15-72	806-816	74	23.5	18	0.26	0.07	7.4	2.3	270	2.5	400	2.2	190	0.3	0.2	689	28	1,220	8.1	28
SMn-116 -------	Cecilia-----------------	55	8	6	8-29-72	684-694	73	23.0	29	.08	.01	3.8	.6	380	2.0	640	2.0	240	.6	.2	973	12	1,750	8.2	25
SMn-117A------	St. Martinville----------	74	10	6	10-16-72	796-806	75	24.0	43	.13	.03	3.8	2.6	310	2.4	450	1.6	230	.3	.2	817	20	1,430	8.1	15
SMn-117B------	-----do----------------	74	10	6	10-10-72	849-859	76	24.5	40	.08	.03	5.4	3.0	290	5.0	450	.0	200	.3	.1	765	26	1,330	---	20
SMn-118A------	-----do----------------	69	10	6	10-26-72	814-824	75	24.0	35	.14	.00	12	6.8	330	5.0	460	2.0	280	.3	.1	898	58	1,570	7.7	5
SMn-118B------	-----do----------------	69	10	6	10-24-72	868-878	75	24.0	31	.29	.04	12	6.3	560	4.8	500	32	620	.4	.1	1,510	56	2,680	---	15
SMn-119 -------	-----do----------------	15	10	6	11- 7-72	848-858	75	24.0	32	.13	.00	7.3	3.6	390	2.0	490	.0	360	.4	.2	1,040	33	1,830	7.4	20
SMn-120 -------	-----do----------------	78	10	6	7- 6-73	880-890	77	25.0	32	1.3	.10	8.0	2.7	440	2.4	510	1.4	410	.4	.2	1,110	31	2,020	8.4	25
SMn-121 -------	Parks ------------------	9	10	6	7-23-73	815-825	76	24.5	35	.78	.04	4.4	1.5	180	1.6	390	.2	62	.4	.2	470	17	767	8.3	10

Table 2.--Chemical analyses of water from test wells in the Bayou Teche area--Continued

Well No.	Area	Location Sec.	Location T. (S.)	Location R. (E.)	Date of collection	Depth of screened interval, in feet	Temperature (°F)	Temperature (°C)	Silica (SiO_2), dissolved	Iron (Fe), dissolved	Manganese (Mn), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO_3)	Sulfate (SO_4), dissolved	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate (NO_3), dissolved	Dissolved solids, calculated	Hardness (Ca, Mg) as $CaCO_3$	Specific conductance (micromhos/cm at 25°C)	pH, field (units)	Color (platinum-cobalt units)
									Milligrams per liter																
ST. MARTIN PARISH--Continued																									
SMn-122A------	Parks ------------------	64	10	6	9-15-73	639-649	73	23.0	33	0.23	0.05	12	2.9	180	3.2	420	6.2	48	0.2	0.1	495	42	759	8.1	10
SMn-122B------	-----do----------------	64	10	6	9- 4-73	815-825	74	23.5	33	.70	.08	6.8	1.7	250	3.7	430	4.2	150	.5	.3	663	24	1,100	8.7	10
LAFAYETTE PARISH																									
Lf-564A--------	Broussard---------------	28	10	5	10-18-68	699-720	71	21.5	34	0.45	----	30	11	120	1.4	380	0.0	45	0.2	0.0	425	120	717	7.6	10
Lf-564B--------	-----do----------------	28	10	5	10-14-68	887-907	75	24.0	35	.48	----	12	4.4	120	1.0	330	.0	36	.3	.0	370	48	606	---	15