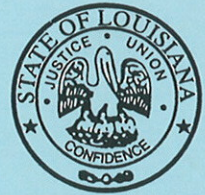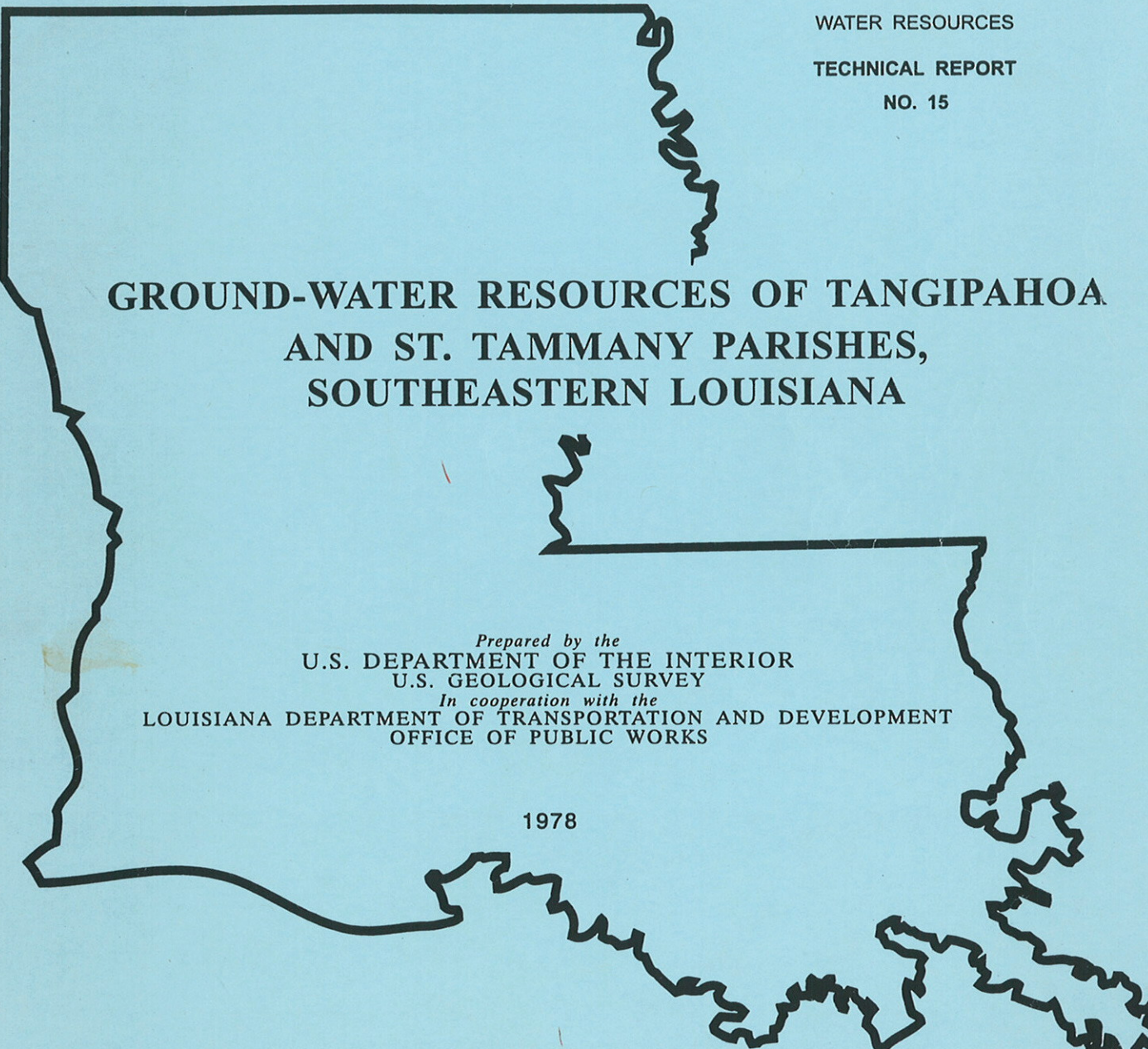STATE OF LOUISIANA

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

OFFICE OF PUBLIC WORKS

WATER RESOURCES

TECHNICAL REPORT

NO. 15

GROUND-WATER RESOURCES OF TANGIPAHOA AND ST. TAMMANY PARISHES, SOUTHEASTERN LOUISIANA

Prepared by the
U.S. DEPARTMENT OF THE INTERIOR
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In cooperation with the
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
OFFICE OF PUBLIC WORKS

1978

STATE OF LOUISIANA

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

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UNITED STATES GEOLOGICAL SURVEY

Water Resources
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GROUND-WATER RESOURCES OF TANGIPAHOA AND ST. TAMMANY PARISHES,
SOUTHEASTERN LOUISIANA

By

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U.S. Geological Survey

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Cooperative projects with

UNITED STATES GEOLOGICAL SURVEY

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GLOSSARY

Aquifer
A formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian well
A well in which the water level rises above the base of the bed confining the aquifer; an artesian well may be either flowing or nonflowing.

Base flow
The discharge entering stream channels from ground-water or other dalayed sources and excludes direct overland runoff.

Cone of depression
The depression, roughly conical in shape, produced in a potentiometric surface by pumping (or artesian flow).

Confining bed
A body of "impermeable" material stratigraphically adjacent to one or more aquifers that serves to confine water in the aquifer that the water level rises above the base of the confining bed.

Corrected specific capacity
Specific capacity corrected for head loss due to pipe friction (including correction for temperature) and partial penetration.

Dip
The angle at which a stratum or any planar feature is inclined from the horizontal.

Ground-water discharge
The water or the quantity of water released from the zone of saturation by any means.

Hydraulic conductivity
The volume of water at the existing kinematic viscosity that will move through a unit area of an isotropic porous medium in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow. Replaces the term "field coefficient of permeability." The hydraulic conductivity multiplied by 7.48 is equal to the coefficient of permeability. For conversion of hydraulic conductivity in feet per day to meters per day, multiply by 0.3048.

Hydraulic gradient
The difference in head per unit distance measured normal to lines connecting points of equal head. The hydraulic gradient, hydraulic conductivity (permeability), and porosity determine the velocity, or rate of ground-water movement.

Milligrams per liter (mg/L)

For the purpose of converting to the metric system, the unit "milligrams per liter" replaces the unit "parts per million," formerly used by the U.S. Geological Survey. The two units are equivalent at dissolved-solids concentrations less than about 7,000 mg/L.

Potentiometric surface

The surface which represents the static head with reference to a specified datum, such as mean sea level. As related to an aquifer, it is defined by the levels to which water will rise in tightly cased wells. The water table is a particular potentiometric surface.

Recharge

The process by which water is absorbed and added to the zone of saturation, either directly into a formation or indirectly by way of another formation.

Seepage run

A series of stream-discharge measurements along a river channel to determine changes in flow between measuring points and the contribution of tributary streams.

Specific capacity

The rate of discharge of water from the well divided by the drawdown of water level within the well. It varies slowly with duration of discharge, which should be stated when known. Commonly expressed in gallons per minute per foot of drawdown for a specified period of continuous pumping at a constant rate.

Storage coefficient

The volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head.

Strike

The direction or bearing of a horizontal line in a plane of an inclined stratum; it is perpendicular to the direction of dip.

Transmissivity

The rate at which water of the prevailing kinematic viscosity is transmitted through a unit width of the aquifer under a unit hydraulic gradient. It is equal to an integration of the hydraulic conductivities across the saturated part of the aquifer perpendicular to the flow paths. (Formerly termed "transmissibility," defined as the rate of flow of water, at the prevailing water temperature, in gallons per day, through a vertical strip of the aquifer 1 foot wide extending the full saturated height of the aquifer under a unit hydraulic gradient.) The transmissivity multiplied by 7.48 is equal to the coefficient of transmissibility. For conversion of transmissivity in feet squared per day to meters squared per day, multiply by 0.093.

Underflow

    The downstream flow of water through the permeable deposits that underlie a stream and that are more or less limited by adjacent sediments of lower permeability.

Unit yield

    The number of cubic feet of water flowing per second for each square mile of area drained, assuming that the runoff (yield) is uniformly distributed with regard to time and area.

Unsaturated zone (zone of aeration)

    The permeable zone between the land surface and the water table, which contains water only temporarily plus water held by capillarity.

Water table

    That surface in an unconfined water body at which the pressure is atmospheric (water level below the top of the aquifer). It is defined by the levels at which water stands in wells that penetrate the water body just far enough to hold standing water.

FACTORS FOR CONVERTING ENGLISH UNITS TO INTERNATIONAL SYSTEM (SI) UNITS

Multiply English units	By	To obtain SI units
acres	0.4047	hectares (ha)
cubic feet per second (ft^3/s)	28.32	liters per second (L/s)
cubic feet per second per square mile [(ft^3/s)/mi^2]	10.93	liters per second per square kilometer [(L/s)/km^2]
feet (ft)	.3048	meters (m)
feet per day (ft/d)	.3048	meters per day (m/d)
feet per mile (ft/mi)	.1894	meters per kilometer (m/km)
feet per year (ft/yr)	.3048	meters per year (m/yr)
feet squared per day (ft^2/d)	.09290	meters squared per day (m^2/d)
gallons per day (gal/d)	.003785	cubic meters per day (m^3/d)
gallons per day per foot [(gal/d)/ft]	.01242	meters squared per day (m^2/d)
gallons per day per square foot [(gal/d)/ft^2]	.04068	meters per day (m/d)
gallons per minute (gal/min)	.06308	liters per second (L/s)
gallons per minute per foot [(gal/min)/ft]	.2070	liters per second per meter [(L/s)/m]
inches (in)	2.540	centimeters (cm)
miles (mi)	1.609	kilometers (km)
million gallons per day (Mgal/d)	3.785×10^6	liters per day (L/d)
square miles (mi^2)	2.590	square kilometers (km^2)

(To convert temperature in °C to °F, multiply by 9/5 and add 32.)

GROUND-WATER RESOURCES OF TANGIPAHOA AND ST. TAMMANY PARISHES, SOUTHEASTERN LOUISIANA

By Dale J. Nyman and Larry D. Fayard

ABSTRACT

The aquifers in Tangipahoa and St. Tammany Parishes constitute one of the largest sources of fresh ground water in Louisiana. There are 12 major aquifers, ranging from Miocene to Holocene in age, that yield water of good quality at rates of 1,000 gallons per minute to more than 3,000 gallons per minute to large-capacity wells as deep as 3,354 feet. Water levels in the shallow aquifer range from near land surface near permanent streams to as much as 80 feet below land surface in some upland areas. Aquifers below depths of 2,000 feet in the extreme southern part of the area may have water levels nearly 100 feet above land surface.

Water levels in wells in aquifers less than about 1,500 feet deep are relatively stable; maximum rates of decline measured from 1939 to 1976 generally have been less than 1 foot per year. The average water-level decline for aquifers below depths of 1,500 feet during the period 1969-76 has been about 2 feet per year. However, the Amite and Hammond aquifers are extensively developed and have had higher than average decline rates, locally more than 3 feet per year. During 1974 an average of about 42 million gallons per day was discharged from aquifers in the area; of this amount, nearly 20 million gallons per day was discharged from uncontrolled, or partially controlled, flowing wells.

The hardness of water from the aquifers generally is less than 30 milligrams per liter, iron and manganese concentration generally is less than 0.5 milligram per liter, and dissolved solids generally are less than 350 milligrams per liter. Locally, the water may contain 0.5 milligram per liter or more of hydrogen sulfide. Water from most of the shallow aquifer and from many of the deep aquifers in the north half of the area tends to be corrosive.

INTRODUCTION

The ground-water system underlying Tangipahoa, St. Tammany, and adjacent parishes is one of the largest sources of fresh ground water in Louisiana. The parishes are in southeastern Louisiana, north of Lake Pontchartrain. (See fig. 1.) The ground-water resources of the area have been described in earlier reports, but the ground-water hydrology of the area had not been studied in detail. The area was included in a reconnaissance investigation of the Florida Parishes by Winner (1963), and the extreme southern part of the area was included in a comprehensive report on the water resources of the Lake Pontchartrain area by Cardwell, Forbes, and Gaydos (1967).

Figure 1.--Location of report area.

Purpose and Scope

Tangipahoa and St. Tammany Parishes are developing rapidly, and ground-water use is increasing. Because of the lack of quantitative information on ground water, a comprehensive study was conducted to map the principal aquifers, to determine the quantity and quality of water available from these aquifers, and to determine the effects of ground-water withdrawals on the aquifers.

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The study began in June 1968, and most fieldwork was completed by April 1971; however, water-use data for 1974 and water-level data through 1976 are included. Data from geophysical and drillers' logs were used to define the aquifer systems. The resulting aquifer maps show the locations of wells used for hydrologic and geologic control; descriptive data for these wells are given in table 19 and 21. Records of water wells were obtained and wells were pumped to determine yields and aquifer characteristics for most of the aquifers. Potentiometric maps reflecting 1974 water levels were drawn for some aquifers. Additional data collected include chemical data on ground water and an inventory of water use. A seepage run better defined the hydrology of the shallow aquifer. The surface-water resources of the area are discussed in detail in a separate report by Fayard and Nyman (1976).

Cooperation and Acknowledgments

This project was part of the continuing cooperative program of water-resources studies by the U.S. Geological Survey and the Louisiana Office of Public Works. Electrical logs of oil wells and test holes were made available by the Louisiana Geological Survey.

The Louisiana Health and Human Resources Administration, Division of Health; the U.S. Environmental Protection Agency; and the U.S. Army Corps of Engineers, New Orleans District, aided the project by furnishing data. The Louisiana Office of Highways provided test-hole sites. County Agents J. M. Bankston, St. Tammany Parish; R. D. Mitchell, Tangipahoa Parish; and M. H. Jones, Washington Parish, supplied data for water-use estimates.

Special appreciation is extended to the well drillers who were serving the area when the fieldwork was conducted--Mr. D. K. Summers, Sr., of Denham Springs; Summers Brothers of Walker; Messrs. C. B. Smith and Frank Morrison of Albany; Mr. Edward Morrison of Livingston; Messrs. H. L. Varnado and Son, Edward Carroll, and Jack Gill, Jr., all of Amite; Mr. Merlin Anthon of Lacombe; Mr. Paul Anthon of Hammond; Mr. John Anthon of Pearl River; and Mr. Frank Cotton of Pine.

The assistance given by managers of public and private water systems and by many individual well owners was invaluable to the project.

WATER USE

An average of about 42 Mgal/d was discharged from aquifers in St. Tammany and Tangipahoa Parishes during 1974. Essentially none of this water is returned to the aquifers. Water use by category is given in table 1.

The largest category of water use (1974) is discharge from uncontrolled flowing wells, which amounts to nearly 20 Mgal/d. The many wells that are allowed to flow uncontrolled for no useful purpose contribute to water-level declines. Hopefully, the wastage of water will decrease as the public becomes more aware of water problems and the need for water conservation. Even without controls, wastage will gradually diminish as

Table 1.--Ground-water use, 1959-74

Year	Uncontrolled flowing wells	Public water supplies	Rural-domestic	Commercial lakes	Industrial	Irrigation	Livestock	Total
				Water-use category, in millions of gallons per day				
				ST. TAMMANY PARISH				
1959	----	1.5	0.93	1.2	1.8	0.18	0.07	------
1965	27	4.1	1.2	----	1.6	.47	.06	1/ 34.4
1969	20	5.1	1.9	2.9	.77	.22	.08	31.0
1974	16	6.0	2.4	1.7	.98	.35	.09	27.5
				TANGIPAHOA PARISH				
1959	----	3.1	1.1	----	1.1	1.3	0.83	------
1965	4.2	5.6	1.9	0.72	1.1	.98	.99	15.5
1969	4.7	6.4	2.1	.50	.63	1.8	.93	17.1
1974	2.7	5.5	2.0	.18	1.1	1.6	.87	14.0

1/ Incomplete.

artesian pressures decline. Suggestions concerning control of wells from which water is flowing to waste are discussed in the following section.

Pumpage for public water systems is the second largest water-use category. An average of more than 11 Mgal/d was used in 1969 and 1974. This usage will probably increase as municipalities grow and as rural water systems are developed. The amount of water pumped by municipal systems in Tangipahoa and St. Tammany Parishes is about equal.

Rural-domestic pumpage, about 4 Mgal/d in 1974, ranks third and is greater in St. Tammany Parish. According to the Covington Chamber of Commerce (oral commun., 1975), the population in St. Tammany Parish is growing about 10 percent per year, and many of these people reside in rural or suburban areas. The rural-domestic category consists of the small, privately owned, home water systems.

Ground-water pumpage for industrial use averaged slightly more than 2 Mgal/d during 1974 and ranked fourth in water use. Industrial pumpage was lowest in 1969 (for the period 1959-74).

Irrigation pumpage averaged slightly less than 2 Mgal/d and ranked fifth in 1974. According to statistics from the U.S. Department of Commerce, Bureau of the Census (1966a, b; 1971a, b), irrigated acreage declined from 1959 to 1969 but returned to about 1959 levels by 1974. The irrigation pumpage given in table 1 may differ from figures published previously by the U.S. Geological Survey for the years 1959-69 because they are based on census figures that were unavailable when the previous estimates were made.

Commercial lakes ranked sixth in use of ground water during 1974. This category includes recreation lakes and those used for fish farming. About 3.4 Mgal/d was pumped in 1969 in the report area; pumping decreased to about 1.9 Mgal/d in 1974. The largest recreation lakes and the largest acreage of fish ponds were built and filling began during 1968 and 1969. By 1974 the recreation lakes were full, and some of the fish farms had gone out of business.

The water used for watering livestock averaged slightly less than 1 Mgal/d during 1974 and ranked seventh in water use. The use of ground water for milk cows, laying hens, broilers, feedlot operations, and for other domestic animals has remained essentially the same for the period 1959-74.

It is not feasible to completely subdivide ground-water pumpage by aquifer at this time. However, estimates have been made for some aquifers in the following sections.

WASTAGE OF GROUND-WATER RESOURCES

Over the years, much ground water has been wasted in southeastern Louisiana because of the belief that if a flowing well were shut down, the life of the well would be shortened or it might not flow again when the valve was reopened. This belief began before modern well screens were developed. The first flowing wells had no screens, or had an improvised "shop screen" that might fail in a short time. Wells completed without screens flow as long as there is a cavity in the sand below the casing. The sudden closing of a valve to stop the flow can create a "water hammer" that will cause this cavity to collapse and fill with sand, thereby reducing or stopping flow. The size of the cavity is analogous to length and size of screen--the greater the area open to the aquifer, the greater the flow. Modern well screens maintain an opening to the aquifer, and the screen is strong enough to withstand normal water-hammer pressures. It is therefore important that flowing wells be properly constructed and equipped with valves so that the flow can be limited to the amount needed. The rules and regulations that implement State Act 606 (1976) require that well owners or lessees install control devices on free-flowing wells that produce more than 25,000 gal/d (Louisiana Department of the State Register, 1977, p. 209-210).

Many of the old wells still exist, although their flow has ceased or been greatly reduced because of declining head. Old wells can also lose flow to aquifers of lower head through holes rusted in casing and couplings. Thus, although surface flow is reduced, the aquifer with higher head is being depleted at a faster rate than is apparent. The potential for contamination of the deeper aquifer increases as its head decreases with time.

Another possible cause of depletion of artesian pressure is flow outside the well casing if the annular space is not effectively sealed. Such flow cannot be easily detected, but it can be prevented by cementing the annular space between the well casing and borehole from top to bottom, as is the practice for most large industrial and municipal wells.

Cementing the annular space protects the outside of the casing from shallow, corrosive water and prevents or retards leakage through cracks and holes. Additional information regarding the advantages of cementing well casings is available in Ahrens (1970, p. 51).

State Act 535 (1972) requires the plugging and sealing of all abandoned wells whether they flow or not. Standards for the abandonment of water wells are outlined in "Water Well Rules, Regulations, and Standards, State of Louisiana" (Louisiana Department of Public Works, 1976).

GEOHYDROLOGIC FRAMEWORK

The sediments of Miocene to Holocene age that underlie the project area are an overlapping series of wedge-shaped, unconsolidated deposits that dip and thicken to the south and southwest. The strike (see "Glossary") of the deposits is generally eastward for most of Tangipahoa Parish, curving slightly southward into St. Tammany Parish, and becoming southeastward in the vicinity of Slidell. The rate of dip is less than 30 ft/mi for sediments shallower than 500 ft below the land surface, but the rate increases with depth and to the southeast, becoming about 100 ft/mi below 3,000 ft near Slidell. The changes in dip and strike are related to regional structural features--the subsiding Mississippi embayment and the uplift in southern Mississippi (Howe, 1962).

Changes in attitude, thickness, depth, and grain size reflect differences in the depositional environment of the sediments. There were many changes in sea level from Miocene time to the present (Holocene); also, sea level changed relative to sedimentary beds because of subsidence and uplift.

Some sands (aquifers) were deposited as offshore bars oriented essentially east-west. Clays were deposited in protected lagoons between bars and the shore. Fairly uniform medium to coarse beach sands were also deposited over extensive areas.

Concurrent with shoreline and nearshore deposition, continental deposition was also occurring. Aquifers resulting from continental deposition are primarily river-channel and flood-plain deposits of generally southward-flowing streams. Such aquifers are therefore more continuous in the north-south direction and may be limited laterally by the clays of natural levees or because the channel was incised into an extensive clay deposit. Continental deposits are typically discontinuous and may exhibit abrupt changes in lithology in a short distance (pls. 1-3). The sequence and a brief description of the aquifers is given in table 2. Aquifers from about 1,800 to 3,000 ft below land surface along the north shore of Lake Pontchartrain are reasonably continuous in the study area. Aquifers above a depth of 1,800 ft may be continuous east-west but extend varying distances north-south because updip they intersect terrace and alluvial deposits that blanket Tangipahoa-St. Tammany Parishes.

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Table 2.--Geohydrologic summary of aquifers

System	Series	Correlative units [Aquifer in Baton Rouge area (Rollo, 1969) or hydraulic zone (Morgan, 1963)]	Aquifer name in this report		Typical range in thickness (ft)	Description and remarks	Highest reported yield (gal/min)	Water-level range, in feet above or below land surface (1974)	Rate of water-level decline, 1974 (ft/yr)	Water quality
Quaternary	Pleistocene and Holocene		Shallow		100 to 400	Mostly sand and gravel. Aquifer includes terrace deposits and alluvium and underlies most of report area. Supplies base flow to streams and is thickest in the flood plains of major streams. Good potential for future development. Hydraulic conductivity ranges from 500 to 1,000 (gal/d)/ft², or from 70 to 140 ft/d.	550	+2 to -80	No continuous decline; water levels respond to rainfall trends.	Iron and manganese range from 0.40 to 2.2 mg/L; hardness typically less than 20 mg/L; water is generally corrosive.
		"400-foot" and "600-foot" sands	Ponchatoula	Upper	200 to 300	Mostly sand and gravel. Aquifer underlies southern half of Tangipahoa and St. Tammany Parishes and is subsurface equivalent of Citronelle Formation. Good potential for future development. Hydraulic conductivity is 1,300 (gal/d)/ft², or 180 ft/d, at Ponchatoula.	1,425	+15 to -7	0 to 0.2	Iron and manganese generally less than 0.35 mg/L; hardness less than 20 mg/L; pH generally ranges from 7.5 to 9.0. Water in aquifer saline in Manchac area.
Tertiary	Pliocene	"800-foot," "1,000-foot," and "1,200-foot" sands		Lower	100 to 200	Mostly medium sand. Aquifer underlies southern two-thirds of Tangipahoa Parish and most of St. Tammany Parish. Some potential for future development. Hydraulic conductivity ranges from 250 (gal/d)/ft², or 35 ft/d, at Hammond, to 500 (gal/d)/ft², or 65 ft/d, at Madisonville.	100	+17 to -2		
			Big Branch		50 to 150	Mostly medium to coarse sand. Aquifer occurs only in southeastern part of St. Tammany Parish. Some potential for future development. Hydraulic conductivity averages about 500 (gal/d)/ft², or 70 ft/d, near Big Branch.	500	+32 to +5	0.5	Iron and manganese generally less than 0.20 mg/L; hardness generally less than 10 mg/L; pH generally greater than 8.0. Water in aquifer saline in vicinity of Lacombe.
		"1,500-foot" sand	Kentwood aquifer system	Kentwood	400 to 500	Mostly sand and gravel. Aquifer occurs in northern Tangipahoa Parish and northwestern Washington Parish. Very good potential for future development. Hydraulic conductivity about 1,000 (gal/d)/ft², or 135 ft/d, at Kentwood.	1,557	+20 to -60	0 to 1	Iron and manganese generally range from 0.01 to 0.20 mg/L; hardness generally less than 35 mg/L; pH about 6.5.
				Abita	50 to 100	Mostly medium to very coarse sand. Aquifer underlies most of report area. Some potential for future development. Hydraulic conductivity about 900 (gal/d)/ft², or 120 ft/d, near Pearl River.	1,515	+90 to -40	0.5 to 2.5	Iron and manganese generally less than 0.40 mg/L; hardness generally less than 10 mg/L; pH 6.5-9.0.
		"1,700-foot" sand		Covington	100 to 200	Mostly medium to coarse sand. Aquifer underlies most of report area. Good potential for future development. Hydraulic conductivity about 1,700 (gal/d)/ft², or 220 ft/d, near Pearl River.	750	+97 to -50	2.0 to 2.2	Iron and manganese generally less than 0.35 mg/L; hardness generally less than 25 mg/L; pH 6.5-9.5.
				Slidell	100 to 200	Mostly medium to coarse sand. Aquifer occurs in southeastern St. Tammany Parish. Good potential for future development. Hydraulic conductivity 1,400 (gal/d)/ft², or 190 ft/d, at Slidell.	4,000	+85 to +80	2.5	Iron and manganese generally less than 0.20 mg/L; hardness less than 10 mg/L; pH 8.0-8.5.
	Miocene	"2,000-foot" sand	Tchefuncta		100 to 150	Mostly medium to coarse sand. Aquifer underlies most of report area except northern half of Tangipahoa Parish. Good potential for future development. Hydraulic conductivity ranges from 500 (gal/d)/ft², or 65 ft/d, at Hammond, to 1,000 (gal/d)/ft², or 135 ft/d, near Covington.	1,500	+98 to -15	1.7 to 2.8	Iron and manganese generally less than 0.40 mg/L but may be as much as 4.0 mg/L; hardness less than 20 mg/L; pH 6.6-8.2. Water in aquifer saline south of Slidell.
		"2,400-foot" sand	Hammond		100 to 200	Mostly medium to coarse sand. Aquifer underlies most of report area. Heavily developed in Hammond area. Hydraulic conductivity ranges from 650 (gal/d)/ft², or 85 ft/d, at Hammond, to 1,500 (gal/d)/ft², or 200 ft/d, at Covington.	3,400	+90 to -50	3.0 to 5.0	Iron and manganese generally less than 0.50 mg/L but may exceed 1.0 mg/L; hardness less than 15 mg/L; pH generally 7.0-9.0. Water in aquifer saline south of line from Slidell to just north of Manchac.
		"2,800-foot" sand	Amite		100 to 150	Mostly medium to coarse sand. Aquifer underlies most of report area. Heavily developed in vicinity of Amite and Independence. Hydraulic conductivity about 1,100 (gal/d)/ft², or 150 ft/d, at Amite.	1,700	+95 to -45	2.4 to 3.4	Iron and manganese generally less than 0.20 mg/L but may exceed 4.0 mg/L; hardness less than 5 mg/L; pH 8.0-9.2. Water in aquifer saline south of a line through Ponchatoula and Pearl River.
			Ramsay		100 to 250	Mostly medium to coarse sand. Aquifer underlies southern Tangipahoa Parish and St. Tammany and Washington Parishes. Good potential for future development. Hydraulic conductivity about 1,600 (gal/d)/ft², or 210 ft/d, at Ramsay.	2,100	+84 to +61	2.4	Iron and manganese range from 0.05 to 0.60 mg/L; hardness 2-20 mg/L; pH 7.1-8.6. Water in aquifer saline south of a line through Hammond and Abita Springs.
			Franklinton		100 to 250	Mostly medium to coarse sand. Aquifer contains freshwater in northernmost Tangipahoa Parish and most of Washington Parish. Good potential for future development. Hydraulic conductivity about 2,000 (gal/d)/ft², or 290 ft/d, at Franklinton.	1,300	-45 to -100	1.7	Iron and manganese less than 0.10 mg/L; hardness less than 10 mg/L; pH 8.6-9.0. Water in aquifer saline south of a line from Greensburg to Sun.

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Faulting can be another reason for abrupt changes in lithology and differences in water level and water quality at similar depths within short distances. No faults were mapped in this report; however, fault zones in southern Tangipahoa and St. Tammany Parishes have been described by Murray (1961, p. 189).

The depth to a particular aquifer can be estimated from information in this report if the elevation of the drilling site is known and the location of the site can be plotted on the appropriate geohydrologic map. For example, for the Ponchatoula aquifer (pl. 6) the depth to the top and bottom of the lower Ponchatoula aquifer would be greater at Natalbany (between Tickfaw and Hammond) than at well Ta-266 and less than at well Ta-276 because the aquifers dip southward, as indicated by the depth information given for these wells in table 4. Natalbany is nearer well Ta-276; therefore, the depth to the aquifer would be closer to the aquifer depths at well Ta-276. The depth of the aquifer interval below sea level at Natalbany would be more than 360 ft and less than 500 ft to the top, and more than 855 ft and less than 975 ft to the bottom. The actual drilling depth would be between 550 and 1,025 ft below land surface, assuming a 50-ft elevation for the land surface at Natalbany. Planners following this procedure should be aware that the aquifers vary greatly in thickness and grain size; therefore a test hole may be needed to determine actual conditions at a particular site. Also, it may be necessary to complete a well in an aquifer to accurately determine the water quality.

AQUIFER CHARACTERISTICS AND WELL YIELDS

The term "aquifer characteristics" refers to variables that quantitatively describe the ability of an aquifer to transmit and store water and to yield water to a well. These variables are hydraulic conductivity, transmissivity, and storage coefficient and are defined in the "Glossary." Values for these variables generally are determined from aquifer tests. Transmissivity is indicative of the amount of water that can flow through the full thickness of the aquifer. Under similar hydrologic conditions the larger the transmissivity, the smaller the drawdown in wells of equal construction and development for a specific pumping rate. The aquifer thickness (tables 4, 6, 8, 10, 12, 15, 17; fig. 7; and pls. 9, 12, 13) multiplied by the average hydraulic conductivity, listed in the section "Aquifer Characteristics and Well Yields" for the aquifer of interest, gives an estimate of the transmissivity at that point.

The specific capacity of a well, or the yield per foot of drawdown for a given period of time, is a factor used to evaluate the performance of a well. The nearer the measured specific capacity approaches the theoretical value, determined from aquifer characteristics, the more efficiant the well. Most deep wells in the area have specific capacities of only 1/2 to 1/3 of the theoretical capacity because the total thickness of the aquifer generally is not screened and pipe-friction and entrance losses generally occur.

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The relation between theoretical specific capacity and transmissivity has been demonstrated by Meyer (1963, p. 339). However, the theoretical specific capacities must be corrected for partial penetration and for pipe friction in deep wells.

Partial penetration concerns the percentage of the aquifer screened by the well. As more of an aquifer is screened, the drawdown at a specific pumping rate is reduced. A convenient method for correcting the drawdown of a partially penetrating well is described by Turcan (1963, p. E145).

Pipe-friction loss is directly proportional to well depth. A convenient source of friction data is the "Water Well Handbook" (Anderson, 1973, p. 34). Because the formulas for pipe friction were determined at a standard temperature (60°F or 15.5°C), and the temperature of water from deep wells in the report area may exceed 90°F (32.0°C), the temperature correction should be made (Cardwell, in Cardwell and others, 1967, p. 32).

If aquifer characteristics are known or can be estimated, graphs can be drawn from which the size of the cone of depression and the additional drawdown caused by interference between wells can be estimated. The hydraulic characteristics for most of the aquifers discussed in this report are given or can be estimated on the basis of the information given.

The use of information in this report to aid in solving practical ground-water problems is illustrated by the following example. Suppose an industry built a plant north of Natalbany in Tangipahoa Parish near well Ta-266 (pl. 1) and required about 2,000 gal/min. The water quality needed and the aquifer characteristics required to produce the desired quantity of water could be supplied by the lower Ponchatoula aquifer. From plate 6 the aquifer occurs between 360 and 510 ft below sea level. Land surface is 50 ft above sea level; therefore, the aquifer occurs 410 to 560 ft below land surface and is 150 ft thick. The average hydraulic conductivity for the lower Ponchatoula aquifer is about 400 (gal/d)/ft^2 (53.5 ft/d) (see section "Ponchatoula Aquifer," "Aquifer Characteristics and Well Yields"); therefore, the transmissivity would be about 60,000 (gal/d)/ft (8,000 ft^2/d).[1] The theoretical specific capacity for a 12-in well, which screened the entire aquifer thickness, would be nearly 25 (gal/min)/ft after pumping 1 day (Meyer, 1963).

If two wells were installed, each yielding 1,000 gal/min, each well would have 40 ft of drawdown after 1 day, assuming no head losses owing to friction and (or) partial penetration or interference between wells. If only half of the aquifer were screened, the drawdown would be increased to about 64 ft, and pipe friction for about 450 ft of 12-in pipe would increase the drawdown to about 65 ft. The observed specific capacity would therefore be about 15 (gal/min)/ft of drawdown. If the two wells were pumping 1,000 gal/min simultaneously and were 500 ft apart, then each well would have nearly 20 ft of additional drawdown after 1 day because of interference (fig. 2). This analysis is described by Lohman (1972, p. 55-56) and by Bruin and Hudson (1955, p. 13-22).

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[1] Hydraulic conductivity times aquifer thickness.

It should also be noted from figure 2 that much of the drawdown occurs during the first day of pumping. After nearly 3 years of pumping (1,000 days) the additional drawdown is estimated to be 33 ft. The drawdown for a transmissivity of 60,000 (gal/d)/ft (8,000 ft^2/d) would be approximately twice as great as for a transmissivity of 100,000 (gal/d)/ft (1,300 ft^2/d). The above estimates of drawdown assume that the pumping rate is constant, that the aquifer has a reasonably consistent thickness and permeability for a radius of several miles around the plantsite, that there is little or no leakage from adjacent aquifers, and that there is no nearby pumping.

WATER LEVELS AND THE POTENTIOMETRIC SURFACE

The potentiometric surface is the altitude to which the water will rise in a tightly cased well screened in an aquifer. For nonflowing wells the head, or water level below land surface, of an aquifer at a particular site can be estimated by subtracting the altitude (which may be positive or negative) of the potentiometric surface from the topographic altitude of the well site. For flowing wells the head above land surface is determined by subtracting the topographic altitude from the altitude of the potentiometric surface. The maps in this report (pls. 5, 6, 7, 8, 10, and 11) are based on data of June 1969 or May 1974.

The hydraulic gradient is the slope of the potentiometric surface, generally measured perpendicular to the potentiometric contour lines. Aquifers of low transmissivity require steeper gradients to supply a given amount of water to a pumping center than do aquifers of high transmissivity. In general, the gradient and shape of the potentiometric contours reflect areal changes in transmissivity and effects of recharge and discharge; they also indicate the location and extent of areas affected by pumping.

The rate of water-level decline reflects the rate of pumping, the distance from pumping, the effect and proximity of boundaries, and the hydraulic characteristics of the aquifer. The average water-level decline, 1969-74, was about 2 ft/yr for aquifers deeper than 1,500 ft. Water levels in wells less than 1,500 ft deep generally declined at less than 1 ft/yr during the same period. Water levels in the terrace deposits respond to local recharge from rainfall. The rate of decline caused by pumping from the shallow aquifers in most of the report area is negligible.

Water-level declines exceeding 1 ft/yr in wells tapping deep aquifers in areas remote from pumping centers probably reflect, at least in part, exchange of water between aquifers in response to head differentials produced by pumping.

Water-level declines cannot continue indefinitely without some consequences. The first notable consequence for aquifers having flowing wells will be the cessation of flow. In nonflowing wells there will be increased pumping lifts resulting in increased costs of pumping water. Eventually, if water-level declines are large, subsidence of the land

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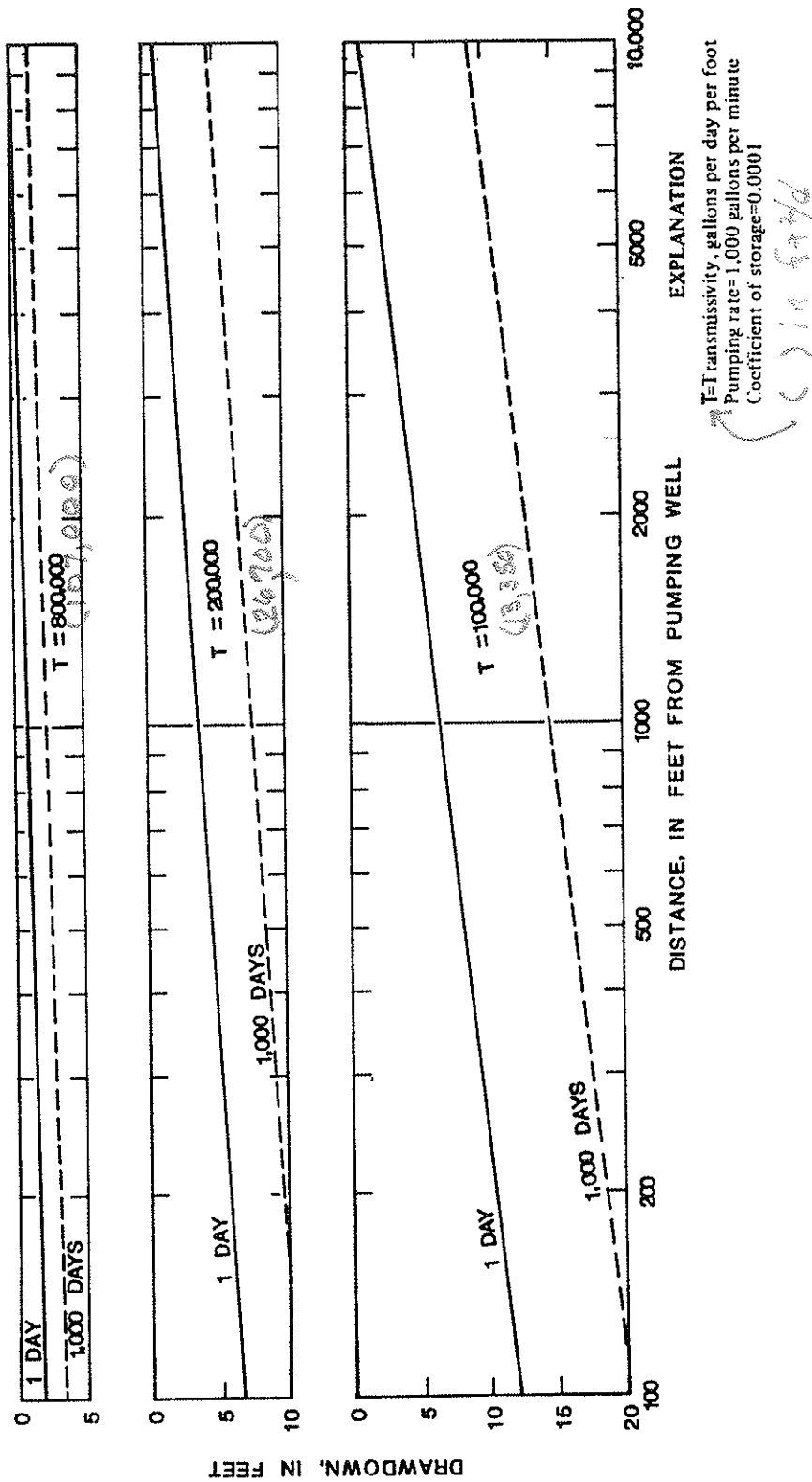
Figure 2.—Theoretical drawdown with distance for indicated time intervals.

EXPLANATION

T=Transmissivity, gallons per day per foot
Pumping rate=1,000 gallons per minute
Coefficient of storage=0.0001

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surface could become a consequence. Southern Tangipahoa and St. Tammany
Parishes likely would be the first areas affected; however, no problems
are foreseen for many years.

WATER QUALITY

Fresh ground water in the area is generally of good quality and is
within the limits of drinking water criteria set by the U.S. Environ-
mental Protection Agency (1976, 1977). Analyses of water from selected
wells in each aquifer are listed in table 20. The water is a sodium
bicarbonate type, and dissolved solids generally range from 120 to 500
mg/L (milligrams per liter). Hardness is normally less than 50 mg/L.
Chloride is less than 50 mg/L except in water from some minor aquifers
of intermediate depth in the southern part of the area. The pH range is
about 5.0 to 8.3 in water from shallow sands, and about 7.0 to 9.4 in
deeper sands. Iron and manganese generally occur in concentrations of
less than 0.3 to 0.05 mg/L, respectively, although water from some aqui-
fers contains higher concentrations in the northern part of the area.
Hydrogen sulfide in solution occurs locally throughout the area, regard-
less of depth. Fluoride concentrations seldom exceed 0.8 mg/L. Silica
content varies from 10 mg/L to as high as 80 mg/L. Color is usually
less than 20 units on the platinum-cobalt scale, although there are
isolated occurrences of color as high as 50 units.

High iron concentrations occur in water from sands between 1,600
and 1,900 ft below land surface in an area bounded by Independence,
Hammond, and Albany. These sands have poor hydraulic connection with
the principal aquifers. Iron concentrations range from 1.0 mg/L to as
high as 5.0 mg/L, and color is generally in the range of 30 to 50 units
on the platinum-cobalt scale.

Ground-water temperatures in the area range from a minimum of about
66°F (19.0°C) in shallow wells to about 100°F (38.0°C) in the deepest
wells and increase at the rate of a little more than 1°F per 100 ft of
depth.

The following tabulations show the recommended limits of some of the
problem constituents in drinking water as suggested by the U.S. Environ-
mental Protection Agency (1976, 1977).

Primary standards (U.S. Environmental Protection Agency, 1976)
include:

Constituent	Concentration (mg/L)
Iron---	a/0.30
Manganese-----------------------------------	b/.05
Nitrate (as nitrogen)------------------	10

    a/ 300 micrograms per liter.

    b/ 50 micrograms per liter.

Proposed secondary standards (U.S. Environmental Protection Agency, 1977) include:

Constituent	Concentration (mg/L)
Chloride	250
Dissolved solids	250
Color	(a)

a/Should be no more than 15 units on the platinum-cobalt scale.

SHALLOW AQUIFER

Extent, Thickness, and Lithology

The shallow aquifer consists of sand and gravel deposits underlying the upland terraces and similar, younger flood-plain deposits of major streams. The upland terrace deposits originally blanketed the entire area but locally have been eroded and redistributed by streams.

The upland terrace deposits are typically more than 100 ft thick in northern Tangipahoa Parish and have been included with the Citronelle Formation in southern Mississippi (Newcome and Thomson, 1970, p. 6-7). In central Tangipahoa and northern St. Tammany Parishes the shallow aquifer dips beneath younger Coastal Plain sediments; the subsurface equivalent of the upland terrace deposits is the upper Ponchatoula aquifer in this report. (See pl. 1 and table 2.) In central Tangipahoa Parish the Citronelle Formation is locally overlain by flood-plain deposits of the Tangipahoa River, forming a massive aquifer of about 400 ft of sand and gravel. In northeastern St. Tammany Parish the Citronelle Formation is locally overlain by flood-plain deposits of the Bogue Chitto and Pearl River, forming an aquifer of about 450 ft of sand and gravel. These thick sections of the aquifer are hydraulically connected to the large rivers in the area and have the potential to yield large quantities of water.

The shallow aquifer locally may contain a large percentage of silt and clay, making well yields highly variable.

Another area of large ground-water potential is the flood plain of Chappepeela Creek from the mouth to a few miles north of Loranger. The electrical log of a well at Zemurray Park indicates about 250 ft of clayey sand and gravel between 22 and 265 ft below land surface.

The Tchefuncta River basin has a high rate of ground-water discharge from the headwaters to near the gage at Folsom. The thickness of the contributing sand and gravel underlying the flood plain of the Tchefuncta River is about 150 ft northwest of Folsom and about 200 ft near Folsom.

Ground-water discharge also is high in the Bogue Falaya basin from near Folsom to north of Ramsay. The aquifer has a thickness of about 200 ft in the northern part of the basin, but southward the aquifer thins to 100 ft near Covington and is more confined.

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Sand and gravel deposits beneath the low coastal terrace and above the Ponchatoula aquifer constitute a unit of the shallow aquifer in southern Tangipahoa and St. Tammany Parishes. (See pl. 1, well Ta-276.) In this area the unit is typically less than 100 ft thick and grades into clay and sandy clay as it thins south of Hammond and Covington.

Aquifer Characteristics and Well Yields

The largest reported well yield from the shallow aquifer is 550 gal/min from an 8-in irrigation well (Wa-104) at the Southeast Louisiana Dairy and Pasture Experiment Station, Franklinton. (See table 19.) A 6-in irrigation well near Amite (Ta-322) yields 300 gal/min; a 4-in well near Roseland (Ta-330) yields 75 gal/min. Most wells in the shallow aquifer are domestic wells, and very few large-capacity wells were found in the project area.

The relations between ground and surface water along the main channel of the Tangipahoa River were analyzed to estimate transmissivity and hydraulic conductivity of the shallow aquifer using a flow net (based on potentiometric contours, pl. 5) and aquifer discharge (based on seepage run, table 3). This assumes that the aquifer is homogeneous and isotropic, that the stream is fully penetrating, and that the gradient is constant. The transmissivities ranged from 70,000 to 350,000 (gal/d)/ft (9,400 to 50,000 ft^2/d). Hydraulic conductivities ranged from 500 to 1,000 (gal/d)/ft^2 (70 to 140 ft/d). These results are in general agreement with the results from aquifer tests of wells in the shallow aquifer in parishes to the west.

The range in base flow reflects the range in characteristics of the aquifer adjacent to the channel where ground-water discharge sustains streamflow. The yield per square mile is based on the area of surface drainage, but it also reflects the size of the subsurface drainage area. Because the instantaneous rate of ground-water discharge is dependent, among other factors, upon the aquifer's transmissivity, the measured ground-water discharge (pl. 4 and table 3) is an index of the aquifer's yield characteristics. Streams with high ground-water discharge, therefore, can be assumed to be connected with aquifers having a high hydraulic conductivity and transmissivity. Although the relation to unit yield is not direct, one can expect that where similar aquifer-stream relations occur, the hydraulic conductivity or transmissivity will be higher in an area where the unit yield is higher.

The aquifer constants determined for the shallow aquifer in the Tangipahoa River basin indicate that a unit yield of 1.0 (ft^3/s)/mi^2 corresponds to a transmissivity of about 100,000 (gal/d)/ft (13,000 ft^2/d). A unit yield of 0.5 (ft^3/s)/mi^2 corresponds to a transmissivity of about 35,000 (gal/d)/ft (4,800 ft^2/d), based on the seepage run of June 11, 1969.

Areas of Highest Yield

Along the flood plains of the major streams there is a decrease in yield downstream (for example, between sites 21 and 28, 36 and 37, and 42 and 43 on pl. 4 and in "Unit yield between sites" column, table 3). It should be pointed out that the unit yields for sites 1, 3, 10, 35, 39, 41, 44, 45, 47, and 48 in the headwater areas do not necessarily indicate areas of low transmissivity. In the headwater areas, tributary streams do not cut deeply into the aquifer and therefore have a lower yield.

The subbasins having the highest unit yields are associated with four streams--the Tangipahoa, Chappepeela, and Tchefuncta Rivers and the Bogue Falaya. Subbasins with yields of about 0.5 $(ft^3/s)/mi^2$ or larger can be considered areas of potentially high ground-water yield or availability. (Well yields of 500 to 1,000 gal/min may be possible.) A high unit yield indicates that ground water in the shallow aquifer is plentiful within a basin or subbasin; however, whether or not a well of a certain size and capacity can be completed at a specific location will be determined by the thickness and permeability of the material found at the well site.

Highest unit yields are along the Tangipahoa River in the northern part of the Tangipahoa basin. Sand and gravel of the Citronelle Formation crop out and increase the yield to streams, as indicated by the high yield of Terrys Creek (pl. 4). Logs of wells along U.S. Highway 51 indicate 100 to 400 ft of sand and gravel adjacent to the river. (See pl. 1). The amount of ground water in storage in such deposits should be very large.

In table 3 the gain in flow (change in discharge between sites) represents the ground-water discharge in the respective reach or subbasin. The flow of a stream would be reduced if wells were installed near the stream in the shallow aquifer. Depending on the use of the water, much of it may be returned to the stream. Although many millions of gallons per day are available from the shallow aquifer near the Tangipahoa River and other streams in the area, significant reduction in the low flow of the streams would be undesirable because of the need to maintain sufficient flow to carry away wastes, support wildlife, and supply riparian water users.

Potentiometric Surface

The potentiometric surface of the shallow aquifer (pl. 5) in June 1969 ranged from a maximum of about 80 ft below land surface in the highland areas to a few feet above land surface in some lowland areas.

Water-level gradients are as much as 20 ft/mi near Kentwood, about 10 ft/mi near Amite, and about 5 ft/mi near Hammond and Covington. These gradients indicate that the rate of ground-water movement may be as much as 550 ft/yr near major rivers in the north and less than 140 ft/yr to the south. This calculation assumes an average hydraulic conductivity of 750 $(gal/d)/ft^2$ (100 ft/d) and an average porosity of 25 percent.

Table 3.--Data for seepage run of June 11, 1969

Map No. (pl. 4)	Station number	Name of site	Drainage area above site (mi²)	Drainage area between sites (mi²)	Discharge at site (ft³/s)	Change in discharge between sites (ft³/s)	Unit yield [(ft³/s)/mi²]	Unit yield between sites [(ft³/s)/mi²]
		NATALBANY RIVER BASIN						
1	07376440	Natalbany River 2.2 mi NNW. of Independence	a/55.8	-----	5.13	------	0.092	----
2	07376505	Natalbany River 2.0 mi SE. of Albany	a/81.6	25.8	11.4	6.27	.140	0.243
3	07376510	Little Natalbany River 4.9 mi W. of Independence	11.3	------	.98	------	.087	----
4	07376525	Little Natalbany River 1.9 mi SE. of Albany	41.7	30.4	4.30	3.32	.103	.109
5	07376622,8	Yellow Water River Canal 4.1 mi WNW. of Ponchatoula	a/13.9	------	3.97	------	.286	----
6	07376614	Ponchatoula Creek 2 mi NNW. of Ponchatoula	a/33.7	------	2.37	------	.070	----
7	07375720	Selsers Creek 2.9 mi NE. of Ponchatoula	a/8.3	------	.01	------	.0012	----
		TANGIPAHOA RIVER BASIN						
8	07375300	Tangipahoa River 1.1 mi E. of Kentwood	237	------	135	------	0.570	----
9	07375310	Terrys Creek 1.2 mi E. of Kentwood	59.6	------	35.6	------	.597	----
10	07375380	Beaver Creek 3.4 mi SW. of Kentwood	a/13.2	------	1.50	------	.114	----
11	07375400	Beaver Creek 0.5 mi N. of Tangipahoa	25.5	12.3	6.29	4.79	.247	0.390
12	07375403	Beaver Creek at mouth, 0.9 mi E. of Tangipahoa	26.0	.5	8.79	2.50	.340	5.0
13	07375404	Tangipahoa River 0.9 mi E. of Tangipahoa	340	17.4	188	8.61	.553	.490
14	07375415	Spring Creek 1.2 mi E. of Tangipahoa	12.5	------	4.64	------	.371	----
15	07375420	Tangipahoa River 0.7 mi E. of Arcola	381	23.5	216	23.4	.567	.826
16	07375424	Big Creek 3.5 mi NE. of Roseland	38.4	------	18.9	------	.492	----
17	07375426	East Fork Big Creek 3.8 mi NE. of Roseland	31.2	------	10.3	------	.330	----
18	07375428	Big Creek 2.1 mi NE. of Amite	81.5	11.9	42.9	13.7	.526	1.15
19	07375430	Tangipahoa River 1.5 mi E. of Amite	474	11.5	290	31.1	.612	2.70
20	07375440	Tangipahoa River 1.4 mi E. of Independence	491	17	308	18	.629	1.06
21	07375450	Tangipahoa River 3.2 mi NE. of Tickfaw	514	23	366	58	.712	2.52
22	07375463	Chappepeela Creek 1.9 mi SE. of Husser	a/31.7	------	12.9	------	.407	----
23	07375475	Chappepeela Creek 3.3 mi SSE. of Loranger	a/46.0	14.1	b/19.3	6.4	.419	.457
24	07375470	Little Chappepeela Creek 2.1 mi NE. of Loranger	27.9	------	9.17	------	.329	----

25	07375476	Chappepeela Creek 4.8 mi S. of Husser	86.6	21.6	35.7	7.33	.412	.335
26	07375478	Bailey Branch 4.8 mi SE. of Loranger	4.72	------	c/1.43	------	------	1.65
27	07375491	Chappepeela Creek 3.6 mi N. of Robert	98.1	d/7.58	d/48.3	11.2	.492	1.28
28	07375500	Tangipahoa River 1 mi E. of Robert	646	36.9	460	47.1	.712	------
29	07375605	Washley Creek 1.1 mi SW. of Robert	a/35.0	------	.03	------	.0008	------
30	07375650	Tangipahoa River 4.3 mi S. of Robert	703	22	e/385	-75	------	------
31	07375680	Bedico Creek 7.0 mi NE. of Madisonville	13.7	------	.35	------	.026	------

TCHEFUNCTA RIVER BASIN

32	07374600	Tchefuncta River 4.3 mi E. of Wilmer	19.8	------	9.68	------	0.488	------
33	07374650	Gorman Creek 6.8 mi SE. of Wilmer	16.4	------	5.04	------	.307	------
34	07374700	Tchefuncta River 9 mi SW. of Franklinton	53.1	16.9	25.6	10.88	.482	0.644
35	07374720	Catca Creek 8.5 mi SW. of Franklinton	8.4	------	2.25	------	.268	.501
36	07375000	Tchefuncta River 3.6 mi SW. of Folsom	95.5	34.0	44.9	17.05	.470	.501
37	07375035	Tchefuncta River 6 mi WNW. of St. Benedict	125	29.5	48.7	3.8	.390	.129
38	07375050	Tchefuncta River 4.0 mi W. of Covington	145	20.0	52.0	3.3	.359	.165
39	07375075	Bogue Falaya 4 mi N. of Folsom	13.9	------	2.63	------	.190	------
40	07375085	Bogue Falaya 1 mi E. of Folsom	a/28.7	14.8	6.38	3.75	.222	.253
41	07375110	Simalusa Creek 4.0 mi NNW. of St. Benedict	20.9	------	3.35	------	.160	.583
42	07375115	Bogue Falaya 3.0 mi NW. of St. Benedict	68.6	19.0	20.8	11.1	.303	.583
43	07375170	Bogue Falaya 1.0 mi NE. of Covington	88.2	19.6	30.5	9.7	.345	.495
44	07375200	Little Bogue Falaya 4.0 mi N. of Covington	17.4	------	1.84	------	.106	------
45	07375210	East Fork Little Bogue Falaya 4.5 mi NE. of Covington	16.8	------	.22	------	.013	------
46	07375214	Little Bogue Falaya 1.6 mi NE. of Covington	37.0	2.8	7.85	5.73	.212	2.05
47	07375222	Abita River 0.2 mi N. of Abita Springs	a/46.2	------	1.19	------	.026	------

BAYOU LACOMBE BASIN

48	07374584	Bayou Lacombe 6.2 mi N. of Lacombe	a/35.6	------	5.13	------	0.144	------

a/ Estimated.
b/ Includes diversions through Chappepeela and Spring Creek Lakes.
c/ Most of discharge is flow from well Ta-269.
d/ Flow and drainage area of Bailey Branch subtracted.
e/ Affected by tide.

The potentiometric contours on the map (pl. 5) can be used to infer the loss, gain, or absence of streamflow. Closely spaced contours usually indicate an increased rate of ground-water flow, assuming no change in the aquifer's thickness and permeability and no pumping. The contours generally become closely spaced near areas of discharge.

Aquifer Development and Water-Level Trends

Water levels in the shallow aquifer in nonpumping areas reflect short- and long-term climatic trends. There has been a general rising trend in water levels from 1968 to 1975 (fig. 3), and at wells Ta-360 and ST-615 (well locations shown on pl. 5) the annual average rise has been about 0.3 ft/yr. The rising trend reflects a period of above-average rainfall. During the winter months, water levels in wells in the north-central part of the study area generally react to local rains within a few hours. In many of these wells, water levels rise 0.1 to 0.5 ft after a rain, returning to nearly the original level within a day or two as the additional water (recharge) dissipates. During the summer, rainfall often has little or no immediate effect on water levels in the aquifer because most of the moisture that infiltrates the soil is returned to the atmosphere by evapotranspiration. Evapotranspiration and the time, frequency, and intensity of precipitation are probably the most important factors controlling water levels in the shallow aquifer.
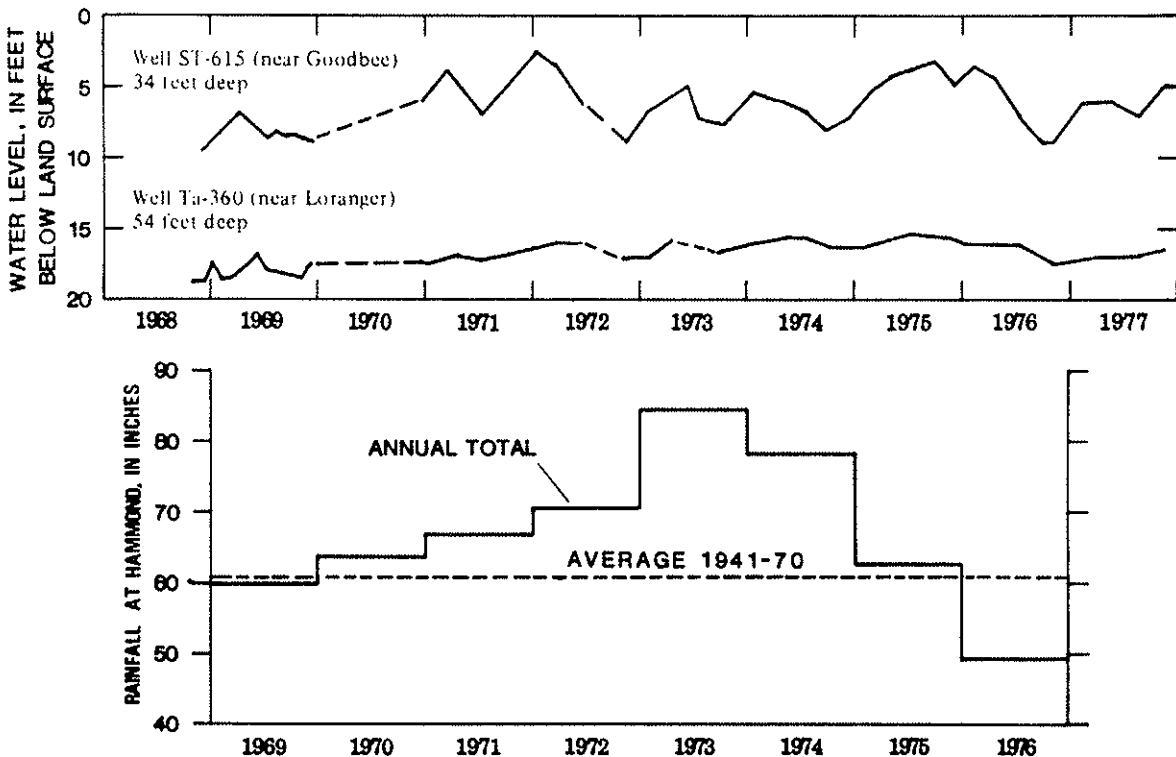
Figure 3.--Hydrographs for wells in the shallow aquifer.

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Water levels generally fluctuate from 3 to 6 ft annually near the rivers and 1 ft or less near ground-water divides (the water-table ridge separating two adjacent subbasins). Years of greater or lesser rainfall will cause fluctuations of greater or lesser amplitude. Shallow wells should be deep enough to allow for the maximum annual change in water level for the location in addition to allowing for adequate drawdown for the quantity of water to be pumped.

About 7 Mgal/d is pumped each year from the shallow aquifer in and adjacent to the study area. Of this amount, about 4 Mgal/d is pumped for rural-domestic use, 1.4 Mgal/d for irrigation, and 0.7 Mgal/d for livestock; of the remainder, most is pumped by small industries.

Water Quality

The shallow aquifer has a mixed-type water of very low mineral content in the northern part of the area. The concentration of dissolved solids ranges from about 30 mg/L near Kentwood to about 50 mg/L near Independence. Iron is present in concentrations ranging from 0.03 to 2.0 mg/L. The pH of the water is generally less than 6.0, and hardness is generally less than 20 mg/L. This water is usually corrosive and may require treatment for some uses. Several wells in the Independen. Amite area yield water with relatively high amounts of nitrate (5.0 and 13.0 mg/L). This may reflect slight contamination from surface sources, possibly from fertilizer applied to crops. However, the recommended limit of 45 mg/L of nitrate (10 mg/L of nitrate as nitrogen) for water to be used for human consumption was not exceeded in any of the samples. (See table 20.)

In the southern part of the area the shallow aquifer contains water that is more mineralized than that in the northern part. Dissolved solids range from about 60 mg/L near Hammond to about 160 mg/L near Slidell. This water is predominantly a sodium bicarbonate type. Hardness is generally less than 20 mg/L, pH is generally in the range of 6.5 to 8.0, and iron is generally present in the range of 0.3 to 2.0 mg/L.

Water from the Bayou Lacombe basin differs greatly from water in the other basins. Drill cuttings from well ST-606, about 8 mi west of Hickory, revealed lignitic, clayey, sand deposits. Water from well ST-606 has a pH of 8.3, hardness of 153 mg/L, and dissolved solids of 256 mg/L. The water has a hydrogen sulfide odor and a very high color, similar to water from a bog or marsh.

PONCHATOULA AQUIFER

Extent, Thickness, and Lithology

The Ponchatoula aquifer underlies the south half of Tangipahoa Parish and most of St. Tammany Parish (pl. 6) and extends to the east, west, and south beyond the study area. The aquifer is hydraulically connected to the shallow aquifer along an approximately east-west line through the towns of Independence and Sun (pls. 1 and 6). North of this

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line the Ponchatoula aquifer and the shallow aquifer combine to form a single hydrologic unit. The combined unit reaches a maximum thickness of about 400 ft near the flood plain of the Tangipahoa River, and a thickness of about 450 ft beneath the flood plains of the Bogue Chitto and Pearl River. South of the line the aquifer dips at about 25 to 50 ft/mi and is divided by an extensive clay bed into upper and lower units. The clay interval separating the Ponchatoula aquifer from the shallow aquifer thickens southward (pl. 1).

The upper Ponchatoula is typically 200 to 300 ft thick. It is thickest in the vicinity of Tickfaw and Hammond, thins to about 200 ft at Ponchatoula, and continues to thin southward. (See tables 2 and 4; pl. 6.) The aquifer becomes finer grained and discontinuous locally in St. Tammany Parish and is also locally broken into many thin sand beds, making aquifer correlation uncertain.

Table 4.—Altitude of aquifer interval, Ponchatoula aquifer

[In feet below mean sea level]

Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer
Upper Ponchatoula aquifer			Upper Ponchatoula aquifer--con.			Lower Ponchatoula aquifer--con.		
Li-145	35	295	Ta-276	170	460	ST-666	475	605+
ST-449	135	180	Ta-284	310	595	ST-669	580	950
ST-563	485	655	Ta-285	210	470	ST-682	430	795
ST-564	345	510	Ta-310	(a)	(a)	ST-684	570	610+
ST-576	420	590	Ta-341	285	430	ST-710	495	650
ST-582	300	505	Ta-421	165	352	ST-712	520	875+
ST-644	170	360	Ta-435	705	940	ST-721	145	535
ST-652	90	215	29307	375	605	Ta-255	575	670+
ST-653	180	445	Lower Ponchatoula aquifer			Ta-257	455	580
ST-663	135	370				Ta-264	505	1,180
ST-666	235	320	Li-145	390	815	Ta-266	365	855
ST-669	150	175	ST-449	540	580+	Ta-267	575	1,155
ST-682	(a)	(a)	ST-525	355	655	Ta-270	640	1,165
ST-684	235	360	ST-563	765	1,130	Ta-271	425	710
ST-710	(a)	(a)	ST-564	675	1,160	Ta-273	820	1,270
ST-712	255	395	ST-567	430	715	Ta-276	505	975
ST-721	(a)	(a)	ST-576	885	1,215	Ta-284	695	890+
Ta-255	210	455	ST-582	595	1,080	Ta-285	535	1,135
Ta-264	270	430	ST-599	(b)	(b)	Ta-310	255	740
Ta-266	25	265	ST-644	575	960	Ta-341	510	1,190
Ta-267	295	470	ST-652	495	625	Ta-421	445	755
Ta-270	285	570	ST-653	600	1,095	Ta-435	1,170	1,940
Ta-271	(a)	(a)	ST-663	570	840	21045	430	1,005
Ta-273	270	715				29307	800	1,390

a/ Upper Ponchatoula missing.
b/ Lower Ponchatoula missing.

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The upper Ponchatoula contains extensive deposits of coarse sand and gravel. A sample for the depth interval 540-550 ft from well Ta-268 at Hammond (fig. 4) indicates the coarseness of these deposits. The upper Ponchatoula typically contains some gravel throughout most of the report area; however, in some areas the aquifer is mostly medium sand. (See sample for well ST-712, near Madisonville, depth 389-411 ft in fig. 4.) The lithology of the aquifer and its stratigraphic position indicate that the upper Ponchatoula is the subsurface equivalent of the Citronelle Formation. The grain size in the aquifer becomes finer southward toward Manchac where the aquifer thins and contains salty water (pl. 1).

The lower Ponchatoula is typically more continuous, although individual sand beds are generally thinner and finer grained than in the upper Ponchatoula. In figure 4 the sieve analyses for depth intervals 619-629 ft (well Ta-268) and 834-856 ft (well ST-712) are representative of the grain-size distribution in the lower Ponchatoula aquifer. Sand thicknesses of less than 100 ft are common, although thicknesses of 100 to 200 ft are more typical. The aquifer generally consists of medium
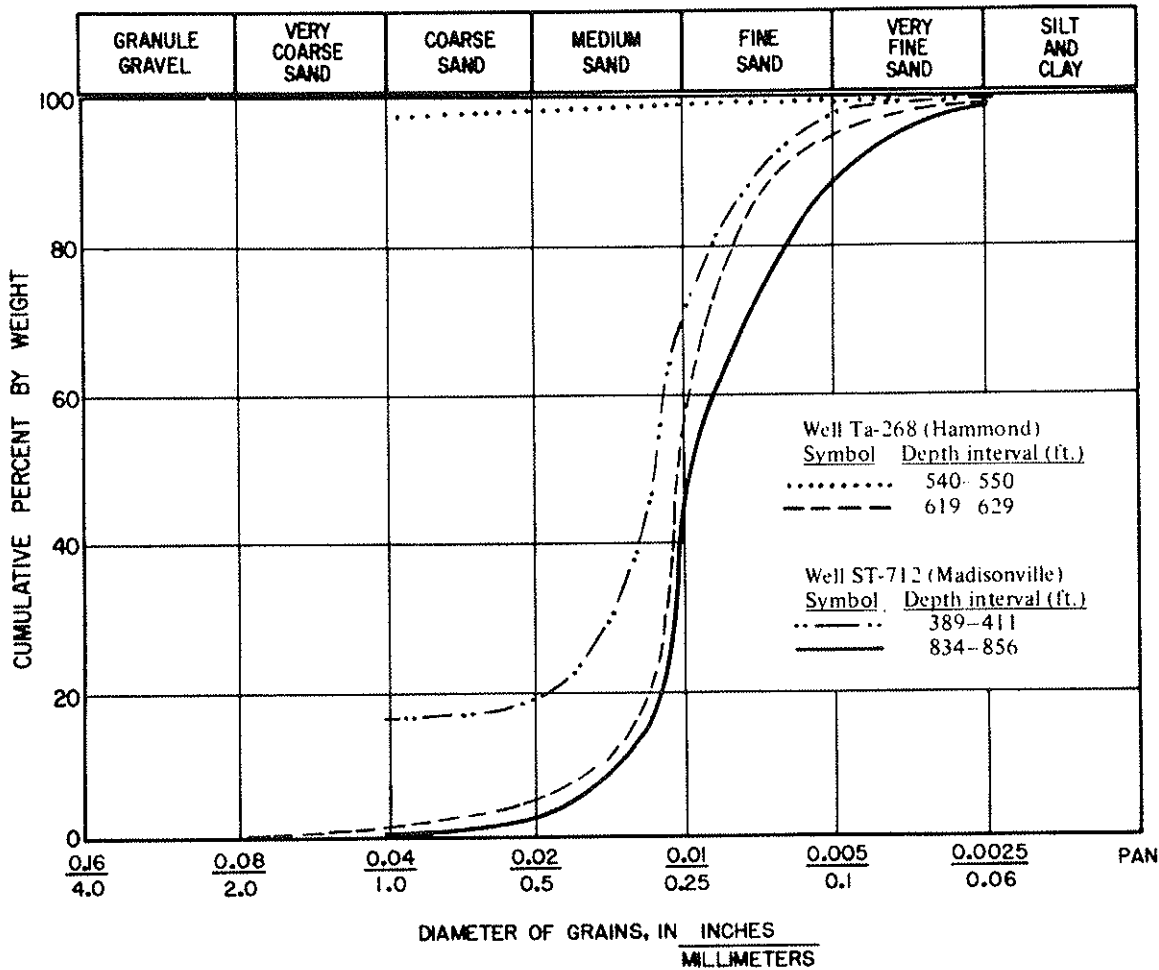
Figure 4.--Sieve analyses of sand samples from the Ponchatoula aquifer.

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sand; coarse sand and some gravel occur locally. Southward, this unit divides into three sands and becomes finer grained. It contains salty water in the vicinity of Manchac (pl. 1).

The information given in table 4 for the lower Ponchatoula aquifer (pl. 6) defines the interval occupied by the aquifer rather than the top and bottom of a major sand. The aquifer generally contains several sandy units (pls. 1-3), which commonly thicken or thin rapidly. Thus, wells drilled a short distance away from the wells shown on plate 6 may penetrate substantially different sand strata.

Aquifer Characteristics and Well Yields

Reported yields to wells range from less than 10 gal/min to more than 100 gal/min for small-diameter wells. The largest reported yield from the upper Ponchatoula aquifer was 1,425 gal/min from a 12-in municipal well (Ta-284) at Ponchatoula. The well, which is reportedly screened in sand and gravel, has an observed specific capacity of 62 (gal/min)/ft of drawdown and a corrected specific capacity of 80 (gal/min)/ft of drawdown after pumping 1,100 gal/min for 24 hours. (See section "Aquifer Characteristics and Well Yields.")

An aquifer test (Lohman, 1972) was made using well Ta-284 as the pumping well; the transmissivity was about 200,000 (gal/d)/ft (27,000 ft^2/d), and the storage coefficient was 0.00045. The 145-ft sand interval in which the well is screened has a hydraulic conductivity of about 1,300 (gal/d)/ft^2 (180 ft/d).

The amount of drawdown that will occur at different distances from well Ta-284 can be estimated from figure 5. For example, the graph shows that for a pumping rate of 500 gal/min, the approximate average continuous usage for the town of Ponchatoula, the drawdown 1,000 ft away would be about 3.5 ft after pumping for 1 year. This analysis is based on procedures described by Lohman (1972, p. 55-56) and by Bruin and Hudson (1955, p. 13-22).

No aquifer test was made in the lower Ponchatoula; however, based on the grain-size distribution (fig. 4) for the applicable wells and depths, it is estimated that the hydraulic conductivity probably ranges from 250 to 500 (gal/d)/ft^2 (35 to 65 ft/d). The highest reported yield from the lower Ponchatoula was 100 gal/min from well Ta-255 at Hammond.

Potentiometric Surface

The potentiometric surface of the upper Ponchatoula is defined primarily in Tangipahoa Parish, and the lower Ponchatoula in St. Tammany Parish. Data for both aquifers are available at a few points (pl. 6), and these indicate that the water level in the lower Ponchatoula is generally higher by 2 or 3 ft. Water-level gradients are low over most of the area but increase to the north where the potentiometric surfaces of the Ponchatoula and the shallow aquifers merge.

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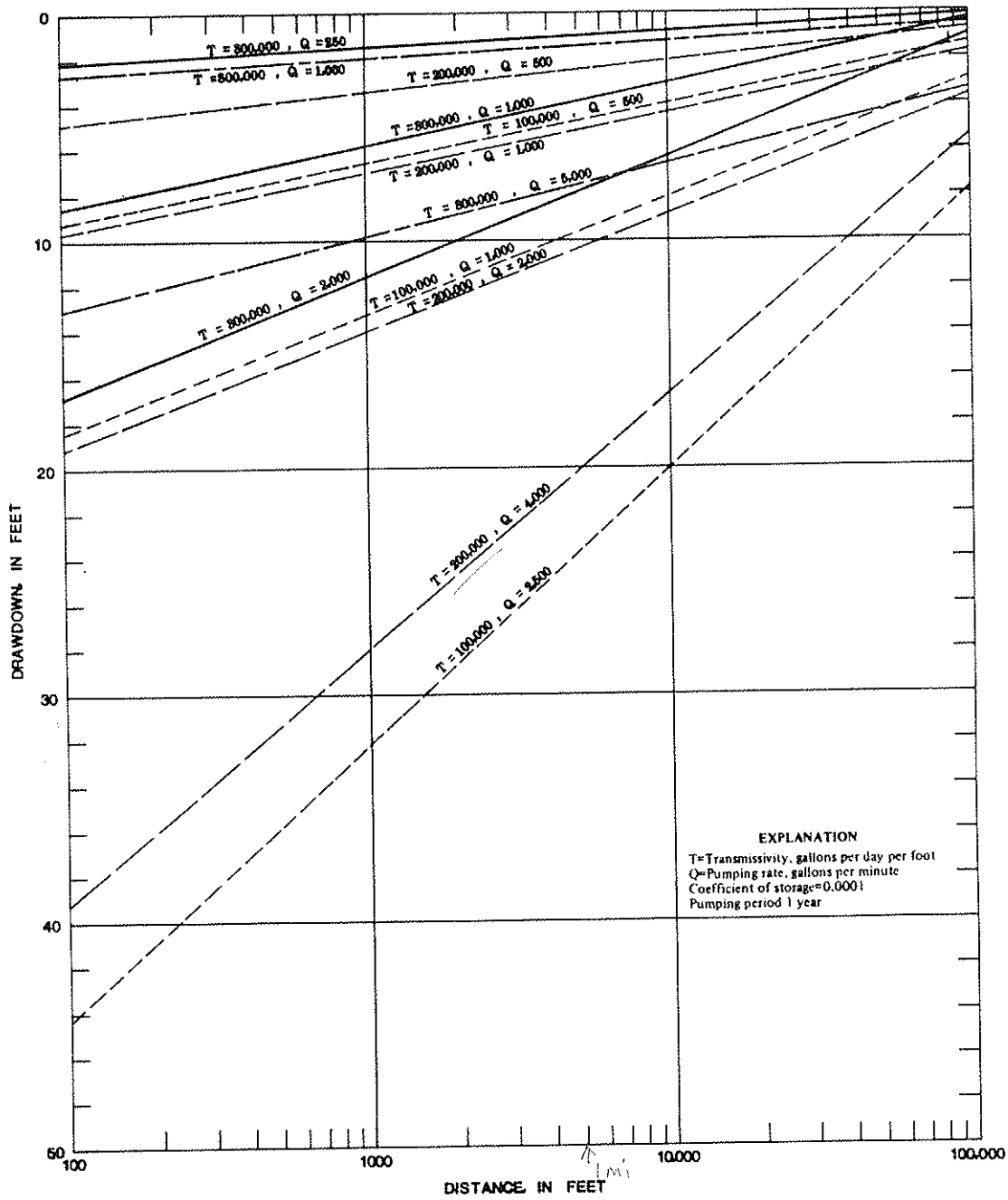
Figure 5.--Theoretical drawdown with distance for indicated pumping rates.

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The most concentrated ground-water development is in the upper Ponchatoula at the town of Ponchatoula. Because of the high transmissivity of the aquifer and the small pumpage, there is no appreciable cone of'depression at Ponchatoula. The average water-level gradient near the town of Ponchatoula is about 2 ft/mi, and the water is moving downgradient at a rate of about 100 ft/yr. Water levels range from about 15 ft above land surface to 7 ft below land surface.

Less water is withdrawn from the lower Ponchatoula than the upper Ponchatoula. Potentiometric gradients in the lower unit are less than 2 ft/mi near Covington and about 1 ft/mi near Lacombe. Water levels in the lower Ponchatoula aquifer ranged from about 17 ft above land surface to 2 ft below land surface during 1969.

Aquifer Development and Water-Level Trends

The Ponchatoula aquifer is one of the least developed aquifers in the area. Only about 1.2 Mgal/d is known to be withdrawn from the aquifer: about 1.0 Mgal/d from the upper Ponchatoula and 0.2 Mgal/d from the lower Ponchatoula. The largest user is the town of Ponchatoula, pumping an estimated average of 0.6 Mgal/d in 1974. Most of the remainder is industrial use; rural-domestic and agricultural uses are small.

The effects of development are shown by water-level changes in two observation wells, Ta-7 and Ta-19, in the upper Ponchatoula (fig. 6). The water level in well Ta-7, at Ponchatoula, has been declining at an average rate of about 0.2 ft/yr for the 37 years of record (fig. 6). There has been no obvious decline during the past 4 years. The water level in well Ta-19, about 4 mi east of Ponchatoula, declined an average of 0.1 ft/yr for the period 1940-65, and 0.2 ft/yr for the period 1965-74.

In St. Tammany Parish the water level in the upper Ponchatoula declined, during the period 1939-76, at an average rate of 0.5 ft/yr at well ST-428, near Hickory. This decline probably indicates a large number of continuously flowing wells in eastern St. Tammany Parish and in the adjacent area in Mississippi. At well ST-449, in the lower Ponchatoula at Abita Springs, the rate of decline was slightly more than 0.2 ft/yr until the late 1960's when the downward trend ceased. The water level has been rising since 1972.

The low rate of water-level decline in the Ponchatoula aquifer at Ponchatoula prior to 1972 was related to the high transmissivity of the aquifer and the relatively low withdrawals. Miscellaneous water-level measurements for the Ponchatoula aquifer are given in table 5.
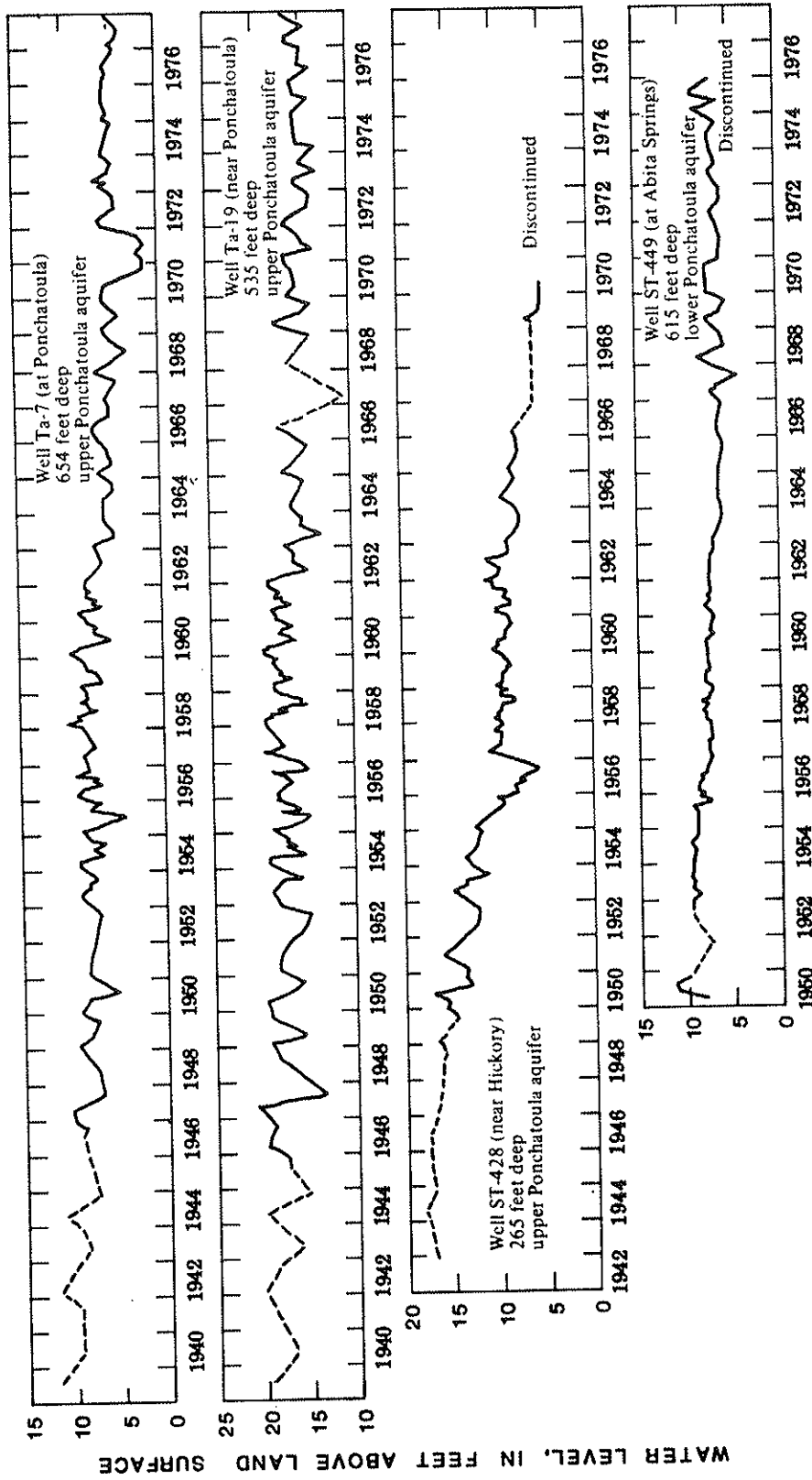
Figure 6.--Hydrographs for the Ponchatoula aquifer.

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Table 5.--Water levels for the Ponchatoula aquifer

Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum		Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum	
		April-May 1969	April-May 1974			April-May 1969	April-May 1974
UPPER PONCHATOULA				LOWER PONCHATOULA			
ST-428	265	+6.52	------	ST-449	615	+7.6	+7.1
Ta-7	654	+5.03	+5.20	ST-662	1,026	+13.8	------
Ta-19	535	+18.0	+15.3	ST-671	1,026	+17.2	+17.4
Ta-328	505	a/2.76	------	ST-673	925	+15.9	+16.2
Ta-400	540	+2.03	------	ST-684	630	+14.6	+14.5
Ta-416	420	7.81	b/6.83	Ta-255	708	2.16	------

a/ Measured July 1969.
b/ Measured September 1974.

Water Quality

Water in the Ponchatoula aquifer is generally of excellent quality for most uses, although hydrogen sulfide may be present locally in quantities as high as 0.5 mg/L. Dissolved solids range from about 160 to 350 mg/L, and hardness is generally less than 20 mg/L. Iron and manganese are generally present in concentrations of less than 0.3 and 0.05 mg/L, respectively. One well (ST-684) in the Madisonville area has an iron concentration of 1.4 mg/L. The pH typically ranges from 7.5 to 9.0. In the Manchac area the aquifer contains slightly saline water (chloride concentration about 350 mg/L). The average water temperature is 73°F (23.0°C).

BIG BRANCH AQUIFER

Extent, Thickness, and Lithology

The Big Branch aquifer occurs primarily in southern St. Tammany Parish and is named for the Big Branch community between Lacombe and Mandeville where most pumpage occurs. (See fig. 7.) The aquifer occurs at depths of 1,350 to 1,500 ft below land surface in the vicinity of the Big Branch and Lacombe communities and typically is about 50 to 150 ft thick (fig. 7). South of Covington the aquifer occurs at a depth of about 1,200 ft.and is less than 50 ft thick. East of Slidell the aquifer occurs at depths of 1,300 to 1,400 ft and is about 80 ft thick.

Geophysical logs indicate that the aquifer grades into clay southward beneath Lake Pontchartrain and north of Covington and Slidell. The aquifer does not extend far enough north in Louisiana to have connection with the shallow aquifer. The aquifer extends eastward into the State of Mississippi. Below the Big Branch are major aquifers having higher artesian head, the Abita and Covington aquifers. Recharge is probably by leakage through confining clays, particularly permeable zones in the

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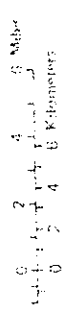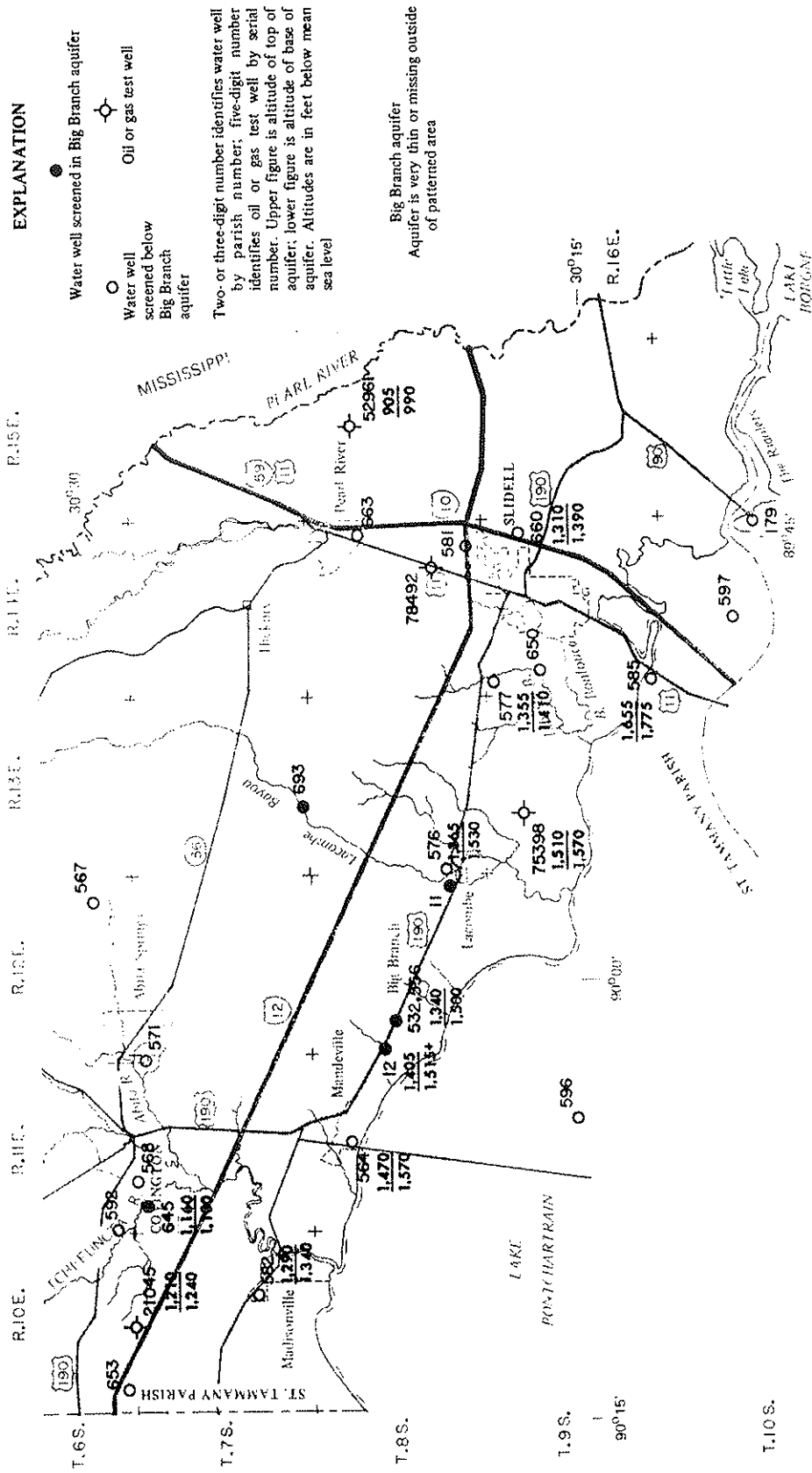
Figure 7.--Geohydrologic map of the Big Branch aquifer.

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lower confining clay (for example, near well ST-572, pl. 3). The con-
fining clay separating the Big Branch and lower Ponchatoula aquifers
thins north of well ST-577 (3 mi west of Slidell, fig. 7 and pl. 3),
and the two aquifers may be interconnected in that area.

The aquifer is mostly medium to coarse sand. Medium sand is typi-
cal of the upper part of the aquifer, grading into coarser material
near the bottom. (See fig. 8.)
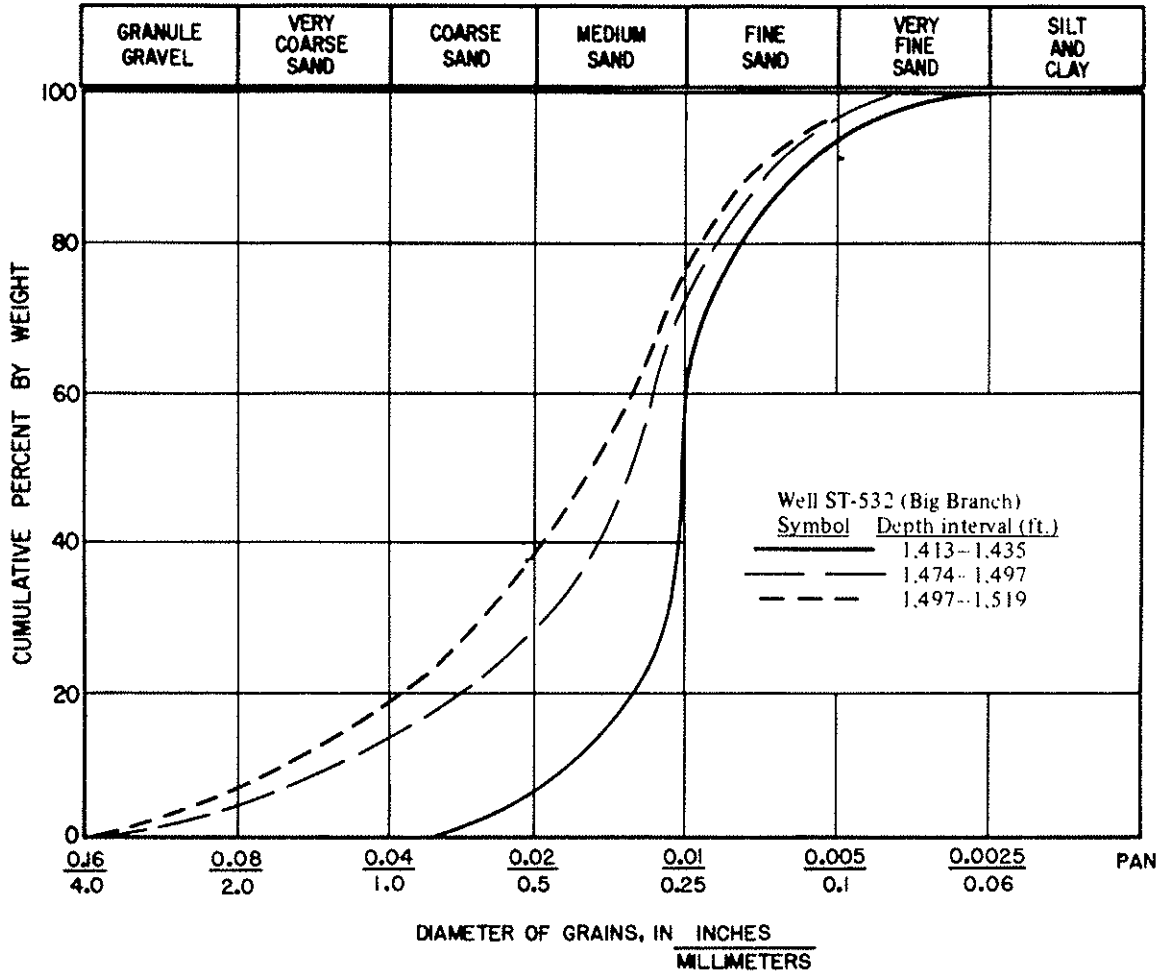
Figure 8.--Sieve analyses of sand samples from the Big Branch aquifer.

Aquifer Characteristics and Well Yields

No aquifer tests or specific-capacity data are available for wells
in the Big Branch aquifer. However, based on sieve analyses of sand
samples from well ST-532 (fig. 8), it is estimated that the hydraulic
conductivity ranges from about 300 to 800 $(gal/d)/ft^2$ (40 to 160 ft/d).

In the past, 6-in wells owned by State facilities in the area have
had flowing yields ranging from 300 to 500 gal/min. For example, in
1939, well ST-12, at Fontainebleau State Park, had an artesian head of

50.7 ft above land surface and flowed 500 gal/min open discharge. Because of declining water levels, many of these wells have been equipped with turbine pumps to maintain desired yields.

Aquifer Development and Water-Level Trends

Pumpage from the Big Branch aquifer apparently began in the 1920's and 1930's. Largest users of the Big Branch aquifer are the Lacombe Fish Hatchery, Southeast Louisiana Hospital, and Fontainebleau State Park. Combined water use by these State facilities was estimated at 0.75 Mgal/d in 1974. Combined discharge from all wells in the aquifer probably is more than 1.2 Mgal/d, nearly 0.3 Mgal/d of which is discharged by uncontrolled flowing wells. During 1969 about 0.4 Mgal/d was discharged from uncontrolled flowing wells.

During the spring of 1974, water levels ranged from 32 ft above land surface near the community of Big Branch to about 5 ft above land surface near Pearl River. Water-level data for the aquifer are given in the following table. The water-level gradient slopes generally southward at the rate of about 1 ft/mi, based on the 1969 water levels corrected to mean sea level. Water levels in wells near the mapped boundary of the aquifer (fig. 7) may be anomalously low because of boundary effects, particularly if there is pumping nearby.

Water levels for the Big Branch Aquifer

Well number	Depth (feet)	Water level, in feet above land-surface datum	
		May 1969	May 1974
ST-12	1,530	30.1	32.5
ST-645	1,200	20.9	----
ST-693	1,235	16.8	----

The hydrograph for key observation well ST-12 (fig. 9) indicates an average water-level decline of about 1 ft/yr prior to 1955. The decline during 1955-56 was due to increased use of the Southeastern Louisiana State Hospital. The average rate of decline, 1956-76, has been about 0.5 ft/yr, but there have been short periods of rising and declining water levels.

Water Quality

Water in the Big Branch aquifer ranges from a soft, sodium bicarbonate type near Madisonville to a sodium chloride type near Lacombe. Wells in the aquifer west of Lacombe produce water of very good quality. The dissolved solids in this area range from 175 to 200 mg/L, iron and manganese concentrations are generally less than 0.2 mg/L, and hardness is generally less than 10 mg/L. The only constituent that detracts from the quality in this area is the local occurrence of hydrogen sulfide, which ranges from 0.1 to 1.0 mg/L.
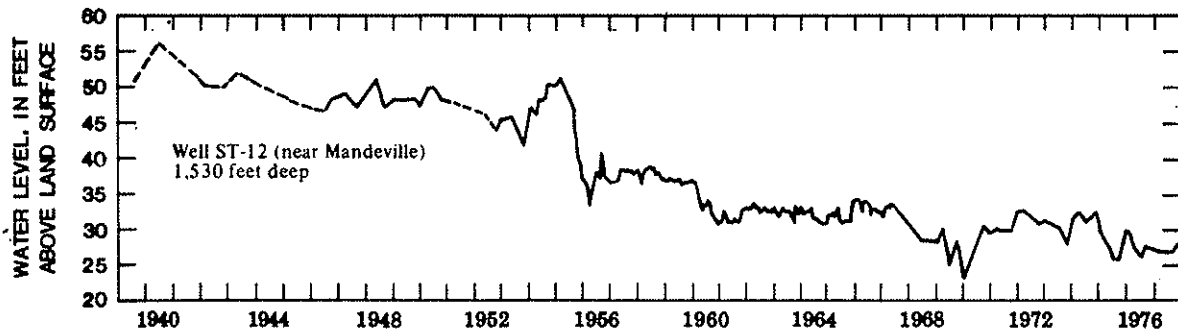
Figure 9.--Hydrograph for the Big Branch aquifer.

Wells in the Lacombe area yield water with a higher chloride concentration than those from the surrounding area. Water from well ST-11, in Lacombe, has a chloride concentration of 1,340 mg/L, hardness of 75 mg/L, and dissolved solids of 2,490 mg/L. The high-chloride water in this section of the aquifer apparently results from incomplete flushing, rather than saltwater encroachment, because the aquifer is discontinuous to the south.

Because of a lack of quality-of-water data for the aquifer east of Lacombe, electrical logs of wells in the area were used to estimate the quality (Turcan, 1966). Dissolved solids in this eastern area probably range from 300 to 400 mg/L, and chloride concentrations probably range from 20 to 40 mg/L.

KENTWOOD AQUIFER SYSTEM

The Kentwood aquifer of northern Tangipahoa and western Washington Parishes divides into three aquifers--the Abita, Covington, and Slidell-- in the southern part of the area (fig. 10). The Abita corresponds to the upper part of the Kentwood aquifer, and the Covington is connected to the lower part. The Slidell aquifer is stratigraphically equivalent to the basal part of the Kentwood but is not directly connected to the Kentwood aquifer. The Slidell aquifer is, however, connected to the Covington aquifer near the town of Pearl River. The four aquifers are discussed separately in this report.

Kentwood Aquifer

Extent, Thickness, and Lithology

The Kentwood aquifer in the northern part of Tangipahoa Parish is a sand and gravel deposit, 400 to 500 ft thick (pl. 1 and table 6), that dips to the south at the rate of about 30 ft/mi. South of an approximately east-west line about 2 mi north of Roseland (pls. 7 and 8), the Kentwood aquifer divides into an upper unit (Abita aquifer) and a lower unit (Covington aquifer). North of this east-west line the deposit of sand and gravel continues into the State of Mississippi where the

30
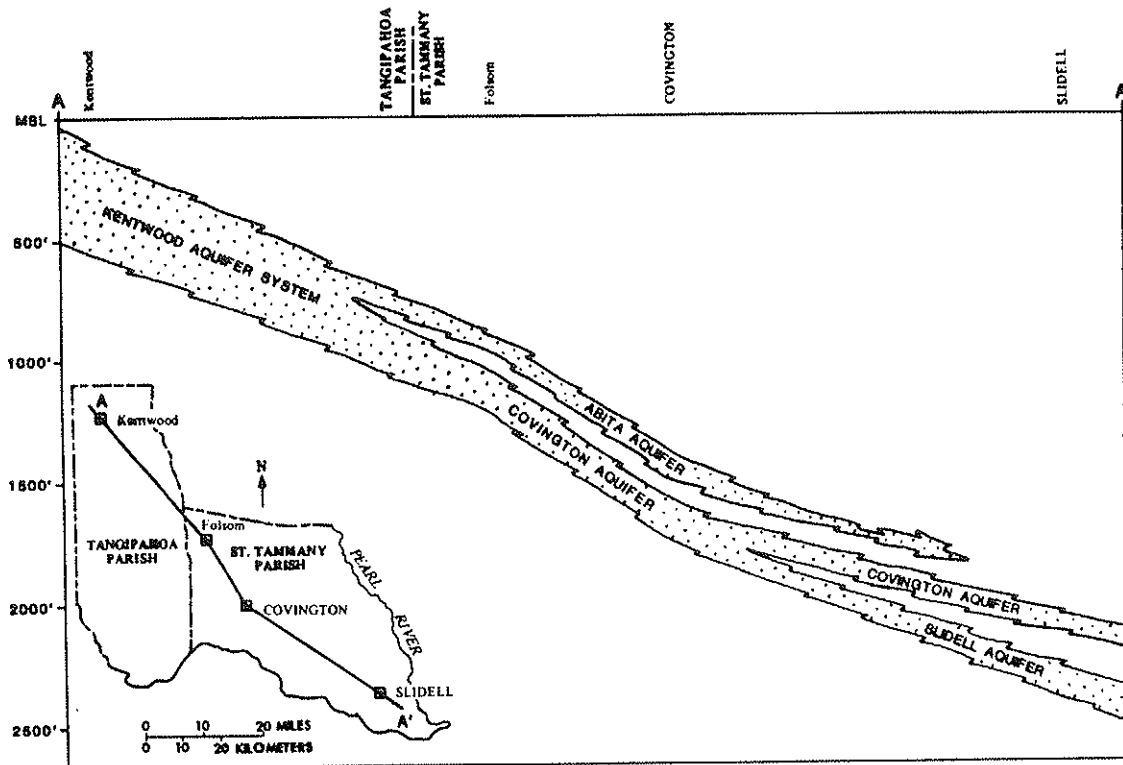
Figure 10.--Idealized section from Kentwood to Slidell showing the
relations between units in the Kentwood aquifer system.

deposits are in contact with the Citronelle Formation and the alluvium
of major rivers. The amount of gravel in the aquifer decreases to the
east, west, and south of the town of Kentwood where it occurs between
the depths of about 370 ft to more than 640 ft.

Table 6.--Altitude of aquifer interval, Kentwood aquifer
[In feet below mean sea level]

Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer
Ta-283	265	670	Ta-440	200	630+
Ta-286	120	530+	Wa-57	335	575
Ta-290	465	880	Wa-91	210	605
Ta-407	40	320+			

Aquifer Characteristics and Well Yields

The transmissivity of the aquifer near Kentwood is very large because of the great thickness and high permeability of the sand and gravel deposits. Well Ta-286, at Kentwood, is screened near the middle of the aquifer, which is more than 400 ft thick at the site. The well, which furnishes part of the water supply for the town of Kentwood, had an observed specific capacity of about 30 (gal/min)/ft of drawdown while pumping 1,557 gal/min for 24 hours. The corrected specific capacity is estimated at about 150 (gal/min)/ft of drawdown, which corresponds to a transmissivity of about 400,000 (gal/d)/ft (54,000 ft^2/d) and an average permeability of about 1,000 (gal/d)ft^2 (140 ft/d) (Meyer, 1963, p. 338-340). A well in this aquifer pumping 250 gal/min, the approximate average usage by Kentwood, would cause only 1.0 ft of drawdown 1,000 ft away after 1 year of pumping. (See fig. 5.)

Potentiometric Surface

The potentiometric surface of the Kentwood aquifer (pls. 7 and 8) indicates the changes in gradient between areas of recharge (in southern Mississippi) and areas of discharge to the south. In addition to pumping from the Abita and Covington aquifers, natural discharge occurs by upward leakage of water through the confining clays to aquifers of lower hydrostatic head. The southward gradient is about 10 ft/mi between Kentwood and Franklinton, decreasing to about 3 ft/mi north of Roseland.

In May 1974, water levels in the Kentwood aquifer ranged from about 60 ft below land surface in highland areas to about 20 ft above land surface in the flood plains of major rivers near Kentwood and Franklinton.

Aquifer Development and Water-Level Trends

During the past 5 years (1969-74) water levels have been rising about 1 ft/yr in the vicinity of Kentwood (table 7). The rising water levels reflect above-average rainfall in the recharge areas in southern Mississippi. North of Franklinton there has been a slight rise in water level (1969-74), whereas at the village of Tangipahoa, water levels are declining nearly 1 ft/yr. This north-south transition from a rising to a declining water level is caused by effects of pumping from the contiguous Abita and Covington aquifers to the south.

Water-level fluctuations in the Kentwood aquifer are represented by the hydrograph for well Wa-18 (fig. 11). The water-level changes in this well have not shown a consistent trend. From 1950 to 1958, well Wa-18 was in service supplying the town of Franklinton, and the water level declined. In 1958 the well was replaced by a deeper well, and the water level rose sharply. From 1969 to 1976 there has been little water-level change. Additional water-level data are given in table 7.

Total pumpage from the Kentwood aquifer during 1974 was about 0.8 Mgal/d. The principal areas of development in the Kentwood aquifer include the town of Kentwood, which pumped about 0.33 Mgal/d, and numerous controlled flowing wells in the flood plains of the Tangipahoa River and
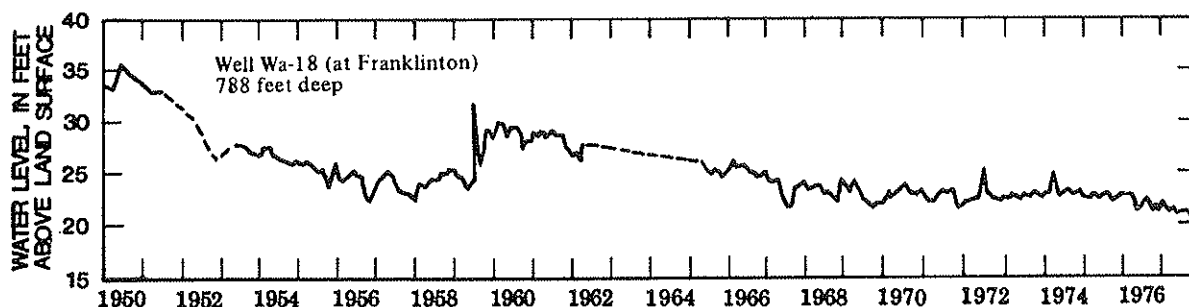
Figure 11.--Hydrograph for the Kentwood aquifer.

Table 7.--Water levels for the Kentwood aquifer

Well number	Depth (feet)	Water level, in feet above(+)or below land-surface datum		Well number	Depth (feet)	Water level, in feet above(+)or below land-surface datum	
		May 1969	May 1974			May 1969	May 1974
Ta-286	640	60.96	57.22	Wa-18	788	+23.5	+23.7
Ta-380	580	+17.52	a/+12.15	Wa-79	310	+23.6	+24.5
Ta-440	603	------	2.01	Wa-91	600	------	12.98

a/ Measured February 1975.

Bogue Chitto. An additional 0.3 Mgal/d probably is removed from the aquifer by uncontrolled flowing wells.

Water Quality

The Kentwood aquifer contains a very dilute mixed-type water. Dissolved solids range from 50 to 150 mg/L. Hardness (as $CaCO_3$) ranges from 10 to 35 mg/L, dissolved iron from 0.01 to 0.12 mg/L, and dissolved manganese from 0 to 0.08 mg/L. The water has a pH of approximately 6.5 and a temperature of 70° to 72°F (21.0° to 22.0°C). There are local occurrences of hydrogen sulfide.

Abita Aquifer

Extent, Thickness, and Lithology

The Abita aquifer of the Kentwood aquifer system is the shallowest unit that is generally continuous throughout the report area. The depth to the top of the aquifer ranges from 500 ft below land surface south of Franklinton (table 8 and pl. 7) to about 2,300 ft at the Rigolets south of Slidell. South of an east-west line 2 mi north of Roseland (pl. 7) the Abita aquifer is highly variable in thickness, ranging from 0 to more than 200 ft, but is typically between 50 and 100 ft thick. The aquifer dips to the southwest at the rate of 40 ft/mi near Folsom and 70 ft/mi near Slidell. East of the town of Pearl River (oil test 52961, pl. 7) the Abita, Covington, and Slidell aquifers converge into a single

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sand unit. The Abita aquifer is absent locally south of Folsom, north-west of Folsom in Tangipahoa Parish, northeast of Abita Springs, at Lacombe and Slidell, and near Hammond (pl. 7).

Table 8.--Altitude of aquifer interval, Abita aquifer
[In feet below mean sea level]

Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer
Li-149	1,740	1,985+	ST-646	2,115	2,260+	Ta-287	670	960
Or-179	2,320	2,435	ST-648	1,595	1,715	Ta-289	610	830
SH-7	800	990	ST-652	1,185	1,260	Ta-296	1,170	1,325
ST-525	(a)	(a)	ST-653	(a)	(a)	Ta-303	1,025	1,130
ST-555	1,640	1,760+	ST-664	1,310	1,370+	Ta-310	890	1,025
ST-558	(a)	(a)	ST-669	(a)	(a)	Ta-313	865	905
ST-562	1,695	1,765	ST-682	1,045	1,115	Ta-314	745	935
ST-563	(a)	(a)	ST-686	770	835+	Ta-341	(a)	(a)
ST-564	1,795	1,870	ST-708	1,890	1,935	Ta-411	(a)	(a)
ST-565	1,930	1,960+	ST-721A	915	965	Ta-435	2,195	2,560
ST-567	(a)	(a)	Ta-257	900	965	21045	1,450	1,555
ST-571	1,390	1,475+	Ta-260	575	900	29307	1,770	1,920
ST-575	985	1,100	Ta-264	(a)	(a)	30902	(a)	(a)
ST-576	(a)	(a)	Ta-266	1,165	1,205	44836	450	520
ST-577	1,865	1,935	Ta-270	(a)	(a)	46024	485	600
ST-578	1,130	1,220	Ta-272	685	910	52961	1,450	1,940
ST-592	1,410	1,665	Ta-278	1,160	1,260	75398	2,010	2,135
ST-598	1,600	1,765	Ta-282	1,015	1,265	78492	1,690	1,740
ST-644	1,260	1,540	Ta-285	(a)	(a)	85312	1,410	1,490

a/Aquifer missing.

The vertical gradation in texture of aquifer material is shown by sieve analyses of sand samples from wells ST-564 and ST-571 (fig. 12). The analyses represent nearly the full thickness of the aquifer. The particle-size distribution indicates that the aquifer is dominantly a medium to very coarse sand at well ST-564 and in the bottom interval of well ST-571. The upper part of the aquifer at well ST-571 is a medium sand.

Aquifer Characteristics and Well Yields

The Abita aquifer has a good yield potential with transmissivities typically ranging from about 80,000 to 100,000 (gal/d)/ft (10,000 to 13,000 ft^2/d). The transmissivity is much greater where the Covington and Slidell aquifers are interconnected, and smaller where the aquifer is thin.

Well ST-586 (pl. 7) had an uncorrected specific capacity of 14.4 (gal/min)/ft of drawdown, or 33 (gal/min)/ft of drawdown after

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GRANULE GRAVEL | VERY COARSE SAND | COARSE SAND | MEDIUM SAND | FINE SAND | VERY FINE SAND | SILT AND CLAY

CUMULATIVE PERCENT BY WEIGHT

100

80

60

40

20

0

Well ST-564 (Mandeville)
Symbol   Depth interval (ft.)
_____   1.803- 1.813
.. _____   1.833 1.843
....   1.863 - 1.873

Well ST-571 (Abita Springs)
Symbol   Depth interval (ft.)
. __ . __ .   1.455 1.465
_____ ____   1.475 1.485
__ __ __   1.495 1.505

0.16   0.08   0.04   0.02   0.01   0.005   0.0025   PAN
4.0   2.0   1.0   0.5   0.25   0.1   0.06

DIAMETER OF GRAINS, IN INCHES
                        MILLIMETERS

Figure 12.--Sieve analyses of sand samples from the Abita aquifer.

corrections for losses due to pipe friction and partial penetration (Cardwell and others, 1967, p. 84). The well was pumping 1,515 gal/min for an unknown period of time. This specific capacity is equivalent to a transmissivity of about 100,000 (gal/d)/ft (13,000 ft^2/d). No additional aquifer data are available within the report area; however, applicable information is available for wells at the National Space Technology Laboratories, 7 mi east of the town of Pearl River.

Three wells at the National Space Technology Laboratories are screened in the Abita aquifer. An aquifer test at one of these wells indicated a transmissivity of 81,000 (gal/d)/ft (11,000 ft^2/d), and a hydraulic conductivity of 930 (gal/d)/ft^2 (120 ft/d) (Newcome, 1967, p. Hll). The observed specific capacity was 15 (gal/min)/ft of drawdown after 24 hours of pumping at 1,218 gal/min. No aquifer tests were made at the other wells, but their yields were 2,487 and 1,089 gal/min.

The relation between the drawdown caused by pumping and distance from a pumping well (fig. 5) for an aquifer with a transmissivity of 100,000 (gal/d)/ft (13,000 ft^2/d) shows that at a pumping rate of

500 gal/min there would be less than 5 ft of drawdown 1 mi from the well after 1 year of continuous pumping.

Potentiometric Surface

Water levels in the Abita aquifer in May 1974 ranged from nearly 40 ft below land surface near Folsom to about 90 ft above land surface in the Slidell area. The potentiometric surface of the Abita aquifer (pl. 7) indicates the changes in gradient between the Kentwood aquifer to the north and areas of discharge to the south. The southward gradient of about 3 ft/mi near Amite decreases to about 1.5 ft/mi near Covington and becomes very flat near Slidell. This change in the potentiometric surface that occurs in a triangular area between Sun, Covington, and Slidell suggests significant changes in the aquifer in this area. The aquifer is apparently discontinuous between Abita Springs and Slidell, causing the flat gradient. Geologic data are inadequate to define the nature of the discontinuities. A fault mapped by Cardwell (Cardwell and others, 1967, pl. 2) cuts the aquifer south of well Or-179 and may restrict discharge to the south.

The Abita aquifer becomes discontinuous and is locally absent in the Hammond area. In sand units equivalent to the Abita the artesian pressure is lower than would be expected--for example, the water level of well Li-149 (table 9) is 60 ft below the projected potentiometric surface. The low water levels probably reflect the influence of pumping in the Baton Rouge area because there is little pumping near well Li-149. The Abita, Covington, and Slidell aquifers apparently are interconnected near the Pearl River, according to geologic data from oil test 52961. Water-level data indicate that near the area of the interconnection, heads in the three aquifers are within a few feet of each other, with the Slidell aquifer having the highest artesian pressure.

Aquifer Development and Water-Level Trends

An estimated 1.0 Mgal/d is discharged from the Abita aquifer (exclusive of water discharged by uncontrolled flowing wells), nearly all of which is pumped in St. Tammany Parish. About 0.3 Mgal/d is pumped in the Covington area from public-supply wells, and another 0.3 Mgal/d is pumped in the Slidell area for domestic and industrial uses. The remaining 0.4 Mgal/d is discharged from rural wells in St. Tammany Parish and central Tangipahoa Parish.

The average rate of water-level decline at observation well ST-16 was about 0.5 ft/yr from 1939 to 1976. (See pl. 7 for location.) The long-term trends of the hydrograph of well ST-16 (fig. 13) reflect regional pumping, and the short-term fluctuations reflect variable use of the well and other wells nearby. Although the overall trend is downward, the water level rose sharply in 1974 and remained at a high level during 1975. The trend during 1976 was sharply downward. The water level in observation well Or-179, in the Abita aquifer south of Slidell, declined about 2.5 ft/yr from 1965 to 1976. This rate of decline is

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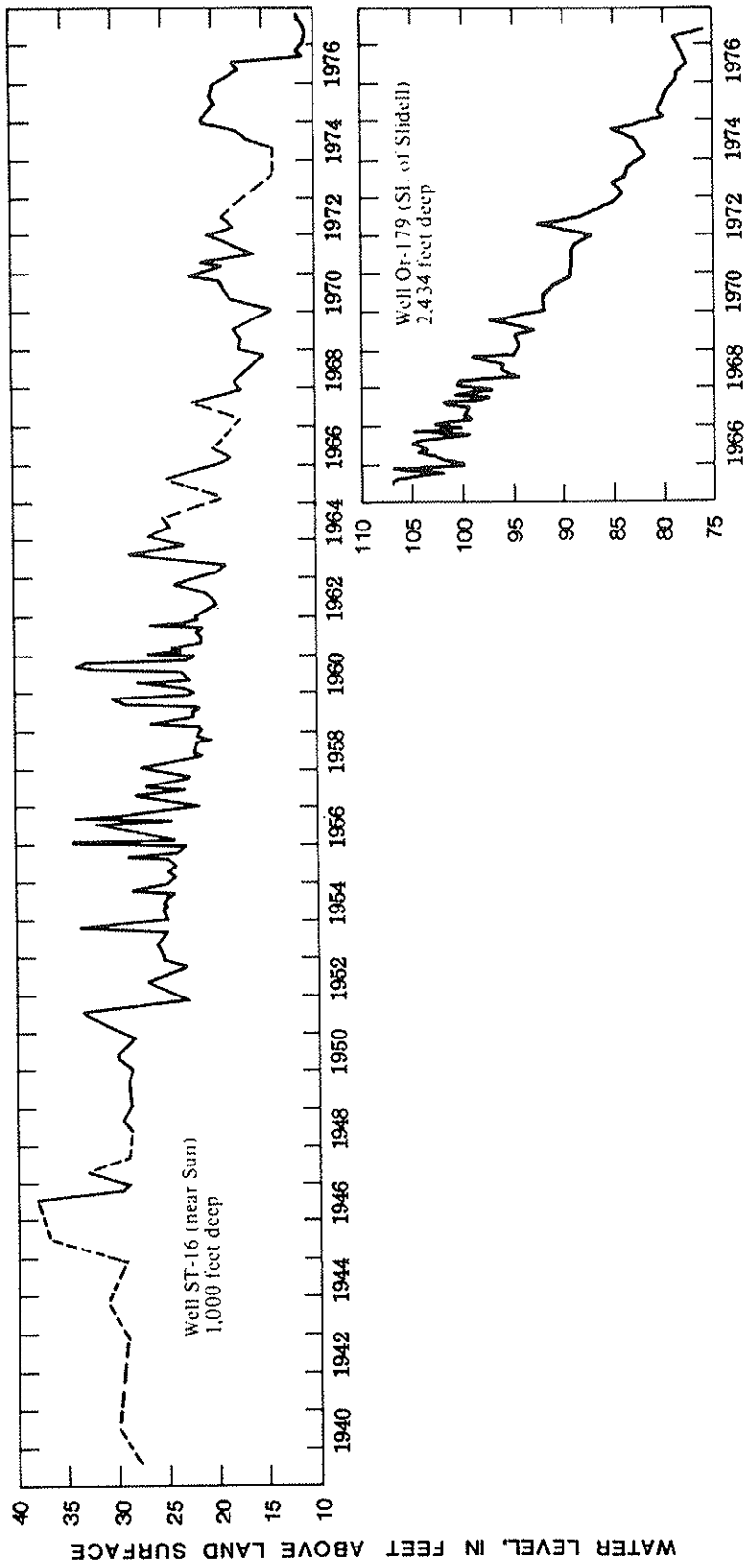
Figure 13.--Hydrographs for the Abita aquifer.

greater than would be expected from the estimated pumpage. Additional water-level data for the Abita aquifer are given in table 9.

Table 9.--Water levels for the Abita aquifer

Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum		Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum	
		May 1969	May 1974			May 1969	May 1974
Li-149	1,898	-------	+24.8	ST-649	1,600	+74.9	a/+63.3
Or-179	2,435	+94.9	+82.4	ST-664	1,407	+65.0	+58.2
ST-16	1,000	+18.2	+14.0	ST-676	1,530	+65.2	+54.9
ST-565	1,971	+96.8	+87.4	ST-681	930	+9.4	-------
ST-571	1,505	+71.7	a/+62.9	ST-686	1,100	32.64	37.0
ST-646	2,263	+96.9	-------	ST-692	1,620	+72.4	+62.4
ST-648	1,685	+80.0	a/+69.0	Ta-347	1,380	+77.5	a/+63.3

a/ Measured February 1975.

Water Quality

Water in the Abita aquifer is a sodium bicarbonate type, having dissolved solids ranging from 50 to 400 mg/L. Iron concentrations are generally less than 0.3 mg/L; however, water from wells west of Abita Springs contains iron in excess of this amount, and some concentrations are as high as 3.0 mg/L. Manganese is present in water from most wells in the aquifer in concentrations of less than 0.1 mg/L. Silica in water from the area west of Abita Springs is generally in the range of 40 to 60 mg/L. The pH ranges from about 6.5 in the northern part of the aquifer to about 9.0 in the southeastern part. Hydrogen sulfide occurs locally and may be as high as 0.5 mg/L. Temperature ranges from 70°F (21.0°C) in the northern part of the aquifer (depths of about 500 ft) to 98°F (36.5°C) in the southern part (well Or-179, 2,435 ft deep).

Covington Aquifer

Extent, Thickness, and Lithology

The Covington aquifer, of the Kentwood aquifer system, is a continuous unit in most of the report area and is one of the most important aquifers. The aquifer ranges in depth below land surface from about 600 ft near Franklinton to about 2,200 ft near Slidell. The aquifer thickness typically ranges from 100 to 200 ft (table 10); however, in the Slidell area the thickness varies greatly and may be less than 100 ft. The aquifer dips to the southwest at a rate ranging from 40 ft/mi in northern Tangipahoa Parish to about 70 ft/mi in southern St. Tammany Parish.

Table 10.—Altitude of aquifer interval, Covington aquifer
[In feet below mean sea level]

Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer
Li-54	(a)	(a)	ST-669	1,430	1,580+	Ta-312	1,240	1,455
SH-5	460	610	ST-708	1,990	2,145+	Ta-314	(a)	(a)
SH-7	1,075	1,255	ST-710	1,410	1,475+	Ta-341	1,550	1,690
SH-8	1,230	1,290	ST-721B	1,045	1,205	Ta-429	(a)	(a)
SJB-158	2,830	3,040	Ta-257	1,165	1,295	Ta-435	2,380	2,560
ST-525	1,265	1,330	Ta-258	1,855	1,940+	21045	1,600	1,745
ST-558	1,165	1,360	Ta-264	1,545	1,710	29307	(a)	(a)
ST-562	1,785	1,915	Ta-265	1,465	1,575	30902	805	965
ST-564	1,960	2,095+	Ta-266	1,380	1,550	34709	2,110	2,190
ST-567	1,425	1,455	Ta-269	1,125	1,205	44836	565	765
ST-573	1,955	2,020	Ta-272	(a)	(a)	46024	815	1,035
ST-576	(a)	(a)	Ta-273	(a)	(a)	47328	575	820
ST-591	2,150	2,180+	Ta-278	1,290	1,380+	52961	1,450	1,940
ST-592	1,410	1,665	Ta-281	1,480	1,685	81235	1,560	1,735
ST-598	1,780	1,895+	Ta-285	(a)	(a)	85312	1,525	., 630
ST-644	1,620	1,710+	Ta-289	955	995	87776	1,450	1,475
ST-652	1,295	1,465	Ta-310	1,270	1,440	137657	1,860	2,055

a/Aquifer missing.

In addition to northern Tangipahoa and western Washington Parishes where the Covington and Abita merge, forming the Kentwood aquifer, the Abita, Covington, and Slidell aquifers also merge to form a massive sand 490 ft thick near the Pearl River at the site of oil test 52961 (pl. 8). The aquifer is essentially absent in the vicinity of Amite (well Ta-272, pl. 1), Lacombe (well ST-576, pl. 3), and near Hammond and Ponchatoula.

Sieve analyses of the aquifer material penetrated by a well at Madisonville indicate that the Covington aquifer is dominantly a medium to coarse sand (fig. 14). Sands in the lower part of the aquifer are typically coarser than in the upper part.

Aquifer Characteristics and Well Yields

Two Covington municipal-supply wells (ST-57 and ST-554) are screened in the Covington aquifer. Well ST-57 had a yield of 750 gal/min when drilled in 1942. The yield of well ST-554 was not documented.

No specific capacity or aquifer tests were conducted in the Covington aquifer in the project area; however, a test at the National Space Technology Laboratories indicated a hydraulic conductivity of 1,670 (gal/d)/ft^2 (220 ft/d), a transmissivity of 200,000 (gal/d)/ft, (27,000 ft^2/d), and an observed specific capacity of 26 (gal/min)/ft of drawdown for industrial well 2 (Newcome, 1967, p. H14). The well was pumped at about 5,000 gal/min for 24 hours.
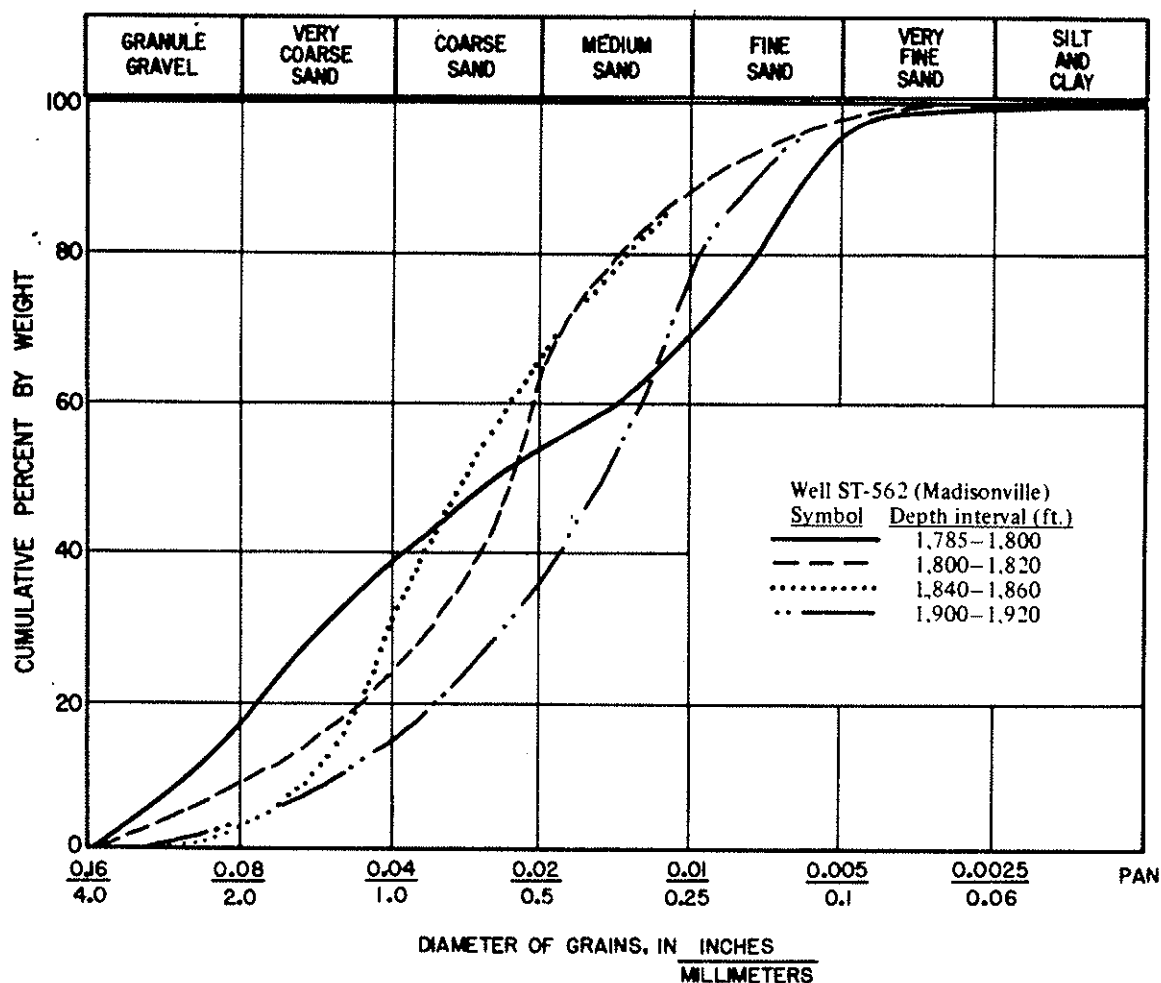
Figure 14.--Sieve analyses of sand samples from the Covington aquifer.

Assuming a transmissivity of 200,000 (gal/d)/ft (27,000 ft^2/d), the average annual pumping rate of 500 gal/min (during 1974) for the city of Covington, for example, would cause less than 4 ft of decline 1 mi from the center of pumping during the first year (fig. 5). This rate of decline would decrease greatly with time unless the pumping rate was increased.

Potentiometric Surface

The potentiometric surface of the Covington, Kentwood, and Slidell aquifers is shown on plate 8. In May 1974, water levels in the Covington aquifer ranged from about 50 ft below land surface in the highland areas east of Roseland to nearly 100 ft above land surface near Madisonville. The water-level gradient in the Covington aquifer decreases rapidly from about 2.5 ft/mi near Roseland to 2 ft/mi near Folsom and 1 ft/mi near Covington. There are no well-defined pumping cones because of the rela- tively high transmissivity and because pumping centers are scattered and the total pumpage is small (generally less than 1 Mgal/d).

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Aquifer Development and Water-Level Trends

About 2.0 Mgal/d was pumped in the report area from the Covington aquifer during 1974 (exclusive of discharge from uncontrolled flowing wells). Of this amount, 1.7 Mgal/d was used in St. Tammany Parish, and 0.3 Mgal/d was used in Tangipahoa Parish. Municipal water systems were the largest users. Water not pumped by public water systems was estimated at 0.85 Mgal/d and was used for domestic, agricultural, and industrial purposes. Discharge from uncontrolled flowing wells was not determined.

In the Covington area the decline at well ST-545 averaged 1.4 ft/yr (fig. 15), 1953-70; the rate of decline increased to about 2.2 ft/yr, 1970-76. The pumpage by suburban water systems from Covington to Madisonville in 1974 averaged about 1.0 Mgal/d. In southwestern Tangipahoa Parish the average rate of decline is about 2.0 ft/yr (pl. 8), reflecting pumpage of 0.15 Mgal/d at Ponchatoula and Albany, and also reflecting the influence of pumping in the Baton Rouge area. (See table 11 for additional information on water levels.)
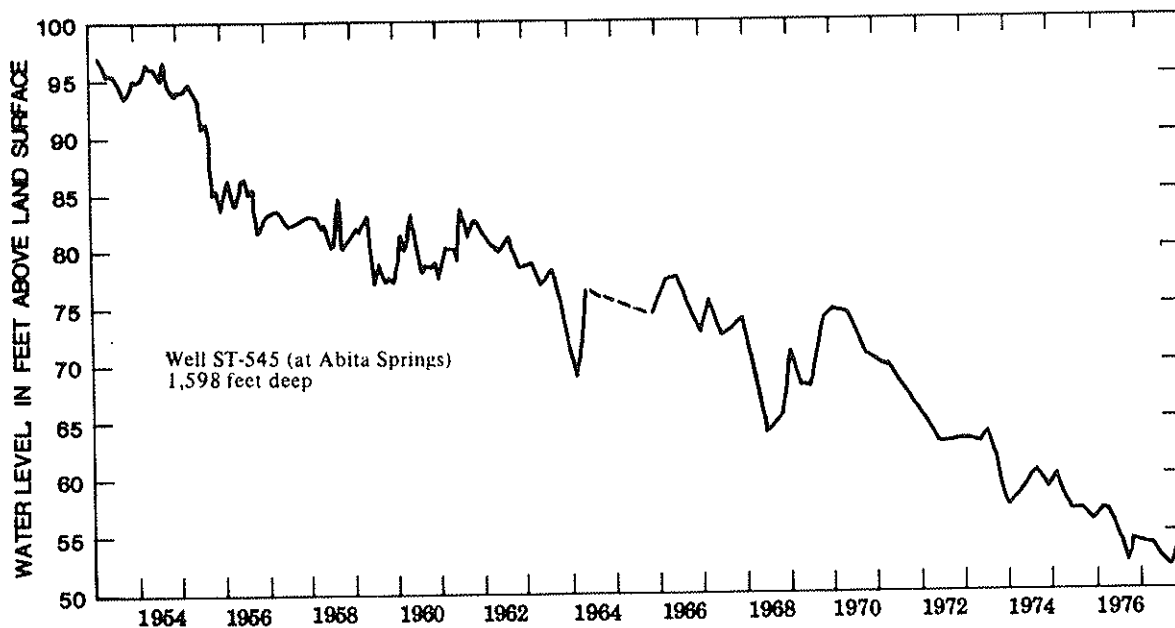
Figure 15.--Hydrograph for the Covington aquifer.

Water Quality

Water in the Covington aquifer is generally a soft, sodium bicarbonate type. Hardness is generally less than 25 mg/L, and dissolved solids range from 50 to 250 mg/L. Iron is typically less than 0.3 mg/L; manganese ranges from 0.01 to 0.57 mg/L. The temperature of water in the aquifer increases from 70°F (21.0°C) in the northern part to 98°F (36.5°C) in the southern part. Similarly, the pH ranges from 6.5 to 9.5. Hydrogen sulfide was present in water from most wells sampled, but concentrations measured did not exceed 0.5 mg/L.

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Table 11.—Water levels for the Covington aquifer

Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum		Well number	Depth (feet)	Water level, in feet above(+) or below land-surface datum	
		May 1969	May 1974			May 1969	May 1974
SJB-158	2,968	--------	+96.7	ST-721B	1,240	d/15	--------
ST-525	1,436	a/+6	-------	Ta-258	1,962	+98.7	--------
ST-545	1,598	+71.6	b/+60.4	Ta-264	1,728	--------	+84.4
ST-562	1,901	+104.0	+96.7	Ta-278	1,430	+76.8	+69.7
ST-564	2,106	--------	+84.8	Ta-281	1,720	+88.1	+79.3
ST-591	2,191	+91.4	+82	Ta-324	1,938	+91.8	+78.0
ST-644	1,710	+87.3	+80.8	Ta-341	1,710	+90.0	+76.5
ST-659	1,492	+62.5	+56.2	Ta-345	1,808	+81.6	--------
ST-665	1,620	+70.6	--------	Ta-397	1,857	+101.6	+93.0
ST-669	1,612	+67.5	+61.3	Ta-420	1,510	+82.3	+72.6
ST-708	2,155	c/+98	-------	Ta-438	1,517	--------	+52.3
ST-710	1,506	+72.8	--------				

a/ Measured June 1969,
b/ Measured September 1974,
c/ Measured October 1969.
d/ Measured October 1971.

Slidell Aquifer

Extent, Thickness, and Lithology

The Slidell aquifer occurs primarily in southern St. Tammany Parish. To the west the aquifer becomes discontinuous (pls. 2, 3, and 8). To the east the aquifer continues into Mississippi, and to the south it may be cut off beneath Lake Pontchartrain by a fault zone (Cardwell, in Cardwell and others, 1967, pl. 2). North of a line between Abita Springs and Hickory the aquifer locally interfingers with the Covington aquifer or grades to clay. The aquifer occurs below a depth of 1,700 ft east of Abita Springs (oil test 85312, pl. 8) and below 2,100 ft at Slidell. The aquifer dips to the southwest at about 75 ft/mi south of Slidell. The thickness of the aquifer generally ranges from 50 to 250 ft (table 12); however, at oil test 52961, 4 mi east of Pearl River (pl. 8), the Abita, Covington, and Slidell aquifers merge to form an essentially un-divided sand unit about 490 ft thick. The Slidell aquifer typically ranges from 100 to 200 ft in thickness.

Sieve analyses indicate that sands in the Slidell aquifer have a slightly finer grain size than the overlying Covington aquifer; however, both aquifers generally consist mainly of medium and coarse sand. Typical sands in the Covington and Slidell aquifers can be compared using figures 14 and 16.

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Table 12.--Altitude of aquifer interval, Slidell aquifer

[In feet below mean sea level]

Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer
ST-563	2,255	2,400+	21045	1,960	2,215
ST-567	(a)	(a)	52961	1,450	1,940
ST-573	2,085	2,190	60741	2,195	2,450
ST-576	2,240	2,325	75398	2,355	2,425
ST-577	2,140	2,300	81235	(a)	(a)
ST-592	(a)	(a)	85312	1,715	1,760
ST-646	2,115	2,260+	136552	1,980	2,125
ST-660	2,135	2,285+	137657	(a)	(a)

a/ Aquifer missing.
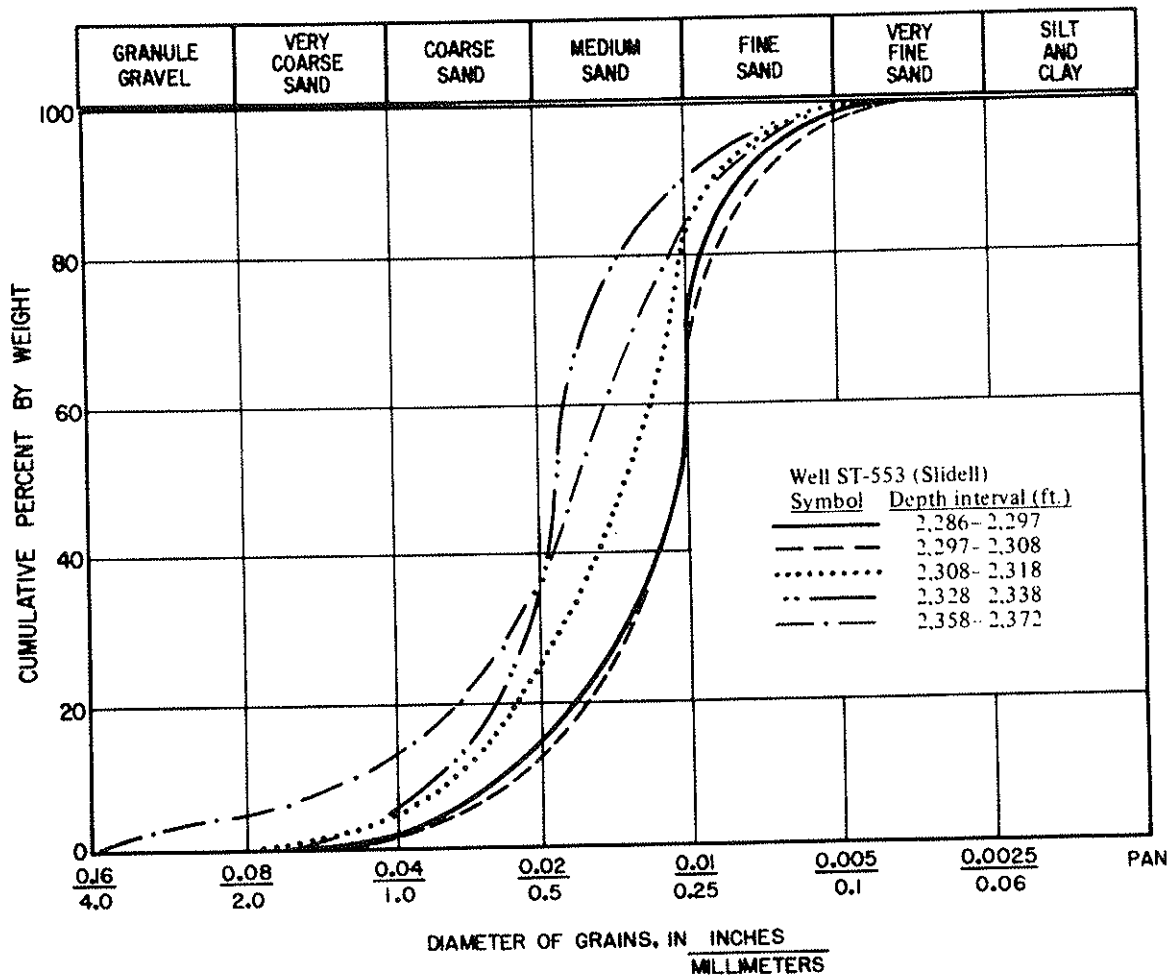
Figure 16.--Sieve analyses of sand samples from the Slidell aquifer.

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Aquifer Characteristics and Well Yields

Transmissivities range from 100,000 (gal/d)/ft (13,000 ft^2/d) to more than 200,000 (gal/d)/ft (27,000 ft^2/d) in the Slidell aquifer. An aquifer test at well ST-576 at Lacombe indicated a transmissivity of 150,000 (gal/d)/ft (20,000 ft^2/d) and a hydraulic conductivity of 1,400 (gal/d)/ft^2 (190 ft/d) for an aquifer containing mostly medium to coarse sand. At Slidell the aquifer has an estimated transmissivity of 200,000 (gal/d)/ft (27,000 ft^2/d) based upon a corrected specific capacity of 79 (gal/min)/ft of drawdown for well ST-563 (Cardwell, in Cardwell and others, 1967, p. 84). The specific capacity was corrected for head losses due to pipe friction and partial penetration. The observed specific capacity was 29 (gal/min)/ft of drawdown while pumping 3,250 gal/min. Well ST-553 at Slidell had an observed specific capacity of about 17 (gal/min)/ft of drawdown and a corrected specific capacity of 30 (gal/min)/ft of drawdown while pumping 2,100 gal/min.

The relation between drawdown and distance at selected pumping rates and transmissivities for the Slidell aquifer can be determined from figure 5. The average rate of pumping for the city of Slidell during 1974 was about 2,200 gal/min. The graph shows that pumping 2,000 gal/min from an aquifer with a transmissivity of 200,000 (gal/d)/ft (27,000 ft^2/d) would cause about 10 ft of drawdown 1 mi from the pumping center after 1 year.

Wells in the Slidell aquifer have the highest yields in the study area. Three wells belonging to the city of Slidell are cited as examples. Well ST-590 had an estimated free flow of 4,000 gal/min when it was drilled in 1964, well ST-563 flowed 3,250 gal/min in 1966, and well ST-553 flowed 2,100 gal/min in 1955. The nonflowing artesian heads during these observations were about 100 ft above land surface. Additional information for these wells is provided in table 19.

Potentiometric Surface

The dashed line extending between the towns of Mandeville and Pearl River on plate 8 separates the potentiometric contours of the Covington aquifer from those of the Slidell aquifer. In May 1964, water levels for wells in the Slidell aquifer ranged from 80 ft above land surface at Lacombe to 85 ft above land surface at Slidell (pl. 8). The 100-ft contour on the potentiometric surface curved partially around the city of Slidell and indicated a shallow cone of depression reflecting the effects of municipal pumping there. Lack of data prevented more complete contouring of the water-level surface. Water-level gradients near this cone are estimated at about 0.5 ft/mi. The low gradient reflects the relatively high transmissivity and adequate spacing of the Slidell municipal wells.

Aquifer Development and Water-Level Trends

The average pumpage for the city of Slidell was 3.2 Mgal/d during 1974. This rate of consumption is probably increasing because the population growth in St. Tammany Parish has been about 10 percent per year, and much of this growth has been in the Slidell area.

The average rate of water-level decline at well ST-563 (fig. 17) in Slidell was about 2.0 ft/yr, 1957-69; but the rate increased to 2.5 ft/yr, 1969-76. Water-level data for the Slidell aquifer are given in table 13.

Table 13.--Water levels for the Slidell aquifer

Well number	Depth (feet)	Water level, in feet above land-surface datum		Well number	Depth (feet)	Water level, in feet above land-surface datum	
		May 1969	May 1974			May 1969	May 1974
ST-563	2,411	100.4	85.6	ST-672	2,230	90.6	79.5
ST-576	2,334	89.8	79.7	ST-683	2,300	94.6	85.4
ST-646	2,263	96.9	----	ST-694	2,300	84.9	----
ST-660	2,300	85.2	----				
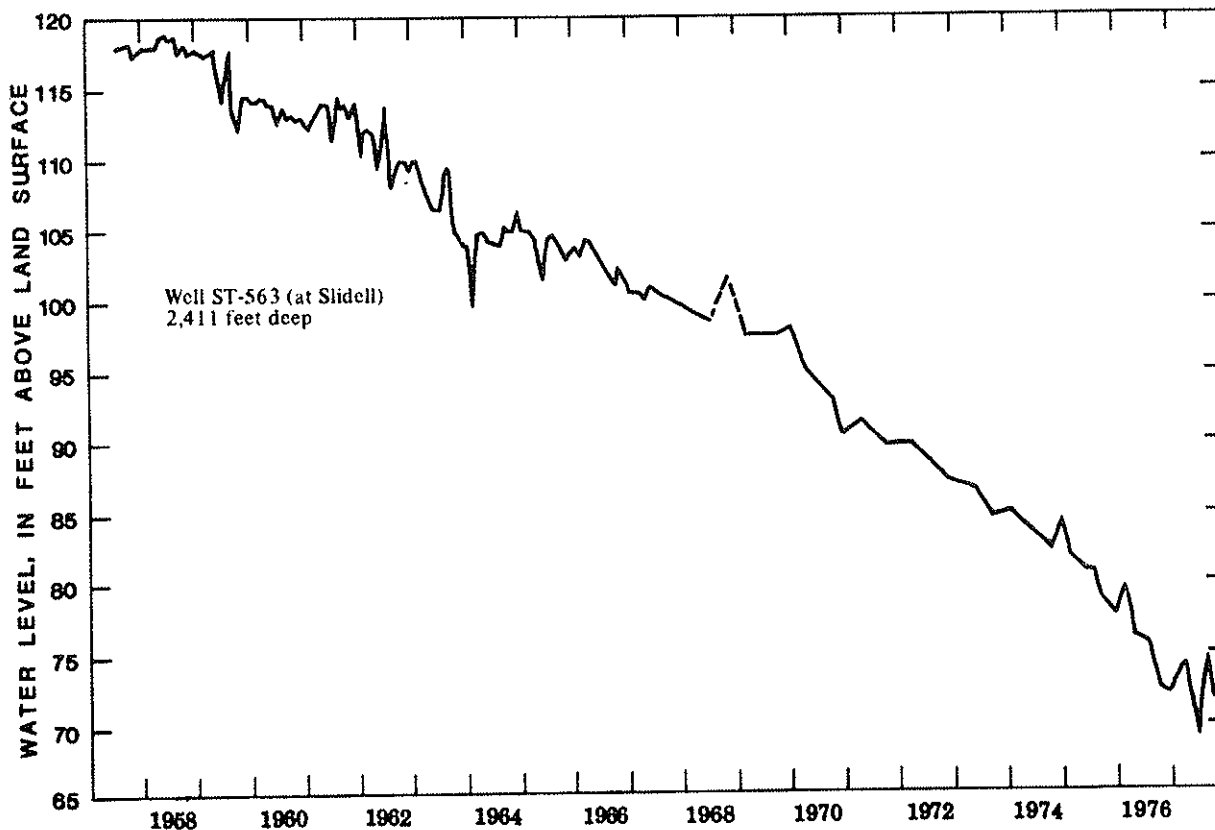
Figure 17.--Hydrograph for the Slidell aquifer.

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Water Quality

Water in the Slidell aquifer is similar in quality to water from the Covington aquifer near Covington. Dissolved solids are about 150 to 250 mg/L, pH is about 8.0 to 8.5, and hardness is less than 10 mg/L. Temperature ranges from 82° to 98°F (28.0° to 36.5°C). Iron is generally less than 0.15 mg/L, and manganese less than 0.05 mg/L. The concentration of hydrogen sulfide averages about 0.3 mg/L from wells of the Slidell municipal water system. Water from these wells has had as much as 0.6 mg/L hydrogen sulfide. Color is generally less than 20 platinum-cobalt units. The concentration of fluoride ranges from 0.2 to 0.5 mg/L.

TCHEFUNCTA AQUIFER

Extent, Thickness, and Lithology

The Tchefuncta aquifer is the uppermost aquifer of Miocene age and is probably stratigraphically equivalent to the "2,000-foot" sand of the Baton Rouge area. The depth to the top of the aquifer ranges from 880 ft below land surface near Franklinton to 2,500 ft below land surface near Mandeville and Slidell. The aquifer varies greatly in thickness, ranging from about 300 ft at Manchac to 20 ft between Robert and Goodbee, and is generally absent in northern Tangipahoa Parish (pl. 9). The aquifer is typically 100 to 150 ft thick. The aquifer dips to the southwest at the rate of about 50 ft/mi near Hammond and about 60 ft/mi north of Slidell. South of Slidell the aquifer contains brackish water. The aquifer is mostly coarse sand with some medium sand at Covington (well ST-568, fig. 18) and fine to medium sand at Hammond (well Ta-253).

Aquifer Characteristics and Well Yields

No aquifer tests have been conducted in wells in the Tchefuncta aquifer; however, estimates of specific capacity for wells ST-573 and ST-574, about 4 mi south of Covington, indicate a transmissivity of about 200,000 (gal/d)/ft (27,000 ft^2/d). The theoretical specific capacities of the two wells were 63 and 77 (gal/min)/ft of drawdown, respectively, after correction for pipe friction (including temperature) and partial penetration. The hydraulic conductivity averages about 1,000 (gal/d)/ft^2 (130 ft/d). These wells had natural flows of 920 and 980 gal/min, respectively, when they were drilled in 1960. (See table 19 for well-construction data.)

The transmissivity at Hammond is estimated at about 60,000 (gal/d)/ft (8,000 ft^2/d), based on a corrected specific capacity of nearly 25 (gal/min)/ft of drawdown for well Ta-253. The hydraulic conductivity at the well site averages about 500 (gal/d)/ft^2 (70 ft/d), which is somewhat low for an aquifer containing mostly medium sand. The well had a yield of 1,500 gal/min when it was drilled in 1950.
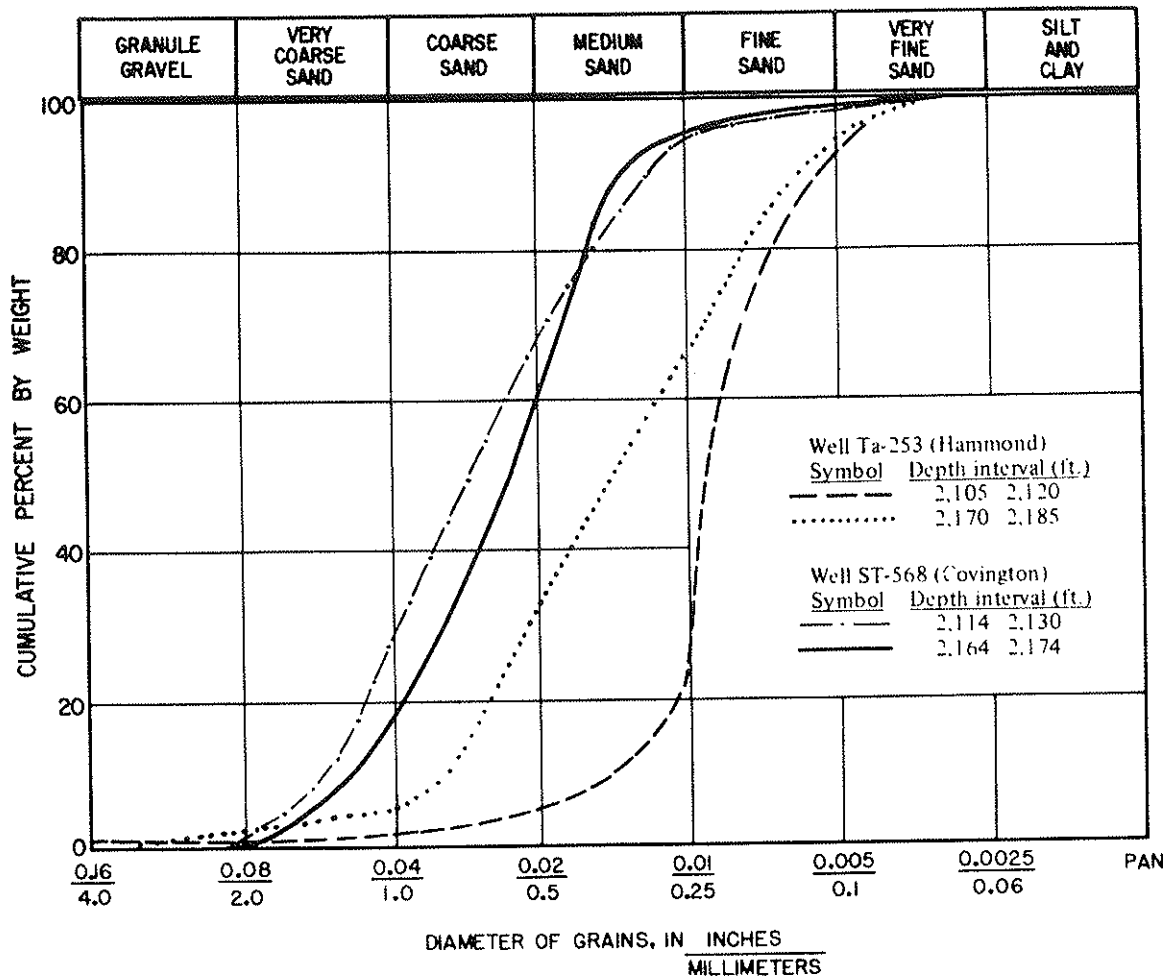
Figure 18.--Sieve analyses of sand samples from the Tchefuncta aquifer.

Aquifer Development and Water-Level Trends

Most of the pumpage from the Tchefuncta aquifer in the study area occurs at Hammond where an average of 1.3 Mgal/d was pumped in 1974. This amount is nearly half of the total municipal pumpage at Hammond, which pumps from the Tchefuncta and Hammond aquifers. Another 0.2 Mgal/d is pumped by public-supply systems near Madisonville.

Water levels ranged from about 10 ft below land surface near Folsom to 70 ft above land surface near Albany and Hammond to 98 ft above land surface near Madisonville in the spring of 1974. The long-term average water-level decline at well Ta-253, at Hammond, 1950-76, was about 1.7 ft/yr (fig. 19). The rate of decline was about 0.5 ft/yr until 1960 when it increased to 1.6 ft/yr. From 1970 to 1976 the rate of decline increased to about 2.8 ft/yr. The increasing rate of decline reflects the composite effect of local pumping and pumping influences to the west in Livingston and East Baton Rouge Parishes.

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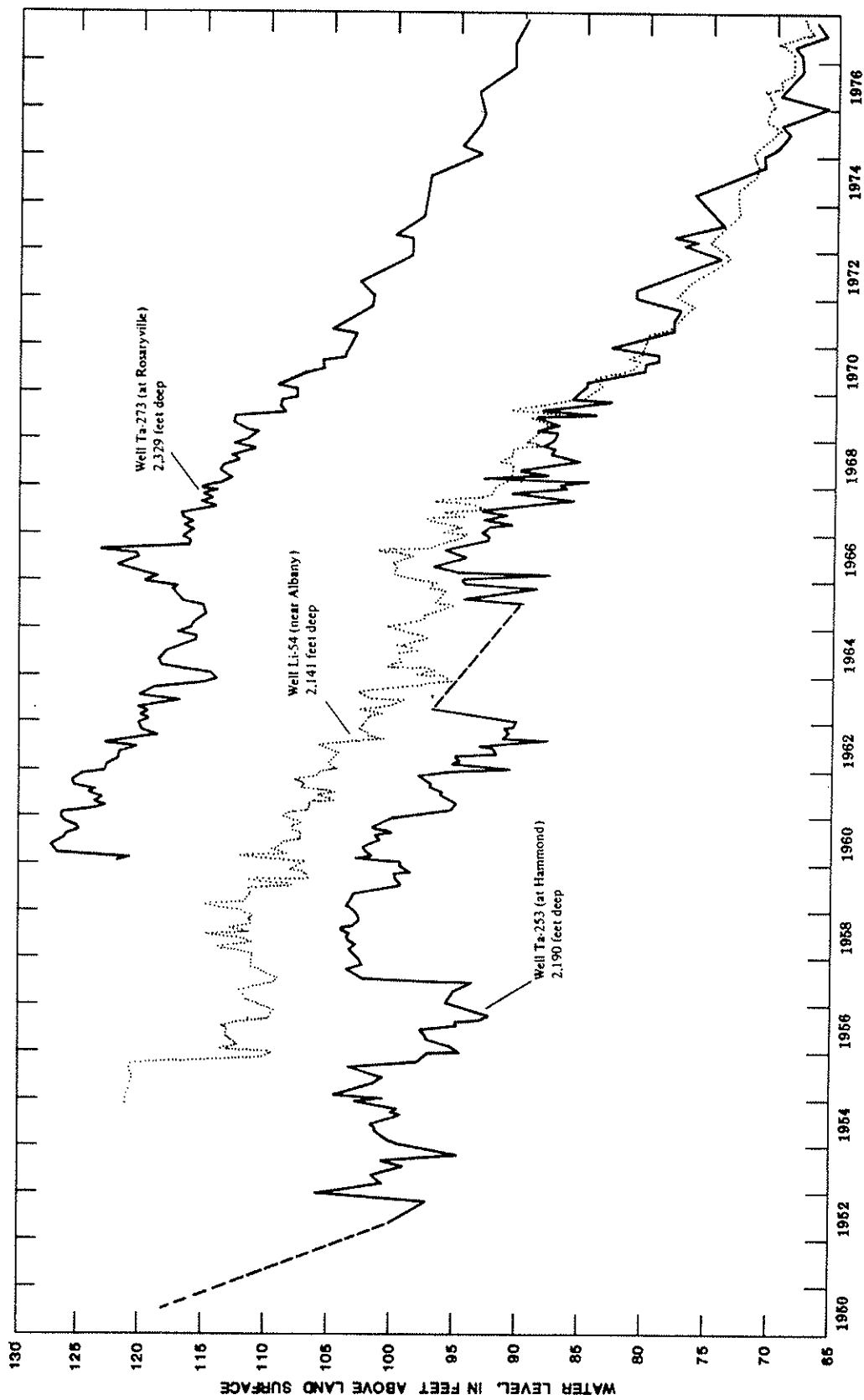
Figure 19.--Hydrographs for the Tchefuncta aquifer.

Well Ta-273 (at Roseryville)
2,329 feet deep

Well Li-54 (near Albany)
2,141 feet deep

Well Ta-253 (at Hammond)
2,190 feet deep

WATER LEVEL, IN FEET ABOVE LAND SURFACE

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The effect of pumping to the west is better shown by the hydrograph for well Li-54·(fig. 19), about 2 mi south of Albany. Although the rate of pumping in the area near this well is very low, the water-level decline averaged 2.2 ft/yr from 1955 to 1968, 4.0 ft/yr from 1969 to 1972, and 1.8 ft/yr from 1973 to 1976. The high rate of decline that began in 1968 corresponds to a significant increase in pumpage in the "2,000-foot" sand at Baton Rouge that occurred in 1969 and 1970. The hydrograph of well Ta-273 (fig. 19), near Springfield, shows water-level changes similar to well Li-54, except that the rates of water-level decline are greater. The average rate of decline in well Ta-273 has been about 2.8 ft/yr from 1966 to 1976. Water-level data for the Tchefuncta aquifer are given in table 14.

Table 14.--Water levels for the Tchefuncta aquifer

Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum		Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum	
		May 1969	May 1974			May 1969	May 1974
Li-54	2,144	+88.4	+73.4	Ta-253	2,190	+88.6	b/+77.8
ST-573	2,506	------	+95.7	Ta-273	2,329	+111.6	+9⁻ ⁵
ST-721A	1,620	a/12.5	-------				

a/ Measured October 1971.

b/ Measured April 1974.

Water Quality

The Tchefuncta aquifer contains a soft, sodium bicarbonate water; hardness is generally less than 20 mg/L. Except for an area in the northern part of the aquifer, iron concentrations are generally less than 0.3 mg/L. Water from a test well at Folsom contained 3.7 mg/L of dissolved iron. Dissolved solids range from 130 to 190 mg/L, pH from 6.6 to 8.2, and temperature from 78° to 88°F (25.5° to 31.0°C). Color of the water is generally less than 20 platinum-cobalt units.

HAMMOND AQUIFER

Extent, Thickness, and Lithology

The Hammond aquifer is a major aquifer that underlies nearly the entire report area, from the outcrop area in southern Mississippi near McComb on southward. Depth to the aquifer ranges from 1,000 ft below land surface at the town of Tangipahoa to below 2,900 ft at Slidell. Generally, the thickness of the aquifer is between 100 and 200 ft (table 15); however, near the community of Hickory the aquifer attains a thickness of 270 ft (pl. 10). The aquifer thins north and east of Hammond (pl. 10) and grades into clay. The aquifer also becomes thin and grades into sandy clay west of Amite, southwest of Springfield, and at Franklinton. The dip is to the south at the rate of 40 to 70 ft/mi

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in Tangipahoa Parish, and 60 to 90 ft/mi to the southwest in St. Tammany Parish. The Hammond aquifer apparently correlates, at least in part, with the Hattiesburg Formation in southern Mississippi (Brown and others, 1944) and with the "2,000-foot" or "2,400-foot" sand of the Baton Rouge area. The approximate southern limit of freshwater is along a line extending from Slidell to just north of Manchac (pl. 10).

Table 15.--Altitude of aquifer interval, Hammond aquifer
[In feet below mean sea level]

Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer
Li-145	1,815	1,885	Ta-266	(a)	(a)	Ta-343	2,265	2,400
SH-5	(a)	(a)	Ta-268	2,300	2,410	Ta-421	1,810	1,905+
SH-7	1,535	1,610	Ta-269	1,795	1,930	Ta-429	1,325	1,545
SH-8	1,620	1,695	Ta-270	2,610	2,680	Wa-57	(a)	(a)
ST-558	1,865	2,070	Ta-271	1,635	1,845	29307	2,780	2,920
ST-568	2,390	2,520	Ta-272	1,360	1,485(?)	30902	1,430	1,490
ST-575	1,920	1,990+	Ta-276	2,245	2,305+	34709	2,725	2,860
ST-578	1,980	2,090+	Ta-277	1,870	1,910	41992	(a)	(a)
ST-592	2,425	2,470	Ta-281	(a)	(a)	44836	1,225	1,365
ST-652	2,120	2,270	Ta-283	800	970	45868	1,470	1,535
ST-682	1,900	2,015	Ta-285	2,270	2,395	46024	1,245	1,370
ST-685	2,360	2,600	Ta-287	(a)	(a)	47328	1,210	1,260
ST-726	1,740	1,870	Ta-289	1,220	1,390	60741	2,855	(b)
ST-729	1,830	2,070	Ta-290	1,070	1,240	75398	3,095	c/3,180
ST-733	1,855	2,205	Ta-296	2,100	2,200+	78492	2,845	c/3,005
Ta-257	1,525	1,825(?)	Ta-303	1,665	1,875	81235	2,265	2,505
Ta-260	1,180	1,220	Ta-314	1,390	1,645	87776	2,115	2,400
Ta-265	(a)	(a)	Ta-339	1,240	1,355			

a/Aquifer missing.
b/Entire aquifer contains salty water.
c/Figure represents altitude of base of freshwater.

Sieve analyses of sand samples from the Hammond aquifer at Hammond and Covington are shown graphically in figure 20. At Hammond, the upper part of the aquifer is fine to medium sand, grading to medium to coarse sand in the lower one-third. The analyses indicate that sand in the aquifer also consists of medium to coarse sand in the lower part at Covington; however, at well ST-568 the lower part of the aquifer appears to be better sorted, suggesting a higher permeability in this zone.

Aquifer Characteristics and Well Yields

Specific-capacity data are available for wells Ta-268, Ta-285, and ST-568 in the Hammond aquifer. The specific capacities were corrected for pipe friction, water temperature, and partial penetration as a basis for estimating transmissivity of the aquifer. Well Ta-285 had a corrected specific capacity of 35 (gal/min)/ft of drawdown, determined

GRANULE GRAVEL | VERY COARSE SAND | COARSE SAND | MEDIUM SAND | FINE SAND | VERY FINE SAND | SILT AND CLAY

CUMULATIVE PERCENT BY WEIGHT

100

80

60

40

20

0

Well ST-568 (Covington)
Symbol   Depth interval (ft.)
—·—·—·—   2,428 2,438
————————   2,528 2,538

Well Ta-268 (Hammond)
Symbol   Depth interval (ft.)
————————   2,355 2,365
— — — —   2,410 2,440

$\frac{0.16}{4.0}$ $\frac{0.08}{2.0}$ $\frac{0.04}{1.0}$ $\frac{0.02}{0.5}$ $\frac{0.01}{0.25}$ $\frac{0.005}{0.1}$ $\frac{0.0025}{0.06}$ PAN

DIAMETER OF GRAINS, IN $\frac{\text{INCHES}}{\text{MILLIMETERS}}$

Figure 20.--Sieve analyses of sand samples from the Hammond aquifer.

during a step-drawdown test. The uncorrected specific capacity was 19.6 (gal/min)/ft of drawdown after pumping 2½ hours at 2,250 gal/min. The well was previously pumped 2 hours at 759 gal/min, and 2 hours at 1,520 gal/min. Wells Ta-268 and Ta-285 at the city of Hammond were pumped at rates of 1,585 and 1,520 gal/min, respectively. Both wells also had a theoretical specific capacity of about 35 (gal/min)/ft of drawdown, which indicates a transmissivity of about 80,000 (gal/d)/ft (11,000 ft^2/d). The hydraulic conductivity at well Ta-285 is about 650 (gal/d)/ft^2 (90 ft/d). Well ST-568, at Covington, was pumped 3,400 gal/min and had a theoretical specific capacity of 81 (gal/min)/ft of drawdown (Cardwell and others, 1967, p. 84), which indicates a transmissivity of more than 200,000 (gal/d)/ft (27,000 ft^2/d). The hydraulic conductivity at well ST-568 is about 1,500 (gal/d)/ft^2 (200 ft/d). The observed specific capacity was 29 (gal/min)/ft.

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Potentiometric Surface

Water levels in wells screened in the Hammond aquifer ranged from 90 ft above land surface near Covington to 54 ft above land surface at Hammond to about 50 ft below land surface near Amite during the spring of 1974. The potentiometric surface of the aquifer slopes to the south at a fairly constant rate except near and south of the city of Hammond where the gradient steepens toward pumping centers and is locally reversed. The hydraulic gradient averages about 1.5 ft/mi. However, in the Hammond pumping cone the gradient is about 5 ft/mi.

The magnitude of the pumping cone at Hammond (pl. 10) is caused by withdrawals at Hammond, the low hydraulic conductivity, and the lack of recharge from the north because of the thinning or absence of the aquifer (pl. 10). This "pinching out" of the aquifer results in a hydrologic boundary, which causes the Hammond cone to be larger and deeper than would be the case without these boundary conditions.

Aquifer Development and Water-Level Trends

The average rate of water-level decline at Hammond (well Ta-268), 1959-69, was about 2.5 ft/yr (fig. 21). From 1969 to 1976 the water level at well Ta-268 has declined at the rate of 5 ft/yr. Water levels in other wells in the Hammond cone, for example, wells Ta-301 and Ta-419 (table 16), were declining at a similar rate from 1969 to 1974. The decline is due to local pumping and an increase in heavy pumping from correlative sands in the Baton Rouge area--"2,000-foot" or "2,400-foot" sands. Pumpage in the Hammond area (1974) was 1.6 Mgal/d.

Table 16. --Water levels for the Hammond aquifer

Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum		Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum	
		May 1969	May 1974			May 1969	May 1974
ST-568	2,545	+104.2	+90.4	Ta-301	2,445	+89.0	b/ +53.7
ST-682	2,129	+22.9	+12.7	Ta-343	2,472	+87.4	+69.8
ST-685	2,632	+101.1	+91.3	Ta-404	-----	+26.3	+14.6
ST-733	2,040	------	a/ +55	Ta-411	1,930	+12.3	+1.6
Ta-268	2,449	+79.0	+53.9	Ta-419	2,192	+65.4	--------
Ta-285	2,418	+70.9	+50.4	Ta-421	1,990	+58.9	--------
Ta-296	2,251	+69.4	+41.4	Ta-429	1,695	c/ 35.5	--------

a/ Measured November 1973.
b/ Measured February 1975.
c/ Measured by driller April 1969.

The water level in well ST-568, at Covington, declined at a rate of nearly 3 ft/yr (1969-74) in response to an average pumping rate of 0.6 Mgal/d (1974). The lower rate of decline compared to Hammond is because of less pumpage, a higher transmissivity, and the general absence of hydrologic boundaries.
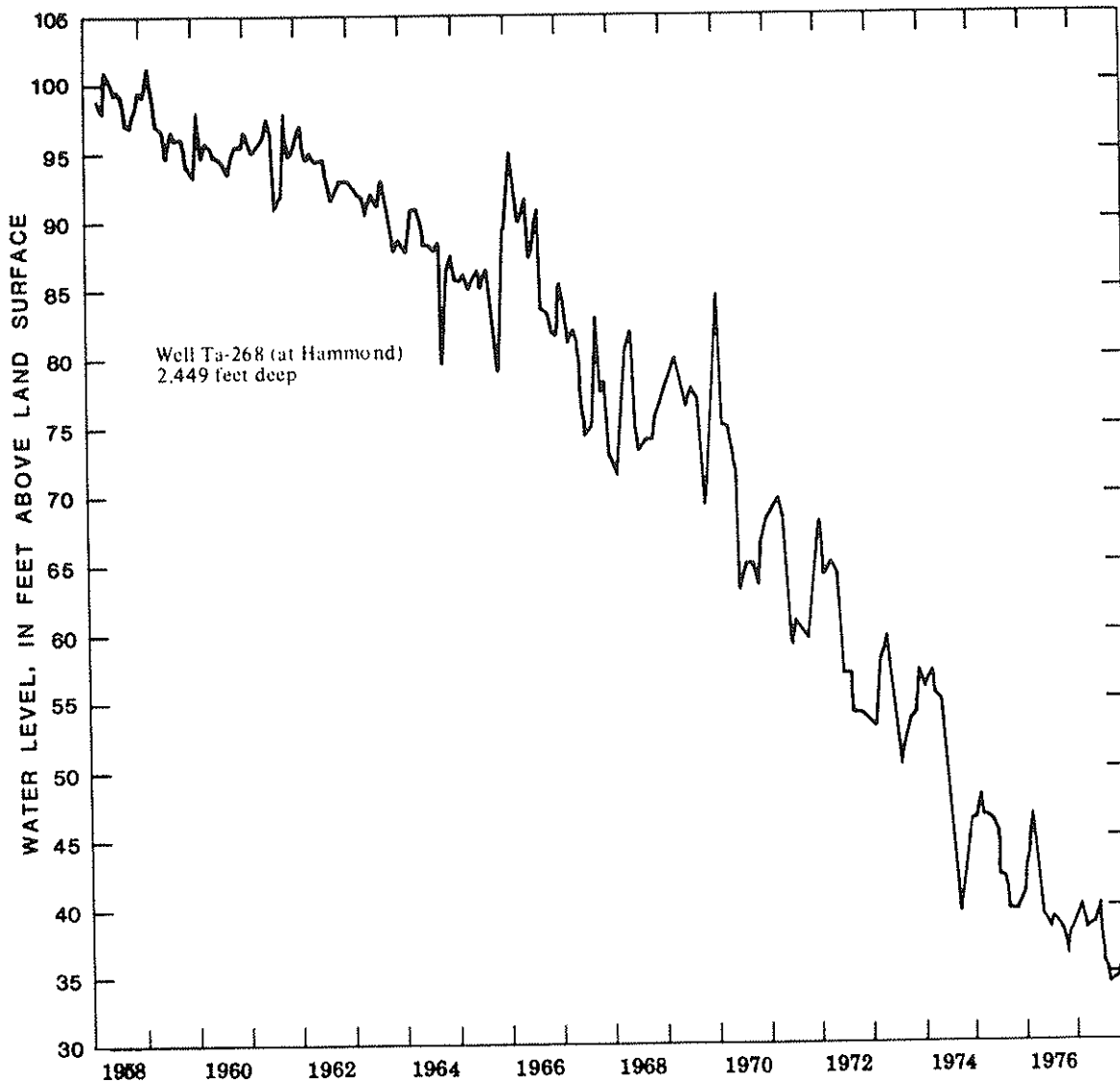
Figure 21.--Hydrograph for the Hammond aquifer.

Water Quality

Water in the Hammond aquifer is a soft, sodium bicarbonate type, generally typical of the deep artesian water in the basin. In the southern part of the area, the iron concentration is generally very low; however, the concentration of iron generally exceeds 0.2 mg/L (and locally exceeds 1.0 mg/L) in water from sands north of a line that extends from a few miles south of Independence, east-southeast to Abita Springs (pl. 10). Water from this northern part of the aquifer also contains manganese in concentrations that generally exceed the recommended limit of 0.05 mg/L. Although the concentration of dissolved solids generally increases downdip, the dissolved-solids content of water withdrawn from wells just south of a boundary that is north of Hammond is greater than that of water from wells farther south. Silica typically ranges from 50 to 80 mg/L in samples from wells in the aquifer. The temperature of water in the Hammond aquifer ranges from 75°F (24.0°C) in the wells near

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Amite to 90°F (32.0°C) in wells near Covington. The pH of water in the northern part of the aquifer is about 7.0 and increases downdip to about 9.0 at Covington. Throughout the aquifer, the hardness of the water is generally less than 15 mg/L, and color is generally less than 20 platinum-cobalt units.

AMITE AQUIFER

Extent, Thickness, and Lithology

The Amite aquifer is one of the most continuous aquifers in the area studied. The aquifer ranges in depth from 1,200 ft below land surface near Kentwood to 3,200 ft near Lacombe. The thickness is typically 100 to 150 ft (table 17), but becomes increasingly variable to the south (pl. 11) where the sand may locally pinch out or thicken within short distances. The aquifer is absent locally between Hammond and Covington, and south of Ponchatoula.

Table 17.--Altitude of aquifer interval, Amite aquifer
[In feet below mean sea level]

Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer	Well or permit number	Altitude of top of aquifer	Altitude of base of aquifer
SH-5	1,325	1,460	Ta-272	1,780	1,875	Wa-57	1,280	1,300
SH-7	1,765	1,925+	Ta-277	2,195	2,305	29307	(a)	(a)
SH-8	1,920	2,015+	Ta-283	1,195	1,280	30902	1,745	1,840
ST-558	2,250	2,310+	Ta-289	1,695	1,810	34709	3,015	3,100
ST-592	2,725	2,800+	Ta-295	2,370	2,435+	41992	3,510	(b)
ST-652	2,605	2,710	Ta-303	1,980	2,120	44836	1,465	1,595
ST-726	2,035	2,205	Ta-310	2,130	2,210+	46024	1,760	1,835
Ta-261	2,120	2,270	Ta-312	2,075	2,160+	75398	3,095	(b)
Ta-262	2,040	2,210+	Ta-313	1,890	1,960+	78492	2,930	c/3,000
Ta-265	2,240	2,335+	Ta-314	1,795	1,920+	81235	(a)	(a)
Ta-266	2,195	2,275	Ta-339	1,580	1,660+	137657	3,195	3,290

a/Aquifer missing.
b/Entire aquifer contains salty water.
c/Figure represents altitude of base of freshwater.

Recharge to the Amite aquifer is principally through the shallow aquifer in southern Mississippi north of McComb. The dip is to the south at a rate of 40 ft/mi near Kentwood, 70 ft/mi near Hammond, and 80 ft/mi to the southwest near Covington. Near the north shores of Lakes Pontchartrain and Maurepas, water in the aquifer becomes salty (pl. 11). The Amite aquifer probably correlates with the "2,400-foot" or "2,800-foot" sands of the Baton Rouge area.

Sieve analyses of sand from wells Ta-289 and Ta-272 at the town of Amite show a dominance of moderately well-sorted fine to medium sand throughout the vertical section of the aquifer (fig. 22). Samples from
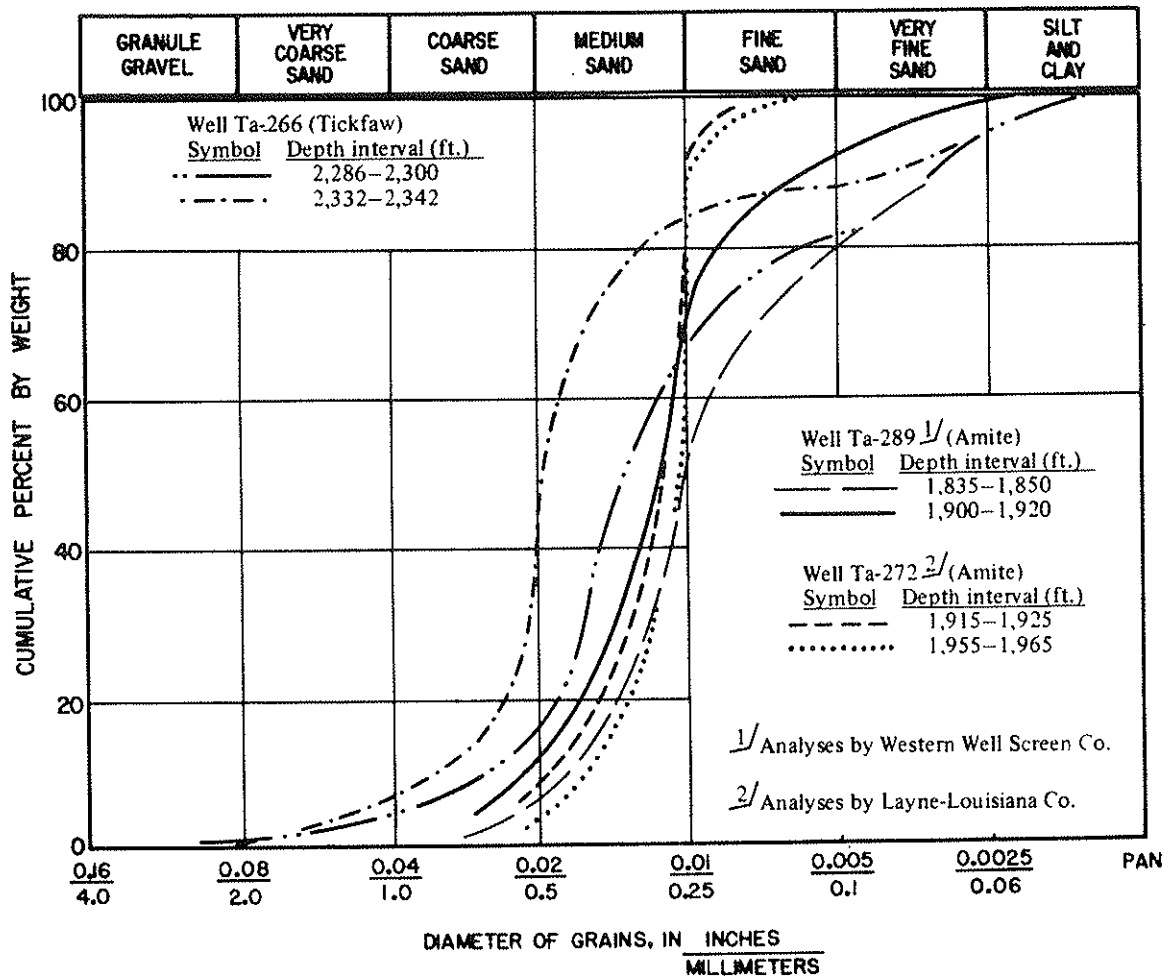
Figure 22.--Sieve analyses of sand samples from the Amite aquifer.

well Ta-266 near Tickfaw grade from fine to medium sand in the upper
half of the aquifer to medium to coarse sand in the lower half.

Aquifer Characteristics and Well Yields

Data for wells Ta-289 (at Amite) and ST-592 (at Covington) indicate
transmissivities of about 125,000 (gal/d)/ft (16,700 ft^2/d) for the Amite
aquifer. Based on an aquifer test at well Ta-289, the average hydraulic
conductivity approaches 1,100 (gal/d)/ft^2 (150 ft/d) for the aquifer,
which is 116 ft thick at the site. The specific capacity for well ST-592
was about 75 (gal/min)/ft of drawdown after corrections for pipe friction,
temperature, and partial penetration. (The aquifer was estimated to be
110 ft thick.) A specific capacity of 75 (gal/min)/ft of drawdown indi-
cates a transmissivity of about 200,000 (gal/d)/ft (27,000 ft^2/d). The
theoretical drawdown in wells tapping an aquifer having a transmissivity
of 200,000 (gal/d)/ft (27,000 ft^2/d) and pumping continuously at rates
ranging from 500 to 5,000 gal/min are shown in figure 5.

The largest yields from the Amite aquifer that have been reported are about 1,700 gal/min. Well Ta-289 at Amite has been pumped at this rate, and well ST-592 at Covington had a natural flow of 1,700 gal/min when it was drilled in 1965. Wells Ta-303 at Independence, Ta-272 at Amite, Ta-261 at Zemurray Park, and SH-8 near Montpelier originally had yields of about 1,000 gal/min or more (table 19).

Potentiometric Surface

The potentiometric surface of the Amite aquifer has been lowered significantly by pumping and is now lower than that of most aquifers in the study area. The hydraulic gradient ranges from about 3 ft/mi south of Kentwood to about 1 ft/mi in the southern part of the area. Gradients probably exceed 3 ft/mi near pumping centers at Amite and Independence. Regional gradients slope to the southwest toward Baton Rouge and to the northeast toward Bogalusa (pl. 11). The Amite aquifer is probably connected to the "2,400-foot" or "2,800-foot" sands of the Baton Rouge area. Water levels ranged from about 45 ft below land surface near the village of Tangipahoa to 95 ft above land surface at Covington in the spring of 1974.

Aquifer Development and Water-Level Trends

The water-level decline in the Amite aquifer (1969-74) was greater than 2 ft/yr throughout the study area and is principally caused by local pumping in Tangipahoa Parish and by pumping to the west. During 1974, about 1.5 Mgal/d was withdrawn by public water supplies, and about 0.5 Mgal/d by industrial, domestic, and agricultural users. At Amite the average annual water-level decline, 1969-74, was about 3.4 ft/yr at well Ta-272. At Independence and Montpelier (wells Ta-262 and SH-7, respectively, fig. 23) the average annual decline, 1964-76, has been nearly 3 ft. The average decline at well ST-592, at Covington, was about 2.4 ft/yr from 1969 to 1974 (table 18).

Table 18.--Water levels for the Amite aquifer

Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum		Well number	Depth (feet)	Water level, in feet above (+) or below land-surface datum	
		May 1969	May 1974			May 1969	May 1974
SH-5	1,683	94.32	109.29	Ta-283	1,457	36.77	43.42
SH-7	2,082	+4.07	12.28	Ta-289	1,956	2.29	17.49
SH-8	2,120	+31.98	+13.68	Ta-294	2,039	1.45	19.55
ST-558	2,431	a/ +16.8	+8.4	Ta-295	2,476	+86.35	+67.3
ST-592	2,843	+108.0	+96.2	Ta-303	2,190	+52.8	------
ST-726	2,254	--------	15.04	Ta-310	2,314	+20.6	------
Ta-262	2,316	+43.0	+24.8	Ta-312	2,209	+60.6	+45.7
Ta-265	2,397	+67.8	------	Ta-313	2,044	+34.9	+20.1
Ta-266	2,345	+67.2	------	Ta-314	2,000	+26.7	+12.8
Ta-269	2,338	+55.3	------	Ta-339	1,847	58.59	72.34
Ta-272	1,994	+12.13	4.83	Ta-415	2,172	+63.6	+46.1
Ta-277	2,350	+66.8	+54.5	Ta-418	2,370	+72.8	+56.0

a/ Measured October 1969.

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WATER LEVEL , IN FEET ABOVE OR BELOW LAND SURFACE

Well Ta-262 (at Independence)
2,316 feet deep

Well SH-7 (at Montpelier)
2,088 feet deep
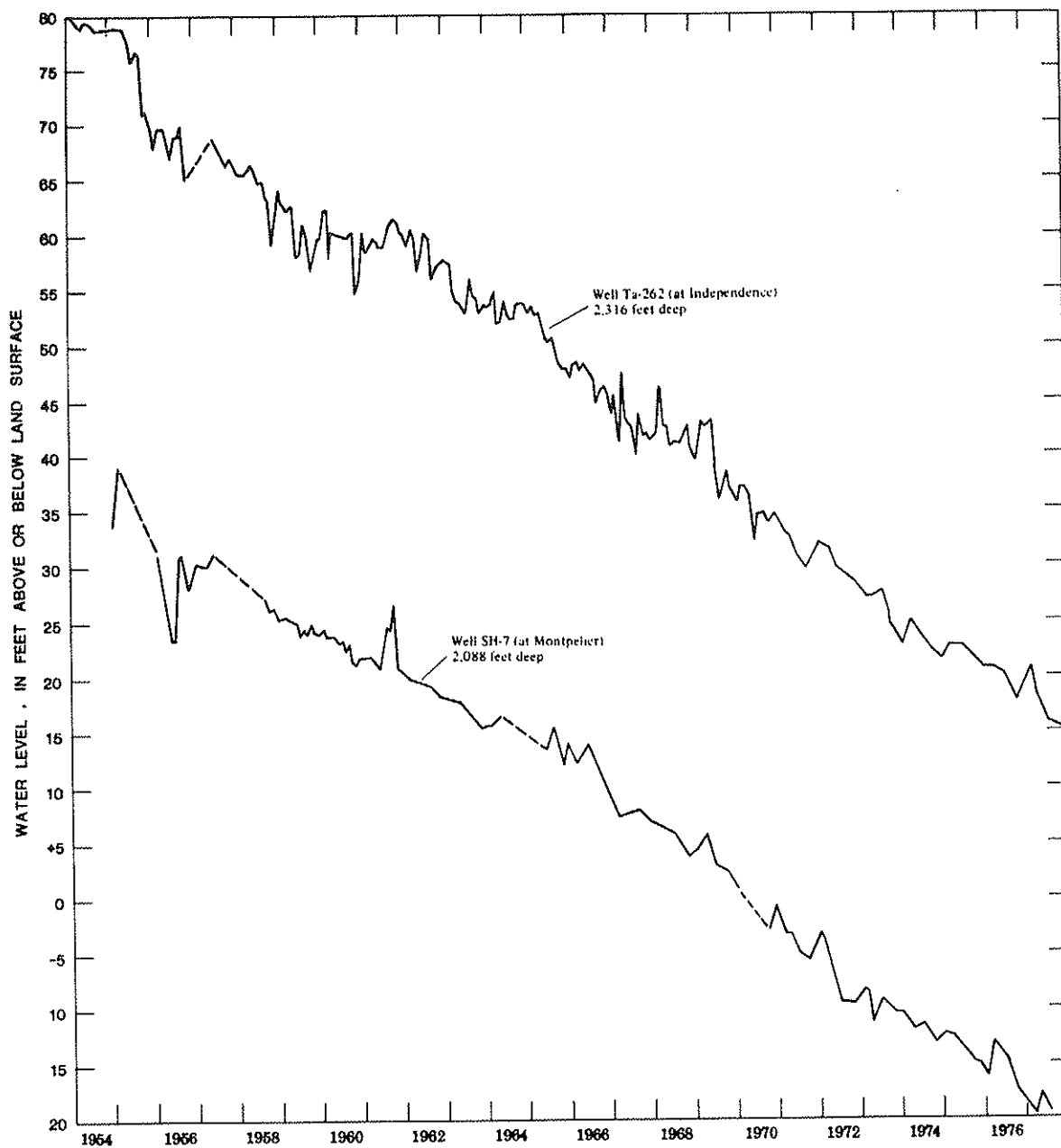
Figure 23.--Hydrographs for the Amite aquifer.

The rate of water-level decline in wells in Tangipahoa and St.
Helena Parishes has increased because of increased local use and prob-
ably also because of the effects of heavy pumping in East Baton Rouge
Parish. Because of the substantial rate of water-level decline in west-
central Tangipahoa Parish, particularly near the towns of Amite and
Independence, St. Tammany Parish is better suited for additional devel-
opment from the Amite aquifer.

Water Quality

The Amite aquifer yields a sodium bicarbonate water that is low in
iron and manganese. Dissolved iron is generally less than 0.2 mg/L, and

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dissolved manganese is less than 0.05 mg/L in water from wells sampled. Hydrogen sulfide is present locally in concentrations as high as 0.5 mg/L. Color is generally less than 15 platinum-cobalt units. The pH of the water generally ranges from 8.0 to 9.2, hardness is typically less than 5 mg/L, and water temperatures range from 79° to 91°F (26.0° to 33.0°C). The dissolved solids range from 175 to 310 mg/L.

RAMSAY AQUIFER

Extent, Thickness, and Lithology

The Ramsay aquifer, although little used, is an extensive aquifer and an important potential source of water in the report area. The aquifer ranges in depth from 1,800 ft below land surface near Kentwood (pl. 12) to 3,300 ft near Covington. Geophysical logs indicate that the aquifer is generally 100 to 250 ft thick. The aquifer becomes very thin and is probably discontinuous in northern Tangipahoa Parish and in St. Helena Parish but thickens to the east, attaining its greatest thickness, 475 ft, south of Franklinton. The aquifer dips to the southwest at the rate of 50 ft/mi north of Kentwood near the Mississippi-Louisiana State line, and 80 ft/mi near Covington. The aquifer contains saline water south of a line extending from just north of Ponchatoula to just south of Abita Springs.

The Ramsay aquifer apparently has a slightly finer grain size to the north and west. Sieve analyses of sand from well Wa-57 at Franklinton (interval 1,750 to 2,000 ft below land surface) indicate medium sand to 1,940 ft and medium and coarse sand from 1,970 to 2,000 ft. Samples from well ST-652 at Ramsay showed the entire aquifer to be mostly medium to coarse sand with some pea gravel.

Aquifer Characteristics and Well Yields

The transmissivity calculated from an aquifer test at well ST-652 is about 160,000 (gal/d)/ft (21,000 ft^2/d); the hydraulic conductivity of the 101-ft-thick aquifer is 1,600 (gal/d)/ft^2 (490 ft/d). This is one of the highest average permeabilities found in the project area. The theoretical specific capacity for a well screening the entire aquifer, with no well losses, would be about 60 (gal/min)/ft of drawdown. The drawdown-distance relations for this aquifer can be interpolated from figure 5 by adding a line halfway between the 100,000 and 200,000 transmissivity lines for a given pumping rate, thus approximating a transmissivity of about 160,000 (gal/d)/ft (21,000 ft^2/d). Well ST-652 had a yield of about 2,100 gal/min when it was first drilled in 1968.

Aquifer Development and Water-Level Trends

Well ST-652, the only large-capacity well in the area screened in the Ramsay aquifer, was completed during the fall of 1968 and was used to fill a 250-acre lake. While the lake was being filled during the summer of 1969, the average daily discharge of the well was about 2.6 Mgal/d.

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During 1974, pumpage was estimated to average about 1.5 Mgal/d. The average rate of water-level decline from 1969 to 1974 was about 2.4 ft/yr. The water-level data in the following table lists measurements made from 1969 to 1976. At well ST-599 (pl. 12) there was 21 ft of change from 1966 to 1974, which is an average decline of 2.6 ft/yr.

Water-level measurements for the Ramsay aquifer

Date	Water level, in feet above land-surface datum	Date	Water level, in feet above land-surface datum
Well ST-652			
5- 2-69	95.8	5- 1-75	87.0
12-22-70	93.8	9-22-75	83.0
4-23-71	94.0	12- 2-75	88.0
10- 4-71	90.0	2-12-76	88.0
3-24-72	88.3	4-22-76	87.0
11-15-72	85.0	7- 8-76	79.0
5-10-73	86.0	9-23-76	80.6
10- 2-73	83.5	11- 9-76	83.0
4-16-74	84.0	2-15-77	86.8
9-25-74	80.3	5-17-77	67.2
12-17-74	89.0	8-31-77	84.0
2-21-75	86.8	11- 1-77	85.0
Well ST-599			
8- -66	82.0	5-16-74	61.0

If the average pumping rate for well ST-652 were held constant, the rate of decline would eventually decrease; however, even if the pumping rate were reduced or if pumping were stopped completely, following a short period of recovery, water levels would probably continue to decline about 2 ft/yr because of regional adjustment in the aquifer system.

Assuming the water-level gradient parallels that of the deep aquifers, water levels in wells ST-599 and ST-652 indicate that the gradient (1974) is essentially flat.

Water Quality

Samples were collected from three wells screened in the Ramsay aquifer. Analyses of these samples showed that dissolved solids range from 151 to 184 mg/L, dissolved iron from 0.03 to 0.59 mg/L, and hardness from 2 to 20 mg/L. The water temperature is 101°F (38.5°C). The dissolved-solids concentration in water from the Ramsay aquifer is lower than would be expected from a freshwater-bearing aquifer of ·this depth. The water from wells ST-599 and ST-729A shows that the concentration of dissolved solids decreases northward. (See table 20.) An estimate based on electrical-log interpretations indicates that the dissolved

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solids would be about 100 mg/L near Franklinton and approximately 50 mg/L near the State line.

FRANKLINTON AQUIFER

Extent, Thickness, and Lithology

The Franklinton aquifer is a source of water supply primarily for Washington Parish and northern Tangipahoa Parish. The area of potential use is limited southward by the interface between freshwater and salty water, which can be approximated by a northwest-trending line south of Greensburg and Sun (pl. 13). The aquifer contains freshwater only from this line northeastward. Depth to the top of the aquifer ranges from about 2,000 ft near Kentwood to about 2,600 ft below land surface near Sun.

The typical thickness of the aquifer ranges from 100 to 250 ft. The maximum thickness is uncertain, but electrical logs of oil-test wells (pl. 13) indicate local, aggregate sand thicknesses of 600 to 700 ft; this includes thin clays that may or may not be continuous. The top of the Franklinton aquifer may be connected to the base of the Lake Ramsay aquifer between oil tests 44836 and 40453 (pl. 13). The aquifer dips southwest, and the rate of dip is 60 ft/mi near the Mississippi-Louisiana State line and 80 ft/mi in northern St. Tammany Parish.

Sieve analyses of sand from the aquifer at Franklinton (well Wa-57) indicate the aquifer is mostly medium and coarse sand (fig. 24). The sand samples grade from a poorly sorted fine to medium sand near the top of the aquifer at a depth of 2,600 ft to a well-sorted medium to coarse sand from about 2,650 to 2,665 ft. The aquifer is broken by a clay lens from 2,675 to 2,700 ft, and below the clay the aquifer continues as a moderately sorted medium to coarse sand from 2,700 ft to the bottom at 2,750 ft.

Aquifer Characteristics and Well Yields

A transmissivity of 290,000 (gal/d)/ft (39,000 ft^2/d) was calculated from an aquifer test at well Wa-57. The hydraulic conductivity is about 2,100 (gal/d)/ft^2 (290 ft/d) based on the above transmissivity and an aquifer thickness of 135 ft. The theoretical specific capacity for a well at this location would be about 100 (gal/min)/ft of drawdown, assuming no losses. The distance-drawdown relations based on the aquifer test are shown in figure 5. The average rate of use for the town of Franklinton is about 300 gal/min. At this rate the drawdown 2 mi from the well is only about 1.5 ft after 1 year of pumping. The present rate of use is very nominal compared to the capacity of the aquifer. If another well were completed in the aquifer and pumped continuously at a rate of 1,000 gal/min at a site 0.25 or 2 mi from well Wa-57, the additional drawdown at well Wa-57 would be 6 and 3 ft, respectively, after 1 year of pumping.

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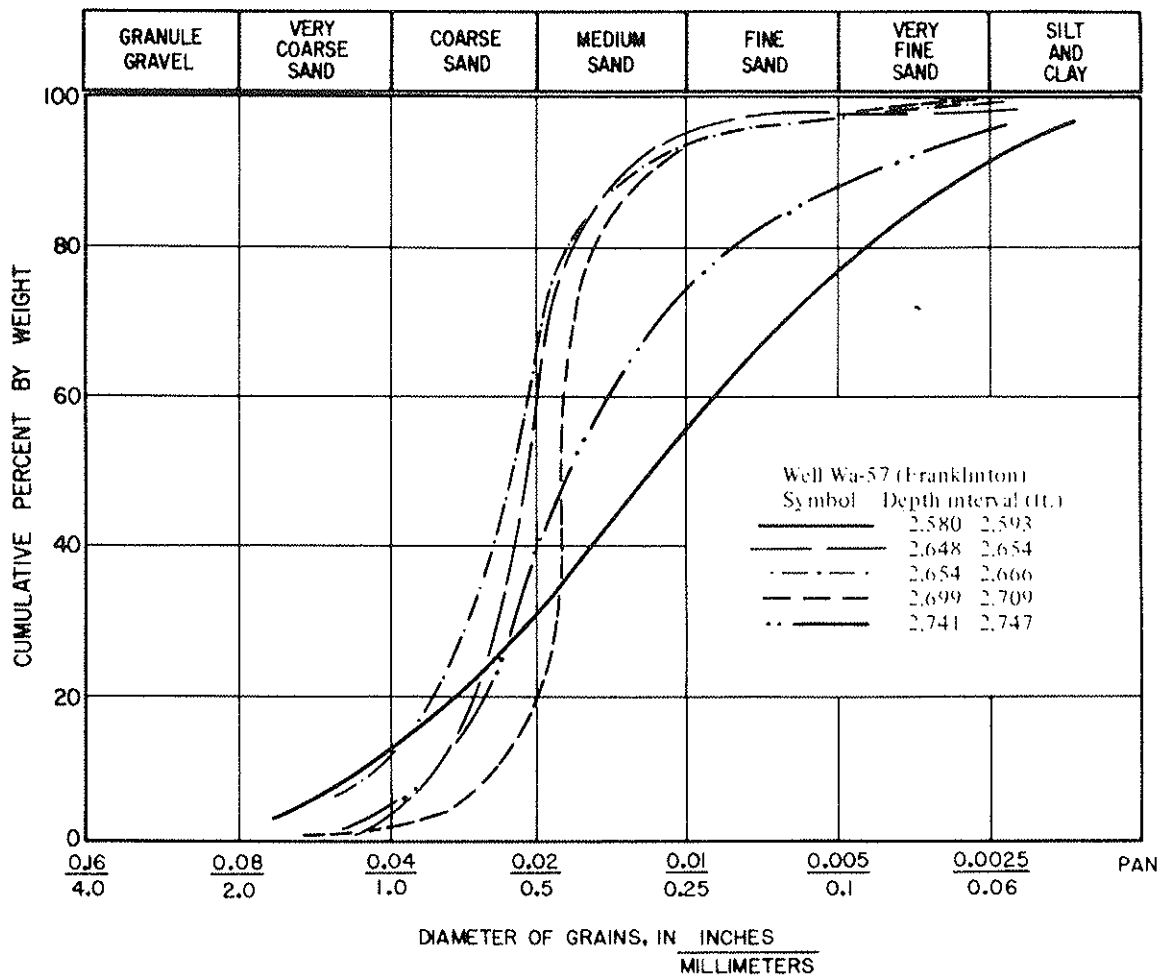
Figure 24.--Sieve analyses of sand samples from the Franklinton aquifer.

Only four wells are known (1974) to be screened in the Franklinton aquifer, Wa-57 and Wa-88 at Franklinton and wells Wa-105 and Wa-106 about 4 mi north of Franklinton. Well Wa-57 had a yield of 1,150 gal/min when first pumped in 1957; well Wa-88 had a yield of 1,300 gal/min in 1971. No yield data are available for wells Wa-105 and Wa-106.

Aquifer Development and Water-Level Trends

During 1974 an average of 442,000 gal/d was pumped by the town of Franklinton from wells Wa-57 and Wa-88. The hydrograph for the Franklinton aquifer (fig. 25) shows water-level measurements in well Wa-57 since it was drilled (1957) and development of the aquifer began. The rate of decline was less than 1 ft/yr prior to 1962, but has averaged 1.7 ft/yr since then. The period of water-level rise, 1974-76, reflects recovery of the local cone about well Wa-57 when well Wa-88 was pumped. Some of the water-level decline in the aquifer probably reflects additional pumping by new water systems in the area.

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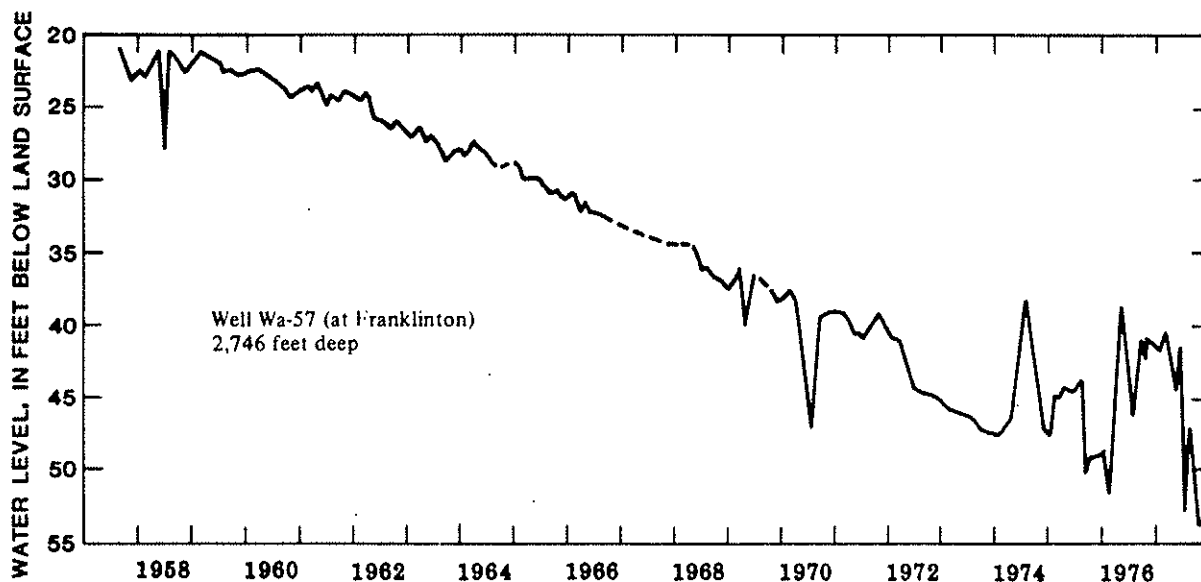
Figure 25.--Hydrograph for the Franklinton aquifer.

Water Quality

Water samples collected from two wells in Franklinton and one well
north of Franklinton have dissolved solids ranging from 240 to 280 mg/L,
hardness less than 10 mg/L, and dissolved iron less than 0.1 mg/L. Tem-
perature of the water is about 88°F (31.0°C), and pH ranges from 8.6 to
9.0 units. There are traces of hydrogen sulfide in the water; however,
this is common for most fresh ground water in the Florida Parishes area.
Color of the water is 20 to 30 units on the platinum-cobalt scale. This
color level is barely detectable by the human eye but may be seen in
reservoirs such as toilet bowls.

SUMMARY AND CONCLUSIONS

There are 12 important aquifers in Tangipahoa and St. Tammany Par-
ishes, and most of these aquifers have sand units that exceed 100 ft in
thickness. Aquifers more than 100 ft thick can generally support wells
yielding more than 1,000 gal/min. The total amount of sand in the fresh-
water section ranges from about 1,000 to nearly 2,000 ft in thickness,
and these sand units contain freshwater to depths ranging from 2,700 to
3,400 ft below land surface.

The rate of water-level decline in the deep aquifers (those deeper
than 1,500 ft below land surface) generally exceeded 2 ft/yr from 1969
to 1976. This rate of water-level decline reflects pumping inside and
outside of the report area and also reflects adjustments in artesian
pressure throughout the aquifer system. Water is moving from the little-
used aquifers that have relatively high artesian heads to heavily pumped
aquifers of lower artesian head. Aquifers shallower than 1,500 ft below
land surface are generally less pumped and therefore have a lower rate
of water-level decline than the deep aquifers.

The water in the report area is a sodium bicarbonate type that gen-
erally contains less iron and hardness with depth and southward to the

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limits of freshwater. In most aquifers, iron and manganese have concentrations less than 0.5 mg/L, hardness less than 30 mg/L, and dissolved solids less than 350 mg/L. Locally, water may contain objectionable amounts of hydrogen sulfide and silica. Water from most of the shallow aquifers and from many of the deep aquifers in the northern part of the area tends to be corrosive.

Aquifers with the greatest potential for development include the Kentwood, Covington, Ponchatoula, Tchefuncta, and shallow aquifers. The Kentwood, Ponchatoula, and shallow aquifers are near sources of recharge, are not pumped heavily, and contain extensive deposits of sand and gravel. The Covington aquifer is pumped in many areas, but the aquifer is sufficiently thick and extensive to accommodate additional development. The Tchefuncta aquifer is used very little and has a large potential for development.

The Amite, Hammond, and Slidell aquifers have had water-level declines exceeding 2 ft/yr (1969-74) in some areas and therefore have a lower potential for additional development. However, these aquifers can support additional development in areas distant from current pumping centers. The Big Branch aquifer is used very little but has a limited potential for further development because of the low transmissivity of the aquifer.

Other aquifers that can be developed further include the Abita, Ramsay, and Franklinton. The Abita aquifer has a lower transmissivity than most of the other aquifers, but locally the sands are sufficiently thick and permeable to supply large-capacity wells (1,000 gal/min or more). The Abita aquifer now has the highest water level above land surface of any aquifer of similar (or shallower) depth in the area. The Ramsay and Franklinton aquifers are used very little because they are the deepest aquifers in the study area and they may not contain freshwater near population centers. These very deep aquifers are generally excellent sources of high-quality water.

About 42 Mgal/d was discharged from the aquifers during 1974. Of this amount, nearly 19 Mgal/d was discharged from uncontrolled flowing wells. Uncontrolled discharge is decreasing because flow decreases as the artesian head (water level) decreases.

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BASIC DATA

Tables 19-21

Table 19.--Records of selected water wells

[Use: D, domestic; I, industrial; Ir, irrigation; N, unused; O, observation; P, public water system; R, recreation; S, livestock; T, test hole]

Well No.	Owner	Driller	Year completed	Elevation (feet above sea level)	Casing diameter (inches)	Depth of screened interval(s) or depth of well (in parentheses), in feet	Yield — Gallons per minute	Yield — Date	Water level — Feet above (+) or below land surface datum	Water level — Date	Use	Aquifer
LIVINGSTON PARISH												
Ll-54	St. Margaret's Catholic Church	D. K. Summers, Sr	1954	33	2½	2,104-2,144	-----	-----	+121.8	10-54	O,P	Tchefuncta.
Ll-145	Fourth Ward Waterworks	Summers Bros	1969	74	6 - 3	{1,632-1,652, 1,892-1,902, 1,945-1,955}	110	7-69	+63.3	7-69	P	Tchefuncta and Hammond.
Ll-149	Travis Lobell	Morrison Drilling Co	1970	15	16 - 8	1,779-1,898	1,640	7-72	+40	7-72	S	Abita.
ORLEANS PARISH												
Or-179	U.S. Geological Survey	Layne-Louisiana, Inc	1965	4	2½	2,429-2,434	-----	-----	+107	6-65	O	Abita.
ST. HELENA PARISH												
SH-5	Town of Greensburg	D. K. Summers, Sr	1954	220	8 - 4	1,633-1,683	300	2-54	60	2-54	P	Amite.
SH-7	Water Systems, Inc	----do----	1955	130	4 - 2½	2,052-2,082	60	1-55	+39.1	3-56	O,P	Do.
SH-8	United Gas Pipeline Co	----do----	1956	98	8 - 6	2,060-2,120	1,200	1-56	+60	1-56	D,I	Do.
SH-22	T. L. Lea	Ed Anderson	----	253	4	160- 170	-----	-----	81.52	10-68	D,S	Shallow.
ST. JOHN THE BAPTIST PARISH												
SJB-158	Louisiana Office of Public Works.	Summers Bros	1971	5	2	2,958-2,968	50	4-71	+109	4-71	T	Covington.
ST. TAMMANY PARISH												
ST-11	Louisiana Wildlife and Fisheries Commission.	A. B. Blakemore	1931	7	6	(1,575)	500	9-39	------	-----	S	Big Branch.
ST-12	Fontainebleau State Park	D. K. Summers, Sr	1939	10	6 - 4	(1,525)	500	6-39	+50.7	9-39	N,O	Do.
ST-16	Bogalusa Tung Oil	-------do-------	1909	78	4	(1,000?)	35	4-57	+21.5	5-61	N,O	Abita.
ST-57	Town of Covington	D. K. Summers, Sr	1942	23	6	1,430-1,510	750	5-42	+93	5-42	P	Covington.
ST-178	Seventh Day Adventist Church	----do----	1939	7	3	326- 346	------	-----	------	-----	P	Shallow.
ST-185	Fontainebleau State Park	----do----	1941	---	4	1,454-1,494	300	10-42	+54	10-42	P	Big Branch.
ST-428	H. D. Howser estate	Louis Fields	1938	20	4	(265)	20	12-42	+17.6	12-42	O	Upper Ponchatoula.
ST-449	A. T. Flot	J. E. Schoultz	1941	35	2½	585- 615	40	4-50	+8.1	4-50	D,O,P	Lower Ponchatoula.
ST-525	H. E. Mead	D. K. Summers, Sr	1943	98	2½	1,414-1,434	35	2-43	+34.3	2-43	D,S	Covington.
ST-532	Southeast Louisiana State Hospital.	----do----	1949	8	10 - 6	(1,519)	375	10-49	+28	10-49	P	Big Branch.
ST-545	A. T. Flot	J. E. Schoultz	1953	35	2½	1,548-1,598	-----	-----	+97.0	3-53	D,O,P	Covington.
ST-551	B. Kennedy	Joe Bradley	1955	5	2½	1,512-1,542	60	9-55	+47	3-55	D	Big Branch.
ST-553	Town of Slidell	D. K. Summers, Sr	1955	10	12 - 8	2,273-2,373	2,100	6-55	+123.1	6-55	O,P	Slidell.
ST-554	Town of Covington	Ed Schultz	1954	---	------	(1,600)	-----	-----	------	-----	-----	Covington.

Well	Owner	Driller	Year	Diam.	Depth	Screen interval	Yield	Date	Altitude	Date compl.	Use	Location
ST-555	Covington Country Club	D. K. Summers, Sr	1955	15	3	1,751-1,791	-----	-----	-----	12-55	P	Abita.
ST-556	Southeast Louisiana State Hospital.	---do---	1956	15	10-6	1,454-1,514	-----	-----	+35	4-56	P	Big Branch.
ST-558	S. Pulitzer	---do---	1956	119	3	2,381-2,431	100	7-56	+41	7-56	D	Amite.
ST-562	Town of Madisonville	---do---	1957	4	4	1,840-1,901	360	7-57	+108.4	5-69	O,P	Covington.
ST-563	Town of Slidell	---do---	1957	8	12	{2,262-2,322 / 2,343-2,411}	3,250	6-57	+117.9	6-57	O,P	Slidell.
ST-564	Town of Mandeville	---do---	1957	5	12-8	1,984-2,104		8-57	+113	8-57	P	Covington.
ST-565	Billups Petroleum Company	---do---	1957	5	3	1,938-1,968	150	10-57	+96.8	7-69	D,O,I,P	Abita.
ST-567	L. S. Herin	---do---	1958	75	3	2,046-2,076					S	Tchefuncta.
ST-568	Town of Covington	---do---	1958	22	10	{2,412-2,435 / 2,449-2,54}	73	7-58	+123	7-58	P	Hammond.
ST-570	W. Keneger	H. W. Sellers	1959	17	4	1,816-1,856			+94.1	11-59	D	Abita.
ST-571	Town of Abita Springs	D. K. Summers, Sr	1960	30	6-4	1,465-1,505	600	2-60	-----	7-60	P	Do.
ST-572	Doris Carson	H. W. Sellers	1960	19	3	1,471-1,501			+26.6	7-60	D	Big Branch.
ST-573	Rivercall Subdivision	D. K. Summers, Sr	1960	21	6	2,426-2,506	919	8-60	+122.4	8-60	P	Tchefuncta.
ST-574	Riverwood Subdivision, Inc	---do---	1960	17	6	{2,423-2,453 / 2,483-2,503}	980	11-60	+120	11-60	P	Do.
ST-575	A. A. Lauret	---do---	1961	110	3-2	{2,054-2,064 / 2,070-2,090}			+25	2-61	D	Hammond.
ST-576	Holy Redeemer College	---do---	1961	17	7	2,238-2,334	890	2-61	+108	2-61	P	Slidell.
ST-577	R. A. Nelson	---do---	1963	11	3	2,263-2,303			+104	6-63	D	Do.
ST-578	Mr. Estopenal	---do---	1963	92	3	2,137-2,167			39	7-63	D	Hammond.
ST-579	Tchefuncta Club Estates	Menge Well and Pump Co	1959	15	10-8	1,792-1,842	1,500	3-59	+103.6	3-59	P	Covington.
ST-581	Town of Slidell	Layne-Louisiana, Inc	1963	22	6	{2,300-2,340 / 2,250-2,340}	784	8-63	+96.8	8-63	P	Slidell.
ST-582	Town of Madisonville	---do---	1963	6	6	1,934-1,994	662	7-63			P	Covington.
ST-585	U.S. Geological Survey, Site G	Circle Drilling Co., Inc	1964			(3,080)					T	
ST-586	Fountain Corp	D. K. Summers, Sr	1964	3	8	{2,019-2,040 / 2,056-2,120}	1,515	9-64	+113	6-64	P	Abita.
ST-587	U.S. Geological Survey, Site H	Circle Drilling Co., Inc	1964			(3,170)					T	Slidell.
ST-590	Town of Slidell	D. K. Summers, Sr	1964	6		(2,400)	4,000	6-65	+98	6-65		Covington.
ST-591	A. Vaultz	Summers Bros	1965	9	2½	2,161-2,191			+99	6-65	D,P	
ST-592	Town of Covington	D. K. Summers, Sr	1965	27	8	{2,670-2,690 / 2,765-2,788 / 2,800-2,843}	1,711	7-65	+109.6	11-65	P	Amite.
ST-595	U.S. Geological Survey, Site L	Circle Drilling Co., Inc	1966			(3,101)					T	
ST-596	U.S. Geological Survey, Site M	---do---	1966			(3,054)					T	
ST-597	U.S. Geological Survey, Site N	---do---	1966			(3,057)					T	
ST-598	Tchefuncta Club Estates	D. K. Summers, Sr	1966	6	8	1,822-1,862	1,440	3-66			P	Covington.
ST-599	L. C. Mizel	---do---	1966	65	3	2,452-2,482	100	8-66	+82	8-66	D	Ramsay.
ST-606	U.S. Geological Survey	---do---	1968	40	1½	25-27			8.2	11-68	O	Shallow.
ST-607	---do---	---do---	1968	117	1½	46-48			6	11-68	O	Do.
ST-615	---do---	---do---	1968	38	1½	32-34			12.9	11-68	O	Do.
ST-644	John F. Bricker	Merlin Anthon	1969	12	4	1,680-1,710	200	5-69	+87.3	5-69	D	Covington.
ST-645	---do---	---do---		11	1½	(1,250)			+20.9	5-69	Ir	Big Branch.
ST-646	Slidell Seafood	Norrison Drilling Co	1966	4	6	2,203-2,263	780		+96.9	8-69	I	Slidell.
ST-647	Lee School	D. K. Summers, Sr	1954	115	3	2,010-2,060			+32.3	1-54	P	Hammond.
ST-648	Harold Burras	Dorman Varnado	1968	22	2	1,687-1,707			+78.5	5-69	D,S	Abita.
ST-649	A. P. Landry	Merlin Anthon	1968	27	2	1,570-1,600			+74.6	9-68	I	Do.
ST-650	Morgan Whitney	---do---	1969	3	2	1,260-1,290			+82.8	5-69	D	Undefined.
ST-652	Willy Core	D. K. Summers, Sr	1968	44	10	3,274-3,354	2,100		+95.8	5-69	R	Ramsay.
ST-653	S and S Fish Farm	---do---	1965	28	8-10	{2,225-2,245 / 2,245-2,305}	2,000	10-65	+107	10-65	S	Hammond.
ST-659	St. Joseph's Abbey Camp	Summers Bros	1951	52	6-4	1,442-1,492	700	1951	+60.7	2-69	P	Slidell.
ST-660	Slidell Holiday Inn	Summers Bros	1967	15	4	2,260-2,300	270	3-67	+99.3	3-67	P	Covington.
ST-662	E. A. Chretian	Merlin Anthon	1969	12	2	1,006-1,026			+13.2	5-69	D	Lower Ponchatoule.
ST-663	R. H. Hamilton	Summers Bros	----	28	2	1,315-1,335			+58	1-68	D	Undefined.

Table 19.--Records of selected water wells--Continued

Well No.	Owner	Driller	Year completed	Elevation (feet above sea level)	Casing diameter (inches)	Depth of screened interval(s) or depth of well (in parentheses), in feet	Yield		Water level		Use	Aquifer
							Gallons per minute	Date	Feet above (+) or below land surface datum	Date		
		ST. TAMMANY PARISH--Continued										
ST-664	Gerald Salassi	Summers Bros	1968	52	2	1,387-1,407	----	----	+63.8	5-69	S	Abita.
ST-665	W. B. Richardson	--do--	1968	48	2	1,590-1,610	----	----	+69.3	5-69	D,S	Covington.
ST-666	United Gas	L. B. Henry	1967	45	8 - 4	329- 349	120	5-67	13.53	5-69	I	Upper Ponchatoula.
ST-669	Prat's Dairy	D. K. Summers, Sr	1953	33	2½	1,570-1,612	----	----	+90.1	1953	D,I	Covington.
ST-671	C. L. Dirksen	Merlin Anthon	1967	6	2	1,050-1,066	----	----	+18.0	3-69	D	Lower Ponchatoula.
ST-672	Forest Lawn Memorial Park	John Anthon	----	13	2½	2,210-2,230	----	----	+89.0	5-69	D,Ir	Slidell.
ST-673	Hartzell Methodist Church	Merlin Anthon	----	6	2	905- 925	----	----	+16.9	3-69	D,P	Lower Ponchatoula.
ST-676	Stark	John Anthon	----	39	2	1,510-1,530	----	----	+62.8	3-69	Ir	Abita.
ST-681	W. L. Smith	Booth Fogg	1952	82	2½	890- 930	----	----	+10.2	5-69	D	Do.
ST-682	Myronne	D. K. Summers, Sr	1954	112	4	2,089-2,129	----	----	+23.8	1954	D,S	Hammond.
ST-683	Ed Fogg	John Anthon	----	7	3	2,280-2,300	----	----	+93.4	3-69	D	Slidell.
ST-684	R. W. Adams; AAA Ranch	Summers Bros	1964	18	2	610- 630	----	----	+14.5	3-69	D	Lower Ponchatoula.
ST-685	Weldon Poole	D. K. Summers, Sr	1964	26	8	2,549-2,629	1,545	5-64	+106	5-64	D,S	Hammond.
ST-686	Crews Ranch	Summers Bros	1964	168	4	987-1,007	----	----	29.5	5-64	D,S	Abita.
ST-692	P. W. Vortish	Jewels Rayburn	1969	32	2½	1,590-1,620	----	----	+72.4	5-69	D,S	Do.
ST-693	Oscar Seybold	D. K. Summers, Sr	1939	27	3	1,195-1,235	----	----	+16.8	4-69	D	Big Branch.
ST-694	H. B. Pounds	John Anthon	1964	16	2	2,270-2,300	----	----	+84.9	5-69	P	Slidell.
ST-702	Mire's Marina	Jenkins	1965	3	2	165- 175	----	----			I	Shallow.
ST-708	R. F. Guste	Paul Anthon	1969	8	2	2,125-2,155	----	----	+98.2	10-69	D	Covington.
ST-710	Donald Maginnis	Summers Bros	1969	32	4	1,464-1,506	310	9-69	+72.8	9-69	D	Do.
ST-712	Louisiana Parks and Recreation Commission.	Morrison Drilling Co	1970	12	6	382- 402	76	7-70	+.02	5-71	P	Upper Ponchatoula.
ST-721A	Louisiana Office of Public Works.	Summers Bros	1971	140	4 - 2	1,610-1,620	25	10-71	12	10-71	T	Tchefuncta.
ST-721B	--do--	--do--	1971	140	4 - 2	1,230-1,240	30	10-71	+15	10-71	T	Covington.
ST-726	Village of Folsom	--do--	1972	140	7 - 4	{2,204-2,214; 2,214-2,254}	200	3-73	+12	11-72	P	Amite.
ST-729A	Louisiana Office of Public Works.	--do--	1973	92	4 - 2	2,935-2,945	25	7-73	+29.4	7-73	T	Hammond.
ST-733	--do--	--do--	1973	67	2	2,030-2,040	35	11-73	+54.6	11-73	T	Do.
ST-734	--do--	--do--	1973	67	2	1,785-1,795	31	11-73	+40	11-73	T	Tchefuncta.
		TANGIPAHOA PARISH										
Ta-7	Town of Ponchatoula	Gray Artesian Well Co	1924	22	6	(654)	300	8-39	+11.5	8-39	N,O	Upper Ponchatoula.
Ta-19	Victor Stevens	Cecil Levine	----	5	2	515- 535	50	8-39	+19.1	8-39	D,Ir,O	Do.
Ta-25	Town of Independence	Mercer-Runyon Co	1937	---	12 - 6	362- 442	305	8-39	16.7	8-39	P,O	Shallow.
Ta-253	City of Hammond	D. K. Summers, Sr	1950	35	12 - 8	2,070-2,190	1,500	7-50	+115	7-50	P,O	Tchefuncta.
Ta-255	Louisiana Office of Highways	S. L. Hebrard	1950	40	4	698- 708	100	5-50	2.5	5-50	N	Lower Ponchatoula.
Ta-257	Ware's Farm	D. K. Summers, Sr	1951	93	3	2,044-2,087	125	7-51	+71.3	7-51	D,S	Amite.
Ta-258	Town of Ponchatoula	--do--	1948	22	8 - 6	1,882-1,962	1,200	4-48	+119.6	4-48	O,P	Covington.

Well no.	Owner	Driller	Year	Altitude (ft)	Diameter (in)	Screened interval (ft)	Yield (gpm)	Date	Water level (ft)	Date	Use	Aquifer
Ta-260	Town of Roseland	D. K. Summers, Sr	1953	131	4	1,951-2,013	125	5-53	+34	5-53	P	Undefined.
Ta-261	Zemurray Foundation	-do-	1953	68	12 - 8	2,290-2,371	960	9-53	+99	9-53	D	Amite.
Ta-262	Town of Independence	-do-	1953	85	3	2,256-2,316	-----	-----	+79.8	1-54	P	Do.
Ta-264	G. Billups	-do-	1954	30	3	1,698-1,728	-----	-----	-----	5-69	D,S	Covington.
Ta-265	Village of Tickfaw	-do-	1954	64	2½	2,357-2,397	-----	-----	+67.85	5-69	P	Amite.
Ta-266	C. G. Forrest and others	-do-	1956	65	2	2,305-2,365	-----	-----	+67.2	5-69	D	Do.
Ta-267	James H. Morrison	-do-	1956	32	4	{2,129-2,149 / 2,149-2,169}	400	8-56	+109	8-56	D	Hammond.
Ta-268	City of Hammond	-do-	1956	35	12 - 8	2,337-2,449	1,585	10-56	+125	10-56	O,P	Do.
Ta-269	Zemurray Foundation	-do-	1956	86	6	{2,250-2,294 / 2,312-2,338}	-----	-----	+73	11-56	S	Amite.
Ta-270	Seventh Ward Hospital	-do-	1958	26	8 - 4	{2,290-2,320 / 2,642-2,662}	309	9-58	+113	9-58	P	Tchefuncta and Hammond.
Ta-271	Town of Independence	-do-	1958	86	6	2,105-2,166	590	11-58	+65	10-58	P	Amite.
Ta-272	Town of Amite	Layne-Louisiana, Inc	1958	116	12 - 8	1,915-1,995	580	3-59	+78	3-59	P	Do.
Ta-273	Dominican Sisters	D. K. Summers, Sr	1960	11	3	2,289-2,329	150	1-60	+127.2	5-60	O,P	Tchefuncta.
Ta-276	Whitmar Acres Subdivision	H. W. Sellers	1960	44	6	2,287-2,347	560	12-60	-----	5-60	P	Hammond.
Ta-277	C. R. Ivey, Sr., Greenhill Farms	-do-	1960	64	3	2,320-2,350	-----	-----	+79.4	12-60	D,S	Amite.
Ta-278	Ray Dunnington	D. K. Summers, Sr	1961	52	2	1,410-1,430	75	1-61	+88	1-61	D,S	Covington.
Ta-281	Donald Joiner	John Anthon	1963	38	-----	1,680-1,720	-----	-----	+93.4	6-63	D,S	Do.
Ta-282	Wilbert Pierce	D. K. Summers, Sr	1963	99	-----	(2,130)	-----	-----	36.8	5-69	P	Amite.
Ta-283	Village of Tangipahoa	Layne-Louisiana, Inc	1963	179	13 - 4	1,419-1,457	300	10-63	+4.1	8-63	P	Upper Ponchatoula.
Ta-284	Town of Ponchatoula	Carloss Well Supply	1963	26	12 -10	542- 608	1,000	8-63	+91	8-64	P	Hammond.
Ta-285	City of Hammond	Layne-Louisiana, Inc	1964	40	16 -12	{2,316-2,372 / 2,382-2,416}	1,520	10-64	65	9-65	P	Hammond.
Ta-286	Town of Kentwood	Stamm-Scheele, Inc	1965	270	12 - 8	559- 640	1,550	9-65	-----	-----	P	Kentwood.
Ta-287	De Sanks Oyster House	Morrison Drilling Co	1966	133	4 - 3	1,940-1,970	-----	-----	-----	5-69	I	Amite.
Ta-289	Town of Amite	Stamm-Scheele, Inc	1966	127	14 -10	1,850-1,930	1,700	12-66	2.29	11-67	P	Amite.
Ta-290	Fluker Waterworks	Summers Bros	1967	145	6 - 3	{1,654-1,674 / 1,913-1,933}	-----	-----	10.6	5-69	P	Amite and Hammond.
Ta-294	Westview Waterworks	Morrison Drilling Co	1966	129	6 - 3	2,009-2,039	-----	-----	1.45	5-69	P	Amite.
Ta-295	Greater Tangipahoa Water Co	D. K. Summers, Sr	1962	43	6 - 4	2,434-2,476	-----	-----	+86.35	2-53	P	Do.
Ta-296	-do-	-do-	1953	52	-----	2,210-2,250	-----	-----	+115.5	5-69	P	Hammond.
Ta-301	-do-	Stamm-Scheele, Inc	1962	32	6	2,395-2,445	-----	-----	+104	5-69	P	Do.
Ta-303	Town of Independence	D. K. Summers, Sr	1967	77	-----	2,069-2,191	-----	-----	+52.8	5-64	P	Amite.
Ta-310	Major Water Co	Summers Bros	1964	111	4 - 3	2,284-2,314	-----	-----	+36	9-64	P	Do.
Ta-312	Tangi Water Co	-do-	1964	72	4 - 3	2,169-2,209	-----	-----	+72	9-64	P	Do.
Ta-313	-do-	-do-	1964	93	4 - 3	2,004-2,044	-----	-----	+44	5-69	P	Do.
Ta-314	C. Cittadino	Dorman Varnado	1965	103	4 - 3	1,960-2,000	120	9-64	+26.7	8-68	P	Do.
Ta-322	C. Y. Voight	Paul Anthon	1968	178	6 - 4	335- 380	300	8-68	51.62	9-68	Ir	Shallow.
Ta-324	Cecil Lavigne	L. C. Anthon	1968	25	2	(1,938)	-----	-----	+104	8-68	D,S	Covington.
Ta-328	Tangipahoa Sheriff's Dept	Amite Pump and Supply	1968	32	4	485- 505	-----	-----	3.06	7-68	P	Upper Ponchatoula.
Ta-330	M. F. C. Services	Summers Bros	-----	135	4	75- 95	75	7-68	7.38	8-68	I	Shallow.
Ta-339	Little Natalbany Waterworks	Morrison Drilling Co	1968	185	4 - 2½	1,807-1,847	65	8-68	57.68	8-68	P	Amite.
Ta-341	Summers Bros	D. K. Summers, Sr	1963	32	3	1,680-1,710	60	11-63	+80.8	11-63	D,S	Covington.
Ta-343	C. G. Sledge	Morrison Drilling Co	1962	42	8 - 6	2,322-2,422	790	6-62	+101.6	6-62	P	Hammond.
Ta-345	D. K. Summers, Sr	L. C. Anthon	-----	47	2½- 2	1,768-1,808	-----	-----	-----	5-69	D,S	Covington.
Ta-347	Hayes	L. C. Anthon	1966	52	1½	1,350-1,380	175	5-69	+77.5	5-69	Ir	Abita.
Ta-354	Mallase	U.S. Geological Survey	1968	85	1½	31- 34	-----	-----	12.60	10-68	O	Shallow.
Ta-356	U.S. Geological Survey	-do-	1968	138	1½	42- 45	-----	-----	11.24	10-68	O	Do.
Ta-360	-do-	-do-	1968	75	1½	52- 54	-----	-----	18.73	10-68	O	Do.
Ta-380	J. Kent, Sr	R. Holtum	1939	175	2	538- 580	3	10-69	+17.5	10-69	N	Kentwood.
Ta-382	Louisiana Tourist Information Center	L. C. Anthon	1968	270	4 - 2	50- 200	-----	-----	48.69	10-68	P,S	Shallow.
Ta-397	Sam Arnold	Paul Anthon	1968	10	2	1,827-1,857	-----	-----	+100.4	12-68	D,S	Covington.
Ta-398	-do-	-do-	-----	10	2	(215)	-----	-----	+3	12-68	N	Shallow.
Ta-400	H. P. Hoover	-----	-----	25	2	(540)	-----	-----	+3.8	12-68	N	Upper Ponchatoula.
Ta-404	Loranger School	D. K. Summers, Sr	1958	118	2	(2,170)	-----	-----	+26.3	5-69	P	Hammond.
Ta-407	F. Collet	Summers Bros	1967	210	4	500- 530	40	12-69	+18.5	11-67	S	Kentwood.

Table 19.--Records of selected water wells--Continued

Well No.	Owner	Driller	Year completed	Elevation (feet above sea level)	Casing diameter (inches)	Depth of screened interval(s) or depth of well, in feet (in parentheses)	Yield, Gallons per minute	Yield, Date	Water level, Feet above (+) or below land surface datum	Water level, Date	Use	Aquifer
						TANGIPAHOA PARISH--Continued						
Ta-409	George Anthon	John Anthon	1963	32	4 - 2	2,580-2,600	-----	-----	+102	4-63	D	Amite.
Ta-411	Menze and Sharp	----do----	----	---	4 - 2	1,910-1,930	-----	-----	+12.3	5-69	D	Hammond.
Ta-415	C. Alessi	D. K. Summers, Sr	1954	67	2½	2,142-2,172	-----	-----	+102	7-54	D	Amite.
Ta-416	Southeast Louisiana University	----	1942	44	6	(420)	-----	-----	7.81	7-69	P,S,Ir	Upper Ponchatoula.
Ta-418	Leo Harper	Morrison Drilling Co	1965	50	2	2,340-2,370	-----	-----	+80.9	8-65	D	Amite.
Ta-419	W. B. Wright, Jr	----do----	1965	52	3	2,162-2,192	-----	-----	+63.9	3-69	D	Hammond.
Ta-420	Dr. E. L. Lensgraf	C. B. Smith	----	47	2	1,620-1,650	-----	5-69	+82.3	5-69	D	Covington.
Ta-421	Joe Robinson	Summers Bros	1964	85	5 - 3	1,960-1,990	-----	-----	+57.8	5-69	D,S	Hammond.
Ta-429	Eastern Heights Water Works	----do----	1969	194	6 - 3	1,655-1,695	-----	-----	35.5	8-69	P	Do.
Ta-433	Sam Arnold	Baden	1948	14	1½	144- 150	5	2-70	-----	-----	D	Shallow.
Ta-435	Louisiana Office of Public Works.	Summers Bros	1971	6	------	(3,180)	-----	-----	-----	-----	N	Covington.
Ta-438	Indian Creek Campground	Dorman Varnado	1973	72	2	1,485-1,515	-----	-----	+52.3	5-74	P	Covington.
Ta-440	U.S. Geological Survey	J. L. Morrison	1974	220	2	593- 603	20	6-74	2.81	8-74	O	Kentwood.
						WASHINGTON PARISH						
Wa-18	Town of Franklinton	D. K. Summers	1942	150	6	(788)	400	1942	+33.4	12-49	O,N	Kentwood.
Wa-57	----do----	----do----	1957	160	12 -10	{2,614-2,678 / 2,714-2,746}	1,150	9-57	20.76	8-57	O,P	Franklinton.
Wa-78	C. J. Truett	Dorman Varnado	1968	150	2	545- 585	-----	-----	+16.7	1968	D,S	Kentwood.
Wa-79	Nell Bullock	----do----	1968	192	2	270- 310	-----	-----	+23.6	5-69	D	Do.
Wa-88	Town of Franklinton	Stamm-Scheele, Inc	1971	185	12	{2,557-2,645 / 2,655-2,660}	850	9-71	63	9-71	P	Franklinton.
Wa-91	U.S. Geological Survey	Amite Pump and Supply	1974	240	2	{2,660-2,700 / 580-600}	20	6-74	12.98	6-74	O	Kentwood.
Wa-104	Louisiana State University Experiment Station.	Summers Bros	1970	225	8	------------	550	6-70	------	-----	Ir	Shallow.
Wa-105	Franklinton Rural Water Co-op	----do----	1975	218	6 - 4	2,280-2,380	-----	-----	98.32	11-75	P	Franklinton.
Wa-106	----do----	----do----	1975	216	6 - 4	2,280-2,380	-----	-----	100.91	11-75	P	Do.

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Table 20.--Chemical analyses of water from selected wells

[Analyses by U.S. Geological Survey. Values for pH were measured in the field except those preceded by the symbol "L," which were measured in the laboratory]

Well No.	Location Sec.	T. (S.)	R. (E.)	Date of collection	Depth of well (ft)	Temperature (°F)	Temperature (°C)	Iron (Fe), dissolved	Manganese (Mn), dissolved	Silica (SiO2), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate (NO3) as NO3, dissolved	Dissolved solids, calculated, sum of determined constituents	Hardness as CaCO3 (Ca, Mg)	Specific conductance (micromhos/cm at 25°C)	Laboratory or field pH (units)	Color (platinum-cobalt units)	Hydrogen sulfide (H2S), in milligrams per liter
SHALLOW AQUIFER																										
SH-22	35	2	6	11-25-69	170	69	20.5	0.05	0.03	12	1.7	0.7	4.5	0.5	12	0	0.0	3.9	0.0	0.10	29	7	32	5.6	5	0.0
ST-178	48	8	12	5-26-65	346	70	21.0	.20	.00	16	2.2	.4	61	1.3	162	6	.0	3.9	.2	.0	167	7	277	L7.1	5	.1
ST-606	17	7	13	12-16-69	27	--	--	2.1	.17	30	41	12	32	2.5	234	0	1.6	9.3	.2	5.5	255	153	408	8.3	15	.2
ST-607	22	5	12	12-17-69	48	--	--	.57	.32	12	3.0	1.1	2.9	.6	16	0	.4	3.1	.1	.0	31	12	40	5.9	0	.0
ST-615	28	6	10	12-17-69	34	70	21.0	.77	.08	48	2.8	1.0	16	1.6	46	0	.4	6.2	.2	.0	99	11	91	6.6	10	.2
ST-702	54	7	10	8-20-69	175	71	21.5	2.2	.18	40	4.5	.9	42	2.4	121	0	3.8	5.9	.0	.0	160	15	214	6.9	20	--
Ta-354	6	5	7	12-17-69	34	--	--	.69	.11	11	3.8	.6	6.6	1.3	6	0	.0	9.9	.1	13	47	12	73	5.5	0	.1
Ta-356	15	3	7	12-17-69	45	--	--	1.2	.09	11	3.9	1.5	7.1	.5	24	0	.0	6.6	.2	1.7	44	16	66	5.9	5	.0
Ta-398	24	7	9	12-17-69	215	68	20.0	.33	.04	23	3.8	.4	35	2.7	102	0	4.2	2.6	.1	.0	122	11	179	7.7	5	.2
Ta-433	38	7	9	2-12-70	150	69	20.5	2.0	.11	33	5.0	1.8	29	3.2	80	0	13	3.1	.1	.0	127	20	161	7.0	15	.0
UPPER PONCHATOULA AQUIFER																										
ST-666	28	7	14	3-3-70	350	72	22.0	0.27	0.04	38	1.1	0.1	67	1.0	168	0	12	3.3	0.3	0.00	206	3	289	8.9	15	0.4
Ta-7	18	7	8	10-15-59	654	75	24.0	.03	.01	32	.0	.5	68	.4	159	0	11	2.9	.5	.10	195	0	280	8.6	20	.0
Ta-284	18	7	8	7-24-68	608	74	23.5	.10	---	29	2.0	.5	63	.4	157	0	11	3.6	.3	1.1	188	7	275	8.4	5	---
LOWER PONCHATOULA AQUIFER																										
ST-449	32	6	12	5-26-70	615	72	22.0	0.86	0.12	58	3.4	0.6	37	3.0	99	0	7.2	2.9	0.2	0.10	161	11	178	L7.7	5	0.1
ST-673	17	9	15	2-12-70	925	73	23.0	.04	.03	37	.0	.0	134	1.7	299	16	13	4.0	.7	.20	354	0	535	9.3	20	.5
ST-684	17	7	10	7-22-69	630	--	--	1.4	.12	57	9.2	1.7	22	3.0	82	0	8.0	3.0	.1	.00	144	30	155	L7.0	30	---
BIG BRANCH AQUIFER																										
ST-11	40	8	12	2-12-70	1,575	85	29.5	0.02	0.18	18	21	4.5	955	5.5	243	0	6.4	1,360	0.4	0.00	2,490	71	4,520	8.4	5	0.3
ST-551	9	9	14	1-14-69	1,542	80	26.5	.05	.03	19	1.2	.2	162	.5	314	21	9.4	32	.6	.90	401	4	633	8.8	30	.9
ST-556	43	8	12	12-19-68	1,514	80	26.5	.12	.04	24	.6	.1	70	.5	159	5	13	3.0	.3	.00	194	2	289	8.5	15	.1
ST-645	46	7	11	12-11-69	1,250	--	21.0	.85	.19	63	10	1.7	16	3.0	68	0	7.2	3.8	.2	.00	138	32	138	7.0	5	.2

Milligrams per liter (columns Iron through Nitrate)

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Table 20.--Chemical analyses of water from selected wells--Continued

Well No.	Sec.	T. (S.)	R. (E.)	Date of collection	Depth of well (ft)	Temp (°F)	Temp (°C)	Iron (Fe), dissolved	Manganese (Mn), dissolved	Silica (SiO2), dissolved	Calcium (Ca), dissolved	Magnesium (Mg), dissolved	Sodium (Na), dissolved	Potassium (K), dissolved	Bicarbonate (HCO3)	Carbonate (CO3)	Sulfate (SO4)	Chloride (Cl), dissolved	Fluoride (F), dissolved	Nitrate (NO3) as NO3, dissolved	Dissolved solids, calculated, sum of determined constituents	Hardness as CaCO3 (Ca, Mg)	Specific conductance (micromhos/cm at 25°C)	Laboratory or field pH (units)	Color (platinum-cobalt units)	Hydrogen sulfide (H2S), in milligrams per liter
KENTWOOD AQUIFER																										
Ta-407	39	1	7	11-25-69	535	72	22.0	0.02	0.06	29	2.8	1.0	7.5	3.0	28	0	2.8	2.8	0.1	0.10	63	11	59	6.3	5	0.1
Ta-440	47	2	8	9-25-75	603	70	21.0	.05	.08	22	7.9	1.3	4.5	3.0	40	0	2.2	2.2	.1	.09	62	25	81	6.3	0	---
Wa-18	46	2	10	2-26-58	736	72	22.0	.01	.00	57	5.6	1.2	7.5	3.6	30	0	12	2.0	.1	.00	118	19	92	L6.5	0	---
Wa-91	32	1	9	9-25-75	600	70	21.0	.12	.07	28	8.9	3.1	12	3.8	39	0	12	2.0	.3	.20	129	35	104	6.3	20	---
ABITA AQUIFER																										
Ox-179	19	10	15	11-10-65	2,435	98	36.5	0.57	---	22	0.4	0.0	152	0.7	377	1	12	8.2	0.6	0.40	383	1	615	8.9	40	---
ST-16	29	5	13	3-16-50	1,000	75	24.0	.04	---	45	1.5	.1	60	3.2	146	0	10	6.2	.2	.00	198	4	266	L8.2	---	0.3
ST-565	29	9	16	12-17-68	1,968	91	33.0	.30	0.02	22	1.0	.6	138	1.1	303	12	12	8.0	.4	.20	344	5	527	8.6	40	.3
ST-571	1	7	11	7-25-68	1,505	81	27.0	.55	.04	44	2.6	.9	49	.6	123	0	10	3.0	.1	.00	171	10	223	8.3	5	.3
ST-692	33	7	13	2-12-70	1,620	80	26.5	.04	.03	19	2.6	.1	70	.4	150	6	15	2.7	.2	.70	189	2	292	9.4	0	.3
COVINGTON AQUIFER																										
ST-562	39	7	10	4-1-71	1,901	84	29.0	0.02	0.01	30	2.4	0.0	68	0.3	153	8	9.0	3.8	0.1	0.00	197	6	280	9.4	5	---
ST-644	46	7	11	12-11-69	1,710	--	--	.00	---	37	5.0	.1	56	.6	144	0	8.2	4.0	.2	.00	182	13	252	8.8	5	0.1
Ta-273	44	7	7	12-13-68	2,329	91	33.0	.01	.01	18	1.0	.1	86	.6	188	8	14	3.1	.3	.00	223	3	350	9.1	20	.4
Ta-324	35	6	9	12-11-69	1,938	--	--	.12	.34	48	9.1	.8	43	1.2	132	0	9.4	3.3	.2	.00	180	26	231	8.7	5	.0
Ta-397	24	7	9	3-3-70	1,857	--	--	---	---	42	11	.4	46	1.9	144	0	8.8	3.9	.1	.00	185	29	247	8.5	5	---
Ta-438	8	5	7	10-30-73	1,517	78	25.5	.97	.08	63	6.0	1.2	25	3.7	75	0	12	6.2	.1	.00	154	20	152	6.6	0	---
SLIDELL AQUIFER																										
ST-563	9	9	14	12-17-68	2,411	98	36.5	0.12	0.03	18	2.3	0.1	99	1.0	224	8	14	9.0	0.3	0.20	262	6	397	8.6	20	0.3
ST-579	51	7	11	8-2-63	1,842	84	29.0	.02	.02	31	2.4	.0	58	1.4	144	0	6.4	4.2	.1	.20	175	6	260	8.5	5	---
TCHEFUNCTA AQUIFER																										
Li-54	2	7	6	12-13-66	2,144	84	29.0	0.20	0.01	45	3.1	0.3	49	2.3	126	0	8.8	4.1	0.1	0.1	175	9	227	L7.7	5	---
ST-725A	10	5	10	10-18-71	1,620	78	25.5	3.7	.19	67	4.8	.5	20	2.4	58	0	10	3.7	.1	.10	138	14	116	6.6	40	---
Ta-253	25	6	7	2-29-56	2,190	89	31.5	.37	.10	58	1.2	.7	51	.6	122	0	9.1	4.2	.2	.10	187	6	241	L7.4	5	0.1
Ta-270	1	7	7	1-6-61	2,662	--	--	.22	.20	49	3.1	.5	45	1.6	118	0	6.6	5.0	.2	.00	171	10	215	L6.8	10	---
HAMMOND AQUIFER																										
ST-568	41	6	11	2-24-60	2,542	92	33.5	0.05	0.02	50	1.5	0.3	51	0.6	123	0	7.6	4.2	0.5	0.10	177	5	223	8.4	10	---
ST-682	6	6	12	2-12-70	2,129	85	29.5	.45	.17	59	1.6	.7	42	1.0	100	0	12	3.1	.3	.00	169	7	186	7.8	0	0.0

74

Well			Date																						
Ta-268	25	6	7	7-26-68	2,449	92	33.5	.06	---	50	.8	.0	65	.3	162	0	9.6	3.0	.6	.10	209	2	275	8.6	20	.1
Ta-404	4	5	8	6- 5-69	2,170	--	----	1.9	.08	66	.8	.0	30	1.2	76	0	1.0	2.7	.2	.00	139	2	142	16.8	10	---
Ta-429	1	3	7	2-25-70	1,695	--	----	1.0	.05	77	.9	.4	26	2.3	62	0	7.6	3.3	.2	.00	149	4	126	7.2	5	---

AMITE AQUIFER

Well			Date																						
SH-5	59	2	5	6-20-68	1,683	82	28.0	0.09	0.0	26	0.0	0.0	69	0.2	172	0	8.8	2.2	0.3	0.1	192	0	279	8.8	5	---
ST-592	31	6	11	7-24-68	2,843	--	----	.07	---	21	.2	.1	97	.3	233	0	14	2.8	.4	.00	251	1	397	9.2	5	---
ST-726	10	5	10	6- 8-73	2,254	85	29.5	.02	.01	23	.0	.0	63	.3	154	0	10	2.6	.1	.10	175	0	258	8.9	5	---
Ta-283	60	2	7	7-25-68	1,457	78	25.5	.15	.01	33	.6	.1	61	.9	149	0	12	3.0	.2	.00	184	2	262	17.6	10	---
Ta-295	14	6	7	7-26-68	2,400	--	----	.03	---	18	.8	.0	70	.4	174	0	10	3.0	.3	.00	188	2	298	18.0	15	---
Ta-310	1	5	7	5-19-69	2,314	87	30.5	.15	.03	20	.4	.0	114	1.2	256	16	12	3.2	.8	.00	294	1	472	8.8	10	---
Ta-411	44	4	9	11-25-69	2,172	84	29.0	4.1	.20	78	1.4	.1	32	1.8	76	0	6.6	3.1	.2	.1	160	4	141	7.3	50	0.2

RAMSAY AQUIFER

Well			Date																						
ST-599	3	5	13	1-15-67	2,482	--	----	0.59	---	62	2.9	0.6	35	3.1	90	0	9.6	3.4	0.1	0.2	161	10	169	7.1	10	---
ST-652	15	6	10	5-14-69	3,354	99	38.5	.03	0.02	16	.5	.2	70	.6	148	6	12	5.0	.1	.20	184	2	281	18.6	15	---
ST-729A	27	5	11	7-11-73	2,945	88	31.0	.09	.30	33	6.1	1.2	40	1.6	110	0	12	3.0	.1	.2	151	20	206	7.6	0	---

FRANKLINTON AQUIFER

Well			Date																						
Wa-57	45	2	10	2- 7-68	2,746	88	31.0	0.09	---	20	0.8	0.0	90	0.3	223	0	6.0	10	0.4	0.50	238	2	385	9.1	30	0.1
Wa-88	30	2	11	3-15-70	2,700	87	30.5	.06	0.01	8.1	.3	.4	95	2.0	212	0	5.2	20	.8	.60	236	2	375	8.6	20	---
Wa-106	55	2	10	11- 5-75	2,380	87	30.5	.09	.02	53	.4	.0	100	1.3	242	7	7.2	2.0	.9	.41	279	1	420	8.7	20	---

Table 21.--Oil-test wells used for geologic correlation

State serial number	Location Sec.	Location T. (S.)	Location R. (E.)	Operator	Well name	Elevation of log datum (ft)	Depth (ft)	Year completed
				LIVINGSTON PARISH				
34709	25	7	5	Stanolind Oil & Gas Co	Hammond Lumber Co. No. 1	18	11,602	1948
41992	3	9	6	Nelson B. Hunt	Currie & O'Brien No. 1	32	10,700	1950
				ST. HELENA PARISH				
37854	15	1	6	Amerada Petroleum Corp	Patrick Needham No. 1	309	10,008	1949
45868	44	4	6	Bates & Cornell	A. Claudet Plantation No. 1	126	10,506	1952
47328	16	3	6	Shell Oil Co	Robertson No. 1	241	10,001	1953
				ST. TAMMANY PARISH				
21045	33	6	10	Ozro B. Phillips	W. L. Stevenson No. 2	40	2,510	1938
43495	5	6	10	Ray Oil Co	Leshok No. 1	63	7,218	1951
52961	10	8	15	Sun Oil Co	Poitevent & Favre Lumber Co. No. 1	23	11,000	1954
60741	25	9	15	Rimrock Tidelands, Inc	Iwanta Realty Co. No. 1	15	8,030	1956
75398	9	9	13	Tommy Neal Oil & Gas Co	Keller-Plauche No. 1	16	10,554	1959
78492	26	8	14	W. R. Fairchild & Associates	Poitevent & Favre Lumber Co. No. 1	39	8,010	1960
85312	17	7	13	Cities Service	Poitevent No. 1	57	8,512	1961
87776	6	7	14	Cities Service	Poitevent No. 3	65	5,525	1961
89684	36	5	12	B. M. Hester	Bogalusa Tung Oil, Inc., No. 1	125	11,460	1962
137657	38	7	10	James C. Storm	Equitable Equipment Co. No. 1	17	8,741	1971
				TANGIPAHOA PARISH				
29307	31	7	8	Humble Oil & Refining Co	Williams, Inc., No. 1	14	9,314	1944
30902	11	4	9	Amerada Petroleum Corp	Lake Superior Piling Co. No. 1	140	9,820	1945
32239	38	2	8	Danciger-Lion Chemical Corp	M. L. Varnado No. 1	241	9,028	1946
81235	23	6	9	Germany Investment Co	Nalty No. 1	46	9,800	1960
				WASHINGTON PARISH				
37655	9	2	12	S. W. Richardson	L.S.U. No. 1	294	11,189	1949
40453	22	3	11	Richardson & Bass	Fannie Brooks No. 1	176	11,988	1950
44836	20	3	11	Nelson B. Hunt	Delos Johnson No. 1	139	11,419	1952
46024	15	4	12	Eagle Drilling & Development Co	Gaylord Container Corp. No. 1	126	7,826	1952
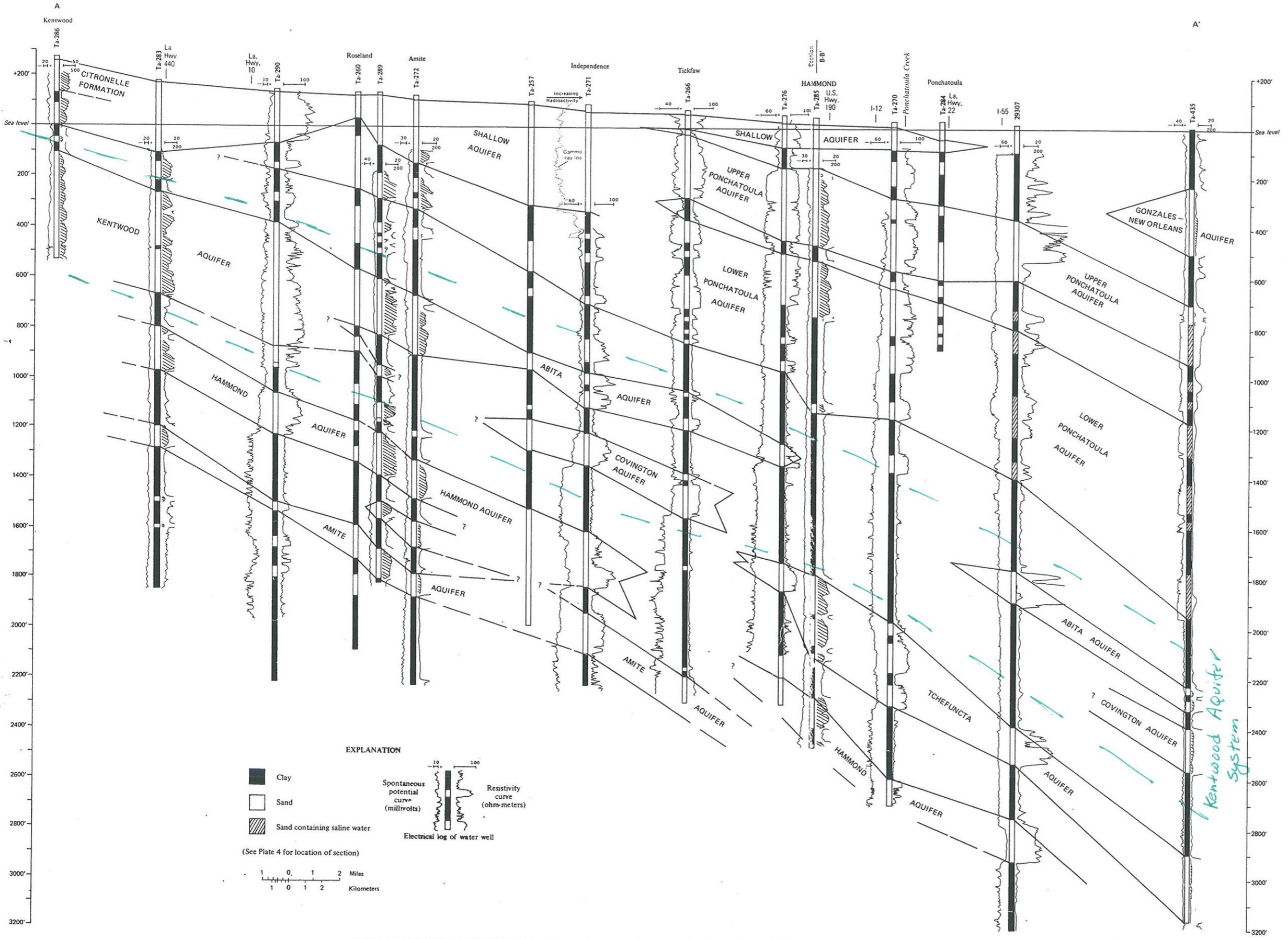
PLATE 1. NORTH-SOUTH GEOHYDROLOGIC SECTION ALONG U.S. HIGHWAY 51 FROM KENTWOOD TO MANCHAC, SOUTHEASTERN LOUISIANA.
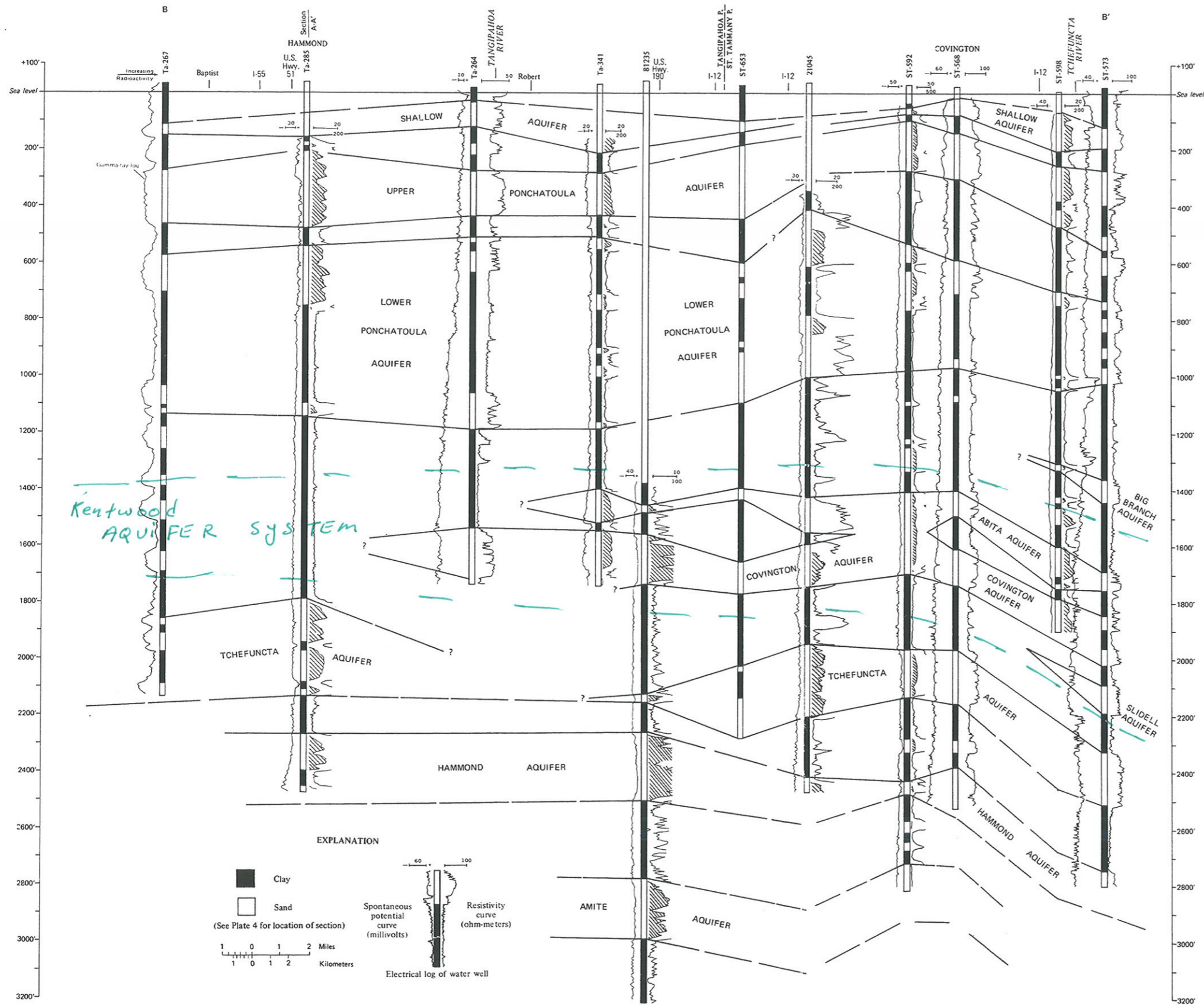
PLATE 2. EAST-WEST GEOHYDROLOGIC SECTION ALONG U.S. HIGHWAY 190 FROM NEAR ALBANY TO COVINGTON, SOUTHEASTERN LOUISIANA.
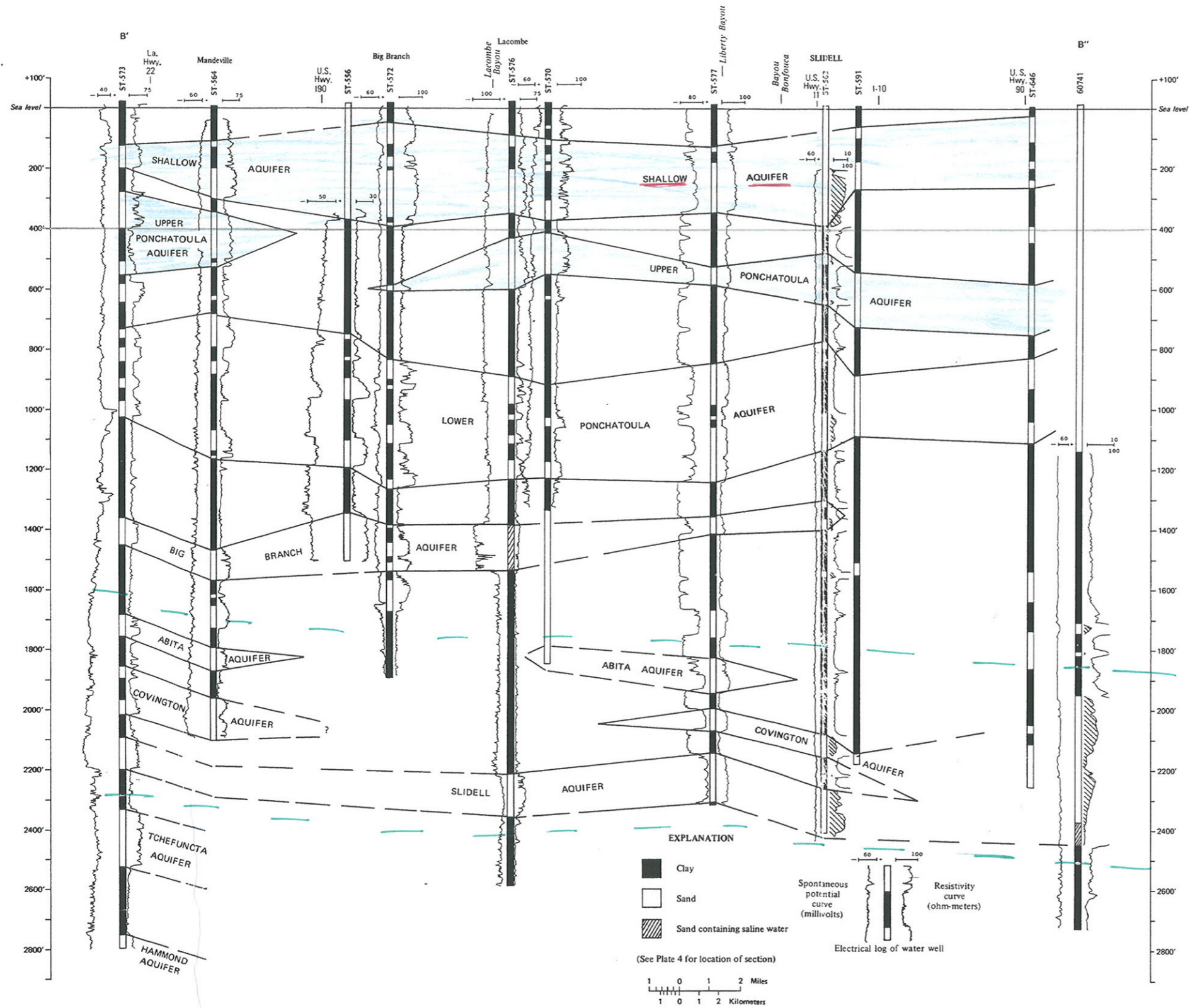
PLATE 3. EAST-WEST GEOHYDROLOGIC SECTION ALONG U.S. HIGHWAY 190 FROM COVINGTON TO THE PEARL RIVER, SOUTHEASTERN LOUISIANA.
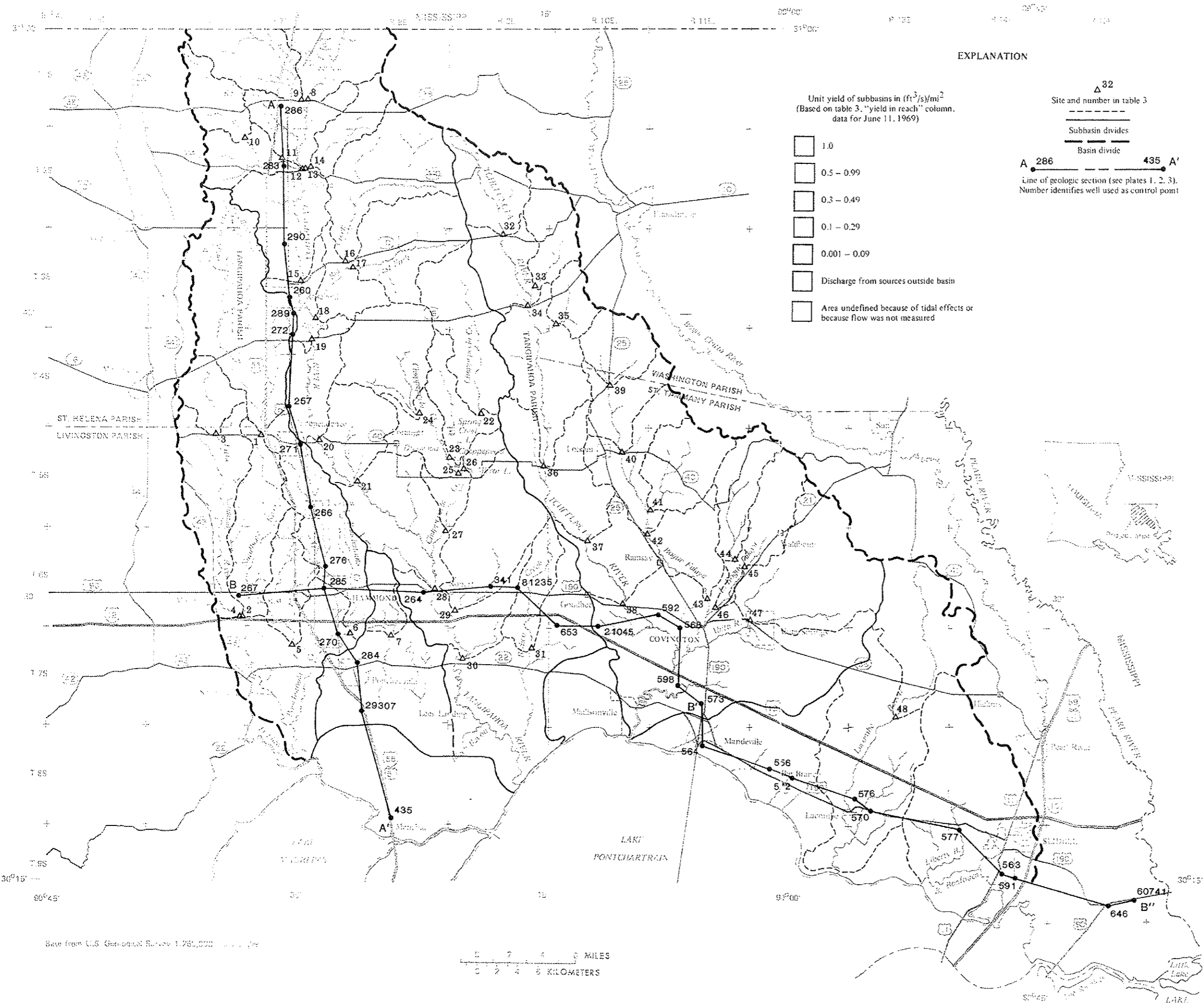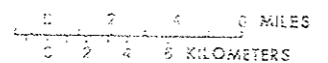
PLATE 4. MAP SHOWING UNIT YIELD OF SELECTED SUBBASINS, SOUTHEASTERN LOUISIANA.
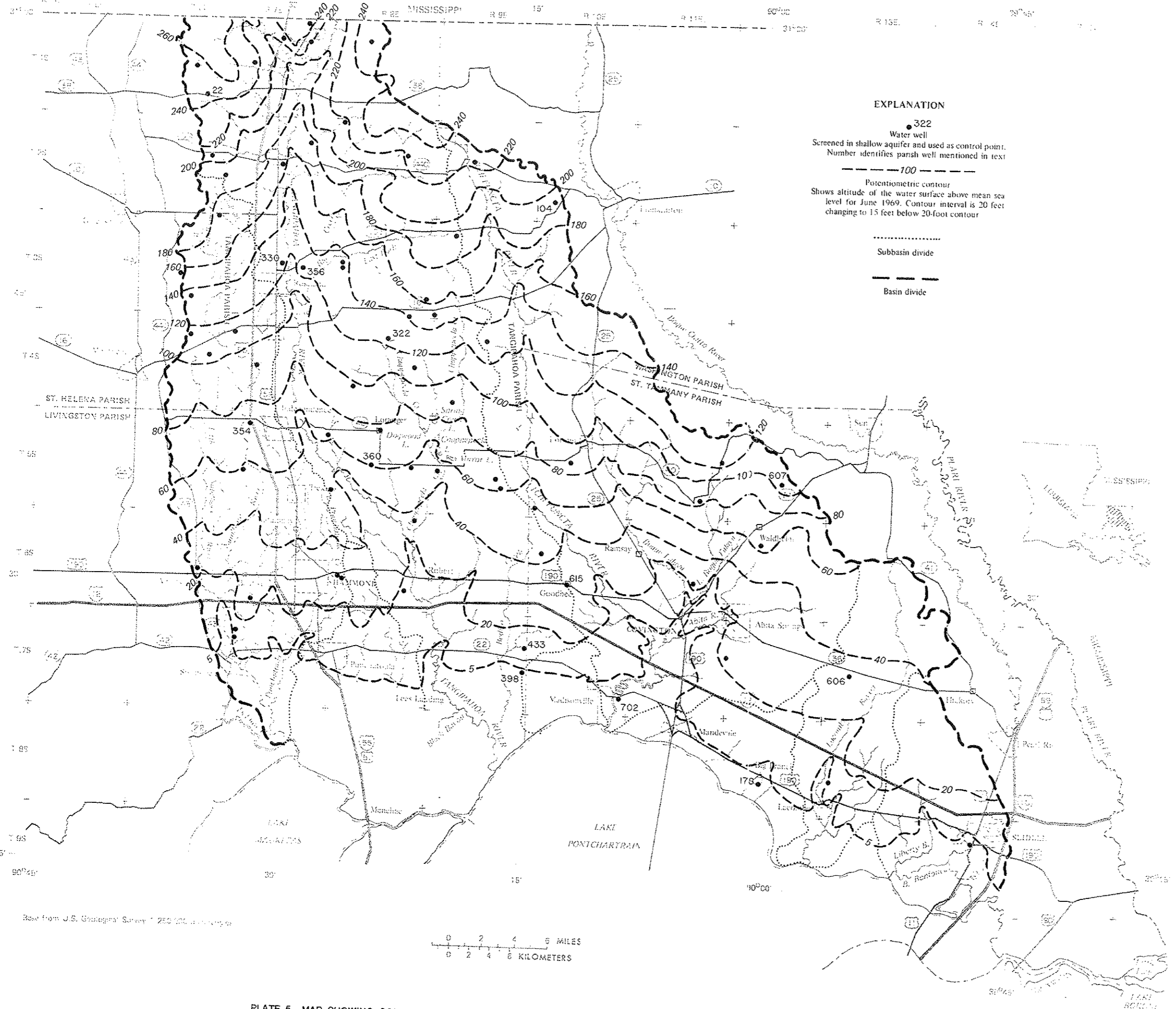
EXPLANATION

● 322
Water well
Screened in shallow aquifer and used as control point.
Number identifies parish well mentioned in text

——— 100 ———
Potentiometric contour
Shows altitude of the water surface above mean sea
level for June 1969. Contour interval is 20 feet
changing to 15 feet below 20-foot contour

···········
Subbasin divide

———
Basin divide
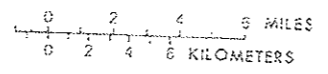
PLATE 5. MAP SHOWING CONFIGURATION OF WATER-LEVEL SURFACE OF THE SHALLOW AQUIFER, SOUTHEASTERN LOUISIANA.

PLATE 7. HYDROLOGIC MAP OF THE ABITA AND KENTWOOD AQUIFERS, SOUTHEASTERN LOUISIANA.

PLATE 8. HYDROLOGIC MAP OF THE KENTWOOD, COVINGTON, AND SLIDELL AQUIFERS, SOUTHEASTERN LOUISIANA.
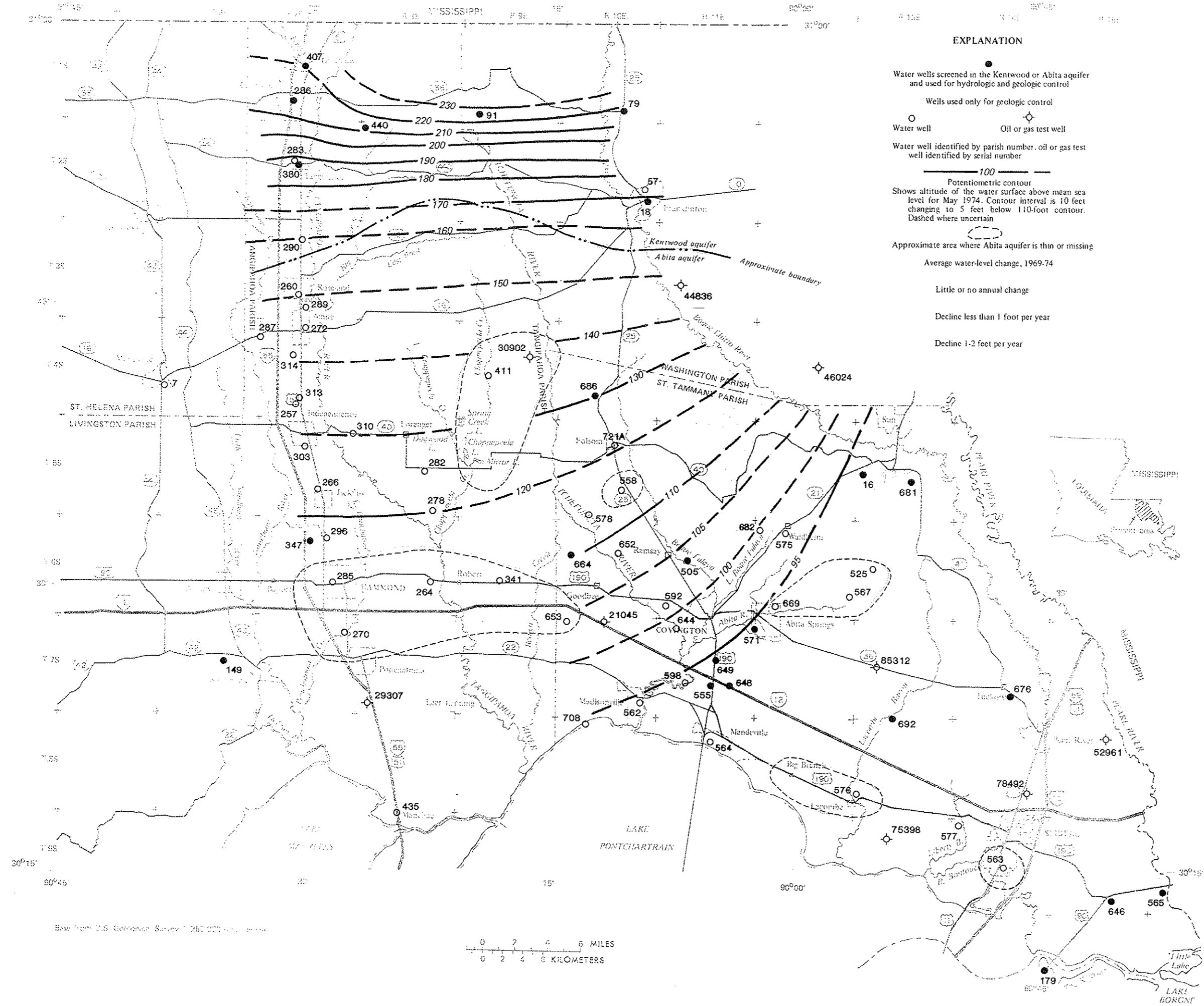
Water well screened in Hammond aquifer and used for hydrologic and geologic control

Wells used only for geologic control

○ Water well ◇ Oil or gas test well

Water well identified by parish number; oil or gas test well identified by serial number

—135—

Potentiometric contour
Shows altitude of the water surface above mean sea level for May 1974. Contour interval is 5 feet. Dashed where uncertain

Approximate area where aquifer is thin or missing

Zone of water quality change
North of the zone, entire aquifer contains fresh water; south of zone, entire aquifer contains saline water; within zone, lower part of aquifer contains water with more than 250 mg/L chloride (proportion of aquifer containing fresh water decreases to the south).

Average water-level change, 1969-74

Decline less than 2 feet per year

Decline 2-4 feet per year

Decline greater than 4 feet per year

Amount of change unknown

PLATE 10. HYDROLOGIC MAP OF THE HAMMOND AQUIFER, SOUTHEASTERN LOUISIANA.
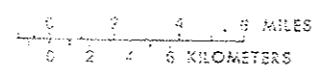
PLATE 11. HYDROLOGIC MAP OF THE AMITE AQUIFER, SOUTHEASTERN LOUISIANA.
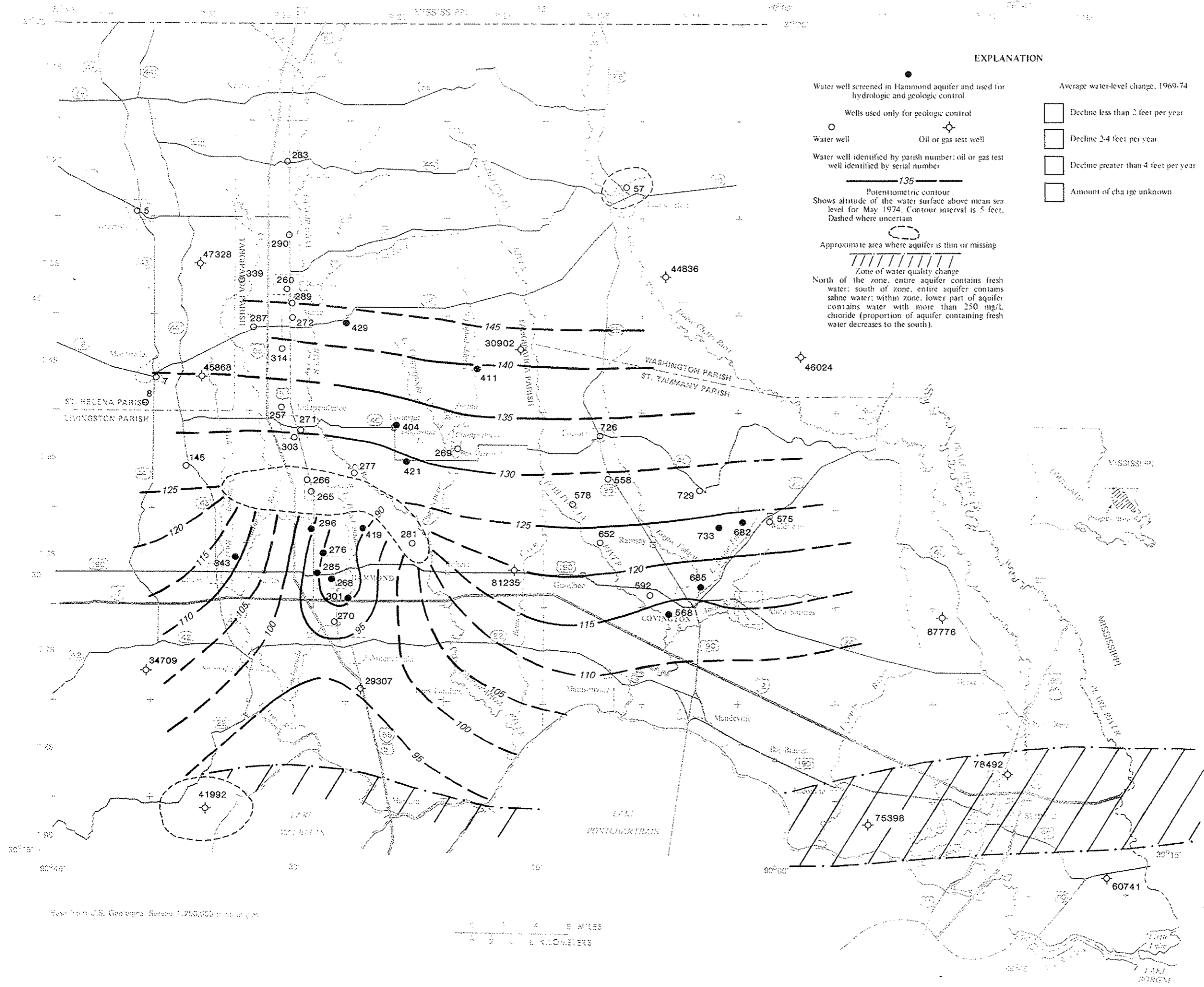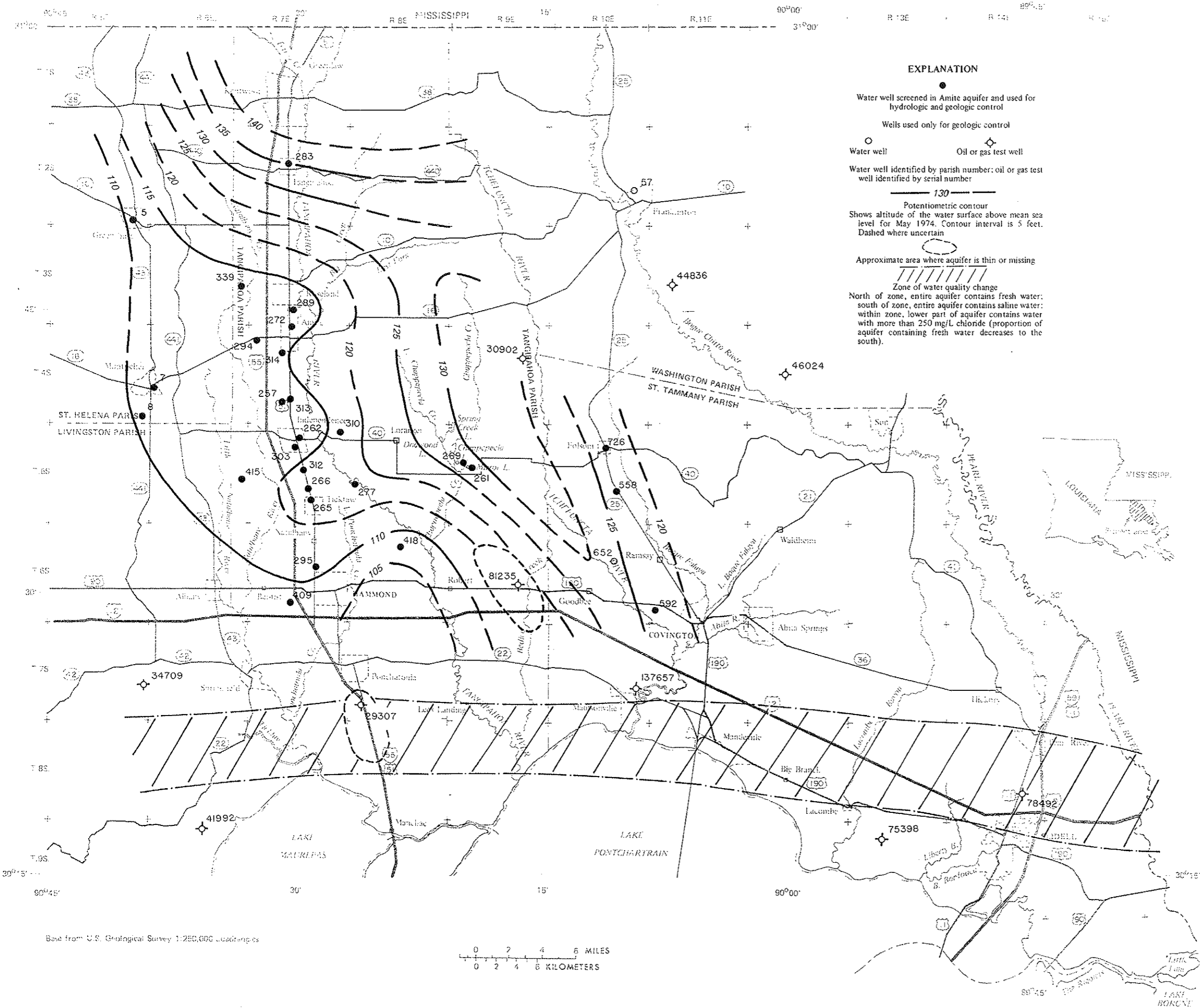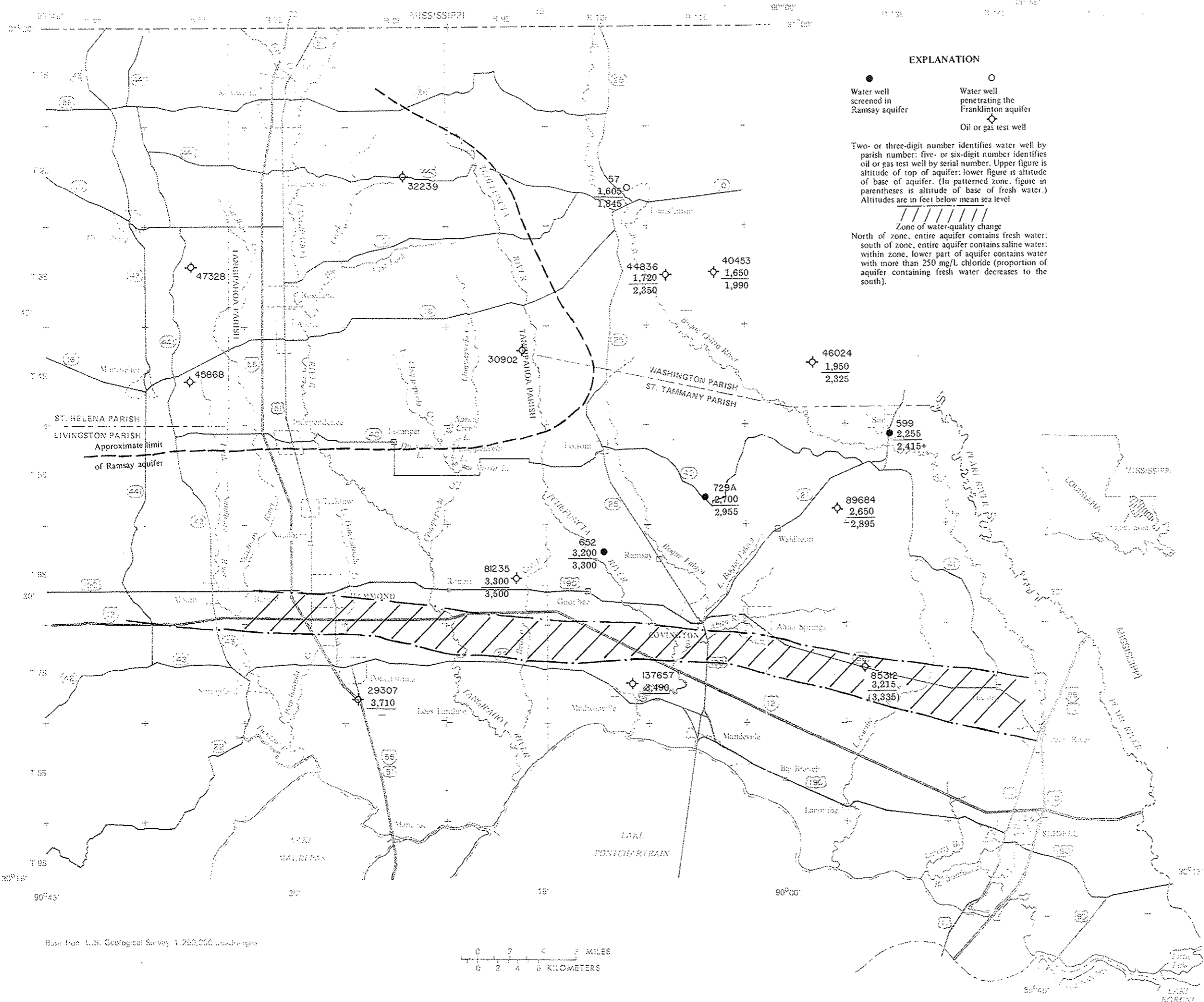
EXPLANATION

● Water well screened in Ramsay aquifer

○ Water well penetrating the Franklinton aquifer

◇ Oil or gas test well

Two- or three-digit number identifies water well by parish number; five- or six-digit number identifies oil or gas test well by serial number. Upper figure is altitude of top of aquifer; lower figure is altitude of base of aquifer. (In patterned zone, figure in parentheses is altitude of base of fresh water.) Altitudes are in feet below mean sea level

/////// Zone of water-quality change
North of zone, entire aquifer contains fresh water; south of zone, entire aquifer contains saline water; within zone, lower part of aquifer contains water with more than 250 mg/L chloride (proportion of aquifer containing fresh water decreases to the south).

32239

57
1,605
1,845

47328

44836
1,720
2,350

40453
1,650
1,990

46024
1,950
2,325

45868

30902

WASHINGTON PARISH
ST. TAMMANY PARISH

ST. HELENA PARISH
LIVINGSTON PARISH
Approximate limit of Ramsay aquifer

599
2,255
2,415+

729A
2,700
2,955

89684
2,650
2,895

652
3,200
3,300

81235
3,300
3,500

137657
3,490

29307
3,710

85312
3,215
(3,335)

TANGIPAHOA PARISH

LAKE MAUREPAS

LAKE PONTCHARTRAIN

LAKE BORGNE
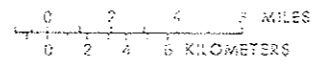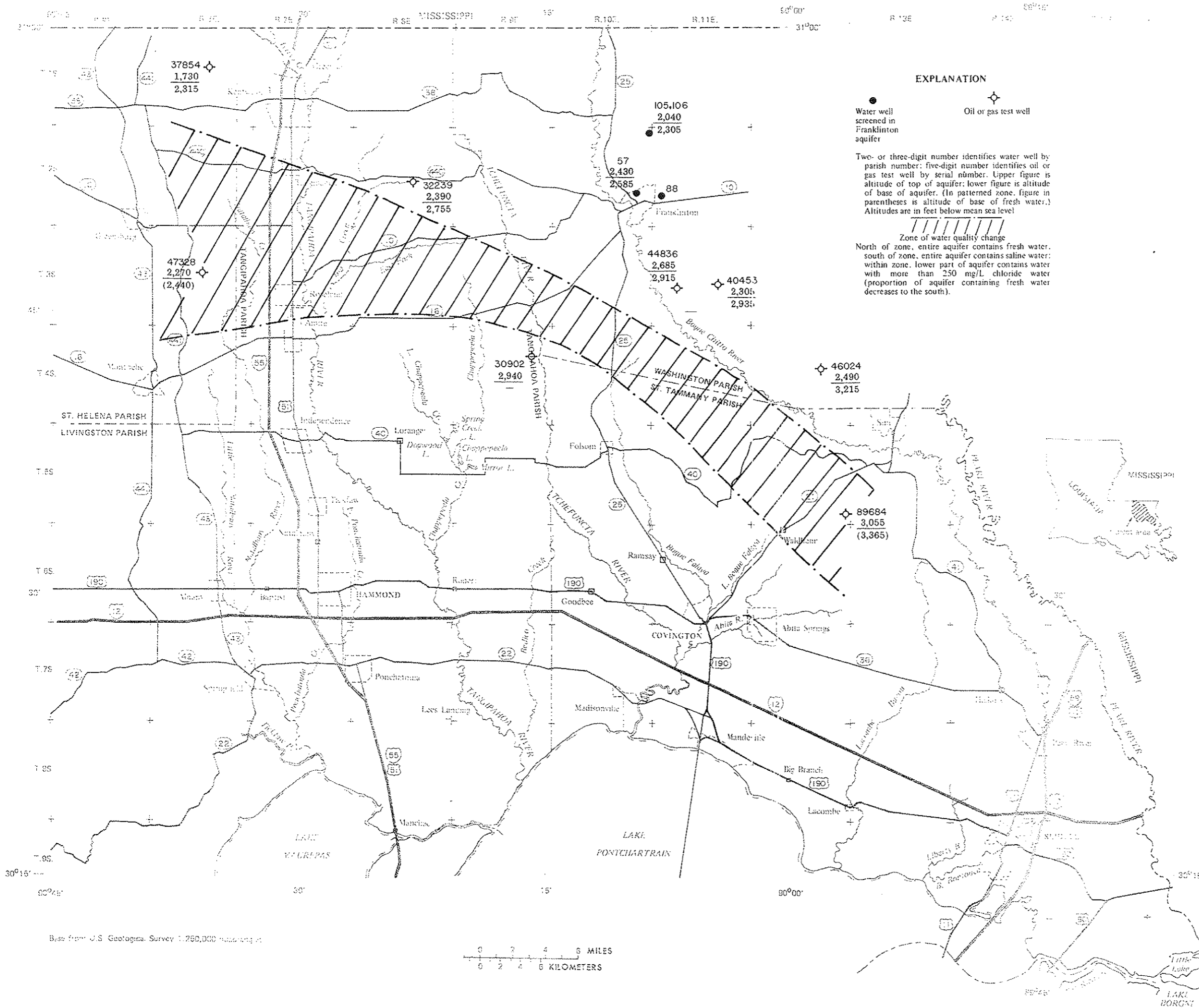
PLATE 12. GEOHYDROLOGIC MAP OF THE RAMSAY AQUIFER, SOUTHEASTERN LOUISIANA.

EXPLANATION

●   ◇

Water well   Oil or gas test well
screened in
Franklinton
aquifer

Two- or three-digit number identifies water well by
   parish number; five-digit number identifies oil or
   gas test well by serial number. Upper figure is
   altitude of top of aquifer; lower figure is altitude
   of base of aquifer. (In patterned zone, figure in
   parentheses is altitude of base of fresh water.)
   Altitudes are in feet below mean sea level

/ / / / / / /
Zone of water quality change
North of zone, entire aquifer contains fresh water;
   south of zone, entire aquifer contains saline water;
   within zone, lower part of aquifer contains water
   with more than 250 mg/L chloride water
   (proportion of aquifer containing fresh water
   decreases to the south).

37854 ◇
1,730
2,315

105,106
2,040
● 2,305

57
2,430
2,585   ● 88

32239 ◇
2,390
2,755

Franklinton

44836
2,685
2,915

40453 ◇
2,305
2,935

47328 ◇
2,270
(2,440)

46024 ◇
2,490
3,215

30902
2,940

WASHINGTON PARISH
ST. TAMMANY PARISH

89684 ◇
3,055
(3,365)

ST. HELENA PARISH
LIVINGSTON PARISH

TANGIPAHOA PARISH

Greensburg
Montiche
Independence
Lorange
Dogwood L.
Folsom
Sun
Walkbour
Ramsay
HAMMOND
Robert
Goodbee
Mose
Baptist
COVINGTON
Abita Springs
Ponchatoula
Lees Landing
Madisonville
Mandeville
Big Branch
Lacombe
Mandieo

LAKE
PONTCHARTRAIN

LAKE
MAUREPAS

LAKE
BORGNE

MISSISSIPPI
LOUISIANA

0   2   4   6 MILES
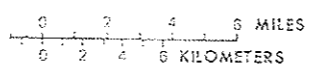0   2   4   6 KILOMETERS

PLATE 13. GEOHYDROLOGIC MAP OF THE FRANKLINTON AQUIFER, SOUTHEASTERN LOUISIANA.