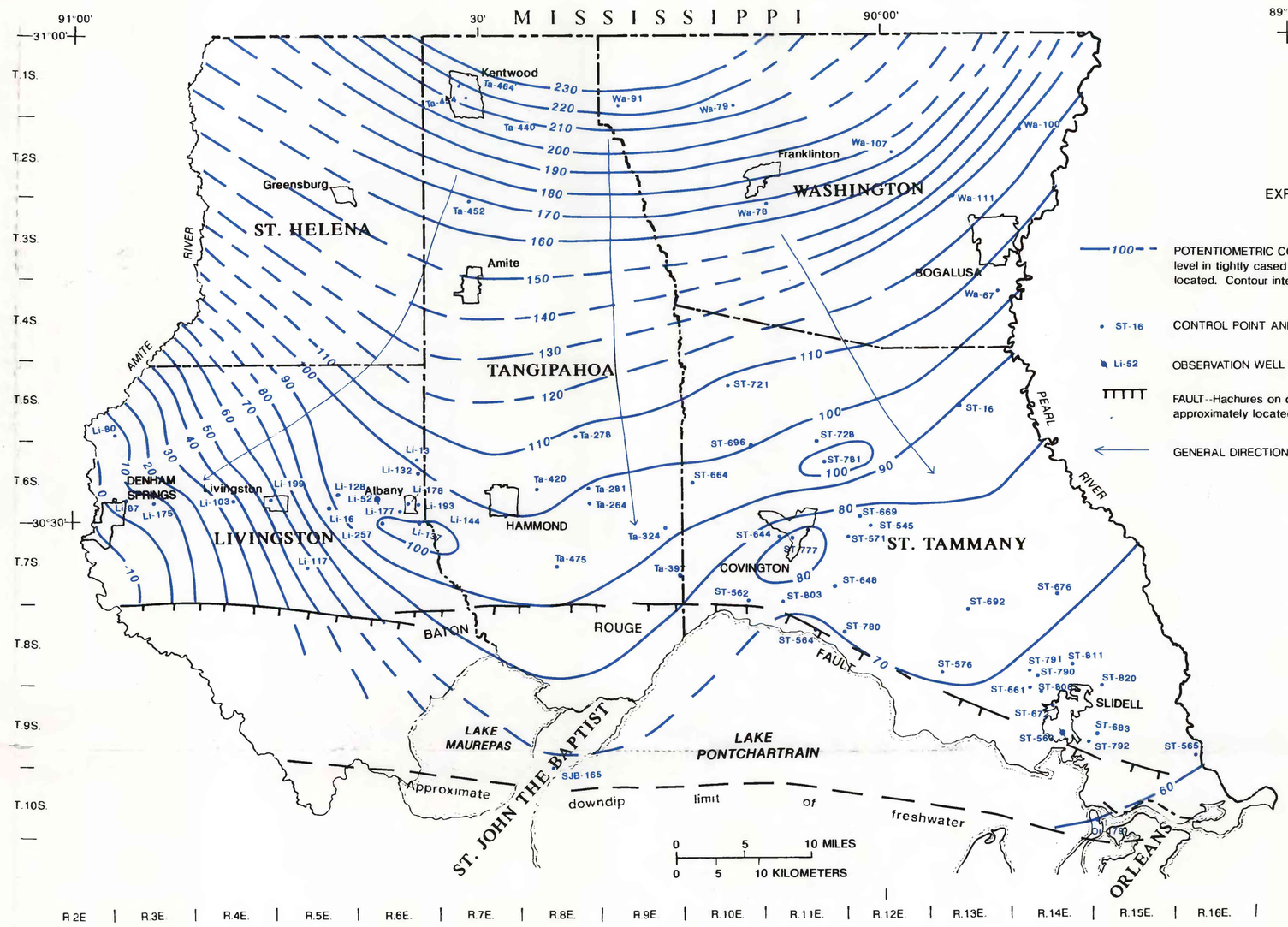
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

WATER-RESOURCES INVESTIGATIONS
REPORT 92-4112 (SHEET 1 OF 2)
EVANGELINE EQUIVALENT AQUIFER SYSTEM--POTENTIOMETRIC SURFACE



EXPLANATION

- 100 — POTENTIOMETRIC CONTOUR--Shows altitude of water level in tightly cased wells. Dashed where approximately located. Contour interval 10 feet. Datum is sea level
- ST-16 — CONTROL POINT AND WELL NUMBER
- Li-52 — OBSERVATION WELL FOR WHICH HYDROGRAPH IS SHOWN
- FAULT--Hachures on downthrown side. Dashed where approximately located
- GENERAL DIRECTION OF GROUND-WATER MOVEMENT

System	Series	Aquifer or aquifer system			
		Southeastern Louisiana[1]			Southwestern[2] Louisiana
		West		East	
		Baton Rouge area		St. Tammany, Tangipahoa, and Washington Parishes	
Tertiary	Pliocene	Evangeline equivalent/southeast Louisiana aquifer system	"800-foot" aquifer	Lower Ponchatoula aquifer	Evangeline aquifer
			"1,000-foot" aquifer		
			"1,200-foot" aquifer		
			"1,500-foot" aquifer	Kentwood aquifer	
				Abita aquifer	
			"1,700-foot" aquifer	Covington aquifer	
				Slidell aquifer	
	?				
	Miocene	Jasper equivalent/ southeast Louisiana aquifer system	"2,000-foot" aquifer	Tchefuncta aquifer	Jasper aquifer system

[1] Based on studies by Morgan, 1963; Nyman and Fayard, 1978; and Tomaszewski, 1988.
[2] Based on a study by Whitfield, 1975.

Figure 1.--Correlation for the Evangeline equivalent/southeast Louisiana aquifer system and other aquifers.

Table 1.--Water-level data used to construct the potentiometric surface of the Evangeline equivelent/southeast Louisiana equifer system, January through April 1990

["1,500-foot," "1,500-foot" aquifer of Baton Rouge area; "1,700-foot," "1,700-foot" aquifer of Baton Rouge area; ABIT, Abita aquifer; CVGN, Covington aquifer; KNTD, Kentwood aquifer; SLDL, Slidell aquifer]

Well number	Well depth (feet)	Aquifer	Water level (land surface datum, in feet)	Water level (sea level datum, in feet)	Date
Livingston Parish					
Li- 16	1,720	"1,700-foot"	+53.85	88.85	2- 5
Li- 52	1,865	"1,700-foot"	+50.95	96.95	2- 2
Li- 80	1,492	"1,700-foot"	-59.38	6.38	4- 4
Li- 87	1,783	"1,700-foot"	-44.14	7.85	2- 7
Li- 96	1,745	"1,700-foot"	+43.20	81.20	2- 5
Li-103	1,796	"1,700-foot"	-5.51	36.49	2- 6
Li-117	2,000	"1,700-foot"	+36.20	56.20	1-30
Li-128	1,658	"1,700-foot"	+45.00	92.00	2- 6
Li-131	1,700	"1,700-foot"	+52.00	108.00	1-31
Li-132	1,360	"1,500-foot"	+43.20	93.20	1-31
Li-137	1,836	"1,700-foot"	+62.30	99.30	2- 2
Li-144	1,731	"1,700-foot"	+64.20	101.20	2- 2
Li-149	1,898	"1,700-foot"	+39.50	54.50	2-12
Li-175	1,866	"1,700-foot"	-44.74	6.00	4- 5
Li-177	1,777	CVGN	+61.50	96.50	2- 1
Li-178	1,900	"1,700-foot"	+55.20	95.20	2- 1
Li-193	1,701	"1,700-foot"	+61.40	97.40	2- 1
Li-199	1,900	"1,700-foot"	+17.60	57.60	2- 6
Li-257	1,842	"1,700-foot"	+65.10	102.10	2- 1
Orleans Parish					
Or-179	2,434	CVGN	+59.60	60.00	1-17
St. John the Baptist Parish					
SJB-165	3,000	CVGN	+66.90	72.90	3-14
St. Tammany Parish					
ST- 16	1,000	ABIT	+10.50	88.50	2-26
ST-545	1,598	ABIT	+43.00	78.00	1-25
ST-562	1,900	CVGN	+73.30	77.30	1-31
ST-563	2,411	SLDL	+55.20	65.50	1-23
ST-564	2,105	CVGN	+57.50	62.50	1-31
ST-565	2,411	ABIT	+57.30	62.30	1-23
ST-571	1,505	ABIT	+46.40	76.40	1-31
ST-576	2,334	SLDL	+54.00	71.00	1-24
ST-644	1,710	CVGN	+64.10	76.10	1-26
ST-648	1,707	CVGN	+53.00	75.00	1-25
ST-661	2,220	SLDL	+52.00	68.00	1-24
ST-664	1,407	ABIT	+41.00	97.00	1-26
St. Tammany Parish--Continued					
ST-669	1,612	ABIT	+44.00	77.00	1-25
ST-672	2,230	SLDL	+48.50	61.50	1-24
ST-676	1,530	ABIT	+31.70	70.70	1-24
ST-683	2,300	SLDL	+58.00	65.00	1-23
ST-692	1,620	ABIT	+42.00	74.00	1-24
ST-696	1,952	CVGN	+2.48	102.48	1-30
ST-721B	1,240	CVGN	-39.94	107.06	2-26
ST-728	1,410	ABIT	+7.70	95.70	1-30
ST-777	1,743	CVGN	+62.00	85.00	1-26
ST-780	1,859	ABIT	+48.70	71.70	1-31
ST-781	2,060	CVGN	+35.60	103.60	1-30
ST-790	2,132	SLDL	+47.20	67.20	1-24
ST-791	2,125	SLDL	+46.50	68.50	1-24
ST-792	2,361	SLDL	+59.60	66.00	1-24
ST-803	1,973	SLDL	+61.90	71.90	1-31
ST-808	1,955	ABIT	+50.40	65.40	1-25
ST-811	2,010	SLDL	+42.00	67.00	1-25
ST-820	2,004	ABIT	+48.70	68.70	1-23
Tangipahoa Parish					
Ta-264	1,728	CVGN	+69.00	99.00	1-24
Ta-278	1,430	CVGN	+56.20	108.20	1-25
Ta-281	1,720	CVGN	+55.50	93.50	1-24
Ta-324	1,938	CVGN	+68.00	93.00	1-24
Ta-397	1,857	CVGN	+70.95	80.95	1-24
Ta-420	1,650	ABIT	+60.15	107.15	1-25
Ta-440	603	KNTD	-5.72	214.28	1-26
Ta-452	775	KNTD	+18.85	168.85	1-25
Ta-454	720	KNTD	-79.61	210.39	1-26
Ta-464	2,260	KNTD	-80.12	219.88	1-26
Ta-475	1,912	ABIT	+79.20	96.20	1-24
Washington Parish					
Wa- 78	585	KNTD	+14.20	164.20	1-24
Wa- 79	310	KNTD	+21.70	213.70	1-24
Wa- 87	730	CVGN	+23.80	103.80	1-25
Wa- 91	600	KNTD	-15.90	224.10	1-24
Wa-100	400	CVGN	+3.75	128.75	1-23
Wa-107	457	CVGN	-81.90	178.10	1-25
Wa-111	612	KNTD	-130.00	130.00	1-25

Figure 2.--Potentiometric surface of the Evangeline equivalent/southeast Louisiana aquifer system, January through April 1990.

INTRODUCTION

The Evangeline equivalent/southeast Louisiana aquifer system is an important source of ground water for an area of southeastern Louisiana known as the Florida Parishes. This aquifer system provides water for industrial use in the Baton Rouge area and public supply in southeastern Louisiana. In 1990, 12.67 Mgal/d were withdrawn for industrial use, and 47.14 Mgal/d were withdrawn for public supply. Withdrawals for industrial use and public supply decreased about 13 Mgal/d from 1980 to 1990, due to a reduction in industrial use (J.K. Lovelace, U.S. Geological Survey, written commun., 1991).

Additional knowledge about ground-water flow and the effects of withdrawals on the Evangeline equivalent aquifer system is needed for assessment of the potential for ground-water development and protection of the resource. To meet this need, water-level changes in wells completed in the aquifer system are being monitored and changes in the configuration of the potentiometric surface are being evaluated as part of the U.S. Geological Survey's cooperative program with the Louisiana Department of Transportation and Development.

This report presents data and maps that illustrate the potentiometric surface during 1990 and water-level changes from 1974 to 1990 for the Evangeline equivalent aquifer system in Livingston, St. Helena, St. Tammany, Tangipahoa, Washington, and parts of Orleans and St. John the Baptist Parishes. Hydrographs of water levels in selected wells completed in the aquifer system also are presented. Water-level data are on file at the U.S. Geological Survey.

The maps in this report are useful for determining direction of ground-water flow, hydraulic gradients, and the effects of withdrawals on the ground-water system. The rate of ground-water movement can be estimated from the gradient when the hydraulic conductivity of the aquifer is known.

GEOHYDROLOGY

This report describes a part of the aquifer system that is stratigraphically equivalent to the lower part of the Evangeline aquifer in southwestern Louisiana (fig. 1). The aquifer system is between the underlying Jasper equivalent/southeast Louisiana aquifer system and the overlying Chicot equivalent/southeast Louisiana aquifer system. The Evangeline equivalent aquifer system is composed of several aquifers (sand units separated by discontinuous clay units) that are hydraulically connected and have similar geohydrologic characteristics.

The Evangeline equivalent aquifer system in the Florida Parishes consists of deposits of gravel, sand, silt, and clay that dip southerly and thicken gulfward. Many of these deposits are gradational, lenticular, and discontinuous laterally within this area (Nyman and Fayard, 1978, p. 6-7).

The aquifers within the lower part of the Evangeline equivalent aquifer system typically have similar heads (water levels) and water quality, indicating that they are connected hydraulically. Figure 1 lists the local aquifer names that have been used to describe the aquifers in southeastern Louisiana. Detailed descriptions of individual aquifers within the Evangeline equivalent aquifer system are discussed in reports by Nyman and Fayard (1978, p. 30-46) and Tomaszewski (1988, p. 20-26).

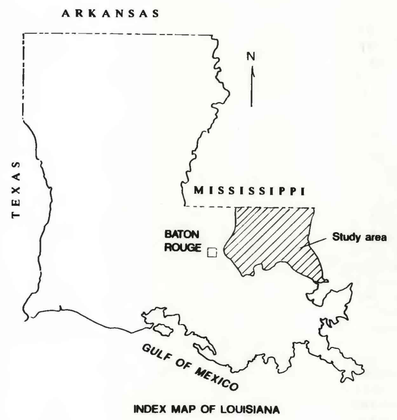
The primary recharge area for this system is in southwestern Mississippi, where it is unconformably overlain by sands and gravels of the Citronelle Formation of Pleistocene age and Holocene alluvial deposits (Martin and Whiteman, 1985). Recharge occurs primarily from percolation of rainfall through the sediments into the aquifer system. Water then moves slowly downgradient in the aquifers (Buono, 1983, p. 17).

The Evangeline equivalent aquifer system is 100 to 300 ft thick near the Louisiana-Mississippi State line along the northern edge of the study area and thickens to about 1,000 ft near the downdip limit of freshwater. The approximate downdip limit of freshwater is shown in figures 2 and 3.

POTENTIOMETRIC SURFACE

The map of the potentiometric surface of the Evangeline equivalent aquifer system (fig. 2) was constructed using water-level data from wells completed in aquifers in this system (table 1). The water levels were then adjusted to sea level. During January through April 1990, the altitudes of water levels in this aquifer system ranged from more than 10 ft below sea level near Denham Springs in Livingston Parish to more than 230 ft above sea level in the northern part of Tangipahoa and Washington Parishes near Mississippi.

Ground water flows from areas of higher head to areas of lower head. In the study area, the direction of flow is perpendicular to the potentiometric surface contours shown on figure 2. Generally, ground-water flow is to the south along the dip of the formation. However, pumping in the Baton Rouge area and in the Slidell-Covington area has altered the natural direction of flow in the southwestern and southeastern parts of the study area.



INDEX MAP OF LOUISIANA

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
foot (ft)	0.3048	meter
million gallons per day (Mgal/d)	3,785	cubic meter per day

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

LOUISIANA GROUND-WATER MAP NO. 5
POTENTIOMETRIC SURFACE, 1990, AND WATER-LEVEL CHANGES, 1974-90, OF THE EVANGELINE EQUIVALENT/SOUTHEAST LOUISIANA AQUIFER SYSTEM

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1992

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