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 91-4137 (SHEET 2 OF 2)
CARNAHAN BAYOU AQUIFER--POTENTIOMETRIC SURFACE
AND WATER-LEVEL CHANGES

CARNAHAN BAYOU AQUIFER

Potentiometric Surface

The potentiometric surface of the Carnahan Bayou aquifer in west-central Louisiana in the fall of 1989 is shown in figure 6. The potentiometric surface presented in this figure was interpreted from water-level measurements (table 3) made in wells completed in the middle and lower parts of the aquifer during November 1989.

The altitude of water level in the Carnahan Bayou aquifer ranged from more than 230 ft below sea level at Alexandria in Rapides Parish where pumping has produced an areally extensive cone of depression to greater than 250 ft above sea level in the recharge area in northern Vernon Parish. The pumping at Alexandria affects water levels in most of Rapides Parish and adjoining Vernon, Natchitoches, Grant, and Avoyelles Parishes. A smaller cone of depression also exists in the Leesville-Fort Polk area in Vernon Parish.

Water-Level Changes

Changes in water levels in the Carnahan Bayou aquifer from 1984 to 1989 are shown in figure 7. For some wells shown in figure 7, 1984 water levels were not available. Water-level change for these wells was estimated using a 1984 water level from a nearby well.

Water levels generally declined during the period 1984-89 at the major pumping centers, whereas water levels did not change substantially or increased slightly in the areas away from the pumping centers. Water levels declined 20 to 33 ft at Alexandria in Rapides Parish and declined as much as 32 ft in an area southwest of Alexandria. The water level declined 10 to 22 ft near the Leesville-Fort Polk area in Vernon Parish during this period.

The hydrograph of well R-1056 (fig. 8) reflects the trend in pumping from the Carnahan Bayou aquifer in Rapides Parish. The hydrograph shows a steady water-level decline of approximately 2.5 ft/yr from 1974 to 1983 except for an unexplained rise in 1976 and 1977. From 1983 to 1989 the water level continued to decline at approximately 5 ft/yr.

The hydrographs of well V-426 and V-428 also indicate a steady decline of the water level in the aquifer (figs. 9 and 10). The water-level decline is almost 1.5 ft/yr in well V-426, which is the closest of the 2 wells to the Leesville-Fort Polk area. The water-level decline is less than 0.5 ft/yr in well V-428 (fig. 10).

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Table 3.--Water-level data used to construct potentiometric surface of the Carnahan Bayou aquifer, November 1989, for parishes in west-central Louisiana

Well number	Well depth (feet)	Water level (feet above or below land surface)	Water level (feet above or below sea level)	Date measured
Rapides				
R- 607	578	121.00	-46.00	11-13
R- 610	892	290.80	-210.80	11-29
R- 613	817	242.97	-162.97	11-17
R- 614	1,040	323.60	-213.60	11-17
R- 616	1,078	331.90	-231.90	11-17
R- 760	292	164.45	-74.45	11-28
R- 777	1,147	221.50	-146.50	11-13
R- 825	1,272	229.80	-149.80	11-17
R- 893	820	66.05	-6.05	11-29
R- 937	2,078	291.60	-71.60	11-21
R- 993	354	183.67	6.33	11-21
R- 1056	1,555	240.20	-0.20	11-28
R- 1204	640	236.80	-126.80	11-17
R- 1207	2,772	72.00	108.00	11-14
R- 1224	794	304.78	-149.78	11-21
Vernon				
V- 47	683	81.68	158.32	11-14
V- 204	1,100	154.34	148.66	11-16
V- 251	300	11.78	258.22	11-15
V- 413	360	+18.90	138.90	11-28
V- 426	915	141.98	163.02	11-20
V- 428	925	117.66	172.34	11-28
V- 459	234	138.50	186.50	11-20
V- 513	1,275	185.90	149.10	11-16
V- 515	1,233	179.05	140.95	11-16
V- 519	842	67.83	132.17	11-16
V- 567	620	80.56	199.44	11-15

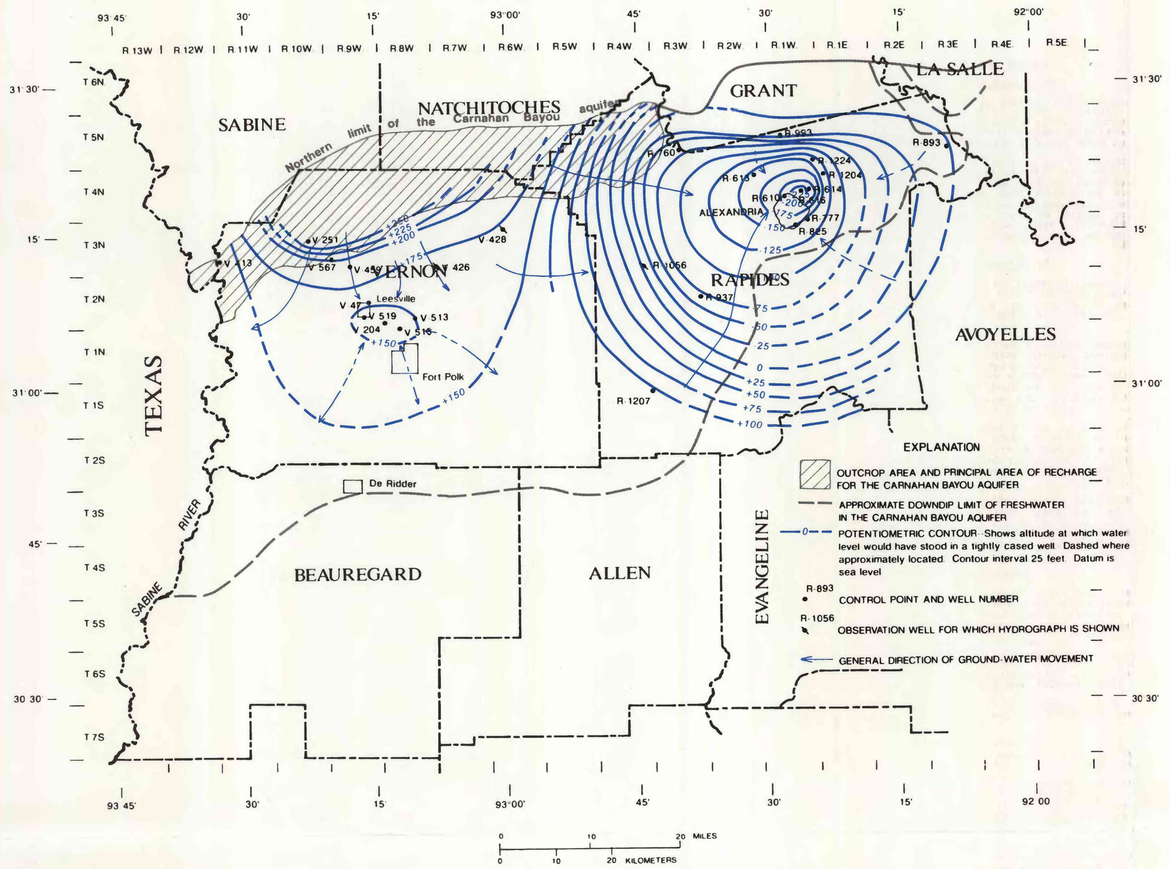


Figure 6.--Potentiometric surface of the Carnahan Bayou aquifer in west-central Louisiana, November 1989.

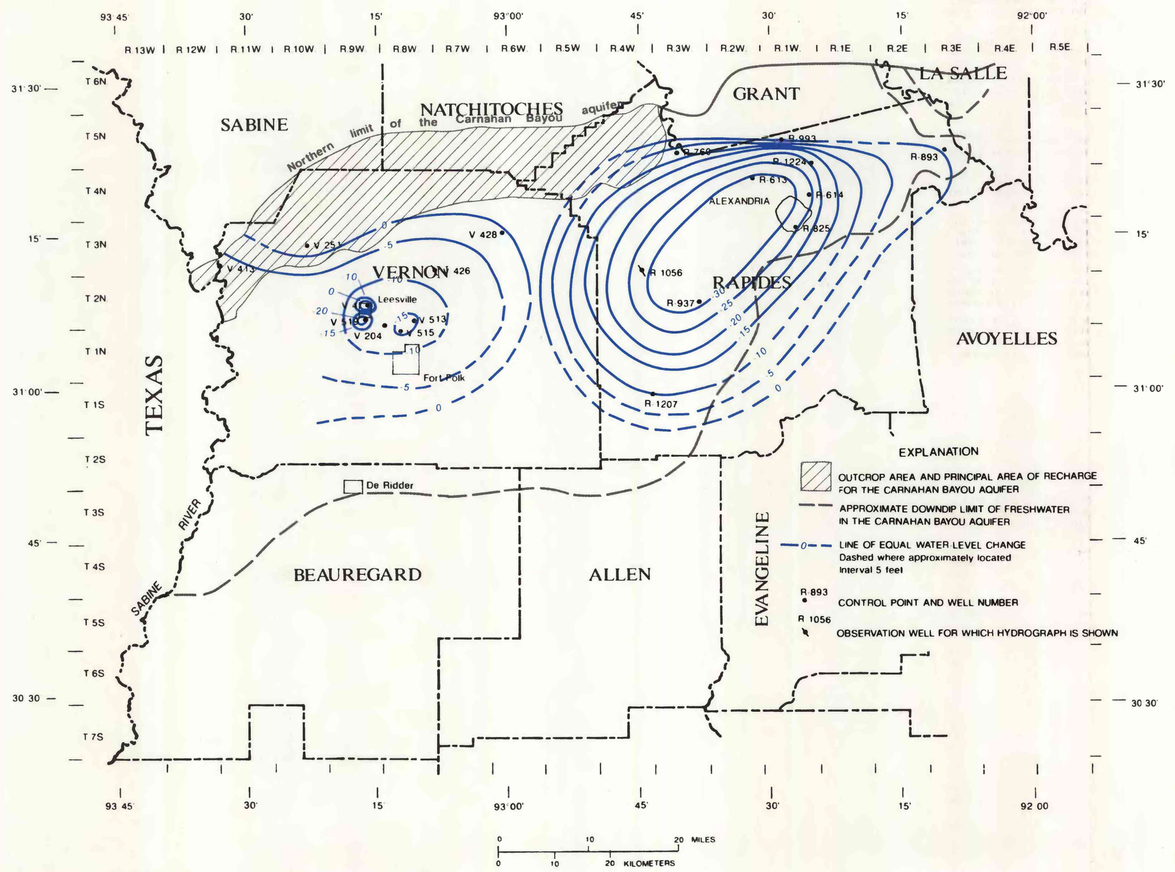


Figure 7.--Water-level changes in the Carnahan Bayou aquifer in west-central Louisiana, 1984-89.

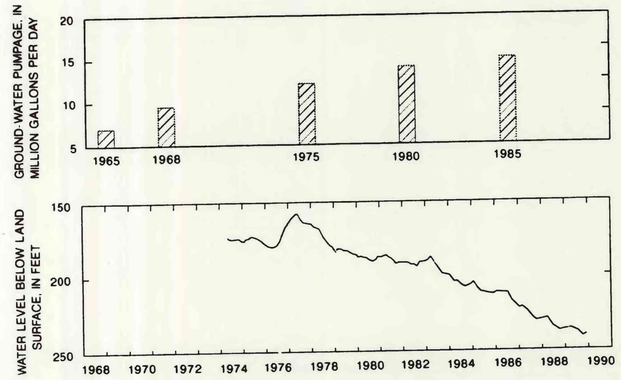


Figure 8.--Water level in Well R-1056 (Rapides Parish) and ground-water withdrawals from the Carnahan Bayou aquifer in Rapides Parish.

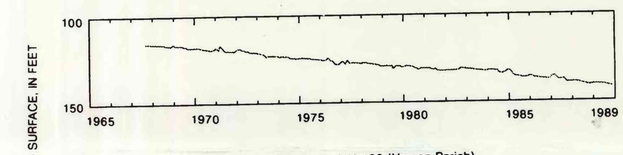


Figure 9.--Water level in well V-426 (Vernon Parish).

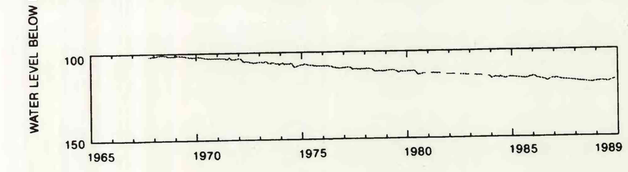
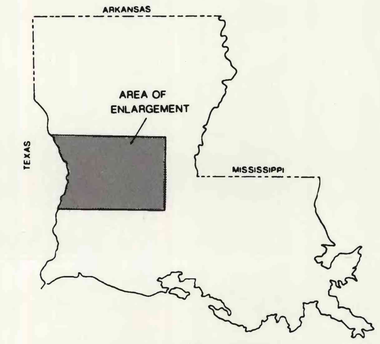


Figure 10.--Water level in well V-428 (Vernon Parish)

CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
foot (ft)	0.3048	meter
foot per year (ft/yr)	0.3048	meter per year
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 both the United States and Canada, formerly called Sea Level Datum of 1929.



INDEX MAP OF LOUISIANA

LOUISIANA GROUND-WATER MAP NO. 4:
POTENTIOMETRIC SURFACE, 1989, AND WATER-LEVEL CHANGES, 1984-89, OF THE JASPER AQUIFER SYSTEM IN WEST-CENTRAL LOUISIANA

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