



INTRODUCTION

The Chicot aquifer system is the primary source of fresh ground water in southwestern Louisiana and is one of the State's most important sources of ground water. Almost half the ground water used in the State is pumped from the Chicot aquifer system. In 1990, a total of 609 million gallons per day was withdrawn from the Chicot aquifer over a 13-parish area. Of this total, 70 percent was used for irrigation and aquaculture, 25 percent for public supply and industrial use, and the remaining 5 percent for domestic use and power generation (Loveless, 1991, p. 92).

Additional knowledge about ground-water flow and the effects of withdrawals on the Chicot aquifer system is needed for assessment of ground-water development potential 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 (water level) during the spring of 1991 and water-level changes during 1985-91 for the Chicot aquifer system in southwestern Louisiana. 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 District Office in Baton Rouge, Louisiana.

The maps in this report can be used 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 water-level gradient when the hydraulic conductivity of the aquifer is known.

SYSTEM	SERIES	LAKE CHARLES AREA	EAST OF LAKE CHARLES	OUTCROP AREA
Quaternary	Holocene	Alluvium	Alluvium, Atchafalaya aquifer, and Abbeville unit	Alluvium
		"200-foot" sand	"Upper sand"	Chicot
		"500-foot" sand	Undifferentiated "Lower sand"	aquifer
Tertiary	Pliocene and Miocene	Evangeline aquifer system		

Figure 1. Correlation for the Chicot aquifer system in southwestern Louisiana.

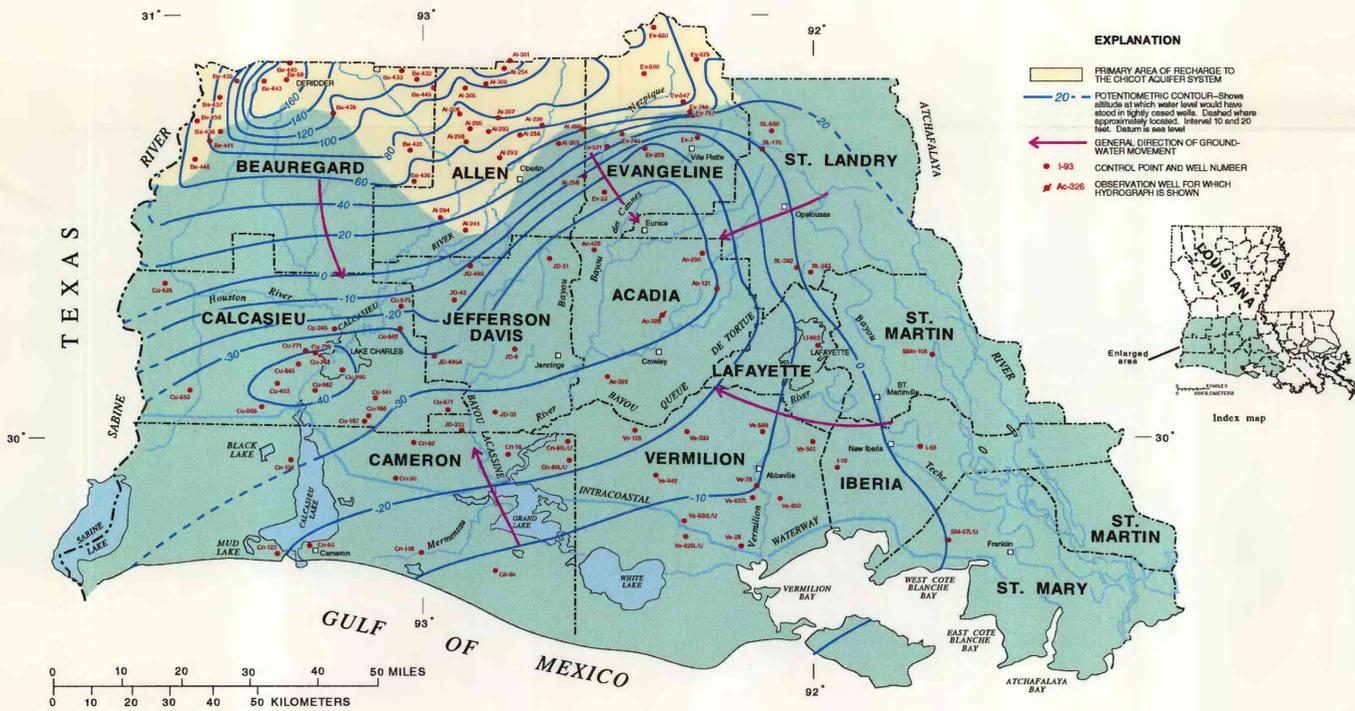


Figure 2. Potentiometric surface of the upper sand unit of the Chicot aquifer system, spring 1991.

HIDROGEOLOGY

The Chicot aquifer system is composed of southerly to southeasterly dipping deposits (Pleistocene age) of silt, sand, and gravel that are separated by units of clay and sandy clay. These deposits crop out throughout the study area except in the low coastal marsh and the flood plains of major streams where the deposits are overlain by similar, younger deposits. The Chicot aquifer system is underlain by the Evangeline aquifer of Pliocene and Miocene age (fig. 1). Areally, the aquifer system covers all of southwestern Louisiana, west of the flood plain of the Atchafalaya River (fig. 2) and extends westward into Texas.

In the northern half of the study area, the Chicot is composed of a single, massive sand that typically ranges from 100 to 400 feet in thickness. Southward, the aquifer thickens and is divided into the upper and lower sands in the east, and into the "200-", "500-", and "700-foot" sands in Calcasieu and Cameron Parishes (Nyman, 1984, p. 4). The Chicot aquifer system in this area was subdivided by Jones (1950, p. 4) based on approximate depths of aquifers in the Lake Charles industrial district.

Recharge to the aquifer system occurs in northern Beaufort, Allen, and Evangeline Parishes (fig. 2) primarily by percolation of rainfall and surface water into permeable sands and gravels of the aquifer system (Jones and others, 1954, p. 150-151). In the southern half of the study area, the aquifer system is overlain by an areally extensive clay layer that inhibits the movement of water into or out of the aquifer system. Additional recharge occurs periodically from the Atchafalaya, Calcasieu, and Vermilion Rivers during high river stages, and through interconnection with underlying aquifers having higher hydraulic heads (Nyman, 1984, p. 9).

POTENTIOMETRIC SURFACE

Maps of the potentiometric surface of the Chicot aquifer system (figs. 2 and 3) were constructed using water-level data from wells completed in aquifers in this system. The regional potentiometric-surface map of the upper sand unit (fig. 2) was constructed using water-level data from wells completed in the recharge area, the "200-foot" sand in the Lake Charles area, and the upper sand unit in the remaining area (table 1). During March and April 1991, the altitudes of water levels in this part of the aquifer system ranged from about 45 feet below sea level in Calcasieu Parish to about 170 feet above sea level in the northernmost part of the study area in Beaufort Parish (fig. 2).

The potentiometric surface for the "500-foot" sand in Calcasieu and Cameron Parishes shows a cone of depression that has been caused by large industrial withdrawals (Loveless, 1991, p. 31). Data used to construct this map are listed in table 2. In March 1991, the altitudes of water levels in the "500-foot" sand ranged from about 95 feet below sea level near the center of the cone of depression in Calcasieu Parish to about 16 feet below sea level in Cameron Parish.

Ground-water flows from areas of higher to lower head (water level), and the direction of flow is perpendicular to the potentiometric surface. In the northern part of the study area, flow in the upper sand is generally to the south along the dip of the sediments. In the southern part of the study area, flow is to the west from the Atchafalaya River and to the north from the coastal areas because of large withdrawals in the Lake Charles industrial district and in the rice farming areas to the east of Lake Charles (fig. 2). Water in the "500-foot" sand in the Lake Charles area flows from all directions toward a cone of depression in the industrial district (fig. 3).

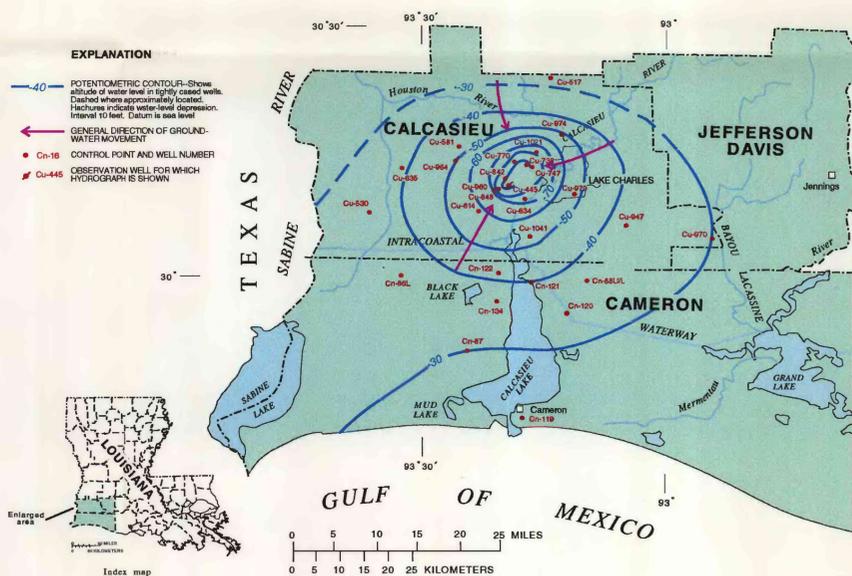


Figure 3. Potentiometric surface of the "500-foot" sand of the Chicot aquifer system, spring 1991.

LOUISIANA GROUND-WATER MAP NO. 10:  
POTENTIOMETRIC SURFACE, 1991, OF THE CHICOT AQUIFER SYSTEM  
IN SOUTHWESTERN LOUISIANA

By  
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CONVERSION FACTORS AND VERTICAL DATUM

Multiply	By	To obtain
foot (ft)	0.3048	meter
million gallons per day (Mgal/d)	3,785,000	liter per day
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—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.

Table 1. Water-level data used to construct the potentiometric-surface map of the upper sand unit of the Chicot Aquifer system, spring 1991

[Chicot Aquifer, 112CHCT; Chicot aquifer upper sand unit, 112CHCTU; "200-foot" sand of Lake Charles area, 11202LC; alluvial aquifers, 112ALVL; +, water level above land surface; -, water level below sea level]

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
ACADIA PARISH					
Ac-121	277	112CHCT	79.16	-30.03	03-05-91
Ac-290	300	112CHCT	86.70	-33.30	03-05-91
Ac-292	244	112CHCT	38.24	-26.17	03-06-91
Ac-326	202	112CHCTU	58.45	-32.63	03-05-91
Ac-428	203	112CHCT	77.47	-35.47	03-05-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
ALLEN PARISH					
Al-236	77	112CHCT	39.67	63.04	03-07-91
Al-241	62	112CHCT	28.60	14.37	03-05-91
Al-254	100	112CHCT	26.78	123.22	03-05-91
Al-288	104	112CHCT	25.21	57.79	03-05-91
Al-292	124	112CHCT	19.22	50.78	03-05-91
Al-299	84	112CHCT	28.37	71.63	03-05-91
Al-294	142	112CHCT	22.05	25.85	03-05-91
Al-295	126	112CHCT	19.38	68.62	03-05-91
Al-296	97	112CHCT	7.90	63.10	03-05-91
Al-298	137	112CHCT	64.38	-12.38	03-07-91
Al-299	122	112CHCT	41.65	-48.35	03-07-91
Al-300	152	112CHCT	62.60	104.40	03-05-91
Al-301	160	112CHCT	38.79	129.21	03-05-91
Al-303	144	112CHCT	60.46	32.54	03-07-91
Al-305	164	112CHCT	58.52	103.48	03-05-91
Al-306	107	112CHCT	2.08	74.92	03-05-91
Al-307	123	112CHCT	20.79	79.21	03-05-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
BEAUREGARD PARISH					
Be-98	223	112CHCT	36.70	166.30	03-07-91
Be-430	123	112CHCT	58.79	61.21	03-06-91
Be-431	84	112CHCT	-40.41	70.41	03-06-91
Be-432	124	112CHCT	33.88	130.12	03-06-91
Be-433	82	112CHCT	4.22	127.78	03-06-91
Be-435	124	112CHCT	18.02	110.98	03-07-91
Be-437	60	112CHCT	7.64	82.36	03-07-91
Be-438	145	112CHCT	9.34	88.66	03-06-91
Be-439	189	112CHCT	46.32	122.68	03-06-91
Be-440	169	112CHCT	43.14	168.86	03-07-91
Be-441	133	112CHCT	62.58	100.42	03-06-91
Be-443	164	112CHCT	35.36	170.64	03-07-91
Be-445	98	112CHCT	23.34	111.66	03-06-91
Be-446	157	112CHCT	23.28	59.72	03-06-91
Be-456	83	112ALVL	5.86	64.14	03-06-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
CALCASIEU PARISH					
Cu-167	350	11202LC	39.99	-32.17	03-06-91
Cu-168	375	11202LC	39.26	-31.45	03-06-91
Cu-395	200	11202LC	36.80	-24.80	03-05-91
Cu-453	345	11202LC	58.12	-44.04	03-06-91
Cu-625	460	112CHCT	56.07	5.87	03-07-91
Cu-641	368	11202LC	44.53	-33.03	03-06-91
Cu-642	287	11202LC	50.39	-31.39	03-05-91
Cu-739	201	11202LC	51.30	-44.67	03-07-91
Cu-748	280	11202LC	47.66	-40.51	03-07-91
Cu-771	241	11202LC	59.62	-41.86	03-05-91
Cu-843	205	11202LC	52.88	-40.88	03-07-91
Cu-853	230	11202LC	55.13	-37.13	03-08-91
Cu-962	287	11202LC	54.04	-43.04	03-07-91
Cu-968	236	11202LC	45.44	-35.44	03-08-91
Cu-971	500	112CHCT	30.70	-25.70	03-06-91
Cu-975	237	11202LC	36.77	-16.77	03-05-91
Cu-990	183	11202LC	57.64	-43.64	03-06-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
CAMERON PARISH					
Cn-16	350	112CHCTU	29.40	-24.37	03-06-91
Cn-60	274	112CHCTU	9.22	-5.35	03-07-91
Cn-481	481	112CHCTU	23.99	-19.26	03-07-91
Cn-80U	453	112CHCTU	25.32	-20.59	03-05-91
Cn-81L	478	112CHCTU	25.41	-20.96	03-05-91
Cn-81U	448	112CHCTU	22.01	-17.56	03-05-91
Cn-90	396	112CHCTU	23.30	-22.11	03-08-91
Cn-92	443	112CHCTU	30.36	-24.86	03-08-91
Cn-93	360	112CHCTU	23.40	-19.64	03-07-91
Cn-118	638	11202LC	19.69	-14.69	03-07-91
Cn-123	236	112CHCT	19.54	-14.54	03-13-91
Cn-134	710	112CHCTU	40.88	-35.88	03-07-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
EVANGELINE PARISH					
Ev-7	300	112CHCT	89.68	-13.34	03-04-91
Ev-23	360	112CHCT	79.49	-28.43	03-04-91
Ev-229	231	112CHCT	89.36	-23.70	04-19-91
Ev-500	120	112CHCT	49.45	68.07	03-04-91
Ev-547	80	112CHCT	51.24	62.14	03-04-91
Ev-571	170	112CHCT	55.16	7.14	03-04-91
Ev-679	70	112CHCT	2.10	43.90	03-04-91
Ev-680	89	112CHCT	56.98	63.02	03-04-91
Ev-748	403	112CHCT	29.11	50.89	03-05-91
Ev-749	144	112CHCT	45.93	17.07	03-04-91
Ev-757	120	112CHCT	71.15	5.85	03-04-91

Table 2. Water-level data used to construct the potentiometric-surface map of the "500-foot" sand in Calcasieu and Cameron Parishes, spring 1991

[500-foot sand of Lake Charles area, 11205LC; Chicot aquifer, 112CHCT]

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
IBERIA PARISH					
I-19	460	112CHCTU	12.44	-2.72	03-08-91
I-93	585	112CHCTU	16.77	1.76	03-08-93

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
JEFFERSON DAVIS PARISH					
JD-9	318	112CHCTU	61.34	-37.24	04-03-91
JD-31	250	112CHCTU	85.16	-35.16	03-05-91
JD-33	350	112CHCT	31.89	-24.71	03-05-91
JD-43	-	112CHCT	49.26	-15.13	03-05-91
JD-222	300	112CHCTU	28.48	-23.87	03-05-91
JD-485A	290	112CHCTU	51.34	-25.98	03-05-91
JD-493	200	112CHCT	47.59	-9.64	03-05-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
LAFAYETTE PARISH					
Lf-662	152	112CHCTU	45.83	-5.46	02-05-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
ST. LANDRY PARISH					
SL-179	94	112CHCT	55.38	-4.15	03-04-91
SL-383	155	112CHCT	21.77	4.73	08-27-90
SL-392	126	112CHCT	48.76	-2.02	08-27-90
SL-552	124	112CHCT	33.00	-3.00	05-17-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
ST. MARTIN PARISH					
SMN-108	505	112CHCTU	1.98	9.36	03-08-91
SMN-109	375	112CHCTU	2.32	9.02	03-08-91

WELL NUMBER	WELL DEPTH (FEET)	AQUIFER	WATER LEVEL SURFACE DATUM (IN FEET)	WATER LEVEL (SEA) DATUM (IN FEET)	DATE
ST. MARY PARISH					
SM-57L	738	112CHCTU	9.58	-0.86	03-