DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
OFFICE OF PUBLIC WORKS

WATER-RESOURCES INVESTIGATIONS
REPORT 86-4348 (SHEET 1 OF 2)

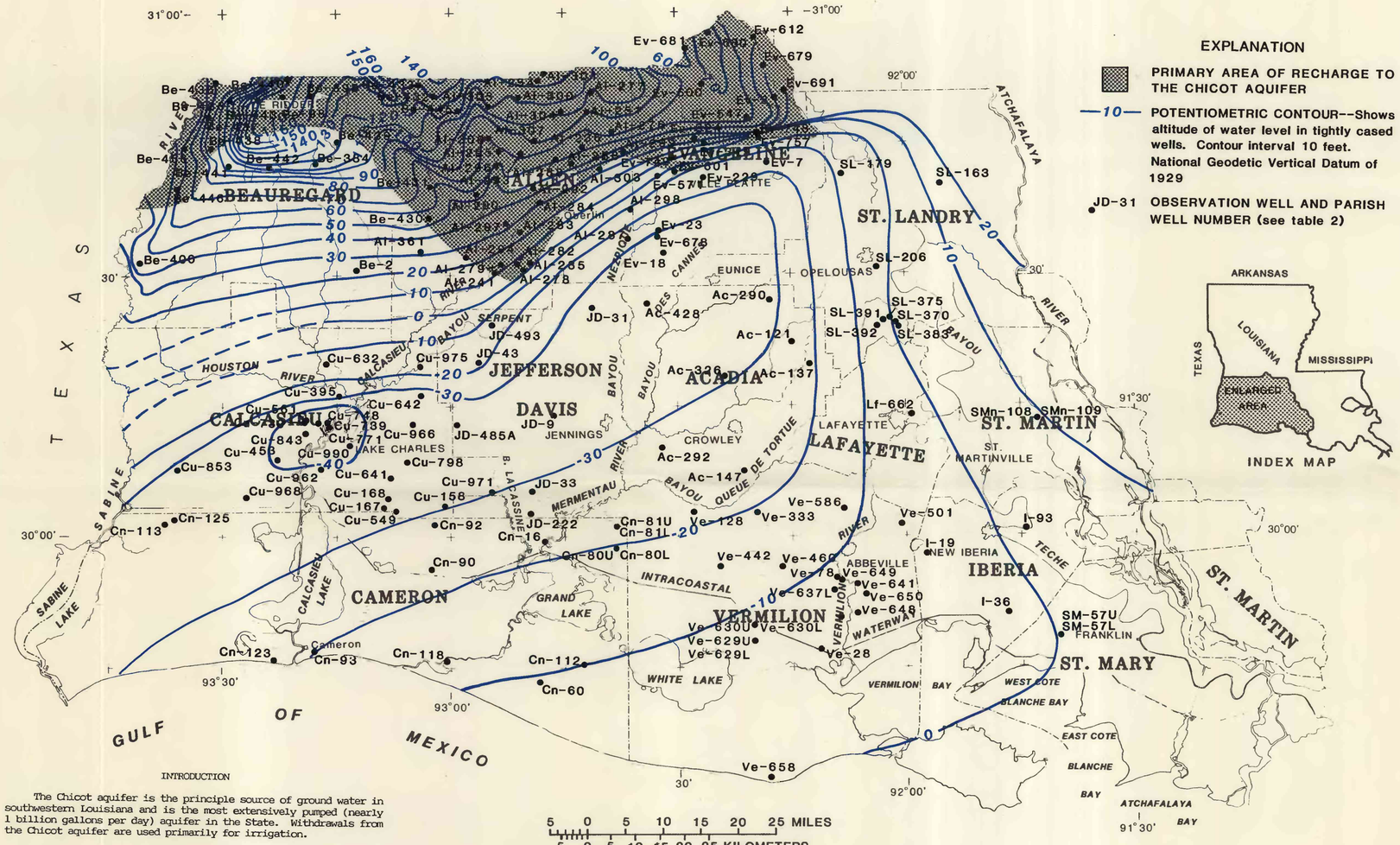

Figure 1.--Potentiometric surface of the upper sand unit, spring 1985.

INTRODUCTION

The Chicot aquifer is the principle source of ground water in southwestern Louisiana and is the most extensively pumped (nearly 1 billion gallons per day) aquifer in the State. Withdrawals from the Chicot aquifer are used primarily for irrigation.

These maps show the generalized potentiometric surfaces of the upper sand unit ("200-foot" sand in the Lake Charles area) and the "500-foot" sand of the Chicot aquifer. General water-level altitudes and flow directions may be inferred from these maps. These maps were prepared in cooperation with the Louisiana Department of Transportation and Development, Office of Public Works. Previous studies of ground-water hydrology in southwestern Louisiana are included in selected references.

Geohydrology

The Chicot aquifer of Pleistocene age is composed of southerly to southeasterly dipping beds of clay, silt, sand, and gravel, which thicken gulfward. The aquifer extends westward into Texas and eastward to the Atchafalaya River. These sediments are underlain by the Evangeline aquifer of Pliocene and Miocene age and the Jasper aquifer of Miocene age.

The primary recharge area for the Chicot aquifer occurs in Beauregard, Allen, and Evangeline Parishes (fig. 1). Southward, this aquifer becomes divided into two distinct layers, an upper and a lower sand unit, except in the Lake Charles area. In the Lake Charles area the Chicot aquifer was divided by Jones (1950) into three layers, "200-, 500-, and 700-foot" sands. The "200-foot" sand correlates with the upper sand unit east of Lake Charles, whereas the "500- and 700-foot" sands correlate with the lower sand unit east of Lake Charles (table 1).

Potentiometric Contour Maps

Potentiometric contour maps are used to determine direction of ground-water flow, areas of recharge and discharge, and the effects of pumping upon the ground-water system. The rate of ground-water movement can also be estimated from the gradient, when used with other hydrologic information.

Potentiometric contour maps were constructed from water-level data that were adjusted to a specified datum, the National Geodetic Vertical Datum of 1929.[1] The regional water-level map of the Chicot aquifer in southwest Louisiana (fig. 1) was constructed using water-level data (table 2) from wells screened in the recharge area, the "200-foot" sand in the Lake Charles area, and the upper sand unit in the remaining area.

A potentiometric map (fig. 2) for the "500-foot" sand in the Lake Charles area shows the cone of depression caused by heavy industrial pumping. Data used in constructing the potentiometric surface of the "500-foot" sand are shown in table 3.

The direction of ground-water flow is perpendicular to the potentiometric contours; ground water moves from an area of higher to lower head (water level). Ground-water flow in the upper sand unit in southwestern Louisiana generally is toward the south and along the dip of the sediments. Because of heavy pumping in the Lake Charles area and the rice farming areas, ground-water also flows toward the west from the Atchafalaya River and toward the north from the coastal areas (fig. 1). Flow toward the west and north, however, is much slower than flow toward the south because of the low water-level gradient.

[1] 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 "Mean Sea Level of 1929."

For additional information write to:

District Chief
U.S. Geological Survey
P.O. Box 66492
Baton Rouge, Louisiana 70896
Telephone: (504) 389-0281

Copies of this report can be purchased from:

U.S. Geological Survey
Map Distribution
Federal Center, Bldg. 810
Box 25286
Denver, Colorado 80225

Table 1.--Hydrogeologic correlation for the Chicot aquifer in southwestern Louisiana

Lake Charles area (Calcasieu and Cameron Parishes)	Rice growing area[1] (remaining parishes)
"200-foot" sand	Upper sand unit
"500-foot" sand	Lower sand unit
"700-foot" sand	

[1] Approximately the eastern two-thirds of the study area.

Table 2.--Water-level data used to construct potentiometric surface of the upper sand unit of the Chicot aquifer, spring 1985, for parishes in southwestern Louisiana

[Chicot aquifer, 112CHCT; Chicot aquifer, upper sand unit, 112CHCTU; "200-foot" sand of Lake Charles area, 11202LC]

Well number	Date measured	Water level [adjusted to NGVD of 1929 (in feet)]	Aquifer
Acadia			
Ac-121	2-25-85	-27.87	112CHCT
Ac-137	2-25-85	-22.55	112CHCTU
Ac-147	2-26-85	-22.75	112CHCTU
Ac-290	2-25-85	-33.55	112CHCT
Ac-292	2-27-85	-27.68	112CHCT
Ac-326	2-25-85	-32.60	112CHCTU
Ac-428	2-25-85	-35.55	112CHCT
Allen			
Al-236	4-24-85	+62.23	112CHCT
Al-241	3-15-85	+13.57	112CHCT
	4-24-85	+11.40	112CHCT
Al-251	3- 8-85	+90.09	112CHCT
	4-23-85	+87.56	112CHCT
Al-254	3- 8-85	+115.59	112CHCT
Al-276	4-24-85	+73.66	112CHCT
Al-277	3- 8-85	+99.63	112CHCT
Al-278	3-15-85	+1.08	112CHCT
Al-279	4-24-85	+12.85	112CHCT
Al-282	3-15-85	+3.65	112CHCT
Al-283	3-15-85	+25.26	112CHCT
Al-284	3-15-85	+31.05	112CHCT
	4-23-85	+30.77	112CHCT
Al-285	3-15-85	+5.11	112CHCT
Al-286	4-24-85	+53.90	112CHCT
Al-287	4-24-85	-22.56	112CHCT
Al-288	4-24-85	+60.87	112CHCT
Al-290	3-15-85	+51.82	112CHCT
Al-292	4-23-85	+49.94	112CHCT
Al-293	3-14-85	+72.35	112CHCT
Al-294	3-15-85	+26.09	112CHCT
Al-295	3-14-85	+68.50	112CHCT
Al-296	3-15-85	+61.70	112CHCT
Al-297	3-15-85	+34.11	112CHCT
Al-298	4-24-85	-12.40	112CHCT
Al-299	4-24-85	+48.82	112CHCT
Al-300	3-15-85	+104.01	112CHCT
Al-301	3- 8-85	+122.11	112CHCT
Al-303	4-24-85	+32.37	112CHCT
Al-306	3-14-85	+95.30	112CHCT
Al-305	3- 8-85	+103.70	112CHCT
Al-306	3-14-85	+70.62	112CHCT
Al-307	3-14-85	+80.07	112CHCT
Al-361	3-15-85	+31.17	112CHCT
Beauregard			
Be-2	3- 8-85	+22.41	112CHCT
Be-98	3- 5-85	+167.11	112CHCT
Be-384	3- 7-85	+115.01	112CHCT
Be-398	3- 7-85	+150.21	112CHCT
Be-400	3- 6-85	+66.57	112CHCT
Be-430	3- 8-85	+59.70	112CHCT
Be-431	3- 8-85	+68.23	112CHCT
Be-432	3- 7-85	+130.13	112CHCT
Be-433	3- 7-85	+127.43	112CHCT
Be-435	3- 7-85	+110.66	112CHCT
Be-436	3- 7-85	+81.47	112CHCT
Be-437	3- 7-85	+82.91	112CHCT
Be-438	3- 7-85	+90.60	112CHCT
Be-439	3- 7-85	+122.32	112CHCT
Be-440	3- 7-85	+168.61	112CHCT
Be-441	3- 7-85	+101.28	112CHCT
Be-442	3- 7-85	+112.28	112CHCT
Be-443	3- 7-85	+171.47	112CHCT
Be-445	3- 8-85	+111.69	112CHCT
Be-446	3- 5-85	+59.64	112CHCT
Be-456	3- 6-85	+63.92	112CHCT
Calcasieu			
Cu-158	2-27-85	-30.12	11202LC
Cu-167	2-28-85	-29.73	11202LC
Cu-168	2-28-85	-32.77	11202LC
Cu-395	2-28-85	-27.53	11202LC
Cu-453	3- 1-85	-41.90	11202LC
Cu-549	2-28-85	-30.85	11202LC
Cu-561	2-25-85	-45.35	11202LC
Cu-632	2-26-85	-15.96	11202LC
Cu-641	2-28-85	-35.16	11202LC
Cu-642	2-26-85	-34.35	11202LC
Cu-730	2-28-85	-45.25	11202LC
Cu-739	3- 1-85	-46.93	11202LC
Cu-748	3- 1-85	-44.31	11202LC
Cu-771	2-28-85	-46.16	11202LC
Cu-798	2-27-85	-31.64	11202LC
Cu-843	2-27-85	-44.87	11202LC
Cu-853	3- 6-85	-33.80	11202LC
Cu-962	-------	-38.39	11202LC
Cu-966	2-28-85	-31.50	11202LC
Cu-968	3- 6-85	-33.42	11202LC
Cu-971	2-27-85	-28.25	112CHCT
Cu-975	2-26-85	-18.61	11202LC
Cu-990	2-27-85	-46.57	11202LC
Cameron			
Cn-16	2-27-85	-21.47	112CHCTU
Cn-60	2-27-85	-6.05	112CHCTU
Cn-80U	2-27-85	-19.95	112CHCTU
Cn-80L	2-27-85	-20.00	112CHCTU
Cn-81U	2-27-85	-21.92	112CHCTU
Cameron--Continued			
Cn-81L	2-27-85	-22.17	112CHCTU
Cn-90	2-27-85	-23.65	112CHCTU
Cn-92	2-27-85	-26.79	112CHCTU
Cn-93	2-27-85	-20.14	112CHCTU
Cn-112	2-27-85	-10.25	112CHCTU
Cn-113	3- 6-85	-39.24	112CHCT
Cn-118	2-27-85	-15.64	11202LC
Cn-123	2-27-85	-17.00	112CHCT
Cn-125	3- 5-85	-37.42	112CHCT
Evangeline			
Ev-3	3-13-85	+33.73	112CHCT
Ev-7	3-13-85	-17.04	112CHCT
Ev-18	3-12-85	-37.19	112CHCT
Ev-23	3-12-85	-28.01	112CHCT
Ev-229	3-12-95	-15.35	112CHCT
Ev-319	4-23-85	+23.68	112CHCT
Ev-324	4-23-85	+32.95	112CHCT
Ev-500	3-12-85	+68.34	112CHCT
Ev-547	3-13-85	+60.62	112CHCT
	4-23-85	+61.74	112CHCT
Ev-571	3-11-85	+8.42	112CHCT
Ev-601	4-23-85	-.51	112CHCT
Ev-612	3-13-85	+52.98	112CHCT
Ev-667	3-12-85	+73.35	112CHCT
Ev-678	4-24-85	-35.44	112CHCT
Ev-679	3-13-85	+44.99	112CHCT
Ev-680	3-12-85	+75.48	112CHCT
Ev-681	3-12-85	+60.11	112CHCT
Ev-691	3-13-85	+33.55	112CHCT
Ev-748	3-18-85	+69.29	112CHCT
	4-23-85	+68.71	112CHCT
Ev-749	3-12-85	+16.38	112CHCT
	4-23-85	+14.58	112CHCT
Ev-757	3-13-85	+6.39	112CHCT
	4-23-85	+4.12	112CHCT
Iberia			
I-19	3- 5-85	-5.55	112CHCTU
I-36	3- 5-85	-1.58	112CHCTU
I-93	3- 5-85	+1.73	112CHCTU
Jefferson Davis			
JD-9	2-27-85	-35.15	112CHCTU
JD-31	2-27-85	-36.84	112CHCTU
JD-33	2-27-85	-26.72	112CHCT
JD-43	2-27-85	-16.37	112CHCT
JD-222	2-27-85	-26.49	112CHCTU
JD-485A	2-26-85	-31.92	112CHCTU
JD-493	2-27-85	-17.25	112CHCT
Lafayette			
Lf-662	4-24-85	-4.05	112CHCTU
St. Landry			
SL-179	3- 6-85	-7.72	112CHCT
SL-206	3- 6-85	-6.65	112CHCT
SL-370	3- 6-85	+.25	112CHCT
SL-375	3- 6-85	-.42	112CHCT
SL-383	3- 6-85	+3.15	112CHCT
SL-391	3- 6-85	-2.60	112CHCT
SL-392	3- 6-85	-3.96	112CHCT
St. Martin			
SMn-108	3- 5-85	+9.21	112CHCTU
SMn-109	3- 5-85	+8.94	112CHCTU
St. Mary			
SM-57U	3- 5-85	+0.22	112CHCTU
SM-57L	3- 5-85	-.88	112CHCTU
Vermilion			
Ve-28	2-26-85	-4.03	112CHCTU
Ve-78	2-26-85	-9.43	112CHCTU
Ve-128	2-26-85	-22.04	112CHCTU
Ve-333	2-26-85	-19.16	112CHCTU
Ve-442	2-26-85	-16.70	112CHCTU
Ve-460	2-26-85	-11.49	112CHCTU
Ve-501	2-26-85	-4.68	112CHCTU
Ve-586	2-26-85	-12.68	112CHCTU
Ve-629U	2-26-85	-4.36	112CHCTU
Ve-629L	2-26-85	-4.46	112CHCTU
Ve-630U	2-26-85	-5.37	112CHCTU
Ve-630L	2-26-85	-5.42	112CHCTU
Ve-637L	2-26-85	-6.93	112CHCTU
Ve-641	2-26-85	-6.52	112CHCTU
Ve-648	2-26-85	-.45	112CHCTU
Ve-649	2-26-85	-5.91	112CHCTU
Ve-650	2-26-85	-6.07	112CHCTU
Ve-658	2-26-85	+.25	112CHCTU

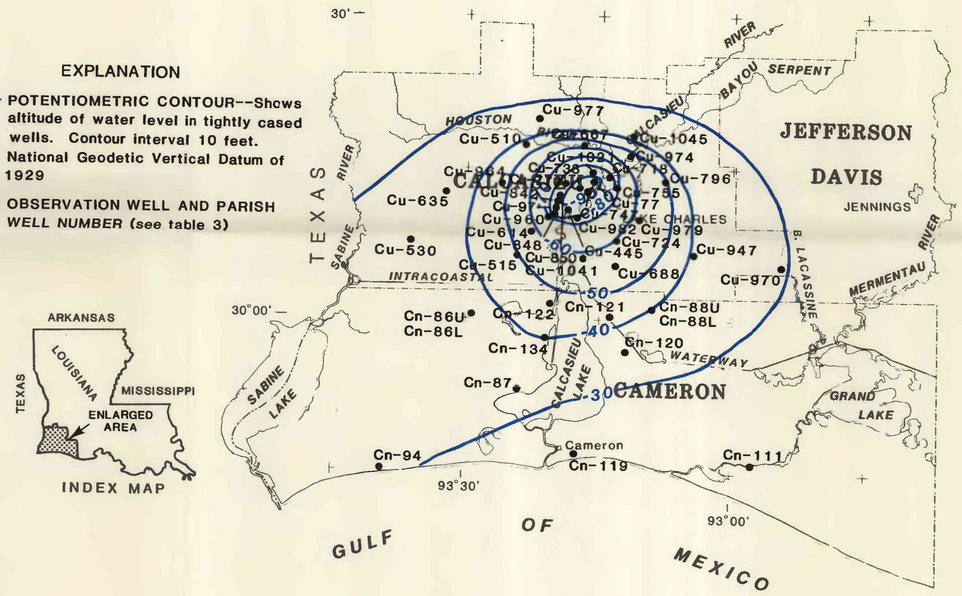

Figure 2.--Potentiometric surface of the "500-foot" sand, spring 1985, Calcasieu, Cameron, and Jefferson Davis Parishes.

Table 3.--Water-level data used to construct potentiometric surface of the "500-foot" sand of the Chicot aquifer, spring 1985, Calcasieu and Cameron Parishes

Well number	Date measured	Water level [adjusted to NGVD of 1929 (in feet)]
Calcasieu		
Cu-77	3- 1-85	-97.82
Cu-97	2-27-85	-89.71
Cu-445	3- 1-85	-89.36
Cu-510	3- 7-85	-47.87
Cu-515	3- 1-85	-48.79
Cu-530	3- 6-85	-31.91
Cu-614	3- 1-85	-57.14
Cu-635	3- 6-85	-34.85
Cu-667	2-28-85	-59.72
Cu-688	2-28-85	-55.60
Cu-718	3- 4-85	-84.75
Cu-724	2-26-85	-56.03
Cu-738	3- 1-85	-98.53
Cu-747	3- 1-85	-90.81
Cu-755	2-27-85	-69.73
Cu-770	2-28-85	-86.40
Cu-796	2-26-85	-51.78
Cu-842	2-25-85	-84.61
Cu-848	3- 4-85	-86.01
Cu-850	2-28-85	-80.80
Cu-947	2-27-85	-38.60
Cu-960	10-27-84	-67.84
Cu-964	3- 1-85	-44.29
Cu-970	2-27-85	-31.68
Cu-974	3- 1-85	-63.69
Cu-977	2-28-85	-32.32
Cu-979	2-27-85	-56.72
Cu-982	2-26-85	-70.65
Cu-1021	2-25-85	-85.45
Cu-1041	2-26-85	-59.76
Cameron		
Cn-86U	3- 6-85	-37.23
Cn-86L	3- 6-85	-37.35
Cn-87	3- 1-85	-32.58
Cn-88U	2-28-85	-39.14
Cn-88L	2-28-85	-39.99
Cn-94	2-28-85	-33.25
Cn-111	2-27-85	-21.69
Cn-119	2-27-85	-23.89
Cn-120	3- 1-85	-35.75
Cn-121	2-28-85	-42.87
Cn-122	3- 1-85	-47.01

LOUISIANA GROUND-WATER MAP NO. 1:
POTENTIOMETRIC SURFACE OF THE CHICOT AQUIFER IN SOUTHWESTERN LOUISIANA, SPRING 1985

By Robert B. Fendick, Jr. and Dale J. Nyman

1987

☆U.S. GOVERNMENT PRINTING OFFICE 1987 —566-394