GROUND-WATER CONDITIONS IN THE BATON ROUGE AREA, 1954-59

With Special Reference To Increased Pumpage

WATER RESOURCES BULLETIN NO. 2

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December 1961

STATE OF LOUISIANA
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and
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In cooperation with the
UNITED STATES GEOLOGICAL SURVEY

Water Resources Bulletin No. 2

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by

C. O. Morgan

Geologist, U. S. Geological Survey

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TABLE 4. WELLS USED AS CONTROL ON PLATE 1

Number on Plate	Well Name or Number	Location Sec.	T.	R.
1	Lee Denham No. 1	2	8 S.	2 E.
2	Campbell No. 3	48	8 S.	2 E.
3	EB-619	37	8 S.	1 E.
4	Gianelloni No. 2	50	8 S.	1 E.
5	Australia Planting Co. No. 1	6	8 S.	13 E.
6	Australia Planting Co. No. 1	3	8 S.	13 E.
7	Grace No. 1	37	8 S.	12 E.
8	Morley Cypress No. 6	28	8 S.	11 E.
9	S. P. Schwing No. 1	44	8 S.	11 E.
10	A. J. Wilbert & Sons No. 1	34	7 S.	11 E.
11	Wilbert & Sons No. B-2	31	7 S.	11 E.
12	WBR-41	18	6 S.	11 E.
13	PC-66	48	5 S.	11 E.[6]
14	WBR-64	38	6 S.	11 E.
15	EB-645	44	5 S.	1 W.
16	A. R. Annison No. 1	33	4 S.	1 W.
17	E. B. Young No. 1	52	4 S.	1 W.
18	EB-588	58	4 S.	1 W.
19	EB-565	30	4 S.	2 E.
20	EB-647	14	4 S.	2 E.
21	W. A. Romans	59	5 S.	2 E.
22	EB-581	49	5 S.	2 E.
23	Li-72	65	6 S.	2 E.[7]
24	Li-56	68	7 S.	2 E.[7]
25	Southern Land Production No. 1	31	6 S.	11 E.
26	Southern Land Products No. 1	3	7 S.	11 E.
27	Catherine Sugar Corp. No. 3	1	7 S.	11 E.
28	M. J. Kahao et al. No. 1	82	7 S.	12 E.
29	W. H. Forman et al. No. 1	85	7 S.	12 E.
30	WBR-50	59	7 S.	12 E.
31	EB-534	42	6 S.	1 W.
32	EB-544	37	6 S.	1 W.
33	EB-517	50	6 S.	1 W.
34	EB-572	56	6 S.	1 W.
35	EB-562	45	6 S.	1 W.
36	EB-444	48	7 S.	1 W.
37	EB-674	48	7 S.	1 W.
38	EB-504	81	7 S.	1 E.
39	EB-453	69	7 S.	1 E.
40	EB-307	48	6 S.	1 E.
41	Jones Estate No. 1	44	6 S.	1 E.
42	EB-623	82	6 S.	1 E.
43	WBR-37	69	7 S.	12 E.
44	The Oakes, Inc. No. 1	93	7 S.	12 E.
45	Joe C. Reed No. 1	5	8 S.	12 E.
46	WBR-23	10	8 S.	12 E.
47	WBR-51	17	8 S.	12 E.

[6] Located in Pointe Coupee Parish

[7] Located in Livingston Parish

ILLUSTRATIONS

Page

								T. 6 S., R. 1 E.													
568	2,449	1- 4-55	22	.08	.02	.8	.1	90	.4	0	219	9.4	3.2	.6	0	.04	236	2.0	284	20	7.6
								T. 6 S., R. 1 W.													
294	2,278	1-10-55	19	.04	0	.2	.1	84	.4	13	177	8.9	4.9	.2	0	0	218	1.0	337	5	8.9
572	2,511	4-10-58	25	.04	.01	1.1	0	121	.4	27	251	8.6	4.8	1.2	.2	.29	322	2.0	483	25	9.1
								WEST BATON ROUGE PARISH													
								T. 6 S., R. 11 E.													
87	2,216	7-27-59	22	.30	0	.7	1.3	105	.7	20	229	11	5.3	.7	.1	.43	300	7.0	446	0	9.1
88	2,226	7-27-59	21	.20	0	.4	.5	89	.7	13	197	10	5.1	.5	.1	.12	259	3.0	376	0	8.9
								"2,800-FOOT" SAND													
								EAST BATON ROUGE PARISH													
								T. 4 S., R. 2 E.													
647	1,950	1- 7-58	17	0.07	0.01	0.3	0	128	0.6	26	277	8.2	2.5	0.7	0	0.33	321	0	514	10	9.0
								T. 4 S., R. 1 W.													
588	2,201	3- 8-56	26	.06	.01	5.1	.1	63	1.1	0	166	9.2	5.0	.2	.2	.06	192	13	271	5	8.4
								T. 5 S., R. 1 W.													
539	2,590	5-29-57	28	.03	.02	1.3	.2	108	.5	16	238	9.0	5.8	1.0	0	.31	288	4.0	448	5	8.9
								T. 5 S., R. 2 E.													
581	2,590	5- 9-56	24	.10	.02	.8	.2	110	.5	28	219	10	2.8	.7	.2	.14	296	3.0	467	20	8.9
								T. 6 S., R. 1 E.													
378	2,777	12-22-54	28	.13	.02	1.2	.2	218	.9	25	483	2.3	23	1.4	0	.21	538	4.0	867	40	8.5
623	2,652	4-26-57	22	.14	.01	1.4	0	177	1.0	17	404	2.4	13	.9	0	.25	433	4.0	701	.....	8.6
								T. 6 S., R. 1 W.													
517	2,590	8-28-52	25	.09	......	.8	.3	152	.8	13	322	6.7	24	.8	0	.26	386	4.0	626	20	8.6
534	2,808	1-10-55	26	.05	0	1.2	.2	177	.8	0	417	3.6	33	1.1	0	.41	457	4.0	723	35	8.2

[a]Total amount of iron in sample presumably in solution when collected.
[b]Field determination.

TABLE 1. SELECTED CHEMICAL ANALYSES OF WATER FROM WELLS IN THE BATON ROUGE AREA, LA.—(Cont'd)

(Analyses made by Quality of Water Branch, U.S. Geological Survey, unless otherwise indicated.)
Location of wells shown on plates 2 and 3

Well No.	Depth of well (feet)	Date of collection	Silica (SiO_2)	Total iron (Fe)[a]	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids Residue at 180°C	Hardness as $CaCO_3$	Specific conductance (micromhos at 25°C)	Color	pH
								T. 7 S., R. 1 W.													
444	2,249	5- 9-51	24	.23	0	1.0	.3	91	2.0	19	190	11	5.0	.3	.2	.23	248	4.0	383	....	9.0
								T. 8 S., R. 1 W.													
575	2,500	6- 1-55	30	.07	.01	.6	0	245	1.2	9	305	1.7	196	.6	0	.37	635	2.0	1,110	20	8.5
575	2,500	4-20-59	....	....	......	....	....	....	....	....	......	......	224	....	......	......	....	....	1,210	....	[b]8.6
								WEST BATON ROUGE PARISH													
								T. 6 S., R. 12 E.													
32	2,096	12-30-54	24	0.01	0.02	0.8	0.1	85	0.4	0	205	10	3.0	0.2	0.5	0.02	226	2.0	350	10	7.5
								"2,400-FOOT" SAND													
								EAST BATON ROUGE PARISH													
								T. 4 S., R. 1 W.													
578A	1,861	3- 8-56	56	.86	.10	2.0	0	4.8	.6	0	113	8.4	5.8	.2	.2	.08	188	5.0	203	5	7.5
								T. 5 S., R. 1 E.													
551	2,300	1- 5-55	24	.07	0	.6	.2	115	.4	12	258	9.0	3.5	.7	.5	.20	296	2.0	452	25	8.7

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Baton Rouge, Louisiana

GROUND-WATER CONDITIONS IN THE BATON ROUGE AREA, 1954-59
With Special Reference To Increased Pumpage

By C. O. Morgan

WATER RESOURCES BULLETIN NO. 2 December 1961

ABSTRACT

In the Baton Rouge area large quantities of fresh ground water are available from 12 aquifers ranging in age from Pleistocene to Miocene. These aquifers, which are named by their depth of occurrence in and near the Baton Rouge industrial district, are: alluvial deposits, shallow Pleistocene deposits, "400-foot" sand, "600-foot" sand, "800-foot" sand, "1,000-foot" sand, "1,200-foot" sand "1,500-foot" sand, "1,700-foot" sand, "2,000-foot" sand, "2,400-foot" sand, and "2,800-foot" sand. The deepest aquifer, the "2,800-foot" sand, contains fresh water to a maximum of 3,100 feet below mean sea level in the eastern part of the area.

In 1959, pumpage for industrial and public supply uses averaged 93 million gallons per day, which is 43 percent more than that pumped in 1953. The average yield of industrial and public-supply wells is 1,000 gallons per minute. The increase in pumpage, which was from aquifers below the "600-foot" sand, primarily has caused a lowering of water levels in the deeper sands. However, decreased pumpage from the "400- and 600-foot"

sands has caused a recovery of water levels in these shallow aquifers.

In addition, pumpage from all aquifers has caused the northward movement of salt water toward areas of heavy pumping. The exact location of and rate of movement of the salt-water interface in each aquifer has not been determined. The only noticeable migration of salt water has occurred in the "600-foot" sand. Analyses of water from wells south of the industrial district and screened in the "600-foot" sand show an increase in chloride content.

The soft, sodium bicarbonate water in aquifers below the "shallow Pleistocene" aquifer generally can be used without treatment for most purposes.

								T. 7 S., R. 1 E.													
157	1,552	5- 8-59	23	.08	0.01	0	0	96	.7	22	185	12	4.1	.7	.1	.11	250	0	390	....	[b]8.8
510	1,605	5- 9-51	36	.24	0	.4	.3	67	.4	0	162	9.6	4.0	.1	1.2	.13	202	2.0	279	....	8.3
621	1,490	7-31-57	31	.30	0	1.5	0	70	.5	3	166	9.8	4.5	.2	.5	.05	204	4.0	299	0	8.4
632	1,550	11-25-58	24	.02	.01	1.7	.06	74	.2	0	183	10	4.8	.3	.1	......	218	4.5	317	10	8.2
								"1,700-FOOT" SAND													
								EAST BATON ROUGE PARISH													
								T. 4 S., R. 1 W.													
566	1,280	1- 5-55	30	.01	0	.4	.1	71	.4	0	171	7.8	3.5	.3	0	0.01	198	1.0	360	10	8.0
								T. 6 S., R. 1 W.													
68	1,817	6-20-44	30	.04	......	.8	.3	67	3.4	19	129	8.6	5.0	.3	.2	......	200	3.0	287	....	8.4
								WEST BATON ROUGE PARISH													
								T. 6 S., R. 10 E.													
34	1,428	12-30-54	45	.03	0	.2	.2	80	.4	10	182	2.1	3.5	.2	0	0.02	235	1.0	340	5	8.7
								T. 6 S., R. 11 E.													
64	1,462	10-16-58	21	.04	......	0	0	74	.4	0	178	10	4.4	.2	.1	......	202	0	303	20	8.2
								T. 7 S., R. 12 E.													
4	1,863	12- 9-52	26	.02	......	.1	.1	70	.6	0	173	9.1	3.2	.2	.2	0.07	197	1.0	280	10	8.1
								"2,000-FOOT" SAND													
								EAST BATON ROUGE PARISH													
								T. 5 S., R. 1 W.													
384	1,919	11-28-44	26	.12	......	3.7	.1	71	3.7	13	163	7.9	4.0	.2	.2	......	210	10	383	....	8.2
								T. 5 S., R. 2 E.													
304	1,725	6- 7-55	58	2.7	0.32	7.0	1.2	38	1.7	0	116	6.3	5.0	.2	0	0.02	178	22	209	35	7.4
								T. 6 S., R. 1 W.													
367	2,061	1-10-55	24	0	0.01	1.3	0.1	77	0.3	2	191	7.8	3.0	0.3	0.2	0.02	213	4.0	323	10	8.0

[a]Total amount of iron in sample presumably in solution when collected.
[b]Field determination.

TABLE 1. SELECTED CHEMICAL ANALYSES OF WATER FROM WELLS IN THE BATON ROUGE AREA, LA.—(Cont'd)

(Analyses made by Quality of Water Branch, U.S. Geological Survey, unless otherwise indicated.)
Location of wells shown on plates 2 and 3

Well No.	Depth of well (feet)	Date of collection	Silica (SiO_2)	Total iron (Fe)[a]	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids Residue at 180°C	Hardness as $CaCO_3$	Specific conductance (micromhos at 25°C)	Color	pH
			Constituents (parts per million)																		
WEST BATON ROUGE PARISH																					
T. 7 S., R. 12 E.																					
35	1,290	3-13-59	29	.18	.10	.0	.0	74	.8	0	174	11	4.3	.5	.1	0.05	206	0	298	....	8.2
37	1,356	3- 6-59	20	.40	.02	.0	.0	94	.9	13	201	12	4.2	1.0	.1	.17	244	0	377	....	8.8
"1,500-FOOT" SAND																					
EAST BATON ROUGE PARISH																					
T. 5 S., R. 1 W.																					
585	1,334	2-26-58	52	.35	.11	1.2	.2	59	.6	0	139	8.6	7.0	.1	.4	.08	199	4.0	247	0	7.7
T. 6 S., R. 1 E.																					
392	1,464	8- 4-58	28	.23	......	.0	.0	59	....	0	132	9.8	5.6	.7	.1	......	193	0	238	10	7.5
615	1,420	4- 1-58	54	....	0.10	1.8	.0	55	0.8	0	134	9.2	4.8	.1	1.0	0.13	194	4.0	242	....	7.6
T. 6 S., R. 1 W.																					
561	1,360	4-10-58	56	.18	.10	2.5	.3	58	1.0	0	144	9.0	6.5	.4	.0	.10	216	8.0	250	0	7.8
T. 7 S., R. 1 W.																					
280	1,955	8- 6-57	22	0.53	0.20	85	26	1,950	8.0	0	299	0	3,050	0.6	......	0.79	5,290	319	9,250	15	7.7
569	2,170	12-22-54	30	.12	0	1.2	0.2	257	.8	15	310	2.2	201	.8	0	.30	666	4.0	1,170	40	8.7

INTRODUCTION

LOCATION AND GENERAL FEATURES OF THE AREA

The project area (fig. 1) includes East Baton Rouge and West Baton Rouge Parishes and is a modification of the Baton Rouge area as used by Meyer and Turcan (1955, p. 2-3), which included most of East Baton Rouge Parish and small parts of West Baton Rouge and East Feliciana Parishes. The Baton Rouge area is in southeastern Louisiana, which geographically is in the Gulf Coastal Plain (Fenneman, 1938, p. 68). Bordering parishes are East Feliciana and West Feliciana to the north, Pointe Coupee and Iberville to the west, Iberville and Ascension to the south, and Livingston and St. Helena to the east. East Baton Rouge and West Baton Rouge Parishes contain a total of 663 square miles and have a maximum north-south length of 27 miles and a maximum east-west dimension of 37 miles. They are between lat. 30°15′ and 30°45′ north and long. 90°50′ and 91°30′ west.

The Baton Rouge industrial district (pl. 3) is the area bounded on the east by Scenic Highway, on the south by Choctaw Drive, on the west by the Mississippi River, and on the north by an east-west line about 0.4 mile north of Airline Highway.

According to the Bureau of the Census, the population of East Baton Rouge Parish increased from 158,236 in 1950 to 230,058 in 1960, and that of West Baton Rouge Parish increased from 11,738 in 1950 to 14,796 in 1960. The largest city in the area is Baton Rouge, which is the State capital and the home of Louisiana State University.

PURPOSE AND SCOPE

In response to numerous requests for information on the availability of fresh ground water in and near Baton Rouge, the U.S. Geological Survey, as a part of the statewide cooperative program with the Louisiana Department of Public Works and the Louisiana Geological Survey, Department of Conservation, has reanalyzed and corrected ground-water data previously assembled and has analyzed new information obtained during the period 1958-59. Since 1953 the Baton Rouge area has been the center of a major

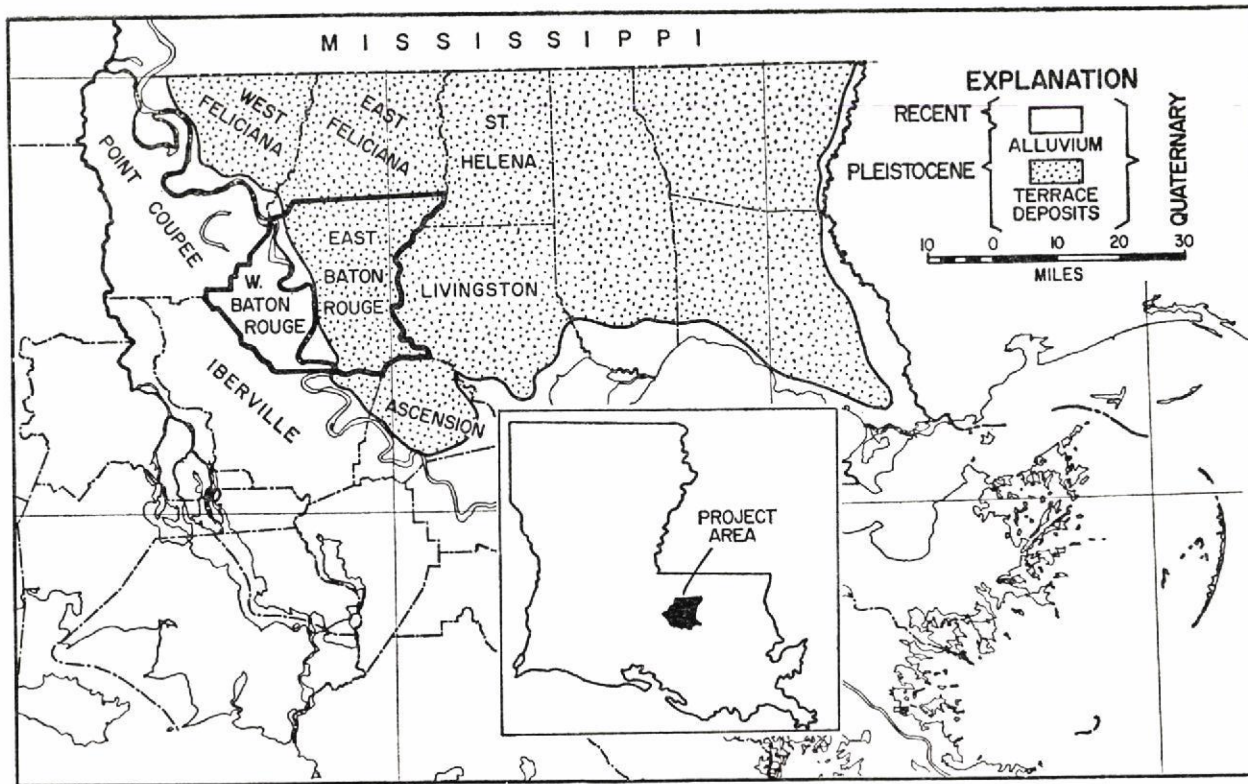

Figure 1. Generalized geologic map of southeastern Louisiana showing location of project area.

									T. 7 S., R. 1 E.												
159	790	3-24-59	29	.09	0.01	.9	.1	75	.9	21	138	11	4.9	.5	.2	0.05	213	2.5	312	....	[b]9.0
									WEST BATON ROUGE PARISH												
									T. 6 S., R. 11 E.												
83	830	1-28-59	62	.43	.02	8.6	1.6	36	2.2	0	110	9.4	7.5	.1	.0	.00	182	28	198	20	7.7
									"1,000-FOOT" SAND												
									EAST BATON ROUGE PARISH												
									T. 6 S., R. 1 W.												
[c]163	975	3-28-51	12	....	......	.4	1.8	56	....	0	136	7.2	8.0	....	......	......	248	6.0	....	....	7.5
									T. 7 S., R. 1 E.												
327	1,240	4-10-44	....	0.08	......	....	....	....	....	26	135	7	4.0	....	......	......	....	12	....	....	8.0
									"1,200-FOOT" SAND												
									EAST BATON ROUGE PARISH												
									T. 5 S., R. 1 W.												
629	1,025	2-26-58	58	2.2	0.13	11	1.8	25	3.2	0	90	9.8	7.2	0.1	0.2	0.10	165	35	181	45	6.9
									T. 6 S., R. 1 E.												
653	1,153	11-25-58	29	.02	.01	1.2	.5	64	.3	0	154	10	5.3	.2	.0	......	198	3.2	271	10	8.2
									T. 6 S., R. 1 W.												
403	1,270	3-23-53	32	.04	......	.2	.3	67	.6	0	162	9.2	4.5	.2	.0	0.03	201	2.0	284	5	8.0
									T. 7 S., R. 1 E.												
219	1,444	4-30-59	24	.05	0.01	.9	.2	94	.8	8	166	11	35	.5	.1	.09	261	3.0	406	....	[b]8.9
326	1,480	4-21-59	27	.04	.02	2.1	.2	96	.6	14	155	11	38	.4	.1	.14	267	6.0	426	....	[b]9.0
									T. 7 S., R. 2 E.												
591	1,374	11-25-58	29	.02	.02	2.9	.4	64	.4	0	159	10	5	.2	.0	......	205	8.8	278	10	8.2

[a]Total amount of iron in sample presumably in solution when collected.
[b]Field determination.
[c]Analysis by Curtis Laboratories, Houston, Texas.

TABLE 1. SELECTED CHEMICAL ANALYSES OF WATER FROM WELLS IN THE BATON ROUGE AREA, LA.—(Cont'd)

(Analyses made by Quality of Water Branch, U.S. Geological Survey, unless otherwise indicated.)
Location of wells shown on plates 2 and 3

Well No.	Depth of well (feet)	Date of collection	Constituents (parts per million) Silica (SiO_2)	Total iron (Fe)[a]	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids Residue at 180°C	Hardness as $CaCO_3$	Specific conductance (micromhos at 25°C)	Color	pH
								T. 7 S., R. 1 W.													
493	704	8-29-52	36	.03	......	18	2.7	201	1.6	0	181	8.4	235	.3	.5	......	593	56	1,060	....	8.0
493	704	5-18-59	35	3.6	0.30	101	23	278	3.4	0	149	1.6	587	.2	.5	0.02	1,300	347	2,110	....	b7.2
500	741	5-18-59	29	.36	.20	9.8	1.4	168	1.3	0	177	5.2	175	.3	.0	.05	482	30	846	....	b7.5
								T. 8 S., R. 3 E.													
597	980	1-19-59	59	.03	.02	2.0	.4	88	2.1	0	176	3.0	36	.2	.1	.00	282	6.5	391	....	7.9
								WEST BATON ROUGE PARISH													
								T. 7 S., R. 12 E.													
42	550	4-19-57	39	.04	.02	3.5	.0	69	.9	0	178	8.6	3.8	.3	.2	.81	216	9.0	310	....	7.5
60	525	10- 8-58	....	.02	......	......	......	....	....	....	......	......	9.8	....	......	......	....	28	311	....	....
								"800-FOOT" SAND													
								EAST BATON ROUGE PARISH													
								T. 7 S., R. 1 W.													
120	945	1-23-45	23	.04	......	2.2	0.1	73	2.6	26	134	10	3.0	0.2	0.2	......	208	6.0	318	....	8.4

industrial expansion in the lower Mississippi River valley. Expansion of existing industries, influx of new industries, and rapid growth of population have caused concern in this area where large quantities of ground water are pumped. It is the purpose of this report to present to the ground-water users new and reanalyzed data that will provide a practical framework for the proper development of this natural resource.

The report augments U.S. Geological Survey Water-Supply Paper 1296, entitled "Geology and Ground-Water Resources of the Baton Rouge Area, Louisiana." Some of the basic and interpretive data in previous reports are repeated but reanalyzed; chemical analyses of the water, evaluation of the hydraulic characteristics of the aquifers, and hydrographs are brought up to date. A fence diagram (pl. 1) is included to show the water-bearing formations that underlie the area. Maps show the location of wells in the area and the density of wells, by aquifer, in the industrial district.

PREVIOUS INVESTIGATIONS

The ground-water resources, geology, geography, and climate of the Baton Rouge area have been described in previous reports. In 1905, a report by G. D. Harris on underground water in southern Louisiana listed the depth of wells, quality of water, and flow of wells in East Baton Rouge Parish at that time. In 1945, E. M. Cushing and P. H. Jones wrote a progress report entitled "Ground-Water Conditions in the Vicinity of Baton Rouge," which was published by the Louisiana Department of Public Works. This report discussed briefly the geology and ground-water hydrology of the area. A more detailed report, entitled "Geology and Ground-Water Resources of the Baton Rouge Area, Louisiana," by Meyer and Turcan was published in 1955 as Water-Supply Paper 1296. In it the authors named the principal aquifers of the area and determined the withdrawals of water and their effect on water levels. Coefficients of transmissibility and storage and data on the quality of water in most of the sands also were presented.

ACKNOWLEDGMENTS

Valuable data and assistance used in the preparation of this report were received from individuals, industries, and governmental agencies, both State and Federal.

Data on pumpage and well construction were provided by Consolidated Chemical Industries, Inc., Copolymer Corp., Corps of Engineers, U.S. Army, Esso Standard Oil Co., Ethyl Corp., Foster Grant Co., Inc., General Chemical Division, and Solvay Process Division of the Allied Chemical & Dye Corp., W. R. Grace & Co., Gulf States Utilities Co., Ideal Cement Co., Kaiser Aluminum & Chemical Corp., Naugatuck Chemical Division of the U.S. Rubber Co., Schuylkill Products Co., Inc., and Union Tank Car Co. Electrical logs, drillers' logs, and well-construction records were obtained from W. M. Eberhart & Sons of Baton Rouge, D. K. Summers of Denham Springs, Layne-Louisiana Co. of Lake Charles, and Acme Wellpoint Corp. of Baton Rouge. Much of the sub-surface geologic information was obtained from electrical logs of oil-test wells provided by Leo W. Hough, State Geologist, Louisiana Geological Survey, Department of Conservation. Leo Bankston and E. C. Donnell, Jr., of the Baton Rouge Water Works Co., furnished pumpage and construction data for public-supply wells and also assisted in making specific-capacity tests. Individuals and officials of the following water companies and municipalities provided additional pertinent data: Alsen Water Co., Inc., Capitol Water Co., Inc., Kleinpeter Water Co., Inc., Village of Addis, Town of Baker, Village of Brusly, Town of Port Allen, and Town of Zachary.

WELL-NUMBERING SYSTEM

Records of water wells in East Baton Rouge and West Baton Rouge Parishes are given in table 3. Locations of the wells listed in this table are shown on either plate 2 or plate 3. Wells in and near the Baton Rouge industrial district are shown also by aquifer screened, on figures 5, 8, 10, 13, 15, 17, 19, 21, 24, and 26. The system of numbering wells in Louisiana is based on an abbreviation of the parish in which they are located and a serial number de-

T. 7 S., R. 1 W.																					
583	304	4-27-56	40	.58	0.08	26	9.3	68	1.7	0	292	0.2	10	0.4	0.1	0.04	310	103	477	10	7.2
T. 7 S., R. 1 E.																					
665	116	11-25-58	31	1.5	......	76	42	52	1.3	0	462	2.2	72	.3	.0	......	508	363	879	10	7.3
T. 8 S., R. 3 E.																					
599	372	1-19-59	26	.12	0.02	8.1	1.9	96	1.5	0	265	0	12	.6	.2	0.03	277	28	433	....	7.9
T. 8 S., R. 2 E.																					
631A	325	4- 5-57	19	.55	.05	23	8.9	163	3.0	0	497	20	21	.4	1.0	.06	503	94	841	....	7.4
660	295	1-27-59	....	.13	......	....	....	....	....	....	.....	.....	15	....	......	......	....	98	764	....	b7.8
680	310	1-23-59	....	.11	......	....	....	....	....	....	.....	.....	11	....	......	......	....	78	545	....	7.9
681	289	2-24-59	18	.10	.02	26	7.1	153	2.2	0	500	0	14	.4	0.2	.22	477	94	759	....	7.7
"400-FOOT" SAND																					
EAST BATON ROUGE PARISH																					
T. 6 S., R. 1 W.																					
155	412	1-25-45	48	.04	......	13	3.3	30	4.5	0	119	7.9	8.0	0	.2	......	184	46	229	....	7.5
357	430	6-21-44	46	.57	......	6.5	3.0	47	5.5	0	147	4.5	8.0	.1	.2	......	200	29	256	....	8.4
T. 7 S., R. 1 E.																					
638	625	4- 1-58	35	.17	0.02	3.1	.5	148	.7	0	205	1.0	113	.2	.2	0.11	403	10	693	....	8.2
T. 7 S., R. 2 E.																					
192	466	3-21-59	....	.33	......	....	....	....	....	....	.....	.....	4.4	....	.....	.....	....	38	268	....	7.5
684	480	3-12-59	36	.29	0.6	9.3	1.7	51	1.4	0	161	0.8	6.1	.1	.5	0.01	192	30	268	....	b7.8
"600-FOOT" SAND																					
EAST BATON ROUGE PARISH																					
T. 6 S., R. 1 W.																					
60	644	1-26-45	54	0.05	......	14	3.3	30	4.4	0	124	8.3	6.0	0.0	0.2	......	187	48	233	....	7.9
547	611	1-10-55	52	.64	0.38	12	2.2	36	1.9	0	127	7.7	7.5	.1	.0	0.07	185	40	234	5	7.4

[a]Total amount of iron in sample presumably in solution when collected.
[b]Field determination.

TABLE 1. SELECTED CHEMICAL ANALYSES OF WATER FROM WELLS IN THE BATON ROUGE AREA, LA.—(Cont'd)

(Analyses made by Quality of Water Branch, U.S. Geological Survey, unless otherwise indicated.)
Location of wells shown on plates 2 and 3

Well No.	Depth of well (feet)	Date of collection	Constituents (parts per million)																Specific conductance (micromhos at 25°C)	Color	pH
			Silica (SiO_2)	Total iron (Fe)[a]	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids Residue at 180°C	Hardness as $CaCO_3$			
								T. 7 S., R. 12 E.—Continued													
55	207	10- 8-58	....	3.8	....	....	....	....	....	....	....	....	8.2	....	....	....	....	274	621	....	....
55	207	4-21-59	....	9.5	....	....	....	....	....	....	....	....	8.0	....	....	....	....	290	601	....	[b]7.2
56	197	6-24-58	....	8.0	....	....	....	....	....	....	....	....	16	....	....	....	....	222	492	....	7.4
56	197	10- 8-58	....	7.1	....	....	....	....	....	....	....	....	13	....	....	....	....	241	572	....	....
56	197	4-21-59	....	8.2	....	....	....	....	....	....	....	....	14	....	....	....	....	244	516	....	[b]7.2
57	190	6-24-58	....	5.4	....	....	....	....	....	....	....	....	16	....	....	....	....	199	479	....	7.2
57	190	10- 8-58	....	5.5	....	....	....	....	....	....	....	....	17	....	....	....	....	187	416	....	....
57	190	4-21-59	....	5.5	....	....	....	....	....	....	....	....	21	....	....	....	....	196	473	....	[b]7.2
								T. 8 S., R. 12 E.													
31	416	6-12-58	32	.72	0	34	9.2	6.9	1.9	0	161	0	5.8	0.2	2.2	0.04	172	123	272	5	7.3
47	440	4-21-58	....	1.2	....	....	....	....	....	....	....	....	6.0	....	....	....	332	243	552	....	....
48	475	4-21-58	....	1.5	....	....	....	....	....	....	....	....	8.0	....	....	....	241	157	402	....	....
51	550	6-12-58	38	1.9	1.4	103	32	125	2.6	0	592	0	126	0.1	0	.21	719	388	1,210	0	6.9
52	456	6-12-58	....	1.7	....	....	....	....	....	....	....	....	8.0	....	....	....	....	210	471	....	....
54	450	6-24-58	....	1.1	....	....	....	....	....	....	....	....	7.0	....	....	....	....	268	556	....	7.3
								"SHALLOW PLEISTOCENE" EAST BATON ROUGE PARISH T. 6 S., R. 1 E.													
687	28	4-10-59	....	1.6	....	....	....	....	....	....	....	....	....	....	....	....	....	194	620	....	[b]6.8

noting the order in which they are inventoried. For example, well EB-1 (T. 6 S., R. 1 W.) on the Esso Standard Oil Co. property in Baton Rouge was the first well inventoried by the U.S. Geological Survey in East Baton Rouge Parish. Well WBR-2 (T. 7 S., R. 12 E.) was the second well inventoried in West Baton Rouge Parish. Well WBR-1 was not included in the table because its exact location could not be verified in the field.

Meyer and Turcan (1955, table 5) listed 483 wells in the Baton Rouge area. The difference in the number listed in their report and in table 3 of this report is not only due to the drilling of new wells but is also the result of reinventorying wells whose records and locations were incomplete or inaccurate in 1953.

GEOLOGY

The Baton Rouge area is immediately underlain by deposits of Recent and Pleistocene age (fig. 1), which in turn are underlain by sedimentary rocks of Pliocene(?) and Miocene age. With the exception of the Quaternary alluvium, which lies in the Mississippi River alluvial plain, most of the fresh-water-bearing sands of the Baton Rouge area crop out north of Baton Rouge in the northern part of southeastern Louisiana (fig. 1) and in the southwest corner of the State of Mississippi. Sands of Miocene age are the oldest deposits containing fresh water in the Baton Rouge area.

Pleistocene and Recent deposits constitute the uppermost sediments of East Baton Rouge and West Baton Rouge Parishes. These sediments may be divided into two units. The older consists of Pleistocene deltaic sediments, which underlie the terraced upland area. The younger consists of Pleistocene and Recent alluvium, which is limited to the present Mississippi River flood plain and lies unconformably on the Pleistocene deltaic sediments.

The Recent and Pleistocene alluvial deposits, the main body of which is west of the Mississippi River, have been differentiated by Cardwell and Rollo (1960, p. 10) primarily on the basis of texture and dating by the carbon-14 method. On the basis of carbon-14 dating, they consider the coarse-grained substratum to be of late Pleistocene age and the overlying fine-grained topstratum to be of Recent age. As reported by Kolb and Van Lopik (1958, pls. 9 and 9A), the carbon-14 age of wood specimens collected from a depth of 133 feet in a well 0.7 mile south of Port Allen was 22,100 ± 780 years. The time interval from the end of the Pleistocene to the present was estimated by Horberg (1955, p. 280) to be approximately 11,000 years. Accordingly, most of the sand and gravel valley fill is considered to be of Pleistocene age, and the thin silty clayey mantle is considered to be of Recent age.

The Pleistocene sediments are underlain by sand and shale of Pliocene(?) age. Rollo (1960, p. 38) tentatively designated the base of the "600-foot" sand of the Baton Rouge area as the top of the Pliocene(?). Evidence to confirm or discount this tentative designation was not found during this investigation. In this report the Pliocene(?) includes the sediments between the base of the "600-foot" sand and the top of the "2,000-foot" sand, which is of Miocene age.

As described by Meyer and Turcan (1955, p. 10), the sediments of Miocene age are similar in appearance to the Pliocene(?) and the basal Pleistocene sediments and can be distinguished only by fossil evidence. A sample from the depth of 2,600 feet in a recently drilled water-test well (WBR-51, T. 8 S., R. 12 E.) contained the fossil *Miorangia microjohnsoni*, which marks the approximate top of the Miocene. This stratum correlates with the "2,000-foot" sand of the Baton Rouge industrial area (pl. 1) and supports the assumption of Meyer and Turcan (1955, p. 10) that the "2,000-foot" sand was the uppermost sand of Miocene age.

TABLE 1. SELECTED CHEMICAL ANALYSES OF WATER FROM WELLS IN THE BATON ROUGE AREA, LOUISIANA

(Analyses made by Quality of Water Branch, U.S. Geological Survey, unless otherwise indicated.)
Location of wells shown on plates 2 and 3

Well No.	Depth of well (feet)	Date of collection	Constituents (parts per million)																Specific conductance (micromhos at 25°C)	Color	pH
			Silica (SiO_2)	Total iron (Fe)[a]	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Carbonate (CO_3)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids Residue at 180°C	Hardness as $CaCO_3$			
ALLUVIUM																					
EAST BATON ROUGE PARISH																					
T. 7 S., R. 1 W.																					
586	372	3-19-57	33	11	0.25	117	39	19	5.2	0	593	0.8	15	0.1	0.2	0.01	522	452	879	15	7.1
T. 8 S., R. 1 E.																					
257	220	4-24-59	25	1.8	.01	40	12	27	1.7	0	225	.4	15	.3	.1	.13	235	147	389	0	[b]7.4
T. 8 S., R. 1 W.																					
232	175	5- 3-55	40	12	.11	84	28	16	3.2	0	458	.1	3.8	.3	0	.10	413	324	670	0	7.1
WEST BATON ROUGE PARISH																					
T. 6 S., R. 11 E.																					
68	150	10-16-58	30	4.0	......	129	12	23	4.1	0	485	1.6	10	.2	12	......	463	371	739	10	7.2
T. 7 S., R. 12 E.																					
55	207	6-24-58	....	4.8	......	......	......	......	....	....	......	......	9.2	....	......	......	......	331	666	....	7.1

[a]Total amount of iron in sample presumably in solution when collected.
[b]Field determination.

WELL RECORDS

Data collected and compiled during the investigation are given in the following tables.

Chemical analyses of water from wells in East Baton Rouge and West Baton Rouge Parishes are presented in table 1.

The specific capacities of 39 wells and the hydraulic characteristics of aquifers in the Baton Rouge area as determined by pumping tests are given in table 2. Specific capacities corrected for head loss due to the flow of water through the pipe also are included in this table.

The number of inventoried wells in East Baton Rouge and West Baton Rouge Parishes, listed in table 3 and classified by use, are:

Use	East Baton Rouge	West Baton Rouge
Industrial	119	22
Public supply	73	20
Domestic	140	17
Irrigation	4	0
Stock	9	0
Test	31	2
Observation	23	4
Pressure relief	0	5
Not in use	73	5
Abandoned	207	9
Total	679	84

Because they are temporary and for special use, only five of the pressure-relief wells at the site of the Port Allen locks were inventoried. The 27 observation wells (table 3) were not drilled for that specific purpose but were used for other purposes and are made available to the U.S. Geological Survey by the owners.

WATER-BEARING SANDS, THEIR PROPERTIES, AND UTILIZATION

The Baton Rouge area is underlain by a complex sequence of continental and marine sediments. The general relation of these sediments is illustrated on the fence diagram (pl. 1). The naming of the aquifers in accordance with their depth in and near the industrial district follows the usage of Meyer and Turcan (1955, pls. 1 and 2). These aquifers include the "400-foot," "600-foot," "800-foot," "1,000-foot," "1,200-foot," "1,500-foot," "1,700-foot," "2,000-foot," "2,400-foot," and "2,800-foot" sands. Other aquifers include the alluvial deposits and shallow-Pleistocene deposits. The aquifers vary in thickness, grain size, and depth, and the exact location of the fresh- and brackish-water interface in each is as unpredictable as the thickness and continuity of the sands. However, electrical logs of oil-test wells indicate that water in most of the sands in the southern part (pl. 1 and fig. 2) of the area is highly mineralized and unsuitable for use. The altitude of the base of fresh ground water and areas where sands at intermediate depths between fresh-water-bearing sands and the land surface contain brackish water are shown on figure 2. The approximate aggregate thickness of fresh-water-bearing sands can be estimated by multiplying the thickness of the fresh-water-bearing deposits by the percentage of sand shown on figure 2. The average altitude of the land surface, which is relatively flat, is less than 50 feet; therefore, the altitude of the base of the fresh ground water approximates the thickness of fresh-water-bearing deposits.

ALLUVIAL DEPOSITS

Physical properties. The alluvial deposits of Recent and Pleistocene age are limited to the flood plain of the Mississippi River. This relatively flat flood plain occurs west and south of the upland surface, which was named the Prairie terrace by Fisk (Fisk and others, 1938, p. 51). The alluvial deposits consist of approximately 80 percent water-bearing sands and gravels and 20 percent silt and clay. In the flood-plain area the deposits range in thickness

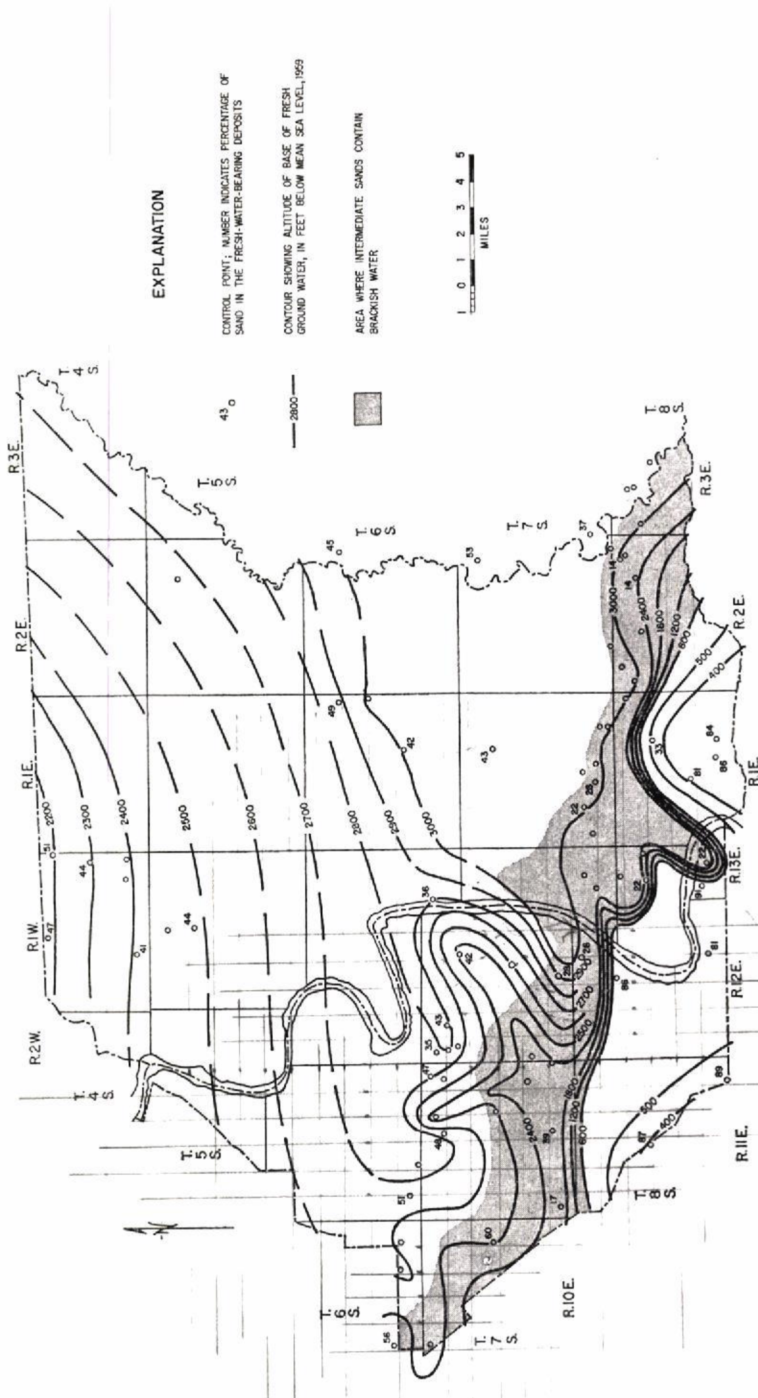

Figure 2. Map showing (1) altitude of the base of fresh ground water, (2) areas where sands at intermediate depths contain brackish water, and (3) percentage of fresh-water-bearing sand, East Baton Rouge and West Baton Rouge Parishes, La.

program for the Baton Rouge area should include the (1) collection of well records, (2) observation of water levels, (3) collection and analysis of geologic and quality-of-water data, and (4) collection and analysis of pumpage data. In the meantime, plans should be formulated to implement the basic-data collection program in order to determine the exact position of the interface between the salt water and fresh water and the rate and direction of ground-water movement. These long-range plans should include (1) the preparation of piezometric maps for each aquifer, (2) the determination of the areal hydraulic characteristics of the aquifers by the analysis of additional pumping-test data, (3) borehole geophysical studies, and (4) chemical analyses data of water from wells between the areas of heavy withdrawals and the area where the aquifer contains salt water. To obtain these needed data it will be necessary to drill test holes and to install observation wells at strategic locations. The long-range plans should be flexible to allow for prompt adjustment of the program to meet the needs shown by frequent analysis of data.

Baton Rouge area are not considered overdeveloped by most industrial users, there are local water-level declines in some aquifers and the menace of salt-water movement northward toward areas of heavy withdrawals. The problem of uneconomical production because of the excessive pumping lifts can be minimized locally by the proper spacing of wells screened in the same aquifer. When planning for proper well spacing, the amount of interference between wells can be calculated from the coefficients of transmissibility and storage.

Recovery of water levels has occurred since 1953 in the "400-foot" and "600-foot" sands, whereas water-level declines have occurred in most of the other aquifers in response to increased pumping throughout the area. Pumping from the alluvial deposits has affected water levels only in the vicinity of the pumped wells.

The aquifers of the industrial district contain salt water down the dip in the vicinity of the southern boundary of the project area. A hydraulic gradient has been established from the salt-water areas toward areas of large withdrawals and salt water must be moving toward the areas of pumping. The only noticeable effect of lateral salt-water migration has occurred in the "600-foot" sand. Analyses of water from wells south of the industrial district and screened in the "600-foot" sand show an increase in chloride content and indicate a progressive migration of salt water toward the industrial district. However, analyses of water from wells tapping the "600-foot" sand within the industrial district do not show an increase in the chloride content. The data necessary for precise mapping of the fresh- and salt-water interface in this and other sands of the Baton Rouge area are lacking. Although the rate of movement of the salt water is probably slow, the interface in some sands may be closer to pumped areas than is shown on the fence diagram (pl. 1).

Although large quantities of ground water are available in the area, detailed planning and proper development will be necessary to obtain maximum recovery from the aquifers without causing serious water-level declines and salt-water encroachment. Therefore, the basic-records

from 250 feet in northern West Baton Rouge Parish to 600 feet in the south-central part of the report area. Although the alluvial deposits pinch out at the edge of the Prairie terrace, the alluvial aquifer is in direct contact with the "400-foot" aquifer of earlier Pleistocene age (fig. 3).

Hydrologic properties. Water levels in wells screened in the alluvial deposits fluctuated with the river as shown by the hydrograph (fig. 4) for the Mississippi River and for well EB-242 (T. 8 S., R. 1 W.), which is 2.4 miles southeast and 1.9 miles north of the river and 4 miles downstream from the gaging station. (See pl. 2.) The hydrograph shows that during low-river stages the alluvium is discharging water into the river, and that during high-river stages the alluvium is recharged by the river. However, the principal source of recharge to the alluvial aquifer is rainfall.

The locations of wells screened only in the alluvial deposits in and near the industrial district are shown on figure 5. The yields from large-diameter wells range from 800 to 3,750 gpm. Well EB-586 (T. 7 S., R. 1 W.), which is owned by Louisiana State University, is the largest yielding (2,100 gpm) irrigation well in the area. One indication of a well's potential yield is its specific capacity, which is defined as the yield per unit drawdown (usually expressed in gallons per minute per foot of drawdown). The drawdown in a pumped well is caused by head losses in the aquifer resulting from flow in the aquifer toward the well and by well losses due to flow through the well screen and well casing. The well loss due to friction caused by flow through the casing is related to the rate of flow and to the diameter, length, and age of the casing. Therefore, if the well's yield and construction are known the observed specific capacity can be corrected for friction loss in the pipe. Corrected specific capacity is calculated by (1) determining the friction loss, according to standard pipe friction tables, produced by the flow of water through the well casing, (2) subtracting the friction loss from the observed drawdown, and (3) dividing the flow (in gallons per minute) by the corrected drawdown (in feet). Corrected specific capacities of wells in this aquifer range

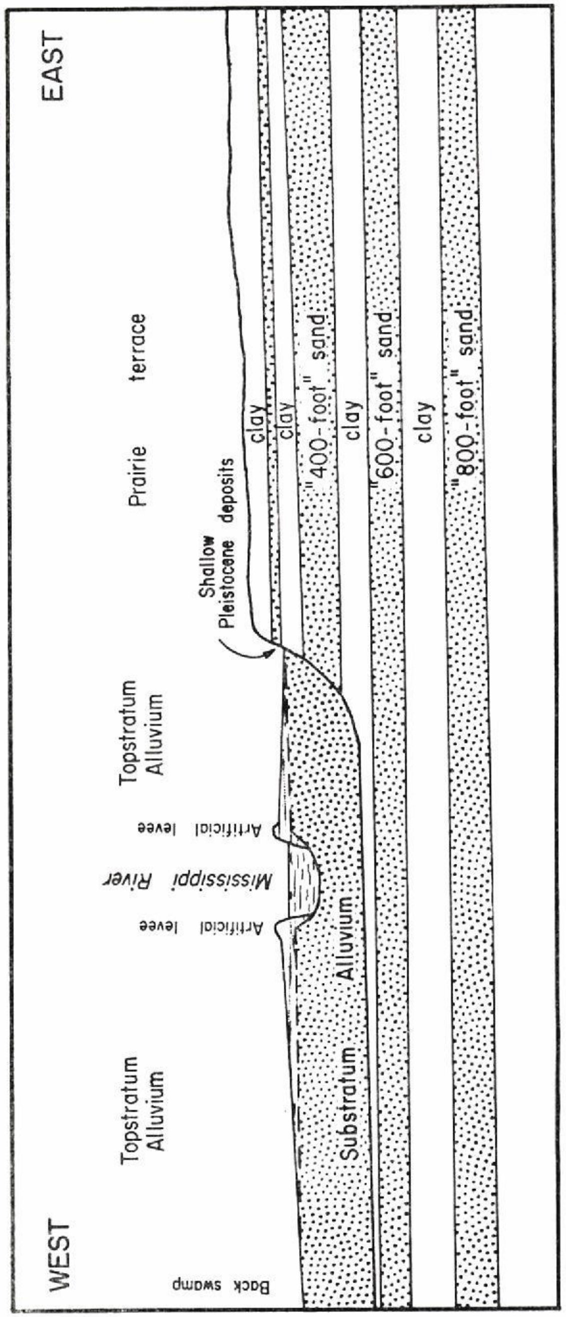

Figure 3. Generalized west-east section showing relation of alluvial deposits to older sediments in the vicinity of the Baton Rouge industrial district.

SUMMARY OF CONCLUSIONS

Fresh ground water in the Baton Rouge area is available from 12 named aquifers—alluvium, shallow Pleistocene deposits, "400-foot," "600-foot," "800-foot," "1,000-foot," "1,200-foot," "1,500-foot," "1,700-foot," "2,000-foot," "2,400-foot," and "2,800-foot" sands, which range in age from Pleistocene to Miocene.

The maximum depth of fresh ground water occurs in the eastern part of the area and is about 3,100 feet below mean sea level. The aggregate thickness of fresh-water-bearing sand in this part of the area is 1,700 feet. In the southern part of the project area most of the sands below the alluvium and the shallow Pleistocene deposits contain brackish or salt water.

The average yield of industrial and public-supply wells is 1,000 gpm (gallons per minute). A maximum yield of 3,750 gpm was pumped from an industrial well screened in the alluvial deposits.

The coefficient of transmissibility of aquifers in the Baton Rouge area ranges from a minimum of 22,000 gpd (gallons per day) per foot for the "1,200-foot" sand to a maximum of nearly 600,000 gpd per foot for the alluvial deposits.

Except for water from the alluvial deposits of the Mississippi River, water from wells in the Baton Rouge area is usually of the sodium bicarbonate type and is suitable for most purposes without treatment. Water from the alluvium is commonly hard and has a high iron content. However, wells adjacent to the river yield a mixture of river water and ground water.

Pumping from all aquifers in the Baton Rouge area has increased from 65 mgd (million gallons per day) in 1953 to 121 mgd in 1959, or 86 percent. However, 28 mgd of this total is temporary pressure-relief pumpage at the Port Allen locks; the balance is for industrial and public-supply purposes. The quantities of ground water pumped for domestic and stock purposes are negligible and are not considered in the total pumpage.

Even though the fresh-water-bearing sands of the

The total water-level decline in the "2,000-foot" sand since 1916 amounts to more than 200 feet (fig. 30). Nearly 160 feet of this decline has occurred since 1939, at an average rate of 8 feet per year. After a period of slight recovery in the late 1940's and early 1950's, water levels have declined at a rate of 13 feet per year as a result of increased withdrawals.

As of 1959, water levels in the "2,400-foot" sand were declining at the rate of 3.5 feet per year in the industrial district. The water-level decline in the "2,800-foot" sand has been about 4 feet per year since 1954.

Another important effect of water-level decline caused by continued withdrawals is the movement of the salt-water interface toward areas of heavy pumping.

from 75 to 94 gpm per foot of drawdown and average 80 gpm per foot of drawdown at an average yield of about 2,600 gpm (table 2).

The coefficient of transmissibility[1] of alluvial deposits in the industrial district ranges from 140,000 to 210,000 gpd per foot (table 2) and averages 170,000 gpd per foot. The average permeability[2] of the alluvial deposits in the industrial district is 1,700 gpd per square foot. The coefficient of storage[3] ranges from 1.0×10^{-2} to 9.0×10^{-4}. The coefficient of transmissibility of the alluvial deposits at the site of well EB-586 (T. 7 S., R. 1 W.) is 580,000 gpd per foot. The hydraulic characteristics of an aquifer—coefficients of transmissibility and storage—can be used to determine the theoretical effects of pumping, which were discussed by Meyer and Turcan (1955, p. 59-63).

Quality of water. The alluvium generally yields a hard[4] calcium bicarbonate type water of high iron content. The total iron and manganese content of the water is considerably more than the 0.3 ppm (part per million) recommended by the U.S. Public Health Service (1946, p. 13) as the maximum limit for drinking purposes. The total iron and manganese concentrations ranged from 0.72 ppm in water from well WBR-31 (T. 8 S., R. 12 E.) (table 1) to 18 ppm in water from well EB-501 (T. 6 S., R. 1 W.) (Meyer and Turcan, 1955, table 2). The hardness of water from the alluvium ranged from 123 ppm (WBR-31)

[1]The coefficient of transmissibility is defined as the number of gallons of water that will move in 1 day through a vertical strip of the aquifer 1 foot wide having the full height of the aquifer, under a hydraulic gradient of 1 foot per foot, at the prevailing temperature of the water.

[2]The field coefficient of permeability is expressed as the rate of flow in gallons per day through a cross-sectional area of 1 square foot under a hydraulic gradient of 1 foot per foot at the prevailing temperature of water.

[3]The coefficient of storage of an aquifer is defined as the volume of water it releases from or takes into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface.

[4]In this report, terms describing the general chemical character of water are used in particular senses, as in the following examples: (1) "alkaline" designates a water in which the pH or the hydrogen-ion concentration is more that 7.0; (2) "calcium bicarbonate" designates a water in which calcium and magnesium ranks first, in order of abundance, over sodium and potassium and bicarbonate is the predominant anion; (3) similarly, "sodium bicarbonate" designates a water in which sodium and potassium ranks first, in order of abundance, over calcium and magnesium; (4) the term "fresh water" designates a water in which the chloride content is less than 250 ppm; and (5) classifications of hardness of water are:

Classification	Hardness as $CaCO_3$
Soft	less than 50 ppm
Moderately hard	50 to 150 ppm
Hard	over 150 ppm

to 452 ppm (EB-586, T. 7 S., R. 1 W.). Although the highest chloride content of water reported herein was 126 ppm (WBR-51, T. 8 S., R. 12 E.), electrical logs of oil-test wells in the southern and southwestern corners of the area indicate that the basal part of the alluvial sands contains salt water (pl. 1). The chloride content of water from wells adjacent to the Mississippi River usually is less than 20 ppm.

Meyer and Turcan (1955, table 2) recorded a yearly temperature range from 59° to 74°F for water from a con-

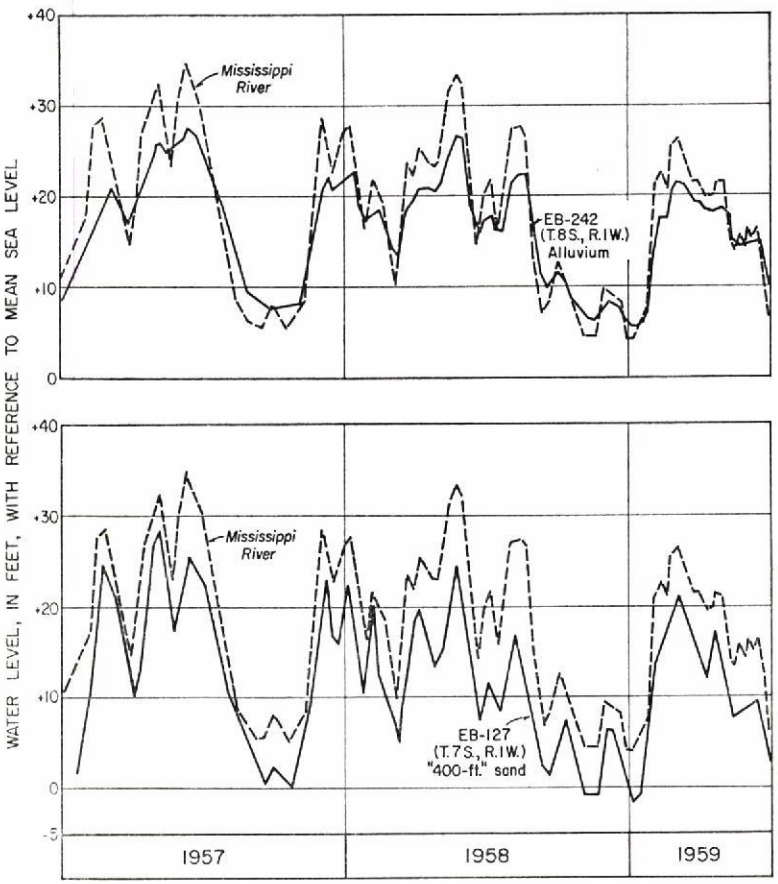

Figure 4. Hydrographs of water levels in the Mississippi River, Recent and Pleistocene alluvium, and "400-foot" sand in the Baton Rouge area.

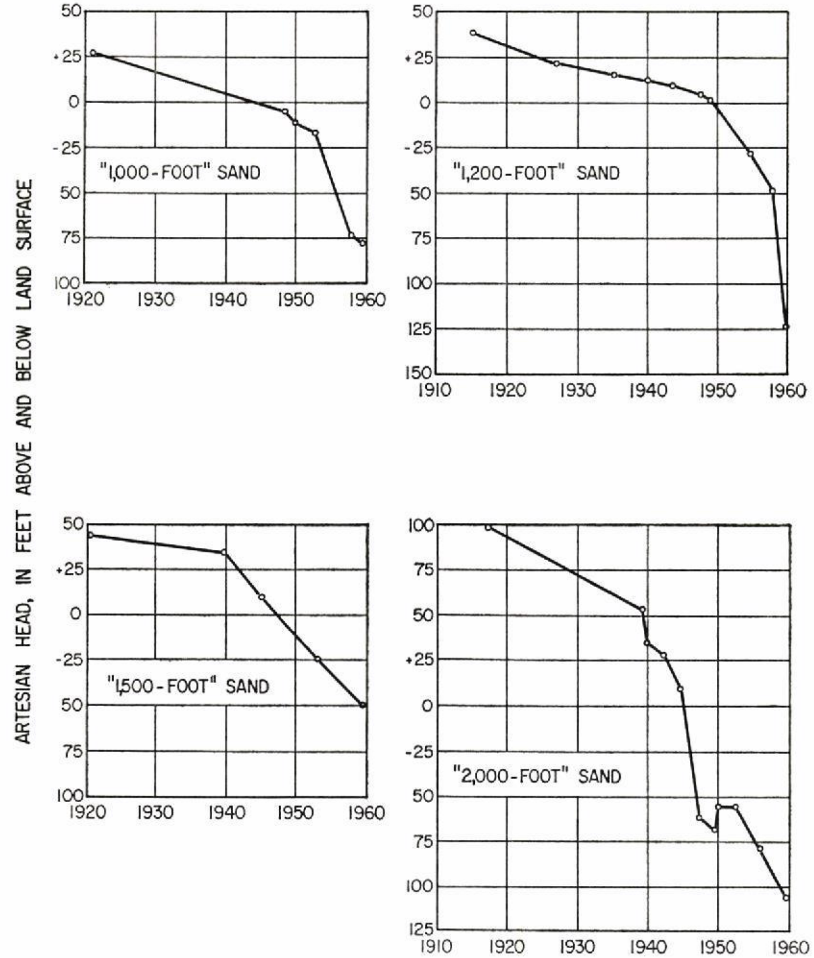

Figure 30. Hydrographs showing general decline of artesian head in selected aquifers in the center of pumping, 1910-59.

Water levels in the "1,500-foot" sand, which is mainly a source of water for public supply, have declined at an average rate of about 4 feet per year since 1939 (fig. 30).

The reported water-level decline in the "1,700-foot" sand since 1953 amounts to 4 feet per year. This rate of decline is the result of a slight increase in pumping from the "1,700-foot" sand and local connection with the "1,500-foot" sand.

EFFECTS OF WITHDRAWALS

Increased withdrawals have resulted in water-level decline in many of the aquifers of the Baton Rouge area; however, the "400-"and "600-foot" sands have shown a marked recovery trend.

A reduction in withdrawals of almost 10 mgd has resulted in a major recovery of water levels in the "400-" and "600-foot" sands. During the last 5 years (1954-59) the water level in a well screened in the "400-foot" sand in the industrial district has recovered 70 feet (fig. 11). The yearly high water level of the "600-foot" sand in 1958 was the highest since 1950. The highest water level in a well screened in both the "400-" and the "600-foot" sands in 1959 was the same as that in 1947. Since 1956 water levels in the "600-foot" sand in the industrial district have recovered at a rate of 7 feet per year.

The "800-foot" sand locally is connected with the "600-foot" sand and the water levels in this sand are similar to that in a nearby well screened in the "600-foot" sand. (See fig. 14.) Because of the nearly uniform pumpage from the "800-foot" sand, there has been no reported serious water-level decline in the industrial district.

The general trend of water levels in the "1,000-foot," "1,200-foot," "1,500-foot," and "2,000-foot" sands in the center of pumping is roughly similar (fig. 30), showing a gradual decline until 1939 and then a rapid decline. These water levels were not measured in any one well but were averaged from reported and measured water levels in a number of wells in the industrial district. Although withdrawals from the "1,000-foot" sand have remained nearly the same over the last few years, water levels have continued to decline (fig. 30) at a rate of about 7 feet per year since 1950. The rate of water-level decline in wells screened in the "1,000-foot" and "1,200-foot" sands is nearly the same because of their hydraulic connection. The water levels in the "1,200-foot" sand have declined from about 12 feet above the land surface in 1939 to about 125 feet below the land surface in 1959. The most pronounced decline occurred in the period 1958-59, when the water level declined 75 feet from a level of 50 feet below the land surface.

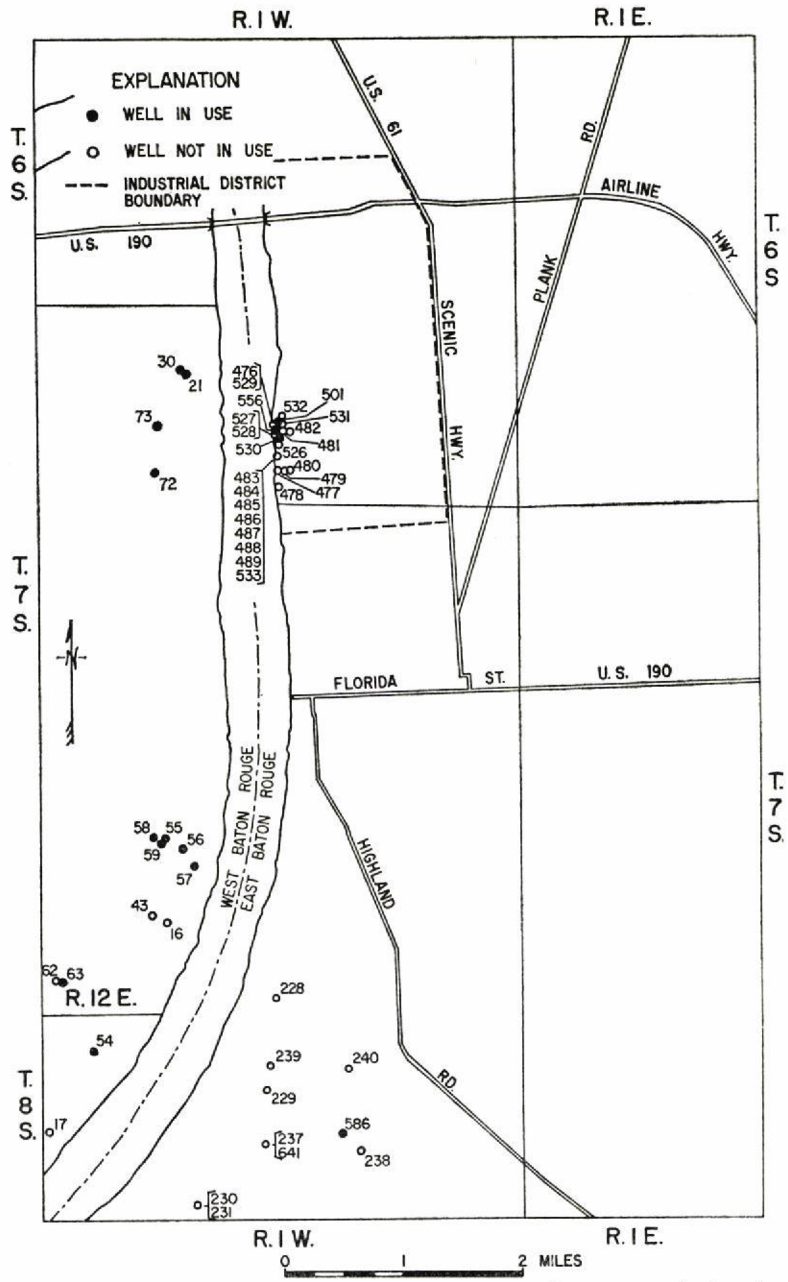

Figure 5. Map showing location of wells screened in the alluvial deposits of Pleistocene age in and near the Baton Rouge industrial district.

tinuously pumped well tapping alluvium (EB-501, T. 6 S., R. 1 W.) on the east bank of the Mississippi River. As distance from the river increases, the magnitude of the yearly temperature variation of well water decreases. Generally the average temperature of water from wells screened in the alluvial deposits is below 70°F.

Withdrawals. Excluding the temporary pressure-relief pumping at the site of the Port Allen locks, it is estimated that in 1959 the daily pumpage from the alluvial deposits was 1.3 mgd. Industries in East Baton Rouge Parish use water from the alluvial deposits for cooling during the warm months. In the cooler months, when the temperature of the river water is below that of the water in the alluvium, river water was used. The maximum amount of water pumped from the alluvium for industrial purposes was about 6 mgd (based on a 31-day period) in October 1956.

Addis is the only municipality in the area that used water from the alluvium. The water-supply system at Addis consists of two wells (WBR-8 and -19, T. 8 S., R. 12 E.), both 232 feet deep.

Many domestic, stock, and irrigation wells are screened in the alluvial sands (table 3). It is estimated that 0.7 mgd of ground water is pumped for these purposes in East Baton Rouge and West Baton Rouge Parishes.

At the Port Allen locks, which are being constructed by the Corps of Engineers, U.S. Army, water is pumped from the alluvium to lower the hydrostatic level so that construction work below river level may proceed without danger of being inundated. In June 1958, a maximum of 47 mgd was pumped (fig. 6) and the average daily pumpage in 1959 was 28 mgd. The total amount of water pumped from 32 temporary wells, 8 permanent wells, and approximately 1,000 dewatering points at this site during the period September 1957, when pumping started, to July 1959 is estimated to be 16.5 billion gallons, or an average of 22 mgd. When construction is completed, 8 wells will be used, during high river stage, to reduce the hydrostatic pressure.

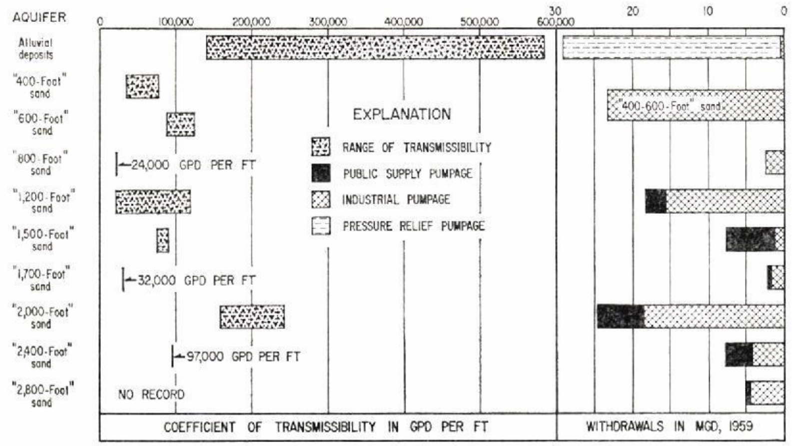

Figure 29. Graphs showing coefficients of transmissibility of and withdrawals from major water-bearing sands of the Baton Rouge area.

in 1953 to about 69 million gallons in 1959. The greatest increase in withdrawals was from the "1,200-foot," "1,500-foot," "2,000-foot," "2,400-foot," and "2,800-foot" sands. Average daily withdrawals from the "1,200-foot" sand have increased from 2.5 million gallons in 1953 to 18.2 million gallons in 1959. Average daily withdrawals from the "1,500-foot" sand, which is utilized mainly as a source of water for public supply, have increased from 5 million gallons to 7.5 million gallons. Average daily withdrawals from the most heavily pumped "deep" aquifer, the "2,000-foot" sand, have increased from 14.5 million gallons to 24.5 million gallons. Withdrawals from the "2,400-foot" sand, although 2.2 mgd greater in 1959 than in 1953, have decreased 2.7 mgd from a peak of 10.4 mgd in 1956. Since 1953, pumping from the "2,800-foot" sand has increased from 1 mgd to 5 mgd.

From 1953 to 1959 the average daily withdrawals of water from the "800-foot," "1,000-foot," and "1,700-foot" sands have been approximately the same. Withdrawals from the "800-foot" sand increased from 1.5 mgd to 2.0 mgd; those from the "1,000-foot" sand increased from 1.7 mgd to 2.0 mgd; and those from the "1,700-foot" sand increased from 1.4 mgd to 2.0 mgd.

transmissibility and the lowest rate of withdrawal, excluding the temporary pumping at the site of the Port Allen locks. Thus, the alluvium is considered to be a large potential source of ground water in the Baton Rouge area.

Pumpage from the alluvium for industrial and public supplies has decreased from a maximum of 6 mgd in October 1956 to about 1.3 mgd in 1959. Domestic and irrigation utilization amounts to approximately 0.7 mgd and industrial pumpage to 0.6 mgd. Pumpage at the Port Allen lock project during the first half of 1959 averaged 28 mgd.

Withdrawals from the "400-" and "600-foot" sands have decreased by 9 mgd since 1953. In that year a daily average of about 32 million gallons, or almost 50 percent of the total daily average pumpage of 65 million gallons for the Baton Rouge area, was pumped from these sands. During the first half of 1959, an average of 22.9 mgd, or about 19 percent of the total daily average pumpage of 121 million gallons, was pumped from these sands.

The average daily withdrawals from the aquifers below the "600-foot" sand increased from 33 million gallons

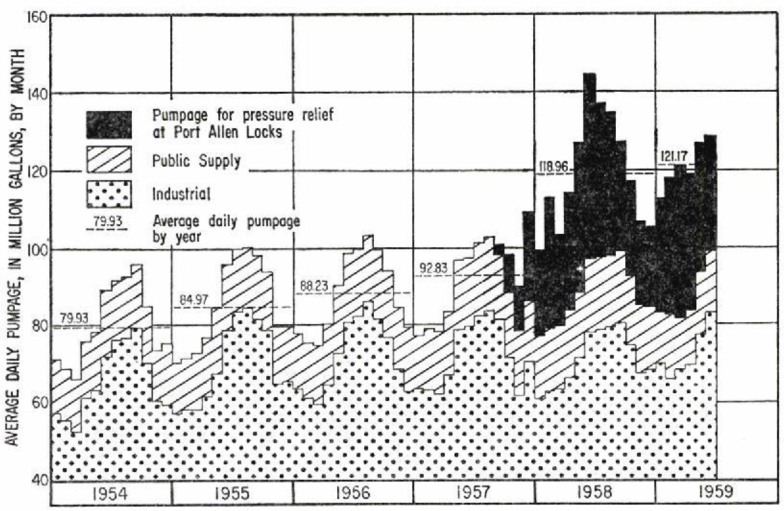

Figure 28. Total ground-water pumpage in the Baton Rouge area, 1954-59.

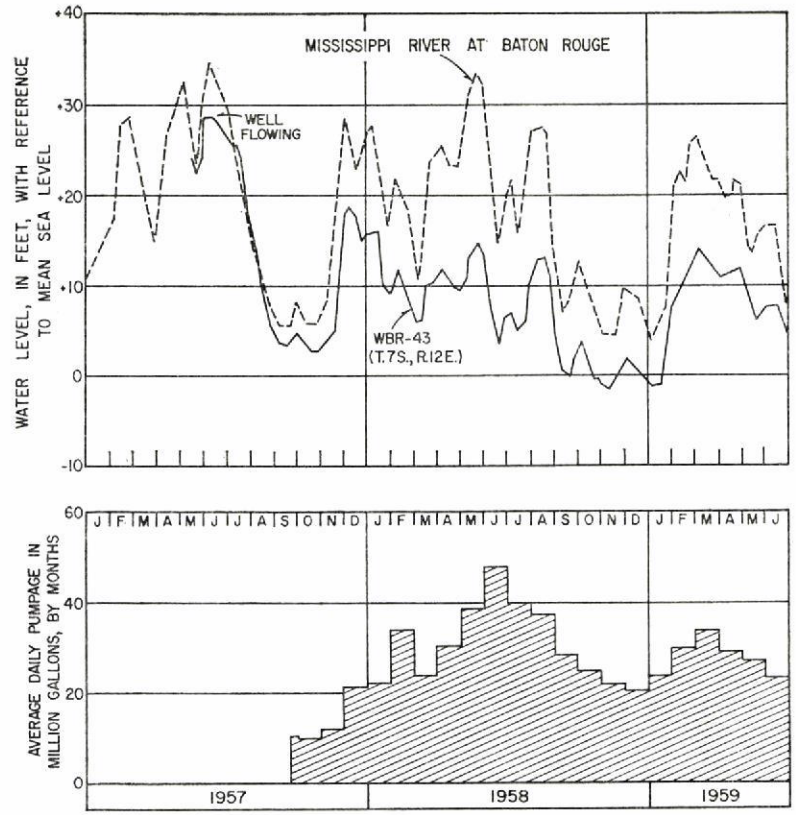

Figure 6. Graphs showing relation of pumpage to water levels in wells screened in the alluvial deposits, Port Allen locks, West Baton Rouge Parish.

Effects of pumping. Drawdown caused by large-scale withdrawal from alluvial sands and gravels, such as at the Port Allen locks, induces influent seepage from the Mississippi River. This boundary (the river) causes the cone of depression affected by large withdrawals to reach equilibrium in form during an early period of pumping. Because river water contains lower concentrations of iron and hardness-causing constituents than water in the alluvium, the quality of the water improves with increased influent seepage from the river. Except for the Port Allen locks area, water levels in most wells screened in the alluvial deposits in the Baton Rouge area have not been affected noticeably by pumping and are usually within 20 feet of the surface. As shown by the hydrograph for well WBR-43, about 0.5 mile from the locks (fig. 6), pumping during the period June 1957-July 1959 at the Port Allen locks in an area of about 2 square miles caused a decline of the water level and increased the quantity of influent seepage. Hydrographs for wells EB-242 and -127, and the river (fig. 4) show the effect of changes in river stage on the water levels in wells some distance from the area of heavy withdrawals.

SHALLOW PLEISTOCENE DEPOSITS

Physical properties. "Shallow Pleistocene" aquifers underlie part of the upland Prairie terrace region of East Baton Rouge Parish, south of the boundary line of T. 6 S. and T. 7 S. The shallow Pleistocene deposits usually are within 200 feet of the surface except in the extreme southeastern corner of the project area where these sands extend to a depth of 450 feet below land surface. As illustrated on plate 1, the shallow Pleistocene deposits are irregular in occurrence and thickness. A mechanical analysis (fig. 7) of sand between depths of 279 and 289 feet in well EB-681 (T. 8 S., R. 2 E.) shows the sand to be medium to coarse grained.

Hydrologic properties. The shallow Pleistocene deposits are recharged by seepage from surface-water bodies and from precipitation on the land surface. Natural discharge takes place at lower elevations in the form of springs and seeps along streams.

Well EB-681 yields 85 gpm with a drawdown of 22.41 feet (table 2). The specific capacity of this well, corrected for head loss due to friction, is 4.0 gpm per foot of drawdown. The location of wells screened in shallow Pleistocene deposits in and near the Baton Rouge industrial district is shown on figure 8.

Quality of water. Several individual sands are grouped within the shallow Pleistocene deposits and the chemical quality of the water in them varies areally. The sand that underlies the city of Baton Rouge yields hard water of the calcium bicarbonate type, as shown by the chemical anal-

WITHDRAWALS AND THEIR EFFECTS

PUMPAGE

As shown by the following table of estimated pumpage for 1953 and the first 6 months of 1959, the average ground-water pumpage has increased by about 56 mgd.

AVERAGE GROUND-WATER PUMPAGE

Gallons per day

Aquifer	1953	1959
Alluvium	Negligible	29,300,000[5]
Shallow Pleistocene deposits	do.	Negligible
"400-" and "600-foot" sand	31,900,000	22,900,000
"800-foot" sand	1,500,000	2,000,000
"1,000-foot" sand	1,700,000	2,000,000
"1,200-foot" sand	2,500,000	18,200,000
"1,500-foot" sand	5,000,000	7,500,000
"1,700-foot" sand	1,400,000	2,000,000
"2,000-foot" sand	14,600,000	24,500,000
"2,400-foot" sand	5,500,000	7,700,000
"2,800-foot" sand	1,000,000	5,000,000
	65,100,000	121,100,000

The demand for additional quantities of ground water during the period 1954-59 is illustrated graphically by figure 28. The pumpage for the purpose of pressure relief at the site of the Port Allen locks amounted to about 28 mgd during 1959. Of the remaining 93 mgd pumped during the first half of 1959, an average of 72 mgd was by industries and 21 mgd was for public supply. Domestic, stock, and irrigation pumping contributed little to the total pumpage and is not included in the total.

The quantity of water pumped from the aquifers and the coefficients of transmissibility of aquifers in the Baton Rouge area are shown on figure 29. On the basis of the Theis nonequilibrium formula (Wenzel, 1942, p. 88) and the assumption that the drawdown in a well screened in an artesian aquifer is constant, the yield from an infinite, homogeneous, and isotropic aquifer is directly proportional to the coefficient of transmissibility. Consequently, the higher the coefficient of transmissibility the larger the potential theoretical yield from the aquifer. As shown, the alluvial deposits have the highest coefficient of

[5]Includes 28 mgd of pumping by the Corps of Engineers, U.S. Army for "pressure relief" at the Port Allen locks.

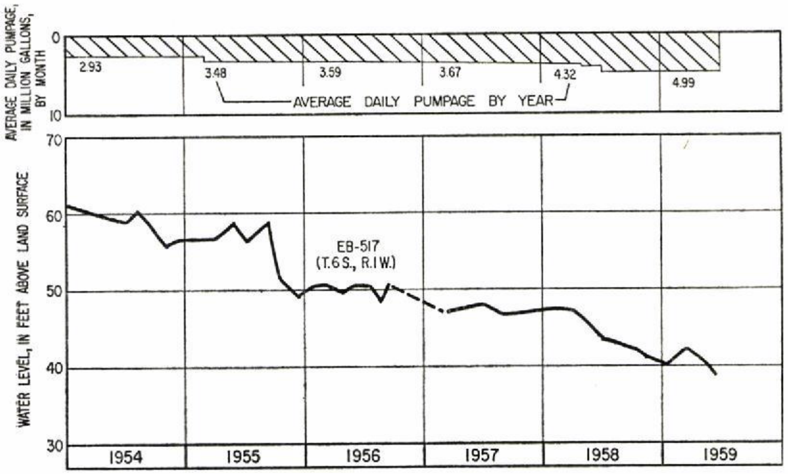

Figure 27. Graphs showing relation of pumpage to water level in a well screened in the "2,800-foot" sand in the Baton Rouge area.

dustries; the remaining 10 percent is used for public supply in Zachary and areas surrounding the city of Baton Rouge.

The relation of pumpage to water-level fluctuations in a well screened in the "2,800-foot" sand near the northern boundary of the industrial district is shown on figure 27. Water from one of three domestic wells in the area (EB-378, T. 6 S., R. 1 E.) is used as a source of heat for a home.

Effects of pumping. Water levels in the "2,800-foot" sand near the northern boundary of the industrial district have declined at a rate of 4 feet per year since 1954. (See fig. 27.) However, static water levels within the industrial district are still above land surface and various quantities of water flow from the wells. As discussed in the section on "Quality of water," the chloride content in water from the "2,800-foot" sand in the industrial district has increased slightly with continued and increased pumping.

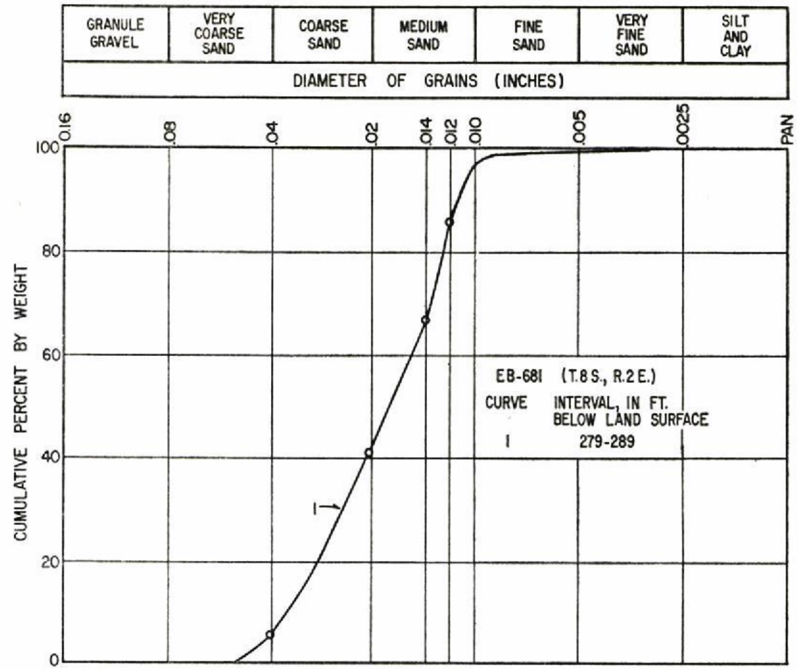

Figure 7. Cumulative curve of mechanical composition of materials from the shallow Pleistocene deposits.

yses (table 1) of water from wells EB-665 (T. 7 S., R. 1 E.) and -687 (T. 6 S., R. 1 E.). The total iron content in water from these wells averages 1.5 ppm. Although the dissolved-solids content of water from well EB-665 was 508 ppm, the individual constituents were not abnormally high. The pH ranges from 6.8 (EB-687) to 7.3 (EB-665). The water from well EB-665 has a temperature of 68°F, which is the average annual temperature of Baton Rouge. Waters having similar chemical constituents are found in the two "shallow Pleistocene" sands in the southeastern part of the project area. The water generally is alkaline, moderately hard, and of sodium bicarbonate type. The iron and manganese concentrations ranged from 0.12 ppm in water from EB-681 (T. 8 S., R. 2 E.) to 0.66 ppm in water from EB-583 (T. 7 S., R. 1 W.). The dissolved-solids content ranged from 277 ppm (EB-599, T. 8 S., R. 3 E.) to 503 ppm (EB-631A, T. 8 S., R. 2 E.). The temperatures of

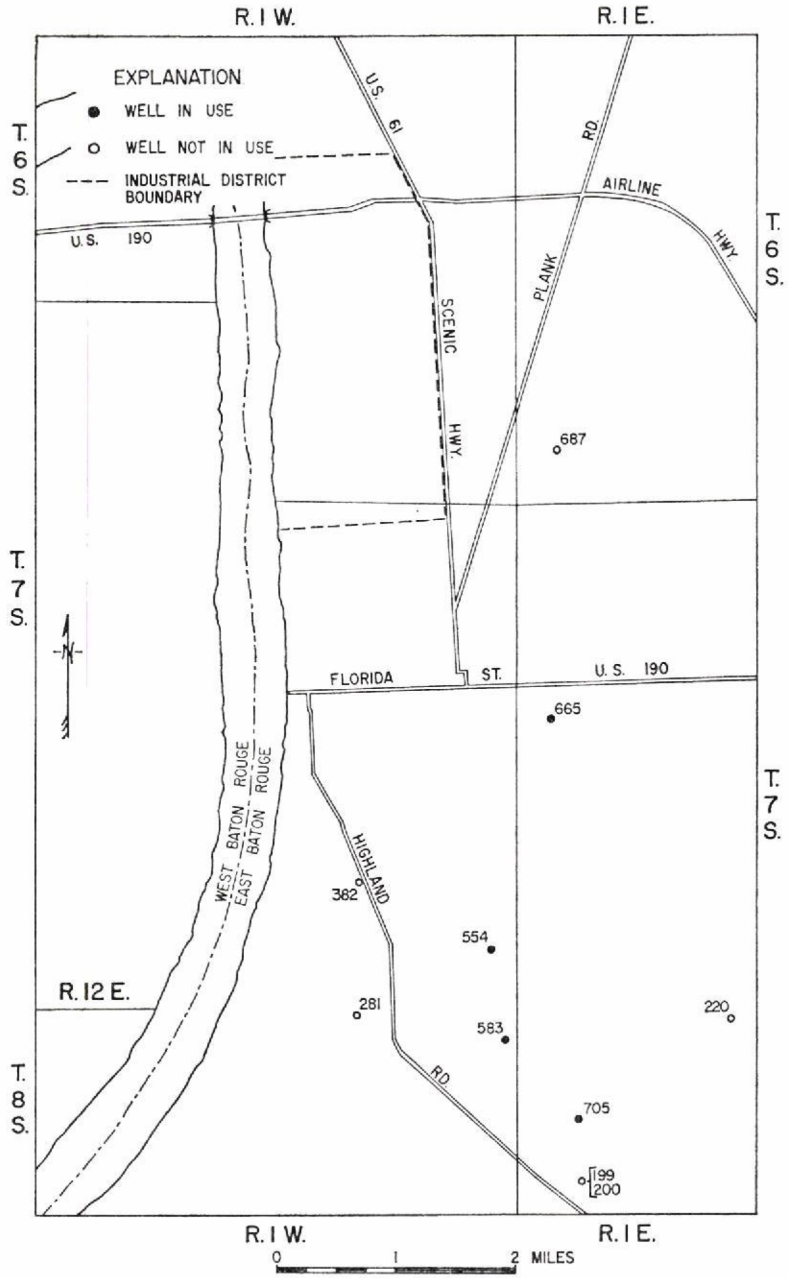

Figure 8. Map showing location of wells screened in the shallow Pleistocene deposits in and near the Baton Rouge industrial district.

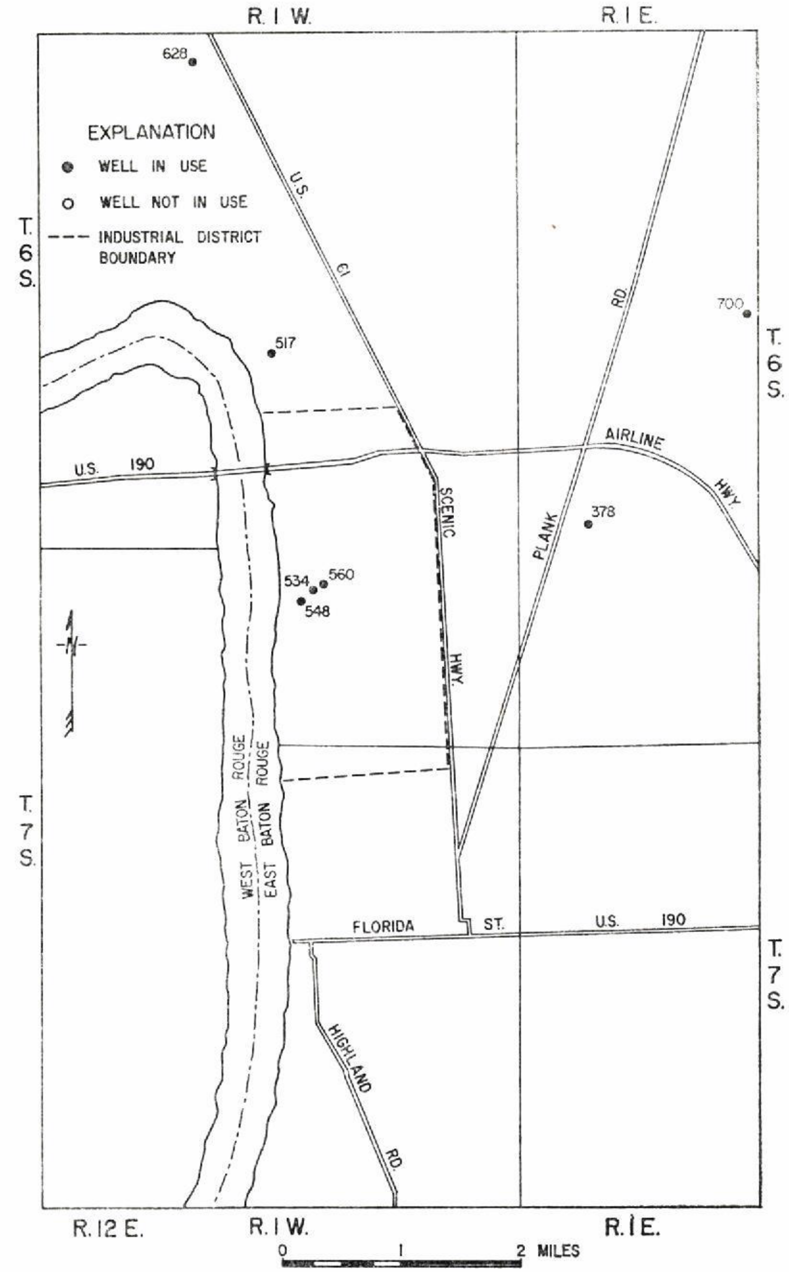

Figure 26. Map showing location of wells screened in the "2,800-foot" sand in and near the Baton Rouge industrial district.

sand grains are poorly sorted, and range in size from fine to coarse, and occasionally to very coarse, sand.

Hydrologic properties. Of the 18 wells screened in the "2,800-foot" sand in the project area (table 3), 17 are in use. At present (1959) 5 industrial wells (EB-534, -548, -560, -628, and -645) are screened in this aquifer. The locations of wells that tap this unit in and near the Baton Rouge industrial district are shown on figure 26. The wells that tap the "2,800-foot" sand flow but they are equipped with pumps in order that additional quantities of water can be obtained. Well EB-700 (T. 6 S., R. 1 E.), 3 miles northeast of the industrial district, had an artesian flow of 900 gpm in 1959. The yields of pumped wells in the industrial district ranged from 1,150 to 1,800 gpm, and averaged 1,500 gpm. Specific capacities of three wells, corrected for pipe friction loss, are 18.5 (EB-534, T. 6 S., R. 1 W.), 27.0 (EB-581, T. 5 S., R. 2 E.), and 58.9 (EB-645, T. 5 S., R. 1 W.) gpm per foot of drawdown (table 2). Wells were not available for pumping tests, and hence the hydraulic characteristics of this sand have not been determined.

Quality of water. The "2,800-foot" sand yields water that is soft, alkaline, and of sodium bicarbonate type. (See table 1.) The total iron content ranged from 0.03 to 0.14 ppm; water in the basal unit of the "2,800-foot" sand is brackish in the industrial district and becomes more mineralized toward the south and west (pl. 1). It has been reported that the chloride content in water from one well (EB-534) increased during the period 1955-59 from 33 to 72 ppm. This slight increase in chloride content is probably the result of the vertical movement of brackish water from the basal part of the "2,800-foot" sand and through the intervening clay layer. As the hydrostatic pressure in the upper part of the "2,800-foot" sand decreases with increased pumping, the quantity of brackish water moving into the upper zone may increase. Temperatures of the water within the industrial district range from 96° to 97°F.

Withdrawals. Pumping from the "2,800-foot" sand has increased from an average of 2.9 mgd in 1954 to 5 mgd in 1959. Over 90 percent of the water pumped is used by in-

the water from wells in southeastern Baton Rouge area range from 69° to 71°F.

The thermal gradient of water from wells in the Baton Rouge area increases by 1°F for about each 90-foot increase in depth. The temperature of water from a well screened at a given depth below 100 feet can be estimated by multiplying the well's depth by the ratio of 1°F per 90 feet and adding the result to the mean annual temperature (68°F). This relation of water temperature to well depth and mean annual temperature is not applicable to the temperature of water from alluvial deposits.

Withdrawals. The "shallow Pleistocene" sands have become important as a source of water for domestic use because of increased needs of the rural population. Small industries in the city of Baton Rouge use water from these sands for washing and cooling purposes; and several privately owned wells yield water for air conditioning and lawn irrigation. The quantity of water pumped from these deposits is negligible and is not considered in the total pumpage figures.

Effects of pumping. As only small amounts of water are pumped from the "shallow Pleistocene" sand, water levels have remained within 20 feet of the surface. In the southernmost part of the area, where brackish water exists at the base of the sand, increased pumping could cause salt water to move toward areas of heavy withdrawals and thus limit the development of this aquifer.

"400-FOOT" SAND

Physical properties. The "400-foot" sand (aquifer) of the Baton Rouge area, which consists of several individual but connected sands, underlies East Baton Rouge Parish and much of West Baton Rouge Parish. As shown on plate 1, the thickness of this unit ranges from 50 feet to 300 feet. Within the industrial district this aquifer ranges in thickness from 75 to 200 feet but is lenticular and is divided into two recognizable sands. (See well 35, pl. 1.)

Sediments of the "400-foot" sand in the industrial district range in grain size from fine to medium. The source of the grain-size analyses of this aquifer and other deposits is Meyer and Turcan (1955), unless otherwise noted. Cumulative curves (fig. 9) of mechanical composition of material from well EB-638 (T. 7 S., R. 1 E.) show a range in grain size from medium to coarse.

The "400-foot" sand in some places is connected with the alluvial deposits or the "600-foot" sand. The "400-foot" sand is hydraulically connected with the alluvium (pl. 1 and fig. 4) near the western edge of the terraced upland in East Baton Rouge Parish, and with the "600-foot" sand in the southern part of both parishes.

Hydrologic properties. Many of the wells screened in the "400-foot" sand are screened also in the "600-foot" sand. The location of "400-" and "600-foot" wells in and near the Baton Rouge industrial district is shown on figure 10. The yields of large-diameter (8 inches or more)

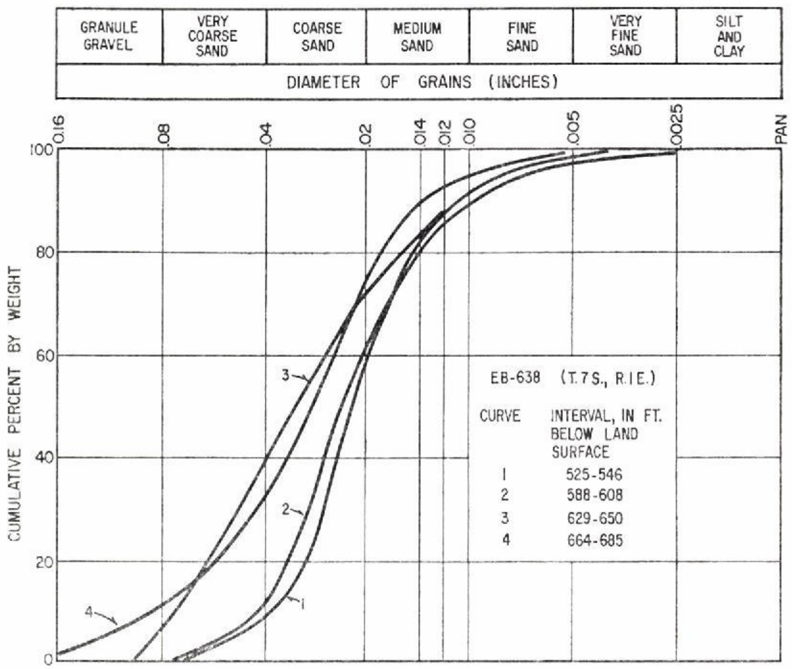

Figure 9. Cumulative curves of mechanical composition of materials from the "400-foot" sand in the Baton Rouge area.

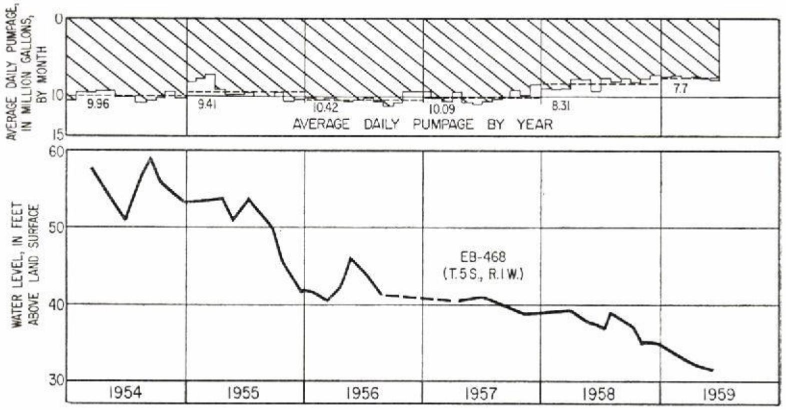

Figure 25. Graphs showing relation of pumpage to water level in a well screened in the "2,400-foot" sand in the Baton Rouge area.

gradually; however, in the early part of 1958, pumping from nearby public-supply wells increased. Along with the reduction in regional pumpage since 1956 has come a decrease in the rate of water-level decline to about 4 feet per year. However, in a 15-month period (April 1958-June 1959) the decline was about 8 feet.

"2,800-FOOT" SAND

Physical properties. The "2,800-foot" sand underlies the project area and includes all fresh-water-bearing sands below the "2,400-foot" sand (pl. 1). In southeastern East Baton Rouge Parish this aquifer is connected with the "2,400-foot" sand. The maximum thickness of the unit occurs in the eastern part of the report area, where three separate sands of the "2,800-foot" aquifer have a combined thickness of 350 feet. In the industrial district this aquifer has two sand units, an upper fresh-water-bearing sand bed about 90 feet thick, and a lower sand bed about 100 feet thick. The quality of water in the lower sand grades from fresh at the top to more mineralized at the bottom. West of the industrial district, the clay bed between the two sands is absent and the lower part of the aquifer contains brackish water, which could locally contaminate large-capacity wells.

The color, yellowish-gray, is similar to that of the shallower Miocene, Pliocene(?), and Pleistocene sands. The

A recovery test was made in well EB-572 (T. 6 S., R. 1 W.). The coefficient of transmissibility computed from the observed data is 97,000 gpd per foot. The thickness of the sand at the well was 163 feet; thus, the coefficient of permeability is 590 gpd per square foot.

Quality of water. Chemical analyses (table 1) of water collected from 7 wells screened in the "2,400-foot" sand indicate the water to be soft, alkaline, and of sodium bicarbonate type and suitable for most purposes. Except for well EB-578A (T. 4 S., R. 1 W.) at Zachary, which yielded water containing 0.86 ppm iron, the total iron in water from the "2,400-foot" sand ranged from 0.04 to 0.30 ppm. The chloride content of the water sampled ranged from 3.2 to 5.8 ppm (table 1); however, electrical logs of oil-test wells in the southern part of the area (pl. 1) show brackish water in this sand. The temperature of water from the "2,400-foot" sand in the project area ranges from 92° to 94°F.

Withdrawals. Withdrawals from the "2,400-foot" sand have decreased from a high of 10.4 mgd in 1956 to 7.7 mgd in the first half of 1959. During the period 1954-59, pumpage for industrial use decreased from 7.5 to 4.4 mgd, whereas the amount used for public supply at Baker, Zachary, and Baton Rouge increased from 2.5 to 3.3 mgd. The relation of pumpage to water level in a well screened in this sand northeast of the industrial district is shown on figure 25.

Effects of pumping. As shown by the records (table 3) for well EB-370 (T. 6 S., R. 1 W.) for the period 1944-59, the long-term water-level decline in the "2,400-foot" sand in the industrial district has been 3.5 feet annually. In April 1959, the reported static water level in this well was 77 feet below land surface. The water levels in well EB-468 (T. 5 S., R. 1 E.), 4 miles northeast of the industrial district, show graphically the effects of regional and local changes in pumping from the "2,400-foot" sand. (See fig. 25.) During the period March 1954 to May 1956 the water level in this well declined at a rate of 6.5 feet per year owing to pumping from wells in the industrial district. Beginning in 1956 pumping from industrial wells decreased

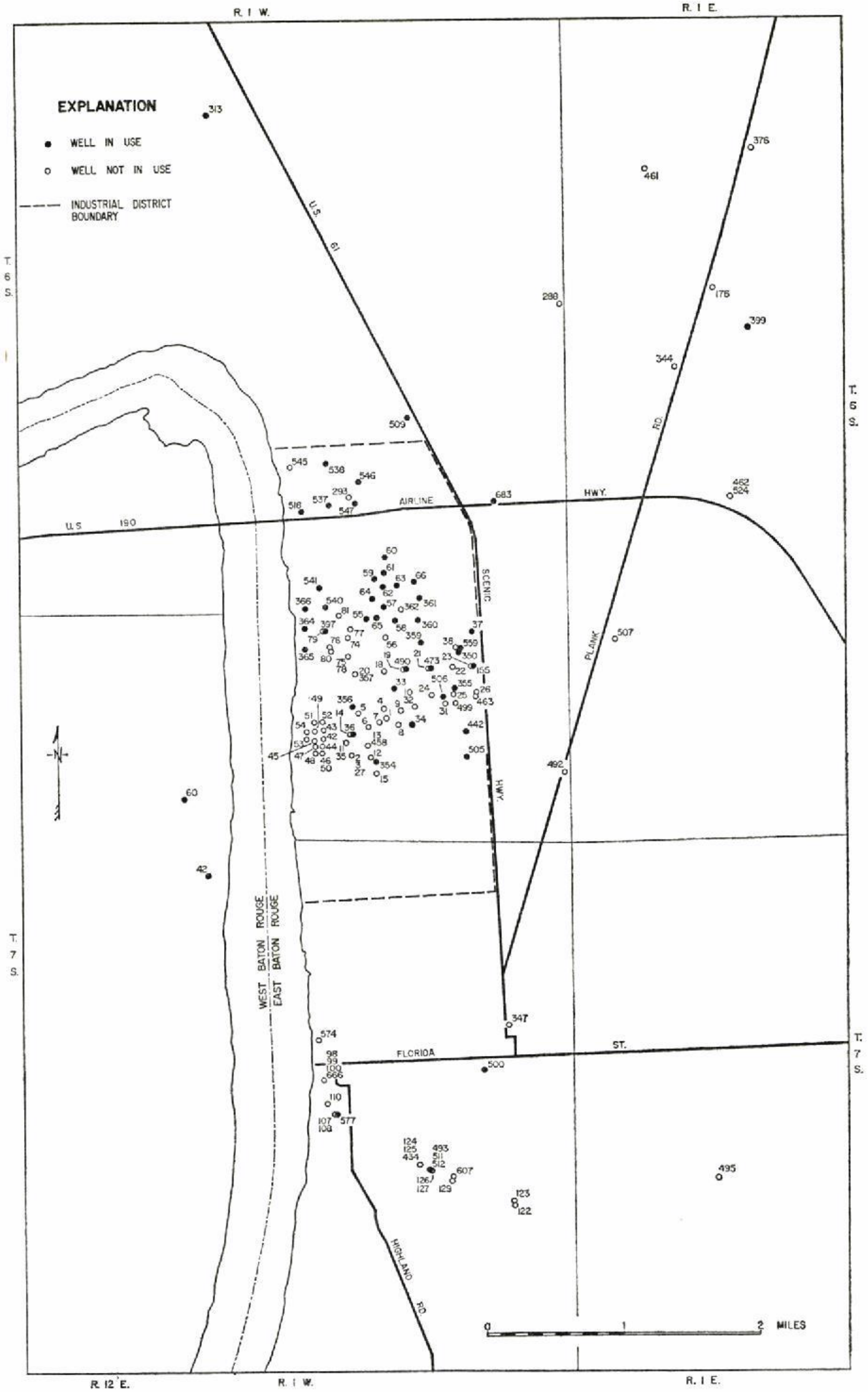

Figure 10. Map showing location of wells screened in the "400-foot" sand, "600-foot" sand, and "400-foot" and "600-foot" sands in and near the Baton Rouge industrial district.

industrial wells screened only in the "400-foot" sand range from 500 to 1,600 gpm. Uncorrected specific capacities of wells in the industrial district range from 13.5 to 45.3 gpm per foot of drawdown. One large-diameter well southeast of Baton Rouge (EB-638, T. 7 S., R. 1 E.) has a specific capacity, corrected for losses due to pipe friction, of 39.6 gpm per foot of drawdown at a yield of 250 gpm (table 2).

The coefficient of transmissibility of the "400-foot" sand (table 2) ranges from 34,000 to 77,000 gpd per foot. The coefficient of permeability ranges from 260 to 530 gpd per square foot and averages 360 gpd per square foot. The coefficient of storage ranges from 2.6 X 10^{-4} to 9.5 X 10^{-4}.

The effect of hydraulic connection between the alluvium and the river is shown by the hydrographs (fig. 4) of the river and well EB-127 (T. 7 S., R. 1 W.) screened only in the "400-foot" sand. There is a slight time lag in the fluctuations of water level in this well but the magnitude of the fluctuations is nearly the same as the changes in the river stage. As shown by these graphs (fig. 4) the Mississippi River discharges at varying rates water into the aquifer.

Quality of water. Water from the "400-foot" sand is of the soft, alkaline, and of sodium bicarbonate type and has a total iron content ranging from 0.04 to 0.57 ppm. Except for water from wells in the southern part of the area in which the chloride content was as much as 113 ppm, the average chloride content of water from wells in this aquifer was less than 8.0 ppm. Periodic and random sampling did not indicate any movement of salt water in this aquifer. Because of its low temperature, water from the "400-foot" sand is used for cooling. The average temperature of water from the "400-foot" sand in the industrial district is 71°F, whereas the temperature of water from wells in the southeastern part of the area is 73°F.

Withdrawals. Because of the large number of wells screened in both the "400-foot" and the "600-foot" sand, it is impossible to compute pumpage by aquifer. Much of the water for industrial use from the "400-" and "600-foot" sands is pumped during the period May to October. Pump-

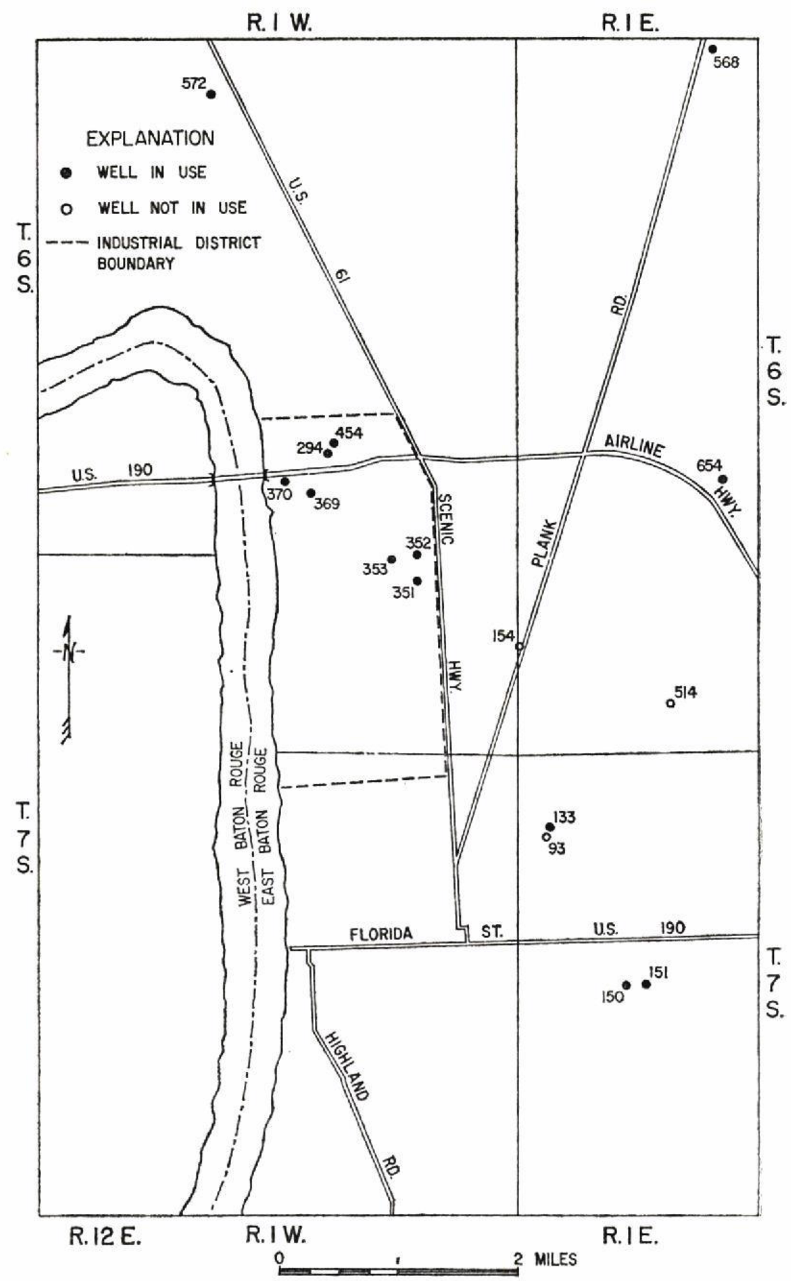

Figure 24. Map showing location of wells screened in the "2,400-foot" sand in and near the Baton Rouge industrial district.

period Jan. 1954-June 1959. This well is immediately southeast of the industrial district but is in an area where several nearby public-supply wells produced from the "2,000-foot" sand. Since 1957 pumping from nearby wells decreased drastically and the subsequent fluctuations in this well primarily are the result of regional withdrawals. During 1958-59 the annual rate of decline in this well decreased to 4 feet. The rate of decline during the same 2 years in well EB-297 (T. 6 S., R. 1 W.), located along the northern perimeter of the industrial district, was 5 feet per year (fig. 23). If pumping continues to increase, water levels will continue to decline at a comparable rate; however, if withdrawals are stabilized, the rate of decline will decrease and water levels will approach equilibrium.

"2,400-FOOT" SAND

Physical properties. With the exception of a small area west of the industrial district, the "2,400-foot" sand underlies most of the project area. The thickness of the "2,400-foot" sand ranges from 80 feet in northwestern East Baton Rouge Parish to 250 feet in northeastern East Baton Rouge Parish. In southeastern East Baton Rouge Parish this aquifer is connected with the "2,800-foot" sand (pl. 1).

Cumulative curves of material from the "2,400-foot" sand show it to be fine- to medium-grained, containing lenses of coarse sand. The olive-gray to yellowish-gray color is similar to that of the "2,000-foot" and "2,800-foot" sands.

Hydrologic properties. As of June 1959, a total of 25 wells screened in the "2,400-foot" sand were in use. (See table 3.) Three of these wells are screened in more than one sand. Wells screened in the "2,400-foot" sand in and near the industrial district are shown on figure 24.

The yields of 6 industrial wells screened only in the "2,400-foot" sand range from 600 to 1,470 gpm and average 1,000 gpm. Specific capacities of 3 wells, corrected for head loss due to pipe friction, range from 15.9 to 45.5 gpm per foot of drawdown (table 2).

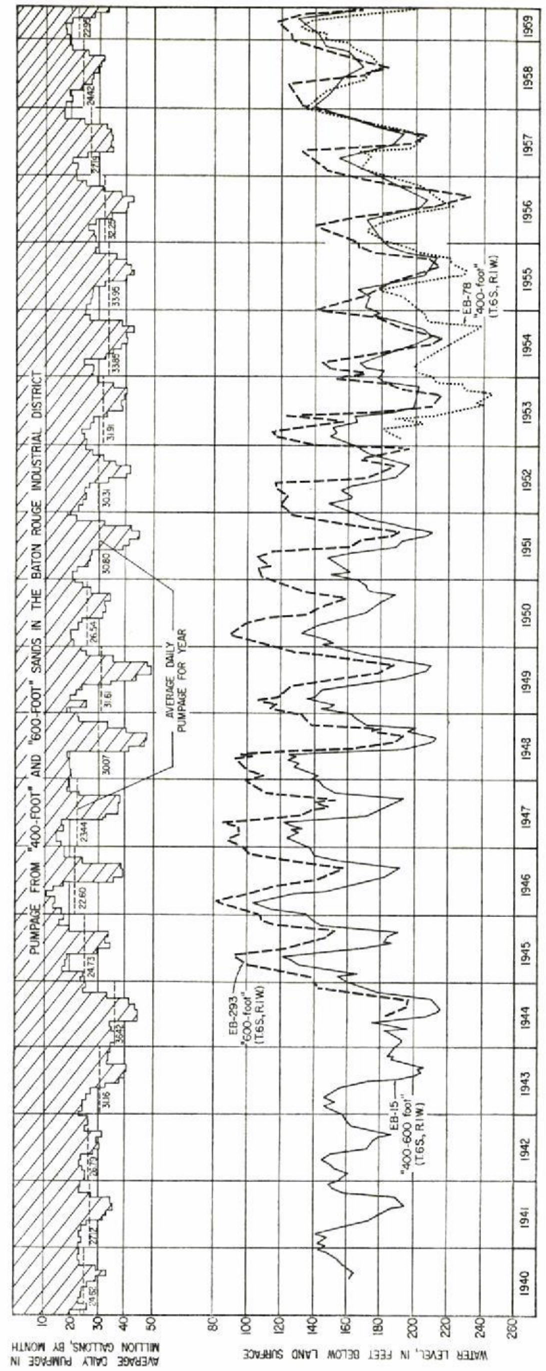

Figure 11. Graphs showing relation of pumpage to water levels in wells screened in the "400-foot" and "600-foot" sands in the Baton Rouge industrial district.

ing for industrial purposes decreases in October and reaches a minimum during the winter. The maximum daily pumpage by year was during the latter part (1944) of World War II, when an average of 36.4 mgd was pumped from the "400-" and "600-foot" sands (fig. 11). The second recorded high was in 1955, when an average of 33.9 mgd was pumped. Since 1955, pumping from the "400-" and "600-foot" sands has gradually decreased, to an average of 22.9 mgd during the first half of 1959.

Although most of the water pumped from the "400-foot" sand is for industrial use, many rural domestic wells also are screened in this aquifer. The only areas where the "400-foot" sand is used for public supply are in the extreme southern part of the upland-terrace areas, where deeper sands contain brackish water. However, the amounts used for rural and public supplies are considered negligible when compared with industrial pumpage.

Effects of pumping. As shown by measurements made in well EB-78 (T. 6 S., R. 1 W.) (fig. 11), water levels in the "400-foot" sand in the industrial district have recovered 70 feet during the 5-year period March 1954-March 1959, an average of 14 feet per year. The hydrograph (fig. 11) of well EB-15 (T. 6 S., R. 1 W.), screened in the "400-" and "600-foot" sands in the industrial district suggests that the recovery trend in wells screened in both aquifers began in 1956 and averaged 14 feet per year, the same as in wells in the "400-foot" sand. Water levels in the "400-" and "600-foot" sands during the period of maximum recovery in 1959 were nearly as high as the highest water level measured in 1947.

"600-FOOT" SAND

Physical properties. The "600-foot" sand, which underlies both East and West Baton Rouge Parishes, consists of several individual but hydraulically-connected sand strata. Because of the lenticularity of the individual sand beds, this aquifer can best be delineated as an interval containing a number of sands. The thickness of the "600-foot" sand ranges from 25 feet to more than 200 feet. The colors of the sand in this aquifer is predominantly yellow-

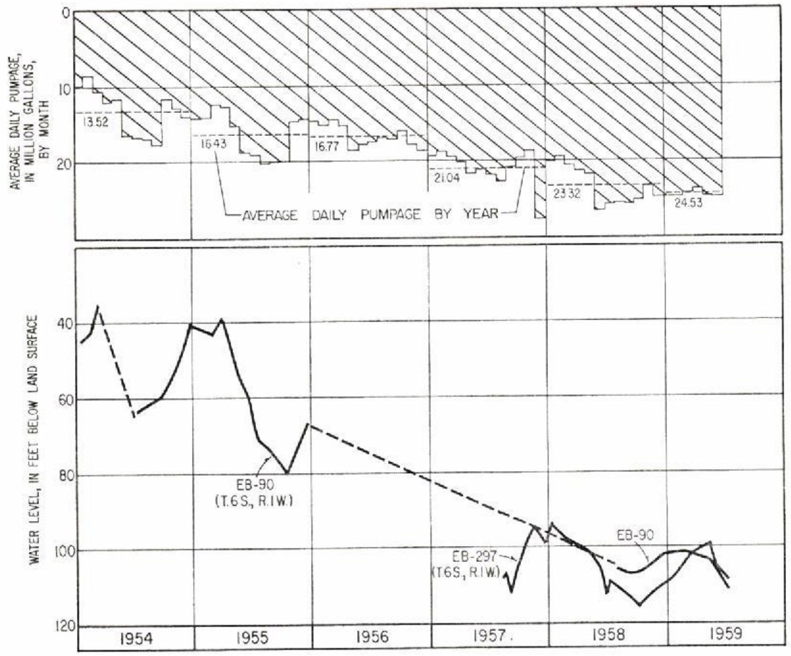

Figure 23. Graphs showing relation of pumpage to water levels in wells screened in the "2,000-foot" sand in the Baton Rouge area.

Withdrawals. The "2,000-foot" sand is one of the most important aquifers of the Baton Rouge area, yielding more than one-fourth of the ground water used for industry and public supply. As shown on figure 23, an average of 24.5 mgd was pumped from this sand during the period January-July 1959. This pumpage rate was slightly greater than that from the "400-" and "600-foot" aquifers during the same period. In 1954, 13.5 mgd was pumped from the "2,000-foot" sand and in 1959 the average pumpage was 24.5 mgd, an increase of 11 mgd in a 5-year period. One-quarter of the water pumped from the "2,000-foot" sand in 1959 (6 mgd) was used for public supply in Baton Rouge; the remainder was used by industries. Six domestic wells that now use the "2,000-foot" sand as a source of supply produce an insignificant amount of water.

Effects of pumping. As shown by the hydrograph (fig. 23) for well EB-90 (T. 7 S., R. 1 E.), water levels have declined at an annual rate of 13 feet during the

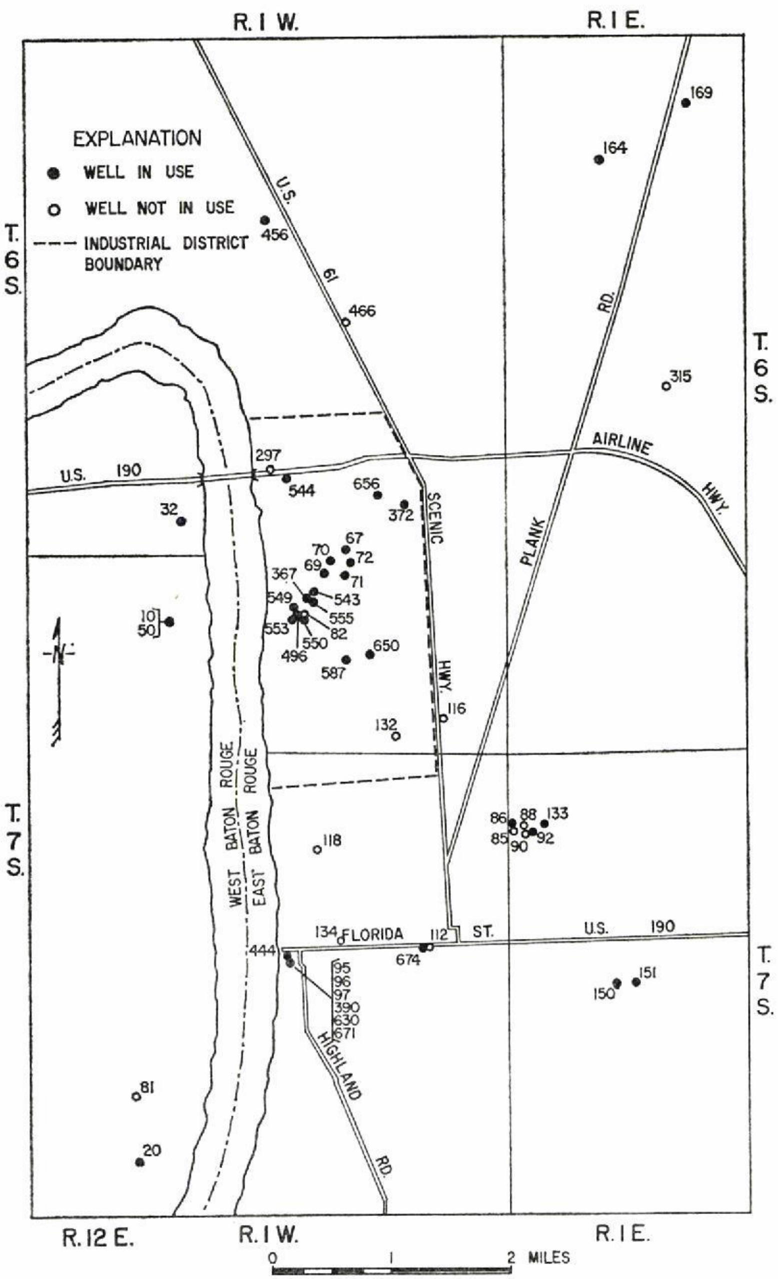

Figure 22. Map showing location of wells screened in the "2,000-foot" sand in and near the Baton Rouge industrial district.

ish gray and light gray. Dark minerals such as amphibole and pyroxene, combined with a large concentration of quartz, give these sands a "salt-and-pepper" appearance. Cumulative curves show the material to be predominantly of medium grain size, but having an average of 25 percent fine sand. In some areas outside the industrial district the "600-foot" sand is connected with the overlying "400-foot" and the underlying "800-foot" sands (pl. 1).

Hydrologic properties. Thirty-two wells are screened in the "600-foot" sand in the Baton Rouge industrial district (fig. 10). Of this total, 12 are screened in only the "600-foot" sand and 20 are screened in two or more aquifers. The locations of wells screened in the "400-" and "600-foot" sands in and near the industrial district are shown on figure 10. The yields from wells screened in only the "600-foot" sand range from 430 to 1,460 gpm and average 1,000 gpm. The uncorrected specific capacities of wells screened only in this sand average 12.8 gpm per foot of drawdown (Meyer and Turcan, 1955, p. 30).

The coefficient of transmissibility of the "600-foot" sand ranges from 88,000 to 123,000 gpd per foot and averages 110,000 gpd per foot. The coefficient of permeability ranges from 520 to 800 gpd per square foot and averages 630 gpd per square foot. The coefficient of storage ranges from 4.1×10^{-4} to 6.1×10^{-4}.

Quality of water. Fresh water from the "600-foot" sand generally is alkaline, soft, and of sodium bicarbonate type (table 1) and has a total iron content that ranged from 0.02 ppm (WBR-60, T. 7 S., R. 12 E.) to 0.64 ppm (EB-547, T. 6 S., R. 1 W.). The manganese content was usually 0.20 ppm or more, except in wells EB-597 (T. 8 S., R. 3 E.) and WBR-42 (T. 7 S., R. 12 E.), which yielded water with manganese content of 0.02 ppm. The chloride content of water from wells in the industrial district was low, as shown by the analysis for well EB-597. The average temperature of water from wells in the industrial district is 74°F.

The "600-foot" sand is the only aquifer in which encroachment of brackish water has been detected. Several miles directly south of the industries and in the vicinity of the Baton Rouge City Park, the chloride content of water from the "600-foot" sand has increased. Figure 12 shows the trend in the chloride content of water from wells EB-500 and -493 (T. 7 S., R. 1 W.). During the period 1951 to May 1959 the chloride content of water from well EB-500 increased from 4 ppm to 175 ppm. The chloride content of water from well EB-493 increased from a high of 320 ppm in June 1952 to a high of 590 ppm in May 1959. Well EB-500 is screened in the basal part of the "600-foot" sand and well EB-493, which is 0.75 mile southwest of well EB-500, is screened in the upper and basal sands of the "600-foot" sand. At the site of well EB-493 the upper and basal sands are separated by 75 feet of clay; however, at the site of well EB-500 the intervening clay thins and probably pinches out within a short distance. The chloride content of water from a well (EB-123) at the Baton Rouge City Park increased from 7 ppm in 1947 to 710 ppm in 1950. This well has not been used or sampled since 1950.

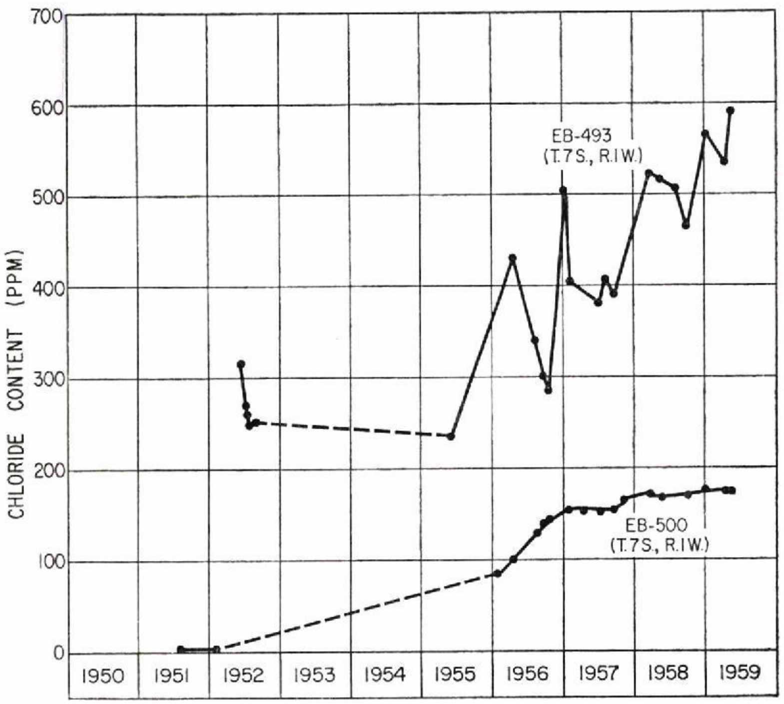

Figure 12. Graphs showing trends in the chloride content of water from wells screened in the "600-foot" sand.

The "2,000-foot" sand is light gray to light brownish gray and is generally of medium grain size, averaging less than 20 percent fine-grained material.

Hydrologic properties. Of the wells listed in table 3, 44 are screened in the "2,000-foot" sand and were in use in 1959. Four of these are multiple-screen wells. Wells screened in the "2,000-foot" sand in and near the Baton Rouge industrial district are shown on figure 22. Yields from 13 public supply and industrial wells screened only in the "2,000-foot" sand range from 870 gpm to 1,800 gpm and average 1,200 gpm. The specific capacities for five wells, corrected for head loss due to pipe friction, range from 31.5 to 94.7 gpm per foot of drawdown and average 48.8 gpm per foot of drawdown (table 2).

Results of four pumping tests indicate a range in the coefficient of transmissibility from 160,000 to 243,000 gpd per foot (table 2) and an average of 205,000 gpd per foot. The coefficient of permeability ranges from 1,100 to 1,500 gpd per square foot and averages 1,250 gpd per square foot. The coefficients of storage determined for two wells are 7.1×10^{-4} and 6.2×10^{-4}.

Quality of water. The "2,000-foot" sand of Baton Rouge yields water that is soft, alkaline, and of sodium bicarbonate type (table 1). Except for the water from a well (EB-304, T. 5 S., R. 2 E.) near the eastern boundary of the report area, the total iron in water from this sand ranged from 0.00 to 0.23 ppm. The manganese content of water in the industrial district was less than 0.02 ppm. With the exception of water from irrigation well EB-575 (T. 8 S., R. 1 W.), south of the city of Baton Rouge, the chloride content of water from the "2,000-foot" sand generally was less than 5.0 ppm. However, that in well EB-575 increased from 196 ppm in 1955 to 224 ppm in April 1959. This increase probably was the result of movement of more highly mineralized water because of local pumping. The sand contains fresh water to the south-central boundary of the report area (well 5, pl. 1), where well EB-575 is screened in this sand. The temperature of water from the "2,000-foot" sand in the project area ranges from 85° to 96°F and in the industrial district, from 88° to 92°F.

1,000 ppm and the water may be unsuitable for domestic and municipal uses (U.S. Public Health Service, 1946, p. 383).

Withdrawals. Since 1953, estimated withdrawals from the "1,700-foot" sand have increased from 1.4 mgd to 2.0 mgd. The major users of the water are industries and the town of Port Allen. Although 17 wells in this aquifer are used for domestic supply, the quantity pumped is small and is not considered in the total pumpage figures.

Effects of pumping. Long-term water-level measurements are not available for the "1,700-foot" sand. The water level in well EB-68 (T. 6 S., R. 1 W.) in the industrial district is reported to have declined at a rate of about 4 feet per year since 1953, and the water level stood at 90 feet below land surface on January 7, 1959.

"2,000-FOOT" SAND

Physical properties. The "2,000-foot" sand is considered the uppermost aquifer of Miocene age in the Baton Rouge area. Except for a small part of north-central East Baton Rouge Parish and the south-central part of the project area, this sand underlies most of the area (pl. 1). In the vicinity of the industrial district and immediately northwestward this aquifer is divided by local clay lenses into three separate sand units; generally, however, the "2,000-foot" sand occurs as a single unit broken only by a few clay lenses.

Except for the northern quarter and the extreme south-central part of the area, and west of the industrial district, the thickness of the "2,000-foot" sand normally is 150 feet or more. The sand has a maximum thickness of 300 feet in the industrial district and southeastern East Baton Rouge Parish.

The "2,000-foot" sand apparently has no direct hydraulic connection with the overlying "1,700-foot" sand or the underlying "2,400-foot" sand; however, the original static (nonpumping) levels in the "2,000-foot," "2,400-foot," and "2,800-foot" sands were nearly the same and indicate a common recharge area.

Periodic analysis indicates that the chloride content of water from the "600-foot" sand in the industrial district has not increased in recent years (1955-59).

Withdrawals. Pumpage from the "400-" and "600-foot" sands is combined because of the many wells screened in both sands; and the subject is discussed in the Withdrawals section of the "400-foot" sand.

Effects of pumping. A reduction of pumping from the "600-foot" sand has resulted in a recovery of water levels. As shown by the hydrograph (fig. 11) for well EB-293 (T. 6 S., R. 1 W.), water levels in the "600-foot" sand in the industrial district have recovered from a yearly high of 140 feet below land surface in April 1956 to a yearly high of 118 feet below land surface in April 1959. This recovery on a yearly basis is about 7 feet.

"800-FOOT" SAND

Physical properties. The "800-foot" sand underlies much of East and West Baton Rouge Parishes (pl. 1), and includes within it sand strata that are irregular in thickness and areal extent. The maximum thickness of the fresh-water-bearing section of sand ranges from 80 feet in the industrial district to 150 feet near the eastern border of the project area. At the southern edge of the industrial district is an east-west-trending sand unit that has no distinct equivalent to the north or south. (See well 35, pl. 1.) Immediately north of the industrial district, sands of the "800-foot" sand pinch out locally, and clay occupies their stratigraphic position for a short distance.

Mechanical analyses of the "800-foot" sand show the grain size to range from fine to medium, of which an average of 70 percent is medium grained. The color of the sand is similar (yellowish to light-gray) to that of the other sands below the alluvium.

Hydrologic properties. Of the 25 wells screened in the "800-foot" sand (fig. 13), eleven are in use. Some of these wells are screened in two or more sands, which include the "400-foot," "600-foot," "1,000-foot," and "1,200-foot" sands. The maximum yield reported for a well screened only in the "800-foot" sand is 950 gpm (EB-467, T. 6 S., R. 1 W.); wells in more than one aquifer yield a maximum of 1,400 gpm (EB-398, T. 6 S., R. 1 W.). Specific capacities of two wells, corrected for loss due to pipe friction, are 13.2 and 36.3 gpm per foot of drawdown. The coefficient of transmissibility, as determined from a recovery test at well EB-467, is 24,000 gpd per foot. On the basis of the thickness of the aquifer at the well, the permeability is 270 gpd per square foot (table 2).

Quality of water. Water from the "800-foot" sand generally is of the alkaline, soft, and of the sodium bicarbonate type. Chemical data of water samples collected from three wells (EB-120, T. 7 S., R. 1 W.; EB-159, T. 7 S., R. 1 E.; WBR-83, T. 6 S., R. 11 E.) screened in the "800-foot" sand are listed in table 1. The total iron content of water from wells EB-159 and -120 in the industrial district was 0.04 and 0.09 ppm respectively. As indicated by the analysis of water from well WBR-83 (table 1), the total iron content of water from the "800-foot" sand northwest of the industrial district was 0.43 ppm. The chloride content in water from wells in the "800-foot" sand was less than 10 ppm, but data from electrical logs indicate that water within this sand near the southern boundary of the project area (pl. 1) becomes highly mineralized. The temperature of water from this sand in the industrial district ranges from 76° to 79°F.

Withdrawals. Withdrawals from this sand have been at the rate of about 2 mgd during the last 6 years (1954-59). Most of the water withdrawn from the "800-foot" sand is used by industries; the remainder, which is a negligible amount, is used for domestic purposes.

Effects of pumping. Even though pumping from the "800-foot" sand is nearly uniform throughout the year, the altitude and fluctuations of water level in the "800-foot" sand in the area south of Florida Street (fig. 14) are similar to those in the "600-foot" sand. These similarities are probably the result of hydraulic connection between the two sands. On the basis of this similarity and reported well records, well EB-128 (T. 7 S., R. 1 W.) was considered in 1953 to be screened in the "600-foot" sand (Meyer and

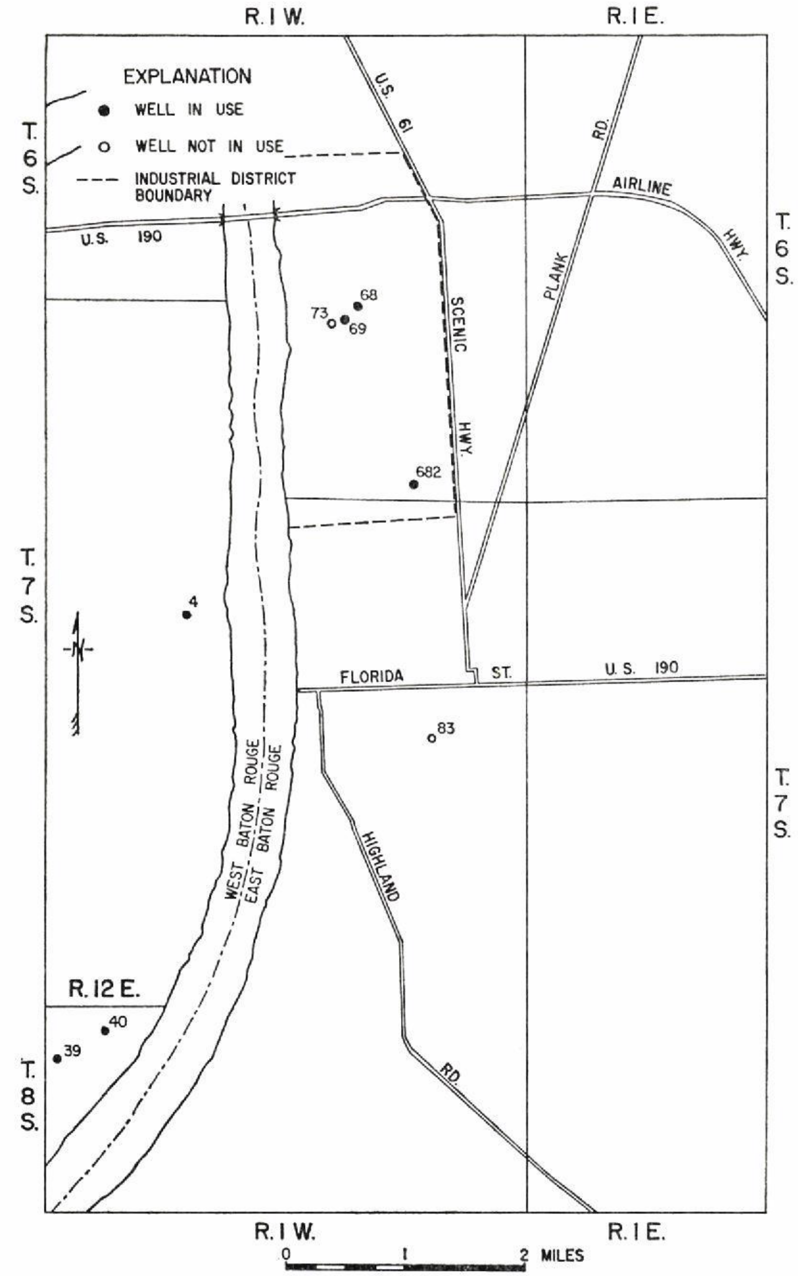

Figure 21. Map showing location of wells screened in the "1,700-foot" sand in and near the Baton Rouge industrial district.

stitutes the "1,700-foot" sand. In the industrial district the aquifer is 120 feet thick. Southwest of the industrial district the "1,700-foot" sand connects with the "1,500-foot" sand (pl. 1).

Cumulative curves of the "1,700-foot" sand show it to be primarily a medium-grained sand, less than 20 percent being fine-grained material. Its appearance is the same as that of other sands of Pliocene(?) and Pleistocene age.

Hydrologic properties. Of the wells listed in table 3, 32 are screened in the "1,700-foot" sand and are in use. Of these 32 wells, 8 are screened in more than one aquifer. Twenty-eight wells are for domestic or public supply, and 4 are owned by industries. The location of the "1,700-foot" wells in and near the industrial district are shown on figure 21.

Reported yields from two industrial wells whose screens are 6 inches, or more, in diameter are 1,000 gpm (EB-68, T. 6 S., R. 1 W.) and 850 gpm (EB-73, T. 6 S., R. 1 W.). Specific capacities of two wells screened in the "1,700-foot" sand are 41.6 gpm per foot of drawdown (corrected for head loss) (EB-68) and 16.8 gpm per foot of drawdown (uncorrected) (EB-282, T. 5 S., R. 1 E.). (See table 2.) The coefficient of transmissibility as determined from a recovery test made in well EB-68 in the industrial district is 32,000 gpd per foot. On the basis of the aquifer's thickness, the coefficient of permeability is 240 gpd per square foot (table 2).

Quality of water. The "1,700-foot" sand yields water that is alkaline, soft, and of sodium bicarbonate type (table 1). The total iron content in water tested ranged from 0.01 to 0.04 ppm. Chloride content of the water ranged from 3.2 to 5.0 ppm and the dissolved-solids content ranged from 197 to 235 ppm. Silica occurred in sufficient quantities (21 to 45) to cause scaling when the water is used as low-pressure boiler feed (Hem, 1959, p. 254). The temperature of the water from the "1,700-foot" sand ranges from 80° to 87°F and in the industrial district, from 84° to 86°F. Electrical logs of oil-test wells indicate that the dissolved-solids content of water from this aquifer in the southern part of the area probably is more than

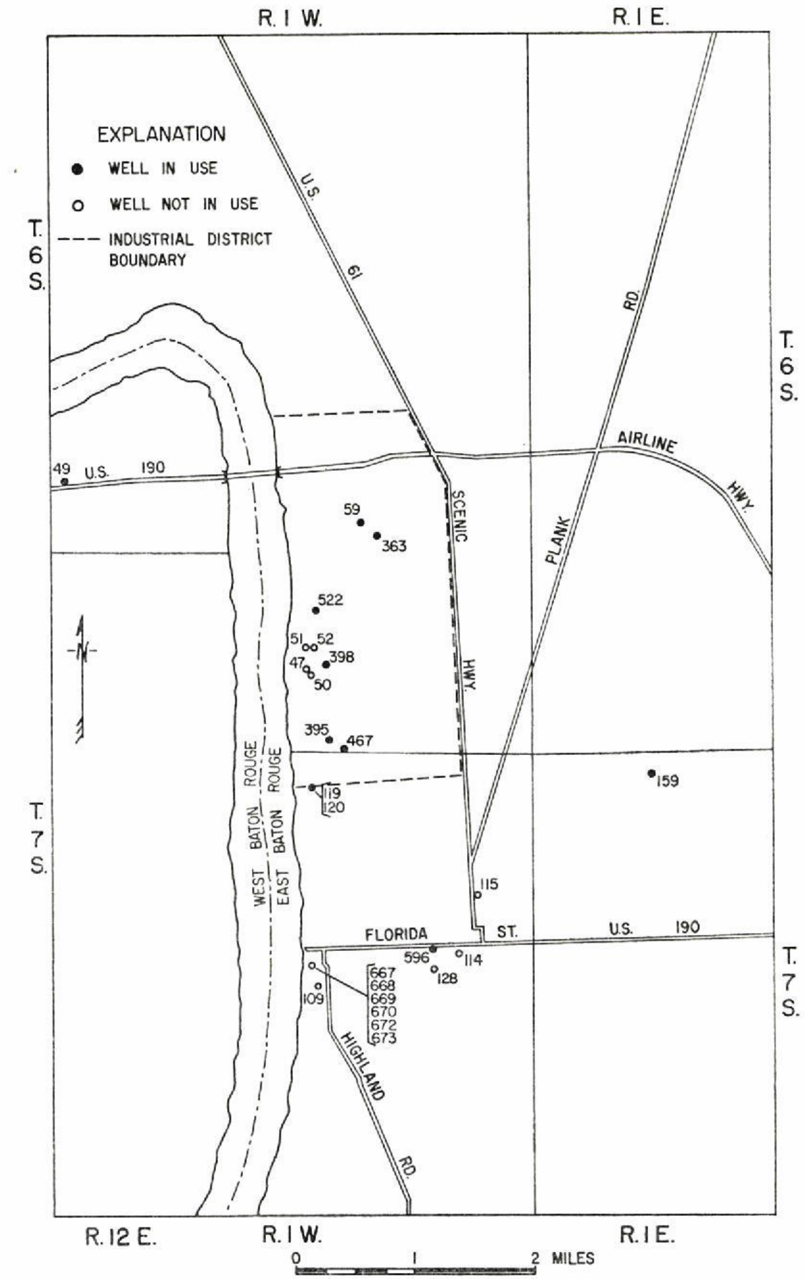

Figure 13. Map showing location of wells screened in the "800-foot" sand in and near the Baton Rouge industrial district.

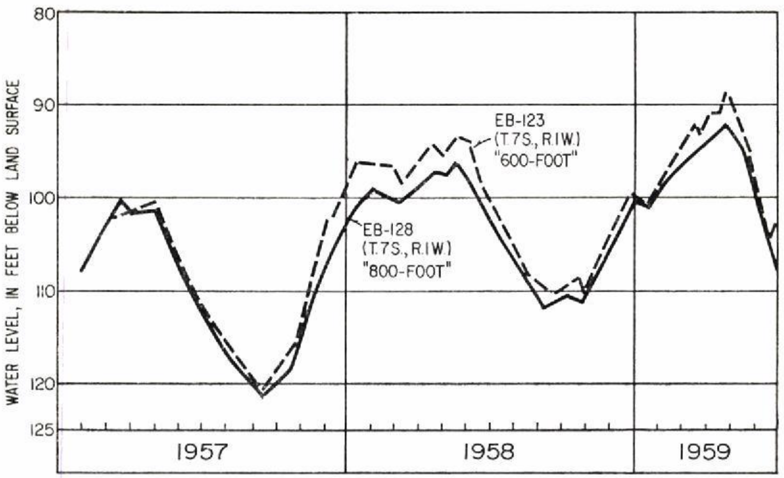

Figure 14. Hydrographs showing water-level fluctuations in wells screened in the "600-foot" and the "800-foot" sands outside the Baton Rouge industrial district.

Turcan, 1955, p. 53). However, well "sounding" and spontaneous-potential and gamma-ray logs indicated that it was 970 feet deep and screened in the "800-foot" sand. However, because of the hydraulic connection between the two sands the water-level fluctuations in well EB-128 are considered to represent those in the "600-foot" sand in the area 2 miles southeast of the center of heavy pumping. Long-term water-level records for well EB-128 show the annual water-level decline in the period Feb. 1941-June 1959 to have been about 0.7 foot. However, as a result of a reduction in pumping since 1954, the water level in this well has recovered at a rate of about 5 feet per year, to a high of 94 feet below the land surface in April 1959.

"1,000-FOOT" SAND

Physical properties. Geologic data indicate that the "1,000-foot" sand, which is a separate hydrologic unit in the Baton Rouge industrial district (pl. 1), coalesces with the "1,200-foot" sand to the north and east of the industrial district. The "1,000-foot" sand is relatively thin (less than 40 feet thick) in the industrial district; however, northward it thickens to 80 feet before connecting with the "1,200-foot" sand. South of the industrial district, it is no more than 50 feet thick.

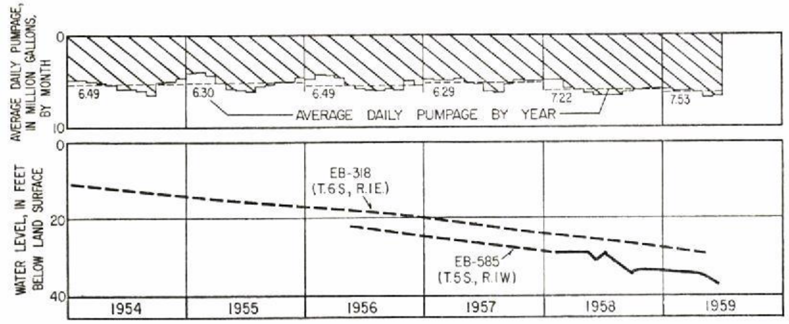

Figure 20. Graphs showing relation of pumpage to water levels in wells screened in the "1,500-foot" sand in the Baton Rouge area.

resents an increase of 1 mgd since 1954. Approximately 85 percent (6.2 mgd) of the water pumped is for public supply in Baton Rouge; industries use approximately 1.3 mgd. Of the inventoried domestic wells in use in 1959, 24 are screened in the "1,500-foot" sand. However, only small quantities of water are pumped from these wells and they are not considered in the total pumpage. Two irrigation wells (EB-157, T. 7 S., R. 1 E., and -348, T. 6 S., R. 1 E.) contribute a small amount to the total pumpage.

Effects of pumping. As shown by the water-level records (table 3) for well EB-94 (T. 7 S., R. 1 E.), the annual water-level decline since 1940 has been about 6 feet in wells near the center of pumping from the "1,500-foot" sand. The relation of pumpage to water levels in wells at different distances from the center of pumping is shown by figure 20. It can be seen that the rate of decline in areas about 6 miles north (well EB-585, T. 5 S., R. 1 W.) and about 7 miles east (EB-318, T. 6 S., R. 1 E.) of the industrial district is the same (3.6 feet per year).

"1,700-FOOT" SAND

Physical properties. The aquifer named the "1,700-foot" sand in the Baton Rouge industrial district is considered to be of Pliocene(?) age. It is irregular in occurrence (pl. 1), and in several areas clay occurs in the same interval. In the northwest corner of East Baton Rouge Parish the unit is represented by a sand 240 feet thick, but eastward the facies change to clay. In southeast East Baton Rouge Parish a maximum thickness of 130 feet con-

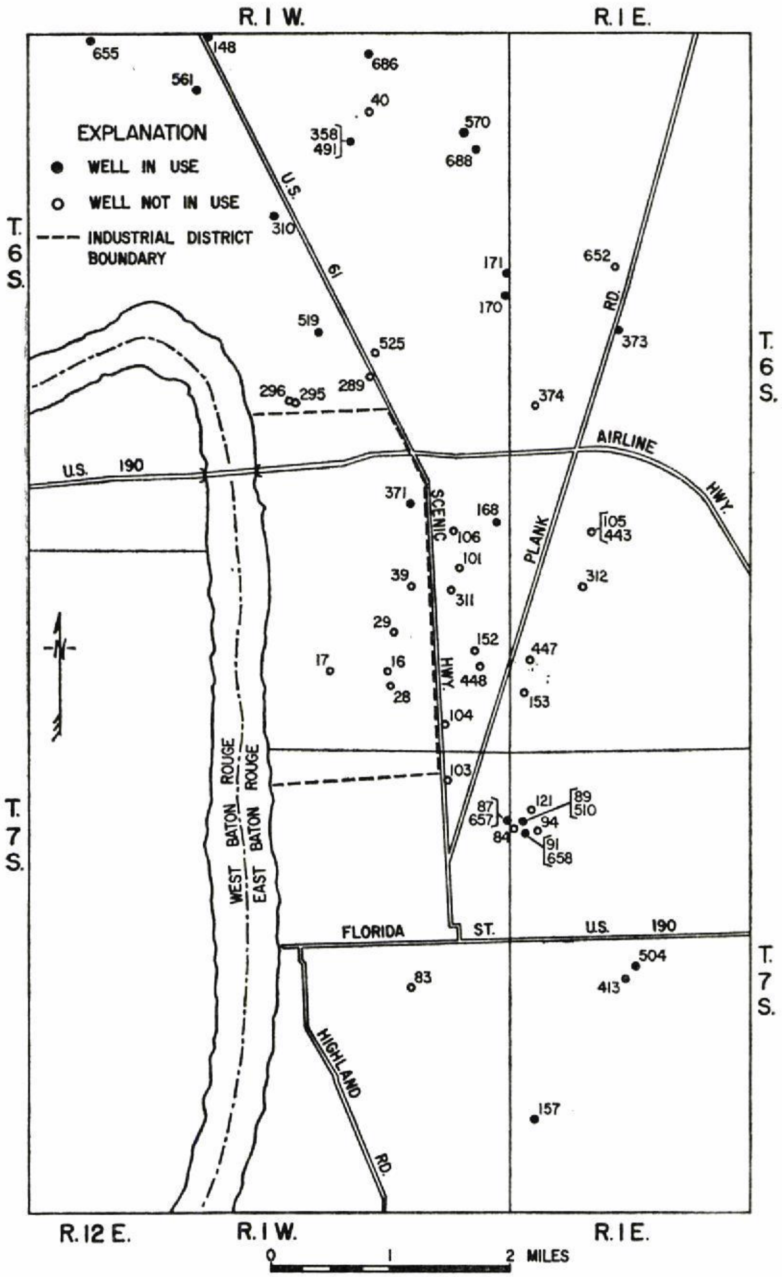

Figure 19. Map showing location of wells screened in the "1,500-foot" sand in and near the Baton Rouge industrial district.

The sand is similar in color to other Pliocene(?) and Pleistocene sands in the area, being yellowish gray to light gray. Cumulative curves show that the sand is medium to fine grained and has a relatively nonuniform distribution of grain sizes.

Hydrologic properties. Only a few wells screened only in the "1,000-foot" sand were in use in 1959. Of the 20 wells listed in table 3 as screened in the "1,000-foot" sand, only 5 are still in use. Of the five only 2, both of which are screened in more than one aquifer (EB-398 and -522, T. 6 S., R. 1 W.) are in the industrial district. These wells and others in the vicinity are shown on figure 15.

Reported specific capacities, not corrected for loss due to friction in the pipe, of 2 wells screened only in the "1,000-foot" sand are 15 and 26 gpm per foot of drawdown. Because of the lack of suitable wells, pumping tests have not been made in this sand.

Quality of water. A complete chemical analysis (EB-163, T. 6 S., R. 1 W.) and a partial analysis (EB-327, T. 7 S., R. 1 E.) of water from the "1,000-foot" sand indicate the water quality to be similar to that from the "800-foot" and "1,200-foot" sands (table 1). The analysis data for well EB-163 shows the water to be of alkaline and of sodium bicarbonate type. All constituents are low in concentration and the water should be satisfactory for most uses without treatment. Water temperatures in the industrial district range from 77° to 79°F.

Withdrawals. A relatively small quantity of water is withdrawn from the "1,000-foot" sand. The two large-diameter industrial wells (EB-398 and -522) screened in this aquifer are screened also in the "800-foot" and "1,200-foot" sands. The village of Erwinville, in West Baton Rouge Parish, has a privately owned public-supply well that taps the "1,000-foot" sand (WBR-29, T. 6 S., R. 10 E.), which supplies water to several families. Only one "1,000-foot" domestic well (EB-137, T. 6 S., R. 1 E.) inventoried is still in use. An estimated total of 2 mgd is pumped from the "1,000-foot" sand and approximately 90 percent of this water is pumped in the Baton Rouge industrial district.

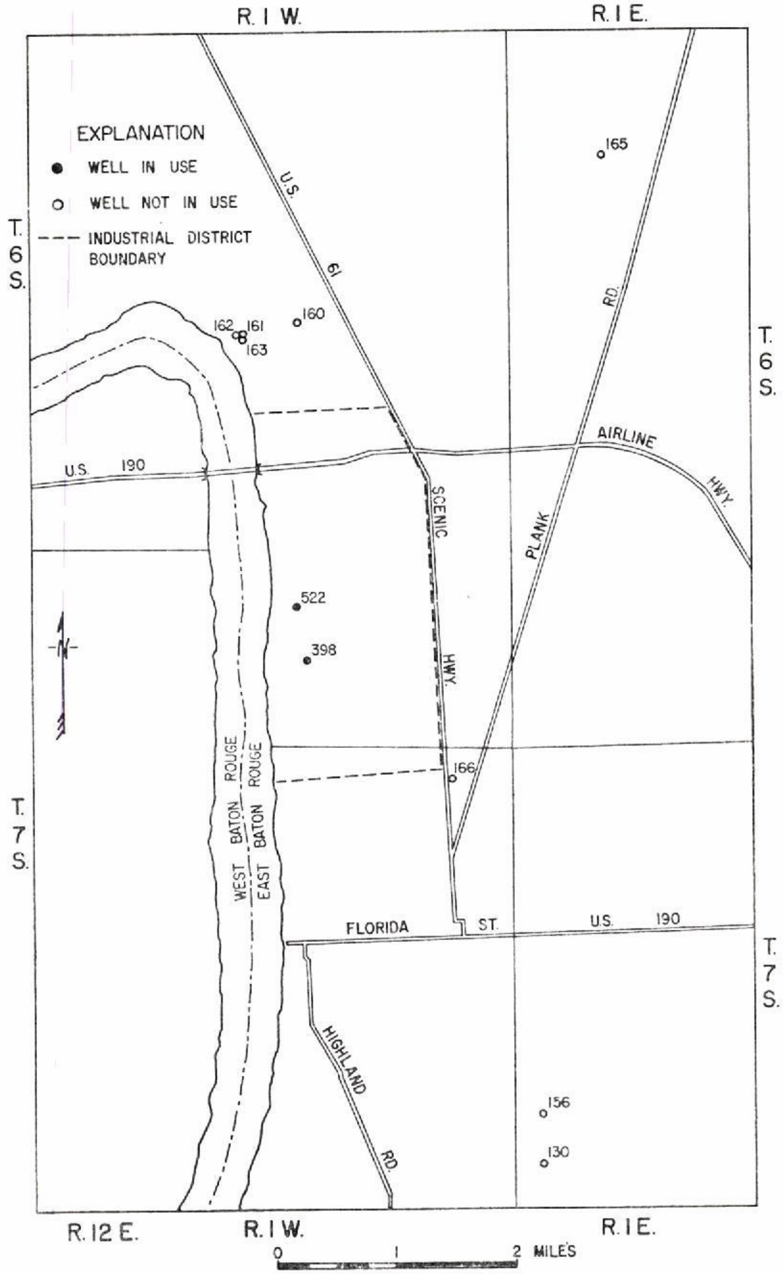

Figure 15. Map showing location of wells screened in the "1,000-foot" sand in and near the Baton Rouge industrial district.

The sediments of the "1,500-foot" sand are olive gray to yellowish gray in color. The sand is primarily of medium grain size; 40 percent or less of the material is fine grained.

Hydrologic properties. Of the inventoried wells listed in table 3 for the "1,500-foot" sand, 65 are in use. Five of these are screened in more than one aquifer. The location of wells screened in the "1,500-foot" sand in and near the industrial district are shown on figure 19. The yields from 6 representative public-supply and industrial wells that are screened only in the "1,500-foot" sand range from 300 to 1,200 gpm, and average 830 gpm. Specific capacities of wells in the "1,500-foot" sand, corrected for head loss in the pipe, range from 14.7 to 54.7 gpm per foot of drawdown (table 2) and average 33.2 gpm per foot of drawdown.

The coefficients of transmissibility as determined from two pumping tests are 76,500 and 90,400 gpd per foot. On the basis of the aquifer's thickness, the coefficients of permeability are 960 and 1,160 gpd per square foot. The tests were recovery tests on the pumped well and it was not possible to determine the coefficient of storage. As the "1,500-foot" sand is an artesian aquifer, the coefficient of storage probably will range between 1×10^{-3} and 1×10^{-5}.

Quality of water. Fresh-water-bearing sands of the "1,500-foot" sand yield water that is alkaline, soft, and of sodium bicarbonate type (table 1). The total iron content of the water from 8 wells (excluding well EB-280) ranged from 0.02 ppm to 0.35 ppm. (See table 1.) Except for wells EB-230 and -569 (T. 7 S., R. 1 W.), the chloride content of water from the "1,500-foot" sand ranged from 4.0 to 7.0 ppm. As indicated by the analyses data of samples from wells EB-280 and -569 (table 1), the chloride content of water from wells in the south-central part of the area ranged from 201 to 3,050 ppm. The dissolved solids in water from wells in this part of the project area ranged from 666 to 5,290 ppm. In the remainder of the area, the dissolved-solids content ranged from 193 to 250 ppm. The temperature of the water generally ranges from 82° to 89°F.

Withdrawals. During the first half of 1959 pumpage from the "1,500-foot" sand averaged 7.5 mgd, which rep-

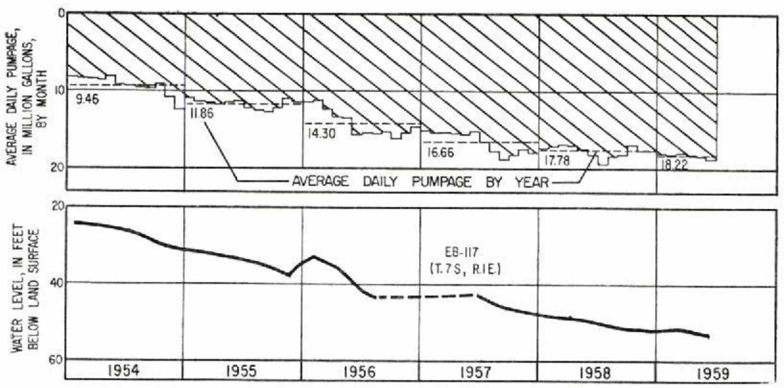

Figure 18. Graphs showing relation of pumpage to water level in a well screened in the "1,200-foot" sand in the Baton Rouge area.

domestic wells contributes only a small amount to the total pumpage. Although the total amount pumped from the "400-" and "600-foot" sands is more than from the "1,200-foot" sand, the "1,200-foot" sand ranks second to the "2,000-foot" sand in quantity pumped from an individual aquifer.

Effects of pumping. The increase in withdrawals from the "1,200-foot" sand has caused an increase in the rate of decline of water levels. As illustrated by the hydrograph (fig. 18) for well EB-117, the annual decline about 4 miles south of the industrial district averaged about 5 feet during the 5½ years, 1954-59. The water level in well EB-535 (T. 6 S., R. 1 W.), located in the approximate center of pumping, declined about 20 feet per year from 1952 on, to a low of 133 feet below land surface in May 1958.

"1,500-FOOT" SAND

Physical properties. Except in the industrial district, the "1,500-foot" sand underlies East Baton Rouge and West Baton Rouge Parishes (pl. 1). Two or three sands separated by clay units normally comprise the "1,500-foot" sand in the vicinity of the industrial district; however, the clay beds are not areally extensive and the sands are hydraulically connected. The aquifer has a maximum thickness of 300 feet in the eastern part of East Baton Rouge Parish, and an average thickness of 100 feet in the project area. The "1,500-foot" sand coalesces with the "1,700-foot" sand in southeastern West Baton Rouge Parish (pl.1).

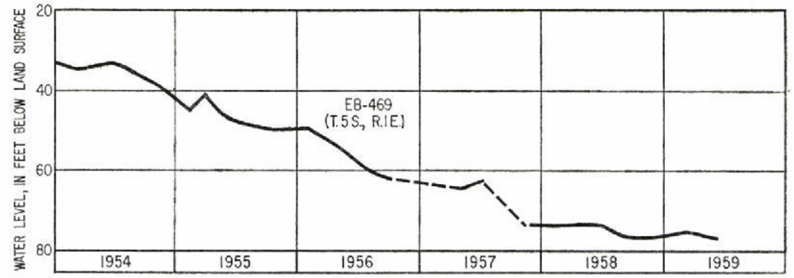

Figure 16. Hydrograph showing water-level fluctuations in a well screened in the "1,000-foot" sand at Baton Rouge.

Effects of pumping. Although withdrawals from the "1,000-foot" sand have not increased during the last few years, the water level in well EB-469 (T. 5 S., R. 1 E.), about 4 miles northeast of the industrial district (fig. 16), has declined at the rate of about 9 feet per year in the period 1954-59. This decline is probably the result of hydrologic connection between the "1,000-foot" sand and the "1,200-foot" sand, which is one of the most heavily pumped aquifers in the industrial district.

"1,200-FOOT" SAND

Physical properties. The "1,200-foot" sand is one of the major water-producing aquifers in the Baton Rouge area. Except for the north-central part of East Baton Rouge Parish, this sand underlies the entire project area. (See pl. 1.) This aquifer has a maximum thickness of 200 feet in the areas north of the industrial district and along the western boundaries of West Baton Rouge Parish (pl. 1). This aquifer is about 100 feet thick in the industrial district. As discussed under the "physical properties" section of the "1,000-foot" sand, the "1,200-foot" sand and the "1,000-foot" sand coalesce a few miles north of the industrial district. (See well 34, pl. 1.)

The "1,200-foot" sand is similar in appearance (yellowish gray to light gray) to other sands of Pliocene(?) and Pleistocene age. Cumulative curves show the grain size to range from fine to medium.

Hydrologic properties. Forty-one of the inventoried wells screened in the "1,200-foot" sand are in use; 35 are screened only in the "1,200-foot" sand, and 6 are screened in two or more sands. All wells screened in the "1,200-foot" sand in and near the industrial district are shown in figure 17. The pumping yield of 18 industrial and public-supply wells range from 300 to 1,800 gpm and average 970 gpm. Specific capacities of wells in this sand, corrected for head loss due to friction, range from 7.8 to 42.9 gpm per foot of drawdown and average 26.0 gpm per foot (table 2).

The coefficient of transmissibility computed from pumping tests ranges from 22,000 to 120,000 gpd per foot and averages 71,000 gpd per foot. The coefficient of permeability ranges from 300 to 800 gpd per square foot and averages 560 gpd per square foot. The coefficient of storage ranges from 1.6 X 10^{-4} to 8.5 X 10^{-5}.

Quality of water. Except for water from well EB-629 (T. 5 S., R. 1 W.), situated in the northern part of the project area, water from the "1,200-foot" sand is of suitable quality for most purposes without treatment (table 1). It is of the soft, alkaline, and of sodium bicarbonate type, having a pH range from 8.0 to 9.0. The total iron content of the water from wells in the central and southern parts of the area ranged from 0.02 ppm to 0.40 ppm, and the hardness ranged from 0 to 9 ppm. Chloride content of water from wells in the industrial district was less than 5.0 ppm; however, toward the south and east they increased to as much as 38 ppm, as shown by the analyses of samples from wells EB-219 and -326 (T. 7 S., R. 1 E.). The temperatures of the water range from 78° to 81°F.

Withdrawals. The average daily pumpage from the "1,200-foot" sand has increased from 2.5 mgd in 1953 to 18.2 mgd during the first half of 1959. The withdrawals from this sand and their effect on the water level in a well (EB-117) about 3 miles southeast of the industrial district are shown on figure 18.

The industries of Baton Rouge during the first half of 1959 pumped an average of 15 mgd, which represents an increase of more than 8 mgd since 1954. Municipal use at Baton Rouge and Port Allen has increased from 0.5 to about 3 mgd during the same period. Pumping from 10

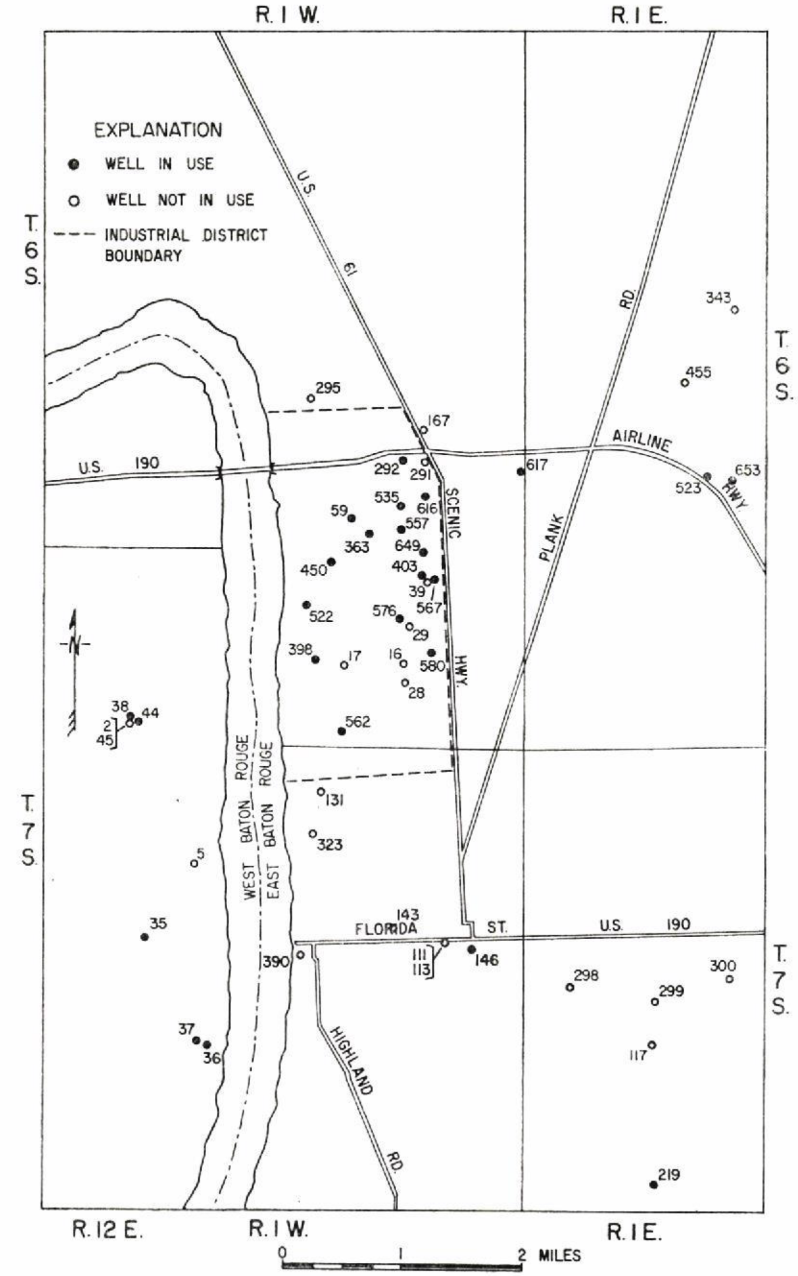

Figure 17. Map showing location of wells screened in the "1,200-foot" sand in and near the Baton Rouge industrial district.