TEXAS
WATER
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BOARD

Report 91

GROUND-WATER RESOURCES OF MATAGORDA COUNTY, TEXAS

MARCH 1969

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REPORT 91

GROUND-WATER RESOURCES OF MATAGORDA COUNTY, TEXAS

By

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Texas Water Development Board

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in cooperation with the
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and
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GROUND-WATER RESOURCES OF MATAGORDA COUNTY, TEXAS

ABSTRACT

Matagorda County is in the central part of the Texas Gulf Coastal Plain. It has a population of 28,500 (1965) and an area of 1,140 square miles. The county's economy is mostly dependent on oil, gas, and petrochemical production, rice farming, and raising of livestock. A reliable supply of fresh ground water is essential for the county's future growth of industry, agriculture, and population.

The surface of Matagorda County is largely a depositional plain of the Beaumont Formation which was deposited by streams as a series of coalescing alluvial and deltaic plains. The depositional period occurred near the close of the last ice age, during a rise in sea level. The geomorphology of the county is typical of a very slightly eroded coastal plain, having low relief, abandoned river valleys, marsh areas, and offshore barrier bars.

Ground water in Matagorda County occurs in several formations of differing ages but similar lithology. The formations are composed of interfingering beds and lenses of silt, clay, sand, and gravel, and function as a single water-bearing unit termed the Gulf Coast aquifer. Ground water moves through the aquifer at 10 to 20 feet per year from areas of recharge in and north of the county to areas of discharge in the Gulf of Mexico.

Use of ground water in the county has increased from 14 mgd (million gallons per day) in 1946 to 17 mgd in 1966. Of the 18,600 acre-feet or 17 mgd used in 1966, 60 percent was for irrigation, 20 percent for industry, 12.5 percent for public supply, and 7.5 percent for rural domestic and livestock uses.

Water levels in wells are gradually declining in Matagorda County, especially in the western part. However, the present pumpage of 18,600 acre-feet per year (17 mgd) could be continued safely and economically indefinitely.

Fresh ground water containing less than 1,000 ppm (parts per million) dissolved solids is available in most of the county, while slightly saline water containing 1,000 to 3,000 ppm dissolved solids is available in all of the county. Most of the fresh ground water, with proper treatment, will meet industrial quality requirements. Ground water suitable for irrigation is available in most of the county. Ground water that meets the quality standards of the U.S. Public Health Service is available in all of the county except Matagorda Peninsula.

Approximately 71 million acre-feet of fresh ground water is in storage in the county; however, only a part of this quantity can be recovered. On the basis of the transmission capability of the aquifer and upon development of a portion of the water in storage, about 118,000 acre-feet or over 6 times present pumpage could be pumped annually in Matagorda County for the next 100 years.

By proper exploration, well completion, and well spacing, ground-water supplies can be developed with little danger of excessive water-level declines or changes in water quality caused by salt-water encroachment.

A comprehensive program of water-level and water-quality observation wells should be established in Matagorda County to monitor changes in ground-water quantity and quality as development occurs.

GROUND-WATER RESOURCES OF MATAGORDA COUNTY, TEXAS

INTRODUCTION

Purpose and Scope

The Matagorda County ground-water investigation was begun in July 1965 by the Texas Water Development Board in cooperation with the Matagorda County Commissioners Court and the Lower Colorado River Authority. The purpose of the study was to determine and describe the occurrence, chemical quality, quantity, and availability of ground water in Matagorda County. Particular emphasis was placed on obtaining information necessary for optimum development and maximum use of the county's ground-water resources for agricultural, industrial, and municipal needs.

This report was prepared under the general direction of John J. Vandertulip, Chief Engineer, Richard C. Peckham, director, Ground Water Division, and Bernard B. Baker, assistant director in charge of Availability Programs; and under the direct supervision of Robert L. Bluntzer, coordinator, East Texas Field Investigations Program.

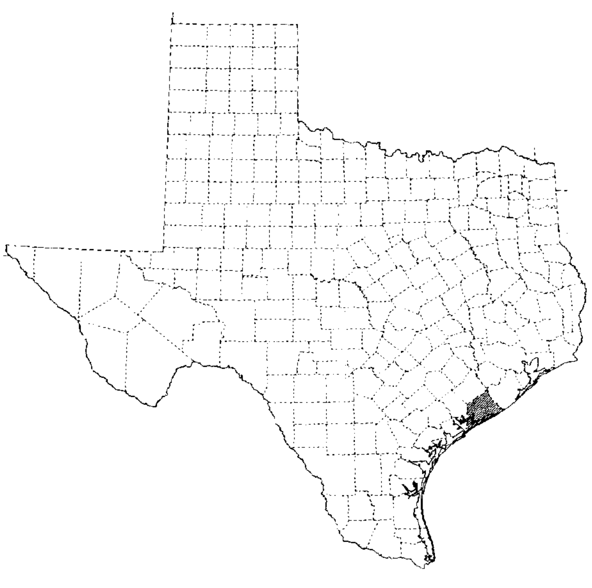

Figure 1.--Location of Matagorda County

Location and Climate

Matagorda County has an area of 1,140 square miles and is located in the central portion of the State's Gulf Coastal Plain (Figure 1). Matagorda County is bounded on the west by Calhoun and Jackson Counties, on the north by Wharton County, on the east by Brazoria County, and on the south by the Gulf of Mexico. Bay City, the county seat, is about 60 miles south-southwest of Houston.

Matagorda County is within the moist subhumid region of Texas (Thornthwaite, 1952). The average annual precipitation at Bay City during the period 1942-66 was 41.16 inches (Figure 2). Annual precipitation ranged from 20.07 inches in 1954 to 65.99 inches in 1961. Rainfall is usually well distributed throughout the year, the maximum rainfall occurring generally in September and minimum rainfall in March (Figure 3). However, abnormal rainfall may occur during the June to September hurricane season.

The average annual temperature at Bay City was 69.8°F during the period 1944-66. The highest recorded temperature was 106°F in July 1954, and the lowest was 11°F in January 1951. The average annual gross lake-surface evaporation in Matagorda County was about 52 inches during the period 1940-65 (Figure 3).

Population and Economy

Matagorda County had an estimated 1965 population of 28,500, with approximately 35 percent of the county's people residing in rural areas. The 1965 populations of the larger cities and towns are as follows: Bay City, 13,000; Palacios, 3,676; Blessing, 1,250; and Matagorda, 700.

The county is served by three major railroads, the Missouri Pacific, the Santa Fe, and the Southern Pacific, and by a network of all-weather state and federal roads. The Intracoastal Waterway, slightly inland from the Gulf of Mexico, crosses the southern parts of the county. The Colorado River has been dredged for barge traffic from the Intracoastal Waterway to new port facilities just south of Bay City.

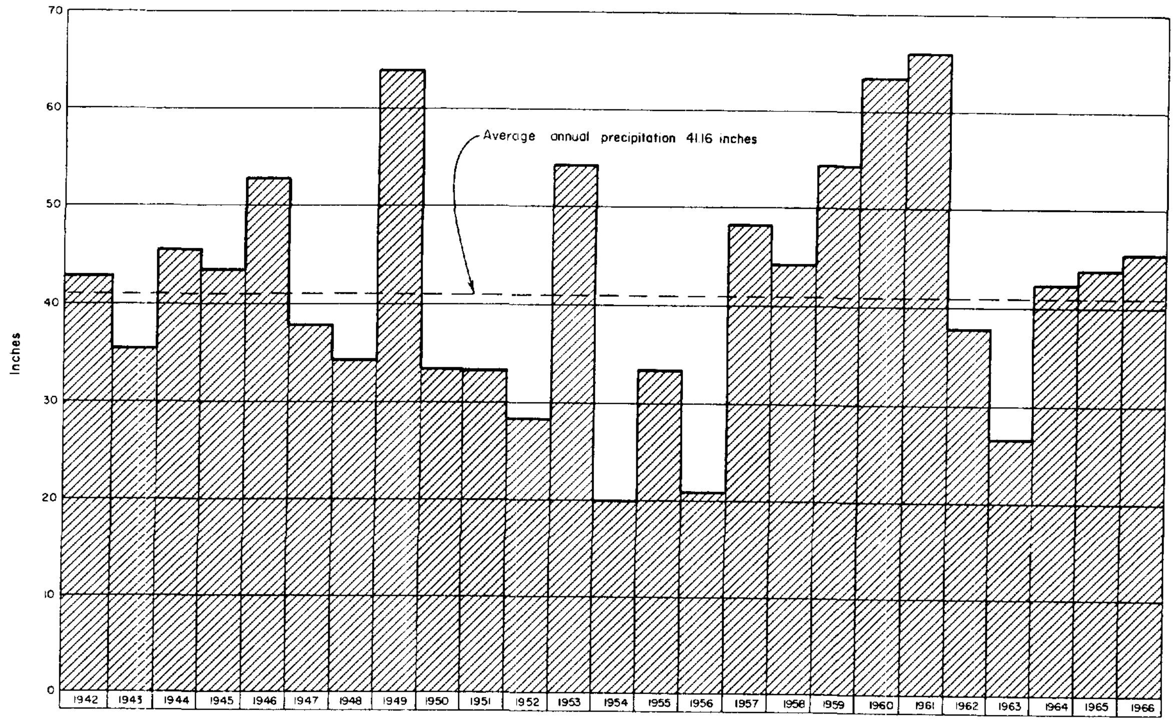

Figure 2.--Annual Precipitation at Bay City, 1942-66
(From Records of U.S. Weather Bureau)

In 1965 Matagorda County produced 1,559,260 barrels (252,600,000 pounds) of rice, 15,434 bales of cotton, 7,013,000 barrels of oil, and had about 80,000 head of cattle on its ranges. Grain sorghum and corn are other leading crops. These products are the main support of the county economy.

The most important agricultural product affecting the county economy and water use is rice. In 1966, most of the county's $13 million farm income was directly supported by 50,000 acres of irrigated rice, 7,000 acres of which was irrigated with ground water only.

Also important to the economy and ground-water usage is the commercial growing of various lawn grasses. Several grass farms use extensive sprinkler irrigation systems. The grass is harvested by stripping the turf and cutting the grass into small blocks. Most of the grass farms are in the eastern part of the county where soils are deep and where abundant shallow supplies of ground water are readily available for irrigation.

An important influence on the county's economy is the production of oil and gas. Since the initial discovery well was drilled at the Old Gulf Dome in 1904, about 150,000,000 barrels of oil has been produced in Matagorda County.

One industry using large amounts of ground water is sulfur mining done by a modification of the Frasch process. The sulfur mine at Old Gulf was reopened in 1965 by Texas Gulf Sulphur Company.

Since 1964, the petrochemical industry has developed rapidly. Future expansion of this industry is expected due to the convenient nearby location of large oil and gas reserves and the excellent transportation facilities.

Because of the irrigation practices used in rice farming and the expected expansion of the petrochemical industry, large supplies of readily available fresh water are essential to the future economic development of Matagorda County.

Methods of Investigation

The study of the ground-water resources of Matagorda County was accomplished by the following methods of investigation:

1. A water well inventory was made, providing information on 109 irrigation, 30 public supply, 20 industrial, 111 domestic or livestock, and 53 unused (abandoned or destroyed) wells. Elevations of these were determined from topographic maps.

2. The base of fresh water, the base of slightly saline water, and the thickness of sands containing fresh water and slightly saline water were computed from 195 electric logs, 33 of them from water wells and 162 from oil and gas tests.

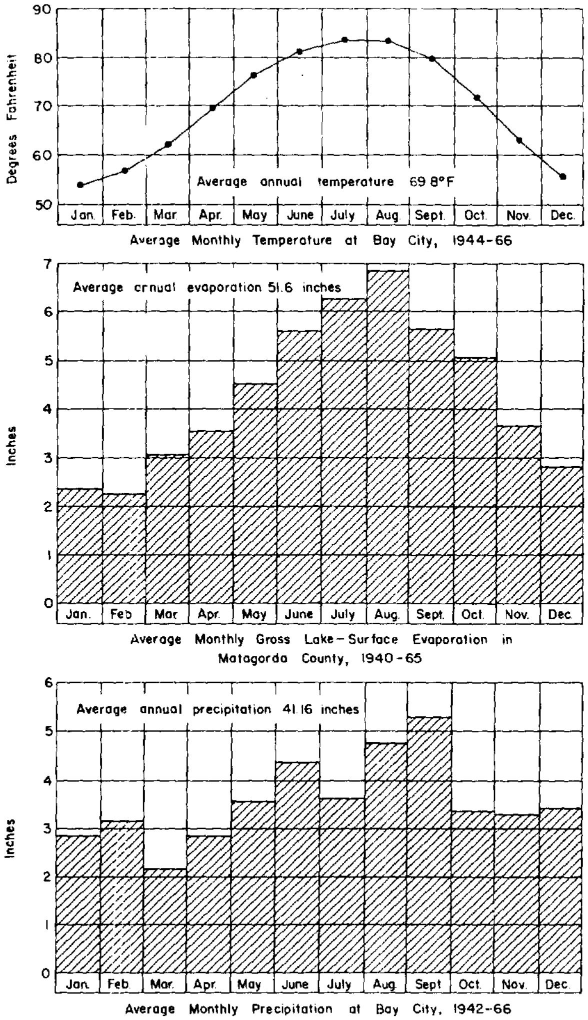

Figure 3.--Average Monthly Temperature and Precipitation at Bay City, and Average Monthly Gross Lake-Surface Evaporation in Matagorda County

(From Kane, 1967, and Records of U.S. Weather Bureau)

3. Drillers' logs of 139 water wells were collected and used as an aid in determining water-bearing sand thickness.

4. Compilations were made of available data on present and past pumpage of ground water for irrigation, industrial use, and public supply. In addition, ground-water pumpage for livestock and rural domestic purposes was estimated from a U.S. Department of Agriculture census of farm population and farm animal population in the county.

5. Pumping tests on 40 wells were conducted in the field or collected from files to determine the hydrologic characteristics of the water-bearing rocks.

6. Measurements of water levels and pumping levels in wells were made when possible. Water-level measurements were made annually on 36 observation wells and monthly on 10 observation wells to determine the seasonal, annual, and long-term fluctuations of water levels.

7. Temperature, precipitation, and evaporation data were compiled for comparison with ground-water pumpage.

8. A geologic map was obtained and modified to establish the recharge areas of the water-bearing rocks.

9. Chemical analyses of water samples were obtained for 195 wells to determine the chemical quality of the ground water.

10. Maps were prepared showing the altitude of the base of fresh water and slightly saline water, and the thickness of sand containing fresh water and slightly saline water. Various graphs, tables, and cross sections were made to illustrate the geohydrologic conditions in the county.

11. All available hydrologic data were analyzed to determine the quantity and quality of ground water available for future development.

12. Studies were made of areas of potential contamination of fresh-water supplies by the disposal of oil-field brines and by salt-water encroachment. These studies included locating waste disposal pits and disposal wells and reviewing the surface-casing requirements for oil and gas production operations.

Previous Investigations

Prior to this report, no detailed studies had been made of the ground-water resources of Matagorda County. Some local studies were performed during World War II by the U.S. Geological Survey for several U.S. Army installations in the county. Taylor (1907) briefly described the occurrence of some wells in Matagorda County, and Deussen (1924) made a general investigation of the geology of the Gulf Coastal Plain west of the Brazos River. These studies included brief discussions of water wells, drillers' logs, and ground water. Other studies were made as follows: Bridges (1935) collected records on 79 wells in the county; Cromack and Bridges (1944) obtained data on 100 wells; Sundstrom, Cromack, and West (1949) collected records on 252 wells, including drillers' logs and chemical analyses of water from selected wells; Rayner (1958) compiled records of water-level measurements in Matagorda County observation wells from 1934-58. Wood (1956) made a general study of ground-water supplies in the Gulf Coast region; and Wood, Gabrysch, and Marvin (1963) made a regional reconnaissance study on the availability of ground water in the Gulf Coast region.

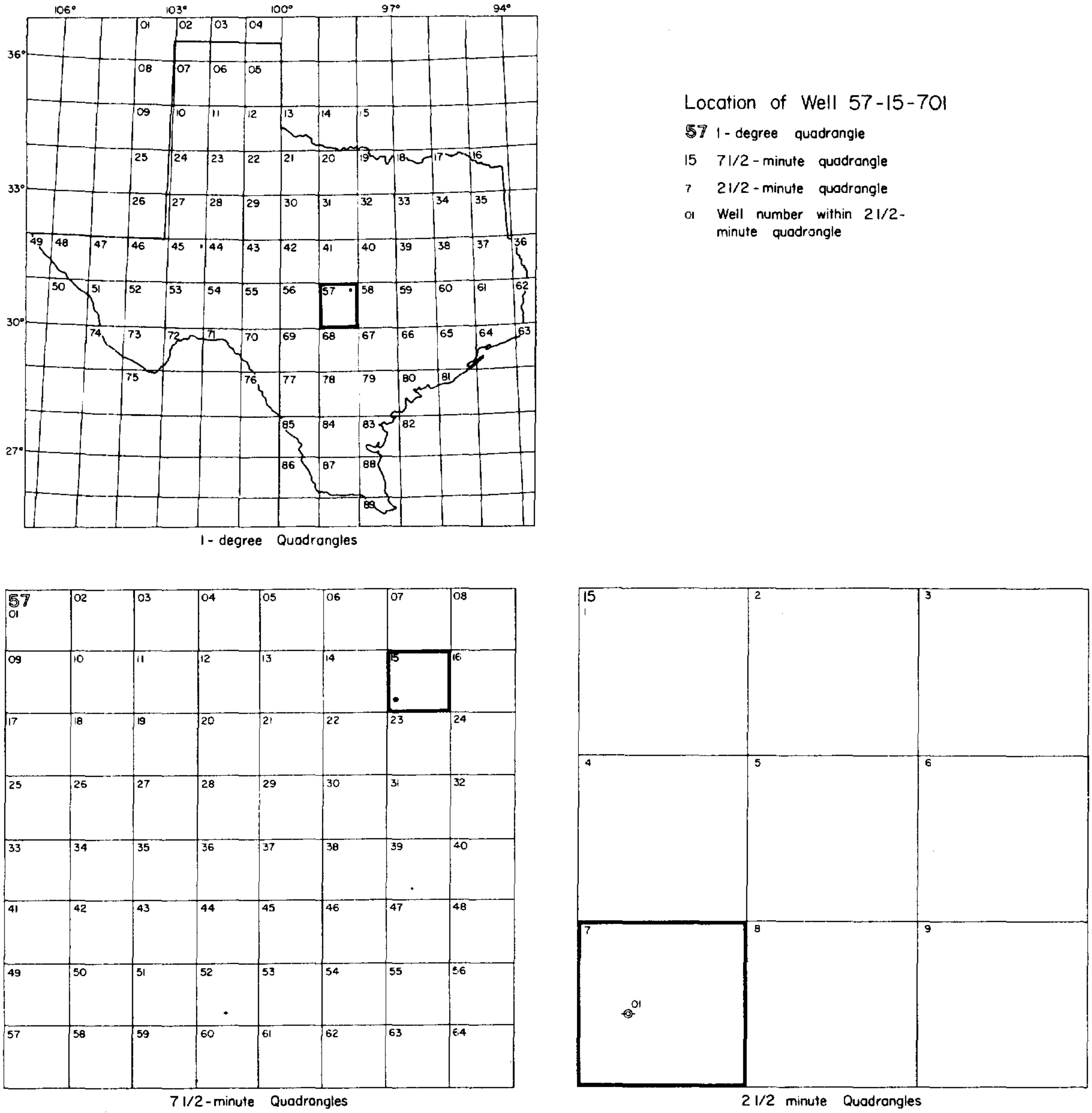

Figure 4.--Well-Numbering System

Well-Numbering System

The well-numbering system (Figure 4) used in this report is one adopted by the Texas Water Development Board for use throughout the State and is based on latitude and longitude. Under this system, each well is assigned a seven-digit number and a 2-letter county designation prefix. Each 1-degree quadrangle in or overlapping into the State is given a two-digit number from 01 to 89. These are the first two digits of a well number. Each 1-degree quadrangle is further divided into sixty-four 7½-minute quadrangles which are each assigned a two-digit number from 01 to 64. These two digits constitute the third and fourth digits of a well number. Finally, each 7½-minute quadrangle is subdivided into nine 2½-minute quadrangles which are numbered 1 to 9 (fifth digit). Within these 2½-minute quadrangles, each well is assigned a two-digit number beginning with 01 (the last two digits).

Matagorda County is in 1-degree quadrangles 65, 66, 80, and 81. The 1-degree and 7-½-minute quadrangles in and adjacent to Matagorda County are shown in the well-location maps (Figures 31 and 32). For reasons of space, the 2½-minute quadrangles are not gridded or numbered. However, their notation occurs as the first digit of the 3-digit number beside each well location.

In this report, each seven-digit well number will have a two-letter prefix to identify the county in which the well is located. The letter prefixes are as follows:

TA, Matagorda County; PP, Jackson County; ZA, Wharton County; BH, Brazoria County; and BW, Calhoun County. For convenience each complete well number will be dashed as follows: TA-80-06-901; the "TA" is the county prefix; the "80" is the 1-degree quadrangle number; the "06" is the 7½-minute quadrangle number; and the "901" is the 2½-minute quadrangle number (9) and the well designation number (01). Well TA-80-06-901 is in Matagorda County and is located on Figure 31 about 4 miles northwest of Blessing.

Acknowledgements

The cooperation of the many landowners, well owners, and industrial and municipal officials is greatly appreciated for allowing access to their wells, assisting in collection of well data, and permitting well tests.

Particular appreciation is expressed to the following individuals and firms: J. M. Pennington, B&P Drilling Contractors, Palacios; Crowell Drilling Company, Ganado; O. T. Davis and Sons, Van Vleck; Leo Franzina, Bay City; Norman Franzina, Bay City; Katy Drilling Company, Katy; Layne Texas Company, Inc., Houston; Harold Mickelson, El Campo; Leonard Mickelson, El Campo; Herbert Powell (deceased), American Water Company, Bay City; Sherman Redd, Van Vleck; S. T. Redus, Area Superintendent, Celanese Chemical Company, Bay City; E. E. Cooke, Plant Manager, Coastal States Gas Producing Company, Bay City; T. B. Butler, Station Superintendent, Florida Gas Transmission Company, Pledger Plant; J. H. Ellerkamp, Plant Superintendent, Texas Gulf Sulphur Company, Old Gulf; Glyn Kinsey, Soil Conservation Service, U.S. Department of Agriculture, Bay City; Robert Lorenz, Program Specialist, U.S. Department of Agriculture, College Station; W. C. Tillman (deceased), Commissioner, Precinct 1, Matagorda County; and E. T. Baker, Jr., Geologist, U.S. Geological Survey, Austin. Their helpful cooperation, suggestions, and discussions of ground-water conditions in Matagorda County and the adjacent Gulf Coast region are greatly appreciated.

GEOLOGIC SETTING

Stratigraphic Units Supplying Ground Water

The stratigraphic units supplying fresh to slightly saline water to wells in Matagorda County range in age from Pleistocene (oldest) to Recent (youngest). The rock formations, in ascending order, are the Willis, Bentley, Montgomery, and Beaumont Formations of Pleistocene age and the coastal and alluvial deposits of Recent age (Table 1). Only the Beaumont Formation and the coastal and alluvial deposits are exposed at the surface in Matagorda County.

The geology of the area is discussed in greater detail by Barton (1930), Doering (1935, 1956), Deussen (1924), Metcalf (1940), Bernard, LeBlanc, and Major (1962), and Bernard and LeBlanc (1965). The stratigraphic nomenclature used in this report is modified from Bernard and LeBlanc (1965). The classification recognizes a division of the Lissie Formation into two units, the underlying Bentley Formation and the overlying Montgomery Formation. The Bentley and Montgomery Formations were originally mapped as the Lissie and part of the Beaumont Formation, as shown in the correlation diagram below. The nomenclature used in this report conforms with that used in the Geologic Atlas of Texas being prepared by the Bureau of Economic Geology (Virgil E. Barnes, Bureau of Economic Geology, personal communication).

The Pleistocene formations crop out in belts approximately parallel to the coast line with the older units cropping out the farthest inland and the younger units cropping out near or on the coast (Figure 5). The formations are delineated on the basis of physiographic features and surface morphology which includes the slope of the land surface, the degree of erosion, and the development of drainage patterns. The surfaces of the older formations have a steeper seaward slope because of inland uplift and coastal subsidence which has been occurring in the Gulf Coast region since early Tertiary time.

HAYS AND KENNEDY (1903)	DEUSSEN (1914, 1924)	DOERING (1935)	FISK (1938, 1940, 1944)	BERNARD AND LeBLANC (1965)	THIS REPORT
Beaumont*	Beaumont	Beaumont	Prairie*	Prairie or Beaumont	Beaumont
			Montgomery*	Montgomery or Upper Lissie	Montgomery
Columbia	Lissie*	Lissie	Bentley*	Bentley or Lower Lissie	Bentley
Lafayette	Reynosa	Willis*	Williana*	Williana or Willis	Willis

* Original definition.

Table 1.--Geologic Description and Water-Bearing Properties of Stratigraphic Units Forming the Gulf Coast Aquifer in Matagorda County

SYSTEM	SERIES	STRATIGRAPHIC UNIT	ESTIMATED THICKNESS (FEET)	COMPOSITION	WATER-BEARING PROPERTIES AND DISTRIBUTION OF SUPPLY
Quaternary	Recent	Alluvium	0-200?	Silt, clay, fine to coarse sand and gravel with wooden debris and logs. Chiefly in in eastern portions of the county.	Capable of yielding large amounts of fresh water. Highly permeable. All irrigation wells in extreme eastern Matagorda County and western Brazoria County are completed in this unit. Fresh water is overlain and underlain by saline water in coastal areas.
		Coastal deposits	0-50?	Beach and dune sand and coastal marsh deposits.	Not capable of yielding fresh water. Water present is highly mineralized.
	Pleistocene	Beaumont Formation	250-900?	Sandy clay, clayey sand, calcareous, fine to medium sand often occurring in thick lenses, some shell beds and calcareous nodules.	Capable of yielding moderate to large amounts of fresh water. Fresh water is overlain and underlain by saline water in coastal areas.
		Montgomery Formation	40-80?	Medium to fine sand, silt, and clay. Generally finer grained than underlying Bentley Formation.	Capable of yielding moderate to large amounts of fresh water. Fresh water is overlain and underlain by saline water in coastal areas.
		Bentley Formation	400-1,000?	Thickly bedded, fine to coarse sand and gravel interbedded with clay. Lense-like sand structure.	Capable of yielding large amounts of fresh water in most of the county with the exception of the coastal areas where formation contains highly mineralized water. Supplies water to irrigation wells in the north-central and northwestern portions of the county.
		Willis Formation	80-85?	Very fine to coarse sand and gravel, ferruginous, interbedded with clays.	Not capable of yielding fresh water. Water is highly mineralized except in extreme northwestern portion of the county.

The older formations are deeply eroded and display drainage patterns and topographic features typical of erosional origin. The younger formations are only slightly eroded, do not have well established drainage patterns, and display topographic features of depositional origin.

In the subsurface, the formations dip toward the coast at a greater angle than the slope of the land surface and, consequently, are encountered at progressively greater depth toward the coast. The youngest Pleistocene formation, the Beaumont, dips toward the coast at about 10 to 20 feet per mile. Because the formations thicken downdip, each formation dips at a greater angle than the overlying formation at a given location.

The rock formations are similar in gross lithology, being composed of silt, clay, sand, and gravel; and, consequently, they are virtually impossible to differentiate in the subsurface by conventional methods. However, the formations generally grade vertically upward from coarse-grained sediments to fine-grained sediments. The formations consist of discontinuous interfingering beds which grade laterally over very short distances from clay to silt to sand to gravel. In this report, the entire sequence of fresh to slightly saline water bearing sediments is termed the "Gulf Coast aquifer" because the various rock formations are hydraulically connected and function as a single aquifer.

Historical Geology

Most of the surface of Matagorda County is a depositional plain of the Beaumont Formation. The remaining surface area is limited to Recent alluvial and coastal deposits located along the coast, in stream valleys, and in the eastern third of the county. The Beaumont Formation was deposited about 100,000 years ago during the Sangamon Interglacial Stage. The formation was formed, as a depositional plain, by a series of coalescing alluvial and deltaic plains deposited by ancient river systems (Barton, 1930; Doering, 1935, 1956).

Near the close of the last ice age, about 25,000 years ago, large ice sheets were spread widely on the continents. Great amounts of water were unavailable to the sea, and as a result the sea level dropped about 450 feet (Fisk, 1944, 1947; Fisk and McFarlan, 1955). The streams readjusted their gradients to the lower sea level, and became well entrenched by eroding deep valleys in the coastal areas. With the retreat and melting of the ice sheets, immense amounts of water were released to the ocean, sea levels rose, and the entrenched deep valleys of the streams were drowned and became estuaries. Present-day examples of these estuaries in Texas are Galveston Bay and San Antonio Bay. On the other hand, the Brazos, Colorado, and Rio Grande Rivers have filled their estuary systems with sediment and these rivers now discharge directly into the Gulf of Mexico.

Within recent times the Colorado River has changed its course several times (Wadsworth, 1966, p. 100). A large abandoned valley of the Colorado River is indicated on the geologic map (Figure 5) by alluvial deposits extending from the vicinity of Wharton and the present Colorado River southeast into Matagorda and Brazoria Counties. This valley was deeply entrenched during the previously mentioned low sea-level substage, and with the rise of sea levels, much of the valley was filled with sediments ranging from clay to gravel.

There is some difference in lithology between the valley-fill sediments and the underlying sediments of the Beaumont Formation, the sediments of the valley fill being generally coarser and containing numerous buried logs. Wood samples have been recovered from the Beaumont Formation; however, the wood is carbonized and easily broken by drill bits. Buried logs in the valley-fill sediments are comparatively fresh, are not carbonized, and occasionally jam drilling operations. The abandoned valley of the Colorado is now occupied by Caney Creek in eastern Matagorda County. In its new valley the Colorado River once emptied into Matagorda Bay, but has built its delta across the bay within recent time and now empties directly into the Gulf of Mexico.

Geomorphology

The topography of Matagorda County ranges from very flat, relatively featureless coastal marshes to a very gently rolling, slightly eroded surface of the Beaumont Formation. The Beaumont Formation forms a relatively young depositional plain with low elevations, ranging from sea level at the coast to 70 feet in the northern part of the county. The surface of the formation's depositional plain has a very gentle seaward slope of approximately 2 feet per mile.

The drainage of Matagorda County is consequent, that is, the courses of the streams were determined by the initial slope of the land. There are three major drainage areas in the county: Tres Palacios Creek in the western part of the county, the Colorado River in the central part, and Caney Creek in the eastern part. The present valley of the Colorado River is marked by steep walls. Also the smaller streams exhibit V-shaped cross profiles typical of streams in the youthful stage. The coastal marshes are very poorly drained and have sinuous tidal channels and shallow rounded lakes.

The depositional features of the Beaumont Formation and the Recent deposits are typical of an uneroded depositional plain with such features as oxbows (abandoned, cut-off river channels), poorly drained back swamp areas, pock marks, and natural levees (Thornbury, 1954, 1965). Recent geomorphic features are the delta of the Colorado River, meander belts in the stream valleys, coastal marshes, barrier islands, wash-over fans, and abandoned river valleys.

Piercement type salt domes have affected the topography of the county. In the recent past at Old Gulf, formerly referred to as "Big Hill" (Deussen, 1924), there was a topographic high caused by the formation of a salt dome in the subsurface. The topographic high rose about 40 feet above the surrounding land surface. In recent years this area has been the scene of intensive sulfur-mining operations and oil and gas production. Mostly because of the removal of sulfur associated with the salt dome, the area is now a topographic low. At Clemville the slight surface expression of another salt dome has been reduced by the withdrawal of oil and gas.

GROUND-WATER HYDROLOGY

Source and Replenishment of the Ground Water

The source of all fresh ground water in Matagorda County is rainfall on the outcrop areas of the water-bearing strata. The principal recharge areas are in Matagorda County and areas to the north in Wharton County.

Many factors determine the amount of water which reaches the water table to recharge the reservoir. These factors include rainfall duration and intensity, soil permeability, vegetative cover, slope of the land surface, and rates of evaporation and transpiration. Only a very small portion of the rainfall enters the aquifer as recharge, as most of the rainfall runs off to streams, evaporates, or is retained in the soil zone and later lost to vegetation or evaporated into the atmosphere. But a small part percolates downward until it eventually reaches the water table, the top of the zone of saturation in which all voids in the rocks are completely filled with water.

Water in the Gulf Coast aquifer in Matagorda County occurs under both water-table (unconfined) and artesian (confined) conditions. Where water-table conditions occur, there is no confining bed and the water is exposed to atmospheric pressure only. Water in a well tapping a water-table aquifer will stand at the top of the zone of saturation. Water-table conditions occur principally in the shallow water sands (less than 100 feet deep) of eastern Matagorda County.

Artesian conditions exist in the deeper water sands, where a confining bed of clay or shale causes the water to be under pressure greater than atmospheric pressure. A well tapping a water sand under artesian conditions will become filled with water above the depth where the sand was first encountered. If pressure is sufficient the well may flow. However, artesian wells do not necessarily flow.

The shallow water-table sands may be recharged from rainfall on the land surface directly overlying them, but artesian sands are usually recharged from rainfall on distant outcrops. Consider as an example the lower artesian sands in well TA-66-64-401, which is 1,057 feet deep, located north of Clemville near the Matagorda-Wharton County line. Assuming a dip of about 30 feet per mile the lower sands supplying water to this well would reach the land surface more than 35 miles inland, near the Wharton-Colorado County line. A small portion of the precipitation which falls there percolates into the subsurface and reaches the water table. The water then slowly moves downdip by gravitational force, beneath confining clay beds which hinder upward flow. As more and more water is added to the water table in the outcrop area, the water in the sands downdip is pressurized. When an opening, such as well TA-66-64-401, is made through the confining layers and into the water sands, the pressure causes the water to rise in the well above the top of the sands; thus, artesian conditions exist.

Most of the large-capacity irrigation, public supply, and industrial wells in Matagorda County produce water from 200 to 700 foot depth interval. Although some domestic and livestock wells produce from shallower depths, and several industrial, public supply, and irrigation wells produce from deeper levels, the greatest withdrawal of water is from depths of 200 to 700 feet. This interval is termed the "heavily pumped zone."

In some parts of Matagorda County there is evidence that sands in the heavily pumped zone are being replenished by water from overlying shallower sands through the bore holes of idle water wells. Under natural conditions, water in the deeper sands of the Gulf Coast aquifer is under greater hydrostatic pressure than in the shallower sands, and consequently, deeper waters tend to move upward through any opening (such as well bores) in the confining layers. However, development in the heavily pumped zone has lowered its hydrostatic pressure, reversing the natural pressure gradient and causing water in shallower sands to move downward into the heavily pumped zone through wells screening both shallow and deep sands. Baker (1965) has demonstrated the replenishment of water from shallow sands to deeper, heavily pumped sands in Jackson County.

Vertical transfer of water also is accomplished without the aid of wells, by slow seepage through the confining clay beds and by indirect movement through interconnected sands lenses.

Rate and Direction of Movement

The fresh ground water underlying Matagorda County is continually moving from areas of recharge to areas of discharge, this ground-water movement being a part of the overall cyclical transfer of the earth's water and water vapor which is known as the hydrologic cycle (Figure 6).

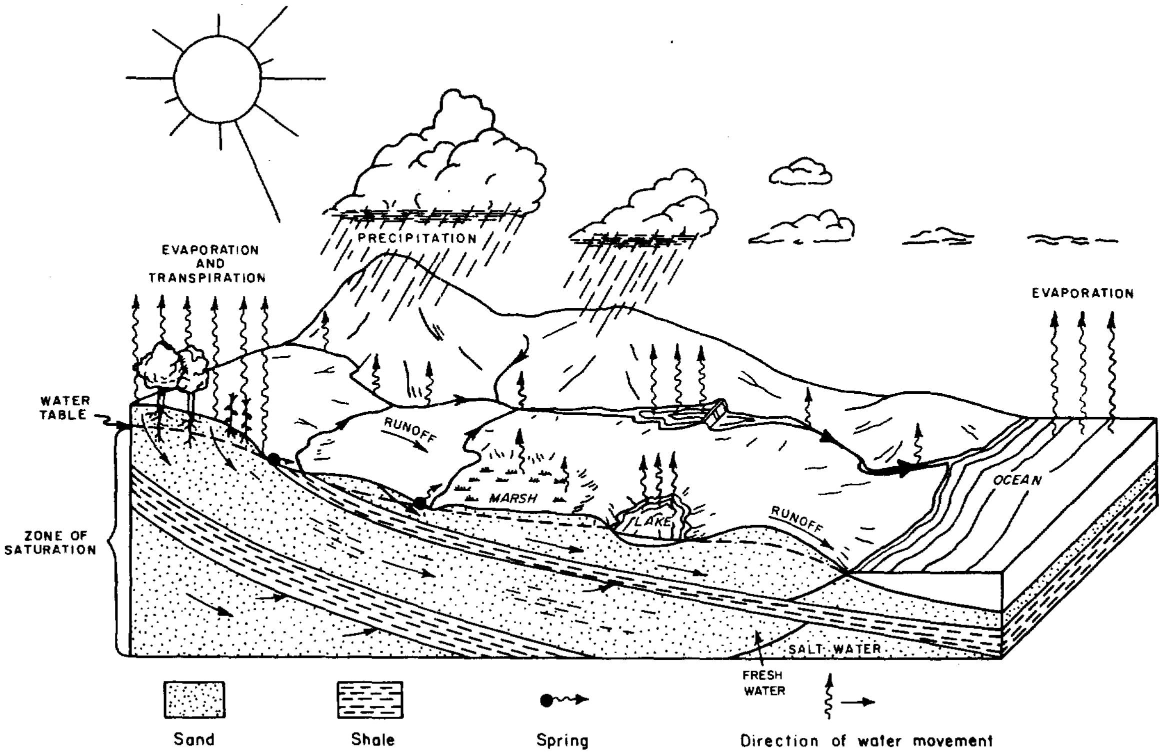

Figure 6.--The Hydrologic Cycle

Normally the ground-water movement in Matagorda County is southeast toward the Gulf of Mexico. In areas of large ground-water withdrawals, the direction of movement may be modified or reversed due to changes in the gradient of the water table or piezometric surface. The piezometric surface is related to artesian or confined aquifers and is defined as an imaginary surface that everywhere coincides with the hydrostatic pressure level of the water in the aquifer. In areas of large and extensive withdrawals, ground water moves from all directions toward the areas of pumpage or lowered pressure. Figure 7 shows the altitude of water levels of the heavily pumped zone in Matagorda County. Ground water will normally move at right angles to the water-level contours (lines of equal water-level elevation).

Ground water which is not withdrawn by wells moves through the aquifer and may finally be discharged below sea level into the Gulf of Mexico.

A delicate balance of hydrostatic pressure is maintained between the fresh ground water moving toward the coast and the salt water in and beneath the Gulf of Mexico. According to the Ghyben-Herzburg theory, salt water is not generally encountered in permeable parts of the aquifer at the coast at sea level, but at a depth equal to approximately 40 times the height of fresh water in the aquifer above sea level (Todd, 1959). This relationship is due to the equilibrium established between two fluids, fresh water and salt water, which have different densities. With a reduction of fresh-water pressures by excessive local withdrawals from wells, the pressure balance between the two waters is altered and salt water invades sands formerly containing fresh water.

However, in Matagorda County near the coast, the upper sands have not yet been flushed of salt water that was present when the sands were deposited. This is because of the extremely low water-table or piezometric-surface gradient and because most of the sand beds pinch out or become clayey and less permeable downdip (Figures 33 and 34).

The rate of movement of ground water depends upon the amount of pore space between individual sand grains (porosity), the extent of interconnection of passageways between the grains (permeability), and the slope or gradient of the water table or piezometric surface. The rate of movement will vary with the type of sediment through which the ground water passes. For clay and shale the rate of movement is negligible. In sand the movement is about 10 to 15 feet per year and in the coarser sediments, such as gravel, it can be 20 or more feet per year.

Ground-water movement may be significantly increased by rapid pumping from wells, which steepens the slope of the water table or piezometric surface and increases the flow toward the wells. An example is the sulfur mining area at Old Gulf. Concentrated pumpage in this area has increased the hydraulic gradient by forming a large cone of depression in the water-level surface (Figure 7). The great vertical extent of the depression indicates a great increase in the rate of ground-water movement.

Discharge of Ground Water From the Aquifer

Natural Processes

In Matagorda County, ground water is lost by natural processes through seepage to streams that intersect the water table, transpiration by vegetation, evaporation to the atmosphere, and ultimately, discharge to the Gulf of Mexico.

Loss of ground water by seepage to streams is termed rejected recharge and is a significant loss in Matagorda County. Most of the major streams have cut their valleys deep enough to intersect the uppermost fresh-water sands.

At times the Colorado River is completely dammed at a point below Bay City to furnish water for irrigation canals. Below the dam, flow is resumed partially by ground-water seepage. Since there is no flow-gaging station on the river below Bay City, and since large amounts of irrigation "tail water" are released from the rice fields and flow into the river, the amount of base flow due to seepage is not known. However, Wood (1956, p. 30-33) estimated that in the 40-50 inch rainfall area of the Gulf Coast region of Texas, probably one inch or more of the water that enters as recharge is later rejected as seepage or base flow to streams.

Evaporation probably causes a great loss of ground water in Matagorda County. Average annual gross lake surface evaporation is about 52 inches per year. The loss is especially important during the summer months of dry soil conditions and great pumping demands on irrigation wells. During very dry summers, it is often necessary to pump irrigation wells at moderate rates for weeks to keep up with evaporation from the rice fields. Assuming that the rice fields remain flooded for 3 summer months, approximately 78,100 acre-feet of water evaporates from the nearly 50,000 acres of rice grown. This figure represents evaporation loss from surface-water irrigation supplies as well as ground-water irrigation supplies. Evaporation loss from 7,000 acres irrigated by ground water only would amount to about 10,900 acre-feet.

Loss by transpiration is probably significant, especially in the heavily timbered eastern one-third of the county. Approximately 260 square miles is covered by dense stands of oak, elm, pecan, cypress, and cottonwood. The loss of water to transpiration by forests depends upon the type of trees, climate conditions, topography, and the storage capacity of the soils in the watershed (Rich, 1951, p. 14). Raber (1937, p. 81-82) reported that the maximum seasonal transpiration rate of hardwoods, such as oak, is about 8 to 10 inches per acre, based on a 60 year old evenly aged full stock stand. Since the root systems of these trees extend some 10-20 feet into the soil and bedrock, the trees take much of their water from the zone of saturation. Assuming a 9 inch per acre per year transpiration loss, then about 124,800 acre-feet per year of soil moisture and ground water is lost by transpiration in the 260 square mile forested area of eastern Matagorda County.

Withdrawal by Wells

Withdrawal by wells in the county amounted to about 18,600 acre-feet or 17 mgd (million gallons per day) in 1966, which is very small in comparison with the natural losses of ground water by seepage, evaporation, transpiration, and discharge to the sea. The transpiration of water from the heavily timbered areas alone is approximately 6½ times the amount discharged by wells.

Hydraulic Characteristics of the Aquifer

Porosity and Permeability

The capacity of an aquifer to yield water to wells depends on several factors such as the type of sediments comprising the aquifer (clay, silt, sand, and gravel) and the porosity and permeability of the sediments. These factors will vary from place to place within the aquifer which, consequently, will be more productive in some areas than in others.

The porosity of a sediment is a measure of the amount of void space expressed as a percentage of the sediment's total volume. Porosity depends on the arrangement and shape of the individual sand grains, their size distribution, and their degree of cementation and compaction. Generally, deeper sands have a greater degree of cementation and compaction and therefore have a lower porosity than shallow sands. Porosity of sediments ranges from 0 to greater than 50 percent, depending upon the type of sedimentary material. Representative ranges in porosity for sedimentary materials are given in the following table (Todd, 1959, p. 16):

MATERIAL	POROSITY (PERCENT)
Soils	50-60
Clay	45-55
Silt	40-50
Medium to coarse mixed sand	35-40
Uniform sand	30-40
Fine to medium mixed sand	30-35
Gravel	30-40
Gravel and sand	20-35
Sandstone	10-20
Shale	1-10

Permeability is a sediments' ability to transmit water, and is related not only to the number and size of void spaces but also the degree of interconnection of these voids. The coefficient of permeability is expressed as the number of gallons of water per day moving through a vertical section of the aquifer 1 foot square and having a hydraulic gradient of 1 foot per foot (45° slope).

Pumping tests in Matagorda County and adjacent areas have indicated coefficients of permeability of the sands of the Gulf Coast aquifer ranging from 103 to 3,950 gpd/ft^2 (gallons per day per square foot) and averaging 573 gpd/ft^2 (Table 2). The highest permeability of 3,950 gpd/ft^2 was measured at well TA-65-58-803, which is completed entirely in the Recent alluvial deposits of the abandoned valley of the Colorado River.

Figure 8 shows the permeabilities of fresh-water sands in Matagorda County. Generally, the sands having the highest permeabilities are in the eastern part of the county in the Recent alluvial deposits of the abandoned valley of the Colorado River. The lower permeabilities are found generally in sands near the coast. The differences in permeability are caused by differences in the physical characteristics of the sands such as grain size, packing, degree of uniformity, and amount of cementation between the grains. Unconsolidated coarse sands and gravels of the Recent alluvial deposits transmit water more readily than the finer grained, more compact and cemented sediments of the underlying Pleistocene formations. Lower permeabilities near the coast are partly due to finer grain size of the sediments.

Coefficients of Transmissibility and Storage

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 and extending through the full thickness of the aquifer, at a hydraulic gradient of 1 foot per foot (45° slope). The coefficient of transmissibility is the product of the coefficient of permeability and aquifer thickness.

The results of the pumping tests were analyzed by either the nonequilibrium formula or by the recovery formula (Theis, 1935) and are listed in Table 2. The range in coefficients of transmissibility was from a low of 10,500 gpd/ft (gallons per day per foot) in well TA-81-10-902 to a high of 399,000 gpd/ft in well TA-65-58-803. The average coefficient of transmissibility calculated from all the pumping tests was 84,475 gpd/ft. Transmissibilities of the sands of the heavily pumped zone in western Matagorda County generally are in the range of 30,000 to 150,000 gpd/ft, and average approximately 70,000 gpd/ft.

The large-capacity irrigation wells, which are screened opposite many sand beds, have higher coefficients of transmissibility than the large-capacity industrial and public supply wells. The industrial and public supply wells are selectively screened opposite fewer sands and therefore produce from only a thin section of the total aquifer thickness. Coefficients of transmissibility of the industrial and public supply wells range from 10,500 gpd/ft in well TA-81-10-902 to 68,500 gpd/ft in well TA-81-01-101.

The approximate transmissibilities that can be expected for the total thickness of fresh-water-bearing sands are shown in Figure 30. The map was constructed by superimposing the contour map of the coefficients of permeability (Figure 8) on the contour map of the total fresh-water sand thickness (Figure 27). At each intersection of the superimposed contours a transmissibility was calculated as the product of the value of the permeability contour and the value of the fresh-water sand thickness contour. The transmissibility map can be used as a relative indicator of availability of fresh water in different areas of the county.

The coefficient of storage is a measure of the water yielding capacity of an aquifer and is defined as the volume of water that an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in the component of the head normal to that surface (Todd, 1959, p. 31). Under artesian conditions, the coefficient of storage is a measure of the ability of the aquifer to yield water by compression of its sediments and the expansion of the water as the piezometric surface is lowered. In artesian (confined) aquifers, the storage coefficient is usually much smaller than in aquifers under water-table (unconfined) conditions. Large pressure changes are required to produce the necessary amount of water in areas under artesian conditions. Under water-table conditions the coefficient of storage is equal to the specific yield or the amount of water that the saturated sediments will yield under the influence of gravity. As a result, a well producing under artesian conditions will develop a large cone of depression over a wide area in a very short time, while a comparable well producing from a water-table aquifer

Table 2.--Coefficients of Permeability, Transmissibility, and Storage of The Gulf Coast Aquifer; and Yields And Specific Capacities of Wells in Matagorda County and Adjacent Areas

WELL	DATE	SCREENED INTERVAL (FEET)	FIELD COEFFICIENT OF PERMEABILITY (GPD/FT^2)	COEFFICIENT OF TRANSMISSIBILITY (GPD/FT)	COEFFICIENT OF STORAGE	YIELD (GPM)	DRAWDOWN OR RECOVERY (FEET)	1-HOUR SPECIFIC CAPACITY (GPM/FT) *SEE REMARKS	REMARKS
				Matagorda County					
TA-65-49-703	Apr. 1, 1967	210-627	--	--	--	1,648	--	--	
901	Mar. 8, 1966	300-355	658	26,300	--	91.5	10.1	9	Recovery test.
57-702	Mar. 14, 1966	331-553	512	25,600	--	252	36.1	7	Drawdown test.
801	July 28, 1955	150-530	812	160,000	--	2,530	--	--	Recovery test.
801	Aug. 27, 1965	do	--	--	--	2,590	--	--	
902	Apr. 1, 1963	329-440	--	--	--	285	41.6	* 7	Recovery test. Specific capacity calculated from 30-minute test.
58-106	Nov. 9, 1945	88-179	--	--	--	840	43	*20	Drawdown test. Specific capacity calculated from 24-hour test.
107	Oct. 4, 1966	75-202	--	176,000	$11x10^{-4}$	--	--	--	Interference drawdown test. Well TA-65-58-108 pumping.
108	do	150-275	693	86,600	--	2,378	40.7	58	Drawdown test.
601	1956	75-157	--	--	--	1,145	35	*33	Drawdown test. Specific capacity calculated from 20-minute test.
803	July 1, 1966	91-215	3,950	399,000	--	1,354	34.2	40	Drawdown test.
66-63-802	May 25, 1966	240-760	582	154,100	--	2,692	55.9	48	Do.
902	May 26, 1966	--	753	82,800	$9.1x10^{-4}$	--	--	--	Interference recovery test. Well TA-66-63-903 was pumped.
903	do	63-240	--	--	--	1,020	--	--	
64-401	May 18, 1966	317-1,042	386	162,000	--	3,417	61.6	55	Drawdown test.
701	Apr. 1, 1966	--	--	--	--	1,600	--	--	
702	Mar. 14, 1966	--	223	64,600	--	2,005	114.0	18	Recovery test.
703	Apr. 16, 1966	--	--	--	--	1,600	--	--	

Table 2.--Coefficients of Permeability, Transmissibility, and Storage of The Gulf Coast Aquifer; and Yields And Specific Capacities of Wells in Matagorda County and Adjacent Areas--Continued

WELL	DATE	SCREENED INTERVAL (FEET)	FIELD COEFFICIENT OF PERMEABILITY (GPD/FT^2)	COEFFICIENT OF TRANSMISSIBILITY (GPD/FT)	COEFFICIENT OF STORAGE	YIELD (GPM)	DRAWDOWN OR RECOVERY (FEET)	1-HOUR SPECIFIC CAPACITY (GPM/FT) *SEE REMARKS	REMARKS
TA-66-64-704	Apr. 16, 1966	--	--	--	--	2,355	--	--	
801	Nov. 20, 1950	409-645	--	--	--	542	74	7	Drawdown test.
802	Nov. 1, 1950	411-670	--	--	--	510	88	6	Do.
80-06-604	Mar. 11, 1966	200-712	--	--	--	1,800	32.4	*56	Drawdown test. Time interval for specific capacity unknown.
07-103	Dec. 15, 1950	203-642	--	--	--	2,800	--	--	
203	June 7, 1966	221-453	--	--	--	2,008	70	*29	Drawdown test. Time interval for specific capacity unknown.
204	do	90-759	--	--	--	1,048	--	--	
206	do	163-390	--	--	--	773	--	--	
402	Apr. 21, 1966	214-960	--	--	--	1,700	--	--	
409	July 19, 1966	192-744	--	--	--	2,415	--	--	
501	July 13, 1955	220-820	403	120,000	--	1,760	21.3	83	Recovery test.
08-102	Nov. 2, 1965	330-760	--	--	--	3,130	99	*32	Recovery test. Specific capacity from 10-minute test.
201	Mar. 18, 1964	530-682	--	--	--	367	47	8	Drawdown test.
202	Feb. 24, 1965	420-780	--	--	--	2,500	105	*24	Recovery test. Specific capacity from 10-minute test.
302	Oct. 28, 1966	530-630	355	35,500	--	413	85.0	5	Recovery test.
701	Sept. 23, 1966	300-600	212	19,700	--	805	51.8	16	Do.
14-601	Apr. 27, 1966	310-768	--	--	--	2,170	48.7	*45	Recovery test. Time interval for specific capacity unknown.
603	June 1, 1966	225-598	--	--	--	1,820	--	--	
605	July 7, 1956	247-351	--	--	--	3,298	47	*70	Recovery test. Specific capacity calculated from 30-minute test.
606	May 7, 1952	333-997	--	--	--	3,560	68	*52	Recovery test. Specific capacity calculated from 10-minute test.

Table 2.--Coefficients of Permeability, Transmissibility, and Storage of The Gulf Coast Aquifer; and Yields And Specific Capacities of Wells in Matagorda County and Adjacent Areas--Continued

WELL	DATE	SCREENED INTERVAL (FEET)	FIELD COEFFICIENT OF PERMEABILITY (GPD/FT^2)	COEFFICIENT OF TRANSMISSIBILITY (GPD/FT)	COEFFICIENT OF STORAGE	YIELD (GPM)	DRAWDOWN OR RECOVERY (FEET)	1-HOUR SPECIFIC CAPACITY (GPM/FT) *SEE REMARKS	REMARKS
TA-80-14-608	Feb. 9, 1964	243-870	--	--	--	3,088	62	*50	Recovery test. Specific capacity calculated from 30-minute test.
802	Mar. 4, 1957	230-410	--	--	--	600	--	--	
15-102	Mar. 9, 1967	506-634	458	45,800	--	408	47.4	9	Recovery test.
106	Apr. 16, 1963	300-912	--	--	--	2,800	95	*29	Recovery test. Time interval for specific capacity unknown.
201	May 15, 1955	353-878	420	107,000	--	2,630	53	*50	Coefficients of permeability and transmissibility calculated from drawdown test. Specific capacity calculated from 20-minute recovery test.
301	June 10, 1966	--	413	67,700	--	1,026	49.3	21	Drawdown test.
401	July 13, 1955	225-1,044	177	63,000	--	2,000	47.4	42	Recovery test.
402	Dec. 10, 1957	275-295	--	--	--	70	14	* 5	Drawdown test. Specific capacity calculated from 8-hour test.
502	Sept. 19, 1966	244-776	103	31,300	--	2,020	--	--	Recovery test.
16-301	Mar. 10, 1967	615-800	505	40,400	--	158.4	31.6	5	Do.
302	July 31, 1964	630-810	--	--	--	203	13	16	Drawdown test.
22-302	Apr. 1943	523-608	--	--	--	255	247	* 1	Drawdown test. Time interval for specific capacity unknown.
23-101	July 19, 1955	190-776	344	82,500	--	1,560	34.1	46	Recovery test.
102	July 17, 1958	530-620	--	--	--	530	34	16	Drawdown test.
301	July 19, 1955	200-770	139	51,500	--	1,535	50.5	30	Recovery test.
402	Mar. 17, 1967	544-586	--	44,800	--	388.5	--	--	Do.
403	Mar. 17, 1967	542-578	--	42,500	0.46×10^{-4}	--	--	--	Interference recovery test. Well TA-80-23-402 was pumped.
81-01-101	May 11, 1951	565-760	--	--	--	940	60	*16	Recovery test. Specific capacity calculated from 20-minute test.
101	Oct. 13, 1955	do	489	68,500	--	1,000	--	--	Recovery test.

Table 2.--Coefficients of Permeability, Transmissibility, and Storage of The Gulf Coast Aquifer; and Yields And Specific Capacities of Wells in Matagorda County and Adjacent Areas--Continued

WELL	DATE	SCREENED INTERVAL (FEET)	FIELD COEFFICIENT OF PERMEABILITY (GPD/FT^2)	COEFFICIENT OF TRANSMISSIBILITY (GPD/FT)	COEFFICIENT OF STORAGE	YIELD (GPM)	DRAWDOWN OR RECOVERY (FEET)	1-HOUR SPECIFIC CAPACITY (GPM/FT) *SEE REMARKS	REMARKS
TA-81-01-102	Oct. 13, 1955	777-1,020	214	30,000	--	915	50.0	18	Do.
103	June 1940	633-791	--	--	--	545	54	*10	Recovery test. Specific capacity calculated from 10-minute test.
104	Apr. 4, 1945	639-789	--	--	--	500	80	* 6	Do.
502	July 7, 1966	123-177	--	--	--	450	51	9	Drawdown test.
601	Mar. 13, 1967	218-660	379	42,800	--	1,290	45.8	28	Recovery test.
602	June 1, 1965	225-651	--	--	--	857	172	* 5	Drawdown test. Time interval for specific capacity unknown.
802	July 18, 1955	150-520	269	35,000	--	1,075	73.2	15	Recovery test.
03-701	May 19, 1960	193-728	--	--	--	1,860	--	--	
09-202	Nov. 17, 1964	240-470	--	--	--	1,032	47	22	Drawdown test.
401	Mar. 24, 1966	--	250	44,300	--	1,182	83.3	14	Coefficients of permeability and transmissibility calculated from recovery test. Specific capacity calculated from drawdown test.
502	Mar. 17, 1952	124-500	--	--	--	2,919	56	*52	Drawdown test. Time interval for specific capacity unknown.
504	July 19, 1955	150-721	306	53,000	--	2,000	52.4	38	Recovery test.
904	Mar. 16, 1967	361-482	717	43,000	12.7×10^{-4}	--	--	--	Interference recovery test. Well TA-81-09-905 was pumped.
905	do	364-491	454	29,500	--	338	27.3	12	Recovery test.
10-901	Apr. 28, 1966	280-296	--	--	--	6.4	--	--	
902	do	--	--	10,500	1.36×10^{-4}	--	--	--	Interference drawdown test. Well TA-81-10-901 pumping.
12-701	Apr. 16, 1962	161-191	--	--	--	45	38	1	Drawdown test.
Jackson County									
PP-80-06-101	July 8, 1955	85-550	727	189,000	--	1,485	--	--	Recovery test.
102	Sept. 9, 1963	104-364	790	124,000	--	1,690	29.9	57	Drawdown test.

Table 2.--Coefficients of Permeability, Transmissibility, and Storage of The Gulf Coast Aquifer; and Yields And Specific Capacities of Wells in Matagorda County and Adjacent Areas--Continued

WELL	DATE	SCREENED INTERVAL (FEET)	FIELD COEFFICIENT OF PERMEABILITY (GPD/FT^2)	COEFFICIENT OF TRANSMISSIBILITY (GPD/FT)	COEFFICIENT OF STORAGE	YIELD (GPM)	DRAWDOWN OR RECOVERY (FEET)	1-HOUR SPECIFIC CAPACITY (GPM/FT) *SEE REMARKS	REMARKS
PP-80-06-104	Sept. 9, 1963	50-215	--	119,000	$14x10^{-4}$	--	--	--	Interference drawdown test. Well PP-80-06-102 pumping.
703	July 8, 1955	154-590	359	79,000	--	1,450	36.1	40	Recovery test.
704	Aug. 21, 1963	146-430	616	104,800	--	1,500	19.6	77	Do.
22-501	Sept. 5, 1963	288-370	361	20,600	--	540	33.2	16	Do.
				Wharton County					
ZA-66-62-904	July 18, 1955	162-573	382	102,000	--	1,430	21.0	68	Recovery test.
63-504	Mar. 15, 1967	167-682	475	195,300	--	2,508	37.7	67	Recovery test.
80-06-202	July 13, 1966	177-620	--	--	--	1,675	23.5	71	Drawdown test.
Average for all wells in table			573	84,475	$8.10x10^{-4}$	1,425	56	30	

will develop a small cone of depression in a much longer period of time. The difference is because of the difference in the storage capacities of the two types of aquifers. The coefficients of storage of the Gulf Coast aquifer in Matagord County and adjacent areas are typical of artesian aquifers, ranging from 0.000046 to 0.0014 (Table 2).

Yields and Specific Capacities of Wells

The yields of 65 large-capacity wells (irrigation, industrial, and public supply) were measured in Matagorda County during this investigation. The range in yields and the average yields of the wells are as follows:

LARGE-CAPACITY WELL TYPE	NUMBER OF WELLS MEASURED	AVERAGE YIELD IN GALLONS PER MINUTE	RANGE IN YIELD IN GALLONS PER MINUTE
Irrigation	42	1,955	450-3,560
Industrial	9	600	92-1,290
Public Supply	14	410	45-1,000

The specific capacity of a well is the yield in gallons per minute per foot of drawdown. Specific capacity depends on two factors, aquifer transmissibility and the frictional resistance encountered by the water at its entrance to the well. The latter factor is determined to a large extent by well construction and thoroughness of well development. Specific capacity of a given well is not constant, however, and will vary with pumping rates and time.

The average specific capacity for the large-capacity wells in Matagorda County and adjacent areas is about 30 gpm/ft (gallons per minute per foot) of drawdown, with a range from 1 to 83 gpm/ft (Table 2). The one-hour specific capacity of 30 wells averaged about 23 gpm/ft.

The general distribution of specific capacities of wells completed in the heavily pumped zone is illustrated on Figure 9. The largest specific capacities are evident in the extreme northwestern and northeastern parts of the county, while the smaller measurements are in the central part and near the coast.

DEVELOPMENT OF THE AQUIFER

Prior to 1900, there was no significant development of ground water in Matagorda County other than the small amount required for domestic and livestock use. The Gulf Coast aquifer was, at that time, in a natural state of hydrologic equilibrium, that is, the amount of ground water lost by natural discharge was balanced by the amount of water received as recharge. Moderate artesian pressures were encountered by wells tapping artesian sands and flowing wells were common throughout the county. The pumpage of large-capacity wells, especially within the last 25 years, has steadily decreased the artesian pressures and at the present time the only flowing wells are near the coast in the southeastern part of the county.

At present, the areas of greatest development are in the western, heavily irrigated part of the county. Some moderately heavy industrial development is in the central and eastern parts of Matagorda County and in western Brazoria County.

Records of 323 water wells in Matagorda County and adjacent areas were collected during this investigation. Of these wells, 109 were used for irrigation, 30 were used for public supply, 20 were used by industry, 111 were used for domestic and livestock purposes, and 53 were unused (abandoned or destroyed). All irrigation, industrial, and public supply wells were inventoried. Only a relatively small but representative number of the domestic and livestock wells were inventoried. Locations of these inventoried water wells are shown on Figure 31, and their related data are given in Table 7. Selected drillers' logs, water levels, and chemical analyses of water samples collected from these wells are presented in Tables 8, 9, and 10, respectively.

Past and Present Development

Ground-water pumpage in Matagorda County in 1966 was about 18,600 acre-feet or 17 mgd (Table 3). The quantity of water pumped from the aquifer is expected to increase due to increased demands by new industry and related increase of population. Ground-water pumpage for irrigation, which accounts for most of the total pumpage, will probably remain fairly constant unless there is a considerable increase or decrease in the county allotments for rice acreage.

Irrigation

Matagorda County irrigation pumpage in 1966 was 10.05 mgd or 11,230 acre-feet, and represents 60 percent of the total ground water pumped during the year (Table 3). Practically all of the ground water pumped for irrigation is used to irrigate rice. Rice is grown in nearly all parts of the county but mostly in the western part.

Table 3.--Pumpage of Ground Water in 1966

USE	MILLION GALLONS PER DAY	ACRE-FEET PER YEAR
Irrigation	10.05	11,230
Industry	3.31	3,700
Public supply	2.08	2,320
Rural domestic and livestock needs	1.21	1,360
Total*	17.00	18,600

* Figures are approximate values. Some pumpage data is based on estimates. Totals are rounded to two significant figures.

Continuous historical acreage records are scarce; however, available records indicate that the first rice was planted during the first decade of the 20th century. Rice acreage increased from 38,000 acres in 1942 to almost 50,000 acres in 1966. The amount of ground water pumped for rice irrigation increased from 12,150 acre-feet in 1955 to 16,970 acre-feet in 1965. This investigation did not determine when the first well was drilled for irrigation purposes in Matagorda County. However, records of wells compiled by Bridges (1935) showed only 2 irrigation wells in the county in the fall of 1934. Cromack and Bridges (1944) report 9 active irrigation wells in the county in 1943. Most of these wells were reportedly drilled in the late 1930's and early 1940's. During the period 1949-66, the number of irrigation wells used in the county increased from 19 (Sundstrom, Cromack, and West, 1949) to 89.

Based on a U.S. Department of Agriculture irrigation survey, 4.0 feet of water per acre per year (during growing season) is required to irrigate rice when using ground water. This figure is the total amount of water required and is met partly by rainfall during the growing season. Surface-water requirements for rice irrigation are slightly higher than ground-water requirements during a comparative growing season, due to seepage and evaporation losses in canal systems between places of surface-water diversion and areas of water use.

Approximately 6.6 percent of the total irrigation water used in the county has been supplied by ground water. Table 4 shows the yearly amounts of ground and surface water applied to rice acreage in the county from 1955 to 1966.

The amount of ground-water pumpage was computed by subtracting the amount of rainfall during the growing season of a year from the 4.0 feet per acre per year requirement. The remainder is then multiplied by the acreage irrigated by ground water in the same year to obtain the annual amount of ground water pumped in acre-feet. Figure 10 shows the yearly ground-water pumpage for irrigation from 1955 to 1966 in Matagorda County.

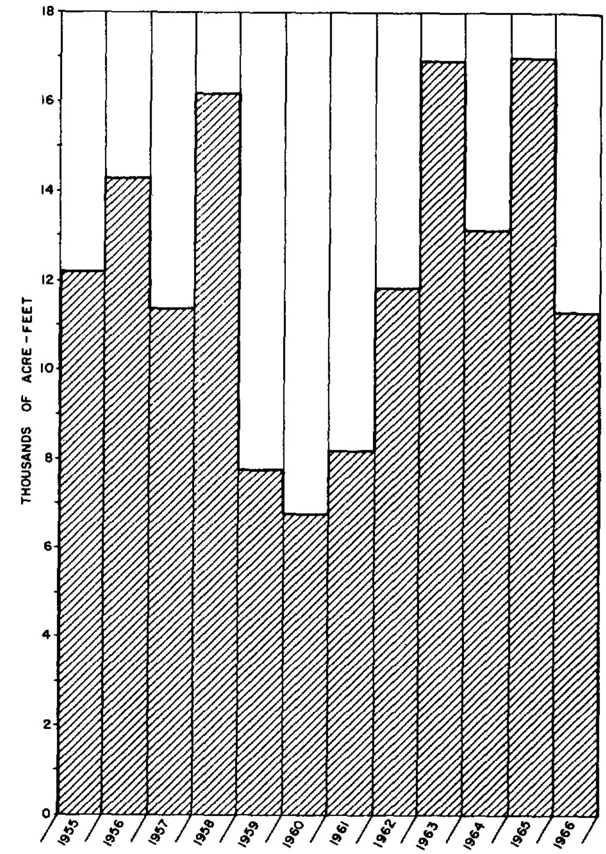

Figure 10.--Pumpage of Ground Water for Irrigation, 1955-66

Industrial

In 1966, 3.31 mgd or 3,700 acre-feet of ground water was pumped in Matagorda County for industrial purposes (Table 3). This is 20 percent of the total ground water pumped in the county in 1966. Industrial pumpage has remained fairly constant with a few minor fluctuations over the years. However, from 1964 to 1966 industrial ground-water pumpage increased from 352 to 3,700 acre-feet or about 1,000 percent (Figure 11). This increase was due largely to the reopening of the sulfur mine at Old Gulf.

The largest single user of ground water for industrial purposes is the Texas Gulf Sulphur Company at the Old Gulf mine. The company has six large-capacity wells pumping 2.89 mgd. The water is used in a modification of the Frasch process for mining sulfur. Industrial water usage other than for mining is mainly restricted to cooling water. Oil and gas companies and chemical production plants used 445 acre-feet of ground water in Matagorda County in 1966.

Table 4.--Extent of Distribution, Source, and Amount of Water Used for Rice Irrigation, 1955-66

YEAR	TOTAL ACRES IRRIGATED[a]	ACRES IRRIGATED BY GROUND WATER[b]	RAINFALL, IN FEET, APRIL TO AUGUST[c]	AMOUNT OF GROUND WATER PUMPED FOR IRRIGATION, IN FEET PER ACRE	AMOUNT OF GROUND WATER PUMPED, IN ACRE-FEET	AMOUNT OF SURFACE WATER PUMPED, IN ACRE-FEET[d]	TOTAL AMOUNT OF IRRIGATION WATER PUMPED, IN ACRE-FEET
1955	43,500	4,672	1.4	2.6	12,150	166,122	178,272
1956	36,400	4,587	0.9	3.1	14,220	126,272	140,492
1957	33,100	4,524	1.5	2.5	11,310	122,345	133,655
1958	34,800	5,208	0.9	3.1	16,140	118,962	135,102
1959	38,700	4,538	2.3	1.7	7,710	143,612	151,322
1960	39,300	5,559	2.8	1.2	6,670	140,502	147,172
1961	38,600	5,404	2.5	1.5	8,110	155,439	163,549
1962	44,500	6,230	2.1	1.9	11,840	207,871	219,711
1963	44,837	6,277	1.3	2.7	16,950	237,311	254,261
1964	45,013	5,958	1.8	2.2	13,110	224,719	237,829
1965	47,788	6,787	1.5	2.5	16,970	256,009	272,979
1966	49,994	7,019	2.4	1.6	11,230	236,558	247,788

[a] Records of the U.S. Department of Agriculture.

[b] Records of the Matagorda County Rice Grower's Cooperative.

[c] Rainfall at Bay City, Texas.

[d] Records of the Texas Water Rights Commission.

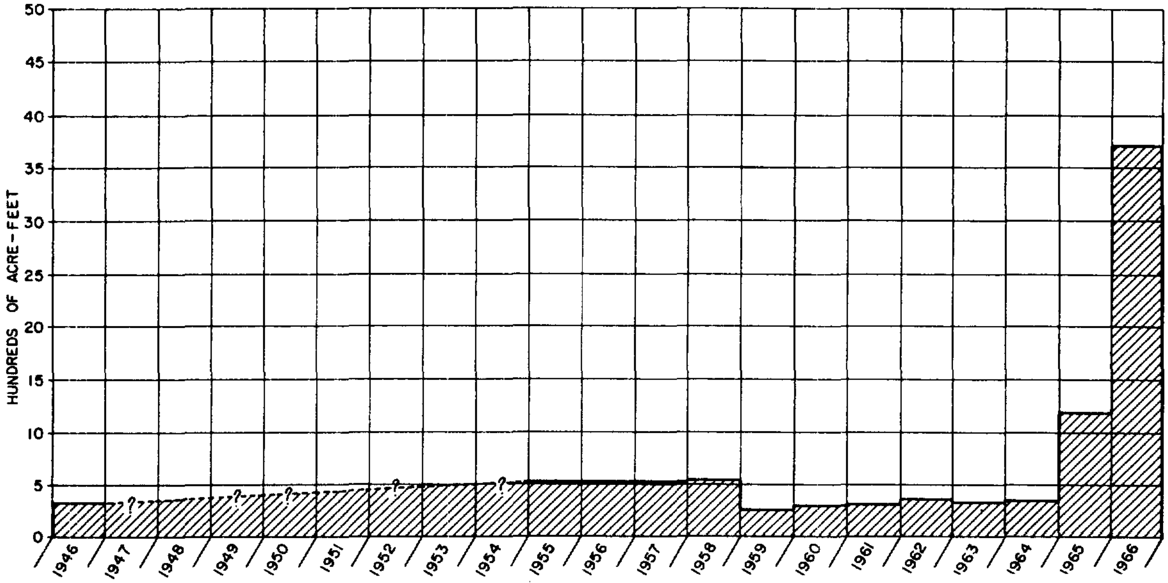

Figure 11.--Pumpage of Ground Water for Industry, 1946 and 1955-66

Public Supply

In 1966, 2.08 mgd of 2,320 acre-feet of ground water was pumped for public supply in Matagorda County (Table 3). This amounts to 12.5 percent of the total ground water pumped in the county during the year.

The use of ground water for public supply in the county increased from a low of 560 acre-feet or 0.5 mgd in 1946 to a high of 2,385 acre-feet or 2.13 mgd in 1963 (Figure 12). This increase was due to the population growth and the drilling of new public supply wells. Several small towns, which previously had no public supply system, drilled new wells to improve their water facilities.

Bay City is the largest user of ground water for public supply. In 1966, about 1,646 acre-feet or 1.47 mgd was pumped at Bay City, which is 71 percent of the ground-water pumpage in the county for public supply. The city has increased in population by 53 percent since 1945, and has drilled 4 water wells since that time. Palacios, the second largest municipality in the county,

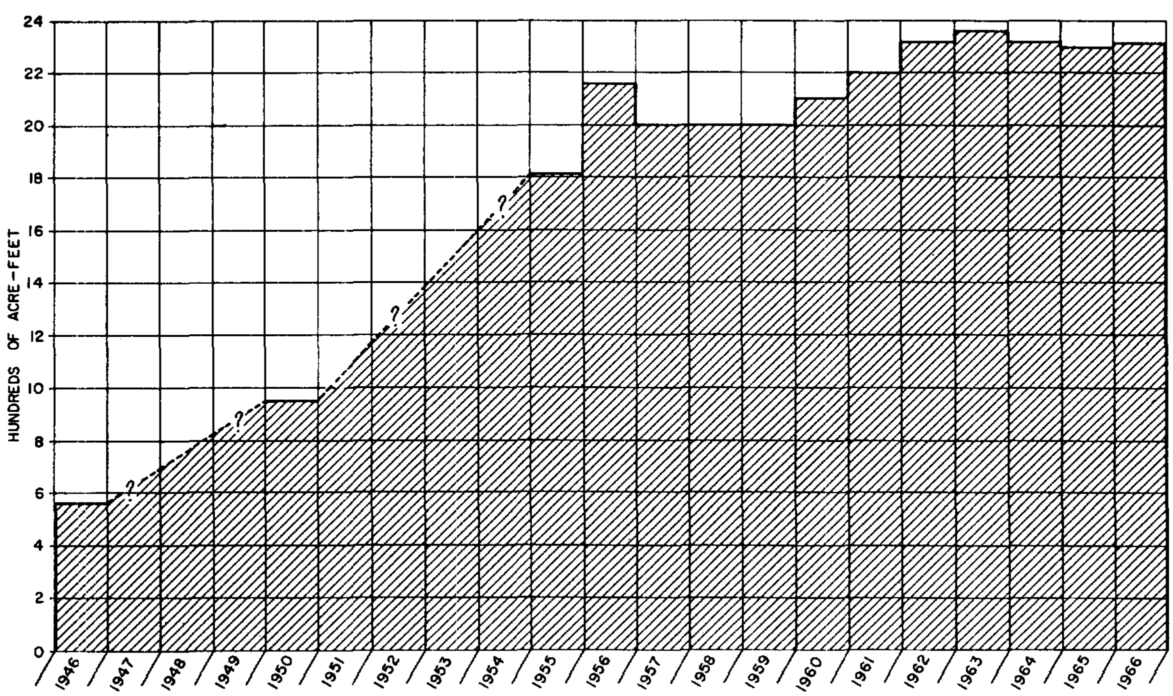

Figure 12.--Pumpage of Ground Water for Public Supply, 1946, 1950, and 1955-66

pumped 481 acre-feet or 0.43 mgd of ground water in 1966, or about 21 percent of the total ground-water pumpage for public supply.

Other municipalities with public water distribution systems using a ground-water source are Van Vleck, Markham, and Blessing. These three systems collectively pumped about 193 acre-feet or 0.17 mgd in 1966. In 1967, the community of Wadsworth established a new ground water supply system. A public ground water distribution system has been proposed for the town of Matagorda.

Fifteen privately owned, small capacity public supply wells with limited distribution systems were inventoried in the county (Wells TA-80-07-902 and 903; TA-80-08-301 and 801; TA-80-16-301; TA-81-10-901; TA-81-11-901; TA-81-12-701 and 702; TA-81-17-402, 403, 404, and 405; and TA-81-25-101 and 102). In 1966, these wells probably produced less than 15 acre-feet or 0.013 mgd of ground water for public supply.

Domestic and Livestock

The usage of ground water for rural domestic and livestock purposes was about 1,360 acre-feet per year or 1.21 mgd (Table 3). This represents approximately 7.5 percent of the ground water pumped in the county in 1966. This estimate is based on a 1965 rural population estimate and a U.S. Department of Agriculture farm animal census.

Future Development

Future development of the Gulf Coast aquifer in Matagorda County will depend on changes in the amounts of rice-acreage allotments, new industry, and population growth. Industry and related population growth are expected to increase while rice-acreage allotments are expected to remain unchanged. An indication of the Gulf Coast aquifer's development potential is discussed in another part of this report (page 54).

Construction of Wells

The construction of water wells depends primarily upon the intended use of the well. For a particular well use, such as industrial, irrigation, public supply, or domestic and livestock, there is usually a different method of completion.

There is no one best method for completion of domestic and livestock wells, as these may be hand dug, driven, or drilled, and usually are screened opposite the first fresh-water-bearing sand encountered. In the northern half of Matagorda County these wells are usually shallow, while in the southern half, because of salt-water-bearing sands and fine-grained, nonporous sediments near the surface, wells are drilled to moderate depths.

The domestic and livestock wells are completed with commercial plastic, stainless steel, or bronze screens, or with torch-slotted steel pipe, or may contain "open end" pipe with no screen or slots at all. Various types of cylinder, jet, and submersible pumps are used, but usually of very small capacity, ½ to 1 horsepower.

The most important factor to consider in the location and construction of a domestic or livestock well is to prevent contamination from entering the well from such sources as septic tanks, privies, cesspools, and barnyards. The annular space outside the casing and above the well screen or slotted interval should be filled with cement, and the well casing should be sealed at the top to prevent entry of objectionable material.

Large-capacity wells, such as those used for irrigation, industry, and public supply, are usually gravel packed. The gravel is placed in the annulus of the well opposite the screened or slotted intervals. Underreaming and gravel packing of a well increases the effective diameter of the well and thereby decreases the entrance velocity of ground water when the well is pumped. During periods of heavy pumping, gravel packing will increase the well's specific capacity (gallons per minute per foot of drawdown), serve as a strainer to keep fine-grained sediments from entering the well bore, and function as a filling material for cavities formed if fine-grained sediments should enter the well bore.

Large-capacity industrial wells are only completed opposite the sands having water of desirable chemical quality. This method assures a maximum yield of the best quality water. Surface casing, 10 to 20 inches in diameter, is usually set to a depth greater than 200 feet and cemented in place from the bottom of the casing to the surface. A hole 30 to 36 inches in diameter is then underreamed below the surface casing in the section having the sands bearing water of the desired quality. Sections of smaller diameter screen and blank casing are set to the bottom of the hole. The annular space between the side of the underreamed hole and the sections of screen and blank casing is then gravel packed.

Public supply wells are usually completed in much the same manner. However, selection of sands containing water of the very best possible chemical quality is the governing factor on how the well is completed.

Large-capacity irrigation wells are usually drilled to large diameters and gravel packed from surface to total depth. The gravel pack from top to bottom facilitates vertical movement of water in the well bore so that all sands penetrated may contribute to the yield of the well.

As shown by Baker (1965, p. 9), water in the shallow sands is, in places under higher pressure than water in the deeper sands, and consequently water from the shallow sands will move downward through the gravel pack. Should the shallow sands contain poor quality water, as is the case in some oil-field areas of Matagorda County, they should be sealed off in the well bore by effective cementing procedures to prevent contamination of the lower sands.

In some irrigation wells the blank surface casing, up to 24 inches in diameter, is set to about 200 feet. This depth will probably accommodate any future lowering of pumps because of declines in water levels during the expected life of the well. The screened interval, completed with smaller diameter blank casing and screen, is usually below 200 feet. This practice generally avoids excessive demands on shallow sands that supply water to nearby domestic and livestock wells and also helps to prevent the contamination problem described above.

The screen in large-capacity irrigation wells is almost invariably torch-slotted casing. The casing may be slotted from about 200 feet to total depth, taking in all sands, or may be selectively slotted opposite the most promising sands as indicated by an electric log or driller's log.

In all large-capacity wells the uppermost screened or slotted interval should be below the lowest expected pump setting, to prevent water from cascading into the well casing. Cascading entraps air which, being highly compressible, reduces pumping efficiency.

The size of screen openings or slots should be determined by the size and degree of sorting of the water-bearing sands and the gravel pack. Slots that are too wide will allow fine-grained sand to enter the well bore and cause "sanding up" of the well and excessive wear on the pump.

Another point that should be considered in well construction is that the well bore should be drilled as vertical and straight as possible, to insure that the pump will operate properly and will not come in contact with the casing. This becomes especially important when deep well turbine pumps have to be lowered because of declining water levels.

Pumps on irrigation wells in Matagorda County are powered by electric motors or engines fueled with gasoline, butane, diesel, or natural gas. Industrial and public supply wells are usually powered by electric motors. However, some have a standby engine fueled with gasoline or diesel.

PUMPAGE EFFECTS

When a well is pumped and ground water is withdrawn from an aquifer, a depression shaped like an inverted cone is formed in the water table or piezometric surface surrounding the well. Theis (1938, p. 893) described this cone of depression as "a pirating agent created by the well to procure water for it, first robbing the aquifer of stored water and finally robbing surface water or areas of transpiration in the localities of recharge or natural discharge." If several closely spaced wells produce from the same aquifer, their cones of depression may overlap causing additional lowering of water levels in the area.

In the Gulf Coast aquifer, the effects of prolonged heavy pumpage can include, in addition to changes in water levels, an encroachment of salt water into sands that formerly contained fresh water, and subsidence of the land surface. Each of these effects will be considered.

Change in Water Levels

In eastern and central Matagorda County, water-level declines generally are small compared to the western part of the county where as much as 52 feet of net decline occurred from 1944 to 1967. With the exception of the area of intense ground-water pumpage for industrial use near Old Gulf (Figure 7), the largest water-level declines are between Palacios and Midfield, and are due primarily to the withdrawal of large quantities of water by deep irrigation wells. Another factor affecting the amount of decline is the relatively low permeabilities of the water sands in the western part of the county as compared to the high permeabilities in the eastern part.

Changes in water levels are illustrated in Figure 13 for eight wells that produce from the heavily pumped zone. It is important to note the relatively small rate of water-level decline of 0.7 feet per year in well TA-81-09-201 in the central part of the county as compared to the average decline rate of 2.2 feet per year in wells TA-80-07-102 and 501 and TA-80-23-101, 301, and 401 in the western part of the county.

Most of the wells in Figure 13, located in the western irrigation area, show a decline in their water levels from 1950 to 1957. This decline generally correlates with the large amount of irrigation pumpage within the same period (Figure 10). The same wells show a rise or leveling off in their water levels from 1958 to 1961, which correlates with the decrease in irrigation pumpage during this period. From 1961 to 1967 all the wells in Figure 13 show a net decline which corresponds to the large irrigation withdrawals for the period (Figure 10).

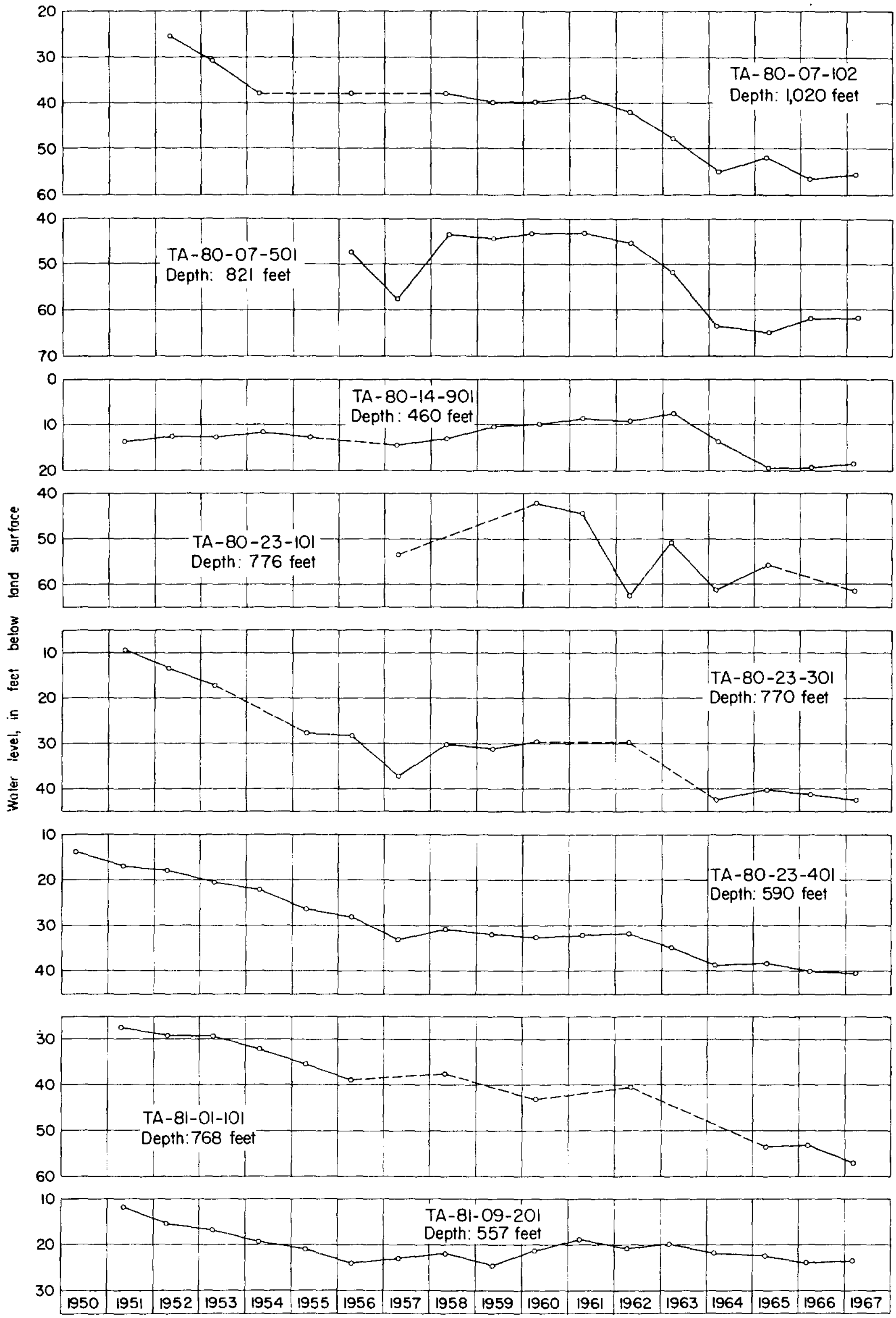

Figure 13

Fluctuations of Water Levels in Selected Wells

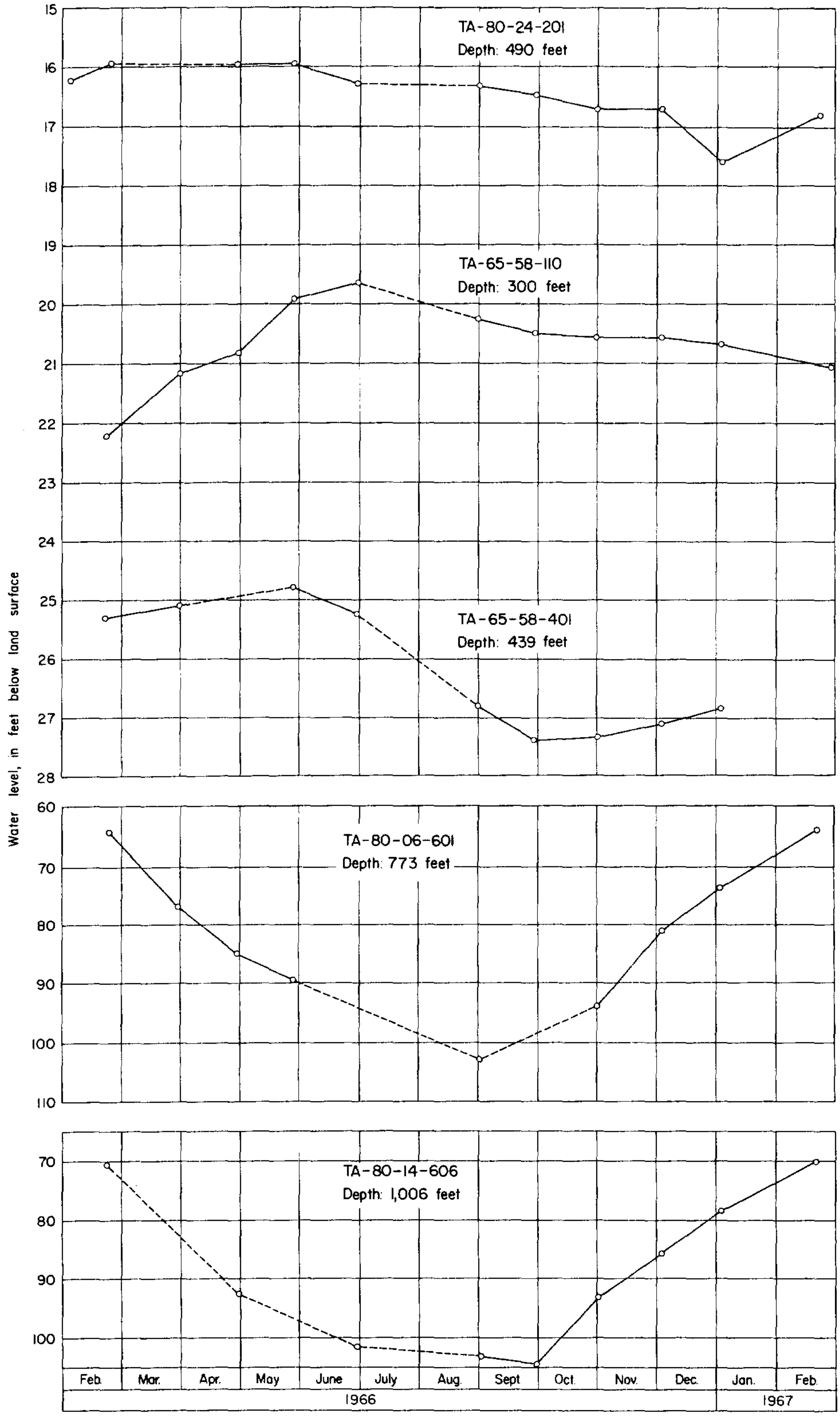

Figure 14

Fluctuations of Water Levels in Selected Wells

The hydrograph for well TA-81-01-101, a Bay City municipal well, shows generally the long-term decline of the water level in the area of largest public supply pumpage in the county. The hydrograph correlates generally with the public supply pumpage illustrated in Figure 12.

Figures 14 and 15 show seasonal changes in water levels. Hydrographs of wells TA-80-06-601 and TA-80-14-606 (Figure 14) and well TA-66-63-901 (Figure 15) reflect the large withdrawals of water during the April to August period of rice irrigation. These illustrate the usual seasonal pattern in Matagorda County, water levels being highest in late winter or early spring when recharge is large and withdrawals are small. Conversely, the lowest water levels are usually recorded during midsummer at the height of the growing season when ground-water pumpage is at its maximum. Also, most of the rainfall during the summer months is probably lost to evaporation and transpiration with very little of it reaching the water table.

Wells in the eastern part of the county generally have seasonal water-level changes of far less magnitude than wells in the western part. This is primarily because of less pumpage in the eastern part of the county, and partly because water-table conditions are more prevalent there in the shallow sands.

Future declines of water levels caused by pumping may be predicted using the available data on coefficients of transmissibility and storage. Figure 16 shows the theoretical relationship of the decline in water levels to transmissibility and distance from the center of pumping. The calculations were based on a well or group of wells pumping 1 mgd for 1 year from the Gulf Coast aquifer having coefficients of transmissibility and storage as indicated.

Figure 17 shows the relationship of decline in water levels as a result of pumping under artesian conditions assuming an aquifer of infinite areal extent and using the coefficients of transmissibility and storage given. The graph shows that the rate of drawdown decreases with time of pumping. As an example, if the 1-year drawdown 1,000 feet from a well pumping 1 mgd is 7.4 feet, then in 100 years, if the well had been pumped continuously at the same rate, the drawdown would be 11 feet. The equilibrium curve is based on the assumption that a line source of recharge is 25 miles from the well or point of discharge.

Figure 18 shows the relationship of drawdown to time and distance as a result of pumping under water-table conditions. These conditions would apply in wells producing from the shallow sands in Matagorda County and in the area of the abandoned valley of the Colorado River in the eastern part of the county.

Salt-Water Encroachment

It can be assumed that prior to 1900, before development of the ground-water supplies of Matagorda County had begun, ground-water conditions were in a state of equilibrium. The amount of water entering the aquifer as recharge balanced the amount of water lost by

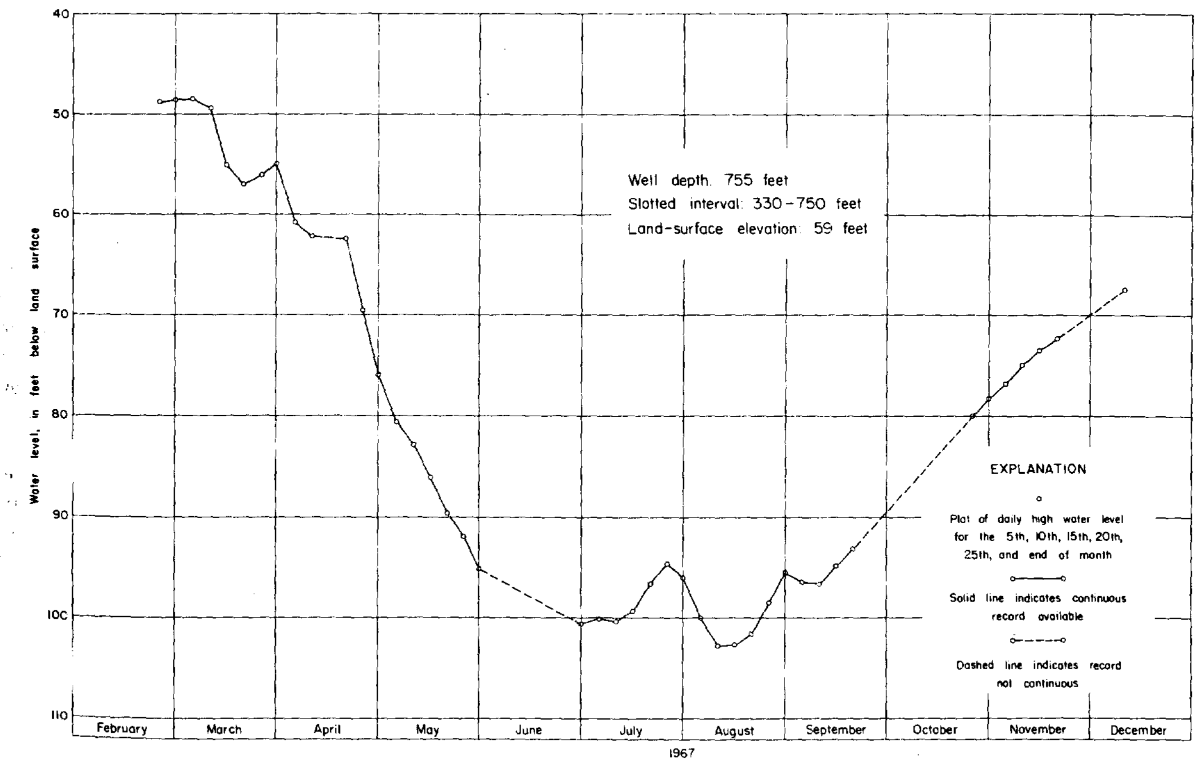

Figure 15.--Fluctuations of Water Level in Recorder Well TA-66-63-901

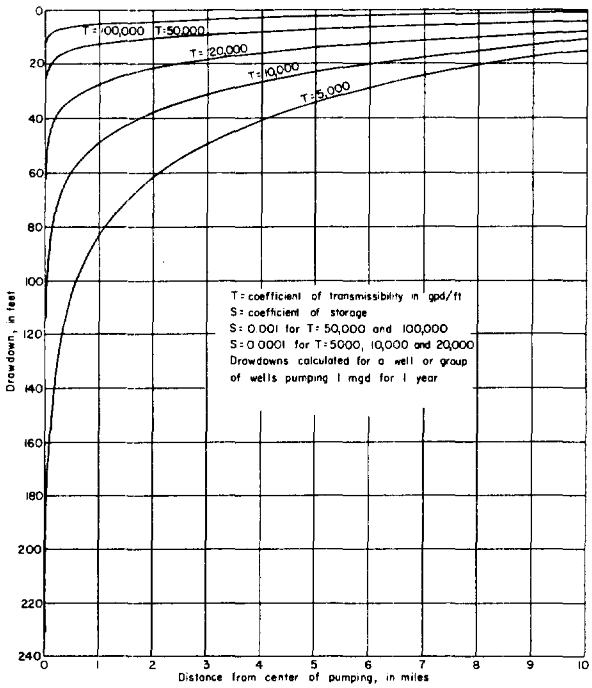

Figure 16.--Relation of Decline in Water Levels to Transmissibility and Distance

natural discharge. The fresh water-salt water interface or boundary was practically stationary in the aquifer near the coast. With this state of equilibrium present, the dynamic and static pressure on the fresh-water side of the interface balanced the pressure on the salt-water side. The water table sloped gently toward the coast, ground water was discharged to the sea, and in no areas of the county were water levels below sea level. Some of the very shallow isolated water sands near the coast contained salt water, which had been entrapped when the sands were deposited.

Water levels have declined in the county as a result of increasing ground-water development for industrial, public supply, and domestic and livestock uses. Development for irrigation, beginning probably in the early or mid-1930s, resulted in further lowering of water levels. By 1934, water levels in the vicinity of Old Gulf were below sea level. Since 1934, water levels have declined to below sea level over most of the western and central part of the county (Figure 7).

Intensive pumping at the Texas Gulf Sulphur Company mine at Old Gulf has lowered water levels to approximately 100 feet below sea level (Figure 7). Large withdrawals of ground water for irrigation between Palacios and Midfield have lowered the water levels to as much as 46 feet below sea level.

Consequently, the hydraulic gradient on the coastal side of these large cones of depression has been reversed. Since ground water must move in the direction of the hydraulic gradient or slope of the piezometric surface (slope of water table in unconfined aquifers), the salt water-fresh water interface undoubtedly has shifted in an inland direction.

At the present time salt-water encroachment does not appear to be a serious problem in Matagorda County with the possible exception of the Old Gulf area. However, if further development and pumpage continue to lower water levels, salt-water encroachment could become a serious problem, especially in the coastal part of the county.

Once sea water invades fresh-water sands, they become relatively useless as far as their resupply by fresh water is concerned. Even if the large withdrawals were discontinued, it would take centuries to flush the salt water from the invaded sands. The most effective method of controlling salt-water encroachment in Matagorda County is to reduce the withdrawals of fresh water in the critical coastal areas to a point where the normal hydraulic gradient can be reestablished. Establishment of the desired gradient may be accomplished by rearranging the pumpage patterns of wells in areas near the coast, by avoiding excessive concentrations of wells, by using ground water from wells farther inland, and by using supplemental surface-water sources.

Land Subsidence

The major cause of land subsidence in Matagorda County is the withdrawal of ground water from the Gulf Coast aquifer. Removal of oil and gas is believed to be a minor cause of regional subsidence, and locally, near Old Gulf, large subsidence has been caused by the removal of sulfur.

In the case of subsidence caused by ground-water withdrawals, the excessive demands on the aquifer and subsequent dewatering of the aquifer result in the compaction of clay and silt. According to Meinzer and Wenzel (1942, p. 458), the water pressure in an artesian aquifer provides a buoyant effect that helps support the aquifer. When the water pressure is reduced, the buoyant effect lessens and the aquifer compacts. The compaction is most severe in fine-grained sediments, such as silt and clay, and does not seem to occur in sand or gravel (Davis and DeWiest, 1966, p. 397).

Figure 19 shows the land-surface subsidence along a generally northeast-trending line in Matagorda County. The amount of subsidence was calculated by comparing elevations of bench marks determined by the U.S. Coast and Geodetic Survey in 1918 and 1951. Of the total 1918 to 1951 subsidence, the greatest amount probably occurred during the period from 1940 to 1951, after extensive ground-water development was begun. Since 1951, even more ground water has been developed in the county and probably more subsidence has occurred.

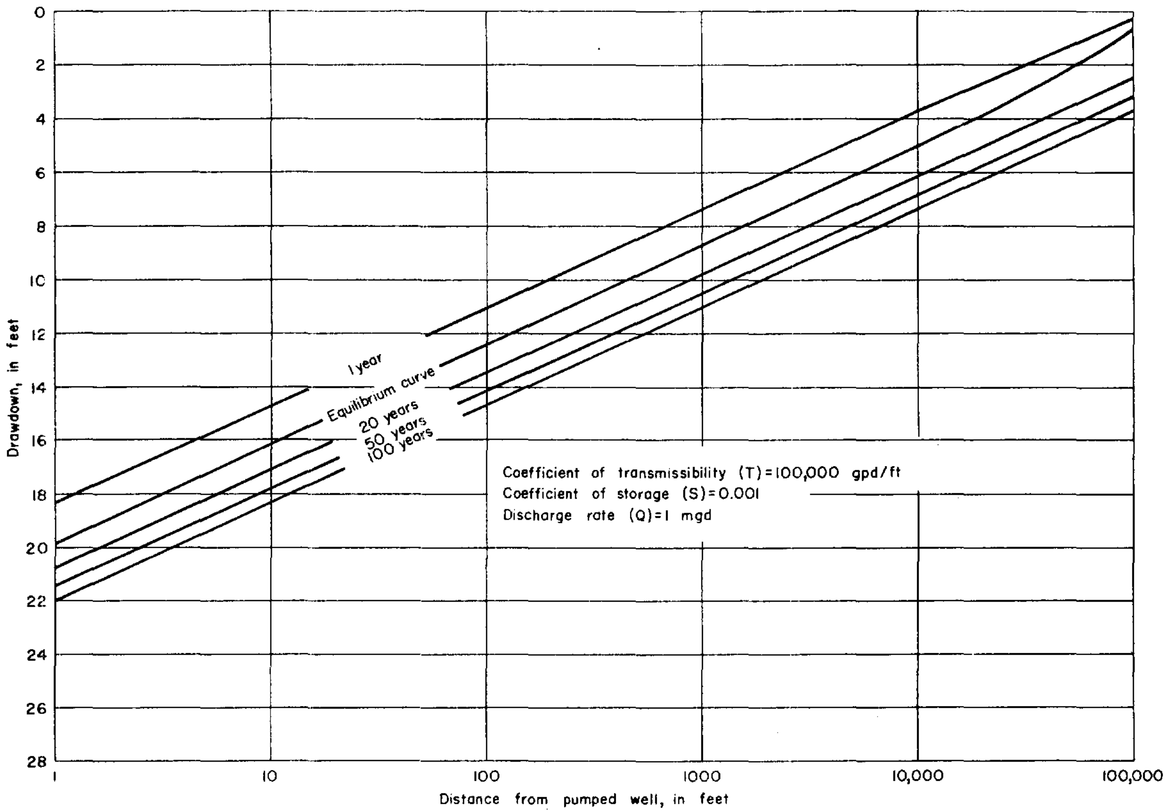

Figure 17.--Relation of Decline in Water Levels to Time and Distance as a Result of Pumping Under Artesian Conditions

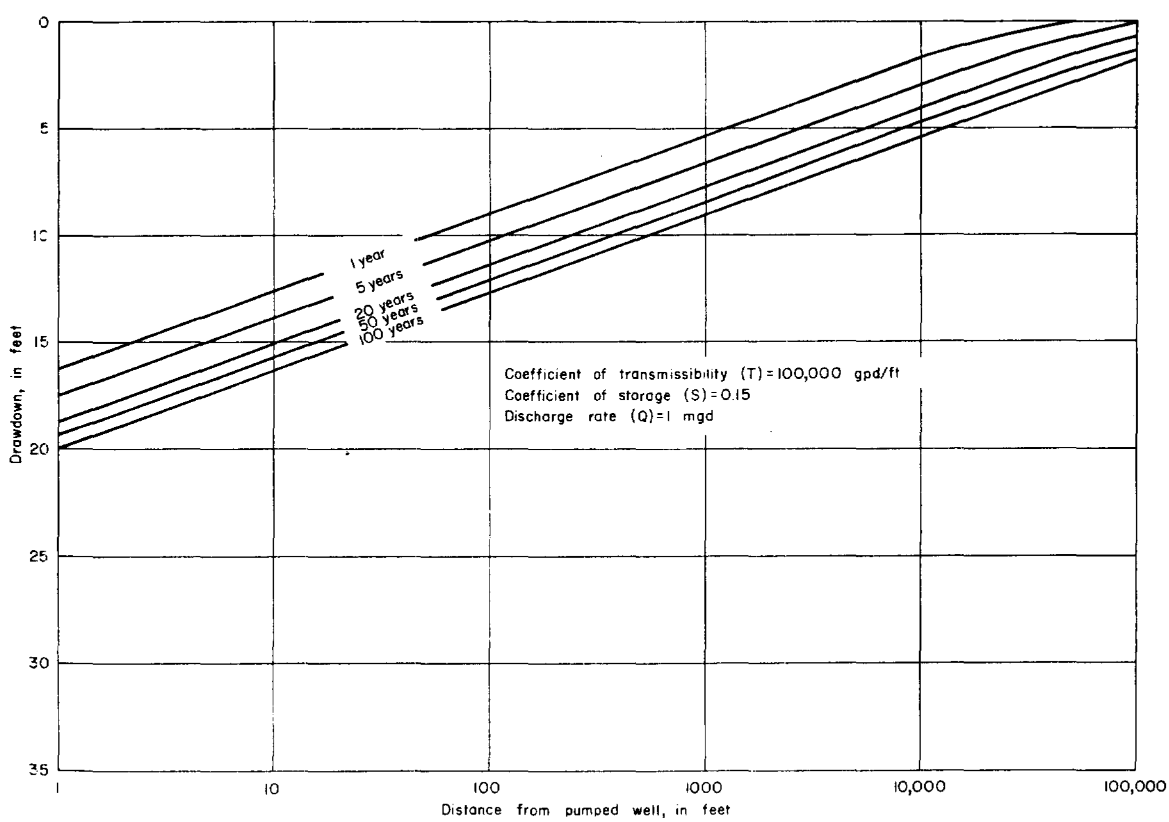

Figure 18.--Relation of Decline in Water Levels to Time and Distance as a Result of Pumping Under Water-Table Conditions

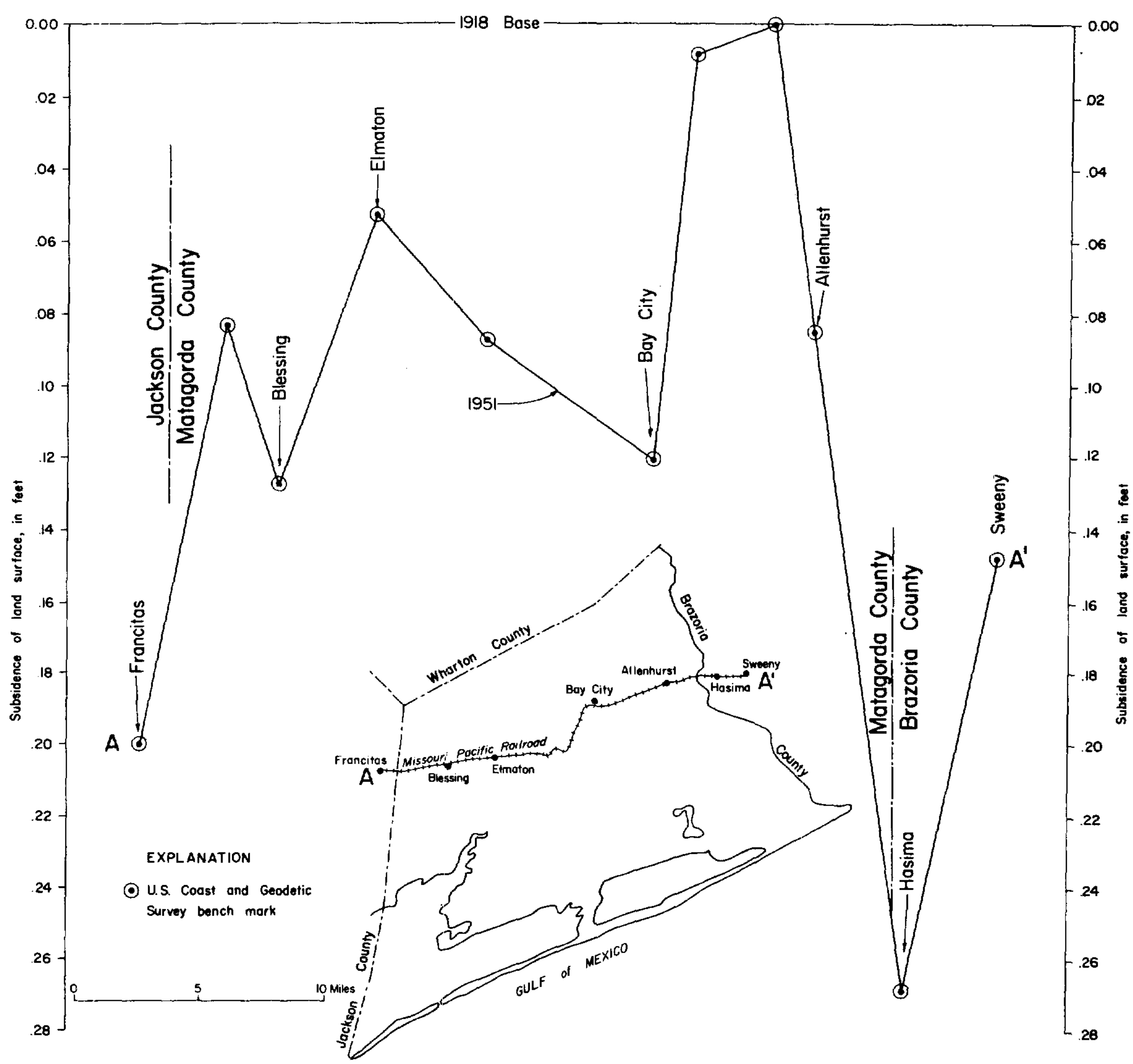

Figure 19.--Profile of Land-Surface Subsidence, 1918-51

The greatest amount of subsidence shown in Figure 19 is in the extreme western and eastern areas of the county. The subsidence in the western area was caused by large ground-water withdrawals for irrigation. In the eastern part of the county the subsidence was probably caused by withdrawal of ground water by large well fields supplying water to oil refineries in the Old Ocean area in Brazoria County.

Winslow and Doyel (1954, p. 419-420) determined that in the northern part of the Houston-Galveston area a 1-foot subsidence of the land surface corresponds to a 100-foot decline in water levels, or the ratio of subsidence to decline is 1:100. Similar comparison of the land-surface subsidence and the decline of water levels in Matagorda County is difficult because of the time differences in the measurements of land elevations and water levels. However, water levels in well TA-80-14-501 near the line of subsidence measurement declined 18.60 feet from 1943 to 1951. Since most of the subsidence probably took place from 1940 to 1951, it can be assumed that, during this period, subsidence in the area of well TA-80-14-501 amounted to about 0.15 foot (Figure 19). Therefore, the ratio of land subsidence to water-level decline in parts of Matagorda County is about 1:124, which compares favorably with the ratio of 1:100 obtained by Winslow and Doyel. The comparison of the northern Houston-Galveston area and Matagorda County is probably a valid comparison because the lithology of geologic formations contributing to land subsidence in the two areas is similar.

At present, land subsidence in Matagorda County is not considered excessive. Excessive subsidence can cause serious problems such as cracking highways, breaking pipelines, sinking foundations of buildings, and disruption of normal water flow in canals and rivers. If oil, gas, or water wells penetrate below the major zones of subsidence, sediments opposite the bottom of the well will remain stationary while some of the overlying clay sediments will settle and exert a drag on the well casing, possibly causing its collapse or rupture (Davis and DeWiest, 1966, p. 399).

The only beneficial effect of land-surface subsidence is the release of water from the relatively impermeable fine-grained sediments. As the fine sediments pack, water is forced out of them and into the sand and gravel beds where the water is more readily available to wells. Winslow and Wood (1959, p. 1034) estimated that in the Houston area the amount of water released by compaction was one-fifth of the total water produced.

CHEMICAL QUALITY OF THE GROUND WATER

The chemical composition of the ground water depends upon the source of the ground water, the movement of the ground water, and of greatest importance, the soil and rock through which the ground water has moved. Generally, the differences in the chemical quality of ground water reflect differences in the chemical composition of the sediments of the water-bring formations. The low rate of ground-water movement inhibits mixing of waters of differing chemical compositions. Relatively impermeable clay beds and tight sands tend to stratify the ground water by limiting vertical movement, which causes variation in water quality at different depths in the aquifer.

Table 10 shows 213 chemical analyses of water from wells in Matagorda County and adjacent areas. The sampled wells are indicated on Figure 31 by a bar over the well number. Table 5 lists and discusses the source and significance of mineral constituents and the physical properties of natural waters.

Relationship of Water Quality to Use

The relationship of water quality to use depends upon the intended use and the particular quality requirements of the user. Several criteria for water-quality requirements have been developed to serve as guides in determining the suitability of water for various uses. These guides cover bacterial content; physical characteristics, such as color, odor, temperature, and turbidity; and chemical constituents. Water-quality problems of bacterial content and physical characteristics usually can be controlled economically. However, the removal or neutralizing of most of the undesirable chemical constituents can be both difficult and expensive.

The major limitation on the use of water for most purposes is the dissolved-solids content. A general classification based on the dissolved-solids concentration in parts per million (ppm) is as follows (Winslow and Kister, 1956, p. 5):

DESCRIPTION	DISSOLVED-SOLIDS CONTENT (PPM)
Fresh	Less than 1,000
Slightly saline	1,000 to 3,000
Moderately saline	3,000 to 10,000
Very saline	10,000 to 35,000
Brine	More than 35,000

Irrigation

The suitability of water for irrigation use depends not only on the chemical quality of the water but also on soil composition and texture, irrigation practices, crops grown, climate, and drainage. The chemical characteristics of water that are particularly important to irrigation are: the sodium-adsorption ratio (SAR), specific conductance, percent sodium, residual sodium carbonate (RSC), and concentration of boron. (See chemical analyses in Table 10.) In general, the higher the value of these characteristics, the less suitable the water will be for irrigation. The following discussions will attempt to give a general understanding of the various criteria for evaluating the suitability of ground water for irrigation.

A system of classification prepared by the U.S. Salinity Laboratory Staff (1954, p. 69-82) for judging the quality of water used for irrigation is shown on Figure 20. This classification, now in common use, is

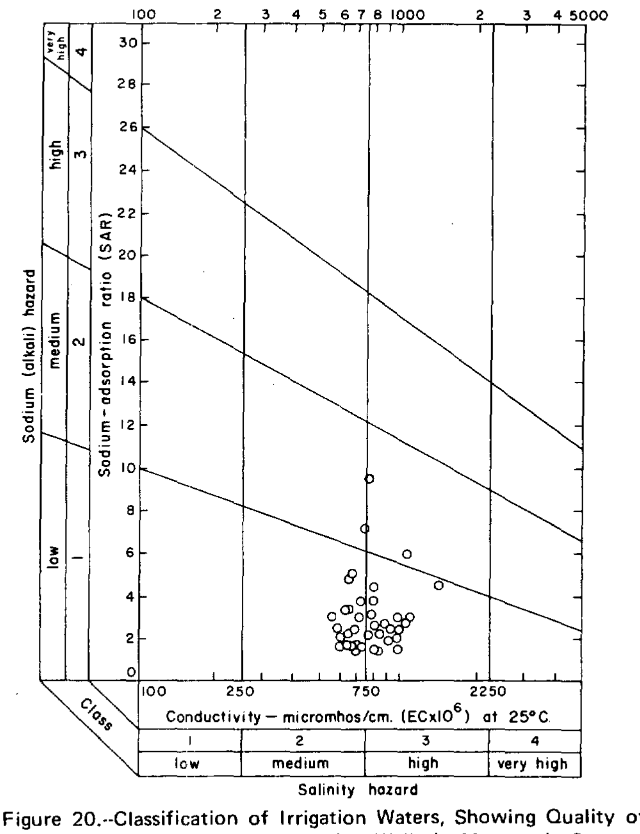

Figure 20.--Classification of Irrigation Waters, Showing Quality of Water From Representative Irrigation Wells in Matagorda County (Modified After U.S. Salinity Laboratory Staff, 1954, p. 80)

Table 5.--Source and Significance of Dissolved Mineral Constituents and Properties of Water

(From Doll and Others, 1963, p. 39-43)

CONSTITUENT OR PROPERTY	SOURCE OR CAUSE	SIGNIFICANCE
Silica (SiO_2)	Dissolved from practically all rocks and soils, commonly less than 30 ppm. High concentrations, as much as 100 ppm, generally occur in highly alkaline waters.	Forms hard scale in pipes and boilers. Carried over in steam of high-pressure boilers to form deposits on blades of turbines. Inhibits deterioration of zeolite-type water softeners.
Iron (Fe)	Dissolved from practically all rocks and soils. May also be derived from iron pipes, pumps, and other equipment.	On exposure to air, iron in ground water oxidizes to reddish-brown precipitate. More than about 0.3 ppm stain laundry and utensils reddish-brown. Objectionable for food processing, textile processing, beverages, ice manufacture, brewing, and other processes. USPHS (1962) drinking water standards state that iron should not exceed 0.3 ppm. Larger quantities cause unpleasant taste and favor growth of iron bacteria.
Calcium (Ca) and Magnesium (Mg)	Dissolved from practically all soils and rocks, but especially from limestone, dolomite, and gypsum. Calcium and magnesium are found in large quantities in some brines. Magnesium is present in large quantities in sea water.	Cause most of the hardness and scale-forming properties of water; soap consuming (see hardness). Waters low in calcium and magnesium desired in electroplating, tanning, dyeing, and in textile manufacturing.
Sodium (Na) and Potassium (K)	Dissolved from practically all rocks and soils. Found also in oil-field brines, sea water, industrial brines, and sewage.	Large amounts, in combination with chloride, give a salty taste. Moderate quantities have little effect on the usefulness of water for most purposes. Sodium salts may cause foaming in steam boilers and a high sodium content may limit the use of water for irrigation.
Bicarbonate (HCO_3) and Carbonate (CO_3)	Action of carbon dioxide in water on carbonate rocks such as limestone and dolomite.	Bicarbonate and carbonate produce alkalinity. Bicarbonates of calcium and magnesium decompose in steam boilers and hot water facilities to form scale and release corrosive carbon-dioxide gas. In combination with calcium and magnesium, cause carbonate hardness.
Sulfate (SO_4)	Dissolved from rocks and soils containing gypsum, iron sulfides, and other sulphur compounds. Commonly present in some industrial wastes.	Sulfate in water containing calcium forms hard scale in steam boilers. In large amounts, sulfate in combination with other ions gives bitter taste to water. USPHS (1962) drinking water standards recommend that the sulfate content should not exceed 250 ppm.
Chloride (Cl)	Dissolved from rocks and soils. Present in sewage and found in large amounts in oil-field brines, sea water, and industrial brines.	In large amounts in combination with sodium, gives salty taste to drinking water. In large quantities, increases the corrosiveness of water. USPHS (1962) drinking water standards recommend that the chloride content should not exceed 250 ppm.
Fluoride (F)	Dissolved in small to minute quantities from most rocks and soils. Added to many waters by fluoridation of municipal supplies.	Fluoride in drinking water reduces the incidence of tooth decay when the water is consumed during the period of enamel calcification. However, it may cause mottling of the teeth, depending on the concentration of fluoride, the age of the child, amount of drinking water consumed, and susceptibility of the individual (Maier, 1950, p. 1120-1132).
Nitrate (NO_3)	Decaying organic matter, sewage, fertilizers, and nitrates in soil.	Concentration much greater than the local average may suggest pollution. USPHS (1962) drinking water standards suggest a limit of 45 ppm. Waters of high nitrate content have been reported to be the cause of methemoglobinemia (an often fatal disease in infants) and therefore should not be used in infant feeding (Maxcy, 1950, p. 271). Nitrate has been shown to be helpful in reducing inter-crystalline cracking of boiler steel. It encourages growth of algae and other organisms which produce undesirable tastes and odors.
Boron (B)	A minor constituent of rocks and of natural waters.	An excessive boron content will make water unsuitable for irrigation. Wilcox (1955, p. 11) indicated that a boron concentration of as much as 1.0 ppm is permissible for irrigating sensitive crops, as much as 2.0 ppm for semitolerant crops, and as much as 3.0 for tolerant crops. Crops sensitive to boron include most deciduous fruit and nut trees and navy beans; semitolerant crops include most small grains, potatoes and some other vegetables, and cotton; and tolerant crops include alfalfa, most root vegetables, and the date palm.

Table 5.--Source and Significance of Dissolved Mineral Constituents and Properties of Water--Continued

CONSTITUENT OR PROPERTY	SOURCE OR CAUSE	SIGNIFICANCE
Dissolved solids	Chiefly mineral constituents dissolved from rocks and soils.	USPHS (1962) drinking water standards recommend that waters containing more than 500 ppm dissolved solids not be used if other less mineralized supplies are available. For many purposes the dissolved-solids content is a major limitation on the use of water. A general classification of water based on dissolved-solids content, in ppm, is as follows (Winslow and Kister, 1956, p. 5): Waters containing less than 1,000 ppm of dissolved solids are considered fresh; 1,000 to 3,000 ppm, slightly saline; 3,000 to 10,000 ppm, moderately saline; 10,000 to 35,000 ppm, very saline; and more than 35,000 ppm, brine.
Hardness as $CaCO_3$	In most waters nearly all the hardness is due to calcium and magnesium. All of the metallic cations other than the alkali metals also cause hardness.	Consumes soap before a lather will form. Deposits soap curd on bathtubs. Hard water forms scale in boilers, water heaters, and pipes. Hardness equivalent to the bicarbonate and carbonate is called carbonate hardness. Any hardness in excess of this is called non-carbonate hardness. Waters of hardness up to 60 ppm are considered soft; 61 to 120 ppm, moderately hard; 121 to 180 ppm, hard; more than 180 ppm, very hard.
Sodium-adsorption ratio (SAR)	Sodium in water.	A ratio for soil extracts and irrigation waters used to express the relative activity of sodium ions in exchange reactions with soil (U.S. Salinity Laboratory Staff, 1954, p. 72, 156). Defined by the following equation: $SAR = \frac{Na^+}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}}$, where Na^+, Ca^{++}, and Mg^{++} represent the concentrations in equivalents per million (epm) of the respective ions.
Residual sodium carbonate (RSC)	Sodium and carbonate or bicarbonate in water.	As calcium and magnesium precipitate as carbonates in the soil, the relative proportion of sodium in the water is increased (Eaton, 1950, p. 123-133). Defined by the following equation: $RSC = (CO_3^{--} + HCO_3^{-}) - (Ca^{++} + Mg^{++})$ where CO_3^{--} HCO_3^{-}, Ca^{++}, and Mg^{++} represent the concentrations in equivalents per million (epm) of the respective ions.
Specific conductance (micromhos at 25°C)	Mineral content of the water.	Indicates degree of mineralization. Specific conductance is a measure of the capacity of the water to conduct an electric current. Varies with concentration and degree of ionization of the constituents.
Hydrogen ion concentration (pH)	Acids, acid-generating salts, and free carbon dioxide lower the pH. Carbonates, bicarbonates, hydroxides, and phosphates, silicates, and borates raise the pH.	A pH of 7.0 indicates neutrality of a solution. Values higher than 7.0 denote increasing alkalinity; values lower than 7.0 indicate increasing acidity. pH is a measure of the activity of the hydrogen ions. Corrosiveness of water generally increases with decreasing pH. However, excessively alkaline waters may also attack metals.

based on the salinity hazard as measured by specific conductivity and the sodium or alkali hazard as measured by the SAR. Excessive amounts of sodium in irrigation waters destroy the soil structure, causing the soil to become plastic and impermeable to water and air movement. The use of ground water with excessive amounts of sodium will normally result in crop damage, drainage problems, and cultivation difficulties.

Plots of representative water analyses from irrigation wells in Matagorda County are shown on Figure 20. Ground water used for irrigation in the county has a low to medium sodium (alkali) hazard and a medium to high salinity hazard. However, due to the high annual rainfall and the crop rotation practices, the U.S. Salinity Laboratory Staff system of classification may not be applicable here. Wilcox (1955, p. 16) concluded that the classification of the U.S. Salinity Laboratory Staff "... is not directly applicable to supplemental waters used in an area of relatively high rainfall." Wilcox (1955, p. 16) further indicated that water with a specific conductance less than 2,250 micromhos per centimeter at 25°C and a SAR value less than 14 can be safely used for supplemental irrigation. Most acreage not planted with rice is planted in row crops which are only irrigated during drought conditions, or is put in rice-pasture rotation. Rice land normally lies fallow for two years between crops and is generally used for grazing cattle. Rainfall during the fallow period may be sufficient to leach from the soils any undesirable accumulation of salts.

The RSC is another factor used in assessing the quality of water for irrigation. Excessive sodium carbonate concentrations cause soils to break down and lose their permeability, restricting the movement of air and water. Alkali soils will develop and the soil will lose its ability to support plant life.

Wilcox (1955, p. 11) gives the following limits for RSC for irrigation waters: above 2.6 epm (equivalents per million) is not suitable for irrigation, 1.25 to 2.6 epm is marginal, and water containing less than 1.25 epm is probably safe.

A RSC calculation was made for each of the 61 chemical analyses of water samples from irrigation wells in Matagorda County (Table 10). The RSC calculations range from 0 to 4.87 epm and average about 1.03 epm. Generally, waters with the lowest RSC are from wells in the northeastern part of the county, while those with the highest RSC are from wells in the heavily irrigated western part. RSC calculations averaged about 0.32 epm and ranged from 0 to 0.99 epm in the northeast, while in the western irrigation area they averaged 1.17 epm and ranged from 0 to 4.87 epm.

Considering the high annual rainfall and crop rotation practices in the county, water containing high RSC can be used safely even in the western irrigation area. Studies by Wilcox, Blair, and Bower (1954, p. 265) show that the leaching of soils caused by high rainfall will modify the permissible limit of RSC to some extent.

Boron is necessary for plant growth, but is highly toxic at concentrations only slightly more than optimum. Scofield (1936, p. 286) suggests that 1 ppm of boron is permissible for irrigating most boron-sensitive crops, and that 3 ppm is permissible for the more boron-tolerant crops. Of 27 water samples analyzed for boron (Table 10), all contained less than 1 ppm boron and most contained less than 0.3 ppm. Thus, boron is not considered to be a problem in Matagorda County.

Based on these factors, the ground water used for irrigation in Matagorda County is rated as satisfactory for the crops grown.

Industrial

The quality standards for industrial water vary depending upon the particular needs of the industrial processes using the water. Because of the wide variance in quality standards, only a general discussion can be made of water quality for industrial use.

Industrial ground-water use in Matagorda County can be classified into four principal categories: cooling water, boiler feed water, process water, and mining water. Mining water accounts for the greatest amount of ground water used by industry in the county.

Generally, ground water used for sulfur mining in the county is not subject to rigid chemical-quality requirements. However, before being heated and pumped underground, the water is treated to remove constituents which would cause encrustation, scaling, and corrosion of boilers and delivery pipes.

Cooling water is usually selected on the basis of consistency of temperature, chemical quality, and dependability of source. Waters high in calcium and magnesium salts, which cause hardness, and other scale-forming chemicals such as iron, aluminum, and silica, are to be avoided since these encrust heat exchange surfaces and thereby reduce the efficiency of the cooling process. Corrosiveness is another feature to be avoided in cooling water. Corrosiveness is caused by acids, dissolved oxygen, carbon dioxide, sodium chloride, and magnesium chloride.

Ground water used for boilers generally must meet rigid chemical-quality standards. This is especially true for high-pressure boilers because the high temperature and pressure cause encrustation, corrosion, and water carry-over. Iron oxides in boiler water can cause priming and foaming. Magnesium chloride breaks down in boiler water to form hydrochloric acid. In addition, the magnesium and calcium present in most waters cause scale on the boiler tubes.

Silica is an important constituent to consider in selecting a water supply for boiler feed, as it forms a particularly hard scale. The scale forming tendency increases with an increase in boiler pressure. The recommended maximum concentration of silica for water used in boilers is as follows (Moore, 1940, p. 263):

MAXIMUM CONCENTRATION OF SILICA (PPM)	BOILER PRESSURE (POUNDS PER SQUARE INCH)
40	Less than 150
20	150 to 250
5	251 to 400
1	More than 400

Silica content in ground water from 166 wells in Matagorda County ranged from 7 to 35 ppm, with most samples ranging from 12 to 22 ppm.

Process water is that water incorporated into a final manufactured product, such as beverages, ice, textiles, and chemicals. The water is usually subject to very rigid chemical-quality standards, some approaching the quality of distilled (pure) water. Any impurities or physical properties, such as high turbidity, color, taste, odor, or high dissolved solids, that would adversely affect the quality of the product, are avoided. Water containing minimal concentrations of manganese and iron is desirable to avoid staining or discoloration.

Several wells in Matagorda County yield water with a noticeable odor of hydrogen sulfide gas (H_2S). A strong odor of hydrogen sulfide (characteristically a "rotten egg" odor) is imparted to water by a concentration of less than 1 ppm of H_2S. Excessive amounts of this gas render water unsuitable for some industrial uses.

As determined from 176 analyses, the ground water of Matagorda County is almost entirely alkaline. The pH values ranged from 6.7 to 8.5, but in only four samples was the pH less than the neutral 7.0 value.

In summary, ground water for industrial use is available in most of the county. In order to meet certain industrial chemical-quality requirements, wells should be carefully completed using extensive testing and selective screening methods. By proper well completion methods and by effective treatment of the water where necessary, most of the fresh water sands in the county could be suitably developed for most industrial uses.

Public Supply

The U.S. Public Health Service has established, and periodically revises, standards for drinking water to be used on common carriers engaged in interstate commerce. The standards are intended to protect the traveling public from poisonous, unpalatable, unsightly, or undigestable water. According to the standards, the chemical constituents should not be present in a water supply in excess of the listed concentrations, except where more suitable supplies are not available or cannot be made available at a reasonable cost. The following is a partial list of chemical standards adopted by the U.S. Public Health Service (1962, p. 7-8):

SUBSTANCE	CONCENTRATION (PPM)
Chloride (Cl)	250
Fluoride (F)	.8*
Iron (Fe)	.3
Manganese (Mn)	.05
Nitrate (NO_3)	45
Sulfate (SO_4)	250
Total dissolved solids	500

*Upper limit based on the annual average of maximum daily air temperature of 80.2°F at Bay City. The recommended control limits of fluoride concentration in ppm are: lower, 0.6; optimum, 0.7; and upper, 0.8.

The standards of the U.S. Public Health Service recommend a chloride content not greater than 250 ppm. Water having more than this and an equivalent amount of sodium will usually have a salty taste and will corrode water supply systems. The chloride content in 204 water samples from water wells in Matagorda County (Table 10) ranged from 29 ppm (well TA-80-07-207) to 2,010 ppm (well TA-81-12-501). However, 166 or about 80 percent of the samples contained less than 250 ppm chloride. The U.S. Public Health Service recommended limit of 250 ppm was exceeded in 38 wells. However, only one public supply well exceeded the 250 ppm limit. Figure 21 shows the location and depth of wells from which water was sampled for analysis during this investigation and the chloride content of each sample. Most of the wells yielding water of higher chloride content are in the eastern part of the county, especially along or near the coast, and in areas of possible oil field brine contamination.

Optimum fluoride concentration in water significantly reduces the incidence of tooth decay. This is especially true if the water is consumed by children during the period of enamel calcification. Excessive fluoride content may cause mottling or brown spots on the teeth, depending upon the age of the individual, the susceptibility of the individual, and the amount of water consumed (Maier, 1950, p. 1120-1132). The optimum fluoride content is determined by the air temperature in the area, which influences the amount of water consumed and consequently the amount of fluoride intake. The presence of fluoride in average concentrations greater than two times the optimum value (0.7 ppm) is considered by the U.S. Public Health Service (1962, p. 8) as grounds for rejection of the water supply. Fluoride content in 159 Matagorda County water well analyses ranged from 0.1 to 3.2 ppm, with 48 samples exceeding the optimum concentration of 0.7 ppm. In only 11 samples did the fluoride content exceed twice the optimum value or 1.4 ppm, and all of these wells were used for watering livestock. The areas of high fluoride content are generally confined to the eastern part of the county.

According to Maxcy (1950, p. 271), there is a definite relationship between water containing more than 45 ppm of nitrate and the incidence of infant cyanosis (methemoglobinemia or "blue baby" disease). Since nitrates are considered to be the final oxidation product of nitrogenous material, their presence in concentrations of more than a few parts per million may indicate present or past contamination by sewage or other organic matter (Lohr and Love, 1954, p. 10). The nitrate concentrations in 184 analyses of water wells in the county ranged from 0 to 163 ppm. In only 3 wells did the nitrate concentration exceed 45 ppm. Wells with the highest nitrate concentrations are either very shallow or very old and therefore are probably susceptible to contamination from surface runoff.

The hardness of water is caused principally by the concentration of calcium and magnesium. Excessive hardness of water causes an increase in soap consumption and encrustation and formation of scale in hot water heaters, water pipes, and cooking utensils. The hardness of water becomes objectionable when it exceeds 120 ppm (Hem, 1959, p. 147). A commonly accepted classification of water hardness is shown in the following table:

HARDNESS RANGE (PPM)	CLASSIFICATION
60 or less	Soft
61 to 120	Moderately hard
121 to 180	Hard
More than 180	Very hard

The hardness of water in 177 sampled wells in the county ranged from 13 to 1,820 ppm. Ground water in the county is generally hard, with 124 of the 177 analyses having a hardness value of 120 ppm or more. In general, water from shallow wells is much harder than water from deeper wells. All major public supply systems in the county, with the exception of two wells, had hardness values below 120 ppm.

The sulfate content of ground water in Matagorda County is low, ranging from 2 to 187 ppm. Water with a sulfate content of 250 ppm or higher may have a laxative effect on individuals not accustomed to drinking sulfate-bearing water.

Iron concentrations greater than 0.3 ppm and manganese concentrations greater than 0.05 ppm are undesirable as they may cause reddish-brown or dark gray stains on laundered materials, plumbing fixtures, and cooking utensils. Iron in high concentrations also imparts a bitter objectionable taste to the water. The total iron content in 79 ground-water samples taken in the county ranged from 0.01 to 1.74 ppm. In only 15 analyses did the total iron concentration equal or exceed 0.3 ppm. Manganese content of water from wells is generally very low throughout the county.

Ground water that satisfies the requirements of the U.S. Public Health Service is available for public supply throughout most of Matagorda County.

Changes in Chemical Quality

It is desirable that the quality of the water produced by a well remain constant during the life of the well. The principal advantage of using ground water is its uniformity of chemical quality and temperature. However, with increased demands on the aquifer by increased pumpage, new hydrologic conditions are imposed upon the aquifer and may cause invasion of fresh-water sands by water of undesirable quality.

In the coastal areas of Matagorda County, the withdrawal of excessive amounts of ground water may reduce the fresh-water pressure to a point where the direction of movement of ground water is reversed, causing salt water to move into the sands that formerly contained fresh water.

Figure 22 illustrates the changes in chloride content in irrigation wells over a short pumping period. These wells had not been pumped for several months prior to the illustrated pumping and sampling period. As a general rule, under normal conditions the chloride content decreases with an increase in pumping time. The changes usually occur within one hour after pumping has started. These short-duration changes are probably caused by an adjustment in the hydraulic pressures of the aquifer caused by the demands of pumping. Since the irrigation wells are slotted opposite several sands,

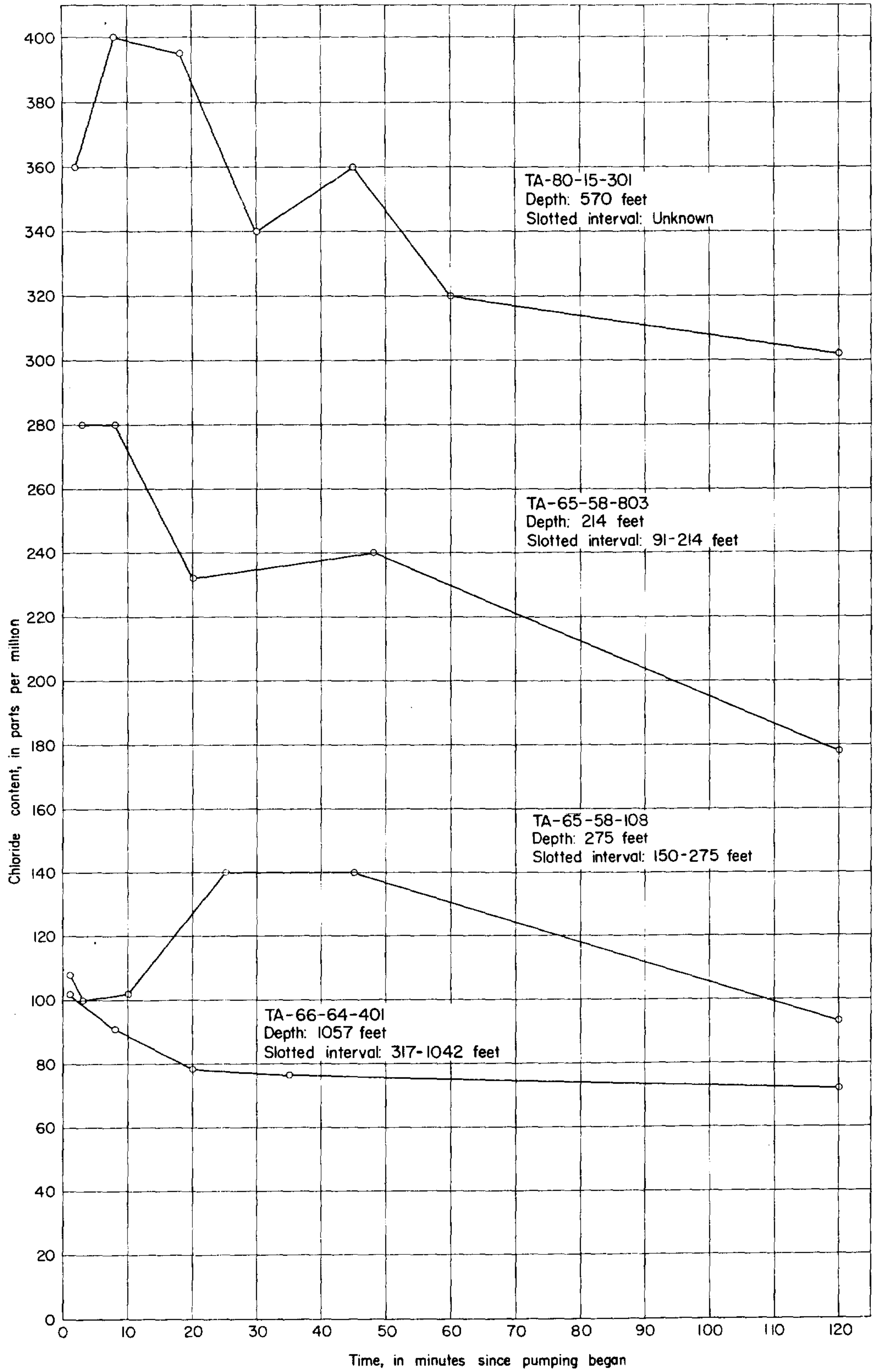

Figure 22

Changes in Chloride Content of Water With Pumping Time in Irrigation Wells

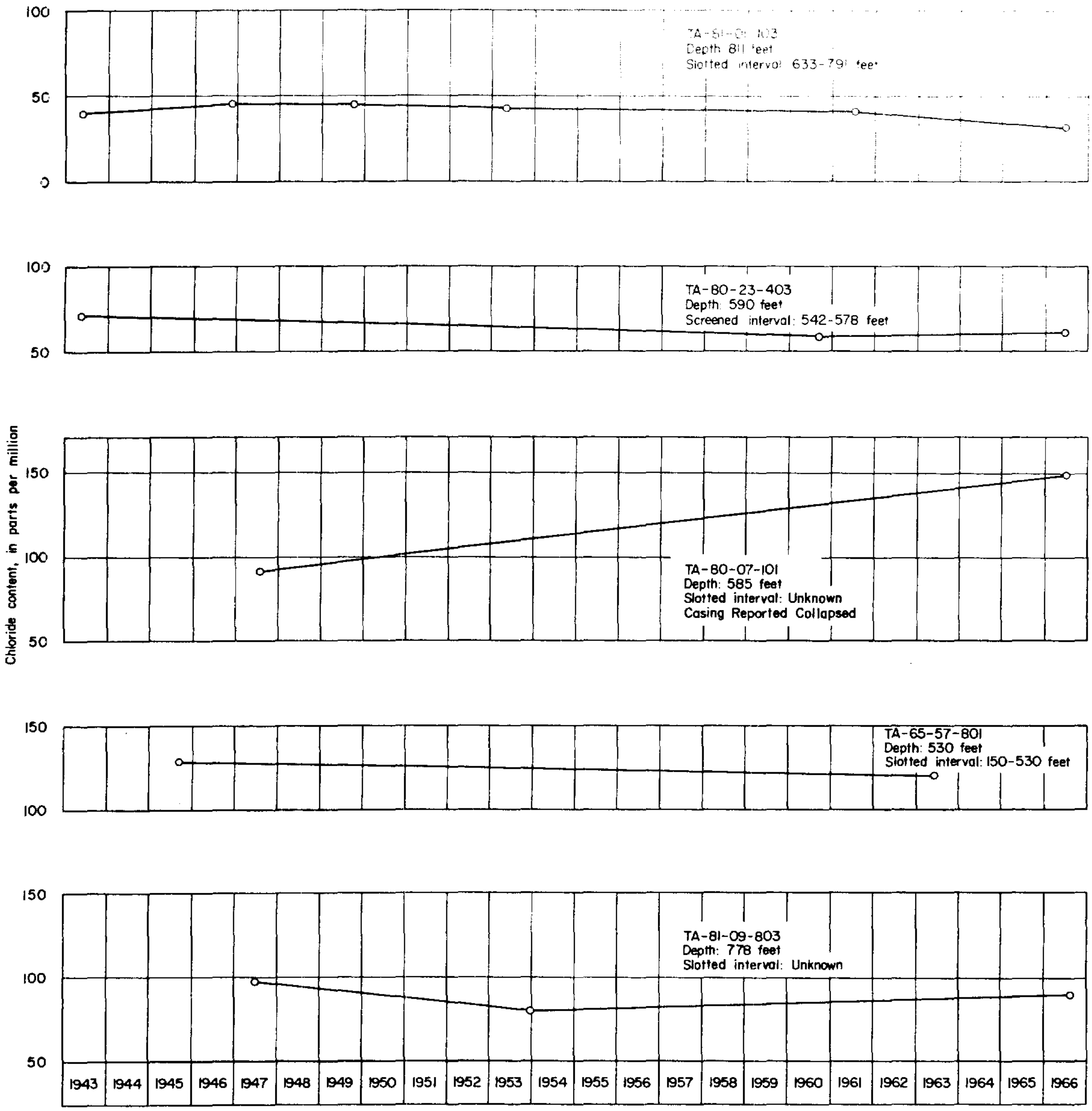

Figure 23.--Changes in Chloride Content of Water From Selected Wells

each of which may contain water of different quality, initial withdrawals will reflect the quality of water from the sand having the highest hydrostatic head. As pumping continues, the quality of the water will likely be determined by the sand or sands contributing the greatest quantity of water to the well. The amount of water contributed by each sand depends upon the transmissibility of the sand and the hydraulic head. In this manner, the quality of the water pumped would have significant changes over a period of time and then stabilize.

Graphs of four irrigation wells illustrated in Figure 22 show the initial rapid chloride changes caused by adjustment of the aquifer and demonstrate the normal decrease of chloride content with increasing pumping time.

Long-term changes in chloride content of water from wells are shown in Figure 23. Chloride changes in wells TA-65-57-801, TA-80-23-403, TA-81-01-103, and TA-81-09-803 and very slight and signify that the wells were selectively and properly screened, and have not pumped excessive amounts of water to cause changes in water quality by salt-water encroachment at the wells. The relatively large change in chloride content demonstrated by the graph of well TA-80-07-101 may support a report of collapsed casing in the well. In 1947 the well was probably producing entirely from the deep sands in the area. Recent collapse of the well casing may have permitted water of higher chloride content from the shallow sands to mix with or replace the water from the deeper sands.

GROUND-WATER PROBLEMS

Decline of Water Levels

In the western part of Matagorda County, large ground-water withdrawals for irrigation have caused rapid declines in water levels. The area most seriously affected is between Midfield and Palacios. The concentration of irrigation wells in this particular area is due to the lack of adequate surface-water supply systems and the intensive rice cultivation. Other rice growing areas of Matagorda County are served by extensive canal systems supplying water pumped from the Colorado River and other streams. Hydrographs of water levels for five wells in the Midfield-Palacios area (TA-80-07-102 and 501; and TA-80-23-101, 301, and 401) are shown in Figure 13.

Pumpage at the well field of the Texas Gulf Sulphur Company at Old Gulf has caused rapid and large water-level declines in the immediate area (Figure 7). The declines are due to the concentration of wells in the area, the high rate of continuous ground-water withdrawal, and the relatively low permeability of the sands.

As a result of the water-level declines in these areas, pumps are being set progressively deeper, pumps with larger power ratings are being installed to raise the required amount of water from greater depths, and the higher pumping lifts are causing higher fuel costs. In addition, new and deeper wells are being drilled due to decreased yields of older shallow wells. As an example, pump settings in eastern and central Matagorda County are generally from 100 to 175 feet, while in the western parts of the county pump settings are from 150 to 250 feet.

Ground-Water Problems in Areas of Oil and Gas Field Operations

As of 1961, the Railroad Commission of Texas recognized 95 oil and gas fields (including multiple pay zones) in Matagorda County (Texas Water Commission and Texas Water Pollution Control Board, 1963). The amount of salt water produced from oil and gas field operations during 1961 amounted to 16,231,711 barrels or about 2,092 acre-feet. Table 6 shows the quantities of salt water disposed by various methods in Matagorda County in 1961.

Surface Brine Pits

The disposal of salt water by unlined surface pits represents the greatest single threat of contamination of the county's shallow fresh-water sands. Disposal of salt water by open pits is based on the assumption that evaporation will effectively remove the salt water added to the pit. With the relatively low annual evaporation and the high annual rainfall in Matagorda County (Figure 3), it is extremely doubtful that surface pits could effectively dispose of all the salt water being placed continuously in the pits.

One factor to be considered is the construction of the surface pits, which often are excavated to the first sand capable of transmitting salt water to the subsurface. These sands are often the first subsurface sands containing fresh water.

Even with the effective evaporation of all or part of the water placed in the pits, the mineral content of the water, which cannot evaporate, would remain in the pits as a salt residue. The concentrated residue would eventually be washed into the shallow sands by rainfall or salt water which might be added to the pit later.

Table 6.--Methods and Quantity of Salt Water Disposed in 1961

METHOD OF DISPOSAL	NUMBER OF FIELDS	QUANTITY DISPOSED		PERCENT
		BARRELS	ACRE-FEET	
Disposal wells	31	15,077,427	1,943.4	93
Open surface pits	60	1,144,101	147.5	7
Surface watercourses	1	707	.1	<1
Unknown	3	9,476	1.2	<1
	Total	16,231,711	2,092.2	100

Salt water from these pits moves into the fresh water sands as a slug with little or no dilution. Since ground-water flow is laminar, the salt-water slug has little or no lateral or vertical diffusion or dilution (California State Water Pollution Control Board, 1952, p. 47). The salt water generally moves vertically downward until it reaches the water table where irreparable damage is done to the fresh-water sands. Since the rate of natural dilution is very slow, many years are required to flush these sands of the undesirable water. Artificial methods of flushing are extremely slow and expensive; hence, for all practical purposes the contamination of the fresh-water sands can be considered permanent.

Contamination of shallow fresh-water sands by salt-water pollution from surface brine-disposal pits has occurred in several oil and gas fields in the county. In the Markham field near Clemville, large areas of vegetative kill are presumably due to the discharge of brine water onto the surface or overflow of brine-disposal pits. In the Clemville area, Shamburger (1958) found evidence of probable salt-water pollution in several water wells ranging in depth from 48 to 55 feet. Field tests of water from these wells showed approximate chloride concentrations ranging from 150 to 4,060 ppm. These wells have since been either destroyed or abandoned.

In the Midfield area there is evidence of probable contamination of shallow fresh-water sands due to brine-disposal operations. Vegetative kill areas are present, and abnormally high chloride concentrations are present in wells TA-80-07-411 and TA-80-07-412. The area has a history of both brine-disposal pits and brine-injection wells.

The Railroad Commission of Texas has issued a statewide "no pit" order effective January 1, 1969. This order will prevent additional contamination from brine-disposal pits in the future. Figure 24 shows the location of surface salt water disposal pits along with brine-disposal wells in Matagorda County in 1966.

Disposal Wells

The most effective and best method of disposal of salt water and other waste products is by the use of deep subsurface disposal wells (Table 11 and Figure 24). These wells inject salt water and other wastes into deep formations well below the base of fresh to slightly saline water (Figure 28).

The Railroad Commission of Texas and the Texas Water Development Board are responsible for reviewing applications and issuing permits for drilling and construction of wells for the purpose of waste disposal. The design and completion requirements for each injection well to be used for disposal of brine and other wastes produced incidental to the production of oil and gas are determined by the Railroad Commission. The Texas Water Development Board determines the requirements for wells to be used for disposal of municipal and industrial wastes not produced with oil or gas. The two permitting agencies work very closely to protect ground-water resources from contamination by injection of wastes into the subsurface. Generally, the injection wells are required to be completed by having their casing set and cemented from the surface to below the base of the fresh to slightly saline water. Another general requirement is that there be an intervening impermeable section (clay or shale) between the base of the fresh to slightly saline water and the top of the injection zone of sufficient thickness to preclude the movement of the injected fluid into the fresh or slightly saline strata. In 1961, 15,077,427 barrels or approximately 1,900 acre-feet of salt water (93 percent of the salt water produced) was disposed of by deep subsurface disposal wells (Tables 6 and 11). By using proper completion methods and reasonable injection pressures, disposal wells would not represent a threat of contamination to the fresh to slightly saline waters.

Table 11 shows the most recent data on brine injection and disposal wells in Matagorda County. Injection zones in the county ranged from 1,480 to 7,102 feet below land surface, while injection pressures ranged from 0 (gravity flow) to 1,000 pounds per square inch.

Improperly completed disposal wells and excessive injection pressures represent a definite threat to fresh-water supplies. The upper part of a disposal well casing should be properly cemented and sealed to keep disposal fluids from entering the fresh-water sands. Salt-water leakage from disposal wells will invade the fresh-water sands, especially if the salt water is under much greater pressure than the fresh water.

One area of contamination of fresh water by disposal of salt water is in the Midfield community. The chemical analyses for wells TA-80-07-411 and TA-80-07-412 show much higher concentrations of chloride and dissolved solids than are found in the native ground water in the general area. Another well in the area, TA-80-07-410, was deepened from an original depth of 81 feet to 113 feet because of highly mineralized water in the shallower sands. A brine-disposal well in the Midfield area was abandoned in 1966 by order of the Railroad Commission of Texas due to leakage of brine water into shallow sands.

Wells Yielding Water With Abnormally High Chloride Content

Several wells in other parts of the county yield water with a chloride content that is abnormally high in relation to the other chemical constituents of the water. Many of these wells are in or near oil and gas fields, where brine disposed in surface pits and disposal wells may be a possible source of contamination. However, ground water in the coastal areas and the southeastern areas of the county has a high chloride content that is due to the natural quality of the native ground water and not to brine contamination.

Several wells in the Sugar Valley and Old Ocean oil fields, east and northeast of Van Vleck, yield water containing a high chloride content. Four of these wells, TA-65-58-109, 404, 503, and 602, contain chloride in excess of 450 ppm, which greatly exceeds the chloride content in water from other wells nearby. In an area southeast of Van Vleck and 3 to 4 miles south of the Old Ocean and Sugar Valley oil fields, several wells also have a high chloride content. Wells TA-81-02-104, 201, 305, 601, 602, and 901 have a chloride content ranging from 230 to 650 ppm, again, much higher than the chloride content of other wells in the immediate area. Wells TA-65-49-601 and 901 and TA-65-50-402 in the extreme northern part of the county also have a relatively high chloride content. In the western part of the county wells TA-80-08-103 and TA-80-15-106, 301, and 901 have a relatively high chloride content. Southeast of Midfield well TA-80-07-902, with a depth of 735 feet, has a chloride content of 226 ppm, while a nearby well, TA-80-07-903, 273 feet in depth, contains only 54 ppm. Wells TA-81-10-201 and 301 yield water containing chloride concentrations of 660 and 393 ppm, respectively, and water from well TA-80-16-801 contained 341 ppm chloride.

The cause of the variance in the quality of water from these wells is not known. In some areas the quality may be due entirely to natural local conditions, and in other areas the wells may be contaminated to varying degrees as a result of brine-disposal operations.

Oil and Gas Well Surface Casing Requirements

A potential source of contamination by salt water is through improperly cased oil and gas wells. These wells commonly penetrate both fresh-water sands and salt-water-bearing sands.

The Railroad Commission of Texas requires that fresh-water strata be protected by casing and cement or by alternative protection devices in oil and gas wells throughout the State. The Texas Water Development Board, through its water quality protection program, furnishes recommendations to oil operators and the Railroad Commission as to the depth to which protection should extend in order that all ground water of usable quality may be protected.

Figure 25 illustrates protection requirements in 15 Matagorda County oil and gas fields based on published field rules of the Railroad Commission.

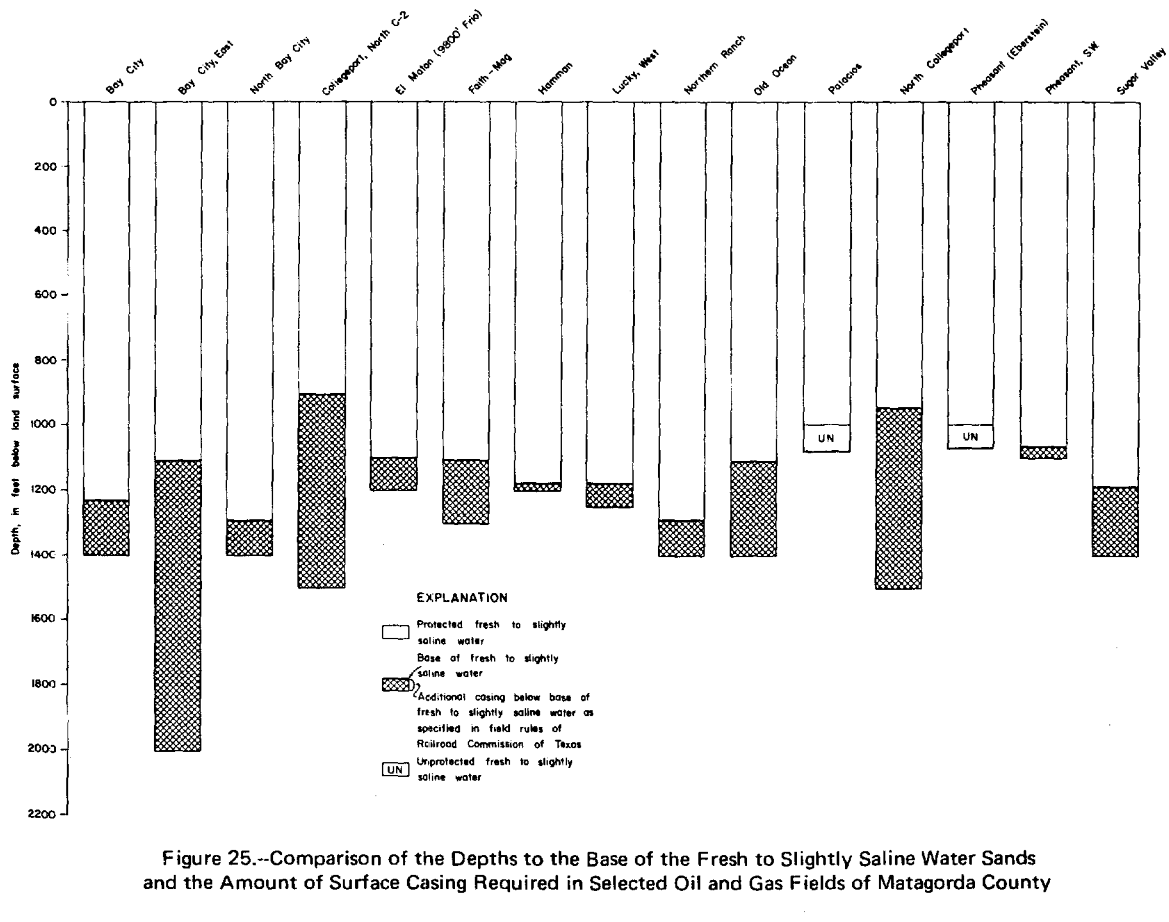

Figure 25.--Comparison of the Depths to the Base of the Fresh to Slightly Saline Water Sands and the Amount of Surface Casing Required in Selected Oil and Gas Fields of Matagorda County

AVAILABILITY OF GROUND WATER

Distribution and Quantity of Water in the Aquifer

Fresh Water

Fresh ground water (water containing less than 1,000 ppm dissolved solids) is present in almost all parts of Matagorda County with the exception of parts of Matagorda Peninsula and possibly some areas bordering Matagorda Bay.

The depth to the base of fresh-water sands reaches a maximum of about 1,600 feet in the extreme northern part of the county. Figure 26 shows the approximate altitude of the base of fresh-water sands in the county. The cumulative thickness of the fresh-water sands is shown on Figure 27, and the thickness can also be estimated on the cross sections (Figures 33, 34, and 35). The fresh-water-bearing sands generally decrease in thickness from northwest to southeast as the coast is approached. The sand thickness may increase or decrease locally, however, as indicated on Figure 27.

Fresh-water sands along most of the coast are both overlain and underlain by sands containing slightly to moderately saline water. The area where fresh-water sands are overlain by saline-water sands extends approximately 10 miles inland from the coast and covers an area of approximately 400 square miles. This area is illustrated on the maps (Figures 26 and 27) and by cross sections A-A′ and B-B′ (Figures 33 and 34).

The maps and cross sections illustrating the base and thickness of fresh-water sands were prepared from electric logs of the oil and gas tests listed in Table 12 and located on the map in Figure 32.

Approximately 71 million acre-feet of fresh water is in storage in the sands of the Gulf Coast aquifer in Matagorda County; however, only a part of this water is recoverable and available for development.

Slightly Saline Water

Slightly saline water (1,000 to 3,000 ppm dissolved solids) generally underlies the entire county, except locally as illustrated by well TA-66-64-503 in Figure 33. The base of the slightly saline water ranges from 20 to 400 feet below the base of fresh water. The altitude of the base of slightly saline water is illustrated on the map in Figure 28 and on the cross sections in Figures 33, 34, and 35. Note that on Figures 33 and 34, in the areas near the coast, the slightly saline water overlies the fresh-water sands.

Approximately 17 million acre-feet of slightly saline water is in storage in the sands underlying Matagorda County. The approximate thickness of sands containing fresh to slightly saline water is shown in Figure 29.

Quantity of Fresh Water Available for Development

Several methods have been used to estimate the quantity of water available for development from the Gulf Coast aquifer. The amount of water in storage can be used as an estimate of the availability of water. The total storage figures, however, can be misleading as only a part of the water in storage can be developed due to the aquifer's water-retention characteristics. This method also neglects recharge and the effects of dewatering of an aquifer.

A more realistic method for determining the availability of ground water would consider also the transmission capacity of the aquifer, the ability of a segment of the aquifer to transmit water under given hydraulic gradients.

The calculation used to estimate the quantity of water available for development in Matagorda County is based on the transmission capacity of the aquifer and upon development of a portion of the water in storage. In determining the quantity of water available for development the following assumptions are used:

1. Water levels will be lowered by development to a depth of 400 feet along a line of discharge 40 miles in length paralleling the coast and the trend of aquifer outcrop and passing through Bay City.

2. All recharge is assumed to occur in the outcrop area, and that recharge is sufficient to replenish the quantity of water transmitted to the line of discharge.

3. The altitiude of the water levels is the same and remains the same in the recharge area.

4. The slope of the hydraulic gradient is uniform after drawdown to 400 feet at the line of discharge.

5. A transmission capacity of 100,000 gpd/ft and a hydraulic gradient of 14 feet per mille was used. A storage coefficient of 0.10 is assumed in determining the quantity of water available from storage as a result of draining, compaction, and depressurizing the water-bearing sands while lowering water levels to 400 feet along the line of discharge.

On the basis of these assumptions, it is estimated that the aquifer will transmit some 63,000 acre-feet of water annually to the line of discharge. In lowering water levels to the 400-foot level, about 5,500,000 acre-feet would be removed from storage. If these figures are correct in their order of magnitude, then about 118,000 acre-feet of fresh water, or over 6 times present pumpage, could be pumped annually in the county for the next 100 years.

Areas Most Favorable for Future Development of Fresh Ground-Water Supplies

The transmissibility map in Figure 30 is based on the fresh-water sand permeabilities and thicknesses. A study of the map will aid in determining areas most favorable for future development of ground water. The map, which is contoured with intervals of 50,000 gpd/ft, shows a range from less than 100,000 gpd/ft in the coastal areas to greater than 400,000 gpd/ft in the extreme northern part of the county. The transmissibilitiess were determined from the analyses of 40 pumping tests conducted in Matagorda County and adjacent areas.

The most favorable area for future development of the ground-water resources is in the northern area where the transmissibility of the aquifer is more than 250,000 gpd/ft and along the Matagorda-Wharton County line. The areas least favorable for future development are the areas adjacent to the coast where transmissibilities are low and fresh-water-bearing sands are thin.

SUMMARY AND CONCLUSIONS

Only a small fraction of the ground water available in Matagorda County is being used. The present rate of withdrawal of 18,600 acre-feet per year or 17 mgd could be maintained indefinitely; however, this rate does not make optimum use of the total fresh ground water that is safely and economically available.

It is estimated that 118,000 acre-feet could be pumped annually in the county for the next 100 years and a lesser amount could be pumped for a longer period.

Any intensive future development of ground-water resources should be limited to the central and northern areas of the county, so as to aviod contamination of fresh water by salt-water encroachment.

Contamination of ground water by salt water produced from oil and gas operations will continue to be a probable cause of water-quality changes. With the gradual elimination of surface brine-disposal pits, one contamination source will be greatly decreased. However, in areas where improperly cased or abandoned injection wells are present, salt-water contamination will continue to exist.

Land-surface subsidence caused by ground-water withdrawals is not a serious problem at present in Matagorda County. However, if local intensive withdrawals of ground water take place, land-surface subsidence could become a significant problem.

If additional development of ground water should occur near the coast, there will be danger of salt-water encroachment and contamination of the coastal fresh-water sands. At present, the rate of salt-water encroachment is very slow, except, perhaps, in the sulfur-mining area at Old Gulf. It would require centuries to flush out the salt water should the fresh-water sands be contaminated.

Future ground-water development should be based on a program of preliminary test-hole drilling and test pumping, chemical analyses of water from the various sands, optimum well completion, and spacing of wells to avoid large concentrated withdrawals of ground water in small areas.

At present, 36 water level observation wells in the county are measured and recorded periodically by the Texas Water Development Board to determine the annual and long-term changes in water levels. On February 20, 1967, well TA-66-63-901 was equipped with a recorder that continuously measures water-level changes. In the future, the water level observation program should be expanded to areas of new development to determine water-level changes over the entire county.

A program should be established to periodically sample ground water for chemical analyses to detect possible changes in water quality, particularly in the coastal areas of potential salt-water encroachment.

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Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas

All wells are drilled unless otherwise noted in Remarks column.

Water level : Reported water levels are given to nearest foot; measured water levels are given to the nearest tenth or hundredth of a foot.

Method of lift and type of power: A, air; C, cylinder; E, electric; G, gasoline, butane, or diesel engine; H, hand pump; J, jet; N, none; Ng, natural gas; R, reciprocating; Sub, submersible; T, turbine; W, windmill. Number indicates horsepower.

Use of water : D, domestic; Ind, industrial; Irr, irrigation; N, none; P, public supply; S, livestock.

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING		ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAMETER (IN)	DEPTH OF WELL (FT)		ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
						Matagorda County						
*TA-65-49-302	E. M. Teague	O. T. Davis & Sons	1960	228	3	228	63	25	1960	J,E ½	D,S	Slotted from 220 to 228 ft. Estimated yield 20 gpm.
* 601	D. M. Anderson	--	--	266	2	266	66	22	1963	J,E	D,S	
602	W. E. Hodge	Wentworth	1913	205	2	205	65	24.90	Oct. 11, 1965	N	N	Well 104 in 1949 Matagorda County report. Abandoned.
* 603	Merity Williams	R. J. Gaidosik	1954	80	3	80	57	--	--	C,H	D,S	Screened from 76 to 80 ft. Temp. 74°F. Estimated yield 5 gpm.
* 703	Runnels-Pierce Ranch	W. V. Davis	1965	627	16 14	250 627	74	--	--	T,G	Irr	Slotted from 210 ft to bottom. Pump set at 200 ft. Measured yield of 1648 gpm on April [illegible], 1967. Gravel packed. Temp. 75°F. 3/
* 801	W. T. Hill	Louis Gregurek	1955	315	2	315	63	--	--	J,E, ½	D,S	Screened from 297 ft to bottom. Estimated yield 20 gpm.
802	Sherrill est.	Edwin Guttenburger	1965	87	3	87	63	20.37	Oct. 15, 1965	C,W	S	1/
* 901	Florida Gas Transmission Co.	Layne Texas Co.	1958	375	9 5	290 375	58	26 32.16 30.17	Nov. 24, 1958 Oct. 17, 1965 Mar. 8, 1967	T,Ng	Ind	Screened from 300 to 320 and 335 to 355 ft. Pump set at [illegible] ft. Pumping level 41.11 ft at 91.5 gpm on March 8, 1967. Underreamed and gravel packed. 1/ 3/
902	Ben Salas	O. T. Davis & Sons	1959	182	3	182	55	--	--	J,E, ½	D,S	Screened from 172 to 182 ft.
50-401	F. H. Hobbins	do	1962	350±	4 3	42 350±	50	25.25	Jan. 10, 1965	N	N	Abandoned because well produced too much sand.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-65-50-402	T. S. Hobbins	R. J. Gaidosik	1956	117	2	117	52	--	--	J,E, $\frac{1}{2}$	D	
403	H. M. Malone	Louis Gregurek	1958	175	4	175	58	22	Aug. 1, 1965	J,E, $\frac{1}{4}$	D,S	
404	do	do	1958	175	4	175	55	21	Aug. 1965	J,E, $\frac{1}{4}$	S	
* 57-401	W. T. Tillman	Leo Franzina	1947	80	3	80	58	--	--	C,W	S	Temp. 71.5°F.
* 502	Skelly Oil Co.	Luther Patterson	1936	585	6	580	56	--	--	N	N	Screened from 549 to 580 ft. Abandoned. Well 129 in 1949 Matagorda County report. 1/
* 503	do	do	1934	190	4	190	55	26 17.35 56.21	1943 Apr. 9, 1951 Aug. 26, 1965	J,A	D	Screened from 180 to 190 ft. Well 130 in 1949 Matagorda County report.
504	Tom Brodeko	--	old	186	2	186	51	14.68	Oct. 7, 1965	N	N	Abandoned.
* 505	do	O. T. Davis & Sons	1962	210	4	210	51	--	--	Sub,E, $\frac{1}{2}$	D,S	Screened from 200 to 210 ft. Estimated yield 20 gpm. Temp. 74°F.
* 601	G. M. Savage	--	1955	180	4	180	47	18.77	Oct. 27, 1965	C,W	S	Slotted from 170 to 180 ft. Formerly supplied drilling rig.
701	Roland Rugeley	American Water Co.	1945	148	12	148	58	14.2 15.46	Apr. 19, 1947 Dec. 3, 1965	T,E	Irr	Well 212 in 1949 Matagorda County report. Underreamed and gravel packed. 1/
* 702	Texas Real Estate	H&S Water Well Service	1965	557	8 6	290 557	54	54.06 58.67	Mar. 14, 1966 Nov. 1, 1966	Sub,E 10	P	Screened from 331 to 356 and 528 to 553 ft. Pumping level 91.48 ft at 252 gpm on March 14, 1966. 1/ 3/
* 801	G. M. Savage	American Water Co.	1946	530	18 14 12	141 519 530	52	12 50.75	June 4, 1947 July 28, 1955	T,Ng	Irr	Slotted opposite sands from 150 to 530 ft. Well 213 in 1949 Matagorda County report. Measured yields of 2530 gpm on July 28, 1955 and 2590 gpm on Aug. 27, 1965. Formerly used as Texas Water Development Board observation well. Gravel packed. 1/ 3/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-65-57-802	G. M. Savage	Americal Water Co.	1948	315	4 3	95 315	54	--	--	Sub,E	D	Screened from 305 to 315 ft. 1/
* 901	Roselawn Memorial Park	do	1955	135	6	--	40	10.18 11.89 11.88	Mar. 25, 1965 Aug. 19, 1965 Feb. 21, 1966	Sub,E	Irr	Formerly used as Texas Water Development Board observation well. 1/
* 902	Matagorda Co. WCID No. 6	Layne Texas Co.	1963	450	11 7	322 450	44	23	Apr. 1, 1963	T,E, 20	P	Screened from 329-349, 400-415, and 430-440 ft. Pump set at 130 ft. Pumping level 70.0 ft at 285 gpm on Apr. 1, 1963. Underreamed and gravel packed. 1/ 3/
* 903	P. I. Mangum	Jessie Lee	1946	35	2	35	46	--	--	R,E, ¼	D,S	Estimated yield 15 gpm.
58-101	G. H. Walker	Louis Gregurek	1954	100	4	100	48	--	--	J,E	Irr	Slotted from 80 to 100 ft.
* 102	do	O. T. Davis & Sons	1957	360	4 3	80 360	49	--	--	J,E, 3/4	D,S	Screened from 352 to 360 ft. Temp. 75°F.
* 103	Josey Ranch	Layne Texas Co.	1945	179	14	179	41	17	Nov. 16, 1946	N	N	Slotted from 87 to 177 ft. Formerly used as an auxiliary supply for refinery. Well 252 in the 1949 Matagorda County report. Abandoned. 1/
104	J. G. Davis	O. T. Davis & Sons	1959	126	8	126	53	21.20	May 5, 1960	N	N	Slotted from 95 to 126 ft. Abandoned.
* 105	do	do	1963	80	12	80	51	25.72	Aug. 18, 1965	T,G, 150	Irr	Pump set at 80 ft. Gravel packed. Temp. 74°F.
106	Josey Ranch	Layne Texas Co.	1945	185	14	179	46	14 23.93	Nov. 9, 1945 Aug. 17, 1965	Sub,E	S	Slotted from 88 to 179 ft. Formerly used as an auxiliary supply for refinery. Well 251 in 1949 Matagorda County report. Pumping level 57 ft at 840 gpm on Nov. 9, 1945. Gravel packed. 1/ 3/
107	do	Leonard Mickelson	1955	202	16	202	45	25.10 22.12	Aug. 17, 1965 Oct. 4, 1966	T,G	Irr	Slotted from 75 to 202 ft. 3/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-65-58-108	Josey Ranch	O. T. Davis & Sons	1956	275	16	275	47	23.57 20.81	Aug. 17, 1965 Oct. 4, 1966	T,G	Irr	Slotted from 150 to 275 ft. Pumping level 66.39 ft at 2378 gpm on Oct. 4, 1966. Gravel packed. Temp. 70°F. 3/
* 109	do	Leo Franzina	1961	294	2	294	46	23.48	Aug. 17, 1965	J,E	D,S	Screened from 274 to 294 ft.
110	do	--	--	300+	4	--	46	12.34 21.07	Apr. 9, 1951 Feb. 27, 1967	N	N	Abandoned. Texas Water Development Board observation well. 4/
* 111	J. G. Davis	O. T. Davis & Sons	1963	140	12	140	54	21.05	Aug. 27, 1965	T,G, 150	Irr	Strong hydrogen sulfide odor. Well pumps sand. Pump set at 80 ft. Gravel packed.
112	do	do	1963	100	12	100	51	22.44	do	T,G, 150	Irr	Gravel packed.
113	do	do	1961	115	18	115	54	--	--	T,G	Irr	Pump set at 80 ft. Gravel packed.
114	G. R. Brown est	B&P Drilling Contractors	1963	103	6	103	45	16.46	Aug. 27, 1965	N	N	Being considered for reuse.
* 115	R. C. Walters	O. T. Davis & Sons	1960	357	2	357	49	--	--	J,E	D	
116	do	do	--	97	2	97	49	15.2	Aug. 18, 1965	N	N	Abandoned.
401	F. V. Bouldin	Luther Patterson	1948	439	7 5	340 382	44	9 25.94 26.83	July 9, 1948 Aug. 17, 1965 Jan. 3, 1967	N	N	Screened from 337 to 382 ft. Formerly supplied oil field camp. Abandoned. Texas Water Development Board observation well. 1/ 4/
402	E. T. Spencer	Louis Gregurek	1963	105	5	--	44	--	--	T,G	Irr	
403	do	do	1963	105	5	--	44	--	--	N	N	
* 404	Sun Oil Co.	--	1946	326	4	326	50	--	--	J,E, ½	D,S	Slotted from 299 to 326 ft. Formerly supplied drilling rig. Estimated yield 20 gpm. Temp. 70°F.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-65-58-405	G. R. Brown	O. T. Davis & Sons	--	115	5	115	50	--	--	Sub,E	D	
406	J. F. Grant	--	old	--	4	--	50	23.02	Oct. 12, 1965	C,W	S	
501	I. V. Simmons	--	--	--	4	--	37	23.02	Aug. 17, 1965	C,W	S	Formerly supplied drilling rig.
502	Gladys Albers	Luther Patterson	1962	150	3	150	38	--	--	J,E, 1½	D	Well has plastic screen.
* 503	M. S. Morris	-- Matula	1945	370	4	--	37	23.26	Aug. 28, 1965	J,E, 1	D	
* 504	I. V. Simmons	--	old	130	4	130	41	25.00	Oct. 12, 1965	J,E, 3/4	S	Formerly supplied drilling rig. Estimated yield 20 gpm. Temp. 75°F.
* 601	Pan American Petroleum Corp.	Coastal Water Well Corp.	1956	157	20 14	72 157	35	38 29.36	1956 Feb. 21, 1967	T,Ng	Ind	Slotted from 75-87, 110-127, and 132-157 ft. Auxiliary supply for refinery. Pumping level 73 ft at 1,145 gpm in 1956. Texas Water Development Board observation well. 1/ 3/ 4/
* 602	G. L. Sewell	O. T. Davis & Sons	1956	537	3	537	36	--	--	J,E, ½	D	Screened from 527 to 537 ft. Estimated yield 30 gpm.
603	M. G. Reeves	--	1942	--	4	--	32	23.84	Oct. 12, 1965	Gas drive	S	Formerly supplied drilling rig.
701	E. G. Ekarius	Louis Gregurek	1957	374	2	374	44	--	--	J,E, ½	D,S	Screened from 354 to 374 ft.
* 801	W. C. Sewell	do	1949	60	3	60	36	--	--	J,E, 3/4	D,S	Estimated yield 20 gpm. Temp. 75°F.
802	do	Henry Lane	--	177	4	177	35	25.22	Oct. 13, 1965	N	N	Formerly supplied drilling rig.
* 803	W. D. York	Leonard Mickelson	1964	214	20	214	30	25.31 21.21	Oct. 13, 1965 July 1, 1966	T,G, 150	Irr	Slotted from 91 to 214 ft. Pumping level 56.34 ft at 1,3[illegible] gpm on July 1, 1966. Pump set at 140 ft. Underreamed and gravel packed. Temp. 70°F. 1/ [illegible]

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TA-65-58-804	W. D. York	Leonard Mickelson	1964	208	20	208	31	21.73	Oct. 13, 1965	N	N	Slotted from 50 to 204 ft. Underreamed and gravel packed. 1/
* 805	do	do	1964	214	20	214	30	--	--	T,G, 150	Irr	Slotted from 46 to 210 ft. Pump set at 120 ft. Estimated yield 2,000 gpm. Underreamed and gravel packed. Temp. 70°F. 1/
66-63-801	C. T. Blankenburg	Crowell Drilling Co.	1964	578	16 14 12	212 332 578	58	39.41	Jan. 25, 1966	T,G, 150	Irr	Slotted from 212-236, 275-332, and 395-578 ft. Gravel packed. Texas Water Development Board observation well. 1/ 4/
* 802	E. F. Baca	Katy Drilling Co.	1959	761	20 12	240 761	58	57.37 73.85	Jan. 28, 1966 May 25, 1966	T,E, 125	Irr	Slotted from 240 to 760 ft. Pumping level 133.23 ft at 2,692 gpm on May 25, 1966. Gravel packed. Temp. 80°F. 1/ 3/
* 901	A. H. Johnson	A. H. Johnson	1959	755	18 13	200 755	59	40.85	Feb. 23, 1967	N	N	Slotted from 330-390, 455-570, 590-615, 643-655, and 700-750 ft. Texas Water Development Board automatic recorder observation well. Gravel packed. Temp. 74°F. 2/ 4/
902	H. E. Insall	Otto Mickelson	1946	545	18 16 12	-- -- --	56	7.0 26.57	Apr. 19, 1947 May 26, 1966	N	N	Well 209 in 1949 Matagorda County report. Gravel packed. Abandoned. 3/
* 903	do	Leonard Mickelson	1955	242	20 12	170 242	56	--	--	T,G	Irr	Slotted from 63-68, 73-111, 116-122, 163-174, 186-199, and 203-240 ft. Measured yield 1,020 gpm on May 26, 1966. Gravel packed. Temp. 73°F. 1/ 3/
* 64-401	Ramon Rooth	Layne Texas Co.	1955	1,057	20 12	305 1057	71	50.00 51.91	Feb. 15, 1955 Feb. 21, 1967	T,G, 150	Irr	Slotted from 317-357, 462-487, 502-527, 562-577, 602-617, 657-727, 752-822, 862-882, and 902-1,042 ft. Pumping level 121.27 ft at 3,417 gpm on May 18, 1966. Texas Water Development Board observation well. Temp. 82°F. 2/ 3/ 4/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING		ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAMETER (IN)	DEPTH OF WELL (FT)		ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
TA-66-64-501	D. K. Poole	American Water Co.	1957	440	12	--	72	20.58	Mar. 22, 1966	T,G, 100	Irr	Slotted 75 ft opposite sands. Pump set at 120 ft. Gravel packed. 1/
* 701	G. M. Savage	do	1950	850	18 12	--	65	55.89	Feb. 4, 1966	T,E, 100	Irr	Measured yield 1,600 gpm on Apr. 1966. Temp. 76° F. 2/ 3/
* 702	Tres Palacios Water Co.	do	1951	856	20 --	-- --	65	20.26 33.07	Mar. 17, 1966 Mar. 14, 1967	T,Ng, 225	Irr	Pumping level 149.16 ft at 2,005 gpm on Mar. 14, 1967. Slotted 290 ft opposite sands. Airline length 163 ft. Pump set at 160 ft. Underreamed and gravel packed. Temp. 73°F. 2/ 3/
* 703	L. F. Harper	do	1959	750	18 12	-- --	56	41.25	Mar. 2, 1966	T,E, 125	Irr	Pump set at 160 ft. Measured yield 1600 gpm on Apr. 16, 1966. Gravel packed. Temp. 74°F 2/ 3/
* 704	do	do	1949	778	18 12	-- --	57	5 55.36	Apr. 16, 1966	T,E, 125	Irr	Pump set at 160 ft. Measured yield 2,355 gpm on Apr. 16, 1966. Gravel packed. Temp. 78°F. 2/ 3/
* 801	Marathon Oil Co.	Layne Texas Co.	1950	657	14 7	407 657	59	36	Nov. 20, 1950	T,E	Ind	Screened from 409-449, 499-509, 529-550, 588-600, and 635-645 ft. Pumping level 110 ft at 542 gpm on Nov. 20, 1950. Pump set at 180 ft. Underreamed and gravel packed. 1/ 2/ 3/
* 802	do	do	1950	682	14 7	400 682	59	30	Nov. 1, 1950	T,Ng, 100	Ind	Screened from 411-451, 510-521, 545-555, 595-600, 615-631, and 660-670 ft. Pumping level 118 ft. at 510 gpm on Nov. 1, 1950. Pump set at 160 ft. Underreamed and gravel packed. Temp. 78°F. 1/ 2/ 3/
80-06-301	Wade Roberts	Otto Mickelson	1940	--	20	--	55	36.76	Feb. 11, 1966	N	N	Casing reported collapsed at 250 ft.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COM-PLET-ED	DEPTH OF WELL (FT)	CASING		ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAM-ETER (IN)	DEPTH OF WELL (FT)		ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
*TA-80-06-302	Wade Roberts	Otto Mickelson	1946	579	16 12	-- 579	55	9.47	May 12, 1960	T,G, 150	Irr	Well 199 in 1949 Matagorda County report. Temp. 74°F.
303	do	do	1941	500+	24 10	-- --	55	7.64 0.0	May 20, 1943 Feb. 11, 1966	T,G, 150	Irr	Well 8 in 1949 Matagorda County report. Estimated yield 1,800 gpm.
* 601	B. W. Trull est.	Leonard Mickelson	1954	773	20 16 14 13	250 367 639 772	55	64.08	Feb. 21, 1967	T,Ng, 280	Irr	Slotted from 192-220, 230-242, 270-348, 378-414, 422-472, 492-520, 532-540, 548-614, 642-686, 724-744, and 758-772 ft. Pump set at 180 ft. Texas Water Development Board observation well. Estimated yield 2,400 gpm. Gravel packed. Temp. 76 F. 4/
* 602	C. M. Hansen	do	1952	626	20 12	200 626	43	--	--	T,Ng	Irr	Slotted from 152-177, 213-216, 235-263, 275-301, 366-425, 430-454, 489-517, 555-590, and 606-624 ft. Gravel packed. Temp. 74°F. 1/
603	do	Otto Mickelson	1939	459	18 12	70 459	43	36.86	Jan. 26, 1966	N	N	Slotted from 82-102, 156-176, 217-227, 242-262, 280-300, 394-426, and 436-456 ft. Well 10 in 1949 Matagorda County report. Abandoned.
* 604	Frank Gresham	Leonard Mickelson	1966	714	20 13	300 714	49	69.76	Mar. 11, 1966	T,Ng, 100	Irr	Slotted from 200-297, 302-348, 361-448, 491-512, 517-545, 549-567, 569-580, 582-643, and 663-712 ft. Pump set at 200 ft. Pumping level 102.20 ft at 1,800 gpm on Mar. 11, 1966. Gravel packed. Temp. 76°F. 1/ 3/
* 605	Ray Hickey	Praytor Drilling & Well Service Co.	1965	71	2	67	46	9.95	Dec. 29, 1966	J,E	D,S	Slotted from 67 to 71 ft. Estimated yield 6 gpm. Temp. 70°F. 1/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-80-06-802	H. H. Ray	American Water Co.	1963	475	16 12	200 475	41	58.19	Mar. 10, 1966	T,Ng, 100	Irr	Slotted from 200-230, 250-275, 318-342, 353-387, and 395-475 ft. Gravel packed. Temp. 7[illegible]°F. 1/
* 901	R. J. Strnadel	Leonard Mickelson	1951	686	18 12	213 686	41	21.04	Mar. 23, 1966	T	N	Slotted from 120-138, 155-168, 228-330, and 363-686 ft. Gravel packed. Abandoned. Temp. 73°F.
* 902	do	Otto Mickelson	1946	468	18 12	85 468	42	15.09	do	N	N	Slotted from 85-125, 192-212, 222-247, 276-321, 356-366, 389-395, 417-427, and 441-466 ft. Gravel packed. Abandoned. Temp. 73°F.
903	B. W. Trull est.	Layne-Bowler	old	421	24 10	-- --	40	11.40 6.20	Apr. 21, 1943 Feb. 22, 1967	N	N	Texas Water Development Board observation well. Abandoned. Gravel packed. 1/ 4/
904	Guy Stovall	Leonard Mickelson	1950	691	20 12	201 691	42	54.37 63.06	May 17, 1960 Mar. 15, 1966	T,Ng, 150	Irr	Slotted from 107-139, 187-211, 224-306, 312-333, 341-371, 377-430, 449-522, 540-548, 560-586, and 647-689 ft. Gravel packed. 1/
* 905	R. J. Strnadel	Crowell Drilling Co.	1962	783	18 14	199 781	42	62.09	Mar. 23, 1966	T,Ng, 100	Irr	Slotted from 446 to 781 ft. Gravel packed. Temp. 77°F. 1/
906	Sun Oil Co.	Luther Patterson	1960	765	8 7 4	566 593 765	37	47	Apr. 1960	T,E, 7½	Ind	Screened from 595-605, 614-630, 689-697, and 705-721 ft. 1/
* 07-101	Kountz & Couch	American Water Co.	1945	585	24 18	-- --	62	61.68	Feb. 10, 1966	T,Ng, 150	Irr	Casing reported collapsed during 1967. Well 201 in 1949 Matagorda County report. Estimated yield 1,200 gpm on Apr. 14, 1966. Temp. 74°F. 1/
102	do	do	1951	1020	20 12	-- --	59	25.05 55.52	Mar. 27, 1952 Feb. 22, 1967	N	N	Texas Water Development Board observation well. Abandoned. Gravel packed. 2/ 4/

See footnotes at end of table.

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-80-07-103	L. W. Chappell	Layne Texas Co.	1950	649	20 12	199 649	56	62.81	Jan. 27, 1966	T,G, 150	Irr	Slotted from 203-221, 230-270, 291-337, 461-510, and 573-642 ft. Measured yield 2,800 gpm. Temp. 76°F. 1/ 2/ 3/
104	Kountz & Couch	American Water Co.	1945	634	24 18	-- --	58	8 14.85	Apr. 19, 1947 Jan. 27, 1966	N	N	Well 200 in 1949 Matagorda County report. Abandoned. 1/
105	F. E. Appling	Leonard Mickelson	1957	302	12	302	58	59.11	Feb. 11, 1966	T,Ng, 150	Irr	Slotted from 118-129, 139-147, 153-157, 162-168, 171-195, 204-217, 225-264, and 277-298 ft. 1/
202	E. F. Baca	Otto Mickelson	1947	585	18 12 10	146 500 585	58	6.00 27.92	Mar. 5, 1947 Apr. 25, 1954	N	N	Well 208 in 1949 Matagorda County report. Collapsed and abandoned. 1/
* 203	do	Leonard Mickelson	1953	453	16 12	151 453	55	53.37	Feb. 21, 1967	T,E, 150	Irr	Slotted from 221-251, 259-330, and 348-453 ft. Pumping level 127 ft at 2,008 gpm on June 7, 1966. Texas Water Development Board observation well. Gravel packed. Temp. 75°F. 1/ 3/ 4/
* 204	H. E. Insall	do	1950	840	20 12	200 840	55	61.39	Jan. 27, 1966	T,G, 150	Irr	Slotted from 90-100, 138-170, 184-194, 200-210, 216-226, 276-364, 394-444, 460-470, 474-493, 496-528, 534-619, 623-709, and 714-759 ft. Measured yield 1,048 gpm. Gravel packed. Temp. 79°F. 1/ 3/
* 205	Fred Cornelius	do	1949	721	18 14 12	265 600 710	54	60.73	do	T,G	Irr	Estimated yield 1,600 gpm. Gravel packed. Temp. 74°F. 1/
* 206	George Walker	Crowell Drilling Co.	1965	390	12 10	216 390	55	--	--	T,G, 100	Irr	Slotted from 163-188, 193-216, and 264-390 ft. Measured yield 773 gpm. Underreamed and gravel packed. Temp. 74°F. 1/ 3/
* 207	Bill Merta	J. A. Johnson Water Well Service	1965	52	2	52	52	--	--	J,E, ½	D,S	Screened from 48 to 52 ft. Estimated yield 10 gpm. Pump set at 21 ft. Gravel packed. Temp. 73°F. 1/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-80-07-301	Berkley Russell est.	Crowell Drilling Co.	1955	373	12 10	228 372	54	43.65	May 12, 1960	C,W	S	Slotted from 182 to 372 ft. Formerly rice irrigation well. Estimated yield 6 gpm. Gravel packed. Temp. 76° F. 1/
* 302	Texas Pipeline Co.	Henry Lane	1942	124	2	124	54	--	--	J,E	Ind	Screened from 118 to 124 ft. Well 60 in 1949 Matagorda County report. Estimated yield 20 gpm. Temp. 75° F.
* 303	C. P. Hiltpold	do	old	268	4 2	-- --	57	63.05	Jan. 5, 1967	C,W	D,S	Screened from 258 to 268 ft. Well 210 in 1949 Matagorda County report. Temp. 77° F.
* 401	Fred Cornelius	American Water Co.	1954	646	18 12	-- --	53	38.92	Mar. 11, 1966	T,Ng, 150	Irr	Estimated yield 2,500 gpm. Temp. 76° F.
* 402	C. C. Mehrens	Leonard Mickelson	1958	960	20 12	294 949	50	67.65	Jan. 27, 1966	T,Ng	Irr	Slotted from 214-232, 280-268, 416-434, 450-466, 484-502, 520-570, 582-654, 672-744, 752-772, 782-799, 802-814, 832-866, and 880-960 ft. Measured yield 1,700 gpm. Gravel packed. Temp. 79° F. 1/ 3/
* 403	do	do	1954	786	20 16 14 12	201 298 605 786	50	69.40	do	T,Ng, 300	Irr	Slotted from 204-236, 294-324, 330-362, 372-386, 416-442, 450-470, 476-484, 492-508, 524-566, 590-602, 610-632, 646-662, 680-712, 720-748, and 774-784 ft. Gravel packed. Temp. 76° F. 2/
404	R. J. Strnadel	Otto Mickelson	1944	510	18	--	50	33.13 27.10	Mar. 28, 1957 Feb. 21, 1967	N	N	Well 206 in 1949 Matagorda County report. Texas Water Development Board observation well. Gravel packed. Abandoned. 4/
407	C. C. Menrens	do	1947	520	12	520	59	58.49	Jan. 27, 1966	N	N	Well 205 in 1949 Matagorda County report. Abandoned.
408	do	--	1962	60	4	60	59	7.97	do	R,E	S	

* See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-80-07-409	R. J. Strnadel	Leonard Mickelson	1966	745	20 12	297 745	49	62.68	Feb. 21, 1966	T,G	Irr	Slotted from 192-202, 253-263, 268-285, 293-365, 383-389, 445-580, 590-610, 616-631, 662-668, 673-693, and 703-744 ft. Pump set at 180 ft. Measured yield 2,415 gpm. Gravel packed. Temp. 75.5°F. 1/ 3/
* 410	V. M. Brhlik	Guy Conner & Son	1965	113	4 3	42 113	49	15.29	Sept.20, 1966	J,E, ¼	D,S	Screened from 105 to 113 ft. Temp. 73°F. Reported yield 10 gpm. 1/
* 411	V. O. Hale	B&P Drilling Contractors	1962	134	4	75	49	--	--	J,E, ¼	D,S	Open hole completion from 75 to 134 ft. Estimated yield 6 gpm. Pump set at 36 ft. Temp. 74°F. 1/
* 412	Harry Cowger	Jim Williams	1910	55	4	55	49	13.51	Sept.20, 1966	C,W	N	Well 4 in 1949 Matagorda County report. Estimated yield 6 gpm. Temp. 73°F.
* 501	H. E. Insall	Leonard Mickelson	1951	821	18 14 12	253 477 821	50	57.87 61.56	Mar. 28, 1957 Feb. 21, 1967	T,G, 150	Irr	Slotted from 220 to 230 and 420 to 820 ft. Pumping level 137.13 ft at 1,760 gpm on July 13, 1955. Texas Water Development Board observation well. Gravel packed. Temp. 76°F. 1/ 3/ 4/
* 502	Charles Nemec, Sr.	J. A. Johnson Water Well Service	1965	54	2	54	44	20	Sept.27, 1965	J,E, ¼	D,S	Screened from 50 to 54 ft. Reported yield 14 gpm. Temp. 76°F. 1/
* 701	J. E. Cornett	Dodson Water Well Service	1961	50	3	50	40	18.40	Sept.20, 1966	C,W	S	Screened from 45 to 50 ft. Estimated yield 5 gpm. Temp. 74°F. 1/
* 802	L. M. Pierce	B&P Drilling Contractors	1965	112	2	112	45	23.42	do	C,W	S	Screened from 101 to 111 ft. Estimated yield 6 gpm. Temp. 74°F. 1/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COM-PLET-ED	DEPTH OF WELL (FT)	CASING DIAM-ETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TA-80-07-901	Jack Reeves	Henry Lane	1942	106	16	106	40	11.3 13.11	Apr. 29, 1943 Feb. 21, 1967	N	N	Slotted from 44 to 106 ft. Well 64 in 1949 Matagorda County report. Texas Water Development Board observation well. Gravel packed. Abandoned. 4/
* 902	Tidehaven Independent School Dist.	American Water Co.	1954	735	8 6	210 735	38	71.40	Sept.23, 1966	T,E, 3	P	Screened from 715 to 735 ft. Estimated yield 60 gpm. Temp. 76°F. 1/
* 903	do	B&P Drilling Contractors	1965	273	4	273	38	58.83	do	S,E, 1	P	Screened from 253 to 268 ft. Pump set at 84 ft. Temp. 77°F. 1/
08-101	Eugene Salas	O. T. Davis & Sons	1955	161	12	161	53	12.75	Feb. 21, 1967	T,G	Irr	Texas Water Development Board observation well. 4/
102	Simon Cornelius	Katy Drilling Co.	1965	760	20 12	321 760	54	80.01	Sept.28, 1966	T,E, 150	Irr	Slotted from 330 to 760 ft. Pump set at 220 ft. Pumping level 204 ft at 3,130 gpm on Nov. 2, 1965. Gravel packed. 1/ 3/
* 103	do	Leo Franzina	1966	55	4	55	54	--	--	C,W	S	Slotted from 48 to 55 ft. Estimated yield 6 gpm. Temp. 72°F.
* 201	Markham Municipal Utilities Dist.	Texas Water Wells	1964	690	10 6	525 690	52	62	Mar. 18, 1964	T,E, 15	P	Screened from 530-544, [illegible] and 652-682 ft. Pumping level 109 ft at 367 gpm; 113 ft at 383 gpm; and 134 ft at 517 gpm on Mar. 18, 1964. Pump set at 160 ft. Underreamed and gravel packed. 1/ 3/
* 202	W. D. Cornelius	Katy Drilling Co.	1965	780	20 12	332 780	58	85	Feb. 24, 1965	T,Ng, 150	Irr	Slotted from 420 to 780 ft. Pump set at 220 ft. Pumping level 190 ft at 2,500 gpm on Feb. 24, 1965. Gravel packed. Temp. 79°F. 1/ 3/
* 203	Jack Miller	Luther Patterson	1952	340	6 5	320 340	58	--	--	T,E, 3	D,S	Screened from 319 to 340 ft. Formerly supplied oil camp. Temp. 74°F.

See footnotes at end of table.

WELL	OWNER	DRILLER	DATE COM-PLET-ED	DEPTH OF WELL (FT)	CASING		ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAM-ETER (IN)	DEPTH OF WELL (FT)		ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
*TA-80-08-301	City of Bay City	Henry Lane	1954	560	6	560	52	50.67	Feb. 27, 1967	T,E, 7½	P	Screened from 448 to 470 ft. Pump set at 100 ft. Texas Water Development Board observation well. Gravel packed. 2/ 4/
* 302	Lower Colorado River Authority	H&S Water Well Service	1963	630	13 6	530 630	50	43 56.7 67.07	Apr. 23, 1963 Dec. 23, 1965 Oct. 28, 1966	T,E, 75	Ind Irr	Screened from 530 to 630 ft. Water used to fill rubber dam on Colorado River and irrigate golf course. Pumping levels 136 ft. at 385 gpm and 140 ft at 400 gpm on Apr. 23, 1963. Pumping level 149.48 ft at 413 gpm on Oct. 28, 1966. Underreamed and gravel packed. 1/ 2/ 3/
401	Jack Reeves	Henry Lane	1943	427	12	427	39	12.22	Feb. 27, 1967	T,G	Irr	Well 65 in 1949 Matagorda County report. Texas Water Development Board observation well. Estimated yield 500 gpm. 4/
501	Joe Senkyrik	American Water Co.	1957	614	12	614	46	36.40	Nov. 14, 1966	T,G, 150	Irr	Slotted from 158 to 614 ft. Pump set at 140 ft. Gravel packed. 1/
502	J. E. Dawdy	O. T. Davis & Sons	1955	195	6	--	41	12.78	Mar. 9, 1966	T,E, 10	Irr	Estimated yield 300 gpm. Pump set at 75 ft.
* 701	J. O. Thompson	American Water Co.	1955	672	12	672	41	77.90 51.19	Sept.23, 1966 Feb. 21, 1967	T,G	Irr	Slotted from 300 to 600 ft. Pump set at 140 ft. Estimated pumping level 136.9 ft at 805 gpm on Sept. 23, 1966. Texas Water Development Board observation well. Temp. 78°F. 2/ 3/ 4/
* 801	Lewis & MacDonald	--	--	750	7	--	40	--	--	J,E, ½	P	
14-301	L. P. Neuszer est.	Crowell Drilling Co.	1952	600	20 12	200 600	33	--	--	N	N	Casing reported collapsed on Mar. 16, 1960. Abandoned. Originally slotted from 200-265, 301-365, and 385-600 ft.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-80-14-302	R. H. Rhodes est.	B&P Drilling Contractors	1966	244	4 3	141 244	36	--	--	N	N	Slotted from 223 to 244 ft. Supplied oil test drilling rig. Estimated yield 300 gpm. Temp. 76°F. 1/
* 303	do	Henry Lane	1940	63	4	63	30	17.42	Sept.20, 1966	C,W	S	Well 24 in 1949 Matagorda County report. Casing collapsed at 63 ft. Estimated yield 5 gpm. Temp. 73°F.
501	J. W. Gresham	Otto Mickelson	1938	519	20 12	80 509	30	14.30 38.29 12.15	Apr. 22, 1943 Mar. 19, 1953 Feb. 26, 1963	N	N	Well 192 in 1949 Matagorda County report. Formerly Texas Water Development Board observation well. Well plugged in 1964. 4/
* 601	Robert Ackerman	Crowell Drilling Co.	1960	768	20 16 12	245 268 768	33	80.87	Apr. 27, 1966	T,Ng, 150	Irr	Slotted from 310-444, 460-610, and 650-768 ft. Pumping level reported 145 ft at 2,400 gpm. Pumping level 128.88 ft at 2,170 gpm. Pump set at 190 ft. Gravel packed. Temp. 78°F. 3/
* 602	Johnny Gresham	American Water Co.	--	640	20 12	180 640	30	70.54	Mar. 18, 1966	T,G	Irr	Slotted from 180 to 640 ft. Gravel packed. Temp. 77°F.
* 603	J. W. Gresham	Crowell Drilling Co.	1960	598	16 12	225 598	31	70.42	do	T,Ng, 150	Irr	Slotted from 225 to 382 and 428 to 598 ft. Pump set at 150 ft. Measured yield 1,820 gpm. Gravel packed. Temp. 77°F. 1/ 3/
605	Farmer's Canal Co.	Layne Texas Co.	1956	917	18 12	352 917	31	50 69.47	Apr. 1961 Jan. 14, 1966	T,Ng, 195	Irr	Slotted from 247 to 917 ft. Drilled to 1,082 ft and plug-back to 917 ft. Pumping level 164 ft at 3,298 gpm on July 7, 1956. Pump set at 200 ft. Gravel packed. 2/ 3/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TA-80-14-606	Farmer's Canal Co.	Layne Texas Co.	1952	1,006	20 16 12	302 556 1,006	33	33 70.28	May 7, 1952 Feb. 22, 1967	T,Ng, 235	Irr	Slotted from 333-393, 417-422, 447-462, 482-502, 512-552, 582-612, 676-682, 702-717, 727-732, 752-773, 783-798, 819-825, 852-882, 907-927, and 952-997 ft. Pumping level 101 ft at 3,560 gpm on May 7, 1952. Texas Water Development Board observation well. Pump set at 180 ft. Gravel packed. 1/ 3/ 4/
* 607	Tom Slone	Otto Mickelson	1944	550	12	--	31	79.27	Mar. 23, 1966	T,G, 150	Irr	Pump set at 160 ft. Estimated yield 1,000 gpm. Temp. 77° F.
608	B. W. Trull est.	Layne Texas Co.	1964	885	20 13	323 885	30	77.09	Jan. 14, 1966	T,N	Irr	Slotted from 243-308, 323-392, 452-542, 665-702, 747-784, 801-812, and 831-870 ft. Pumping level 144 ft at 3,088 gpm on Feb. 9, 1964. Pump set at 200 ft. Gravel packed. 1/ 3/
801	Oswald Kubecka	Leonard Mickelson	1947	719	18 15 13 12	107 125 194 719	16	48.86	Feb. 22, 1967	N	N	Texas Water Development Board observation well. Gravel packed. 1/ 4/
802	J. A. Derrick	B&P Drilling Contractors	1957	415	8	415	15	41.50 54.06	Mar. 21, 1960 Mar. 18, 1966	T,E, 25	Irr	Slotted from 230 to 285 and 300 to 410 ft. Measured yield 600 gpm. Gravel packed. 1/ 3/
901	Tom Slone	J. H. Powell	old	460	24	--	25	13.75 14.39 18.70	Apr. 5, 1951 Mar. 27, 1957 Feb. 22, 1967	N	N	Texas Water Development Board observation well. Gravel packed Abandoned. 4/
15-101	Matagorda Co. WCID No. 5	Luther Patterson	1948	615	6 4	140 615	40	45.02	Jan. 7, 1966	T,E, 10	N	Screened from 585 to 615 ft. Pump set at 120 ft. 1/
* 102	do	B&P Drilling Contractors	1956	645	10 6	502 645	40	67.35	Feb. 22, 1967	T,E, 50	P	Screened from 506-520, 535-557, and 570-634 ft. Pumping level 116.4 ft at 408 gpm on Mar. 9, 1967. Pump set at 200 ft. Cemented from 502 ft to surface. Underreamed and gravel packed. Texas Water Development Board observation well. 1/2/3/4/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-80-15-104	J. N. Pierce est.	Otto Mickelson	1939	529	16 12	--	39	6	1939	C,W	S	Well 27 in 1949 Matagorda County report. Formerly used for rice irrigation. Reported to have yielded 1,600 gpm. Last used for irrigation in 1950. Temp. 74°F.
* 105	J. L. Sullivan	Dodson Water Well Service	1961	60	2	60	37	--	--	J,E, ¼	D,S	Screened from 52 to 60 ft. Estimated yield 6 gpm. Temp. 78°F. 1/
* 106	Farmer's Canal Co.	Crowell Drilling Co.	1963	912	20 12	300 912	36	68.44	Jan. 14, 1966	T,E	Irr	Slotted from 300 380, 400-615, 665-705, and 740-912 ft. Pump set at 200 ft. Pumping level 167 ft at 2800 gpm on Apr. 16, 1963. Gravel packed. Temp. 78°F. 1/ 3/
201	Farmer's Canal Co.	Layne Texas Co.	1955	898	18 13	306 898	34	66.83	do	T,E	Irr	Slotted from 353-409, 464-470, 504-539, 608-630, 669-704, 719-739, 749-781, 801-815, 828-838, and 858-878 ft. Pumping level 140 ft at 2,630 gpm on May 15, 1955. Pump set at [illegible] ft. Gravel packed. 1/ 2/ 3/
202	do	do	1954	844	18 12	300 844	33	63.93	do	T,E, 150	Irr	Slotted from 300-320, 345-395, 495-553, 566-585, 641-661, 681-706, 713-726, 741-757, and 774-822 ft. Pump set at [illegible] ft. Gravel packed. 2/
* 301	Ira Foster	American Water Co.	1954	570	18 12	-- --	31	25.64	Feb. 22, 1967	T,G, 100	Irr	Texas Water Development Board observation well. Pumping level 81.79 ft at 1,026 gpm on June 10, 1966. Gravel packed. Temp. 74°F. 2/ 3/ 4/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TA-80-15-401	Farmer's Canal Co.	Layne Texas Co.	1954	977	18 12	316 977	32	69.50	Jan. 15, 1966	T,Ng, 100	Irr	Slotted from 225-252, 288-303, 490-505, 533-553, 576-629, 693-751, 765-798, 835-872, 882-895, 930-950, and 961-977 ft. Drilled to 1,051 ft in 1954. Plugged back to 977 ft on Dec. 6, 1963. Pumping level 148 ft at 2,513 gpm on July 15, 1954. Pumping level 143.5 ft at 2,000 gpm on July 13, 1955. Pump set at 200 ft. Gravel packed. Texas Water Development Board observation well. 1/ 2/ 3/ 4/
402	Texas Eastern Transmission Co.	do	1957	300	8 4	270 295	31	61 72.86	Dec. 15, 1957 Feb. 22, 1967	T,E, 5	P	Screened from 275 to 295 ft. Pumping level 75 ft at 70 gpm on Dec. 10, 1957. Pump set at 126 ft. Texas Water Development Board observation well. 1/ 3/ 4/
* 403	Edward Keprta	B&P Drilling Contractors	1965	59	4	59	32	11.61	Dec. 28, 1966	J,E	S	Screened from 47 to 55 ft. Estimated yield 8 gpm. Temp. 70°F. 1/
501	Charles Payne	Crowell Drilling Co.	1957	456	12 8	258 456	28	39.1	May 6, 1966	T,G, 100	Irr	Slotted 95 ft opposite sands. Pump set at 120 ft. Gravel packed.
* 502	W. H. Laslie	do	1951	776	20 12	244 776	27	53.09	Feb. 22, 1967	T,G, 150	Irr	Slotted 304 ft from 244 to 776 ft. Measured yield 2,020 gpm. Pump set at 200 ft. Texas Water Development Board observation well. Gravel packed. 3/ 4/
503	W. T. Gunter	Henry Lane	1953	760	16 12	200 760	27	--	--	N	N	Casing collapsed. Abandoned.
* 701	do	American Water Co.	1955	850	18 12	-- --	24	--	--	T,Ng, 150	Irr	Estimated yield 2,000 gpm. Gravel packed. Temp. 79°F.
* 702	Harold Hunt	Henry Cleveland	1957	671	12 10	300 671	22	--	--	T,Ng, 150	Irr	Estimated yield 1,200 gpm. Gravel packed. Temp. 79°F.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TA-80-15-705	J. K. Rockenbaugh	O. T. Davis & Sons	1963	66	16	66	24	12.68	Mar. 18, 1966	T,E, 5	Irr	Slotted from 36 to 66 ft. Pump set at 40 ft. Gravel packed.
* 901	A. T. Bohuslav	Praytor Drilling and Well Service	1965	38	2	38	2	4	May 11, 1965	J,E	D	Screened from 34 to 38 ft. Estimated yield 10 gpm. Temp. 74°F. 1/
* 902	do	A. T. Bohuslav	1947	20	7	20	15	13.26	Dec. 2, 1966	J,E	D,S	Screened from 16 to 20 ft. Estimated yield 10 gpm. Gravel packed. Temp. 74 F.
* 16-101	Dan Curry	B&P Drilling Contractors	1964	93	3	93	25	13.5	June 25, 1964	J,E, 3/4	D,S	Screened from 82 to 92 ft. Reported yield 40 gpm. Temp 72°F. 1/
* 201	Buckeye Ranch	Redd's Water Well Service	1965	100	4 2	42 100	40	15.28	Sept.19, 1966	C,W	S	Screened from 93 to 100 ft. Estimated yield 6 gpm. Temp 75°F. 1/
* 301	Celanese Chemical Co.	Layne Texas Co.	1964	823	8 4	607 823	34	36 41.79	Aug. 6, 1964 Mar. 10, 1967	T,E	P	Screened from 615-64[illegible], [illegible], and 780-800 ft. Pumping level 61 ft at 152 gpm on Aug. 6, 1964. Pumping level [illegible] after pumping 3 hours at [illegible] gpm on Mar. 10, 1967. [illegible] at 200 ft. Underreamed and gravel packed. 1/ 2/ 3/
* 302	Big Three Welding Equipment Co.	do	1964	835	10 6	615 835	34	37	July 31, 1964	T,E	Ind	Screened from 630-670, 745-[illegible], and 790-810 ft. Pumping level 51 ft at 203 gpm on July 31, 1964. Pump set at 100 ft. Underreamed and gravel packed. 1/ 2/ 3/
* 303	Buckeye Ranch	Redd's Water Water Service	1965	98	4 2	41 98	27	15.73	Sept.19, 1966	C,W	S	Screened from 91 to 98 ft. Estimated yield 6 gpm. Temp. 75°F. 1/
* 801	H. A. Norris	Norman Franzina	1962	130	2	130	27	15	Apr. 15, 1962	C,W	S	Screened from 124 to 130 ft. Estimated yield 6 gpm. Temp. 75°F.

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WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TA-80-22-301	H. C. Mozley	George Barnett	old	361	2	361	14	21.23 45.41 13.06	Apr. 4, 1951 Mar. 27, 1957 Feb. 24, 1967	N	N	Well 33 in 1949 Matagorda County report. Texas Water Development Board observation well. Abandoned. 4/
* 302	Palacios Municipal Airport	--	1943	649	14 8	502 649	11	62.36 57.81	Nov. 29, 1966 Feb. 21, 1967	T,E, 25	P	Slotted from 523 to 564 ft. Screened from 564 to 608 ft. Pumping level 265 ft at 255 gpm in April 1943. Gravel packed. 3/
* 23-101	Otto Frick	American Water Co.	1949	776	20 12	205 776	21	53.64 61.44	Mar. 27, 1957 Feb. 22, 1967	T,E	Irr	Slotted from 190 ft to bottom. Pumping level 136.78 ft at 1,560 gpm on July 19, 1955. Texas Water Development Board observation well. 2/ 3/ 4/
* 102	City of Palacios	Layne Texas Co.	1958	637	13 7	525 637	17	61	July 17, 1958	T,E	P	Screened from 530 to 585 and 595 to 620 ft. Pumping levels; 95 ft at 530 gpm, 98 ft at 560 gpm, 102 ft at 590 gpm, and 106 ft at 644 gpm on July 17, 1958. Pump set at 160 ft. Underreamed and gravel packed. Temp. 80° F. 1/ 2/ 3/
* 201	M. D. Whitley	B&P Drilling Contractors	1965	52	2	52	16	13.76	Dec. 28, 1966	Sub,E, 3/4	D,S	Screened from 47 to 52 ft. Estimated yield 7 gpm. Temp. 72° F. 1/
* 301	Mason Holsworth	American Water Co.	1946	770	18 12	200 770	15	Flowed 9.29 37.10 42.41	Mar. 13, 1947 Apr. 4, 1951 Mar. 27, 1957 Feb. 22, 1967	T,G, 150	Irr	Well 227 in 1949 Matagorda County report. Pumping level 108.36 ft at 1,535 gpm on July 19, 1955. Texas Water Development Board observation well. 2/ 3/ 4/
* 302	John Carrick	Norman Franzina	1953	331	3 2	62 331	15	37	1953	J,E, ½	D,S	Screened from 315 to 331 ft. Estimated yield 10 gpm. Temp. 70° F. 1/
401	City of Palacios	J. H. Powell	old	590+	12	--	13	13.89 33.15 40.56	Mar. 23, 1950 Mar. 27, 1957 Feb. 22, 1967	N	N	Well 40 in 1949 Matagorda County report. Texas Water Development Board observation well. 4/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-80-23-402	City of Palacios	Layne Texas Co.	1936	588	13 6	546 586	12	52.33	Mar. 17, 1967	T,E	P	Screened from 544 to 586 ft. Well 194 in 1949 Matagorda County report. Measured yield 388.5 gpm on Mar. 17, 1967. Gravel packed. 1/ 3/
* 403	do	do	1941	590	13 6	530 590	13	48.75	do	T,G,E	P	Screened from 542 to 578 ft. Well 195 in 1949 Matagorda County report. Underreamed and gravel packed. 1/ 3/
404	Lamesa Corp.	do	1937	574	13 7	-- --	10	54.97	Dec. 14, 1965	N	N	Screened from 527 to 571 ft. Well 47 in 1949 Matagorda County report. Formerly supplied U.S. Army Camp Hulen. Underreamed and gravel packed. Abandoned. 1/
405	do	Texas Water Supply Corp.	1941	717	16	--	10	45.13	do	N	N	Screened from 523 to 545 and 581 to 591 ft. Well 49 in 1949 Matagorda County report. Formerly supplied U.S. Army Camp Hulen. Abandoned. 1/
* 501	A. A. Penland	Norman Franzina	1962	68	4	68	16	--	--	C,W	S	Open end completion. Estimated yield 6 gpm. Temp. 75°F.
502	M. A. Guillot	do	1965	583	2	583	10	--	--	C,W	D,S	Screened from 567 to 583 ft. 1/
24-201	R. E. Bowers	Henry Lane	1950	490	14	--	11	16.55 14.57 16.82	July 18, 1955 Mar. 17, 1957 Feb. 22, 1967	T,N	N	Slotted from 350 to 490 ft. Texas Water Development Board observation well. 4/
* 202	John Merck	Norman Franzina	1962	411	3 2	84 411	13	21.95	Nov. 3, 1966	C,W	S	Screened from 395 to 411 ft. Estimated yield 5 gpm. Temp. 72°F. 1/
* 701	R. E. Smith	Leon Franzina	1962	355	3 2	21 355	4	15.20	Nov. 18, 1966	C,W	S	Screened from 339 to 355 ft. Estimated yield 6 gpm. Temp. 77°F. 1/
* 31-101	Letulle est.	--	--	360	4	--	0	--	--	C,H	D	Estimated yield 20 gpm. Temp. 74°F.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COM-PLET-ED	DEPTH OF WELL (FT)	CASING		ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAM-ETER (IN)	DEPTH OF WELL (FT)		ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
TA-80-38-301	Matagorda-Hilton Club	B&P Drilling Contractors	1965	504	4 2	81 504	3	6.5	Feb. 10, 1965	C,W	D,S	Screened from 491 to 501 ft. Measured yield 60 gpm when drilled. Pump set at 42 ft. 1/
* 81-01-101	City of Bay City	Layne Texas Co.	1950	768	14 9	557 768	51	25.33 38.72 57.12	Apr. 9, 1951 Mar. 28, 1956 Feb. 23, 1967	T,E,G	P	Screened from 565-585, 600-660, 670-700, 710-730, and 750-760 ft. Pumping level 68 ft at 759 gpm on July 31, 1950. Pumping level 88 ft at 940 gpm on May 11, 1951. Measured yield 1,000 gpm on Oct. 13, 1955. Underreamed and gravel packed. Cemented from 556 ft to surface. Pump set at 160 ft. Emergency stand-by well. Texas Water Development Board observation well. 1/ 3/ 4/
* 102	do	do	1950	1,032	14 9	769 1,032	51	16.75 36.14 49.03	Apr. 9, 1951 Mar. 28, 1956 Feb. 23, 1967	T,E	P	Screened from 777-792, 812-837, 857-892, 945-980, and 990-1,020 ft. Pumping levels 83 ft at 770 gpm and 100 ft at 1,009 gpm on July 14, 1950. Pumping level 83 ft at 969 gpm on May 11, 1951. Pumping level 91.85 ft at 915 gpm on Oct. 13, 1955. Underreamed and gravel packed. Cemented from 769 ft to surface. Pump set at 120 ft. Texas Water Development Board observation well. Temp. 83°F. 1/ 2/ 3/ 4/
* 103	do	do	1940	811	13 7	623 811	50	6.5	June 1940	T,E	P	Slotted from 633-677, 687-728, and 754-791 ft. Well 134 in 1949 Matagorda County report. Pumping level 69 ft at 545 gpm in June 1940. Underreamed and gravel packed. Cemented from 623 ft to surface. 1/ 3/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-01-104	City of Bay City	Layne Texas Co.	1945	815	14 7	619 815	50	16	Apr. 4, 1945	T,E	P	Slotted from 639 to 754 and 765 to 789 ft. Well 216 in 1949 Matagorda County report. Pumping level 103 ft at 500 gpm on Apr. 4, 1945. Underreamed and gravel packed. Cemented from 619 ft to surface. Pump set at 170 ft. 1/ 3/
401	G. E. Brown est.	Pan American Oil Co.	1953	840	11	840	49	--	--	T,Ng	Irr	Perforated from 320 to 840 ft. Oil test plugged back to 840 ft. Pump set at 140 ft.
* 402	E. P. Kilbride	B&P Drilling Contractors	1966	443	4 2	210 443	43	45.58	Sept.22, 1966	Sub,E, 3/4	D,S	Screened from 427 to 442 ft. Estimated yield 14 gpm. Pump set at 84 ft. Temp. 75°F. 1/
* 501	F. J. Milberger	O. T. Davis & Sons	1964	160	12	160	35	7.65	Dec. 9, 1965	T,G, 70	Irr	Slotted from 120 to 160 ft. Estimated yield 1,000 gpm. Pump set at 80 ft. Gravel packed. Temp. 74°F.
502	A. B. Vaughn, Jr.	B&P Drilling Contractors	1966	180	11	180	30	6 4.65	July 7, 1966 Sept.22, 1966	T,E, 20	Irr	Slotted from 123 to 177 ft. Pumping level 57 ft at 450 gpm on July 7, 1966. Pump set at 120 ft. Gravel packed. 1/ 3/
* 601	Coastal States Gas Producing Co.	H&S Water Well Service	1965	665	16 11	218 665	34	24 25.23	July 23, 1965 Feb. 11, 1966	T,E	Ind	Screened from 218-256, 455-474, and 604-660 ft. Pumping levels; 46 ft at 325 gpm, 61 ft at 717 gpm, 86 ft at 1,130 gpm, and 106 ft at 1424 gpm on July 23, 1965. Pumping level 80.31 ft at 1,290 gpm on Mar. 13, 1967. Underreamed and gravel packed. 1/ 3/
* 602	do	do	1965	651	16 11	220 651	35	22	June 1, 1965	T,E, 150	Ind	Screened from 225-243, 340-351, 456-466, 472-483, and 621-651 ft. Test hole drilled to 1,007 ft. Pumping levels; 72 ft at 383 gpm, 111 ft at 508 gpm, 177 ft at 760 gpm, and 194 ft at 857 gpm on June 1, 1965. Underreamed and gravel packed. 3/

See footnotes at end of table.

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-01-801	Harry Burkhart	American Water Co.	1954	200	12	--	31	8.76	Nov. 23, 1965	T,E, 15	Irr	Reported yield 400 gpm. Gravel packed. Temp. 73°F. 1/
* 802	Francis Savage	do	1947	520	18 12	150 520	31	55.96 29.96 36.33	July 18, 1955 Mar. 26, 1965 Feb. 21, 1967	T,Ng, 150	Irr	Slotted from 150 to 520 ft. Pumping level 129.17 ft at 1,075 gpm on July 18, 1955. Texas Water Development Board observation well. Underreamed and gravel packed. Temp. 78° F. 3/ 4/
* 803	D&D Vacuum Service, Inc.	B&P Drilling Contractors	1965	158	4	158	34	3.73	Dec. 14, 1966	J,E, 1½	Ind	Slotted from 143 to 158 ft. Reported yield 20 gpm. Pump set at 50 ft. Temp. 74°F. 1/
* 02-101	O. W. Birkner	American Water Co.	1964	495	4 2	110 495	40	--	--	Sub,E	D,S	Screened from 480 to 495 ft. Estimated yield 30 gpm.
102	do	--	old	120	2	--	45	12.26	Oct. 14, 1965	N	N	Abandoned.
103	Eugene Anderson	Louis Gregurek	1948	120	2	120	37	--	--	C,H	D,S	
* 104	S. A. Matthews	do	1941	141	4	141	45	16.24	Oct. 21, 1965	J,E, ½	D,S	Open end completion. Estimated yield 25 gpm. Temp. 72°F.
* 105	T. D. Matthews	T. D. Matthews	1933	43	4	43	40	26.95	Oct. 28, 1965	J,E, ½	D,S	Open end completion. Temp. 73°F.
106	do	E. B. Dacke	1948	150	4	150	36	14.48	do	C,W	S	Open end completion.
107	do	Leon Franzina	1945	150	4	150	40	19.76	do	C,W	S	Do.
* 201	Hudson Cattle Co.	Luther Patterson	1965	620	4	621	33	--	--	Sub,E, 3	D,S	Slotted from 602 to 620 ft.
202	do	do	1965	620	8	621	30	--	--	Sub,E, 20	Irr	Slotted from 150-160, 550-570, and 600-620 ft. Reported yield 420 gpm.
203	do	do	1965	620	4	621	41	--	--	Sub,E, 3	S	Slotted from 602 to 620 ft.
* 204	Joe Senkyrick, Jr.	--	old	90	4	--	38	24.08	Oct. 22, 1965	J,E, ½	S	Estimated yield 20 gpm.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-02-205	Joe Senkyrick, Jr.	Leo Franzina	1959	480	4 2	40 480	35	24.08	Oct. 22, 1965	J,E	D	Estimated yield 30 gpm. Temp 74°F.
301	Matthew Boone	Matthew Boone	old	31	1	31	27	8.26	Oct. 21, 1965	C,H	D,S	Open end completion.
304	E. Le Blanc	O. T. Davis & Sons	1958	117	5 2	40 117	26	21.17	Oct. 23, 1965	N	N	Screened from 107 to 117 ft.
* 305	Nilson Farms	Leon Franzina	--	600	4	--	28	--	--	Sub,E, ½	D,S	Estimated yield 30 gpm.
403	L. B. Bates	--	1938	80	4	80	30	13.78	Oct. 27, 1965	Sub,E, ½	D,S	Screened from 75 to 80 ft.
501	E. B. Hite	Payne Equip. Co.	1956	400+	12	--	25	11.65	Dec. 9, 1965	T,G, 70	Irr	Reported sanded up. Originally gravel packed.
502	Hansen Farms	Norman Franzina	1963	77	4 2	21 77	31	12.86	Oct. 21, 1965	C,W	S	Screened from 71 to 77 ft. 1/
503	Joe Senkyrick, Jr.	--	old	--	3	--	38	23.81	Oct. 22, 1965	N	N	Abandoned.
* 601	Nilson Farms	--	--	80	4	--	31	23.20	do	J,E, 3/4	D,S	Estimated yield 30 gpm.
* 602	do	Redd's Water Well Service	1964	180	2	180	26	--	--	J,E, 3/4	S	Screened from 157 to 163 ft. Estimated yield 20 gpm. 1/
801	Rugeley-Ferguson	Leo Franzina	1962	210	4 2	42 210	30	--	--	J,E	S	Screened from 200 to 210 ft.
* 802	Hawkins est.	C&S Water Well Service	1966	120	6	120	25	--	--	J,A	N	Supplied drilling rig. Estimated yield 300 gpm. Temp. 7[illegible]
* 901	do	Norman Franzina	1963	294	4 2	21 294	19	7.93	Oct. 27, 1966	J,E, 1	D,S	Screened from 278 to 294 ft. Estimated yield 10 gpm. Temp 76°F. 1/
* 902	Dr. Russell Matthes	do	1963	142	6	142	20	12.21	Oct. 24, 1966	Sub,E, 5	Irr	Slotted from 102 to 142 ft. Estimated yield 60 gpm. Pump set at 125 ft. Gravel packed. Temp. 76°F.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-03-401	George Ratliff	S. O. Burford	1963	117	2	117	23	--	--	J,E, ½	D,S	Screened from 101 to 117 ft. Estimated yield 6 gpm. Temp. 73°F. 1/
402	B. J. Patterson	--	1926	42	4	42	25	22.41	Oct. 22, 1965	C,H	D,S	Open end completion.
* 501	D. L. Gibbs	American Water Co.	1956	232	8	232	22	--	--	T,E, 10	Irr	Slotted 85 ft. Estimated yield 400 gpm. Gravel packed. Temp. 71°F. 1/
502	J. A. Butter	Leo Franzina	1964	150	3	150	20	24.34	Apr. 13, 1967	C,W	S	Slotted from 142 to 150 ft. 1/
* 701	C. B. Hamill	Luther Patterson	1957	731	13 8	678 731	15	15 9.68	1957 Oct. 23, 1966	T,E, 75	Irr	Screened from 193-218, 498-516, and 713-728 ft. Measured yield 1,860 gpm. Temp. 72°F. 1/ 3/
09-201	Atchison, Topeka & Santa Fe Railway Co.	J. W. Powell	1920	557	4	--	30	Flowed 11.69 22.78 23.25	Sept. 11, 1934 Apr. 10, 1951 Mar. 27, 1957 Feb. 21, 1967	N	N	Completed from 524 to 527 ft. Well 144 in 1949 Matagorda County report. Formerly supplied steam locomotives. Texas Water Development Board observation well. Abandoned. 1/ 4/
* 202	Selkirk Ranch	Layne Texas Co.	1964	485	13	485	31	40 23.34	Nov. 17, 1964 Nov. 19, 1965	T,G, 100	Irr	Slotted from 240-266, 275-295, 305-315, 350-360, 365-375, 385-395, 400-430, and 455-470 ft. Pumping levels; 87 ft at 1032 gpm and 90 ft at 1,040 gpm on Nov. 17, 1964. Gravel packed. 1/ 2/ 3/
* 401	T. J. Petrucha	American Water Co.	1964	360	16	360	19	15.34 16.15	Mar. 19, 1966 Mar. 24, 1966	T,G, 150	Irr	Pumping level 103.36 ft at 1,182 gpm. Pump set at 130 ft. Gravel packed. Temp. 76°F. 3/
501	C. M. Laird	Leo Franzina	1957	562	12	562	29	20.65 19.75	Apr. 30, 1960 Nov. 26, 1966	T,G, 79	Irr	Slotted from 240-264, 320-354, 418-432, and 516-534 ft. Pump set at 160 ft. Underreamed and gravel packed. 2/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
TA-81-09-502	M. C. White	Layne Texas Co.	1952	502	16 10	203 562	31	24 19.37	Mar. 17, 1952 Mar. 19, 1966	T,E, 75	Irr	Slotted from 124-149, 169-174, 184-199, 203-208, 218-268, 273-278, 289-294, 324-354, 364-369, 384-389, 394-400, and 417-500 ft. Pumping level 80 ft at 2,919 gpm on Mar. 17, 1952. Gravel packed. 1/ 3/
503	T. J. Petrucha	American Water Co.	1947	310	12	--	28	38.26 20.65 20.31	July 19, 1955 Mar. 25, 1965 Feb. 21, 1967	N	N	Reported caved. Abandoned. Texas Water Development Board observation well. Gravel packed. 4/
* 504	do	do	1954	721	20 12	-- --	28	42.39 22.81 23.00	July 19, 1955 Mar. 25, 1965 Feb. 21, 1967	T,E, 75	Irr	Pumping level 94.80 ft at 2,000 gpm on July 19, 1955. Pump set at 140 ft. Texas Water Development Board observation well. Gravel packed. 2/ 3/ 4/
505	do	do	1954	720	12	--	28	19.42	Dec. 10, 1965	T,E 50	Irr	Gravel packed. 2/
* 506	W. W. Doss, Sr.	Leo Franzina	1966	115	4 2	21 115	32	12.67	Nov. 15, 1966	C,W	S	Open end completion. Estimated yield 6 gpm. Temp. 73°F. 1/
* 507	Wadsworth Water Supply Corp.	Layne Texas Co.	1967	720	9 7 5	500 650 720	30	40	Aug. 1, 1967	Sub,E	P	Screened from 660 to 710 ft. Pumping level 52 ft at 100 gpm on Aug. 1, 1967. Pump set at 110 ft. Well drilled to 753 ft and plugged back to 720 ft. Cemented from 650 ft up to 475 ft. Underreamed and gravel packed. 1/ 2/
* 601	L. J. Zernicek	do	1963	147	3	147	25	16.70	Dec. 8, 1966	C,W	S	Slotted from 139 to 147 ft. Estimated yield 6 gpm. Temp. 74°F. 1/
801	Leland Rogers	American Water Co.	1954	577	12	--	23	16.44	Feb. 21, 1967	N	N	Reported sanded. Texas Water Development Board observation well. Gravel packed. 2/ 4/

See footnotes at end of table.

WELL	OWNER	DRILLER	DATE COM-PLET-ED	DEPTH OF WELL (FT)	CASING: DIAM-ETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-09-802	S. A. Lawson	Henry Lane	1943	828	4 2	-- --	20	Flowed 24.25	Apr. 18, 1947 Sept.30, 1966	C,W	S	Well 234 in 1949 Matagorda County report. Estimated yield 5 gpm. Temp. 80°F.
* 803	do	do	1942	778	2 1	-- --	23	Flowed 28.21	Apr. 18, 1947 Sept.30, 1966	C,W	D,S	Well 233 in 1949 Matagorda County report. Estimated yield 6 gpm. Temp. 81°F.
901	Texas Gulf Sulphur Co.	Layne Texas Co.	1918	521	24	--	20	16.0 20.60	Sept.14, 1934 Mar. 30, 1965	C,W	S	Well 170 in 1949 Matagorda County report. Formerly supplied sulfur mine. 1/
* 902	do	do	1918	491	24 12	103 491	20	16.5 23.29	Sept.13, 1934 Mar. 31, 1965	T,E, 40	Irr	Slotted from 117-172, 360-391, 401-423, and 466-487 ft. Well collapsed. Believed producing from 117 to 172 ft interval. Used to fill duck pond. Well 172 in 1949 Matagorda County report. 1/
903	do	do	1927	515	16	--	16	--	--	N	N	Formerly supplied sulfur mine. Collapsed and plugged. Well 171 in 1949 Matagorda County report. 1/
* 904	do	do	1965	492	16 10	354 492	20	147.92	Mar. 16, 1967	T,E	Ind	Screened from 361-381, 392-410, and 460-482 ft. Pump set at 170 ft. Underreamed and gravel packed. Cemented from 354 ft to surface. 1/ 2/ 3/
* 905	do	do	1965	496	16 10	362 496	20	112.41	do	T,E, 40	Ind	Screened from 364-384, 389-404 and 461-491 ft. Pumping level 140.28 ft at 338 gpm on Mar. 16, 1967. Underreamed and gravel packed. Cemented from 362 ft to surface. 1/ 2/ 3/
* 906	do	B&P Drilling Contractors	1965	785	16 11	515 785	20	--	--	T,E	Ind	Slotted from 720 to 785 ft. Underreamed and gravel packed. Cemented from 515 to 200 ft. 2/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-09-907	Texas Gulf Sulphur Co.	B&P Drilling Contractors	1965	212	16 11	137 212	20	19.2 25.93	Mar. 29, 1965 Mar. 31, 1965	T,E, 40	Ind	Screened from 139 to 162 and 189 to 212 ft. Test hole drilled to 524 ft. Pump set at 100 ft. Underreamed and gravel packed. Cemented from 137 ft to surface. Measured yield 650 gpm on Mar. 29, 1965. 1/
* 908	Baer est.	Leo Franzina	1965	450	3 2	63 450	26	--	--	C,W	S	Screened from 434 to 450 ft. Estimated yield 6 gpm. Temp. 76°F. 1/
* 10-201	Hawkins est.	do	1942	568	2	568	15	--	--	C,W	S	Screened from 548 to 568 ft. Temp. 77°F.
202	do	--	old	107	24	--	25	20.06	Nov. 24, 1965	N	N	Formerly rice irrigation well. Abandoned.
* 203	do	Norman Franzina	1962	268	4 2	21 252	8	+ 0.81	Oct. 27, 1966	C,W	S	Screened from 252 to 268 ft. Temp. 76°F. 1/
* 204	do	do	1963	432	4 2	21 416	15	8.63	do	C,W	S	Screened from 416 to 432 ft. Estimated yield 4 gpm. Temp. 72°F. 1/
* 301	do	do	1963	451	4 2	21 451	10	10.52	do	C,W	S	Screened from 435 to 451 ft. Estimated yield 6 gpm. Temp. 76°F. 1/
* 601	do	do	1962	522	3 2	21 522	9	6.73	do	C,W	S	Screened from 506 to 522 ft. Estimated yield 6 gpm. Temp. 74°F.
* 901	Bay Stock Farms, Inc.	do	1965	296	4 2	-- 296	3	--	--	J,E, 1	P	Screened from 280 to 296 ft. Measured yield 6.4 gpm. Temp. 72°F. 3/
902	do	do	1965	296	4	--	3	Flowed 6.42	Dec. 2, 1965 Apr. 28, 1966	N	N	Abandoned. 3/
* 11-101	Hawkins est.	do	1963	600	4 2	23 600	11	+ 0.35	Oct. 27, 1966	C,W	S	Screened from 584 to 600 ft. Estimated yield 6 gpm. Temp. 72°F. 1/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-11-501	Baer est.	B&P Drilling Contractors	1966	433	4	433	11	--	--	J,A	N	Slotted from 390 to 433 ft. Supplied drilling rig. Reported yield 300 gpm. Temp. 76° F. 1/
* 601	Raleigh Sanborn	O. T. Davis & Sons	1961	525	4 2	21 525	4	4.21	Oct. 26, 1966	C,W	S	Screened from 517 to 525 ft. Estimated yield 6 gpm. Temp. 77°F. 1/
* 901	C. J. Downey	Pursley Drilling Co.	1964	527	4 3	495 527	3	Flowed	Sept.21, 1966	Sub,E	P	Screened from 495 to 527 ft. Pump set at 60 ft. Temp. 77°F.
* 12-101	J A Cattle Co.	Leo Franzina	1961	470	3 2	42 470	5	2.28	Oct. 26, 1966	C,W	S	Screened from 454 to 470 ft. Estimated yield 5 gpm. Temp. 74°F. 1/
401	Dr. Lyndon Bing	American Water Co.	1955	516	20 12	-- --	2	Flowed	Sept.21, 1966	T,N	N	Screened from 165-175, 197-216, 268-296, and 495-514 ft. Reported yield 2,400 gpm. Gravel packed. 1/ 2/
* 402	Raleigh Sanborn	O. T. Davis & Sons	1961	473	4 2	21 473	5	3.76	Oct. 26, 1966	C,W	S	Screened from 465 to 473 ft. Estimated yield 5 gpm. Temp. 75°F. 1/
* 501	J. A. Smith	Texas Water Wells	1956	796	20	796	2	8.77 + 2.0	Dec. 3, 1965 Oct. 26, 1966	T,G, 150	Irr	Slotted from 230-278, 485-495, and 748-788 ft. Gravel packed. Temp. 76°F.
* 502	J A Cattle Co.	Leo Franzina	1961	567	3 2	42 567	2	+ 0.23	Oct. 26, 1966	C,W	S	Screened from 551 to 567 ft. Estimated yield 5 gpm. Temp. 79°F. 1/
* 701	Matagorda Co. WCID No. 2	Layne Texas Co.	1962	197	7 5	159 197	3	Flowed	Apr. 16, 1962	Sub,E, 2	P	Screened from 161 to 191 ft. Pumping level 36 ft at 45 gpm on Apr. 16, 1962. Gravel packed. 1/ 3/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-12-702	Matagorda Co. WCID No. 2	W. A. Bighan	1966	542	4 3	220 542	3	0.0	Sept.21, 1966	Sub,E, 3	P	Screened from 522 to 542 ft. Estimated yield 60 gpm. Well deepened from 220 ft to 542 ft. Pump set at 126 ft. Temp. 79°F.
* 703	L. W. Saunders	Dodson & Bigham	1962	111	2	111	3	--	--	J,E, ¼	D	Screened from 105 to 111 ft. Estimated yield 6 gpm. Temp. 76°F.
* 17-201	R. R. Traylor	Leo Franzina	1963	398	3 2	21 382	10	--	--	C,W	S	Screened from 382 to 398 ft. Estimated yield 6 gpm. Temp. 80°F. 1/
301	Texas Gulf Sulphur Co.	--	1934	135	--	--	12	12.53 10.98 10.34	Apr. 7, 1959 May 2, 1960 Mar. 13, 1961	N	N	Formerly supplied old Texas Gulf Sulphur Camp. Abandoned.
* 302	do	Layne Texas Co.	1965	162	16 11	126 162	10	9.22	Mar. 30, 1965	T,E, 40	Ind	Screened from 134 to 162 ft. Pump set at 100 ft. Underreamed and gravel packed. Test hole drilled to 433 ft. 1/
* 303	do	B&P Drilling Contractors	1965	402	11	402	8	5	Apr. 22, 1965	T,E	Ind	Screened from 100 to 130 ft. Slotted from 130 to 161 and 378 to 400 ft. Reported yield 400 gpm. Pump set at 98 ft. Underreamed and gravel packed. 1/
* 401	U.S. Army Corps of Engineers	H&S Well Service	1964	682	4 2	149 682	17	--	--	Sub,E	D,S	Screened from 662 to 682 ft. Estimated yield 250 gpm. Temp. 78°F.
* 402	do	Henry Lane	1943	773	4	773	3	Flowed	June 11, 1943	T,E	P	Screened from 753 to 773 ft. Well 174 in 1949 Matagorda County report. Temp. 80°F. 1/
* 403	Matagorda Water Works	B. F. Powell	1914	710	6	--	5	+ 9.8 1.26	Aug. 11, 1934 Jan. 6, 1966	Sub,E	P	Stand-by well.
* 404	do	Leo Franzina	--	410	--	--	5	--	--	Sub,E	P	Temp. 78°F.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING DIAMETER (IN)	CASING DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*TA-81-17-405	Culver Development Co.	Leo Franzina	1964	472	6 4	200 472	5	2.48 4.16	Feb. 21, 1966 Sept.22, 1966	Sub,E	P	Screened from 450 to 472 ft. Estimated yield 100 gpm. Temp. 75°F.
* 25-101	do	B&P Drilling Contractors	1958	568	6 4	111 568	5	3.39	Dec. 14, 1965	J,E	P	Screened from 480 to 495 and 544 to 566 ft. Temp. 80°F. 1/
* 102	do	Leo Franzina	1963	565	6 4	197 565	6	--	--	Sub,E	P	Screened from 543 to 565 ft. Temp. 79°F. 1/
						Brazoria County						
BH-65-50-501	Humble Oil & Refining Co.	Layne Texas Co.	1953	770	16 9	520 770	52	--	--	T,E	Ind	Screened from 530-550, 570-600, 670-700, and 740-760 ft. Underreamed and gravel packed. 1/
502	do	do	1953	780	16 9	520 780	52	--	--	T,E	Ind	Screened from 525-535, 570-580, 590-610, 670-690, and 730-770 ft. Underreamed and gravel packed.
503	do	do	1953	150	14 9	109 150	52	28.70	May 28, 1966	T,E, 10	P	Screened from 120 to 140 ft. Underreamed and gravel packed. 1/
805	E. P. Duke	Crowell Drilling Co.	1966	238	20	238	45	25.52	Feb. 15, 1967	T,G, 100	Irr	Slotted from 89-143, 158-168, and 183-238 ft. Pump set at 100 ft. Gravel packed. 1/
806	Duke Brothers	Leonard Mickelson	1965	213	20	213	40	10.30	do	T,G	Irr	Slotted from 60 to 210 ft. Gravel packed. 1/
807	Peter Duke	do	1965	208	20	208	40	17.30	do	T,G	Irr	Slotted from 65 to 205 ft. Gravel packed. 1/
81-02-302	Dewey Boone	Johnson Brothers	1958	100	2	100	29	--	--	J,E	D,S	
303	do	Harry Gyme	1919	72	1	72	27	21.89	Oct. 21, 1965	N	N	Abandoned.

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COM-PLET-ED	DEPTH OF WELL (FT)	CASING		ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAM-ETER (IN)	DEPTH OF WELL (FT)		ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
							Calhoun County					
BW-80-22-502	B. W. Trull est.	Layne Texas Co.	1954	676	18 12	301 676	11	49.63	Jan. 14, 1966	T,--	Irr	Slotted from 321-341, [illegible], 431-461, 501-526, 546-571, 586-616, and 636-661 ft. Drilled to 916 ft and [illegible] back to 676 ft due to [illegible] salt content. Pump set at [illegible] ft. 1/
							Jackson County					
PP-80-06-101	M. W. Mauritz	-- Mickelson	1945	550	18 12	106 550	65	42.6 44.3 52.9	Mar. 24, 1960 Mar. 3, 1964 Feb. 23, 1967	T,Ng, 100	Irr	Slotted from 85 to 550 ft. Measured yields, 1,48[illegible] gpm on July 8, 1955 and 1,620 g[illegible] July 30, 1963. Temp. 74°F. [illegible]
* 102	W. N. Patman	George Burt	1959	364	16	364	58	66.5 52.3	Sept. 9, 1963 Mar. 3, 1964	T,Ng, 60	Irr	Slotted from 104-134, 154-[illegible], and 269-364 ft. Pumping level 97.4 ft at 1,690 gpm on Sept. 9, 1963. Pump set at 120 ft. Gravel packed. Temp. 73°F. 1/ 3/
104	do	--	--	215	24 10	50 215	58	74.7 50.7	July 30, 1963 Mar. 3, 1964	N	N	Slotted from 50 to 215 ft. Abandoned. 3/
407	Jay Anderson & Bros.	Katy Drilling Co.	1957	925	18 12	311 925	47	50.8	Mar. 23, 1964	T,Ng, 180	Irr	Slotted from 177 to 925 ft. 1/
* 703	A. H. Wadsworth, Sr.	Crowell Drilling Co.	1954	590	16 12	-- 590	37	45.4 67.07	Mar. 24, 1960 Feb. 23, 1967	T,Ng, 50	Irr	Slotted from 154 to 590 ft. Pumping level 147.59 ft at 1,450 gpm on July 8, 1955. Drilled to 608 ft and plugged back to 590 ft. Gravel packed. 2/ 3/
* 704	M. W. Mauritz & Son	do	1963	430	18 16 12	146 166 430	37	46.4	Mar. 3, 1964	T,Ng	Irr	Slotted from 146 to 430 ft. Pump set at 140 ft. Pumping level 129.63 ft at 1,500 gpm on Aug. 21, 1963. Gravel packed. Drilled to 637 ft and plugged back to 430 ft. 2/ 3/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING: DIAMETER (IN)	CASING: DEPTH OF WELL (FT)	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL: ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	WATER LEVEL: DATE OF MEASUREMENT	METHOD OF LIFT	USE OF WATER	REMARKS
*PP-80-14-101	A. A. Brown est.	Crowell Drilling Co.	1952	650	20 12	208 650	34	--	--	T,Ng, 50	Irr	Slotted from 208-270, 287-355, 375-419, and 473-650 ft. Temp. 74°F. 1/
* 403	Francitas Gas Co	Texas Water Supply Corp.	1941	386	20 10 8	20 156 386	24	--	--	T,Ng, 125	Ind	Screened from 313 to 384 ft. 1/
803	O. D. Kubecka	Leonard Mickelson	1947	504	18 12	166 504	24	40	1960	T,G, 150	Irr	Slotted from 218 to 504 ft. 1/
22-101	L. M. Olson	Henry Lane	1951	365	12	365	13	28.8	Sept. 5, 1963	C,W	S,Irr	Slotted from 280 to 360 ft. Estimated yield 600 gpm. 1/
* 401	Three Grains Corp.	Leonard Mickelson	1953	690	20 12	202 690	16	75.4 49.0 57.87	Sept. 5, 1963 Mar. 23, 1964 Jan. 14, 1966	T,G, 150	Irr	Slotted from 300-410, 480-530, and 560-590 ft. Pump set at 160 ft.
* 501	B. J. Wesselman	Crowell Drilling Co.	1959	370	12	370	16	40.8 47.3 53.39	Mar. 26, 1960 Mar. 23, 1964 Mar. 12, 1965	T,E, 30	Irr	Slotted from 288 to 370 ft. Pumping level 115.42 ft at 540 gpm on Sept. 5, 1963. Pump set at 120 ft. 1/ 3/
						Wharton County						
ZA-65-49-101	R. G. Herin, et. al.	Leonard Mickelson	1952	642	20 12	204 642	71	--	--	T,Ng	Irr	Slotted from 107-128, 140-144, 189-204, 216-229, 254-276, 289-317, 325-365, 374-483, and 495-639 ft. Estimated yield 2,100 gpm. Pump set at 170 ft. Gravel packed. 1/
301	A. K. King, Jr.	--	1956	214	16	214	67	28.83	Oct. 3, 1966	T,G, 100	Irr	Slotted from 160 to 166 and 200 to 214 ft. Underreamed and gravel packed.
402	R. G. Herlin, et. al.	Leonard Mickelson	1948	579	18 13	145 580	76	39.00	Mar. 22, 1966	T,Ng	Irr	Slotted from 70-120, 143-183, 206-216, 228-248, 258-304, 335-417, 457-485, 492-527, and 560-579 ft. Pump set at 170 ft. Gravel packed. 1/

See footnotes at end of table.

Table 7.--Records of Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	CASING		ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
					DIAMETER (IN)	DEPTH OF WELL (FT)		ABOVE (+) OR BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
ZA-66-62-904	R. B. Wallace	Leonard Mickelson	1955	574	20 16 12	200 316 574	72	45.4 53.17	Mar. 21, 1956 Mar. 3, 1964	T,Ng, 140	Irr	Slotted from 162-289, 352-452, 467-527, and 553-573 ft. Pumping level 126.6 ft at 1,430 gpm on July 18, 1955. Gravel packed. 3/
* 63-504	Shannon & Wolfe	do	1964	687	18 13	250 687	68	42.19	Feb. 27, 1967	T,G, 150	Irr	Slotted from 167-198, 208-214, 219-225, 240-246, 256-310, 324-331, 339-343, 361-405, 414-456, 461-581, and 591-682 ft. Pumping level 100.63 ft at 2,508 gpm on Mar. 15, 1967. Pump set at 150 ft. Gravel packed. Temp. 77°F. 1/ 3/
* 80-06-202	Kountz & Couch	--	1960	620	16 13	210 620	56	13.33	Feb. 10, 1966	T,Ng, 150	Irr	Slotted from 177-210, 225-245, 280-332, 365-450, and 510-620 ft. Pumping level 67.57 ft at 1,675 gpm on July 13, 1966. Gravel packed. Temp. 77°F. 3/

* For chemical analyses of water, see Table 10.
1/ For drillers' logs of wells, see Table 8.
2/ Electric logs in files of the Texas Water Development Board, Austin, Texas.
3/ For results of pumping tests, yields, and specific capacities of wells, see Table 2.
4/ For water-level measurements from observation wells, see Table 9.

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas

Matagorda County

Well TA-65-49-802

Owner: Sherrill est.
Driller: Edwin Guttenburger.

	THICKNESS (FEET)	DEPTH (FEET)
Topsoil	10	10
Red clay	15	25
Sand	5	30
Red clay	45	75
Sand and gravel	15	90

Well TA-65-49-901

Owner: Florida Gas Transmission Co.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Soil	3	3
Clay	65	68
Coarse sand and gravel	58	126
Gravel and clay streaks	64	190
Clay	100	290
Clay and clay streaks	7	297
Sand and gravel	22	319
Clay	14	333
Fine sand	24	357
Clay	26	383
Fine sand	6	389
Clay	2	391
Fine sand	15	406

Well TA-65-57-502

Owner: Skelly Oil Company.
Driller: Luther Patterson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil and clay	70	70
Sand	109	179
Shale	196	375
Fine sand	27	402
Shale	106	508
Sandy shale	20	528
Shale	20	548
Water sand, coarse	35	583
Shale	2	585

Well TA-65-57-701

Owner: Rowland Rugeley.
Driller: American Water Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	30	30
Sand	8	38
Clay	25	63
Sand	81	144
Clay	4	148

Well TA-65-57-702

Owner: Texas Real Estate.
Driller: H&S Water Well Service.

	THICKNESS (FEET)	DEPTH (FEET)
Surface	4	4
Clay	14	18
Sand	5	23
Clay	11	34
Sand	13	47
Clay	7	54
Sand	14	68
Sandy shale	24	92
Sand and gravel	37	129
Shale	94	223
Sand	15	238
Shale	16	254
Sand (fine)	28	282
Shale	16	298
Sand	58	356
Shale	21	377
Sand	20	397
Clay with hard streaks	75	472
Shale	41	513
Sand and gravel	40	553
Shale	72	625
Sand with shale streaks	15	640
Shale with sand streaks	90	730
Sandy shale	20	750

Well TA-65-57-801

Owner: G. M. Savage.
Driller: American Water Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface	10	10
Clay	55	65
Sand	150	215
Shale	50	265
Sand	40	305
Shale	95	400
Sand	45	445
Shale	25	470
Sand	30	500
Shale	10	510
Sand	17	527
Shale	3	530

Well TA-65-57-802

Owner: G. M. Savage.
Driller: American Water Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay	19	22
Sand	18	40
Shale	22	62
Sand	141	203
Shale	44	247
Sand	68	315

Well TA-65-57-901

Owner: Roselawn Memorial Park.
Driller: American Water Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	15	15
Sand	10	25
Clay	45	70
Sand	65	135

Well TA-65-57-902

Owner: Matagorda County WCID No. 6.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Top soil	4	4
Clay	12	16
Sand	2	18
Clay	26	44
Sand	12	56
Clay	11	67
Sand	24	91
Clay	23	114
Sand and gravel	15	129
Sandy clay	7	136
Sand and gravel	20	156
Clay	2	158
Sand, gravel and few clay streaks	28	186
Clay	4	190
Sand	49	239
Sandy clay	2	241
Sand	20	261
Sandy clay and clay	16	277
Sand rock	1	278
Clay and sandy streaks	45	323
Sand and gravel	25	398
Clay and sandy clay	24	372
Sand and gravel	9	381
Sandy clay and clay streaks	14	395
Sand	34	429
Clay and sandy clay	82	511
Sand	19	530
Clay	3	533
Sand	15	528
Clay	2	550

Well TA-65-58-103

Owner: Josey Ranch.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Sandy soil	3	3
Black dirt	4	7
Red clay	34	41
Clay	6	47
Sand	3	50
Clay	26	76
Sand and gravel	79	155
Sand	15	170
Clay	9	179

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-65-58-106		
Owner: Josey Ranch. Driller: Layne Texas Co.		
Black soil	2	2
Sand and clay	26	28
Clay	16	44
Shale	17	61
Clay	10	71
Sand	16	87
Clay	4	91
Sand and gravel, some clay streaks	49	140
Sand and gravel	10	150
Coarse-grained sand	31	181
Clay	4	185
Well TA-65-58-401		
Owner: F. V. Bouldin. Driller: Luther Patterson.		
Clay and sand	25	25
Sand	95	120
Shale	23	143
Sand	11	154
Shale	13	167
Sand	31	198
Shale	18	216
Sandy shale	24	240
Sand	43	283
Shale	59	342
Sand	36	378
Shale	4	382
Sand	16	398
Sandy shale	13	411
Sand	27	438
Shale	1	439

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-65-58-601		
Owner: Pan American Petroleum Corp. Driller: Coastal Water Well Corp.		
Clay	25	25
Clay	21	46
Fine sand	20	66
Gumbo	9	75
Coarse sand and gravel	12	87
Gumbo	23	110
Fine sand	17	127
Gumbo	5	132
Sand and gravel	22	154
Gravel	3	157
Well TA-65-58-803		
Owner: W. D. York. Driller: Leonard Mickelson.		
Soil and clay	87	87
Sand (coarse)	34	121
Clay	10	131
Sand	23	154
Clay	9	163
Sand	23	186
Clay	4	190
Sand	21	211
Clay	3	214
Well TA-65-58-804		
Owner: W. D. York. Driller: Leonard Mickelson.		
Soil and clay	50	50
Sand (coarse)	30	80
Clay	4	84
Sand	22	106
Clay	9	115
Sand	17	132
Clay	6	138
Gravel and sand	26	164
Clay	21	185
Sand	18	203
Clay	5	208

Well TA-65-58-805

Owner: W. D. York.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil and clay	46	46
Sand	29	75
Clay	6	81
Sandy gravel	26	107
Clay	8	115
Sand	17	132
Clay	14	146
Sand	27	173
Clay	14	187
Sand	23	210
Clay	4	214

Well TA-66-63-801

Owner: C. T. Blankenburg.
Driller: Crowell Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	16	16
Sand	24	40
Clay	52	92
Sand	16	108
Clay	16	124
Sand	8	132
Shale	82	214
Sand	22	236
Shale	39	275
Sand	6	281
Shale	7	288
Sand	24	312
Shale	4	316
Sand	16	332
Shale	62	394
Sandy shale	36	430
Sand	42	472
Shells	6	478
Sand	8	486
Shale	18	504
Sand	74	578

Well TA-66-63-802

Owner: E. F. Baca.
Driller: Katy Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Top soil and clay	30	30
Sand	5	35
Clay	22	57
Sand	4	61
Clay	13	74
Sand	21	95
Clay	30	125
Sand	19	144
Clay	113	257
Sand	10	267
Clay	83	350
Sand and small clay streaks	14	364
Clay	64	428
Sand	49	477
Clay	41	518
Sand and small clay streaks	39	557
Clay	26	583
Sand	12	595
Sand and small clay streaks	119	714
Clay	13	727
Sand	34	761
Clay	--	761

Well TA-66-63-903

Owner: H. E. Insall.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil and clay	24	24
Sand	43	67
Lime	6	73
Sand	37	110
Clay	5	115
Sand	6	121
Clay	42	163
Sand	11	174
Clay	12	186
Sand	13	199
Clay	4	203
Sand and clay layers	38	241

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-66-64-501		
Owner: D. K. Poole. Driller: American Water Co.		
Surface	8	8
Clay	7	15
Sand	15	30
Clay	54	84
Sand	91	175
Shale	20	195
Sand	15	210
Clay	18	228
Sand	27	255
Shale	40	295
Sand	20	315
Shale	5	320
Sand	18	338
Shale	10	348
Sand	32	380
Shale	32	412
Sand	28	440
Well TA-66-64-801		
Owner: Marathon Oil Co. Driller: Layne Texas Co.		
Soil	4	4
Clay	28	32
Sand and clay	30	62
Clay-broken	35	97
Sand	10	107
Clay	32	139
Sand	23	162
Blue and red clay	140	302
Clay	21	323
Sand	20	343
Shale	17	360
Sand	11	371
Shale	36	407
Sand and gravel	65	472
Shale	15	487
Sand and gravel	23	510
Shale	7	517
Sandy shale	5	522
Sand	34	556
Shale	32	588
Sand	17	605
Shale-broken	25	630
Sand	19	649
Shale and sand breaks	39	688
Well TA-66-64-802		
Owner: Marathon Oil Co. Driller: Layne Texas Co.		
Soil	5	5
Red clay	42	47
Sand-brown	45	92
Clay-broken	45	137
Sand	26	163
Clay	162	325
Sand and shells	23	348
Shale	48	396
Sand and gravel	51	447
Shale	22	469
Sand	10	479
Red and blue shale	16	495
Sand and shale breaks	37	532
Shale	10	542
Sand	16	558
Shale	27	585
Sand	16	601
Shale	6	607
Sand	20	627
Shale	6	633
Sand	13	646
Shale	6	652
Sand	19	671
Shale	43	714
Sand	55	769
Shale	12	781
Sand	38	819

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-66-64-802--Continued		
Sandy shale	16	835
Shale	3	838

Well TA-80-06-602

Owner: C. M. Hansen.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil clay	32	32
Sand	17	49
Clay	30	79
Sand	24	103
Shale	50	153
Sand	25	178
Clay and shale	36	214
Sand, rocky	3	217
Gumbo	19	263
Sand	27	263
Sand	33	588
Shale	17	605
Shale and gumbo	11	274
Sand, rocky	27	301
Gumbo and shale	65	366
Sand and shale	21	387
Sand	38	425
Gumbo	5	430
Sand	24	454
Gumbo	35	489
Sand, rocky	28	517
Shale	38	555
Sand	18	623

Well TA-80-06-604

Owner: Frank Gresham.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil and clay	35	35
Sand	20	55
Clay streaks	11	66
Sand	10	76
Clay	26	102
Sand	18	120
Clay	7	127
Sand	11	138
Clay	10	148
Sand streaks	7	155
Clay	13	168
Sand	10	178
Clay and sand	22	200
Sand	23	223
Sand with clay streaks	75	298
Clay	5	303
Coarse sand	46	349
Clay	13	362
Coarse sand	28	390
Sand and clay streaks	58	448
Clay	42	490
Sand	21	511
Clay	4	515
Sand	29	544
Clay	4	548
Sand	19	567
Clay	2	569
Sand	11	580
Clay	2	582
Rock, sand	61	643
Clay	20	663
Rocky sand	49	712

Well TA-80-06-605

Owner: Ray Hickey.
Driller: Praytor Drilling & Well Service Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay, red	9	9
Sand	4	13
Clay, gray	53	66
Sand	5	71

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-06-802		
Owner: H. H. Ray. Driller: American Water Co.		
Surface	5	5
Clay	45	50
Sand	45	95
Shale	50	145
Sand	20	165
Shale	35	200
Sand	30	230
Shale	20	250
Sand	25	275
Shale	43	318
Sand	24	342
Shale	11	353
Sand	34	387
Shale	8	395
Sand	80	475
Well TA-80-06-903		
Owner: B. W. Trull est. Driller: Layne-Bowler.		
Clay	74	74
Sand	39	113
Clay	149	262
Sand	59	321
Clay and gumbo	80	401
Gravel	20	421
Well TA-80-06-904		
Owner: Guy Stovall. Driller: Leonard Mickelson.		
Clay	14	14
Sand	3	17
Clay	21	38
Sand	16	54
Clay	7	61
Sand and shale	15	76
Sand	10	86
Shale and sand	21	107
Sand	31	138
Gumbo	49	187
Sand	23	210
Shale	13	223
Sand and shale	45	268
Sand	38	306
Shale	6	312
Sand	21	333
Shale	8	341
Sand	29	370
Shale	6	376
Sand	7	383
Sand and layers of clay	46	429
Shale	19	448
Sand	4	452
Shale and sand	17	469
Sand and lime rock	29	498
Shale, hard	23	521
Gumbo	18	539
Sand	3	542
Shale	18	560
Sand and lime layers	25	585
Shale and gumbo	45	630
Gumbo	18	648
Sand	41	689
Well TA-80-06-905		
Owner: R. J. Strnadel, Sr. Driller: Crowell Drilling Co.		
Clay	85	85
Sand	45	130
Shale	70	200
Sand	20	220
Shale	25	245
Sand	10	255
Shale	20	275
Sand	50	325
Shale	25	350
Sand	22	372
Shale	12	384

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-06-905--Continued		
Sand	18	402
Shale	44	446
Sand	34	480
Shale	32	512
Sand	28	540
Shale	14	559
Sand	18	572
Shale	10	582
Sand	14	596
Rock	4	600
Sand	62	662
Shale	14	676
Sand	24	700
Hard sand	14	714
Sand	8	722
Shale	23	745
Sand	35	780
Shale	3	783
Well TA-80-06-906		
Owner: Sun Oil Co. Driller: Luther Patterson.		
Surface	47	47
Sand	60	107
Shale	173	280
Sand	10	290
Shale	8	298
Gravel	22	320
Shale	2	322
Shale	67	389
Sand	21	410
Shale	81	491
Sand	15	506
Shale	58	564
Sand	7	571
Shale	20	591
Sand	2	593
Sand	74	667
Shale	19	686
Sand	8	694
Shale	8	702
Sand	24	726
Shale	18	744
Sand	22	766
Well TA-80-07-101		
Owner: Kountze & Couch. Driller: American Water Co.		
Surface soil	10	10
Sand	35	45
Shale	15	60
Sand	20	80
Shale	110	190
Sand	25	215
Shale	5	220
Sand	22	242
Shale	28	270
Sand	25	295
Sticky shale	33	328
Sand	12	340
Sticky shale	45	385
Sand	70	455
Shale	45	500
Sand	30	530
Sticky shale	15	545
Sand	40	585
Well TA-80-07-103		
Owner: L. W. Chappel. Driller: Layne Texas Co.		
Clay	200	200
Sand and gravel	70	270
Clay	20	290
Gravel	45	335
Clay	88	423
Sand and gravel	80	503
Clay	63	566
Sand and gravel	80	646
Clay	3	649

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-07-104		
Owner: Kountze & Couch. Driller: American Water Co.		
Surface soil	10	10
Sand	20	30
Shale	30	60
Sand	35	95
Sticky shale	90	185
Sand	30	215
Shale	10	225
Sand	25	250
Shale	20	270
Sand	30	300
Shale	10	310
Sand	15	325
Sticky shale	60	385
Shale	52	437
Sand	73	510
Shale	8	518
Sand	22	540
Sticky shale	15	555
Sand	79	634
Well TA-80-07-105		
Owner: F. E. Appling. Driller: Leonard Mickelson.		
Soil-clay	10	10
Sand	11	21
Clay	16	37
Sand	14	51
Clay	65	116
Sand	11	127
Clay	10	137
Sand	8	145
Clay	6	151
Sand	3	154
Clay	5	159
Sand	6	165
Clay	4	169
Sand	6	175
Sand and shale	17	193
Clay	9	201
Sand	13	214
Clay	8	222
Sand, rocky	39	261
Clay	13	274
Sand, rocky	28	302
Well TA-80-07-202		
Owner: E. F. Baca. Driller: Otto Mickelson.		
Surface soil	1	1
Clay	22	23
Sand	10	33
Clay and sand layers	21	54
Sand	19	73
Clay	9	82
Sand	18	100
Clay	5	105
Sand	36	141
Clay	40	181
Sand	29	210
Clay	26	236
Sand	7	243
Clay	39	282
Sand	10	292
Clay	7	299
Sand	41	340
Clay	10	350
Rocky sand	12	362
Sand	67	429
Clay	7	436
Rocky sand	29	465
Gumbo	36	501
Rocky sand	76	577
Lime rock	6	583
Rocky sand	5	588
Gumbo	14	602

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-07-203		
Owner: E. F. Baca. Driller: Leonard Mickelson.		
Soil and clay	20	20
Sand	50	78
Clay, rocky	22	100
Sand	13	113
Clay and shale	105	218
Sand	7	225
Sand and shale	15	240
Sand	7	247
Shale	8	255
Sand with rock layers	72	327
Shale, hard	18	345
Sand, rocky	107	452
Well TA-80-07-204		
Owner: H. E. Insall. Driller: Leonard Mickelson.		
Clay	21	21
Sand	25	46
Clay	20	66
Sand	20	86
Clay	14	100
Sand with clay layers	56	156
Sand and hard shale	123	279
Sand	74	353
Shale	6	359
Sand and shale	39	398
Sand	12	410
Shale and sand	30	440
Sand	5	445
Shale	27	472
Shale	4	476
Sand	19	495
Shale	3	498
Sand	31	529
Shale	6	535
Sand and lime rock	182	717
Shale	15	732
Sand	13	745
Sand with layers	44	780
Lime shale	15	804
Sand and lime	36	840
Well TA-80-07-205		
Owner: Fred Cornelius. Driller: Leonard Mickelson.		
Clay	13	13
Sand	4	17
Clay	38	55
Sand	4	59
Clay	11	70
Sand	13	83
Clay-rocky	24	107
Sand	7	114
Clay	20	134
Sand, rocky	3	137
Clay	80	217
Sand, rocky	44	261
Gumbo	18	279
Sand, rocky	11	290
Gumbo	6	296
Sand, rocky	37	333
Clay and lime sand	21	354
Sand	17	371
Clay	40	411
Sand	12	423
Shale	17	440
Sand, shale	69	509
Shale	19	528
Sand (shale)	25	553
Gumbo	19	572
Sand, shale	13	585
Boulders and sand	29	614
Gumbo	10	624
Sand, rocky	18	642
Gumbo	46	688
Sand	24	712
Gumbo	9	721

Well TA-80-07-206

Owner: George Walker.
Driller: Crowell Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	21	21
Sand	17	38
Clay	11	49
Sand	9	58
Clay	8	66
Sand	36	102
Hard	7	109
Sand, hard streaks	25	134
Shale	31	165
Sand	20	185
Shale	10	195
Sand	19	214
Shale	52	266
Sandy shale	34	300
Sand	30	330
Broken sand	14	344
Sand	46	390
Shale	14	404

Well TA-80-07-207

Owner: Bill Merta.
Driller: J. A. Johnson Water Well Service.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	30	30
Sand	22	52

Well TA-80-07-301

Owner: Berkley Russell estate.
Driller: Crowell Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	16	16
Sand	54	70
Clay	42	112
Sand	29	141
Sand-clay	44	185
Sand	100	285
Sand, hard	29	314
Shale	12	326
Sand-gravel	47	373

Well TA-80-07-402

Owner: C. C. Mehrens.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil-clay	23	23
Shale	8	31
Sand	28	59
Shale, sticky	47	106
Sand	21	127
Shale-sand	85	212
Sand	25	237
Shale, sticky-hard	47	284
Sand, rocky	80	364
Sand, rocky	22	506
Sand-shale	21	527
Sand, rocky	46	573
Shale	13	586
Sand, rocky	39	625
Shale	14	639
Sand, rocky	22	661
Shale, sticky	15	676
Sand, rocky	119	795
Shale	5	369
Sand	6	375
Shale	21	396
Sand	6	402
Shale	17	419
Sand	20	439
Shale	7	446
Sand	23	469
Shale	15	484
Shale	4	799
Sand, rocky	14	813
Shale-lime	36	849
Rock, sand	18	867
Sand-shale	15	882
Sand	36	918
Sand-shale	21	939
Sand	21	960

Well TA-80-07-409

Owner: R. J. Strnadel.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil-clay	89	89
Sand	16	105
Clay	6	111
Sand	33	144
Clay	10	154
Sand	9	163
Clay	31	194
Sand	10	204
Clay	51	255
Sand	10	265
Clay	5	270
Rocky sand	17	287
Clay	8	295
Rocky sand	29	324
Gravel	42	366
Clay	18	384
Sand	6	390
Clay	15	405
Sticky shale	41	446
Rocky sand	94	540
Rock	6	546
Sand, rocky	38	584
Clay	10	594
Rocky sand	20	614
Clay	6	620
Sand	15	635
Clay	30	665
Sand	6	671
Clay	5	676
Sand	20	696
Clay	10	706
Rocky sand	51	757
Clay	2	759

Well TA-80-07-410

Owner: V. M. Brhlik.
Driller: Guy Conner & Son.

	THICKNESS (FEET)	DEPTH (FEET)
Surface clay	10	10
Clay and caliche	10	20
Clay	10	40
Clay, caliche and sand	10	50
Sand	8	58
Clay	2	60
Clay, caliche and sand	10	70
Sand and caliche	10	80
Sand	4	84
White clay	6	90
Clay	6	96
Sand	16	112

Well TA-80-07-411

Owner: V. O. Hale.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Old depth	58	58
Clay	19	77
Sand	5	82
Clay	52	134

Well TA-80-07-501

Owner: H. E. Insall.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil and clay	78	78
Clay and shale	8	86
Sand	17	103
Clay	6	109
Sand	10	119
Clay	11	130
Sand	8	138
Clay and sand	78	216
Sand	15	231
Shale and sand	21	252
Sand	42	294
Shale, hard	9	303
Sand	36	339
Shale	12	351

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-07-501--Continued		
Sand and shale	10	370
Shale	42	412
Sand and shale	10	422
Sand	398	820
Well TA-80-07-502		
Owner: Charles Nemec, Sr. Driller: J. A. Johnson Water Well Service.		
Clay	30	30
Fine sand and gravel streaks	30	54
Well TA-80-07-701		
Owner: J. E. Cornett. Driller: Dodson Water Well Service.		
Clay	35	35
Sand and gravel	15	50
Well TA-80-07-802		
Owner: L. M. Pierce. Driller: B&P Drilling Contractors.		
Surface soil	3	3
Sandy clay	27	30
Sand	17	47
Clay	33	80
Sand	8	88
Sandy clay	1	89
Sand	23	112
Well TA-80-07-902		
Owner: Tidehaven Independent School Dist. Driller: American Water Co.		
Surface	10	10
Surface sand	10	20
Shale	135	155
Sand	15	170
Shale	70	240
Sand	85	325
Shale	75	400
Sand	35	435
Shale	40	475
Sand	30	505
Shale	170	675
Coarse sand	60	735

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-07-903		
Owner: Tidehaven Independent School Dist. Driller: B&P Drilling Contractors.		
Surface soil	4	4
Clay	10	14
Sand	7	21
Clay	49	70
Sand	6	76
Clay	79	155
Hard sand and lime	4	159
Clay	27	186
Sand	3	189
Sandy clay	60	249
Sand	23	272
Clay	1	273
Well TA-80-08-102		
Owner: Simon Cornelius. Driller: Katy Drilling Co.		
Top soil	110	110
Clay	12	122
Sand gravel	8	130
Clay	8	138
Sand	2	140
Clay	8	148
Sand	5	153
Clay	34	187
Sand	7	194
Clay	74	268
Sand and clay breaks	16	284
Clay	19	303
Clay, tough	27	330
Lime rock with clay breaks	15	345
Clay	14	359
Sand	16	375
Clay	37	412
Sand, rocky	70	432
Clay	9	441
Sand and clay	29	470
Sand	11	481

Well TA-80-08-102--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Clay	5	486
Sand	7	493
Clay	5	498
Sand	10	508
Clay and sand strips	10	518
Sand	26	544
Clay	10	554
Sand and shale	7	561
Clay	16	577
Sand with lime	21	598
Shale, sandy	17	615
Sand, rocky	7	622
Clay and shale	33	655
Sand	12	667
Clay	11	678
Sand and lime rock	82	760
Clay	9	769
Sand	3	772
Clay	32	804
Sand	17	821
Clay and sand strips	16	837

Well TA-80-08-201

Owner: Markham Municipal Utilities Dist.
Driller: Texas Water Wells.

	THICKNESS (FEET)	DEPTH (FEET)
Surface	6	6
Clay	9	15
Sand	10	25
Sandy shale	25	50
Hard shale	20	70
Sand	10	80
Shale	140	360
Sand	4	364
Shale	46	410
Sandy shale	38	448
Sand	5	453
Shale	14	467
Sand	11	478
Shale	45	125
Sand and shale breaks	10	135
Shale	15	150
Sand	45	195
Shale	10	205
Sand	15	220
Shale	32	510
Sand	8	518
Shale	6	524
Sand	52	576
Shale	82	658
Sand	25	683
Shale	20	703

Well TA-80-08-202

Owner: W. D. Cornelius.
Driller: Katy Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	210	210
Clay, sand breaks	15	225
Sand, clay breaks, rocky	20	245
Clay, with short sand breaks	35	280
Clay, tough	30	310
Sand	5	315
Clay, tough	8	323
Sand, rocky	34	357
Clay	18	325
Sand and lime rock	14	389
Clay with sand breaks	20	409
Clay, tough	49	458
Sand, rocky	28	486
Clay	16	502
Sand with lime rock	11	513
Clay, tough	8	521
Sand with lime rock	4	525
Clay, tough	27	552
Sand, rocky	26	578
Clay and sand strips	30	608
Sand, rocky	7	615
Clay	23	638
Sand, rocky and hard	8	646
Sand and clay strips	29	675

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-08-202--Continued		
Sand, rocky	35	710
Clay	20	730
Sand	9	739
Clay and lime rocks	5	744
Sand, hard rock	17	761
Clay and sand strips	21	782

Well TA-80-08-302

Owner: Lower Colorado River Authority.
Driller: H&S Water Well Service.

	THICKNESS (FEET)	DEPTH (FEET)
Shale	70	70
Sand	20	90
Shale	13	103
Sand	15	118
Shale	31	149
Sand	9	158
Sandy shale	143	301
Sand	62	363
Shale	7	370
Sand	10	380
Shale	30	410
Sand	16	426
Shale	10	436
Sand	34	470
Shale	60	530
Sand	40	570
Shale	6	576
Sand	59	635
Shale	47	682
Sand	25	707
Streaks of sand and shale	48	755

Well TA-80-08-501

Owner: Joe Senkyrik.
Driller: American Water Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface	8	8
Clay	17	25
Sand	31	56
Clay	102	158
Sand	32	190
Shale	128	318
Sand	16	334
Shale	53	387
Sand	79	466
Shale	59	525
Sand	30	555
Shale	15	570
Sand	44	614

Well TA-80-14-302

Owner: R. H. Rhodes est.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	4	4
Clay	3	7
Sand	10	17
Clay	30	47
Sand	4	51
Clay	167	218
Sand	25	243
Clay	1	244

Well TA-80-14-603

Owner: J. W. Gresham.
Driller: Crowell Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	100	100
Sand	23	123
Clay	9	132
Sand	7	139
Shell	36	175
Sand	25	200
Shale	40	240
Sand	28	268
Shale	14	282
Sand and shell	48	330
Shale	15	345
Hard sand	27	372
Hard	12	384
Shale	48	432
Sand	28	460
Shale	10	470
Hard sand	20	490

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-14-603--Continued		
Shale	15	505
Hard sand	45	550
Shale, hard	25	575
Sand	21	596
Shale	7	603
Sand	13	616
Shale	14	630
Sand, hard	24	654
Shale, hard	14	668
Sand	19	687
Shale	9	696
Well TA-80-14-606		
Owner: Farmer's Canal Co. Driller: Layne Texas Co.		
Surface soil	4	4
Sand clay	15	19
Clay	90	109
Sand	40	149
Shale and sandy shale	72	221
Hard shale	4	225
Sandy shale	10	235
Clay	17	252
Coarse sand	23	275
Hard sand	4	279
Sandy shale	6	285
Sand, shale and lime	17	302
Shale	25	327
Sand and gravel	56	383
Sand and lime	12	395
Coarse sand, lime and shale	16	411
Sand	8	419
Coarse sand and lime	12	431
Shale	7	438
Sand with lime streaks	9	447
Shale and sand	8	455
Sand, shale and lime	10	465
Hard sand	11	476
Shale	3	479
Sand and gravel	23	502
Sand and gravel	40	542
Hard shale	7	549
Sand	7	556
Hard and sticky shale	20	576
Sand and gravel	35	611
Shale	35	646
Sand (broken)	5	651
Shale	18	669
Sand	13	682
Shale	15	697
Sand	11	708
Shale and sandy shale	34	742
Sand	15	757
Sand and lime	23	780
Sand rock	3	783
Sand and lime	14	797
Shale	10	807
Sand	8	815
Sand and lime	12	827
Hard shale and lime	15	842
Sand	17	859
Sandy shale	21	880
Hard and sticky shale	21	901
Sand	19	920
Sticky shale	10	930
Sandy shale	5	935
Sand	26	961
Shale	4	965
Sand	24	989
Shale (tough)	16	1,005
Well TA-80-14-608		
Owner: B. W. Trull est. Driller: Layne Texas Co.		
Surface soil	4	4
Clay and sand clay	26	30
Clay and sandy clay streaks	152	182

Well TA-80-14-608--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Sand	12	194
Shale	11	205
Sand, broken	12	217
Sand	50	267
Sand, broken	13	280
Sand	22	302
Clay	23	325
Sandy shale	14	339
Sand	48	387
Sandy shale	27	414
Sand	33	447
Sand	26	473
Shale	5	478
Sand	17	495
Sandy shale	13	508
Sand	6	514
Sand	15	529
Clay	24	553
Sandy clay-broken	51	604
Clay	10	614
Sand and broken sandy clay	16	630
Clay	14	644
Clay and sandy clay	19	663
Sand and streaks of sandy clay	32	695
Clay and streaks of sandy clay	49	744
Sand and sandy clay	35	779
Clay	21	800
Sand	5	805
Hard sand and shale	25	830
Sand	15	845
Sand-broken	30	875
Shale and sandy shale	89	964
Sand	24	988
Shale and sandy shale	12	1,000

Well TA-80-14-801

Owner: Oswald Kubecka.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	42	42
Clay, rocky	5	47
Clay	36	83
Sand	17	100
Clay	96	196
Sand	24	220
Clay	17	237
Sand, rocky	23	260
Clay	23	283
Sand	13	296
Clay	7	303
Sand	46	349
Clay	14	363
Sand	46	409
Clay	7	416
Sand, rocky	21	437
Clay	15	452
Lime-shale	26	478
Lime, shale and sand	49	527
Sand and lime	32	559
Lime-shale and layers of sand	70	629
Rock and gravel	31	660
Lime gumbo	10	670
Lime-shale and sand	46	716

Well TA-80-14-802

Owner: J. A. Derrick.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	6	6
Clay	77	83
Sand and clay streaks	12	95
Clay	45	140
Sand and lime	2	142
Clay	96	238
Sand and clay	5	243
Sand	13	256
Sandy clay	6	262

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-14-802--Continued		
Sand	2	264
Clay	39	303
Sand	8	311
Clay	9	320
Sand	15	335
Sandy clay	3	338
Clay	8	346
Sand	15	361
Clay	6	367
Sand	32	367
Clay	104	503
Sandy clay	5	508
Sand	5	513
Clay	2	515
Sand	11	526
Sand and clay	2	528
Sand	18	546
Clay	21	567
Well TA-80-15-101		
Owner: Matagorda County WCID No. 5. Driller: Luther Patterson.		
Surface clay	23	23
Shale	7	30
Sand	18	48
Sand and shale	32	80
Shale	36	116
Sand	14	130
Shale	15	145
Sand	11	156
Shale	159	315
Sand	19	334
Shale	92	426
Sand	30	456
Shale	21	477
Sand	17	494
Shale	8	502
Sand	22	524
Shale	10	534
Sand	19	553
Shale	31	584
Sand	30	614
Shale	1	615
Well TA-80-15-102		
Owner: Matagorda County WCID No. 5. Driller: B&P Drilling Contractors		
Surface soil	4	4
Clay	2	6
Clay, sand and lime	10	16
Sand	2	18
Clay	21	39
Sand	29	68
Clay, sandy	3	71
Sand	4	75
Sand and clay	4	79
Sand and lime	5	84
Clay	18	102
Sand	10	112
Clay	37	149
Sand	5	154
Clay	80	234
Sand	2	236
Clay	32	268
Sand	9	277
Clay	18	295
Sand	4	299
Clay	4	303
Sand	49	352
Clay	30	382
Sand	4	386
Clay	38	424
Sand	35	459
Clay	19	478
Sand	11	489
Clay	10	499
Sand	6	505

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-15-102--Continued		
Sand	20	525
Clay	11	536
Sand	19	555
Clay	8	563
Sand and clay	7	570
Sand	8	578
Clay	1	579
Sand	15	594
Sand and clay	3	597
Sand	38	635
Clay	10	645

Well TA-80-15-105

Owner: J. L. Sullivan.
Driller: Dodson Water Well Service.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	20	20
Clay and fine sand	20	40
Sand and gravel	20	60

Well TA-80-15-106

Owner: Farmer's Canal Co.
Driller: Crowell Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	32	32
Sand	18	50
Clay	60	110
Sandy shale	36	146
Shale	148	294
Sand	31	325
Sand, broken	43	368
Shale	177	545
Sand	20	565
Shale	20	585
Sand	27	612
Shale	33	645
Sand	15	660
Shale	12	672
Sand	32	704
Shale	36	740
Sand	15	755
Shale	57	812
Sand	16	828
Hard sand	21	849
Sand	16	865
Shale	30	895
Sand	15	910
Shale	10	920
Shale and sand streaks	65	985
Sand	70	1,055
Shale, tough	54	1,109

Well TA-80-15-201

Owner: Farmer's Canal Co.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay and sandy clay	88	91
Sand	10	101
Clay	20	121
Sand	15	136
Clay and sandy clay	54	190
Sand	15	205
Sandy clay	25	230
Clay	12	242
Sandy shale and clay	22	264
Sticky shale	16	280
Hard, sticky shale	60	340
Sandy shale	5	345
Sand and gravel	13	358
Sandy shale	5	363
Sand and gravel	43	406
Hard, sticky shale	34	440
Hard, sandy shale	25	465
Hard, sticky shale	30	495
Sandy shale	5	500
Sand	36	536
Sticky shale	15	551
Sandy shale	23	574
Shale and sandy shale	29	603
Sand	20	623
Shale and sandy shale	36	659

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-15-201--Continued		
Hard shale	6	665
Sand	39	704
Shale	11	715
Sand	21	736
Sandy shale	10	746
Hard sandy shale	37	783
Sandy shale	10	793
Sand	17	810
Sandy shale	12	822
Sand	13	835
Hard shale	8	843
Sandy shale	12	855
Sand	12	867
Hard sandy shale	31	898
Well TA-80-15-401		
Owner: Farmer's Canal Co. Driller: Layne Texas Co.		
Top soil and clay	116	116
Sand	30	146
Shale	84	230
Sand	26	256
Shale	41	297
Sand breaks and sandy shale	10	307
Shale and sandy shale	189	496
Sand	12	508
Shale and sand breaks	28	536
Sand	19	555
Shale	26	581
Sand	35	616
Shale	5	621
Sand	12	633
Hard shale	61	694
Sand	31	725
Shale	6	731
Sand	21	752
Shale	20	772
Sand	22	794
Shale	42	836
Sand	26	862
Shale	5	867
Sand	15	882
Shale	3	885
Sand and layer of lime	12	897
Hard shale and streaks of sand	40	937
Sand	18	955
Hard shale	8	963
Sand	18	981
Hard shale and streaks of sand	15	996
Sand	49	1,045
Shale	6	1,051
Well TA-80-15-402		
Owner: Texas Eastern Transmission Co. Driller: Layne Texas Co.		
Top soil	2	2
Clay and sandy clay	82	84
Sand	8	92
Clay	43	135
Sand, fine and clay	22	157
Clay and sandy clay	85	242
Sand	18	260
Sand, coarse, fine gravel with clay streaks	39	299
Clay, blue	29	328
Clay, sticky	92	420
Well TA-80-15-403		
Owner: Edward Keprta. Driller: B&P Drilling Contractors		
Surface soil	4	4
Clay	5	9
Sand	3	12
Clay	6	18
Sand	19	37
Sandy clay	4	41
Sand	1	42
Sandy clay	6	48
Sand	10	58
Clay	1	59

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-15-901		
Owner: A. T. Bohuslav. Driller: Praytor Drilling & Well Service.		
Red clay	12	12
Sand, white	8	20
Clay, gray	5	25
Sand, white	13	38
Well TA-80-16-101		
Owner: Dan Curry. Driller: B&P Drilling Contractors		
Surface soil	3	3
Clay	4	7
Sand	2	9
Clay	3	12
Sand	2	14
Clay	3	17
Hard sand	1	18
Clay	15	33
Sand	11	44
Clay	1	45
Sand	1	46
Clay	37	83
Sand	8	91
Clay	2	93
Well TA-80-16-201		
Owner: Buckeye Ranch. Driller: Redd's Water Well Service.		
Clay	30	30
Fine sand	10	40
Clay	44	84
Sand and gravel	16	100
Well TA-80-16-301		
Owner: Celanese Chemical Co. Driller: Layne Texas Co.		
Surface soil	6	6
Red clay	68	74
Gray clay	49	123
Sand and clay breaks	20	143
Clay and sand streaks	11	154
Clay and sandy clay	21	175
Sand	9	184
Sandy clay and clay streaks	15	199
Sand and clay layers	16	215
Shale and sandy shale	96	311
Sand	25	336
Sticky shale	39	375
Sand	16	391
Sandy shale	4	395
Shale	5	400
Sand and streaks of shale	41	441
Shale	9	450
Sand	8	458
Shale	116	574
Sand	6	580
Shale	11	591
Sand and sandy shale	15	606
Sand, broken	44	650
Sandy shale and streaks of sand	52	702
Shale	32	734
Sand	15	749
Shale	28	777
Sand	23	800
Shale	7	807
Sand	11	818
Sandy shale	5	823
Well TA-80-16-302		
Owner: Big Three Welding Equipment Co. Driller: Layne Texas Co.		
Surface soil	31	31
Clay	17	48
Sand	13	61
Clay and sandy clay	50	111
Sand	6	117
Clay and sandy clay	43	160
Clay	23	183
Sand	12	195
Shale	22	217
Sand, lignite and shale	20	237

Well TA-80-16-302--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Shale	5	242
Sand and shells	10	252
Shale	31	283
Sandy shale and sand streaks	43	326
Sand	7	333
Shale	31	364
Sand and sandy shale	26	390
Shale	34	424
Sand and sandy shale	21	445
Shale and sandy shale	87	532
Sand	13	545
Shale	23	567
Sand	5	573
Shale	16	589
Shale and sandy shale	13	602
Sand	15	617
Shale	2	619
Sand	26	645
Sand	26	671
Sand and sandy shale	71	742
Sand	9	751
Sand and streaks of shale	34	785
Sand and streaks of shale	44	829
Shale	5	834

Well TA-80-16-303

Owner: Buckeye Ranch.
Driller: Redd's Water Well Service.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	30	30
Fine sand	10	40
Clay	40	80
Sand and gravel	18	98

Well TA-80-23-102

Owner: City of Palacios.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Soil	2	2
Clay	116	118
Sand	6	124
Clay	13	137
Sand	5	142
Sticky shale	75	217
Shale	36	253
Shell	7	260
Shale	25	285
Fine brown sand	25	310
Shale	11	321
Sand	7	328
Shale	198	526
Coarse sand	55	581
Shale	13	594
Sand	6	600
Sandy shale and streaks of sand	20	620
Shale	34	654

Well TA-80-23-201

Owner: M. D. Whitely.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	4	4
Clay	5	9
Sand	5	14
Clay	6	20
Sand	6	26
Sandy clay	21	47
Sand	5	52

Well TA-80-23-302

Owner: John Carrick.
Driller: Norman Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface	3	3
Clay	57	60
Sand	8	68
Clay	117	185
Sand	5	190
Sandy shale	115	305
Clay	6	311
Sand and gravel	20	331

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-23-402		
Owner: City of Palacios. Driller: Layne Texas Co.		
Clay	7	7
Sand	8	15
Clay	44	59
Sand	7	66
Clay	109	175
Sand	7	182
Clay	40	222
Sandy clay	24	246
Sand	12	258
Clay	48	306
Sand	12	318
Shale	24	342
Sand	3	345
Clay	14	359
Sand	14	373
Shale	3	376
Sand	38	414
Shale	31	445
Sand	7	452
Shale	28	480
Sand	6	486
Shale	60	546
Water sand	42	588
Shale	19	607
Well TA-80-23-403		
Owner: City of Palacios. Driller: Layne Texas Co.		
Soil	1	1
Clay	14	15
Sand	4	19
Sandy clay	24	43
Sand	8	51
Clay	55	106
Sandy clay	20	126
Clay and caliche	30	156
Sandy clay	16	172
Sand, clay and caliche	44	216
Soft shale	29	245
Shale and layers of shell	23	268
Shale	18	286
Tough shale	7	293
Shale	11	304
Sand	12	316
Shale and streaks of shell	43	359
Sand	21	380
Shale	63	443
Shale and layers of sand	17	460
Shale and layers of shell	21	481
Shale	30	511
Hard shale	25	536
Sand	33	569
Shale	3	572
Sand	6	578
Shale	12	590
Well TA-80-23-404		
Owner: Lamesa Corp. Driller: Layne Texas Co.		
Soil and clay	15	15
Sand	5	20
Red clay	28	48
Sand	5	53
Clay	70	123
Sand	21	144
Clay	20	164
Fine grained red sand	5	169
Soft clay	37	206
Clay streaks, shale and shell	70	276
Sand	24	300
Clay	33	333
Shells and clay	31	364
Clay	13	377
Sand	5	382
Clay and shell	66	448
Sand	5	453

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-23-404--Continued		
Sticky clay	72	525
Fine grained hard sand	44	569
Sticky clay	5	574
Well TA-80-23-405		
Owner: Lamesa Corp. Driller: Texas Water Supply Corp.		
Sand	12	12
Clay	28	40
Sand	16	56
Clay	40	96
Hard sand	44	140
Shale	15	155
Hard sand	5	160
Shale	85	245
Sand	58	303
Shale	67	370
Shale and sand streaks	5	375
Sticky clay	63	438
Sand	8	446
Shale	88	534
Sand	7	541
Shale and sand streaks	4	545
Hard fine grained sand	5	550
Sticky shale	30	580
Sand	24	604
Sticky shale	26	630
Sand	20	650
Sticky shale	44	694
Sand	23	717
Well TA-80-23-502		
Owner: M. A. Guillot. Driller: Norman Franzina.		
Surface soil	3	3
Clay	81	84
Lime and red powder sand	20	104
Sandy shale and clay	161	265
Powdery sand	14	279
Clay	65	344
Shell	6	350
Clay	193	543
Sand and gravel	40	583
Well TA-80-24-202		
Owner: John Merck. Driller: Norman Franzina.		
Surface soil	3	3
Clay	17	20
Fine sand	8	28
Clay	132	160
Fine sand	4	164
Clay	86	250
Fine sand	23	273
Clay	57	330
Fine sand	81	411
Well TA-80-24-701		
Owner: R. E. Smith. Driller: Leo Franzina.		
Surface soil	3	3
Clay	15	18
Sand	6	24
Shale and shell	196	220
Sticky shale	105	325
Sand and gravel	30	355
Well TA-80-38-301		
Owner: Matagorda-Hilton Club. Driller: B&P Drilling Contractors		
Shell	1	1
Clay	63	64
Clay	18	82
Sand	31	113
Clay	132	250
Sand	6	256
Clay	90	346
Sand	3	349
Sandy clay	3	352
Sand	3	355
Sandy clay	5	360
Sand	5	365

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-80-38-301--Continued		
Sandy clay	16	381
Sand	8	392
Sandy clay	5	397
Fine sand	3	400
Sandy clay	11	411
Sand	2	413
Sandy clay	1	414
Sand	5	419
Sandy clay	11	430
Sand	2	432
Sandy clay	47	479
Sand and clay	5	489
Sand	17	501
Clay	3	504

Well TA-81-01-101

Owner: City of Bay City.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay and sandy clay	107	107
Sand and gravel	39	146
Tough shale	181	327
Sand	12	339
Shale	17	356
Sand	47	403
Shale	19	422
Sand and thin shale streaks	28	450
Shale and sandy shale	96	546
Sand	36	582
Shale	14	596
Sand and few shale breaks	100	696
Shale	7	703
Sand	20	723
Shale and streaks of sand	20	743
Sand	13	756
Shale	8	764

Well TA-81-01-102

Owner: City of Bay City.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Top soil	114	114
Sand and gravel	31	145
Tough clay	205	350
Sandy shale	36	386
Shale and streaks of sand	13	399
Sand and gravel	49	448
Shale	6	454
Coarse sand	13	467
Hard shale and sandy shale	98	565
Sand	15	580
Shale	20	600
Sand	52	652
Hard sand and shale breaks	48	700
Coarse sand	28	728
Hard shale and sandy shale	19	747
Sand	16	763
Shale	7	770
Sand	23	793
Tough shale	19	812
Sand	24	836
Shale	10	846
Sand	47	893
Shale	7	900
Sand and breaks of shale and lime	124	1,024
Hard sandy shale	12	1,036

Well TA-81-01-103

Owner: City of Bay City.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Soil and clay	13	13
Sand and clay	126	139
Clay	133	272
Sandy clay and clay	51	323
Shale	20	343
Sand and clay breaks	10	353
Shale	39	392

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-01-103--Continued		
Sand and shale streaks	37	429
Shale	8	437
Sand with shale breaks	33	470
Shale	26	496
Sand and shale breaks	53	549
Shale	24	573
Fine sharp sand	10	583
Blue mixed shale	36	619
Sharp sand	44	663
Shale	9	672
Sand and shale breaks	36	708
Shale	17	725
Sand	20	745
Shale	9	754
Sand and shale breaks	31	785
Shale and sand streaks	21	806
Gravel, layers sand	15	812
Shale	10	822
Coarse sand and gravel	25	847
Shale	10	857
Fine sand and hard lime	45	902
Shale, clay, layers lime	98	1,000

Well TA-81-01-104

Owner: City of Bay City.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	15	15
Sand	92	107
Shale and clay	20	127
Gravel	15	142
Clay and gravel	45	187
Clay	60	247
Sandy clay	45	292
Clay, layers sand	104	396
Sand, shale breaks	43	439
Shale	3	442
Sandy shale	89	531
Shale	20	551
Sandy shale	23	574
Fine hard sand	12	586
Shale, blue	25	611
Shale	16	627
Sharp sand, fine gravel	135	762
Shale	11	773
Sand, gravel, few lime shells	24	797

Well TA-81-01-402

Owner: G. P. Kilbride.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	4	4
Clay	8	12
Sand	2	14
Clay	29	43
Sand	2	45
Clay	48	93
Sandy clay and lime	11	104
Sand	61	165
Clay	14	179
Sand	20	199
Sand	3	202
Sand	4	206
Clay	180	386
Sand	56	442
Clay	1	443

Well TA-81-01-502

Owner: A. B. Vaughn, Jr.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	4	4
Clay	5	9
Sand	37	46
Clay	2	48
Sand	24	72
Sandy clay	8	80
Sandy lime	4	84
Sandy clay	42	126
Sand	4	130
Sandy clay	2	132
Sand (fine)	11	143
Sand	27	170
Sandy clay	80	250

Well TA-81-01-601

Owner: Coastal States Gas Producing Co.
Driller: H&S Water Well Service.

	THICKNESS (FEET)	DEPTH (FEET)
Soil	2	2
Red clay	55	57
Sand and gravel	29	86
Clay with streaks sand	90	176
Clay	6	182
Sand and gravel	10	192
Clay	26	218
Sand and gravel	38	256
Blue clay	199	455
Sand and gravel	19	474
Clay	130	604
Sand and gravel	56	660
Clay	5	665

Well TA-81-01-602

Owner: Coastal States Gas Producing Co.
Driller: H&S Water Well Service.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay with streaks sand	51	54
Sandy clay with sand streaks	12	66
Sand with shale breaks	52	118
Shale	3	121
Sand and gravel	67	188
Shale	26	214
Sandy clay with streaks sand	11	225
Sand and gravel	18	243
Blue shale	97	340
Sand	11	351
Red and blue shale	105	456
Sand	10	466
Shale	6	472
Sand	11	483
Red and blue shale	138	621
Sand and gravel	30	651
Red and blue shale	18	669
Sand	14	683
Red and blue shale	26	709
Sand	15	724
Sandy shale	26	750
Sand	27	777
Sandy shale	12	789
Sand	12	801
Sand and sandy shale	12	813
Sand with shale	39	852
Hard streaks	2	854
Sand	14	868
Sand with streaks sandy shale	18	886
Shale	43	929
Sandy shale with streaks sand	4	933
Sand	15	948
Shale	15	963
Sand	44	1,007

Well TA-81-01-801

Owner: Harry Burkhart.
Driller: American Water Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	10	10
Clay	35	45
Fine sand	30	75
Clay	71	146
Coarse sand	54	200

Well TA-81-01-803

Owner: D&D Vacuum Service, Inc.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	4	4
Clay	13	17
Sand	14	31
Sand clay	9	40
Sand	15	55
Clay	84	139
Sand	19	158

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-02-502		
Owner: Hansen Farms. Driller: Norman Franzina.		
Surface	3	3
Clay	27	30
Fine sand	5	35
Clay	15	50
Sand and gravel	27	77
Well TA-81-02-602		
Owner: Nilson Farms. Driller: Redd's Water Well Service.		
Clay	63	63
Gravel, heavy	10	73
Clay	31	104
Gravel, fine	12	116
Clay	36	152
Heavy sand, fine gravel	11	163
Well TA-81-02-901		
Owner: Hawkins estate. Driller: Norman Franzina.		
Surface soil	3	3
Clay	57	60
Fine sand	60	120
Clay	154	274
Sand and gravel	20	294
Well TA-81-03-401		
Owner: George Ratliff. Driller: S. O. Burford.		
Black surface soil	4	4
Clay	13	17
Surface sand	2	19
Clay	40	59
Fine sand	2	61
Clay and shale	40	101
Sand and gravel	16	117
Well TA-81-03-501		
Owner: D. L. Gibbs. Driller: American Water Co.		
Surface soil	10	10
Clay	18	28
Sand	12	40
Shale	52	92
Sand	16	108
Shale	22	130
Sand	102	232
Well TA-81-03-502		
Owner: J. A. Butter. Driller: Leo Franzina.		
Surface	3	3
Clay	12	15
Sand	20	35
Clay	95	130
Sand and gravel	20	150
Well TA-81-03-701		
Owner: C. B. Hamill. Driller: Luther Patterson.		
Surface material	24	24
Shale	74	98
Sand	41	139
Shale	33	172
Sand	51	223
Shale	11	234
Sand	10	244
Shale	180	424
Sand	21	445
Shale	47	492
Sand	25	517
Shale	193	710
Sand	19	729
Shale	2	731
Well TA-81-09-201		
Owner: Atchison, Topeka and Santa Fe Railway Co. Driller: J. W. Powell.		
Clay	16	16
Sand	7	23
Clay	29	52
Sand	15	67
Clay	2	69
Sand	10	79

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-09-201--Continued		
Clay	29	108
Sand	16	124
Blue clay	12	136
Coarse-grained sand	11	147
Blue clay	17	164
Fine-grained sand	15	179
Clay	10	189
Fine-grained sand	6	195
Clay	24	219
Coarse-grained sand	39	258
Clay	55	313
Fine-grained sand	19	332
Gumbo	49	381
Fine-grained sand	13	394
Gumbo	13	407
Coarse-grained sand	26	433
Blue clay	91	524
Water sand	33	557
Well TA-81-09-202		
Owner: Selkirk Ranch. Driller: Layne Texas Co.		
Surface soil	2	2
Clay	16	18
Sand and clay	7	25
Sand and hard layers	13	38
Clay	47	85
Clay and sand streaks	21	106
Clay	44	150
Clay and sand streaks	80	230
Sand, gravel and streaks of clay	39	269
Blue shale	12	281
Sandy shale	23	304
Sand	10	314
Sandy shale and shale	14	328
Shale and sandy shale	45	373
Sandy shale and shale	41	414
Sandy shale and sand	15	429
Shale and sandy shale	71	500
Sand, gravel and sand streaks	41	541
Shale and sand streaks	18	559
Sand	5	564
Shale and sand streaks	28	592
Shale	11	603
Well TA-81-09-502		
Owner: M. C. White. Driller: Layne Texas Co.		
Top soil and clay	8	8
Sand	38	46
Sandy clay	30	76
Sand, gravel and shale breaks	74	150
Clay and sand streaks	75	225
Sand and gravel	46	271
Clay and sand breaks	30	301
Clay	30	331
Sand	20	351
Sandy shale and sand streaks	66	417
Sandy shale and sand streaks	28	445
Sand and gravel	57	502
Well TA-81-09-506		
Owner: W. W. Doss, Sr. Driller: Leo Franzina.		
Surface soil	3	3
Clay	42	45
Sandy shale	51	96
Sand and gravel	19	115
Well TA-81-09-507		
Owner: Wadsworth Water Supply Corp. Driller: Layne Texas Co.		
Clay	8	8
Sand	22	30
Clay	2	32
Sand	8	40
Clay	6	46
Sand	26	72
Sandy clay	13	85
Sand and gravel	27	112

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-09-507--Continued		
Clay	4	116
Sand and gravel	27	143
Clay	6	149
Sand and gravel	74	223
Sand (coarse)	42	265
Clay	4	269
Sand	14	283
Sandy clay	14	297
Sand and clay streaks	15	312
Sand	23	335
Clay	5	340
Sand	15	355
Clay	4	359
Sand	4	363
Sand and sandy clay	11	374
Sand	9	383
Sandy clay	8	391
Sand	39	430
Clay	12	442
Sand	4	446
Sandy clay	14	460
Sand	11	471
Sandy clay	11	482
Sand and clay streaks	22	504
Sand	65	569
Shale	12	581
Shale (blue)	30	611
Sandy shale	19	630
Shale	4	634
Sand and gravel	76	710
Shale	22	732
Sand and few shale streaks	21	753

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-09-601		
Owner: L. J. Zernicek. Driller: Texas Co.		
Surface soil	3	3
Clay	15	18
Yellow clay	54	72
Shale, lime and sand	53	125
Sand	22	147
Well TA-81-09-901		
Owner: Texas Gulf Sulphur Co. Driller: Layne Texas Co.		
Clay	11	11
Sand	31	42
Clay	35	77
Coarse-grained sand	73	150
Coarse grained white sand	10	160
Clay	52	212
Coarse-grained sand	10	222
Gumbo	181	403
Fine grained gray sand	15	418
Gumbo	4	422
Fine-grained sand	21	443
Gumbo	78	521
Well TA-81-09-902		
Owner: Texas Gulf Sulphur Co. Driller: Layne Texas Co.		
Clay	19	19
Sand	15	34
Clay	5	39
Red sand	16	55
Clay	8	63
Red sand	35	98
Clay	16	114
Coarse-grained sand	57	171
Gumbo	186	357
Sand and gravel	34	391
Gumbo	11	402
Sand and shale	20	422
Gumbo	43	465
Hard sand	26	491

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-09-903		
Owner: Texas Gulf Sulphur Co. Driller: Layne Texas Co.		
Soil and clay	9	9
Sand	27	36
Clay	28	64
Sand	34	98
Clay	40	138
Sand and gravel	26	164
Clay	28	192
Sand	18	210
Gumbo	88	298
Shale	10	308
Gumbo	23	331
Shale	27	358
Gumbo and shale	43	401
Sandy shale	15	416
Gumbo	45	461
Shale	8	469
Sand	36	505
Gumbo	10	515
Well TA-81-09-904		
Owner: Texas Gulf Sulphur Co. Driller: Layne Texas Co.		
Top soil	2	2
Clay	10	12
Sand	33	45
Clay	8	53
Sand	27	80
Clay	5	85
Sand	14	99
Clay	15	114
Sand	54	168
Clay and sandy clay	86	254
Sand and sandy clay	14	268
Clay, shell and sandy clay	87	355
Sand	66	421
Clay and shell	38	459
Coarse sand	24	483
Clay	12	495
Sand and sandy shale	19	514
Shale	11	525
Well TA-81-09-905		
Owner: Texas Gulf Sulphur Co. Driller: Layne Texas Co.		
Top soil	2	2
Clay	12	14
Red sand	31	45
Clay and sandy clay	45	90
Clay	50	140
Coarse Sand	25	165
Clay	31	196
Fine sand	6	202
Clay	47	249
Clay	109	358
Sand	53	411
Clay	51	462
Sand	31	493
Clay	12	505
Well TA-81-09-907		
Owner: Texas Gulf Sulphur Co. Driller: B&P Drilling Contractors		
Top soil	2	2
Clay	13	15
Sand	28	43
Clay	15	58
Sand	28	86
Clay and sandy clay	12	98
Clay and sandy clay	41	139
Sand	23	162
Clay	27	189
Sand	23	212
Clay	116	328
Sandy shale	41	369
Sand	15	384
Clay	13	397
Sand	14	411
Clay, shell and sand streaks	26	437

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-09-907--Continued		
Sandy clay	16	453
Sand	6	459
Sandy clay and shell	19	478
Sandy clay and sand	15	493
Clay and sandy clay streaks	31	524

Well TA-81-09-908

Owner: Baer est.
Driller: Leo Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay	27	30
Sticky shale	138	168
Fine sand	12	180
Shale	140	320
Hard, stickv shale	102	422
Sand and shell	28	450

Well TA-81-10-201

Owner: Hawkins est.
Driller: Leo Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay	15	18
Sand	17	35
Clay	13	48
Sand	12	60
Clay	60	120
Sand	20	140
Shale	60	200
Sand	19	219
Shale	55	274
Sandy shale	17	291
Shale	44	335
Sand and shell	17	352
Shale	42	394
Sand	19	413
Shale	17	430
Lime rock	1	431
Shale	5	436
Sticky shale	96	532
Sand	36	568

Well TA-81-10-203

Owner: Hawkins est.
Driller: Norman Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface	3	3
Clay	42	45
Fine sand and gravel	115	160
Clay	82	242
Sand and gravel	26	268

Well TA-81-10-204

Owner: Hawkins est.
Driller: Norman Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay	112	115
Fine sand	32	147
Clay	258	405
Sand and gravel	27	432

Well TA-81-10-301

Owner: Hawkins est.
Driller: Norman Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay	82	85
Sand and gravel	125	210
Clay	210	420
Sand	31	451

Well TA-81-11-101

Owner: Hawkins est.
Driller: Norman Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay	117	120
Fine sand	10	130
Clay	245	375
Fine sandy shale and lime	20	395
Clay	185	580
Sand	20	600

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-11-501		
Owner: Baer est. Driller: B&P Drilling Contractors		
Surface soil	4	4
Clay	103	107
Sand	9	116
Clay	7	123
Sand and clay	42	165
Clay	36	201
Fine sand	84	285
Sand	32	317
Fine sand	26	343
Sandy clay	38	381
Fine sand	5	386
Sand	47	433
Well TA-81-11-601		
Owner: Raleigh Sanborn. Driller: O. T. Davis & Sons.		
Clay	0	50
Broken formation sand, gravel, and shale	75	125
Blue shale, sand rock, broken formation	165	290
Broken sand	20	310
Blue shale	185	495
Water sand and gravel	30	525
Well TA-81-12-101		
Owner: J A Cattle Co. Driller: Leo Franzina.		
Surface soil	3	3
Clay	17	20
Sand	5	25
Clay	65	90
Sand, shale, shell	130	220
Sticky clay	220	440
Sand and shell	30	470
Well TA-81-12-401		
Owner: Dr. Lyndon Bing. Driller: American Water Co.		
Surface clay and sand	25	25
Shale	40	65
Sand	25	90
Shale	68	158
Sand	4	162
Sand	14	176
Shale	9	185
Sand	32	217
Shale	45	262
Sand	39	301
Shale	183	484
Sand	31	515
Shale	1	516
Well TA-81-12-502		
Owner: J A Cattle Co. Driller: Leo Franzina.		
Surface soil	3	3
Clay	13	16
Salt sand	5	21
Shale and shell	207	228
Sticky shale	292	520
Shell	20	540
Sand	27	567
Well TA-81-12-701		
Owner: Matagorda County WCID No. 2. Driller: Layne Texas Co.		
Clay	55	55
Sand	54	109
Clay	22	131
Sand	101	232
Sandy clay	22	254
Sand and clay streaks	8	262
Sand	8	270
Well TA-81-17-201		
Owner: R. R. Traylor. Driller: Leo Franzina.		
Surface soil	3	3
Clay	9	12
Sand	6	18
Clay	97	115
Fine sand	11	126

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-17-201--Continued		
Sticky shale	105	231
Shale and shell	42	273
Sticky shale and shell	42	315
Blue shale	55	370
Sand and shell	28	398

Well TA-81-17-302

Owner: Texas Gulf Sulphur Co.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	2	2
Clay	7	9
Red sand	33	42
Clay	38	80
Sand	5	85
Clay	9	94
Sand	9	103
Clay	31	134
Sand	28	162
Shale	224	386
Sand and shell	13	399
Clay	8	407
Sandy clay	26	433

Well TA-81-17-303

Owner: Texas Gulf Sulphur Co.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	2	2
Clay	2	4
Sand	26	30
Hard sand	1	31
Sand	6	37
Clay	50	87
Sand	20	107
Fine sand	15	122
Sand	13	135
Clay	3	138
Sand	12	150
Clay	109	259
Sand and clay	8	267
Clay	112	379
Sand and shell	1	380
Sandy clay	1	381
Sand	1	382
Clay	1	383
Fine sand	17	400
Sandy clay	7	407

Well TA-81-17-402

Owner: U.S. Army Corps of Engineers
Driller: Henry Lane

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	12	12
Sand	23	35
Blue shale	51	86
Sand	19	105
Shale	58	163
Shale and sand	22	185
Sticky shale	75	260
Sand	21	281
Shale	68	349
Sand	26	375
Sticky shale	75	450
Sand	52	502
Sticky shale	96	598
Sand and shale	42	640
Sand	20	660
Shale	78	738
Sand	35	773

Well TA-81-25-101

Owner: Culver Development Co.
Driller: B&P Drilling Contractors

	THICKNESS (FEET)	DEPTH (FEET)
Sand and shell	24	24
Sandy clay	6	30
Clay	9	39
Sand and shell	5	44
Clay	4	48
Sand	4	52
Sandy clay	5	57
Sand and shell	4	61
Clay	43	104
Sand and shell	45	149

	THICKNESS (FEET)	DEPTH (FEET)
Well TA-81-25-101--Continued		
Clay	66	215
Sand	12	227
Clay	20	247
Sand	6	253
Clay	45	298
Sand	8	306
Sandy clay	124	430
Fine sand	66	496
Sandy clay	4	500
Fine sand	6	506
Sandy clay	35	541
Fine sand	25	566
Clay	2	568

Well TA-81-25-102

Owner: Culver Development Co.
Driller: Leo Franzina.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	3	3
Clay	17	20
Sand	15	35
Shale and lime	85	120
Sand	11	131
Shale and shell	87	218
Sticky shale	82	300
Sand	14	314
Shale and shell	131	445
Sand	16	461
Hard shale	78	539
Sand	27	566

Brazoria County

Well BH-65-50-501

Owner: Humble Oil & Refining Co.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Top soil	4	4
Sandy clay	10	14
Sand	32	46
Clay and sand streaks	57	103
Sand and fine gravel	52	155
Red clay	38	193
Sand	47	240
Clay and sand streaks	69	309
Sandy clay	17	329
Sand	21	347
Shale, sandy shale, lime, and gravel	120	467
Sand	25	492
Shale	5	497
Sticky shale	13	510
Sandy shale	8	518
Sand	33	551
Hard sandy shale	5	556
Sandy shale	11	567
Sand	34	601
Sand with shale layers	36	637
Sand	13	650
Hard shale	18	668
Sand	41	709
Sandy shale	11	720
Sand and shale	13	733
Sand	37	770

Well BH-65-50-503

Owner: Humble Oil & Refining Co.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Top soil	4	4
Clay and sandy clay	12	16
Sand and sandy clay	36	52
Clay	50	102
Sandy clay	7	109
Sand and fine gravel	41	150

Well BH-65-50-805

Owner: E. P. Duke.
Driller: Crowell Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	50	50
Sand	11	61
Clay	23	84
Sand	59	143
Clay	20	163
Sand	5	168

	THICKNESS (FEET)	DEPTH (FEET)
Well BH-65-50-805--Continued		
Clay	15	183
Sand	5	188
Clay	8	196
Sand	42	238
Shell	22	260

Well BH-65-50-806

Owner: Duke Brothers.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil, clay	54	54
Sand, gravel	86	140
Clay	30	170
Gravel	12	182
Clay	15	197
Sand	9	206
Clay	5	211

Well BH-65-50-807

Owner: Peter Duke.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Soil, clay	65	65
Sand	4	69
Gravel	40	109
Clay	5	114
Gravel	18	132
Clay	24	156
Gravel	2	158
Clay	13	171
Gravel, clay	7	178
Clay	17	195
Gravel	10	205
Clay	4	209

Calhoun County

Well BW-80-22-502

Owner: B. W. Trull est.
Driller: Layne Texas Co.

	THICKNESS (FEET)	DEPTH (FEET)
Soil	3	3
Clay	31	34
Caliche and clay	12	46
Sandy shale	23	69
Shale	41	110
Sandy shale	10	120
Sand and sandy shale	30	150
Shale, sandy shale, and shell	38	188
Shale, sticky shale	29	217
Sandy shale	15	232
Sticky shale	86	318
Sand with shale breaks	48	366
Hard shale	8	374
Sandy shale	7	381
Sand	11	392
Hard shale	14	406
Sandy shale	20	426
Sand	41	467
Sand and sandy shale	10	477
Sticky shale	20	497
Sand	8	505
Sandy shale	5	510
Sand	18	528
Shale	14	542
Sand with shale layers	31	573
Shale	6	579
Sandy shale	5	584
Sand	34	618
Shale	12	630
Sandy shale	5	635
Sand and gravel	29	664
Shale and sandy shale	34	698
Sandy shale	13	711
Sand	35	746
Shale and sandy shale	20	766
Sticky shale	19	785
Hard sand	15	800
Sandy shale	7	807
Sand	8	815
Sand shale	7	822
Sand, broken	29	851
Sandy shale	9	860
Sand	14	874

	THICKNESS (FEET)	DEPTH (FEET)
Well BW-80-22-502--Continued		
Hard sandy shale	6	880
Sand	25	905
Shale	11	916
Jackson County		
Well PP-80-06-102		
Owner: W. N. Patman. Driller: George Burt.		
Surface	3	3
Clay	8	11
Sand	3	14
Clay	34	48
Sand, lime	34	82
Clay	19	101
Sand, gravel	25	126
Clay	31	157
Sand	25	182
Formation, broken	9	191
Sand and gravel	25	216
Clay and lime streaks	13	229
Formation, broken	42	271
Sand	15	286
Clay	30	316
Sand	5	321
Clay	10	331
Sand	10	341
Clay	2	343
Sand	18	361
Clay	3	364
Well PP-80-06-407		
Owner: Jay Anderson & Bros. Driller: Katy Drilling Co.		
Top soil	100	100
Sand	17	117
Clay	27	144
Sand	8	152
Clay	25	177
Sand	14	191
Clay	114	305
Sand	15	320
Clay	50	370
Sand	40	410
Clay	90	500
Sand	65	565
Clay	15	580
Sand	13	593
Clay	23	616
Sand	21	637
Clay	18	655
Sand and rock	33	688
Clay	12	700
Rock, hard	2	702
Sand and rock	34	736
Sand and clay strips	24	760
Sand	31	791
Clay	13	804
Sand, clay bottom	121	925
Well PP-80-14-101		
Owner: A. A. Brown est. Driller: Crowell Drilling Co.		
No record	155	155
Sand, streaks	25	180
Sand	25	205
Clay	3	208
Sand	42	250
Clay	55	305
Sand	10	315
Clay	3	318
Sand	24	342
Clay	33	375
Shell and sand	35	410
Clay	80	490
Gravel, streaks	40	530
Sand	18	548
Sand, hard streaks	22	570
Clay	20	590
Gravel, white ball	60	650

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

Well PP-80-14-403

Owner: Francitas Gas Co.
Driller: Texas Water Supply Corp.

	THICKNESS (FEET)	DEPTH (FEET)
Surface clay	51	51
Shale, sandy	6	57
Shale	26	83
Sand	15	98
Shale, sticky	57	155
Sand	21	176
Shale, sticky	80	256
Sand	22	278
Shale, sticky	35	313
Sand	21	334
Shale	9	343
Sand	41	384
Shale	2	386

Well PP-80-14-803

Owner: O. D. Kubecka.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	31	31
Shale, hard	15	46
Clay	64	110
Sand	27	137
Clay, hard	42	179
Sand	4	183
Clay	9	192
Sand	13	205
Clay	31	236
Gravel and sand	68	304
Clay	13	317
Gravel and sand	35	352
Gumbo	8	360
Sand and gravel	75	435
Shale and sand	36	471
Rock and sand	33	504

Well PP-30-22-101

Owner: L. M. Olson.
Driller: Henry Lane.

	THICKNESS (FEET)	DEPTH (FEET)
Surface soil	5	5
Shale	25	30
Shale, sandy	20	50
Sand and rock	10	60
Sand	38	98
Shale	22	120
Shale, sandy	20	140
Shale	15	155
Sand	30	185
Shale	13	198
Sand	10	208
Shale	32	240
Shale, sandy	40	280
Sand	50	330
Shale, sandy	10	340
Sand	20	360
Shale	5	365

Well PP-80-22-501

Owner: B. J. Wesselman.
Driller: Crowell Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	103	103
Sand	9	112
Clay	18	130
Sand streaks	18	148
Clay	54	202
Shells	12	214
Clay	96	310
Sand	28	338
Clay	3	341
Sand	29	370

Wharton County

Well ZA-65-49-101

Owner: R. G. Herlin, et. al.
Driller: Leonard Mickelson.

	THICKNESS (FEET)	DEPTH (FEET)
Clay	12	12
Sand	54	66
Gravel	37	103

	THICKNESS (FEET)	DEPTH (FEET)
Well ZA-65-49-101--Continued		
Clay	4	107
Sand and gravel	21	128
Clay	12	140
Sand	4	144
Clay	45	189
Sand	15	204
Gumbo	12	216
Sand	13	229
Gumbo	26	255
Sand	22	277
Gumbo	13	290
Sand, rocky	29	319
Gumbo	8	327
Sand, rocky	39	366
Shale	8	374
Clay, layers of sand	20	394
Sand	6	400
Clay, layers of sand	34	434
Sand and shale	10	444
Sand, rocky	41	485
Clay	11	496
Sand, rocky	142	638
Well ZA-65-49-402		
Owner: R. G. Herlin, et. al. Driller: Leonard Mickelson.		
Clay	11	11
Sand, pack	23	34
Clay	20	54
Sand	67	121
Clay, layers of sand	62	183
Gumbo, red	20	203
Clay layers of sand	13	216
Gumbo, red	12	228
Sand, rocky	20	248
Gumbo	8	256
Sand, rocky	48	304
Clay	27	331
Shale, sand	24	355
Rocky sand	12	367
Clay, layers of sand	33	400
Sand, rocky	17	417
Gumbo	39	456
Layers shale and sand	19	475
Sand	10	485
Gumbo	7	492
Gravel	35	527
Gumbo	33	560
Rocky sand	19	579
Rock	5	584
Rocky clay	17	601
Rock	2	603
Well ZA-66-63-504		
Owner: Shannon & Wolfe. Driller: Leonard Mickelson.		
Soil and clay	27	27
Sand	48	75
Clay	5	80
Sand (gravel)	31	111
Clay	16	127
Sand	20	147
Clay	7	154
Sand	6	160
Clay	7	167
Sand	31	198
Clay	10	208
Sand	7	215
Clay	5	220
Sand	6	226
Clay	15	241
Sand	6	247
Clay	10	257
Sand	54	311
Clay	14	325
Sand	7	332
Clay	8	340

Table 8.--Drillers' Logs of Wells in Matagorda County and Adjacent Areas--Continued

	THICKNESS (FEET)	DEPTH (FEET)
Well ZA-66-63-504--Continued		
Sand	4	344
Clay	17	361
Sand and shale	17	378
Rocky sand	28	406
Clay	8	414
Rocky sand	42	456
Clay	5	461
Rocky sand, wood cuttings	120	581
Clay	10	591
Sand	21	612
Rock	6	618
Sand	5	623
Rock	6	629
Rocky sand	15	644
Rock	6	650
Rocky sand	32	682

Table 9.--Water Levels in Selected Wells in Matagorda County

Well TA-65-58-110

Owner: Josey Ranch

DATE		WATER LEVEL
Apr.	9, 1951	12.34
Mar.	28, 1952	16.32
Mar.	18, 1953	13.96
May	6, 1960	23.15
Mar.	15, 1961	19.60
Feb.	26, 1963	24.11
Feb.	6, 1964	26.65
Mar.	25, 1965	28.19
Feb.	21, 1966	22.21
Mar.	31, 1966	21.18
Apr.	29, 1966	20.83
May	27, 1966	19.92
June	30, 1966	19.65
Sept.	1, 1966	20.26
Sept.	29, 1966	20.47
Nov.	1, 1966	20.55
Dec.	3, 1966	20.54
Jan.	3, 1967	20.67
Feb.	27, 1967	21.07

Well TA-65-58-401

Owner: F. V. Bouldin

DATE		WATER LEVEL
July	9, 1948	9
Aug.	17, 1965	25.94
Feb.	21, 1966	25.30
Mar.	31, 1966	25.10
May	27, 1966	24.78
June	30, 1966	25.23
Sept.	1, 1966	26.79
Sept	29, 1966	27.37
Nov.	1, 1966	27.31
Dec.	3, 1966	27.10
Jan.	3, 1967	26.83

Well TA-65-58-601

Owner: Pan American Petroleum Corp.

DATE		WATER LEVEL
	1956	38
Mar.	25, 1965	29.28
Aug.	18, 1965	35.08
Feb.	21, 1966	27.55
Mar.	31, 1966	28.82
Apr.	29, 1966	29.84
May	27, 1966	29.36
June	30, 1966	28.16
Sept.	1, 1966	30.32
Sept.	29, 1966	29.49
Nov.	1, 1966	28.97
Dec.	3, 1966	28.13
Jan.	3, 1967	29.89
Feb.	21, 1967	29.36

Well TA-66-63-801

Owner: C. T. Blankenburg

DATE		WATER LEVEL
Jan.	25, 1966	39.41
Mar.	31, 1966	28.17
Apr.	29, 1966	25.32
May	27, 1966	23.49
June	30, 1966	27.13
Sept.	1, 1966	26.70
Nov.	1, 1966	25.36
Dec.	3, 1966	23.90
Jan.	3, 1967	22.99

Well TA-66-63-901

Owner: A. H. Johnson
(Recorder Well, recorder installed Feb. 23, 1967)

DATE		WATER LEVEL
May	12, 1960	40.73
Mar.	24, 1965	45.84
Feb.	22, 1966	49.69
Feb.	23, 1967	49.35
Feb.	25, 1967	48.79
Feb.	28, 1967	48.56
Mar.	5, 1967	48.47
Mar.	10, 1967	49.40
Mar.	15, 1967	55.28
Mar.	20, 1967	57.08
Mar.	25, 1967	56.12
Mar.	31, 1967	55.94
Apr.	5, 1967	60.79
Apr.	10, 1967	62.26
Apr.	20, 1967	62.48
Apr.	25, 1967	69.60
Apr.	30, 1967	75.97
May	5, 1967	80.69
May	10, 1967	82.81
May	15, 1967	86.22
May	20, 1967	89.72
May	25, 1967	92.02
May	31, 1967	95.28
June	30, 1967	100.72
July	5, 1967	100.11
July	10, 1967	100.42
July	15, 1967	99.30
July	20, 1967	96.65
July	25, 1967	94.68
July	31, 1967	95.99
Aug.	5, 1967	100.03
Aug.	10, 1967	102.80
Aug.	15, 1967	102.66
Aug.	20, 1967	101.63
Aug.	25, 1967	98.48
Aug.	31, 1967	95.53
Sept.	5, 1967	96.38
Sept.	10, 1967	96.73
Sept.	15, 1967	94.93
Sept.	20, 1967	93.22
Oct.	25, 1967	80.01
Oct.	31, 1967	78.43
Nov.	5, 1967	76.95
Nov.	10, 1967	75.22
Nov.	15, 1967	73.69

DATE	WATER LEVEL
Well TA-66-63-901--Continued	
Nov. 19, 1967	72.69
Dec. 11, 1967	67.56
Well TA-66-64-401	
Owner: Ramon Rooth	
Feb. 15, 1955	50.00
Feb. 4, 1966	52.88
Feb. 22, 1966	51.47
May 18, 1966	55.15
Feb. 21, 1967	51.91
Well TA-80-06-601	
Owner: B. W. Trull est.	
Mar. 24, 1965	61.58
Jan. 14, 1966	72.09
Feb. 23, 1966	64.16
Mar. 31, 1966	77.00
Apr. 29, 1966	85.00
May 27, 1966	89.59
Sept. 1, 1966	102.99
Nov. 1, 1966	94.11
Dec. 3, 1966	81.30
Jan. 3, 1967	74.00
Feb. 21, 1967	64.08
Well TA-80-06-903	
Owner: B. W. Trull est.	
Apr. 21, 1943	11.40
Apr. 5, 1951	17.32
Mar. 27, 1952	18.30
Mar. 19, 1953	20.23
Mar. 24, 1954	23.27
Mar. 22, 1956	25.60
Mar. 28, 1957	27.65
Apr. 3, 1958	26.58
Apr. 6, 1959	21.13
Mar. 21, 1960	17.34
Mar. 14, 1961	13.33
Feb. 26, 1963	11.99
Feb. 7, 1964	17.08
Mar. 24, 1965	8.16
Feb. 23, 1966	9.65
Feb. 22, 1967	6.20
Well TA-80-07-102	
Owner: Kountz & Couch	
Mar. 27, 1952	25.05
Mar. 18, 1953	30.69
Mar. 24, 1954	37.62
Mar. 22, 1956	37.91
Apr. 3, 1958	37.98
Apr. 6, 1959	39.74
Mar. 21, 1960	39.92
Mar. 21, 1961	38.77
Mar. 28, 1962	41.81
Feb. 26, 1963	47.51
Feb. 7, 1964	54.93
Mar. 24, 1965	51.74
Feb. 23, 1966	56.56
Feb. 22, 1967	55.52
Well TA-80-07-203	
Owner: E. F. Baca	
Mar. 24, 1965	48.20
Jan. 26, 1966	52.92
Feb. 22, 1966	52.19
Feb. 21, 1967	53.37
Well TA-80-07-404	
Owner: R. J. Strnadel	
Apr. 19, 1947	6.0
Apr. 5, 1951	29.10
Mar. 27, 1952	28.79
Mar. 19, 1953	31.34
Mar. 24, 1954	37.72
Mar. 23, 1955	30.06
Mar. 22, 1956	31.29
Mar. 28, 1957	33.13
Apr. 3, 1958	26.28
Apr. 6, 1959	24.84
Mar. 21, 1960	24.70
Mar. 14, 1961	21.36
Mar. 28, 1962	19.31
Feb. 26, 1963	22.98
Feb. 7, 1964	29.39
Mar. 24, 1965	28.00
Jan. 27, 1966	30.75
Feb. 23, 1966	28.06
July 19, 1966	40.07
Feb. 21, 1967	27.10
Well TA-80-07-501	
Owner: H. E. Insall	
Mar. 22, 1956	47.29
Mar. 28, 1957	57.87
Apr. 3, 1958	43.55
Apr. 6, 1959	44.51
Feb. 22, 1960	43.19
Mar. 22, 1961	43.05
Mar. 28, 1962	45.20
Feb. 26, 1963	51.94
Feb. 7, 1964	63.08
Mar. 24, 1965	64.98
Jan. 27, 1966	65.96
Feb. 23, 1966	61.54
Mar. 31, 1966	71.38
Apr. 29, 1966	64.71
June 30, 1966	105.10
Sept. 29, 1966	102.69
Nov. 1, 1966	86.73
Jan. 3, 1967	70.19
Feb. 21, 1967	61.56

DATE		WATER LEVEL

Well TA-80-07-901

Owner: Jack Reeves

DATE		WATER LEVEL
Apr.	29, 1943	11.3
Mar.	24, 1965	15.80
Feb.	22, 1966	13.59
Feb.	21, 1967	13.11

Well TA-80-08-101

Owner: Eugene Salas

DATE		WATER LEVEL
Mar.	24, 1965	16.38
Feb.	22, 1966	13.97
Feb.	21, 1967	12.75

Well TA-80-08-301

Owner: City of Bay City, Letulle Park Well

DATE		WATER LEVEL
Mar.	24, 1965	37.02
Feb.	24, 1966	49.86
Feb.	27, 1967	50.67

Well TA-80-08-401

Jack Reeves

DATE		WATER LEVEL
Mar.	24, 1965	14.60
Feb.	22, 1966	11.18
Feb.	27, 1967	12.22

Well TA-80-08-701

Owner: J. O. Thompson

DATE		WATER LEVEL
Mar.	24, 1965	47.12
Feb.	2, 1966	51.91
Feb.	22, 1966	50.43
Sept.	23, 1966	77.90
Feb.	21, 1967	51.19

Well TA-80-14-501

Owner: J. W. Gresham

DATE		WATER LEVEL
Apr.	22, 1943	14.30
Apr.	9, 1951	32.96
Mar.	27, 1952	37.24
Mar.	19, 1953	38.29
Mar.	24, 1954	39.68
Mar.	23, 1955	48.39
Mar.	22, 1956	17.15
Mar.	27, 1957	18.85
Apr.	6, 1959	14.87
Mar.	21, 1960	13.91
Mar.	14, 1961	11.49
Mar.	28, 1962	13.88
Feb.	26, 1963	12.15

Well TA-80-14-606

Owner: Farmer's Canal Co.

DATE		WATER LEVEL
May	7, 1952	33
May	5, 1960	52.98
Mar.	14, 1961	55.21
Jan.	14, 1966	75.46
Feb.	25, 1966	70.29
Apr.	29, 1966	92.14
June	30, 1966	101.22
Sept.	1, 1966	102.99
Sept.	29, 1966	104.38
Nov.	1, 1966	93.10
Dec.	3, 1966	85.82
Jan.	3, 1967	78.58
Feb.	22, 1967	70.28

Well TA-80-14-801

Owner: Oswald Kubecka

DATE		WATER LEVEL
Mar.	24, 1965	47.48
Feb.	25, 1966	48.93
Feb.	22, 1967	48.86

Well TA-80-14-901

Driller: Tom Slone

DATE		WATER LEVEL
Apr.	5, 1951	13.75
Mar.	27, 1952	12.39
Mar.	19, 1953	12.64
Mar.	24, 1954	11.65
Mar.	23, 1955	12.70
Mar.	27, 1957	14.39
Apr.	3, 1958	13.01
Apr.	6, 1959	10.63
Mar.	21, 1960	10.00
Mar.	14, 1961	8.98
Mar.	28, 1962	9.12
Feb.	26, 1963	7.82
Feb.	7, 1964	13.60
Mar.	24, 1965	19.56
Feb.	25, 1966	19.80
Feb.	22, 1967	18.70

Well TA-80-15-102

Owner: Matagorda Co. WCID No. 5

DATE		WATER LEVEL
Mar.	25, 1965	62.73
Feb.	25, 1966	67.11
Feb.	22, 1967	67.35

Well TA-80-15-301

Owner: Ira Foster

DATE		WATER LEVEL
Mar.	24, 1965	26.22
Feb.	3, 1966	24.76
Feb.	24, 1966	25.96
Feb.	22, 1967	25.64

Well TA-80-15-401

Owner: Farmer's Canal Co.

DATE		WATER LEVEL
July	13, 1955	93.08
Mar.	24, 1965	63.24
Jan.	15, 1966	69.50

Well TA-80-15-402

Owner: Texas Eastern Transmission Company

DATE		WATER LEVEL
Dec.	15, 1957	61
Mar.	25, 1965	65.89
Feb.	26, 1966	68.80
Feb.	22, 1967	72.86

Well TA-80-15-502

Owner: W. H. Laslie

DATE		WATER LEVEL
Feb.	24, 1966	49.97
Feb.	22, 1967	53.09

DATE		WATER LEVEL
Well TA-80-22-301		
Owner: H. C. Mozley		
Apr.	4, 1951	21.23
Mar.	27, 1952	25.64
Mar.	19, 1953	30.46
Mar.	24, 1954	29.37
Mar.	23, 1955	31.36
Mar.	22, 1956	36.75
Mar.	27, 1957	45.41
Apr.	3, 1958	20.63
Apr.	7, 1959	21.27
Mar.	21, 1960	13.55
Mar.	13, 1961	10.73
Mar.	28, 1962	18.90
Feb.	26, 1963	19.29
Feb.	7, 1964	14.28
Mar.	25, 1965	15.83
Feb.	24, 1966	12.57
Feb.	22, 1967	13.06
Well TA-80-23-101		
Owner: Otto Frick		
July	19, 1955	102.94
Mar.	27, 1957	53.64
Mar.	21, 1960	42.39
Mar.	15, 1961	44.45
Mar.	28, 1962	62.62
Feb.	26, 1963	50.96
Feb.	7, 1964	61.14
Mar.	25, 1965	55.96
Feb.	22, 1967	61.44
Well TA-80-23-301		
Owner: Mason Holsworth		
Apr.	4, 1951	9.29
Mar.	27, 1952	13.32
Mar.	19, 1953	17.17
Mar.	23, 1955	27.76
Mar.	26, 1956	28.13
Mar.	27, 1957	37.10
Apr.	3, 1958	30.17
Apr.	7, 1959	31.20
Mar.	21, 1960	29.58
Mar.	28, 1962	29.80
Feb.	7, 1964	42.40
Mar.	24, 1965	40.10
Feb.	28, 1966	41.29
Feb.	22, 1967	42.41
Well TA-80-23-401		
Owner: City of Palacios		
Mar.	23, 1950	13.89
Apr.	4, 1951	16.97
Mar.	27, 1952	17.93
Mar.	19, 1953	20.41
Mar.	24, 1954	22.19
Mar.	23, 1955	26.52
Mar.	22, 1956	28.04
Mar.	27, 1957	33.15
Apr.	3, 1958	30.85
Apr.	7, 1959	31.94
Mar.	23, 1960	32.62
Mar.	15, 1961	32.10
Mar.	28, 1962	31.79
Feb.	26, 1963	34.81
Feb.	7, 1964	38.86
Mar.	24, 1965	38.16
Feb.	25, 1966	40.06
Feb.	22, 1967	40.56
Well TA-80-24-201		
Owner: R. E. Bowers		
July	18, 1955	16.55
Mar.	28, 1956	12.38
Mar.	17, 1957	14.57
Apr.	3, 1958	13.99
Mar.	7, 1959	13.82
Feb.	21, 1960	13.33
Mar.	14, 1961	12.88
Mar.	28, 1962	12.68
Feb.	7, 1964	14.68
Mar.	24, 1965	15.51
Feb.	4, 1966	16.19
Feb.	24, 1966	15.90
Apr.	28, 1966	15.93
May	27, 1966	15.91
June	30, 1966	16.25
Sept.	1, 1966	16.30
Sept.	29, 1966	16.45
Nov.	1, 1966	16.70
Dec.	3, 1966	16.69
Jan.	3, 1967	17.58
Feb.	22, 1967	16.82
Well TA-81-01-101		
Owner: City of Bay City		
Apr.	9, 1951	25.33
Mar.	28, 1952	27.40
Mar.	18, 1953	29.08
Mar.	25, 1954	32.03
Mar.	24, 1955	35.39
Mar.	28, 1956	38.72
Apr.	2, 1958	37.47
Mar.	23, 1960	43.09
Mar.	30, 1962	40.47
Mar.	24, 1965	53.52
Feb.	24, 1966	53.05
Feb.	23, 1967	57.12
Well TA-81-01-102		
Owner: City of Bay City		
Apr.	9, 1951	16.75
Mar.	28, 1952	28.59
Oct.	12, 1955	37.11
Mar.	28, 1956	36.14
Apr.	2, 1958	46.38
Apr.	7, 1959	34.35

Table 9.--Water Levels in Selected Wells in Matagorda County--Continued

DATE	WATER LEVEL
Well TA-81-01-102--Continued	
Mar. 23, 1960	35.46
Mar. 15, 1961	34.95
Mar. 24, 1965	55.76
Feb. 25, 1966	51.80
Feb. 23, 1967	49.03
Well TA-81-01-802	
Owner: Francis Savage	
July 18, 1955	55.96
Mar. 21, 1960	25.59
Mar. 14, 1961	26.32
Mar. 29, 1962	26.66
Feb. 26, 1963	27.66
Feb. 7, 1964	29.52
Mar. 26, 1965	29.96
Nov. 23, 1965	34.07
Feb. 21, 1967	36.33
Well TA-81-09-201	
Owner: Atchison, Topeka & Santa Fe Railway Co.	
Apr. 10, 1951	11.69
Mar. 28, 1952	15.15
Mar. 18, 1953	16.68
Mar. 25, 1954	19.06
Mar. 24, 1955	20.86
Mar. 28, 1956	23.90
Mar. 27, 1957	22.78
Apr. 2, 1958	21.78
Apr. 7, 1959	24.30
Mar. 18, 1960	21.05
Mar. 13, 1961	18.71
Mar. 29, 1962	20.60
Feb. 26, 1963	19.77
Feb. 7, 1964	21.66
Mar. 26, 1965	22.18
Feb. 21, 1966	23.86
Feb. 21, 1967	23.25
Well TA-81-09-503	
Owner: T. J. Petrucha	
July 19, 1955	38.26
Apr. 7, 1959	22.34
Mar. 18, 1960	17.82
Mar. 25, 1965	20.65
Feb. 21, 1966	19.98
Feb. 21, 1967	20.31
Well TA-81-09-504	
Owner: T. J. Petrucha	
July 19, 1955	42.39
Apr. 2, 1958	18.84
Apr. 7, 1959	23.09
Mar. 18, 1960	16.74
Mar. 25, 1965	22.81
Feb. 21, 1966	22.62
Feb. 21, 1967	23.00
Well TA-81-09-801	
Owner: Leland Rogers	
Mar. 25, 1965	15.07
Feb. 22, 1966	16.70
June 30, 1966	22.84
Sept. 1, 1966	19.55
Sept. 29, 1955	18.05
Nov. 1, 1966	18.40
Dec. 3, 1966	17.23
Jan. 3, 1967	17.42
Feb. 21, 1967	16.44

Table 10.--Chemical Analyses of Water from Selected Water Wells in Matagorda County and Adjacent Areas

(Analyses Given are in Parts Per Million Except Percent Sodium, Specific Conductance, pH, Sodium Adsorption Ratio, and Residual Sodium Carbonate.)

Analyses by Texas State Department of Health Unless Indicated by Footnote.

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	MANGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	PERCENT SODIUM	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C)	pH	SODIUM ADSORPTION RATIO (SAR)	[illegible]
										Matagorda County												
TA-65-49-302	228	Oct. 6, 1965	15	0.04	--	29	4	164	--	365	15	95	0.8	<0.4	--	500	91	--	850	7.9	--	
601	266	Aug. 28, 1965	15	--	--	50	12	174	--	290	14	210	.4	<.4	--	620	175	--	1,120	7.5	--	
603	80	Oct. 8, 1965	18	.18	--	102	49	130	--	660	68	83	.4	<.4	--	780	459	--	1,250	7.5	--	
703	627	Nov. 15, 1966	22	.72	<0.05	63	18	55	2	312	16	64	.3	<.4	0.25	394	234	34	687	7.8	--	
801	315	Oct. 7, 1965	20	.04	--	67	16	52	--	299	14	59	.4	<.4	--	375	232	--	645	7.8	--	
901	375	Aug. 27, 1965	13	--	--	89	31	251	--	243	10	500	.3	<.4	--	1,010	349	--	1,650	7.6	--	--
50-402	117	Oct. 1, 1965	21	--	--	105	18	160	--	395	13	247	.3	<.4	--	760	338	--	1,350	7.5		
57-401	80	Apr. 19, 1967	24	<.02	<.05	79	24	64	2	427	27	41	.4	<.4	--	471	297	--	780	7.8	--	
502	585	Aug. 27, 1965	8	--	--	39	13	50	--	253	7	32	.3	<.4	--	273	153	--	495	7.3	--	
503	190	Aug. 26, 1965	17	--	--	42	15	52	--	265	15	30	.3	<.4	--	301	166	--	525	8.1	--	
505	210	Oct. 7, 1965	20	<.02	--	63	16	72	--	312	18	69	.4	<.4	--	411	226	--	700	7.7	--	
601	180	Aug. 27, 1965	15	--	--	40	13	80	--	287	17	49	.5	<.4	--	356	155	--	625	7.6	--	
702	557	Mar. 31, 1966	--	<.02	<.05	40	13	81	--	310	16	43	.5	<.4	--	500	154	--	680	8.2	--	--
1/ 801	530	June 4, 1947	--	--	--	87	29	*106	--	445	18	129	--	.2	--	588	336	--	--	--	--	
801	530	Aug. 27, 1965	17	--	--	86	28	115	--	455	17	126	.5	<.4	--	610	332	43	1,075	7.7	[illegible]	
802	315	do	13	--	--	30	13	124	--	342	12	70	.7	<.4	--	431	130	--	750	7.8		
901	135	do	13	--	--	75	18	112	--	298	19	169	.5	<.4	--	550	263	48	1,000	7.9	[illegible]	
902	450	June 8, 1966	--	.08	<.05	25	7	142	--	264	10	120	.6	<.4	--	570	91	--	840	7.9	--	
903	35	Oct. 12, 1965	18	.06	--	133	6	46	--	387	31	70	.3	1.5	--	496	357	--	825	7.4	--	
1/ 58-102	360	May 11, 1960	15	--	--	25	9.3	*157	--	261	15	149	.6	.0	--	499	100	77	903	7.5	[illegible]	
5/ 103	179	June 10, 1946	31.5	--	--	127	65.7	83.5	--	413	67	255	--	--	--	886	--	24	--	--	[illegible]	
1/ 105	80	May 6, 1960	24	--	--	86	20	83	2.1	426	22	77	.4	.0	.25	524	296	38	976	6.9	2.1	
106	185	Aug. 27, 1965	17	--	--	101	29	121	--	370	21	213	.3	<.4	--	680	372	--	1,250	[illegible]	--	
108	275	Oct. 5, 1966	21	--	<.05	75	22	89	<2	399	14	93	.4	<.4	--	510	278	41	872	7.4	[illegible]	
109	294	Aug. 27, 1965	10	--	--	65	22	284	--	193	<4	500	.4	<.4	--	980	253	--	1,908	7.5		
111	140	Aug. 27, 1965	15	--	--	110	31	80	--	489	37	92	.4	<.4	--	610	403	30	1,045	7.6	[illegible]	
115	357	Aug. 28, 1965	10	--	--	28	9	150	--	256	12	143	.5	<.4	--	479	108	--	870	7.7	--	
404	326	Jan. 20, 1967	23	--	.17	48	18	278	3	207	<4	461	.5	<.4	--	930	196	--	1,950	7.8		
405	115	Aug. 18, 1965	20	--	--	87	25	94	--	429	11	108	.4	<.4	--	560	320	--	975	[illegible]	--	
503	370	Aug. 28, 1965	10	--	--	54	18	295	--	245	7	459	.5	<.4	--	960	209	--	1,850	7.6	--	
504	130	Oct. 12, 1965	18	--	--	88	28	97	--	461	21	102	.4	<.4	--	580	335	--	1,035	[illegible]	--	

See footnotes at end of table.

Table 10.--Chemical Analyses of Water from Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	MANGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCo_3$	PERCENT SODIUM	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C)	pH	SODIUM ADSORPTION RATIO (SAR)	RESIDUAL SODIUM CARBONATE (RSC)
6/ TA-65-58-601	157	Mar. 15, 1956	--	--	--	--	--	--	--	--	--	120	--	--	--	630	450	--	--	--	--	--
602	537	Oct. 12, 1965	10	--	--	52	14	483	--	181	5	770	0.5	<0.4	--	1,420	187	--	2,750	7.5	--	--
801	60	Oct. 13, 1965	17	0.4	--	107	32	127	--	530	40	145	.4	<.4	--	730	405	--	1,300	7.4	--	--
803	214	July 1, 1966	24	--	--	117	42	154	2.5	550	85	178	.5	<.4	--	870	464	42	1,430	7.4	3.1	0.00
805	214	do	24	--	--	113	33	132	2.5	510	92	149	.5	<.4	--	800	418	41	1,305	7.4	2.8	.00
66-63-802	761	Apr. 11, 1966	28	<.02	<0.05	73	26	97	2.5	348	38	129	.4	<.4	0.20	560	289	42	942	7.9	2.5	.00
901	755	Dec. 9, 1966	20	--	<.05	55	23	80	2	343	20	76	.9	<.4	--	446	231	43	763	7.5	2.3	1.01
903	242	Sept. 20, 1966	24	--	.1	94	23	112	<2	399	18	160	.4	<.4	.30	630	329	43	1,080	7.5	2.7	.00
64-401	1,057	May 18, 1966	20	.06	<.05	20	10	108	2	260	18	72	.4	<.4	.20	376	94	71	645	7.8	5.0	2.38
701	850	Apr. 1, 1966	27	<.02	<.05	41	19	54	2.5	276	18	40	.3	<.4	.15	337	180	40	553	8.1	1.8	.92
702	856	June 8, 1966	27	--	--	89	21	94	2.5	418	17	99	.5	<.4	--	550	309	40	930	7.6	2.3	.68
703	750	Apr. 16, 1966	30	<.02	<.05	75	27	70	2.5	378	18	96	.6	<.4	.15	500	300	33	845	7.8	1.8	.20
704	778	do	27	<.02	<.03	49	20	63	2.5	283	18	68	.4	<.4	.15	384	205	40	645	8.0	1.9	.54
4/ 801	657	Sept. 26, 1964	23	.01	--	40	17	63	--	273	25	40	--	--	--	524	170	--	524	6.7	--	--
4/ 802	682	do	20	.4	--	32	20	78	--	293	28	46	--	--	--	517	160	--	549	6.7	--	--
80-06-302	579	May 20, 1966	28	<.02	<.05	87	25	98	3	410	18	130	.5	<.4	--	590	321	40	996	7.4	2.4	.31
601	773	do	30	<.02	<.05	66	22	52	3	301	18	79	.3	<.4	--	418	255	31	702	7.5	1.4	.00
602	626	May 20, 1966	35	<.02	.1	80	34	121	3	417	34	164	.5	<.4	--	680	342	43	1,116	7.6	2.9	.00
604	714	Apr. 22, 1966	29	<.02	<.05	55	20	49	2.5	304	18	42	.3	<.4	.15	362	218	33	602	7.8	1.4	.62
605	71	Dec. 29, 1966	24	--	<.05	78	32	94	2	459	13	95	.7	<.4	--	560	327	--	966	7.5	--	--
802	475	May 20, 1966	27	<.02	.08	57	27	115	2.5	322	22	152	.6	<.4	--	560	256	49	961	7.6	3.1	.17
1/ 901	686	May 17, 1960	29	--	--	82	31	131	1.6	387	38	180	--	.0	.09	691	332	46	1,220	7.4	3.1	.00
1/ 902	468	do	28	--	--	62	30	143	1.9	422	46	140	.6	.0	.33	660	278	53	1,160	7.0	3.7	.00
905	783	May 20, 1966	29	<.02	.06	59	22	63	2.5	306	21	78	.3	<.4	--	425	239	36	705	7.6	1.8	.24
1/ 07-101	585	Apr. 19, 1947	--	--	--	81	23	*48	--	309	18	92	--	.0	--	452	296	--	--	--	--	--
101	585	July 14, 1966	27	--	--	87	26	80	2.5	343	17	148	.7	<.4	--	560	327	34	983	7.4	1.9	.00
103	649	June 1, 1966	27	--	--	71	20	58	3	296	17	86	.4	<.4	--	428	259	33	730	7.6	1.6	.00
203	453	June 7, 1966	26	--	--	83	29	104	3	372	28	160	.5	<.4	--	610	327	40	1,065	7.6	2.5	.00
204	840	June 8, 1966	26	--	--	55	22	54	3	289	16	63	.4	<.4	--	381	229	34	646	7.8	1.6	.16
205	721	June 12, 1967	25	--	<.05	55	31	81	2	314	15	120	.7	<.4	--	484	265	40	859	7.9	2.2	.00
206	390	Dec. 5, 1965	23	--	--	81	23	116	--	360	25	154	.6	<.4	--	600	298	46	1,050	7.4	2.9	.00
207	52	Dec. 2, 1966	24	--	<.05	74	37	58	<2	510	10	29	.9	<.4	--	484	340	--	820	7.7	--	--

See footnotes at end of table.

Table 10.--Chemical Analyses of Water from Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	MANGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCO_3$	PERCENT SODIUM	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C)	pH	SODIUM ADSORPTION RATIO (SAR)
TA-80-07-301	373	Jan. 5, 1967	24	--	0.08	44	21	106	2	318	9	115	0.4	<0.4	--	478	199	--	835	[illegible]	--
302	124	Sept. 20, 1966	25	--	--	61	26	91	<2	355	12	112	.6	<.4	--	500	262	--	871	[illegible]	--
303	268	Jan. 5, 1967	25	0.34	<.05	44	18	72	3	310	<4	61	.4	<.4	--	372	183	--	630	[illegible]	[illegible]
401	646	June 1, 1966	27	--	--	70	22	58	3	307	17	85	.4	<.4	--	433	267	32	740	[illegible]	[illegible]
402	960	Apr. 21, 1966	23	<.02	<.05	22	10	112	2	270	17	76	.5	<.4	0.20	394	98	71	660	8.1	[illegible]
403	786	Apr. 8, 1966	29	<.02	<.05	68	22	54	2.5	299	18	83	.3	<.4	.15	421	254	31	715	[illegible]	[illegible]
409	745	July 13, 1966	24	--	--	67	18	74	2	328	19	88	.9	<.4	--	454	241	40	783	[illegible]	[illegible]
410	113	Sept. 20, 1966	25	--	--	76	26	91	<2	433	12	92	.5	2.5	--	540	294	--	914	7.6	--
411	134	do	22	--	--	520	124	223	5	333	8	1,460	.4	2.5	--	2,530	1,820	--	4,520	[illegible]	
412	55	do	19	--	--	216	44	226	<2	530	92	383	.3	163	--	1,400	720	--	2,300	[illegible]	[illegible]
1/ 501	821	July 13, 1955	27	--	--	54	19	63	2.5	296	18	70	--	.2	.16	400	212	39	693	[illegible]	[illegible]
502	54	Sept. 20, 1966	21	--	--	83	27	104	--	445	12	115	.6	<.4	--	580	321	--	992	[illegible]	
701	50	do	22	--	--	55	32	102	<2	495	9	46	.8	<.4	--	510	270	-	851	[illegible]	
802	112	do	22	--	<.05	73	28	82	<2	394	8	101	.7	<.4	--	510	296	--	889	7.6	--
902	735	Sept. 23, 1966	17	--	<.05	33	15	178	3.5	271	4	226	.7	<.4	--	610	144	--	1,130	8.0	--
903	273	do	18	--	--	35	17	91	<2	327	12	54	.5	<.4	--	389	157	--	652	7.7	[illegible]
08-103	55	Jan. 20, 1966	25	--	.42	99	39	200	3	443	108	279	.7	<.4	--	970	409	--	1,690	[illegible]	[illegible]
201	690	June 8, 1966	--	.10	<.05	35	13	76	--	287	19	38	.4	<.4	--	468	143	--	612	7.9	--
202	780	do	21	--	--	37	15	72	2	283	15	43	.5	<.4	--	345	153	50	576	[illegible]	[illegible]
203	340	Jan. 20, 1967	24	--	.19	44	18	80	2	306	16	69	.5	<.4	--	405	182	--	686	7.9	--
301	560	July 19, 1963	--	.22	<.05	38	14	84	--	303	14	47	.4	<.4	--	405	150	--	675	[illegible]	
301	560	June 9, 1966	--	.13	<.05	40	13	78	--	305	19	42	.5	<.4	--	498	154	--	657	[illegible]	--
2/ 302	630	Apr. 23, 1963	20	--	--	45	14	66	--	287	19	41	--	--	--	493	170	46	--	[illegible]	[illegible]
701	672	Sept. 19, 1966	16	--	<.05	16	9	198	<2	361	<4	154	.8	<.4	.40	570	74	85	995	[illegible]	[illegible]
801	750	Mar. 11, 1964	15	--	--	14	6	126	--	289	13	63	.6	<.4	--	530	58	--	665	[illegible]	--
14-302	244	Sept. 30, 1966	17	--	--	32	17	106	--	328	16	63	.6	<.4	--	413	149	--	700	[illegible]	--
303	63	Sept. 20, 1966	21	--	--	59	36	135	<2	414	37	141	.9	<.4	--	630	295	--	1,110	[illegible]	[illegible]
601	768	May 27, 1966	20	--	--	35	14	108	2	310	21	74	.6	<.4	--	427	148	61	722	[illegible]	[illegible]
602	640	May 20, 1966	23	<.02	.06	35	14	93	2.5	310	18	50	.3	<.4	--	388	148	57	638	[illegible]	[illegible]
603	598	June 1, 1966	21	--	--	35	17	92	2.5	307	21	54	.5	<.4	--	395	157	56	645	[illegible]	[illegible]
607	550	July 14, 1966	19	--	--	38	11	97	2.5	318	18	51	.6	<.4	--	394	140	60	673	[illegible]	[illegible]
15-102	645	Aug. 22, 1956	--	.37	<.05	35	17	73	--	290	18	37	.3	<.4	--	--	157	--	--	[illegible]	--

See footnotes at end of table.

Table 10.--Chemical Analyses of Water from Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	MANGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCo_3$	PERCENT SODIUM	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C)	pH	SODIUM ADSORPTION RATIO (SAR)	RESIDUAL SODIUM CARBONATE (RSC)
TA-80-15-102	645	June 15, 1955	--	0.14	<0.05	37	16	68	--	294	17	37	0.4	<0.4	--	469	158	--	618	7.8	--	--
104	529	June 2, 1966	25	--	--	79	23	129	2	395	24	157	.6	<.4	--	630	294	49	1,080	7.7	3.3	.60
105	60	Sept. 20, 1966	22	--	--	79	15	89	<2	406	8	81	.4	<.4	--	494	260	--	838	7.7	--	--
106	912	June 12, 1967	20	--	<.05	46	22	155	3	336	19	178	.8	<.4	--	610	206	62	1,062	8.2	4.7	1.38
301	570	June 10, 1966	22	--	--	82	35	195	3	382	47	302	.7	<.4	--	880	348	55	1,550	7.7	4.5	.00
403	59	Dec. 28, 1966	24	--	<.05	107	5	104	2	376	17	130	.5	<.4	--	580	288	--	963	7.5	--	--
502	776	Sept. 2, 1966	18	--	--	17	8	143	<2	306	14	79	.6	<.4	--	430	77	80	732	7.9	7.1	3.49
701	850	June 2, 1966	18	--	--	47	12	172	2	375	21	148	1.0	<.4	--	600	169	69	1,026	7.8	5.8	2.77
702	671	Apr. 21, 1966	16	<.02	<.05	12	6	163	2	342	17	78	.7	<.4	0.20	461	54	86	762	7.9	9.6	4.52
901	38	Dec. 2, 1966	24	--	.15	60	40	285	8	520	66	333	.8	<.4	--	1,060	314	--	1,840	7.7	--	--
902	20	do	28	--	<.05	98	39	33	<2	411	9	54	.8	70	--	530	403	--	884	7.4	--	--
16-101	93	June 12, 1967	25	--	<.05	65	32	160	3	489	33	153	.8	<.4	--	710	295	--	1,200	8.1	--	--
201	100	Sept. 19, 1966	20	--	<.05	53	20	87	<2	349	11	73	.7	<.4	--	437	216	--	746	7.6	--	--
3/ 301	823	July 11, 1964	10	.11	--	11	5	*150	--	309	14	74	--	--	--	570	46	--	720	8.0	--	--
3/ 302	835	July 31, 1964	9	.18	--	12	4	*143	--	312	14	62	--	--	--	554	47	--	676	7.9	--	--
303	98	Sept. 19, 1966	20	--	--	79	38	110	--	530	3	111	.6	<.4	--	620	353	--	1,051	7.8	--	--
801	130	Dec. 8, 1966	22	--	--	73	42	245	--	453	52	341	.7	<.4	--	1,000	355	--	1,760	7.5	--	--
22-302	649	June 4, 1965	--	.22	<.05	5	1	173	--	348	19	58	.9	<.4	--	610	18	--	784	8.5	--	--
1/ 23-101	776	July 19, 1955	18	--	--	8.1	3.4	*168	--	332	21	67	--	.0	--	454	34	91	773	8.5	12.6	4.76
102	637	June 8, 1966	--	<.02	.05	7	2	166	--	336	20	60	.8	<.4	--	590	28	--	780	8.4	--	--
201	52	Dec. 28, 1966	24	--	<.05	86	27	191	3	471	36	234	.5	<.4	--	830	326	--	1,450	7.5	--	--
1/ 301	770	Mar. 13, 1947	--	--	--	9.0	3.7	*226	--	382	9	146	--	.0	--	590	38	--	--	--	--	--
1/ 301	770	July 19, 1955	17	--	--	9.9	4.3	*177	--	344	11	94	--	.0	--	488	42	91	846	8.3	13.1	4.87
302	331	June 12, 1967	15	--	--	14	5	141	--	334	12	51	.7	<.4	--	403	55	--	674	8.0	--	--
1/ 402	588	Apr. 8, 1943	17	.05	--	6.6	2.8	*178	--	353	17	73	1.0	.2	--	475	28	--	--	--	--	--
402	588	June 8, 1966	--	.52	<.05	7	3	161	--	334	19	61	.8	<.4	--	590	30	--	780	8.4	--	--
403	590	do	--	.14	<.05	6	3	169	--	338	20	69	.8	<.4	--	610	91	--	800	8.4	--	--
501	68	Nov. 22, 1966	25	--	<.05	191	62	297	6	375	41	760	.4	<.4	--	1,570	730	--	2,800	7.5	--	--
24-202	411	Nov. 3, 1966	10	--	<.05	7	5	182	2	367	9	79	1.0	<.4	--	475	36	--	811	8.0	--	--
701	355	Nov. 18, 1966	16	--	<.05	11	6	182	<2	399	<4	80	.6	<.4	--	492	51	--	831	8.0	--	--
31-101	360	May 6, 1966	16	--	--	9	4	249	--	570	5	89	1.0	<.4	--	650	40	--	1,073	7.9	--	--
81-01-101	768	Oct. 4, 1960	--	.14	<.05	36	14	67	--	261	16	34	.3	<.4	--	333	158	--	555	7.7	--	--

See footnotes at end of table.

Table 10.--Chemical Analyses of Water from Selected Water Wells in Matagorda County and Adjacent Areas--Continued

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	MAGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCo_3$	PERCENT SODIUM	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C)	pH	SODIUM ADSORPTION RATIO (SAR)	RESIDUAL SODIUM CARBONATE (RSC)
TA-81-01-101	768	June 9, 1966	--	0.09	0.05	17	8	103	--	261	15	44	0.4	<0.4	--	448	75	--	608	8.0	--	--
102	1,032	Oct. 4, 1960	--	.08	<.05	21	9	96	--	251	16	44	.2	<.4	--	345	90		575	7.8		
102	1,032	June 9, 1966	--	.12	<.05	36	14	62	--	268	16	33	.3	<.4	--	429	150	--	564	7.8	--	--
103	811	Feb. 16, 1943	--	--	--	27	--	91	--	--	--	48	--	--	--	--	--	--	--	--	--	
103	811	Nov. 7, 1946	--	--	--	--	--	75	--	--	--	46	--	--	--	--	--	--	--	--	--	
103	811	Sept. 28, 1949	--	--	--	37	--	74	--	--	--	46	--	--	--	--	--	--	--	[illegible]	--	
103	811	Apr. 15, 1953	--	1.2	<.05	34	15	70	--	262	22	43	.4	<.4	--	345	147	--	345	[illegible]	--	
103	811	Oct. 4, 1960	--	1.1	<.05	26	12	80	--	244	18	44	.3	<.4	--	327	114	--	545	8.1	--	
103	811	June 9, 1966	--	.18	<.05	31	13	69	--	256	13	38	.3	<.4	--	420	133	--	567	8.0	--	
104	815	Oct. 6, 1960	--	.17	<.05	26	12	80	--	255	15	40	.3	.4	--	342	114	--	570	--	--	
104	815	June 9, 1966	--	.12	<.05	31	13	75	--	264	15	38	.4	<.4	--	436	133	--	585	7.8	--	--
402	443	Sept. 22, 1966	17	.08	<.05	19	11	112	<2	310	14	49	.6	<.4	--	375	91	--	635	8.0	--	
501	160	Dec. 9, 1965	22	.08	<.05	91	28	150	--	409	16	215	.6	<.4	--	720	344	49	1,250	[illegible]		
4/ 601	665	Nov. 14, 1966	25	1.2	--	72	29	98	--	385	3	136	--	--	--	749	298	--	911	7.2	--	
4/ 602	651	June 20, 1966	19	1.0	--	26	13	125	--	298	7	100	--	--	--	589	120	--	873	7.4	--	
1/ 801	200	May 17, 1960	24	--	--	86	41	172	2.8	412	26	279	--	2.8	0.30	837	383	49	1,460	[illegible]	--	
1/ 802	520	Apr. 22, 1947	--	--	--	72	24	*141	--	400	17	170	--	.0	--	626	278	--	--	--	--	
1/ 802	520	July 18, 1955	18	--	--	18	6.2	150	--	320	11	85	--	.2	.28	448	70	82	768	8.1	--	
803	158	Dec. 6, 1966	25	--	.23	96	31	125	3	417	12	211	.3	<.4	--	710	368	--	1,250	7.5	--	
02-101	495	Oct. 14, 1965	10	<.02	--	13	4	181	--	222	7	174	.4	<.4	--	498	50	--	930	[illegible]	--	
104	141	Oct. 21, 1965	18	--	--	161	18	197	--	428	31	325	.2	50	--	1,010	476	--	1,850	[illegible]	--	
105	43	Oct. 28, 1965	23	<.02	<.05	80	10	113	--	328	8	144	.2	.5	--	540	240	--	950	[illegible]	--	
201	620	Oct. 22, 1965	10	<.02	--	19	5	461	--	211	<4	650	.7	<.4	--	1,250	70	--	2,400	7.8	--	
204	90	do	25	.04	.21	108	21	104	--	393	19	170	3.2	<.4	--	640	355	--	1,100	7.3	--	
205	480	do	13	.04	<.05	6	2	211	--	438	12	64	2.3	<.4	--	530	23	--	560	8.1		
305	600	Oct. 23, 1965	12	<.02	.05	16	4	317	--	246	5	378	1.4	<.4	--	850	56	--	1,550	7.8	--	
601	80	Oct. 22, 1965	11	.04	.05	10	5	267	--	309	5	256	1.8	.5	--	710	45	--	1,200	8.0	--	
602	180	Oct. 23, 1965	21	.04	<.05	152	26	144	--	479	70	230	2.8	<.4	--	880	486	--	1,500	7.3	--	--
802	120	Sept. 29, 1966	20	--	--	132	31	124	<2	875	10	296	.3	<.4	--	800	460	--	1,450	7.9	--	
901	294	Oct. 27, 1966	22	<.02	--	18	3	306	3	281	<4	345	1.1	<.4	--	840	60	--	1,630	7.8	--	--
902	142	Oct. 23, 1966	20	.28	.56	121	41	133	4	451	63	222	.4	<.4	.23	830	469	38	1,600	7.5	2.7	[illegible]
03-401	117	Oct. 26, 1966	19	--	.37	127	33	140	3	495	40	226	.4	<.4	--	830	454	--	1,490	7.7	--	--

See footnotes at end of table.

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (Fe)	MANGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCo_3$	PERCENT SODIUM	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C)	pH	SODIUM ADSORPTION RATIO (SAR)	RESIDUAL SODIUM CARBONATE (RSC)
1/TA-81-03-501	232	May 19, 1960	22	--	--	100	36	*115	--	522	40	126	0.4	0.0	--	696	398	39	1,230	7.0	2.5	0.61
1/ 701	731	do	22	--	--	126	35	*151	--	460	44	256	.3	1.8	--	862	458	42	1,570	6.8	3.1	.00
3/ 09-202	485	Nov. 18, 1964	14	0.32	--	42	11	*129	--	368	10	86	--	--	--	666	152	65	890	7.7	3.2	3.03
401	360	Mar. 24, 1966	25	<.02	<0.05	79	39	138	3	368	25	240	.5	<.4	0.25	730	361	45	1,290	7.8	3.2	.00
1/ 504	721	July 19, 1955	21	--	--	37	8.8	143	--	366	11	90	--	.2	.28	498	128	71	849	8.0	5.5	3.43
506	115	Nov. 15, 1966	7	--	<.05	39	11	39	2	172	8	61	.1	<.4	--	252	141	--	468	7.5	--	--
3/ 507	720	Aug. 1, 1967	13	.21	.02	6	1	152	--	325	10	51	.8	.3	--	559	20	--	667	8.4	--	--
601	147	Dec. 8, 1966	21	--	.19	67	42	144	3	266	15	306	.2	<.4	--	730	341	--	1,350	8.1	--	--
1/ 802	828	Apr. 18, 1947	--	--	--	5.3	2.2	*373	--	564	2	261	--	.0	--	939	22	--	--	--	--	--
802	828	Sept. 30, 1966	15	--	--	5	1	367	<2	550	<4	253	3.1	<.4	--	910	18	--	1,600	8.3	--	--
803	778	do	13	--	--	3	1	208	--	378	7	88	1.1	<.4	--	510	13	--	852	8.6	--	--
902	491	Mar. 30, 1965	22	--	--	89	29	119	--	394	17	195	.5	<.4	--	670	343	--	1,190	7.2	--	--
7/ 904	492	Mar. 6, 1967	17	.07	--	15	6	236	--	518	2	106	--	--	--	635	62	--	1,050	8.0	--	--
7/ 905	496	May 2, 1966	16	1.29	.05	10	4	235	--	544	5	88	--	--	--	646	40	--	--	8.1	--	--
7/ 906	785	Mar. 6, 1967	16	.19	--	38	12	1,030	--	317	5	1,505	--	--	--	2,730	144	--	--	7.8	--	--
7/ 907	212	do	25	--	.1	82	26	125	--	395	17	172	--	--	--	632	312	--	--	7.4	--	--
908	450	Dec. 8, 1966	15	--	<.05	5	4	221	<2	520	<4	65	1.6	<.4	--	570	27	--	943	8.3	--	--
10-201	568	Nov. 24, 1965	13	<.02	<.05	13	5	600	--	530	<4	660	2.5	<.4	--	1,560	51	--	2,750	7.9	--	--
203	268	Oct. 27, 1966	19	--	--	51	20	152	5	389	<4	183	.6	1.5	--	630	235	--	--	8.2	--	--
204	432	do	24	--	--	68	21	144	6	386	<4	182	.5	<.4	--	640	257	--	1,170	7.4	--	--
301	451	do	12	--	<.05	10	4	468	2	630	4	393	2.0	<.4	--	1,210	42	--	2,110	8.1	--	--
601	522	Jan. 6, 1967	22	--	<.05	4	22	466	2	570	<4	445	1.7	<.4	--	1,240	103	--	2,250	7.9	--	--
901	296	Dec. 2, 1965	20	<.02	<.05	34	21	235	--	560	5	164	.5	<.4	--	760	169	--	1,250	7.6	--	--
11-101	600	Oct. 27, 1966	15	--	<.05	23	11	790	5	570	4	950	.8	<.4	--	2,080	103	--	3,690	7.8	--	--
501	433	Sept. 27, 1966	16	--	--	15	7	245	--	497	<4	135	1.0	<.4	--	660	68	--	1,111	7.8	--	--
601	525	Oct. 26, 1966	15	--	<.05	12	7	382	4	495	<4	332	.8	4.5	--	1,000	59	--	1,820	7.8	--	--
901	527	Sept. 21, 1966	13	--	<.05	12	5	295	<2	492	<4	200	1.1	<.4	--	770	51	--	1,390	8.1	--	--
12-101	470	Oct. 26, 1966	15	--	<.05	18	9	421	4	423	4	454	.8	3	--	1,140	82	--	2,130	7.6	--	--
402	473	do	16	--	<.05	18	11	407	4	520	6	405	.5	<.4	--	1,120	91	--	2,110	7.6	--	--
501	796	do	9	1.74	<.05	122	78	1,270	9	394	187	2,010	1.0	<.4	.95	3,880	620	81	6,680	7.7	22.1	.00
502	567	do	12	--	<.05	21	12	750	6	520	21	930	1.5	1.5	--	2,010	101	--	3,510	7.9	--	--
3/ 701	197	Apr. 7, 1962	16	.90	--	110	79	*545	--	512	17	955	--	--	--	2,253	800	--	3,655	8.2	--	--

See footnotes at end of table.

Table 10.--Chemical Analyses of Water from Selected Water Wells in Matagorda County and Adjacent Areas--Continued

	WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	SILICA (SiO_2)	IRON (FE)	MAGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	BORON (B)	DISSOLVED SOLIDS	TOTAL HARDNESS AS $CaCo_3$	PERCENT SODIUM	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C)	pH	[illegible]
	TA-81-11-702	542	Sept. 21, 1966	16	--	<0.05	6	17	590	7	590	<4	640	0.5	<0.4	--	1,570	86	--	2,850	7.7	--
	703	111	do	18	--	--	69	45	590	--	354	29	940	.6	3.5	--	1,870	356	--	3,240	7.3	--
	17-201	398	Nov. 18, 1966	18	--	<.05	9	8	312	3	650	<4	134	.8	<.4	--	810	56	--	1,330	7.9	--
7/	302	162	Mar. 6, 1967	24	0.20	.14	69	24	181	--	415	10	223	--	--	--	700	270	--	--	7.4	[illegible]
7/	303	402	do	25	.23	.21	101	31	149	--	366	17	274	--	--	--	814	380	--	--	7.4	--
-	401	682	Dec. 23, 1965	12	<.02	<.05	4	2	226	--	497	6	58	2.3	<.4	--	560	18	--	930	[illegible]	--
1/	402	773	June 11, 1943	16	.45	--	4.4	1.2	*236	--	464	2	103	1.1	.0	--	601	16	--	--	--	
	402	773	Jan. 5, 1966	17	--	--	5	1	238	--	456	5	110	1.1	<.4	--	600	16	--	992	8.3	
	404	410	Jan. 6, 1966	20	--	--	9	5	250	--	560	8	90	.9	<.4	--	660	43	--	1,070	[illegible]	
	405	472	Sept. 22, 1966	17	.02	--	6	3	288	--	610	<4	99	1.0	<.4	--	710	28	--	1,159	7.9	--
	25-101	568	Jan. 7, 1966	17	--	--	8	5	399	--	730	<4	226	1.2	1.5	--	1,020	39	--	1,680	8.1	--
	102	565	May 4, 1966	18	--	--	8	4	400	--	740	<4	221	1.1	<.4	--	1,020	36	--	1,700	8.0	--
	Jackson County																					
1/	PP-80-06-102	364	July 30, 1963	42	0.21	--	121	35	*95	--	390	16	224	0.5	0.2	0.07	726	446	32	1,250	6.8	[illegible]
1/	703	590	Aug. 11, 1960	24	--	--	42	17	*78	--	308	18	53	--	.0	--	383	175	49	648	7.2	[illegible]
1/	704	430	July 30, 1963	24	.36	--	58	25	*110	--	360	51	98	.6	.0	.11	544	248	49	900	7.0	[illegible]
1/	14-101	650	Apr. 22, 1964	23	.01	--	48	18	80	2	324	18	66	.4	.0	.15	415	194	47	716	7.4	[illegible]
1/	403	386	May 21, 1964	--	--	--	--	--	--	--	312	--	56	--	--	--	--	152	--	681	[illegible]	
1/	22-401	690	Aug. 3, 1960	15	--	--	14	6	*205	--	399	19	112	--	.0	.19	567	60	88	964	7.5	[illegible]
1/	501	370	Sept. 5, 1963	15	.08	--	12	6	156	2	358	18	63	.8	.0	.20	449	55	86	752	[illegible]	
	Wharton County																					
	ZA-66-63-504	687	May 31, 1966	28	--	--	73	19	50	3	287	17	79	0.4	<0.4	--	410	260	29	698	[illegible]	[illegible]
	80-06-202	620	July 13, 1966	28	--	--	84	23	49	2.5	303	17	104	.3	<.4	--	457	304	26	804	[illegible]	[illegible]

* Sodium and potassium calculated as sodium (Na).
Laboratory conducting analysis:
1/ U.S. Geological Survey Laboratory.
2/ Jordan Laboratories.
3/ Microbiology Service Laboratories.
4/ Aquatrol.
5/ R. M. Burket.
6/ Pan American Petroleum Corporation.
7/ Texas Gulf Sulphur Company.

Table 11.--Records of Brine Injection and Disposal Wells in Matagorda County

LEASE	WELL NO.	CURRENT OPERATING COMPANY	SURVEY AND ABSTRACT NUMBER	INJECTION ZONE (FEET BELOW LAND SURFACE)	SURFACE CASING SIZE (IN.)	SURFACE CASING LENGTH (FT)	SURFACE CASING CEMENT (NO. OF SACKS)	INTERMEDIATE CASING SIZE (IN.)	INTERMEDIATE CASING LENGTH (FT)	INTERMEDIATE CASING CEMENT (NO. OF SACKS)	LONG STRING CASING SIZE (IN.)	LONG STRING CASING LENGTH (FT)	LONG STRING CASING CEMENT (NO. OF SACKS)	TYPE INJECTION	CURRENT DAILY VOLUME OF BRINE INJECTED (BBLS)	SURFACE INJECTION PRESSURE (psi)
B. J. Pierce, et al.	2	A. Smith	J. W. E. Wallace, A-99	1,570-1,629	--	--	--	--	--	--	5-1/2	1,700	300	Tubing with packer	600	Gravity
W. J. Culbertson	1	Superior	Burnett & Sojourner, A-13	1,920-1,942	13-3/8	1,441	800	--	--	--	7	8,516	500	do	2,000	450
F. G. Cobb "B"	40	Skelly	M. Cummins, A-22	1,652-1,714	7	1,796	480	--	--	--	--	--	--	do	6,000	800
C. Laurence	7	do	Burnett & Sojourner, A-13	2,920-3,010	7	3,061	650	--	--	--	--	--	--	do	750	500
D. Kourtze "B"	3	Texas Pacific	I&GN RR, A-279	2,348-2,388	8-5/8	416	205	--	--	--	5-1/2	2,479	335	do	1,500	800
South Texas Development Co.	1	Irwin & Buck	Battle, Berry & Williams, A-3	1,610-3,640	13-3/8	1,498	750	9-5/8	6,849	--	7	10,388	1,000	Annulus	100	200
L. V. Stoddard	1	Ada	G. B. M. Cotton, A-17	2,312-2,790	13-5/8	2,516	216	9-5/8	9,580	1,000	5-1/2	10,731	400	Tubing	600	900
M. E. Crouch	1	Steward & Gouger	John Crier, A-19	6,340-6,350	10-3/4	1,337	835	--	--	--	4-1/2	7,122	295	Long string	100	Gravity
M. E. Cornelius	3	Roberts-Whitson	M. M. Morrison, A-96	1,689-9,200	9-5/8	1,689	350	--	--	--	4-1/2	9,870	400	Annulus	200-400	600 600
B. W. Trull Unit Well	1	Crown Central	I&GN RR, A-289	2,224-2,290	10-3/4	1,110	675	--	--	--	5-1/2	8,553	200	Casing	250-500	300
Reinke est.	1	Kirby	John Martin, A-357	2,500-8,570	10-3/4	2,500	1,350	7	10,980	600	5	11,350	115	Annulus	70-80	--
F. M. Cornelius	1	CR. A. Inc.	I&GN RR, A-289	2,242-2,293	10-3/4	1,122	535	--	--	--	5-1/2	8,746	425	Tubing	500-800	150-300
Buckeye	1	Monsanto	G. B. M. Cotton, A-17	2,506-?	13-5/8	2,506	1,550	9-5/8	9,526	500	7	15,000	700	Annulus	30	Gravity
D. H. Braman "C"	2	Sun	Amos Rawls, A-81	1,900-3,200	9-5/8	30	10	--	--	--	7	3,250	250	Tubing	2,800	300
B. W. O'Connor "A"	1	Continental	Bowman & Reese, A-8	1,558-8,000	9-5/8	1,558	405	--	--	--	5-1/2	9,914	500	Annulus	90-200	250
J. A. Wheeler	3-LC	Gandy-McAuley	I&GN RR, A-209	7,102-7,135	10-3/4	--	--	--	--	--	2-7/8	7,935	400	Casing	500-1,000	750-1,000
Richards Unit	11	Crown Central	I&GN RR, A-289	1,574-7,390	--	--	--	--	--	--	--	--	--	--	--	Gravity
J. B. Norris	2	Westland	I&GN RR, A-252	1,950-2,010	9-5/8	1,505	400	--	--	--	2-7/8	2,050	--	Long string	300	--
V. W. Creech Unit	1	M. P. S. Prod.	Burnett & Sojourner, A-13	1,480-7,675	9-3/8	1,479	550	--	--	--	5-1/2	9,977	450	Annulus	40-60	20-100
A. Spencer	2	Superior	F. Pettus, A-73	2,000-2,100	--	--	--	--	--	--	5	2,100	--	Tubing with packer	1,300	700
Insall Gas Unit	1	Pan American	Elisha Hall, A-45	2,750-2,780	10-3/4	2,526	2,000	7	10,250	500	5	10,620	150	Annulus	800	800
H. A. Norris, et al., "B"	1	Gulf	I&GH RR, A-298	1,914-2,079	--	--	--	--	--	--	4-1/2	2,173	325	Tubing	120	Gravity
Williams Gas Unit	2	Pan American	Elisha Hall, A-45	2,895-2,940	10-3/4	2,755	1,350	7	9,223	500	5	10,549	125	Annulus	800	700
Bay City Unit 14	1	do	do	2,670-2,694	10-3/4	2,532	2,000	--	--	--	7	10,396	1,100	do	800	700
D. P. Moore LST	1	U. M. Harrison	R. P. T. Stone, A-92	2,050-9,455	10-3/4	2,050	1,070	--	--	--	5-1/2	10,485	356	do	60	Gravity
Blessing-Pierce	1	Texaco	I&GN RR, A-209	1,950-2,700	10-3/4	1,553	525	--	--	--	7	8,365	400	Tubing	10,000	300
J. C. Lewis	1	Humble	C. G. Cox, A-18	2,000-3,450	8-5/8	2,000	500	--	--	--	4-1/2	3,500	225	Long string	50-250	Gravity
R. C. Millican Gas Unit	1	Pan American	I&GN RR, A-274	1,700-2,600	--	--	--	--	--	--	5	2,650	--	do	710	800
W. W. Doss Unit "A"	1	Tenneco	B. F. Jacques, A-52	2,415-2,480	13-3/8	1,425	790	--	--	--	9-5/8	6,819	400	Tubing	500	100

Table 11. --Records of Brine Injection and Disposal Wells in Matagorda County--Continued

LEASE	WELL NO.	CURRENT OPERATING COMPANY	SURVEY AND ABSTRACT NUMBER	INJECTION ZONE (FEET BELOW LAND SURFACE)	SURFACE CASING			INTERMEDIATE CASING			LONG STRING CASING			TYPE INJECTION	CURRENT DAILY VOLUME OF BRINE INJECTED (BBLS)	SURFACE INJECTION PRESSURE (psi)
					SIZE (IN.)	LENGTH (FT)	CEMENT (NO. OF SACKS)	SIZE (IN.)	LENGTH (FT)	CEMENT (NO. OF SACKS)	SIZE (IN.)	LENGTH (FT)	CEMENT (NO. OF SACKS)			
J. L. Camp	5	Draper, Goodale & Co.	I&GN RR, A-336	1,625-1,700	10-3/4	1,567	885	--	--	--	5-1/2	6,540	300	Annulus	200	50-100
R. H. Clover Unit	2	Atlantic Refg.	J. T. Belknar, A-113	3,400-4,100	10-3/4	1,292	725	--	--	--	5-1/2	8,211	325	Long string	300	Gravity
W. S. Gillene, et al.	2-C	Brazos	GM&D, A-182	4,283-4,287	8-5/8	1,014	427	--	--	--	4-1/2	4,356	624	Annulus	40	100
J. B. Beld	1	Mound	I&GN RR, A-339	2,515- ?	10-3/4	2,515	1,400	--	--	--	5-1/2	10,503	800	do	150	800
George Krueger	1	M. P. S. Prod.	A. W. Magnum, A-362	2,460-2,560	8-5/8	606	235	--	--	--	4-1/2	6,811	430	do	150	150-200
B. W. Trull Estate	1	Mobil	Susan Perkins, A-371	2,050-2,168	9-5/8	1,122	400	--	--	--	7	9,240	255	Long string	1,000	500
Sallie Johnson	4	Skelly	Maria Cummins, A-22	1,534-1,746	--	--	--	--	--	--	7-5/8	1,801	475	Tubing	2,023	0-250
Moore est.	13	do	I&GN RR, A-10	1,604-1,718	10-3/4	163	125	--	--	--	7	1,803	475	do	1,288	0-250
B. W. Trull	1	Highland	Manly Sexton, A-495	1,580- ?	--	--	--	--	--	--	--	--	--	do	--	--
Midfield Townsite Unit	1	R. A. Gardner	I&GN RR, A-289	1,513-6,888	10-3/4	1,513	610	--	--	--	5-1/2	8,830	520	Annulus	500	500-700
Texas Gulf Minerals	1	H. H. Howell	I&GN RR, A-213	5,120-5,275	10-3/4	175	140	--	--	--	4-1/2	6,353	640	Long string	100	--
Ethel Cornelius	1	Mobil	J. C. Peyton, A-74	1,690-2,865	10-3/4	3,062	1,475	--	--	--	--	--	--	Tubing with packer	1,000	200
M. B. Guess	1	British-American	R. H. Williams, A-105	2,982- ?	10-3/4	2,982	3,000	7-5/8	11,452	--	5-1/2	14,266	352	Annulus	50	500
Gregg Laurence	7	Skelly	Burnett & Sojourner, A-13	1,850-3,030	--	--	--	--	--	--	7	3,075	--	Tubing with packer	--	--
Cooke "B"	3	do	do	1,853-2,766	7	2,826	625	--	--	--	--	--	--	do	2,200	500

Table 12.--Geophysical Tests Selected as Data-Control Points in Matagorda County and Adjacent Areas

(For Location of Wells, See Figure 32)

WELL	OPERATOR	LEASE NAME AND WELL	SURVEY AND ABSTRACT NUMBER
		Matagorda County	
TA-65-49-502	Geier-Jackson, et al.	C.C. Sherrill No. 1	Z. Woods, A-108
903	Pan American Petroleum Corp.	C. Runnels, Jr. No. B-1	P. Demos, A-25
50-701	Humble Oil & Refining Co. et al.	Pierce est. Oil & Gas Interest No. B-1	I. Foster, A-39
57-101	Kirkwood & Morgan	Pierce est., et al. No. A-1	R.S. Beggs, A-117
	do		
102	do	Pierce est., et al. No. 2	W. Brown, A-118
201	Union Prod. Co.	Armour No. 1	C. Demos, A-24
301	Phillips Petroleum Co.	A. Smith, et al. No. 1	D. Rawls, A-83
402	M.P.S. Prod. Co.	G. Kruger No. 1	A.W. Mangum, A-362
403	Pierce Estate, Inc.	Fee No. 1	I&GN RR, A-250
506	Skelly Oil Co.	Cobb No. B-29, SWD No. 2	M. Cummins, A-22
602	do	G.M. Savage No. 1	Do.
603	Humble Oil & Refining Co.	Granbury No. B-2	A. Rawls, A-81
58-117	Falcon-Seaboard Drilling Co.	H.B. Hurlock No. 1	F. Pettus, A-73
407	Humble Oil & Refining Co.	J.F. Grant No. 5	A. Rawls, A-81
408	Skelly Oil Co.	G. Lawrence No. 5	Burnett & Sojourner, A-13
409	Humble Oil & Refining Co.	A.B. Taylor No. B-2	F. George, A-40
410	do	Bouldin No. 6	Burnett & Sojourner, A-13
505	do	Truitt & Gravier No. 1	F. George, A-40
506	Union Prod. Co.	Pinckney No. 1	Johnson, Walker & Borden, A-54
806	J.S. Abercrombie	Salt Water Test No. 1	Battle, Berry & Williams, A-3
807	Stanolind Oil & Gas Co.	P.J. Reeves No. 2	P. Pruitt, A-77
66-63-904	Hamill & Hamill	Rycade No. W-4	W. Hadden, A-194
905	Rycade Oil Corp.	Fee No. 1	do
64-502	Brazos Oil & Gas Co. & M.T. Halbouty	M.E. Crouch No. 1	J.G. Hurd, A-198
503	Southern Natural Gas	J.L. Camp No. 1	W. Hurd, A-196
601	Arkansas Fuel Oil Corp.	M.E. Crouch No. B-1	J. Crier, A-19
705	Goodale, Bertman & Co.	Northern Ranch No. 1	I&GN RR, A-330
706	Viking Drilling Co. & J.W. Pace	J. Camp No. 1	Do.
80-06-304	J.A. Gray	Beyer No. 1	I&GN RR, A-295
501	Intex Oil Co.	Kountze & Stewart No. 1	I&GN RR, A-317
606	Ambassador Oil Corp.	G. Stovall No. 1	I&GN RR, A-212
803	H.H. Howell, et al.	Texas Gulf Minerals No. 1	I&GN RR, A-213

Table 12.--Oil and Gas Tests Selected as Data Control Points in Matagorda County and Adjacent Areas--Continued

WELL	OPERATOR	LEASE NAME AND WELL	SURVEY AND ABSTRACT NUMBER
TA-80-06-907	Sun Oil Company	Stovall-Johnson SWD No. 1	I&GN RR, A-315
07-106	N.E. Schwartz, Tr.	Kountze & Crouch est. No. 1	I&Gn RR, A-279
107	J.K. Lewis & Taylor Drilling Co.	Kountze & Stewart No. 1	I&GN RR, A-322
108	H.H. Howell	Stovall-Appling No. 1	I&GN RR, A-284
109	Ambassador Oil Corp. & Bay City Drilling Co.	G.F. Stovall, et al. No. 1	I&GN RR, A-283
208	Atlantic Ref. Co.	Kountze No. B-1	W.H. Gainer, A-483
304	The Texas Co.	A.B. Turner Fee N.C.T.-1 No. 2	H. Parker, A-68
305	Seadrift Pipeline Corp.	Fee No. 2	W. Hadden, A-194
306	Hamill & Hamill	Hudson No. 11	H. Parker, A-68
307	Thompson Drilling Co.	Kountze No. 1	Do.
413	Crown Central Petro. Corp. & Acorn Oil Co.	B.W. Trull est. No. 1	I&GN RR, A-289
503	L.L. Smith, et al.	T.B. Krenek No. 1	I&GN RR, A-288
504	Falcon-Seaboard Drilling Co.	F.C. Cornelius No. 2	W.C. Clapp, A-15
803	Magnolia Petroleum Co.	Live Oak No. 2	J.W.E. Wallace, A-99
804	Adolph Smith	B.B. Pierce, et al No. 2	Do.
805	E.B. Colvin & Gulf Coast Royalty Co.	G.P. Heffel Finger No. 1	Do.
08-204	W.E. Rowe	C.D. Cornelius No. 1	M. Choate, A-439
303	Cosden Petroleum Corp.	Farthing & Thompson Unit No. 1	H. Harrison, A-47
304	Sun Oil Co.	Braman No. D-1	T. Cayce, A-14
402	Sohio Petroleum Co.	F.F. Insall No. 1	J. Partin, A-69
403	Placid Oil Co.	L. Letulle No. 1	R. Graves, A-42
503	Rowan Drilling Co.	Robertson No. 1	D. Etherton, A-153
601	Cosden Petroleum Corp.	W.D. Cornelius Unit No. 2, Well No. 1	H. Harrison, A-46
702	Sun Oil Co.	C. Junek No. 1	T. Jamison, A-51
14-609	Oil & Gas Property Management, Inc.	Trull & Pybus No. 1	G.W. Nexsen, A-65
610	Tenneco Oil Co.	R.B. Trull No. 4	G.W. Nexsen, A-65
902	Magnolia Petroleum Co. & Sinclair Oil & Gas Co.	R.B. Trull No. 1	S. Perkins, A-371
15-107	North Central Oil Corp. & Cypress Oil Co.	W.O. Selkirk No. 1	J. Tilley, A-93
108	Texaco, Inc.	Blessing Hammond No. 20	Texas Rice & Dev. Co., A-537
109	Texkan Oil Co.	J.A. Wheeler No. 1-C	J.E. Pierce, A-540
110	Texaco, Inc.	Blessing Hammond No. 65	J.E. Pierce, A-541

Table 12.--Oil and Gas Tests Selected as Data-Control Points in Matagorda County and Adjacent Areas--Continued

WELL	OPERATOR	LEASE NAME AND WELL	SURVEY AND ABSTRACT NUMBER
TA-80-15-111	Texaco, Inc.	Blessing Pierce No. 57	J.E. Pierce, A-541
112	do	Blessing St. Germain No. 31	J.E. Pierce, A-540
203	Argo Oil Corp.	V.C. Murphy No. 1	H.M. Gove, A-173
404	The Texas Co.	H.H. Thomas No. 1	G. Payne, A-369
601	Humble Oil & Refining Co.	South El Maton Unit No. 1 Well No. 1	D. Ness, A-429
903	Magnolia Petroleum Co.	Scarborough No. 1	J.C. Hall, A-197
16-202	Humble Oil & Refining Co.	Pierce est. No. 1	C.G. Cox, A-18
203	do	J.C. Lewis No. 1	Do.
401	do	El Maton Gas Unit No. 2 Well No. 1	D. Ness, A-429
601	Phillips Petroleum Co.	Pierce est. No. 1	N. Clopper, A-16
701	M.T. Halbouty	S. Kubela No. 1	J.C. Hall, A-197
901	Stanolind Oil & Gas Co.	F.S. Robbins No. 1	C.H. Vanderveer, A-195
902	Magnolia Petroleum Co.	W.W. Rugeley No. 1	A. Sheppard, A-383
22-801	Ohio Oil Co.	B.W. Trull No. A-1	I. Van Dorn, A-400
901	Skelly Oil Co., & Sunray DX Oil Co.	State Tract 291, Gulf "D" Well No. 1	Located in Tres Palacios Bay
23-103	Magnolia Petroleum Co.	City of Palacios No. 1	L. Goodwin, A-162
104	do	City of Palacios No. 2	Do.
105	Brazos Oil & Gas Co.	L.S. Harrison No. 1	Do.
303	do	Salt Water Disposal No. 1	B.C. Arthur, A-111
304	do	M.S. Holsworth No. 1	Do.
601	Pure Oil Co.	Franzen No. 1	E. Yeamans Heirs, A-419
602	Brazos Oil & Gas	C.T. Frazier No. 2	E. Yeamans Heirs, A-418
603	do	C. Letulle No. 1-A	L. DeMoss, A-145
801	do	H. Letulle No. 1	R. Wright, A-407
901	do	Letulle No. 1	G. Whellwright, A-405
24-101	Continental Oil Co.	S.G. Anderson No. 1	E.L. Holmes, A-203
102	Brazos Oil & Gas Co.	Cunyas No. 1	GM&D, A-187
103	do	T.H. Lewis No. 1	J.E. Pierce, A-398
203	L.A. Wagner	Broughton & Lloyd No. 1	A. Sheppard, A-383
204	Slick Oil Corp.	Johnson Gas Unit No. 1	J.J.T. Criswell, A-20
301	Trull, Russel & Thompson	S.G. Selkirk, Jr., Tr., et al. No. 1	W. Selkirk, A-87
302	Southern Minerals Corp.	Rugeley No. 1	A. Shepard, A-383
401	Brazos Oil & Gas Co.	Gillespie No. 1	GM&D, A-185
402	Pure Oil Co.	S. Lettulle No. 1	GM&D, A-186

Table 12.—Oil and Gas Tests Selected as Data Control Points in Matagorda County and Adjacent Areas—Continued

WELL	OPERATOR	LEASE NAME AND WELL	SURVEY AND ABSTRACT NUMBER
TA-80-24-403	Apache Corp	Pierce est. Oil & Gas Unit No. 1	GM&D, A-182
404	Brazos Oil & Gas Co.	S. Letulle No. 5	GM&D, A-180
405	do	Fulmer No. 1	J.E. Pierce, A-493
702	Apache Corp.	Pierce Estate No. 2	S.R. Fisher, A-36
801	do	Pierce Estate No. 3	Do.
901	Gulf Oil Corp.	State Tract 21, No. 1	Located in Matagorda Bay
31-102	Southern Minerals Corp.	State Tract 308, No. 1	Located in Tres Palacios Bay
39-102	The Texas Co.	P. Huebner No. 1	E. Green, A-165
501	Western Natural Gas	State Tract 608, No. 1	Located in Gulf of Mexico
81-01-105	Stanolind Oil & Gas Co.	Bay City Independent School Dist. No. 1	I&GN RR, A-269
106	Pan American Petroleum Corp.	G. Moore No. 1	R.P.T. Stone, A-92
107	Stanolind Oil & Gas Co.	F.F. Insall No. 1	E. Hall, A-45
108	do	H. Rugeley No. 1	Do.
403	Humble Oil & Refining Co.	P. Huebner No. 1	Do.
503	do	Huebner No. 2-A	J. Silver, A-381
504	Brewster-Bartle Drilling Co.	F. Huebner No. 1	J. Silver, A-382
804	Scurlock Oil Co.	Hurst No. 1	L.L. Veider, A-97
901	Gulf Oil Corp.	M. Gilmore Gas Unit No. 2, Well No. 1	I&GN RR, A-301
02-206	Humble Oil & Refining Co.	First City National Bank of Houston, Tr. No. 1	W.B. Nuckols, A-66
603	Pan American Petroleum Corp.	C.R. Allen No. 1	R.H. Williams, A-105
604	British American Oil Prod. Co.	M.B. Guess No. 1	Do.
701	Continental Oil Co.	H. Rugeley No. 1	I&GN RR, A-302
803	Standard Oil Co. of Texas	M.H. Lewis, et al. No. 1	F. Fry, A-155
804	Gulf Oil Corp.	H. Rugeley No. 1	T. Fowler, A-156
903	Magnolia Petroleum Co.	J. Hawkins No. 1	S. Williams, A-106
904	Stanolind-Skelly, et al.	R. Sanborn No. 1	Do.
905	do	M.C. Fall No. 1	Do.
03-403	Fourth M.E. Andrews, Ltd.	M. Estill No. 1	Tone & Jamison, A-94
404	do	M. Estill No. 2	Do.
801	E. Crockrell, Jr., et al.	Neal No. 1	Kingston & Powell, A-56
901	Atlantic Refining Co.	Craig Estate No. 1	T. Williams, A-107
09-101	J.S. Michael	O. Vaughn, et al. No. 1	I&GN RR, A-306
203	Magnolia Petroleum Co.	F. Savage No. 1	I&GN RR, A-310

Table 12. Oil and Gas Tests Selected as Data-Control Points in Matagorda County and Adjacent Areas--Continued

WELL	OPERATOR	LEASE NAME AND WELL	SURVEY AND ABSTRACT NUMBER
TA-81-09-301	Magnolia Petroleum Co.	Cornelius No. 8	J.C. Peyton, A-74
302	do	Cornelius No. 1	Do.
402	Mobil Oil Co.	Ryman Unit No. 1	D. McFarland, A-61
804	C.G. Newton, Tr.	Gulf Stream-Zipprian No. 1	L. Lessassier, A-58
805	J.M. Huber Corp.	Petrucha No. 1	F.W. Dempsey, A-26
10-101	Magnolia Petroleum Co. & Sinclair Oil & Gas Co.	J.J. Letulle No. 1	S.R. Fisher, A-37
102	Gulf Oil Corp.	H.B. Hawkins No. 2	J. Dwyer, A-31
205	Phillips Petroleum Co.	Mott No. 1-A	D. McCarthy, A-354
302	Gulf Oil Corp.	H.B. Hawkins, et al. No. 1	J. Dwyer, A-31
701	Magnolia Petroleum Co.	J.J. Letulle Unit No. 1	S.F. Austin, A-1
801	Humble Oil & Refining Co.	Letulle No. 1	I&GN RR, A-254
11-102	Socony-Mobil Oil Co.	J. Hawkins No. 3	P. Pickett, A-75
201	Progress Oil Co. of Texas	O.S. Van de Mark No. 1	G.S. Pentecost, A-71
202	H.A. Potter	R. Sanborn No. 1	T. Williams, A-107
301	do	Freeman No. 4	McCoy & Deckro, A-60
401	Progress Petroleum Co.	H.R. Hawkins, et al. No. 1	G.S. Pentecost, A-71
17-304	R.H. Parker	Gottschalk No. 1	I. Ingram, A-49
305	Scurlock Oil Co.	Gulftex Oil Co., et al. No. 1	Do.
306	Falcon-Seaboard Drilling Co.	Baer Ranch No. 1	W. Simpson, A-89
307	Texas Gulf Sulphur	Fee No. 17	Do.
308	Pan American Petroleum Corp.	E.A. Gottschalk	I. Ingram, A-49
309	The Texas Co.	Baer Estate No. 2	W. Simpson, A-89
310	do	Baer Estate No. 1	Do.
18-301	Union Prod. Co.	State Tract 77, No. 1	Located in East Matagorda Bay
501	Shell Oil Co.	L.W. Kain No. 1	J. Duncan, A-144
901	do	State Tract 500-S, No. 1	Located in Gulf of Mexico
19-401	Gulf Oil Corp.	State Tract 475-S, No. 1	Do.
25-201	Atlantic Refining Co.	State Tract 527-S, No. 1	Do.
		Brazoria County	
BH-65-59-804	Pan American Petroleum Corp.	B.R.L.D. Co. No. A-1	O. Jones, A-78
		Jackson County	
PP-80-22-403	Alcoa Mining Co. & Crown Central Petroleum Corp.	F.E. Applying No. 1	S.C. Lyons, A-212
		Wharton County	
ZA-65-49-704	Brewster & Bartle Drilling Co.	Prasifka No. 1	J. Clements, A-82
66-64-103	F.L. Karsten	Myatt No. 1-B	J. Hyland, A-626