TEXAS BOARD OF WATER ENGINEERS



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# GEOLOGY AND GROUND-WATER RESOURCES OF HAYS COUNTY, TEXAS

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# GEOLOGY AND GROUND-WATER RESOURCES OF HAYS COUNTY, TEXAS


## ABSTRACT

The Edwards limestone of early Cretaceous age is the chief aquifer for San Marcos Springs and about 160 other springs and wells in Hays County, along the Balcones fault zone in south-central Texas.

Hays County is underlain by a basement of Paleozoic rocks; and in the southeastern part of the county the Hosston and Sligo formations of early Cretaceous age, correlative with the Coahuila series of Mexico, have been encountered in the subsurface. Rocks exposed in the county are principally Cretaceous and Quaternary sedimentary units, which are assigned to the Trinity, Fredericksburg, and Washita groups in the Comanche series; the Eagle Ford shale, Austin chalk, Taylor marl, and Navarro groups in the Gulf series; and the Leona formation and equivalent rocks in the Pleistocene series. Recent alluvium and colluvium locally overlie the older rocks.

In addition to the Edwards limestone in the Fredericksburg group, water-bearing rock units in Hays County include the Pearsall formation (Travis Peak of outcrop areas) and the Glen Rose limestone in the Trinity group, the Austin chalk and Taylor marl, and the Quaternary rocks.

The surface slope and regional dip are toward the southeast. Several normal strike faults have displaced the Cretaceous rocks downward to the southeast, the aggregate displacement being about 1,700 feet within the county. The boundaries of the Edwards limestone ground-water reservoir are formed by major faults which are the major controls of movement of water.

Much of the water discharged at San Marcos Springs is derived from influent seepage from streams and infiltration from precipitation in recharge areas southwest of Hays County. The average underground inflow from Comal County through the Edwards limestone reservoir is estimated as 70,000 acre-feet per year for the period 1934-47. The discharge of San Marcos Springs, averaging about 55 million gallons a day during 1955, greatly exceeds local ground-water recharge within Hays County.

Depth to water, direction of movement of water, subsurface location of aquifers, and quality of water in Hays County have been determined from records of 519 wells and springs, drillers' logs of 49 wells, periodic water-level measurements in about 70 wells, and chemical analyses of water samples from 238 wells and springs.

Ground water from wells in the Pearsall formation generally contains less than 500 parts per million of dissolved solids. Water from the Glen Rose limestone in some places contains more than 500 parts per million of sulfate and more than 1,000 parts per million of dissolved solids; locally it is high in nitrate also. Water from the Edwards limestone commonly is very hard but is otherwise of good quality for most uses, except in the southeastern part of the

county. Analyses of two water samples from the Austin chalk indicate a high content of bicarbonate. Water from the Taylor marl and from Quaternary sediments generally is hard, and locally it contains excessive nitrate.

Most wells in Hays County are used for domestic and stock supplies. About 20 wells, most of them in the Edwards limestone, yield water in relatively large amounts for industrial use, irrigation, or public supplies.

# INTRODUCTION

## Purpose and Scope of Investigation

The purpose of the investigation in Hays County was to obtain geologic and hydrologic data relating to the occurrence of ground water, especially its occurrence in the Edwards limestone and the associated Comanche Peak limestone. The work was done as part of a continuing program of ground-water investigations along the Balcones fault zone being carried on cooperatively by the U. S. Geological Survey, the Texas Board of Water Engineers, and the city of San Antonio.

Geologic studies were directed primarily toward an orientation for the presentation of hydrologic data. The mapping of stratigraphic units is intended to be consistent with that in other investigations in nearby areas, whereas emphasis in description is placed on hydrologic properties of the rock units. The geologic map shows those features of geologic structure which have a direct bearing on the occurrence or movement of ground water.

## Location of Area

Hays County is in south-central Texas (fig. 1), on the boundary between the Edwards Plateau and the Gulf Coastal Plain. The parallel of 30°00' north latitude and the meridian of 98°00' west longitude intersect approximately in the center of the county.

The greatest north-south length of the county is about 41 miles, and the greatest east-west width is about 35 miles; the total area is about 670 square miles. In 1950 the population of the county was 17,840 and; the population density about 27 persons per square mile. San Marcos, the county seat, is approximately midway between Austin and San Antonio.

## Previous Investigations

Hill and Vaughan in 1898 presented a description of the regional geology of part of central Texas, giving early information on San Marcos Springs and the artesian well at the nearby U. S. Fish Hatchery. They also prepared a geologic map (Hill and Vaughan, 1902) that included the portion of Hays County north of 30°00' north latitude and west of 98°00' west longitude, or approximately the northeast quarter of the county. Meinzer (1927, p. 33-36) summarized records of the discharge of San Marcos Springs for the period 1894-1921. About the same time Brucks (1927) prepared a report on the geology of the San Marcos quadrangle, in which he discussed the general geology of the southeastern part of Hays County.

Intermittently during the years 1916-35, Prof. F. L. Whitney of the University of Texas mapped the geology of several counties, including Hays, along the Balcones fault zone (Whitney, 1956). Several theses for advanced degrees at the University of Texas contain contributions to the geology of the county. These include the

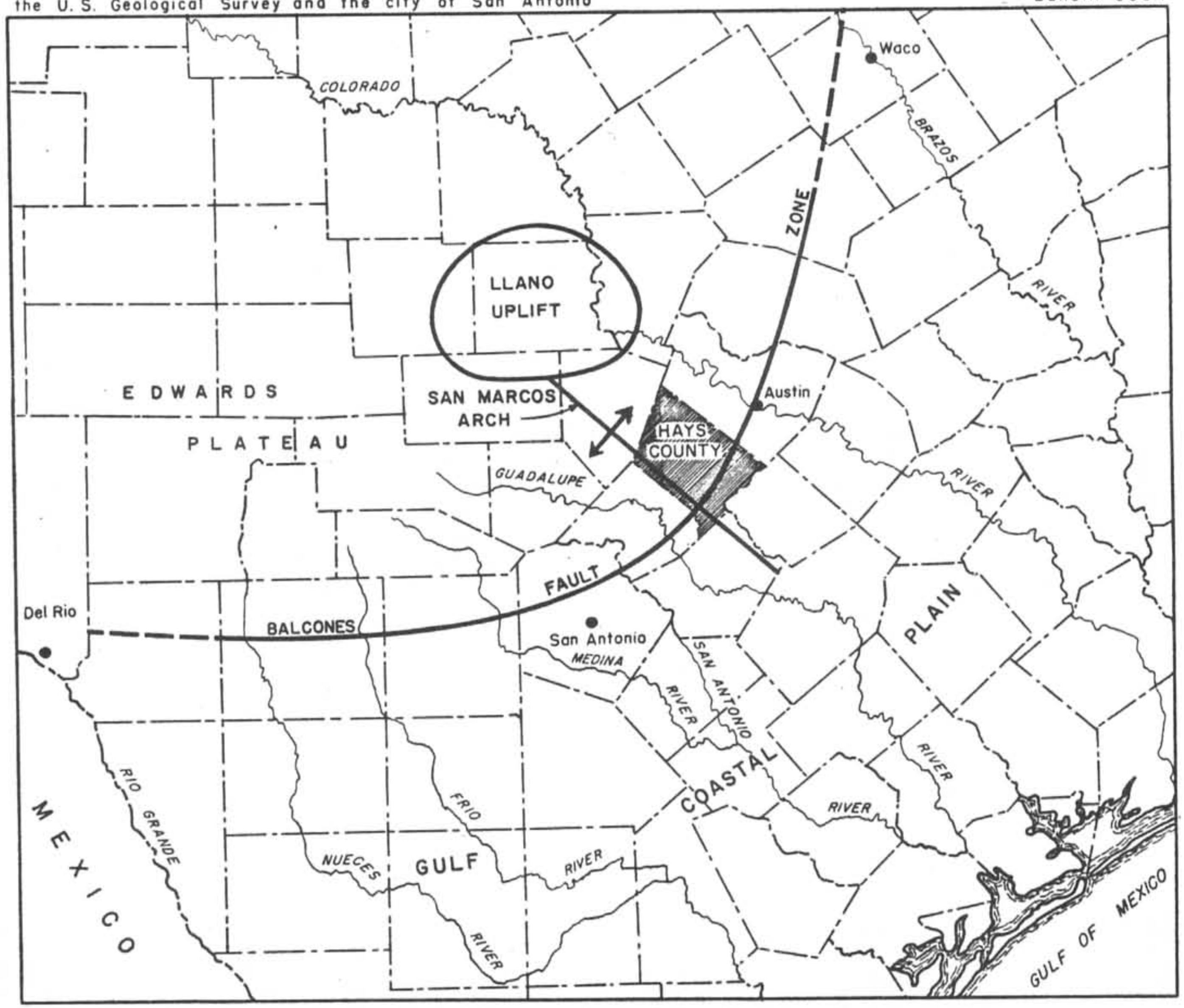


FIGURE I.- Index map of part of Texas showing location of Hays County and regional physiographic and structural features.

work of Cronin (1932) 1/, Koenig (1940) 2/, and DeCook (1956) 3/.

Records of wells and springs in Hays County were presented by Barnes (1938), and later these were supplemented and brought up to date (DeCook and Doyel, 1955). Local investigations of ground-water conditions near Buda, Kyle, and San Marcos have been made by Bennett (1942), George and Bennett (1942), and George and Follett (1945). Studies by Rhoades and Guyton (1955) have contributed materially to an understanding of the occurrence of ground water in rocks of the Trinity group. A regional discussion of ground water in the Edwards and associated limestones (Petitt and George, 1956) includes data from parts of Hays County. Records of fluctuations of water levels in wells in Hays County have been published by the Texas Board of Water Engineers (Follett, 1956).

## Methods of Investigation

The geologic maps of Hays County (pls. 1 and 2) were compiled on a base map prepared from aerial mosaics and a general highway map on a scale of 1 inch to the mile. Geologic mapping in the field was done on aerial photographs at a scale of 1:20,000.

Hydrologic data in the report include many of the records of wells and springs and chemical analyses of water previously published (DeCook and Doyel, 1955), and more recent data gathered during the course of the geologic mapping.

The chemical analyses prior to 1943 were made by employees of the Works Progress Administration and in part do not conform to standards of accuracy of the Geological Survey. The rest of the analyses were made in the laboratory of the Geological Survey in Austin.

Special attention has been given to information regarding the occurrence of water at San Marcos Springs. Records of yield of the springs have been summarized, and some knowledge of the direction of movement of ground water toward the springs has been gained by periodic water-level measurements in several observation wells near San Marcos. For purposes of numbering the wells, the county has been divided into quadrangles, each embracing 10 minutes of latitude and longitude. The quadrangles are labeled alphabetically beginning in the northern part of the county and the wells are numbered consecutively within each quadrangle.

The investigation was made under the general supervision of A. N. Sayre, chief of the Ground Water Branch of the Geological Survey, and under the immediate supervision of R. W. Sundstrom, district engineer in charge of ground water investigations in Texas. Fieldwork was done during the months of July and August 1954 and 1955, and March through June 1956.

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1/ Cronin, K. S., 1932, An Edwards, Georgetown erosional interval: Univ. of Texas M. A. thesis, 27 p.

2/ Koenig, J. B., 1940, A consideration of the Blanco River terraces north of San Marcos, Texas: Univ. of Texas M. A. thesis, 42 p.

3/ DeCook, K. J., 1956, Geology of San Marcos Springs quadrangel, Hays County, Texas: Univ. of Texas M. A. thesis, 90 p.

## Acknowledgments

The writer wishes to thank William F. Guyton & Associates for the loan of aerial photographs of the county, which greatly facilitated the geologic mapping. On several occasions the writer was accompanied in the field by Messrs. Fred L. Stricklin and Robert Pavlovic, oil company geologists, and Prof. Keith Young of the University of Texas, all of whom provided valuable geologic advice. Prof. Young also made some of the paleontologic determinations. Mr. R. G. Mitchel, formerly of the Texas Board of Water Engineers, assisted in collecting logs of wells and completing the geologic mapping in the western part of the county. Appreciation is expressed to the many ranchers who permitted access to their lands. Mr. Paul G. Rogers of San Marcos was especially helpful during the collection of data at San Marcos Springs.

# GEOGRAPHY

## History of Settlement

The southeastern part of Hays County was traversed by Spanish explorers and travelers for many years prior to 1800. In 1807 colonists from the interior of Mexico founded a settlement along the San Marcos River about 5 miles below San Marcos Springs. A historical marker at this location briefly outlines its history, as follows:

> "Site of first town of San Marcos. Known officially as Villa de San Marcos de Neve. Established in 1807 by Mexican settlers. The population on January 6, 1808, was 81. A flood in 1808 and subsequent Indian raids led to its abandonment in 1812."

The present site of San Marcos was included in a land grant made by the Mexican government of Coahuila and Texas to Juan Veramendi in 1831. After several years the grant came into the joint possession of three American settlers--William Lindsey, Gen. Edward Burleson, and Eli T. Merriman, who proceeded in 1851 with plans to lay out the new town of San Marcos. 1/

The arrival of German immigrants and many settlers of English and Scotch-Irish ancestry, around 1845, caused a surge in population and the founding of several new settlements in the county, particularly in the western part. In 1848 a sawmill was built at the town now called Wimberley. Between 1847 and 1852 settlers opened land at "Allen's Prairie," about 2 miles west of the present site of Bude; in the Dripping Springs and Driftwood areas; and along the Blanco River west of Kyle.

The present communities of Buda and Kyle were established after the extension from Austin of the International and Great Northern Railroad, which was opened through Hays County in 1881.

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1/ Dobie, D. R. 1932, The history of Hays County, Texas: Univ. of Texas M. A. thesis, 134 p.

Hays County was created by the Texas Legislature on March 1, 1848, and San Marcos, the largest community, was designated the county seat. The county was named for John Coffee ("Jack") Hays, a professional surveyor from Tennessee who was famous as a scout and Texas Ranger.

The population of the county has grown during the past century by natural increase and steady immigration. Many descendants of the early settlers are living in the county today. By 1950, according to the U. S. Census Bureau, the population of San Marcos was 9,980, and that of Hays County was 17,840.

## Agricultural and Industrial Development

The prairie farmland in the southeastern part of Hays County is utilized for the raising of cotton, corn, oats, flax, and wheat. In the northwestern part some of these crops are raised on small farms in the river valleys, but most of the terrain is rugged and is used primarily for the raising of cattle, sheep, and goats. Several recreational and resort areas have been developed near Wimberley in recent years.

Several small industries have been established at San Marcos. These include a wool-scouring plant, a die-casting plant, a meat-processing plant, and a small ceramics industry. San Marcos is well known for its schools, as well as for the Springs and other tourist attractions. The establishment of an Air Force base nearby also has enhanced the economy of the city.

## Climate

The climate in Hays County is temperate; the summers are hot but the winters are mild. Climatic records obtained at the U. S. Weather Bureau station at San Marcos may be considered generally representative of Hays County. However, the northwestern two-thirds of the county, at somewhat greater altitude, may have slightly lower temperatures than San Marcos and may receive more precipitation at times, owing to lifting of northward-flowing air from the Gulf of Mexico.

The long-term mean annual temperature at San Marcos is 67.8°F. The long-term mean monthly temperature for January is 50.6°F and for August, 84.0°F (table 1).

Table 1.--Long-term mean monthly temperatures at San Marcos
(From records of U. S. Weather Bureau)

| Month | Mean temperature (°F) | Month | Mean temperature (°F) |
|---|---|---|---|
| January | 50.6 | July | 83.6 |
| February | 52.9 | August | 84.0 |
| March | 60.7 | September | 78.9 |
| April | 67.3 | October | 69.6 |
| May | 74.5 | November | 59.3 |
| June | 81.5 | December | 51.2 |

Table 2 lists the first and last days on which freezing temperatures occured in the years 1945 through 1956.

Table 2.--First and last days having temperatures below 32°F for the years 1945-56, at San Marcos (From records of U. S. Weather Bureau)

| Year | Date of last freezing temperature | Date of first freezing temperature | Year | Date of last freezing temperature | Date of first freezing temperature |
|---|---|---|---|---|---|
| 1945 | Feb. 28 | Nov. 22 | 1951 | Mar. 20 | Nov. 3 |
| 1946 | Mar. 10 | Dec. 3 | 1952 | Mar. 24 | Nov. 11 |
| 1947 | Mar. 17 | Nov. 8 | 1953 | Feb. 26 | Nov. 9 |
| 1948 | Mar. 14 | Nov. 10 | 1954 | Mar. 7 | Nov. 6 |
| 1949 | Mar. 3 | Dec. 15 | 1955 | Mar. 29 | Oct. 25 |
| 1950 | Mar. 20 | Nov. 4 | 1956 | Jan. 14 | Nov. 27 |

The long-term mean annual precipitation at San Marcos is 32.81 inches. During the 10 year period of drought 1947-56, however, the mean annual precipitation was 28.35 inches. The minimum recorded precipitation for 1 year was 15.77 inches, in 1917; the maximum was 52.24 inches, in 1946.

The heaviest precipitation often comes during the months of April, May and September, although there is no significant rainy season. The spring and autumn rains, as well as many of the winter rains, commonly occur along slowly moving fronts between cold continental polar air and relatively warm and moist maritime tropical air. Convectional thundershowers are frequent during the summer season.

The monthly precipitation at San Marcos for the years 1893-1954, as published by the U. S. Weather Bureau, has been tabulated by Petitt and George (1956, v. 2, pt. 3, p. VII-23, VII-24). The record of monthly precipitation for the years 1922-56 with relation to the discharge of San Marcos Springs is shown graphically in figure 2.

The average annual rate of evaporation from a free water surface at San Antonio, computed by multiplying the evaporation from a Bureau of Plant Industry pan by a factor of 0.97, is 63.77 inches (Bloodgood and others, 1954, p. 67). A similar evaporation rate probably prevails in the San Marcos area, and therefore the potential annual evaporation is about twice the mean annual precipitation.

## Vegetation

The climate of south-central Texas at the eastern edge of the Edwards Plateau is sufficiently warm and moist to support a rather dense vegetal cover as compared with that of the semiarid region along the western margin of the plateau. In Hays County the more common types of trees are several varieties of oak, elm, hackberry, cedar, and mesquite. In local areas where sufficient water is available, as in the valley bottom lands, larger trees abound--cottonwood, cypress, sycamore,

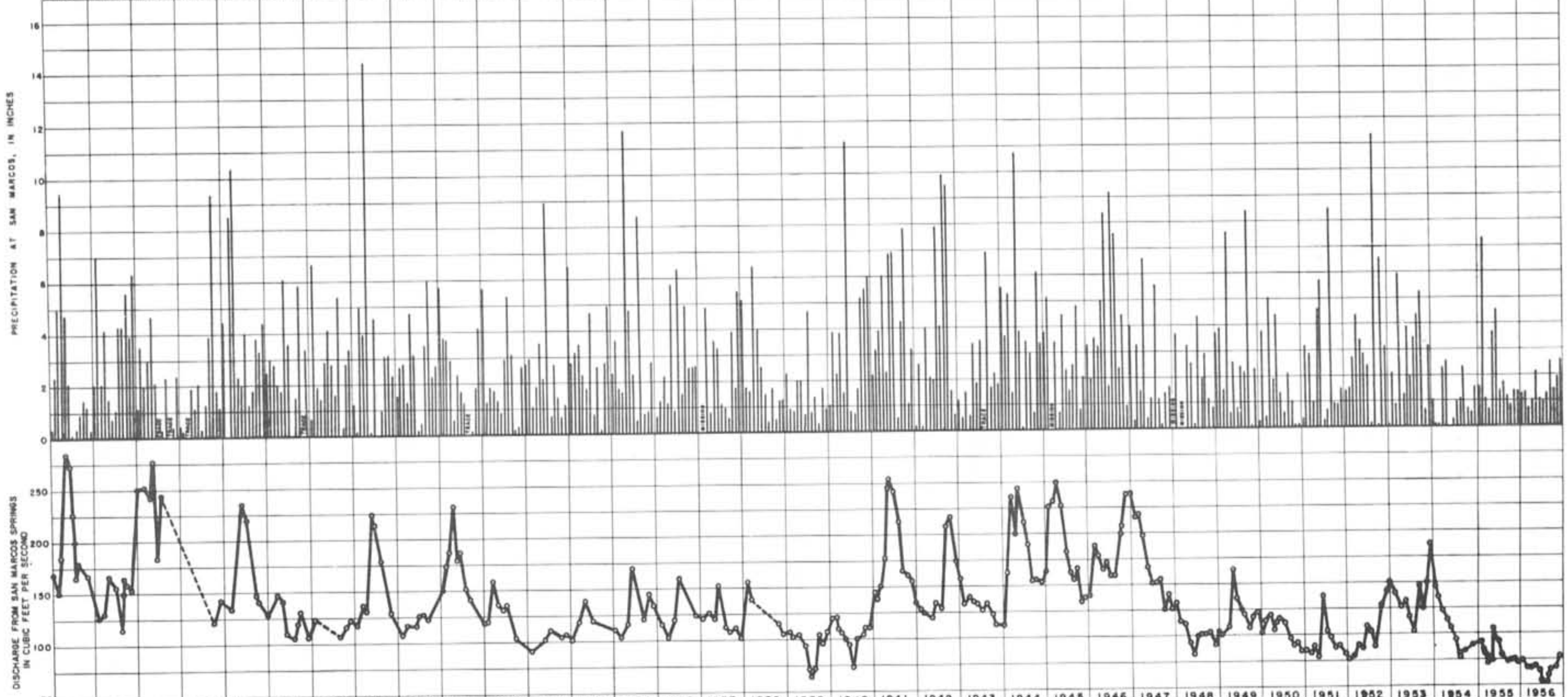



FIGURE 2.- Graphs showing monthly precipitation at San Marcos and periodically measured discharge of San Marcos Springs, 1922 - 56
[Climatic data from records of U. S. Weather Bureau]

and willow. A few types of cactus, notably the prickly pear, are abundant, locally.

The types of rock and soil developed on the different geologic formations, as well as the climate exert considerable control on local distribution of plant types. Guyler (1931, p. 67-78) has discussed the distribution of vegetation with respect to geologic formations of Cretaceous age in Texas. In general, heavy growths of oak commonly occur on limestone outcrops, juniper on marly slopes, and mesquite and natural grasses on shaly and sandy formations.

The distribution and density of vegetation are significant factors in the hydrologic cycle. Their quantitative effect on recharge of ground water has not been evaluated in Hays County. It has been shown in other areas, however, that vegetation may affect ground-water recharge, storage, and discharge in at least four ways: (1) direct interception of precipitation, and subsequent evaporation from plant surfaces; (2) use of soil moisture; (3) retention of runoff; and (4) use of ground water by phreatophytes (Gatewood and others, 1950; Meinzer, 1949).

## Topography

### DRAINAGE

Approximately the northern half of Hays County is in the Colorado River drainage basin, and the southern half is in the Guadalupe River basin. The Pedernales River, which flows across the north end of the county, joins the Colorado River at a point about 18 miles north-northeast of Dripping Springs. Barton Creek and Onion Creek, which drain the north-central part of the county, join the Colorado River in Travis County about 15 miles northeast of Buda.

The San Marcos River heads at San Marcos Springs and flows south-eastward into Caldwell County. Its largest tributary is the Blanco River, which drains most of the southern part of Hays County and joins the San Marcos River about 3 miles below San Marcos. Cypress Creek contributes considerable runoff to the Blanco River. Water from a spring known as Jacob's Well (D-69; pl. 1) flows perennially into Cypress Creek and contributes to the runoff of the Blanco River near Wimberley.

The Pedernales River where it crosses Hays County and the Blanco River along most of its course north of the Balcones fault zone, are considered to be antecedent on the Edwards Plateau, where a dendritic drainage pattern has been developed. Relative uplift of the plateau area above the Coastal Plain has caused rejuvenation of these streams so that they have cut through all or parts of the Edwards, Glen Rose, and Travis Peak formations. In places on the Edwards limestone outcrop, the Blanco River and some smaller streams appear to have been offset along northeast-trending faults where the downthrown or southeast sides consist of hard, resistant beds of the Edwards.

The Geological Survey has maintained gaging stations on Blanco River at Wimberley and on San Marcos River at San Marcos intermittently since 1924 and 1915, respectively. Records of runoff at these stations and miscellaneous measurements of the flow of San Marcos Springs have been published in Geological Survey water-supply papers.

## RELIEF

The Balcones escarpment in the southeastern part of Hays County is the boundary between the Edwards Plateau on the northwest and the Coastal Plain on the southeast. The boundary is not everywhere clear cut or sharply defined, but in general the "Hill country" to the northwest has more rugged topography and greater relief than the plains to the southeast.

The highest points in the county are slightly more than 1,600 feet above sea level, along ridge summits of the Blanco-Colorado drainage divide about 12 miles northwest of Wimberley. The lowest point is about 555 feet above sea level, at the San Marcos River where it enters Caldwell County. A maximum local relief of about 300 feet occurs in several places along the Blanco River in its traverse of the Glen Rose limestone. The outcrop of the Edwards limestone displays a more subdued topography and gentle relief except where streams have cut narrow, precipitous gorges through the hard limestone.

From the Comal-Hays County line almost to the Blanco River, the San Marcos Springs fault (pl.1) has produced an escarpment creating relief of 100 to 150 feet (pl. 2). From the Blanco River northward to Travis County, however, the zone of major faulting is displaced several miles to the northwest, and the topography of the Edwards Plateau merges irregularly into that of the Coastal Plain.

On the plains area southeast of the Balcones fault zone, the surface is underlain largely by the Taylor marl and rocks of the Navarro group, which weather rather easily to a topography of gentle sloping rises and valleys.(Pl. 3)

# GEOLOGY

## Stratigraphy and Water-bearing Properties of Rock Units

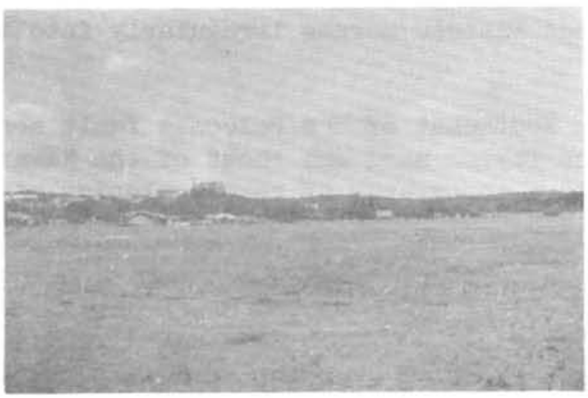
The land surface in Hays County is immediately underlain by sedimentary rocks of the Cretaceous and Quaternary systems. The Cretaceous sequence of central Texas is well represented in the county, the oldest exposed rocks of the system being those of the Trinity group and the youngest, the Navarro group. The Quaternary sediments consist largely of Pleistocene terrace gravels and local deposits of Recent alluvium and colluvium.

The most prolific water-bearing rocks in the county are the limestone units of Cretaceous age. Some of the sandy Cretaceous formations and the Quaternary deposits of sand and gravel also yield significant amounts of ground water. The formations that consist principally of clay or shale are relatively impermeable and tend to impede ground-water movement.

The stratigraphic succession in Hays County, with descriptions of lithologic and water-bearing characteristics and thicknesses of the rock units, is shown in table 3.

### PRE-CRETACEOUS ROCKS

Although the oldest exposed rocks in Hays County are Cretaceous in age,



View of Balcones escarpment from U. S. Highway 81 near San Marcos

Table 3.--Geologic formations in Hays County

| System | Series | Group | Formation | | Depositional thickness (feet) | Lithology | Water-bearing properties |
|---|---|---|---|---|---|---|---|
| Quaternary | Recent | | Alluvium and colluvium | | 0 - 30± | Clay, silt, sand, and gravel. | Locally yields small supplies of water. |
| Quaternary | Pleistocene | | Leona formation and Onion Creek marl of Hill and Vaughan (1898) | | 0 - 50± | Marl, silt, sand, gravel, and conglomerate. | Yield small to moderate supplies of water. |
| Tertiary (?) | Pliocene (?) | | Uvalde gravel | | 0 - 20± | Silt and gravel. | Not known to yield water in Hays County. |
| Cretaceous | Gulf | Navarro | | | 300± | Clay and clayey marl. | do |
| | | | Taylor marl | | 300+ | Blue-gray nodular, locally chalky marl. | Yields small supplies of water to a few shallow wells. |
| | | | Austin chalk | | 160 - 200+ | Light-gray marly or chalky limestone and tan marly fissile shale. | Yields small supplies of water in Hays County. |
| | | | Eagle Ford shale | | 20 - 30+ | Blue calcareous shale and gray arenaceous, bentonitic limestone. | Not known to yield water in Hays County. |
| | Comanche | Washita | Buda limestone | | 30 - 60 | Tan and gray massive hard nodular limestone. | do |
| | | | Grayson shale | | 40 - 60 | Blue-gray to tan gypsiferous, ferruginous marly shale. | Yields no water in Hays County. |
| | | | Georgetown limestone | | 10(?)- 50 | Light-gray and white argillaceous nodular limestone and tan calcareous shale. | Generally not water bearing in Hays County. |
| | | Fredericksburg | Edwards limestone | | 400± | Gray dolomitic, siliceous massive honeycombed limestone. | Principal aquifer in Hays County. Yields large supplies of water to wells and San Marcos Springs. |
| | | | Comanche Peak limestone | | 30 - 40 | Light-gray argillaceous, nodular limestone. | Not distinguished from Edwards limestone in wells. |
| | | | Walnut clay | | 5 - 15± | Blue-gray sandy or calcareous clay; light-gray to white argillaceous nodular limestone. | Not known to yield water in Hays County. |
| | | Trinity | Glen Rose limestone | Upper member | 500 - 900 | Hard limestone alternating with argillaceous marl, in part arenaceous and gypsiferous. Massive biostromal limestones at base. | Yields small supplies of generally highly mineralized water. |
| | | | | Lower member | | | Yields moderately large supplies from lower part. |
| | | | Travis Peak formation (Pearsall of subsurface) | Hensell member | - 85± | Fine-grained sand, siltstone, and marly limestone. | Yields small to moderate supplies of water. |
| | | | | Cow Creek limestone member | 60 - 70 | Massive detrital limestone | |
| | | | | Sycamore sand member of Hill (1901) | 50 | Conglomerate and sand. | |

Continued on next page.

Table 3.--Geologic formations in Hays County--Continued

| System | Series | Group | Formation | Depositional thickness (feet) | Lithology | Water-bearing properties |
|---|---|---|---|---|---|---|
| Cretaceous | Coahuila of Mexico | Nuevo Leon and Durango of Mexico | Sligo formation | 0 - 200+ | Limestone and shale. | Probably yields water to a few deep wells in Hays County. |
| | | | Hosston formation | 0 - 500± | Shale, shaly sandstone, and sandstone. | Not known to yield water in Hays County. |
| | Pre-Cretaceous | | | ? | | do |

these and younger sediments are underlain by a basement of Paleozoic rocks. Prior to Cretaceous deposition the Paleozoic rocks had been deformed, metamorphosed in places (Barnes, 1948, p. 11), and exposed to subaerial erosion, so that pre-Cretaceous rocks at different locations may represent various systems of the Paleozoic era.

The exposure of Paleozoic rocks nearest Hays County is along the Pedernales River in Blanco County a few miles upstream from the Blanco-Hays County line. Toward the southeast, the Paleozoic rocks are encountered in general at increasingly greater depths. Pennsylvanian shales reportedly were encountered at 820 feet in well C-33, an oil test in western Hays County (pl. 1). Pre-Cretaceous rocks were reported at about 700 feet in the Bucklin No. 1 Elsner test well about 3 miles south of Dripping Springs. Paleozoic rocks were entered at about 2,750 feet in well H-30. Rocks reported as Precambrian(?) but which may be metamorphosed Paleozoic rocks, were encountered in 3 wells at depths of about 4,800 feet in the Luling oil field in Caldwell County (Sellards, 1931, p. 827).

## CRETACEOUS SYSTEM

The Cretaceous system in the Texas-Mexico region has been divided into the Coahuila series (in Mexico), Comanche series, and Gulf series; however, only the Comanche and Gulf series are represented in the outcrop in Hays County. Rocks of the Coahuila series crop out in Mexico and their probable equivalents are exposed at the surface in Arkansas, but they have been identified only in the subsurface in south-central Texas.

### Equivalents of Coahuila series of Mexico

The Coahuila series was formerly considered a lower group of the Comanche series but has more recently been established as a separate series in Mexico (Imlay, 1944a, p. 1082). The Coahuila series of Mexico is divided into the Durango and Nuevo Leon groups. The Durango group is of Neocomian age and the overlying Nuevo Leon group is of late Neocomian and early Aptian age. Rocks bearing Neocomian fossils crop out near the Rio Grande and the Mississippi River, whereas their equivalents in south-central Texas occur only in the subsurface.

The rocks of Coahuilan age in the subsurface in Hays County are, in ascending order, the Hosston and Sligo formations, which occur as a wedge between the underlying Paleozoic rocks and the overlying Pearsall formation. (Travis Peak of outcrop areas) Imlay (1945, p. 1419) states that the age of the Hosston formation is "mainly Neocomian" and that "a lower Aptian age for the Sligo formation is indicated by its similarity to lower Aptian beds in northern Mexico."

The Hosston and Sligo formations have been identified in the log of well F-25, an oil test in eastern Hays County (fig. 3). The Hosston here is about 500 feet thick, and its electrical properties indicate that it consists mainly of shale, shaly sandstone, and sandstone. The Sligo formation is about 230 feet thick at this location. The lithologic and electric logs indicate that it consists principally of thick limestone in the upper 100 feet and alternating limestone and shale in the lower part.

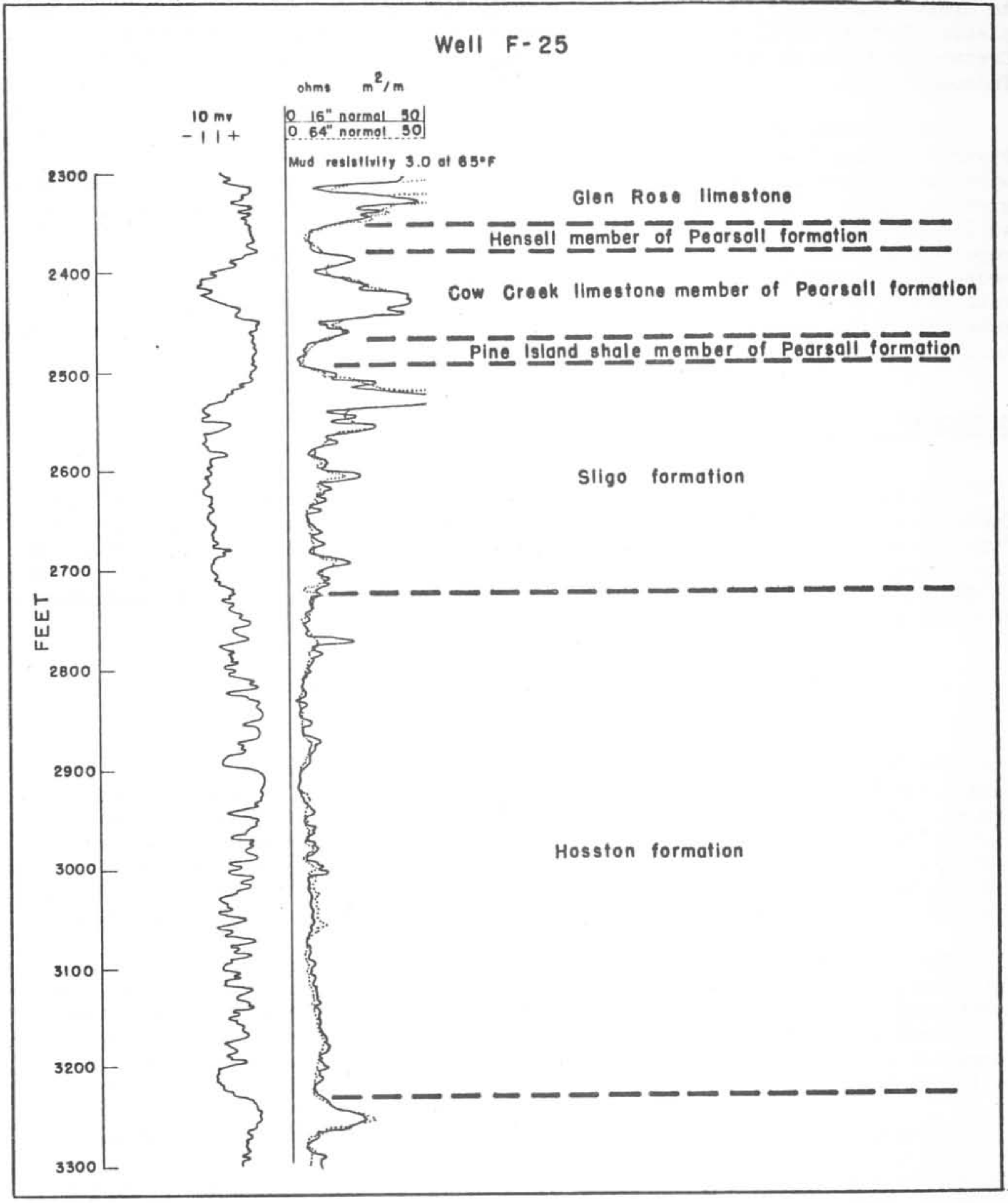



FIGURE 3.- Partial electric log of well F-25 illustrating the electrical properties of the Hosston, Sligo, and Pearsall formations.

The Hosston formation is not known to yield water to wells in Hays County; however, it seems probable that at least small quantities of potable water could be obtained from sands of the Hosston in the northern part of the county. A few wells in the north-central part of the county produce water from beds which are probably in the upper part of the Sligo formation.

## Comanche Series

The Comanche series at the outcrop in central Texas has been divided into the Trinity, Fredericksburg, and Washita groups. The oldest exposed rocks in Hays County are in the Trinity group.

### TRINITY GROUP

The exposed section of the Trinity group in Hays County is similar to that described by Hill (1901, p. 131) in the Colorado River section, where the formations included in the Trinity group are the Travis Peak formation and the Glen Rose limestone. Hill (p. 141) divided the Travis Peak formation into three members, in ascending order the Sycamore sands, Cow Creek beds, and Hensell sands (fig. 4a).

Barnes (1948, p. 8) proposed the name Shingle Hills formation to include the Hensell and Glen Rose members, and included only the Sycamore and Cow Creek members in the Travis Peak formation.

Imlay (1945, p. 1441) assigned the rocks above the Sligo formation and below the Glen Rose limestone to the Pearsall formation in the subsurface section in south Texas, the type section of the Pearsall being at a well in Frio County. As described by Imlay, the Pearsall formation includes the Pine Island shale, Cow Creek limestone, and Hensell shale members (fig. 4b), which compose a lithic sequence similar to that of the members of the Travis Peak formation where they crop out. Imlay suggested that the name Travis Peak be restricted to the formation where it is exposed at the surface.

Lozo and Stricklin (1956, p. 74) have proppsed a revision of terminology for the Comanche series and older rocks, using the term "division" for the Trinity, Fredericksburg, and Washita lithic units. They divide the Trinity as shown in figure 4c.

As pointed out by Lozo and Stricklin (p. 68), some confusion has been introduced by the dual concept of groups as rock-stratigraphic units and biostratigraphic units. It is difficult, therefore, to correlate units such as those in the Trinity group from surface to subsurface sections. The terminology of Lozo and Stricklin is based upon "cyclic repetitions of systematic deviations in type of sedimentation" and applies, in part, to both surface and subsurface units. According to their proposed subdivision of the Trinity division, the Sycamore sand and its subsurface equivalents, the Hosston and Sligo formations, compose the lower Trinity division. Their newly named Hammett shale occupies the stratigraphic position of the Pine Island shale in the subsurface section and underlies the Cow Creek limestone. The Hammett and Cow Creek compose the middle Trinity division. The Hensell sand at the outcrop and the overlying Glen Rose limestone constitute the upper Trinity division.

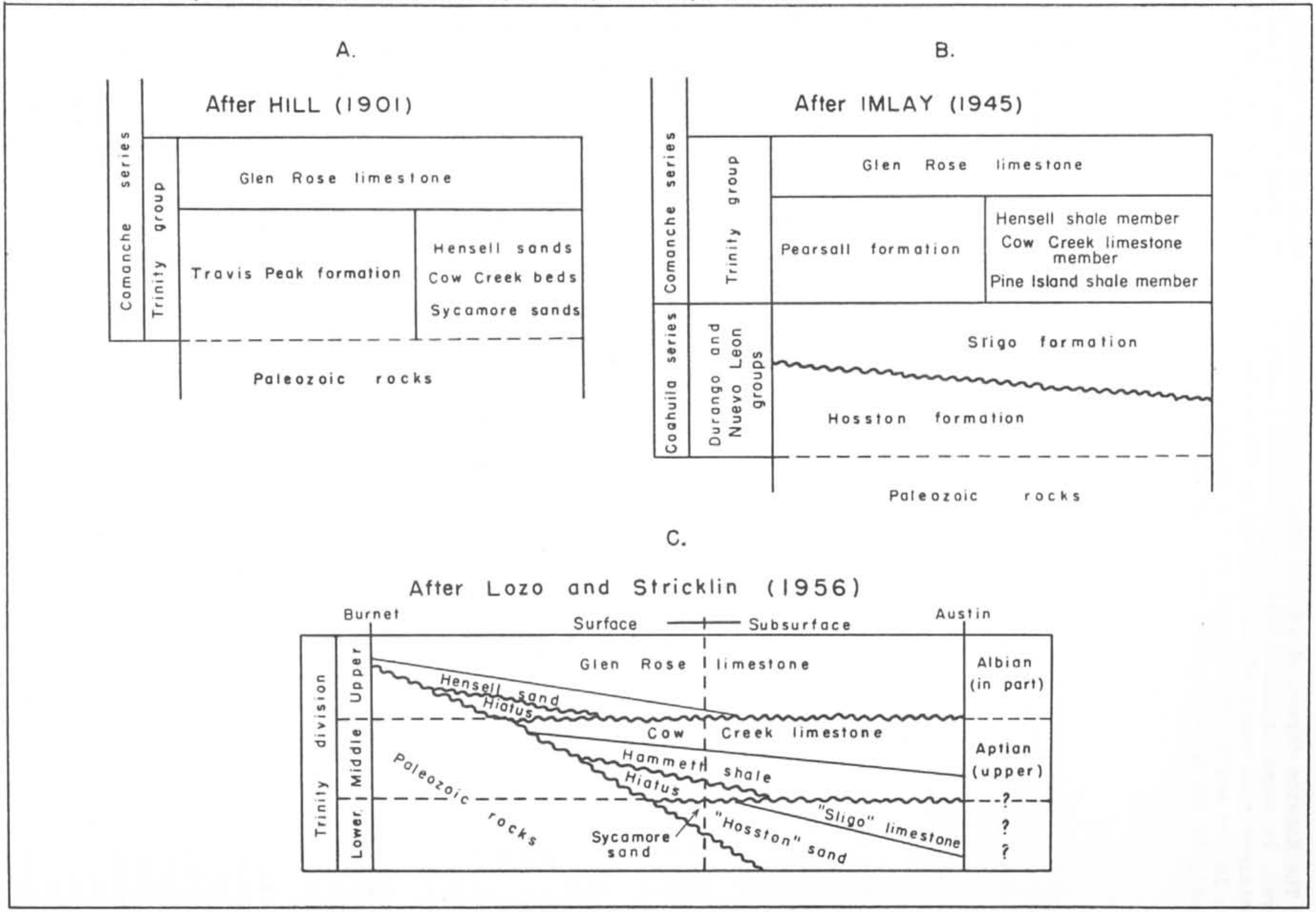



FIGURE 4.- Stratigraphic sequence of the Trinity group and related rocks

In the Hays County investigation the nomenclature of the outcrop of the Trinity group is after Hill (1901); however, the names of the members of the Travis Peak formation are slightly modified to conform to local usage -- Sycamore sand member of Hill (1901), Cow Creek limestone member, and Hensell member. In the subsurface, the nomenclature of Imlay is recognized in that the subsurface equivalent of the Travis Peak is referred to as the Pearsall formation.

## Travis Peak (subsurface Pearsall) formation

The Travis Peak formation, equivalent to the Pearsall formation in the subsurface, crops out in a few places in Hays County along the Blanco River west of Wimberley and in the Valley of the Pedernales River in the northern part of the county (pl. 1). In the latter area the exposed section is about 200 feet thick, representing all but the lowermost part of the formation. The electrical properties of the Pearsall (Travis Peak) formation are illustrated in figure 3.

### Sycamore sand member of Hill (1901)

The Sycamore sand member of Hill is exposed in Hays County only along the Pedernales River, where it consists generally of 50 feet or less of coarse conglomerate grading upward into tan and red crossbedded sand. The sand section has not been identified in logs of wells toward the southeast but the Pine Island shale is shown to occupy its stratigraphic position (fig. 3). Beds similar to the conglomerate have been observed near the base of the Hosston formation in logs of some wells downdip and the Sycamore may be at least partly equivalent to the Hosston as indicated by Lozo and Stricklin (fig. 4c). The weater-bearing properties of the Sycamore are not known.

### Cow Creek limestone member

The Cow Creek limestone member, overlying the Sycamore sand member, is essentially a massive detrital limestone. The Cow Creek commonly forms steep or overhanging bluffs, and its top is easily mapped in most places as it forms a broad, resistant terrace below the more easily eroded Hensell member.

Although the complete section was not measured, the Cow Creek member probably attains a thickness of 60 to 70 feet in some places. It is partially exposed along the Blanco and Pedernales Rivers (pl. 1) and forms an overhanging cliff and the walls of an open cavern at Dead Mans Hole (spring A-1, pl. 1).

The upper and middle parts of the Cow Creek limestone member are hard and somewhat dolomitic. The lower part is more argillaceous and locally contains beds of large oysters. In several places near the junction of Dead Mans Creek and the Pedernales River, 10 to 20 feet of dark-olive-green unctuous shale is exposed in the lower part of the Cow Creek. The upward gradation of the shale into the argillaceous limestone is generally obscured by weathered blocks and fragments of the overlying resistant limestone. In logs of wells in the downdip direction the shale occupies the stratigraphic position of the Pine Island shale member below the Cow Creek limestone member.

The limestone beds of the Cow Creek member are somewhat porous and permeable and yield water to a few wells in Hays County. At places on the outcrop, seeps and springs emerge from limestone of the Cow Creek member. The water-bearing characteristics of the Cow Creek have not been determined in Hays County, but pumping tests in Comal County have indicated that the permeability of the member is low (Welder and George, 1955).

## Hensell member

The Hensell member, overlying the Cow Creek limestone member, is about 85 feet thick in northwestern Hays County. Its largest areas of outcrop are along the upper flanks of the Pedernales River valley, where the Hensell characteristically forms nonresistant slopes between the limestones of the Cow Creek and Glen Rose. Inliers of Hensell may be seen along the Blanco River several miles north of Wimberley.

A lithic description of the Hensell member is included below with that of the Glen Rose limestone (see p. 37-38). In general the Hensell is composed of fine-grained sand and siltstone and marly limestone. The Hensell becomes progressively more fine grained and argillaceous in the downdip direction, and logs of wells in eastern Hays County indicate that the Hensell member is predominantly shale (figs. 3 and 5).

In surface exposures the lower siltstone locally has a distinctive brick-red and olive-green color, is glauconitic, and contains pockets of chalky white calcareous material. The marly limestone in the upper part of the section is fossiliferous, containing the large foraminifer Orbitolina texana (Roemer), as well as a varied molluscan fauna including large exogyrate oysters.

The sandier sections of the outcrop of the Hensell member in and near Blanco County appear to constitute favorable areas for recharge of ground water. The water moves downdip and, as the member becomes thin and shaly in central and eastern Hays County, most of it probably leaks into limestones of the underlying Cow Creek or overlying Glen Rose. It seems probable that water yielded by some wells, apparently from the Hensell member, is actually obtained from the lowermost part of the Glen Rose limestone or the upper part of the Cow Creek limestone member of the Pearsall.

## Glen Rose limestone

The Glen Rose limestone crops out over approximately the northwestern half of Hays County. The thickness of the formation ranges from less than 500 feet in the extreme northern part of the county to nearly 800 feet at San Marcos, and probably exceeds 900 feet in the extreme eastern part of the county.

The Glen Rose limestone has been divided into upper and lower members at the top of a well-known fossiliferous zone called the Salenia texana zone. The contact is referred by many field geologists to the top of the Corbula bed, a flaggy limestone bed at the top of the Salenia texana zone containing an abundance of the small clam Corbula martinae M. Whitney. The zone is distinctive and persistent throughout several counties, is readily traced on the surface, and is used as a reference in logging of wells. In the thicker downdip sections the upper and lower members are almost equally thick; however, the lower member thins rapidly updip and in many places composes only about one-fourth the thickness of the formation.

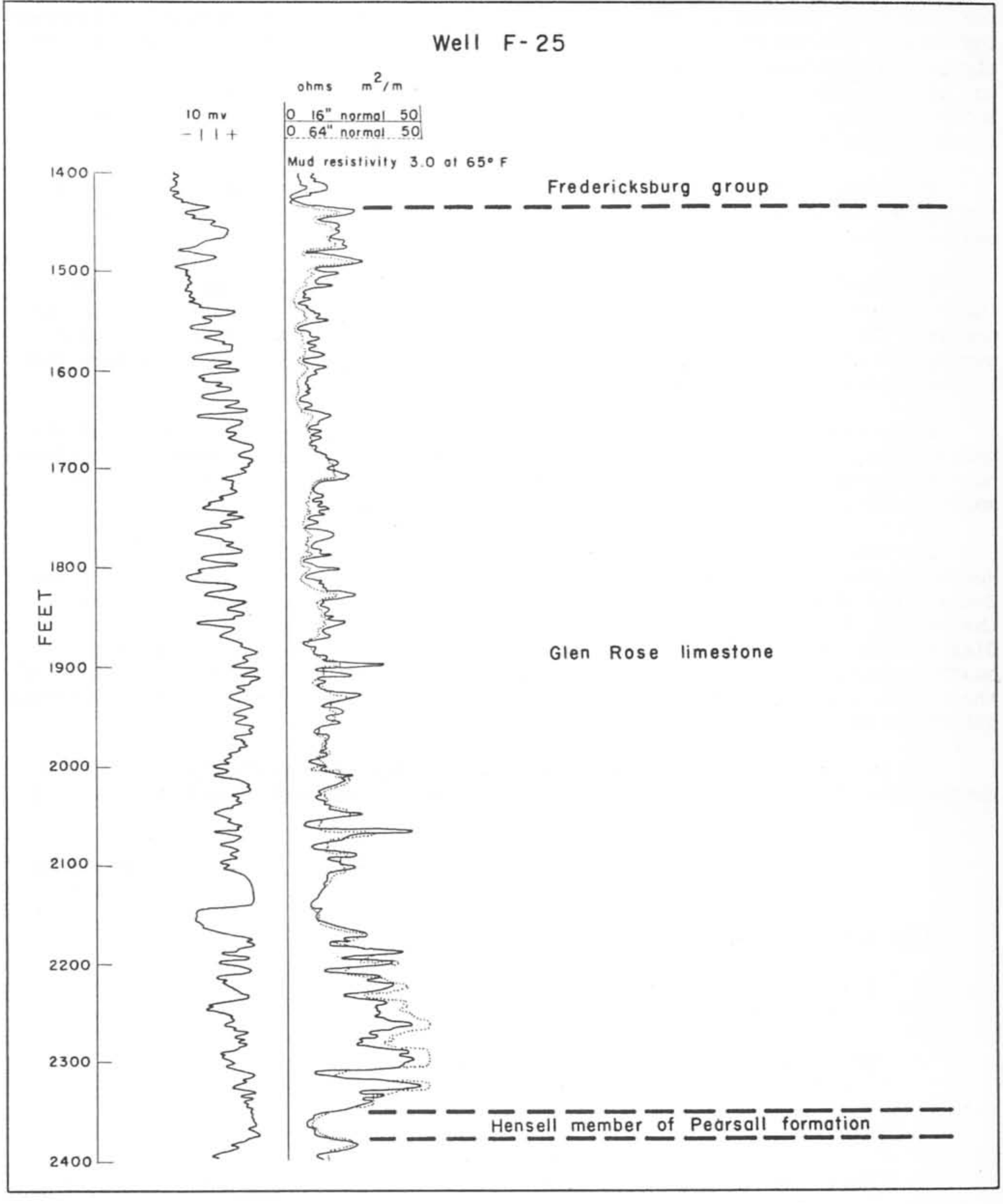



FIGURE 5.- Partial electric log of well F-25 illustrating the electrical properties of the Hensell member of the Pearsall formation and the Glen Rose limestone

The lithic and hydrologic characteristics of the upper and lower members differ somewhat. Generally, the upper member is characterized by regularly alternating beds of dolomitic limestone and marly shale, in which water-bearing zones of significant thickness are rare. The lower member is similar in its upper part, but contains more thick-bedded and massive limestones in the lower part, which locally yields considerable quantities of water. The electrical properties of the Glen Rose in eastern Hays County are illustrated in figure 5.

The lower member of the Glen Rose limestone crops out along the flanks of the Pedernales River valley in northern Hays County and in the Blanco River valley upstream from the Wimberley fault (pl. 1).

The basal part of the lower member is a sequence of biostromes 1/ containing numerous large oysters and rudistids as well as moundlike masses of colonial corals. The basal limestone is only a few feet thick in the northernmost exposures, but along the Blanco River above the Fisher store crossing it is more than 50 feet thick.

Above the basal limestone the lower member of the Glen Rose consists of alternate thin limestone beds and marly shales, with a few thick-bedded fossiliferous limestones in the upper part. Caprinid-bearing biostromes are exposed at many localities about 40 to 50 feet below the *Corbula* bed.

The lower member of the Glen Rose is, in part, a downdip facies of the Hensell member of the Pearsall formation. The transgressive contact between the Hensell and the Glen Rose approaches the *Corbula* bed toward the northwest so that the Hensell thickens near the outcrop and the basal limestone sequence of the Glen Rose becomes thinner. (See measured section, p. 35 to 37.) In most places on the outcrop the Hensell-Glen Rose contact may be readily traced at the base of the lowest persistent limestone beds not overlain by the characteristic calcareous siltstone beds of the Hensell.

The following section was measured near the Blanco-Hays County line, a few hundred feet north of the road about 2½ miles west-northwest of well B-5 (pl. 1).

| | Thickness (feet) |
|---|---|
| Glen Rose limestone, upper member: | |
| Limestone, tan, thin-bedded, hard, flaggy, crossbedded | 1.0 |
| Marl, streaked brown and tan, calcareous, moderately hard, laminated | 8.5 |
| Limestone, light-gray, hard, laminated | 2.7 |
| Marl, tan and brown, calcareous, gypsiferous, soft | 9.3 |

---

1/ The term biostrome as used here is from Pettijohn (1949, p. 299) and applies to bedded structures consisting mainly of organic remains.

| | Thickness (feet) |
|---|---|
| Glen Rose limestone, lower member: | |
| Limestone, light-gray to tan, weathers brown, slightly rippled; contains *Corbula martinae* M. Whitney | 0.5 |
| Cover (includes *Salenia texana* zone) | 10.3 |
| Limestone, light-tan, weathers dark gray, medium-bedded, honeycombed, forms prominent ledge; contains rudistids and large gastropods | 2.2 |
| Cover | 7.4 |
| Limestone, light-tan, weathers mottled gray and yellow, medium-bedded, hard | 1.8 |
| Cover | 7.3 |
| Limestone, chalky white, weathers gray, thick-bedded, hard, fossiliferous, minutely honeycombed | 3.3 |
| Limestone, tan, marly, thin-bedded, indurated; contains abundant *Orbitolina texana* (Roemer) and numerous gastropods and pelecypods | 2.0 |
| Cover | 9.2 |
| Limestone, tan, marly, thin-bedded; contains poorly preserved oysters | 0.5 |
| Cover | 3.0 |
| Limestone, light-gray, thick-bedded, hard, honeycombed | 1.5 |
| Cover | 1.5 |
| Limestone, light-gray, thick-bedded, hard; contains numerous gastropods | 2.5 |
| Cover | 1.5 |
| Limestone, white, weathers gray, indistinctly medium-bedded; contains large gastropods and pelecypods | 8.7 |
| Cover | 5.5 |
| Limestone, white, weathers gray, medium-bedded, fossiliferous | 5.0 |
| Limestone, chalky white, weathers gray, marly, indurated, fossiliferous | 8.1 |

| | Thickness (feet) |
|---|---|
| Glen Rose limestone, lower member (continued): | |
| Limestone, chalky white, weathers gray, very hard, indistinctly medium-bedded, fossiliferous | 3.0 |
| Cover | 3.9 |
| Limestone, light-gray, thick-bedded, hard; contains gastropods, large *Pecten* sp., and numerous other large pelecypods | 3.7 |
| Cover | 2.2 |
| Limestone, white, weathers dark gray, thick-bedded, brittle, honeycombed, ledge-forming; contains rudistids and large *Pecten* sp. | 1.0 |
| Marl, yellow-brown, calcareous; contains abundant *Orbitolina texana* (Roemer) | 1.0 |
| Limestone, white, weathers dark gray, thick-bedded, very hard, honeycombed, ledge-forming; contains rudistids | 1.0 |
| Cover | 4.5 |
| Limestone, white, medium-bedded, very hard; contains *Orbitolina texana* (Roemer) and small pelecypods | 2.3 |
| Marl, yellow-brown, calcareous; contains abundant *Orbitolina texana* (Roemer) | 2.0 |
| Limestone, white, weathers dark gray, thick-bedded, very hard, brittle, honeycombed, ledge-forming; contains rudistids | 1.0 |
| Limestone, light-gray, weathers mottled gray and tan, massive, very hard; contains rudistids and large exogyrate oysters, marly and very fossiliferous in upper 1 foot; contains gastropods and large pelecypods | 5.1 |
| Limestone, light-tan, marly, indistinctly thin-bedded, moderately hard | 3.3 |
| Limestone, light-gray, weathers dark gray, massive, reeflike, very hard, prominent ledge-former, honeycombed; contains rudistids | 7.8 |

Travis Peak formation, Hensell member:

| | Thickness (feet) |
|---|---|
| Limestone, light-gray, thick-bedded, moderately resistant, marly in upper 3.0 feet, interbedded with three 6 inch layers of calcareous marl and, 3.5 feet below top, a thin layer of tan calcareous earthy siltstone. Fossils include <u>Orbitolina texana</u> (Reomer), small finely ribbed <u>Neithea</u> sp., <u>large</u> turreted gastropods, and large exogyrate oysters | 11.0 |
| Siltstone, tan, slightly calcareous, soft, earthy; contains oysters in upper 1.0 foot | 13.9 |
| Marl, tan, sandy, somewhat indurated, ledge-forming slightly glauconitic; contains subrounded quartz grains $\frac{1}{2}$-1 mm. in diameter | 5.7 |
| Marl, tan, sandy, soft; contains scattered quartz grains 1-2 mm. in diameter | 4.4 |
| Limestone, light-gray, dolomitic, massive, brittle, honeycombed, ledge-forming | 8.7 |
| Marl, tan, calcareous, medium-bedded, chalky, soft | 4.2 |
| Sandstone, light-gray-green, thick-bedded, medium to coarse-grained, friable, glauconitic; contains scattered large quartz grains 1-3 mm. | 2.7 |
| Limestone, light-gray, thick-bedded, calcareous, marly, nodular, chalky; contains clams and gastropods | 2.0 |
| Cover | 4.0 |
| Limestone, light-gray, weathers dark gray, massive, micrograined, hard, somewhat honeycombed, porous, ledge-forming; contains abundant large oysters and finely broken shell detritus | 12.8 |
| Siltstone, dark-red and olive-green layers, weathers reddish tan, poorly bedded, soapy in texture, soft, slope-forming, glauconitic, nonfossiliferous; contains chalk-white calcareous pockets and seams | 14.9 |

| | Thickness (feet) |
|---|---|
| Travis Peak formation, Cow Creek limestone member: | |
| Limestone, light-gray with yellow spots, massive, calcareous, slightly honeycombed; contains pelecypods ---------------------------------------------- | 5.5 |
| Limestone, creamy-white to light-gray with tan and yellow blotches, weathers dark gray, massive, blocky, lower 5.0 feet coquinal and very porous, upper 2.0 feet very calcareous; contains many microfossils ------------------------------------------- | 6.9 |
| Cover (alluvium and detrital blocks from overlying limestone beds) ------------------------------------------ | 4.2 |
| Summary by members: | |
| Glen Rose limestone, upper member measured ------------------ | 21.5 |
| Glen Rose limestone, lower member measured ------------------ | 123.6 |
| Travis Peak formation, Hensell member measured -------------- | 84.3 |
| Travis Peak formation, Cow Creek limestone member measured ------------------------------------------- | 16.6 |
| Total section measured ---------------------------------- | 246.0 |

Although the measured thickness of the lower member of the Glen Rose limestone is about 124 feet at the above locality, this member is almost 200 feet thick where exposed along the Blanco River about 7 miles northwest of Wimberley. Logs of wells at Wimberley indicate a thickness of about 250 feet, and farther southeast the thickness probably exceeds 300 feet.

The electrical properties of the lower member of the Glen Rose limestone in western Hays County are illustrated by the electric log of well G-59 at Wimberley (fig. 6).

The basal limestone sequence of the lower member of the Glen Rose contains solution channels that carry significant quantities of water; it probably is the most prolific water-bearing zone in the Glen Rose limestone. It is the source of water for spring D-69, which feeds 1,000 gallons per minute, or more, into Cypress Creek. Many wells at Wimberley, along the Blanco River, and at places in the northwestern part of the county produce water from the basal limestones. The upper part of the lower member generally yields only small quantities of water in Hays county.

The upper member of the Glen Rose limestone crops out in a large part of northwestern Hays County. Much of the outcrop area is in the high hilly country where relief of several hundred feet is common.

The upper member of the Glen Rose has a rather persistent thickness of 350 to 400 feet. The lower boundary, or Corbula bed, is readily identified and

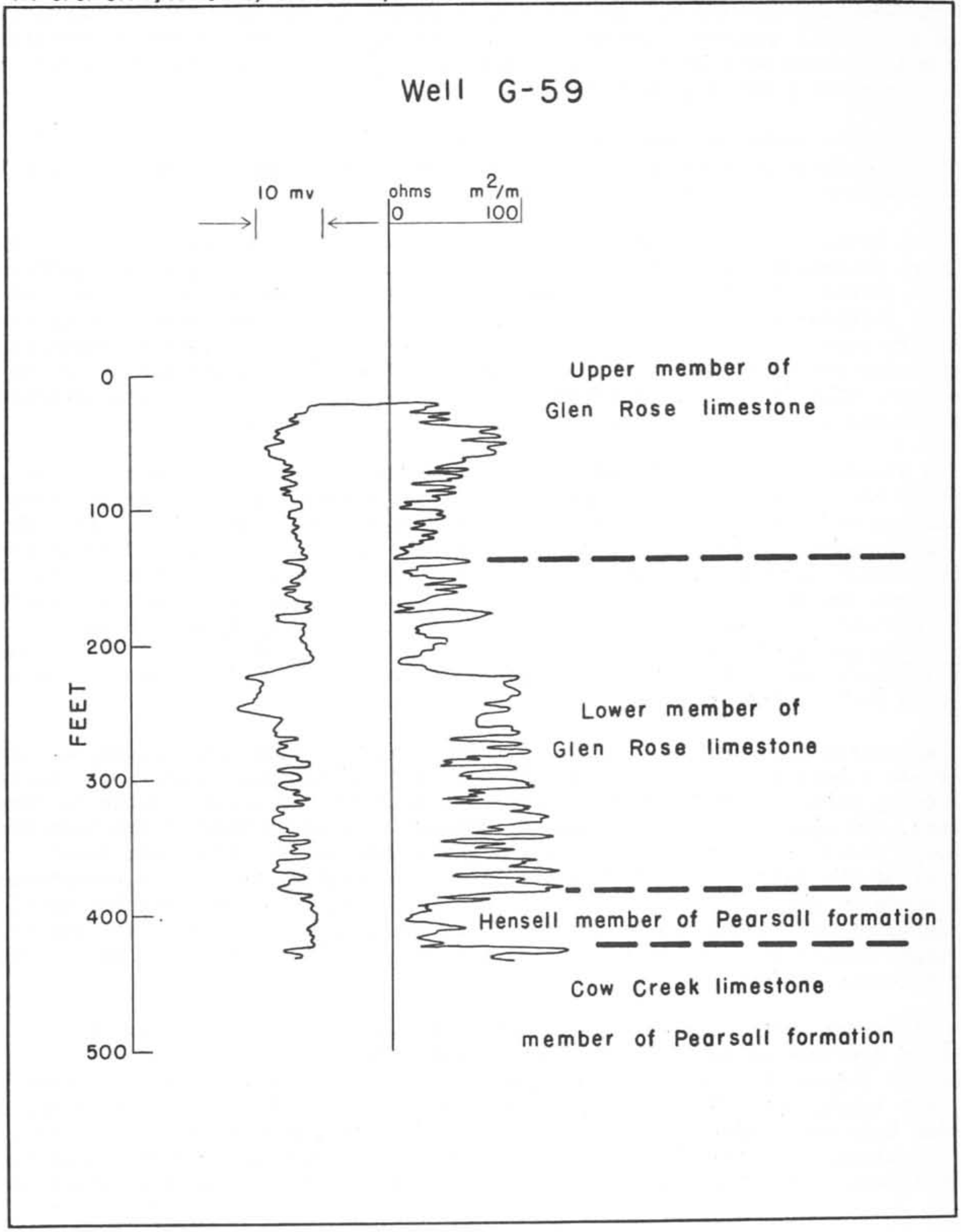



FIGURE 6.- Electric log of well G-59 illustrating the electrical properties of the Hensell member of the Pearsall formation and the lower member of the Glen Rose limestone

traced; the upper, or Trinity-Fredericksburg contact, is distinct in some localities and obscure in others. The contact is placed at the base of the Walnut clay where it is well exposed; elsewhere it is inferred below the typical Fredericksburg beds of very hard white to light-gray thick-bedded or massive dolomitic limestones, generally not separated by shale beds.

The upper member of the Glen Rose limestone is characterized by beds of light- to dark-gray or tan marly shale alternating with beds of tan generally fine-grained dolomitic or arenaceous limestone.

The basal part of the upper member consists of 20 to 30 feet of tan or yellow marl interbedded with white chalky limestone, the marl being very gypsiferous at some levels. The marl appears superficially to be granular and porous, but mineral solution and reprecipitation by circulating water have made much of the rock very compact. The basal section is overlain by 60 to 70 feet of regularly alternating shale and limestone beds characteristic of the upper member of the Glen Rose, only sparsely fossiliferous for the most part and forming a steplike or slope-and-terrace topography.

A distinctive fossiliferous section generally 30 to 40 feet thick occurs about 80 to 100 feet above the base of the upper member. It consists of thick or massive resistant limestone beds separated at intervals of about 10 feet by soft marly shales. The hard, nodular limestone beds in most places form at least three conspicuous terraces, which can be seen for distances of several miles. The limestones and intervening shales contain a prolific fauna of pelecypods, gastropods, echinoids, foraminifers, and other forms. *Orbitolina texana* (Roemer), *Porocystis globularis* (Giebel), *Loriola* sp., and several other species are abundant in these and lower beds but are generally rare or absent at higher levels in the Glen Rose limestone.

Approximately the upper 200 feet of the Glen Rose limestone is composed of alternate limestone and shale beds (pl. 4). Most of the shales are soft, marly, and poorly exposed. The limestones are generally tan, dolomitic, dense to fine grained, and sparsely fossiliferous as compared with lower beds of the Glen Rose, although poorly preserved pelecypods and gastropods are found at some levels. Several of the beds are visibly crystalline, crossbedded, and finely arenaceous. A sequence of gypsiferous marls and shales similar to those near the bottom of the upper member occurs about 200 feet above the *Corbula* bed. Near the top of the upper member is a sequence of thick beds of dolomitic limestone, which probably thickens downdip.

Yields of water from the upper member of the Glen Rose are generally small. The best aquifers probably are the hard fossiliferous limestones and the sandy limestone strata, but the water-bearing intervals are generally not more than a few feet thick, and are separated by impermeable shale. The anhydrite or gypsum in some beds has caused a high content of sulfate in the water in some places, and relatively slow circulation of the water has contributed to a generally high mineralization of ground water from the upper member of the Glen Rose limestone.

## FREDERICKSBURG GROUP

The Fredericksburg group in Hays County includes, in ascending order, the Walnut clay, the Comanche Peak limestone, and the Edwards limestone. The Walnut clay is relatively thin and is not considered water bearing. The Comanche Peak limestone, where identified, is hydrologically similar to the Edwards limestone.

View of upper member of Glen Rose limestone, 4 miles south of Wimberley, Texas.

Base of Fredericksburg group is near horizon.

For these reasons the Fredericksburg group was mapped as a unit (pl. 1).

## Walnut clay

The Walnut clay conformably overlies the Glen Rose limestone. The Walnut ranges in thickness from 5 to 15 feet and is commonly less than 10 feet thick. In southwestern Hays County the Walnut consists of blue-gray sandy or calcareous clay which weathers to light tan or yellow. In northeastern Hays County and adjoining Travis County the clay is overlain by several feet of light-gray to white chalky or argillaceous, nodular limestone. The clay beds contain a varied fauna of gastropods and pelecypods, among which *Exogyra texana* Roemer is commonly abundant. Beds containing *Exogyra texana* also occur, however, in the underlying Glen Rose limestone. In the northeastern part of the county, *Gryphaea marcoui* Hill and Vaughan is commonly found in abundance in the higher chalky limestone beds. A foraminiferal fauna is present in the Walnut, *Dictyoconus walnutensis* being characteristic but not restricted to the formation.

The Walnut clay is not known to yield water to wells in Hays County.

## Comanche Peak limestone

The contact between the Walnut clay and the Comanche Peak limestone is gradational in Hays County, and in many places does not present a clear horizon for mapping. Adkins (in Sellards, Adkins, and Plummer, 1933, p. 334) indicates that the Comanche Peak "...is a facies of the Fredericksburg, and may be in part laterally continuous with Walnut below and Edwards above."

The Comanche Peak consists generally of light-gray nodular, argillaceous limestone, very similar to the upper part of the Walnut clay in the northeastern part of the county. There are also thick-bedded to massive dolomitic limestone beds that are hardly distinguishable from the lower part of the overlying Edwards limestone. Chert nodules are scarce or absent in both the Comanche Peak and the lower part of the Edwards limestones in contrast to the abundance of chert in the upper part of the Edwards. Veinlets and nodules of white to brown secondary calcite are common in the Comanche Peak, but are found also in honeycombed dolomitic limestone beds of the overlying Edwards. The thickness of the Comanche Peak ranges from about 30 to 40 feet in Hays County.

The Comanche Peak limestone is not differentiated from the Edwards limestone by well drillers, and it is probable that at least some of the water produced from the so-called Edwards actually is derived from the Comanche Peak. Because of the lithologic similarity of the two formations, it is assumed that they have similar water-bearing characteristics.

## Edwards limestone

The Edwards limestone is the principal aquifer in Hays County. The formation was named by Hill and Vaughan (1898, p. 227), and its type locality, according to Adkins (*in* Sellards, Adkins, and Plummer, 1933, p. 339), is on Barton Creek near Austin.

The principal outcrop of the Edwards limestone in Hays County extends from northeast to southwest across the county in a belt about 4 to 7 miles wide (pl. 1). Several outliers of the Edwards also cap ridges between the Hidden Valley and Tom Creek faults. The outcrop areas are characterized by relatively subdued topography, thin rocky soil, and a thick cover of vegetation, mostly mountain scrub oak.

The thickness of the Edwards limestone is about 350 feet in the Federal fish hatchery well at San Marcos (Hill and Vaughan, 1898, p. 287, 290). The electric log of well F-25, an oil test in northeastern Hays County indicates that the Edwards is about 400 feet thick in that area (fig. 7).

The Edwards limestone in Hays County consists principally of light-gray brittle thick-bedded to massive limestone, commonly dolomitic, containing minor beds of argillaceous or siliceous limestone and calcareous shale. Bedded or nodular chert and flint characterize much of the formation, although no chert or flint is found at the base (George, 1952, p. 23) or in the upper 30 feet near San Marcos.

Lenticular masses of clay occur locally in the subsurface in the upper part of the Edwards. They may have been transported into place or they may be residual, having been deposited after solution of limestone by ground water. On the outcrop, particularly on some of the higher interfluvial surfaces a few miles west of San Marcos, beds of the Edwards limestone have been almost completely decomposed, and the surface is covered by a red calcareous clay soil, supporting only small mesquite trees and grasses. Locally, on the weathered surfaces of compact marly beds containing calcitic fossil fragments, the matrix is partially decomposed to a bright-red argillaceous mass in which the fossils appear as white sparry calcite.

Complete sections of the Edwards limestone are not well exposed in Hays County because of faulting. Partial sections are exposed in several places along the Blanco River and Onion Creek; approximately the upper third of the formation including its upper contact are well exposed along Sink Creek northwest of San Marcos. In this area the uppermost part of the Edwards is characterized by massive honeycombed rudistid- and caprinid-bearing biostromes, in addition to beds of white to light-gray brittle, massive siliceous limestone, sublithographic limestone, and calcareous shale.

The following section was measured along the right bank of Sink Creek on the J. C. Storts ranch, about 1½ miles north-northwest of San Marcos:

| | Thickness (feet) |
|---|---|
| Georgetown limestone: | |
| Shale, creamy white and tan, very calcareous, faintly thin-bedded, soft, contains Gryphaea washitaensis Hill, Kingena wacoensis (Roemer), and Neithea (?) sp. and other fossils ---------------------------------------- | 1.8 |

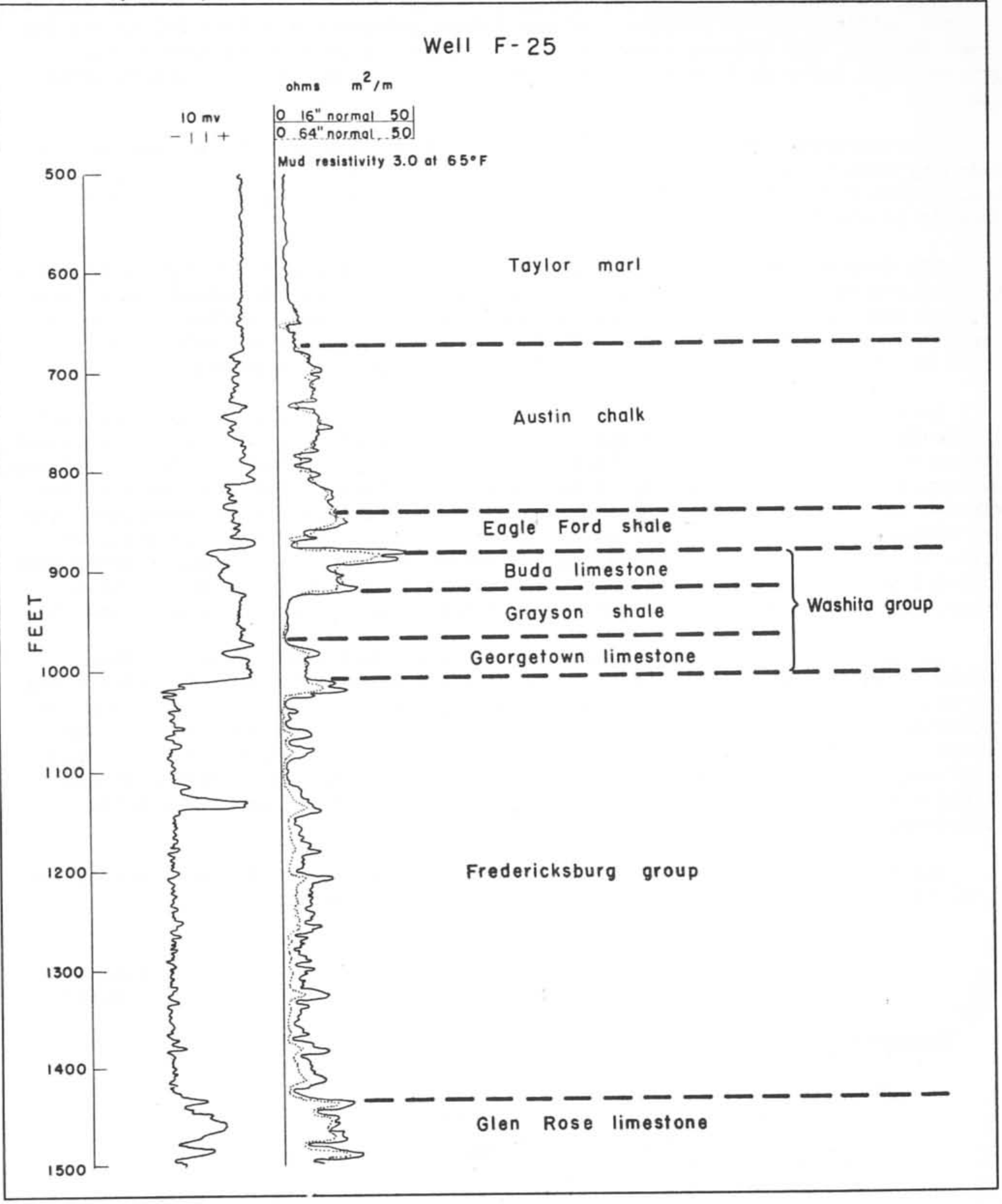



FIGURE 7.- Partial electric log of well F-25 illustrating the electrical properties of the Fredericksburg group, Washita group, Eagle Ford shale, Austin chalk, and Taylor marl

| | Thickness (feet) |
|---|---|
| Edwards limestone: | |
| Limestone, steel-gray, surface red and pitted, has burnt appearance, siliceous, massive, saccharoidal in texture, very hard, brittle; contains calcitized fragments of Toucasia sp ---------------------------------- | 1.8 |
| Limestone, similar to above but more decomposed, honeycombed; shows blocky weathering; contains small calcite crystals and consists largely of rudistids, probably Toucasia sp --------------------------- | 3.9 |
| Limestone, white to light-gray, weathers smooth and white, calcareous, massive, micrograined, rather hard, contains scattered brown secondary calcite inclusions, miliolids (?), a few rudistids near top, and small Neithea sp --------------------------------- | 2.1 |
| Limestone, light-gray to pale-brown, dolomitic, thick-bedded, macrosaccharoidal in texture, hard, honeycombed ------------------------------------------ | 4.9 |
| Limestone, light-gray, weathers dark-gray, massive, brittle; contains many caprinids in lower 4 feet ----------- | 13.4 |
| Limestone, steel-gray, weathers cream white to light-gray, calcareous, thin-bedded, flaggy, faintly laminar, brittle, sublithographic; contains few rudistids in lower 2 feet -------------------- | 3.5 |
| Limestone, chalky white, weathers dark-gray with rusty-red blotches, massive, soft, badly decomposed; contains chert nodules throughout -- small ones near top and many large nodules 2 feet below top --------------- | 6.1 |
| Limestone, steel-gray, weathers smooth dark gray, siliceous, indistinct flaggy thin bedding, sublithographic, very hard; contains many light-gray 4- to 5-inch chert nodules ------------------------------- | 1.7 |
| Chert, light- and dark-gray, banded; contains 8- to 12-inch beds of nodules; blocky -------------------------- | 0.8 |
| Limestone, brown, argillaceous, no bedding visible, earthy, soft; contains two thin beds of large chert nodules ----------------------------------------------- | 2.9 |
| Limestone, dark-gray, siliceous, indistinct 1- to 2-inch bed, sublithographic, hard, brittle, contains 3-inch bed of chert nodules 1 foot above base --------------------------------------------------- | 2.8 |
| Shale, light-gray to tan, slightly calcareous, no visible bedding, soft --------------------------------- | 2.7 |

| | Thickness (feet) |
|---|---|
| Edwards limestone (Continued): | |
| Limestone, light-gray, thick-bedded, macrocrystalline, hard, slightly honeycombed in upper 2 feet, bottom 1 foot slightly softer and decomposed; contains 5-inch bed of chert nodules 0.5 foot above base | 3.3 |
| Limestone, light-gray to tan, calcareous, slightly argillaceous, blocky 1-foot bedding, slightly chalky, somewhat indurated; contains miliolids and 2-inch bed of chert 0.8 foot above base | 4.4 |
| Summary by formations: | |
| Total Georgetown limestone measured | 1.8 |
| Total Edwards limestone measured | 54.3 |
| Total section measured | 56.1 |

In the rudistid-bearing beds of the measured section, the more abundant Pachydonta are of the genera Monopleura and Toucasia. The marly limestone beds commonly contain many pelecypods and gastropods, either as individuals or as fragments. Small echinoids are found locally in some of the beds.

Miliolid Foraminifera are present in several beds near the top of the Edwards. These can be identified in drill cuttings or hand specimens, and can be used to indicate the top of the formation. The genus Nummoloculina has recently been identified in rocks ranging from the Sligo limestone to the upper part of the Devils River (Georgetown) limestone by Conkin and Conkin (1956, p. 890-896), who point out that the abundance of miliolids is characteristic of back-reef and inter-reef environments. In southwestern Texas, where the upper part of the Devils River or Georgetown limestone is composed partly of reef-type limestones, it contains miliolids, as does the Edwards. In Hays County, however, where the Georgetown limestone contains marly limestones of an ammonite facies, the highest horizon at which miliolids occur is probably near the top of the Edwards limestone.

The Edwards limestone in Hays County and elsewhere in the region in characterized by beds of "honeycomb" limestone (pl. 5). Many of the interconnected openings in this structure are spaces from which shell material has been dissolved. Aragonitic shells have been replaced commonly by calcite, and in places the calcite has been partially dissolved from a less soluble dolomitic limestone matrix.

The method of formation of the ground-water reservoir in the Edwards limestone has been discussed by George (1952, p. 36-38). Solution in the upper part of the formation may have taken place during pre-Georgetown uplift of the Edwards and exposure to subaerial erosion. The openings have been enlarged and solution has been continued by the action of carbon dioxide-bearing meteoric water which has been recharged intermittently to the reservoir. A net work of steeply dipping faults and joints, intersecting the water-bearing beds, has provided channels along which water can move and solution continue. Several large caverns have been formed by solution in the vicinity of San Marcos. Wonder Cave, Ezell's Cave,

View of honeycomb structure in Edwards limestone along
Sink Creek north of San Marcos

and Johnson's Well (also a cave) are all located along or adjacent to the San Marcos Springs fault and not far below the Edwards-Georgetown contact. Several smaller caves are located elsewhere on the outcrop, and well drillers often report caves in drill holes in the Edwards limestone.

The Edwards limestone is the principal aquifer in Hays County. It is the source of water for San Marcos Springs and for the public-supply wells in San Marcos, Kyle, and Buda. In addition, four irrigation wells and many domestic and stock wells produce water from the Edwards in Hays County.

Wells that penetrate the lower part of the Edwards limestone along the northwestern boundary of its outcrop belt are generally small producers. Southeast of the Hidden Valley fault and in the western part of the E grid (pl. 1), water levels generally are deep and large yields are not obtained, as these areas are near the updip boundaries of the principal Edwards reservoir where conditions for recharge are unfavorable. The largest yields are obtained from wells in the eastern part of the county where the full thickness of the Edwards is saturated.

## WASHITA GROUP

The Washita group is represented in Hays County by the Georgetown limestone, the Grayson shale, and the Buda limestone. None of these formations is considered water bearing in the county. The distinctive lithic character of each is readily observed on the outcrops and in well logs. The electrical properties of rocks of the Washita group are shown in figure 7.

### Georgetown limestone

The Georgetown limestone and equivalent rocks in much of the greater San Antonio region have been included in the Edwards and associated limestones, the principal aquifer along the Balcones fault zone (Petitt and George, 1956). In Hays County, however, the Georgetown limestone is generally not water bearing and has been distinguished from the Edwards limestone in both its lithic and its hydrologic characteristics.

In Hays County the Georgetown limestone unconformably overlies the Edwards limestone. Evidence of the unconformity is the absence of the lower part of the Georgetown, as indicated by fossils characteristic of the next higher beds, and the absence of all the Kiamichi formation and possibly the upper part of the Edwards limestone. The unconformable Georgetown-Edwards contact is marked in the San Marcos area by the presence of thin calcareous shale beds containing Georgetown fossils, overlying the pitted, corroded surface of dark-gray brittle rudistid- or caprinid-bearing beds of the Edwards limestone.

The Georgetown limestone crops out in Hays County in several small areas in the hilly country northwest of the Kyle and San Marcos Springs faults, and in a few isolated patches where it has slumped into the Edwards limestone (pls. 1 and 2). The outcrops are characterized by rubbly, marly slopes, supporting growths predominantly of juniper trees. The outcrops closely resemble those of some of the marly limestones in the upper member of the Glen Rose limestone.

The thickness of the Georgetown limestone in Hays County as reported in drillers' logs ranges from about 25 to 45 feet, although in many logs the

Georgetown and Edwards limestones are not distinguished. The measured thickness of the Georgetown is about 32 feet where it is exposed along Sink Creek near San Marcos. Near Fort Worth, the thickness of rocks between the Kiamichi formation and the Grayson shale is more than 200 feet; southward toward the San Marcos arch, near the edge of the depositional basin, this sequence becomes progressively thinner by the pinching out of beds (onlap, or transgressive overlap). The thickness of the Georgetown limestone at Round Rock in Williamson County has been reported to be 83 feet; 1/ at Austin it is about 60 feet (K. P. Young, oral communication). It appears to be 40 to 50 feet along the Blanco River and Onion Creek where the upper part of the formation is similar to that of the thinner section at San Marcos, but where the marly limestones near the base are thicker.

The outcropping Georgetown limestone appears to be less than 10 feet thick in places south and west of San Marcos near the axis of the San Marcos arch. In several places the apparent thinness or absence of the Georgetown is due to its having slumped into sinkholes or being obscured by local faulting. It seems likely, however, that in places near the Comal-Hays County line the Georgetown limestone may be only a few feet thick, the overlying Grayson shale resting almost directly upon the Edwards limestone. The Georgetown-Grayson contact appears conformable; the thinning or absence of lower beds of the Georgetown is evidently due to nondeposition on structurally high areas of Edwards limestone.

The Georgetown limestone in Hays County is composed largely of light-gray nodular moderately indurated argillaceous limestone, but includes beds of light-gray to light-tan soft calcareous shale and white thick-bedded hard brittle limestone.

The lithic sequence of the Georgeotwn in the vicinity of San Marcos is composed of four distinct parts, in ascending order: (1) basal beds of tan soft calcareous shale, 1 to 2 feet thick; (2) light-gray nodular highly fossilierous marly limestone and thin beds of calcareous shale, about 20 feet thick; (3) white to light-gray mostly thick-bedded very hard limestone having a porcelaneous texture and a splintery to subconchoidal fracture, about 7 feet thick; and (4) alternating marly limestone and marly shale, 2 to 4 feet thick. The Georgetown-Grayson contact is placed at the top of the uppermost limestone bed.

In general, each of the four lithic units in the San Marcos section contains a characteristic assemblage of fossils. The echinoid *Hemiaster elegans* Shumard occurs abundantly near the top of the basal shale. The brachiopod *Kingena wacoensis* (Roemer) occurs at several horizons throughout the formation. The upper hard limestone beds and the upper shales are characterized by the turriculate ammonoid *Turrilites brazoens* is Roemer. The lower marly limestone sequence is profusely fossiliferous, containing brachiopods, gastropods, and a variety of pelecypods and mortonicerid ammonoids.

The following composite section, includes the entire thickness of the Georgetown limestone. It was measured at Sink Spring and upstream from Lime Kiln Road along Sink Creek, 1.9 miles northeast and 1.5 miles north-northeast from the post office at San Marcos.

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1/ Atchison, D. E., 1954, Geology of Brushy Creek quadrangle, Williamson County, Texas: Texas Univ. Master's thesis, 95 p.

| | Thickness (feet) |
|---|---|
| Grayson shale: | |
| Shale, blue-gray, weathers tan, calcareous, indistinctly laminated, slightly gypsiferous; contains Exogyra arietina Roemer | 2.0+ |
| Georgetown limestone: | |
| Limestone, light-gray, medium-bedded, nodular, indurated; contains Kingena wacoensis (Roemer), Pecten(?) sp | .7 |
| Shale, tan; contains nodules of soft white limestone and Exogyra arietina Roemer | .6 |
| Limestone, light-gray to white, weathers a mottled black and white blotched with pink medium-bedded, nodular, hard, chalky, glauconitic; contains Kingena wacoensis (Roemer) | 1.9 |
| Shale, tan, calcareous, thinly laminated, sparsely fossiliferous | 0.5 |
| Limestone, light-gray to white, weathers light gray and pink, calcareous, thick-bedded to massive, hard, brittle, chalky in places, glauconitic; shows conchoidal fracture; contains few Kingena wacoensis (Roemer), calcitic fragmental pelecypods, and numerous Turrilities brazoens is Roemer in lower 1.0 foot | 6.5 |
| Limestone, gray to dark-gray, indistinctly medium-bedded, nodular, indurated | 2.5 |
| Cover | 2.0+ |
| Limestone, mottled dark-gray and tan, argillaceous, thin- to medium-bedded, sublaminar in part, hard; contains many Gryphaea washitaensis Hill | 1.8 |
| Limestone, light gray, weathers dark gray, argillaceous, medium-bedded, chalky; contains many Gryphaea washitaensis Hill some Pecten(?) sp | 1.7 |
| Shale, tan to yellow, fissile, calcareous, contains limestone concretions and some Kingena wacoensis (Roemer) | .5 |

| | Thickness (feet) |
|---|---|
| **Georgetown limestone (Continued):** | |
| Limestone, light-gray, weathers dark gray and tan, argillaceous, calcareous, thin- to medium-bedded, moderately indurated with a few thin calcareous shale stringers; contains abundant *Gryphaea washitaensis* Hill, *Pecten*(?) sp., *Protocardia texana* (Conrad), *Arctostrea carinata* (Lamarck) *Mortoniceras* sp., and *Prohysteroceras* sp | 3.3 |
| Shale, tan, calcareous, irregularly thin-bedded | .3 |
| Limestone, light-gray, thick-bedded, indurated, contains *Exogyra americana* Marcou and *Arctostrea carinata* (Lamarck) near base, *Gryphaea washitaensis* Hill and *Neithea* sp. throughout | 2.1 |
| Limestone, tan, argillaceous, soft, contains many *Arctostrea carinata* (Lamarck) | .4 |
| Limestone, light-gray to creamy white, thick-bedded to massive, nodular, hard, thin calcareous shale bed in middle; contains *Gryphaea washitaensis* Hill and *Arctostrea carinata* (Lamarck) | 4.1 |
| Limestone, tan, argillaceous, thin-bedded, soft | .3 |
| Limestone, very light gray, calcareous, hard; contains mass of *Exogyra americana* Marcou and *Arctostrea carinata* (Lamarck) near base and *Gryphaea washitaensis* Hill and *G. gibberosa* Cragin throughout | 1.1 |
| Shale, tan and creamy white, very calcareous, faintly laminated, soft; contains abundance of shells including *Gryphaea washitaensis* Hill, *Kingena wacoensis* (Roemer), and *Neithea* sp | 1.1 |
| **Edwards limestone:** | |
| Limestone, steel-gray, red and pitted on upper surface, siliceous, massive, hard, brittle; contains *Toucasia* sp | 3.0+ |
| **Summary by formations:** | |
| Grayson shale: | 2.0+ |
| Georgetown limestone: | 31.4+ |
| Edwards limestone: | 3.0+ |
| Total section measured: | 36.4+ |

Northeastward from San Marcos the Georgetown limestone is lithically similar to that at the San Marcos section, except for a notable thickening of the lower limestone sequence. Thus, in electric logs of wells in Hays County the Edwards-Georgetown contact may be picked at the contact of the marly sequence with the underlying compacted and indurated Edwards limestone (fig. 7), but northward toward Austin the lowermost beds of the Georgetown more closely resemble the Edwards, and the contact is not easily discernible in the electric logs.

No wells are known to produce water from the Georgetown limestone in Hays County. The shale, marl, and compact limestones of the Georgetown are relatively impermeable and the formation acts as an upper confining bed for water in the Edwards limestone.

## Grayson shale

The Grayson shale, conformably overlying the Georgetown limestone, crops out in a rather large, flat area west of Buda, and in many places, commonly along hillsides or ravines, in the hilly country along the northwest side of the San Marcos Springs fault (pls. 1 and 2).

The formation is 44 feet thick as measured northwest of San Marcos along Sink Creek. The thicknesses reported in drillers' logs range from approximately 40 to 60 feet. Thicknesses of 40 to 50 feet are commonly reported in the San Marcos area, and 55 to 60 feet in the vicinity of Buda.

The Grayson shale consists largely of blue-gray marly shale and laminated clay weathering to tan or yellow brown. The Grayson contains much gypsum and pyrite. The lower two-thirds of the formation is calcareous at most levels; the upper third is less calcareous and more gypsiferous.

The guide fossil *Exogyra arietina* Roemer is found in all parts of the formation, but is more abundant in the lower half. *Grypaea graysonana* Stanton occurs abundantly in some beds in the upper 10 to 15 feet of the shale and in the lower part of the overlying Buda limestone. Large individuals of *Pecten* sp. and the ammonoids *Stoliczkaia* sp. and *Submantelliceras* sp. also are respectative of the upper part of the Grayson shale.

No wells are known to produce water from the Grayson shale in Hays County.

## Buda limestone

The Buda limestone in Hays County conformably overlies the Grayson shale. The contact, however, is obscured in many places by talus from the overlying brittle Buda limestone.

The outcrops of Buda limestone in Hays County are confined to the area of the Balcones fault zone, occurring characteristically as resistant caps on small hills or mounds (pls. 1 and 2). The thickness of the Buda ranges from about 30 to 60 feet, according to logs of water wells throughout the county.

The Buda in Hays County consists of very hard fossiliferous crystalline limestone which is commonly glauconitic. Colors on fresh surfaces are light gray, tan, or pale orange, and on weathered surfaces, dark gray or brown.

Bedding is medium to massive and indistinct; the beds have nodular surfaces. Some beds of calcarenite in the upper part of the formation are red orange on fresh fracture, consisting largely of shell debris which resembles a detrital coquina. The lower part of the formation includes several beds of light-gray calcilutite, which has a conchoidal fracture and contains numerous small casts lined or filled with crystalline calcite.

Fossils in the Buda include several pelecypods and numerous small gastropods. Pecten roemeri Hill and the ammonoid genus Budaiceras are reportedly characteristic of the Buda limestone (Adkins, 1928, p. 18), but both types are relatively rare in Hays County. Large nautiloids are abundant in some beds near the middle of the formation.

The Buda is not known to yield water to wells in Hays County.

## Gulf Series

### EAGLE FORD SHALE

The lowest recognizable rock unit representing the Gulf series in Hays County is the Eagle Ford shale. It unconformably overlies the Buda limestone of the Comanche series.

The Eagle Ford shale crops out on several hilltops and ridges in and near San Marcos and in a few large areas adjacent to Onion Creek near Buda (pls. 1 and 2). The Blanco River has cut through an entire section of the shale about 3 miles southwest of Kyle; the best exposed sections, however, have been disturbed by local faulting.

Along the Blanco River the Eagle Ford appears to be at least 30 feet thick. Drillers' logs of wells between San Marcos and Kyle show thicknesses ranging from 23 to 32 feet and apparently increasing toward the northeast.

The Eagle Ford shale consists of three distinct lithic units in Hays County. As exposed in the vicinity of San Marcos, the sequence is as follows: (1) a basal blue calcareous shale about 7 feet thick; (2) a middle gray sandy flaggy limestone 4 to 5 feet thick; and (3) an upper compact silty shale 10 feet or more thick. The arenaceous limestone beds in the middle section strongly resemble the Boquillas flags, the equivalent of the Eagle Ford in west Texas. The middle part of the Eagle Ford contains numerous seams and layers of bentonitic material. The arenaceous beds contain Inoceramus sp. and abundant fish remains.

The Eagle Ford shale is not known to yield water to wells in Hays County.

### AUSTIN CHALK

The Austin chalk unconformably overlies the Eagle Ford shale in Hays County. The Eagle Ford-Austin contact and the lower 60 feet or more of the chalk are well exposed along the Blanco River about 3 miles southwest of Kyle. Elsewhere in the county, southwest of San Marcos and in an area of several square miles near Kyle, the Austin chalk occurs as erosional remnants between faults. A few slumped or downfaulted blocks are capped by the Austin chalk several miles northwest of the larger outcrop areas (pls. 1 and 2). The Austin chalk is in fault contact with the Taylor marl at many places in Hays County.

Some parts of the Austin chalk in Hays County are poorly exposed or not exposed at all, and no complete section was measured. Drillers' logs of several wells near San Marcos and southwestward show about 160 to 180 feet of chalk, and near Kyle and Buda to the northeast about 200 feet or more.

The Austin chalk, as observed southwest of San Marcos and along the Blanco River, contains beds of light-gray argillaceous or chalky limestone interbedded with gray or tan laminated calcareous shale. Crystals and small seams of pyrite and marcasite occur locally, and some of the beds contain glauconite or exhibit red-brown ferruginous stains. Among the more abundant fossils are the pelecypods *Gryphaea aucella* Roemer, *Exogyra laeviuscula* Roemer, *Inoceramus* sp., *Camptonectes* sp., and *Neithea* sp., as well as many gastropods and large, subglobose nautiloids.

Solutional cavities occur in surface exposures of some of the hard fossiliferous limestone beds. Beds of this type transmit some water, but in general, circulation of water is impeded by intervening layers of compact chalk, marl, and shale. At a few places northeast of San Marcos gravity springs and seeps flow during wet periods, the flow representing local drainage of the more permeable beds. Small supplies of water are produced from the Austin chalk by several wells. A few wells, which yield water principally from the Edwards limestone, temporarily yield water also from the Austin chalk after heavy rains recharge the chalk locally.

## TAYLOR MARL

The Taylor marl unconformably overlies the Austin chalk in Hays County and in other parts of south-central Texas (Stephenson, 1937, p. 136). On the outcrop in Hays County the Taylor marl is in fault contact with the Austin chalk and older rocks for a distance of several miles along the Kyle and San Marcos Springs faults (pls. 1 and 2).

The thickness of the Taylor marl in Hays County is probably 300 feet or more, although the exact thickness is difficult to determine owing to the lithic similarity of the Taylor and the overlying rocks of the Navarro group. Drillers' logs of wells in the southeastern part of the county show sections of clay and marl as much as 340 feet thick overlying the Austin chalk; however, part of this thickness may represent rocks of the Navarro. The maximum figure of 300 feet assigned to the Taylor in Hays County is in accord with the 300 feet of thickness in Comal County (George, 1952, p. 14).

On the outcrop in Hays County the Taylor marl is blue-gray thin-bedded nodular locally chalky, clayey marl, which is tan or light brown where weathered. Locally the Taylor contains *Alectryonia falcata* (Morton) and large individuals of *Exogyra ponderosa* Roemer.

A small number of dug wells and shallow drilled wells on the outcrop of the Taylor marl produce water for domestic and stock use from relatively shallow depths. Because of its lithic character, it is unlikely that large yields will be obtained from the Taylor.

NAVARRO GROUP

Rocks of the Navarro group overlie the Taylor marl in easternmost Hays County. The rocks consist of about 300 feet of chiefly blue-gray compact shaly clay and clayey marl, hardly distinguishable from the underlying Taylor marl on weathered outcrops. Likewise in well logs, it is difficult to distinguish the Taylor from the Navarro because of lithic similarities. The Navarro and Taylor have not been differentiated on the geologic maps (pls. 1 and 2).

No wells in Hays County are known to produce water from the Navarro group, and it is not generally considered water bearing.

## TERTIARY (?) SYSTEM

### Pliocene(?) Series

#### Uvalde Gravel

The Uvalde gravel in Hays County occurs as terrace gravel along the southeast side of the Balcones fault zone. The gravel is found as remnants atop stream divides, where it forms upland terraces or caps of hills. It is thin, attaining a maximum thickness of about 20 feet in a few places. The Uvalde is composed of subrounded pebbles and cobbles of chert, flint, and limestone, commonly weathered out of a calcareous matrix and forming a veneer upon a characteristic heavy black soil.

The age of the Uvalde gravel remains to be determined definitely, although it has been regarded generally as older than the Pleistocene Leona formation.

The remnants of the Uvalde gravel are generally small in area and discontinuous. They probably absorb rainfall readily and, because of high topographic position, just as readily discharge contained water into underlying formations or through seeps and springs. The Uvalde is therefore considered not an aquifer. Because of its sporadic occurrence and lack of hydrologic importance, the Uvalde was not mapped.

## QUATERNARY SYSTEM

### Pleistocene Series

#### Leona Formation, and Onion Creek Marl of Hill and Vaughan (1898)

The Leona formation and the Onion Creek marl of Hill and Vaughan (1898, p. 252) have not been differentiated in the investigation; the two formations, where mapped (pls. 1 and 2), are shown as older alluvium. The maximum thickness of the older alluvium in Hays County probably is about 50 feet.

The Leona forms a broad, flat terrace extending from the vicinity of Kyle southeastward into Caldwell County. The terrace is about 100 feet higher than the adjoining flood plain of the Blanco River to the southwest. Because of its distinctive topographic form and position, the Leona terrace has been mapped separately from the lower terraces of undifferentiated Quaternary sediments.

The Onion Creek marl of Hill and Vaughan forms a terrace in the valley of Onion Creek in an area 1 to 2 miles wide and about 4 miles long, extending from just southwest of Buda to the Hays-Travis County line. The Onion Creek terrace is at approximately the same altitude as the Leona terrace described above.

The present valleys of the Blanco and San Marcos Rivers are underlain in part by rocks of the Leona formation. Small outcrops of the formation are found also along Onion Creek and smaller streams in the Edwards Plateau, but the Leona has not been distinguished at these localities because of its small extent and lack of hydrologic significance.

The Leona formation in Hays County consists largely of pebble conglomerates in a marly matrix, but also includes limestone gravels, poorly sorted sand, and silt.

The lithic characteristics of the Onion Creek marl have been described as follows (Hill and Vaughan, 1898, p. 252):

> Occupying an intermediate attitude below the level of the Uvalde formation and above the present flood plains of the numerous secondary streams of the Edwards Plateau and Rio Grande Plain, there is a formation which consists of a faint yellow or salmon-yellow calcareous marl, sometimes accompanied by fine pebble conglomerate, all of which is derived from the Cretaceous limestone material.

In the area southeast of Kyle, the saturated thickness of the Leona formation probably does not exceed 10 feet in most places. A few shallow wells produce water for domestic and stock use. Because of the high topographic position of the Leona in this area and the relative impermeability of the underlying rocks, at least some of the contained water is drained by gravity springs along the boundaries of the outcrop.

Locally, where the Leona formation has been deposited in sufficient thickness within the river valleys, it yields enough water to irrigate small areas. Where it rests upon rather permeable formations such as the Edwards limestone and Austin chalk, it probably acts as a recharge facility for the underlying rocks.

## Recent Series

### Alluvium

Stream deposits of relatively recent geologic age cover marginal flood plain areas along the Blanco and San Marcos Rivers in the Balcones fault zone and southeastward. They also occur locally in higher reaches of the Blanco River and along smaller stream channels in the plateau area.

Recent alluvium in Hays County contains much surficial clay and silt, but poorly sorted sands and gravels also are exposed along deeper stream channels. The maximum observed thickness of the alluvium is about 30 feet.

A few wells obtain small supplies of water from the alluvium in Hays County, but its thickness and area extent generally are not great. In the present stream valleys where deposits of the Leona formation and Recent alluvium are contiguous, the two formations probably act as one hydrologic unit and they have not been differentiated on the geologic map (pl. 1).

#### Colluvium

At several localities along the banks of the Blanco River and some of the smaller streams, and along the escarpment of the San Marcos Springs fault (pl. 2) the surface rock consists of colluvium, or detrital rocks that have been deposited directly by the action of gravity. On relatively steep slopes of the stream valleys, blocks of rock material ranging in length from a few feet to more than 200 feet have slumped because of undercutting in the stream channels. Some of the blocks are intact, whereas others have been overturned and broken. The slumping commonly occurs along water-lubricated slide surfaces in the Grayson shale. Along the escarpment in San Marcos the colluvial material includes several such blocks in addition to much loose detritus derived from the Grayson shale, Buda limestone, and Eagle Ford shale.

The deposits of colluvium are surficial features and are relatively small; consequently, their effect on the occurrence and movement of ground water is negligible.

## Structural Geology

### REGIONAL STRUCTURE

In Hays County Cretaceous and younger sediments rest upon a structural basement of Paleozoic rocks which have been deformed by post-Pennsylvanian orogeny and erosion. The Paleozoic rocks were deposited previously in a sea on the southeast limb of the Llanoria geosyncline, which extended from Arkansas southwestward through central Texas and possibly into Mexico. Before the end of the Pennsylvanian period, orogenic movements commenced in the geosynclinal area and the rocks were somewhat deformed. Intermittent uplift and erosion continued probably into the Mesozoic era so that at the beginning of Cretaceous deposition the regional slope was to the southeast.

Transgressive Cretaceous seas extended from the southeast and covered the entire central Texas area. Later uplift of the Llano area (fig. 1), however, caused the erosional removal of Cretaceous rocks and exposed the Paleozoic rocks from the Llano uplift southeastward almost to the western border of Hays County.

More or less continuous deposition along the Gulf Coast from the Cretaceous period to the present time has been accompanied by normal faulting along the Balcones fault zone, which transects Hays County.

### Balcones Fault Zone

The Balcones fault zone extends from near Waco southwestward through Austin and San Antonio, thence westward to near Del Rio (fig. 1). Movement along faults of the Balcones fault zone is predominantly downward toward the southeast; movement in the Luling-Mexia fault zone, about 20 miles southeast, is predominantly downward toward the northwest. Thus the Balcones fault zone is the northwestern boundary of a regional graben which parallels the southeastern margin of the Llano uplift in the vicinity of Hays County.

Faulting is not limited to the Balcones and Luling-Mexia fault zones. Approximately parallel faults occur at intervals of a few miles between these zones and, in Hays County, northwestward beyond Wimberley. The Balcones fault zone, as well as the Luling-Mexia, represents local concentrations of faults having relatively small individual but major aggregate displacement.

The zone of major displacement in the Balcones fault zone is not continuous across Hays County. Sellards (Sellards and Baker, 1934, p. 56-57) describes two "sub-zones" of faulting, entering Hays County from the southwest and coverging near the Colorado River in Travis County. One of these (possibly the Hidden Valley fault) crosses the Comal-Hays County line near the head of Purgatory Creek and has a relatively small throw. The other zone is described as follows:

> At the margin of the Coastal Plain in the vicinity of San Marcos, is a highly complicated zone of faulting characterized by numerous faults, some of which are of large throw...The individual faults have in the main the same trend, although there are many faults of divergent trend, resulting in numerous small and irregularly shaped fault blocks, so that the fault pattern as a whole is very complex.

The latter zone, which consists principally of the Comal Springs and San Marcos springs faults, causes the greatest local stratigraphic displacement and forms a sharp, visible boundary between the Edwards Plateau and the Coastal Plain. A zone of faulting, having a similar but larger displacement, passes near Mount Bonnell in Austin, enters Hays County from the northeast about 8 miles northwest of Buda, and extends southwestward toward Wimberley.

Although the general trend of the Balcones fault zone across Hays County is about N. 15° E., the individual zones of major displacement trend about N. 45° E. the approximate strike of the strata. The faults are <u>en échelon</u>, being offset about 12 miles within the county. A secondary set of faults strikes almost north-south, the downthrow being predominant to the east. Between the two subzones in east-central Hays County is an area of many rather small faults of more complex pattern (pls. 1 and 2).

## San Marcos Arch

A regional subsurface structural arch named San Marcos arch by Adkins (Sellards, Adkins, and Plummer, 1933, p. 266), extends through southwestern Hays County. The Comal-Hays County line lies approximately along the axis of the arch, which trends about S. 50° E. extending from the Llano uplift to the Gulf Coastal Plain (fig. 1).

The arch has no direct topographic expression but is evident from the thinning of some post-Edwards Cretaceous formations along its crest, particularly the Georgetown limestone, Eagle Ford shale, and Austin chalk.

Although the age of forming of the arch has not been exactly determined, Sellards (Sellards and Baker, 1934, p. 114) has stated that it may have been formed during the Pennsylvanian period and rejuvenated in the Cretaceous period.

### Regional Dips

On the Edwards Plateau in northwestern Hays County, the regional dip of the Cretaceous rocks is generally about 20 feet per mile to the southeast, which is the approximate gulfward slope of the land surface. Southeast of the Balcones fault zone the dip is progressively greater toward the Gulf, probably approaching 100 feet per mile in southeastern Hays County.

## LOCAL STRUCTURE

### Faults

The major trend of the faults in Hays County is about N. 45° E.; individual faults in the major fault zones strike between about N. 35° E. and N. 50° E. In the San Marcos-Kyle area, and locally elsewhere, a secondary trend of branching or interconnecting faults strikes almost north, commonly within the range of about N. 5°-15° E. A few faults have general east-west trends.

Evidence of the dips of faults generally is difficult to obtain, as no wells in the county are known to intersect faults, and fault traces on sloping surfaces are not plainly visible except in a few places. Where the dips have been observed, they commonly exceed 60°, and their steepness is indicated further by the generally straight traces of faults across uneven land surfaces.

Stratigraphic displacement along most of the faults is downward on the east or southeast sides (pl. 1), although there are a few faults of opposite displacement in all parts of the county. The maximum displacement along any single fault in the county probably does not exceed 500 feet, but the total displacement across the Balcones fault zone is much greater, estimated at about 1,700 feet within Hays County.

At least seven major faults in Hays County are traceable for many miles and have relatively great displacement. In addition to these, at least 70 faults are of lesser length and have less displacement generally.

The traces of faults shown on the geologic maps (pls. 1 and 2) in some places represent single distinct fractures; in other places they represent zones of fracturing up to several hundred feet in width, and they may include several closely related parallel or *en échelon* faults.

#### COMAL SPRINGS FAULT

The Comal Springs fault forms the principal escarpment in Hays County, extending from beyond the Comal-Hays County line to a point near Purgatory Creek, northeast of which the trace of the fault is concealed by alluvium for several miles. The position of its northeastward continuation across the county is indicated by logs of wells, showing throws of about 400 feet near well H-98, 360 feet near San Marcos, 350 feet near Uhland, and more than 300 feet near the Hays-Travis County line. According to George (1952, p. 29) the Comal Springs fault has a throw of 400 to 600 feet in Comal County. The strike of the fault in Hays County is about N. 40° E.

The Comal Springs fault is approximately along the southeastern boundary of the fresh-water-bearing part of the Edwards limestone reservoir, at least from the vicinity of San Marcos to Comal County. No wells are known to produce water of usable quality from the Edwards limestone southeast of the fault.

## SAN MARCOS SPRINGS FAULT

The San Marcos Springs fault forms the southeasternmost boundary of the outcrop of Edwards limestone in southern Hays County. The strike of the fault is about N. 40° E. Near San Marcos Springs it branches into two major faults, one continuing the strike about N. 40° E. and the other striking about N. 25° E. toward Kyle.

The Edwards limestone is in contact with the Austin chalk along the San Marcos Springs fault at the Comal-Hays County line. At San Marcos Springs the uppermost part of the Edwards is thrown against rocks identified as probably the lower part of the Taylor marl or possibly the upper part of the Austin chalk. A stratigraphic displacement of more than 300 feet is thus indicated at the springs. Northeastward, the southerly branch of the fault appears to decrease in throw, but its northerly branch appears to increase in throw in the direction of Kyle.

## OTHER LARGE FAULTS

The Kyle fault is possibly an extension of the northerly branch of the San Marcos Springs fault. It crosses the Blanco River about a mile west of Highway 81, extends through Kyle, and is well exposed along Plum Creek about a mile northeast of Kyle where it forms the contact between the Austin chalk and the Taylor marl. Immediately northeast of Kyle the fault has a throw of possibly less than 50 feet. Farther northeastward it apparently dies out, much of its movement being taken up by the north-trending branch fault between Kyle and Buda. The Kyle fault strikes about N. 30° E. It forms the approximate southeastern boundary of the fresh water in the Edwards limestone reservoir from San Marcos to the vicinity of Buda.

The Mustang Branch fault is the zone of faulting, or series of faults intersecting at small angles, which forms the northwestern boundary of the outcrops of rocks of the Washita group in central Hays County. This zone of faulting trends toward the northeast, the faults tending to veer or be offset toward the northwest at several places along the trace. The amount of displacement along the fault is not known; however, it appears to range greatly within short distances along the strike. Near the crossing of the fault by the Blanco River, considerable recharge from runoff to the Edwards limestone occurs through the fracture openings associated with the fault.

The Hidden Valley fault extends northeastward from the Hays-Comal County line at least as far as the Blanco River. The average displacement of the fault is estimated to be about 200 feet in Comal County (George, 1952, p. 31); however, the displacement generally decreases toward the northeast so that near its end in Hays County the fault merges into a slight flexure. For a distance of about 10 miles the Hidden Valley fault forms the southeastern boundary of the outcrop of Glen Rose limestone.

The Wimberley fault extends from near Onion Creek southwestward at least to Wimberley and perhaps beyond into Comal County. It is best exposed at several places between Wimberley and Lone Man Creek. Near well D-64 the Trinity-Fredericksburg contact is displaced at least 120 feet by the fault.

Near the Blanco River about 4 miles southwest of Wimberley, a fault zone or group of parallel faults as much as 500 feet apart strikes about N. 45° E. The juncture of this fault zone with the Wimberley fault in the vicinity of Wimberley is inferred because of displacements in the stratigraphic sequence apparent in outcrops and cross sections from point to point along the trend.

The Tom Creek fault trending northeastward extends all the way across Hays County with a few minor offsets and slight changes in direction. It crosses the Comal County line at a point about 6 miles west-southwest of Wimberley and the Travis County line at a point about 7 miles northeast of Driftwood. The fault forms the northwestern limit of the Edwards limestone in Hays County. The displacement along the fault ranges widely from place to place; near Cypress Creek the displacement is about 150 feet, but in places between Cypress Creek and the Blanco River it is less than 50 feet.

## MINOR FAULTS

About 70 minor faults, having displacements ranging from a few feet to 150 feet or more, have been mapped in Hays County. Some of the faults directly affect the movement of ground water, forming either conduits or barriers; others are not significant except as they alter the outcrop pattern by offsetting formational contacts. Faults in the more competent rocks such as hard limestones are apt to be distinct fractures, whereas faulted shales or marls commonly are dragged and slumped and leave no open fracture along the fault planes. In several places where the Edwards limestone crops out or underlies the surface at shallow depths, rocks on the downthrown sides of faults have not been dragged upward as might be expected, but rather have collapsed because of solution in the limestone, so that rocks at the surface dip toward the fault plane along both sides of its trace.

## COMPLEX FAULTING IN EAST-CENTRAL HAYS COUNTY

North of San Marcos and west of Kyle, an area of about 15 square miles contains numerous small, interconnected faults (pls. 1 and 2). Near San Marcos the southeasternmost outcrops of Edwards limestone are along the San Marcos Springs fault; north of the Blanco River, the southeastern boundary of the Edwards outcrop is approximately along the Mustang Branch fault. Thus one effect of the complex faulting in the intervening area is an eastward or northeastward lowering of the rocks. For example, at well H-47 (pl. 1) the Edwards limestone crops out at an altitude of about 710 feet; at well E-50, approximately along the regional strike of the strata, the top of the Edwards limestone is at a depth of about 360 feet or an altitude of about 440 feet, indicating a lowering of at least 270 feet between the points. This was caused partly by eastward downthrow along several north-trending faults and partly by slight local northeastward dips of the rocks along hinge faults in the area.

### Folds and Dips

Folding of competent rock units in Hays County has not been observed; however, local increases in regional dip at several localities have generally been associated with the major faults. Along the San Marcos Springs fault, as well as some of the other large faults, dips of 10° or more occur locally as a result of drag, especially in the Grayson shale and other incompetent formations. At many places along minor faults, the rocks appear to dip toward the faults from both upthrown and downthrown sides, probably because of solution and slumping along the fault zones.

Within the outcrop of the Glen Rose limestone, particularly along the Blanco River where many faults are in evidence, local changes in dip that resemble monoclinal flexures commonly are alined along the extensions of known faults.

In the area of complex faulting about 4 miles west of Kyle, dips of about 5° toward the northwest are common. At least two fault blocks, several miles in length, have been downthrown more on the northwest side than on the southeast, with a resultant tilting against the regional dip. In the same area, some blocks dip gently toward the northeast, probably as a result of increased throw along faults in that direction, so that in a distance of several miles along the strike of the fault zone younger rocks crop out north of the Blanco River.

### Sinkholes

Numerous sinkholes have been formed on the outcrop of the Edwards limestone by solution of the limestone by ground water and subsequent caving of overlying beds. The sinkholes are commonly filled by rocks of the Georgetown and Grayson formations, and in a few places rocks as young as the Eagle Ford shale and Austin chalk have slumped into the depressed areas and are entirely surrounded by older rocks.

Sinkholes in Hays County range in area from a few hundred square feet to several acres. Many of them are roughly circular or oval and commonly are elongated and alined to the northeast along faults or zones of structural weakness.

## GROUND-WATER RESOURCES

### Source of Ground Water

The fresh ground water in Hays County is derived principally from precipitation on the outcrop areas of the water-bearing rocks, or of hydraulically connected rock units both in Hays County and in several other counties west and southwest of the county. The general direction of slope of the land surface, as well as the regional dip of the rocks, is toward the southeast. Some of the intake areas are toward the northwest and the direction of movement of part of the ground water is southeastward across the county to areas of discharge. These intake areas extend upland toward the Llano uplift, principally in northwestern Hays County and in Blanco County to the northwest. Most of the ground water in Hays County, however, originated as precipitation on areas of outcrop far to the west and has moved underground eastward and northeastward generally parallel to the Balcones fault zone, entering Hays County from Comal County on the southwest.

## Recharge of Ground Water

Recharge to a ground-water reservoir within a specific geologic formation or other rock unit may occur in several ways: (1) by direct infiltration of precipitation on the outcrop of the formation; (2) by influent seepage from streams that flow across the outcrop; (3) by interflow from adjacent (underlying or overlying) formations; and (4) by underflow from adjacent areas within the ground-water reservoir.

A part of the precipitation that falls on the outcrop runs off directly at the surface, some is returned to the atmosphere by evaporation, and some percolates into the soil and ultimately is transpired by vegetation or infiltrates to the ground-water reservoir.

Infiltration, or influent seepage, is largely controlled by the lithic characteristics of the formation. Coarse-grained, well-rounded and -sorted sand and gravel readily receive recharge, whereas fine-grained sediments, such as clay and shale, and poorly sorted materials provide more resistance to infiltration. Limestone commonly contains solution channels and fracture spaces that are favorable avenues for recharge.

In an unconfined aquifer, water moves from recharge areas downslope along the hydraulic gradient. Under confined conditions, water moves in a general downdip direction beneath confining strata. A confined aquifer that is fully saturated is called an artesian aquifer. Recharge causes an increased in artesian pressure downdip from the outcrop, while discharge tends to decrease pressure.

### TRAVIS PEAK FORMATION

The outcrop areas of the Travis Peak formation in Hays County are relatively small. A part of the recharge to the formation is derived from precipitation and influent seepage on the outcrops along the Blanco and Pedernales River valleys (pl. 1). An undertermined but probably large proportion of recharge to the Travis Peak occurs on its outcrop areas in Blanco County, from whence the movement is downdip toward the southeast into Hays County.

### GLEN ROSE LIMESTONE

The outcrop of the Glen Rose limestone covers approximately the northwestern half of Hays County. Almost all this outcrop, as well as its northwestward extension into Blanco County, constitutes an area of potential recharge to the formation.

Water penetrating the outcrop of the Glen Rose probably moves vertically only short distances, the principal component of movement being in the direction of dip of the strata. Much of the Glen Rose limestone consists characteristically of alternate beds of limestone and marl or shale, which have a great range in permeability; therefore it is unlikely that water moves freely downward through great thicknesses of the formation. Water available for recharge on the outcrops of relatively impermeable beds, such as shale or clayey marl, probably runs off or is otherwise dissipated, comparatively little infiltrating to the zone of saturation. On the other hand, water enters beds of limestone and sandy marl more freely and much of it ultimately reaches the zone of saturation. Water within such permeable beds does not easily enter the less permeable beds above and below, but rather follows paths of least resistance and continues to flow downdip along the bedding.

Similarly, there is probably little if any recharge to the Glen Rose limestone from the overlying Edwards limestone, as the intervening Walnut clay deters vertical movement. At the lower boundary of the Glen Rose, however, some water may move upward from permeable beds of the Hensell member of the Pearsall formation into the basal biostromal limestone beds of the Glen Rose.

Recharge from surface water flowing across the outcrop of the upper member of the Glen Rose limestone generally is small, owing to the prevalence of relatively impermeable beds. Recharge to the lower member of the Glen Rose occurs locally through the more permeable beds and probably in significant amounts where the Blanco River crosses the lower limestone beds of the Glen Rose west of Wimberley.

EDWARDS LIMESTONE

In the following discussion of recharge, the term "Edwards limestone" is used to include both the Edwards and the Comanche Peak limestones. The two formations are considered to be a single hydrologic unit.

Underflow from Comal County probably is the largest source of recharge to the Edwards limestone in Hays County. The amount of underflow into the county during the period 1934-47 has been estimated to be about 70,000 acre-feet per year. This estimate is based on studies of recharge, discharge, and changes in storage for the entire reservoir, extending from Kinney County on the west through Hays County (Petitt and George, 1956, p. 21-49).

Except during periods of storm runoff, much of the flow of streams that cross the Edwards limestone in Hays County is recharged to the ground-water reservoir. Purgatory Creek flows intermittently from its source near well G-40 (pl. 1), but loses all its fair-weather flow to the Edwards downstream from the Hidden Valley fault. A local area of recharge along Purgatory Creek, near well G-48, is indicated by contours which show a high on the water surface in the Edwards for 1954 (Petitt and George, pl. 9).

Onion Creek also flows intermittently across the outcrop of upper Glen Rose limestone near Driftwood, and likewise contributes much of its runoff to the Edwards limestone farther downstream. Smaller streams such as Sink Creek, Halifax Creek, and Mustang Branch rarely flow and probably contribute relatively small amounts of recharge to the Edwards.

The Blanco River flows almost continuously at the Wimberley gaging station and downstream as far as the Halifax ranch near the Mustang Branch fault. According to Petitt and George (p. 37), all runoff in the Blanco up to 15 second-feet probably is recharged to the Edwards limestone in the area.

Detailed quantitative studies of the contribution of recharge from streams in Hays County have not been made. Petitt and George (p. 21-41), however, in their studies of recharge to the entire reservoir in the area extending along the Balcones fault zone from Kinney County on the west through Hays County, have estimated the recharge by drainage basins. Their data indicate that during the period 1934-47 1/ the average annual recharge from streams in Hays County was about 30,000 acre-feet.

Recharge to the Edwards limestone in Hays County by underflow from other formations is probably slight. The underlying Walnut clay and overlying Georgetown limestone are relatively impermeable. Where the Edwards is adjacent to the Glen Rose limestone, as along the Hidden Valley, Wimberley, and Tom Creek faults, it may receive some recharge across the fault zones from water-bearing zones in the Glen Rose. However, owing to the high proportion of argillaceous rock material in the Glen Rose limestone and to the drag and crumpling of beds, the faults may act as barriers rather than as conduits for ground-water movement in some places. Water levels in water-bearing zones in the Glen Rose limestone updip from the Hidden Valley fault and in the Edwards limestone southeast of the fault show a sharp dropoff or discontinuity along the fault, indicating that it impedes movement into the Edwards limestone.

Direct infiltration from precipitation on the outcrop of Edwards limestone in Hays County accounts for a small part of the recharge to the aquifer. The surface of the formation is weathered and has a relatively thin soil cover and an abundance of solution and fracture openings, providing a receptive intake area. However, even with the excellent recharge facility, a large part of the precipitation is consumed by evapotranspiration, and appreciable quantities of water are recharged to the reservoir only during extended periods of precipitation.

## AUSTIN CHALK

No perennial streams cross the outcrop of the Austin chalk in Hays County; hence the only opportunity for recharge by influent seepage is along minor stream channels during heavy rainstorms. The amount of recharge to the Austin by this method is probably small. The Austin chalk may receive some recharge by underflow where it is locally in fault contact with the Edwards limestone. Most of the recharge to the Austin, however, is probably derived from precipitation on the outcrop areas and by infiltration where overlain by alluvium.

## QUATERNARY ROCKS

The older alluvium of the extensive terrace between Kyle and the Hays-Caldwell County line is topographically high and is underlain for the most part by relatively impermeable rock material. Consequently, it receives essentially all of its recharge by direct infiltration from precipitation.

Alluvium within the valleys of Onion Creek and the Blanco and San Marcos Rivers probably absorbs some water by infiltration of precipitation and, locally,

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1/ The period 1934-47 represents a period of near-normal precipitation and excludes the effects of the period of drought from 1947 to 1957.

by underflow from adjacent and topographically higher saturated rocks. Most of the recharge, however, probably is from the streams. In most places the water table is lower than the stream beds and influent seepage is no doubt relatively rapid.

## Movement of Ground Water

After water has been recharged to a formation or other water-bearing rock unit, it moves toward points of discharge along paths which may be indirect and tortuous. In sedimentary rocks, water tends to move parallel to the rock bedding because the rock generally is more permeable in this direction. However, some water moves across the bedding when the pressure head is less in adjacent strata. Such movement of water from one formation to another commonly is called interformational leakage.

The stratigraphy and geologic structure profoundly affect the rate and direction of movement of ground water in Hays County. For example, in most of the Glen Rose limestone, impermeable shale beds separate the limestone strata commonly at intervals of only a few feet, and effectively retard vertical movement of water except within individual beds. Lateral movement along the bedding is affected in many places by facies changes in the formations. A permeable bed may grade into a relatively impermeable one in a short distance, causing movement along the bedding to be retarded.

At some places in Hays County, faults form ground-water conduits for and in other places barriers to ground-water movement. For example, figure 8 shows that water levels in wells H-43, H-75, and H-95 fluctuated similarly during the period 1937-56. Wells H-75 and H-95 are in the Edwards limestone, whereas well H-43 probably does not penetrate the Edwards. The similarity of the fluctuations and the proximity of well H-43 to the Kyle fault indicate that the well probably is hydraulically connected to the Edwards limestone through the fault zone. The Hidden Valley fault, on the other hand, probably is a partial barrier. Water in the upper part of the Glen Rose limestone evidently moves along the upper side of the fault and not through it, whereas some water in the lower zones probably enters the Edwards limestone across the fault plane. The Comal Springs and San Marcos Springs faults also form barriers to southeastward movement of water in the Edwards limestone by bringing the Edwards into contact with relatively impermeable beds of Austin chalk or Taylor marl.

Plate 6 is a map of Hays County showing by contours the configuration of the water surface in the Edwards limestone in August 1956. Although movement generally is in the direction of the greatest slope (normal to the contour lines), the lack of control and the heterogeneous nature of the aquifer prevent the use of the map for detailed study of the direction and rate of water movement. In general, the water moves from southwest to northeast generally parallel to the Balcones fault zone from Comal County toward San Marcos Springs. Between San Marcos and Kyle a greater northeast component of movement is indicated, but north of Kyle the general direction of movement is east. The contours show a slight ridge or ground-water divide near Buda.

Because of the offset of major faulting in northeastern Hays County, ground water in the Edwards limestone southeast of the Mustang Branch fault must move toward the east or northeast at increasingly greater depths and possibly at lower velocities. Much of the ground water in the large outcrop area of Edwards limestone northwest of the Mustang Branch fault and north of the Blanco River evidently

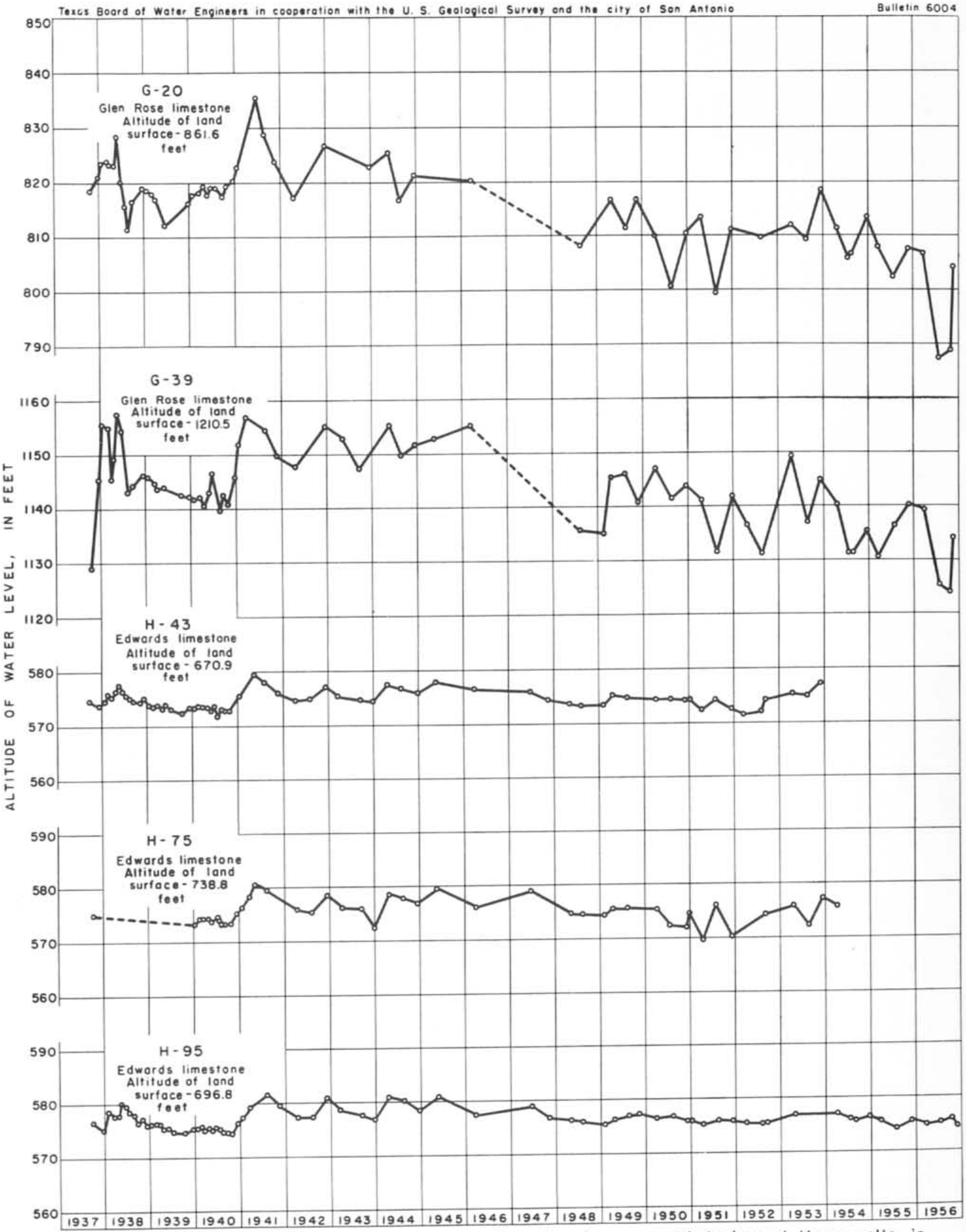
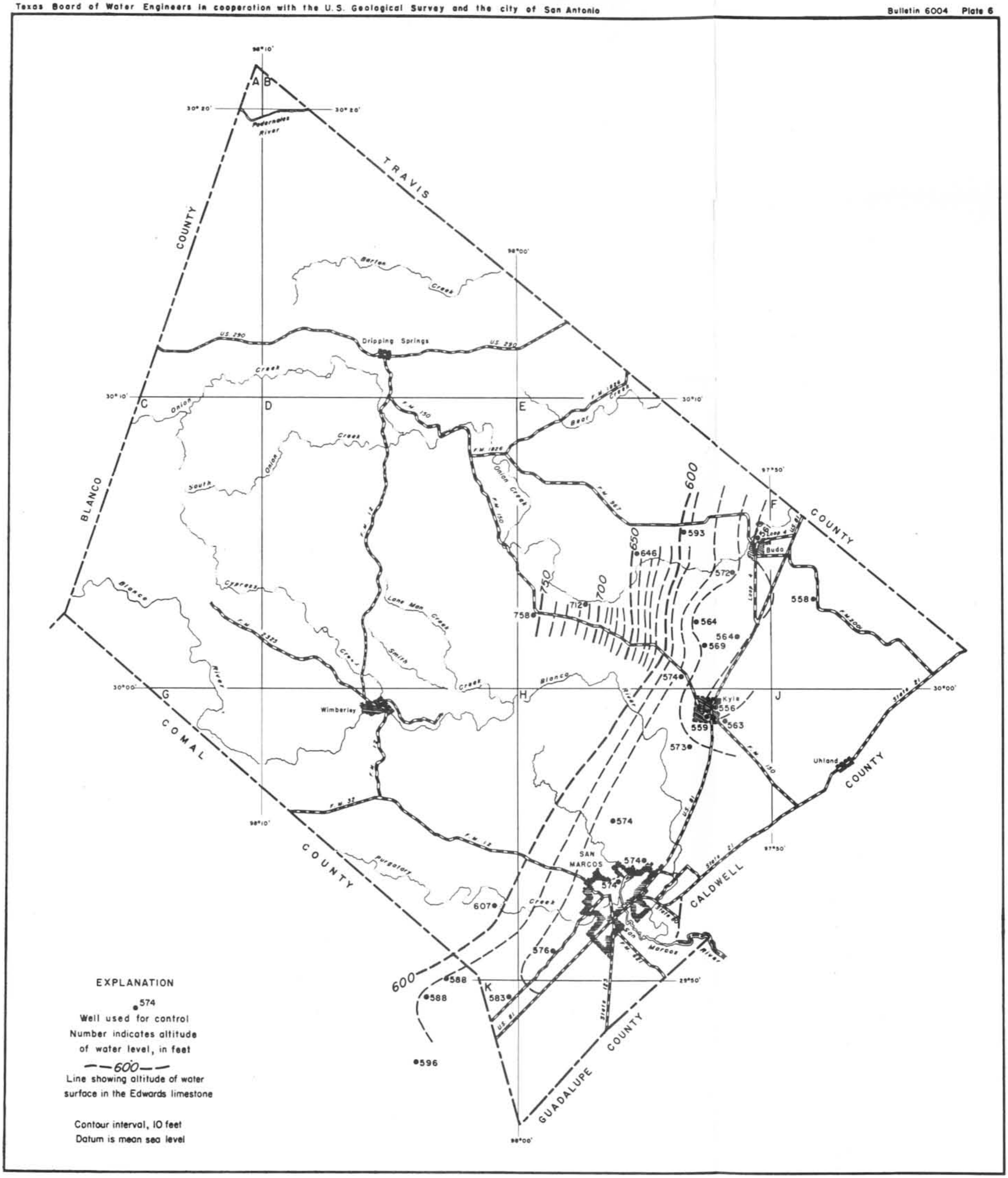



FIGURE 8. - Hydrographs of two wells in the Glen Rose limestone near Wimberley and three wells in the Edwards limestone near San Marcos, 1937-56




CONTOUR MAP OF WATER SURFACE IN THE EDWARDS LIMESTONE RESERVOIR, HAYS COUNTY, TEXAS, AUGUST, 1956

moves east-southeastward across the several faults near Buda and toward the eastern corner of Hays County. Adjacent to the Hays-Travis County line north of Buda, the contours indicate some movement eastward into Travis County.

## Discharge of Ground Water

The discharge of ground water may be considered as either natural or artificial. Natural discharge includes discharge from springs and water lost to the atmosphere through the natural processes of evaporation and transpiration. Artificial discharge is water pumped or flowing from wells.

The total discharge of ground water from all formations in Hays County has not been determined; however, estimates of discharge from the Edwards reservoir have been made in connection with areal studies of the Edwards. Inasmuch as San Marcos Springs, which discharges from the Edwards, represents by far the largest single discharge in the county, the total discharge figures for the Edwards represent the major part of the discharge from all sources. Figure 9 shows the average annual discharge from the Edwards reservoir in Hays County for the period 1934-56. The discharge varies widely; however, the variation is due largely to fluctuations in flow of the springs, which in turn are dependent on precipitation on the recharge areas.

### NATURAL DISCHARGE

#### San Marcos Springs

San Marcos Springs (pl. 7) is one of several large springs along the Balcones fault zone that discharge water from the Edwards limestone from Travis County to Kinney County (Livingston, Sayre, and White, 1936, pl. 5; Petitt and George, pl. 1).

The source of water at San Marcos Springs is the Edwards limestone, which is locally faulted against the Taylor marl. Water issues from five large fissures a foot or more in length and from numerous smaller openings in the limestone.

Measurements of the flow of San Marcos Springs have been made intermittently since 1894. Records of discharge for the period 1894-1921 have been illustrated and summarized by Meinzer (1927, p. 33-36). Measurements for the period 1922-56 are shown graphically in figure 2. The greatest measured discharge of the springs was 286 cfs (cubic feet per second), in May 1922. A flow of 350 cfs recorded in October 1919 is believed to be partly flood runoff. The minimum measured discharges were 51 cfs in March 1898 and 52 cfs in August 1956. In some years, such as 1931 and 1945 (fig. 2), the discharge reached a maximum in April or May, which are usually the months of heaviest precipitation on the recharge area. During the last 6 months of each year, the flow usually declines. Exceptions to this pattern occur commonly during years of markedly increased precipitation as in 1952, or in the first of several relatively dry years, such as 1947.

Figure 2 compares precipitation at San Marcos with the flow of San Marcos Springs. The discharge of San Marcos Springs is dependent on recharge from streamflow and precipitation on the outcrop of the Edwards limestone; some of

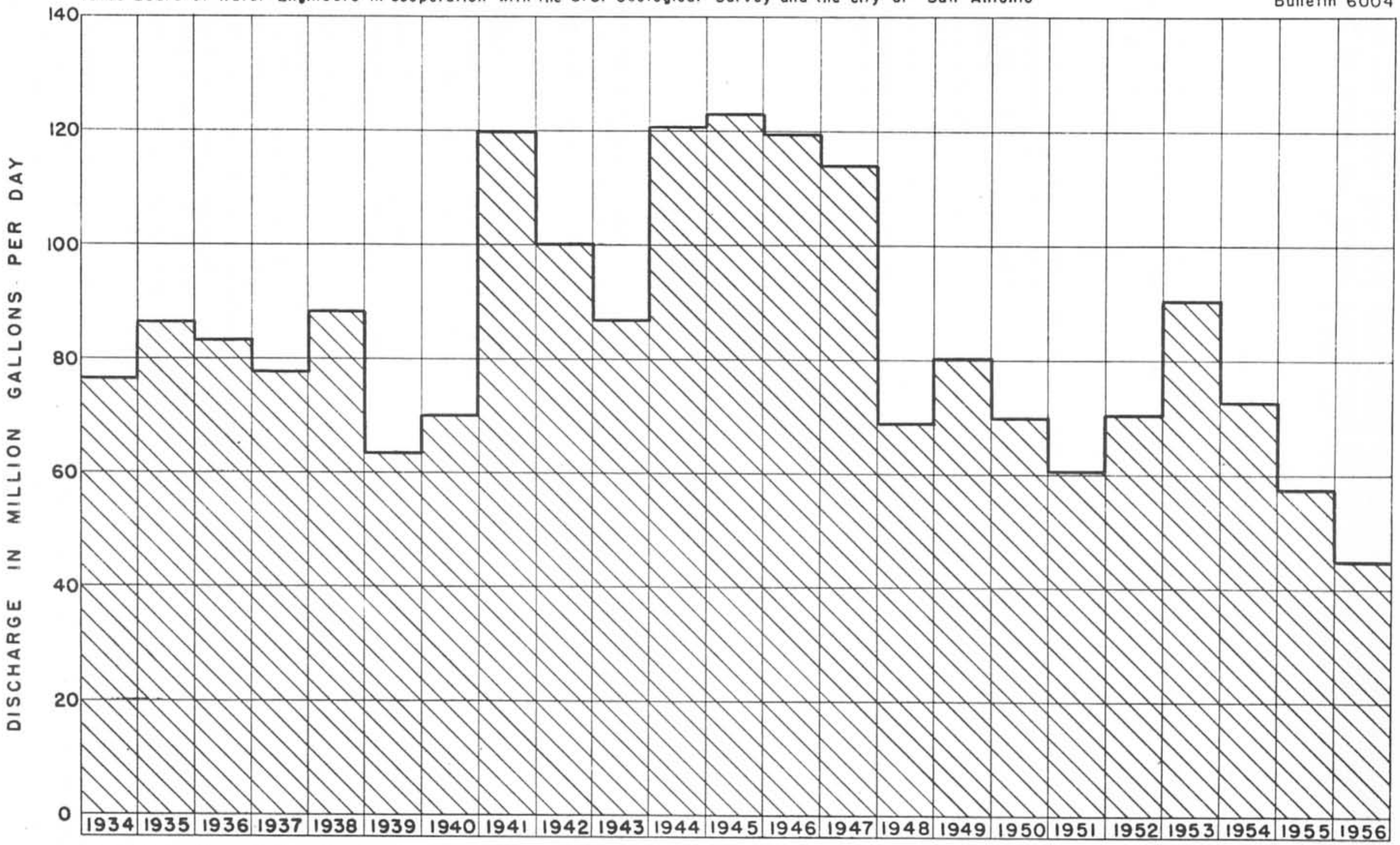



FIGURE 9.- Estimated discharge by wells and springs from the Edwards limestone reservoir in Hays County, 1934 - 56

Northeast view of lake at San Marcos Springs the effective recharge area may be at a considerable distance from San Marcos. Thus, local showers, at the San Marcos station as in July 1939, did not reach the recharge area of the Edwards limestone and are not correlative with the discharge record. Conversely, some rises in spring flow, such as that of January 1953 were not related to increased precipitation at San Marcos, indicating a source of water remote from the immediate San Marcos area.

Throughout the long-term record, however, precipitation at San Marcos is representative generally of regional precipitation, and periods of greater spring flow correspond to periods of heavier precipitation. During the years 1922-31 the mean annual precipitation was 33 inches, and the measured discharge of the springs exceeded 200 cfs in all but two of those years. During the period 1932-39 the mean annual precipitation was about 31 inches and the measured discharge of the springs during that period never exceeded 175 cfs and remained generally between 100 and 150 cfs.

For the period 1941-47 the mean annual precipitation was approximately 41 inches, and the average discharge of 70 measurements was 173 cfs. During the relatively dry years 1948-56, on the other hand, the mean annual precipitation at San Marcos was about 30 inches, and the average discharge of 95 measurements was 101 cfs. During 1956, in which the precipitation was only 18.37 inches, the average flow of about 66 cfs was the lowest of the 35-year period.

A gaging station was established at San Marcos Springs in May 1956, and daily discharge figures are available for the period since that time. The average daily discharge for the period June through December 1956 was about 63 cfs. This figure probably represents a near minimum for an extended period as it was preceded by a long period of drought.

The flow of San Marcos Springs probably is affected by large withdrawals of ground water from the reservoir southwest of Hays County because part of the water discharged from the springs comes from that direction. A part of the decrease in flow during later years probably is the result of the increase in pumping for municipal and irrigation use outside the county.

### Other Springs in Edwards Limestone

Several other springs or seeps issue from the Edwards limestone and produce small quantities of water in Hays County. Some springs derive water from locally perched water bodies in relatively permeable beds of the upper part of the Edwards. Others, such as springs D-54 and D-61 (pl. 1), issue from the base of the Edwards, where the downward percolation of water has been impeded by the underlying Walnut clay. A spring of the latter type adjacent to well G-40 formerly flowed and fed Purgatory Creek; during the recent drought the spring flowed only occasionally.

### Springs in Glen Rose Limestone

The largest spring in the Glen Rose limestone in Hays County is known as "Jacob's Well: (D-69) and is about 4 miles northwest of Wimberley along Cypress Creek. The spring issues from a massive limestone in the lower member of the Glen Rose. Faulting in the vicinity of the spring evidently has placed the permeable beds opposite relatively impermeable beds, thus causing flow upward along the fault. The spring flows perennially into Cypress Creek. The measured discharge at the spring on January 26, 1955, was 2.39 cfs, or about 1,100 gpm (gallons per minute).

In the upper member of the Glen Rose limestone numerous springs or seeps discharge small quantities of water. The springs are in topographically high areas and they commonly issue from thin, only moderately permeable beds of small areal extent.

### Springs in Quaternary Rocks

Springs near the contact with underlying clays discharge water from the Leona formation along the boundary of the outcrop southeast of Kyle. Examples of such springs are J-4 and J-5, which have been used to supply water for the town of Uhland.

Small springs or seeps issue from Quaternary gravels into the Blanco River in a few places in the central and western parts of the county where the river has undercut the alluvium. The gravels are recharged either by influent seepage upstream or by underflow from permeable beds in the Glen Rose limestone.

### Evaporation and Transpiration

Ground water is discharged to the atmosphere by evaporation and transpiration by plants where the water table is near the land surface. Discharge by evaporation is negligible where the water table is more than a few feet below the land surface. Discharge by transpiration, however, may be substantial even though the water table may be much farther below the land surface, because the roots of some phreatophytes 1/ extend to a considerable depth. Quantitative estimates of discharge of ground water by evaporation and transpiration are beyond the scope of this report, but such discharge in Hays County probably is small compared to the spring flow.

Most of the water discharged by evaporation and transpiration comes from the Quaternary rocks, particularly along the streams where the water table is shallow and phreatophytes are abundant.

## ARTIFICIAL DISCHARGE

The total discharge from wells in Hays County in 1956 was probably about 4 mgd (million gallons per day). This is only a small percentage of the total ground-water discharge in the county, as the flow of San Marcos Springs averaged about 42 mgd in 1956.

The yields of individual wells in the county range from a few gallons per minute to more than 1,000 gpm. Most of the wells yield less than 20 gpm, as about 84 percent of them are of small diameter and are pumped for domestic and stock use. About 20 public-supply and irrigation wells produce more than 50 gpm. Yields of 1,000 gpm or more are obtained from a few wells in the Edwards limestone.

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1/ Plants that habitually obtain their water supply from ground water.

The small average yield of the wells in Hays County is not representative of the potential yield. Most of the wells are constructed so as to produce only enough water for domestic and stock use and do not penetrate the full thickness of the aquifers. Properly constructed, fully penetrating wells, particularly in the Edwards limestone, would probably yield much larger quantities of water than the existing wells.

Of the 472 wells inventoried in Hays County, 40 produce water from the Pearsall formation; 159 from the Glen Rose limestone; 148 from the Edwards limestone; 41 from the Austin chalk or Taylor marl; 32 from the Quaternary rocks; and 52 from undetermined sources (table 4).

Only two flowing wells were inventoried in Hays County, wells H-72 and H-109 at the fish hatchery southwest of San Marcos Springs, and it is unlikely that many more exist or will be drilled. The zone in which the hydrostatic head in the Edwards limestone reservoir is above the land surface probably is limited to the vicinity of San Marcos Springs and possibly a narrow belt along the San Marcos Springs fault and below the escarpment.

Although wells at Wimberley were flowing in 1956, five wells tapping the lower member of the Glen Rose limestone or the Pearsall formation (G-9, G-12, G-13, G-14, and G-17, pl. 1) were reported to have flowed in 1937 and 1938, when the hydrostatic levels ranged from about 9 to 20 feet above the land surface. On November 9, 1956, the water level in well G-12 was 35.09 feet below the land surface; on April 4, 1951, the level in well G-13 was 20.40 feet below the land surface.

## Fluctuations of Water Levels

Changes in water levels in wells reflect changes in storage of ground water. A rise in water levels indicates an increase in storage, and a decline in water levels indicates a decrease in storage. Although the change in quantity of storage per unit change in water level has not been determined for the aquifers in Hays County, certain related factors are worthy of mention.

Water levels in the Edwards limestone aquifer in the county exhibit little or no long-term trend despite the pronounced trends in precipitation. The reason appears to be related to the stabilizing effect of San Marcos Springs and the large amount of underflow into the county from the reservoir south and west of Hays County. Because the springs are the principal point of discharge, the altitude of water levels in Edwards wells in the vicinity of San Marcos never is less than the altitude of the spring pool. (The altitude of the pool averages about 574 feet above mean sea level.)

The hydrographs of the wells shown in figure 10 suggest that slight rises of water levels are dissipated within a few months as a result of increased discharge from San Marcos Springs.

Water levels in Edwards wells generally have fluctuated less than 15 feet since 1937. Representative hydrographs of wells H-75 and H-95 (fig. 8) suggest that although water levels respond somewhat to increased rates of recharge, they remain relatively constant during extended drought periods such as the period 1947-56. The nearly constant head in the pool at the springs controls the lower limit of water levels in the wells for as long as the springs continue to flow.

Table 4.--Comparison of ground water in Hays County with standards recommended by U. S. Public Health Service

| | Chemical constituents (in parts per million) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Iron (Fe) | | Magnesium (Mg) | | Sulfate ($SO_4$) | | Chloride (Cl) | | Fluoride (F) | | Nitrate a/ ($NO_3$) | | Dissolved solids | | | |
| Maximum recommended | 0.3 | | 125 | | 250 | | 250 | | 1.5 | | 45 | | 500 b/ | | | |
| Geologic formation | Number of determinations | Number exceeding 0.3 | Number of determinations | Number exceeding 125 | Number of determinations | Number exceeding 250 | Number of determinations | Number exceeding 250 | Number of determinations | Number exceeding 1.5 | Number of determinations | Number exceeding 45 | Number of determinations | Number exceeding 500 | Number exceeding 1,000 | Number exceeding 2,000 |
| *All wells | 31 | 5 | 152 | 10 | 234 | 33 | 235 | 15 | 28 | 20 | 214 | 19 | 157 | 56 | 24 | 10 |
| **Pearsall formation | 3 | 0 | 20 | 1 | 26 | 2 | 27 | 1 | 3 | 1 | 27 | 0 | 20 | 3 | 2 | 0 |
| Glen Rose limestone | 3 | 1 | 51 | 6 | 77 | 14 | 77 | 2 | 7 | 4 | 72 | 6 | 47 | 19 | 10 | 5 |
| Edwards limestone | 17 | 4 | 47 | 2 | 75 | 13 | 75 | 8 | 15 | 13 | 62 | 0 | 48 | 16 | 8 | 4 |
| Austin chalk | 0 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Taylor marl | 4 | 0 | 13 | 0 | 16 | 0 | 16 | 0 | 1 | 1 | 16 | 3 | 13 | 6 | 0 | 0 |
| Quaternary rocks | 4 | 0 | 17 | 0 | 18 | 0 | 18 | 2 | 1 | 0 | 16 | 8 | 17 | 6 | 1 | 0 |

a/ Maxcy (1950, p. 271)

b/ 1,000 ppm permitted

* Includes wells not identified with a formation

** Subsurface equivalent of Travis Peak formation

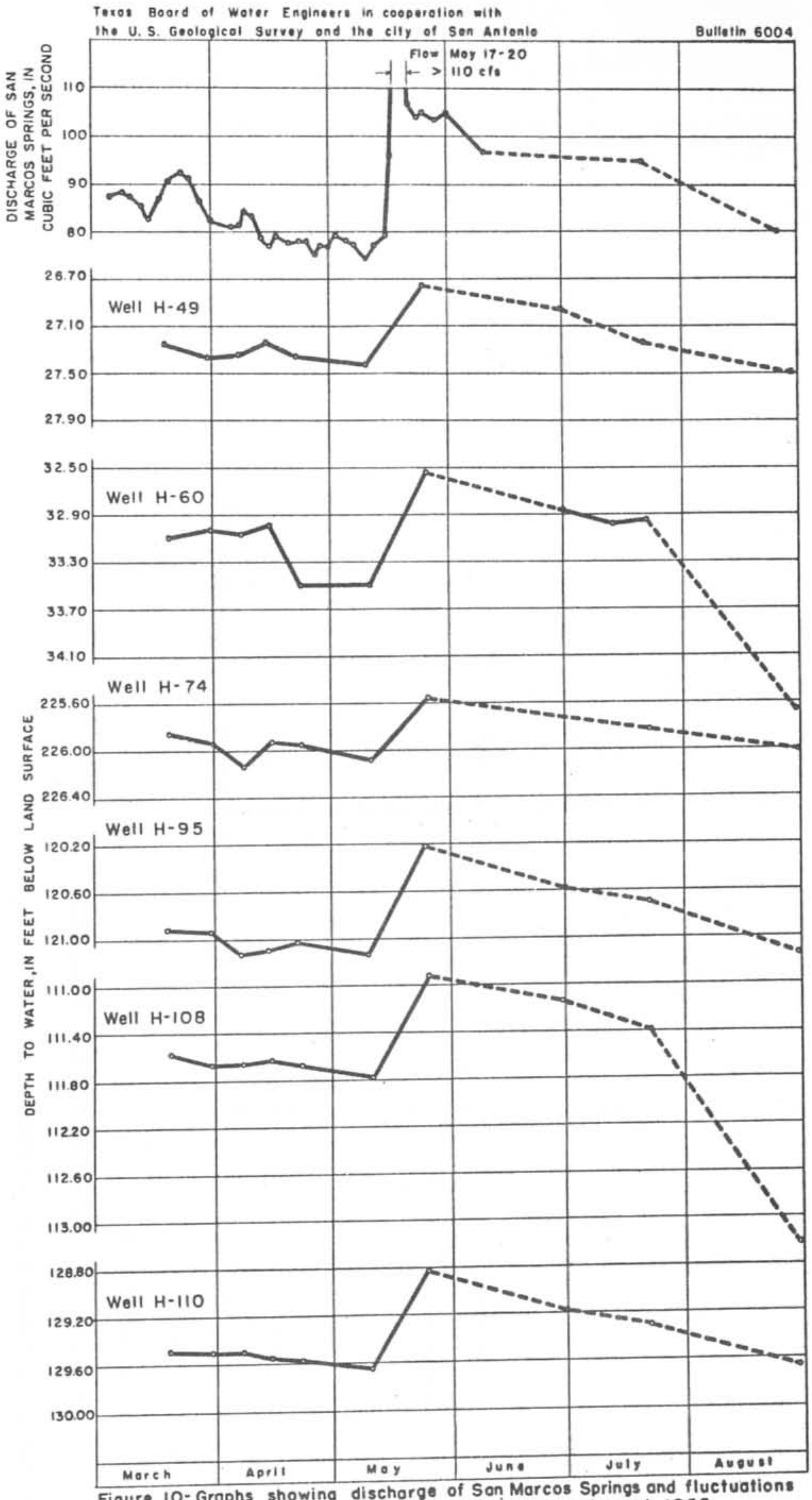

Figure 10.- Graphs showing discharge of San Marcos Springs and fluctuations of water levels in nearby wells, March-August 1955.

The spring flow during drought periods is maintained principally by underflow into the county which is derived from storage in the part of the reservoir to the south and west remote from the springs. Only a small part is contributed from storage in Hays County as is evidenced by the constancy of water levels in observation wells.

Water levels in observation wells in the Glen Rose limestone and other water-bearing formations commonly fluctuate through a greater range than those in the Edwards limestone. For example, the hydrographs of wells G-20 and G-39 in figure 8 show a greater response of water levels to both wet and dry periods. Water levels in some wells fluctuate rather erratically; that in well D-36, for example, has risen more than 80 feet in 1 month (table 6). The high rises which are coincident with periods of precipitation are caused by the concentration of water from a large drainage area in a relatively small recharge area or by the low porosity of the water-bearing material.

## QUALITY OF GROUND WATER

The concentration of various chemical constituents was determined for 239 samples of ground water from 235 wells and springs in Hays County (table 8). One sample was a mixture of water from 2 wells (H-67 and H-68) and 5 wells were sampled twice on different dates. The analyses, in conjunction with the well-location map (pl. 1), are especially useful in determining the type of water likely to be encountered at a proposed well site.

Temperatures of water measured in 2 wells and 8 springs in Hays County ranged from 67° to 79°F. The source of water for 1 of the wells and 7 springs is the Glen Rose limestone; the source for well G-11 is probably the Pearsall formation, and for spring H-65, the Edwards limestone.

Temperature measurements were made on July 12, 1955, at each of the 5 large fissures at San Marcos Springs. The readings at 4 of the fissures were 71°F, and at the other one, 73°F. Mr. W. H. Brown of the Texas Game and Fish Commission measured the water temperature at one of the fissures at about 8:00 a.m. on one day each month during the period March 1950 to April 1952. Air temperature at the times of measurement ranged from 42° to 84°F, but the water temperature ranged form 71.5° to 72.5°F, indicating that the temperature of the spring water is relatively constant throughout the year. By comparison, the long-term mean annual air temperature at San Marcos is about 68°F.

Water dissolves some mineral substances from the atmosphere, but most of its mineralization comes from solution of the rocks with which it is in contact. Some of the factors affecting the concentration of mineral matter in water are the length of time water is in contact with the rocks, the solubility of the rocks, the amount of dissolved carbon dioxide in the water, the temperature and pressure of the water, and the loss of water by evapotranspiration. Highly mineralized water in Hays County generally is associated with slow movement of the water. For example, water in the Austin chalk is commonly highly mineralized, probably as a result of poor artesian circulation where the water occurs in lenses of limestone interbedded with relatively impermeable shale or marl.

The chemical character of the water is not generally identifiable with the geologic formation whence it is derived. However, some combinations of constituents are more common in certain formations than in others. For example, sodium appears to be the predominant cation more generally in water from the Taylor marl than in water from the other formations, and the concentration of nitrate usually is higher in water from the Quaternary deposits than in water from the other formations.

The average concentration of dissolved solids was 459 ppm (parts per million) in samples of water from 67 wells in the Edwards limestone northwest of the Comal Springs and Kyle faults. Southeast of the Kyle fault, the Edwards limestone has been downfaulted to depths of several hundred feet, where circulation of ground water is relatively slow and the water is highly mineralized. Water samples from wells F-10, H-25, and H-37 (pl. 1) contained respectively 9,400, 1,960, and 2,180 ppm of dissolved solids. The average content of dissolved solids in samples from 8 wells tapping the Edwards southeast of the Kyle fault was 2,990 ppm.

The taste and the hazard to health are the principal chemical criteria for potable water. The maximum concentration limits for some constituents of drinking water set by the U. S. Public Health Service (1946) for use on interstate carriers are as follows:

| Constituent | Concentration (ppm) |
|---|---|
| Iron and manganese together | 0.3 |
| Magnesium | 125 |
| Sulfate | 250 |
| Chloride | 250 |
| Fluoride | 1.5 |
| Dissolved solids: | |
| Recommended | 500 |
| Permitted if better water not available | 1,000 |

Nitrate in concentrations of more than 45 ppm may be a cause of methemoglobinemia ("blue baby disease") in infants (Maxcy, 1950, p. 271). The suitability of the water from the various formations for drinking, based on the above-mentioned standards, is summarized in table 4.

Because of excess concentration of one or more constituents, table 4, 58 of the 235 samples would not be acceptable for drinking, according to the recommended standards of the U. S. Public Health Service. The table suggests that a high fluoride content in the water may be the major factor affecting the desirability of water for drinking. Of 28 samples tested for fluoride, 20 had concentrations exceeding 1.5 ppm. If used continuously by children during formation of the teeth, water containing excessive fluoride causes mottling of teeth (Dean, Dixon, and Cohen, 1935, p. 424-442). The concentration of nitrate exceeded 45 ppm in 8 of 16 samples of water from the Quaternary deposits but the percentage of wells from the other formations with water containing excessive amounts of nitrate is small. Some communities use water that contains minerals far in excess of the concentrations suggested in the standards. After becoming accustomed to high concentrations, people apparently suffer no ill effects from water containing as much as 2,000 ppm of dissolved solids. Livestock can tolerate water having up to 10,000 ppm; however, few would thrive on such water.

Hardness is one of the most important chemical properties affecting the use of ground water for domestic and industrial use. Soap consumption increases as hardness increases. Although this effect is minimized by the use of synthetic detergents in place of soap, the use of hard water results in scale or deposits in pipes, coils, and boilers. Calcium and magnesium are the principal constituents that cause hardness; several others also cause hardness but are present in negligible amounts.

An arbitrary classification commonly used to describe the hardness of water is as follows: Less than 61 ppm, soft; 61 to 120 ppm, moderately hard; 121 to 200 ppm, hard; and more than 200 ppm, very hard. Water having a hardness of more than 200 ppm must be softened to make it satisfactory for most purposes. Most of the ground water in Hays County is very hard; about 96 percent of the samples had a hardness in excess of 200 ppm.

Ground water in Hays County generally is suitable for irrigation. The principal factors in classifying water for irrigation are the concentration of dissolved solids, the relative proportion of sodium to other cations, and the concentration of boron or other elements that may be toxic. Although only two determinations were made, boron probably is not an important factor in the ground water of Hays County. The highest percent sodium in 52 samples was 73, and the average was less than 20. The sodium hazard is not considered great if the percentage is less than 75; thus, the sodium content of ground water in Hays County apparently is not a limiting factor in the use of the water for irrigation.

The salinity hazard to irrigation is related to the extent of mineralization from all the chemical constituents. Less than 10 percent of the samples had dissolved-solids concentrations considered hazardous to irrigation.

## UTILIZATION OF GROUND WATER

Table 5 gives records of 472 wells and 47 springs in Hays County. Probably more than half the wells in the county are represented; most of those not recorded are small domestic and stock wells which probably have characteristics similar to nearby wells for which data are given.

### Domestic and Stock Supply

About 397 wells recorded in Hays County yield small supplies of water for domestic use or watering stock. Some of the domestic and stock wells have been drilled in each of the water-bearing formations in the county but about 70 percent are in either the Glen Rose limestone or the Edwards limestone. Most of the wells produce only a few gallons per minute and are pumped by windmills or small electric or gasoline-powered pumps.

### Irrigation

Present and potential development of ground water for irrigation in Hays County is small. Table 5 includes records of 6 wells that are used for irrigation;

4 of the wells (H-8, H-49, H-77, and H-106) produce water from the Edwards limestone, 1 (E-73) from the Pearsall formation, and 1 (H-91) from Quaternary rocks near the San Marcos River.

Several wells in the Pearsall formation or the lower Glen Rose limestone in western Hays County may yield enough water to irrigate small farms, but level land suitable for irrigation in that part of the county is restricted mostly to the rather narrow stream valleys. Water from the Edwards limestone is used for irrigation principally on the flood plains adjacent to Sink Creek and the Blanco River and on several farms near Kyle and Buda. Irrigation wells in these areas are equipped with turbine pumps powered by electric, gas, or gasoline motors. Yields of some wells exceed 1,000 gpm; well H-77 reportedly yielded more than 1,500 gpm when tested. Most large wells, however, are not pumped at full capacity.

## Public Supply

Public water supplies are obtained in San Marcos, Kyle, and Buda from wells in the Edwards limestone. Wells H-67, H-68, and H-85 on the upthrown side of the San Marcos Spring fault (pl. 1) are used for the San Marcos municipal supply. In 1954 the San Marcos wells pumped an average of 2.16 mgd. Some of the water was used to supply Edward Gary Air Force Base near San Marcos.

Water for residents of Wimberley and other communities in the county is supplied from privately owned wells.

## Industrial Supply

The use of water for industrial purposes in Hays County is small. A part of the public supply at San Marcos is used for air-conditioning and small industries. Well C-25 in the western part of the county supplies the pumping station of the Texas-New Mexico Pipeline Company.

## Future Development

During the relatively dry years 1947-56, water levels in some wells, especially in western Hays County, dropped so far that it was necessary to lower pumps or deepen wells in order to maintain supplies. Several such wells and some new ones have been drilled to the basal Glen Rose limestone or the Pearsal formation. It seems likely that these aquifers will be drilled more extensively in the vicinity of Wimberley and elsewhere during future drought periods.

Supplies of irrigation water have been obtained from the Edwards limestone in several places along the Balcones fault zone. Further development may be limited, however, by conditions other than water supply. In some areas where large yields are available, topography and soils are not well suited to irrigation. Also, development from wells will reduce the flow from springs.

On the flood plain of the San Marcos River southeast of San Marcos, the use of irrigation water from the Quaternary sediments may increase, although any large-scale development appears unfeasible. In this area the saturated thickness of the aquifer generally is not more than about 20 feet and the amount of water in storage is not great; thus, development is limited by the rate of recharge.

## SUMMARY OF CONCLUSIONS

The Edwards and Comanche Peak limestones form a ground-water reservoir which is the principal source of ground water in Hays County. The reservoir supplies large quantities of water to San Marcos Springs and to many wells in the county, including the public-supply wells at San Marcos, Kyle, and Buda and a few irrigation wells. It produces water which is hard but is otherwise of good chemical quality except in the eastern part of the county where the water is highly mineralized.

Recharge to the reservoir in Hays County occurs to a very small extent by direct penetration of rainfall on the outcrop, to a larger extent by seepage from streams which cross the outcrop in the county, and to the greatest extent by underflow into the county from the southwest.

Most of the water in the limestone reservoir moves from southwest to northeast generally parallel to the Balcones fault zone. Lesser amounts of water move southeastward from the areas of outcrop on the northwest to the fault zone where the water changes direction and moves northeastward. San Marcos Springs is the principal discharge point for the reservoir in Hays County; however, a small amount of water may move northeastward and eastward into Travis County. Additional supplies of water might be produced from the limestone reservoir in Hays County; however, the development would diminish either the flow of San Marcos Springs or the underflow into Travis County, or both.

Other aquifers of less importance in Hays County include the Pearsall formation, the Glen Rose limestone, the Austin chalk, the Taylor marl, and the Quaternary rocks. The Pearsall yields small to moderate quantities of water to wells in the western part of the county and is a potential source of supply throughout much of the county, although the depth to the formation in the eastern part would probably make development in that area prohibitive.

The Glen Rose limestone yields small to moderate supplies of water to domestic and stock wells in the western part of the county; the larger supplies are obtained from the lower member of the Glen Rose. Much of the water in the Glen Rose is highly mineralized, sulfate being the principal objectionable constituent. Additional supplies are available for development in the western part of the county; however, large yields should not be expected from individual wells and the water obtained may be rather highly mineralized.

The Austin chalk and Taylor marl produce small quantities of water to wells in the eastern part of the county. Large sustained yields should not be expected from the two formations because of the lenticular and irregular distribution of the few relatively permeable zones.

The Quaternary rocks yield small quantities of water for domestic and stock use principally along stream valleys in the eastern part of the county. These rocks should be considered as a minor source of water because they are only present in small areas and are generally thin.

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Table 5.--Records of wells and springs in Hays County

All wells are drilled unless otherwise noted in remarks column.
Water level: Reported water levels given in feet; measured water levels given in feet and tenths.
Method of lift and type of power: C, cylinder; E, electric; G, gasoline; H, hand; J, jet; T, turbine; W, windmill. Number indicates horsepower.
Use of water: D, domestic; Ind, industrial; Irr, irrigation; N, none; P, public supply; S, stock.

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *A-1 | S. F. Hurlbut | -- | -- | Spring | -- | Pearsall formation | (+) | -- | Flows | S | Numerous springs supplying pool about 60 x 85 ft.; known as "Dead Man's Hole." |
| A-2 | W. A. Breed | -- | -- | 260 | 6 | Glen Rose limestone | 174.8 | Jan. 10, 1951 | C,W | S | An old well. |
| *A-3 | Ollie Sorrells | A. Clements | 1940 | 251 | -- | do | -- | -- | C,E | D,S | Weak supply reported. |
| A-4 | Leon Sorrells | -- | -- | 375 | -- | Pearsall (?) formation | 140.6 | Jan. 10, 1951 | C,W | D,S | Strong supply reported; an old well. |
| *A-5 | Paul Sorrells | A. Hayden | 1947 | 150 | -- | Glen Rose limestone | -- | -- | C,W | D,S | |
| A-6 | Roy Breed | -- | -- | 60 | 6 | Glen Rose limestone, probably upper member | 34.7 | Jan. 10 1951 | C,W | S | Weak supply reported; an old well. |
| A-7 | Mrs. Minnie Luersen | A. Clements | 1917 | 196 | 6 | do | 190 | Nov. 1950 | C,E | D,S | |
| *A-8 | Ed Holmes | -- | -- | 69 | 6 | do | 26.8 | Sept. 9, 1937 | J,E | D,S | Casing: 2 ft. of 6-in. Temp. 72°F. |
| A-9 | -- | -- | 1942 | 160 | 6 | Glen Rose limestone | 125.8 | Nov. 17, 1950 | C,W | S | |
| *A-10 | Mrs. I. W. Davis | Glass & Saunders | 1928 | 113 | 6 | do | 85.6 | Sept. 9, 1937 | N | N | |
| A-11 | C. B. Griffin | -- | -- | 25 | 48 | Glen Rose limestone, upper member | 12.3 | Nov. 17, 1950 | N | N | Dug well. Rock curb; an old well. |
| A-12 | D. F. Watson | -- | -- | 100 | 6 | Glen Rose limestone | 39.5 | do | C,W | D,S | Strong supply reported. |
| A-13 | M. J. McNair | -- | -- | 38 | 6 | Glen Rose limestone, upper member | 22.6 | Nov. 20, 1950 | H | N | Weak supply reported;an old well. |
| A-14 | do | -- Paige | -- | 400 | 6 | Pearsall (Travis Peak) formation (?) | 119.6 | do | N | N | Highly mineralized water reported; an old well. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A-15 | M. C. McNair | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | -- | Flows | D,S | Flows into concrete reservoir. |
| *A-16 | J. M. Smitherman | -- | -- | 345 | 6 | Glen Rose (?) limestone | -- | -- | C,W | D,S | Weak supply reported; an old well. |
| A-17 | do | -- | -- | 87 | 6 | Glen Rose limestone, probably upper member | 45.0 | Nov. 20, 1950 | H | D | An old well. |
| A-18 | L. C. McCarty | -- Paige | -- | 200 | 6 | Glen Rose limestone | 135.6 | do | C,G | D,S | Strong supply reported. Used to irrigate 2 acres; an old well. |
| *A-19 | Walton Walker | Earl Johnson | -- | 350 | 6 | Glen Rose (?) limestone | -- | -- | C,W | D,S | |
| A-20 | S. H. Brooks | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Nov. 22, 1952 | Flows | S | Flows into concrete trough. |
| B-1 | S. F. Hurlbut | -- | -- | 180 | -- | Pearsall formation | -- | -- | C,E | D,S | Strong supply reported. |
| *B-2 | Willie Puryear | Willie Puryear | 1907 | 177 | 6 | Glen Rose limestone | 94.6<br>96.0 | Nov. 3, 1937<br>Dec. 19, 1950 | H | D | |
| B-3 | Mrs. T. L. Myers | -- | -- | 42 | 6 | Glen Rose limestone, upper member | -- | -- | C,W | D,S | Strong supply reported; an old well. |
| *B-4 | Mrs. Truman Breed | Arthur Clements | 1914 | 272 | 6 | Glen Rose limestone | 23.0 | Nov. 3, 1937 | C,G | D,S | Reportedly cleaned and deepened in 1948. |
| *B-5 | R. N. Cotten | A. Hayden | 1928 | 450 | 6 | Pearsall formation (?) | -- | -- | C,W | D,S | |
| B-6 | W. A. Breed | -- | -- | 220 | 6 | Glen Rose limestone | 188.0 | Dec. 20, 1950 | C,W | D,S | Strong supply reported; an old well. |
| B-7 | W. H. Meyers | -- | -- | 190 | 6 | do | 143.4 | do | C,W | S | Weak supply reported; an old well. |
| *B-8 | do | A. Hayden | 1938 | 575 | 6 | Pearsall formation (?) | -- | -- | C,W | D | do |
| B-9 | G. M. Douglas | -- | -- | 223 | 6 | Glen Rose limestone | 191.4 | Dec. 19, 1950 | C,W | D | Weak supply reported; an old well. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B-10 | Gay Carroll | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Dec. 19, 1950 | Flows | D | Enclosed in a stone and concrete reservoir. |
| B-11 | M. Z. Piland | A. Hayden | -- | 365 | 6 | Glen Rose (?) limestone | 164.2 | do | C,E | D,S | Strong supply reported; an old well. |
| B-12 | J. F. Darter | -- | -- | 20 | 30 | Glen Rose limestone, upper member | 8.1 | do | H | D | Dug well. Rock curb; an old well. |
| B-13 | J. J. Lumpkin | John Glass | 1947 | 110 | 6 | Glen Rose limestone | 174.4 | do | C,E | D,S | Reportedly flowed when drilled. |
| B-14 | J. G. Puryear | -- | -- | 200 | 8 | do | 68.8 | Jan. 23, 1951 | H | D,S | An old well. |
| B-15 | F. W. Werth | Ed Milam | 1915 | 280 | 6 | do | 191.4<br>165.0 | Nov. 3, 1937<br>Dec. 19, 1950 | C,W | D,S | |
| B-16 | B. T. Crumley | -- | -- | 237 | -- | do | 180.4 | Nov. 15, 1937 | C,W | S | |
| B-17 | do | -- | -- | 20 | 30 | Glen Rose limestone, upper member | 12.0<br>15.6 | do<br>Jan. 23, 1951 | C,E | D | Dug well. |
| B-18 | W. S. Hall | -- | -- | 230 | 6 | Glen Rose (?) limestone | 84.6 | Nov. 15, 1937 | C,E | S | Deepened to 472 ft. and strong supply reported. |
| B-19 | do | -- | -- | 230 | 6 | Glen Rose limestone | 182.1 | Jan. 23, 1951 | C,W | D | An old well. |
| B-20 | G. W. Stillman | Ab Sprouts | 1910 | 150 | 6 | do | -- | -- | C,E | D,S | |
| B-21 | A. Magness | -- Glass | 1935 | 210 | -- | do | 95.3 | Jan. 11, 1951 | C,W | D,S | |
| B-22 | C. U. Trautwein | Ed Milam | 1930 | 182 | 6 | do | 183.4 | Jan. 26, 1951 | C,W | D,S | |
| *B-23 | John Glosson | -- | -- | 207 | 6 | do | 106.6 | Nov. 15, 1937 | C,E | D,S | |
| B-24 | Ben Everett | -- | -- | 67 | 6 | Glen Rose limestone, probably upper member | 38.0 | Jan. 23, 1951 | N | N | An old well. |
| *B-25 | do | -- | -- | 183 | 6 | Glen Rose limestone | 161.2 | Nov. 15, 1937 | C,E | D,S | |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *B-26 | G. W. Houchin | -- | -- | 85 | 7 | Glen Rose limestone | 45.4<br>30.1 | Sept. 7, 1937<br>Dec. 20, 1950 | H | D | Reported to vary seasonally. |
| *B-27 | M. H. McFarland | -- | 1907 | 9 | 60 | Glen Rose limestone, upper member | 6.7<br>8.5 | Sept. 7, 1937<br>Dec. 20, 1950 | C,E | D,S | Dug well. Rock curb. Reported to vary seasonally. |
| *B-28 | E. A. Traylor | -- | -- | Spring | -- | do | (+) | do | Flows | S | Flows into rock pit. Temp. 73°F. |
| *B-29 | J. W. Farrell | Felix Saunders | 1922 | 442 | 7 | Pearsall formation (?) | -- | -- | C,W | D,S | Deepened from 330 feet in 1949. |
| *B-30 | Mrs. W. L. Farrell | G. W. Houchin | 1905 | 96 | 6 | Glen Rose limestone | 65.9<br>60.6 | Sept. 9, 1937<br>Dec. 20, 1950 | N | N | Unused for 5 years. |
| *B-31 | J. E. Cogbill | -- | -- | 165 | 7 | do | 76.6<br>148.3 | Sept. 9, 1937<br>Jan. 10, 1951 | H | D | Deepened from 106 feet. |
| B-32 | G. G. Koehn | -- | 1912 | 16 | 72, 40 | Glen Rose limestone, upper member | 10.1 | Sept. 9, 1937 | H | D | Dug well. |
| B-33 | Fred Alva | -- | -- | 135 | -- | Glen Rose limestone | 10.1<br>68.7 | Sept. 9, 1937<br>Jan. 10, 1951 | H | D,S | Formerly dug well 14 ft. deep. |
| *B-34 | W. A. Harber | -- | -- | 200 | 6 | do | 150 | Sept. 1937 | C,W | D,S | |
| B-35 | Carl Widen | -- Kennedy | 1943 | 157 | 6 | do | 150.2 | Nov. 21, 1950 | C,W | D,S | |
| B-36 | S. W. Harper | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Nov. 20, 1950 | Flows | D,S | Flows into concrete reservoir. |
| B-37 | J. O. Follis | -- | -- | 102 | 6 | Glen Rose limestone | 101.9 | Nov. 21, 1950 | C,W | S | Highly mineralized water reported; an old well. |
| B-38 | -- | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Dec. 19, 1950 | Flows | N | Known as "Dripping Springs". |
| *B-39 | P. O. Brannan | -- | 1902 | 110 | 7 | Glen Rose limestone | 41.9<br>98.9 | Sept. 7, 1937<br>Dec. 19, 1950 | N | N | |
| *B-40 | Dripping Springs School | John Glass | 1949 | 190 | 8 | do | -- | -- | C,E | P | Supplies 250 students during school year. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *B-41 | Felix Lindsey | -- | 1912 | 64 | 6 | Glen Rose limestone | 42.1 | Nov. 17, 1937 | C,E | D,S | |
| B-42 | do | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Nov. 28, 1950 | Flows | S | Reported to fluctuate seasonally. |
| *B-43 | Clarence Southwell | F. Saunders | -- | 149 | 6 | Glen Rose limestone | 1/103.1 | Aug. 6, 1941 | C,E | D | |
| *B-44 | Lester Brenizer | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Nov. 28, 1950 | Flows | D,S | Concrete basin around spring. Reported to fluctuate seasonally. Known as "Walnut Springs". Temp. 72°F. |
| B-45 | Ike D. Roberts | John T. Shaw | 1897 | 86 | -- | Glen Rose limestone | 10.1 | Sept. 2, 1937 | C,E | D,S | |
| *B-46 | Albert Garcia | -- | -- | 87 | 6 | do | 1/ 59.8 | Dec. 3, 1953 | H | D | Altitude 1,210.4 ft. |
| *B-47 | do | -- | -- | 40 | 48, 36 | do | 1/ 36.5 | do | N | N | Dug well. Altitude 1,208.2 ft. |
| B-48 | Lee Berkley | -- | -- | 40 | 72 | do | 19.7 | Jan. 11, 1951 | H | D | Dug well; an old well. |
| B-49 | do | -- | -- | 245 | 6 | do | 156.0 | do | N | N | An old well. |
| *B-50 | H. A. McIntyre | -- | 1902 | 170 | 6 | do | -- | -- | C,W | D,S | |
| *B-51 | W. J. Vaughn | Chas. Hayden | -- | 137 | 6 | do | 78.6 | Nov. 17, 1937 | H | D,S | Reported varies seasonally. |
| B-52 | E. E. Townes | A. Clements | 1940 | 202 | 6 | do | 190.9 | Jan. 11, 1951 | N | N | |
| *B-53 | do | do | -- | 799 | -- | Pearsall formation | -- | -- | C,E | D,S | |
| B-54 | do | John Glass | 1950 | 425 | 8 | Glen Rose (?) limestone | 156.0 | Jan. 11, 1951 | C,W | D,S | Strong supply reported. |
| B-55 | E. E. Townes | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | do | Flows | N | Reported to fluctuate seasonally. Known as Miller Springs. |
| B-56 | do | -- | -- | 135 | 6 | Glen Rose limestone | 84.9 | do | N | N | An old well. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| B-57 | E. E. Townes | A. C. Clements | 1941 | 441 | 6 | Glen Rose (?) limestone | 183.8 | Jan. 11, 1951 | C,W | S | Strong supply reported. |
| *B-58 | Glynn C. Key | -- | -- | 46 | 6 | Glen Rose limestone, upper member | 1/ 36.0 | Dec. 3, 1953 | H | D | Altitude 1,262.2 ft. |
| *B-59 | do | -- | -- | 87 | 6 | do | 1/ 55.2 | do | H | D | Altitude 1,261.6 ft. |
| *B-60 | Bob Breeding | -- | -- | Spring | -- | do | -- | -- | N | N | No longer flowing. Formerly supplied stock. Temp. 78°F. |
| *B-61 | do | -- | -- | Spring | -- | do | (+) | Jan. 11, 1951 | Flows | N | Rock wall around spring. Formerly supplied house and stock. Temp. 79°F. |
| B-62 | E. W. Rutter | -- | -- | 375 | 6 | Glen Rose limestone | 238.6 | do | C,W | D,S | Weak supply reported; an old well. |
| *B-63 | F. J. Turck | S. W. Glass | 1931 | 623 | 6 | -- | 97.6 | Sept.24, 1937 | C,E | D | Deepened from 235 ft. in November 1950. |
| B-64 | H. J. Willie | -- | -- | 225 | 6 | Glen Rose limestone, probably upper member | 216.2 | Nov. 29, 1950 | C,W | D,S | An old well. |
| B-65 | W. D. Newman | -- | -- | 50 | -- | do | 32.5 | June 6, 1952 | C,W | D,S | An old well. |
| B-66 | Mrs. R. Christal Estate | -- | -- | 42 | 144 | do | 31.7 | Nov. 27, 1950 | H | D,S | Dug. |
| B-67 | do | -- | -- | 110 | 6 | do | 53.1 | do | H | D | Reportedly a weak well; an old well. |
| B-68 | Thomas Sawyer | -- | 1949 | 580 | 8 | -- | -- | -- | C,E | S | |
| *B-69 | Gay Carroll | S. Glass | 1956 | 590 | -- | Pearsall formation | -- | -- | C,E | D,S | |
| *C-1 | J. C. Crisp | -- | -- | Spring | -- | Glen Rose limestone (?) | (+) | Nov. 17, 1950 | Flows | D | Flows into small concrete reservoir. Temp. 67°F. |
| C-2 | Ernest Luersen | A. Williamson | 1946 | 284 | 6 | Glen Rose limestone | 87.2 | do | C,W | D,S | |
| C-3 | L. C. McCarty | -- | -- | Spring | -- | Glen Rose limestone (?) | (+) | Nov. 20, 1950 | Flows | S | Several small seeps from creek bank. |
| C-4 | S. H. Brooks | H. Harmon | 1923 | 320 | 6 | Glen Rose limestone | 310.0 | Nov. 22, 1950 | H | D | |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date com-plet-ed | Depth of well (ft.) | Diam-eter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C-5 | Mrs. -- Hardcastle | -- | -- | 400 | 6 | -- | 213.4 | Nov. 21, 1950 | C,W | D,S | An old well. |
| C-6 | do | -- | -- | 137 | 6 | Glen Rose lime-stone, probably upper member | 130.1 | do | N | N | An old well. |
| C-7 | do | -- | -- | 67 | 48 | Glen Rose lime-stone, upper member | 36.0 | do | -,H | D | Dug well. Stone curb. Used for drinking water in summer time; an old well. |
| C-8 | P. H. Prochnow | -- | 1894 | 503 | 5 | -- | 491<br>123.0 | 1931<br>Nov. 21, 1950 | C,G | N | Well apparently caved to 127 ft. |
| C-9 | Jim Curnutte | -- | -- | 300 | 8 | Glen Rose limestone | 260.4 | Nov. 22, 1950 | C,W | S | |
| *C-10 | G. J. Contois | -- | 1917 | 54 | -- | Glen Rose lime-stone, upper member | 42.0<br>41.8 | Nov. 2, 1937<br>Nov. 22, 1950 | C,H | N | |
| C-11 | Mrs. -- Irving | -- | -- | Spring | -- | Glen Rose (?) limestone | (+) | Nov. 17, 1950 | Flows | S | Many small seeps at contact of lime-stone and gravel in creek bank. |
| C-12 | -- Nicholson | -- | -- | 400 | 6 | do | 167.2 | Nov. 20, 1950 | N | N | Formerly supplied ranch house; an old well. |
| *C-13 | do | -- | -- | Spring | -- | Glen Rose lime-stone, upper member | (+) | Nov. 17, 1950 | Flows | D | Flows from solution channel in lime-stone into stone and concrete box. Reported to fluctuate seasonally. |
| C-14 | D. B. Gilder | -- | -- | 210 | -- | Glen Rose lime-stone, lower member | -- | -- | C,E | D,S | An old well. |
| *C-15 | Steiner & Garnett | -- | -- | 240 | 6 | Pearsall (?) formation | -- | -- | C,W | D,S | |
| *C-16 | D. R. Strauss | -- | 1920 | 390 | 18 | Glen Rose limestone | -- | -- | C,W | D,S | Weak supply reported. |
| C-17 | H. W. Jones | -- Owens | 1948 | 300 | -- | Glen Rose (?) limestone | 208.6 | June 4, 1952 | C,W | D,S | |
| *C-18 | Mrs. D. M. Meeks | -- | -- | Spring | -- | Glen Rose lime-stone, upper member | (+) | do | Flows | S | Reported to fluctuate seasonally. Known as Bottom Spring. Temp. 72°F. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *C-19 | Mrs. D. M. Meeks | -- | 1922 | 90 | 6 | Glen Rose limestone, lower member | 69.8<br>70.9 | Oct. 26, 1937<br>June 4, 1952 | C,W | D,S | |
| *C-20 | J. J. Ploch | -- | 1911 | 292 | 6 | Pearsall formation | 160 | 1923 | C,W | S | |
| *C-21 | George Rust | -- | -- | 172 | 6 | Pearsall (?) formation | 1/ 97.0 | Dec. 3, 1953 | C,G | D,S | Altitude 1,162.2 ft. |
| *C-22 | do | -- Adare | 1934 | 470 | 6 | Pearsall (Travis Peak) formation | 1/222.1 | do | N | N | Altitude 1,165.5 ft. |
| *C-23 | J. N. Byler | Sise-Rothrock, & Irving | 1929 | 610 | 10 | -- | 1/220.4 | do | C,W | D | Oil test. Altitude 1,163.0 ft. |
| C-24 | H. R. Sites | R. E. Gage | 1922 | 313 | 6 | Pearsall formation | -- | -- | C,W | D,S | |
| C-25 | Texas-New Mexico Pipe Line Co. | E. R. Osborne | 1937 | 331 | 6 | do | -- | -- | T,E, 7½ | Ind | Supplies pumping station. 2/ |
| *C-26 | Norco Ranch | -- | -- | Spring | -- | Glen Rose limestone, lower member | (+) | June 4, 1952 | Flows | S | Fault structure in limestone. |
| *C-27 | -- Nornhousser | -- Paige | 1901 | 220 | 6 | Pearsall (Travis Peak) formation | -- | -- | C,E | D,S | |
| C-28 | Mrs. W. W. Burnett | Walter Burnett | 1940 | 24 | 7 | Glen Rose limestone, lower member | 0.2 | June 4, 1952 | C,W | S | Dug well. In bed of Cottonwood Creek. |
| *C-29 | do | -- | -- | 62 | 6 | Pearsall (?) formation | 49.1 | June 14, 1942 | C,E | D | |
| C-30 | Henry Grote | -- | -- | 150 | 6 | Glen Rose (?) limestone | 50 | 1942 | C,W | D,S | |
| C-31 | W. A. Ellinghausen | -- | -- | 65 | -- | Glen Rose limestone, lower member | 19.1 | June 4, 1952 | N | N | Dug; an old well. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *C-32 | T. J. Burnett | -- Owens | 1939 | 175 | 8 | Pearsall (?) formation | -- | -- | C,E | D | |
| C-33 | J. L. Harwell | -- | 1956 | 4,661 | -- | -- | -- | -- | N | N | Oil test. 2/ |
| *D-1 | Allie Mae Malott | -- | -- | 537 | 6 | Glen Rose (?) limestone | 50.0 | Nov. 21, 1950 | C,W | S | |
| *D-2 | Jack Duncan | -- | 1925 | 77 | 6 | Glen Rose limestone, upper member | 32.9<br>32.5 | Nov. 2, 1937<br>Nov. 21, 1950 | C,G | D,S | Casing: 21 ft. of 6-in. |
| D-3 | W. I. Kuykendall | John Glass | -- | 305 | 6 | -- | 120.0 | Nov. 28, 1950 | C,W | S | Original depth 150 ft; deepened to 305 ft. in 1947. |
| D-4 | A. A. Elsner | E. A. Bucklin | 1930 | 2,460 | 10 | -- | -- | -- | -- | -- | Oil test. 2/ |
| D-5 | W. I. Kuykendall | -- | -- | 200 | 6 | Glen Rose limestone, lower member | 120.4 | Nov. 28, 1950 | C,H | N | An old well. |
| *D-6 | do | -- | 1910 | 200 | 6 | do | -- | -- | C,W | D,S | Casing: 20 ft. of 6-in. |
| D-7 | A. A. Elsner | Will Glass | 1916 | 115 | 6 | Glen Rose limestone | 58.3<br>58.1 | Nov. 17, 1937<br>Nov. 27, 1950 | H | D,S | |
| *D-8 | do | Tom Robbins | 1909 | 311 | 6 | -- | 241 | 1937 | C,W | D,S | |
| D-9 | Paul Garnett | -- Hayden | -- | 207 | 6 | Glen Rose (?) limestone | 163.9 | Nov. 27, 1950 | C,W | D,S | An old well. |
| *D-10 | do | -- | 1912 | 168 | 6 | Glen Rose limestone | 125.2<br>133.3 | Nov. 17, 1937<br>Nov. 27, 1950 | C,W | S | |
| *D-11 | John Cauthen | -- Glass | 1907 | 185 | 6 | do | 6.3 | Nov. 27, 1950 | C,H | D,S | |
| D-12 | Ludene Dodson | -- | 1942 | 79 | 6 | do | 61.3 | Dec. 4, 1950 | N | N | |
| D-13 | J. V. Bell | -- | -- | 126 | 6 | do | 109.0 | do | C,W | D,S | |
| D-14 | State of Texas | -- | -- | Spring | -- | Glen Rose (?) limestone | (+) | -- | Flows | D | At Camp Ben McCulloch. Estimated flow 10 gpm. |
| *D-15 | Mrs. Chas. Howard | Chas. Hayden | 1929 | 116 | 7 | Glen Rose limestone | 103.7 | Nov. 16, 1937 | C,E | D,S | Altitude 1,018.1 ft. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level | | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Below or above (+) land surface datum (ft.) | Date of measurement | | | |
| D-16 | Mrs. Chas. Howard | Chas. Hayden | 1926 | 85 | 6 | Glen Rose limestone | 58.6<br>59.7 | Nov. 16, 1937<br>Dec. 7, 1950 | N | N | Altitude 975.1 ft. |
| D-17 | J. K. Eichelberger | -- | -- | 120 | 6 | do | 95.2 | Mar. 30, 1943 | C,W | S | Altitude 1,026.2 ft. |
| D-18 | V. T. Hennig | -- | -- | 135 | 6 | do | 81.2 | Dec. 4, 1950 | C,W | S | An old well. |
| D-19 | J. E. Watson | Chas. Hayden | 1924 | 113 | 6 | do | 93.7<br>96.2 | Nov. 4, 1937<br>Dec. 4, 1950 | C,W | S | Casing: 20 ft. of 6-in. Altitude 1,019.7 ft. |
| D-20 | E. H. Martin | -- | -- | 15 | 60 | Glen Rose limestone, upper member | 4.1<br>13.0 | Mar. 27, 1943<br>Dec. 4, 1950 | H | D,S | Dug well. Rock curb; an old well. |
| *D-21 | do | Ed Milam | 1912 | 173 | 7 | Glen Rose limestone, probably lower member | 143.8<br>136.8 | Nov. 2, 1937<br>Dec. 4, 1950 | C,W | D | |
| D-22 | James R. Hall | F. L. Sanson | -- | 75 | -- | Glen Rose limestone | 1/ 32.6 | Dec. 3, 1952 | C,E | D,S | |
| *D-23 | Wiley Roberts | Noah Black | 1900 | 89 | 6 | do | 1/ 84.8 | do | C,W | D,S | Casing: 25 ft. of 6-in. Altitude 1,116.5 ft. |
| D-24 | J. W. Champion | Wm. Hayden | 1940 | 120 | 6 | do | 70 | 1940 | C,E | D,S | First water reported at 80 ft. |
| D-25 | D. T. Tetley | -- | -- | 98 | 6 | do | -- | -- | N | N | Formerly supplied house. Dry; an old well. |
| D-26 | Howard Gilmore | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Nov. 29, 1950 | Flows | S | Known as Mountain Spring. Water from contact of clay with underlying porous limestone. |
| D-27 | Clara Pantermuehl | -- | -- | 200 | 6 | Glen Rose limestone | 67.2 | Nov. 22, 1950 | C,E | D,S | An old well. |
| *D-28 | Mrs. Pearl Rodgers | J. L. Rodgers | 1900 | 241 | 6 | Glen Rose (?) limestone | 191.5 | Nov. 2, 1937 | C,E | D,S | |
| D-29 | do | -- | -- | 165 | 6 | Glen Rose limestone | 150.5 | Nov. 22, 1950 | N | N | An old well. |
| D-30 | Henry Homan | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | do | Flows | S | |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D-31 | W. E. Hatch | -- | -- | 306 | 6 | Glen Rose limestone | -- | -- | C,W,G | D,S | An old well. |
| D-32 | Frank Sanson | -- | -- | 200+ | 6 | Glen Rose (?) limestone | 137.1 | Nov. 29, 1950 | C,W | D,S | An old well. |
| D-33 | K. C. Whisenant | -- | -- | 90 | 6 | Glen Rose limestone | 53.0 | do | C,W | D,S | An old well. |
| D-34 | Lloyd David | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Jan. 26, 1951 | Flows | S | |
| *D-35 | Mrs. K. Michaelis | -- | 1905 | 262 | 6 | Glen Rose (?) limestone | -- | -- | C,W,G | N | Casing: 20 ft. of 6-in. Reported to have gone dry in 1948. |
| *D-36 | T. E. Gillespie | -- | -- | 140 | 6 | Glen Rose limestone | 1/142.9 | Aug. 2, 1950 | C,E | D | Altitude 1,248.3 ft. |
| *D-37 | J. B. Leggett | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Nov. 1950 | Flows | D,S | Flows into 30-in. concrete pipe set in pit. Known as Bryant Spring. |
| D-38 | D. C. Hall | -- | -- | Spring | -- | do | (+) | Nov. 28, 1950 | Flows | S | Flows into 3 concrete reservoirs. Known as Pillot Springs. Water from solution channels in limestone ledges. |
| D-39 | J. L. Eichelberger | -- | -- | 120 | 7 | Glen Rose limestone | 21.7<br>21.3 | Mar. 30, 1943<br>Dec. 3, 1950 | C,H | S | Altitude 920.2 ft. |
| D-40 | Mrs. Viola Whisenant | -- | -- | 60 | 6 | do | 43.8<br>42.9 | Mar. 29, 1943<br>Dec. 12, 1950 | H | D | Altitude 925.0 ft.; an old well. |
| D-41 | do | -- | -- | 300 | 6 | Glen Rose (?) limestone | 32.1<br>50.3 | Mar. 29, 1943<br>Dec. 12, 1950 | C,W | D,S | Altitude 927.7 ft.; an old well. |
| D-42 | L. E. Ray | -- Dobbins | 1917 | 303 | 6 | Glen Rose limestone | -- | -- | C,W | D,S | |
| *D-43 | M. G. Michaelis | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Dec. 1950 | Flows | S | Flows into concrete tanks. Known as Powderhorn Spring. |
| *D-44 | P. J. Tonkyro | -- | -- | Spring | -- | do | (+) | do | Flows | D,S | Flows into 25 gallon reservoir. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *D-45 | C. C. Cook | -- Adaire | 1923 | 185 | 6 | Pearsall (Travis Peak) formation (?) | 106.7 | Oct. 28, 1937 | C,E | D,S | |
| *D-46 | L. R. Calhoun | -- | -- | 132 | 6 | -- | 121.1 | Nov. 1, 1937 | C,E | D,S | |
| D-47 | B. S. Garnett | -- Millard | 1908 | 252 | 6 | Pearsall (?) formation | 174.6<br>170.0 | Oct. 30, 1937<br>June 4, 1952 | C,W | D,S | Casing: 14 ft. of 6-in. |
| D-48 | W. M. Mayfield | A. Williamson | 1950 | 292 | 8 | do | 184.4 | Jan. 26, 1951 | C,W | S | |
| *D-49 | do | -- | 1919 | 300 | 6 | do | 172.2<br>172.8 | Oct. 28, 1937<br>Jan. 25, 1951 | C,W | D,S | |
| D-50 | Mrs. John Cure | -- | -- | 215 | 6 | Glen Rose limestone | 134.7 | Jan. 26, 1951 | C,W | D,S | An old well. |
| D-51 | Harry Davis | -- Owens | -- | 700 | -- | Pearsall (?) formation | -- | -- | C,E | D,S | An old well. |
| *D-52 | Walter G. Loeffer | -- | 1922 | 100 | 6 | Glen Rose limestone, upper member | 51.2<br>66.3 | Oct. 28, 1937<br>Dec. 12, 1950 | C,W | D,S | |
| D-53 | J. J. Blackwell | -- | 1900 | 12 | 36 | Edwards limestone | 7.5 | Dec. 12, 1950 | C,W | D,S | Dug. Rock curb. |
| *D-54 | Joe Cruze | -- | -- | Spring | -- | do | -- | -- | -- | S | Flowed into earthen tank; stopped flowing in summer of 1949. Flowed from solution channel in limestone. |
| *D-55 | do | H. Harmon | 1900 | 125 | 6 | Glen Rose limestone, upper member | 74.9<br>87.3 | Apr. 12, 1943<br>Dec. 12, 1950 | C,W | D,S | |
| D-56 | A. B. Vogt | -- Hayden | 1930 | 300 | 6 | do | -- | -- | C,G | S | |
| *D-57 | Joe Stuart | A. Williamson | 1942 | 429 | 6 | Glen Rose (?) limestone | 174.3<br>192.7 | Mar. 29, 1943<br>Dec. 12, 1950 | C,W | S | Casing: 6 ft. of 6-in. Altitude 1,004.6 ft. |
| D-58 | E. R. Holder | -- | -- | 119 | 6 | -- | 71.5<br>72.8 | Mar. 31, 1943<br>Dec. 12, 1950 | N | N | Reported weak supply. Altitude 991.0 ft; an old well. |
| *D-59 | John Whisenant | -- | 1915 | 113 | 6 | Edwards (?) limestone | 98.3 | Oct. 29, 1937 | C,G | D,S | |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D-60 | Mrs. W. J. Gebhard | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Jan. 25, 1951 | Flows | D,S | Flows into gravity distribution system. Supplies 6 houses. Reported flow, 25 gpm. |
| D-61 | Leon Jaworski | -- | -- | Spring | -- | Edwards (?) limestone | (+) | do | Flows | D | Flows into sealed tank. Known as Grapevine Springs. |
| D-62 | Mrs. H. H. Phillips | -- | -- | 1,011 | [illegible] | Pearsall (?) formation | 177.4<br>174.9 | Apr. 10, 1939<br>Dec. 12, 1950 | C,W | S | Original depth 615 ft. Deepened to 1,011 ft. in 1939. 2/ |
| *D-63 | H. Thornton | -- | -- | [illegible] | 6 | Glen Rose limestone, upper member | 109.2 | Jan. 25, 1951 | C,W | D | An old well. |
| D-64 | Mrs. W. S. Harris | A. Williamson | 1925 | 104 | [illegible] | do | 40 | 1951 | J,E | D,S | |
| *D-65 | Mrs. M. Roberts | Felix Saunders | 1930 | 151 | 6 | Glen Rose limestone | [illegible].1<br>77.3 | Nov. 19, 1937<br>July 23, 1952 | C,W | D,S | Casing: 14 ft. of 6-in. |
| *D-66 | Mrs. Rena Dobie | T. E. Owens | 1936 | [illegible] | [illegible] | do | 1/ 5.7 | Dec. 3, 1953 | C,W | D,S | Casing: 6 ft. of 6-in. Altitude 758.7 ft. |
| *D-67 | H. B. Pendleton | -- | -- | 125 | [illegible] | do | 71.2<br>95.7 | Oct. 26, 1937<br>Jan. 25, 1951 | C,W | D,S | |
| D-68 | do | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Jan. 25, 1951 | Flows | S | Flows from solution channels in limestone. Known as Green Hole Spring. |
| D-69 | -- | -- | -- | Spring | -- | Glen Rose limestone, lower member | (+) | do | Flows | N | Head of Cypress Creek. Flows from solution channels in limestone. Known as Jacob's Well. Measured yield, 1,070 gpm, Jan. 26, 1955. Temp. 66°F. |
| *D-70 | R. A. Byler | R. Paige | 1904 | 332 | 6 | Pearsall (Travis Peak) (?) formation | -- | -- | C,W | D,S | |
| *D-71 | Odessa Ferris | -- | -- | 26 | 30 | Glen Rose limestone | 23.2<br>12.5 | Oct. 28, 1937<br>June 10, 1952 | N | N | Dug. Rock curb. |
| D-72 | do | Gilbert Owens | 1936 | 300 | 9 | Pearsall formation | 170.2<br>134.4 | Oct. 28, 1937<br>June 10, 1952 | C,W | S | |
| *D-73 | E. C. James | A. Williamson | 1949 | 350 | 7 | do | -- | -- | T,E, $7\frac{1}{2}$ | P | Supplies hotel and houses on Eagle Rock Ranch. One of eight wells. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *D-74 | E. C. James | A. Williamson | 1953 | 350 | 8 | Pearsall formation | -- | -- | T,E, 10 | P | Supplies hotel and houses on Eagle Rock Ranch. One of eight wells. |
| D-75 | Nagel Bros. | E. Williamson | 1954 | 395 | 8 | do | 119.0 | Sept.10, 1954 | -- | S | |
| E-1 | A. M. James | -- | -- | 300 | 6 | Glen Rose limestone, upper member | 136.0 | Nov. 27, 1950 | N | N | An old well. |
| *E-2 | do | Chas. Hayden | -- | 154 | 6 | do | 139.5<br>60.4 | Nov. 4, 1937<br>Mar. 24, 1943 | C,G | D,S | Altitude 1,054.7 ft.; an old well. |
| E-3 | W. R. Smith | do | -- | 267 | 6 | do | 76.9<br>119.3 | Nov. 10, 1937<br>Dec. 4, 1950 | C,W | S | Well recovers slowly after pumping. Altitude 1,061.7 ft. |
| E-4 | A. M. James | -- | -- | Spring | -- | Glen Rose (?) limestone | (+) | Dec. 4, 1950 | Flows | D,S | Flows from contact of gravel with limestone into a sealed concrete tank. |
| E-5 | Ben M. Barker | Chas. Hayden | 1930 | 353 | 6 | -- | -- | -- | C,G | -- | |
| *E-6 | W. P. Webb | John Glass | 1948 | 310 | 8, 6 | Glen Rose limestone | -- | -- | T,G | D,S | Supplies Friday Mountain Ranch Boys Camp. |
| E-7 | do | do | 1948 | 315 | -- | do | -- | -- | C,E | D,S | Standby well for Friday Mountain Boys Camp. |
| *E-8 | do | -- | -- | Spring | -- | Glen Rose limestone, upper member | -- | -- | -- | -- | Ceased flowing during summer of 1951. |
| *E-9 | Chas. Morton | Chas. Hayden | 1931 | 110 | 6 | do | 50.1<br>55.3 | Nov. 10, 1937<br>Mar. 26, 1943 | J,E | D,S | Altitude 945.0 ft. |
| E-10 | do | -- | -- | 36 | 7 | do | 18.0 | Mar. 26, 1943 | -- | -- | Well abandoned. Altitude 903.9 ft. An old well. |
| E-11 | Stephen Barker | S. W. Glass | 1950 | 416 | 7 | -- | 121 | Dec. 1950 | C,W | S | Casing: 250 ft. of 7-in. Drawdown reported 19 ft. after bailing 30 gpm for 1 hour. |
| E-12 | do | -- | -- | Spring | -- | Edwards limestone | -- | -- | N | N | Ceased flowing in 1948. Known as Indian Head Spring. |
| E-13 | do | -- | -- | Spring | -- | do | (+) | Dec. 5, 1950 | Flows | S | Flows from solution channel in limestone. Reported to fluctuate seasonally. Known as Spanish Oaks Spring. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E-14 | Stephen Barker | -- | 1928 | 259 | -- | -- | -- | -- | C,W,E | D,S | Reported strong supply. |
| *E-15 | -- Jarvis | -- | 1890 | 237 | 6 | Glen Rose limestone | 64.8<br>142.6 | Nov. 16, 1937<br>Dec. 7, 1950 | C,W | S | |
| E-16 | M. O. Rogers | -- | -- | Spring | -- | Glen Rose limestone, upper member | (+) | Dec. 7, 1950 | Flows | S | Flows from solution cavity in limestone. Reported to fluctuate seasonally. |
| *E-17 | do | Harvey Harmon | -- | 110 | 6 | -- | 1/ 57.6 | Aug. 17, 1953 | C,W | D,S | Reported strong supply. Altitude 992.5 ft. |
| *E-18 | John Greenhall | -- | -- | 90 | 6 | Edwards (?) limestone | 35.6<br>29.8 | Mar. 31, 1943<br>Jan. 9, 1951 | C,W | S | Altitude 900.8 ft. |
| E-19 | do | Felix Saunders | 1920 | 500 | 6 | Edwards limestone | -- | -- | C,E | D,S | Casing: 160 ft. of 6-in. Reported strong supply. |
| *E-20 | do | -- | 1945 | 320 | 6 | do | 128.0 | Dec. 7, 1950 | C,W | S | |
| E-21 | Cecil Ruby | -- | -- | 400 | 5 | do | 166.3 | Mar. 5, 1943 | C,E | D,S | Altitude 837.8 ft. |
| E-22 | do | Hugh Glass | 1950 | 245 | 6 | do | 157.4<br>144.1 | Dec. 5, 1950<br>Sept. 5, 1952 | C,W | S | Altitude 805.7 ft. |
| *E-23 | J. E. Tomerlin | -- | -- | 270 | 6 | do | 239 | Oct. 1950 | J,E | D,S | |
| *E-24 | J. L. Dodgen | T. E. Owens | 1937 | 312 | 6 | do | 1/276.6 | Jan. 9, 1951 | C,E | D,S | Altitude 852.4 ft. 2/ |
| *E-25 | E. O. Dodgen | Jim Wallace | 1917 | 325 | 6 | do | -- | -- | C,W,G | D,S | Casing: 110 ft. of 6-in. |
| E-26 | J. L. Dodgen | J. A. Johnson | 1943 | 280 | 5 | do | 226.4 | Mar. 5, 1943 | C,E | D,S | Casing: 76 ft. of 5-in. Altitude 825.7 ft. |
| E-27 | Roy Elliott | -- | -- | 300 | 7 | do | -- | -- | C,G | D,S | Reported strong supply; an old well. |
| E-28 | J. C. Elliott | -- Johnson | 1938 | 307 | 8 | do | -- | -- | C,G | D,S | Casing: 200 ft. of 8-in. |
| E-29 | -- Summerall | -- | -- | 260 | 6 | Edwards limestone | 175.1<br>182.0 | Nov. 8, 1937<br>Jan. 9, 1951 | C,W | S | Altitude 715.3 ft. |
| E-30 | S. T. Cruze | -- Wallace | 1910 | 320 | 8 | do | 218.1<br>227.5 | Nov. 17, 1937<br>Jan. 9, 1940 | C,E | D,S | |
| E-31 | Henry Armbruster | T. E. Owens | 1937 | 248 | 6 | do | 1/162.9 | Oct. 24, 1950 | C,E | D,S | Altitude 730.3 ft. 2/ |

*See footnotes at end of table.

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E-32 | F. Tompkins | -- | -- | 100 | 6 | -- | 31.0 | Oct. 26, 1950 | J,E | D | An old well. |
| *E-33 | Homer Heep | C. L. Tyler | 1943 | 242 | 7 | Edwards limestone | 105.5 | Apr. 13, 1943 | C,E | D,S | Casing: 176.5 ft. of 7-in. Altitude 704.1 ft. 2/ |
| E-34 | John D. Garrison | -- | -- | 21 | 50 | Quaternary (?) rocks | 19.8 | Oct. 25, 1950 | J,E | D | Dug; an old well. |
| E-35 | Boggs Estate | -- Robinson | -- | 340 | -- | Edwards limestone | -- | -- | C,E | D,S | |
| *E-36 | J. J. Horton | -- | 1907 | 243 | 5 | do | 1/106.6 | Dec. 2, 1953 | C,E | D | Casing: 230 ft. of 5-in. Used occasionally. Altitude 707.2 ft. |
| E-37 | J. A. Rogers | Saunders & Glass | 1948 | 345 | 8, 6 | do | 150 | 1949 | T,E | P | One of two wells supplying city of Buda. 2/ |
| *E-38 | do | C. L. Tyler | 1940 | 325 | 8 | do | 122.2<br>155.8 | Apr. 13, 1943<br>Jan. 2, 1951 | T,E | P | Casing: 173 ft. of 8-in. One of two wells supplying city of Buda. Altitude 714.8 ft. 2/ |
| E-39 | John Howe | -- | -- | -- | -- | Edwards (?) limestone | 157.7<br>156.9 | Nov. 8, 1950<br>Sept. 5, 1952 | C,W | D,S | Altitude 742.6 ft. |
| *E-40 | Wilmont Estate | -- | -- | 500 | -- | Edwards limestone | -- | -- | C,E | D,S | |
| E-41 | P. Ries | -- | -- | 300 | 6 | do | 163.8<br>167.3 | Jan. 2, 1951<br>Sept. 5, 1952 | C,W | D | Altitude 780.1 ft. |
| E-42 | W. G. Burris | -- | -- | 18 | 40 | Austin (?) chalk | 13.2 | Nov. 9, 1950 | H | S | Dug. Stone curb; an old well. |
| *E-43 | M. J. H. Ferguson | -- Robinson | 1900 | 231 | -- | Edwards (?) limestone | 134.3<br>204.0 | Sept.16, 1937<br>Mar. 27, 1952 | C,W | D,S | Altitude 767.1 ft. |
| E-44 | -- Cullens | -- | -- | 9 | 30 | Taylor marl. | 7.4 | Oct. 26, 1950 | C,W | S | Dug. Concrete curb. |
| *E-45 | John Butler | -- | 1898 | 507 | 6 | Edwards limestone | 1/157.6 | May 1, 1948 | J,E | D,S | Altitude 740.4 ft. |
| E-46 | Mrs. Laura B. Negley | C. L. Tyler | 1943 | 508 | 7 | do | 181.0<br>177.7 | Nov. 8, 1950<br>Sept. 5, 1952 | C,W | S | Altitude 755.9 ft. 2/ |
| E-47 | do | do | 1941 | 430 | 7 | do | 189.7<br>226.2 | Mar. 4, 1943<br>Nov. 8, 1950 | C,W | D,S | Altitude 786.6 ft. 2/ |

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Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *E-48 | Mrs. Laura B. Negley | C. L. Tyler | 1943 | 400 | 6 | Edwards limestone | 1/229.3 | Dec. 3, 1953 | C,W | S | Altitude 827.[illegible] ft. 2/ |
| *E-49 | do | -- | -- | 414 | 10 | do | 155.2<br>210.7 | June 4, 1943<br>Nov. 8, 1950 | C,W | S | Casing: 5-in. from 254 to 303 ft. Altitude 819.4 ft; an old well. |
| E-50 | do | C. L. Tyler | 1945 | 465 | 6 | do | 213.0<br>213.8 | Nov. 8, 1950<br>Sept. 5, 1952 | C,W | S | Casing: 326 ft. of 6-in. Altitude 800.2 ft. 2/ |
| *E-51 | F. W. Miller | do | 1943 | 314 | 6 | do | 235.5 | June 4, 1943 | C,E | D,S | Casing: 215 ft. of 6-in. 2/ |
| E-52 | M. G. Michaelis | do | 1942 | 325 | 5 | do | 267.7<br>267.5 | Mar. 30, 1943<br>Sept. 5, 1952 | C,W | S | Casing: 241 ft. of 5-in. Altitude 875.6 ft. 2/ |
| E-53 | do | -- | -- | 250 | -- | do | 184.6 | Jan. 9, 1940 | C,E | D,S | Altitude 823.6 ft; an old well. |
| *E-54 | do | -- | 1904 | 250 | 6 | do | -- | -- | C,G | D,S | Cased to bottom. |
| *E-55 | Jim Blair | C. L. Tyler | 1941 | 300 | 6 | do | 237.3 | Mar. 31, 1943 | C,W,E | D,S | Casing: 260 ft. of 6-in. Altitude 936.7 ft. 2/ |
| E-56 | do | -- | -- | 200 | 7 | do | 153.7<br>158.2 | Mar. 31, 1943<br>Sept. 5, 1952 | C,W | S | Altitude 868.8 ft; an old well. |
| E-57 | E. W. Zimmerman | C. L. Tyler | 1940 | 348 | 8 | Glen Rose limestone | 137.2<br>146.6 | Mar. 30, 1943<br>Dec. 8, 1950 | C,W | D,S | Casing: 125 ft. of 6-in. Altitude 1,027.5 ft. 2/ |
| *E-58 | do | -- | -- | 127 | 8,<br>6 | Glen Rose limestone, upper member | 1/ 89.8 | Dec. 3, 1953 | N | N | Altitude 1,010.2 ft. |
| *E-59 | Joe Stuart | -- | -- | 500 | 6 | Edwards limestone | 1/206.5 | Sept. 5, 1952 | C,W | D,S | Altitude 963.1 ft. |
| E-60 | Vernon Cox | -- | -- | 300 | 6 | do | 225.2 | Jan. 3, 1951 | C,W | S | Altitude 953.6 ft.; an old well. |
| E-61 | do | -- | -- | 300 | 6 | do | 215.1 | Dec. 8, 1950 | C,W | D,S | |
| *E-62 | C. M. Decker | -- | -- | 375 | 6 | do | -- | -- | C,W,G | D,S | |
| *E-63 | -- Gregg | -- | -- | 250 | 8,<br>5 | do | 191.7 | July 31, 1945 | C,E | S | Originally 210 ft. deep. Well failed and was deepened to 250 ft. in 1941. |
| *E-64 | Ed Montague | C. L. Tyler | 1941 | 128 | 8,<br>6 | Austin chalk | 63.4<br>60.3 | June 4, 1943<br>Dec. 8, 1950 | C,E | D,S | Casing: 15 ft. of 8-in., 20 ft. of perforated 6-in. in bottom. 2/ |
| E-65 | Paul J. Grelle | -- | -- | 450 | -- | Edwards limestone | 1/232.6 | Sept. 5, 1952 | C,W | D,S | Altitude 821.6 ft. |

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Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *E-66 | Mrs. E. Fehlis | -- | 1912 | 387 | 7 | Edwards limestone | -- | -- | C,G | D,S | |
| *E-67 | Jim Hale Miller | -- | -- | 500 | 6 | do | 156.1 | Oct. 2, 1937 | C,E | D,S | Casing: 375 ft. of 6-in. |
| E-68 | W. A. Word | -- Glass | 1950 | 456 | -- | do | -- | -- | C,E | D,S | |
| *E-69 | A. L. Schmeltekopf | -- | 1905 | 42 | 35 | Taylor (?) marl | 36.3<br>15.6 | Sept.15, 1937<br>Nov. 10, 1950 | N | N | Dug. Stone and concrete crub. Not used for 10 years. |
| *E-70 | H. K. Wilbern | -- Owens | 1947 | 450 | 6 | Edwards limestone | -- | -- | C,E | D,S | |
| *E-71 | A. D. Dees | -- | -- | 14 | 48 | Taylor marl | 8.7 | Nov. 9, 1950 | C,E | D,S | Dug. Stone curb; an old well. |
| *E-72 | F. C. Litterst | -- | -- | 553 | 8 | Edwards limestone | 136.2 | Oct. 30, 1953 | C,E | D,S | |
| *E-73 | P. R. Rutherford | -- Glass | 1952 | 1,430 | 7 | Pearsall formation | -- | -- | T,G | S,Irr | Screened in both upper and lower sands of Travis Peak. Upper sand reported at 1,130 ft. |
| *E-74 | do | A. Williamson | 1949 | 295 | 8 | Glen Rose limestone | -- | -- | T,E 7½ | D,S | |
| *E-75 | Mrs. Ida Hill | -- Owens | 1952 | 526 | 6 | Edwards limestone | -- | -- | C,W | S | Casing: 200 ft. of 6-in. |
| E-76 | City of Buda | J. B. Virdell | 1954 | 390 | 10 | do | 148 | Dec. 1954 | T,- | P | Casing: 222 ft. of 10-in. Reported adequate for city supply.2/ |
| E-77 | Chas. Morton | -- Glass | 1954 | 600 | -- | Pearsall formation | 125 | 1954 | C,E | D,S | |
| *E-78 | R. J. Kidd | -- | 1955 | 980 | -- | do | 60 | May 30, 1955 | -- | D | |
| F-1 | Herman Heep | C. L. Tyler | 1945 | 301 | 6 | Edwards limestone | -- | -- | C,E | D,S | Casing: 205 ft. of 6-in. 2/ |
| F-2 | B. L. Guess | -- | -- | Spring | -- | Quaternary rocks | (+) | Oct. 24, 1950 | Flows | N | Small seeps from gravel in bank of draw. Well dug into bank yields water for house. |
| *F-3 | Thomas Yoe | -- | -- | 30 | 28 | Quaternary (?) rocks | 1/ 26.5 | Apr. 24, 1952 | N | N | Dug. Brick curb. |
| F-4 | -- Costello | -- | -- | 24 | 50 | Taylor marl | 12.2 | Oct. 23, 1950 | H | D | Dug. Brick curb. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level | | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Below or above (+) land surface datum (ft.) | Date of measurement | | | |
| F-5 | Tom A. Green | -- Wallace | 1924 | 577 | 6 | Edwards limestone | 60 | 1924 | C,E | D | Reported strong supply. |
| *F-6 | Herman Heep | -- | -- | 500 | 6 | Edwards (?) limestone | -- | -- | N | N | |
| *F-7 | Tom Pate | John Howe | -- | 665 | 5 | Edwards limestone | -- | -- | C,E | D,S | Casing: 555 ft. of 5-in. Reported highly mineralized water at 550 ft.; an old well. |
| *F-8 | M. J. Coady | -- | -- | 28 | 24 | Taylor marl | 13.3 | Oct. 23, 1950 | J,E | D,S | Dug. Wood curb; an old well. |
| F-9 | R. H. Black | -- | -- | 20 | 72 | do | 16.6 | Oct. 20, 1950 | H | S | Dug. Stone and concrete curb; an old well. |
| *F-10 | L. S. Coers | C. L. Tyler | 1944 | 650 | 6 | Edwards limestone | 181.6<br>179.5 | Jan. 9, 1951<br>Sept. 5, 1952 | C,W | S | Casing: 562 ft. of 6-in. Altitude 742.4 ft. 2/ |
| F-11 | Elmer Satterwhite | -- | -- | 19 | 44 | Taylor marl | 15.3 | Nov. 6, 1950 | C,W | S | Dug. Brick curb; an old well. |
| *F-12 | Alvis Satterwhite | -- | -- | 13 | 80 | do | 11.5 | do | C,E | D | do |
| F-13 | E. H. Meyer | -- | -- | 35 | 24 | Taylor (?) marl | 20.9 | Oct. 20, 1950 | N | N | Dug; an old well. |
| F-14 | Rudolph Braune | -- | 1949 | 17 | 36 | do | 9.9 | Oct. 23, 1950 | J,E | D,S | Dug. Concrete curb. |
| *F-15 | do | -- | 1907 | 19 | 30 | -- | 8.9 | Nov. 8, 1937 | -- | -- | Well destroyed in 1950. |
| F-16 | William Schultze | -- | -- | 20 | 30 | Taylor marl | 6.2 | Oct. 23, 1950 | J,E | D | Dug. Concrete curb. |
| F-17 | Edgar Mathias | -- | -- | 14 | 36 | do | 7.5 | do | N | N | Dug. Brick curb; an old well. |
| *F-18 | L. Romeros | -- | 1916 | 23 | 41 | do | 18.2<br>17.4 | Nov. 8, 1937<br>Oct. 23, 1950 | C,W | D,S | Dug. Brick curb. |
| F-19 | Will G. Barber | John H. Foster | 1929 | 616 | -- | -- | -- | -- | -- | -- | Oil test. Caved and abandoned. Z. Hinton Survey 4, well 2. 2/ |
| F-20 | do | do | 1929 | 804 | -- | -- | -- | -- | -- | -- | Oil test. Caved and abandoned. Z. Hinton Survey 4, well 1. 2/ |
| F-21 | do | do | 1929 | 665 | 10 | -- | -- | -- | -- | -- | Oil test. Caved and abandoned. Z. Hinton Survey 4, well 3. 2/ |
| *F-22 | A. W. Whitten | C. L. Tyler | 1942 | 502 | 7 | Edwards limestone | 135 | 1942 | C,E | D,S | Casing: 431 ft. of 7-in. 2/ |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| F-23 | -- | -- | -- | 15 | 23 | Taylor marl | 6.6 | Oct. 20, 1950 | C,W,H | N | Dug. |
| F-24 | J. R. Alexander | -- | 1948 | 2,028 | 9 | -- | -- | -- | -- | N | Oil test. 2/ |
| F-25 | David Schubert | -- | 1955 | 3,338 | 6 | -- | -- | -- | -- | N | Oil test. Reported altitude 584 ft. 2/ |
| *G-1 | N. W. Reed | -- | -- | 65 | 6 | Glen Rose limestone, lower member | 53.1 | Oct. 21, 1937 | C,W | D,S | |
| G-2 | Mrs. Maud DeVilbis | -- | -- | 86 | -- | Glen Rose limestone | 38.3 | June 4, 1952 | C,W | D,S | An old well. |
| G-3 | do | -- | 1939 | 375 | -- | -- | -- | -- | C,W | S | |
| G-4 | A. H. Barnes, Jr. | -- | -- | 225 | 6 | Glen Rose limestone, lower member | 47.4 | June 4, 1952 | N | N | Well contaminated from cess pool. |
| *G-5 | W. H. Moses | Fleming Adaire | 1917 | 84 | 6 | do | 33.7 | Oct. 21, 1937 | -- | -- | Well plugged. |
| *G-6 | B. D. Bell | -- | 1895 | 112 | 6 | Glen Rose limestone | 36.0 | Oct. 20, 1937 | C,H | D | |
| *G-7 | do | -- | 1895 | 200 | 6 | do | 21.3 | do | N | N | |
| G-8 | Mrs. Georgia Clayton | -- | 1939 | 264 | 6 | -- | 12.3 | Mar. 20, 1939 | -- | -- | Well plugged. |
| *G-9 | E. C. James | T. E. Owens | 1937 | 260 | 6 | Pearsall (?) formation | 22.7 | Jan. 25, 1951 | J,E | D | Water level reported 16.3 ft. above land surface datum in October 1937. |
| *G-10 | J. K. Keith | do | 1937 | 46 | 6 | Glen Rose limestone | 30.1 | Nov. 19, 1937 | J,E | D,S | Casing: 28 ft. of 6-in. |
| *G-11 | Mrs. J. W. Pyland | do | -- | 215 | 6 | Pearsall (?) formation | 5.1 | Nov. 11, 1937 | C,W | D,S | Casing: 30 ft. of 6-in. Temp. 70°F. |
| *G-12 | Mrs. N. E. Hughes | -- | -- | 170 | 6 | Glen Rose limestone, lower member | 1/ 10.9 | Jan. 25, 1951 | H | D | Casing: 10 ft. of 6-in. Altitude 863.1 ft. Water level measured 8.6 ft. above land surface datum on Nov. 11, 1937. An old well. |
| G-13 | Curtis Morris | -- | -- | 162 | 6 | do | 1/ 20.4 | Apr. 4, 1951 | J,E | D | Casing: 22 ft. of 6-in. Altitude 850.9 ft. Water level measured 17.2 ft. above land surface datum on April 28, 1938. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *G-14 | M. A. Morris | T. E. Owens | 1938 | 165 | 6 | Glen Rose limestone, lower member | -- | -- | C,E | D,S | Casing: 26 ft. of 6-in. Water level measured 19.5 ft. above land surface datum on Apr. 26, 1938. |
| *G-15 | C. W. Burdett | T. E. Owens | 1939 | 525 | 6 | Pearsall (?) formation | 11.5 | Feb. 14, 1939 | J,E | D,S | 2/ |
| *G-16 | R. E. New | do | 1939 | 260 | 6 | -- | 0.8 | Nov. 8, 1939 | J,E | D | |
| *G-17 | W. A. Leath | do | 1936 | 248 | 6 | -- | 24.3 | June 10, 1952 | C,E | D | Casing: 32 ft. of 6-in. Water level measured 16.1 ft. above land surface datum on Oct. 15, 1937. 2/ |
| G-18 | J. J. Peterson | do | 1938 | 274 | 6 | Glen Rose (?) limestone | 24 | 1938 | N | N | Formerly supplied summer camp. |
| *G-19 | do | -- | -- | Spring | -- | Quaternary rocks (?) | (+) | June 10, 1952 | Flows | N | |
| G-20 | W. A. Leath | Fleming Adaire | -- | 104 | 6 | Glen Rose limestone | 1/ 43.2 | Oct. 15, 1937 | C,W | S | Casing: 40 ft. of 6-in. Altitude 961.6 ft. |
| G-21 | Tom Nance | do | 1903 | 500 | 6 | do | 176.4 | Oct. 19, 1937 | N | N | |
| *G-22 | do | -- | -- | 33 | -- | Quaternary (?) rocks | 26.5 | do | N | N | Dug. Well dry Dec. 15, 1950. |
| G-23 | Charlie Howell | -- | -- | Spring | -- | -- | (+) | Dec. 15, 1950 | Flows | -- | Known as Fern Bank Spring. |
| *G-24 | Morton Ranch | -- | 1927 | 400 | 6 | -- | 276.5 | Apr. 7, 1943 | C,W | D,S | |
| G-25 | Dan Nance | Fleming Adaire | 1928 | 311 | 6 | Edwards (?) limestone | 224.1 | Oct. 20, 1937 | C,G | S | |
| G-26 | Joe Freeman | -- | -- | 275 | 6 | Edwards limestone | 162.0<br>154.2 | Dec. 15, 1950<br>Mar. 26, 1952 | C,W | S | |
| G-27 | Gene Scrutchin | -- | 1897 | 315 | 6 | do | 150.9<br>244.5 | June 11, 1952<br>Apr. 4, 1955 | N | N | |
| *G-28 | Dan Nance | A. Newton | 1916 | 280 | 7 | -- | 231.9 | Oct. 18, 1937 | C,W | D,S | Casing: 4 ft. of 7-in. |
| *G-29 | R. R. Williams | -- | -- | 270 | 6 | -- | 200.5<br>244.2 | Jan. 9, 1940<br>Mar. 19, 1955 | C,W | D,S | Altitude 1,001.4 ft. |
| *G-30 | do | -- | -- | 270 | 6 | -- | -- | -- | C,W | S | An old well. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *G-31 | A. Capps | -- | -- | 280 | 6 | Glen Rose limestone, upper member | 35.4 | June 11, 1952 | C,E | S | Casing: 6 ft. of 6-in. |
| G-32 | R. R. Williams | -- | -- | 300 | 6 | -- | -- | -- | C,W | D,S | |
| *G-33 | do | -- | -- | 500 | 6 | -- | -- | -- | C,W | S | Water reported from 250 to 300 ft. |
| *G-34 | A. Capps | Jack Adaire | 1916 | 58 | 6 | Glen Rose limestone, upper member | 37.6<br>35.4 | Nov. 13, 1937<br>June 11, 1952 | C,E | D,S | |
| G-35 | Mrs. R. F. Clayton, Sr. | E. Owens | -- | 129 | 6 | do | 1/ 55.0 | Mar. 21, 1946 | C,E | D | Altitude 1,119.2 ft. |
| *G-36 | H. K. Wilbern | -- | 1918 | 100 | 6 | do | -- | -- | C,W | D,S | |
| G-37 | C. W. Williamson | Bob Paige | 1900 | 60 | 6 | do | 40<br>47.1 | Oct. 1937<br>July 23, 1952 | C,H | D,S | Casing: 20 ft. of 6-in. |
| *G-38 | Fred Boyett | -- | -- | 58 | 6 | -- | 1/ 10.5 | Dec. 3, 1953 | N | N | Altitude 1,204.4 ft. |
| *G-39 | do | John Payne | 1909 | 124 | 6 | Glen Rose limestone, upper member | 1/ 65.4 | July 23, 1952 | C,W | D,S | Altitude 1,210.5 ft. |
| *G-40 | E. S. Allen | -- | 1920 | 85 | 6 | do | 21.6<br>19.7 | Nov. 13, 1937<br>July 23, 1952 | C,W | D,S | |
| *G-41 | O. A. Stoepler | Jack Adaire | -- | 41 | -- | Edwards (?) limestone | 12.7 | Oct. 15, 1937 | C,W | D,S | |
| G-42 | R. R. Williams | do | -- | 170 | 5 | -- | 162.7 | Nov. 13, 1937 | N | N | |
| G-43 | Herman Heep | do | -- | 300 | -- | -- | -- | -- | C,W,G | D,S | |
| *G-44 | M. E. Ruby | A. Williamson | 1942 | 450 | 6 | -- | -- | -- | C,W,G | D,S | |
| *G-45 | Herman Heep | John Haunz | 1900 | 504 | 6 | Edwards limestone | 278.1 | Mar. 28, 1955 | C,W | D | Casing: 20 ft. of 6-in. |
| *G-46 | Rector Williams | E. B. Kutscher | 1939 | 315 | 6 | do | 278.0 | Apr. 5, 1943 | C,W,G | D,S | Casing: 6 ft. of 6-in. 2/ |
| *G-47 | W. N. Allbright | Jack Adaire | 1926 | 342 | -- | do | 293.4<br>297.5 | Apr. 6, 1943<br>Dec. 14, 1950 | C,W | S | |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| G-48 | Ed Posey | -- | -- | 234 | -- | Edwards limestone | 227.6<br>224.4 | Jan. 4, 1951<br>Sept. 5, 1952 | C,W | S | Altitude 830.9 ft.; an old well. |
| G-49 | do | -- | -- | 420 | 6 | do | 290.3 | Sept. 5, 1952 | C,W,G | D,S | Reported sulfur odor. Altitude 867.1 ft.; an old well. |
| *G-50 | J. H. Robinson | A. Newton | 1880 | 300 | 6 | do | 244.5<br>248.4 | Nov. 23, 1937<br>Jan. 16, 1951 | C,W | S | Casing: 50 ft. of 6-in. Altitude 829.5 ft. |
| G-51 | R. Wegner | E. B. Kutscher | 1941 | 381 | 6 | do | -- | -- | C,W | D,S | Casing: 5 ft. of 6-in. 2/ |
| *G-52 | do | -- | 1900 | 280 | 6 | do | 207 | 1930 | C,W | S | Casing: 20 ft. of 6-in. |
| G-53 | J. H. Robinson | E. B. Kutscher | 1940 | 362 | 6 | do | -- | -- | C,W,E | D,S | Casing: [illegible].5 ft. of 6-in. 2/ |
| G-54 | Rector Williams | do | 1940 | 377 | 7 | do | 296.0 | Jan. 16, 1951 | C,W | D,S | Casing: 5 ft. of 7-in. 2/ |
| *G-55 | do | A. Newton | 1914 | 428 | -- | do | 332.3<br>337.8 | Mar. 10, 1943<br>Mar. 31, 1955 | C,G | D,S | Altitude 913.8 ft. |
| *G-56 | Mrs. J. T. Taylor | A. Williamson | 1951 | 546 | -- | Pearsall (?) formation | 90 | June 1951 | C,E | D | |
| *G-57 | H. W. Leunie | do | 1953 | 534 | 7 | do | 150 | June 1953 | C,E | D,S | Casing: 20 ft. of 7-in. |
| *G-58 | Mose A. Smith | -- | -- | 500 | -- | do | 85 | Sept. 1953 | C,E | D,S | |
| G-59 | -- Roselle | -- | 1954 | 435 | 8 | Pearsall formation | 13.1 | Sept.14, 1954 | -- | D | See figure 6. |
| G-60 | Raymond Bealy | E. Williamson | 1954 | 561 | 8 | do | 127 | Dec. 8, 1954 | -- | N | Reported not adequate for irrigation. |
| G-61 | Weldon Schlameus | -- | -- | -- | -- | Glen Rose limestone | 37.5 | Mar. 24, 1955 | -- | N | Reported altitude 1,156 ft. |
| G-62 | -- Cromwell | E. Williamson | -- | 339 | 6 | do | 40.0 | Mar. 16, 1955 | C,E | D | Reported altitude 1,112 ft. |
| *G-63 | O. A. Stoeppler | do | 1954 | 805 | 7 | Pearsall formation | 384.3 | Mar. 29, 1955 | C,E | D,S | Reported altitude 1,108 ft. |
| G-64 | do | R. R. Williams | -- | 300 | -- | Glen Rose limestone | 47.4 | Mar. 31, 1955 | -- | N | Reported altitude 1,061 ft. |
| G-65 | do | E. B. Kutschev | 1946 | 475 | 7 | -- | -- | -- | C,W | S | Reported altitude 1,110 ft. |
| G-66 | -- Williams | E. Williamson | 1947 | 290 | -- | -- | 223.5 | Apr. 1, 1955 | C,W | S | Reported altitude 1,024 ft. |

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Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| G-67 | Scott Posey | -- | 1900 | 300 | -- | -- | 247.9 | Apr. 1, 1955 | C,W | S | Reported altitude 1,042 ft. |
| G-68 | R. R. Williams | E. Williamson | -- | 400 | 6 | -- | 227 | Mar. 29, 1955 | C,W | S | Reported altitude 1,058 ft. |
| G-69 | G. Scrutchin | -- | -- | 233 | 6 | -- | 212.9 | Apr. 4, 1955 | N | N | Reported altitude 1,012 ft. |
| G-70 | do | -- | -- | 221 | 6 | -- | 185.8 | do | C,W | S | Reported altitude 1,027 ft. |
| G-71 | do | -- | 1943 | 214 | -- | -- | 201.5 | do | C,W | S | Reported altitude 970 ft. |
| G-72 | do | -- | 1945 | 252 | 6 | Edwards limestone | 228.7 | Apr. 5, 1955 | C,W | S | Reported altitude 893 ft. |
| G-73 | do | -- | -- | -- | -- | do | 262.5 | Mar. 5, 1955 | C,W | S | Reported altitude 891 ft. |
| G-74 | -- Heimer | -- | -- | 404 | -- | do | 297.8 | Mar. 18, 1955 | C,W | D | Reported weak supply. |
| G-75 | Roger Cowan | -- | -- | 346 | -- | do | 274 | Apr. 5, 1955 | C,W | -- | Reported weak supply. Reported altitude 943 ft. |
| G-76 | Herman Heep | -- Saunders | 1951 | 720 | 8 | do | 305 | Mar. 28, 1956 | N | N | Reported altitude 983 ft. |
| G-77 | do | E. Williamson | -- | 600 | 6 | do | 305.4 | do | C,W | S | Reported altitude 973 ft. |
| G-78 | J. H. Robinson | E. B. Kutscher | 1944 | 305 | -- | do | 251.6 | Mar. 9, 1955 | C,W | S | Reported altitude 929 ft. |
| G-79 | do | do | 1955 | 470 | 8 | do | -- | -- | C,W | S | Reported altitude 971 ft. |
| H-1 | A. H. Morton | -- Owens | -- | 365 | 6 | -- | 222.0 | Apr. 7, 1943 | C,E | D,S | |
| *H-2 | C. C. Mitchell | Delbert Owens | 1928 | 436 | 6 | Edwards limestone | -- | -- | C,W | D,S | Casing: 46 ft. of 6-in. |
| H-3 | Texas-New Mexico Pipeline Co. | -- | 1928 | 500 | 6 | do | -- | -- | N | N | Casing: 100 ft. of 6-in. Formerly supplied pumping station. |
| *H-4 | Otto Welge | A. Newton | 1908 | 290 | 6 | do | 274.9 | Oct. 12, 1937 | C,E | D,S | Casing: 60 ft. of 6-in. |
| *H-5 | E. H. Tarbutton | -- | -- | 148 | -- | do | 62.8 | Oct. 22, 1937 | C,G | D,S | |
| *H-6 | Katie F. Smith | A. B. Roger | 1919 | 125 | 6 | do | 75.4 | Dec. 13, 1950 | C,W,E | D,S | |
| H-7 | D. W. Glasscock | -- Schmidt | -- | 131 | 8 | do | 64.0 | Nov. 13, 1950 | C,E | D | |
| *H-8 | City of Kyle | -- Owens | 1950 | 336 | 8 | do | -- | -- | C,E | Irr | Supplies cemetery. |
| H-9 | A. A. Hale | Fleming Adaire | 1912 | 290 | 5 | do | 1/132.1 | Sept. 5, 1952 | C,E | D,S | |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *H-10 | C. C. Houston | -- | 1887 | 24 | 30 | Quaternary (?) rocks | 15.8<br>16.5 | Oct. 2, 1937<br>Nov. 13, 1950 | C,E | D,S | Dug. Reported to fail in severe drought. |
| *H-11 | do | C. L. Tyler | 1940 | 324 | 7 | Edwards limestone | 1/140.1 | Sept. 5, 1952 | C,W | D,S | Altitude 720.9 ft. |
| *H-12 | H. R. Todd | -- | -- | 23 | 30 | Quaternary (?) rocks | 14.8<br>8.0 | Oct. 2, 1937<br>Nov. 13, 1950 | N | N | Dug. Brick curb. |
| *H-13 | do | A. Tolson | 1916 | 277 | 6 | Edwards limestone | 130.1<br>227 | Oct. 2, 1937<br>1950 | C,E | D,S | |
| *H-14 | Hobart Schwab | -- | 1907 | 300 | -- | do | 180.9<br>193.2 | Aug. 1, 1945<br>Nov. 13, 1950 | C,E | D,S | Supplies dairy. |
| *H-15 | Mrs. O. G. Parke, Sr. | -- | 1907 | 300 | 6 | do | 1/205.9 | Sept. 5, 1952 | C,W,G | D,S | Altitude 776.1 ft. |
| H-16 | Will Lindsey | -- Owens | 1946 | 335 | 3 | do | 204.8<br>212.3 | Dec. 8, 1950<br>Sept. 5, 1952 | C,W | D,S | Altitude 734.3 ft. |
| H-17 | B. Kuhn | -- | -- | 365 | 6 | do | 123.0 | Dec. 8, 1950 | C,W | D,S | An old well. |
| *H-18 | Roy B. Brooks | C. L. Tyler | 1939 | 385 | 6 | do | 186.6<br>207.0 | July 31, 1945<br>Oct. 27, 1950 | C,W | D,S | 2/ |
| *H-19 | City of Kyle | S. W. Glass | 1949 | 765 | 8 | do | 130 | Oct. 1949 | T,E | P | Casing: 300 ft. of 8-in. Reported yield 176 gpm. Originally [illegible] ft. deep. |
| H-20 | State Highway Department | -- | -- | -- | -- | do | 1/121.4 | Dec. 2, 1953 | N | N | Altitude 704.2 ft. |
| *H-21 | City of Kyle | O. A. Payte | 1938 | 595 | 8 | do | -- | -- | T,E | P | Standby well for city. Original depth 377 ft. 2/ |
| H-22 | -- Hill | C. L. Tyler | 1939 | 100 | -- | Austin chalk | -- | -- | -- | -- | 2/ |
| *H-23 | Nicholas Thiele | Fleming Adaire | 1934 | 372 | 5 | Edwards limestone | 1/133.5 | Dec. 2, 1953 | C,E | D,S | Altitude 71[illegible] ft. 2/ |
| H-24 | Dewey Alexander | -- | -- | 33 | 54 | Quaternary (?) rocks | 28.3 | Nov. 9, 1950 | C,W | D,S | Dug. Stone curb; an old well. |
| *H-25 | Ed Cullen | -- Robertson | -- | 600 | 10 | Edwards limestone | 1/110.8 | Sept. 5, 1952 | C,E | D,S | Casing: 100 ft. of 10-in. Altitude 67[illegible].3 ft. |
| *H-26 | -- Hill | -- | -- | Spring | -- | Taylor marl (?) | (+) | 1950 | Flows | S | |
| H-27 | Alfred Lippe | -- | -- | 19 | 48 | Taylor marl | 14.9 | Nov. 9, 1950 | C,E | D,S | Dug. Rock curb; an old well. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H-28 | R. Tapia | -- | -- | 18 | 36 | Taylor marl | 13.3 | Oct. 25, 1950 | H | D | Dug. Concrete curb. |
| H-29 | Joe Franke | -- | 1940 | 14 | 50 | do | 9.1 | Oct. 26, 1950 | C,G | D,S | Dug. Brick curb. |
| H-30 | Geo. Heidenreich | -- Robertson | 1931 | 2,767 | -- | -- | -- | -- | -- | -- | Oil test. Well plugged.2/ |
| *H-31 | W. W. Patterson | -- | 1890 | 19 | 60 | Quaternary rocks | 13.7 | Nov. 10, 1937 | -- | -- | Dug. Well destroyed. |
| *H-32 | Geo. Heidenreich | -- | -- | 13 | 96 | do | 9.0 | Oct. 27, 1950 | C,E | D,S | Dug. Concrete curb; an old well. |
| H-33 | Emil Ehrlich | -- | -- | Spring | -- | do | -- | Nov. 10, 1950 | Flows | S | Known as Pole Cat Springs. |
| H-34 | Lex Ward | -- | -- | 13 | 48 | do | 10.3 | Nov. 9, 1950 | H | D | Dug. Wooden curb; an old well. |
| *H-35 | O. R. Patterson | -- | -- | 23 | 36 | Quaternary (?) rocks | 22.3<br>21.6 | Sept. 18, 1937<br>Nov. 9, 1950 | C,W | D,S | Dug. Rock curb. |
| H-36 | C. B. Donaldson | C. L. Tyler | 1940 | 530 | 7 | Edwards limestone | -- | -- | -- | -- | Well abandoned, water reported unfit for use.2/ |
| *H-37 | O. G. Parke | -- Hayden | -- | 512 | 6 | do | 124.3<br>228.0 | Apr. 8, 1943<br>Sept. 3, 1953 | C,W | D,S | |
| *H-38 | Roy Michael | -- | -- | 121 | 6 | -- | 79.5<br>85.1 | Sept. 15, 1937<br>Nov. 14, 1950 | C,W | D,S | |
| H-39 | Tom Johnson | -- | -- | 20 | 44 | Quaternary rocks | 18.6 | Nov. 9, 1950 | C,W | D,S | Dug. Rock curb; an old well. |
| H-40 | A. H. Young | -- | -- | 29 | 70 | do | 22.8 | do | C,W | N | Dug. |
| H-41 | L. R. Jones | -- | -- | 19 | 54 | do | 4.5 | Nov. 10, 1950 | C,W | D,S | Dug. Brick and concrete curb. Supplies 4 houses. |
| H-42 | H. E. Neuse | -- | -- | 9 | 36 | do | 7.1 | do | C,W | D,S | Dug; an old well. |
| *H-43 | E. N. Cason | -- | -- | 121 | 6 | -- | 1/ 93.8 | Dec. 2, 1953 | C,G | D,S | Altitude 670.9 ft. |
| *H-44 | D. E. Mitchell | E. B. Kutscher | 1947 | 160 | 6 | Edwards limestone | 140 | 1947 | C,E | D,S | |
| *H-45 | Joe Freeman | -- | -- | 249 | 6 | do | 206.6 | Oct. 18, 1937 | C,W | S | |
| H-46 | do | A. Williamson | 1943 | 328 | 6 | do | 238.0<br>264.1 | Apr. 5, 1943<br>Jan. 14, 1951 | C,W | S | Altitude 838.6 ft. |
| *H-47 | do | -- | 1897 | 186 | 6 | do | 1/137.1 | Apr. 21, 1952 | C,W | S | Altitude 703.7 ft. |

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Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| H-48 | B. Hinton | -- | -- | 158 | 6 | Edwards limestone | 137.9<br>133.3 | Jan. 4, 1951<br>Sept. 5, 1952 | C,W,E | D,S | Reported strong supply. Altitude 712.3 ft.; an old well. |
| H-49 | A. F. Knispel | -- | -- | -- | 34 | do | 1/ 28.2<br>27.9 | Oct. 8, 1937<br>Nov. 14, 1950 | C,G | S,Irr | Dug. Brick curb. |
| H-50 | Louis Woods | Louis Woods | -- | 141 | -- | Edwards (?) limestone | 136.0<br>134.9 | Sept.14, 1937<br>Mar. 9, 1943 | C,W | D,S | |
| H-51 | C. R. Booth | A. Williamson | 1944 | 154 | 8 | do | 84.4 | Nov. 13, 1950 | N | N | |
| *H-52 | L. B. McClanahan | -- | -- | 33 | 23 | Quaternary (?) rocks | 13.0<br>13.0 | Sept.18, 1937<br>Nov. 18, 1950 | N | N | Dug. Rock curb. |
| *H-53 | J. L. Sawyer | -- | -- | 37 | 30 | do | 36.1<br>35.6 | Sept.14, 1937<br>Nov. 10, 1950 | H | D | do |
| H-54 | -- | -- | -- | 43 | 72 | do | 39.5 | Nov. 9, 1950 | C,E | D,S | Dug. |
| H-55 | L. A. Williams | -- | 1923 | 29 | 72 | do | 24.8 | do | C,W | D,S | Dug. Brick curb. |
| *H-56 | Harry Neuse | -- | 1935 | 11 | 52 | Quaternary rocks | 9.1 | Sept.18, 1937 | C,W | D | Dug. |
| H-57 | do | -- | -- | 33 | 36 | do | 20.9 | Nov. 10, 1950 | C,E | D | do |
| H-58 | A. Mulvihill | W. H. Glass | 1947 | 375 | -- | Edwards limestone | -- | -- | -- | -- | Well plugged, water reported unfit for use. 2/ |
| *H-59 | W. N. Goforth | -- | -- | Spring | -- | do | (+) | -- | Flows | D,S, Ind | Supplies 12 families and cotton oil mill. |
| H-60 | H. W. Hageman | -- | 1914 | 77 | 5 | do | 1/ 32.3<br>38.1 | Apr. 13, 1953<br>Mar. 19, 1955 | N | N | Altitude 607.3 ft. |
| H-61 | Lina Schwarzlose | -- | 1930 | 21 | 60 | Quaternary (?) rocks | 15.6<br>15.4 | Sept.14, 1937<br>Nov. 13, 1950 | N | N | Dug. Rock curb. |
| *H-62 | F. G. Avey | -- | 1905 | 42 | 34 | do | 30.5<br>28.4 | Sept.14, 1937<br>Nov. 13, 1950 | N | N | Dug. Rock and brick curb. |
| *H-63 | H. H. Butz | Fleming Adaire | -- | 22 | 72 | Quaternary rocks | 14.8<br>20.5 | Sept.14, 1937<br>June 9, 1952 | C,W | D,S | Dug. |
| H-64 | R. D. Kelley | R. D. Kelley | 1937 | 890 | 10,<br>8 | -- | -- | -- | -- | -- | Oil test, W. P. Donaldson et al. 2/ |

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Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *H-65 | A. B. Rogers Estate | -- | -- | Spring | -- | Edwards limestone | (+) | June 9, 1952 | Flows | N | Flows into Spring Lake. Temp. 72°F. |
| *H-66 | do | -- | -- | Spring | -- | do | (+) | do | Flows | N | Known as San Marcos Springs. |
| *H-67 | City of San Marcos | J. R. Johnson | 1941 | 115 | 13 | do | -- | -- | T,E | P | Casing: 77 ft. of 13-in. perforated pipe, 32 ft. of 10-in. liner. 2/ |
| *H-68 | do | Walter Payne | 1914 | 85 | 8 | do | -- | -- | T,E | P | Casing: 85 ft. of 8-in. |
| H-69 | Southwest Texas State Teachers College | A. Williamson | 1945 | 120 | -- | do | -- | -- | T,E | P | One of two wells supplying college. |
| H-70 | do | -- | 1925 | 110 | -- | do | -- | -- | T,E | P | do |
| H-71 | do | -- | -- | 90 | -- | -- | -- | -- | T | N | Formerly supplied college. An old well. |
| H-72 | U. S. Department of the Interior | -- | 1895 | 1,495 | 12 | Edwards limestone | (+) | 1950 | Flows | -- | Reported yield in 1936, 300 gpm; reported yield in 1950, 300 gpm; reported yield in 1955, 400 gpm. Plugged at 188 ft. 2/ |
| *H-73 | Tex Hughson | -- | -- | 282 | 6 | do | 1/251.9 | Mar. 15, 1943 | C,G | D,S | Altitude 820.9 ft. |
| *H-74 | City of San Marcos | -- | 1910 | 280 | 5 | do | 1/227.6<br>226.9 | Oct. 5, 1937<br>Jan. 23, 1940 | N | N | Well plugged. |
| *H-75 | E. Brooks | Fleming Adaire | 1908 | 176 | 6 | do | 1/161.1 | Dec. 3, 1953 | C,W | D,S | Casing: 80 ft. of 6-in. Altitude 738.8 ft. |
| *H-76 | John Avey | E. B. Kutscher | 1941 | 204 | 6 | do | 189.9 | Apr. 6, 1943 | C,E | D,S | 2/ |
| H-77 | John C. Storts, Jr. | do | 1951 | 92 | 12 | do | 46 | 1954 | T,E | Irr,S | Reported strong supply. |
| H-78 | W. N. Allbright | -- Clayton | 1913 | 360 | 6 | do | 319.6 | Oct. 6, 1937 | C,E | D,S | |
| H-79 | Joe Freeman | -- | -- | 300 | 6 | do | 240.2<br>87.3 | Apr. 6, 1943<br>Jan. 4, 1951 | C,W | S | Altitude 821.4 ft.; an old well. |
| H-80 | McLerran Ranch | -- | -- | 100 | 6 | do | 85.8 | Sept. 5, 1952 | C,W | D,S | Altitude 661.5 ft.; an old well. |
| H-81 | W. L. Bagley | -- Clayton | -- | 137 | 6 | do | 124.2 | Jan. 4, 1951 | C,W | D | Reported strong supply. Altitude 698.7 ft.; an old well. |
| *H-82 | Mrs. R. L. Jennings | O. A. Payte | 1937 | 560 | -- | -- | 18.6 | Oct. 4, 1937 | N | N | Oil test. 2/ |
| *H-83 | J. A. Clayton | -- | -- | 90 | 6 | Edwards limestone | 71.2<br>71.4 | Sept.27, 1937<br>Dec. 14, 1950 | C,W | D,S | Altitude 646.4 ft. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *H-84 | J. B. Netherland | -- Adaire | -- | 250 | 6 | Edwards limestone | 61.7<br>61.5 | Sept.29, 1937<br>Jan. 4, 1951 | C,E | D,S | Altitude 637.9 ft. |
| H-85 | City of San Marcos | Virdell Bros. | 1954 | 125 | 13 | do | 10 | June 1954 | T,E,G | P | |
| *H-86 | O. N. Edge | -- | -- | 143 | 6 | -- | 102.1<br>36.6 | Sept.27, 1937<br>Mar. 9, 1943 | -- | -- | Well plugged. Altitude 632.4 ft. |
| *H-87 | R. G. Fourqurean | -- | -- | 21 | 30 | Taylor marl | 6.8<br>9.9 | Sept.27, 1937<br>Oct. 31, 1950 | C,G | D,S | Dug. Rock curb. |
| H-88 | Charles Abel | -- | -- | 27 | 30 | Quaternary rocks | 13.0<br>17.1 | Oct. 6, 1937<br>July 9, 1952 | C,W | D | do |
| *H-89 | Mrs. Ethel Mercer | -- | 1930 | 45 | 50 | do | -- | -- | J,E | D,S | Dug. Fails during droughts. |
| H-90 | M. L. Luersen | -- | -- | 29 | 45 | do | 26.3 | Nov. 11, 1950 | C,W,E | D,S | Dug. Concrete curb. Reported to fail during droughts; an old well. |
| H-91 | Walter Mittendorf | -- | 1917 | 34 | -- | do | 29.6<br>30.1 | Oct. 6, 1937<br>Nov. 7, 1950 | C,G | Irr | Dug. Concrete curb. Irrigates 3 acres. Reported yield 400 gpm. |
| *H-92 | W. R. Henk | -- | -- | 20 | 96 | Taylor marl | 13.4 | Oct. 30, 1950 | C,E | D | Dug. Rock curb; an old well. |
| *H-93 | Mrs. Carrie H. Crawford | -- | -- | 36 | 30 | do | 7.2<br>16.9 | Oct. 1, 1937<br>Nov. 6, 1950 | N | N | Dug. Rock curb. Reported to fail during droughts. |
| H-94 | W. P. Donaldson | -- | 1929 | 210 | 6 | Edwards limestone | 1/ 2.8 | Dec. 2, 1953 | C,W | N | Casing: 30 ft. of 6-in. Altitude 650.4 ft. |
| H-95 | G. M. Jackson | A. Newton | 1910 | 204 | 6 | do | 1/119.0 | Apr. 13, 1953 | C,W | N | Altitude 596.8 ft. |
| *H-96 | -- Fehlis | -- | 1900 | 200 | 6 | do | 129.3<br>151.9 | Sept.27, 1937<br>Dec. 13, 1950 | C,W | D,S | Altitude 705.2 ft. |
| *H-97 | Ruth Jackson | A. Newton | -- | 21 | 24 | -- | [illegible].1 | Sept.29, 1937 | C,W | S | Dug. Rock curb. |
| H-98 | Chas. Fehlis | E. B. Kutscher | 1939 | 565 | 5 | Edwards limestone | 90 | 1939 | -- | -- | Well destroyed. 2/ |
| *H-99 | Southwest Texas State Teachers College | -- | 1917 | 234 | 6 | do | 157.4<br>155.3 | Sept.29, 1937<br>Mar. 10, 1943 | C,E | D,S | Supplies experimental farm and dairy. Altitude 733.0 ft. |
| *H-100 | W. C. McCarty | A. C. Newton | -- | 240 | 6 | do | -- | -- | C,E | D,S | Casing: 30 ft. of 6-in. |
| *H-101 | E. B. McCormick | -- | -- | 138 | 6 | do | 156.0<br>153.3 | Sept.29, 1937<br>Mar. 10, 1943 | C,E | D,S | Altitude 732.6 ft. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *H-102 | Herbert Goehring | -- | -- | 131 | 6 | Austin (?) chalk | 117.1<br>120.2 | Sept.27, 1937<br>Mar. 9, 1943 | C,E | D,S | Altitude 694.5 ft. |
| *H-103 | R. G. Johnson | E. B. Kutscher | -- | 229 | 6 | Edwards limestone | 162.2<br>159.6 | Oct. 1, 1937<br>Mar. 9, 1943 | C,W | D,S | Casing: 44 ft. of 6-in. Altitude 750.3 ft. |
| *H-104 | F. G. Lowman | John Aiken | 1900 | 194 | 8 | do | 159.0<br>156.7 | Sept.27, 1937<br>Mar. 9, 1943 | C,E | D,S | Casing: 150 ft. of 6-in. Altitude 733.2 ft. |
| H-105 | V. C. Gold | -- | -- | 13 | 24 | Taylor marl | 11.0 | Oct. 26, 1950 | J,E | D | Dug. Brick curb; an old well. |
| H-106 | Roy Kirkland | -- | 1954 | -- | -- | Edwards limestone | -- | -- | T,G | Irr | |
| H-107 | City of Kyle | W. S. Glass | 1956 | 360 | 8 | do | -- | -- | -- | P | 2/ |
| H-108 | J. C. Storts | -- | -- | -- | 6 | do | 1/111.6 | Mar. 19, 1955 | C,W | S | Altitude 636.3 ft. |
| H-109 | U. S. Fish Cultural station | E. R. Owens | 1956 | 261 | 15 | do | (+) | Feb. 25, 1957 | Flows | Ind | Water evidently enters from 65-70 ft. Temp. 72.5°F. 2/ |
| H-110 | Corrie Smith | -- | -- | -- | 6 | do | 1/129.5 | Mar. 19, 1955 | C,W | S | Altitude 704.9 ft. |
| H-111 | do | E. R. Owens | 1955 | 110 | 8 | do | 71.0 | Aug. 30, 1955 | C,E | D | |
| *J-1 | F. W. Homann | -- | 1925 | 12 | 64 | Taylor marl | 3.4<br>5.2 | Nov. 10, 1937<br>Oct. 26, 1950 | N | N | Dug. Brick curb. |
| J-2 | J. H. Wanat | -- | 1948 | 18 | 36 | do | 11.7 | Oct. 26, 1950 | H | D,S | Dug. Concrete curb. |
| J-3 | Gus Heideman | -- | -- | 12 | 48 | do | .6 | do | C,E | D,S | Dug. Concrete curb; an old well. |
| *J-4 | A. F. Garbrecht & Sons | -- | -- | Spring | -- | Quaternary rocks | (+) | do | Flows | P | Flows into closed reservoir and supplies town of Uhland. Reported flow in 1948, 40 gpm. |
| *J-5 | Fritz Homann | -- | -- | Spring | -- | do | (+) | do | Flows | -- | Formerly supplied water for town of Uhland. |
| J-6 | do | -- | -- | 23 | 60 | do | 17.3 | Oct. 27, 1950 | C,W | D,S | Dug. Stone curb; an old well. |
| *J-7 | Herbert Seeliger | -- | 1900 | 45 | 30 | do | 19.7<br>25.3 | Nov. 10, 1937<br>Oct. 26, 1950 | C,W | D,S | Dug. Brick curb. |
| J-8 | August Schiwitz | -- | -- | 17 | 60 | Quaternary rocks | 12.0 | Oct. 26, 1950 | C,W | D,S | Dug. Concrete curb; an old well. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| J-9 | August Schiwitz | -- | -- | Spring | -- | Quaternary rocks | (+) | Oct. 26, 1950 | Flows | D | Flows into rock reservoir. Reported to supply 5 families. |
| *J-10 | Emil Heidenreich | -- | -- | 12 | 60 | do | 8.0 | Oct. 27, 1950 | C,E | D | Dug. Stone curb; an old well. |
| J-11 | H. J. Vanderbeck | -- | -- | 18 | 60 | do | 12.1 | do | C,E | D | do |
| *J-12 | E. Wranitzky | Simmons & Sterzing | 1955 | 1,051 | 7, 5 | Edwards limestone | 64.7 | May 7, 1955 | -- | N | Reported water highly mineralized. 2/ |
| *K-1 | W. N. Yates | -- | 1902 | 360 | -- | do | -- | -- | C,G | D,S | Reported drawdown 30 ft. after pumping 5 gpm for 3 hours. |
| K-2 | August Schulze | E. B. Kutcher | 1946 | 225 | 8 | do | 169.8<br>171.7 | Oct. 30, 1950<br>Sept. 5, 1952 | C,W | D,S | Altitude 757.4 ft. |
| *K-3 | E. L. Williamson | -- | 1900 | 16 | 30 | Taylor marl | 9.3<br>10.6 | Sept.28, 1937<br>Oct. 30, 1950 | C,W | D,S | Dug. Rock curb. |
| *K-4 | E. B. Kutcher | -- Owens | 1898 | 137 | 6 | Edwards limestone | 144.9<br>141.9 | Sept.28, 1937<br>Mar. 9, 1943 | C,E | D,S | Altitude 728.5 ft. |
| *K-5 | Ewell Jackson | A. Newton | 1913 | 200 | 6 | do | 185.3 | Oct. 1, 1937 | C,G | D,S | |
| K-6 | -- | -- | -- | 17 | 70 | Taylor marl | 6.3<br>8.3 | Sept.28, 1937<br>Oct. 31, 1950 | C,W | S | Dug. Rock curb. |
| K-7 | E. A. Jaster | -- | -- | 27 | 45 | do | 15.0 | Oct. 29, 1953 | C,E | D,S | Dug. Concrete curb. |
| *K-8 | Gustav Bierstedt | -- | 1924 | 10 | -- | do | 4.9 | Nov. 11, 1937 | N | N | Dug. |
| K-9 | G. S. Natal | -- | -- | 26 | 70 | do | 12.3 | Oct. 31, 1950 | C,G | D,S | Dug. Brick curb; an old well. |
| K-10 | Wade Jenkins | -- | -- | 19 | 90 | do | 8.6 | do | C,E | S | Dug. Stone curb. |
| *K-11 | Claude Harris | -- | -- | 16 | 36 | Taylor(?) marl | 8.6<br>9.0 | Oct. 1, 1937<br>Oct. 31, 1950 | C,W | D,S | Dug. Rock Curb. |
| K-12 | -- | -- | -- | 14 | 60 | Taylor Marl | 9.7 | Oct. 30, 1950 | C,W | N | Dug; an old well. |
| *K-13 | David Ramsey | -- | 1922 | 19 | 96 | do | 16.9<br>11.2 | Nov. 9, 1937<br>Oct. 30, 1950 | C,W,E | D,S | Dug. Rock curb. |
| *K-14 | Eddie Meyer | -- | -- | 44 | 40 | Taylor(?) marl | 30.5 | Oct. 30, 1950 | C,W | D | Dug. Rock curb; an old well |
| K-15 | -- Rieder | -- | 1938 | 13 | 40 | Taylor marl | 11.9 | do | C,W | S | Dug. Rock curb. |

*See footnotes at end of table.

Table 5.--Records of wells and springs in Hays County--Continued

| Well | Owner | Driller | Date completed | Depth of well (ft.) | Diameter of well (in.) | Water-bearing unit | Water level: Below or above (+) land surface datum (ft.) | Water level: Date of measurement | Method of lift | Use of water | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|
| K-16 | Jerome Kietert | -- | -- | 15 | 44 | Taylor marl | 8.9 | Nov. 6, 1950 | C,W | D,S | Dug. Rock curb; an old well. |
| *K-17 | Reinhold Bading | -- | 1907 | 17 | 30 | Taylor(?) marl | 11.1<br>10.2 | Nov. 9, 1937<br>Oct. 30, 1950 | H | S | Dug. Rock curb. |

1/ For water-level measurements see table 6.
2/ For drillers log see table 7.
* For analysis of water see table 8.

Table 6.--Water levels in wells in Hays County
(in feet below land-surface datum)

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well B-43. Owner: Clarence Southwell | | | | | |
| Nov. 17, 1937 | 128.0 | July 1, 1939 | 129.7 | Jan. 30, 1941 | 92.4 |
| Mar. 1, 1938 | 96.6 | Oct. 4 | 133.3 | Mar. 27 | 79.3 |
| June 22 | 103.9 | Dec. 20 | 133.4 | May 29 | 82.3 |
| Sept. 29 | 126.1 | Mar. 27, 1940 | 132.9 | Aug. 6 | 193.1 |
| Jan. 26, 1939 | 129.1 | June 25 | 132.1 | | |
| Mar. 1 | 129.3 | Sept. 23 | 131.4 | | |
| Well B-46. Owner: Albert Garcia | | | | | |
| Sept. 7, 1937 | 63.59 | May 24, 1939 | 65.75 | Aug. 6, 1941 | 58.46 |
| Dec. 10 | 63.11 | July 1 | 68.99 | Nov. 19 | 61.11 |
| Jan. 25, 1938 | 49.71 | Oct. 4 | 66.95 | Apr. 2, 1942 | 62.05 |
| Mar. 1 | 54.96 | Dec. 20 | 66.12 | Aug. 3 | 62.45 |
| Mar. 31 | 56.24 | Jan. 24, 1940 | 65.14 | Dec. 7 | 58.81 |
| May 20 | 55.96 | Feb. 28 | 64.93 | Apr. 15, 1943 | 61.48 |
| June 22 | 58.39 | May 6 | 62.29 | Sept. 12 | 63.30 |
| July 21 | 60.91 | May 28 | 62.17 | Dec. 18 | 63.63 |
| Aug. 30 | 62.70 | June 25 | 62.06 | May 1, 1944 | 56.34 |
| Sept. 27 | 62.90 | July 29 | 58.32 | Aug. 25 | 62.27 |
| Nov. 5 | 63.88 | Sept. 23 | 62.37 | Dec. 19 | 57.85 |
| Dec. 12 | 65.00 | Oct. 28 | 62.93 | May 24, 1945 | 56.28 |
| Jan. 26, 1939 | 64.71 | Dec. 6 | 63.30 | Mar. 29, 1946 | 52.88 |
| Mar. 1 | 64.48 | Jan. 30, 1941 | 54.05 | Aug. 5, 1948 | 64.83 |
| Mar. 29 | 64.92 | Mar. 27 | 48.49 | Feb. 8, 1949 | 64.76 |
| Apr. 28 | 65.48 | May 29 | 53.06 | Apr. 18 | 61.56 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well B-46--Continued | | | |
| Aug. 23, 1949 | 63.45 | Dec. 3, 1953 | 59.82 | Oct. 5, 1956 | 68.49 |
| Nov. 30 | 62.90 | Mar. 15, 1954 | 61.92 | Nov. 9 | 68.58 |
| Apr. 11, 1950 | 60.56 | Apr. 9 | 62.02 | Jan. 8, 1957 | 68.53 |
| Aug. 2 | 62.17 | July 22 | 63.79 | Mar. 8 | 68.48 |
| Dec. 7 | 64.10 | Aug. 23 | 65.16 | May 9 | 60.21 |
| Apr. 4, 1951 | 62.42 | Dec. 3 | 66.18 | July 16 | 56.05 |
| Aug. 7 | 62.91 | Mar. 9, 1955 | 65.60 | Nov. 19 | 48.75 |
| Dec. 5 | 63.47 | July 15 | 67.38 | Jan. 10, 1958 | 54.54 |
| Apr. 16, 1952 | 63.16 | Nov. 9 | 67.90 | Mar. 12 | 49.03 |
| Aug. 8 | 62.58 | Mar. 9, 1956 | 67.35 | May 13 | 49.95 |
| Apr. 14, 1953 | 61.88 | July 13 | 68.19 | July 3 | 54.25 |
| Aug. 18 | 62.77 | | | | |
| | | Well B-47. Owner: Albert Garcia | | | |
| Sept. 7, 1937 | 7.76 | Jan. 26, 1939 | 28.55 | May 28, 1940 | 34.15 |
| Dec. 10 | 9.13 | Mar. 1 | 30.28 | June 25 | 34.12 |
| Jan. 25, 1938 | 4.94 | Mar. 29 | 30.30 | July 29 | 33.87 |
| Mar. 1 | 6.33 | Apr. 28 | 30.37 | Aug. 29 | 33.89 |
| Mar. 31 | 7.06 | May 24 | 30.30 | Sept.23 | 33.82 |
| May 20 | 6.59 | July 11 | 30.37 | Oct. 28 | 33.89 |
| June 22 | 6.88 | Oct. 4 | 33.06 | Dec. 6 | 33.48 |
| July 21 | 8.79 | Dec. 20 | 34.12 | Jan. 30, 1941 | 6.52 |
| Aug. 30 | 17.52 | Jan. 24, 1940 | 34.12 | Mar. 27 | 5.76 |
| Sept.27 | 21.82 | Feb. 28 | 34.12 | May 29 | 6.66 |
| Nov. 5 | 19.50 | Mar. 27 | 34.18 | Aug. 6 | 14.39 |
| Dec. 12 | 26.60 | May 6 | 34.13 | Nov. 19 | 31.96 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well B-57--Continued | | | | | |
| Apr. 2, 1942 | 34.70 | Aug. 23, 1949 | 37.32 | Aug. 23, 1954 | 41.07 |
| Aug. 3 | 38.61 | Nov. 30 | 37.18 | Dec. 3 | 40.61 |
| Dec. 7 | 38.26 | Apr. 11, 1950 | 37.07 | Mar. 9, 1955 | 39.51 |
| Apr. 15, 1943 | 38.01 | Aug. 2 | 36.45 | July 15 | 36.49 |
| Aept.12 | 38.28 | Dec. 7 | 37.71 | Nov. 9 | 40.09 |
| Dec. 18 | 38.29 | Apr. 4, 1951 | 36.90 | Mar. 9, 1956 | 37.83 |
| May 1, 1944 | 25.73 | Aug. 7 | 36.09 | May 9, 1957 | 27.05 |
| Aug. 23 | 25.51 | Dec. 5 | 36.01 | July 16 | 8.54 |
| Dec. 19 | 25.28 | Apr. 13, 1952 | 35.89 | Nov. 19 | 6.85 |
| May 24, 1945 | 6.53 | Dec. 3, 1953 | 36.50 | Jan. 10, 1958 | 6.68 |
| Mar. 29, 1946 | 5.25 | Mar. 15, 1954 | 36.96 | Mar. 12 | 4.72 |
| Aug. 5, 1948 | 37.40 | Apr. 9 | 38.92 | May 13 | 5.80 |
| Feb. 8, 1949 | 36.70 | July 22 | 37.08 | July 3 | 6.31 |
| Apr. 18 | 37.31 | | | | |
| Well B-58. Owner: Glynn C. Key | | | | | |
| Sept. 4, 1937 | 36.56 | Nov. 5, 1938 | 35.71 | Jan. 24, 1940 | 39.47 |
| Dec. 10 | 36.72 | Dec. 12 | 36.02 | Feb. 28 | 37.62 |
| Jan. 25, 1938 | 36.35 | Jan. 26, 1939 | 37.27 | Mar. 27 | 37.55 |
| Mar. 1 | 35.59 | Mar. 1 | 37.12 | May 6 | 38.04 |
| Mar. 31 | 35.35 | Mar. 29 | 37.22 | May 28 | 37.72 |
| May 21 | 34.63 | Apr. 28 | 37.22 | June 25 | 37.60 |
| June 22 | 37.64 | May 24 | 37.20 | July 29 | 36.80 |
| July 21 | 38.96 | July 1 | 37.35 | Aug. 29 | 36.69 |
| Aug. 31 | 37.45 | Oct. 4 | 37.56 | Sept.23 | 36.74 |
| Sept.27 | 37.16 | Dec. 20 | 37.48 | Oct. 28 | 36.83 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well B-58--Continued | | | |
| Dec. 6, 1940 | 36.02 | Aug. 5, 1948 | 37.73 | Dec. 3, 1954 | 37.41 |
| Jan. 30, 1941 | 35.48 | Feb. 8, 1949 | 37.74 | Mar. 9, 1955 | 37.13 |
| Mar. 27 | 34.88 | Aug. 23 | 37.60 | July 15 | 41.22 |
| May 29 | 34.65 | Nov. 11 | 37.92 | Nov. 9 | 40.15 |
| Aug. 6 | 35.96 | Apr. 11, 1950 | 37.83 | Mar. 9, 1956 | 37.91 |
| Nov. 19 | 35.50 | Aug. 2 | 36.22 | July 13 | 53.84 |
| Apr. 2, 1942 | 36.49 | Dec. 7 | 37.36 | Oct. 5 | 54.11 |
| Aug. 3 | 36.21 | Apr. 4, 1951 | 37.59 | Nov. 9 | 49.83 |
| Dec. 7 | 35.42 | Aug. 7 | 39.63 | Jan. 8, 1957 | 51.91 |
| Apr. 15, 1943 | 35.62 | Dec. 5 | 37.68 | Mar. 8 | 38.92 |
| Sept.12 | 36.12 | Apr. 18, 1952 | 37.85 | May 9 | 38.12 |
| Dec. 18 | 36.72 | Aug. 8 | 37.44 | July 16 | 37.31 |
| May 1, 1944 | 35.03 | Apr. 14, 1953 | 36.71 | Nov. 19 | 36.34 |
| Aug. 25 | 35.06 | Aug. 18 | 37.59 | Jan. 10, 1958 | 35.83 |
| Dec. 19 | 36.28 | Dec. 3 | 36.04 | Mar. 12 | 35.17 |
| May 24, 1945 | 34.93 | Apr. 9, 1954 | 36.53 | May 13 | 35.31 |
| Mar. 29, 1946 | 34.86 | July 22 | 37.14 | July 3 | 35.64 |
| | | Well B-59. Owner: Glynn C. Key | | | |
| Sept. 4, 1937 | 65.78 | July 21, 1938 | 62.03 | Mar. 29, 1939 | 73.72 |
| Dec. 10 | 68.38 | Aug. 31 | 61.09 | Apr. 28 | 73.24 |
| Jan. 25, 1938 | 59.66 | Sept.27 | 65.79 | May 24 | 73.46 |
| Mar. 1 | 56.71 | Nov. 5 | 69.59 | July 1 | 74.33 |
| Mar. 31 | 62.52 | Dec. 12 | 70.62 | Oct. 4 | 75.06 |
| May 21 | 53.26 | Jan. 26, 1939 | 72.28 | Dec. 20 | 75.95 |
| June 22 | 59.27 | Mar. 1 | 73.70 | Jan. 24, 1940 | 73.04 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well B-59--Continued | | | |
| Feb. 28, 1940 | 75.46 | May 1, 1944 | 59.40 | Apr. 9, 1954 | 63.37 |
| Mar. 27 | 75.11 | Aug. 25 | 55.43 | July 22 | 68.14 |
| May 6 | 75.77 | Dec. 19 | 61.33 | Aug. 23 | 68.47 |
| May 28 | 76.26 | May 24, 1945 | 51.08 | Dec. 3 | 68.87 |
| June 25 | 74.61 | Mar. 29, 1946 | 47.62 | Mar. 9, 1955 | 69.15 |
| July 29 | 65.57 | Aug. 5, 1948 | 71.97 | July 15 | 75.18 |
| Aug. 29 | 70.24 | Feb. 8, 1949 | 72.97 | Nov. 9 | 75.51 |
| Sept.23 | 69.35 | Apr. 18 | 72.12 | Mar. 9, 1956 | 75.65 |
| Oct. 28 | 69.84 | Aug. 23 | 70.52 | July 13 | 77.50 |
| Dec. 6 | 64.53 | Nov. 30 | 73.45 | Oct. 5 | 77.70 |
| Jan. 30, 1941 | 62.77 | Apr. 11, 1950 | 70.93 | Nov. 9 | 77.86 |
| Mar. 27 | 46.94 | Aug. 2 | 70.08 | Jan. 8, 1957 | 77.44 |
| May 29 | 46.29 | Dec. 7 | 69.61 | Mar. 8 | 77.77 |
| Aug. 6 | 56.79 | Apr. 4, 1951 | 72.46 | May 9 | 75.93 |
| Nov. 19 | 58.68 | Aug. 7 | 72.73 | July 16 | 71.86 |
| Apr. 2, 1942 | 67.74 | Dec. 5 | 72.59 | Nov. 19 | 59.73 |
| Aug. 3 | 67.09 | Apr. 18, 1952 | 72.10 | Jan. 10, 1958 | 57.51 |
| Dec. 3 | 61.95 | Aug. 8 | 70.40 | Mar. 12 | 50.24 |
| Apr. 15, 1943 | 64.43 | Apr. 14, 1953 | 64.64 | May 13 | 53.78 |
| Sept.12 | 63.38 | Aug. 18 | 71.34 | July 3 | 61.39 |
| Dec. 18 | 65.70 | Dec. 3 | 55.24 | | |
| | | Well C-21. Owner: George Rust | | | |
| Nov. 15, 1937 | 94.65 | Mar. 1, 1938 | 91.41 | July 21, 1938 | 90.44 |
| Dec. 13 | 95.95 | Mar. 31 | 92.42 | Aug. 30 | 91.35 |
| Jan. 20, 1938 | 75.1 | Apr. 28 | 73.4 | Dec. 12 | 94.28 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well C-21--Continued | | | |
| Jan. 25, 1939 | 95.27 | Aug. 3, 1942 | 96.84 | Dec. 5, 1951 | 102.79 |
| May 24 | 92.18 | Dec. 7 | 97.44 | Apr. 18, 1952 | 105.08 |
| Oct. 4 | 98.23 | Apr. 15, 1943 | 96.2 | Aug. 8 | 109.85 |
| Jan. 24, 1940 | 100.85 | Sept. 11 | 96.60 | Apr. 13, 1953 | 102.37 |
| Feb. 28 | 98.88 | Dec. 18 | 97.20 | Aug. 18 | 102.03 |
| Mar. 27 | 98.96 | May 1, 1944 | 93.73 | Dec. 3 | 96.95 |
| Apr. 30 | 99.23 | Aug. 25 | 92.17 | Dec. 3, 1954 | 97.00 |
| May 28 | 99.38 | Dec. 19 | 93.41 | Mar. 9, 1955 | 87.76 |
| June 25 | 99.55 | May 24, 1945 | 88.23 | July 15 | 106.88 |
| July 29 | 99.50 | Mar. 21, 1946 | 74.56 | Nov. 9 | 99.20 |
| Aug. 29 | 99.53 | Aug. 5, 1948 | 99.79 | Mar. 9, 1956 | 101.39 |
| Sept. 23 | 99.76 | Feb. 8, 1949 | 103.16 | July 12 | 109.64 |
| Oct. 28 | 99.92 | Apr. 18 | 98.89 | Oct. 4 | 100.75 |
| Dec. 6 | 99.71 | Aug. 23 | 99.33 | Nov. 9 | 100.91 |
| Jan. 30, 1941 | 99.05 | Nov. 30 | 100.17 | Jan. 7, 1957 | 100.89 |
| Mar. 27 | 81.2 | Apr. 11, 1950 | 101.50 | Mar. 8 | 102.04 |
| May 29 | 89.9 | Aug. 2 | 100.92 | May 9 | 100.32 |
| Aug. 6 | 87.69 | Dec. 6 | 100.22 | July 16 | 98.14 |
| Nov. 19 | 91.25 | Apr. 4, 1951 | 103.85 | Mar. 12, 1958 | 88.07 |
| Apr. 2, 1942 | 94.74 | Aug. 9 | 112.29 | July 2 | 88.50 |
| | | Well C-22. Owner: George Rust | | | |
| Nov. 15, 1937 | 272.34 | Apr. 28, 1938 | 270.5 | May 24, 1939 | 274.00 |
| Dec. 13 | 272.67 | May 20 | 271.21 | Oct. 4 | 274.80 |
| Jan. 26, 1938 | 235.02 | Mar. 1, 1939 | 273.70 | Dec. 20 | 275.15 |
| Mar. 31 | 269.39 | Mar. 29 | 273.98 | Jan. 24, 1940 | 275.23 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well C-22--Continued | | | |
| Feb. 28, 1940 | 275.10 | Sept.11, 1943 | 275.20 | Aug. 24, 1954 | 236.46 |
| Mar. 27 | 275.13 | Dec. 18 | 275.53 | Dec. 3 | 236.33 |
| Apr. 30 | 275.00 | May 1, 1944 | 273.56 | Mar. 9, 1955 | 237.60 |
| May 28 | 275.01 | Aug. 25 | 274.46 | July 15 | 238.13 |
| June 25 | 275.02 | Dec. 19 | 275.09 | Nov. 9 | 239.88 |
| July 29 | 275.01 | May 24, 1945 | 273.89 | Mar. 9, 1956 | 241.00 |
| Aug. 29 | 275.12 | Mar. 21, 1946 | 219.52 | July 13 | 242.86 |
| Sept.23 | 275.23 | Aug. 5, 1948 | 276.08 | Oct. 4 | 247.43 |
| Oct. 28 | 275.34 | Feb. 8, 1949 | 276.53 | Nov. 9 | 238.21 |
| Dec. 6 | 275.38 | Apr. 18 | 276.29 | Jan. 7, 1957 | 239.07 |
| Jan. 30, 1941 | 274.80 | Aug. 23 | 276.43 | Mar. 8 | 238.69 |
| Mar. 27 | 269.17 | Nov. 30 | 276.61 | May 9 | 221.14 |
| May 29 | 255.02 | Apr. 11, 1950 | 276.68 | July 16 | 226.81 |
| Aug. 6 | 271.62 | Aug. 2 | 276.62 | Nov. 19 | 219.32 |
| Nov. 19 | 274.11 | Dec. 6 | 276.90 | Jan. 10, 1958 | 217.26 |
| Apr. 2, 1942 | 274.69 | Aug. 18, 1950 | 234.20 | Mar. 12 | 200.75 |
| Aug. 3 | 274.89 | Dec. 3 | 222.06 | May 13 | 203.82 |
| Dec. 7 | 274.76 | Apr. 9, 1954 | 232.91 | July 2 | 220.05 |
| Apr. 15, 1943 | 274.86 | July 22 | 235.44 | | |
| | | Well C-23. Owner: J. N. Byler | | | |
| Nov. 1, 1937 | 221.88 | June 23, 1938 | 218.2 | Jan. 25, 1939 | 226.01 |
| Jan. 25, 1938 | 208.00 | July 21 | 218.34 | Mar. 1 | 224.62 |
| Mar. 1 | 213.12 | Aug. 30 | 219.76 | Jan. 24, 1940 | 232.88 |
| Mar. 31 | 214.76 | Sept.29 | 221.98 | Feb. 28 | 233.3 |
| Apr. 28 | 172.9 | Dec. 12 | 226.80 | Sept.23 | 231.75 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well C-23--Continued | | | |
| Oct. 28, 1940 | 232.48 | Aug. 5, 1948 | 232.8 | Aug. 7, 1951 | 283.50 |
| Nov. 19, 1941 | 218.94 | Apr. 18, 1949 | 231.05 | Dec. 5 | 235.2 |
| Apr. 13, 1943 | 220.51 | Nov. 30 | 233.70 | Apr. 18, 1952 | 240.4 |
| Sept. 11 | 225.89 | Apr. 11, 1950 | 236.90 | Aug. 8 | 236.94 |
| May 1, 1944 | 213.72 | Aug. 2 | 228.80 | Apr. 13, 1953 | 228.72 |
| Aug. 25 | 219.98 | Dec. 6 | 232.08 | Aug. 18 | 229.77 |
| May 24, 1945 | 212.62 | Apr. 4, 1951 | 231.02 | Dec. 3 | 220.40 |
| Mar. 21, 1946 | 198.75 | | | | |
| | | Well D-22. Owner: James R. Hall | | | |
| Aug. 23, 1949 | 61.16 | Dec. 3, 1953 | 32.58 | Jan. 8, 1957 | 68.03 |
| Nov. 30 | 62.16 | Apr. 9, 1954 | 54.48 | Mar. 8 | 67.25 |
| Apr. 11, 1950 | 42.67 | July 22 | 67.86 | May 9 | 42.36 |
| Aug. 2 | 56.79 | Aug. 24, 1954 | 69.82 | July 16 | 51.29 |
| Dec. 7 | 64.18 | Dec. 3 | 53.00 | Nov. 19 | 40.90 |
| Apr. 4, 1951 | 47.11 | Mar. 9, 1955 | 52.94 | Jan. 10, 1958 | 41.10 |
| Aug. 7 | 65.39 | July 15 | 56.59 | Mar. 12 | 40.99 |
| Dec. 5 | 64.90 | Mar. 9, 1956 | 68.40 | May 13 | 42.84 |
| Apr. 18, 1952 | 39.74 | July 13 | 70.60 | July 3 | 51.71 |
| Aug. 8 | 62.99 | Oct. 5 | 68.80 | | |
| Apr. 14, 1953 | 41.82 | Nov. 9 | 68.71 | | |
| | | Well D-23. Owner: Wiley Roberts | | | |
| Oct. 28, 1937 | 85.00 | Mar. 31, 1938 | 84.88 | June 22, 1938 | 84.82 |
| Dec. 10 | 85.13 | Apr. 23 | 84.83 | July 21 | 85.01 |
| Mar. 1, 1938 | 84.80 | May 20 | 84.76 | Aug. 30 | 84.99 |

(Continued on next page)

Table 6.-- Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well D-23--Continued | | | |
| Sept.29, 1938 | 85.27 | Aug. 6, 1940 | 84.85 | Aug. 8, 1952 | 85.26 |
| Nov. 5 | 86.96 | Nov. 19 | 85.00 | Apr. 14, 1953 | 84.83 |
| Dec. 12 | 85.20 | Apr. 2, 1942 | 85.07 | Aug. 18 | 85.14 |
| Jan. 26, 1939 | 85.05 | Aug. 3 | 85.06 | Dec. 3 | 84.85 |
| Mar. 1 | 84.02 | Dec. 7 | 84.87 | Apr. 9, 1954 | 85.51 |
| Mar. 29 | 84.97 | Apr. 15, 1943 | 84.79 | July 21 | 85.91 |
| Apr. 28 | 85.31 | Sept.11 | 84.99 | Aug. 24 | 86.35 |
| May 24 | 85.06 | Dec. 18 | 85.05 | Dec. 3 | 85.07 |
| July 1 | 85.23 | May 1, 1944 | 84.76 | Mar. 9, 1955 | 86.34 |
| Oct. 4 | 85.08 | Aug. 25 | 85.02 | July 15 | 85.89 |
| Dec. 20 | 85.11 | Dec. 19 | 84.88 | Nov. 9 | 85.37 |
| Jan. 24, 1940 | 85.10 | May 24, 1945 | 84.82 | Mar. 9, 1956 | 85.15 |
| Feb. 28 | 85.08 | Mar. 21, 1946 | 84.82 | July 13 | 86.61 |
| Mar. 27 | 85.05 | Aug. 5, 1948 | 85.05 | Oct. 5 | 88.62 |
| Apr. 30 | 84.95 | Feb. 8, 1949 | 85.00 | Nov. 9 | 85.76 |
| May 28 | 85.02 | Apr. 18 | 84.89 | Jan. 8, 1957 | 85.18 |
| June 25 | 84.89 | Aug. 23 | 85.05 | Mar. 7 | 85.10 |
| July 29 | 84.87 | Nov. 30 | 85.11 | May 9 | 84.82 |
| Aug. 29 | 84.98 | Apr. 11, 1950 | 84.92 | July 16 | 85.13 |
| Sept.23 | 85.05 | Aug. 2 | 84.95 | Nov. 19 | 83.21 |
| Oct. 28 | 85.04 | Dec. 7 | 85.58 | Jan. 10, 1958 | 84.81 |
| Dec. 6 | 84.87 | Apr. 4, 1951 | 85.92 | Mar. 12 | 83.82 |
| Jan. 30, 1941 | 84.89 | Aug. 7 | 85.08 | May 13 | 84.80 |
| Mar. 27 | 84.84 | Dec. 5 | 85.15 | July 3 | 85.52 |
| May 29 | 84.82 | Apr. 18, 1952 | 85.15 | | |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well D-36. Owner: T. E. Gillespie | | | | | |
| Oct. 28, 1937 | 24.42 | May 24, 1939 | 117.76 | Mar. 27, 1941 | 20.39 |
| Dec. 10 | 24.55 | July 1 | 128.99 | May 29 | 22.92 |
| Jan. 25, 1938 | 18.66 | Oct. 4 | 123.36 | Nov. 19 | 43.18 |
| Mar. 31 | 23.08 | Dec. 20 | 120.24 | Apr. 2, 1942 | 24.83 |
| Apr. 24 | 20.81 | Jan. 24, 1940 | 108.04 | Aug. 3 | 67.50 |
| May 20 | 21.94 | Feb. 28 | 23.71 | Dec. 7 | 23.69 |
| June 22 | 23.71 | Mar. 27 | 24.86 | Apr. 15, 1943 | 23.38 |
| July 21 | 36.50 | Apr. 30 | 23.75 | Sept.11 | 88.97 |
| Aug. 30 | 25.07 | May 28 | 24.89 | Dec. 18 | 93.99 |
| Sept.29 | 66.33 | June 25 | 23.29 | May 1, 1944 | 23.31 |
| Nov. 5 | 109.92 | July 29 | 23.61 | Aug. 25 | 62.49 |
| Dec. 12 | 98.50 | Aug. 29 | 54.50 | Dec. 19 | 22.79 |
| Jan. 26, 1939 | 70.60 | Sept.23 | 68.59 | May 24, 1945 | 23.67 |
| Mar. 1 | 78.88 | Oct. 28 | 87.50 | Mar. 21, 1946 | 21.96 |
| Mar. 29 | 64.80 | Dec. 6 | 22.86 | Apr. 11, 1950 | 72.66 |
| Apr. 28 | 104.16 | Jan. 30, 1941 | 22.93 | Measurements discontinued | |
| Well D-66. Owner: Mrs. Rena Dobie | | | | | |
| Nov. 19, 1937 | 65.94 | July 21, 1938 | 54.06 | Apr. 22, 1939 | 64.10 |
| Dec. 10 | 65.45 | Aug. 30 | 53.95 | May 24 | 58.67 |
| Jan. 20, 1938 | 2.71 | Sept.29 | 56.84 | July 1 | 59.59 |
| Mar. 1 | 6.98 | Nov. 5 | 59.25 | Oct. 4 | 60.58 |
| Mar. 31 | 24.62 | Dec. 12 | 57.62 | Dec. 20 | 60.21 |
| Apr. 23 | 3.69 | Jan. 26, 1939 | 58.90 | Jan. 24, 1940 | 58.75 |
| May 20 | 4.71 | Mar. 1 | 59.10 | Feb. 28 | 41.94 |
| June 23 | 41.56 | Mar. 29 | 57.86 | Mar. 27 | 55.54 |

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Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well D-66--Continued | | | |
| Apr. 30, 1940 | 38.18 | Aug. 25, 1944 | 64.01 | Aug. 24, 1954 | 114.37 |
| May 28 | 57.30 | Dec. 19 | 7.66 | Dec. 3 | 115.43 |
| June 25 | 9.23 | May 24, 1945 | 61.11 | Mar. 8, 1955 | 117.33 |
| July 29 | 45.08 | Mar. 21, 1946 | 5.49 | July 15 | 113.07 |
| Aug. 29 | 58.52 | Aug. 5, 1948 | 74.14 | Nov. 9 | 113.30 |
| Sept. 23 | 58.99 | Feb. 8, 1949 | 80.63 | Mar. 9, 1956 | 113.53 |
| Oct. 28 | 61.51 | Apr. 18 | 6.34 | July 13 | 115.38 |
| Dec. 6 | 7.61 | Aug. 23 | 82.55 | Oct. 4 | 118.08 |
| Jan. 30, 1941 | 7.69 | Nov. 30 | 72.73 | Nov. 9 | 118.55 |
| Mar. 27 | 4.73 | Apr. 11, 1950 | 73.60 | Jan. 7, 1957 | 115.57 |
| May 29 | 7.27 | Aug. 2 | 79.2 | Mar. 8 | 117.86 |
| Aug. 7 | 60.08 | Dec. 6 | 74.75 | May 9 | 5.69 |
| Nov. 19 | 64.05 | Apr. 5, 1951 | 103.9 | July 16 | 112.49 |
| Apr. 2, 1942 | 68.47 | Aug. 7 | 115.33 | Nov. 19 | 8.42 |
| Aug. 3 | 70.07 | Dec. 5 | 115.69 | Jan. 10, 1958 | 19.11 |
| Dec. 7 | 14.54 | Aug. 8, 1952 | 117.99 | Mar. 12 | 6.05 |
| Apr. 15, 1943 | 6.72 | Apr. 14, 1953 | 108.70 | May 12 | 5.61 |
| Sept. 11 | 35.97 | Aug. 17 | 112.30 | July 2 | 109.79 |
| Dec. 18 | 66.24 | Dec. 3 | 5.72 | | |
| May 1, 1944 | 42.13 | July 22, 1954 | 133.76 | | |
| | | Well E-17. Owner: M. O. Rogers | | | |
| Nov. 4, 1937 | 63.24 | Apr. 29, 1940 | 51.25 | Sept. 27, 1940 | 53.21 |
| Jan. 8, 1940 | 52.09 | May 24 | 50.67 | Oct. 30 | 53.42 |
| Feb. 26 | 51.59 | June 24 | 50.32 | Jan. 30, 1941 | 18.5 |
| Mar. 25 | 52.44 | Aug. 26 | 56.50 | Mar. 28 | 5.26 |

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Table 6.--Water levels in Wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well E-17--Continued | | | |
| May 31, 1941 | 8.65 | Nov. 30, 1949 | 56.12 | Mar. 8, 1955 | 55.07 |
| Aug. 8 | 51.86 | Apr. 12, 1950 | 56.90 | July 15 | 57.51 |
| Nov. 18 | 54.00 | Aug. 3 | 55.40 | Nov. 9 | 59.48 |
| Apr. 10, 1942 | 52.33 | Dec. 6 | 54.83 | July 12, 1956 | 63.79 |
| Dec. 4 | 48.18 | Jan. 3, 1951 | 57.21 | Oct. 5 | 59.61 |
| Mar. 30, 1943 | 51.42 | Aug. 8 | 56.31 | Nov. 9 | 61.98 |
| Sept. 9 | 51.99 | Dec. 5 | 55.04 | Jan. 7, 1957 | 59.14 |
| Apr. 28, 1944 | 34.46 | Mar. 31, 1952 | 53.62 | Mar. 8 | 57.22 |
| Aug. 23 | 53.02 | Aug. 8 | 58.22 | May 9 | 52.79 |
| Dec. 21 | 50.56 | Apr. 13, 1953 | 53.60 | July 16 | 47.12 |
| May 22, 1945 | 50.6 | Aug. 17 | 57.81 | Nov. 18 | 5.87 |
| Mar. 22, 1946 | 29.5 | Apr. 7, 1954 | 56.95 | Jan. 10, 1958 | 13.78 |
| Aug. 6, 1948 | 58.40 | July 21 | 57.40 | Mar. 11 | 2.94 |
| Feb. 10, 1949 | 53.03 | Aug. 23 | 55.64 | May 12 | 8.45 |
| Aug. 24 | 54.55 | Dec. 6 | 62.28 | July 3 | 53.88 |
| | | Well E-24. Owner: J. L. Dodgen | | | |
| Dec. 2, 1937 | 272.94 | Aug. 23, 1944 | 259.93 | Jan. 9, 1951 | 276.63 |
| Mar. 5, 1943 | 264.67 | Dec. 21 | 262.43 | Aug. 27, 1954 | 275.99 |
| Sept. 9 | 265.98 | May 22, 1945 | 246.36 | Aug. 28, 1956 | 287.20 |
| Dec. 21 | 268.70 | Aug. 6, 1948 | 268.47 | Mar. 11, 1958 | 253.84 |
| Apr. 28, 1944 | 257.55 | Feb. 10, 1949 | 273.70 | | |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well E-31. Owner: Henry Armbruster | | | | | |
| Dec. 1, 1937 | 154.86 | Jan. 30, 1941 | 152.51 | Aug. 23, 1944 | 155.69 |
| Jan. 9, 1940 | 166.26 | Mar. 28 | 144.08 | May 22, 1945 | 114.14 |
| Feb. 27 | 166.11 | Aug. 8 | 117.71 | Mar. 23, 1946 | 121.55 |
| Mar. 25 | 166.98 | Nov. 18 | 130.71 | June 21, 1947 | 104.67 |
| Apr. 27 | 165.22 | Apr. 10, 1942 | 150.98 | Nov. 19 | 112.83 |
| May 28 | 166.42 | Aug. 8 | 151.33 | Apr. 2, 1948 | 153.65 |
| June 24 | 162.99 | Dec. 4 | 101.15 | Oct. 24, 1950 | 162.9 |
| July 29 | 156.85 | Apr. 1, 1943 | 140.52 | | |
| Aug. 26 | 160.01 | Dec. 17 | 155.99 | | |
| Well E-36. Owner: J. J. Horton | | | | | |
| Sept.16, 1937 | 125.60 | Mar. 28, 1939 | 136.51 | Oct. 29, 1940 | 139.48 |
| Dec. 16 | 127.62 | Apr. 27 | 137.15 | Dec. 5 | 123.53 |
| Jan. 19, 1938 | 116.10 | May 24 | 136.91 | Jan. 30, 1941 | 110.26 |
| Feb. 28 | 102.79 | July 3 | 137.08 | Mar. 28 | 99.91 |
| Mar. 30 | 103.48 | Oct. 3 | 141.37 | May 22 | 88.54 |
| Apr. 20 | 99.01 | Dec. 18 | 140.80 | Aug. 8 | 88.05 |
| May 17 | 95.83 | Jan. 23, 1940 | 141.26 | Nov. 18 | 107.36 |
| June 22 | 100.00 | Feb. 26 | 142.11 | Apr. 10, 1942 | 123.53 |
| July 20 | 108.25 | Mar. 25 | 142.87 | Aug. 8 | 129.07 |
| Aug. 26 | 112.55 | Apr. 29 | 138.00 | Dec. 4 | 102.25 |
| Sept.26 | 120.92 | May 24 | 139.55 | Apr. 1, 1943 | 111.51 |
| Nov. 2 | 125.27 | June 24 | 129.57 | Apr. 13 | 110.15 |
| Dec. 13 | 129.49 | July 26 | 125.17 | Sept. 9 | 122.91 |
| Jan. 24, 1939 | 130.95 | Aug. 26 | 133.69 | Dec. 17 | 131.61 |
| Feb. 28 | 132.72 | Sept.27 | 137.04 | Apr. 28, 1944 | 93.63 |

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Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well E-36--Continued | | | | | |
| Aug. 23, 1944 | 103.00 | Apr. 4, 1951 | 137.46 | Mar. 7, 1956 | 141.79 |
| Dec. 21 | 105.91 | Aug. 8 | 139.78 | July 12 | 148.76 |
| May 22, 1945 | 87.62 | Dec. 5 | 139.00 | Aug. 28 | 146.64 |
| Mar. 23, 1946 | 92.35 | Mar. 27, 1952 | 142.93 | Oct. 5 | 148.61 |
| June 20, 1947 | 100.88 | Aug. 8 | 138.25 | Nov. 9 | 139.77 |
| Nov. 18 | 120.11 | Sept. 6 | 138.74 | Jan. 7, 1957 | 139.96 |
| May 1, 1948 | 129.65 | Apr. 13,1953 | 122.19 | Mar. 8 | 135.22 |
| Aug. 6 | 135.46 | Aug. 17 | 135.64 | May 9 | 107.04 |
| Feb. 10, 1949 | 138.11 | Dec. 2 | 106.59 | July 16 | 112.52 |
| Apr. 22 | 122.29 | Apr. 7, 1954 | 121.35 | Nov. 18 | 97.42 |
| Aug. 23 | 130.78 | July 21 | 140.13 | Mar. 11, 1958 | 82.89 |
| Apr. 12, 1950 | 129.71 | Aug. 23 | 139.41 | May 12 | 82.87 |
| Aug. 3 | 129.67 | Dec. 6 | 134.51 | July 3 | 88.27 |
| Dec. 6 | 135.79 | Mar. 8, 1955 | 134.12 | | |
| Jan. 2, 1951 | 136.60 | July 13 | 132.12 | | |

Well E-45. Owner: John Butler

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Sept.15, 1937 | 166.03 | Apr. 27, 1939 | 171.00 | Apr. 9, 1942 | 145.32 |
| Jan. 20, 1938 | 157.66 | May 25 | 162.96 | Dec. 4 | 143.93 |
| Feb. 28 | 153.28 | July 3 | 150.12 | Mar. 15, 1943 | 151.77 |
| Mar. 30 | 148.25 | Jan. 29, 1940 | 167.89 | Apr. 29, 1944 | 147.15 |
| Apr. 20 | 152.36 | Mar. 25 | 166.24 | Dec. 18 | 145.42 |
| May 17 | 135.97 | Aug. 29 | 163.16 | Mar. 22, 1946 | 87.93 |
| Aug. 26 | 140.28 | Oct. 30 | 165.12 | June 20, 1947 | 90.90 |
| Nov. 2 | 179.48 | Jan. 29, 1941 | 155.17 | Nov. 19 | 95.08 |
| Jan. 24, 1939 | 189.34 | Mar. 31 | 132.80 | May 1, 1948 | 157.55 |
| Feb. 28 | 184.33 | Nov. 18 | 143.82 | | |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well E-48. Owner: Mrs. Laura B. Negley | | | | | |
| Feb. 10, 1949 | 242.25 | Sept. 6, 1952 | 238.33 | Aug. 28, 1956 | 263.88 |
| Apr. 20 | 234.22 | Apr. 13, 1953 | 226.69 | Oct. 5 | 267.98 |
| Aug. 24 | 233.87 | Aug. 17 | 232.11 | Nov. 9 | 250.87 |
| Nov. 10 | 236.35 | Dec. 3 | 229.27 | Jan. 7, 1957 | 247.18 |
| Apr. 11, 1950 | 236.45 | Apr. 6, 1954 | 225.22 | Mar. 7 | 245.08 |
| Aug. 3 | 230.20 | July 21 | 240.58 | May 8 | 223.77 |
| Dec. 6 | 239.66 | Aug. 23 | 242.88 | July 16 | 224.63 |
| Jan. 2, 1951 | 240.31 | Dec. 6 | 242.04 | Nov. 18 | 215.56 |
| Apr. 4 | 243.47 | Mar. 8, 1955 | 238.34 | Jan. 10, 1958 | 217.97 |
| Aug. 8 | 237.23 | July 13 | 237.57 | Mar. 11 | 201.32 |
| Dec. 5 | 243.30 | Nov. 9 | 246.60 | May 12 | 199.55 |
| Feb. 26, 1952 | 246.34 | Mar. 7, 1956 | 248.78 | July 3 | 202.62 |
| Aug. 8 | 233.30 | July 12 | 253.90 | | |
| Well E-58. Owner: F. W. Zimmerman | | | | | |
| Nov. 16, 1937 | 97.09 | Dec. 5, 1940 | 94.92 | Mar. 28, 1944 | 90.01 |
| Jan. 9, 1940 | 98.64 | Jan. 30, 1941 | 94.05 | Aug. 23 | 91.79 |
| Feb. 26 | 97.88 | Mar. 28 | 82.52 | Dec. 21 | 92.12 |
| Mar. 25 | 101.39 | May 31 | 84.26 | May 22, 1945 | 90.82 |
| Apr. 29 | 97.03 | Aug. 8 | 87.81 | Mar. 22, 1946 | 92.78 |
| May 24 | 96.97 | Nov. 18 | 89.01 | Aug. 6, 1948 | 94.29 |
| June 24 | 96.72 | Apr. 10, 1942 | 91.38 | Feb. 10, 1949 | 95.48 |
| July 26 | 96.14 | Aug. 8 | 91.63 | Apr. 20 | 93.36 |
| Aug. 26 | 96.08 | Dec. 4 | 90.78 | Aug. 23 | 94.62 |
| Sept. 27 | 96.21 | Mar. 29, 1943 | 91.40 | Nov. 30 | 95.02 |
| Oct. 30 | 95.98 | Dec. 21 | 92.62 | Apr. 12, 1950 | 95.10 |

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Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well E-58--Continued | | | |
| Aug. 3, 1950 | 94.46 | Apr. 7, 1954 | 93.38 | Nov. 9, 1956 | 97.98 |
| Dec. 8 | 95.02 | July 21 | 92.56 | Jan. 7, 1957 | 97.65 |
| Apr. 4, 1951 | 97.69 | Aug. 23 | 93.48 | Mar. 7 | 98.55 |
| Aug. 8 | 95.00 | Dec. 6 | 93.99 | May 8 | 97.56 |
| Dec. 5 | 94.78 | Mar. 8, 1955 | 92.77 | July 16 | 96.00 |
| Mar. 31, 1952 | 96.10 | July 13 | 93.81 | Nov. 18 | 88.07 |
| Aug. 8 | 94.02 | Nov. 9 | 95.68 | Jan. 10, 1958 | 91.53 |
| Apr. 13, 1953 | 91.62 | Mar. 7, 1956 | 96.07 | Mar. 10 | 58.81 |
| Aug. 17 | 91.61 | July 12 | 97.27 | May 12 | 67.55 |
| Dec. 3 | 89.83 | Oct. 5 | 97.54 | July 3 | 88.57 |
| | | Well E-59. Owner: Joe Stuart | | | |
| Nov. 4, 1937 | 193.6 | Jan. 3, 1951 | 203.6 | Aug. 23, 1954 | 212.9 |
| Mar. 30, 1943 | 196.8 | Mar. 31, 1952 | 207.0 | Aug. 29, 1956 | 204.88 |
| Dec. 12, 1950 | 207.6 | Sept. 5 | 206.5 | Mar. 11, 1958 | 191.96 |
| | | Well E-65. Owner: Paul J. Grelle | | | |
| Mr. 4, 1943 | 222.4 | Mar. 27, 1952 | 243.2 | Aug. 29, 1956 | 247.63 |
| Dec. 8, 1950 | 233.7 | Sept. 5 | 232.6 | Mar. 11, 1958 | 202.43 |
| Jan. 3, 1951 | 234.5 | Aug. 30, 1954 | 233.5 | | |
| | | Well F-3. Owner: Thomas Yoe | | | |
| Sept.16, 1937 | 25.55 | May 17, 1938 | 22.32 | Jan. 24, 1939 | 25.82 |
| Jan. 19, 1938 | 25.40 | June 22 | 23.47 | Feb. 28 | 26.90 |
| Feb. 28 | 23.66 | Aug. 26 | 24.00 | Mar. 28 | 25.98 |
| Mar. 30 | 24.46 | Nov. 2 | 25.73 | Apr. 27 | 26.20 |
| Apr. 20 | 24.18 | Dec. 13 | 25.78 | May 24 | 26.13 |

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Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well F-3--Continued | | | |
| July 3, 1939 | 27.17 | Mar. 29, 1943 | 25.90 | May 28, 1945 | 24.41 |
| Dec. 18 | 29.60 | Apr. 29 | 25.98 | July 28 | 25.24 |
| Jan. 23, 1940 | 26.95 | May 31 | 25.97 | Sept. 3 | 25.55 |
| Feb. 26 | 26.46 | June 30 | 25.95 | Sept. 30 | 25.69 |
| Mar. 25 | 27.08 | July 28 | 25.98 | Nov. 4 | 25.74 |
| Apr. 29 | 26.49 | Sept. 1 | 26.05 | Dec. 5 | 25.74 |
| May 24 | 26.51 | Oct. 4 | 25.09 | Jan. 4, 1946 | 25.88 |
| June 24 | 26.45 | Oct. 30 | 25.16 | Feb. 7 | 25.78 |
| July 26 | 25.74 | Nov. 28 | 26.20 | Mar. 5 | 25.68 |
| Aug. 26 | 26.00 | Jan. 5, 1944 | 26.10 | Apr. 4 | 25.49 |
| Sept. 27 | 26.16 | Feb. 3 | 25.98 | Apr. 28 | 25.08 |
| Oct. 30 | 26.28 | Feb. 27 | 25.93 | July 2 | 24.89 |
| Nov. 30 | 26.08 | Apr. 1 | 25.14 | Aug. 3 | 25.38 |
| Jan. 2, 1941 | 25.19 | Apr. 30 | 24.81 | Sept. 2 | 24.38 |
| Jan. 30 | 25.52 | May 29 | 24.53 | Oct. 2 | 23.98 |
| Feb. 26 | 25.44 | July 2 | 23.03 | Oct. 7 | 23.75 |
| Mar. 28 | 24.81 | July 30 | 23.96 | Dec. 2 | 22.93 |
| May 22 | 22.97 | Aug. 27 | 24.58 | Jan. 12, 1947 | 23.52 |
| Aug. 8 | 23.78 | Oct. 1 | 25.19 | Jan. 29 | 22.66 |
| Nov. 18 | 25.64 | Oct. 30 | 25.56 | Mar. 2 | 23.28 |
| Apr. 10, 1942 | 26.00 | Dec. 1 | 25.55 | Mar. 30 | 23.94 |
| Aug. 8 | 26.17 | Jan. 1, 1945 | 25.26 | Apr. 27 | 24.51 |
| Dec. 4 | 25.40 | Feb. 4 | 24.67 | June 1 | 25.02 |
| Feb. 4, 1943 | 25.71 | Mar. 30 | 24.42 | June 29 | 25.33 |
| Feb. 25 | 25.85 | May 2 | 24.06 | July 27 | 25.35 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well F-3--Continued | | | |
| Sept. 1, 1947 | 25.59 | Apr. 23, 1949 | 26.10 | Nov. 22, 1950 | 26.46 |
| Sept.28 | 25.67 | May 21 | 25.78 | Dec. 19 | 26.55 |
| Oct. 31 | 25.76 | June 26, 1949 | 25.82 | Jan. 24, 1951 | 26.60 |
| Nov. 30 | 25.84 | July 24 | 25.90 | Feb. 28 | 26.68 |
| Dec. 30 | 25.87 | Aug. 28 | 25.96 | Mar. 29 | 26.68 |
| Feb. 29, 1948 | 25.99 | Sept.23 | 26.09 | Apr. 24 | 26.53 |
| Mar. 28 | 26.06 | Oct. 25 | 26.10 | May 22 | 26.45 |
| Apr. 25 | 26.14 | Nov. 25 | 26.22 | June 28 | 25.88 |
| May 30 | 26.08 | Dec. 22 | 25.27 | July 23 | 26.03 |
| June 27 | 26.23 | Jan. 27, 1950 | 26.83 | Aug. 23 | 26.18 |
| July 29 | 26.18 | Feb. 24 | 26.32 | Sept.24 | 26.25 |
| Aug. 29 | 26.24 | Mar. 28 | 26.31 | Oct. 24 | 26.37 |
| Sept.26 | 26.30 | Apr. 27 | 26.73 | Dec. 20 | 26.58 |
| Oct. 26 | 26.39 | May 31 | 26.25 | Feb. 1, 1952 | 26.64 |
| Nov. 25 | 26.37 | June 26 | 25.68 | Feb. 26 | 26.62 |
| Dec. 24 | 26.46 | July 26 | 27.03 | Mar. 24 | 26.65 |
| Jan. 31, 1949 | 26.44 | Aug. 23 | 26.77 | Apr. 24 | 26.53 |
| Feb. 27 | 26.00 | Sept.25 | 27.17 | | |
| Mar. 27 | 25.92 | Oct. 25 | 26.36 | | |
| | | Well G-12. Owner: Mrs. N. E. Hughes | | | |
| Nov. 11, 1937 | +8.6 | Dec. 12, 1938 | 9.90 | May 24, 1939 | 8.08 |
| July 21, 1938 | 2.21 | Jan. 25, 1939 | 10.97 | July 1 | 7.81 |
| Aug. 30 | 6.30 | Mar. 29 | 13.45 | Oct. 4 | 7.59 |
| Sept.29 | 6.71 | Apr. 23 | 9.80 | Dec. 20 | 16.73 |
| Nov. 5 | 8.49 | Apr. 28 | 9.20 | Jan. 24, 1940 | 19.05 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well G-12--Continued | | | |
| Feb. 28, 1940 | 21.81 | May 1, 1944 | 26.41 | Apr. 9, 1954 | 34.33 |
| Mar. 27 | 24.30 | Aug. 25 | 26.52 | July 22 | 37.08 |
| Apr. 30 | 27.00 | Dec. 19 | 27.08 | Aug. 24 | 36.94 |
| May 28 | 27.64 | May 24, 1945 | 26.68 | Dec. 3 | 34.00 |
| June 25 | 28.14 | Mar. 21, 1946 | 25.65 | Mar. 8, 1955 | 33.66 |
| July 29 | 28.44 | Aug. 5, 1948 | 29.63 | July 15 | 37.35 |
| Aug. 29 | 28.63 | Feb. 8, 1949 | 29.35 | Nov. 9 | 36.02 |
| Sept.23 | 28.51 | Apr. 18 | 28.57 | Mar. 7, 1956 | 34.44 |
| Oct. 28 | 28.56 | Aug. 23 | 30.41 | July 13 | 38.81 |
| Dec. 6 | 28.62 | Nov. 30 | 30.42 | Oct. 4 | 36.54 |
| Jan. 30, 1941 | 28.05 | Apr. 11, 1950 | 30.88 | Nov. 9 | 35.09 |
| Mar. 24 | 27.59 | Aug. 2 | 32.40 | Jan. 7, 1957 | 34.19 |
| May 23 | 26.87 | Dec. 6 | 31.98 | Mar. 8 | 33.77 |
| Aug. 7 | 27.72 | Apr. 4, 1951 | 32.23 | May 9 | 30.54 |
| Nov. 19 | 28.48 | Aug. 7 | 34.65 | July 16 | 34.62 |
| Apr. 2, 1942 | 28.78 | Dec. 5 | 32.29 | Nov. 19 | 29.11 |
| Aug. 3 | 28.66 | Apr. 17, 1952 | 32.61 | Jan. 10, 1958 | 29.76 |
| Dec. 7 | 28.09 | Aug. 8 | 34.37 | Mar. 12 | 27.41 |
| Apr. 15, 1943 | 27.96 | Apr. 14, 1953 | 32.07 | May 12 | 28.90 |
| Sept.11 | 27.53 | Aug. 18 | 36.26 | July 2 | 33.56 |
| Dec. 18 | 27.53 | Dec. 3 | 32.16 | | |

Well G-13. Owner: Curtis Morris

| | | | | | |
|---|---|---|---|---|---|
| Apr. 28, 1938 | +17.2 | Apr. 30, 1940 | 14.36 | July 29, 1940 | 15.85 |
| Feb. 28, 1940 | 9.24 | May 28 | 15.04 | Aug. 29 | 16.04 |
| Mar. 27 | 11.72 | June 25 | 15.54 | Sept.23 | 15.90 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well G-13--Continued | | | | | |
| Oct. 28, 1940 | 15.97 | Dec. 7, 1942 | 15.48 | Aug. 5, 1948 | 16.98 |
| Dec. 6 | 16.01 | Apr. 15, 1943 | 14.35 | Feb. 8, 1949 | 16.74 |
| Jan. 30, 1941 | 15.46 | Sept.11 | 15.43 | Apr. 18 | 15.91 |
| Mar. 27 | 15.01 | Dec. 18 | 14.94 | Aug. 23 | 17.83 |
| May 23 | 14.28 | May 1, 1944 | 13.74 | Nov. 30 | 17.87 |
| Aug. 7 | 15.11 | Aug. 25 | 13.93 | Apr. 11, 1950 | 18.27 |
| Nov. 19 | 15.87 | Dec. 19 | 14.48 | Aug. 2 | 20.68 |
| Apr. 2, 1942 | 16.17 | May 24, 1945 | 14.09 | Dec. 6 | 20.74 |
| Aug. 3 | 16.04 | Mar. 21, 1946 | 13.04 | Apr. 4, 1951 | 20.4 |
| Well G-20. Owner: W. A. Leath | | | | | |
| Oct. 14, 1937 | 43.20 | May 26, 1939 | 49.41 | Apr. 2, 1942 | 44.44 |
| Dec. 13 | 40.53 | Dec. 20 | 45.36 | Dec. 7 | 34.82 |
| Jan. 26, 1938 | 38.03 | Jan. 24, 1940 | 43.83 | Dec. 18, 1943 | 38.70 |
| Mar. 1 | 37.60 | Mar. 27 | 43.41 | May 1, 1944 | 36.08 |
| Mar. 31 | 38.02 | Apr. 30 | 43.23 | Aug. 25 | 44.70 |
| Apr. 23 | 38.32 | May 28 | 43.81 | Dec. 19 | 40.20 |
| May 19 | 33.18 | June 25 | 42.55 | Mar. 21, 1946 | 41.27 |
| June 23 | 41.46 | July 29 | 42.55 | Aug. 5, 1948 | 53.46 |
| July 20 | 45.80 | Sept.23 | 44.19 | Apr. 18, 1949 | 44.95 |
| Aug. 3 | 50.32 | Oct. 28 | 42.07 | Aug. 23 | 50.00 |
| Sept.29 | 44.88 | Dec. 6 | 41.20 | Nov. 30 | 44.90 |
| Dec. 12 | 42.53 | Jan. 30, 1941 | 38.71 | Apr. 11, 1950 | 51.56 |
| Jan. 25, 1939 | 43.13 | May 23 | 26.25 | Aug. 2 | 61.08 |
| Mar. 1 | 43.45 | Aug. 7 | 32.69 | Dec. 6 | 50.81 |
| Mar. 29 | 44.63 | Nov. 19 | 37.74 | Apr. 5, 1951 | 48.14 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well G-20--Continued | | | |
| Aug. 7, 1951 | 62.00 | Dec. 3, 1954 | 48.18 | Mar. 8, 1957 | 55.82 |
| Dec. 5 | 50.35 | Mar. 8, 1955 | 53.74 | May 9 | 51.06 |
| Aug. 8, 1952 | 51.93 | July 15 | 59.32 | July 16 | 57.08 |
| Apr. 13, 1953 | 49.63 | Nov. 9 | 53.89 | Nov. 19 | 35.11 |
| Aug. 18 | 52.31 | Mar. 7, 1956 | 54.81 | Jan. 10, 1958 | 40.70 |
| Dec. 3 | 43.04 | July 13 | 74.32 | Mar. 12 | 27.61 |
| Apr. 9, 1954 | 50.10 | Oct. 3 | 72.84 | May 12 | 42.69 |
| July 22 | 55.66 | Nov. 9 | 57.40 | July 2 | 54.48 |
| Aug. 23 | 54.90 | Jan. 7, 1957 | 57.34 | | |
| | | Well G-35. Owner: Mrs. R. F. Clayton, Sr. | | | |
| Oct. 14, 1937 | 61.92 | Oct. 4, 1939 | 65.90 | Mar. 27, 1941 | 55.51 |
| Dec. 13 | 61.72 | Dec. 20 | 64.67 | May 23 | 55.66 |
| Jan. 25, 1938 | 62.56 | Jan. 24, 1940 | 63.58 | Aug. 7 | 63.29 |
| Mar. 1 | 60.98 | Feb. 28 | 63.88 | Nov. 19 | 58.83 |
| Mar. 30 | 60.57 | Mar. 27 | 64.25 | Apr. 2, 1942 | 60.18 |
| Apr. 23 | 60.19 | Apr. 30 | 64.53 | Aug. 3 | 58.14 |
| May 19 | 58.51 | May 28 | 66.51 | Dec. 7 | 55.61 |
| June 23 | 61.21 | June 25 | 65.07 | Apr. 15, 1943 | 57.19 |
| Aug. 30 | 61.19 | July 29 | 60.13 | Sept. 11 | 57.62 |
| Sept. 29 | 64.92 | Aug. 29 | 64.80 | May 1, 1944 | 54.68 |
| Dec. 12 | 60.97 | Sept. 23 | 63.11 | Aug. 25 | 57.82 |
| Jan. 25, 1939 | 63.70 | Oct. 28 | 62.76 | Dec. 19 | 55.50 |
| Mar. 1 | 68.37 | Dec. 6 | 59.89 | May 24, 1945 | 57.19 |
| Apr. 23 | 67.59 | Jan. 30, 1941 | 57.55 | Mar. 21, 1946 | 54.99 |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well G-38. Owner: Fred Boyett. | | | |
| Oct. 15, 1937 | 47.50 | Sept.23, 1940 | 52.42 | Dec. 6, 1950 | 50.52 |
| Dec. 13 | 49.75 | Oct. 28 | 53.44 | Apr. 4, 1951 | 46.98 |
| Jan. 26, 1938 | 5.14 | Dec. 6 | 40.80 | Aug. 7 | 53.74 |
| Mar. 2 | 8.11 | Jan. 30, 1941 | 9.19 | Dec. 5 | 54.54 |
| Mar. 30 | 7.98 | Mar. 27 | 4.68 | Apr. 18, 1952 | 44.96 |
| Apr. 23 | 6.14 | May 23 | 7.58 | Aug. 9 | 51.97 |
| May 19 | 7.59 | Aug. 7 | 9.66 | Apr. 13, 1953 | 10.47 |
| June 23 | 9.62 | Nov. 29 | 43.06 | Aug. 17 | 50.86 |
| July 20 | 40.31 | Apr. 2, 1942 | 37.39 | Dec. 3 | 10.48 |
| Aug. 30 | 44.19 | Aug. 3 | 42.98 | Apr. 7, 1954 | 10.85 |
| Sept.29 | 45.46 | Dec. 7 | 8.86 | July 21 | 52.14 |
| Dec. 12 | 47.73 | Apr. 15, 1943 | 8.81 | Aug. 24 | 53.59 |
| Jan. 25, 1939 | 49.49 | Sept.11 | 44.54 | Dec. 3 | 54.75 |
| Mar. 1 | 49.46 | Dec. 18 | 44.14 | Mar. 8, 1955 | 55.49 |
| Apr. 23 | 50.19 | May 1, 1944 | 9.21 | July 15 | 57.56 |
| May 26 | 52.06 | Aug. 25 | 43.01 | Nov. 9 | 57.15 |
| Oct. 4 | 53.18 | Dec. 19 | 9.32 | Mar. 7, 1956 | 57.46 |
| Dec. 12 | 53.68 | May 24, 1945 | 8.13 | July 13 | Dry |
| Jan. 24, 1940 | 54.39 | Mar. 21, 1946 | 7.39 | Oct. 3 | Dry |
| Feb. 28 | 54.59 | Aug. 5, 1948 | 50.22 | May 9, 1957 | 8.07 |
| Mar. 27 | 53.06 | Feb. 8, 1949 | 40.91 | July 16 | 9.93 |
| Apr. 30 | 48.86 | Apr. 19 | 8.98 | Nov. 19 | 7.42 |
| May 28 | 51.50 | Aug. 23 | 46.46 | Jan. 10, 1958 | 7.68 |
| June 25 | 35.62 | Nov. 30 | 48.51 | Mar. 12 | 7.13 |
| July 29 | 47.78 | Apr. 11, 1950 | 43.24 | May 12 | 8.05 |
| Aug. 29 | 51.16 | Aug. 2 | 47.68 | July 2 | 11.40 |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well G-39. Owner: Fred Boyett | | | |
| Oct. 15, 1937 | 81.55 | Dec. 6, 1940 | 64.60 | Apr. 18, 1952 | 74.10 |
| Dec. 13 | 65.15 | Jan. 30, 1941 | 58.72 | Aug. 9 | 79.29 |
| Jan. 26, 1938 | 54.89 | Mar. 27 | 53.53 | Apr. 13, 1953 | 61.06 |
| Mar. 2 | 55.54 | Aug. 7 | 56.13 | Aug. 17 | 73.70 |
| Mar. 30 | 64.99 | Nov. 19 | 60.80 | Dec. 3 | 65.44 |
| Apr. 23 | 61.22 | Apr. 2, 1942 | 62.81 | Apr. 7, 1954 | 70.11 |
| May 19 | 52.86 | Dec. 7 | 55.24 | July 21 | 79.05 |
| June 23 | 55.90 | Apr. 15, 1943 | 57.42 | Aug. 24 | 78.93 |
| Aug. 30 | 67.28 | Sept.11 | 63.31 | Dec. 3 | 74.98 |
| Sept.29 | 66.24 | May 1, 1944 | 55.20 | Mar. 8, 1955 | 79.91 |
| Dec. 12 | 64.10 | Aug. 25 | 60.83 | July 15 | 74.19 |
| Jan. 25, 1939 | 64.76 | Dec. 19 | 58.76 | Nov. 9 | 70.20 |
| Mar. 1 | 65.62 | May 24, 1945 | 57.61 | Mar. 7, 1956 | 71.34 |
| Apr. 23 | 66.60 | Mar. 21, 1946 | 55.32 | July 13 | 85.20 |
| May 26 | 66.56 | Aug. 5, 1948 | 74.61 | Oct. 3 | 86.36 |
| Oct. 4 | 67.86 | Feb. 8, 1949 | 75.43 | Nov. 9 | 76.18 |
| Dec. 20 | 68.32 | Apr. 19 | 64.97 | Jan. 7, 1957 | 72.22 |
| Jan. 24, 1940 | 68.68 | Aug. 23 | 64.05 | Mar. 8 | 70.84 |
| Mar. 27 | 68.36 | Nov. 30 | 69.58 | May 9 | 56.39 |
| Apr. 30 | 69.90 | Apr. 11, 1950 | 62.87 | July 16 | 58.39 |
| May 28 | 67.55 | Aug. 2 | 69.01 | Nov. 19 | 59.14 |
| June 25 | 63.78 | Dec. 6 | 66.46 | Jan. 10, 1958 | 58.58 |
| Aug. 29 | 70.77 | Apr. 4, 1951 | 69.29 | Mar. 12 | 49.13 |
| Sept.23 | 67.89 | Aug. 9 | 68.70 | May 12 | 53.52 |
| Oct. 12 | 69.61 | Dec. 5 | 68.40 | July 2 | 69.89 |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well H-9. Owner: A. A. Hale | | | | | |
| Sept.15, 1937 | 128.0 | Jan. 3, 1951 | 130.1 | Aug. 26, 1954 | 132.6 |
| Apr. 8 | 127.7 | Feb. 26, 1952 | 130.7 | Aug. 28, 1956 | 132.35 |
| Nov. 13, 1950 | 129.9 | Sept. 5 | 132.1 | Mar. 13, 1958 | 116.40 |
| Well H-11. Owner: C. C. Houston | | | | | |
| Apr. 8, 1943 | 140.7 | Jan. 3, 1951 | 144.3 | Sept. 5, 1952 | 140.1 |
| Nov. 13, 1950 | 143.4 | Mar. 26, 1952 | 146.4 | | |
| Well H-15. Owner: Mrs. O. G. Parke, Sr. | | | | | |
| Aug. 1, 1945 | 181.3 | Jan. 5, 1951 | 195.7 | Sept. 5, 1952 | 205.9 |
| Nov. 13, 1950 | 196.8 | Mar. 26, 1952 | 201.8 | | |
| Well H-20. Owner: State Highway Department | | | | | |
| July 3, 1939 | 128.27 | Oct. 30, 1940 | 139.77 | Dec. 21, 1944 | 130.55 |
| Jan. 11, 1940 | 137.65 | Dec. 5 | 145.99 | May 22, 1945 | 125.97 |
| Jan. 23 | 137.84 | Jan. 29, 1941 | 130.38 | Apr. 1, 1946 | 127.16 |
| Feb. 26 | 143.19 | Mar. 28 | 127.95 | June 21, 1947 | 141.88 |
| Mar. 25 | 143.59 | May 22 | 121.29 | Nov. 19 | 135.00 |
| Apr. 27 | 140.91 | Aug. 8 | 121.83 | May 1, 1948 | 159.97 |
| May 24 | 140.33 | Apr. 10, 1942 | 131.51 | Aug. 5 | 162.82 |
| June 27 | 151.43 | Aug. 8 | 137.69 | Feb. 10, 1949 | 149.23 |
| July 1 | 142.05 | Dec. 4 | 128.88 | Apr. 20 | 147.97 |
| July 26 | 148.65 | Mar. 15, 1943 | 131.62 | Aug. 24 | 169.15 |
| July 29 | 142.84 | Sept. 9 | 136.44 | Nov. 8 | 157.45 |
| Aug. 26 | 150.62 | Dec. 17 | 136.14 | Apr. 12, 1950 | 131.57 |
| Aug. 27 | 141.80 | Apr. 29, 1944 | 133.39 | Aug. 3 | 130.62 |
| Sept.27 | 143.55 | Aug. 23 | 129.52 | Dec. 6 | 131.45 |

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| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well H-20--Continued | | | | | |
| Jan. 3, 1951 | 131.30 | Apr. 7, 1954 | 127.94 | Nov. 8, 1956 | 140.13 |
| Apr. 3 | 132.31 | July 21 | 141.48 | Jan. 8, 1957 | 136.47 |
| Aug. 8 | 133.67 | Aug. 23 | 152.54 | Mar. 7 | 136.44 |
| Dec. 5 | 132.17 | Dec. 6 | 131.00 | May 8 | 127.54 |
| Mar. 26, 1952 | 134.32 | Mar. 8, 1955 | 130.45 | July 16 | 135.63 |
| Aug. 8 | 132.13 | July 13 | 161.86 | Nov. 18 | 121.78 |
| Sept. 5 | 136.04 | Nov. 9 | 136.96 | Jan. 9, 1958 | 118.47 |
| Apr. 13, 1953 | 124.43 | Mar. 7, 1956 | 137.30 | Mar. 11 | 112.50 |
| Aug. 17 | 132.45 | July 12 | 190.60 | May 14 | 110.24 |
| Dec. 2 | 121.39 | Oct. 5 | 148.73 | July 3 | 118.42 |
| Well H-23. Owner: Nicholas Thiele | | | | | |
| Sept.15, 1937 | 134.59 | Feb. 28, 1939 | 141.74 | Sept.27, 1940 | 148.70 |
| Dec. 14 | 136.42 | Mar. 28 | 138.65 | Oct. 30 | 147.77 |
| Jan. 20, 1938 | 136.39 | Apr. 25 | 138.75 | Dec. 5 | 145.83 |
| Feb. 28 | 132.20 | May 24 | 139.45 | Jan. 29, 1941 | 139.37 |
| Mar. 30 | 131.02 | Oct. 3 | 148.40 | Mar. 28 | 135.81 |
| Apr. 20 | 130.82 | Dec. 18 | 148.24 | May 22 | 130.28 |
| May 18 | 128.36 | Jan. 23, 1940 | 147.43 | Aug. 8 | 130.41 |
| June 22 | 127.43 | Feb. 26 | 147.68 | Nov. 18 | 132.99 |
| July 20 | 128.58 | Mar. 25 | 149.26 | Apr. 10, 1942 | 141.21 |
| Aug. 26 | 129.79 | Apr. 27 | 148.37 | Aug. 8 | 144.26 |
| Sept.26 | 131.20 | May 24 | 149.31 | Dec. 4 | 137.25 |
| Nov. 2 | 133.14 | June 27 | 149.33 | Mar. 15, 1943 | 139.78 |
| Dec. 13 | 136.50 | July 26 | 147.93 | Sept. 9 | 143.27 |
| Jan. 24, 1939 | 137.36 | Aug. 26 | 148.17 | Dec. 17 | 143.41 |

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Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well H-23--Continued | | | | | |
| Apr. 29, 1944 | 138.68 | Apr. 4, 1951 | 143.52 | Mar. 7, 1956 | 148.15 |
| Aug. 23 | 137.58 | Aug. 8 | 148.56 | July 12 | 175.77 |
| Dec. 21 | 138.33 | Dec. 5 | 144.46 | Aug. 28 | 160.77 |
| May 22, 1945 | 136.18 | Mar. 26, 1952 | 145.42 | Oct. 5 | 159.67 |
| Mar. 22, 1946 | 137.73 | Aug. 8 | 145.00 | Nov. 8 | 150.93 |
| June 20, 1947 | 140.67 | Sept. 6 | 148.94 | Jan. 7, 1957 | 147.59 |
| Nov. 19 | 140.95 | Apr. 13, 1953 | 136.30 | Mar. 7 | 147.81 |
| May 1, 1948 | 158.58 | Aug. 17 | 144.77 | May 8 | 139.18 |
| Aug. 5 | 157.50 | Dec. 2 | 133.47 | July 16 | 149.69 |
| Apr. 20, 1949 | 150.40 | Apr. 7, 1954 | 136.23 | Nov. 18 | 133.07 |
| Aug. 24 | 155.69 | July 21 | 150.09 | Jan. 9, 1958 | 129.46 |
| Nov. 10 | 156.19 | Aug. 23 | 155.18 | Mar. 11 | 126.54 |
| Apr. 12, 1950 | 142.76 | Dec. 6 | 141.87 | May 12 | 124.38 |
| Aug. 3 | 142.3 | Mar. 8, 1955 | 142.26 | July 3 | 137.18 |
| Dec. 6 | 142.21 | July 13 | 159.58 | | |
| Jan. 3, 1951 | 142.74 | Nov. 9 | 148.87 | | |
| Well H-25. Owner: Ed Cullen | | | | | |
| Feb. 28, 1939 | 106.4 | Mar. 26, 1952 | 111.7 | Aug. 28, 1956 | 117.34 |
| Apr. 1, 1943 | 105.5 | Sept. 5 | 110.8 | Mar. 13, 1958 | 96.71 |
| Jan. 9, 1951 | 110.6 | Aug. 31, 1954 | 110.8 | | |
| Well H-43. Owner: E. N. Cason | | | | | |
| Sept.15, 1937 | 96.20 | Feb. 28, 1938 | 95.00 | May 18, 1938 | 93.31 |
| Dec. 16 | 97.01 | Mar. 30 | 95.57 | June 22 | 94.49 |
| Jan. 20, 1938 | 96.25 | Apr. 20 | 94.46 | July 20 | 95.29 |

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Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well H-43--Continued | | | |
| Aug. 26, 1938 | 95.78 | Aug. 26, 1940 | 97.80 | Nov. 19, 1947 | 96.37 |
| Sept. 28 | 96.10 | Sept. 27 | 97.97 | May 1, 1948 | 97.08 |
| Nov. 2 | 96.43 | Oct. 29 | 97.83 | Aug. 6 | 97.30 |
| Dec. 12 | 95.72 | Jan. 29, 1941 | 95.08 | Feb. 8, 1949 | 97.38 |
| Jan. 24, 1939 | 96.99 | May 22 | 91.03 | Apr. 20 | 95.70 |
| Feb. 28 | 97.11 | Aug. 8 | 92.80 | Aug. 23 | 96.02 |
| Mar. 28 | 97.03 | Nov. 18 | 94.81 | Apr. 12, 1950 | 96.41 |
| Apr. 22 | 97.54 | Apr. 9, 1942 | 95.93 | Aug. 3 | 96.15 |
| May 24 | 97.25 | Aug. 8 | 95.91 | Dec. 6 | 96.53 |
| July 3 | 97.81 | Dec. 4 | 93.76 | Jan. 4, 1951 | 96.68 |
| Oct. 3 | 98.40 | Mar. 15, 1943 | 95.53 | Apr. 4 | 98.49 |
| Dec. 18 | 97.55 | Sept. 9 | 96.03 | Aug. 8 | 96.49 |
| Jan. 23, 1940 | 97.34 | Dec. 21 | 96.53 | Dec. 5 | 98.15 |
| Feb. 26 | 97.21 | Apr. 29, 1944 | 93.26 | Mar. 26, 1952 | 99.09 |
| Mar. 25 | 97.10 | Aug. 23 | 94.09 | Aug. 8 | 98.76 |
| Apr. 27 | 97.10 | Dec. 18 | 94.84 | Sept. 5 | 96.63 |
| May 24 | 97.60 | May 22, 1945 | 92.99 | Apr. 13, 1953 | 95.49 |
| June 27 | 97.37 | Mar. 22, 1946 | 94.36 | Aug. 17 | 95.87 |
| July 26 | 98.86 | June 21, 1947 | 94.80 | Dec. 2 | 93.79 |
| | | Well H-47. Owner: Joe Freeman | | | |
| Oct. 5, 1937 | 131.9 | Dec. 14, 1950 | 135.5 | Apr. 21, 1952 | 137.1 |
| Apr. 5, 1943 | 129.0 | Jan. 4, 1951 | 134.1 | | |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well H-49. Owner: A. F. Knispel | | | | | |
| Oct. 8, 1937 | 28.2 | Apr. 7, 1955 | 27.34 | July 22, 1955 | 27.24 |
| Nov. 14, 1950 | 27.9 | Apr. 14 | 27.25 | Aug. 30 | 27.50 |
| Aug. 3, 1954 | 27.51 | Apr. 22 | 27.36 | Oct. 14 | 27.28 |
| Aug. 26 | 27.43 | May 10 | 27.42 | Nov. 9 | 27.30 |
| Mar. 19, 1955 | 27.24 | May 25 | 26.77 | Mar. 13, 1958 | 21.76 |
| Mar. 30 | 27.36 | June 30 | 26.96 | | |
| Well H-60. Owner: H. W. Hageman | | | | | |
| Sept.14, 1937 | 42.58 | July 3, 1939 | 34.36 | Nov. 18, 1941 | 31.47 |
| Dec. 16 | 33.72 | Oct. 3 | 34.95 | Apr. 9, 1942 | 32.51 |
| Jan. 20, 1938 | 33.40 | Dec. 18 | 34.11 | Aug. 8 | 34.53 |
| Feb. 28 | 32.38 | Jan. 23, 1940 | 33.99 | Dec. 4 | 30.57 |
| Mar. 30 | 32.44 | Feb. 26 | 36.11 | Apr. 6, 1943 | 32.34 |
| Apr. 20 | 32.23 | Mar. 25 | 33.75 | Sept. 9 | 32.69 |
| May 18 | 33.93 | Apr. 27 | 33.69 | Dec. 21 | 33.08 |
| June 22 | 31.46 | May 24 | 34.24 | Apr. 29, 1944 | 31.17 |
| July 20 | 31.98 | June 27 | 33.93 | Aug. 23 | 30.83 |
| Aug. 26 | 32.02 | July 26 | 35.94 | Dec. 18 | 31.64 |
| Sept.28 | 32.71 | Aug. 26 | 36.24 | May 22, 1945 | 30.02 |
| Nov. 2 | 33.00 | Sept.27 | 34.52 | Mar. 22, 1946 | 31.51 |
| Dec. 13 | 33.30 | Oct. 29 | 34.40 | June 21, 1947 | 31.60 |
| Jan. 24, 1939 | 33.68 | Dec. 5 | 33.04 | Nov. 19 | 32.99 |
| Feb. 28 | 33.74 | Jan. 29, 1941 | 32.05 | May 1, 1948 | 33.38 |
| Mar. 28 | 33.68 | Mar. 28 | 30.20 | Aug. 5 | 33.85 |
| Apr. 25 | 34.08 | May 22 | 29.04 | Feb. 8, 1949 | 34.07 |
| May 24 | 34.54 | Aug. 8 | 29.65 | Apr. 20 | 32.57 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well H-60--Continued | | | |
| Aug. 23, 1949 | 32.68 | Apr. 13, 1953 | 32.26 | Oct. 5, 1956 | 33.25 |
| Nov. 8 | 32.75 | Aug. 17 | 33.55 | Nov. 8 | 33.01 |
| Apr. 12, 1950 | 33.95 | Dec. 2 | 30.84 | Jan. 7, 1957 | 33.09 |
| Aug. 2 | 32.63 | Apr. 7, 1954 | 32.80 | Mar. 7 | 32.83 |
| Dec. 6 | 33.10 | July 21 | 33.04 | May 8 | 30.07 |
| Jan. 4, 1951 | 33.20 | Aug. 23 | 33.11 | July 5 | 31.04 |
| Apr. 4 | 33.15 | Dec. 7 | 33.03 | Nov. 19 | 29.01 |
| Aug. 8 | 33.78 | Mar. 8, 1955 | 33.04 | Jan. 10, 1958 | 29.64 |
| Dec. 5 | 33.14 | July 13 | 32.97 | Mar. 11 | 26.81 |
| Mar. 26, 1952 | 33.38 | Nov. 7 | 33.09 | May 12 | 27.49 |
| Aug. 8 | 32.95 | Mar. 7, 1956 | 33.25 | July 2 | 29.74 |
| Sept. 5 | 33.50 | July 12 | 33.34 | | |
| | | Well H-73. Owner: Tex Hughson | | | |
| Oct. 5, 1937 | 259.6 | Oct. 29, 1940 | 254.7 | Apr. 9, 1942 | 252.7 |
| Jan. 23, 1940 | 254.3 | Jan. 29, 1941 | 252.2 | Dec. 4 | 249.9 |
| Apr. 29 | 254.0 | May 22 | 247.8 | Mar. 15, 1943 | 251.9 |
| July 26 | 254.2 | Aug. 8 | 249.3 | | |
| | | Well H-74. Owner: City of San Marcos | | | |
| Oct. 5, 1937 | 227.6 | Apr. 14, 1955 | 225.93 | Aug. 30, 1955 | 226.01 |
| Jan. 23, 1940 | 226.9 | Apr. 22 | 225.95 | Oct. 14 | 225.93 |
| Mar. 19, 1955 | 225.86 | May 10 | 226.07 | Nov. 9 | 225.94 |
| Mar. 30 | 225.95 | May 25 | 225.55 | | |
| Apr. 7 | 226.14 | July 22 | 225.83 | | |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well H-75. Owner: E. Brooks | | | |
| Oct. 5, 1937 | 163.79 | Aug. 8, 1941 | 159.35 | Feb. 8, 1949 | 164.48 |
| Jan. 9, 1940 | 165.19 | Apr. 9, 1942 | 162.82 | Apr. 18 | 163.15 |
| Feb. 26 | 164.50 | Aug. 7 | 163.29 | Aug. 25 | 163.04 |
| Mar. 25 | 164.46 | Dec. 4 | 160.15 | Apr. 11, 1950 | 163.39 |
| Apr. 27 | 164.40 | Apr. 6, 1943 | 162.67 | Aug. 2 | 166.22 |
| May 24 | 164.87 | Sept. 9 | 162.77 | Dec. 6 | 166.62 |
| July 1 | 164.16 | Dec. 21 | 166.15 | Jan. 4, 1951 | 163.99 |
| July 26 | 164.63 | Apr. 29, 1944 | 159.91 | Apr. 4 | 169.09 |
| Aug. 27 | 165.01 | Aug. 23 | 160.87 | Aug. 8 | 162.55 |
| Sept.27 | 165.19 | Dec. 18 | 161.72 | Dec. 5 | 168.62 |
| Oct. 29 | 165.04 | May 22, 1945 | 159.38 | Sept. 5, 1952 | 164.07 |
| Dec. 5 | 163.59 | Mar. 21, 1946 | 162.78 | Apr. 13, 1953 | 162.82 |
| Jan. 24, 1941 | 162.43 | June 23, 1947 | 159.80 | Aug. 17 | 166.65 |
| Mar. 28 | 160.45 | May 2, 1948 | 163.95 | Dec. 3 | 161.12 |
| May 22 | 158.04 | Aug. 5 | 164.13 | Apr. 7, 1954 | 162.93 |
| | | Well H-94. Owner: W. P. Donaldson | | | |
| Sept.27, 1937 | 74.94 | Aug. 26, 1938 | 72.82 | July 1, 1940 | 5.35 |
| Dec. 14 | 3.85 | Sept.28 | 73.27 | July 26 | 75.83 |
| Jan. 20, 1938 | 85.02 | Dec. 13 | 74.60 | Aug. 27 | 76.23 |
| Feb. 3 | 6.97 | May 26, 1939 | 77.70 | Jan. 24, 1941 | 7.10 |
| Mar. 30 | 28.34 | Dec. 18 | 77.15 | Mar. 28 | 4.41 |
| Apr. 20 | 6.25 | Jan. 23, 1940 | 76.58 | May 22 | 10.87 |
| May 18 | 7.02 | Feb. 27 | 76.29 | Aug. 8 | 62.00 |
| June 22 | 19.38 | Apr. 27 | 73.30 | Nov. 18 | 35.97 |
| July 20 | 72.18 | May 24 | 75.84 | Apr. 9, 1942 | 6.72 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well H-94.--Continued | | | |
| Aug. 7, 1942 | 25.83 | Nov. 8, 1949 | 9.04 | Mar. 8, 1955 | 48.11 |
| Dec. 4 | 7.93 | Apr. 11, 1950 | 67.39 | July 13 | 69.53 |
| Mar. 12, 1943 | 71.87 | Aug. 1 | 72.78 | Nov. 7 | 74.92 |
| Sept. 9 | 16.21 | Dec. 6 | 74.62 | Mar. 7, 1956 | 74.74 |
| Dec. 21 | 74.17 | Jan. 4, 1951 | 74.70 | July 12 | 65.25 |
| Apr. 29, 1944 | 60.54 | Aug. 8 | 74.21 | Oct. 5 | 71.51 |
| Aug. 23 | 70.80 | Dec. 5 | 72.68 | Nov. 8 | 72.29 |
| Dec. 18 | 7.52 | Mar. 25, 1952 | 74.81 | Jan. 7, 1957 | 61.59 |
| May. 22, 1945 | 65.49 | Aug. 8 | 73.90 | Mar. 7 | 46.97 |
| Mar. 20, 1946 | 6.85 | Sept. 5 | 74.70 | May 8 | 8.50 |
| June 23, 1947 | 41.86 | Apr. 13, 1953 | 72.94 | July 5 | 23.84 |
| Nov. 19 | 43.64 | Aug. 17 | 75.02 | Nov. 19 | 3.68 |
| May 2, 1948 | 74.24 | Dec. 2 | 2.80 | Jan. 10, 1958 | 12.17 |
| Aug. 5 | 74.15 | Apr. 7, 1954 | 40.71 | Mar. 11 | 9.92 |
| Feb. 10, 1949 | 10.98 | July 21 | 50.28 | May 12 | 9.51 |
| Apr. 18 | 11.70 | Aug. 23 | 51.51 | July 2 | 65.91 |
| Aug. 25 | 73.53 | Dec. 7 | 51.77 | | |
| | | Well H-95. Owner: G. M. Jackson | | | |
| Sept.29, 1937 | 120.19 | July 20, 1938 | 118.24 | Mar. 28, 1939 | 120.69 |
| Dec. 14 | 121.66 | Aug. 26 | 118.82 | Apr. 22 | 121.27 |
| Feb. 2, 1938 | 118.04 | Sept.28 | 120.32 | May 26 | 121.33 |
| Mar. 30 | 119.08 | Nov. 2 | 119.73 | July 3 | 121.69 |
| Apr. 20 | 119.32 | Dec. 13 | 120.05 | Oct. 5 | 122.20 |
| May 18 | 116.68 | Jan. 24, 1939 | 120.65 | Dec. 18 | 121.41 |
| June 22 | 117.34 | Feb. 28 | 120.64 | Jan. 23, 1940 | 121.43 |

(Continued on next page)

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| | | Well H-95--Continued | | | |
| Feb. 27, 1940 | 121.24 | Apr. 29, 1944 | 115.74 | Mar. 25, 1952 | 121.17 |
| Mar. 25 | 121.39 | Aug. 23 | 116.53 | Aug. 8 | 121.47 |
| Apr. 27 | 121.24 | Dec. 18 | 118.37 | Sept. 5 | 121.37 |
| May 24 | 121.58 | May 22, 1945 | 115.81 | Apr. 13, 1953 | 119.83 |
| June 27 | 121.35 | Mar. 20, 1946 | 118.98 | Apr. 7, 1954 | 119.74 |
| July 26 | 121.27 | June 23, 1947 | 117.78 | July 21 | 120.94 |
| Aug. 27 | 121.72 | Nov. 19 | 119.85 | Aug. 23 | 120.94 |
| Sept.27 | 122.04 | May 2, 1948 | 120.47 | Dec. 7 | 120.29 |
| Oct. 29 | 121.96 | Aug. 5 | 120.72 | Mar. 8, 1955 | 121.00 |
| Dec. 5 | 120.41 | Feb. 10, 1949 | 121.41 | July 13 | 122.94 |
| Jan. 24, 1941 | 119.12 | Apr. 18 | 120.35 | Nov. 9 | 121.06 |
| Mar. 28 | 117.31 | Aug. 25 | 119.70 | Mar. 7, 1956 | 121.92 |
| Aug. 8 | 115.00 | Nov. 7 | 119.61 | July 12 | 121.23 |
| Nov. 18 | 117.26 | Apr. 11, 1950 | 120.20 | Oct. 5 | 120.81 |
| Apr. 9, 1942 | 119.40 | Aug. 1 | 119.94 | Nov. 8 | 122.16 |
| Aug. 7 | 119.28 | Dec. 6 | 120.74 | Jan. 7, 1957 | 121.08 |
| Dec. 4 | 115.67 | Jan. 4, 1951 | 120.76 | Mar. 7 | 121.04 |
| Mar. 12, 1943 | 118.09 | Apr. 4 | 121.42 | May 8 | 116.44 |
| Sept.10 | 119.00 | Aug. 8 | 120.55 | | |
| Dec. 21 | 119.84 | Dec. 5 | 120.83 | | |
| | | Well H-108. Owner: J. C. Storts | | | |
| Mar. 19, 1955 | 111.59 | Apr. 22, 1955 | 111.70 | July 22, 1955 | 111.40 |
| Mar. 30 | 111.67 | May 10 | 111.80 | Aug. 30 | 113.24 |
| Apr. 7 | 111.66 | May 25 | 110.93 | Nov. 9 | 111.81 |
| Apr. 14 | 111.65 | June 30 | 111.14 | | |

Table 6.--Water levels in wells in Hays County--Continued

| Date | Water level | Date | Water level | Date | Water level |
|---|---|---|---|---|---|
| Well H-110. Owner: Corrie Smith | | | | | |
| Aug. 24, 1954 | 129.49 | Apr. 7, 1955 | 129.50 | May 10, 1955 | 129.65 |
| Mar. 19, 1955 | 129.49 | Apr. 14 | 129.54 | May 23 | 128.82 |
| Mar. 30 | 129.51 | Apr. 22 | 129.58 | May 25 | 128.83 |

Table 7.--Drillers' logs of wells in Hays County

Well C-25

Owner: Texas-New Mexico Pipeline Co. Driller: E. R. Osborne.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Chalk | 5 | 5 | Limestone, gray | 14 | 260 |
| Limestone, gray | 5 | 10 | Limestone, blue | 12 | 272 |
| Shale, blue | 50 | 60 | Shale, brown | 10 | 282 |
| Shale, gray | 10 | 70 | Shale, red | 3 | 285 |
| Limestone, yellow | 25 | 95 | Cavity | 3 | 288 |
| Limestone, white | 50 | 145 | Limestone, gray | 24 | 312 |
| Limestone, gray | 75 | 220 | Limestone, yellow; water | 13 | 325 |
| Limestone, yellow | 26 | 246 | Limestone | 6 | 331 |

Well C-33

Owner: J. L. Harwell.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface | 10 | 10 | Shale | 50 | 870 |
| Limestone | 530 | 540 | Shale and some sand | 1,580 | 2,450 |
| Sand | 80 | 620 | Limestone and dolomite | 2,211 | 4,661 |
| Shale and some sand | 200 | 820 | | | |

Well D-4

Owner: A. A. Elsner. Driller: E. A. Bucklin.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Topsoil | 17 | 17 | Gravel | 21 | 231 |
| Lime, gray | 33 | 50 | Lime, white | 29 | 260 |
| Shale, gray | 10 | 60 | Shale, gray | 5 | 265 |
| Lime, white | 22 | 82 | Lime, gray | 15 | 280 |
| Sand, water | 18 | 100 | Lime, sandy | 20 | 300 |
| Lime, white | 110 | 210 | Shale, gray | 10 | 310 |

(Continued on next page)

Table 7.--Drillers' logs of wells in Hays County--Continued

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Well D-4--Continued | | | | | |
| Sand, gray | 32 | 342 | Lime, white | 10 | 610 |
| Shale, gray | 48 | 390 | Sand, water | 12 | 622 |
| Slate, blue | 20 | 410 | Lime, gray | 23 | 645 |
| Shale, sandy | 48 | 458 | Lime, mixed | 10 | 655 |
| Shale, green | 8 | 466 | Lime, black | 5 | 660 |
| Sand, red | 3 | 469 | Lime, gray | 65 | 725 |
| Sand, white | 7 | 476 | Shale, sandy | 45 | 770 |
| Lime, white | 10 | 486 | Red beds | 5 | 775 |
| Shale, mixed | 5 | 491 | Shale, green | 20 | 795 |
| Lime, brown | 29 | 520 | Shale, brown | 25 | 820 |
| Shale, red | 18 | 538 | Shale, gray | 50 | 870 |
| Sand, red | 7 | 545 | Shale, black | 45 | 915 |
| Sand, white | 18 | 563 | Shale, gray | 55 | 970 |
| Shale, red | 3 | 566 | Shale, black | 1,490 | 2,460 |
| Lime, gray | 34 | 600 | | | |

Well D-62

Owner: Mrs. H. H. Phillips.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| No record | 615 | 615 | Limestone, hard gray | 13 | 928 |
| Lime, alternating soft and hard, and dobie with shell breaks | 150 | 765 | Limestone, brown | 24 | 952 |
| | | | Limestone, soft black | 8 | 960 |
| Lime, coarse | 110 | 875 | Sand | 35 | 995 |
| Lime and fossils | 20 | 895 | Shale, blue | 16 | 1,011 |
| Shale, sandy, blue | 20 | 915 | | | |

Table 7.--Drillers' logs of wells in Hays County--Continued

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Well E-24 | | | | | |
| Owner: J. L. Dodgen. Driller: T. E. Owens. | | | | | |
| Caliche | 5 | 5 | Lime, white | 32 | 94 |
| Clay, yellow | 15 | 20 | Lime | 188 | 282 |
| Shale, blue | 42 | 62 | Sand, water | 30 | 312 |
| Well E-31 | | | | | |
| Owner: Henry Armbruster. Driller: T. E. Owens. | | | | | |
| Lime | 32 | 32 | Lime | 163 | 248 |
| Clay, blue | 53 | 85 | | | |
| Well E-33 | | | | | |
| Owner: Homer Heep. Driller: C. L. Tyler. | | | | | |
| Soil, black | 1 | 1 | Shale | 34 | 87 |
| Clay and gravel | 8 | 9 | Limestone | 31 | 118 |
| Clay, yellow | 16 | 25 | Clay | 57 | 175 |
| Shale, blue | 6 | 31 | Limestone | 67 | 242 |
| Chalk | 22 | 53 | | | |
| Well E-37 | | | | | |
| Owner: J. A. Rogers. Driller: Saunders & Glass. | | | | | |
| Surface | 4 | 4 | Limestone | 35 | 98 |
| Gravel | 10 | 14 | No record | 57 | 155 |
| Chalk | 24 | 38 | Limestone, dark-blue, water-bearing | 190 | 345 |
| Shale | 25 | 63 | | | |

Table 7.--Drillers' logs of wells in Hays County--Continued

Well E-38

Owner: J. A. Rogers. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface | 4 | 4 | Limestone | 30 | 115 |
| Clay and gravel | 9 | 13 | Clay | 56 | 171 |
| Chalk | 30 | 43 | Limestone | 154 | 325 |
| Shale | 42 | 85 | | | |

Well E-46

Owner: Mrs. Laura B. Negley. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface | 4 | 4 | Shale, black | 31 | 309 |
| Clay, yellow, joint | 50 | 54 | Limestone | 42 | 351 |
| Shale, blue | 7 | 61 | Clay | 58 | 409 |
| Chalk | 217 | 278 | Limestone | 99 | 508 |

Well E-47

Owner: Mrs. Laura B. Negley. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface | 2 | 2 | Limestone | 44 | 289 |
| Marl | 23 | 25 | Clay | 52 | 341 |
| Chalk | 187 | 212 | Limestone | 89 | 430 |
| Shale | 33 | 245 | | | |

Well E-48

Owner: Mrs. Laura B. Negley. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Chalk | 115 | 115 | Clay | 50 | 237 |
| Shale | 26 | 141 | Limestone | 163 | 400 |
| Limestone | 46 | 187 | | | |

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| **Well E-50** | | | | | |
| Owner: Mrs. Laura B. Negley. Driller: C. L. Tyler. | | | | | |
| Soil | 3 | 3 | Limestone | 44 | 278 |
| Marl | 26 | 29 | Clay | 51 | 329 |
| Chalk | 172 | 201 | Limestone | 136 | 465 |
| Shale | 33 | 234 | | | |
| **Well E-51** | | | | | |
| Owner: F. W. Miller. Driller: C. L. Tyler. | | | | | |
| Soil | 1 | 1 | Limestone | 41 | 161 |
| Shale, hard, white | 41 | 42 | Clay | 55 | 216 |
| Chalk | 33 | 75 | Limestone | 98 | 314 |
| Shale | 45 | 120 | | | |
| **Well E-52 (partial log)** | | | | | |
| Owner: M. G. Michaelis. Driller: C. L. Tyler. | | | | | |
| Surface | 2 | 2 | Clay, yellow, cavity | 3 | 70 |
| Dobie | 17 | 19 | Shale, black | 17 | 87 |
| Clay, yellow | 21 | 40 | Limestone, light-yellow | 6 | 93 |
| Limestone, hard, yellow | 3 | 43 | Total depth | | 325 |
| Shale, black | 24 | 67 | | | |
| **Well E-55** | | | | | |
| Owner: Jim Blair. Driller: C. L. Tyler. | | | | | |
| Surface | 3 | 3 | Clay | 10 | 25 |
| Clay, red, and gravel | 7 | 10 | No record | 275 | 300 |
| Limestone | 5 | 15 | | | |

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|

Well E-57

Owner: F. W. Zimmerman. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Soil---------------------- | 1 | 1 | Clay, yellow, and lime shells------------------ | 61 | 93 |
| Clay, yellow--------------- | 9 | 10 | Lime, soft, pale-blue------ | 157 | 250 |
| Lime, blue---------------- | 10 | 20 | Strata, hard, some sand; little water----------- | 25 | 275 |
| Shale, blue--------------- | 10 | 30 | Strata, hard; water sand at 335 ft-------------- | 73 | 348 |
| Lime, gray---------------- | 2 | 32 | | | |

Well E-64

Owner: Ed Montague. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface------------------- | 2 | 2 | Chalk--------------------- | 92 | 107 |
| Marl---------------------- | 13 | 15 | Limestone----------------- | 21 | 128 |

Well E-76

Owner: City of Buda. Driller: J. B. Virdell.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Topsoil and gravel--------- | 20 | 20 | Mud, blue----------------- | 55 | 160 |
| Chalk rock---------------- | 25 | 45 | Limestone (Georgetown)----- | 57 | 217 |
| Shale, hard, blue---------- | 19 | 64 | Limestone (Edwards)-------- | 173 | 390 |
| Chalk rock---------------- | 41 | 105 | | | |

Well F-1

Owner: Herman Heep. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Soil---------------------- | 3 | 3 | Limestone----------------- | 28 | 152 |
| Clay, red, and gravel------ | 35 | 38 | Clay---------------------- | 50 | 202 |
| Chalk--------------------- | 56 | 94 | Limestone----------------- | 99 | 301 |
| Shale--------------------- | 30 | 124 | | | |

Table 7.--Drillers' logs of wells in Hays County--Continued

Well F-10

Owner: L. S. Coers. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Soil | 2 | 2 | Shale, black | 32 | 459 |
| Clay, yellow | 24 | 26 | Limestone | 44 | 503 |
| Shale, blue | 170 | 196 | Clay | 59 | 562 |
| Marl and blue shale | 35 | 231 | Limestone | 88 | 650 |
| Chalk | 196 | 427 | | | |

Well F-19

Owner: Will G. Barber. Driller: John H. Foster.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Clay | 20 | 20 | Lime | 53 | 481 |
| Shale | 220 | 240 | Clay | 30 | 511 |
| Marl | 50 | 290 | Lime | 59 | 570 |
| Chalk | 118 | 408 | Clay | 42 | 612 |
| Shale | 20 | 428 | Lime | 4 | 616 |

Well F-20

Owner: Will G. Barber. Driller: John H. Foster.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Clay | 10 | 10 | Shale | 20 | 510 |
| Shale | 190 | 200 | Lime | 47 | 557 |
| Marl | 26 | 226 | Clay | 53 | 610 |
| Chalk | 264 | 490 | Lime | 194 | 804 |

Table 7.--Drillers' logs of wells in Hays County--Continued

Well F-21

Owner: Will G. Barber. Driller: John H. Foster.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Clay---------------------- | 18 | 18 | Shale--------------------- | 17 | 497 |
| Clay, hard packed--------- | 20 | 38 | Lime---------------------- | 48 | 545 |
| Shale, hard packed-------- | 211 | 249 | Clay---------------------- | 49 | 594 |
| Marl---------------------- | 14 | 263 | Lime---------------------- | 55 | 649 |
| Chalk--------------------- | 217 | 480 | Lime, white--------------- | 16 | 665 |

Well F-22

Owner: A. W. Whitten. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Soil, black--------------- | 3 | 3 | Limestone----------------- | 40 | 368 |
| Clay, yellow-------------- | 40 | 43 | Clay---------------------- | 62 | 430 |
| Chalk--------------------- | 255 | 298 | Limestone----------------- | 72 | 502 |
| Shale--------------------- | 30 | 328 | | | |

Well F-24

Owner: J. R. Alexander. Driller: --

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Marl (Navarro and Taylor)-- | 720 | 720 | Shale (Glen Rose)--------- | 20 | 1,576 |
| Chalk and shale (Austin)--- | 254 | 974 | Lime, gray (Glen Rose)----- | 243 | 1,819 |
| Shale (Eagle Ford)--------- | 22 | 996 | Shale (Glen Rose)--------- | 34 | 1,853 |
| Lime (Buda)--------------- | 50 | 1,046 | Dolomite (Glen Rose)------- | 66 | 1,919 |
| Shale (Grayson)----------- | 48 | 1,094 | Shale (Glen Rose)--------- | 2 | 1,921 |
| Lime (Georgetown)--------- | 43 | 1,137 | Dolomite, line and chert (Glen Rose)------------ | 107 | 2,028 |
| Lime and dolomite (Edwards)- | 419 | 1,556 | | | |

Table 7.--Drillers' logs of wells in Hays County--Continued

Well F-25

Owner: David Schubert. Driller: --

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Gravel and clay | 91 | 91 | Lime and shale | 200 | 2,350 |
| Shale | 559 | 650 | Shale | 30 | 2,380 |
| Chalk and shale | 220 | 870 | Lime and shale | 70 | 2,450 |
| Shale | 10 | 880 | Shale | 70 | 2,520 |
| Lime | 40 | 920 | Lime and shale | 54 | 2,574 |
| Shale | 55 | 975 | Dolomite and lime | 76 | 2,650 |
| Lime | 135 | 1,110 | Lime | 100 | 2,750 |
| Lime and shale | 15 | 1,125 | Shale and lime | 150 | 2,900 |
| Lime | 295 | 1,420 | Shale | 30 | 2,930 |
| Lime and shale | 710 | 2,130 | Shale and sand | 360 | 3,290 |
| Shale | 20 | 2,150 | Shale | 48 | 3,338 |

Well G-15

Owner: C. W. Burdett. Driller: T. E. Owens.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Gravel, terrace | 17 | 17 | Limestone, sandy | 60 | 277 |
| Limestone, blue | 40 | 57 | Limestone, fine, soft, white, sandy | 30 | 307 |
| Limestone, white | 30 | 87 | Limestone, gray, sandy | 67 | 374 |
| Limestone, blue | 50 | 137 | No record | 51 | 425 |
| Limestone, yellow | 20 | 157 | Dolomite, brown | 37 | 462 |
| Limestone, blue | 30 | 187 | Shale, bluish-green | 56 | 518 |
| Limestone and limestone pebbles | 30 | 217 | Limestone, white | 7 | 525 |

Table 7.--Drillers' logs of wells in Hays County--Continued

Well G-17

Owner: W. A. Leath. Driller: T. E. Owens.

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Lime, white---------------- | 240 | 240 |
| Sand, hard-packed, white--- | 8 | 248 |

Well G-46

Owner: Rector Williams. Driller: E. B. Kutscher.

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Dirt, red, and boulders---- | 85 | 85 |
| Clay, red, and boulders---- | 22 | 107 |
| Rock, hard, honeycombed---- | 9 | 116 |
| Cave---------------------- | 4 | 120 |
| Caving material----------- | 28 | 148 |
| Boulders------------------ | 30 | 178 |
| Rock, loose, white--------- | 7 | 185 |
| Rock, blue---------------- | 26 | 211 |
| Rock, yellow; seep of water------------------ | 3 | 214 |
| Clay, yellow-------------- | 21 | 235 |
| Rock, red, and clay-------- | 3 | 238 |
| Rock, yellow, water-------- | 52 | 290 |
| Rock, yellow, and blue----- | 10 | 300 |
| Sand, water--------------- | 7 | 307 |
| Sand and rock------------- | 8 | 315 |

Well G-51

Owner: R. Wegner. Driller: E. B. Kutscher.

| | Thickness (feet) | Depth (feet) |
|---|---|---|
| Boulders------------------ | 46 | 46 |
| Rock, adobe--------------- | 18 | 64 |
| Rock, softer-------------- | 5 | 69 |
| Rock, white, crystalline--- | 6 | 75 |
| Rock, dark-red------------ | 20 | 95 |
| Rock, honeycombed--------- | 9 | 104 |
| Rock, brownish-red--------- | 6 | 110 |
| Rock, coarse pieces-------- | 14 | 124 |
| Rock, red----------------- | 14 | 138 |
| Rock, light-red------------ | 16 | 154 |
| Rock, white--------------- | 6 | 160 |
| Rock, blue---------------- | 11 | 171 |
| Rock, gray---------------- | 28 | 199 |
| Rock, yellow-------------- | 71 | 270 |
| Rock, gray---------------- | 2 | 272 |
| Rock, blue, spotted-------- | 13 | 285 |
| Rock, blue---------------- | 5 | 290 |
| Rock, gray---------------- | 5 | 295 |

(Continued on next page)

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Well G-51--Continued | | | | | |
| Rock, yellow--------------- | 15 | 310 | Sand, gray, water---------- | 3 | 364 |
| Rock, gray, mixed---------- | 25 | 335 | Rock, blue----------------- | 11 | 375 |
| Rock, blue----------------- | 26 | 361 | Rock, light blue----------- | 6 | 381 |

Well G-53

Owner: J. H. Robinson. Driller: E. B. Kutscher.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface-------------------- | 10 | 10 | Rock, yellow, honeycombed-- | 80 | 250 |
| Boulders------------------- | 10 | 20 | Rock----------------------- | 34 | 284 |
| Clay, red, and boulders---- | 80 | 100 | Rock, yellow--------------- | 41 | 325 |
| Rock, hard----------------- | 12 | 112 | Rock, yellow and blue------ | 10 | 335 |
| Rock, cement--------------- | 58 | 170 | Rock, soft, dark-blue------ | 17 | 352 |
| (Small cave at 170 ft) | | | Sand, gray; water---------- | 10 | 362 |

Well G-54

Owner: Rector Williams. Driller: E. B. Kutscher

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Boulders, small cave------- | 20 | 20 | Rock, yellow--------------- | 3 | 163 |
| Boulders------------------- | 22 | 42 | Rock, pink----------------- | 12 | 175 |
| Clay, yellow--------------- | 3 | 45 | Rock, red------------------ | 23 | 198 |
| Rock, light-red------------ | 10 | 55 | Rock, white, flinty-------- | 37 | 235 |
| Rock, pink----------------- | 5 | 60 | Rock, yellow--------------- | 15 | 250 |
| Rock, white---------------- | 15 | 75 | Rock, blue----------------- | 75 | 325 |
| Rock, hard, white---------- | 21 | 96 | Rock, gray, cave at 360 ft; water at 369 ft----- | 44 | 369 |
| Rock, hard in layers------- | 20 | 116 | Rock, sandy, gray---------- | 8 | 377 |
| Rock, white---------------- | 44 | 160 | | | |

Table 7.--Drillers' logs of wells in Hays County--Continued

Well H-18

Owner: Roy B. Brooks. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Marl, hard | 3 | 3 | Limestone, very hard, gray | 13 | 247 |
| Chalk | 163 | 166 | Lime, soft, blue | 4 | 251 |
| Shale | 31 | 197 | Clay | 49 | 300 |
| Limestone | 37 | 234 | Limestone | 85 | 385 |

Well H-21

Owner: City of Kyle. Driller: O. A. Payte.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface | 5 | 5 | (Dry crevice at 227 ft) | | |
| Marl, hard | 13 | 18 | Clay | 52 | 310 |
| Caprock, hard | 4 | 22 | Limestone | 150 | 460 |
| Chalk | 160 | 182 | Limestone, alternate strate flint, cobbles and porous limestone, water-bearing | 66 | 526 |
| Shale | 32 | 214 | Limestone | 69 | 595 |
| Limestone | 44 | 258 | | | |

Well H-22

Owner: -- Hill. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Soil, black | 3 | 3 | Marl, hard | 21 | 56 |
| Clay, yellow | 32 | 35 | Chalk | 44 | 100 |

Well H-23

Owner: Nicholas Thiele. Driller: Fleming Adaire.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Lime, white | 290 | 290 | Lime, gray; water from 368 to 372 ft | 32 | 372 |
| Clay, blue | 50 | 340 | | | |

Well H-30

Owner: Geo. Heidenreich. Driller: -- Robertson.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Topsoil | 20 | 20 | Shale, sticky | 52 | 2,261 |
| Clay | 241 | 261 | Sand | 39 | 2,300 |
| Chalk | 226 | 487 | Shale, sticky, blue | 5 | 2,305 |
| Shale | 30 | 517 | Shale | 5 | 2,310 |
| Limestone | 57 | 574 | Limestone, sandy | 5 | 2,315 |
| Clay | 36 | 610 | Limestone, hard | 20 | 2,335 |
| Limestone | 45 | 655 | Shale and limestone | 20 | 2,355 |
| Caliche | 2 | 657 | Shale, gummy | 21 | 2,376 |
| Limestone | 469 | 1,126 | Limestone and shale | 72 | 2,448 |
| Rock | 116 | 1,242 | Sand | 149 | 2,597 |
| Limestone | 673 | 1,915 | Shale, red | 13 | 2,610 |
| Shale, sticky | 16 | 1,931 | Rock, hard | 6 | 2,616 |
| Shale, sticky, and hard limestone | 46 | 1,977 | Rock | 46 | 2,662 |
| Limestone, hard | 38 | 2,015 | Sand | 15 | 2,677 |
| Limestone, sandy, and shale | 194 | 2,209 | Shale | 90 | 2,767 |

Well H-36

Owner: C. B. Donaldson. Driller: C. L. Tyler.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Soil | 2 | 2 | Shale | 30 | 412 |
| Gravel | 17 | 19 | Limestone; sulfur water | 45 | 457 |
| Shale, blue | 150 | 169 | Clay | 50 | 507 |
| Chalk | 213 | 382 | Limestone; sulfur water | 23 | 530 |

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|

Well H-58

Owner: A. Mulvihill. Driller: W. H. Glass.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Gravel | 12 | 12 | Shale | 23 | 218 |
| Clay, yellow | 15 | 27 | Limestone | 41 | 259 |
| Clay, blue | 5 | 32 | Clay | 76 | 335 |
| Chalk | 163 | 195 | Limestone | 40 | 375 |

Well H-64

Owner: R. D. Kelley. Driller: R. D. Kelley.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Soil, black | 2 | 2 | Lime, soft, sandy | 35 | 715 |
| Gravel, caliche | 14 | 16 | Lime, hard | 2 | 717 |
| Clay, yellow | 31 | 47 | Shale, blue | 1 | 718 |
| Clay, blue, sticky | 43 | 90 | Lime, hard, crystallized | 3 | 721 |
| Clay, blue, sandy | 160 | 250 | Lime, hard | 17 | 738 |
| Clay, light-blue | 25 | 275 | Sand | 2 | 740 |
| Sand and pyrite | 55 | 330 | Lime and flint | 4 | 744 |
| Marl | 25 | 355 | Sand, tight | 2 | 746 |
| Chalk, hard | 175 | 530 | Lime and flint | 4 | 750 |
| Serpentine | 1 | 531 | Sand | 5 | 755 |
| Lime, sandy | 4 | 535 | Lime and flint | 10 | 765 |
| Chalk, sandy | 20 | 555 | Lime, hard | 5 | 770 |
| Shale | 27 | 582 | Lime, hard, flint | 25 | 795 |
| Lime, sandy | 48 | 630 | Lime, sandy | 20 | 815 |
| Clay, sticky, full of shells | 50 | 680 | Lime, hard | 10 | 825 |

(Continued on next page)

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Well H-64--Continued | | | | | |
| Lime, sandy | 6 | 831 | Lime and shale | 16 | 865 |
| Clay, white | 18 | 849 | Lime, porous | 25 | 890 |

Well H-67

Owner: City of San Marcos. Driller: J. R. Johnson.

| | | | | | |
|---|---|---|---|---|---|
| Cellar | 16 | 16 | Limestone, solid | 33 | 90 |
| Clay, yellow, with blue strata | 20 | 36 | Boulders, flint | 6 | 96 |
| Limestone, yellow | 18 | 54 | Limestone, yellow, honey-combed, very porous | 19 | 115 |
| Limestone, broken, very porous | 3 | 57 | | | |

Well H-72

Owner: U. S. Department of the Interior. Driller: --

| | | | | | |
|---|---|---|---|---|---|
| Soil | 3 | 3 | Shale, hard, blue | 24 | 223 |
| Clay, red | 15 | 18 | Flint, black | 6 | 229 |
| Lime, soft | 8 | 26 | Lime, soft, white | 97 | 326 |
| Gravel, lime | 4 | 30 | Lime, hard, white | 57 | 383 |
| Clay, blue | 68 | 98 | Lime, gray | 27 | 410 |
| Lime, gray | 30 | 128 | Lime, rotten | 25 | 435 |
| Cavern, water | 2 | 130 | Lime, hard, gray | 51 | 486 |
| Lime, white | 52 | 182 | Shale, blue | 5 | 491 |
| Lime, yellow (crystal-lized) | 8 | 190 | Lime, soft, white | 42 | 533 |
| Cavern, water | 5 | 195 | Lime, hard, gray | 41 | 574 |
| Rock volcanic | 4 | 199 | Lime, hard (sulfur) | 21 | 595 |

(Continued on next page)

Table 7.--Drillers' logs of wells in Hays County--Continued

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Well H-72--Continued | | | | | |
| Lime, soft (sulfur) ----- | 30 | 625 | Lime, gray -------------- | 104 | 1,112 |
| Shale, blue ------------ | 27 | 652 | Shale, blue ------------ | 7 | 1,119 |
| Lime, sulfur ----------- | 49 | 701 | Lime, gray; water ------- | 59 | 1,178 |
| Lime, hard, white ------- | 29 | 730 | Lime, light yellow ------ | 113 | 1,291 |
| Clay, white ------------ | 5 | 735 | Sand, coarse, gray ------ | 54 | 1,345 |
| Lime, hard, white ------- | 25 | 760 | Lime, hard, white ------- | 5 | 1,350 |
| Lime ------------------- | 5 | 765 | Lime, hard, gray -------- | 55 | 1,405 |
| Lime, white ------------ | 34 | 799 | Sand, hard, black ------- | 8 | 1,413 |
| Lime, hard, blue -------- | 11 | 810 | Lime, gray, sandy, fine - | 62 | 1,475 |
| Lime, soft, white ------- | 198 | 1,008 | Clay, blue -------------- | 20 | 1,495 |

Well H-76

Owner: John Avey. Driller: E. B. Kutscher.

| | | | | | |
|---|---|---|---|---|---|
| Boulders --------------- | 20 | 20 | Rock, hard -------------- | 4 | 190 |
| Rock, cement; cave at 130 ft --------------- | 110 | 130 | Sand -------------------- | 6 | 196 |
| Rock, honeycombed ------- | 56 | 186 | Rock -------------------- | 8 | 204 |

Well H-82

Owner: Mrs. R. L. Jennings. Driller: O. A. Payte.

| | | | | | |
|---|---|---|---|---|---|
| Marl ------------------- | 40 | 40 | Clay -------------------- | 55 | 335 |
| Chalk, white ----------- | 160 | 200 | Lime -------------------- | 35 | 370 |
| Shale ------------------ | 30 | 230 | Lime, white ------------- | 120 | 490 |
| Lime ------------------- | 50 | 280 | Lime, gray -------------- | 70 | 560 |

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|

Well H-98

Owner: Chas. Fehlis. Driller: E. B. Kutscher.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Surface material and yellow clay; water at 45 ft---- | 60 | 60 | Shale--------------------- | 30 | 435 |
| Marl---------------------- | 172 | 232 | Limestone----------------- | 55 | 490 |
| Chalk--------------------- | 173 | 405 | Clay---------------------- | 40 | 530 |
| | | | Limestone----------------- | 35 | 565 |

Well H-107

Owner: City of Kyle. Driller: W. S. Glass.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Chalk (Austin)------------ | 180 | 180 | Shale (Grayson)----------- | 60 | 318 |
| Shale (Eagle Ford)-------- | 30 | 210 | Limestone (Georgetown)----- | 40 | 358 |
| Limestone (Buda)---------- | 48 | 258 | Limestone (Edwards)-------- | 2 | 360 |

Well H-109

Owner: U. S. Fish Cultural Station. Driller: E. R. Owens.

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| Clay, red and yellow------- | 15 | 15 | Lime, white, hard--------- | 44 | 171 |
| Gravel with water---------- | 5 | 20 | Clay, blue---------------- | 3 | 174 |
| Shale, blue---------------- | 35 | 55 | Lime, brownish-gray, soft-- | 10 | 184 |
| Lime, gray, hard----------- | 15 | 70 | Lime, brown, soft--------- | 8 | 192 |
| Water, little-------------- | 30 | 100 | Lime, brown, hard--------- | 4 | 196 |
| Lime, white, soft---------- | 10 | 110 | Lime, brown, soft--------- | 4 | 200 |
| Lime, gray, hard----------- | 17 | 127 | Lime, brown, hard--------- | 61 | 261 |

Table 7.--Drillers' logs of wells in Hays County--Continued

| | Thickness (feet) | Depth (feet) | | Thickness (feet) | Depth (feet) |
|---|---|---|---|---|---|
| **Well J-12** | | | | | |
| Owner: E. Wranitzky. Driller: Simmons and Sterzing. | | | | | |
| Surface-------------------- | 4 | 4 | Chalk (Austin)------------- | 256 | 830 |
| Gravel--------------------- | 1 | 5 | Shale (Eagle Ford)--------- | 35 | 865 |
| Clay, yellow--------------- | 45 | 50 | Limestone (Buda)----------- | 25 | 890 |
| Shale, blue---------------- | 50 | 100 | Shale (Grayson)------------ | 40 | 930 |
| Limestone, blue (Pecan Gap of drillers)-------- | 12 | 112 | Limestone (Georgetown)----- | 48 | 978 |
| Marl (Taylor)-------------- | 462 | 574 | Limestone (Edwards)-------- | 73 | 1,051 |

Table 8.--Analyses of water from wells and springs in Hays County

(In parts per million except specific conductance, pH, and percent sodium)

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A-1 | S. F. Hurlbut | Spring | Nov. 5, 1937 | - | - | 56 | 15 | 10 | 244 | 11 | 10 | - | (a) | 224 | 204 | - | - | - |
| A-3 | Ollie Sorrells | 251 | Aug. 29, 1943 | 12 | - | 72 | 57 | 21 | 412 | 84 | 24 | - | 0.2 | 473 | 414 | 10 | [illegible] | - |
| A-5 | Paul Sorrells | 150 | do | 12 | - | 380 | 137 | 16 | 358 | 1,180 | 18 | - | .2 | 1,920 | 1,510 | 2 | 2,270 | - |
| A-8 | Ed Holmes | 69 | Sept. 9, 1937 | - | - | - | - | - | 232 | 10 | 27 | - | (a) | - | - | - | - | - |
| A-10 | Mrs. I. W. Davis | 113 | do | - | - | - | - | - | 268 | 101 | 20 | - | (a) | - | - | - | - | - |
| A-16 | J. M. Smitherman | 345 | Aug. 26, 1952 | 12 | - | 242 | 305 | 32 | 273 | 1,920 | 47 | 3.6 | 2.5 | 2,930 | 2,310 | 3 | 3.280 | 8.0 |
| A-19 | Walton Walker | 350 | Nov. 7, 1937 | - | - | - | - | - | - | 1,780 | 33 | - | (a) | - | - | - | - | - |
| B-2 | Willie Puryear | 177 | Nov. 3, 1937 | - | - | 189 | 77 | 85 | 342 | 300 | 270 | - | 20 | 1,090 | 787 | - | - | - |
| B-4 | Mrs. Truman Breed | 272 | do | - | - | - | - | - | 183 | 39 | 19 | - | (a) | - | - | - | - | - |
| B-5 | R. N. Cotten | 450 | do | - | - | - | - | - | 226 | 38 | 18 | - | (a) | - | - | - | - | - |
| B-8 | W. H. Meyers | 575 | Jan. 20, 1954 | 10 | 0.08 | 56 | 51 | 21 | 432 | 22 | 11 | .6 | .0 | 384 | 349 | 11 | 689 | 7.5 |
| B-23 | John Glosson | 207 | Nov. 15, 1937 | - | - | 85 | 55 | 6.0 | 415 | 58 | 36 | - | (a) | 444 | 439 | - | - | - |
| B-25 | Ben Everett | 183 | do | - | - | 204 | 70 | 43 | 366 | 459 | 80 | - | (a) | 1,040 | 798 | - | - | - |
| B-26 | G. W. Houchin | 85 | Sept. 7, 1937 | - | - | 120 | 48 | 6.0 | 366 | 132 | 50 | - | (a) | 536 | 494 | - | - | - |
| B-27 | M. H. McFarland | 9 | do | - | - | - | - | - | 390 | 20 | 14 | - | (a) | - | - | - | - | - |
| B-28 | E. A. Traylor | Spring | do | - | - | - | - | - | 488 | 43 | 20 | - | (a) | - | - | - | - | - |
| B-29 | J. W. Farrell | 442 | Sept. 9, 1937 | - | - | 76 | 89 | 7.0 | 366 | 226 | 24 | - | (a) | 602 | 555 | - | - | - |
| B-30 | Mrs. W. L. Farrell | 96 | do | - | - | - | - | - | 372 | 58 | 68 | - | (a) | - | - | - | - | - |
| B-31 | J. E. Cogbill | 165 | do | - | - | - | - | - | 256 | 77 | 24 | - | (a) | - | - | - | - | - |
| B-34 | W. A. Harber | 200 | do | - | - | 223 | 78 | 26 | 201 | 689 | 36 | - | (a) | 1,151 | 878 | - | - | - |
| B-39 | P. O. Brannon | 110 | Sept. 7, 1937 | - | - | 76 | 32 | 38 | 342 | 58 | 44 | - | (a) | 416 | 320 | - | - | - |
| B-40 | Dripping Springs School | 190 | Jan. 20, 1954 | 14 | 0.00 | 454 | 185 | 36 | 352 | 1,570 | 25 | 4.4 | 1.2 | 2,460 | 1,890 | 4 | 2,710 | 7.2 |
| B-41 | Felix Lindsey | 64 | Nov. 17, 1937 | - | - | 122 | 93 | 11 | 466 | 253 | 34 | - | (a) | 753 | 687 | - | - | - |
| B-43 | Clarence Southwell | 149 | do | - | - | 99 | 48 | 2.0 | 372 | 112 | 20 | - | (a) | 464 | 445 | - | - | - |
| B-44 | Lester Brenizer | Spring | Sept. 2, 1937 | - | - | 87 | 19 | 1.0 | 305 | 20 | 20 | - | (a) | 297 | 297 | - | - | - |

See footnotes at end of table.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| B-46 | Albert Garcia | 87 | Sept. 7, 1937 | - | - | - | - | - | 342 | 101 | 29 | - | (a) | - | - | - | - | - |
| B-47 | do | 40 | do | - | - | 287 | 108 | 361 | 207 | 518 | 405 | - | - | - | 1,160 | - | - | - |
| B-50 | H. A. McIntyre | 170 | -- | - | - | 78 | 67 | 7.0 | 451 | 90 | 17 | - | (a) | 461 | 472 | - | - | - |
| B-51 | W. J. Vaughn | 137 | Nov. 17, 1937 | - | - | 96 | 32 | 8.0 | 372 | 54 | 18 | - | (a) | 391 | 370 | - | - | - |
| B-53 | E. E. Townes | 799 | Aug. 26, 1952 | 13 | - | 190 | 150 | 69 | h351 | 896 | 54 | 2.2 | 2.0 | 1,580 | 1,110 | 15 | 2,070 | [illegible] |
| B-58 | Glynn C. Key | 46 | Sept. 4, 1937 | - | - | 51 | 38 | 5.0 | 207 | 13 | 33 | - | 80 | 322 | 283 | - | - | - |
| B-59 | do | 87 | do | - | - | 90 | 30 | 9.0 | 323 | 14 | 30 | - | 90 | 390 | 349 | - | - | - |
| B-60 | Bob Breeding | Spring | do | - | - | 151 | 45 | 72 | 510 | 15 | 60 | - | 150 | 793 | 563 | - | - | - |
| B-61 | Bob Breeding | Spring | do | - | - | 96 | 26 | 5.0 | 378 | 18 | 26 | - | (a) | 361 | 346 | - | - | - |
| B-63 | F. J. Turck | 623 | Aug. 26, 1952 | 12 | - | 178 | 111 | 29 | 421 | 547 | 30 | 2.6 | 0.2 | 1,120 | 900 | 7 | 1,540 | 7.4 |
| B-69 | Gay Carroll | 596 | Mar. 23, 1956 | - | - | - | - | - | 234 | - | 131 | - | - | - | 1,460 | - | 3,190 | 7.8 |
| C-1 | J. C. Crisp | Spring | Aug. 26, 1952 | 9.8 | - | 83 | 31 | 6.7 | 368 | 25 | 14 | .4 | 1.2 | 356 | 334 | 4 | 642 | 7.9 |
| C-10 | G. J. Contois | 54 | Nov. 2, 1937 | - | - | 75 | 5.0 | 6.0 | 201 | 36 | 14 | - | (a) | 235 | 208 | - | - | - |
| C-13 | -- Nicholson | Spring | Jan. 20, 1954 | 16 | - | 86 | 30 | 18 | 317 | 19 | 34 | .0 | 60 | 419 | 338 | 10 | 710 | 7.8 |
| C-15 | Steiner & Garnett | 240 | Oct. 30, 1937 | - | - | - | - | - | 268 | 29 | 18 | - | (a) | - | - | - | - | - |
| C-16 | D. R. Strauss | 390 | Nov. 1, 1937 | - | - | 103 | 47 | 18 | 409 | 116 | 19 | - | (a) | 504 | 443 | - | - | - |
| C-18 | Mrs. D. M. Meeks | Spring | Oct. 26, 1937 | - | - | - | - | - | 250 | 11 | 16 | - | (a) | - | - | - | - | - |
| C-19 | do | 90 | do | - | - | 34 | 9.0 | 6.0 | 122 | 11 | 16 | - | (a) | 136 | 120 | - | - | - |
| C-20 | J. J. Ploch | 292 | Nov. 1, 1937 | - | - | - | - | - | 293 | 32 | 20 | - | (a) | - | - | - | - | - |
| C-21 | George Rust | 172 | Nov. 15, 1937 | - | - | 110 | 11 | 13 | 360 | 12 | 20 | - | (a) | 361 | 322 | - | - | - |
| C-22 | do | 470 | do | - | - | 54 | 26 | 20 | 268 | 18 | 24 | - | (a) | 288 | 241 | - | - | - |
| C-23 | J. N. Byler | 810 | Nov. 2, 1937 | - | - | - | - | - | 293 | 43 | 16 | - | (a) | - | - | - | - | - |
| C-26 | Norco Ranch | Spring | Feb. 23, 1938 | - | - | 126 | 10 | 14 | 397 | 18 | 23 | - | (a) | 398 | 356 | - | - | - |
| C-27 | -- Nornhousser | 220 | June 14, 1952 | - | - | 50 | 19 | 54 | 342 | 18 | 12 | - | 5.5 | 327 | 203 | - | - | - |
| C-29 | Mrs. W. W. Burnett | 62 | do | - | - | 75 | 32 | 6.9 | 326 | 45 | 11 | - | 5.0 | 336 | 318 | - | - | - |

See footnotes at end of table.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C-32 | T. J. Burnett | 175 | June 13, 1942 | - | - | 51 | 39 | 17 | 324 | 31 | 19 | - | .0 | 317 | 282 | - | - | - |
| D-1 | Allie Mae Malott | 537 | Jan. 20, 1954 | 12 | 0.02 | 70 | 79 | 38 | 455 | 160 | 24 | 3.0 | 0.5 | 641 | 500 | 14 | 1,000 | 7.5 |
| D-2 | Jack Duncan | 77 | Nov. 2, 1937 | - | - | - | - | - | 317 | 28 | 34 | - | (a) | - | - | - | - | - |
| D-6 | W. I. Kuykendall | 200 | -- | - | - | 100 | 18 | 17 | 329 | 30 | 19 | - | 44 | 390 | 326 | - | - | - |
| D-8 | A. A. Elsner | 311 | Nov. 17, 1937 | - | - | 109 | 28 | 12 | 281 | 155 | 26 | - | (a) | 458 | 367 | - | - | - |
| D-10 | Paul Garnett | 168 | do | - | - | 66 | 26 | 14 | 244 | 61 | 26 | - | (a) | 313 | 271 | - | - | - |
| D-11 | John Cauthen | 185 | Nov. 5, 1937 | - | - | - | - | - | 183 | 74 | 18 | - | (a) | - | - | - | - | - |
| D-15 | Mrs. Chas. Howard | 116 | Nov. 16, 1937 | - | - | - | - | - | 403 | 180 | 24 | - | (a) | - | - | - | - | - |
| D-21 | E. H. Martin | 173 | Nov. 2, 1937 | - | - | 372 | 194 | 124 | 195 | 1,370 | 26 | - | (a) | 2,540 | 1,730 | - | - | - |
| D-23 | Wiley Roberts | 89 | Oct. 28, 1937 | - | - | 98 | 16 | 9.0 | 348 | 18 | 16 | - | (a) | 330 | 310 | - | - | - |
| D-28 | Mrs. Pearl Rodgers | 241 | Nov. 2, 1937 | - | - | - | - | - | 317 | 156 | 32 | - | (a) | - | - | - | - | - |
| D-35 | Mrs. K. Michaelis | 262 | Nov. 15, 1937 | - | - | 84 | 16 | 33 | 299 | 58 | 26 | - | (a) | 371 | 275 | - | - | - |
| D-36 | T. E. Gillespie | 140 | Oct. 28, 1937 | - | - | - | - | - | 146 | 11 | 15 | - | (a) | - | - | - | - | - |
| D-37 | J. B. Leggett | Spring | do | - | - | 104 | 6 | 6.0 | 317 | 13 | 16 | - | (a) | 301 | 284 | - | - | - |
| D-43 | M. G. Michaelis | Spring | Nov. 20, 1937 | - | - | - | - | - | 244 | 11 | 14 | - | (a) | - | - | - | - | - |
| D-44 | P. J. Tonkyro | Spring | Oct. 29, 1937 | - | - | - | - | - | 256 | 11 | 22 | - | (a) | - | - | - | - | - |
| D-45 | C. C. Cook | 185 | Oct. 28, 1937 | - | - | - | - | - | 342 | 22 | 15 | - | (a) | - | - | - | - | - |
| D-46 | L. R. Calhoun | 132 | Nov. 1, 1937 | - | - | 82 | 15 | 20 | 305 | 35 | 15 | - | (a) | 317 | 264 | - | - | - |
| D-49 | W. M. Mayfield | 300 | Oct. 28, 1937 | - | - | 89 | 13 | 8.0 | 317 | 11 | 14 | - | (a) | 291 | 278 | - | - | - |
| D-52 | Walter G. Loeffer | 100 | do | - | - | 111 | 38 | 9.0 | 366 | 91 | 41 | - | (a) | 470 | 433 | - | - | - |
| D-54 | Joe Cruze | Spring | Apr. 12, 1943 | - | - | - | - | - | 422 | 90 | 15 | - | - | - | - | - | - | - |
| D-55 | do | 125 | do | - | - | - | - | - | 397 | 11 | 13 | - | - | - | - | - | - | - |
| D-57 | Joe Stuart | 429 | Mar. 30, 1943 | - | - | - | - | - | 378 | 227 | 14 | - | - | - | - | - | - | - |
| D-59 | John Whisenant | 113 | Oct. 29, 1937 | - | - | 79 | 28 | 16 | 366 | 18 | 20 | - | (a) | 341 | 312 | - | - | - |
| D-63 | H. Thornton | 140 | Jan. 20, 1954 | 13 | 0.69 | 45 | 54 | 15 | 383 | 35 | 11 | - | 1.8 | 363 | 334 | 9 | 656 | 7.9 |

See footnotes at end of table.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| D-65 | Mrs. M. Roberts | 151 | Nov. 19, 1937 | - | - | 222 | 147 | 5.0 | 329 | 630 | 17 | - | (a) | 1,380 | 1,150 | - | - | - |
| D-66 | Mrs. Rena Dobie | 150 | do | - | - | 80 | 50 | 4.0 | 390 | 65 | 19 | - | (a) | 410 | 405 | - | - | - |
| D-67 | H. B. Pendleton | 125 | Oct. 28, 1937 | - | - | 633 | 62 | 20 | 265 | 1,570 | 20 | - | (a) | 2,440 | 1,840 | - | - | - |
| D-70 | R. A. Byler | 332 | - | - | - | 55 | 28 | 21 | 263 | 55 | 15 | - | (a) | 306 | 252 | - | - | - |
| D-71 | Odessa Ferris | 26 | Oct. 25, 1937 | - | - | 313 | 45 | 45 | 110 | 37 | 172 | - | - | - | 963 | - | - | - |
| D-73 | E. C. James | 350 | Jan. 19, 1954 | 12 | .04 | 55 | 41 | 7.6 | c341 | 29 | 12 | - | .0 | 325 | 306 | 5 | 586 | 8.3 |
| D-74 | do | 350 | do | 12 | .04 | 56 | 41 | 7.7 | c339 | 28 | 11 | - | .2 | 324 | 305 | 5 | 586 | 8.5 |
| E-2 | A. M. James | 154 | Nov. 4, 1937 | - | - | 159 | 51 | 2.0 | 500 | 167 | 19 | - | (a) | 644 | 607 | - | - | - |
| E-6 | W. P. Webb | 310 | Jan. 20, 1954 | 14 | - | 406 | 296 | 44 | 368 | 1,900 | 23 | 4.0 | 3.5 | 2,870 | 2,280 | 4 | 3,140 | 7.4 |
| E-8 | do | Spring | Mar. 24, 1943 | - | - | - | - | - | 298 | 12 | 11 | - | - | - | - | - | - | - |
| E-9 | Chas. Morton | 110 | Nov. 10, 1937 | - | - | - | - | - | 329 | 11 | 15 | - | (a) | - | - | - | - | - |
| E-15 | -- Jarvis | 237 | Nov. 16, 1937 | - | - | 144 | 52 | 3.0 | 244 | 43 | 78 | - | 276 | 716 | 572 | - | - | - |
| E-17 | M. O. Rogers | 110 | Nov. 4, 1937 | - | - | - | - | - | 262 | 55 | 21 | - | (a) | - | - | - | - | - |
| E-18 | John Greenhall | 90 | -- | - | - | 95 | 38 | 13 | 476 | 11 | 14 | - | (a) | 405 | 394 | - | - | - |
| E-20 | do | 320 | Jan. 19, 1954 | 11 | 0.02 | 45 | 26 | 5.1 0.9 | d261 | 9.9 | 9.2 | - | 2.5 | 240 | 219 | 5 | 442 | 8.7 |
| E-23 | J. E. Tomerlin | 270 | -- | - | - | 86 | 27 | 5.0 | 336 | 11 | 15 | - | 31 | 343 | 327 | - | - | - |
| E-24 | J. L. Dodgen | 312 | Dec. 2, 1937 | - | - | 66 | 30 | 11 | 342 | 15 | 12 | - | (a) | 302 | 289 | - | - | - |
| E-25 | E. O. Dodgen | 325 | Nov. 8, 1937 | - | - | 92 | 20 | 5.0 | 342 | 22 | 14 | - | (a) | 321 | 312 | - | - | - |
| E-33 | Homer Heep | 242 | Apr. 17, 1943 | - | - | 57 | 29 | 11 | 295 | 29 | 10 | - | .0 | 281 | 262 | - | - | - |
| E-36 | J. J. Horton | 243 | Sept.16, 1937 | - | - | - | - | - | 177 | 48 | 16 | - | (a) | - | - | - | - | - |
| E-38 | J. A. Rogers | 325 | Jan. 28, 1946 | 10 | .05 | 58 | 33 | 3.0 3.0 | 280 | 36 | 12 | 1.8 | .0 | 301 | 280 | - | 543 | 8.2 |
| E-40 | Wilmont Estate | 500 | -- | - | - | - | - | - | 262 | 20 | 10 | - | (a) | - | - | - | - | - |
| E-43 | M. J. H. Ferguson | 231 | Sept.16, 1937 | - | - | 107 | 45 | 117 | 281 | 394 | 43 | - | (a) | 859 | 453 | - | - | - |
| E-45 | John Butler | 507 | Sept.15, 1937 | - | - | 104 | 46 | 181 | 299 | 339 | 175 | - | (a) | 996 | 449 | - | - | - |
| E-48 | Mrs. Laura B. Negley | 400 | Aug. 1, 1945 | - | - | - | - | - | 288 | 10 | 10 | - | .4 | - | 258 | - | - | - |

See footnotes at end of table.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E-48 | Mrs. Laura B. Negley | 400 | Jan. 19, 1954 | 9.0 | 2.3 | 40 | 28 | 4.8 | e256 | 2.9 | 8.8 | - | .0 | 221 | 215 | 5 | 419 | 8.4 |
| E-49 | do | 414 | June 4, 1943 | - | - | - | - | - | 210 | 36 | 190 | - | - | - | - | - | - | - |
| E-51 | F. W. Miller | 314 | Aug. 1, 1945 | - | - | - | - | - | 328 | 12 | 11 | - | - | - | 321 | - | - | - |
| E-54 | M. G. Michaelis | 250 | Nov. 4, 1937 | - | - | - | - | - | 323 | 28 | 14 | - | (a) | - | - | - | - | - |
| E-55 | Jim Blair | 300 | Mar. 30, 1943 | - | - | - | - | - | 350 | 4.0 | 7.0 | - | - | - | - | - | - | - |
| E-58 | F. W. Zimmerman | 127 | Nov. 16, 1937 | - | - | - | - | - | 378 | 40 | 15 | - | (a) | - | - | - | - | - |
| E-59 | Joe Stuart | 500 | Nov. 4, 1937 | - | - | 358 | 170 | 55 | 366 | 1,330 | 24 | - | (a) | 2,110 | 1,600 | - | - | - |
| E-62 | C. M. Decker | 375 | -- | - | - | 136 | 3.0 | 13 | 378 | 14 | 18 | - | 36 | 406 | 352 | - | - | - |
| E-63 | -- Gregg | 250 | July 31, 1945 | - | - | - | - | - | 266 | 10 | 10 | - | - | - | 252 | - | - | - |
| E-64 | Ed Montague | 128 | do | - | - | - | - | - | 280 | 14 | 12 | - | 36 | - | 285 | - | - | - |
| E-66 | Mrs. E. Fehlis | 387 | Nov. 23, 1938 | - | - | 54 | 37 | 25 | 296 | 65 | 17 | 2.4 | .5 | 347 | 287 | - | - | - |
| E-67 | Jim Hale Miller | 500 | Oct. 2, 1937 | - | - | - | - | - | - | 212 | 30 | - | (a) | - | - | - | - | - |
| E-69 | A. L. Schmeltekopf | 42 | Sept.15, 1937 | - | - | 274 | 6.0 | 70 | 159 | 55 | 180 | - | - | - | 709 | - | - | - |
| E-70 | H. K. Wilbern | 450 | Aug. 26, 1952 | 12 | - | 82 | 57 | 207 | 301 | 324 | 208 | 3.2 | 3.0 | 1,140 | 439 | 51 | 1,740 | 7.5 |
| E-71 | A. D. Dees | 14 | Jan. 19, 1954 | 21 | 0.02 | 95 | 13 | 46 | f340 | 39 | 26 | - | 42 | 458 | 290 | 25 | 747 | 6.4 |
| *E-72 | F. C. Litterst | 553 | Nov. 19, 1951 | 13 | - | 162 | 123 | 837 | 288 | 900 | 1,110 | 3.6 | 2.0 | 3,290 | 910 | 66 | 5,050 | 8.2 |
| E-73 | P. R. Rutherford | 1,196 | Mar. 6, 1952 | 14 | - | 40 | 58 | 41 | 310 | 122 | 27 | .8 | .0 | 488 | 338 | 21 | 871 | 8.1 |
| E-73 | do | 1,430 | Aug. 26, 1952 | 15 | - | 44 | 48 | 40 | 222 | 170 | 21 | 1.4 | 2.0 | 474 | 305 | 22 | 579 | 8.2 |
| E-74 | do | 295 | do | 15 | - | 94 | 29 | 3.7 | 398 | 12 | 13 | .2 | 5.0 | 376 | 354 | 2 | 670 | 7.5 |
| E-75 | Mrs. Ida Hill | 526 | Jan. 19, 1954 | 4.2 | .06 | 46 | 16 | 20 | g171 | 44 | 24 | - | .0 | 250 | 181 | 19 | 434 | 8.3 |
| E-78 | R. J. Kidd | 980 | June 2, 1955 | 16 | - | 234 | 116 | 42 17 | 256 | 569 | 266 | 1.8 | .2 | 1,390 | 1,060 | 8 | 2,130 | 7.8 |
| F-3 | Thomas Yoe | 30 | Sept.16, 1937 | - | - | 67 | 2.0 | 27 | 183 | 48 | 18 | - | (a) | 261 | 177 | - | - | - |
| F-6 | Herman Heep | 500 | -- | - | - | 80 | 66 | 531 | 171 | 610 | 600 | - | (a) | 1,980 | 471 | - | - | - |
| F-7 | Tom Pate | 665 | Aug. 26, 1952 | 13 | - | 71 | 45 | 202 | 282 | 290 | 185 | 2.8 | 0.2 | 999 | 362 | 55 | 1,610 | 7.8 |
| F-8 | M. J. Coady | 28 | Jan. 19, 1954 | 20 | - | 56 | 11 | 178 | 360 | 191 | 46 | 2.4 | 8.7 | 703 | 184 | 68 | 1,070 | 8.1 |

See footnotes at end of table.
*Well E-72, boron (B) 3.0. Well E-78, boron 0.44.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F-10 | L. S. Coers | 650 | Aug. 26, 1952 | 10 | - | 469 | 221 | 2,570 | 256 | 2,720 | 3,280 | 2.8 | - | 9,400 | 2,080 | 73 | 13,400 | 7.2 |
| F-12 | Alvis Satterwhite | 13 | Jan. 19, 1954 | 22 | 0.02 | 46 | 12 | 186 | c410 | 137 | 40 | - | 40 | 686 | 164 | 71 | 1,070 | 8.6 |
| F-15 | Rudolph Braune | 19 | Nov. 8, 1937 | - | - | 574 | 133 | 1,020 | 226 | 1,770 | 1,520 | - | 30 | 5,160 | 1,980 | - | - | - |
| F-13 | L. Romeros | 23 | do | - | - | 49 | 20 | 158 | 293 | 148 | 82 | - | 46 | 647 | 203 | - | - | - |
| F-22 | A. W. Whitten | 502 | Apr. 1, 1943 | - | - | - | - | - | 306 | 350 | 335 | - | - | - | - | - | - | - |
| G-1 | N. W. Reed | 65 | Oct. 21, 1937 | - | - | 95 | 60 | 16 | 281 | 219 | 42 | - | (a) | 570 | 482 | - | - | - |
| G-5 | W. H. Moses | 84 | do | - | - | - | - | - | 372 | 124 | 17 | - | (a) | - | - | - | - | - |
| G-6 | B. D. Bell | 112 | Oct. 20, 1937 | - | - | - | - | - | - | 310 | 16 | - | (a) | - | - | - | - | - |
| G-7 | do | 200 | do | - | - | 154 | 41 | 9.0 | 293 | 150 | 39 | - | 150 | 687 | 556 | - | - | - |
| G-9 | E. C. James | 260 | Oct. 15, 1937 | - | - | 71 | 53 | 1.0 | 384 | 59 | 17 | - | (a) | 390 | 396 | - | - | - |
| G-10 | J. K. Keith | 46 | Nov. 19, 1937 | - | - | 160 | 11 | 20 | 537 | 14 | 26 | - | (a) | 495 | 447 | - | - | - |
| G-11 | Mrs. J. W. Pyland | 215 | Nov. 11, 1937 | - | - | - | - | - | 378 | 58 | 26 | - | (a) | - | - | - | - | - |
| G-12 | Mrs. N. E. Hughes | 170 | do | - | - | 74 | 58 | 5.0 | 397 | 54 | 36 | - | (a) | 422 | 421 | - | - | - |
| G-14 | M. A. Morris | 185 | Apr. 19, 1936 | - | - | 60 | 60 | 4.0 | 378 | 62 | 17 | - | (a) | 392 | 397 | - | - | - |
| G-15 | C. W. Burdett | 525 | Nov. 11, 1939 | - | - | 54 | 36 | 12 | 320 | 26 | 14 | - | 0.0 | 300 | 283 | - | - | - |
| G-16 | R. E. New | 260 | -- | - | - | 52 | 61 | 11 | 388 | 60 | 18 | - | .0 | 393 | 380 | - | - | - |
| G-17 | W. A. Leath | 248 | Oct. 15, 1937 | - | - | 66 | 56 | 6.0 | 390 | 59 | 20 | - | (a) | 399 | 395 | - | - | - |
| G-19 | J. J. Peterson | Spring | Nov. 11, 1939 | - | - | 85 | 19 | 12 | 329 | 25 | 16 | - | (a) | 319 | 292 | - | - | - |
| G-22 | Tom Nance | 33 | Oct. 19, 1937 | - | - | 144 | 18 | 60 | 299 | 24 | 211 | - | (a) | 604 | 436 | - | - | - |
| G-24 | Morton Ranch | 400 | Apr. 7, 1943 | - | - | - | - | - | 284 | 34 | 70 | - | - | - | - | - | - | - |
| G-28 | Dan Nance | 230 | Oct. 15, 1937 | - | - | - | - | - | - | 11 | 18 | - | 29 | - | - | - | - | - |
| G-29 | R. R. Williams | 270 | Oct. 14, 1937 | - | - | - | - | - | 165 | 11 | 90 | - | (a) | - | - | - | - | - |
| G-30 | do | 270 | Mar. 15, 1943 | - | - | 60 | 49 | 2.1 | 344 | 58 | 90 | - | .5 | 348 | 351 | - | - | - |
| G-31 | A. Capps | 280 | Nov. 13, 1937 | - | - | 74 | 28 | 3.0 | 329 | 18 | 13 | - | (a) | 298 | 302 | - | - | - |
| G-33 | R. R. Williams | 500 | Nov. 12, 1937 | - | - | 60 | 32 | 9.0 | 299 | 33 | 14 | - | (a) | 295 | 280 | - | - | - |

See footnotes at end of table.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G-34 | A. Capps | 53 | Nov. 13, 1937 | - | - | - | - | - | 335 | 14 | 14 | - | (a) | - | - | - | - | - |
| G-36 | H. K. Wilbern | 100 | -- | - | - | 48 | 32 | 27 | 342 | 11 | 12 | - | (a) | 293 | 250 | - | - | - |
| G-38 | Fred Boyett | 58 | Oct. 15, 1937 | - | - | 146 | 39 | 60 | 305 | 51 | 66 | - | 320 | 632 | 524 | - | - | - |
| G-39 | do | 124 | do | - | - | - | - | - | 155 | 35 | 29 | - | (a) | - | - | - | - | - |
| G-40 | E. S. Allen | 35 | Nov. 13, 1937 | - | - | - | - | - | 314 | 25 | 16 | - | (a) | - | - | - | - | - |
| G-41 | O. A. Stoepler | 41 | Oct. 15, 1937 | - | - | - | - | - | - | 15 | 22 | - | (a) | - | - | - | - | - |
| G-44 | M. E. Ruby | 450 | Mar. 15, 1943 | - | - | 95 | 76 | 28 | 319 | 331 | 90 | - | 0.2 | 698 | 558 | - | - | - |
| G-45 | Herman Heep | 504 | Oct. 15, 1937 | - | - | - | - | - | 275 | 11 | 9.0 | - | (a) | - | - | - | - | - |
| G-46 | Rector Williams | 315 | Apr. 5, 1943 | - | - | - | - | - | 316 | 20 | 6.0 | - | - | - | - | - | - | - |
| G-47 | W. N. Allbright | 342 | Apr. 6, 1943 | - | - | - | - | - | 267 | 22 | 7.0 | - | - | - | - | - | - | - |
| G-50 | J. H. Robinson | 300 | Nov. 23, 1937 | - | - | 55 | 30 | 4.0 | 281 | 21 | 10 | - | (a) | 258 | 258 | - | - | - |
| G-52 | R. Wegner | 280 | Nov. 24, 1937 | - | - | 55 | 23 | 10 | 266 | 16 | 13 | - | (a) | 251 | 234 | - | - | - |
| G-55 | R. Williams | 428 | Nov. 23, 1937 | - | - | 100 | 42 | 5.0 | 293 | 162 | 13 | - | (a) | 471 | 421 | - | - | - |
| G-56 | Mrs. J. T. Taylor | 546 | June --, 1951 | 16 | - | 44 | 47 | 9.9 | 239 | 66 | 14 | - | .0 | 339 | 304 | 7 | 673 | [illegible] |
| G-57 | H. W. Lennie | 534 | Sept.14, 1953 | - | - | - | - | - | 366 | - | 23 | - | - | - | 1,170 | - | 2,450 | [illegible] |
| G-58 | Mose A. Smith | 500 | Sept.28, 1953 | 10 | - | 100 | 39 | 7.8 1.4 | 330 | 122 | 15 | - | 14 | 491 | 410 | 4 | 654 | [illegible] |
| G-58 | do | 500 | Aug. 22, 1957 | - | - | - | - | - | 317 | 720 | 22 | - | - | - | 1,010 | - | 1,560 | 7.3 |
| G-63 | Otto Stoepbler | 805 | Mar. 21, 1957 | 14 | - | 80 | 51 | 20 | 369 | 124 | 15 | - | 1.0 | 486 | 410 | 10 | 522 | [illegible] |
| H-2 | C. C. Mitchell | 436 | -- | - | - | - | - | - | 323 | 11 | 15 | - | (a) | - | - | - | - | - |
| H-4 | Otto Welge | 290 | Oct. 17, 1937 | - | - | 68 | 18 | 10 | 263 | 22 | 17 | - | (a) | 267 | 246 | - | - | - |
| H-5 | E. H. Tarbutton | 148 | Oct. 22, 1937 | - | - | 65 | 12 | 6.0 | 214 | 25 | 17 | - | (a) | 230 | 213 | - | - | - |
| H-6 | Katie F. Smith | 125 | -- | - | - | 58 | 17 | 9.0 | 226 | 22 | 19 | - | (a) | 236 | 216 | - | - | - |
| H-8 | City of Kyle | 336 | Sept. 3, 1953 | 11 | 0.57 | 43 | 33 | 15 | 267 | 47 | 14 | - | .5 | 306 | 256 | 11 | 542 | [illegible] |
| H-10 | C. C. Houston | 24 | Oct. 2, 1937 | - | - | - | - | - | 293 | 24 | 13 | - | (a) | - | - | - | - | - |
| H-10 | do | 24 | Sept. 3, 1953 | 10 | - | 195 | 4.8 | 27 | 228 | 40 | 60 | - | 311 | 760 | 505 | 10 | 1.173 | [illegible] |

See footnotes at end of table.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H-11 | C. C. Houston | 324 | Sept. 3, 1953 | 12 | 0.02 | 60 | 37 | 18 | 276 | 82 | 15 | - | 9.0 | 368 | 302 | 11 | 635 | 7.5 |
| H-12 | H. R. Todd | 23 | Oct. 2, 1937 | - | - | 410 | 23 | 95 | 403 | 62 | 260 | - | 700 | 1,750 | 1,120 | - | - | - |
| H-13 | do | 277 | do | - | - | 67 | 29 | 30 | 293 | 74 | 26 | - | (a) | 370 | 288 | - | - | - |
| H-13 | do | 277 | Sept. 3, 1953 | 13 | .02 | 55 | 35 | 24 | 237 | 69 | 18 | - | 1.2 | 363 | 281 | 16 | 626 | 7.4 |
| H-14 | Hobart Schwab | 300 | Sept. 1, 1945 | 12 | .49 | 45 | 34 | 40 | 272 | 69 | 25 | 3.6 | .0 | 367 | 252 | 26 | 601 | 7.2 |
| H-15 | Mrs. O. G. Parke, Sr. | 300 | do | 12 | .15 | 54 | 35 | 37 | 286 | 70 | 25 | 3.2 | .0 | 380 | 279 | 18 | 634 | 7.7 |
| H-18 | Roy B. Brooks | 385 | do | 11 | .15 | 66 | 40 | 58 | 296 | 138 | 36 | 3.6 | .2 | 509 | 329 | 24 | 802 | 7.9 |
| H-19 | City of Kyle | 765 | Oct. 26, 1949 | 13 | .02 | 72 | 43 | 17 5.2 | 283 | 129 | 22 | 3.6 | .0 | 490 | 356 | 9 | 725 | 7.6 |
| H-21 | do | 595 | Nov. 2, 1945 | 17 | 1.1 | 80 | 45 | 52 | 278 | 172 | 46 | 3.6 | .2 | 591 | 334 | 16 | 985 | 7.4 |
| H-23 | Nicholas Thiele | 372 | Sept. 15, 1937 | - | - | 75 | 44 | 146 | 268 | 350 | 70 | - | (a) | 817 | 367 | - | - | 7.9 |
| H-25 | Ed Cullen | 600 | Aug. 26, 1952 | 15 | - | 139 | 94 | 426 | 260 | 513 | 642 | 2.8 | .2 | 1,960 | 734 | 56 | 3,300 | 7.6 |
| H-26 | -- Hill | Spring | Nov. 25, 1938 | - | - | 124 | 6.4 | 39 | 272 | 44 | 83 | - | 43 | 473 | 336 | 20 | - | - |
| H-31 | W. W. Patterson | 19 | Nov. 10, 1937 | - | - | 130 | 16 | 92 | 397 | 133 | 116 | - | 108 | 840 | 515 | - | - | - |
| H-32 | Geo. Heidenreich | 13 | Jan. 19, 1954 | 11 | .06 | 79 | 2.5 | 6.2 | d202 | 14 | 92 | - | 39 | 273 | 207 | 6 | 438 | 8.5 |
| H-35 | O. R. Patterson | 23 | Sept. 18, 1937 | - | - | 95 | 4.0 | 16 | 195 | 11 | 25 | - | 100 | 347 | 252 | - | - | - |
| *H-37 | O. G. Parke | 512 | Sept. 3, 1953 | 12 | .18 | 159 | 102 | 469 17 | 238 | 491 | 780 | 3.6 | .0 | 2,180 | 816 | 55 | 3,580 | 7.4 |
| H-38 | Roy Michael | 121 | Sept. 15, 1937 | - | - | - | - | - | 360 | 44 | 37 | - | (a) | - | - | - | - | - |
| H-43 | E. N. Cason | 121 | Sept. 15, 1937 | - | - | - | - | - | 244 | 22 | 21 | - | (a) | - | - | - | - | - |
| H-44 | D. E. Mitchell | 160 | Jan. 19, 1954 | 12 | 0.04 | 94 | 14 | 3.5 | h345 | 51 | 65 | - | 5.5 | 312 | 292 | 3 | 545 | 8.6 |
| H-45 | Joe Freeman | 249 | Oct. 18, 1937 | - | - | - | - | - | 275 | 124 | 11 | - | (a) | - | - | - | - | - |
| H-47 | do | 186 | Apr. 5, 1943 | - | - | - | - | - | 305 | 91 | 14 | - | - | - | - | - | - | - |
| H-52 | L. B. McClanahan | 33 | Sept. 18, 1937 | - | - | 437 | 21 | 149 | 195 | 80 | 424 | - | - | - | 1,150 | - | - | - |
| H-53 | J. L. Sawyer | 37 | Sept. 14, 1937 | - | - | 69 | 12 | 19 | 189 | 20 | 20 | - | 76 | 309 | 223 | - | - | - |
| H-56 | Harry Neuse | 11 | Sept. 18, 1937 | - | - | 153 | 2.0 | 38 | 464 | 40 | 24 | - | 23 | 508 | 392 | - | - | - |
| H-59 | W. N. Goforth | Spring | Oct. 4, 1937 | - | - | - | - | - | 262 | 27 | 29 | - | (a) | - | - | - | - | - |

See footnotes at end of table.
*Well H-37, boron (B) 1.2.

Table 8.--Analyses of water from wells and springs in Hays County--Continued

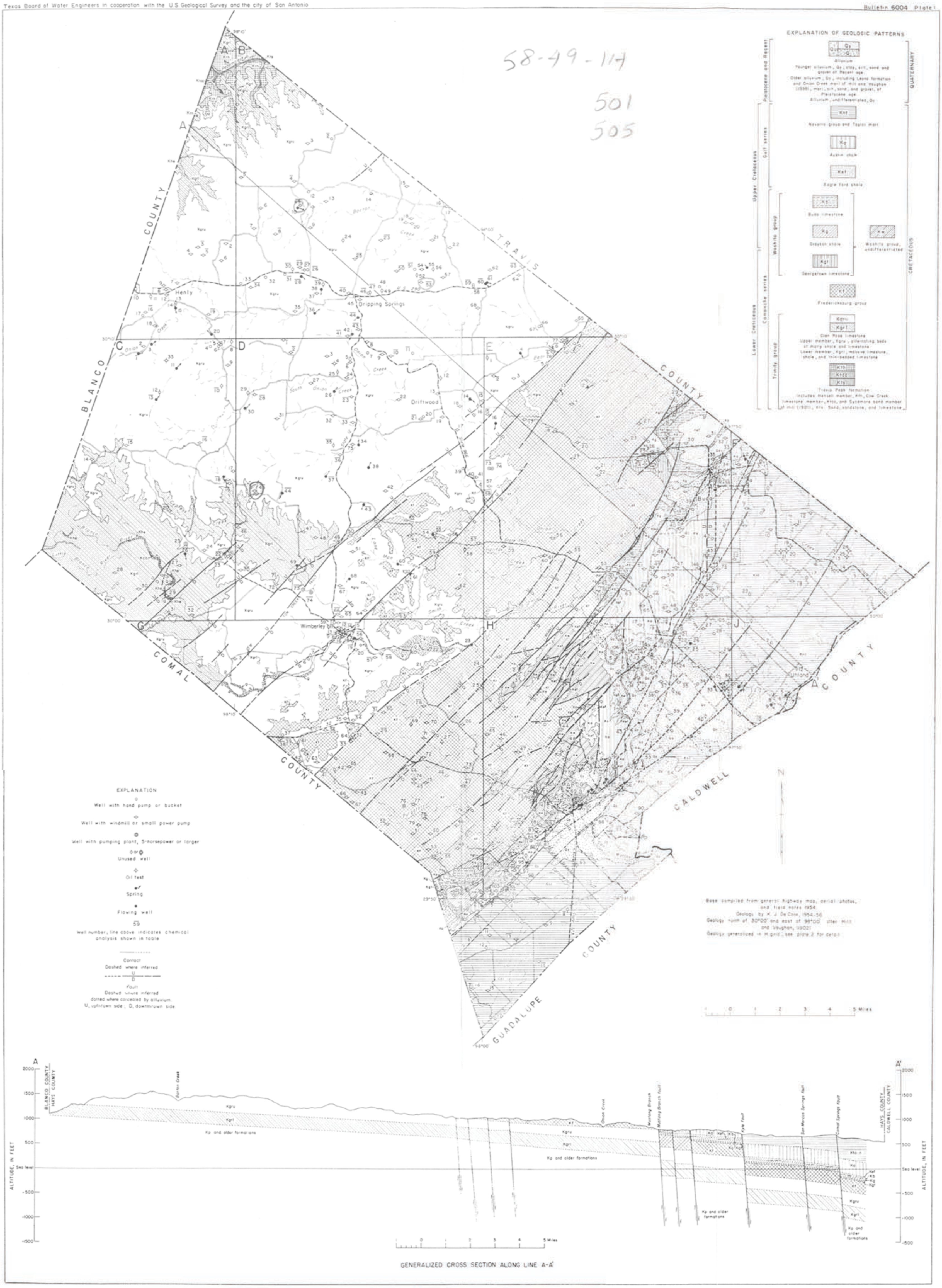
| Well | Owner | Depth of well (feet) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H-62 | F. G. Avey | 42 | Sept.14, 1937 | - | - | 158 | 16 | 15 | 232 | 113 | 102 | - | 50 | 568 | 460 | - | - | - |
| H-63 | H. H. Butz | 22 | do | - | - | 128 | 10 | 24 | 293 | 44 | 62 | - | 50 | 452 | 361 | - | - | - |
| H-65 | A. B. Rogers Estate | Spring | May 16, 1947 | 11 | .05 | 90 | 20 | 12 | 234 | 19 | 22 | 0.3 | 3.0 | 349 | 306 | 5 | 602 | 7.2 |
| H-66 | Do | Spring | Mar. 23, 1955 | 13 | - | 82 | 21 | 5.7 | 309 | 17 | 16 | 1.0 | 4.6 | 334 | 291 | 4 | 556 | 7.4 |
| H-67)<br>H-68) | City of San Marcos | - | Nov. 11, 1945 | 12 | .05 | 88 | 18 | 13 | 314 | 23 | .22 | .4 | 4.3 | 337 | 294 | 5 | 537 | 7.0 |
| H-73 | Tex Hughson | 282 | Oct. 5, 1937 | - | - | - | - | - | 275 | 73 | 10 | - | (a) | - | - | - | - | - |
| H-74 | City of San Marcos | 280 | do | - | - | 92 | 46 | 3.0 | 293 | 142 | 26 | - | (a) | 453 | 419 | - | - | - |
| H-75 | E. Brooks | 176 | do | - | - | - | - | - | - | 15 | 15 | - | (a) | - | - | - | - | - |
| H-76 | John Avey | 204 | Apr. 6, 1943 | - | - | - | - | - | 314 | 4.0 | 6.0 | - | - | - | - | - | - | - |
| H-82 | Mrs. R. L. Jennings | 560 | Oct. 4, 1937 | - | - | - | - | - | - | 197 | 204 | - | (a) | - | - | - | - | - |
| H-83 | J. A. Clayton | 90 | Sept.27, 1937 | - | - | - | - | - | 311 | 40 | 30 | - | (a) | - | - | - | - | - |
| H-84 | J. B. Netherland | 250 | Sept.29, 1937 | - | - | 98 | 18 | 10 | 305 | 40 | 36 | - | (a) | 352 | 321 | - | - | - |
| H-86 | O. N. Edge | 143 | Sept.27, 1937 | - | - | 115 | 45 | 180 | 275 | 212 | 285 | - | 20 | 992 | 473 | - | - | - |
| H-87 | R. G. Fourqurean | 21 | do | - | - | - | - | - | 110 | 84 | 50 | - | (a) | 287 | - | - | - | - |
| H-89 | Mrs. Ethel Mercer | 45 | Jan. 19, 1954 | 11 | 0.06 | 77 | 20 | 13 | 299 | 27 | 18 | - | 9.9 | 330 | 274 | 9 | 581 | 8.5 |
| H-92 | W. R. Henk | 20 | do | 11 | .02 | 60 | 6.6 | 18 | 187 | 16 | 24 | - | 15 | 248 | 177 | 18 | 433 | 8.3 |
| H-93 | Mrs. Carrie H. Crawford | 36 | Oct. 1, 1937 | - | - | - | - | - | 427 | 15 | 32 | - | (a) | - | - | - | - | - |
| H-96 | -- Fehlis | 200 | Sept.27, 1937 | - | - | 76 | 26 | 17 | 256 | 59 | 44 | - | (a) | 348 | 296 | - | - | - |
| H-97 | Ruth Jackson | 21 | Sept.29, 1937 | - | - | 124 | 32 | 284 | 427 | 323 | 235 | - | 50 | 1,260 | 440 | - | - | - |
| H-99 | Southwest Texas State Teachers College | 234 | do | - | - | - | - | - | 275 | 95 | 36 | - | (a) | - | - | - | - | - |
| H-100 | W. C. McCarty | 240 | -- | - | - | 60 | 15 | 15 | 250 | 18 | 13 | - | (a) | 244 | 209 | - | - | - |
| H-101 | E. B. McCormick | 188 | Sept.29, 1937 | - | - | 117 | 52 | 5.0 | 284 | 153 | 3.0 | - | (a) | 546 | 507 | - | - | - |
| H-102 | Herbert Goehring | 131 | Sept.27, 1937 | - | - | - | - | - | 305 | 40 | 36 | - | (a) | - | - | - | - | - |

See footnotes at end of table.

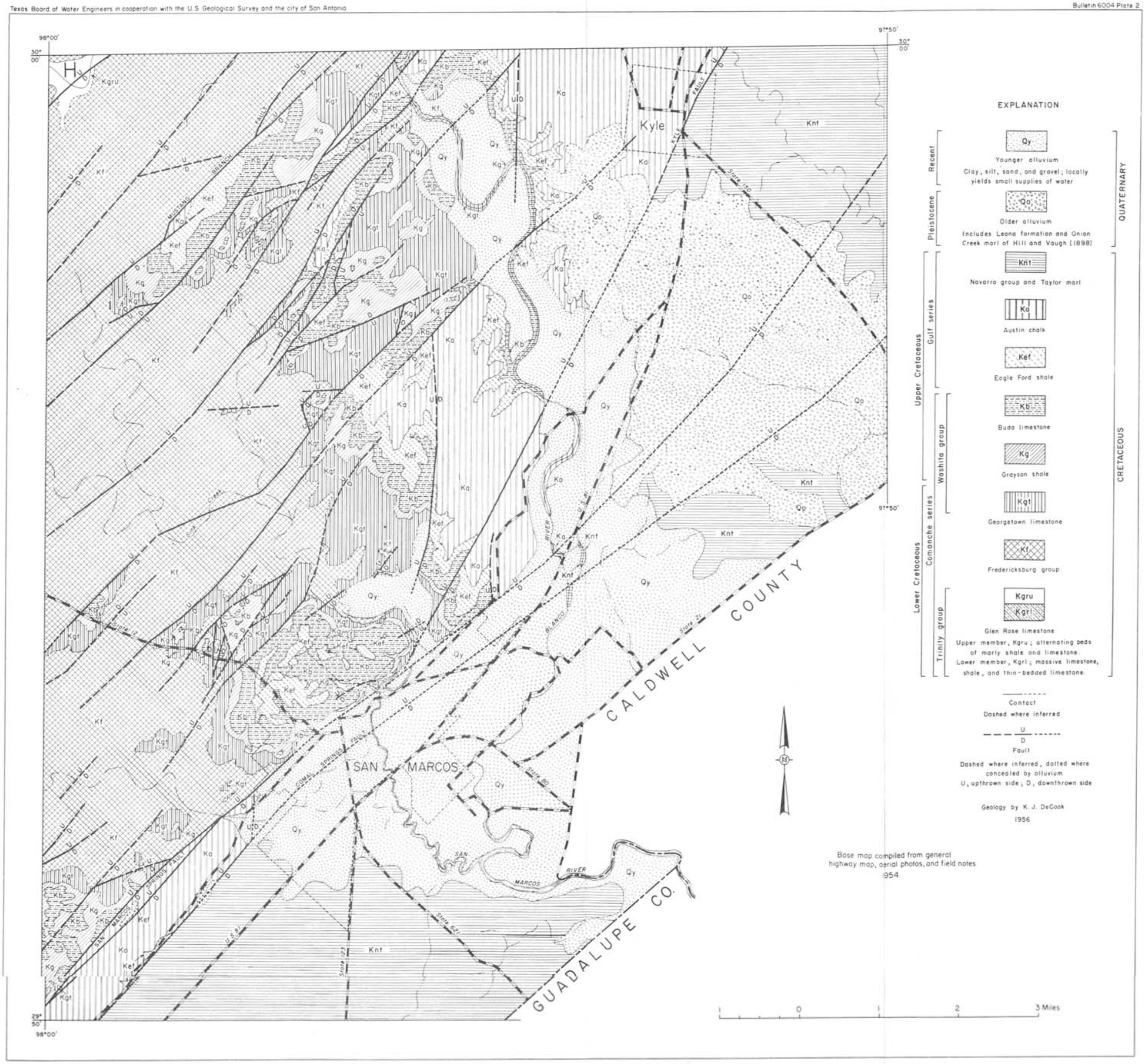
Table 8.--Analyses of water from wells and springs in Hays County--Continued

| Well | Owner | Depth of well (ft.) | Date of collection | Silica ($SiO_2$) | Iron (Fe) | Calcium (Ca) | Magnesium (Mg) | Sodium and potassium (Na + K) | Bicarbonate ($HCO_3$) | Sulfate ($SO_4$) | Chloride (Cl) | Fluoride (F) | Nitrate ($NO_3$) | Dissolved solids | Hardness as $CaCO_3$ | Percent sodium | Specific conductance (micromhos at 25°C) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H-103 | R. G. Johnson | 229 | Oct. 1, 1937 | - | - | - | - | - | - | 62 | 56 | - | (a) | - | - | - | - | - |
| H-104 | F. G. Lowman | 194 | Sept.27, 1937 | - | - | - | - | - | - | 88 | 54 | - | 120 | - | - | - | - | - |
| J-1 | F. W. Homann | 12 | Nov. 10, 1937 | - | - | - | - | - | 311 | 231 | 129 | - | 22 | - | - | - | - | - |
| J-4 | A. F. Garbrecht & Sons | Spring | Feb. 8, 1946 | 14 | 0.03 | 114 | 5.9 | 15 | 286 | 24 | 21 | 0.6 | 57 | 392 | 309 | 6 | 637 | 7.3 |
| J-5 | Fritz Homann | Spring | Nov. 10, 1937 | - | - | 107 | 6.0 | 51 | 317 | 54 | 40 | - | 39 | 453 | 294 | - | - | - |
| J-7 | Herbert Seeliger | 45 | do | - | - | 116 | 3.0 | 31 | 183 | 144 | 28 | - | 36 | 448 | 302 | - | - | - |
| J-10 | Emil Heidenreich | 12 | Jan. 19, 1954 | 11 | .02 | 107 | 4.9 | 22 | j260 | 38 | 26 | - | 55 | 421 | 287 | 14 | 649 | 8.4 |
| J-12 | Eugene Wranitzky | 1,051 | Apr. --, 1955 | - | - | - | - | - | 140 | 200 | 314 | - | - | - | - | - | 1,520 | 8.2 |
| K-1 | W. N. Yates | 360 | Sept.28, 1937 | - | - | - | - | - | 299 | 205 | 150 | - | (a) | - | - | - | - | - |
| K-3 | E. L. Williamson | 16 | do | - | - | 121 | 12 | 40 | 305 | 106 | 56 | - | (a) | 485 | 353 | - | - | - |
| K-4 | E. B. Kutcher | 187 | do | - | - | 122 | 57 | 105 | 317 | 238 | 185 | - | (a) | 863 | 540 | - | - | - |
| K-5 | Ewell Jackson | 200 | Oct. 1, 1937 | - | - | 149 | 68 | 145 | 354 | 277 | 275 | - | (a) | 1,090 | 652 | - | - | - |
| K-8 | Gustav Bierstedt | 10 | Nov. 11, 1937 | - | - | 106 | 25 | 208 | 415 | 228 | 160 | - | (a) | 947 | 365 | - | - | - |
| K-11 | Claude Harris | 16 | Oct. 1, 1937 | - | - | 75 | 21 | 59 | 183 | 77 | 90 | - | 55 | 467 | 273 | - | - | - |
| K-13 | David Ramsey | 19 | Nov. 9, 1937 | - | - | 149 | 23 | 156 | 299 | 220 | 185 | - | 89 | 969 | 469 | - | - | - |
| K-14 | Eddie Meyer | 44 | Jan. 19, 1954 | 7.2 | .08 | 44 | 1.6 | 4.9 1.0 | 151 | 2.0 | 38 | - | 2.5 | 147 | 116 | 8 | 261 | 8.2 |
| K-17 | Reinhold Bading | 17 | Nov. 9, 1937 | - | - | 150 | 11 | 67 | 378 | 148 | 62 | - | 20 | 644 | 422 | - | - | - |

a - Nitrate less than 20 ppm.
b - Includes equivalent of 8 ppm of carbonate ($CO_3$).
c - Includes equivalent of 14 ppm of carbonate ($CO_3$).
d - Includes equivalent of 11 ppm of carbonate ($CO_3$).
e - Includes equivalent of 7 ppm of carbonate ($CO_3$).
f - Includes equivalent of 10 ppm of carbonate ($CO_3$).
g - Includes equivalent of 3 ppm of carbonate ($CO_3$).
h - Includes equivalent of 15 ppm of carbonate ($CO_3$).
i - Includes equivalent of 4 ppm of carbonate ($CO_3$).
j - Includes equivalent of 9 ppm of carbonate ($CO_3$).




GEOLOGIC MAP SHOWING LOCATION OF WELLS AND SPRINGS IN HAYS COUNTY




# GEOLOGIC MAP OF THE SOUTHEASTERN PART OF HAYS COUNTY