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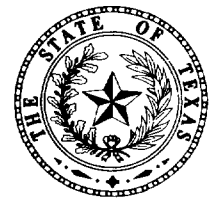

Report 102

GROUND-WATER RESOURCES OF KERR COUNTY, TEXAS

NOVEMBER 1969

TEXAS WATER DEVELOPMENT BOARD

REPORT 102

GROUND-WATER RESOURCES OF KERR COUNTY, TEXAS

By

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United States Geological Survey

Prepared by the U.S. Geological Survey
in cooperation with the
Texas Water Development Board
City of Kerrville
and
Upper Guadalupe River Authority

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TEXAS WATER DEVELOPMENT BOARD

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GROUND-WATER RESOURCES OF KERR COUNTY, TEXAS

ABSTRACT

Kerr County, an area of 1,101 square miles near the southern edge of the Edwards Plateau, had an estimated population of 20,400 in 1965. The economy depends largely on the raising of livestock and meeting the needs of vacationists and hunters. Most of the water used in the county is obtained from ground-water sources.

The principal water-bearing units in the county, from oldest to youngest, are the Hosston and Sligo Formations, the Hensell Member of the Pearsall Formation, and the Edwards and associated limestones. The Glen Rose Limestone is of lesser importance.

A total of about 3,600 acre-feet or 3.2 mgd (million gallons per day) of ground water was pumped from wells in 1966 to supply the needs of Kerr County, of which 2,470 acre-feet (2.2 mgd) was for municipal supply, 670 acre-feet (0.6 mgd) for domestic use and livestock, and about 460 acre-feet (0.4 mgd) for irrigation.

Additional ground water is available for development. An average of about 52,000 acre-feet per year is discharged from the Edwards and associated limestones through springs and seeps. An additional 6,000 acre-feet is discharged from the upper member of the Glen Rose Limestone. However, a substantial increase in withdrawals from the Edwards and associated limestones would necessarily result in a reduction in the natural ground-water discharge, which in turn would result in a reduction in the base flow of the Guadalupe River.

The area most favorable for the development of large-capacity wells from the Hosston, Sligo, and Pearsall Formations is the southern half of the county where the formations are thickest.

The chemical quality of the ground water in the aquifers is generally suitable for public supply and industrial use, and is excellent for irrigation. The water from the upper member of the Glen Rose Limestone is slightly saline; the evaporite beds in the upper member yield water that is high in sulfate and must be cased off when drilling to the underlying aquifers.

INTRODUCTION

Purpose and Scope of the Investigation

The investigation in Kerr County was begun in September of 1966 as a cooperative project of the U.S. Geological Survey, the Texas Water Development Board, the city of Kerrville, and the Upper Guadalupe River Authority. The purpose of the study was to determine the occurrence, availability, dependability, and quality of the ground-water resources of Kerr County. The results of the investigation (completed in 1968) are described in this report.

The investigation consisted of an inventory of all municipal, industrial, and irrigation wells, and a representative number of domestic supply wells, livestock wells, springs, and oil tests. Data on water use and pumpage were collected, and measurements of the depth to water in wells were made during the inventory. The surface geology was mapped so that the recharge areas of the water-bearing units could be delineated. Maps and sections were prepared to illustrate and correlate geologic and hydrologic data.

The report contains records of 333 wells and springs (Table 3), drillers' logs of 11 wells (Table 4), records of periodic water-level measurements in 9 wells (Table 5), and chemical analyses of 48 ground-water samples (Table 6). The locations of wells and springs are shown in Figure 10.

Appreciation is expressed to the many landowners, drillers, and city officials who willingly supplied much of the information on which this report is based.

Location and Economic Development of the Area

Kerr County is in central Texas near the southern edge of the Edwards Plateau (Figure 1). Kerrville, the county seat and the principal commercial center in the county, is about 60 miles northwest of San Antonio. The area of the county is 1,101 square miles.

The predominantly rough and rolling land is used primarily for the raising of livestock and for recreation. The county is a popular resort and hunting area; recreation facilities are offered by many private and public camps. Farming, most of which is dry farming, is limited to the cultivation of feed and grain crops in the stream valleys. Kerrville is an important center for ranch products, ranching supplies, banking, and the manufacture of aircraft.

In 1965, the estimated population of Kerr County was 20,400, of which 11,300 lived in Kerrville. The small towns of Mountain Home, Hunt, Ingram, Legion, and Center Point had a combined population of about 3,100. In general, the population of the county has shown a slow but steady increase.

Previous Investigations

Prior to this investigation, little detailed information was available concerning the ground-water resources and geology of Kerr County. The public water supply of Kerrville was described by Sundstrum, Broadhurst, and Dwyer (1949, p. 74-75). The geology of parts of the county has been mapped and described by Barnes (1952a and 1952b; 1954a, 1954b, and 1954c). A reconnaissance report on the ground-water resources of the Guadalupe, San Antonio, and Nueces River basins, including most of Kerr County, was prepared by Alexander, Myers, and Dale (1964). A similar report by Mount and others (1967) included information on the northern part of the county. A low-flow investigation of the upper Guadalupe River basin was made by Kunze and Smith (1966).

Well-Numbering System

The well-numbering system in this report, based on the divisions of latitude and longitude, is the one adopted by the Texas Water Development Board for use throughout the State. Under this system, each 1-degree quadrangle in the State is given a number consisting of two digits. These are the first two digits appearing in the well number—large open-block numerals 57 and 68 as shown in Figure 10. Each 1-degree quadrangle is divided into 7-1/2 minute quadrangles, which are given two-digit numbers from 01 to 64. These are the third and fourth digits of the well number and are shown generally in the upper left-hand corner of each 7-1/2 minute quadrangle in Figure 10. Each 7-1/2 minute quadrangle is subdivided into 2-1/2 minute quadrangles which are given

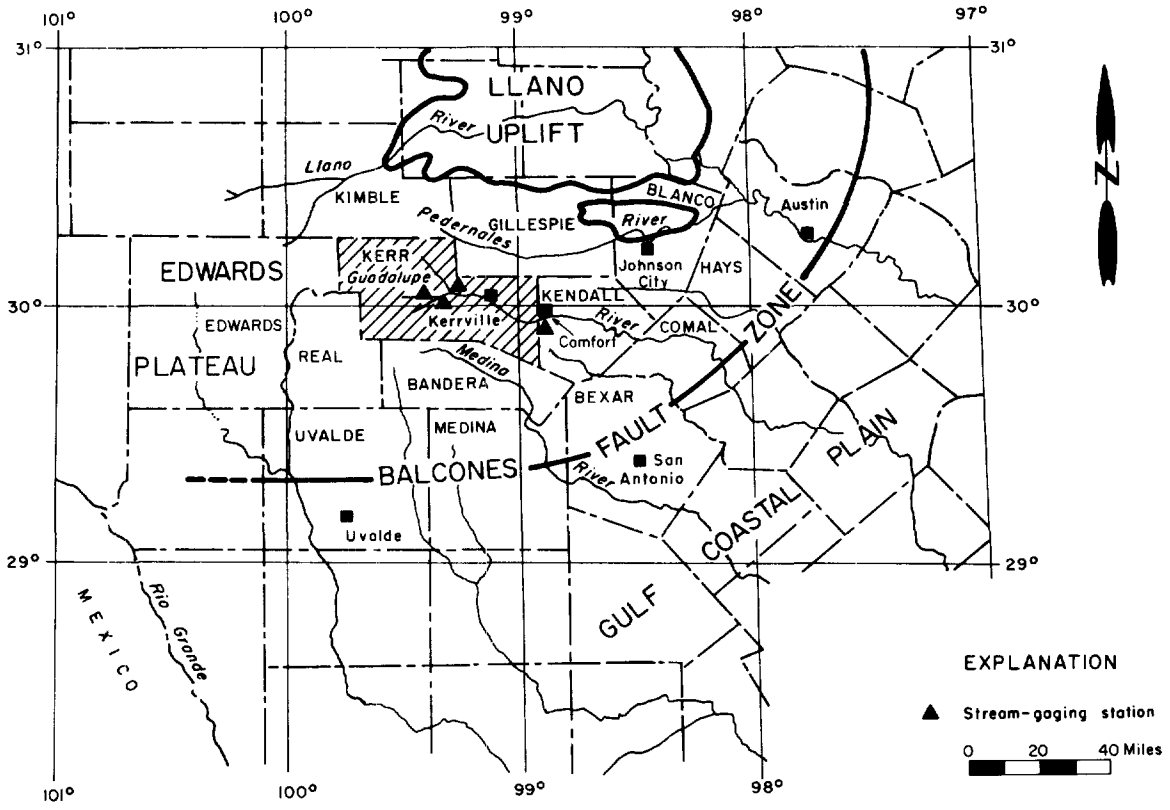

Figure 1.—Map of Central Texas Showing Physiographic Features and Location of Kerr County

single digit numbers from 1 to 9. This is the fifth digit of the well number. Finally, each well within a 2-1/2 minute quadrangle is given a 2-digit number, starting with 01. These are the last two digits of the well number. The last three digits are given at the well location on Figure 10. In addition to the 7-digit well number, a 2-letter prefix is used to identify the county. The prefix for Kerr County is RJ.

Topography and Drainage

The predominantly rough and rolling topography of Kerr County is characteristic of the Edwards Plateau or "hill country" region. In the western part of the county the land surface is gently rolling, but in places, erosion of resistant limestone beds has formed steep slopes and narrow valleys. Extensive dissection of the plateau in the eastern part of the county has formed wide valleys separated by high hills of generally uniform altitude. The altitude of the land surface ranges from about 1,400 feet in the bed of the Guadalupe River at the southeastern edge of the county to about 2,400 feet in the western part.

Most of Kerr County is drained by the upper Guadalupe River, which rises in the western part of the county. The Llano and Pedernales Rivers to the north and the Medina River to the south drain small peripheral areas of the county amounting to less than 25 percent of the total area.

The U.S. Geological Survey has gaging stations on the Guadalupe River at Comfort in western Kendall County; on the Guadalupe River at Hunt; on the North Fork of the Guadalupe River near Hunt; and on Johnson Creek near Ingram. The locations of the stations are shown on Figure 1. Records of runoff at these stations and miscellaneous measurements of streamflow at other points in the county have been published by the U.S. Geological Survey in annual Water-Supply Papers, Part 8, "Western Gulf of Mexico Basins" through 1960, and since then in the annual series of open-file reports "Surface Water Records of Texas."

Climate

Kerr County has a subhumid to semiarid climate coupled with mild winters and hot summers. Annual rainfall ranges from about 32 inches on the eastern edge of the county to about 26 inches on the western edge The average annual precipitation at Kerrville from 1931 to 1966 was 30.96 inches. Although the average monthly precipitation of 2.58 inches is fairly evenly distributed throughout the year, the heaviest rainfall occurs in May and September (Figure 2). The precipitation usually is sufficient for the production of feed and grain crops.

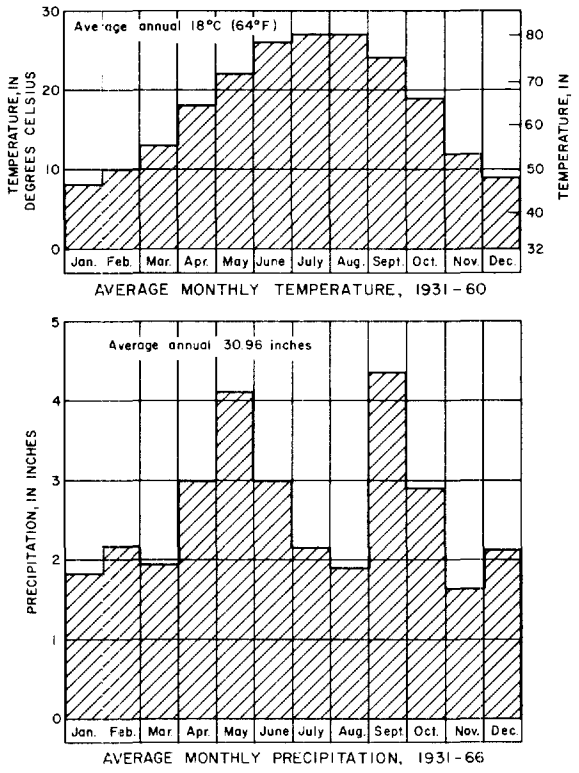

Figure 2.—Average Monthly Temperature and Precipitation at Kerrville
(Data from records of U.S. Weather Bureau)

The average annual temperature at Kerrville is 64°F (18°C); the average monthly temperature ranges from 46°F (8°C) in January to 80°F (27°C) in July and August (Figure 2). Temperatures generally are above freezing during the winter, and the hot summer days are moderated by a low relative humidity. The average annual gross lake-surface evaporation from 1940 to 1965 was about 71.9 inches (Kane, 1967), or more than twice the average annual precipitation.

GEOLOGY AS RELATED TO THE OCCURRENCE OF GROUND WATER

The geologic formations that yield water to wells in Kerr County range in age from Early Cretaceous to Holocene. They are composed chiefly of conglomerate, sand, clay, marl, dolomite, and limestone.

The primary structural feature affecting the occurrence of ground water is the gentle south (10 to 15 feet per mile) dip of the formations. The county is crossed by several discontinuous northeast-trending faults. Because displacements along the faults are small, and because the faults apparently have little effect on the occurrence of ground water, they are not shown on the geologic map (Figure 10).

The principal water-bearing units in Kerr County are, from oldest to youngest, the Hosston and Sligo Formations, the Hensell Member of the Pearsall Formation, and the Edwards and associated limestones. Other units such as the upper member of the Glen Rose Limestone and the alluvial deposits of Pleistocene and Holocene age are not important sources of ground water, although they yield water to a few wells. The lithology and water-bearing properties of all the units in the county are summarized in Table 1.

For general discussions of the relative well yields, the following ratings are used:

DESCRIPTION	YIELD (GALLONS PER MINUTE)
Small	0 to 25
Moderate	25 to 500
Large	More than 500

Pre-Cretaceous Rocks

Pre-Cretaceous rocks are not exposed in Kerr County; their nearest exposure is along the Pedernales River in Gillespie County, which borders Kerr County on the northeast. Logs of oil tests and water wells indicate that these rocks consist chiefly of black non-calcareous shale, limestone, and sandstone.

Although pre-Cretaceous rocks are not known to yield water to wells in the county, small quantities of fresh and slightly saline water might possibly be obtained from them in the northern part of the county.

The approximate altitude of the base of the Cretaceous rocks is shown in Figure 3.

Cretaceous System

Hosston and Sligo Formations

Imlay (1945, p. 1425) divided the Cretaceous rocks of south Texas into the Coahuila (in Mexico), Comanche, and Gulf Series. The pre-Comanche rocks were classified as the Hosston and Sligo Formations and correlated with the Durango and Nuevo León Groups of the Coahuila Series of Mexico.

The Hosston and Sligo Formations do not crop out in Kerr County, but equivalent rocks may be exposed along the Pedernales and Llano Rivers in Gillespie County, north of Kerr County.

In the southern part of Kerr County, the Hosston consists of conglomerate, sand, sandstone, and dolomite interbedded with shale. The Hosston grades upward into sandy dolomite and dolomitic limestone of the Sligo Formation. In places the Hosston contains a thick, well cemented basal conglomerate. North of Kerrville, the

Table 1.--Geologic Units and Their Water-Bearing Properties in Kerr County

SYSTEM	SERIES	GROUP	GEOLOGIC UNIT			APPROXIMATE MAXIMUM THICKNESS (FEET)	CHARACTER OF ROCKS	WATER-BEARING PROPERTIES
Tertiary(?) and Quaternary	Pliocene(?), Pleistocene, and Holocene		Alluvium			40	Clay, silt, sand, and gravel.	Yields small to moderate quantities of fresh water to a few domestic and livestock wells in stream valleys.
Cretaceous	Comanche	Washita and Fredericksburg	Buda Limestone			15	Hard, fine-grained limestone.	Not known to yield water to wells in Kerr County.
			Grayson Shale			20	Clay and marl with thin lenses of limestone.	Does not yield water to wells in Kerr County.
			Edwards and associated limestones	Edwards and Georgetown Limestones	Zone C	250	Hard, massive, cherty limestone.	Yields small to moderate quantities of fresh water to domestic and livestock wells in most of the county. Principal aquifer in western part of the county.
					Zone B	150	Flaggy, chert-bearing dolomite and dolomitic limestone.	
					Zone A	100	Massive, hard, dense limestone containing few thin beds of dolomite, chert, and shale.	
				Comanche Peak Limestone		50	Nodular, marly limestone.	
		Trinity	Glen Rose Limestone	Upper Member		385	Shale and nodular marl alternating with thin beds of impure limestone; member also contains two distinctive evaporite beds.	Yields are generally small; much of the water is slightly saline.
				Lower Member		210	Medium- to thick-bedded limestone with interbedded layers of sand and shale.	Yields small to moderate quantities of fresh water for irrigation, domestic, and livestock wells in eastern part of the county.
			Pearsall Formation	Hensell Member		155	Conglomerate, sand, shale, dolomite, and marl.	Yields small to moderate quantities of fresh water to municipal, irrigation, domestic, and livestock wells in eastern part of the county.
				Cow Creek Limestone Member		70	Massive, fossiliferous, sandy limestone with beds of shale, sand, and lignite.	Yields small to moderate quantities of water to a few wells in eastern part of the county.
				Pine Island Shale Member		50	Fossiliferous, dark-blue to gray shale containing interbedded layers of sand and argillaceous limestone.	Does not yield water to wells in Kerr County.
	Coahuila of Mexico	Nuevo Léon and Durango of Mexico	Sligo and Hosston Formations			180	Conglomerate, sand, sandstone, shale, dolomite, and limestone.	Yields moderate to large quantities of fresh water to municipal, irrigation, and domestic wells in eastern part of the county.
Pre-Cretaceous	?	?	?			?	Black, non-calcareous shale, sandstone, and limestone.	Not known to yield water to wells in Kerr County.

Hosston and Sligo Formations are represented by a series of conglomerate, sand, and shale beds.

The formations form a northward-thinning wedge of predominantly clastic rocks. The formations thin from about 180 feet in well RJ-69-07-903 to 100 feet in well RJ-56-63-502 (Figure 11). North of Kerrville, well log data are inadequate for separating the Hosston and Sligo Formations from the overlying Pearsall Formation.

The Hosston and Sligo Formations have been penetrated in about 25 water wells in Kerr County, most of which are in the vicinity of Kerrville. The yields of these wells range from 80 gpm (gallons per minute) in well RJ-56-64-707 to 1,150 gpm in well RJ-56-63-607. Of the 25 wells about half derive a part of their water supply from overlying aquifers. Nearly all of the water needs of Kerrville are obtained from the Hosston and Sligo Formations, and most of the city wells, after acidizing, had reported yields in excess of 1,000 gpm.

The Hosston and Sligo Formations can be expected to yield moderate to large quantities of fresh water to wells in most of Kerr County.

Trinity Group

The Trinity Group in Kerr County includes, from oldest to youngest, the Pearsall Formation and the Glen Rose Limestone. The oldest water-bearing unit exposed in the county is the lower member of the Glen Rose Limestone.

Pearsall Formation

Imlay (1945, p. 1441) assigned the rocks above the Sligo and below the Glen Rose Limestone to the Pearsall Formation in the subsurface of south Texas. The Pearsall was divided into the Pine Island Shale, Cow Creek Limestone, and Hensell Shale Members in ascending order. In this report the name "Hensell Member" is used because the member is predominantly sandy. Imlay stated that the Pearsall is the subsurface equivalent of the Travis Peak Formation and suggested that the name Travis Peak be restricted to the formation where it is exposed at the surface.

Pine Island Shale Member

In the southern part of the county, the Pine Island Shale Member consists of fossiliferous, dark-blue to gray shale containing interbedded layers of sand and argillaceous limestone. The shale is relatively impermeable and confines the water in the underlying Sligo Formation. The member, which thins northward and becomes increasingly sandy, ranges in thickness from 50 feet in well RJ-69-07-903 to 10 feet in well RJ-56-63-502 (Figure 11). The Pine Island is probably absent in the subsurface north of Kerrville. The Pine Island Shale is not an aquifer in Kerr County.

Cow Creek Limestone Member

The Cow Creek Limestone Member consists primarily of massive, white to gray, sandy, fossiliferous limestone. In places, the member contains interbedded layers of sand, shale, and lignite. The Cow Creek maintains a fairly uniform thickness of 50 to 70 feet in the southern part of the county. The member thins, and the limestone beds grade into sand and shale north of Kerrville.

The water-bearing properties of the Cow Creek Limestone in the county are, for all practical purposes, unknown because there are no wells in the area that screen only the Cow Creek. In the eastern part of the county, where the Cow Creek can be recognized in well logs, most of the wells screen more than one aquifer; the yields of these wells average about 280 gpm. On the basis of an aquifer test of well RJ-56-63-608, which screened both the Cow Creek and the Hosston and Sligo units, the Cow Creek is capable of yielding large quantities of water. The well yielded 1,400 gpm, of which possibly as much as one-half, or about 700 gpm, may have been contributed by the Cow Creek Limestone Member (Moulder, E. A., 1955, written communication).

Hensell Member

The Hensell Member consists of conglomerate, sand, shale, dolomite, and marl. Correlation of individual beds is difficult because beds may pinch out or change composition. In general, the member becomes coarser grained and thins toward the north as the dolomite and marl beds pinch out. The Hensell, which is thickest in the southern part of the county (about 155 feet in well RJ-69-04-601 as shown on Figure 12), thins northward and becomes indistinguishable from the underlying Hosston and Sligo Formations (Figure 11).

The Hensell is an important aquifer in the eastern half of the county where it yields small to moderate quantities of fresh water for municipal, irrigation, domestic, and livestock uses. In the western part of the county, the member has been penetrated by only a few water wells because shallower aquifers provide adequate water supplies for most purposes. Small to moderate yields can be expected from the Hensell Member in most of the county. Well RJ-56-64-705 had a reported yield of 228 gpm; however, only a few wells yield more than 100 gpm. The average yield is about 25 gpm. Most of the wells in the Hensell yield water that is hard but suitable for most purposes.

Glen Rose Limestone

The Glen Rose Limestone, the oldest formation exposed in Kerr County, crops out in the eastern part of the county where streams have cut through the overlying Edwards and associated limestones (Figure 10).

In Comal County, George (1952, p. 17-18) divided the Glen Rose Limestone into lower and upper members. A thin limestone bed at the top of a prominent fossiliferous zone (*Salenia texana* zone) was arbitrarily selected as the boundary between the members. The limestone bed, capped by a layer of the fossil *Corbula texana* Whitney, is immediately overlain by a porous evaporite bed of anhydrite at the base of the upper member. A second evaporite zone, which has characteristics almost identical to the underlying zone, is approximately in the middle of the upper member.

In this report, these anhydrite zones are referred to as the lower and upper evaporite beds. The thin limestone bed at the boundary of the members and the overlying evaporite beds form easily mappable units. The evaporite beds, which are recognizable in well cuttings and are indicated by a strong resistivity peak on electric logs, are useful in subsurface correlations. The contact between the Pearsall Formation and the Glen Rose Limestone is placed arbitrarily at the base of the lowest massive limestone beds of the Glen Rose.

Lower Member

The oldest geologic unit exposed in the county, the lower member of the Glen Rose Limestone consists primarily of medium- to thick-bedded fossiliferous limestone and interbedded layers of shale and sand. The member maintains a fairly uniform thickness of 180 to 210 feet throughout most of the county (Figures 11 and 12); however, in the northeastern and north-central parts of the county, it thins rapidly updip. Barnes (1952b) states " ...the outcrop thickness of the Glen Rose Limestone is 146 feet 1 mile east of the White Oak School..." White Oak School is in Gillespie County about 12 miles north of Kerrville.

The lower member of the Glen Rose generally yields small to moderate quantities of water of good chemical quality to wells in the eastern part of the county.

Upper Member

The upper member consists chiefly of shale and nodular marl alternating with thin beds of impure limestone.

The two evaporite beds are important marker horizons, which are identifiable in both the outcrop and subsurface (Figures 11 and 12). Where exposed, the evaporite beds consist of 20 to 30 feet of yellow marl and dolomite interbedded with chalky limestone; most of the anhydrite has been removed from the beds by solution. The most productive beds of the member are the evaporite beds. The member ranges in thickness from about 385 feet in the southern part of the county to 330 feet in the northwestern part.

In general, the upper member of the Glen Rose Limestone yields only small quantities of mostly slightly saline water to wells. The lower evaporite bed is highly permeable locally. Near Center Point in the eastern part of the county, well RJ-69-08-502, which produces from the lower evaporite bed, had a reported yield of 1,000 gpm. Unfortunately, the water from the evaporite beds has a high sulfate content that makes the water unfit for most purposes; therefore, particular care should be taken to case off the evaporite beds properly when drilling through the upper member of the Glen Rose.

Fredericksburg and Washita Groups

The Fredericksburg Group in Kerr County includes the Comanche Peak Limestone and the Edwards Limestone. The lowermost formation of the Fredericksburg Group, the Walnut Clay, and the uppermost formation, the Kiamichi, have not been recognized in Kerr County.

The Washita Group includes the Georgetown Limestone, the Grayson Shale, and the Buda Limestone. The Grayson Shale and Buda Limestone are exposed in the northwestern part of the county, but because they have small areal extent and little hydrologic significance, these exposures are not included on the geologic map (Figure 10). The Comanche Peak, Edwards, and Georgetown Limestones, which form a single hydrologic unit, are referred to in this report as the Edwards and associated limestones.

Edwards and Associated Limestones

The Edwards and associated limestones generally cap the topographic divides and crop out in about four-fifths of the report area.

The Comanche Peak, the oldest formation in the unit, consists of light-gray, nodular, marly limestone ranging in thickness from 20 to 50 feet. Many springs and seeps issue from the base of the formation.

The upper 500 feet of the Edwards and associated limestones consists of the Edwards and Georgetown Limestones. The limestones can be divided into three zones in the western part of the county: (A) The lower zones is a massive, light-gray to cream, hard, dense limestone containing a few thin beds of dolomite, chert, and shale. The zone is about 100 feet thick. (B) The middle zone, about 150 feet thick, consists chiefly of

flaggy, gray to brown, chert-bearing dolomite and dolomitic limestone, much of which is extensively honeycombed. Springs and seeps are common in the lower part of the zone. (C) The upper zone is predominantly massive, light-gray to buff, hard, fossiliferous limestone. Chert, as nodules and in beds, is common throughout most of the zone, which is about 250 feet thick.

The Edwards and associated limestones, the principal aquifer in the western half of the county, supplies small to moderate quantities of water of good chemical quality. The yields of most of the wells are small, generally less than 5 gpm. In many places, larger yields probably could be obtained from properly constructed wells penetrating the full thickness of the limestone and by using hydrochloric acid to develop the well.

Grayson Shale

The Grayson Shale, 15 to 20 feet thick, consists of yellow or yellowish-brown clay and marl with thin lenses of limestone. The Grayson does not yield water to wells in Kerr County.

Buda Limestone

The Buda Limestone in Kerr County has a maximum observed thickness of 15 feet. The formation is composed of light-gray to buff, hard, fine-grained limestone and is not known to yield water to wells in the county.

Tertiary(?) and Quaternary Systems

The alluvium of Pliocene(?), Plistocene, and Holocene age is not an important water-bearing unit in Kerr County. Alluvial deposits, consisting of clay, silt, sand, and gravel, occur as terrace and flood-plain deposits along nearly all streams in the county. The maximum observed thickness is about 40 feet in the Guadalupe River valley east of Kerrville. The deposits yield small to moderate quantities of fresh water to a few domestic and livestock wells.

GROUND WATER

Source and Occurrence of Ground Water

The principal source of ground water in Kerr County is precipitation within the county and in adjacent counties. Nearly all of the precipitation is evaporated from the land surface, is transpired by plants, or runs off as streamflow. A small part of the water reaches the water table to become a part of the ground water in storage.

Ground water occurs under water-table (unconfined) or artesian (confined) conditions. Under water-table conditions, the water will not rise in wells above the point where it is first encountered; under artesian conditions, the water is confined between relatively impermeable layers and will rise above the base of the confining layer. Water-table conditions occur in the Edwards and associated limestones and alluvial deposits in Kerr County. Water in the Hosston, Sligo, and Pearsall Formations and in most of the Glen Rose Limestone occurs under artesian pressure. The pressure that causes the water to rise in the well is created and maintained by the water in the updip part of the formation. The level or surface to which water will rise in artesian wells is called the piezometric surface.

Recharge, Movement, and Discharge of Ground Water

Recharge to the Hosston and Sligo Formations and to the Cow Creek Limestone and Hensell Members of the Pearsall Formation occurs chiefly by direct infiltration of precipitation on the outcrops of these rocks north of Kerr County.

The Glen Rose Limestone and alluvium are recharged by rainfall and streamflow on their outcrop.

The Edwards and associated limestones are recharged by precipitation on their outcrop. The limestones contain solution-enlarged fractures which permit relatively free downward and lateral movement of ground water. Water entering the limestones moves downward under the force of gravity to the water table or zone of saturation. In the zone of saturation, the water moves laterally towards discharge areas (springs and seeps) along the stream valleys.

Ground water in Kerr County is in a state of transient storage, moving slowly from places of recharge to places of discharge. The movement is seldom uniform in direction or velocity. Where water is withdrawn by pumping, the direction of ground-water movement is towards the center of pumping.

Adequate data were not available to determine accurately the direction of movement of the water in the aquifers. In general, however, water moves down the dip of the formations toward the south and southeast except where large or concentrated withdrawals of ground water have formed cones of depression.

Ground water is discharged to the surface in the county by springs and seeps in the outcrop, by evapotranspiration, and by wells. Subsurface discharge occurs by vertical seepage through semi-confining beds (interformational leakage) and by underflow out of the county to the south. The quantity of water discharged by wells is very small compared to that discharged through springs and seeps.

Relation Between Ground Water and Streamflow

Streamflow consists of water that goes directly from precipitation to the stream, known as direct runoff, and water that discharges from the saturated zone through seeps and springs, known as base flow. In Kerr County, the base flow of the Guadalupe River is sustained largely by spring flow, 90 percent of which is from the Edwards and associated limestones (Kunze and Smith, 1966, p. 8), the rest being from the Glen Rose Limestone. Being sustained by ground-water discharge, the base flow is dependent on ground-water recharge; hence, changes in the base flow reflect changes in ground-water storage. Consequently, estimates of the ground-water recharge to the Edwards and associated limestones can be made from the base-flow records of the streams.

The average annual flow of the upper Guadalupe River at Comfort (Figure 1) for the period 1945-64 was about 90,000 acre-feet, of which 44,000 acre-feet was base flow (Figure 4). This base flow probably closely approximates the total ground-water discharge from the Edwards and associated limestones from about 75 percent of the county; a small part of the base flow is from the Glen Rose Limestone. On this basis, the average annual discharge from or recharge to the aquifer in that part of the county drained by the Guadalupe River is about 53 acre-feet per square mile. Applying this value to the entire county, the average annual discharge from the two aquifers is about 58,000 acre-feet, which is roughly equivalent to about 1 inch of precipitation, or less than 5 percent of the average annual precipitation.

Kunze and Smith (1966, p. 21) gave the following description of the water quality in the Guadalupe River:

> "With the exception of Third Creek near Legion, the water of the upper Guadalupe River and its tributaries meets the chemical requirements of the U.S. Public Health Service drinking water standards (1962, p. 34). The water is very hard, however, and may require softening for domestic, municipal, and industrial uses.
>
> "According to standards for irrigation set by the U.S. Salinity Laboratory Staff, the water of the Guadalupe River (except from Third Creek) is classified as having medium salinity and low sodium hazard. In the report area, where the average annual rainfall is about 30 inches, the water is satisfactory for irrigation. Water in the Guadalupe River drainage area is satisfactory for recreation use."

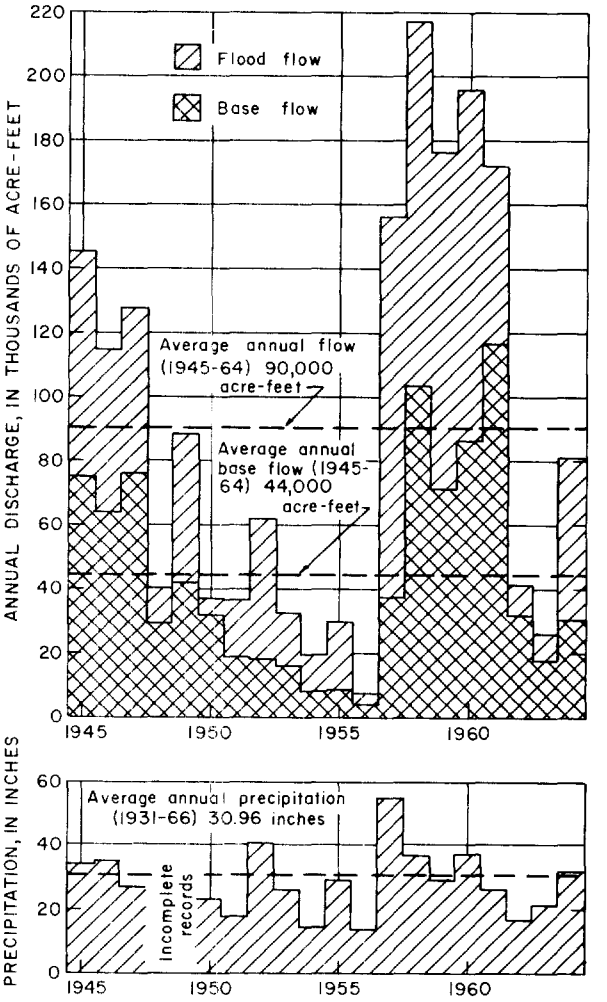

Figure 4.--Comparison of Base Flow and Flood Flow of the Guadalupe River at Comfort and Precipitation at Kerrville

Selected chemical analyses of samples from seven locations are given in Table 7. The analyses are presented in graphic form in Figure 5.

Fluctuation of Water Levels

Water levels in the wells in the county fluctuate mainly in response to changes in the rates of recharge to and discharge from the aquifers. A rise in water levels indicates an increase in storage; a decline in water levels indicates a decrease in storage.

Records of water-level changes in the aquifers that supply water to wells in Kerr County are too meager for more than a cursory comparison. Of wells measured in the 1950-55 period and again during the present investigation, five were in the Hosston and Sligo Formations in the Kerrville area, four were in the Edwards and associated limestones in the western part of the county, and three were in the Hensell Member of the Pearsall near Kerrville.

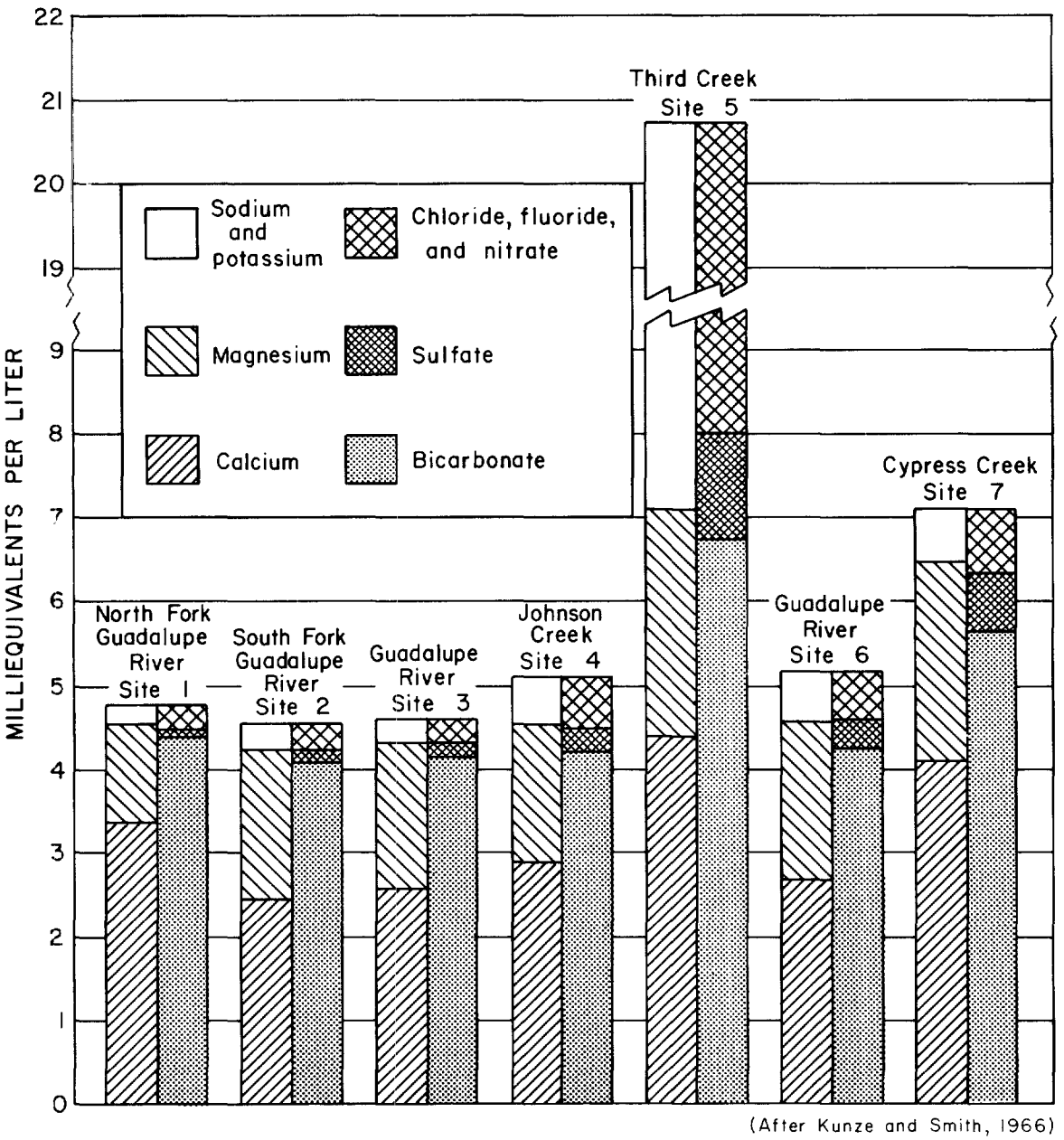

Figure 5.—Selected Chemical Analyses of Water from the Guadalupe River and Its Tributaries

The water levels in the five wells in the Hosston and Sligo Formations were substantially lower in 1966-67 than when measured in 1950-55 (Table 5). The declines, ranging from 32.2 to 70.4 feet, reflect the more or less continuous pumping of large quantities of water from closely spaced wells in and near Kerrville. Short-term fluctuations of the water levels in two wells are shown in Figure 6. Although the period of records is too short to indicate a general trend, the records do show the seasonal fluctuations in response principally to changes in rates of pumping of water for the needs of Kerrville.

Water-level changes in four wells tapping the Edwards and associated limestones in the western part of the county ranged from an average decline of 2.5 feet in two wells to an average rise of 1.5 feet in two wells (Table 3). If these changes are respresentative of the aquifer as a whole, it seems apparent that the changes in reservoir storage are, for all practical purposes, negligible and that the aquifer probably was as full of water in 1967 as it has been, as least in recent years.

Records of water-level fluctuations in wells tapping the lower member of the Glen Rose Limestone and the Hensell Member of the Pearsall Formation are too meager for comparative purposes.

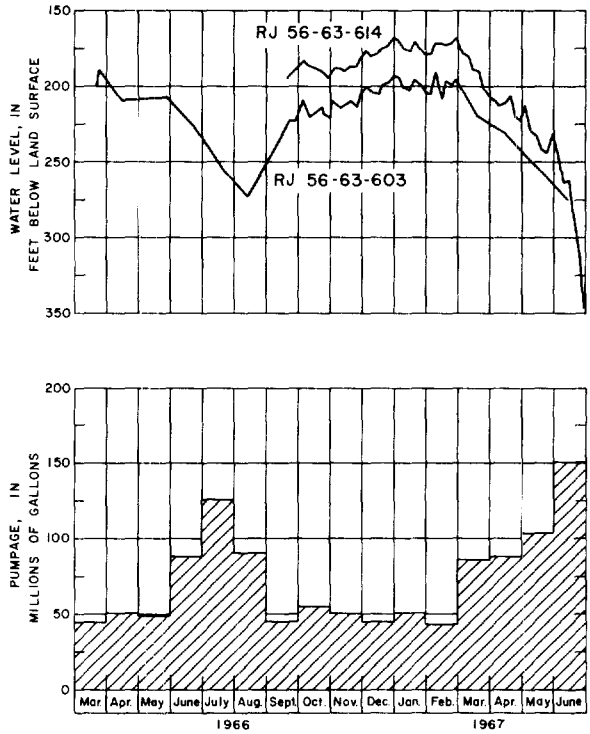

Figure 6.—Comparison of Water Levels in Wells and Pumpage at Kerrville

Well Construction

Most of the domestic and livestock wells are cased with 5- or 6-inch diameter galvanized pipe to the desired aquifer. Some of the wells have torch-slotted pipe set opposite the water-bearing sands. Wells penetrating the limestone aquifers do not require casing to prevent caving. The wells are equipped with windmills, submersible pumps, or jet pumps.

The large-capacity wells, principally for municipal supply, are drilled in a manner similar to the domestic wells except that larger well casing is used and hydrochloric acid is used in their development. Where the reservoir rock is limestone or calcareous sandstone and conglomerate, the yields of wells tapping these rocks often are increased by the use of acid. The acid increases the permeability of the reservoir rock by enlarging the joints or solution channels in the immediate vicinity of the well. This process increases the effective well diameter, thereby increasing the yield of the well per unit of drawdown.

The major problems of well construction are related to the caving tendencies of shale beds and to the occurrence of highly mineralized water in the evaporite zones of the upper member of the Glen Rose Limestone. If a shale bed is soft and has a tendency to cave when penetrated by the drill bit, the bed should be cased off so that the shale will not collapse and shut off production from underlying water-bearing strata. In the upper member of the Glen Rose Limestone, the two evaporite zones, which are sources of highly mineralized water, should be cased and cemented to prevent contamination of better quality water in the deeper aquifers.

Ground-Water Development

Ground water in Kerr County is used primarily for public supply and, to a lesser extent, for irrigation and domestic and livestock purposes. During 1966, about 3,600 acre-feet or 3.2 mgd (million gallons per day) of ground water was pumped for all purposes. Most of the water was from the Hosston and Sligo Formations and the Hensell Member of the Pearsall Formation.

In 1966, about 2.2 mgd or 2,470 acre-feet of ground water was pumped for public supply. This was about 69 percent of the total water pumped in the county. Of the 2.2 mgd, 90 percent or nearly 2 mgd was pumped by Kerrville. The monthly pumpage of ground water by Kerrville since 1944 is shown in Figure 7. Private water companies at Ingram, Guadalupe Heights, and Center Point used a total of 72,000 gpd (gallons per day), and the U.S. Veterans' Hospital at Legion used 121,000 gpd.

Rural domestic and livestock water use in 1966 was about 600,000 gpd (670 acre-feet), or about 19 percent of the total ground water pumped in the county.

In general, precipitation is adequate for the production of feed and grain crops, but when precipitation is below normal during the growing season, ground water is used for supplementary irrigation. In 1966, only 460 acre-feet of ground water was pumped for irrigation.

Aquifer Tests

Pumping tests were made on several municipal wells to determine the water-bearing properties of the Hosston and Sligo Formations. Results of these and other tests may be applicable only to the area within and near the city limits of Kerrville.

The principal hydraulic properties of a water-bearing material are the coefficients of transmissibility and storage. The ability of an aquifer to transmit and store water is dependent on these properties.

The field coefficient of transmissibility is expressed as the amount of water, in gallons per day at the prevailing temperature of the water, that will flow through a vertical strip of the aquifer one foot wide and extending the full saturated height of the aquifer under a hydraulic gradient of one foot per foot. The coefficient of storage is the volume of water released from or taken into storage per unit surface of the aquifer per unit change in the component of head normal to that surface. Under artesian conditions, the volume of water released

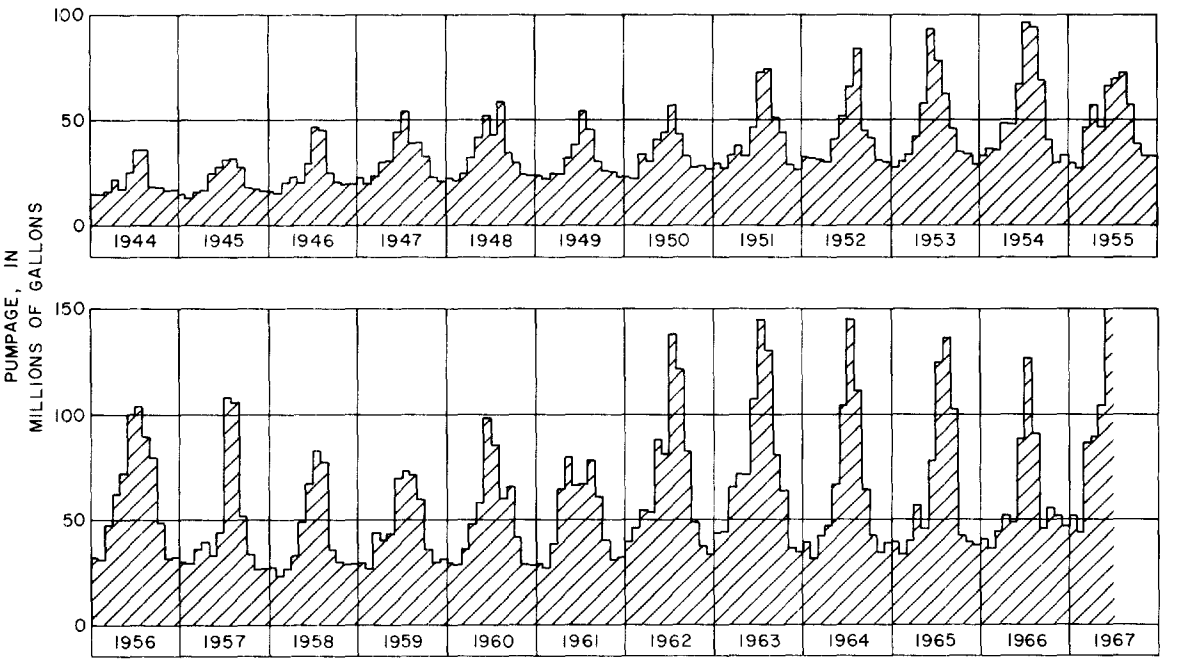

Figure 7.—Monthly Pumpage of Ground Water by the City of Kerrville

from or taken into storage is determined by the compressibility of the aquifer and expansion of the water. Under water-table conditions, the coefficient of storage is practically equal to the specific yield, which is the volume of water involved in gravity draining or filling divided by the volume of the material drained or or filled.

The Theis nonequilibrium formula (Theis, 1935, p. 519-524) was used to analyze the pumping tests in this investigation. The Theis recovery method (Wenzel, 1942, p. 95-97) was used to analyze the recovery data of pumped wells. Table 2 gives the results of the aquifer tests on the municipal wells tapping the Hosston and Sligo Formations at Kerrville. All the wells penetrate the full section of the aquifer. Well RJ-56-63-608 also includes the Cow Creek Limestone Member of the Pearsall Formation.

The aquifer tests, which included a recharge test in several municipal supply wells of Kerrville, indicated that the coefficients of transmissibility for the Hosston and Sligo Formations ranged from 15,000 to 24,000 gpd per foot and averaged about 20,000 gpd per foot. Whether this average value applies to the Hosston and Sligo Formations throughout the county is not known because all the well tests were concentrated in or near Kerrville. The test in well RJ-56-63-608 resulted in a coefficient of transmissibility of 46,000 gpd per foot (Moulder, 1955, written communication). Available records indicated, however, that this well probably was producing from two units—the Hosston and Sligo Formations and the Cow Creek Limestone Member of the Pearsall Formation. The latter formation probably is not connected hydraulically to the other wells. Moulder (1955, written communication) concluded that about equal quantities of water were produced from each of the two water-bearing units but it did not necessarily follow that the two units had similar transmissibilities. The coefficients of storage determined from the tests of four wells screened only in the Hosston and Sligo Formations averaged about 0.000035.

The coefficients of transmissibility and storage are useful in estimating the drawdown of water levels that could be expected due to pumping a well or a group of wells. Figure 8 shows the relation among drawdown, distance, and time in a well pumping from an infinite aquifer having the hydraulic characteristics of the Hosston and Sligo Formations. The calculations of drawdown were based on a well pumping 1,000 gpm; the drawdown at other rates would be nearly proportional. The graph also is useful in estimating the drawdown in a well caused by pumping several closely spaced wells. The drawdown at any one well would be the sum of the drawdown effects of all wells. Because of the fairly low coefficient of transmissibility of the Hosston and Sligo Formations (20,000 gpd per foot), large drawdowns can be expected, and where several wells are pumped in a concentrated area, the interference between wells may be sufficient to cause a serious decrease in yields of the wells, an increase in pumping costs, or both.

Because of the concentration of wells and heavy pumpage in the city of Kerrville and the low transmissibility of the aquifer, water levels have declined substantially as a result of interference between wells. In order to expand the city supply and to avoid the mutual interference between wells, it would be necessary to

Table 2.—Results of Aquifer Tests

WELL	GEOLOGIC FORMATION	COEFFICIENT OF TRANSMISS-IBILITY (GPD/FT)	COEFFICIENT OF STORAGE	REMARKS
RJ-56-63-603	Hosston and Sligo	22,000	5×10^5	Drawdown of observation well.
56-63-604	do	24,000	--	Do.
56-63-607	do	20,000	2×10^5	Do.
56-63-608	Hosston and Sligo, and Cow Creek Limestone Member of Pearsall Formation	46,000	7.4×10^4	Recovery of observation well.
56-63-614	Hosston and Sligo	19,000	5×10^{-5}	Drawdown of observation well.
56-63-901	do	15,000	3×10^{-5}	Do.

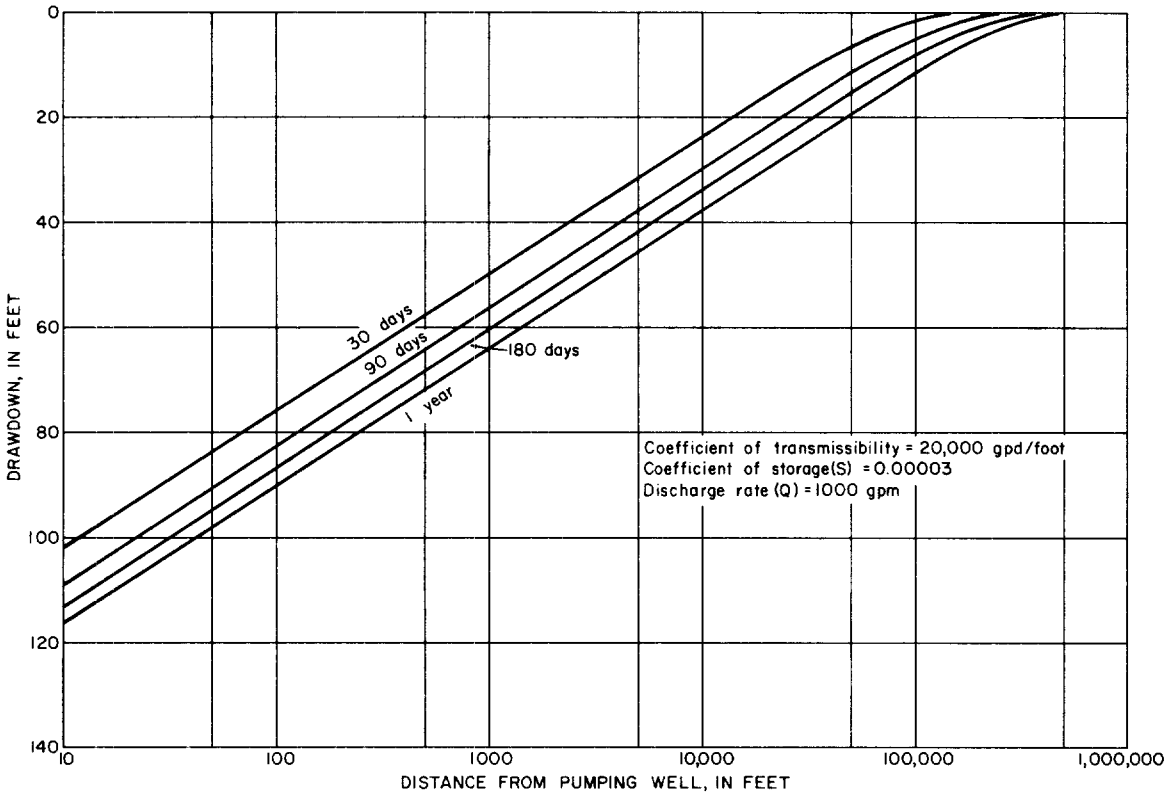

Figure 8.—Relation of Distance to Drawdown and Time for a Well Pumping 1,000 Gallons Per Minute

extend the city well fields and water mains well beyond the present city limits of Kerrville. Inasmuch as a surface-water supply is apparently available to the city, it may be more economical to consider the direct use of the water from the Guadalupe River rather than an expensive extension of the well fields and collection systems.

Chemical Quality of Ground Water

The chemical constituents in ground water are dissolved from the soil and rock through which the water has passed; consequently, the differences in chemical character of the water reflect, in a general way, the nature of the geological formations that have been in contact with the water. Other factors that influence the mineralization of water are the length of time the water has been in contact with the rock and the effects of temperature and pressure. Analyses of water from 48 wells and springs in Kerr County are given in Table 6. The dissolved-solids, sulfate, and chloride content of the water from wells and springs are shown in Figure 9.

The suitability of a water supply depends upon the chemical quality of the water and the limitations imposed by the contemplated use of the water. Various criteria of requirements have been developed for most categories of water quality, including bacterial content, physical characteristics, and chemical constituents. Usually, water-quality problems of the first two categories can be alleviated economically, but the removal or neutralization of undesirable chemical constituents may be difficult and expensive.

For many purposes, the dissolved-solids content is a major limitation on the use of water. A general classification of water based on dissolved-solids content follows (Winslow and Kister, 1956, p. 5).

DESCRIPTION	DISSOLVED-SOLIDS CONTENT (MILLIGRAMS PER LITER) [1]
Fresh	Less than 1,000
Slightly saline	1,000 to 3,000
Moderately saline	3,000 to 10,000
Very saline	10,000 to 35,000
Brine	More than 35,000

1/ Milligrams per liter (mg/l) is considered equivalent to parts per million (ppm) for water containing less than 7,000 mg/l dissolved solids.

The U.S. Public Health Service has established and periodically revises standards to control the quality of the drinking water to be used on common carriers engaged in interstate commerce. The standards are designed to protect the traveling public and are commonly used to evaluate public water supplies. According to these standards, chemical constituents should not be present in a water supply in excess of the listed concentrations except where other more suitable supplies are not available. Some of the standards adopted by the U.S. Public Health Service (1962, p. 7-8) are as follows:

SUBSTANCE	CONCENTRATION (MILLIGRAMS PER LITER)
Chloride (Cl)	250
Fluoride (F)	1.0*
Iron (Fe)	.3
Manganese (Mn)	.05
Nitrate (NO_3)	45
Sulfate (SO_4)	250
Dissolved solids	500

* Upper limit for Kerr County based on an annual average of maximum daily air temperature between 70.7 and 79.2°F.

The concentration of dissolved solids in 43 analyzed samples ranged from 231 to 2,960 mg/l (milligrams per liter), exceeding 1,000 mg/l in only 5 samples. About 37 percent of the analyzed samples exceeded the 500 mg/l limit.

The optimum content of fluoride in drinking water reduces the incidence of tooth decay, especially in children, when the water is consumed during the period of enamel calcification (Maier, 1950, p. 1120-1132). Excessive concentration of fluoride in water may cause teeth to become mottled. The presence of fluoride in water in Kerr County in average concentrations greater than 1.6 mg/l would constitute grounds for rejection of the supply (U.S. Public Health Service, 1962, p. 8).

The fluoride content in 37 samples collected in the county ranged from 0.0 to 2.6 mg/l; it exceeded 0.5 mg/l in 31 wells and it exceeded 1.6 mg/l, which is twice the optimum value, in 8 samples. The high fluoride content is found primarily in samples collected from the Hosston, Sligo, Pearsall, and Glen Rose Limestone.

Iron and manganese in the water form reddish-brown or dark-gray stains on clothes, plumbing fixtures, and utensils. Water containing 0.3 mg/l of iron and manganese combined will probably cause noticeable staining. Twenty-four of 36 determinations showed an iron content in excess of 0.3 mg/l. Iron appears to be a problem in all water-bearing units except the Edwards and associated limestones and alluvial deposits. In 4 samples analyzed for manganese, two samples had a concentration that was more than the established limit of 0.05 mg/l.

High concentrations of nitrate in ground water may be an indication of pollution from organic matter, commonly sewage (Lohr and Love, 1954, p. 10). All of the samples collected in Kerr County contained less than 45 mg/l; in fact, only four samples exceeded 2 mg/l.

Water containing sulfate in excess of 250 mg/l may produce a laxative effect. The sulfate content in 46 samples ranged from 5.8 to 2,040 mg/l, exceeding the established limit of 250 mg/l in 8 samples. Most of the high sulfate water is in the upper member of the Glen Rose Limestone.

Calcium and magnesium are the principal constituents in water that cause hardness. Hard water increases soap consumption and induces the formation of scale in water pipes and hot water heaters. The commonly accepted standards and classifications of water hardness are shown in the table below.

The water in Kerr County is generally very hard. The hardness as determined in 48 samples ranged from 172 to 2,240 mg/l. The hardness was less than 180 mg/l in only one sample.

The classifications given for irrigation waters should be used as a general guide only because the suitability of water for irrigation depends on other factors such as soil texture and composition, adequacy of drainage, type of crops grown, and climate.

A classification commonly used for judging the quality of water for irrigation was proposed in 1954 by the U.S. Salinity Laboratory Staff (1954, p. 69-82). The classification is based primarily on the salinity hazard as measured by the electrical conductivity of the water and the sodium hazard as measured by the SAR (sodium-adsorption ratio). Wilcox (1955) reported that water generally may be used safely for supplementary irrigation if the specific conductance of the water is less than 2,250 micromhos per centimeter at 25°C and its SAR is less than 14. The specific conductance of 47 samples ranged from 430 to 3,280, exceeding 2,250 in 4 samples of water from wells tapping the upper member of the Glen Rose Limestone. The high conductance of these 4 samples was attributed largely to the high sulfate content. The SAR of 35 samples were all well below the limit of 14.

The RSC (residual sodium carbonate) is also used to assess the quality of water for irrigation. Excessive RSC will cause the water to be alkaline, and the organic material in the soil will tend to dissolve. The soil may become a grayish-black and the land areas affected are referred to as "black alkali." Wilcox (1955, p. 11) states that laboratory and field studies have resulted in the conclusion that water containing more than 2.5 me/l (milliequivalents per liter) RSC is not suitable for irrigation. Water containing from 1.25 to 2.5 me/l is marginal, and water containing less than 1.25 me/l RSC probably is safe. However, the successful use of marginal water for irrigation might be made possible by proper irrigation practices and use of soil amendments. Furthermore, the degree of leaching will modify the permissible limit to some extent (Wilcox, Blair, and Bower, 1954, p. 265).

The RSC in 31 samples ranged from 0.00 to 1.79 me/l. In 26 of the 31 samples, the RSC was 0.00. Four of the five samples having an RSC value were from wells tapping the Hosston and Sligo Formations.

An excessive boron content will make water unsuitable for irrigation. Wilcox (1955, p. 11) indicates that a maximum permissible boron concentration for irrigating sensitive crops would be 1.0 mg/l; for semitolerant crops, 2.0 mg/l; and for tolerant crops, 3.0 mg/l. Boron does not seem to be a problem in Kerr County. Of 15 boron determinations, all of the samples had concentrations less than 1 mg/l.

AVAILABILITY OF GROUND WATER FOR FUTURE DEVELOPMENT

The ground-water resources of Kerr County are only partly developed. The availability of water for future development from the aquifers depends chiefly on the average rate of recharge and the ability of the aquifers to transmit water.

HARDNESS RANGE		CLASSIFICATION
MILLIGRAMS PER LITER	GRAINS PER GALLON	
60 or less	3.5 or less	Soft
61 to 120	3.6 to 7.0	Moderately hard
121 to 180	7.1 to 10.5	Hard
More than 180	More than 10.5	Very hard

Data are not sufficient to evaluate quantitatively the potential development of the Hosston, Sligo, and Pearsall Formations. However, on the basis of the performance of several large-capacity wells, yields of as much as 1,000 gpm probably could be obtained from wells in the southern half of the county; and as much as 500 gpm in the northern half where the saturated thickness of these units is considerably less. These yields are based on the assumption that the wells are properly constructed and developed—that is, the wells are screened throughout the entire thickness of the aquifer and are treated with acid.

The Edwards and associated limestones are capable of furnishing considerably larger quantities of water than is presently (1967) being withdrawn. The amount of water available for perennial development is not known, but on the basis of estimates of the base-flow records of the Guadalupe River at Comfort, about 52,000 acre-feet of water is discharged annually from the aquifer as spring flow. Although this quantity of water is available for development without depleting the aquifer, a substantial increase in the use of the ground water in the Edwards and associated limestones would necessarily result in a reduction in the natural ground-water discharge which, in turn, would result in a reduction in the base flow of the Guadalupe River.

Few wells obtain water from the lower member of the Glen Rose Limestone; hence, its potential is practically unknown. The quantity of water that can be developed, without depleting the aquifer, doubtlessly is small. Spring-flow records indicate that 6,000 acre-feet a year or 5.3 mgd of water is discharged from the upper member of the Glen Rose Limestone by springs. On the basis of the available well data, a well penetrating the basal massive unit of the lower member might be expected to yield as much as 350 gpm, assuming that the well has been developed with acid. The upper member of the Glen Rose yields water that generally is slightly saline; consequently, little additional development of the water in this aquifer is expected.

The available ground-water supplies are adequate to sustain an increase of several times the present rate of development. An increase of this magnitude, however, should follow a program that will assure the most efficient use of the water available. Such a program would include the spacing of wells to minimize the effect due to pumping closely spaced wells and the effect of additional ground-water development on the base flow of the streams. If a substantial increase in water needs is anticipated, the development of available surface-water supplies should be considered.

ARTIFICIAL RECHARGE POSSIBILITIES AT KERRVILLE

In consideration of the future water supply for the city of Kerrville, the question has been raised as to the possibility of artificially recharging the water-bearing sands that supply the city's wells. It has been suggested that surface water could be injected during the winter and spring months to help meet the heavy demands during the summer months.

During the period March 2-4, 1955, a recharge test that demonstrates the physical feasibility of artificial recharge was made by the U.S. Geological Survey at one of the city wells. Recharge water was injected into a well at the rate of 400 gpm for a period of about 24 hours, after which the rate was increased to 500 gpm and continued for another 24 hours. Measurements of water levels in the injection well indicated that the rise in water level due to the injection of 400 gpm for 24 hours was about 25 feet. Using the formation coefficients determined from this and other aquifer tests, it is estimated that 100 days of continued recharge at 400 gpm would raise the water level an additional 10 feet at the injection well.

Theoretically, the rise in water level is proportional to the injection rate, so it would appear that the rise in water level for an injection rate of 1,000 gpm would be $\frac{1,000}{400} \times 25 = 62.5$ feet for 1 day, or 87.5 feet for 100 days. Actually, the rise may be somewhat more than this because of turbulence and frictional losses in and around the well.

Because an attempt to inject water at different rates was unsuccessful, no reliable estimate may be made of the head losses to be expected at rates exceeding 500 gpm. From the performance of other pumping wells, it would appear unlikely that the losses would exceed 50 percent of the theoretical rise. It is, therefore, concluded that recharge water could be injected at a rate of at least 1,000 gpm. The total quantity of water that could be injected would depend on the quantity available and the number and spacing of injection wells. The approximate effect of rises in water levels in the vicinity of the injection wells can be estimated from Figure 8.

Although it is physically feasible to artificially recharge the aquifer, several practical considerations should be made. The recharge water would probably require filtration and chlorination to prevent clogging of the well and aquifer by the accumulation of suspended material or contamination of the aquifer by bacteria or other agents.

The Guadalupe River is the obvious source of water for artificial recharge. If it is necessary to provide reservoir storage space on the river, it may be more economical to pump directly from storage into a treatment and distribution system for use during the summer months. This is especially true because it would be necessary to treat the surface water before injection, and the same treatment would be required before the water could be pumped directly into the distribution system. For these reasons, the entire concept of artificial recharge, merely to provide additional water during the hot summer months, may not be economically feasible. Additional studies should be made of the economics of the proposal.

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Table 3.--Records of Wells and Springs in Kerr County

All wells are drilled unless otherwise noted in remarks column.

Water level : Reported water levels are given in feet, measured water levels are given in feet and tenths.

Method of lift and type of power : C, centrifugal; E, electric; G, gasoline, butane, or diesel engine; J, jet; N, none; P, piston; S, submersible; T, turbine; W, windmill. Number indicates horsepower.

Use of water : H, household; I, irrigation; N, none; P, public supply; S, livestock; U, unused.

Water-bearing unit : QTal, Pliocene(?), Pleistocene, and Holocene alluvial deposits; Kea, Edwards and associated limestones; Kgru, upper member of Glen Rose Limestone; Kgrl, lower member of Glen Rose Limestone; Kph, Hensell Member of Pearsall Formation; Kpc, Cow Creek Limestone Member of Pearsall Formation; Ksh, Sligo and Hosston Formations.

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
					Kerr	County						
RJ-56-42-901	W. R. Allen	--	Old	480	6	Kea	--	400	1966	C,P	H,S	Reported discharge 1 1/2 gpm.
43-701	C. Hyde	--	Old	421	6	Kea	2,298	390	June 1961	C,P	H,S	Temp. 22°C.
801	M. B. Schreiner	Tucker Drilling Co.	1959	4,511	--	--	2,222	--	--	--	--	Oil test. 1/
45-701	E. Real	M. Scarbrough	1927	751	10	Kph	--	150	1966	C,E, 2	H,S	Cased to 720 ft. Reported discharge 50 gpm. Temp. 22°C.
702	Mrs. A. Bishop	--	1892	357	6	Kea	2,222	309.9	Dec. 12,1952	C,W	H,S	Reported small supply of water.
703	R. W. Cootman	--	Old	360	6	Kea	--	300	1966	P,W	S	Do.
801	G. Lock	M. Scarbrough	1942	355	6	Kea	--	285	Aug. 1966	P,W	S	Reported discharge 3 gpm when drilled.
901	E. A. Jung	--	1939	247	6	Kea	--	150	1966	P,W	H,S	Cased to 5 ft. Reported small supply of water.
902	R. L. Parker	--	1916	285	6	Kea	--	147.4	Aug. 18, 1966	P,W	H,S	Cased to 6 ft. Reported discharge 15 gpm.
903	R. Bierschwale	--	1917	300	6	Kea	--	189.0	do	P,W	H,S	Cased to 8 ft. Reported discharge 4 gpm. Pump set at 286 ft.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-46-801	W. McDougal	M. Scarbrough	1956	288	6	Kea	--	214.8	Aug. 18, 1966	P,W	S	Reported discharge 3 gpm.
802	do	J. Drury	1917	288	6	Kea	--	265	1966	P,W	H,S	Pump set at 285 ft. Reported small supply of water.
803	W. C. Walker	M. Scarbrough	1920	350	6	Kea	--	215	Aug. 1966	T,E	H,S	Cased to 4 ft. Pump set at 229 ft. Reported small supply of water.
804	do	do	1956	283	6	Kea	--	270	Aug. 1966	P,W	H,S	Cased to 4 ft. Pump set at 270 ft. Reported small supply of water.
805	T. Oehler	J. Drury	1915	379	6	Kea	--	309.1	Aug. 17, 1966	T,E	H,S	Cased to 3 ft. Reported small supply of water.
806	H. Oehler	M. Scarbrough	1956	357	6	Kea	--	329	1966	P,W	H,S	Cased to 3 ft. Reported discharge 6 gpm.
51-401	M. B. Schreiner	O. N. Beer, Inc.	1960	4,218	--	--	2,130	--	--	--	--	Oil test.1/
501	do	Tucker Drilling Co.	1958	4,014	--	--	2,130	--	--	--	--	Do.
502	W. R. Schreiner	Humble Oil & Refining Co.	1945	3,770	--	--	2,057	--	--	--	--	Do.
* 52-301	J. T. Burrus	M. Scarbrough	1939	742	6	Kgru, Kph	2,192	525	1966	P,W	S	Cased to bottom. Slotted from 700 ft to bottom. Temp. 23°C.
302	do	--	1880	240	6	Kea	2,120	199.0	Aug. 17, 1966	P,-	N	Reported small supply of water.
* 701	Mrs. J. H. Hall	--	Old	350	6	Kea	2,190	232	1961	P,E	H,S	Do.
702	T. C. Hall	--	Old	360	6	Kea	2,180	330	1966	C,E, 1	H,S	Reported discharge 5 gpm.
801	T. D. Hall	--	Old	320	6	Kea	2,260	291.3	Mar. 31, 1966	P,W	S	Cased to 3 ft. Reported no decrease in discharge during 1947-56 drought. Measured drawdown 5 ft after 24 hours pumping 2 gpm.
802	do	Edmunds Drilling Co.	1962	367	8	Kea	2,300	325.3	do	P,E, 1	S	Cased to 20 ft. Reported discharge 5 gpm when drilled.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-52-901	B. R. Schulz	--	Old	420	6	Kea	2,305	373.2 371.4	Jan. 29, 1953 Mar. 31, 1966	S,E	H,S	Reported small supply of water.
53-101	J. T. Burrus	M. Scarbrough	1929	450	6	Kea, Kgru	2,205	280	1966	T,E, 1	H,S	Cased to 5 ft. Reported discharge 10 gpm.
201	G. Lock	W. E. Page	1926	358	6	Kea	2,230	344.9	Aug. 16, 1966	P,W	H,S	Cased to 6 ft. Reported small supply of water.
202	H. B. Engelman	--	1926	360	6	Kea	2,225	299.1	do	P,W	H,S	Reported small supply of water.
203	do	M. Scarbrough	1954	325	6	Kea	2,225	300	Aug. 1966	P,E, 4	H,S	Do.
204	A. Hyde	W. E. Page	1926	355	6	Kea	2,212	393.7	Aug. 16, 1966	P,W	H	Cased to 6 ft. Pump set at 345 ft.
205	J. Holton	--	Old	600	6	Kph	2,218	550	1966	P,E, 5	S	Cased to 575 ft. Reported small supply of water.
206	S. Poorman	M. Scarbrough	Old	365	10	Kea	2,145	234.8	Aug. 15, 1966	P,W	H	Reported small supply of water.
301	Tatsch Estate	--	Old	350	6	Kea	2,171	199.1	Aug. 29, 1966	P,W	S	Cased to 5 ft. Reported small supply of water.
302	J. Weatherby	Edmunds Drilling Co.	1964	680	5	Kph	2,180	550	1966	S,E	H	Cased to bottom. Slotted from 600 ft to bottom.
303	do	do	1965	350	6	Kea	2,160	258.3	Aug. 29, 1966	P,W	S	Measured drawdown 20 ft after 1 hour pumping 3 gpm. Temp. 22°C.
304	do	--	Old	300	6	Kea	2,080	181.6	do	P,W	S	Reported small supply of water.
305	Mrs. R. A. Sproul	--	Old	280	6	Kea	2,087	181.4 183.2	Dec. 11, 1952 Aug. 15, 1966	P,W	H,S	Cased to 15 ft. Measured drawdown 15 ft after 24 hours pumping 1 1/2 gpm.
501	do	--	Old	180	6	Kea	2,070	150	1966	P,W	H,S	Cased to 20 ft. Reported small supply of water.
502	do	--	Old	280	6	Kea	2,150	253.6	Aug. 15, 1966	P,E	S	Cased to 16 ft. Measured drawdown 13 ft after 24 hours pumping 1 gpm.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-53-503	M. W. Rodgers	--	Old	150	4	Kea	2,100	130	Aug. 1966	P,W	H,S	Reported small supply of water.
504	L. Basse	W. E. Page	1939	350	6	Kea	2,154	222.0	Dec. 12, 1952	P,W	H,S	Do.
601	Mrs. R. A. Sproul	Edmunds Drilling Co.	1951	400	6	Kea	2,022	129.9	Aug. 15, 1966	P,W	S	Cased to 160 ft. Reported small supply of water.
602	do	--	1920	250	6	Kea	2,045	150.4	do	P,W	S	Cased to 16 ft. Temp. 21°C.
603	do	--	Old	300	6	Kea	2,132	221.7	Dec. 12, 1952 Aug. 15, 1966	P,W	S	
701	Priour Bros.	--	1909	317	6	Kea	2,164	250	Aug. 19, 1966	P,W	H,S	Reported small supply of water.
702	do	--	1948	337	6	Kea	2,166	250	Aug. 1966	P,W	H,S	Do.
54-101	Tatsch Estate	--	Old	350	6	Kea	2,150	250	Aug. 1966	P,W	H,S	Do.
102	Mrs. F. Tatsch	B. L. Raborn	1951	2,645	--	--	2,128	--	--	--	--	Oil test. Reported base of Cretaceous at 815 ft.1/
103	do	--	Old	350	6	Kea	2,156	300	Aug. 1966	P,W	S	Cased to 5 ft. Reported small supply of water.
* 104	do	--	Old	350	6	Kea	2,222	275.2	Aug. 18, 1966	P,W	S	Cased to 5 ft. Measured drawdown 16.5 ft after 24 hours pumping 1 gpm. Temp. 22°C.
105	C. St. Clair	--	1920	180	6	Kea	2,100	100	Aug. 1966	P,W	S	Cased to 5 ft. Reported small supply of water.
201	D. B. Walker	R. Morris	1895	140	6	Kea	2,115	133.0	Aug. 29, 1966	P,E	H,S	Cased to 5 ft.
202	Mrs. D. Wienecke	-- Sellers	Old	237	6	Kea	2,175	200.1	Aug. 30, 1966	P,W	H,S	Reported small supply of water.
203	do	M. Scarbrough	1943	150	6	Kea	2,225	120.7	do	P,W	S	
204	H. Oehler	--	1900	300	6	Kea	2,200	281.7	Aug. 17, 1966	P,W	H,S	Cased to 6 ft.
401	C. St. Clair	--	1904	180	6	Kea	2,055	140	Aug. 1966	S,E, 1/3	H,S	Cased to 5 ft. Reported discharge 7 gpm.
402	W. Ellebracht	--	--	Spring	--	Kea	1,900	+	Mar. 31, 1966	Flows	S	Estimated flow 500 gpm, Mar. 31, 1966. Reported never ceased flowing. Temp. 21°C.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-54-403	W. Ellebracht	--	--	Spring	--	Kea	1,898	+	Mar. 31, 1966	Flows	I	Estimated flow 2,500 gpm, Mar. 31, 1966. Reported never ceased flowing. Supplies water for fish hatchery. Temp. 21°C.
501	H. Goff	--	Old	190	6	Kea	2,110	150	Aug. 1966	P,W	H,S	Cased to 10 ft. Reported discharge 1 1/2 gpm.
502	L. Hamilton	--	--	120	6	Kea	2,055	90	Aug. 1966	T,E, 1/2	H,S	Cased to 5 ft.
503	W. Barrett	--	1951	80	6	Kea	2,025	55.3	Aug. 31, 1966	P,W	H,S	Reported discharge 3 gpm.
504	C. Oehler	--	Old	85	6	Kea	2,075	60	Aug. 1966	P,E, 1/2	U	Reported small supply of water.
505	do	Edmunds Drilling Co.	1961	570	5	Kph	2,060	453.7	Aug. 31, 1966	S,E, 3	H,S	
701	Mrs. W. W. Meadow	--	--	Spring	--	Kea	1,895	+	Mar. 2, 1967	Flows	S	Estimated flow 15 gpm, Mar. 2, 1967. Reported never ceased flowing. Temp. 21°C.
802	J. Smith	--	--	Spring	--	Kea	1,880	+	Aug. 31, 1966	Flows	H,S	Estimated flow 10 gpm, Aug. 31, 1966. Reported never ceased flowing. Temp. 21°C.
803	J. E. Mavor	Edmunds Drilling Co.	1965	395	6	Kgrl	1,850	250	1967	S,E, 1 1/2	H	
804	do	--	Old	395	6	Kgrl, Kgru	1,800	204.9	Mar. 2, 1967	S,E, 1 1/2	H	Cased to 80 ft.
55-701	Mrs. G. Lindquist	--	Old	300	6	Kgru	1,860	200	Nov. 1966	P,E, 3/4	H	Reported small supply of water.
801	J. E. Jones	Edmunds Drilling Co.	1951	380	5	Kgrl	1,800	280	Nov. 1966	S,E, 1	H	
56-701	W. R. Henke	-- Edwards	1954	44	6	Kea	1,920	17.5	Nov. 8, 1966	P,E, 1/2	H,S	Cased to 6 ft. Pump set at 42 ft. Measured drawdown 22 ft after 28 hours pumping 2 gpm.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-56-702	W. R. Henke	--	--	Spring	--	Kea	1,900	+	Nov. 8, 1966	Flows	S	Estimated flow 10 gpm, Nov. 8, 1966. Reported never ceased flowing. Temp. 21°C.
59-301	D. H. Hughes	--	1944	372	6	Kea	2,345	337	Dec. 1952	P,W	H,S	Reported small supply of water.
60-101	W. Klein	--	1951	477	6	Kea	2,342	258.6 261.9	Dec. 18, 1952 Mar. 31, 1967	P,W	H,S	
501	Texas Fish & Wildlife Dept.	--	--	Spring	--	Kea	1,945	+	Apr. 13, 1967	Flows	S	Estimated flow 150 gpm, Apr. 13, 1967. Temp. 19°C.
601	Stowers Ranch	--	--	Spring	--	Kea	2,000	+	do	Flows	H,S	Estimated flow 15 gpm, Apr. 13, 1967. Reported never ceased flowing. Temp. 19°C.
901	Callum Ranch	--	--	300	6	Kea	2,280	249.3	Apr. 12, 1967	P,W	S	
902	do	C. Ekstine	1948	150	6	Kea	2,077	49.8	do	P,W	S	Cased to 20 ft. Pump set at 106 ft.
61-201	Patio Ranch	Edmunds Drilling Co.	1960	780	6	Kph	2,120	550	1967	S,G, 5	H	Reported moderate supply of water. Pump set at 640 ft.
301	Boy Scouts of America	--	Old	200	6	Kea	2,092	148.4	Nov. 11, 1967	P,W	S	Reported discharge 3 gpm.
401	Callum Ranch	--	--	200	6	Kea	2,066	117.9	Apr. 12, 1967	P,W	S	
402	do	--	--	Spring	--	Kea	1,915	+	do	Flows	S	Estimated flow 25 gpm, Apr. 12, 1967. Reported never ceased flowing. Temp. 18°C.
501	L. F. Scherer, Jr.	Edmunds Drilling Co.	1962	265	5	Kea	2,098	151	Apr. 1962	P,W	S	Cased to 18 ft. Reported discharge 4 gpm when drilled. 2/
502	Boy Scouts of America	do	1964	756	7	Kph	2,060	483.3	Apr. 11, 1967	S,E, 5	H	Cased to bottom. Slotted from 712 ft to bottom. Reported discharge 25 gpm when drilled.
503	E. Waggoner	do	1966	778	7	Kph	1,920	335	Apr. 1967	S,E, 3	H	Cased to bottom. Slotted from 610 to 650 ft, and 690 ft to bottom.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-61-504	A. L. McCullough	--	--	Spring	--	Kea	1,890	+	Apr. 12, 1967	Flows	H	Estimated flow 25 gpm, Apr. 12, 1967. Reported never ceased flowing. Temp. 21°C.
505	M. J. Ball	--	Old	35	6	Kea	1,934	22	Apr. 1967	P,W	S	Reported small supply of water. Pump set at 33 ft.
601	Camp Wildemar	Edmunds Drilling Co.	1967	765	7	Kph	1,845	262.9	Apr. 3, 1967	S,E, 15	H	Cased to 565 ft. Reported moderate supply of water. Temp. 20°C. 1/
701	Callum Ranch	--	--	275	6	Kea	2,156	148.3	Apr. 12, 1967	P,W	S	
702	do	--	--	Spring	--	Kea	1,987	+	do	Flows	S	Estimated flow 100 gpm, Apr. 12, 1967. Reported never ceased flowing. Temp. 18°C.
703	do	--	--	200	6	Kea	2,091	62.7	do	P,W	S	
704	do	--	--	200	6	Kea	2,103	82.7	do	P,W	S	
705	do	--	1967	275	6	Kea	2,170	153.3	do	P,W	S	
801	M. T. Ball	Edmunds Drilling Co.	1949	33	6	Kea	1,994	20.6	do	P,W	S	Cased to bottom. Slotted from 29 ft to bottom. Pump set at 31 ft. No measureable drawdown after pumping 24 hours at 2 gpm. Temp. 19°C.
62-101	C. L. Meadow	--	--	Spring	--	Kea	1,895	+	Apr. 11, 1967	Flows	S	Estimated flow 150 gpm, Apr. 11, 1967. Reported never ceased flowing. Temp. 20°C.
102	do	--	--	Spring	--	Kea	1,900	+	do	Flows	H	Estimated flow 3 gpm, Apr. 11, 1967. Reported never ceased flowing. Temp. 21°C.
103	do	--	--	Spring	--	Kea	1,900	+	do	Flows	S	Estimated flow 75 gpm, Apr. 11, 1967. Reported never ceased flowing. Temp. 20°C.
104	do	--	--	Spring	--	Kea	1,880	+	do	Flows	S	Estimated flow 50 gpm, Apr. 11, 1967. Reported never ceased flowing. Temp. 20°C.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-62-105	C. L. Meadow	--	--	Spring	--	Kea	1,990	+	Apr. 11, 1967	Flows	S	Estimated flow 75 gpm, Apr. 11, 1967. Reported never ceased flowing. Temp. 21°C.
106	J. H. Duncan	--	--	Spring	--	Kgru	1,780	+	do	Flows	S	Estimated flow 10 gpm, Apr. 11, 1967. Temp. 19°C.
201	C. O'Neal	W. Wehmeyer	1952	375	7	Kgrl	1,800	189.2	Mar. 2, 1967	S,E, 1 1/2	H	Pump set at 280 ft.
202	F. Switzer	F. Switzer	Old	25	48	Kgru	1,780	21.3	do	T,E	H	Dug well.
301	-- Bailey	S. W. Forester	1929	1,120	--	--	1,762	--	--	--	--	Oil test. Reported top of black shale at 620 ft.
302	W. Henderson	Edmunds Drilling Co.	1964	305	6	Kgrl	1,805	230	Mar. 1967	S,E	H	Cased to bottom. Slotted from 250 ft to bottom.
303	E. C. Puryear	W. Wehmeyer	1961	330	8	Kgrl	1,790	214.2	Mar. 2, 1967	S,E, 1 1/2	S	Cased to 270 ft. Pump set at 280 ft.
* 401	C. A. Clements	--	--	305	6	Kgru	1,780	150	1951	N	N	
402	J. H. Duncan	--	Old	17	36	Kgru	1,805	15.6	Apr. 11, 1967	P,W	H	Dug well.
403	do	--	Old	21	24	Kgru	1,785	25.6	do	T,E, 3	H	Do.
* 404	J. D. Brance	W. E. Page	1965	618	7	Kph	1,780	225	May 1966	T,E, 3	H	Cased to 600 ft. Reported moderate supply of water. Temp. 21°C.
* 405	L. Graham	Edmunds Drilling Co.	1965	712	7	Kph	1,800	157	Dec. 1965	S,E, 3	H,S	Cased to bottom. Slotted from 602 to 626 ft, 652 to 675 ft, and 692 ft to bottom. Reported moderate supply of water. Temp. 21°C. 2/
* 501	J. W. Calvin	do	1963	921	7	Kph, Kpc, Ksh	2,025	413.7	May 5, 1966	S,E, 20	P	Cased to bottom. Slotted from 760 ft to bottom. Reported moderate supply of water. Temp. 23°C. 1/
* 502	P. B. Hunter	--	1935	32	36	QTal	1,745	5	May 1966	P,W	H	Dug well. Temp. 20°C.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-62-503	P. B. Hunter	--	1951	32	36	QTal	1,745	5	May 1966	C,E, 5	H	Dug well. Cased to 29 ft. Reported discharge 60 gpm.
* 601	W. D. Lancaster	Edmunds Drilling Co.	1960	400	5	Kph	1,745	158	1960	S,E, 1	H,S	Cased to bottom. Slotted from 360 ft to bottom. Pump set at 231 ft. Temp. 22°C. 2/
602	A. Bittel	W. E. Page	1951	184	6	Kea	1,996	98.3	Dec. 1, 1966	P,W	S	Measured drawdown 1 ft after 24 hours pumping 3 gpm. Temp. 21°C.
603	do	--	--	Spring	--	Kea	1,900	+	do	Flows	S	Estimated flow 50 gpm, Dec. 1, 1966. Reported never ceased flowing. Temp. 20°C.
* 801	Mrs. H. C. Hanszen	--	1956	864	8	Kph	1,955	378.8	May 16, 1966	S,E, 15	H,S	Cased to bottom. Slotted from 729 to 795 ft, and 805 to 820 ft. Originally drilled to 1,060 ft; plugged back to 864 ft. Measured discharge 150 gpm. Temp. 24°C. 1/
* 802	do	--	--	Spring	--	Kea	1,920	+	May 4, 1966	Flows	S	Estimated flow 50 gpm, May 4, 1966. Temp. 21°C.
* 803	do	--	--	Spring	--	Kea	1,935	+	do	Flows	S	Estimated flow 30 gpm, May 4, 1966. Temp. 21°C.
804	J. Moore	British-American Oil Co.	1964	1,232	--	--	2,099	--	--	--	--	Oil test. 1/
901	A. Bittel	--	1900	15	48	Kgru	1,820	8.9	Dec. 1, 1966	T,E, 1/2	H	Dug well. Cased to 5 ft.
902	do	W. E. Page	1951	400	5	Kgru	1,900	307.6	do	N	N	Cased to bottom. Slotted from 380 ft to bottom. Reported small supply of "gyp" water.
63-201	R. Davis	W. Wehmeyer	1954	245	6	Kgru	1,780	150	1954	P,E, 1 1/2	H,S	Pump set at 225 ft.
202	H. Bennison	do	1964	340	6	Kgrl	1,755	173.6	Nov. 17, 1966	P,E	I	
203	P. W. Jones	Edmunds Drilling	1952	176	5	Kgrl	1,720	142.8	do	S,E, 1	H	Cased to bottom. Slotted from 156 ft to bottom.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-63-204	S. L. Ballard	W. Wehmeyer	1961	234	6	Kgrl	1,720	158.3	Nov. 23, 1966	S,E, 3/4	H	
205	R. W. Smith	Edmunds Drilling Co.	1961	450	6	Kph	1,750	200.4	do	S,E, 1 1/2	H	
301	J. Osborne	W. E. Page	1958	377	6	Kph	1,745	152.8	Aug. 19, 1966	P,E, 1	H	Cased to bottom. Slotted from 350 ft to bottom.
* 401	C. Craig	Edmunds Drilling Co.	1965	600	8	Kph	1,780	215	Apr. 1966	T,E, 15	P	Cased to bottom. Slotted from 435 ft to bottom. Reported discharge 250 gpm. Temp. 22°C. 2/
402	do	do	1962	625	7	Kph	1,840	276	Apr. 1966	S,E, 15	P	Cased to bottom. Slotted from 400 ft to bottom. Pump set at 400 ft. Reported moderate supply of water.
* 403	J. W. Hill	Edmunds Drilling Co.	1958	536	7	Kph	1,905	335	July 1958	S,E, 2	H	Cased to bottom. Slotted from 486 ft to bottom. Pump set at 420 ft. Reported moderate supply of water. Temp. 22°C.
404	Boy Scouts of America	--	Old	416	5	Kph	1,780	150	Apr. 1967	S,E, 5	H	Cased to 380 ft.
405	L. Mann	W. E. Page	1964	357	8	Kph	1,710	48.3	Dec. 1, 1966	S,E, 1 1/2	H	Cased to bottom. Slotted from 300 ft to bottom. Measured drawdown 6.6 ft after 1/2 hour pumping 15 gpm. Temp. 22°C.
406	A. J. Colbath	--	--	Spring	--	Kea	1,880	+	Dec. 2, 1966	Flows	H	Estimated flow 6 gpm, Dec. 2, 1966. Temp. 21°C.
501	City of Kerrville	H. Saunders	1957	620	16	Ksh	1,674	214.9	Feb. 16, 1967	S,E, 100	P	Cased to bottom. Slotted from 513 ft to bottom. Measured drawdown 84 ft after 3/4 hour pumping 900 gpm. Acidized with 15,000 gallons. Temp. 21°C. 1/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
*RJ-56-63-502	W. F. Stelzer	Edmunds Drilling Co.	1965	657	9	Kph, Ksh	1,702	400	Apr. 1966	S,E, 15	H	Cased to bottom. Slotted from 470 to 540 ft, and 550 to 630 ft. Pump set at 550 ft. Reported moderate supply of water. Temp. 19° C. 1/
503	A. Treiber	W. E. Page	Old	300	6	Kgrl	1,760	185	Nov. 1966	P,E	H	Cased to 290 ft. Reported small supply of water.
504	G. Voss	Edmunds Drilling Co.	1963	400	5	Kph	1,685	150	Nov. 1966	S,E, 1	H	Reported small supply of water.
505	S. L. Griffin	W. E. Page	1963	300	5	Kph	1,640	139.7	Nov. 29, 1966	S,E, 1	H	Cased to bottom. Slotted from 279 ft to bottom.
506	M. Johnson	--	Old	400	6	Kph	1,690	152.3	do	S,E, 1	H	
507	R. Hansen	King Stokes	1956	614	8	Kpc, Ksh	1,665	200	Dec. 1966	S,E, 1 1/2	H	Cased to 450 ft. Reported discharge 300 gpm after acidizing with 5,000 gallons. 1/
508	H. A. Swan	C. Eckstine	Old	450	5	Kph	1,665	131.9	Dec. 2, 1966	S,E, 2	H	
601	City of Kerrville	--	Old	610	7	Kph, Ksh	1,650	157.1	Apr. 14, 1966	N	N	Destroyed. 1/
* 602	City of Kerrville well 2	--	Old	650	7	Kgrl, Kph, Kpc, Ksh	1,650	153.6	do	N	N	Destroyed. Temp. 22°C. 1/
* 603	City of Kerrville well 3	J. R. Johnson	1940	725	12	Ksh	1,652	275.3	June 14, 1967	T,E, 75	P	Cased to 510 ft. Drilled to 725 ft; caved at 667 ft. Measured drawdown 39 ft after many hours pumping 610 gpm. Acidized 15,000 gallons. Temp. 21°C. 1/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
* RJ-56-63-604	City of Kerrville well 4	J. H. Crowler	1945	605	14	Ksh	1,653	192.5	Feb. 14, 1967	T,G, 75	P	Cased to 470 ft. Measured drawdown 30 ft after 20 hours pumping 670 gpm when drilled. Acidized 15,000 gallons. Temp. 21°C. 3/
* 605	City of Kerrville well 5	J. R. Johnson	1947	600	14	Ksh	1,656	232.7	Apr. 13, 1967	T,E, 100	P	Cased to 463 ft. Reported discharge 1,000 gpm when drilled. Acidized. 15,000 gallons. Temp. 21°C. 3/
606	City of Kerrville well 6	do	1949	665	12	Ksh	1,683	200	1967	N	N	Cased to 95 ft. Acidized 20,000 gallons. 1/
607	City of Kerrville well 7	do	1949	634	16	Ksh	1,640	267.6	June 14, 1967	T,E, 125	P	Cased to 530 ft. Measured drawdown 38 ft after many hours pumping 1,150 gpm. Acidized 15,000 gallons. 1/2/3/
608	City of Kerrville well 8	do	1952	619	20	Kpc, Ksh	1,632	139.6	Mar. 17, 1967	S,E, 150	P	Cased to 440 ft. Reported discharge 1,400 gpm when drilled. Acidized 15,000 gallons. 1/3/
609	City of Kerrville	Edmunds Drilling Co.	1963	600	--	--	1,631	--	--	--	--	Test hole. 1/
610	do	do	1967	641	--	--	1,722	--	--	--	--	Test hole. 1/2/
611	City of Kerrville well 12	do	1965	610	12	Ksh	1,690	215.8	Apr. 13, 1967	T,E, 125	P	Cased to 540 ft. Measured drawdown 124 ft after 1 hour pumping 1,227 gpm. Acidized 15,000 gallons. Temp. 22°C. 1/3/
612	G. H. Daniel	W. E. Page	1966	320	7	Kgrl	1,675	146.2	Aug. 19, 1966	S,E, 1	H	Pump set at 189 ft.
613	R. G. Grona	Edmunds Drilling Co.	1962	318	5	Kgrl	1,740	100	Dec. 1966	S,E, 3/4	H	Cased to 297 ft. Pump set at 126 ft.
614	City of Kerrville well 13	do	1966	603	12	Ksh	1,620	197.0	Sept. 20, 1966	T,E	P	Cased to 532 ft. Measured drawdown 207 ft after 1 3/4 hours pumping 512 gpm. Acidized 15,000 gallons. Temp. 22°C. 1/2/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-63-701	J. Brunner	W. Wehmeyer	1960	575	6	Kph	1,830	269.7	Dec. 2, 1966	S,E, 3	H,S	
702	L. Guthrie	--	Old	160	6	Kea	2,010	141.4	do	S,E, 1	H	Cased to 10 ft. Reported small supply of water.
901	City of Kerrville well 9	J. R. Johnson	1952	625	12	Ksh	1,608	177.3	Mar. 17, 1967	S,E, 75	P	Cased to bottom. Slotted from 500 ft to bottom. Measured drawdown 85 ft after many hours pumping 764 gpm. Acidized 15,000 gallons. 1/3/
902	Lehmann & Monroe	Hayes Oil Co.	1951	650?	8	--	1,640	175	1951	T,G	N	Unused irrigation well. Reported moderate supply of water.
903	C. F. Rowsey	J. M. Wright	1966	560	12	Kgrl, Kph, Kpc	1,620	123.2	Apr. 7, 1966	T,E	I	Cased to 350 ft. Slotted from 255 to 350 ft. Reported discharge increased from 325 to 700 gpm after acidizing with 15,000 gallons. 1/
904	do	do	1966	600	8	Kgrl, Kph, Kpc	1,720	204.8	do	T,E	I	Cased to 340 ft. Reported discharge increased from 135 to 200 gpm after acidizing with 5,000 gallons. 1/
905	do	W. E. Page	--	600	8	Ksh?	1,640	119.4	Apr. 7, 1966	T,E	I	
906	J. Weatherby	Edmunds Drilling Co.	1964	631	8	Ksh	1,610	150	1964	S,E, 5	H,S	Cased to bottom. Slotted from 545 to 568 ft, and 575 to 618 ft. 1/
907	Lynn Rest Cemetery	do	1963	210	5	Kgru	1,605	108.4	Jan. 26, 1967	S,E, 3	H	Reported small supply of "gyp" water.
908	Lehman & Monroe	do	1967	476	6	Kph	1,680	187.6	Mar. 31, 1967	S,E	H	1/
64-101	Mrs. A. Robinson	W. Weymeyer	1956	180	6	Kea	2,066	109.4	Nov. 9, 1966	P,W	S	Cased to 20 ft. Reported discharge 3 gpm.
102	A. E. Reid	--	--	Spring	--	Kea	1,920	+	Nov. 10, 1966	Flows	S	Estimated flow 90 gpm, Nov. 10, 1966. Reported never ceased flowing. Temp. 19°C.
103	do	--	--	Spring	--	Kea	1,920	+	do	Flows	H	Estimated flow 18 gpm, Nov. 10, 1966. Reported never ceased flowing. Temp. 20°C.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-64-104	A. E. Reid	--	--	Spring	--	Kea	1,925	+	Nov. 10, 1966	Flows	S	Estimated flow 100 gpm, Nov. 10, 1966. Reported never ceased flowing. Temp. 20°C.
105	do	--	--	Spring	--	Kea	1,960	+	do	Flows	S	Estimated flow 2 gpm, Nov. 10, 1966. Temp. 20°C.
106	T. D. Hall	--	--	Spring	--	Kea	1,970	+	do	Flows	S	Estimated flow 15 gpm, Nov. 10, 1966. Reported never ceased flowing. Temp. 20°C.
107	A. E. Reid	--	--	Spring	--	Kea	1,900	+	do	Flows	S	Estimated flow 9 gpm, Nov. 10, 1966. Reported never ceased flowing. Temp. 20°C.
108	do	--	--	Spring	--	Kea	1,900	+	do	Flows	S	Estimated flow 200 gpm, Nov. 10, 1966. Reported never ceased flowing. Temp. 20°C.
201	Mrs. A. Robinson	--	1921	90	6	Kea	2,035	75.7	Nov. 9, 1966	S,E, 1/2	H,S	Reported discharge 15 gpm.
202	O. R. Schwethelm	Edmunds Drilling Co.	1948	184	6	Kea	2,050	106.1	do	P,E, 2	H,S	Cased to 20 ft. Reported discharge 4 gpm.
203	A. L. Evans	do	1958	575	5	Kph	2,050	450	Nov. 1966	S,E, 5	H,S	Reported discharge 25 gpm.
204	do	--	--	550	5	Kph	2,045	436.9	Nov. 9, 1966	N	N	
* 401	U.S. Dept. of Agriculture	W. Wehmeyer	1960	465	5	Kph	1,840	307	1960	S,E, 3	P	Cased to bottom. Slotted from 376 ft to bottom. Measured discharge 25 gpm. Temp. 23°C.
402	D. Hainlen	Edmunds Drilling Co.	1956	500	7	Kph	1,780	214.2	Nov. 10, 1966	S,E, 5	H	
403	City of Kerrville	do	1965	605	--	--	1,654	--	--	--	--	Test hole. 1/2/
404	G. Foster	--	Old	500	5	Kgru, Kph	1,765	221.9	June 15, 1966	P,W	S	Reported "gyp" water.
405	F. A. Karger	--	1934	2,019	--	--	1,742	--	--	--	--	Oil test. Reported black shale at 572 ft.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
*RJ-56-64-501	G. Foster	--	--	Spring	--	Kgru	1,830	+	June 15, 1966	Flows	S	Estimated flow 15 gpm, June 15, 1966.
502	B. R. Schulz	--	--	Spring	--	Kea	1,920	+	do	Flows	H	Estimated flow 100 gpm, June 15, 1966. Reported never ceased flowing.
* 601	do	J. R. Johnson	1952	634	12	Ksh	1,758	150	1952	T,E, 75	I	Pump set at 330 ft. Reported discharge 1,000 gpm. Temp. 23°C. 1/
602	R. Voight	-- Lyndecker	1927	475	6	Kgru, Kgrl	1,780	170.0	June 15, 1966	N	N	Cased to 10 ft. Had to lower pump 20 ft during drought. Well abandoned in 1963. Reported small supply of "gyp" water.
603	E. Eeb	W. Wehmeyer	1956	340	6	Kgru	1,820	219.1	June 17, 1966	P,W	S	Reported "gyp" water.
604	do	--	1886	18	54	Kgru	1,615	7.8	do	C,W	H,S	Dug well. Reported small supply of water. Reported well dry at 18 ft during 1947-56 drought.
701	City of Kerrville Well 11	J. R. Johnson	1963	638	12	Ksh	1,600	171.5 194.7	Mar. 23, 1966 June 21, 1966	T,E, 150	P	Cased to 528 ft. Measured drawdown 97 ft pumping 938 gpm. Acidized with 15,000 gallons. 1/
* 702	U.S. Veterans Administration Hospital	do	1962	665	12	Ksh	1,630	135	May 1966	T,G, 50	P	Cased to 643 ft. Slotted from 598 to 643 ft. Reported large supply of water. Acidized with 5,000 gallons. Temp. 23°C. 2/
703	City of Kerrville Farm well	King Stokes	1953	600	7	Ksh	1,639	138.7	Mar. 16, 1967	P,E, 1	H,S	Pump set at 300 ft. 1/
* 704	J. Peschel	W. E. Page	1962	302	6	Kgru	1,635	197	1962	S,E	H,S	Cased to 184 ft. Temp. 22°C.
* 705	Kerrville State Park	--	1935	336	7	Kph	1,585	62.7 106.9	July 28, 1950 Mar. 15, 1967	S,E, 5	P	Reported drawdown 127 ft after 4 hours pumping 228 gpm. Temp. 21°C.
706	W. J. Cass	A. Smith	1956	640	7	Kph, Ksh	1,585	284.7	Aug. 8, 1966	P,E, 3	H,S	Cased to 550 ft. Slotted from 450 to 500 ft.
707	Lions Camp	Edmunds Drilling Co.	1957	668	8	Ksh	1,620	135	1957	S,E, 15	P	Cased to bottom. Slotted from 548 ft to bottom. Reported discharge 80 gpm.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-56-64-708	Lions Camp	Cravens Drilling Co.	1952	466	7	Kph	1,720	76	1952	T,E, 10	P	Cased to 443ft. Pump set at 240 ft.
57-57-101	R. P. Smith	--	--	Spring	--	Kea	1,855	+	Feb 23, 1967	Flows	H	Estimated flow 65 gpm, Feb. 23, 1967. Reported spring dry during 1947-56 drought. Temp. 21°C.
201	do	Edmunds Drilling Co.	1955	400	6	Kgrl	1,890	258.8	do	P,W	H,S	
202	do	do	1950	200	6	Kea	2,062	116.3	do	P,W	S	Cased to 6 ft. No measureable drawdown after pumping 24 hours at 1 1/2 gpm.
203	do	--	--	Spring	--	Kea	1,940	+	do	Flows	S	Estimated flow 5 gpm, Feb. 23, 1967. Reported never ceased flowing. Temp. 21°C.
204	F. Real	--	--	Spring	--	Kea	1,910	+	do	Flows	S	Estimated flow 1 gpm, Feb. 23, 1967.
205	do	--	Old	107	6	Kea	1,950	18.6	Feb. 23, 1967	P,W	S	Cased to 10 ft.
* 501	do	--	--	Spring	--	Kea	1,840	+	do	Flows	H,S	Estimated flow 50 gpm, Feb. 23, 1967. Reported never ceased flowing. Temp. 23°C.
502	do	--	--	Spring	--	Kea	1,850	+	do	Flows	S	Estimated flow 50 gpm, Feb. 23, 1967. Reported never ceased flowing.
* 701	A. C. Pfeiffer	B. Werner	1956	263	5	Kgrl, Kph	1,545	45	1959	J,E, 1	H	Cased to 181 ft. Temp. 21°C.
702	do	do	1956	270	8	Kgru, Kgrl, Kph	1,520	30	1957	T,G, 25	I	Cased to 60 ft. Deepened from 210 to 270 ft. Pump set at 160 ft. Reported discharge 300 gpm.
703	L. R. Rusch	L. Bergmann & Sons	1964	360	8	Kgrl, Kgh	1,565	56.1	Mar. 21, 1967	S,E, 15	I	Cased to 187 ft. Measured drawdown 105 ft after 4 hours pumping 113 pgm.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-57-57-704	L. R. Rusch	--	--	80	6	Kgru	1,570	53.2	Feb. 21, 1967	S,E, 3/4	S	Reported "gyp" water.
705	do	--	Old	25	48	Kgru	1,544	20.9	do	S,E, 1/2	H	Dug well.
706	P. Pfeiffer Estate	--	Old	14	32	Kgru	1,575	11.8	do	J,E, 1/2	H	Do.
707	P. Pfeiffer Estate	L. Bergmann & Sons	1967	360	6	Kgrl	1,640	155.6	Feb. 21, 1967	P,W	S	Cased to 296 ft. Reported discharge 60 gpm.
* 708	M. Reeh	Edmunds Drilling Co.	1965	350	5	Kph	1,590	76.4	do	S,E, 3/4	H	Cased to 300 ft. Pump set at 150 ft. Reported moderate supply of water. Temp. 21°C.
801	Mrs. R. Holekamp	L. Bergmann & Sons	1937	270	7	Kgrl	1,570	80.2 93.0	Oct. 19, 1961 Feb. 21, 1967	P,E, 5	S	Cased to 180 ft. Reported discharge 30 gpm.
802	A. D. Bartel	--	1880	56	40	Kgru	1,575	52.1	Sept. 9, 1966	J,E, 1/2	H,S	Dug well. Cased to 25 ft.
803	K. A. Holekamp	--	1946	265	6	Kgru	1,600	105.6	Feb. 21, 1967	P,S	H	Cased to 150 ft. Pump set at 200 ft. Reported discharge 4 1/2 gpm. Reported "gyp" water.
68-01-101	G. Walker	G. L. Rowsey	1955	668	5	Kgrl, Kph, Kpc, Ksh	1,690	215.7	May 9, 1966	P,W	S	Cased to 409 ft. Slotted from 358 to 409 ft. Oil test; converted to water well. Originally drilled to 3,175 ft; plugged back to 668 ft.
102	do	--	Old	250	6	Kgrl	1,640	135.1	Nov. 9, 1966	P,E, 5	S	No measureable drawdown after pumping 24 hours at 3 gpm.
103	do	Rowsey & Taylor Oil Co.	1954	2,115	8	--	1,528	--	--	--	--	Oil test. 1/
104	R. O. Perkins	Tucker Drilling Co.	1954	3,495	--	--	1,534	--	--	--	--	Oil test. 1/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
*RJ-68-01-201	G. Karger	C. Spenrath	1895	210	6	Kgrl, Kph	1,485	16	Sept. 1966	P,E, 3	H	Cased to 16 ft. Reported moderate supply of water. Temp. 21°C.
202	Mrs. E. Kutzer	L. Bergmann & Sons	1948	322	7	Kgrl	1,880	120	1961	T,E, 3	I	Cased to 140 ft. Reported discharge 38 gpm.
203	Mrs. A. Heinen	--	Old	300	6	Kph	1,460	46.0	Sept. 7, 1966	P,E, 3/4	H	Pump set at 120 ft.
204	C. R. Blank	B. F. Lackey	1964	268	6	Kph	1,510	60	1964	S,E, 1	S	Cased to bottom. Slotted from 208 ft to bottom.
205	do	do	1964	268	6	Kgrl	1,535	80	1964	S,E, 1	H	Do.
206	L. P. Flach	--	Old	152	6	Kgrl	1,485	22.4	Sept. 9, 1966	P,E, 1/2	H	Pump set at 60 ft.
207	C. Haufler	L. Bergmann & Sons	1963	210	7	Kgrl	1,525	120	1963	S,E, 3/4	H	Cased to 62 ft. Pump set at 165 ft. Reported discharge 40 gpm when drilled. 2/
401	G. Walker	--	Old	81	6	Kgru	1,485	27.8	May 9, 1966	P,W	S	No measureable drawdown after pumping 24 hours at 2 gpm.
402	do	Edmunds Drilling Co.	1951	270	6	Kph	1,480	30	1966	J,E, 1/2	H	Cased to 226 ft.
403	C. H. Molter	--	Old	260	6	Kph	1,485	70.9	Dec. 20, 1966	P,E, 1	H,S	
404	B. Doebbler	Spenrod Bros.	1900	200	6	Kgrl, Kph	1,485	40.4	do	S,E, 3/4	H	Cased to bottom. Slotted from 180 ft to bottom. Pump set at 60 ft.
405	do	do	1900	200	6	Kgrl, Kph	1,510	49.9	do	P,W	S	Cased to bottom. Slotted from 180 ft to bottom. Pump set at 42 ft.
406	R. O. Perkins	L. Bergmann & Sons	1953	666	12	Kph, Kpc, Ksh	1,485	34	1953	N	N	Cased to 651 ft. Slotted from 255 to 645 ft. Reported discharge 159 gpm. Unused irrigation well. 1/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-68-01-501	Hermann Sons	--	Old	38	96	QTal	1,432	33.3	Apr. 8, 1966	P,E, 3	H	Dug well.
502	do	W. Werner	1955	350	6	Kph	1,435	49.5	do	P,E, 3	H	
503	do	L. Bergmann & Sons	1949	405	6	Kph	1,545	156	Feb. 1949	P,E, 3	H	Cased to 313 ft. Reported moderate supply of water.
504	C. Bonam	--	Old	233	6	Kgru	1,500	101.7	Apr. 8, 1966	S,E, 1 1/2	H,S	Reported weak supply of "gyp" water.
701	H. D. Cook	F. Fox	1936	385	6	Kgru, Kgrl	1,610	96.8	Nov. 7, 1966	P,E, 1 1/2	S	Cased to 97 ft. Reported "gyp" water.
702	L. Pressler	W. E. Page	1921	319	6	Kgru, Kgrl	1,555	88.2	do	P,W	H,S	Cased to 90 ft.
09-101	U. Letz	--	1923	480	6	Kgru, Kgrl, Kph	1,580	250	1966	P,W	S	Reported "gyp" water.
102	do	W. E. Page	1946	889	5	Kph	1,990	529	Nov. 1966	P,G, 7 1/2	S	Cased to bottom. Slotted from 809 ft to bottom. Pump set at 817 ft. Reported small supply of water.
103	B. B. Parker	B. F. Lackey	1960	49	6	Kgru	1,610	32.8	Nov. 7, 1966	P,W	S	Measured drawdown 3.1 ft after 24 hours pumping 2 gpm.
201	U. Letz	W. E. Page	1921	83	6	Kgru	1,680	12	Nov. 1966	P,W	S	Cased to bottom. Slotted from 73 ft to bottom. Pump set at 20 ft. Reported "gyp" water.
202	do	--	--	Spring		Kea	1,860	+	Nov. 7, 1967	Flows	H	Estimated flow 2 gpm, Nov. 7, 1967. Reported never ceased flowing. Temp. 20°C.
69-03-201	G. F. Schreiner	Continental Oil Co.	1942	6,010	--	--	2,340	--	--	--	--	Oil test. 1/
501	Hilda Auld	Auld & Tucker	1958	5,972	--	--	2,350	--	--	--	--	Do.
502	W. Auld	Edministon & Fowler	1949	3,504	--	--	2,348	--	--	--	--	Oil test. 1/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-69-03-503	W. Auld	Woodward & Co.	1951	5,932	--	--	2,363	--	--	--	--	Oil test. 1/
504	do	Edmunds Drilling Co.	1951	298	6	Kea	2,410	208.6	June 27, 1955	P,W	S	Measured drawdown 10 ft after 1/2 hour pumping 5 gpm. Temp. 21°C.
601	H. Wilson	--	1950	291	6	Kea	2,335	258.6	Jan. 28, 1953	P,W	H,S	1/
602	do	--	1938	316	6	Kea	2,348	293.2	do	P,W,E, 3	H,S	
603	do	--	1950	277	6	Kea	2,333	247.5	Dec. 23, 1952	P,W	S	
04-401	H. Johnson	--	1928	345	6	Kea	2,366	279	Dec. 1952	P,W	H,S	
501	G. Schriener	--	1948	170	6	Kea	2,240	96.1	Jan. 29, 1953	P,W	S	
502	E. M. Peters	--	--	208	6	Kea	2,196	158.7	Dec. 16, 1952	P,W,E, 1 1/2	H,S	
601	C. O. Whitworth	Phillips Petroleum Co.	1949	6,620	--	--	2,193	--	--	--	--	Oil test.
701	A. Wilson, Jr.	Mull Drilling Co.	1961	7,031	--	--	2,381	--	--	--	--	Oil test. 1/
05-201	Lynnhaven Ranch	--	--	Spring	--	Kea	1,955	+	July 12, 1967	Flows	S	Estimated flow 10 gpm. July 12, 1967. Temp. 21°C.
202	do	--	--	Spring	--	Kea	1,975	+	do	Flows	S	Estimated flow 5 gpm, July 12, 1967. Temp. 21°C.
06-301	H. Real	E. Schmidt, et al.	1953	5,519	--	--	2,070	--	--	--	--	Oil test. 1/
401	F. F. Fisher	Tucker Drilling Co.	1965	5,365	--	--	2,236	--	--	--	--	Do.
501	C. Walton	A. Smith	1954	560	5	Kph	1,783	229.9	Dec. 11, 1958	P,E	H,S	Cased to bottom. Slotted from 500 ft to bottom. 1/
601	W. J. Goldston	--	--	Spring	--	Kgru	1,800	+	do	Flows	S	Estimated flow 10 gpm, Dec. 11, 1958. Spring flows from upper evaporite bed.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
*RJ-69-06-801	T. Friedman	A. Smith	1954	450	7	Kgrl, Kph	1,671	83	May 1954	T,E	H	Cased to 237 ft. 1/
* 901	W. J. Goldston	do	1954	455	6	Kgrl, Kph	1,693	120	July 1954	S,E, 1 1/2	H	Cased to bottom. Slotted from 300 ft to 400 ft. 1/
* 07-101	F. Logan	--	1955	460	8	Kgru, Kph	1,760	100	1966	S,E, 1	H	Cased to 275 ft. Temp. 21°C.
102	Kickapoo Kamp	--	1948	12	36	QTal	1,720	9	Sept. 1966	C,E, 1	H,S	Dug well. Cased to 9 ft. Reported discharge 25 gpm.
103	F. Logan	--	1952	16	48	Kgru	1,740	5.4	Sept. 15, 1966	S,E, 1	H	Dug well. Pump set at 15 ft.
104	N. Traudt	--	--	Spring	--	Kea	1,860	+	do	Flows	H	Estimated flow 10 gpm, Sept. 15, 1966. Reported never ceased. Temp. 19°C.
105	do	--	--	Spring	--	QTal	1,760	+	do	Flows	S	Estimated flow 30 gpm, Sept. 15, 1966. Temp. 21°C.
201	F. Real	--	--	Spring	--	Kea	1,820	+	do	Flows	H	Estimated flow 15 gpm, Sept. 15, 1966. Reported never ceased flowing. Temp. 21°C.
202	do	W. E. Page	1938	400	6	Kgrl, Kph	1,650	88.4 101.8	Dec. 17, 1952 Sept. 15, 1966	P,W	S	
203	O. Nuenhoffer	--	Old	25	36	Kgru	1,650	21.1	Mar. 16, 1967	J,E, 1/2	H	Dug well. Cased to bottom with rock. Reported dry at 25 ft during 1947-57 drought.
* 301	G. E. Ross	--	Old	600	6	Kph	1,780	274.4	May 26, 1966	S,E, 2	H	Cased to bottom. Slotted from 480 ft to bottom. Pump set at 330 ft. Measured drawdown 9.5 ft after 18 hours pumping 50 gpm. Temp. 22°C.
302	F. Real	W. E. Page	1949	425	6	Kgrl, Kph	1,751	197.5 241.7	Dec. 17, 1952 Sept. 15, 1966	P,W	H	
401	H. Cheyney	--	--	Spring	--	Kea	1,840	+	Mar. 15, 1967	Flows	S	Estimated flow 55 gpm, Mar. 15, 1967. Reported never ceased flowing. Temp. 20°C.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-69-07-501	B. L. Wiedenfeld	--	--	Spring	--	Kea	1,840	+	Mar. 15, 1967	Flows	S	Estimated flow 3 gpm, Mar. 15, 1967. Temp. 20°C.
502	J. C. Jacobson	Edmunds Drilling Co.	1960	530	5	Kph	1,770	275	Mar. 1967	P,E, 1	H	
503	Mrs. L. Meacham	W. Wehmeyer	1960	690	6	Kph	1,900	394.4	Mar. 15, 1967	S,E, 1 1/2	H	
701	H. Cheyney	--	1925	275	6	Kea	2,050	128.2	Jan. 29, 1954	S,E, 1	H,S	Reported discharge 5 gpm. Reported water level declined during 1947-56 drought.
702	B. L. Wiedenfeld	W. E. Page	1937	110	6	Kea	2,032	78.7	Mar. 15, 1967	P,W	S	Cased to 3 ft. Reported discharge 65 gpm when drilled.
703	do	do	1937	105	6	Kea	2,080	100	Mar. 1967	P,E, 1/2	S	Cased to 2 ft.
801	do	--	--	Spring	--	Kea	1,900	+	Mar. 15, 1967	Flows	S	Estimated flow 15 gpm, Mar. 15, 1967. Temp. 19°C.
901	R. B. Nowlin	G. L. Rowsey	1954	6,363	--	--	1,685	--	--	--	--	Oil test. Reported base of Cretaceous at 970? ft.
* 902	E. W. Brown, Jr.	W. E. Page	1952	1,000	8	Ksh	1,769	334	Nov. 1952	T,G, 30	I	Cased to 796 ft. Pump set at 480 ft. Reported discharge 90 gpm. 1/
903	R. B. Nowlin	G. L. Rowsey	1954	7,903	--	--	1,670	--	--	--	--	Oil test. 1/
* 08-101	City of Kerrville Airport well	Edmunds Drilling Co.	1956	665	12	Ksh	1,581	117.0	Jan. 26, 1967	S,E, 15	P	Cased to 551 ft. Pump set at 450 ft. Reported discharge 90 gpm. Base of Cretaceous at 645 ft. Temp. 22°C.
102	Guadalupe Heights Utility Corp. well 1	W. E. Page	Old	600	7	Kph, Kpc, Ksh	1,620	201.2	Mar. 3, 1967	N	N	Destroyed. 1/
103	Guadalupe Heights Utility Corp. well 2	Edmunds Drilling Co.	1962	660	7	Kph, Kpc, Ksh	1,620	200	Apr. 1966	S,E, 15	P	Cased to 522 ft. Reported moderate supply of water. 2/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-69-08-104	Guadalupe Heights Utility Corp.	W. E. Page	1967	690	8	Ksh	1,620	240.5	Apr. 27, 1966	S,G, 7 1/2	P	Cased to bottom. Slotted from 630 to 680 ft. Measured drawdown 31 ft after 6 hours pumping 150 gpm. 1/
105	M. O. Mefford	do	1963	65	5	QTal	1,545	31.2	May 19, 1966	S,E, 1/2	H	Cased to bottom. Slotted from 30 ft to bottom.
106	C. Meeks	G. L. Rowsey	1954	900	15	Kph, Ksh	1,580	80	1954	T,G, 150	I	Cased to 600 ft. Slotted from 200 to 600 ft. Reported discharge 1,100 gpm. Irrigates 120 acres.
107	do	do	1954	900	15	Kph	1,615	130	1954	T,G, 130	I	Cased to 600 ft. Slotted from 200 to 600 ft. Reported discharge 700 gpm. Irrigates 40 acres.
108	B. L. Wiedenfeld	W. E. Page	1937	642	8	Ksh	1,605	107.2	Mar. 14, 1967	T,E, 7 1/2	S	Cased to 580 ft. Pump set at 120 ft.
109	do	F. Cox	1930	333	5	Kph	1,620	81.0 109.3	Dec. 22, 1952 Mar. 15, 1967	S,E, 2	H	Cased to bottom. Slotted from 300 ft to bottom.
* 201	J. L. Rappolee	--	1964	530	5	Kph, Kpc	1,655	162.7	Mar. 17, 1967	S,E, 2	H	Cased to 445 ft. Temp. 22°C. 1/ 3/
202	M. G. Morgan	Edmunds Drilling Co.	1966	542	5	Kph, Kpc	1,645	132.3	May 20, 1966	S,E, 1 1/2	H	Cased to 500 ft. 1/
301	G. Walker	Schuch & Foester	1945	287	6	Kgrl	1,578	113.4	May 9, 1966	P,W	S	Cased to 207 ft. Pump set at 147 ft. No measureable drawdown after pumping 24 hours at 3 gpm.
302	E. Walker	W. E. Page	1962	419	6	Kgrl	1,700	224	1962	P,W	H,S	Cased to 385 ft.
* 401	A. B. Prais	--	--	480	6	Kgru, Kgrl, Kph, Kpc	1,575	32	1966	T,E, 3	S	Cased to 20 ft. Pump set at 120 ft. Reported discharge 15 gpm. Temp. 22°C.
* 402	do	Edmunds Drilling Co.	1966	580	5	Kph, Kpc	1,575	81.5	Mar. 17, 1967	S,E, 1 1/2	H	Cased to bottom. Slotted from 560 ft to bottom. Pump set at 220 ft. Temp. 21°C.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-69-08-403	G. Heap	--	Old	200	10	Kgru	1,535	69.4	Mar. 15, 1967	S,E, 3/4	H	Pump set at 118 ft. Reported "gyp" water.
404	W. E. Huble	W. E. Page	--	540	6	Kph	1,645	200	Mar. 1967	S,E, 5	H	Cased to bottom. Slotted from 510 ft to bottom. Pump set at 250 ft. Reported discharge 6 gpm.
405	C. Pearson	--	Old	42	30	Kgru	1,640	35.9	Mar. 16, 1967	N	N	Dug well. Reported small supply of water.
501	G. L. Finch	B. F. Lackey	1958	338	7	Kgru, Kgrl	1,555	77.7	May 10, 1966	P,W	S	Cased to bottom. Slotted from 100 ft to bottom. Measured drawdown 100 ft after 1/2 hour pumping 3 gpm. Reported "gyp" water.
* 502	do	do	1956	78	9	Kgru	1,530	58	1956	T,G, 20	I	Cased to 75 ft. Pump set at 76 ft. Reported discharge 1,000 gpm. Irrigates 20 acres.
503	do	--	1886	39	40	Kgru	1,530	35	May 1966	J,E, 3/4	H	Dug well. Pump set at 38 ft. Reported water level declined during 1947-56 drought.
* 504	do	B. F. Lackey	1964	36	7	QTal	1,520	22	May 1966	J,E, 3/4	H,S	Cased to 35 ft. Pump set at 35 ft. Reported discharge 30 gpm. Temp. 19°C.
505	H. Wellborn	F. Cox	1925	325	6	Kgrl, Kph	1,525	57.1 56.9	Dec. 23, 1952 May 10, 1966	P,E, 1/2	H,S	Cased to 75 ft.
* 601	Mosty Bros.	Edmunds Drilling Co.	1954	312	10	QTal, Kgru, Kgrl, Kph	1,525	128.4	Mar. 15, 1967	S,E, 10	I	Cased to 60 ft. Drilled to 495 ft; caved at 312 ft. Measured drawdown 112 ft after 4 hours pumping 100 gpm. Irrigates nursery. Temp. 23°C. 1/ 3/
602	W. L. Russell	D. Edwards	1938	325	6	Kgrl, Kph	1,610	60	Apr. 1966	S,E, 1	H	Cased to 38 ft. Pump set at 185 ft. Reported small supply of water.
603	J. Burkett	--	Old	320	6	Kph	1,515	80	Apr. 1966	S,E, 5	P	Pump set at 250 ft. Reported moderate supply of water.

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
RJ-69-08-604	J. Burkett	Edmunds Drilling Co.	1965	314	8	Kph	1,530	143	1965	S,E, 7 1/2	P	Cased to 251 ft. Reported moderate supply of water.
605	do	--	--	314	8	Kph	1,530	71.1	May 27, 1966	S,E, 15	P	Cased to 230 ft. Pump set at 270 ft. Reported discharge 150 gpm.
606	Mosty Bros.	W. E. Page	1921	317	15	QTal, Kgru, Kgrl Kph, Kpc	1,525	120.1	Jan. 27, 1967	S,E, 10	H,I	Cased to 40 ft. Measured drawdown 150 ft after 3 hours pumping 95 gpm. Irrigates nursery. Temp. 22°C. 3/
607	S. Mosty	Edmunds Drilling Co.	--	240	6	Kgru, Kgrl, Kph	1,510	55.2	Apr. 29, 1966	S,E, 1	H,S	
608	M. Kilburn	--	Old	200	6	Kgru, Kgrl	1,505	51.6	do	P,E, 1	H	Cased to 50 ft. Measured drawdown 15 ft after 1/2 hour pumping 5 gpm.
609	R. Mosty	--	Old	250	6	Kgrl, Kph	1,510	45	Apr. 1966	J,E, 1	H,S	
610	Mosty Bros.	--	Old	300	6	Kgrl, Kph	1,500	77.3	July 19, 1966	J,E, 1	H	
611	R. B. Nowlin	-- Van Dyke	1920	550	8	Kph, Kpc, Ksh	1,515	50	Nov. 1966	T,G, 25	U	Reported discharge 200 gpm. Unused irrigation well.
612	R. Mosty	--	Old	192	6	Kgrl	1,555	81.5 87.4	Apr. 29, 1966 July 19, 1966	P,E, 1	H,S	
* 613	G. Walker	F. Fox	1906	225	6	Kgrl, Kph	1,510	54.8	May 9, 1966	P,W	H,S	Cased to 147 ft. Pump set at 83 ft. Measured drawdown 2 ft after 24 hours pumping 2 gpm. Temp. 21°C.
* 614	Mosty Bros.	A. Week	1956	427	8	Kph, Kpc	1,570	104.8 108.2 108.0	Apr. 29, 1966 June 22, 1966 June 27, 1966	T,G, 25	I	Cased to 180 ft. Measured drawdown 87 ft after 4 hours pumping 110 gpm. Irrigates nursery. Temp. 22°C. 1/

See footnotes at end of table.

Table 3.--Records of Wells and Springs in Kerr County--Continued

WELL	OWNER	DRILLER	DATE COMPLETED	DEPTH OF WELL (FT)	DIAMETER OF WELL (IN.)	WATER-BEARING UNIT	ALTITUDE OF LAND SURFACE (FT)	WATER LEVEL		METHOD OF LIFT	USE OF WATER	REMARKS
								BELOW LAND-SURFACE DATUM (FT)	DATE OF MEASUREMENT			
*RJ-69-08-615	Mosty Bros.	Mosty Bros.	1966	61	12	QTal	1,515	34.7	July 19, 1966	N	N	Pump set at 56 ft. Temp. 22°C.
701	R. B. Nowlin	--	Old	21	36	Kgru	1,660	7.0	May 11, 1966	P,W	H,S	Dug well. Cased to 10 ft.
702	B. Mansfield	--	Old	24	48	Kgru	1,640	11.2	do	J,E, 1/2	H,S	Dug well. Pump set at 20 ft.
703	R. M. Montel	--	1937	22	36	Kgru	1,675	14.3 12.0	Dec. 19, 1952 May 11, 1966	P,W	S	Dug well.
801	M. Whitt	--	Old	28	36	Kgru	1,645	9.6	do	J,E, 1/2	H,S	Do.
16-101	R. Stevens	--	Old	240	6	Kgru	1,715	17.9	do	P,E, 1/2	H	Pump set at 80 ft.
* 102	Dickey Bros. Dairy	W. E. Page	1956	680	5	Kph, Kpc	1,755	100	Jan. 1956	S,E, 2	H	Cased to bottom. Slotted from 600 ft to bottom. Temp. 19°C.
201	C. E. Morgan	do	1951	520	5	Kph, Kpc	1,552	144.8	Feb. 25, 1959	P,E, 2	H,S	Cased to 492 ft. Measured drawdown 15 ft after 5 minutes pumping 10 gpm.
202	J. H. Saul	Ohio Oil Co.	1945	5,070	--	--	1,756	--	--	--	--	Oil test. Reported base of Cretaceous at 950 ft.

* For chemical analyses of water from wells and springs, see Table 6.
1/ Electric or radioactivity logs in files of U.S. Geological Survey, Austin, Texas.
2/ For drillers' logs of wells, see Table 4.
3/ For water-level measurements in wells, see Table 5.

Table 4.—Drillers' Logs of Wells in Kerr County

Well RJ-56-61-501

Owner: L. F. Scherer, Jr.
Driller: Edmunds Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Rocks, loose and sand	4	4
Lime, white	56	60
Lime, yellow; seep	30	90
Lime, yellow	90	180
Lime, soft; water	20	200
Shale, blue, lime shells	10	210
Lime, blue, shells; water	14	224
Shale, blue, hard	41	265

Well RJ-56-62-405

Owner: L. Graham.
Driller: Edmunds Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Topsoil and caliche	30	30
Shale, gray, and lime shells	283	313
Lime, sandy, and shale breaks	35	348
Shale, blue and lime shells	46	394
Sand and shale breaks	20	414
Shale, red and lime shells	12	426
Sand and sandrock	33	459
Sand and sandy lime	80	539
Shale, red and lime shells	63	602
Sand	24	626
Lime, sandy, gray	13	639
Shale, gray	5	644
Lime, sandy, gray, and shale breaks	8	652
Sand	23	675
Shale, red	17	692
Conglomerate	20	712

Well RJ-56-62-601

Owner: W. D. Lancaster.
Driller: Edmunds Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Topsoil	3	3
Rock and yellow clay	22	25
Shale, blue	105	130
Sand, water	7	137
Shale, gray	183	320
Shale, black	13	333
Sand	15	348
Sand and shale, brown	12	360
Sand, water	40	400

Well RJ-56-63-401

Owner: C. Craig.
Driller: Edmunds Drilling Co.

	THICKNESS (FEET)	DEPTH (FEET)
Clay, yellow	67	67
Shale, blue	183	250
Shale, black	20	270
Shale, gray, and sand	30	300
Sand and shale	82	382
Shale, brown	18	400
Sand, red, water	157	557
Sand, gray	25	582
Shale, red	18	600

Well RJ-56-63-607

Owner: City of Kerrville, well 7
Driller: J. R. Johnson.

	THICKNESS (FEET)	DEPTH (FEET)
No record	45	45
Limestone, marly	55	100
Limestone, sandy, thin shale layers	30	130
Sandstone, dolomite and shale	25	155
Sandstone, some shale and gypsum	15	170
Limestone, brown, dolomitic	10	180
Sandstone, some shale	10	190
Dolomite, sandy	10	200
Dolomite, some sandy shale	30	230
Limestone and dolomite, sandy	20	250
Limestone and sandstone	10	260
Limestone and dolomite, sandy	20	280
Shale, red and sandy dolomite	20	300
Limestone, sandy, some dolomite and shale	30	330
Limestone, white, pink and yellow, sandy	70	400
Shale and dolomite, sandy	20	420
Limestone, shale, and dolomite	20	440
Limestone, white to pink, sandy	40	480

Table 4.—Drillers' Logs of Wells in Kerr County—Continued

Well RJ-56-63-607—Continued

	THICKNESS (FEET)	DEPTH (FEET)
Shale, gray, sandy, some limestone	20	500
Limestone, sandy, and sandstone	20	520
Limestone and chert, conglomerate	100	620
Shale, black	14	634

Well RJ-56-63-610

Owner: City of Kerrville.
Driller: Edmunds Drilling Co.

Soil, caliche, and clay	28	28
Shale, some limestone	50	78
Limestone and shale	43	121
Shale, some limestone	20	141
Siltstone, some limestone and shale	20	161
Lime and shale, sandy	120	281
Lime, sandy with shale and sandstone	20	301
Limestone, silty and sandstone	194	495
Sandstone, some shale	22	517
Shale and sandstone	35	552
Sandstone, some shale and limestone	10	562
Conglomerate and sand, some shale	46	608
Shale, black	33	641

Well RJ-56-63-614

Owner: City of Kerrville, well 13
Driller: Edmunds Drilling Co.

Clay	2	2
Gravel	33	35
Limestone, gray	3	38
Clay, sticky	12	50
Limestone, gray, hard, sandy with some shale	35	85
Limestone, gray, some gypsum	11	96
Limestone, gray	34	130
Shale, gray	11	141
Limestone, gray, sandy	12	153
Limestone, gray, gypsum	23	176
Limestone and shale	56	232
Limestone interbedded with sand	11	243
Limestone, white to pink, some sand	67	310
Limestone and sand	23	333
Limestone, gray, hard, sandy	45	378
Limestone, dolomite, sand and shale	67	445
Limestone, red, white and green, some sand	23	468
Limestone and shale	22	490
Limestone, sandy, some sand	24	514
Limestone with some sand and shale	23	537
Conglomerate of limestone and chert	23	560
Shale, red	12	572
Conglomerate of limestone and chert	31	603

Well RJ-56-64-403

Owner: City of Kerrville.
Driller: Edmunds Drilling Co.

Soil, caliche, and gravel	20	20
Lime, gray, and shale breaks	101	121
Lime, sandy	11	132
Shale, gray with sandy lime	11	143
Lime, sandy and shale breaks	44	187
Sand and lime shells	22	209
Lime and sand	13	222
Lime, sandy	22	244
Sand and lime with shale breaks	22	266
Sand and sandy lime	46	312
Sand	11	323
Sand and lime	11	334
Lime with sand lenses	33	367
Lime	22	389
Lime with red shale breaks	44	433
Lime, red to gray	11	444
Sand, some shale	11	455
Lime, sandy	15	470
Sand, some shale	11	481
Sand and lime	12	493
Sand, some shale	11	504
Sand	11	515

Table 4.—Drillers' Logs of Wells in Kerr County—Continued

Well RJ-56-64-403—Continued

	THICKNESS (FEET)	DEPTH (FEET)
Lime and sand	11	526
Lime, sandy	11	537
Lime, some shale	11	548
Lime, shale, and sand	12	560
Sandstone and shale	11	571
Shale, black	34	605

Well RJ-56-64-702

Owner: U.S. Veterans Administration Hospital.
Driller: J. R. Johnson.

Surface soil and caliche	3	3
Lime, sandy, and shale	292	295
Clay, pink, gray, and green	15	310
Lime, brown	15	325
Clay, red	5	330
Lime, tan, sandy	50	380
Lime, hard, tan	25	405
Clay, red, with red sandy lime	40	445
Clay, red, sticky	15	460
Lime, sandy, conglomerate	45	505
Clay, blue, sticky	50	555
Clay, brown, sticky	10	565
Clay, red, sticky	15	580
Lime, hard and conglomerate	15	595
Lime, hard, sandy and conglomerate	3	598
Conglomerate, sandy	52	650
Clay, brown	10	660
Shists	5	665

Well RJ-68-01-207

Owner: C. Haufler.
Driller: L. Bergmann & Sons.

Caliche and broken rock	30	30
Shale, soft-blue, and rock layers	15	45
Rock, medium-hard, yellow, and gray shale	15	60
Rock, medium-hard, grayish-yellow	12	72
Shale, hard, blue	18	90
Rock, medium, soft-gray	35	125
Shale, hard, bluish-gray, oily	20	145
Rock, medium-hard, light-gray	10	155
Shale, medium-hard, dark-gray	7	162
Shale, soft, bluish-gray sandy, some water	8	170
Rock, medium-hard, gray	6	176
Sand, coarse, water	3	179
Sandstone, medium-hard, gray	5	184
Sand	1	185
Rock, medium-hard, gray	10	195
Shale, medium, soft-red and brown	15	210

Well RJ-69-08-103

Owner: Guadalupe Heights Utility Corp.
Driller: Edmunds Drilling Co.

Topsoil	3	3
Caliche	3	6
Gravel	24	30
Rock	10	40
Shale, gray, and lime	240	280
Glen Rose, top	20	300
Sand, red, fine	35	335
Sand, red, and lime shells	15	350
Shale, red	10	360
Sand, red	22	382
Lime and sand	49	431
Sand and lime, specks of brown shale	33	464
Sand, yellow and lime	9	473
Lime, sandy, and green shale specks	12	485
Sand and lime	37	522
Sand, brown, and green shale	22	544
Sand, red, and lime	24	568
Lime	12	580
Lime, sandy and brown shale	10	590
Sand	23	613
Sand, lime, and blue shale	47	660

Table 5.—Water Levels in Wells in Kerr County

Well RJ-56-63-604

Owner: City of Kerrville, well 4.

DATE	WATER LEVEL
Dec. 10, 1954	140.35
Mar. 1, 1955	122.65
Mar. 22, 1966	193.08
Sept. 2	248.44
Feb. 14, 1967	192.52

Well RJ-56-63-605

Owner: City of Kerrville, well 5.

DATE	WATER LEVEL
Dec. 10, 1954	142.17
Mar. 1, 1955	126.55
Mar. 22, 1966	192.86
May 27	210.06
Aug. 12, 1966	277.00
a/ Sept. 1	305.42[a]
Sept. 22	225.67
Dec. 2	205.33
Jan. 26, 1967	196.94
Apr. 13	232.72

a/ Pumping.

Well RJ-56-63-607

Owner: City of Kerrville, well 7.

DATE	WATER LEVEL
Dec. 10, 1954	131.90
Mar. 1, 1955	117.40
Mar. 22, 1966	176.51
Apr. 14	184.63
May 27	182.77
June 21	215.80
July 19	240.15
Aug. 12	270.75
Sept. 2, 1966	236.36
Sept. 26	220.68
Nov. 2	208.81
Nov. 18	214.23
Dec. 2	204.28
Dec. 13	203.30
Dec. 20	199.11
Jan. 11, 1967	196.87
Jan. 16, 1967	187.57
Feb. 14	–
Mar. 17	213.68
Apr. 13	222.05
May 18	258.41
June 14	267.62

Well RJ-56-63-608

Owner: City of Kerrville, well 8.

DATE	WATER LEVEL
Dec. 9, 1954	110.16
Mar. 1, 1955	93.87
Mar. 23, 1966	126.11
Apr. 14	127.47
May 27	124.90
June 21	137.02
July 19	168.66
Aug. 12, 1966	186.62
Sept. 1	159.72
Sept. 26	146.01
Nov. 2	141.14
Nov. 18	140.07
Dec. 2	138.18
Dec. 13	135.94
Dec. 20, 1966	134.89
Jan. 11, 1967	132.84
Jan. 26	132.06
Mar. 17	139.58

Well RJ-56-63-611

Owner: City of Kerrville, well 12.

DATE	WATER LEVEL
Mar. 22, 1966	197.4
Mar. 29	194.60
Mar. 31	192.87
Apr. 5	195.15
Apr. 10	197.18
Apr. 15	201.76
Apr. 20	202.80
Apr. 25	199.92
Apr. 30	199.00
May 5	194.15
May 10	192.77
May 15	192.93
May 20	197.19
May 26, 1966	196.78
May 31	194.40
June 5	196.14
June 10	204.09
June 4	210.64
June 20	212.71
June 25	215.59
June 30	222.08
July 5	228.15
July 12	224.97
July 15	227.82
July 18	231.52
Aug. 5	252.25
Aug. 10, 1966	251.58
Aug. 15	244.32
Aug. 20	239.17
Aug. 25	237.08
Aug. 31	230.76
Sept. 5	227.85
Sept. 10	222.61
Sept. 13	220.60
Sept. 26	220.4
Nov. 2	208.8
Nov. 18	215.54
Dec. 2	214.65
Dec. 13	210.89
Dec. 20, 1966	209.36
Jan. 11, 1967	207.43
Jan. 26, 1967	207.7
Feb. 14	203.3
Mar. 17, 1967	210.3
Apr. 13	215.8

Recorder installed March 29, 1966; removed September 13, 1966.

Table 5.—Water Levels in Wells in Kerr County—Continued

Well RJ-56-63-901

Owner: City of Kerrville, well 9.

DATE	WATER LEVEL
Dec. 10, 1954	110.13
Mar. 23, 1966	157.32
May 27	170.74
June 21	194.17
July 19	220.91
Aug. 12	262.40
Sept. 1, 1966	207.52
Sept. 23	188.05
Nov. 18	181.90
Dec. 2	166.04
Dec. 13	169.24
Dec. 20	167.71
Jan. 11, 1967	168.15
Jan. 26	162.53
Mar. 17	177.32

Well RJ-69-08-201

Owner: J. L. Rappolee.

DATE	WATER LEVEL
May 11, 1966	146.87
June 21	156.54
Aug. 8	159.15
Sept. 1	159.5
Sept. 23	159.8
Sept. 26, 1966	160.5
Nov. 2	161.9
Dec. 2	160.4
Dec. 13	158.1
Dec. 20	157.8
Jan. 11, 1967	157.6
Jan. 23	158.2
Feb. 17	157.4
Mar. 17	162.7

Well RJ-69-08-601

Owner: Mosty Bros.

DATE	WATER LEVEL
May 27, 1966	55
July 19	109.1
July 25	107.7
Sept. 1	68.3
Sept. 26, 1966	59.9
Nov. 2	61.1
Dec. 2	72.2
Dec. 20	60.9
Jan. 23, 1967	72.6
Mar. 1	61.9
Mar. 15, 1967	128.4

Well RJ-69-08-606

Owner: Mosty Bros.

DATE	WATER LEVEL
May 17, 1966	49.7
July 19	106.4
Sept. 1	88.8
Nov. 2, 1966	64.4
Dec. 2	79.7
Dec. 20	62.5
Jan. 27, 1967	120.1

Table 6.--Chemical Analyses of Water from Wells and Springs in Kerr County

(Analyses Given are in Milligrams per Liter Except Specific Conductance, pH, Percent Sodium, Sodium Adsorption Ratio, and Residual Sodium Carbonate.)

Water-bearing unit: QTal, Pliocene(?), Pleistocene, and Holocene alluvial deposits; Kea, Edwards and associated limestones; Kgru, upper member of Glen Rose Limestone; Kgrl, lower member of Glen Rose Limestone; Kph, Hensell Member of Pearsall Formation; Kpc, Cow Creek Limestone member of Pearsall Formation; Ksh, Sligo and Hosston Formations.

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	WATER-BEARING UNIT	SILICA (SiO_2)	IRON (Fe)	MANGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	STRONTIUM (Sr)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	PHOSPHATE (PO_4)	BORON (B)	DISSOLVED SOLIDS	HARDNESS AS $CaCO_3$	PERCENT SODIUM	SODIUM ADSORPTION RATIO (SAR)	RESIDUAL SODIUM CARBONATE (RSC)	SPECIFIC CONDUCTANCE (MICROMHOS AT 25°C)	pH
RJ-56-43-701	421	June 29, 1961	Kea	14	--	--	39	26	--	*13	--	228	12	21	0.4	3.2	--	--	231	204	12	0.4	--	430	7.4
56-52-301	742	Aug. 17, 1966	Kph	--	5.6	--	--	--	--	--	--	240	876	18	--	--	--	--	--	1,080	--	--	--	1,790	7.2
56-52-701	350	June 28, 1961	Kea	13	--	--	55	19	--	*11	--	256	5.8	14	.2	3.0	--	--	246	215	10	.3	--	440	7.3
56-54-104	350	Aug. 18, 1966	Kea	13	.20	--	51	11	--	33	1.0	204	18	42	.5	.8	--	--	270	172	29	1.1	0.00	490	7.5
56-62-401	305	Sept.18, 1951	Kgru	9.4	15	--	346	212	--	*29	--	258	1,490	26	--	.0	--	--	2,240	1,740	4	--	--	2,590	8.0
56-62-404	618	May 5, 1966	Kph	11	2.2	--	45	33	--	90	10	394	36	70	1.1	.0	--	0.31	490	248	43	2.5	1.50	870	7.4
56-62-405	712	June 13, 1966	Kph, Ksh	9.6	.49	--	38	34	--	101	10	396	39	69	1.4	.0	--	--	497	235	47	2.9	1.79	873	7.0
56-62-501	921	June 20, 1966	Kph, Kpc, Ksh	11	.55	--	46	30	--	72	7.5	360	30	50	1.3	1.0	0.00	.26	426	240	39	2.0	1.10	741	7.4
56-62-502	32	May 5, 1966	QTal	11	.07	--	61	22	--	5.5	1.2	258	10	11	.0	16	--	.06	264	242	5	.2	.00	466	7.3
56-62-601	400	Apr. 26, 1966	Kph	13	2.1	--	60	48	--	24	8.7	382	60	17	1.3	.2	--	.26	420	347	13	.6	.00	731	7.3
56-62-801	864	May 4, 1966	Kph	11	2.0	--	64	38	--	124	9.9	384	155	89	1.5	.0	--	.56	682	316	45	3.0	.00	1,120	7.3
56-62-802	Spring	Sept. 4, 1951	Kea	--	--	--	--	--	--	--	--	354	--	8.5	--	--	--	--	--	300	--	--	--	571	7.4
56-62-803	Spring	do	Kea	--	--	--	--	--	--	--	--	350	--	10	--	--	--	--	--	294	--	--	--	567	7.5
56-63-401	600	Apr. 26, 1966	Kph	14	.03	0.02	60	42	--	24	7.0	382	42	13	.9	.2	.00	.17	391	322	14	.6	.00	681	7.3
56-63-403	536	do	Kph	13	1.1	--	69	55	--	21	8.7	372	115	17	2.0	.0	--		484	398	10	.5	.00	812	7.1
56-63-502	657	do	Kph, Ksh	11	.08	--	29	31	--	24	20	288	24	12	.9	.2	--	--	294	200	19	.7	.72	515	7.8
56-63-602	650	Nov. 16, 1945	Kgrl, Kph, Ksh	14	.26	--	79	45	--	11	6.6	368	79	20	1.0	.5	--	--	451	382	--	--	--	744	7.9
56-63-603	725	July 1946	Ksh	14	.85	--	77	45	--	29	5.8	380	58	24	1.0	.0	--	--	441	374	--	--	--	668	7.2
56-63-603	725	June 9, 1966	Ksh	12	6.9	.17	74	46	5.2	16	3.7	376	105	17	1.2	.0	.00	.15	460	374	8	.4	.00	781	7.2
56-63-604	605	Nov. 16, 1945	Ksh	14	2.1	--	62	43	--	9	6.3	370	26	19	.8	.2	--	--	380	332	--	--	--	645	7.9
56-63-604	605	Nov. 21, 1945	Ksh	12	.10	--	66	43	--	9.9	--	373	26	20	1.0	.0	--	--	372	342	--	--	--	662	7.4
56-63-605	600	June 9, 1966	Ksh	12	.03	.17	61	43	--	19	7.0	378	44	20	1.1	.0	.00	.15	393	329	11	.5	.00	691	7.0
56-64-401	465	June 17, 1966	Kph	12	.22	--	64	46	--	16	6.3	388	56	13	1.5	.5	.00	.14	406	350	9	.4	.00	698	7.4
56-64-501	Spring	June 15, 1966	Kgru	12	.01	--	88	22	--	6.0	.8	366	6.8	12	.6	1.8	--	--	330	310	4	.1	.00	579	7.2
56-64-601	634	June 15, 1966	Ksh	9.7	.16	--	76	45	--	95	8.2	374	43	168	1.5	.0	--	.34	631	375	35	2.1	.00	1,140	7.2

See footnote at end of table.

Table 6.--Chemical Analyses of Water from Wells and Springs in Kerr County--Continued

WELL	DEPTH OF WELL (FT)	DATE OF COLLECTION	WATER-BEARING UNIT	SILICA (SiO_2)	IRON (Fe)	MANGANESE (Mn)	CALCIUM (Ca)	MAGNESIUM (Mg)	STRONTIUM (Sr)	SODIUM (Na)	POTASSIUM (K)	BICARBONATE (HCO_3)	SULFATE (SO_4)	CHLORIDE (Cl)	FLUORIDE (F)	NITRATE (NO_3)	PHOSPHATE (PO_4)	BORON (B)	DISSOLVED SOLIDS	HARDNESS AS $CaCO_3$	PERCENT SODIUM	SODIUM ADSORPTION RATIO (SAR)	RESIDUAL SODIUM CARBONATE (RSC)	SPECIFIC CONDUCTANCE (MICROMHOS AT 25° C.)	pH
RJ-56-64-702	665	Sept. 2, 1963	Ksh	11	2.6	--	62	43	--	20	6.7	383	30	25	1.1	0.0		--	387	332	11	0.5	0.00	--	--
56-64-704	302	Mar. 6, 1966	Kgru	6.7	21	--	426	286	--	43	21	206	2,040	37	--	.2	--	--	2,960	2,240	4	.4	.00	3,250	6.7
56-64-705	336	Aug. 8, 1966	Kph	12	1.8	--	114	62	--	16	7.5	358	258	12	1.5	.0	--	--	659	540	6	.3	.00	1,010	7.5
57-57-501	Spring	Feb. 23, 1967	Kea	--	--	--	--	--	--	--	--	406	6.0	12	--	--	--	--	--	348	--	--	.00	635	7.3
57-57-701	263	Oct. 19, 1961	Kgrl, Ksh	11	--	--	108	57	--	100	13	358	224	144	1.8	.0	--	--	920	504	30	1.9	--	1,370	7.0
57-57-708	350	Feb. 21, 1967	Kph	11	3.5	--	90	46	--	91	24	360	138	140	1.8	.0	--	--	719	414	31	1.9	.00	1,200	7.3
68-01-201	210	Oct. 18, 1961	Kgrl, Kph	12	--	--	100	57	--	126	14	362	202	196	1.8	.0	--	0.50	957	484	35	2.5	--	1,480	7.0
69-06-801	450	July 1954	Kgrl, Kph	14	--	--	86	62	--	*39	--	342	222	30	--	.0	--	--	654	470	--	--	--	988	8.0
69-06-901	455	Aug. 29, 1955	Kgrl, Kph	14	--	--	100	55	--	*33	--	350	212	28	--	.2	--	--	614	475	13	--	--	965	7.4
69-07-101	460	Aug. 6, 1955	Kgru, Ksh	14	7.5	--	141	90	--	*28	--	341	461	16	--	.0	--	--	998	722	8	--	--	1,300	7.4
69-07-301	600	May 26, 1966	Kph	12	.78	--	88	52	7.5	22	9.8	366	195	16	1.8	.2	--	--	584	442	10	.5	.00	937	7.2
69-07-902	1,000	Mar. 17, 1967	Ksh	13	.34	--	71	47	--	30	11	376	108	19	1.5	.2	--	--	486	370	14	.7	.00	793	7.3
69-08-101	665	May 6, 1966	Ksh	11	.18	0.02	57	37	--	35	8.1	388	31	15	1.0	.0	0.00	.21	386	294	20	.9	.48	673	7.7
69-08-201	530	May 19, 1966	Kph, Kpc	12	3.9	--	65	44	6.6	21	9.1	374	85	14	1.5	.2	--	--	442	350	11	.5	.00	748	7.4
69-08-401	480	June 9, 1966	Kgru, Kgrl, Ksh, Kpc	10	7.6	--	463	244	6.4	38	3.2	290	2,010	26	--	.8	--	--	2,950	2,080	4	.4	.00	3,280	6.8
69-08-402	580	Mar. 17, 1967	Kpc, Kph	--	--	--	--	--	--	--	--	372	118	24	--	--	--	--	--	390	--	--	.00	825	7.3
69-08-502	78	May 27, 1966	Kgru	12	.88	--	435	109	10	17	10	341	1,280	24	2.6	1.5	--	.55	2,070	1,550	2	.2	.00	2,460	7.2
69-08-504	36	May 10, 1966	QTal	12	.02	--	91	20	--	9.0	1.3	350	18	17	.3	.8	--	--	341	310	6	.2	.00	605	7.0
69-08-601	312	July 25, 1962	QTal, Kgru, Kgrl, Kph	12	.41	--	180	99	--	20	6.2	302	592	26	2.0	.2	--	.36	1,090	856	5	.3	--	1,450	8.7
69-08-613	225	June 11, 1966	Kgrl, Kph	9.9	5.0	--	70	48	8.6	21	11	380	118	16	1.6	.0	--	--	482	382	10	.5	.00	817	7.0
69-08-614	427	June 27, 1966	Kph, Kpc	12	.68	--	76	49	--	26	9.3	388	110	16	1.4	.0	--	.24	491	392	12	.6	.00	815	7.2
69-08-615	61	July 21, 1966	QTal	15	--	--	114	17	--	25	3.2	324	67	36	.2	28	--	--	464	354	13	.6	.00	784	7.4
69-16-102	680	Feb. 13, 1957	Kph, Kpc	12	--	--	72	50	--	*41	--	375	120	26	1.8	.6	--	--	507	385	19	.9	--	825	7.5

* Sodium and potassium calculated as sodium (Na).

Table 7.--Chemical Analyses of Water From the Guadalupe River and Its Tributaries in Kerr County

(Analyses Given Are in Milligrams Per Liter Except Specific Conductance, pH, Sodium Adsorption Ratio, and Residual Sodium Carbonate.)

SITE	STREAM	DATE	DIS-CHARGE (CFS)	SILICA (SiO_2)	CAL-CIUM (Ca)	MAGNE-SIUM (Mg)	SODIUM (Na)	POTAS-SIUM (K)	BICAR-BONATE (HCO_3)	SUL-FATE (SO_4)	CHLO-RIDE (Cl)	FLUO-RIDE (F)	NI-TRATE (NO_3)	DIS-SOLVED SOLIDS	HARDNESS AS $CaCO_3$ CALCIUM MAGNESIUM	HARDNESS AS $CaCO_3$ NON-CARBONATE	SODIUM ADSORP-TION RATIO (SAR)	SPECIFIC CONDUCT-ANCE (MICROMHOS AT 25°C)	pH
1	North Fork Guadalupe River	Mar. 15, 1965	14.2	12	68	14	4.6	0.9	268	4.6	7.9	0.2	4.2	[a] 248	227	8	0.1	437	7.2
2	South Fork Guadalupe River	Mar. 24, 1965	27.9	5.9	49	22	5.5	.7	250	7.2	9.9	.2	.8	[a] 224	213	8	.2	403	7.8
3	Guadalupe River	Mar. 16, 1965	49.1	--	--	--	--	--	258	--	11	--	--	235	222	11	--	426	7.4
4	Johnson Creek	do	17.7	--	--	--	--	--	264	--	22	--	--	265	230	14	--	470	7.7
5	Third Creek	Mar. 24, 1965	1.18	5.3	88	33	314		412	61	434	.8	27	[a] 1,170	355	18	7.3	2,070	7.4
6	Guadalupe River	Mar. 25, 1965	79.4	5.5	54	23	14		260	16	20	.3	1.2	[a] 262	229	16	.4	473	7.6
7	Cypress Creek	do	4.03	6.4	82	29	15		345	33	26	.4	1.8	[a] 364	324	42	.4	600	7.5

[a] Calculated from determined constituents.