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Report 235

OCCURRENCE, AVAILABILITY, AND CHEMICAL QUALITY OF GROUND WATER IN THE EDWARDS PLATEAU REGION OF TEXAS

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July 1979

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REPORT 235

OCCURRENCE, AVAILABILITY, AND CHEMICAL QUALITY OF GROUND WATER IN THE EDWARDS PLATEAU REGION OF TEXAS

By

Loyd E. Walker

July 1979

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TABLE OF CONTENTS

TABLE OF CONTENTS–Continued

TABLE OF CONTENTS—Continued

TABLE OF CONTENTS—Continued

TABLES

FIGURES

TABLE OF CONTENTS—Continued

DATA BY COUNTIES

DATA BY COUNTIES—Continued

(Figure 2 indexes additional data, published previously, for some of the counties listed above.)

OCCURRENCE, AVAILABILITY, AND CHEMICAL QUALITY OF GROUND WATER IN THE EDWARDS PLATEAU REGION OF TEXAS

ABSTRACT

The Edwards Plateau is located in southwest Texas and lies between 98° and 103° west longitude and 29° and 32° north latitude. The area composes approximately 23,000 square miles and includes all or parts of 28 counties. The region is bounded on the west by the Pecos River; on the north, northwest, and northeast by the physical limit of the Cretaceous rocks; on the east by the Llano uplift; on the south and southeast by the Balcones fault system; and on the southwest by the Rio Grande.

The agricultural economy of the region is based primarily on ranching. Some of the leading sheep- and goat-producing counties in the State are in the Edwards Plateau region. In 1972, the agricultural income was over $135 million.

The production of oil and gas is the principal industry, especially in the northwestern part of the region. More than three billion barrels of oil have been produced in the study area since oil was first discovered in the area in 1925.

Rocks of sedimentary origin overlie the Precambrian granites beneath the Edwards Plateau. These sedimentary rocks range in thickness from a few hundred feet along the eastern part of the Plateau to about 15,000 feet in the western part.

The principal aquifers, or water-bearing units, in order of importance and development are the Edwards-Trinity (Plateau), composed of the Antlers Formation and the Edwards and associated limestones; the alluvium; the lower Cretaceous, composed of the Hosston, Sligo, Pearsall, and Glen Rose Formations; the Hickory; and the Ellenburger-San Saba. Other units that yield fresh to slightly saline water in limited areas on or near the Edwards Plateau are the Ogallala aquifer and rocks of Pennsylvanian, Permian, and Triassic age.

The total amount of fresh to slightly saline ground water available from all aquifers on the Edwards Plateau is more than 450,000 acre-feet per year. Of this amount, approximately 308,000 acre-feet is available annually from the Edwards-Trinity (Plateau) and the alluvium aquifers.

In 1972 approximately 86,000 acre-feet of ground water was pumped by wells on the Edwards Plateau for municipal, industrial, irrigation, livestock, and domestic use. About 70 percent of the water pumped was for irrigation. Water levels are declining in the Edwards-Trinity (Plateau) aquifer in areas of heavy pumping in Ector, Glasscock, Midland, Reagan, and Upton Counties. The greatest water-level declines are in southern Glasscock and northern Reagan Counties.

Ground water in most of the counties on the Edwards Plateau is suitable for municipal, industrial, and agricultural uses. The water is generally very hard, but treatment methods can be used to remove calcium carbonate. Other undesirable dissolved minerals such as sulfate, chloride, and fluoride are present in varying amounts in water from the Antlers Formation; however, the water has been used for most purposes without apparent harmful results.

The prospect of irrigation from the Edwards-Trinity (Plateau) aquifer is good, especially in the central part of the Plateau where the topography is relatively flat, the soil is deep, and the growing season is long.

OCCURRENCE, AVAILABILITY, AND CHEMICAL QUALITY OF GROUND WATER IN THE EDWARDS PLATEAU REGION OF TEXAS

INTRODUCTION

Purpose and Scope

Field work for the Edwards Plateau region study was begun in the summer of 1965 to collect and compile ground-water information for testimony to be presented at a public hearing of the Texas Water Rights Commission concerning the existence and extent of an underground water reservoir. Following that hearing, the data-gathering effort was expanded to establish a better understanding of the geologic and hydrologic characteristics of the Edwards-Trinity (Plateau) aquifer and to prepare a report useful to landowners, the Texas Water Development Board, other state and federal agencies, and the general public.

The scope of the study included the collection and compilation of all available data pertaining to the occurrence, availability, and chemical quality of water in the Edwards-Trinity (Plateau) aquifer and other aquifers on the Edwards Plateau.

Location and Extent of the Region

The Edwards Plateau is located in southwest Texas between 98° and 103° west longitude and 29° and 32° north latitude. The area of this report corresponds primarily to the extent of the Edwards-Trinity (Plateau) aquifer (Figure 1). It covers approximately 23,000 square miles and includes all or parts of 28 counties. The region is bounded on the west by the Pecos River; on the north, northwest, and northeast by the physical limit of the Cretaceous rocks; on the east by the Llano uplift; on the south and southeast by the Balcones fault system; and on the southwest by the Rio Grande.

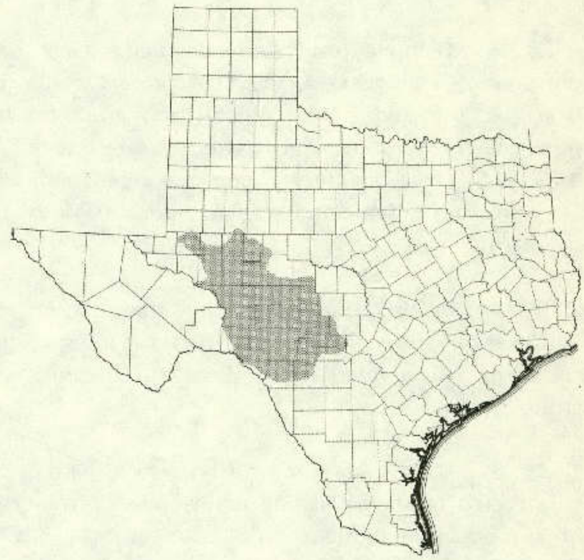


Figure 1.—Location of the Edwards-Trinity (Plateau) Aquifer

Methods of Investigation

The study of the ground-water resources of the Edwards Plateau was accomplished by performing the following tasks:

1. Irrigation, public supply, industrial, and selected domestic and livestock wells were inventoried (a total of 5,128 wells). Records of wells and springs are included in the tables or in referenced reports. Locations of wells and springs are shown on county well location maps in this report or in referenced reports. Surface elevations of these wells and springs were determined from topographic maps, by Paulin altimeter, and by surface-elevation maps of seismic projects furnished by oil companies.

2. A geologic map was compiled to show the surface formations on the Edwards Plateau.

3. Maps were constructed to show the altitude of the top of Trinity Group, altitude of the base of the Edwards-Trinity (Plateau) aquifer, altitude of water levels in the Edwards-Trinity (Plateau) aquifer, and the area of greatest water-level decline.

4. Chemical analyses of water samples were obtained and compiled to determine the chemical quality of the ground water.

5. A total of 940 electric and gamma-ray logs of oil and gas tests were used to determine the top and base of Cretaceous formations, and to show their relationship to the underlying rocks.

6. Compilations were made of all available data on present and past pumpage of ground water for irrigation use and public supply, and ground water pumpage for domestic and livestock was estimated by using U.S. Department of Commerce census and U.S. Department of Agriculture animal population in the region.

7. Precipitation, evaporation, transpiration, and temperature data were compiled to assist in estimating recharge to aquifers, base flow of streams, and ground-water pumpage.

8. Data were compiled and maps were constructed to show location and amounts of reported brine production and location of brine disposal wells for the years 1961 and 1967.

9. Various graphs, charts, tables, and geologic sections were constructed to illustrate geohydrologic conditions.

10. Pumping tests of wells were conducted, or results of pumping tests were collected from files, and the volume of dewatering in the Antlers Formation was calculated to determine the hydrologic characteristics of the water-bearing rocks.

11. Hydrographs of observation wells were constructed to determine the annual and long-term fluctuations of water levels.

12. Available hydrologic data were studied to determine quantity and quality of ground water available for future development.

13. Prior to the completion of this study, basic data reports were published on Glasscock, Irion, Reagan, Schleicher, Sterling, and Sutton Counties in order to make data on water wells and the chemical quality of the ground water readily available for use. These data were used, but not reproduced, in the present study.

Previous Investigations

Collection of basic ground-water data on 11 counties on the Edwards Plateau was conducted during the period 1936 to 1942. Duplicated reports of records of wells, drillers' logs, water analyses, and maps showing locations of wells and springs in these counties are as follows: Ector County, Davis (1937); Edwards County, Frazier (1939); Gillespie County, Shields (1937); Glasscock County, Lang (1937); Howard County, Samuell (1937); Irion County, Frazier (1941); Kinney County, Bennett and Cromack (1940); Midland County, Davis (1938); Sterling County, George and Dalgarn (1942); Tom Green County, Barnes and Dalgarn (1941); and Val Verde County, Frazier (1940).

Follett (1956) compiled records of water-level measurements in observation wells in Kinney, Uvalde, and Val Verde Counties, 1929 to March 1956. Currently, water levels in nine wells in Val Verde County are being measured at annual intervals as a part of the Texas Water Development Board observation-well program.

Rayner (1959a, 1959b, 1959c) compiled records of water-level measurements in observation wells in Crockett, Glasscock, Midland, Reagan, Sterling, Tom Green, and Upton Counties, 1937 through 1957. Currently, water levels in 13 wells in Crockett County, 18 wells in Glasscock County, 11 wells in Reagan County, and four wells in Sterling County are being measured at annual or bimonthly intervals as a part of the Board observation-well program.

Detailed ground-water studies have been conducted in the following counties on the Edwards Plateau: Coke County, Wilson (1973); Crockett County, Iglehart (1967); Ector County, Knowles (1952); Edwards County, Long (1962); Kerr County, Reeves (1969); Kimble County, Alexander and Patman (1969); Kinney County, Bennett and Sayre (1962); Menard County, Baker and others (1965); Tom Green County, Willis (1954); Upton County, White (1968); Uvalde County, Welder and Reeves (1962); and Val Verde County, Reeves and Small (1973).

Reconnaissance investigation of the ground-water resources of the Colorado River basin was conducted by Mount and others (1967) during 1959 to 1961. Reconnaissance investigation of the ground-water resources of the Middle Rio Grande basin was conducted by Brown, Rogers, and Baker (1965) during 1959 to 1961.

Basic ground-water data reports of six counties on the Edwards Plateau have been conducted as follows: Schleicher County, Muller and Couch (1971); Glasscock

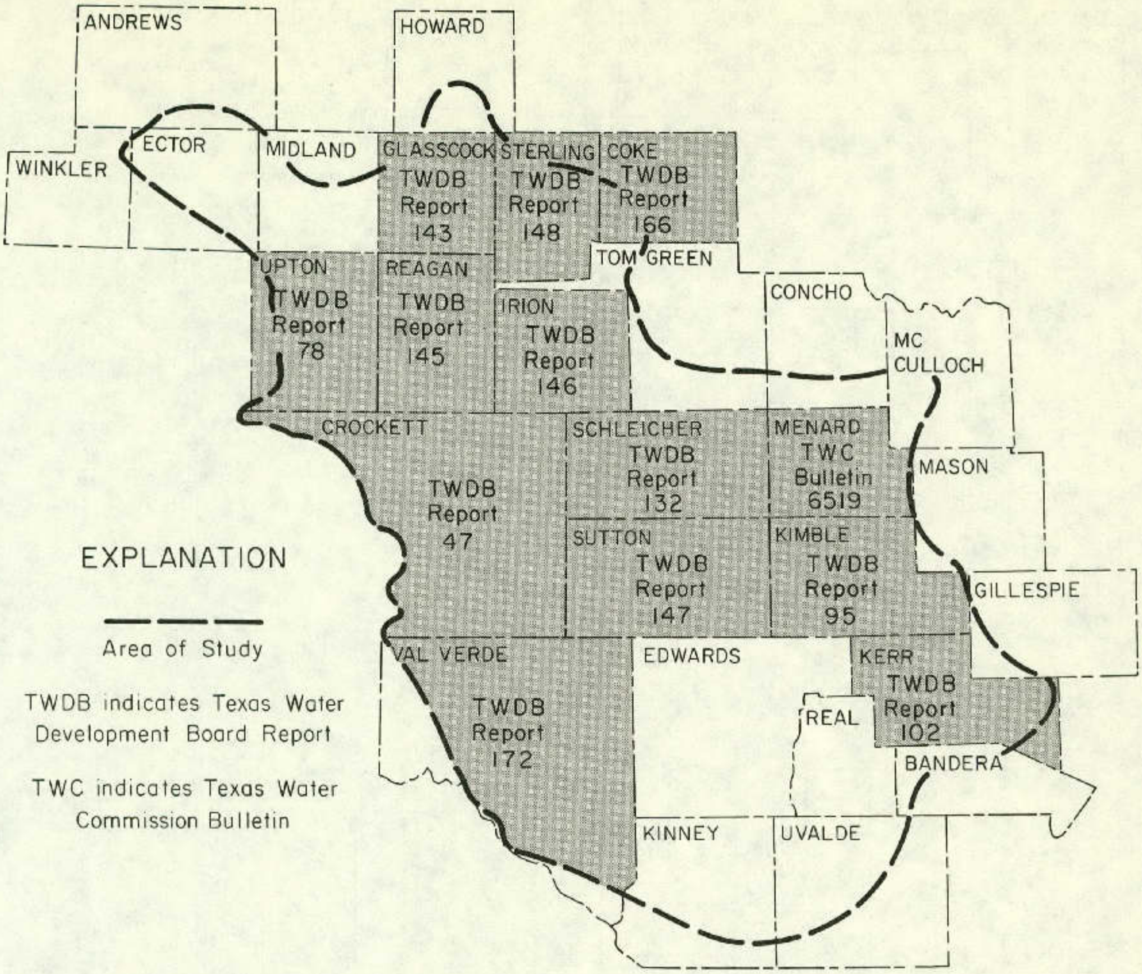


Figure 2.—Previously Published Reports Containing Ground-Water Data Used in This Study

County, Couch and Muller (1972); Reagan County, Muller and Couch (1972); Irion County, Pool (1972); Sutton County, Muller and Pool (1972); and Sterling County, Pool (1972).

Previously published reports that contain data used in this study are shown on Figure 2.

Well-Numbering System

The well-numbering system used 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 (Figure 3). In this system, each well is assigned a seven-digit number and a 2-letter county designation prefix. Each 1-degree quadrangle in or overlapping into the State is given a two-digit number from 01 to 89. These are the first two digits of a well number. Each 1-degree quadrangle is further divided into sixty-four 7½-minute quadrangles which are each assigned a two-digit number from 01 to 64 constituting the third and fourth digits of a well number. Finally, each 7½-minute quadrangle is subdivided into nine 2½-minute quadrangles which are numbered 1 to 9 (fifth digit). Within these 2½-minute quadrangles, each well is assigned a two-digit number beginning with 01 (the last two digits).

The Edwards Plateau region is in 1-degree quadrangles 27, 28, 29, 42, 43, 44, 45, 53, 54, 55, 56, 57, 68, 69, 70, and 71. The 1-degree and 7½-minute quadrangles are shown on the well-location maps. For reasons of space, the 2½-minute quadrangles are not shown. Their notation, however, occurs as the first digit of the 3-digit number beside each well location.

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

Andrews	AB	Coke	DR
Bandera	AS	Concho	DZ

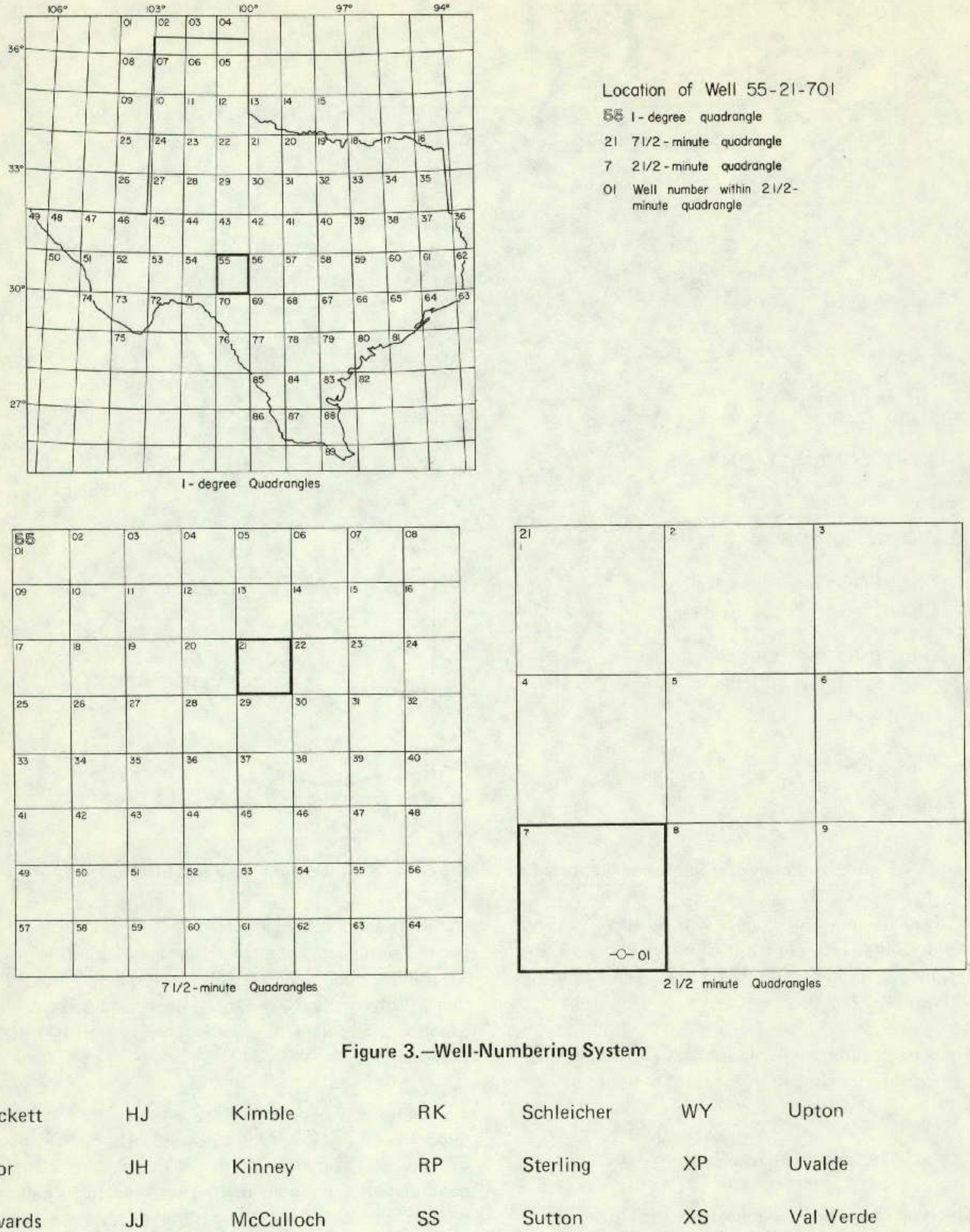


Figure 3.—Well-Numbering System

Crockett	HJ	Kimble	RK	Schleicher	WY	Upton	YL
Ector	JH	Kinney	RP	Sterling	XP	Uvalde	YP
Edwards	JJ	McCulloch	SS	Sutton	XS	Val Verde	YR
Gillespie	KK	Mason	SZ	Tom Green	YB	Winkler	ZP
Glasscock	KL	Menard	TH				
Howard	PB	Midland	TJ				
Irion	PK	Reagan	UZ				
Kerr	RJ	Real	WA				

Acknowledgements

This study was greatly facilitated by the aid and cooperation of many individuals, oil companies, and organizations. Appreciation is expressed to the well drillers, officials of municipalities, industries, utility

companies, and water-well owners for permission to inventory wells. Special acknowledgement is made to the U.S. Soil Conservation Service for supplying ownership data and to the U.S. Geological Survey for data furnished from their files.

Personnel

The author is indebted to Glenward Elder, Daniel Muller, and James Pool for writing the first draft of parts of this report. Basic field data for this report were collected by the following personnel:

Name	Year started on project
H. E. "Gene" Couch	1965
Danney Corley	1969
Glenward Elder	1969
Kenneth Jackson	1968
Daniel Muller	1965
James Pool	1967

Topography, Drainage, and Vegetation

The topography of the Edwards Plateau region ranges from rolling plains to flat tableland and rugged, steep-walled canyons and draws. The altitude of the land surface ranges from about 1,000 feet in Uvalde County to 3,300 feet in Ector County.

The surface in the northern part of Ector, Midland, Howard, and Glasscock Counties (the southern limit of the High Plains) is covered by Ogallala sediments of Tertiary age. This surface merges with the northern limit of Cretaceous rocks of the Plateau as rolling plains which have been altered slightly by stream erosion. In the southwest part of Ector and Upton Counties, the Cretaceous rocks, have been removed by erosion which resulted in a northwest-southeast trending escarpment known as Concho Bluff. The principal vegetation in this area consists of short grasses, mesquite, cactus, creosotebush, and scattered shin oak.

The limit of the Edwards Plateau region on the east and northeast is a result of erosion by the Colorado River and its tributaries. The North Concho River has dissected the Cretaceous rocks in northeast Glasscock, northern Sterling, and Tom Green Counties. Erosion by other tributaries of the Colorado River removed the Cretaceous rocks in parts of Concho, McCulloch, Menard, Kimble, and Gillespie Counties. The surface relief in these counties is greater than the surface relief in the northwest due to erosion of the softer rocks of Triassic, Permian, and Pennsylvanian ages. Grasses, mesquite, live oak, and scattered stands of juniper (cedar) are predominant in this area.

The central part of the Plateau which includes parts of Concho, Irion, Edwards, Kinney, and Menard Counties, is relatively flat and featureless except for erosion along drainage courses and occasional sink holes formed by solution of the limestone bedrock. Principal vegetation here consists of grasses, live oak, shin oak, juniper (cedar), mesquite, and cactus.

The greatest topographic relief is in the southern and southwestern parts of the Plateau where streams have cut through the resistant limestones. Steep-walled canyons and draws of moderate to considerable relief are present in Bandera, Crockett, Edwards, Gillespie, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde Counties. Vegetative cover in this area consists mainly of short grasses, juniper (cedar), live oak, mesquite, cactus, and guajillo.

About 75 percent of the study area is drained by the Colorado River and its major tributaries, the Concho, San Saba, and Llano Rivers. About 20 percent of the area is drained by the Devils and Pecos Rivers and about 5 percent is drained by the Frio, Guadalupe, Medina, Nueces, and Sabinal Rivers.

Climate

The climate of the Edwards Plateau region ranges from semiarid in the northwest to subhumid in the southeast. The seasons are characterized by hot summers and mild winters. The July maximum temperature ranges from 94°F (34°C) in Sutton County to 98°F (37°C) in Tom Green County. The January minimum temperature ranges from 30°F (-1°C) in Howard County to 40°F (4°C) in Val Verde County. The first frost in autumn occurs about November 6 in Ector, Howard, and Midland Counties, and the last frost in spring usually occurs about April 3. The first frost generally occurs about December 9 in Val Verde County and the last frost occurs about March 10. The frost-free days (growing season) varies from 213 days in Kimble County to 300 days in Val Verde County.

The mean annual precipitation ranges from 12 inches in western Ector County in the northwest to 32 inches in Bandera and Gillespie Counties in the southeast. Figure 4 shows the average annual precipitation for the region for the period 1931-60, and the average monthly precipitation for the period of record at selected stations on the Plateau.

Evaporation rates are generally high throughout the Plateau because of high temperature, low humidity and precipitation, and prevailing winds. Table 1 shows the computed annual gross and net lake surface evaporation by county in the study area for the period 1940 through 1965. The annual average net lake surface evaporation for the period 1940-65 ranges from 43 inches in Gillespie County to 69 inches in Ector County. Net lake surface evaporation is the actual evaporation loss which would occur; that is, the gross lake surface evaporation less the effective rainfall.

History, Population, and Economy

Fifteen of the 28 counties on the Edwards Plateau were organized from Bexar County, or the Bexar District; nine were organized from the original Tom Green County; and three were organized from the original Crockett County. The first county to be organized was Gillespie County in 1848 and the last to be organized was Real County in 1913.

The Edwards Plateau is a sparsely populated area averaging about 12 persons per square mile. The 1970 estimated population of the 28 counties comprising the study area was 416,847. Population of the major trade centers was as follows: Big Spring 28,735; Del Rio 21,330; Midland 59,463; Odessa 78,380; and San Angelo 63,884. Many smaller towns and communities on the Plateau serve as local markets, supply centers, and seats of local and county government. The region is served by two railroads and by an excellent network of State and federal highways.

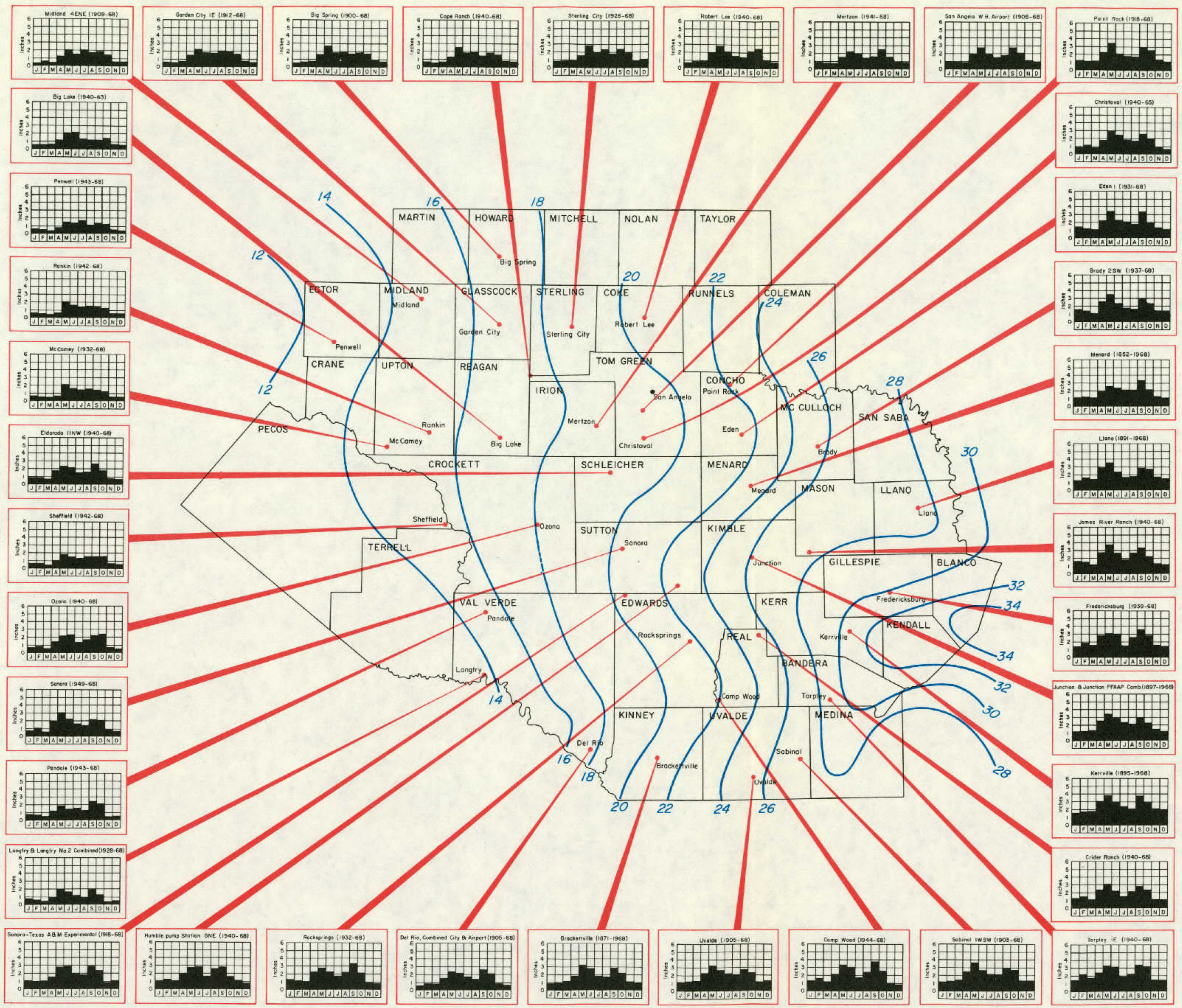
The total income for the study area in 1968 was $1.1 billion, with agricultural income representing $100 million of the total. The agricultural economy of the Edwards Plateau region is primarily ranching, and the region includes some of the leading sheep and goat producing counties in the State. There were over 4 million head of livestock (sheep, cattle, goats, and horses) in the study area in 1968. Sheep is the leading livestock in 68 percent of the counties; cattle the leading livestock in 28 percent of the counties; and goats and horses make up the remaining 4 percent. Poultry raising is expanding in the region due to available markets. Farming is spotted throughout the region with crops consisting of small grains, hay, cotton, peanuts, vegetables, pecans, and fruits.

The production of oil and gas is also important to the economy. Fifteen of the 28 counties on the Edwards Plateau are presently producing oil and gas. Over 3 billion barrels of oil has been produced since 1925 when oil was first discovered in the region. Current (1969) casinghead gas production is over 3 billion cubic feet per year.

Table 1.—Average Annual Lake-Surface Evaporation, 1940-65

(From Kane, 1967)

County	Gross evaporation (inches)	Net evaporation (inches)	County	Gross evaporation (inches)	Net evaporation (inches)
Coke	85	63	McCulloch	75	51
Concho	79	58	Menard	78	57
Crockett	83	67	Midland	82	68
Ector	82	69	Reagan	83	68
Edwards	76	55	Real	74	52
Gillespie	69	43	Schleicher	82	66
Glasscock	82	67	Sterling	82	65
Howard	81	64	Sutton	78	59
Irion	83	66	Tom Green	83	66
Kerr	73	49	Upton	83	66
Kimble	74	52	Uvalde	74	52
Kinney	77	57	Val Verde	84	67



EXPLANATION

32

Average Annual Precipitation (1930-1960), in inches

Weather Data Station

Isohyets from Carr, 1967

Precipitation Graphs from National Weather Service Data

N

0 10 30 50 Kilometers

0 15 30 Miles

Figure 4

Average Annual Precipitation, 1930 to 1960, and Average Monthly Precipitation for Period of Record at Selected Stations

GEOLOGY

Geologic History and Regional Structure

Precambrian Period

During the middle Precambrian Period, pre-existing rocks were altered by metamorphism (heat and compressive forces). These metamorphic rocks occur at the surface in the Llano uplift, and rocks of similar alteration occur beneath the Edwards Plateau. Following the alteration of the rocks, two series of granites were intruded in the Llano area. The Llano uplift and other major structural features of the Edwards Plateau are shown on Figure 5.

Extensive erosion began in late Precambrian time and possibly continued into the early Cambrian. The known topographic relief of the terrain resulting from the erosion in the Llano area exceeded 800 feet.

Also, during late Precambrian time, a low arch was forming in the Plateau area from Sutton County on the south to Nolan County on the north. The term *West Central Texas upwarp* has been applied to this structural feature.

Cambrian Period

The sea advanced into the central Texas area during late Cambrian time and deposition of sediments began which continued into early Ordovician. These sediments were deposited in an apparent trough through Menard and McCulloch Counties and as far north as Callahan County. Deposition of sediments to the northwest of this trough was affected, either by thinning or missing due to onlap over the regionally high West

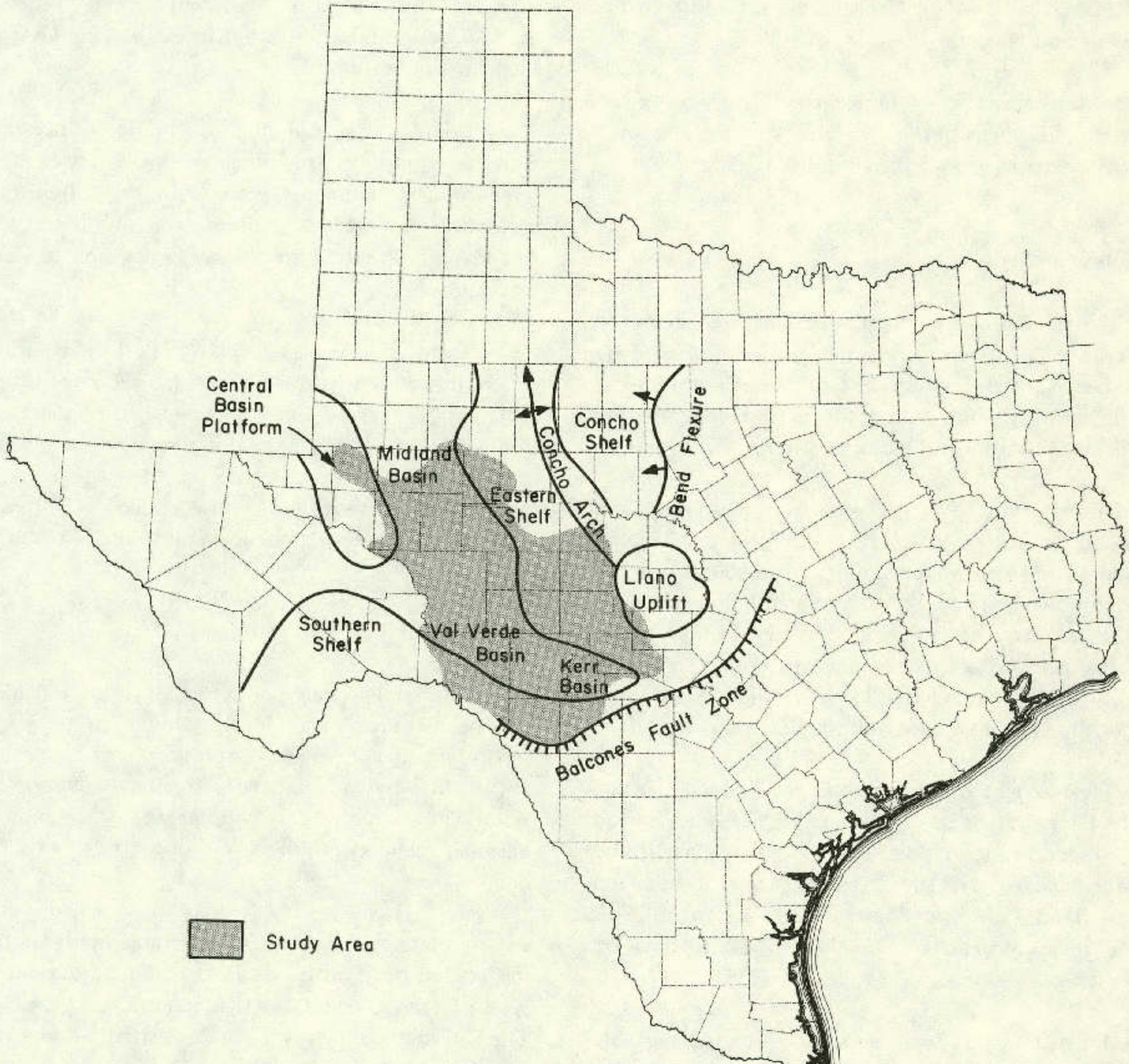


Figure 5.—Structural Features of West-Central Texas

Central Texas upwarp. Differential subsidence (uneven sinking of the sea bottom) continued through the Cambrian.

Rocks of the Cambrian dip to the west and northwest at about 120 feet per mile from the outcrop in southeastern McCulloch County. From the outcrop in the central part of Mason County, the dip is to the southwest at 100 to 150 feet per mile.

Ordovician Period

During early Ordovician time, an extensive epicontinental sea covered Texas resulting in deposition of the Ellenburger Group. In middle Ordovician, uplift and erosion in the Edwards Plateau region and northward not only removed previously deposited sediments but restricted succeeding deposition. This uplift, termed *the Texas peninsula* apparently extended from Uvalde and Medina Counties on the south to the Red River on the north.

In late Ordovician time, the Llano area again subsided and deposition occurred. The close of the Ordovician experienced renewed uplift and erosion.

Pennsylvanian Period

The structural history of the Pennsylvanian Period is a series of land emergence and erosion followed by submergence and deposition. Extensive earth movements (folding and faulting) during the period also affected pre-existing structure and sedimentation.

During early Pennsylvanian, a broad foreland developed in the area of Kimble, Menard, Concho, McCulloch, and Tom Green Counties and counties to the north. Following erosion of this foreland, limestone was deposited. Also, near the end of early Pennsylvanian time, the Concho arch, an elongated domal structure, was uplifted. This arch extended from Mason County on the south to Dickens County on the north.

Development of the Concho shelf, Bend flexure, and the Eastern shelf began during middle Pennsylvanian time. Also, during middle Pennsylvanian, uplift and faulting occurred near the present towns of Richland Springs, Bend, Pontotoc, San Saba, and Lampasas. This had a major effect on Cambrian and Ordovician sediments.

Uplift of the western Llano area during late Pennsylvanian time removed much of the sediments deposited earlier. In parts of Mason, McCulloch, and Menard Counties, late Pennsylvanian sediments may rest on rocks of Precambrian age. The Llano area again experienced uplift caused by the initial westward tilting toward the Midland basin. This tilting continued through the Permian and Triassic Periods. Alternate advance and retreat of shorelines near the end of the Pennsylvanian produced sand, limestone, and shale beds on the Concho shelf. Farther west, on the Eastern shelf, reef masses were formed. The dip of the Pennsylvanian sediments is to the west-northwest.

Permian Period

Little regional earth movement was experienced during early Permian, except for the continued tilting of the landmass toward the Midland basin. This movement caused the shoreline to migrate westward. Relatively unstable near-shore conditions existed along the eastern part of the platform area, while reef masses were building on the Eastern shelf in Coke, Tom Green, and Schleicher Counties.

Some reef building continued into middle Permian time on the Eastern shelf; however, the predominant sediments were gypsum, anhydrite, and dolomitic limestone. During the middle Permian, sediments continued to thicken westward toward the basin area.

Conditions favorable to the deposition of evaporites continued throughout late Permian time with salt, anhydrite, and shale (red beds) being deposited in the basin area. To the east, along the western edge of the Eastern shelf, evaporites gave way to sands and shales with minor amounts of anhydrite. The dip of the Permian is to the west-northwest into the Midland basin.

Triassic Period

As the Permian sea retreated from the Midland basin, erosion and local folding followed; thus, separating the Permian formations from subsequent sediments by an extensive regional unconformity. Although erosion was widespread, the amount of Permian material removed is thought not to have been great.

In late Triassic time, considerable uplift to the east initiated deposition of sands, conglomerates, and shales west of Tom Green, Coke, Irion, and Crockett Counties. The Triassic sediments were deposited on the eroded Permian surface.

Cretaceous Period

Triassic and Paleozoic rocks were subjected to erosion during the Jurassic and early Cretaceous, forming a nearly flat or broadly undulating plain which Hill (1932, p. 260) named the Wichita paleoplain. It was over this eroded surface that the last epicontinental sea advanced northward from the Gulf across Texas.

Two structural features in this area are worthy of special note. The first is an area in southern Reagan County, composed of two subsurface depressions—one to the west of Big Lake and the other northeast of Big Lake. These depressions apparently were caused by solution of Permian evaporites and collapse of overlying sediments. These depressions were later filled with collapse debris and subsequent sediments.

The other major structural feature is a "high" located at the common corners of Schleicher, Menard, Kimble, and Sutton Counties. According to Cartwright (1932, p. 694), this "high" was an island of Permian sediments in the Trinity sea.

During most of Cretaceous time, the sea advanced inland. The sea then began retreating by stages of advance and retreat. A number of interruptions occurred in the sedimentation cycle during the Cretaceous, the most prominent being the erosional unconformity between the Comanche and Gulf Series.

Major faulting of the Cretaceous rocks is generally confined to the Balcones fault zone south of the Edwards Plateau. This fault zone extends across Kinney, Uvalde, and Medina Counties, curving northward through Bexar, Comal, Hays, Travis, Williamson, Bell, and McLennan Counties. The fault zone forms a hinge line between the Gulf Coastal Plain and the higher Edwards Plateau area. The faulting is thought to have begun in the late Cretaceous and continued into the Cenozoic. As the sediment load increased in the Gulf of Mexico and Gulf Coastal Plain, structural adjustment in the form of normal gravity faults resulted in the Balcones fault zone.

The general dip of the Cretaceous beds is to the southeast about 10 feet per mile with the angle of dip increasing near the Balcones fault zone.

Quaternary Period

With the Edwards Plateau above sea level, erosion attacked the thick sections of Cretaceous rocks, depositing alluvium along the streams which traverse the Plateau. The alluvium is in the form of terraces and flood-plain deposits that are Pleistocene and Recent in age.

No major post-Cretaceous structural changes have occurred within the Edwards Plateau except perhaps near the southern boundary in association with the Balcones faulting. Minor folding and faulting has occurred as well as the development of joint systems, solution channels, and caverns in the limestones.

Stratigraphy

The geologic units within the Edwards Plateau, which contain fresh to slightly saline water (less than 3,000 milligrams per liter dissolved solids), range in age from Cambrian to Recent. The surface exposures of the geologic units within the study area are illustrated in Figure 6, and the thickness, lithology, and water-bearing characteristics of these units are summarized in Table 2. The following discussions pertain primarily to those units that contain fresh to slightly saline water.

Cambrian

The *Hickory Sandstone Member of the Riley Formation* was deposited upon an unevenly eroded surface of metamorphic and igneous rocks of Precambrian age and thus varies in thickness. This variation in thickness is not only due to depositional environment but also to subsequent erosion and faulting. The thickness of the Hickory is reported to be 320 feet in Gillespie County and 500 feet in Kimble County. On the outcrop in southeastern McCulloch County, the thickness is approximately 360 feet with an average of 400 feet to the west and northwest towards Menard and Concho Counties. Figure 7 shows the outcrop and the altitude of the base of the Hickory.

Near the outcrop, the Hickory is overlain by the Cap Mountain Limestone Member of the Riley Formation; the contact between these two members is placed at a topographical and vegetational break. The gentle, sandy slopes of the Hickory supports the growth of deciduous trees, whereas the steeper, more resistant slopes of the Cap Mountain are more compatible to the growth of cedar. In the subsurface, the contact is not as readily distinguished.

Normally, the Hickory is non-calcareous and non-glauconitic in contrast to some of the younger Cambrian sandstones. It is composed mainly of yellow, brown, and red, angular to subround, cross-bedded sandstone cemented with iron oxide or clay, with numerous shale beds in the upper part of the section.

Table 2.—Geologic Units and Their Water-Bearing Characteristics

System	Series	Group	Stratigraphic unit	Approximate maximum thickness (feet)	Character of rocks	Water-bearing characteristics
Quaternary	Pleistocene to Recent		Alluvium	125	Sand, clay, silt, caliche, and gravel.	Yields small to large amounts of water in stream valleys.
Tertiary	Pliocene		Ogallala Formation	125	Varicolored clay, silt, coarse to fine sand. Contains some quartz gravel and caliche.	Yields small to moderate amounts of water to wells in Ector, Midland, and Glasscock Counties.
Cretaceous	Comanche	Washita	Buda Formation	40	Soft, gray, nodular limestone; marl; and thin, hard, granular limestone. Massive brittle limestone.	Reported to yield small to moderate amounts of water to wells in Uvalde County.
			Del Rio Formation	20	Clay, marl, and thin beds of marly limestone.	Not known to yield water to wells.
			Edwards and associated limestones: Georgetown Formation	200	Gray, fossiliferous, massive to thin-bedded limestone; alternating beds of soft nodular limestone and shales, flint nodules.	Reported to yield small to large amounts of water to wells and springs in the southern part of the Edwards Plateau.
		Fredericksburg	Edwards and associated limestones: Kiamichi Formation	100	Black, petroliferous shale grading downward into shale and sand; limestone with some dolomite and anhydrite.	Do.
			Edwards and associated limestones: Edwards Formation	480	White to gray, fossiliferous, thin to massive limestone with chert beds; brown, granular dolomite.	Important aquifer on the Edwards Plateau. Yields small to large amounts of water to wells and springs.
			Edwards and associated limestones: Comanche Peak Formation	100	Gray, massive, nodular, marly limestone. Few chalky and sandy beds.	Yields small amounts of water to wells and springs.
			Edwards and associated limestones: Walnut Formation	30	Clay, marl, and limestone.	Not known to yield water to wells.
		Trinity	Antlers Formation (255): Paluxy Sand	75	*Antlers:* White to red, fine to medium-grained sand with some beds of clay. Scattered lenses of gravel, in places conglomeritic at base. *Paluxy:* Fine to medium, loose sand.	*Antlers:* Important aquifer in the northwestern part of the Edwards Plateau. Yields small to moderate amounts of water to wells. *Paluxy:* Yields moderate to large amounts of water to wells in Crockett County.
			Antlers Formation: Glen Rose Formation	1,700	*Glen Rose:* Alternating layers of hard limestone and sandy clay, gray to green shale, gypsum, and anhydrite.	*Glen Rose:* Yields small to slightly saline water to wells and springs on the Edwards Plateau.
			Antlers Formation; Pearsall Formation (500): Hensell Sand Member	500	*Hensell Sand Member:* Red to yellow, fine to coarse, loose to cemented sand interbedded with marl, limestone, sands, sandstone, conglomerate, and calcareous shale.	*Hensell:* Yields small to moderate amounts of fresh to slightly saline water to wells in the southeastern part of the Edwards Plateau.
			Antlers Formation; Pearsall Formation: Cow Creek Limestone Member	210	*Cow Creek Limestone Member:* Limestone and calcareous sandstone with shale layers.	*Cow Creek:* Yields small to moderate amounts of water to wells in Kerr and Bandera Counties.
			Antlers Formation; Pearsall Formation: Pine Island Shale Member	400	*Pine Island Shale Member:* Shale, sand and conglomerate.	*Pine Island:* Not known to yield water to wells.
			Antlers Formation: Hosston and Sligo Formations	1,120	*Hosston and Sligo:* Sand, conglomerate, sandstone, shale, limestone, and dolomite.	*Hosston and Sligo:* Yields moderate to large amounts of water to wells in the southeastern part of the Edwards Plateau.
Triassic		Dockum	Chinle Formation	570	Red, maroon, and purple shale. Thin discontinuous bed of sand and silt.	Yields small amounts of slightly saline water from sand lenses.
			Santa Rosa Formation	560	Multicolored, fine to coarse-grained, micaceous sandstone interbedded with variegated shale.	Yields fresh to very saline water to wells on the Edwards Plateau.
			Tecovas Formation	270	Red to red-brown shale with fine grained micaceous sand.	Not known to yield water to wells.
Permian	Guadalupe	White Horse	Tansill Formation	100	Anhydrite, sand, limestone, and dolomite.	May contain fresh water on the Edwards Plateau where formations are in hydraulic contact with overlying Cretaceous rocks.
			Yates Formation	125	Sandstone, anhydrite, and shale.	
			Seven Rivers Formation	650	Sandstone, anhydrite, salt, dolomite, and shale.	
			Queen Formation	230	Sandstone, anhydrite, and shale.	
	Leonard	Pease River	Blaine Formation	300	Gypsiferous, varicolored sandstone and clay with thin sandstone beds and thin to massive gypsum beds.	Yields slightly mineralized water to wells near edge of Edwards Plateau in northern Tom Green County.
			San Angelo Formation	250	Red sand and siltstone interbedded with clay, coarse cross-bedded sand, and basal conglomerate.	Reported to produce mineralized water to wells near edge of the Edwards Plateau in northern Tom Green County.
		Clear Fork	Choza Formation	625	Dolomite interbedded with varicolored clay.	Not known to yield fresh water to wells on the Edwards Plateau. May contain fresh water where formations are in hydraulic contact with overlying Cretaceous rocks.
			Vale Formation (140): Bullwagon Dolomite Member	75	*Vale:* Varicolored, sandy, gypsiferous shale. *Bullwagon:* Massive dolomite interbedded with shale.	
			Arroyo Formation (60+): Standpipe Limestone Member	15	*Arroyo:* Alternating layers of shale and limestone. *Standpipe:* Limestone and marl.	
	Wolfcamp	—	—	—	Limestone and shale.	Yields small amounts of water to wells in the common corners of Menard, Kimble, Schleicher, and Sutton Counties.
Pennsylvanian	Cisco to Atoka	—	—	—	Limestone, shale, and sandstone.	Yields small amounts of water to wells on the eastern edge of the Edwards Plateau.
Ordovician	—	Ellenburger	—	800	Gray to yellowish-gray, fine to coarse, crystalline limestones and dolomite with chert.	Yields fresh to slightly saline water in the eastern part of the Edwards Plateau.
Cambrian			Wilberns Formation: San Saba Limestone Member	400	Glauconitic limestone.	Yields small amounts of fresh to slightly saline water to wells on the eastern edge of the Edwards Plateau.
			Wilberns Formation: Point Peak Shale Member	200+	Soft, greenish, calcareous shale with beds of dolomite and limestone. Reef-like masses of limestone.	
			Wilberns Formation: Morgan Creek Limestone Member	140	Medium to coarse-grained glauconitic limestone.	
			Wilberns Formation: Welge Sandstone Member	35	Brown, nonglauconitic sandstone.	
			Riley Formation: Lion Mountain Sandstone Member	70	Glauconitic sandstone and limestone.	
			Riley Formation: Cap Mountain Limestone Member	500	Granular limestone with limey sand.	
			Riley Formation: Hickory Sandstone Member	500	Yellow, brown, and red sandstone. Thin lenses of red or gray clay.	Yields moderate to large amounts of fresh to slightly saline water to wells in eastern Edwards Plateau.
Precambrian rocks					Pink granite, dark gray schist, and pink gneiss.	Not known to yield water to wells on the Edwards Plateau.

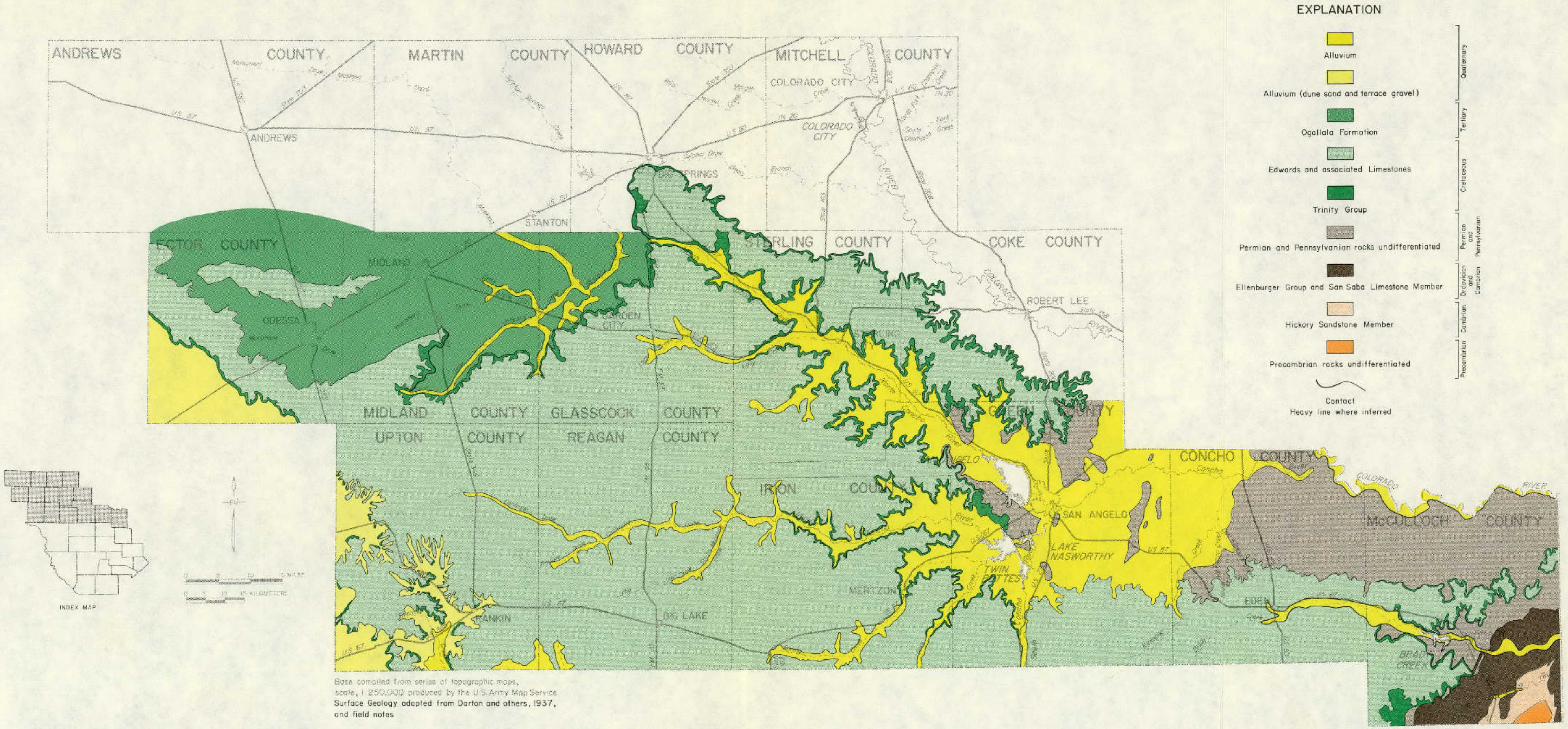


Figure 6

Geologic Map of the Edwards Plateau Region

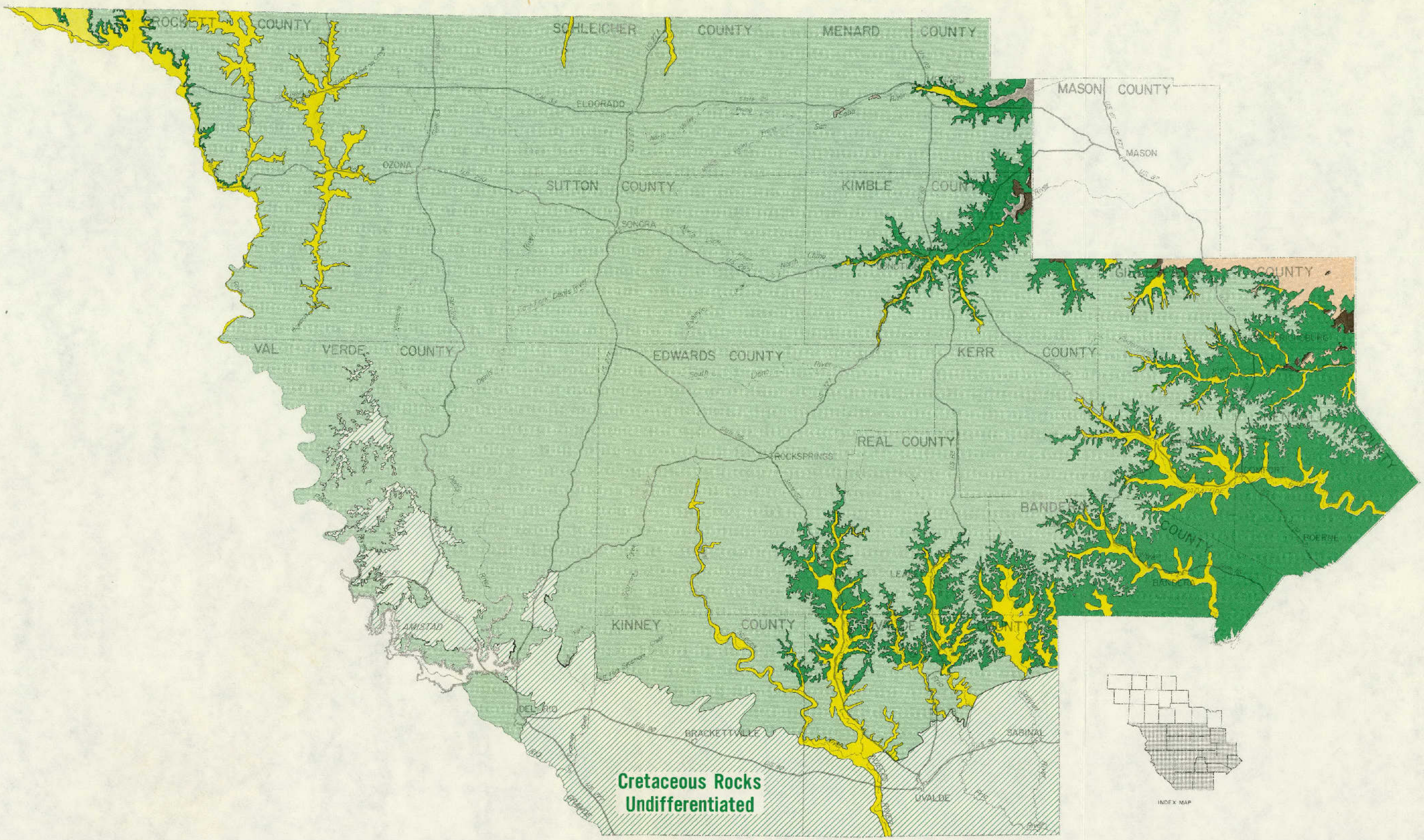
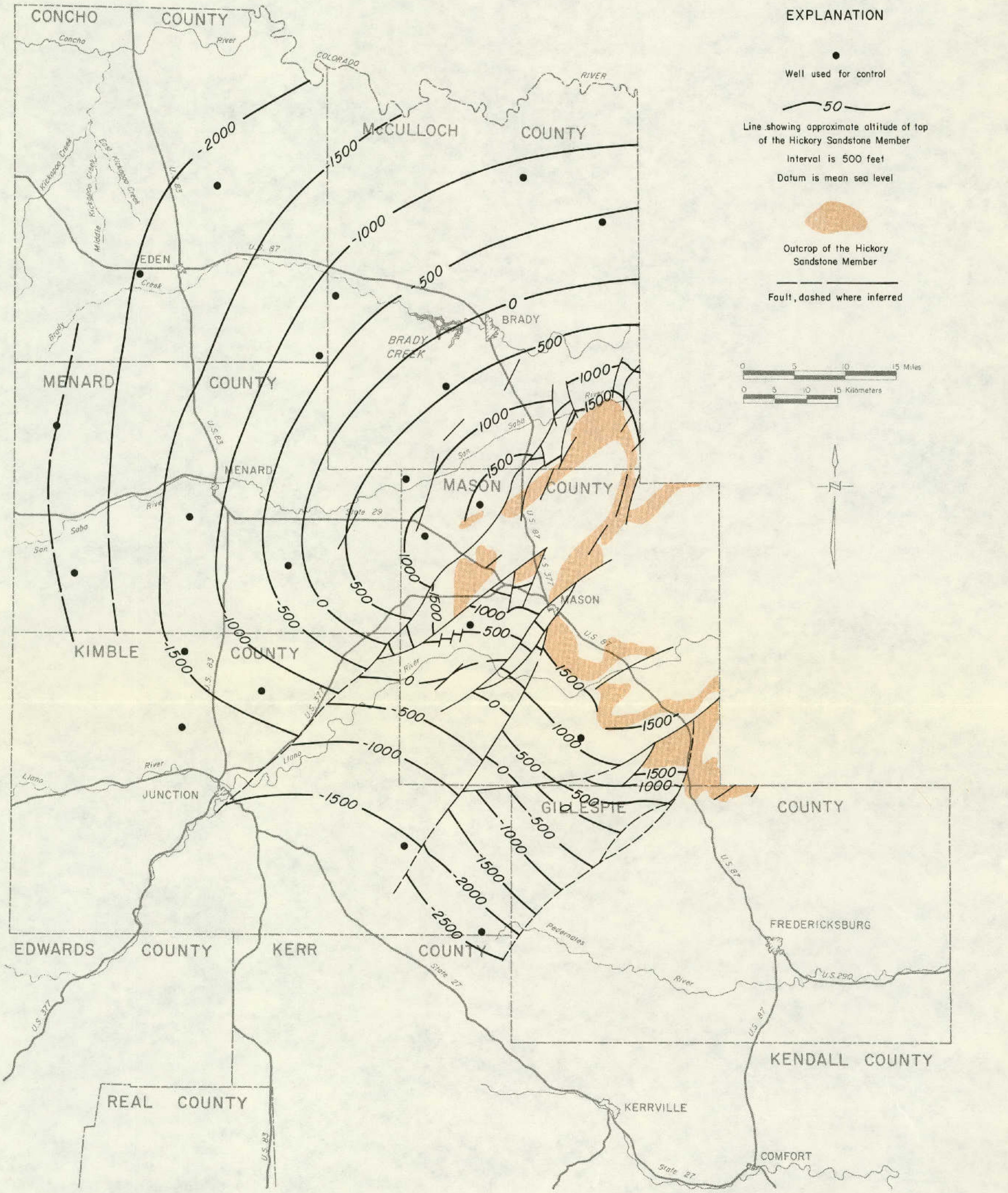


Figure 6 Continued



Base compiled from series of topographic maps, scale 1:250,000
Produced by the U.S. Army Map Service

Subsurface data primarily from Mount and others, 1967, Plate 13, with some control added.
Geology adapted from Darton and others, 1937

Figure 7

Approximate Altitude of the Top of the Hickory Sandstone Member of the Riley Formation

The sandstone varies from very fine grained to coarse grained with the latter being more predominant in the lower part; locally conglomerate is present at the base of the Hickory.

The *San Saba Limestone Member of the Wilberns Formation* is predominantly glauconitic limestone with sandstone and dolomite beds. However, notable facies changes do occur from one locality to another. The lower part of the member contains bioherms at some localities similar to those in the Point Peak Shale Member which underlies the San Saba. In areas where the bioherms are absent, the contact between the Point Peak and the San Saba is the top of the highest significant shale. However, when bioherms are present the boundary is much more difficult to determine. Overlying the San Saba is the Threadgill Member of the Tanyard Formation of the Ellenburger Group and this boundary also is often not distinct. The separation is generally based on the highest glauconite and the approximate faunal boundary. Generally speaking, data on the San Saba in the subsurface are lacking because of the difficulty in distinguishing it from other members of the Wilberns Formation and those of the Tanyard Formation. Due to the difficulty in distinguishing the two rock units and because they are hydrologically connected, the San Saba and the overlying Ellenburger Group are considered a single aquifer (Figure 8).

The San Saba outcrops in southeastern McCulloch County and averages about 280 feet in thickness. In the central portion of Gillespie County, the entire section of Paleozoic rocks has been removed by erosion. However, in the southern part of the county, between Fredericksburg and the Pedernales River, the San Saba is approximately 400 feet thick. In Menard County, the San Saba consists of limestone in the upper part and sandstone in the lower part. The sandstone section has a maximum thickness of about 200 feet and the limestone section is approximately 150 feet thick.

Ordovician

Formations of the *Ellenburger Group* are considered as a single unit in this report because of the lack of data and the difficulty in distinguishing the different formations in the subsurface. Rocks of this group underlie most of the Edwards Plateau. They consist mainly of nonglauconitic limestones and dolomites that range from very fine to coarse grained and are gray to yellowish gray in color. The rocks are generally fossiliferous and chert bearing, especially in the upper part.

Figure 8 shows the outcrop and approximate altitude of the top of the Ellenburger—San Saba aquifer. The Ellenburger outcrops in southwestern Mason County and extends into northeastern Kimble County. Much of the upper part has been eroded causing variations in thickness of the group ranging from approximately 450 to 800 feet in these two counties. Other outcrops of the Ellenburger occur in southeastern McCulloch County and eastern Menard County. The thickness in McCulloch County varies from 280 to 600 feet and averages about 450 feet. The maximum observed thickness in Menard County is about 600 feet in the western part of the county. In Gillespie County, because of faulting and subsequent erosion, the Ellenburger varies from zero to about 1,000 feet in thickness. South of Fredericksburg, the Ellenburger overlies the San Saba Limestone Member and is overlain by the Hensell Sand Member of Cretaceous age.

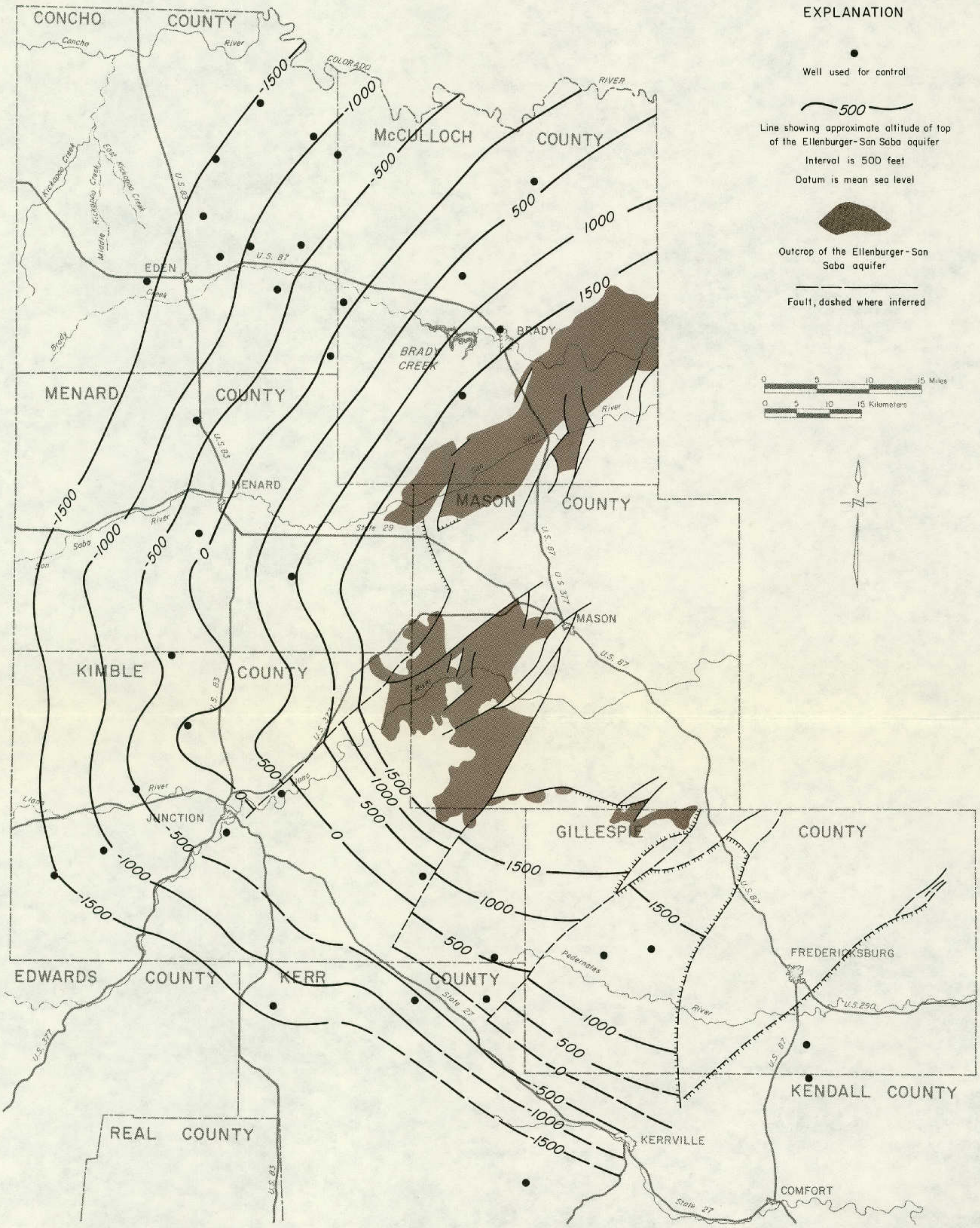
Permian

Sediments of Permian age are present in the subsurface of the Edwards Plateau. Thickness of these sediments ranges from a few feet along the eastern edge of the Plateau to over 9,000 feet in the Midland basin. In the Eastern shelf area, the Permian is composed of limestone and shales, but in the Midland basin, shales and sandstones predominate. In the southern part of the Eastern shelf, along the common boundaries of Schleicher, Menard, Kimble and Sutton Counties, Permian limestone is in hydraulic contact with the Edwards and associated limestones. This is the only known area on the Edwards Plateau where fresh to slightly saline water occurs in Permian rocks.

Triassic

The *Santa Rosa Formation* is composed mainly of discontinuous lenses of reddish-brown to gray, medium- to coarse-grained, subangular, arkosic sandstone and conglomerate, interbedded with red, green, and blue shale. Also, mica is common throughout the section. A well indurated quartz conglomerate occurs locally near the base either as one thick bed or as alternating thin beds of conglomerate and sand.

In the southeastern corner of Upton County, the Santa Rosa is approximately 100 to 160 feet thick. The formation thickness increases to 560 feet to the northeast in the Midland basin. On the Central basin platform in Upton County, the Santa Rosa is overlain by the Chinle Formation and overlaps the Tecovas Formation. In parts of Crockett, Reagan, Irion, Sterling, and Tom Green Counties the Santa Rosa overlaps



Base compiled from series of topographic maps, scale 1:250,000
Produced by the U.S. Army Map Service

Subsurface data primarily from Mount and others, 1967, Plate 12, with some control added.
Geology adapted from Darton and others, 1937

Figure 8
Approximate Altitude of the Top of the Ellenburger-San Saba Aquifer

Permian rocks and is truncated by Cretaceous rocks. Surface exposures of the Santa Rosa occur along the North Concho River in Sterling County.

On the Edwards Plateau, the Chinle Formation is present in the subsurface in all or parts of Upton, Crockett, Midland, Ector, Glasscock, Sterling, Irion, and Tom Green Counties. In this area, the Chinle is conformable with the underlying Santa Rosa, and there is an angular unconformity at the top of the Chinle with overlying Cretaceous beds or Quaternary alluvium.

Shales colored from red to maroon and purple are predominant in the Chinle, along with discontinuous lenses of fine-grained, red to gray sandstone and siltstone. Limestone occurs locally as several thick beds and more commonly as cream or red-colored nodules in the shale. Thickness of the Chinle ranges from zero on most of the Edwards Plateau to 570 feet in the Midland basin.

Cretaceous

The last great epicontinental sea advance during post-Jurassic time deposited the Cretaceous sands, shales, and limestones on an eroded land surface. The stratigraphy of the Cretaceous on the Edwards Plateau consists only of the Comanche Series and is relatively simple. The rocks are divided into the Trinity, Fredericksburg, and Washita Groups.

Trinity Group

The units of the Trinity Group, south of the wedge-edge of the Glen Rose Formation, consist of the Hosston, Sligo, Pearsall, and Glen Rose Formations and the Paluxy Sand. The sand unit that overlies the Permian or Triassic rocks north of the wedge-edge of the Glen Rose, is termed the Antlers Formation (Fisher, 1966 p. 8). Figure 9 shows the altitude of the top of the Trinity Group.

The Glen Rose pinch-out (Figure 9) extends eastward from southern Crockett County across Sutton County to the Sutton-Kimble County line, thence northeastward to the northeast corner of Menard County. South of this line the Trinity Group consists of a basal sand unit and an upper limestone unit. Also south of the Glen Rose pinch-out in Uvalde, Kerr, Bandera, Real, Kinney, and Edwards Counties, there occurs a section of strata which Adkins (1932, p. 273) proposed to be included in the Trinity Group and Comanche Series. Imay (1945, p. 1425) correlated this section with the Durango and Nuevo León Groups of the Coahuilla Series of Mexico and classified them in ascending order as the Hosston and Sligo Formations. Lozo and Stricklin (1956, p. 74) suggested that these formations are Comanchean in age.

The *Hosston Formation* in Uvalde County consists mainly of red sandstone with interbedded shale and limestone. Conglomerate forms the base of the formation which rests upon rocks of Paleozoic age. The thickness varies from 350 to 910 feet.

In Bandera and Kerr Counties, the Hosston is composed of conglomerate and sandstone interbedded with red and green clay and dolomite. Sandy dolomite, dolomitic sandstone, and shale are the principal constituents in the southern parts of the counties. The known thickness of the Hosston in Bandera County ranges from 260 to 335 feet, thinning northward. Erosion of the underlying Paleozoic rocks produced an uneven surface with considerable relief, thus the northward thinning is not uniform.

In Kinney County, west of Brackettville near the Val Verde County line, the drillers' log of an oil test by Mobil Oil Company (J. F. Beidler well) indicates the Hosston to be 200 feet of shale, limestone, red beds, and red sandstone.

The *Sligo Formation* in Kinney County is 68 feet thick and consists of sandy shale. In Kerr County and in northern Bandera County, the Sligo is composed of sandy dolomite, dolomitic limestone, and dense, sandy dolomite. In Uvalde County, the formation thickness ranges from 30 to 210 feet and is predominantly limestone interbedded with sandstone and shale.

Both the Hosston and Sligo Formations may be present in Sutton, Real, and Edwards Counties; however, at this writing no known correlation of these formations have been made.

The *Pearsall Formation* is composed of three members, in ascending order, the Pine Island Shale, the Cow Creek Limestone, and the Hensell Sand. The Cow Creek and Hensell are known to yield water to wells on the Edwards Plateau.

In Edwards, Real, and Crockett Counties, the Pearsall Formation has not been differentiated other than being separated into three parts or zones. The lower part is composed of alternating beds of varicolored calcareous shale and poorly sorted sand that locally is conglomeritic. The middle part is chiefly limestone and dolomitic limestone with minor amounts of shale and marl. The upper part contains well sorted sand, calcareous shale, and thin-bedded limestone. Thickness

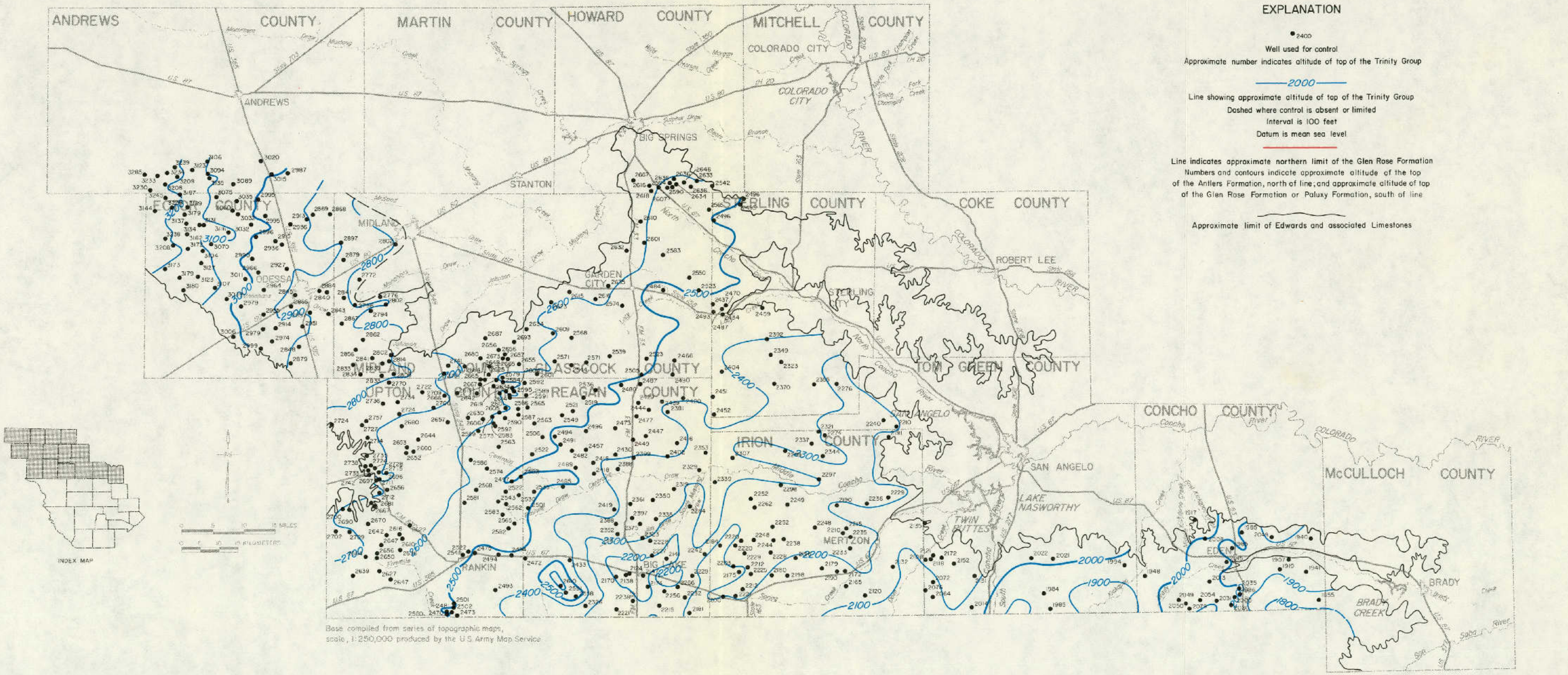


Figure 9

Approximate Altitude of the Top of the Trinity Group

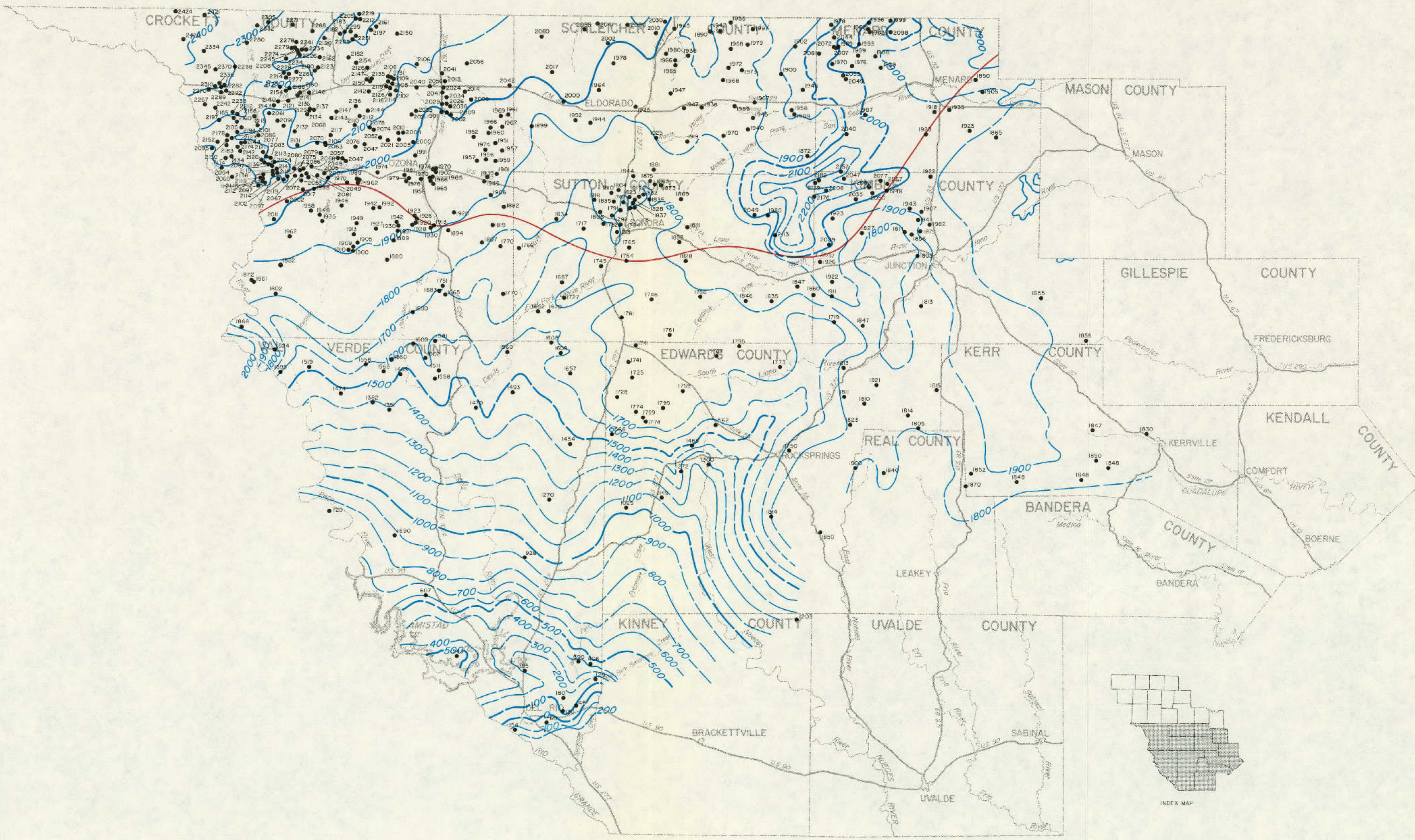


Figure 9 Continued

of the unit in Edwards County varies from 150 feet in the north to over 400 feet in the south. In Real County, the thickness ranges from 200 feet to over 500 feet, the thicker section being in the southern part of the county.

In Kerr and Bandera Counties, the *Cow Creek Limestone Member of the Pearsall Formation* is predominantly massive, white, gray to brown, sandy, fossiliferous limestone and dolomite. Locally there are interbedded layers of sand and shale. In Bandera County and northward into Kerr County, the thickness is fairly uniform, 50 to 60 feet. As the Cow Creek continues northward in Kerr County, it thins and grades into shale and sand.

The *Hensell Sand Member of the Pearsall Formation* in Kerr and Bandera Counties is composed of conglomerate, sandstone, shale, marl, and dolomite. The maximum thickness is about 150 feet near the boundary of the two counties. The Hensell thins to the north and south. To the north, the dolomite and marl pinch-out and the Hensell becomes more conglomeritic; whereas to the south, sandstone, shale, and dolomite become more predominant.

In Gillespie County, the Hensell consists of poorly-sorted sand, silt, and clay with beds of limestone common. The upper part of the member is generally fine grained, red to gray in color, and becomes less sandy as it grades upward into the overlying Glen Rose Formation. Conglomerate and coarse, angular sand are in the lower part. Its thickness in Gillespie County ranges from zero in the northern part of the county to over 300 feet in the western part.

In Kimble County, the Hensell is composed of sand, sandstone, siltstone, and clay. It is overlain by the Glen Rose and rests unconformably upon irregularly eroded rocks of Paleozoic age. The thickness of the Hensell varies from zero in the northwest part of the county to 180 feet in the southern part. The pinch-out of the Hensell in Kimble County is approximately on a line extending from the southwest corner to the northeast corner of the county.

On the Edwards Plateau, the *Glen Rose Formation* is a wedge-shaped mass of rocks that thins northward until it is nonexistent along the line previously discussed. The rocks for the most part consist of clays, marls, and limestones, typical of deposition on a continental shelf. Erosion of the limestone and soft marl along stream valleys forms a stair-step or terraced topography.

In southern Crockett County, the Glen Rose consists of thin-bedded limestone and calcareous shale. It overlies the basal sand unit and is overlain by a sand unit called the Paluxy Sand by Iglehart (1967, p. 18). The thickness of the Glen Rose in Crockett County varies from zero to about 100 feet.

The Glen Rose in Sutton County consists of limestone, sandstone, and green and red shale. It is underlain by Permian formations and overlain by the Fredericksburg Group. The thickness ranges from zero to about 420 feet in the southern part of the county.

In Kimble County, the Glen Rose is composed of limestone beds alternating with marl along with some gypsum and anhydrite. The thickness varies from zero in the northwest to 425 feet in the southeast part of the county. The Glen Rose overlaps the Hensell Sand Member of the Pearsall Formation in the southeastern parts of Kimble and Menard Counties, and Paleozoic rocks northwest of the Hensell pinch-out. The Edwards and associated limestones overlap the Glen Rose in Kimble and Menard Counties. In Menard County, the Glen Rose is mainly multicolored clay, silt, and sand, with minor amounts of marl and limestone. The thickness ranges from zero to over 200 feet.

In Kerr County, the Glen Rose can be separated into an upper member and lower member. The lower member is chiefly medium- to thick-bedded, fossiliferous limestone with interbedded sand and shale. The thickness is fairly constant throughout most of the county and ranges from 180 to 210 feet. The contact between the Glen Rose Formation and the underlying Hensell Sand Member is usually placed at the base of the lowest massive limestone beds of the Glen Rose.

The upper member varies in thickness from 330 feet in the northwestern part of Kerr County to 385 feet in the southern part. Shale and nodular marl predominate in the upper member, alternating with thin-bedded impure limestone. There are two marker horizons of porous anhydrite in the upper member, one of these evaporite beds is located near the middle of the upper member. The base of the lower anhydrite bed is usually selected as the boundary between the two members.

In Bandera County, the Glen Rose is predominantly a rudistid limestone, with minor amounts of sand, clay, dolomite, and anhydrite. The limestone is thin bedded in the upper member and massive in the lower member. Since the contact between the Hensell and the Glen Rose is gradational, the separation is arbitrarily placed at the base of the lowest massive limestone bed in the lower member of the Glen Rose. The contact with the overlying Comanche Peak Formation is also gradational. The lower member of the Glen Rose in Bandera County thickens from 190 feet in the north to 380 feet in the south.

The upper member of the Glen Rose is mainly blue to yellowish-brown shale, marl, and thin-bedded fossiliferous limestone with two evaporite sections. The upper evaporite beds, which occur in the middle of the member, consist of anhydritic marl and dolomite. Both evaporite sections are characterized on electric logs by high resistivity kicks, and on the outcrop they occur as brown, ferruginous, dolomitic clay with the anhydrite having been removed by leaching. In the northern part of Bandera County, the upper member is about 385 feet thick increasing to about 440 feet in the southern part of the county.

The lithology of the Glen Rose in Kinney County is similar to that in Bandera County. The thickness of the Glen Rose in Kinney County varies from 1,100 feet in the north-western part of the county to about 1,700 feet in the south-central part.

Thickness of the Glen Rose in Edwards and Real Counties ranges from 450 to 750 feet and from 480 to 780 feet respectively; the thicker sections occur in the southern parts of these counties.

In southern Crockett County, Iglehart (1967, p. 18) refers to a sand section between the Glen Rose and Comanche Peak Formations as the *Paluxy Sand*. The sand is not present above the Glen Rose at all locations in southern Crockett County and the thickness varies considerably, reaching a maximum of 75 feet in the southern part of the county.

For the purpose of this report, the basal sand unit that overlies the Permian or Triassic rocks north of the wedge-edge of the Glen Rose Formation is termed the *Antlers Formation.*

In Ector, Midland, Glasscock, Sterling, Upton, Reagan, Irion, Crockett, Coke, Tom Green, Schleicher, and Sutton Counties, the Antlers consists of buff to gray, fine- to medium-grained, cross-bedded, quartz sand and sandstone interbedded with lesser amounts of red, gray, and purple shale. In some places, a fine gravel occurs at the base, these areas should correlate with the topographic lows of the eroded pre-Cretaceous surface. The induration of the sand varies from place to place, from tightly cemented to friable or poorly cemented. The latter is commonly referred to by local drillers as *pack sand*. The base of the Antlers is often difficult to determine due to the reworking of Triassic and Permian age red shales by Cretaceous seas.

Thickness of the Antlers varies locally because the sand was deposited on an eroded surface of low to moderate relief (10 to 100 feet). The maximum thickness is about 254 feet in west-central Reagan County. In addition to Reagan County, thick sections of the Antlers also occur in eastern and northeastern Upton County (216 feet), north-central Crockett County (224 feet), southwestern Glasscock County (250 feet), and southwestern Schleicher County (237 feet). In Ector County, the thickness ranges from about 70 to 120 feet.

The Antlers is absent in an area of the northern and central parts of the Plateau in parts of Concho, Kimble, McCulloch, Menard, Schleicher, Sutton, and Tom Green Counties. This is due to the presence of "highs" of resistant Paleozoic deposits which were never covered by the Cretaceous (Trinity) seas (Cartwright, 1962, p. 694).

Fredericksburg Group

The *Walnut Formation* is either thin or absent over most of the Edwards Plateau region. On Mount Margaret, near Tennyson in Coke County, the Walnut consists of 22 feet of brown sand and sandy marl overlying the Antlers and underlying the Comanche Peak Formation. In Tom Green County, the Walnut consists of 5 to 15 feet of yellowish, sandy marl and clay. The Walnut in Gillespie County is a yellow clay only a few feet thick that grades upward into the overlying Comanche Peak. Previous investigators may have included some of the Walnut Formation with the Comanche Peak.

The *Comanche Peak Formation* is present either at the surface or in the subsurface over the entire area of the Edwards Plateau. It is typically a chalky to argillaceous, nodular limestone and overlies the Walnut Formation, where it is present, and underlies the Edwards Formation.

In Tom Green County, the Comanche Peak is about 100 feet thick and consists of soft, yellowish, chalky and sandy limestone in the lower part and massive, more resistant beds of limestone in the upper part.

To illustrate the variation in thickness of the Comanche Peak limestone in the southern part of the Edwards Plateau, the following examples are given:

County	Thickness in feet	County	Thickness in feet
Gillespie	30	Real	70
Uvalde	60-90	Bandera	25-60
Kinney	25	Kerr	20-50
Edwards	45-60		

In Crockett County, the combined thickness of the Comanche Peak and the Edwards is about 190 feet, and consists of soft, yellow to white, nodular, marly limestone in the lower part and massive, chert-bearing limestone in the upper part. In Upton County, this same section is about 168 feet thick and is composed of yellowish-brown, massive nodular limestone and calcareous clay. The Edwards and associated limestones in Ector County probably consists of only the Comanche Peak, which varies in thickness from zero to about 50 feet. It overlies the Antlers, and the best exposures are along Concho Bluff in the western part of the county.

In Coke County on Mount Margaret, the Comanche Peak consists of 35 feet of white, massive to nodular limestone and brown marly to sandy limestone, and is overlain by the Edwards Formation. In parts of Concho and McCulloch Counties, the Edwards has been removed by erosion and the Comanche Peak occurs at the surface.

The *Edwards Formation* is a thin-bedded to massive, fossiliferous, honey-combed limestone which forms the relatively flat topographic divides with steep-walled stream canyons on the Edwards Plateau. The limestone generally contains chert or flint nodules with dolomitic limestone in the lower part. In Sutton and nearby counties, the Edwards is a granular to crystalline, dolomitic limestone called *brown lime* or *brown sand* on local well driller's logs. Caverns or caves and smaller solution channels are common in the Edwards.

In Gillespie and Menard Counties, Barnes (1943, p. 40) studied isolated gypsum deposits in the Edwards which he believed to be parts of a formerly widespread evaporite horizon. To this evaporite horizon, which occurs about 140 feet above the base of Edwards, Barnes applied the name *Kirschberg*. The thickness of the Edwards in Gillespie County is about 200 feet.

In Uvalde County, the Edwards ranges from 50 to 100 feet in thickness and consists of massive lithographic to medium-grained limestone with a few beds of dolomite. The limestone contains minor amounts of chert.

In Kinney County, the Edwards is about 575 feet thick overlying the Comanche Peak and underlying the Georgetown. The lithology of the Edwards in Kinney County is mainly massive-bedded, light to dark gray limestone with some marl which is thin and flaggy near the base.

The Edwards in Tom Green County is massive, gray limestone with some porous, chalky limestone beds. Honey-combed limestone and chert or flint nodules are common. The thickness varies from 50 to 200 feet.

In Bandera, Edwards, Real, and Kerr Counties, the Edwards and the Georgetown Formations are considered as one unit and have not been differentiated. In these counties the thickness of the unit is about 500 feet. In Menard County, the Comanche Peak, Edwards, and Georgetown are considered as a single unit that ranges in thickness from zero to 250 feet; and in Kimble County this unit varies in thickness from 380 to 480 feet.

The *Kiamichi Formation* is recognized only in the southern part of the Edwards Plateau. Lithology of the formation in Uvalde County is described as thin to flaggy, dark gray to buff, petroliferous limestone. Zones of solution breccia occur in the limestone, along with bedded and nodular flint. A few beds of black, petroliferous shale occur in the upper part of the formation. Leached zones are present at or near the outcrop due to the removal of gypsum by weathering. Downdip, the gypsum and the limestone increase in thickness as the depth increases. In Uvalde County, the thickness of the Kiamichi Formation ranges from 155 to 210 feet (Welder and Reeves, 1962, p. 17).

In Kinney County, the Kiamichi is composed mainly of black shale, black and brown limestone (possibly petroliferous) and anhydrite. This section of strata is about 200 feet thick (Bennett and Sayre, 1962, p. 30).

According to White (1968, p. 19), H. D. Eargle assigned 93 feet of calcareous clay and marl on King Mountain in Upton County to the Kiamichi Formation.

Washita Group

Adkins (1932, p. 361), in discussing the Washita Group, stated that a large area in the western part of the Edwards Plateau, comprising Crockett, southern Upton, Reagan, Irion, Schleicher, western Menard, Sutton, and northern Edwards Counties is capped by the Washita. In the northern part of the Plateau, the *Georgetown Formation* is the most extensively exposed unit of the Washita Group due to removal of part or all of the Del Rio and Buda Formations by post-Cretaceous erosion.

In Crockett County, the Georgetown consists of soft, nodular limestone and marl in the lower part and massive, more resistant, fossiliferous limestone in the upper part. The thickness varies from 340 to 400 feet. An unconformity separates the Georgetown from the underlying Edwards. The Buda occurs at higher elevations in Crockett County.

In Upton County, the Washita Group has not been differentiated and consists of about 195 feet (possibly up to 250 feet) of calcareous clay, marl, and thin to massive-bedded limestone. The limestone caps the slopes of clay and marl.

In Uvalde County, the Georgetown ranges from about 310 to 400 feet in thickness. It overlies the Kiamichi and is overlain by the Del Rio Formation. The limestone is white and fine grained with flint beds or nodules occurring in the section between 140 and 275 feet above the base of the Georgetown. Near the top of the Georgetown, the limestone becomes more argillaceous as it grades upward into the overlying Del Rio.

The Georgetown and the Edwards Formations in Kinney County are so similar that, according to Bennett and Sayre (1962, p. 31-32), faunal studies of the fossils are essential in differentiating the two formations. In the eastern part of the county, Bennett and Sayre (1962, p. 31) recorded a 55-foot section of Georgetown which consisted of very fine-textured, massive, nodular, light-gray limestone intercalated with thin beds of marl. Imlay (1945, p. 20) recorded 505 to 550 feet of Georgetown in the Mobil Oil Company Wardlaw well 10-3/4 miles east of the city of Del Rio in Kinney County.

The *Buda Formation* in Crockett County consists of thin-bedded, hard, sparry limestone at the top and microcrystalline limestone at the bottom, separated by yellow, fossiliferous, nodular marl. A maximum of about 40 feet of Buda caps the high flat divides in Crockett County.

In Uvalde County, the Buda is a dense, very fine-grained, massive limestone whose color ranges from white to gray to pink. On the outcrops, mainly in the southern part of the county, the Buda weathers to a light gray or brown, and along the streams it may have a white, nodular appearance. The Buda ranges from about 70 feet near Sabinal to about 100 feet in the western part of Uvalde County. It lies conformably on the Del Rio Formation and is overlain unconformably by the Eagle Ford Formation.

In Kerr County, the Buda has a maximum observed thickness of 15 feet and in Kinney County the thickness ranges from 65 feet on the outcrop at Turkey Mountain to 119 feet in the subsurface in the southwest part of the county. The maximum thickness of the Buda in Edwards County is 20 feet, and in Real County the maximum thickness is about 10 feet.

Tertiary

The Tertiary System is represented by the *Ogallala Formation* along the northern edge of the Edwards Plateau. The Ogallala consists of alternating beds of clay, caliche, gravel, and sand. The gravel and sand, for the most part, is poorly sorted and unconsolidated. In parts of Ector, Midland, Martin, Howard, and Glasscock Counties, the Ogallala lies unconformably on Triassic and Cretaceous rocks and is overlain by Quaternary alluvium over much of this area. At Panther Creek, in northern Glasscock County, the Ogallala appears to have a thickness of some 250 feet (Figure 10).

Quaternary

Alluvial deposits of Pleistocene and Recent age occur along nearly all of the stream courses on the Edwards Plateau (Figure 6). These deposits consist of sand, gravel, silt, and clay derived from the erosion of the underlying rocks, and occur primarily as terrace and flood-plain alluvium. The terrace material along the North and Middle Concho Rivers and their tributaries north and west of San Angelo ranges in thickness from a few feet to as much as 120 feet in Sterling County. In Uvalde County, north of the Balcones fault zone, the alluvial deposits attain a maximum thickness of about 100 feet. The maximum observed thickness of alluvium in Kerr, Edwards, Real, and Kimble Counties varies between 40 and 50 feet. In Sutton and Gillespie Counties, the alluvium appears to be about 25 feet or less in thickness, but locally in Sutton County may reach a thickness of about 100 feet. Along Live Oak Creek and Howard's Creek in Crockett County, the thickness ranges from a few inches to over 200 feet.

Geology as Related to the Occurrence of Ground Water

The aquifers that contain fresh water on the Edwards Plateau are listed in order of their importance and development.

Edwards-Trinity (Plateau) Aquifer

The term *Edwards-Trinity (Plateau) aquifer* as used in this report includes all the rocks from the base of the Antlers Formation (Trinity Group) to the top of the

Georgetown Formation (Washita Group). In parts of Sterling, Irion, Reagan, and Crockett Counties, where the Santa Rosa Formation subcrops beneath the Antlers, the two formations are considered to be a single hydrologic unit (Figures 10, 11, and 12). South of the Glen Rose Formation pinch-out, the Edwards-Trinity (Plateau) aquifer includes all rocks from the top of the Glen Rose to the top of the Georgetown Formation. The approximate altitude of the base of the Edwards-Trinity (Plateau) aquifer is shown on Figure 13.

Water in the Edwards-Trinity (Plateau) aquifer flows generally in a southeasterly direction. However, locally the direction of flow will vary; for example, near the major streams the flow of ground water will be towards these streams. To a certain extent, the ground water flow conforms to the surface topography.

From a regional standpoint, the Edwards and associated limestones and the Antlers Formation constitute a single aquifer. However, in some areas the zone of saturation is below the limestone and the fresh ground water (less than 1,000 milligrams per liter dissolved solids) is confined to the Antlers. The areas where the fresh water occurs only in the Antlers are Ector and Midland Counties and in parts of Upton, Glasscock, and Reagan Counties. In parts of Crockett, Reagan, Irion, Sterling, and Tom Green Counties, the Santa Rosa Formation is included with the Antlers and Edwards and associated limestones to compose the Edwards-Trinity (Plateau) aquifer. In these counties, pre-Cretaceous erosion removed the Chinle Formation that had overlain the Santa Rosa Formation; thus, the Antlers was deposited directly on the Santa Rosa.

Only a small amount of water is found in the Georgetown Formation in the northern part of the Edwards Plateau due to its limited distribution and occurrence above the zone of saturation. In the southern part of the Plateau, the Georgetown contributes a major portion of ground water to wells developed in the Edwards and associated limestones.

The Edwards Formation contains water in varying amounts in solution cavities, fractures, and dolomitic limestones over the Plateau except for areas where the water is confined to the Antlers Formation and to Permian rocks.

Along the east and southeastern edge of the Plateau, the saturation of the Edwards-Trinity (Plateau) aquifer is thin and ground-water discharge through seeps and springs is rapid. This is due in part to the high topographic position of the formation and stream erosion. The areas where the saturated thickness appears to be the greatest are in southern Val Verde County and in Reagan County, three or four miles southwest of the town of Big Lake. The apparent saturated thickness near Big Lake exceeds 700 feet and includes rocks of the Edwards and associated limestones, the Antlers, and the Santa Rosa. Reported discharge of wells developed in the Edwards-Trinity (Plateau) aquifer vary from less than 50 to over 1,000 gallons per minute (gpm).

Alluvium Aquifer

Alluvium occurs along the North and Middle Concho Rivers and their tributaries. These deposits range in thickness from a few feet to as much as 250 feet, and are generally in hydraulic contact with, and probably receive recharge from the Antlers.

The alluvial deposits along the Frio, Nueces, Sabinal, and Guadalupe Rivers in the southern part of the Plateau are recharged by stream flood waters and discharge from the Edwards and associated limestones. Maximum thickness of the alluvium in these areas ranges from 25 feet to about 100 feet. Maximum thickness of alluvium in western Crockett County along Live Oak Creek and Howard's Creek is about 200 feet.

The saturated thickness of the alluvium varies from less than 30 feet to about 200 feet. The greatest saturated thickness is along the North Concho River in northeast Glasscock and northwest Sterling Counties. Reported discharge of wells developed for irrigation range from less than 100 to 1,500 gpm.

Lower Cretaceous Aquifer

The formations which, for this report, are referred to as the lower Cretaceous aquifer are in ascending order, the Hosston, Sligo, Pearsall, and Glen Rose. In the areas where all are present, they generally are in hydrologic connection and are considered as one aquifer. Locally, any one of these formations may constitute an aquifer.

Since these formations occur only south of the Glen Rose pinch-out, they are usually developed near the eastern and southern edges of the Edwards Plateau. Also, some wells produce from these formations along the streams where the Edwards and associated limestones have been removed by erosion.

The Hosston and Sligo Formations range in thickness from a few feet along the northern limit to about 1,200 feet in the southern part of Kinney, Uvalde, and Val Verde Counties. Fresh to slightly saline water is yielded to wells in Bandera and Kerr Counties. In

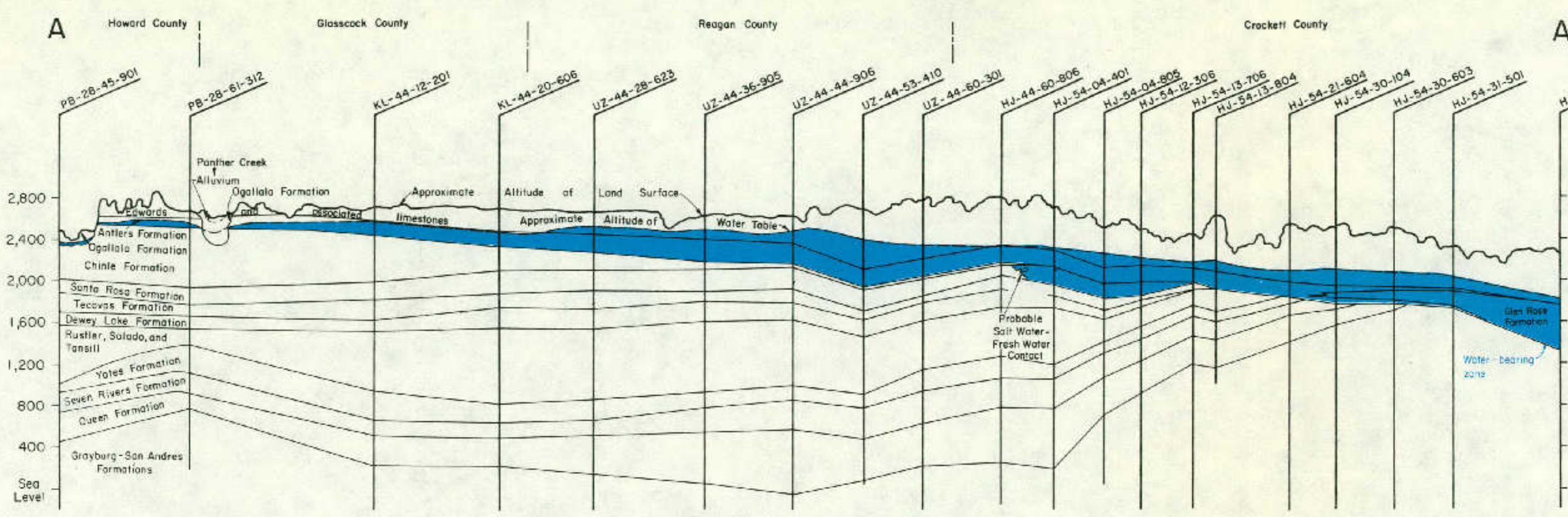


Figure 10
Geologic Section A-A'
Howard County to Crockett County

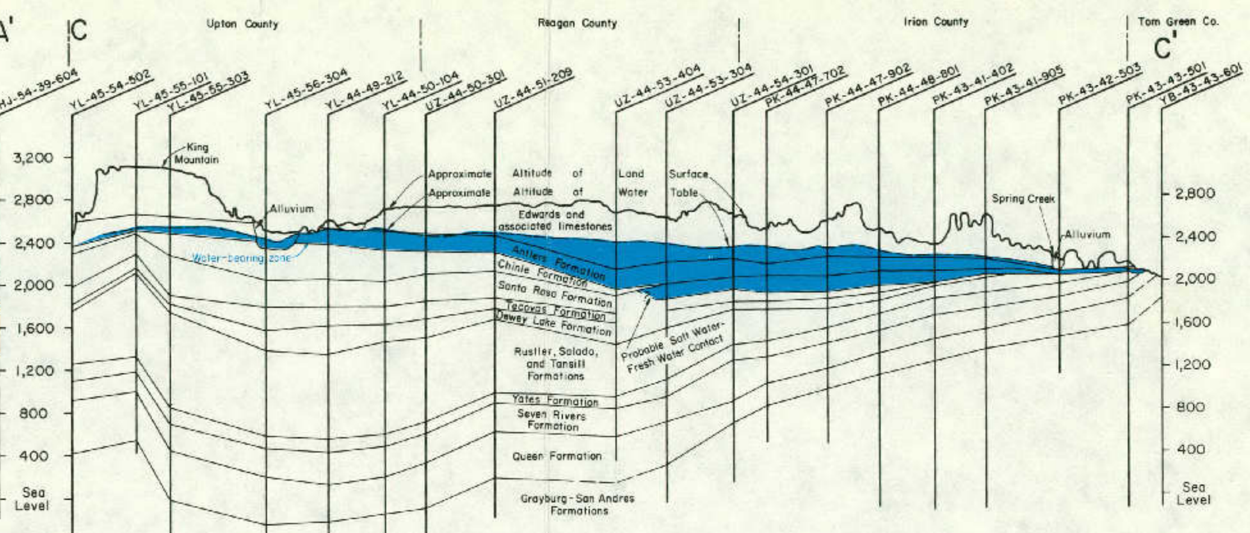


Figure 12
Geologic Section C-C'
Upton County to Tom Green County

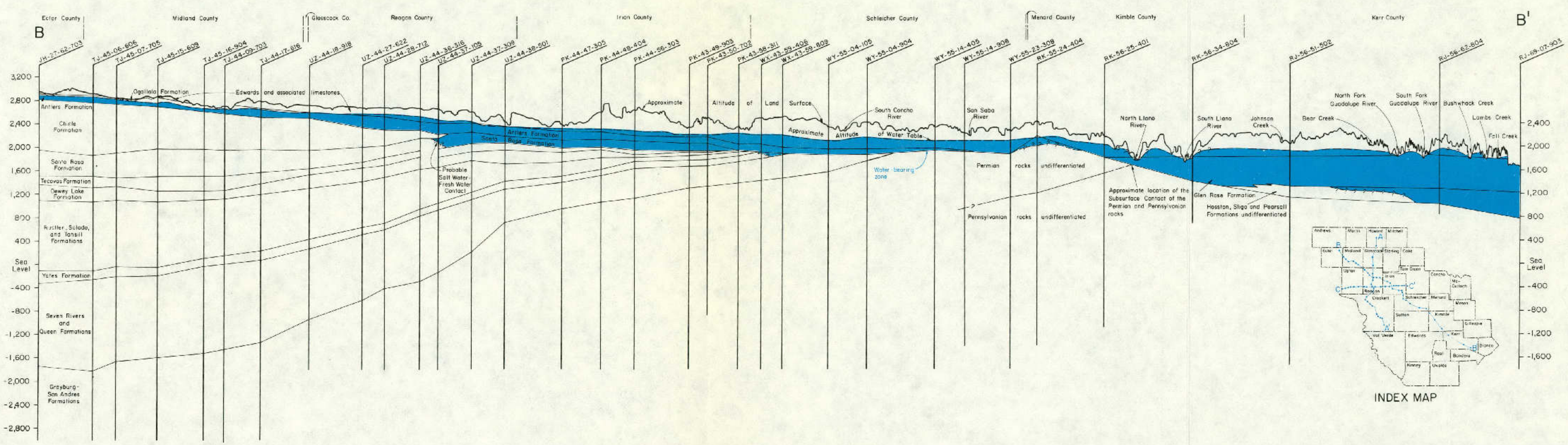


Figure 11
Geologic Section B-B'
Ector County to Kerr County

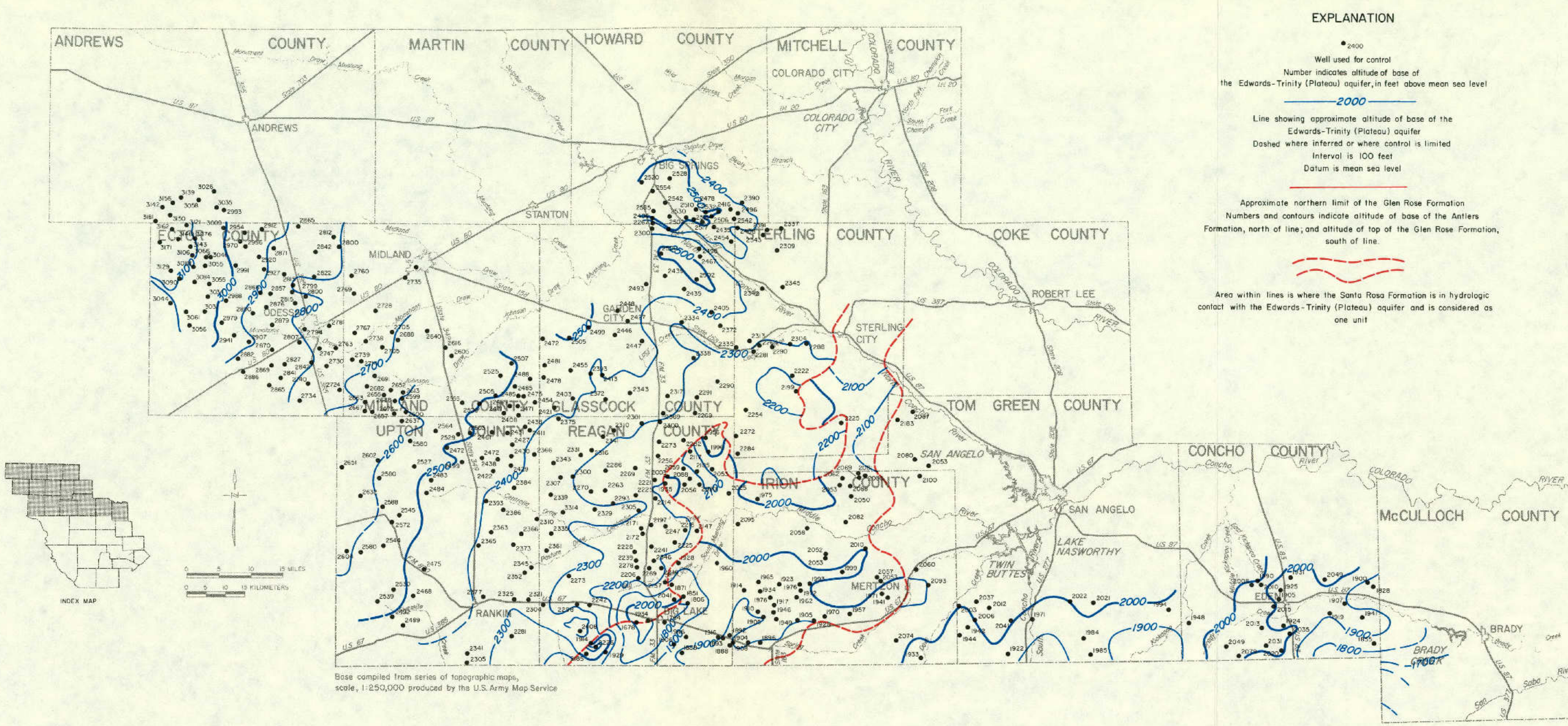


Figure 13

Approximate Altitude of the Base of the Edwards-Trinity (Plateau) Aquifer

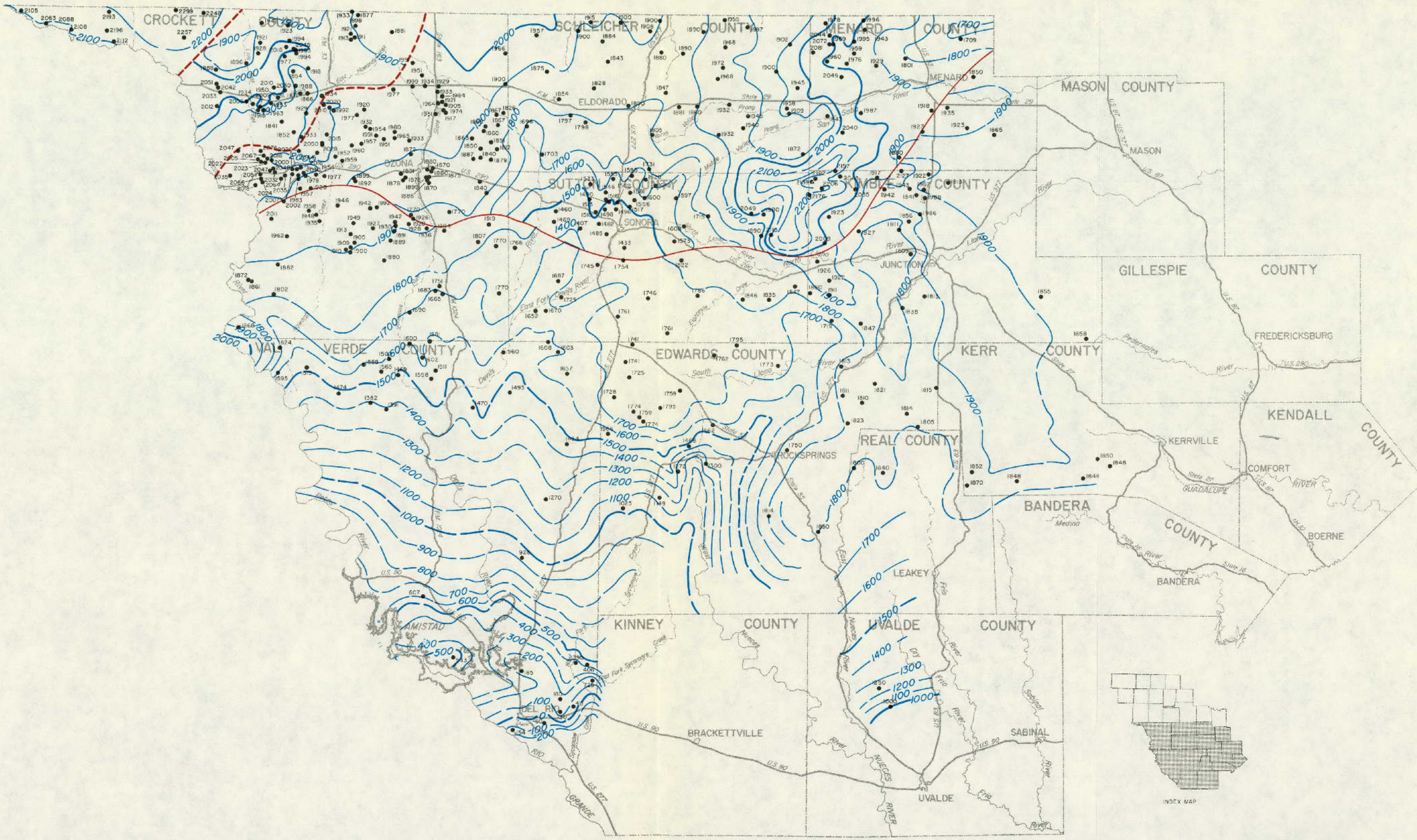


Figure 13 Continued

Kinney, Uvalde, and Val Verde Counties, the Hosston and Sligo either yield saline water, or have not been developed in wells and the water quality is not known. Maximum reported yield of this aquifer is greater than 1,000 gpm.

The Cow Creek Limestone and Hensell Sand Members of the Pearsall Formation are present in the subsurface of the southern part of the Edwards Plateau. Thickness of these members range from a few feet near the northern limit to about 250 feet in Kerr, Bandera, and Uvalde Counties. Fresh to slightly saline water is yielded to wells developed in the Cow Creek and Hensell in Kimble, Kerr, and Bandera Counties. The Hensell may contain fresh to slightly saline water in the southern parts of Edwards and Real Counties, however, no wells of record penetrate the Hensell. Discharge of wells developed in the Cow Creek and Hensell is reported to range from a few gallons per minute to about 300 gpm.

The Glen Rose Formation is wedge-shaped and composed of limestone, marl, shale, and evaporites which range in thickness from a few feet near the northern limit to about 1,700 feet in the southwestern part of the Plateau. Wells have been developed in the Glen Rose in areas where the overlying sediments have been removed by erosion or do not contain the desired amount of ground water. Most of the wells are located in southern Real, northern Uvalde, eastern Kerr, and Bandera Counties. In the southeastern part of the Plateau, the Glen Rose has been divided into the upper member and lower member. The upper member yields small amounts of slightly saline water from the limestone and small to moderate amounts of water from evaporite beds. The water from the evaporite beds is high in sulfate content and unfit for most purposes. The lower member yields small to moderate amounts of fresh water from massive limestones.

Hickory Aquifer

The Hickory Sandstone Member of the Riley Formation ranges in thickness from a few feet on the outcrop to 500 feet in southeastern McCulloch County.

Wells developed in the Hickory are mainly confined to the outcrop area east of the Edwards Plateau in McCulloch, Mason, and San Saba Counties. Several municipal wells are completed in the Hickory, such as the wells at Brady and Melvin in McCulloch County. The city of Eden in Concho County has one well completed in the Hickory which is used as a supplementary water source. The city of San Angelo has completed two test wells in the Hickory in southeastern Concho County and western McCulloch County.

Near the outcrop the Hickory is under water-table conditions, and downdip the aquifer is under artesian pressure. The movement of water within the Hickory is both downdip and laterally. Reported discharge of wells range from less than 100 to about 1,000 gpm.

Ellenburger-San Saba Aquifer

The Ellenburger-San Saba aquifer is composed of the San Saba Limestone Member of the Wilberns Formation of Cambrian age and the Ellenburger Group of Ordovician age. Because of the difficulty in separating these units in the subsurface and the fact that they are hydrologically connected, they are considered as a single aquifer.

Well development in the Ellenburger-San Saba is principally near the outcrop east and southeast of the Edwards Plateau in McCulloch, San Saba, and Gillespie Counties. A few wells have been developed in this aquifer on the Plateau in southwestern McCulloch, eastern Menard, and northeastern Kimble Counties. Reported discharge of wells developed in the Ellenburger-San Saba aquifer exceed 1,000 gpm; however, most wells discharge less than 500 gpm.

Ogallala Aquifer

The Ogallala Formation of Tertiary age is the principal water-bearing unit on the High Plains. Along its southern limit, which is adjacent to the Edwards Plateau in Ector, Midland, and Glasscock Counties, the Ogallala is an important source of ground water locally.

Water in the Ogallala flows to the south and southeast, except in local areas of heavy pumping of the aquifer where the direction of flow is toward the area of withdrawal.

The saturated thickness of the Ogallala varies greatly. In Midland County, the saturation ranges from about 10 to 62 feet with an average of about 30 feet. The average saturation of the Ogallala in Ector County is 55 feet, ranging from a low of 5 feet to a high of 81 feet. The greatest saturated thickness is in northwestern Glasscock County where the average is 76 feet and ranges from 32 to 112 feet. Reported discharge of wells developed in the Ogallala in Ector, Glasscock, and Midland Counties ranges from about 10 to 1,500 gpm. Wells developed along the northern edge of the Plateau likely penetrate both the Ogallala and Antlers Formations.

Permian Aquifer

Several stratigraphic units of the Permian System are in apparent hydraulic contact with the overlying Cretaceous units and may contain small amounts of fresh to slightly saline water in parts of Irion, Sterling, Tom Green, Crockett, and Coke Counties. The units which appear most promising as a source of ground water, solely on the basis of lithology, are the Yates, Seven Rivers, and Queen Formations. Two other possible sources of ground water from the Permian are the Bullwagon Dolomite Member of the Vale Formation and the San Angelo Formation which also occur beneath the Cretaceous in southeastern Tom Green and northwestern Schleicher Counties.

Permian limestone contains fresh to slightly saline water in the area of the common corners of Kimble, Menard, Schleicher, and Sutton Counties. The Permain is overlain by the Edwards and associated limestones in this area and is recharged by water from the Cretaceous.

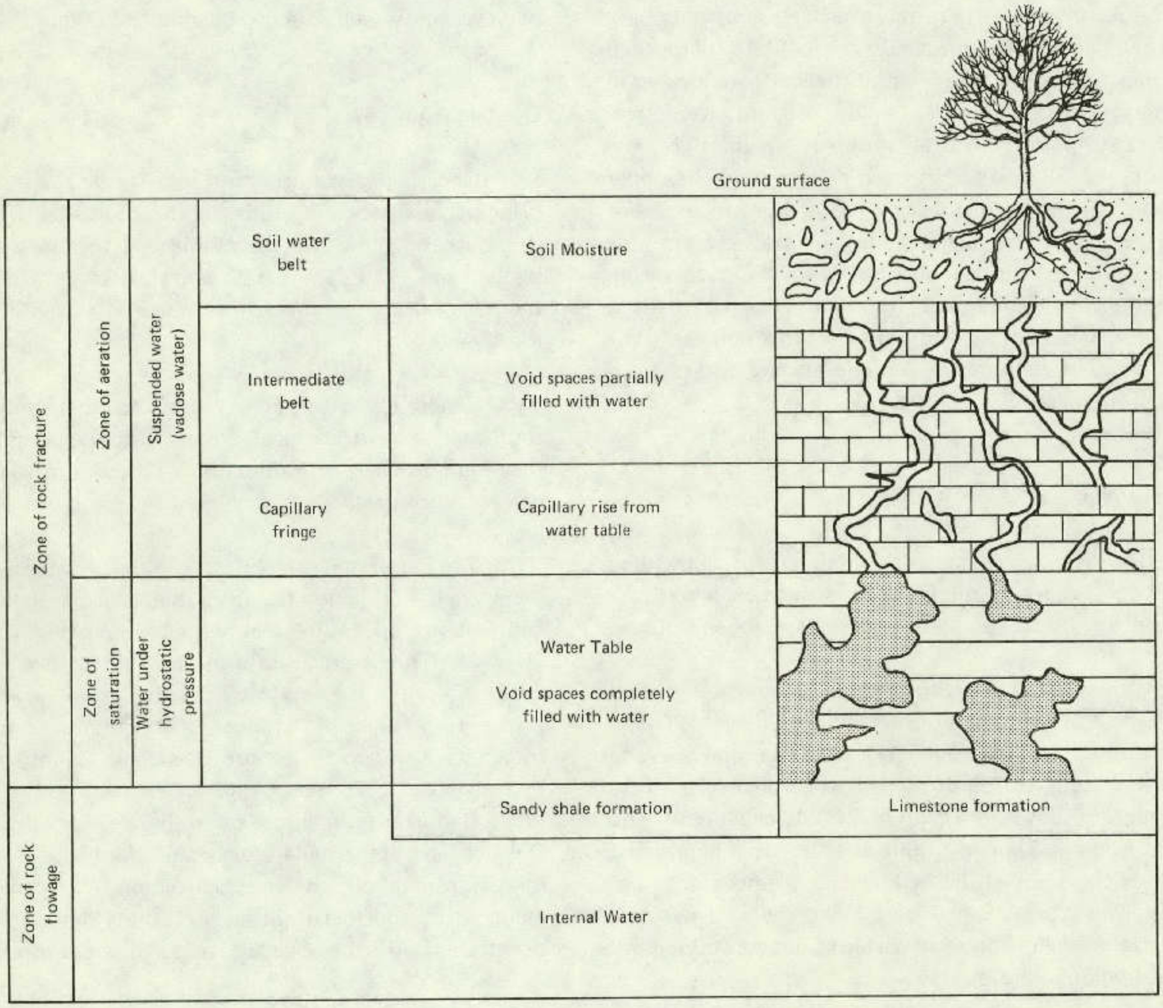
GROUND-WATER HYDROLOGY

The course that water travels through the atmosphere, on the land surface, under the ground, in lakes and the ocean, and then again to the atmosphere by evaporation is called the hydrologic cycle (Figure 14).

The Earth's Ground-Water Reservoir

To show the earth's reservoir characteristics with respect to percolating waters and the storage of water requires that the earth's crust be divided into its various components as shown in the following illustration.

The lithosphere or earth's crust is separated into a zone of rock flowage and a zone of rock fracture. Within the zone of rock flowage that is relatively deep within the earth, interstices or void spaces may be absent because the rocks are in a state of plastic flow due to the stresses exceeding the elastic limit. Internal water will not be dealt with in this study.



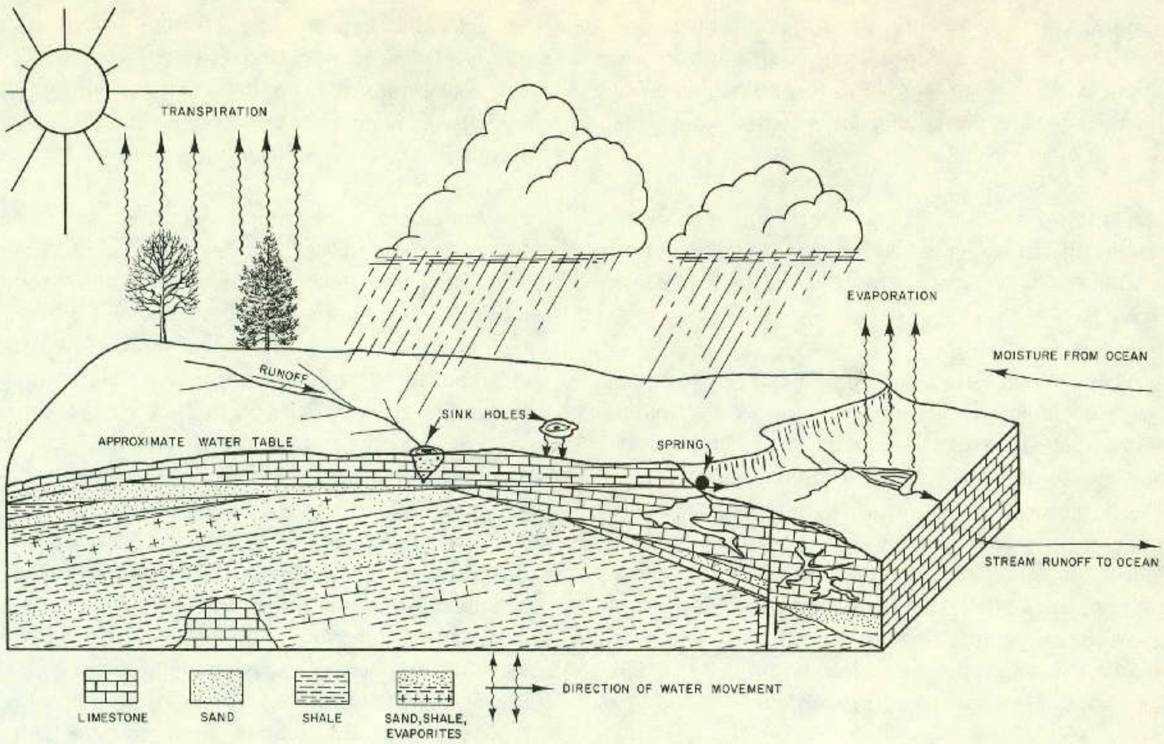


Figure 14.—Hydrologic Cycle

Pertinent to this report and ground-water hydrology, however, is the zone of rock fracture and its subdivisions—the zone of aeration and the zone of saturation.

In the zone of aeration, water is suspended by molecular attraction or capillary forces and may be influenced by gravitational forces as it moves downward to the saturated zone below. This zone is further divided into three belts—the belt of soil moisture, the intermediate belt, and the capillary fringe.

The belt of soil moisture is the layer of the earth's crust that furnishes water to vegetation. Thickness of this belt may be from a few inches to tens of feet. Under certain conditions water may pass downward beyond the reach of roots of ordinary vegetation.

Phreatophytes are plants that do not depend entirely upon the soil belt for moisture; hence, occasionally their roots may extend downward and tap the capillary fringe at shallow depths along streams.

The intermediate belt lies below the soil moisture belt and acts as a conduit for percolating water influenced by gravitational forces. Some of the water in this belt may progress downward to the capillary fringe while some remains suspended by molecular and capillary attraction and is not recoverable by wells.

The capillary fringe lies between the intermediate belt and zone of saturation below, and contains water held above the water table by capillary forces greater than downward gravitational forces. Silts and clays may have a thick fringe while coarse sands and gravels may have one that is insignificant. In limestones, the capillary fringe may be nonexistent.

With regard to this study, the focus of attention will be on the zone of saturation; that is, the interval of the earth's crust in which water completely fills the pore spaces of the rocks and is potentially recoverable by wells for use by man. The occurrence of ground water in the saturated zone will be covered later in this report.

Source of Ground Water

Recharge to the ground waters of the Edwards Plateau is derived entirely from precipitation, whether it be from the region's characteristic spring and fall rains or rare winter snows. Before percolation to the aquifers begins, there are many factors that affect the course that the water will take on its way to the water table.

Some of these factors are surface runoff, soil moisture content, evaporation, transpiration by vegetation, wind velocity, temperature, and permeability of both the soils and underlying rocks to the water table surface.

Surface runoff is that portion of the precipitation that reaches the stream channels without first percolating to the aquifer. Consequently, these waters never become ground water.

The soil moisture content is the water held in the soil by molecular attraction. Soil moisture varies depending upon the vegetative cover, elapsed time from last rainfall, wind velocity, infiltration capacity, and capillary potential. Infiltration capacity is the maximum rate that a soil may absorb water. Capillary potential is the measure of the force required to remove moisture from the soil. Percolation to the aquifer begins when downward forces exceed the capillary potential. If the soil is thin or nonexistent, water may run directly into limestone through cracks, joints, and solution openings.

Evaporation, or the change of water into vapor that passes into the atmosphere, is influenced by temperature, humidity, and wind velocity. In the Edwards Plateau region, the annual rate of evaporation is three times greater than the annual rate of precipitation, thus creating a perpetual low soil moisture content that retards percolation except under the most ideal conditions. Percolation usually occurs during relative short periods after rainfall.

Transpiration is the emission of water vapor to the atmosphere by plants. The rate of transpiration varies throughout the life of the plant depending upon the temperature, sunlight, moisture available, degree of plant development, and other atmospheric conditions. Because some factors have the same influence on both evaporation and transpiration in much the same way, namely temperature and wind velocity, they are usually treated together as evapotranspiration. Under any given set of conditions, the evapotranspiration requirements must be met before the soil moisture capacity is reached and percolation begins. High temperatures and high wind velocities increase evapotranspiration and are major factors in determining the recharge potential to water-bearing formations.

Soil permeability is an expression of the ability of water to pass through pore spaces of the soil and varies throughout the Edwards Plateau from less than 0.06 to 0.63 inches per hour. Rain intensities greater than these rates will produce surface runoff. Soils developed over unconsolidated alluvium or colluvium tend to facilitate the downward movement of water to the aquifer.

Exposed bedrock or extremely thin soils are common over much of the Edwards Plateau. In these areas, soils do not play an important role with respect to the recharge; hence, water descends unhindered through the zone of aeration to the aquifer.

Limestone is the predominant rock underlying the Edwards Plateau soils. The permeability of the limestone is not necessarily due to intergranular pore space as in sandstones, but more to joints, crevices, and solution openings that have been enlarged by solvent action of water charged with carbon dioxide. In areas where this water action is extensive and the limestone is somewhat in a pure and brittle state, these openings become quite large, producing solution channels and caverns where large quantities of water may be stored. Where this dissolving action has become highly developed, a karst topography is characteristic, and numerous sink holes can be seen on the surface of the land. These depressions are caused by the slumping or caving of the ceilings of caverns. Consequently, the permeability may be high but irregularly distributed, and recharge to the water table is direct with little interference from the soils and other surface conditions. Runoff may extend for short distances before it disappears into the subsurface. Rapid recharge of this type may cause water-table mounds that dissipate after rainfall periods.

The source of water to the alluvium aquifer in the Edwards Plateau region of Texas is from precipitation upon the surface of the outcrop and from water-bearing formations in hydraulic contact with the alluvium. The latter case is evidenced by springs that maintain the baseflow of the South Concho, San Saba, North Llano, South Llano, Pedernales, Nueces, and Frio Rivers. The alluvial deposits in these streambeds contain relatively unconsolidated sediments; therefore, recharge rates should be high. A deterrent to efficient percolation would be heavy canopies of brush, such as mesquite and salt cedar, along many of the stream courses. These phreatophytes use large quantities of water when it is available.

Determination of the amount of recharge to the ephemeral stream sediments of the Plateau and adjoining areas is difficult to ascertain because these data are not available.

The Hickory Sandstone Member crops out principally in McCulloch and Mason Counties. Precipitation upon this sandy surface provides the main source of recharge to the aquifer. Other possible sources of water may come from streams traversing the outcrop and from underlying Precambrian granites and gneisses that have been fractured by faulting, and whose outcrop lies at higher elevations than the Hickory.

Interformational leakage through the overlying Cap Mountain Limestone and Lion Mountain Sandstone Members may also contribute water to the Hickory.

The source of recharge to the Ellenburger-San Saba aquifer is precipitation upon its outcrop in San Saba, southeast McCulloch, eastern Menard, southwestern Mason, southwestern Kimble, and Gillespie Counties (Figure 8). Overlying formations such as alluvium and the Hensell Sand Member may provide some recharge. Also, recharge may occur in faulted areas where permeable beds are adjacent to the aquifer or hydrostatic pressure differential permits water movement along fault planes.

Recharge to the Glen Rose Formation and the Hensell Sand Member occurs on the outcrop and from percolation through the overlying Edwards and associated limestones. Some water may be contributed by the Cambrian and Ordovician aquifers where they are in contact with the Lower Cretaceous rocks.

Occurrence of Ground Water

On the Edwards Plateau, ground water occurs in the saturated zones of the rock strata. In the Antlers Formation, water occupies the interstices or pore spaces between the sand grains. The percent porosity and the permeability, or ability of the water to move through the formations, are dependent upon the grain size, shape, sorting, packing, and degree of cementation. More important, however, than the foregoing characteristics of the sediments, is the cementing material. Extensive calcite cementing in parts of the Antlers may retard ground-water movement and reduce storage capacity.

With regard to the Edwards and associated limestones, the amount of water occupying the void spaces depends upon the type of porosity, whether primary or secondary. Primary porosity originates at the time of deposition of shell fragments, precipitated limey muds, calcite sand, talus deposits, reef masses, and accumulations of the remains of small planktonic organisms. Much of this porosity is lost soon after deposition due to compaction and induration and probably plays a minor role with respect to water storage in the Edwards Plateau.

More important, from the standpoint of ground-water storage and production, is the secondary porosity in dolomites and limestones. The diagenetic, post-depositional change of calcite to dolomite results in a corresponding 13 percent volume reduction of the lithified rocks, thus creating this amount of additional void space. In Sutton County, drillers inadvertently refer to these dolomite water-bearing layers as "sugar sands". Probably the most important form of secondary porosity on the Edwards Plateau is caused by the solution of limestone along fractures, joints, and around fossils. These are the zones most important with regard to water production, along with underlying saturated sands of the Antlers Formation. Water may occur in relatively small openings to those the size of caverns. Solution channels and honeycomb limestone are common forms of secondary porosity developed by the solvent action of ground water.

The ground water in the saturated zone may occur under water table, or unconfined, and artesian, or confined conditions. When the upper surface of the saturated zone has direct contact through the aerated zone to the land surface and is therefore under atmospheric pressure, as a lake surface would be, the aquifer is under water-table conditions. If the saturated zone is overlain by a relatively impervious bed, or aquitard, that restricts the upward movement of water causing the aquifer to be under pressure, then artesian conditions prevail. When an artesian well is drilled, water will rise above the level at which it was encountered. A water-level recorder well in southwestern Glasscock County shows daily barometric pressure changes which are indicative of artesian conditions.

Where the Antlers Formation crops out, water-table conditions persist except where clay lenses may act as aquitards of confinement to underlying saturated sandstones. These lenses are present in areas where the Triassic rocks have been reworked during deposition of the Antlers. Water-table conditions also exist where joint systems are developed. The joint systems increase the susceptibility of rocks to the disolving action of water resulting in larger passageways through which the water may move. Areas of this type are noticable by the karst topography such as may be observed in Schleicher County. Water-table conditions also probably prevail in the vicinity of discharge basins along the South Concho, San Saba, and Llano Rivers.

Throughout the Edwards Plateau, drillers quite often report that water will rise in a well above the level at which it was encountered; consequently, water-table conditions may not be as prevalent as previously reported. In Upton County, White (1968, p. 20) reports the Antlers is confined in the southeastern corner of the county where the saturated sands are overlain by beds of low permeability at the base of the Edwards and associated limestones. In this area, he reports that water will rise as much as 25 feet in wells, and in some wells hydrogen sulfide gas is released after being entrapped by the confining strata.

In alluvial deposits, water occurs in the void spaces of sediments made up of clays, sands, gravels, boulders, and conglomerates. The surface of the saturated zone makes up the water table in areas where these deposits occur.

The occurrence of ground water in the interstices of the Hickory Sandstone Member is under both water table and artesian conditions. Mason (1961, p. 21) states that clay lenses in the outcrop area of the Hickory impede the vertical movement of water. Where these lenses exist, the wells have artesian pressure and may even flow; otherwise, unconfined water occurs. North and west of the outcrop area, the Hickory is confined by overlying formations.

Mount and others (1967, p. 72) describe the occurrence of water in the Ellenburger-San Saba aquifer as being in vugular and cavernous openings as well as in fractures and joints enlarged by solution. He also reports that the aquifer is under artesian pressure with few exceptions.

In the southeastern portion of the study area, through Kimble, Gillespie, and Kendall Counties, ground water occurs in the Lower Cretaceous aquifers. These aquifers in descending order are the Glen Rose Formation, Hensell Sand and Cow Creek Limestone Members of the Pearsall Formation, and the Sligo and Hosston Formations.

In Kendall County, most of the water in the Glen Rose limestones occurs under artesian pressure because of the presence of relatively impervious beds which act as confining layers. The upper member of the Glen Rose has solution channels which contain the water. These channels are tubular and have developed parallel to the bedding planes of the thin-bedded limestone. In the thick-bedded limestone of the lower member, vertical connection of solution channels is greater, which allows for more water to be stored in the rocks.

The Cow Creek Member is predominantly massive, white, fossiliferous limestone. Ground water probably occurs in the vugs developed in the fossiliferous portion of the limestone.

The Hensell Member is comprised of loosely cemented conglomerate, sand, sandstone, shale, and marl. Where the Hensell is an important aquifer, ground water is contained primarily in the sands and sandstones.

The Sligo Formation consists mainly of sandy dolomite and dolomitic limestone which are known to contain ground water in Kendall County. The Hosston Formation contains conglomerate, sandstone, and dolomite interbedded with shale. Ground water occurs in this formation in quantities sufficient to maintain irrigation wells in Kendall County.

Direction and Rate of Ground-Water Movement

Ground water moves in the direction of the hydraulic gradient from areas of recharge to areas of discharge. The movement is perpendicular to lines of equal elevations on the water-table, or piezometric, surface.

In the Edwards-Trinity Plateau aquifer, geological structure has the greatest influence on the direction of ground-water movement. Regionally, the base of the Cretaceous slopes to the south and southeast, and this is reflected by the surface of the saturated zone of the Edwards-Trinity (Plateau) aquifer (Figure 15). Local changes to this trend occur in areas of artificial discharge such as in the St. Lawrence irrigation area of south central Glasscock and north central Reagan Counties. Here, a regional cone of depression of the water table has been created and water moves toward the center of development or pumpage. Figure 15 also indicates water movement towards the major stream drainage courses. At the head of most of these major streams, water flows from springs. In the southwestern part of the Plateau area, ground water moves to the Rio Grande; in the north, northeast, and central parts, movement is to the Colorado River and its tributaries; and in the southeastern part, movement is to the Nueces, San Antonio, and Guadalupe Rivers.

In the Edwards and associated limestones, lines perpendicular to the water-level contours show the direction of movement. However, where fractures and joint patterns are developed and the permeability is high in a certain direction because of solution by ground water, the direction of flow may be quite different than the water-table map indicates.

The rate of movement of ground water is usually very slow. On the Edwards Plateau the hydraulic gradient may range from more than 50 feet per mile to less than 5 feet per mile. Normally, the slope of the water table increases nearer to the larger drainage ways.

When water moves very slowly all the molecules move in more or less parallel lines. This is described as streamline or laminar flow. As the velocity increases, a point is reached when laminar flow ceases and movement becomes turbulent. Flow that occurs between these two extremes is unstable. Flow in the Antlers Formation is laminar. The rate of movement may be from a few feet to several feet per year. Water moving

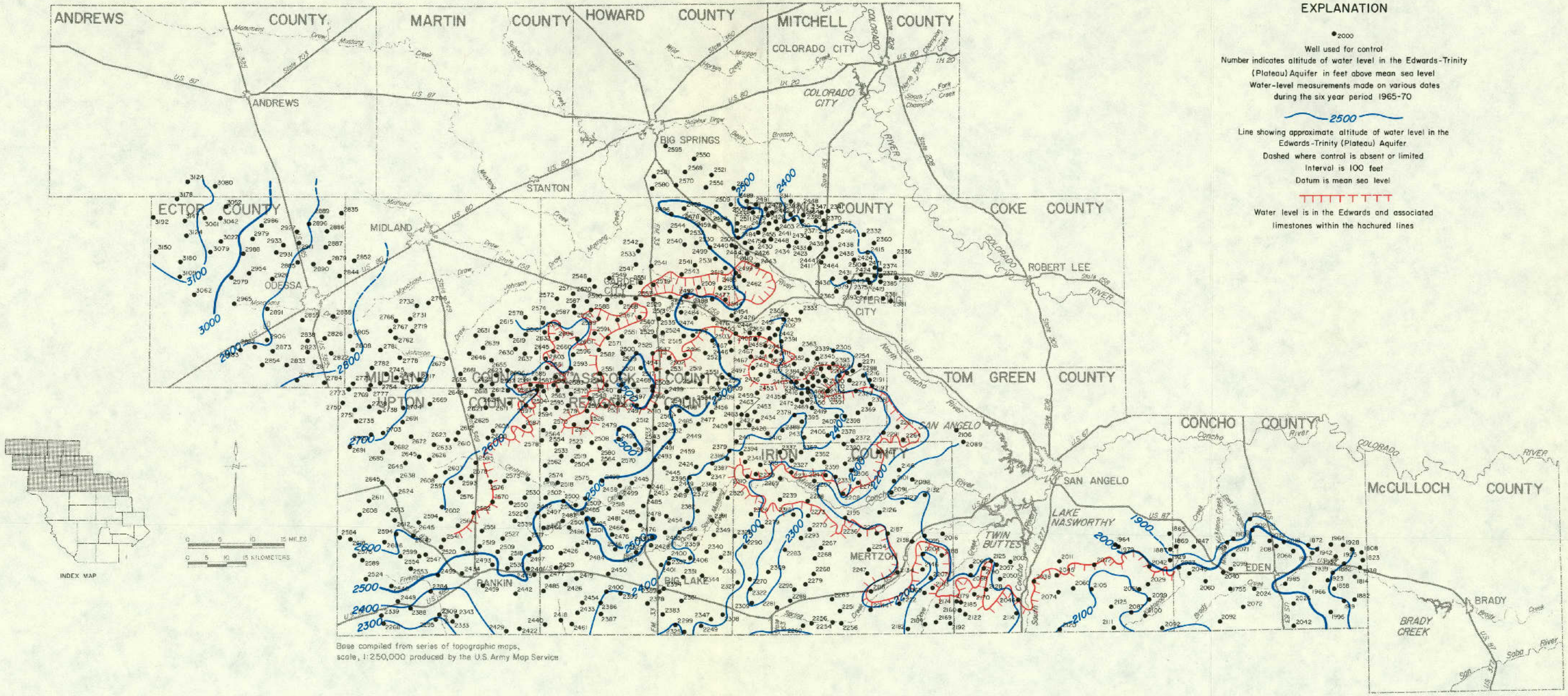


Figure 15

Approximate Altitude of Water Levels in the Edwards-Trinity (Plateau) Aquifer

Figure 15 Continued

through fractured or jointed rocks, or through solution channels, may attain much higher velocities and result in turbulent flow. Some of these rates could be on the order of several hundred feet per day.

The complexity of a limestone aquifer, coupled with an underlying aquifer of fine to coarse sand with extensive calcareous cementation and clay lenses, is almost impossible to describe in terms of direction of movement and rates of flow. Porosity in the limestone may change rapidly in either vertical or horizontal directions, and likewise, the permeability. Water-table conditions may extend for great distances or may occur in insolated areas. Rates of flow evidently increase toward the natural discharge points as the hydraulic gradient increases.

The direction of water movement in the alluvium aquifer is the same as in the streams. The rate of movement may be relatively fast compared to water moving in adjacent beds of the Antlers because of the higher permeabilities in the unconsolidated alluvial sediments.

The Hickory Sandstone Member of the Riley Formation extends radially away from the Llano uplift which centers in Llano and Mason Counties (Figure 7). Generally, the beds dip rather uniformally at the rate of 100 to 150 feet per mile to the north, west, and southwest, and the piezometric surface of the Hickory should reflect the orientation of the beds. The hydraulic gradient would show less slope than the beds themselves, but the direction of ground water movement would normally be downdip. However, the altitude of the water surface in wells tapping the Hickory in McCulloch County (Mason, 1961, p. 28) shows the water to be moving more or less along the strike of the beds rather than downdip. An extension of the piezometric surface into adjoining areas would probably show the water movement to be downdip in the aquifer.

The description of the Hickory as a coarse to very fine-grained sandstone (Barnes and others, 1959, p. 26-27) indicates the rate of water movement should be very slow. Also, the altitude of the water surface indicates that the hydraulic gradient is about 5 to 10 feet per mile and not more than 20 feet per mile, well within the range for low-rate laminar flow. Another factor influencing the rate of flow in the Hickory aquifer is the temperature of the water. An increase in temperature of the water from 40°F (4°C) to 90°F (32°C) approximately doubles the velocity. Some of the usable water in the Hickory is encountered at depths greater than 3,000 feet below the land surface where the temperature is higher, thus the rate of flow is relatively higher than at shallower depths.

The direction in which the water moves through the Ellenburger-San Saba aquifer cannot accurately be determined because of the lack of data. The general direction of movement is believed to be away from the Llano uplift. The direction of movement of the ground water in the Lower Cretaceous aquifer is generally with the dip of the beds.

Natural Discharge of Ground Water

From the standpoint of volume of water discharged naturally, spring flow would rank first; then evapotranspiration from alluvium when the water table is near the surface along the main drainage ways. Ground-water loss due to interformational leakage or outflow cannot be determined because control is lacking.

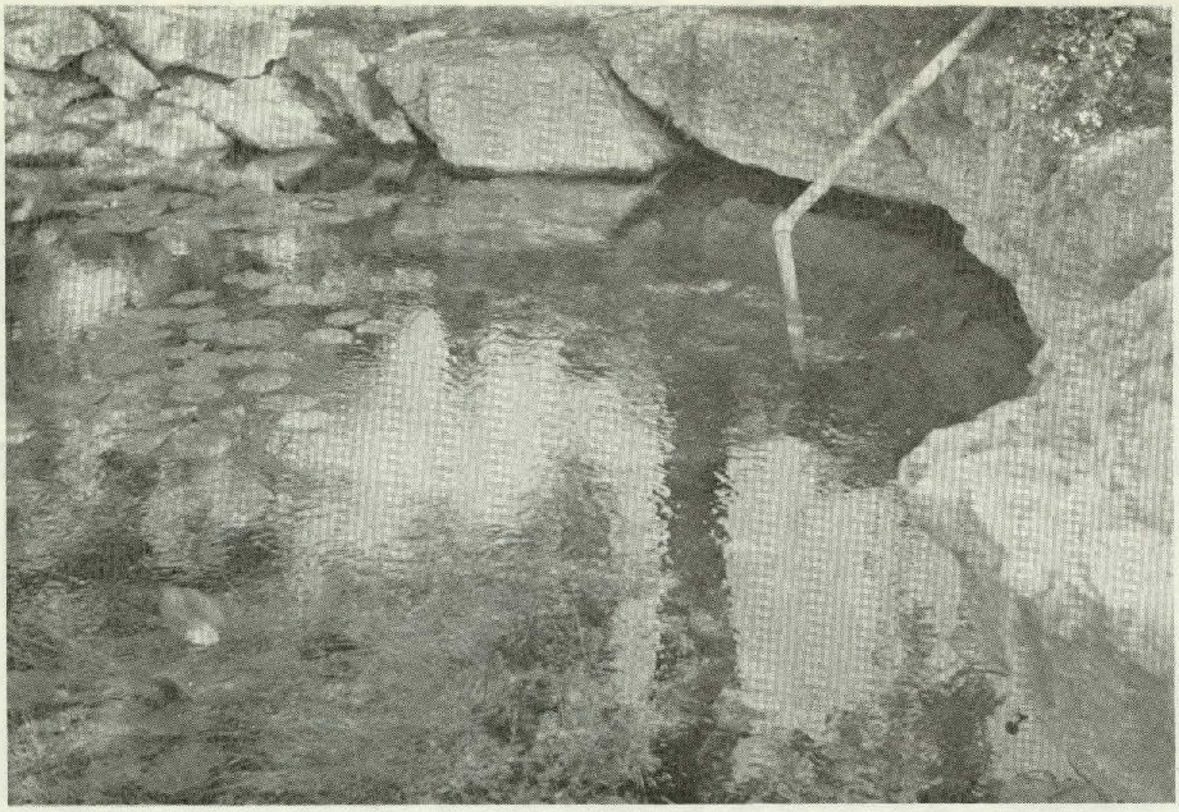
Springs occur along the borders of the Plateau where erosion has cut the Edwards and associated limestones down to the water table. The major rivers formed by this erosional action are headed by springs. Following is a discussion of major springs that flow as headwaters of some of the streams on the Edwards Plateau.

Spring Creek, Irion County.—On the Reginald Atkinson Ranch near Mertzon, water issues from cracks in the limestone bed of the creek. According to Blank, and others (1966, p. 19), artesian pressure forces the water out and causes it to mound up about six inches. The estimated flow of the springs was 10 to 20 cubic feet per second (ft^3/s).

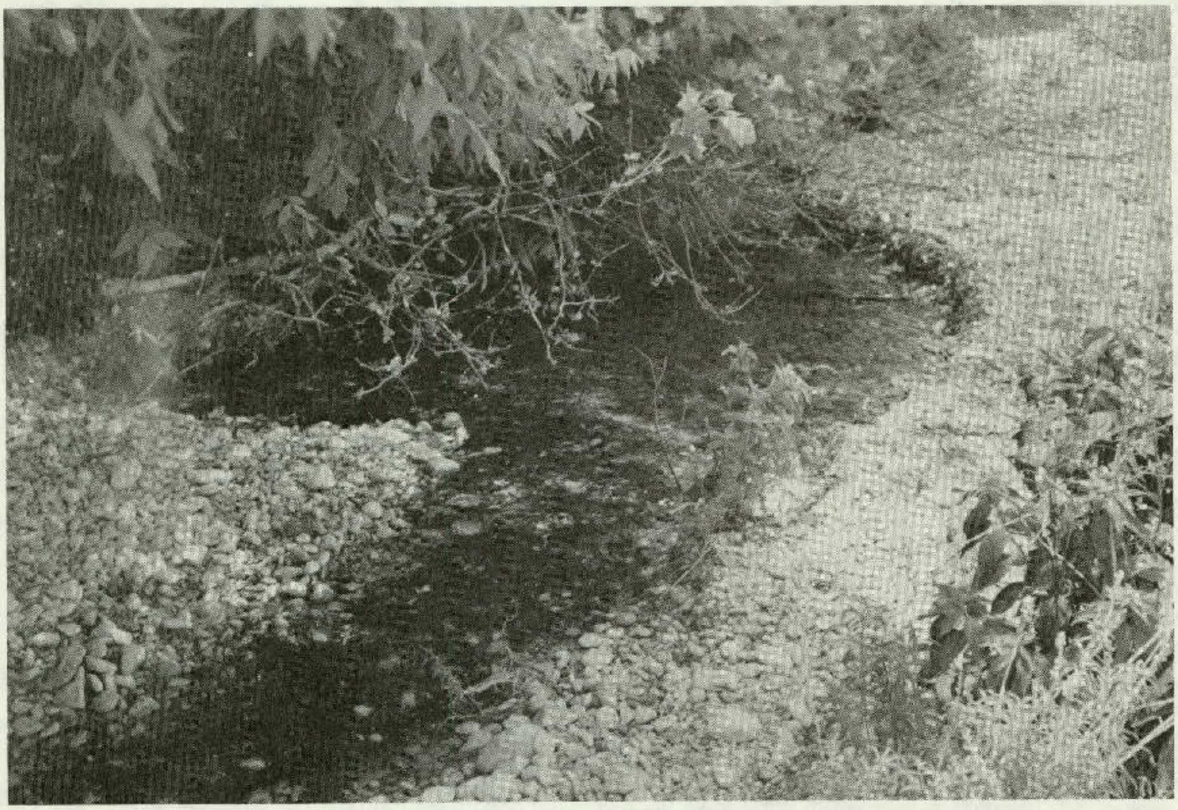
On a steep hillside, immediately above the springs, a friable dolomite which alternates with a dense, hard limestone, crops out. This suggests that the dolomite may be the aquifer within the Edwards and associated limestones. The approximate elevation of the springs is 2,200 feet above mean sea level.

Dove Creek, Irion County.—On the Schreiner Ranch, 8 miles southeast of Mertzon, a large spring discharges from beneath thick, white limestone ledges. Approximately one-quarter of a mile downstream, dolomite beds overlying the white limestone can be seen. The springs appear to be located at the base of the dolomite beds. Artesian pressure is not evident. Estimates of the flow in August 1961, by Blank, and others (1966, p. 20) was about 20 ft^3/s. The altitude of the spring is about 2,162 feet above mean sea level.

South Concho River, Tom Green County.—About 3 miles north of the Schleicher-Tom Green County line



Dove Creek



Devils River

on the Head-of-the-River Ranch, water flows from jointed white, flaggy limestone in the streambed of the South Concho River. It appears that the springs are located near the base of dolomite beds which appear just upstream. The approximate altitude of the springs is 2,071 feet above mean sea level.

South Concho River

San Saba River, Schleicher County.—About 1 mile west of the Schleicher-Menard County line, near Fort McKavett, springs issue from the bed of the San Saba River. One of the better sources of water is covered by a small rock house. The altitude at the springs is about 2,060 feet above mean sea level.

North Llano River, Sutton County.—At Fort Terrett in eastern Sutton County, water appears in the gravel streambed of the North Llano River on the Ray Parker Ranch. A spring fed pool of water is located a short distance upstream. A cliff, 60 to 75 feet high to the south of the upper pool, consists of beds of gray to dark gray dolomite and dolomitic limestone. The uppermost spring is about 1,972 feet above mean sea level.

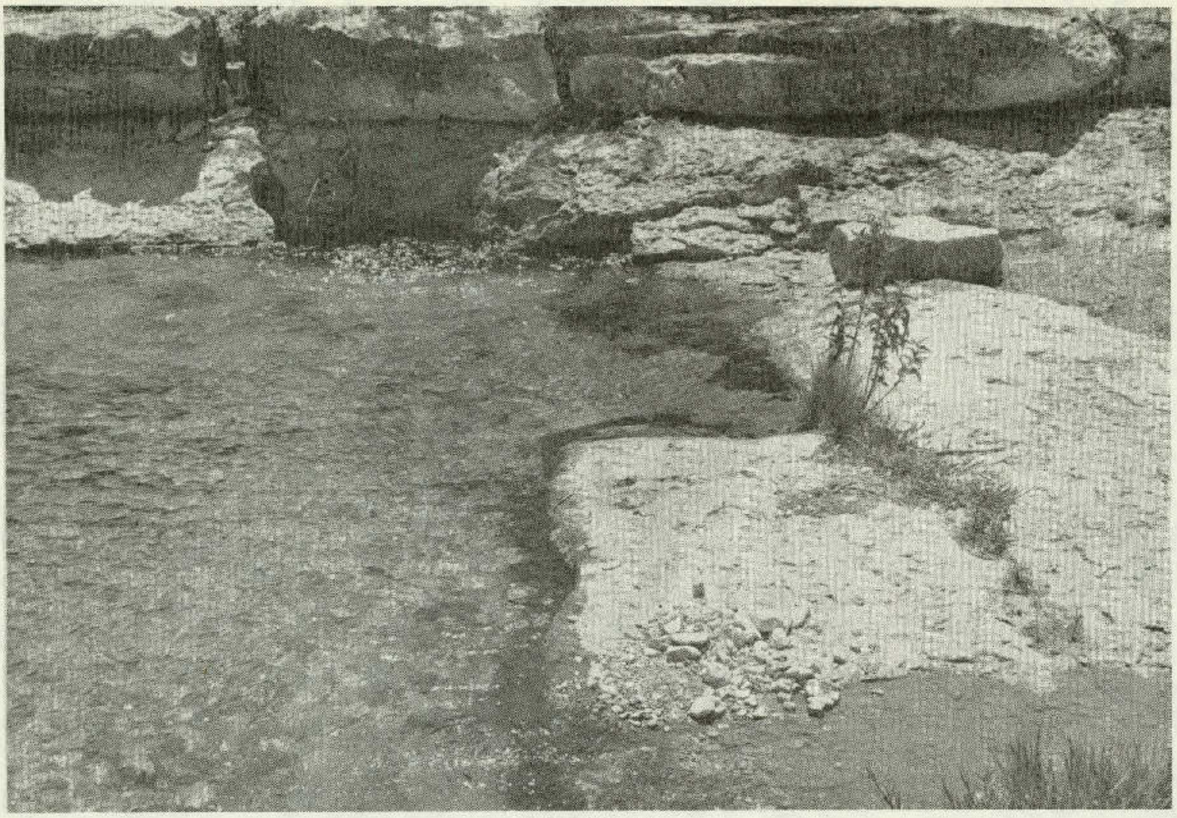
South Llano River, Edwards County.—In the upper valley of the South Llano River, some of the largest springs on the interior of the Edwards Plateau issue from the Edwards and associated limestones. These springs, named Seven Hundred Springs, are located just south of the Edwards-Kimble County line near U.S. Highway 377. Water flows without evidence of artesian pressure. At the highway crossing, a thick stratum of dark gray, spongy dolomite crops out in the bed of the river. Measurements made in 1939 and 1955 showed flows from the springs ranging from 70 to 9,740 gallons per minute (gpm) along the South Llano River. From a point near the highway and downstream for several miles, springs occur between the elevations of about 1,950 to 1,890 feet above mean sea level.

Hackberry Creek, Edwards County.—Long (1962, p. 59) points out that on the Gilmer Ranch, 9 miles east of Rocksprings, there are springs that flowed 1,135 gpm in 1939 and 2,580 gpm in 1954. These springs issue from small openings beneath ledges of brownish-gray, spongy, fine-grained dolomite. The approximate elevation of these springs is 1,968 feet above mean sea level.

Nueces River, Real County.—On the Peterson Ranch, about 15 miles east of Rocksprings, flow of about 1 cfs appears from under ledges in the streambed. Flow increases from other springs farther downstream.

Frio River, Real County.—Water first appears in the bed of the Frio River on the Prade Ranch at an altitude of about 1,900 feet above mean sea level.

West Nueces River, Edwards County.—Kickapoo Springs head up the flow on the West Nueces River. These springs are located approximately 21 miles southwest of Rocksprings on the James Rudasill Ranch. There are several springs that flow from joints in the rock bed of the main stream; however, the largest spring flows from gravel under a small amount of artesian pressure. Long (1962, p. 76) measured a total flow of



Spring Creek

about 1,100 to 1,350 gpm. The altitude is about 1,748 feet above mean sea level.

Devils River, Val Verde County.—The uppermost springs on the Devils River are about 10 miles downstream from Juno. Flow issues from several openings along the base of a rock bluff on the west side of the valley (Blank, and others, 1966, p. 22). The springs are at an elevation of about 1,597 feet above mean sea level.

There are other springs farther south at lower elevations and on Dolan Creek about 1 mile above its mouth. The total flow from Dolan Springs and the many other complimentary springs was 3,100 gpm in 1939. The altitude at Dolan Springs is about 1,350 feet above mean sea level, considerably lower than Pecan Springs which is 17 miles to the northwest.

On the Edwards Plateau, an average of 285,686 acre-feet of water per year is estimated to be discharged from seeps and springs along streams as rejected recharge. A total of about 9,370 acre-feet per year is discharged by underflow on significant rivers.

The movement of water downdip in the Edwards and associated limestones in the vicinity of the Balcones fault zone is called subsurface outflow. The confinement by overlying impervious strata increases the artesian head as the water moves downdip. Eventually, this water is discharged at the land surface as artesian springs such as San Felipe Springs at Del Rio and Las Moras Springs near Brackettville. In Val Verde County alone, Reeves (1971) estimates that there is 500,000 acre-feet of water available for development that is discharged by springs.

Withdrawal of Ground Water by Wells

From 1955 through 1972, there has been approximately 1,260,000 acre-feet of ground water withdrawn from the Edwards-Trinity (Plateau) aquifer by municipal, industrial, irrigation, domestic, and livestock wells in the study area on the Edwards Plateau (Table 3). This is an average of about 70,000 acre-feet a year. In 1972, about 86,000 acre-feet or 76,600,000 gallons per day of water was withdrawn by wells on the Edwards Plateau.

Ector County and the city of Odessa pumped the greatest amount of water for municipal use with an average of about 3,300 acre-feet per year. Ector County also uses the most ground water annually for industrial and domestic purposes with an average of about 5,000 acre-feet and 670 acre-feet, respectively.

Most ground water is used for irrigation. Glasscock County leads all counties on the Edwards Plateau with an average of about 17,200 acre-feet per year, followed by Reagan County with about 8,500 acre-feet per year.

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Bandera County		
1972	–	–	–	117.9	78.9
1971	–	–	–	118.6	79.7
1970	–	–	–	116.0	79.9
1969	–	0	–	119.1	80.8
1968	–	.1	–	114.8	74.4
1967	–	.1	–	110.7	85.8
1966	–	0	–	106.5	81.0
1965	–	.1	–	102.4	91.0
1964	–	.1	–	98.2	93.6
1963	–	.2	–	94.1	96.0
1962	–	.2	–	89.9	84.0
1961	–	0	–	85.8	100.8
1960	–	.1	–	81.7	103.2
1959	–	.1	–	83.5	105.6
1958	–	.1	–	85.2	103.6
1957	–	0	–	86.9	107.1
1956	–	0	–	88.7	108.0
1955	–	.1	–	90.5	108.7
Totals	–	1.2	–	1,790.5	1,662.1
			Coke County		
1972	–	150.0	–	33.4	295.1
1971	–	152.7	–	33.4	296.2
1970	–	151.7	–	33.7	295.6
1969	–	152.9	–	34.2	295.9
1968	–	189.1	–	33.7	297.6
1967	–	215.5	–	33.2	301.7
1966	–	278.2	–	32.6	301.0
1965	–	336.6	–	32.2	302.8
1964	–	430.2	–	31.6	304.4
1963	–	402.2	–	31.0	309.2
1962	–	470.5	–	30.5	314.1
1961	–	2.3	–	30.0	315.2
1960	–	2.0	–	29.5	316.2
1959	–	3.1	–	30.4	325.9
1958	–	2.0	–	31.4	318.4
1957	–	3.6	–	32.3	310.6
1956	–	8.8	–	33.2	303.1
1955	–	4.1	–	34.2	295.5
Totals	–	2,955.5	–	580.5	5,498.5

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Conchc County		
1972	227.6	1.0	—	93.7	194.0
1971	199.0	1.0	—	94.2	194.2
1970	180.0	1.0	—	94.6	194.6
1969	137.9	1.1	—	94.9	196.5
1968	120.6	1.2	—	91.3	197.6
1967	160.1	1.4	—	87.8	198.8
1966	149.3	2.4	—	84.2	199.9
1965	159.5	2.7	—	80.7	201.0
1964	173.9	3.1	—	77.1	202.0
1963	162.5	2.6	—	73.5	207.8
1962	172.1	3.8	—	70.0	213.7
1961	139.8	2.9	—	66.4	220.3
1960	162.2	2.2	—	62.8	225.2
1959	136.0	1.5	—	67.1	231.1
1958	135.5	.8	—	71.4	221.7
1957	126.0	1.6	—	75.6	212.5
1956	126.0	1.3	—	79.9	203.1
1955	119.7	1.5	—	84.1	194.0
Totals	2,787.7	33.1	—	1,449.3	3,708.0
			Crockett County		
1972	1,285.8	54.3	4,600.0	69.0	328.7
1971	1,105.0	172.7	4,580.0	69.0	329.4
1970	1,127.0	101.0	4,600.0	69.0	329.0
1969	1,006.8	81.1	4,539.0	67.2	329.7
1968	1,056.8	127.0	4,612.4	69.0	328.8
1967	1,257.9	144.0	4,946.5	70.8	328.1
1966	1,034.8	173.8	4,866.3	72.6	327.2
1965	1,143.8	132.3	4,999.2	74.4	326.4
1964	1,147.1	102.9	4,806.3	76.2	325.7
1963	1,077.4	257.9	4,492.2	77.9	323.6
1962	1,123.6	354.7	1,089.7	79.6	321.4
1961	943.3	247.1	1,247.3	81.4	319.3
1960	944.7	180.8	1,220.1	83.2	317.2
1959	934.8	264.8	1,319.1	85.7	315.2
1958	815.1	237.6	1,233.7	88.0	310.8
1957	836.3	242.5	1,171.2	90.5	306.4
1956	919.5	307.4	1,144.8	93.0	302.3
1955	700.0	326.5	1,291.8	95.4	297.7
Totals	18,459.7	3,508.4	56,759.6	1,411.9	5,766.9

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Ector County		
1972	1,617.9	4,627.1	550.0	750.0	16.7
1971	1,700.0	5,751.5	573.0	749.9	16.7
1970	1,717.0	5,316.0	560.0	753.8	17.0
1969	1,468.2	6,316.5	624.1	753.8	17.0
1968	990.2	5,351.0	539.9	729.8	16.4
1967	1,544.0	5,676.4	539.9	705.8	15.6
1966	1,184.1	5,668.2	539.9	682.0	15.2
1965	1,920.0	5,640.4	539.9	658.0	14.2
1964	1,748.0	5,194.0	470.8	634.0	13.4
1963	1,293.2	5,347.0	470.8	610.0	13.6
1962	1,564.7	5,132.1	470.8	586.0	13.8
1961	3,175.9	5,180.8	470.8	562.0	13.4
1960	2,410.3	4,614.2	417.7	538.2	13.6
1959	3,744.0	4,524.5	282.5	585.4	13.2
1958	7,005.5	4,240.7	195.3	632.6	13.8
1957	9,401.1	4,168.0	195.3	680.0	14.0
1956	9,377.5	3,727.2	195.3	727.2	14.4
1955	7,902.0	3,653.0	144.2	774.4	14.8
Totals	59,763.6	90,128.6	7,780.2	12,112.9	266.8
			Edwards County		
1972	559.8	5.0	—	146.8	707.8
1971	244.0	6.3	—	147.2	709.0
1970	296.0	5.9	—	147.0	709.0
1969	181.3	8.7	—	147.2	709.4
1968	220.9	3.1	—	144.4	687.8
1967	331.4	.8	—	141.7	663.2
1966	331.4	1.5	—	138.9	638.4
1965	220.9	5.2	—	136.1	613.7
1964	199.4	8.3	—	133.3	589.0
1963	200.2	2.1	—	130.5	602.3
1962	199.6	.4	—	127.8	615.4
1961	204.0	4.1	—	125.0	628.6
1960	184.1	2.1	—	122.2	641.9
1959	186.8	1.0	—	125.8	655.1
1958	167.2	.8	—	129.5	663.3
1957	120.9	1.5	—	133.1	671.7
1956	120.9	8.7	—	136.8	680.2
1955	120.9	.4	—	140.4	688.5
Totals	4,089.7	65.9	—	2,453.7	11,874.3

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Gillespie County		
1972	–	–	320.0	342.9	358.9
1971	–	–	322.8	343.0	359.0
1970	–	–	323.0	343.6	359.0
1969	–	–	323.0	343.9	359.6
1968	–	–	323.0	336.8	355.0
1967	–	–	323.0	329.8	350.7
1966	–	–	323.0	322.7	346.4
1965	–	–	323.0	315.8	341.9
1964	–	–	323.0	308.7	337.5
1963	–	–	323.0	301.6	340.1
1962	–	–	323.0	294.6	342.6
1961	–	–	323.0	287.5	345.2
1960	–	–	323.0	280.5	347.9
1959	–	–	323.0	287.0	350.5
1958	–	–	323.0	293.4	346.1
1957	–	–	323.0	299.9	341.9
1956	–	–	323.0	306.2	337.4
1955	–	–	320.0	312.7	333.1
Totals	–	–	5,807.8	5,650.6	6,252.8
			Glasscock County		
1972	–	4.7	23,701.0	100.8	244.6
1971	–	5.3	22,860.0	100.8	245.0
1970	–	5.6	27,108.9	101.0	245.6
1969	–	5.8	26,910.8	101.9	248.0
1968	–	12.2	30,257.7	101.0	230.8
1967	–	12.7	23,712.7	100.1	212.9
1966	–	20.4	22,799.8	99.2	196.5
1965	–	11.0	20,791.5	98.4	179.3
1964	–	7.2	22,749.3	97.3	162.2
1963	–	9.6	17,606.2	96.4	158.8
1962	–	8.3	16,642.3	95.5	155.3
1961	–	8.7	14,024.3	94.7	152.1
1960	–	4.5	10,798.5	93.8	148.6
1959	–	3.1	8,006.1	93.4	145.2
1958	–	3.2	6,196.7	93.2	139.6
1957	–	6.6	6,631.0	93.0	134.1
1956	–	16.3	5,776.9	92.7	128.5
1955	–	10.8	4,009.2	91.0	122.8
Totals	–	156.0	310,582.9	1,744.2	3,249.9

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Howard County		
1972	294.9	1.6	—	51.7	33.0
1971	287.0	2.3	—	52.8	33.0
1970	181.0	2.0	—	52.9	33.0
1969	252.1	3.9	—	53.7	33.3
1968	174.8	4.6	—	61.5	33.2
1967	208.3	5.2	—	69.2	30.0
1966	160.0	5.2	—	77.1	33.3
1965	161.6	5.3	—	84.8	33.3
1964	184.9	5.8	—	92.6	33.3
1963	193.9	5.3	—	100.5	32.1
1962	219.3	4.9	—	108.2	30.9
1961	34.8	5.3	—	116.0	29.8
1960	34.7	4.8	—	123.8	28.6
1959	35.7	8.0	—	124.6	27.4
1958	33.6	6.6	—	125.2	27.2
1957	28.0	8.1	—	126.0	27.0
1956	16.5	6.6	—	126.7	26.8
1955	16.5	7.8	—	127.5	26.8
Totals	2,517.6	93.3	—	1,674.8	552.0
			Irion County		
1972	10.2	20.9	769.0	83.8	254.3
1971	7.0	24.7	769.9	84.5	255.0
1970	9.0	18.0	770.8	84.5	255.0
1969	42.6	147.0	782.0	84.9	256.1
1968	38.7	151.3	771.8	85.6	251.7
1967	34.9	132.8	799.4	86.4	247.3
1966	30.5	125.2	806.9	87.0	242.9
1965	38.7	101.6	817.4	87.7	238.6
1964	34.3	85.5	330.6	88.5	234.3
1963	35.5	85.0	12.8	89.2	237.1
1962	34.5	84.6	11.0	89.8	239.8
1961	31.9	6.5	11.7	90.5	242.5
1960	33.3	10.6	7.6	91.3	245.2
1959	34.0	12.2	3.0	94.8	248.0
1958	34.1	8.8	2.5	98.1	240.9
1957	33.5	19.4	2.5	101.6	234.1
1956	33.5	19.1	9.3	105.1	227.1
1955	35.4	10.1	—	108.5	220.4
Totals	551.6	1,064.0	6,678.2	1,641.8	4,370.3

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Kerr County		
1972	—	10.0	—	674.6	300.0
1971	—	11.2	—	674.0	300.9
1970	—	—	—	673.6	300.9
1969	—	—	—	673.6	301.9
1968	—	1.0	—	671.7	307.1
1967	—	1.0	—	669.8	312.4
1966	—	0	—	667.9	317.7
1965	—	0	—	666.0	323.0
1964	—	.2	—	630.5	328.3
1963	—	.2	—	662.2	334.8
1962	—	0	—	660.2	341.4
1961	—	.3	—	658.4	348.1
1960	—	.3	—	656.5	354.6
1959	—	.2	—	653.2	361.3
1958	—	.3	—	639.1	361.1
1957	—	0	—	625.1	361.0
1956	—	0	—	610.9	360.8
1955	—	0	—	596.8	360.7
Totals	—	24.7	—	11,764.1	5,976.0
			Kimble County		
1972	—	45.5	—	157.0	231.8
1971	—	45.4	—	157.0	232.1
1970	—	31.0	—	157.6	232.0
1969	—	.7	—	157.8	232.2
1968	—	.3	—	154.7	232.3
1967	—	.3	—	151.7	232.1
1966	—	.7	—	148.6	232.1
1965	—	0	—	145.6	231.9
1964	—	2.5	—	142.5	231.9
1963	—	.8	—	139.5	236.9
1962	—	2.0	—	136.4	241.7
1961	—	1.8	—	133.3	246.7
1960	—	1.7	—	130.3	251.7
1959	—	1.3	—	172.2	256.5
1958	—	.8	—	213.9	257.2
1957	—	.7	—	255.8	257.9
1956	—	1.0	—	297.7	258.3
1955	—	1.5	—	339.6	259.0
Totals	—	138.0	—	3,191.2	4,354.3

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use				
	Public supply	Industrial	Irrigation	Domestic	Livestock
Kinney County					
1972	—	—	—	31.8	142.7
1971	—	—	—	32.9	142.7
1970	—	—	—	32.9	142.7
1969	—	0.1	—	33.0	143.2
1968	—	0	—	32.8	138.2
1967	—	.2	—	32.5	140.4
1966	—	.2	—	32.3	143.0
1965	—	.1	—	31.9	145.0
1964	—	.1	—	31.6	147.3
1963	—	.2	—	31.4	152.5
1962	—	.6	—	31.0	157.6
1961	—	.5	—	30.8	162.8
1960	—	.4	—	30.5	167.9
1959	—	.1	—	37.8	173.0
1958	—	.2	—	44.9	165.0
1957	—	.2	—	52.2	157.0
1956	—	.1	—	59.4	149.0
1955	—	.1	—	66.7	140.9
Totals	—	3.1	—	676.4	2,710.9
McCulloch County					
1972	—	1.0	—	63.7	132.0
1971	—	.8	—	64.0	132.0
1970	—	.7	—	64.0	132.9
1969	—	0	—	64.3	133.7
1968	—	.2	—	63.4	132.8
1967	—	.2	—	62.5	131.7
1966	—	0	—	61.6	130.4
1965	—	0	—	60.7	129.6
1964	—	.5	—	59.8	128.6
1963	—	.1	—	58.9	128.4
1962	—	.5	—	58.0	128.4
1961	—	.5	—	57.1	128.2
1960	—	.5	—	56.2	128.1
1959	—	.5	—	61.8	128.0
1958	—	.5	—	67.3	124.0
1957	—	1.3	—	72.9	120.3
1956	—	1.1	—	78.4	116.4
1955	—	1.2	—	84.0	112.6
Totals	—	9.6	—	1,158.6	2,298.1

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Menard County		
1972	313.4	3.2	460.0	87.6	357.0
1971	276.0	3.5	461.3	86.7	359.6
1970	186.0	3.7	460.1	87.0	368.7
1969	189.3	4.0	463.3	87.5	369.8
1968	191.9	4.8	463.4	87.8	361.9
1967	271.6	4.2	461.8	88.2	354.1
1966	252.0	2.5	461.8	88.6	346.3
1965	234.8	2.7	464.1	88.9	334.8
1964	263.6	5.3	466.3	89.3	330.7
1963	280.4	9.3	462.3	89.6	336.9
1962	177.3	9.9	463.3	89.9	343.0
1961	237.3	7.4	466.6	90.4	349.2
1960	263.6	5.0	468.3	90.7	355.2
1959	253.5	2.5	296.2	94.3	361.4
1958	169.9	2.3	4.9	97.9	346.9
1957	153.0	.8	7.0	101.6	332.5
1956	233.5	.6	2.6	105.2	317.9
1955	203.9	.6	–	108.8	303.4
Totals	4,151.0	72.3	6,333.3	1,660.0	6,229.3
			Midland County		
1972	183.8	311.6	2,608.0	57.8	121.6
1971	189.0	637.2	2,590.0	57.5	120.0
1970	143.0	1,238.0	2,610.8	57.6	120.6
1969	140.0	1,220.4	2,605.2	57.2	121.8
1968	139.0	1,862.5	2,624.2	67.1	117.4
1967	139.0	2,140.2	2,646.7	77.0	112.9
1966	135.0	2,080.3	2,715.7	86.7	108.5
1965	135.0	1,087.1	2,391.3	96.6	104.0
1964	133.0	823.8	2,259.8	106.4	99.6
1963	132.0	738.1	1,804.3	116.3	98.0
1962	130.0	820.6	1,522.8	126.1	96.3
1961	130.0	804.9	1,436.7	135.9	94.7
1960	125.0	668.1	1,226.7	145.8	92.9
1959	125.0	614.9	746.0	144.6	91.3
1958	124.0	657.0	737.1	143.4	93.7
1957	121.0	558.7	610.8	142.2	96.1
1956	120.0	627.6	381.2	140.9	98.5
1955	120.0	627.2	396.3	139.8	100.8
Totals	2,463.8	17,518.2	31,913.6	1,898.9	1,888.7

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Reagan County		
1972	449.6	1,062.8	12,902.3	44.9	211.7
1971	451.3	1,690.6	12,911.0	45.3	212.9
1970	433.0	1,670.0	13,644.1	45.0	212.7
1969	498.7	1,661.9	13,855.4	45.3	214.9
1968	516.7	1,638.9	12,686.1	47.0	216.1
1967	541.8	1,962.8	12,578.9	49.0	217.2
1966	503.2	2,036.9	12,720.4	50.7	218.5
1965	495.8	1,315.1	11,848.5	52.5	219.8
1964	514.8	1,082.1	12,884.1	54.4	221.0
1963	522.1	1,154.5	10,273.8	56.2	209.4
1962	470.9	1,198.1	6,782.2	58.0	197.9
1961	406.2	1,425.8	4,658.9	59.8	186.2
1960	463.0	1,771.1	4,025.9	64.7	174.6
1959	443.9	1,555.1	3,484.9	63.7	163.2
1958	550.0	900.1	2,046.7	62.7	146.1
1957	651.0	670.1	2,042.6	61.8	129.0
1956	709.3	679.7	1,889.7	60.8	111.9
1955	571.0	228.9	1,261.7	59.8	95.0
Totals	9,192.3	23,771.1	152,497.2	981.6	3,358.1
			Real County		
1972	–	–	–	71.8	284.4
1971	–	–	–	72.3	285.3
1970	–	–	–	72.6	285.0
1969	–	–	–	73.3	289.0
1968	–	–	–	71.7	274.1
1967	–	–	–	70.1	259.2
1966	–	–	–	68.6	244.2
1965	–	–	–	67.0	229.3
1964	–	–	–	65.4	214.3
1963	–	–	–	63.9	215.0
1962	–	–	–	62.3	215.8
1961	–	0.4	–	60.7	216.6
1960	–	–	–	59.1	217.4
1959	–	–	–	64.3	218.2
1958	–	–	–	69.5	215.6
1957	–	–	–	74.7	213.0
1956	–	–	–	79.9	210.2
1955	–	–	–	85.1	207.6
Totals	–	0.4	–	1,252.3	4,294.2

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Schleicher County		
1972	250.6	4.0	6,206.3	92.9	200.0
1971	210.3	208.1	6,210.9	92.9	200.6
1970	204.0	76.0	6,070.3	93.4	200.6
1969	206.8	166.8	6,062.3	93.2	201.5
1968	237.3	204.4	6,025.4	95.0	216.5
1967	187.5	131.8	7,009.8	96.8	210.7
1966	224.0	131.4	6,445.7	99.2	204.8
1965	201.0	131.3	6,197.8	100.4	198.8
1964	224.3	154.6	6,429.7	102.2	194.1
1963	223.1	116.0	5,344.4	104.0	198.9
1962	204.0	125.8	4,478.7	105.7	205.2
1961	206.8	117.4	4,360.5	107.5	211.3
1960	205.7	93.5	4,375.3	109.3	217.6
1959	205.5	52.3	3,929.7	111.7	223.7
1958	231.5	152.6	3,646.2	114.1	225.7
1957	260.8	10.7	3,326.3	116.5	227.0
1956	334.5	11.4	2,861.9	118.8	228.9
1955	406.7	10.5	1,646.4	121.3	230.6
Totals	4,224.4	1,898.6	90,627.6	1,874.9	3,796.5
			Sterling County		
1972	190.4	237.7	1,710.6	15.3	52.0
1971	78.9	247.3	1,710.6	15.4	52.5
1970	71.0	235.0	1,718.3	14.9	52.8
1969	60.0	315.0	1,715.4	14.7	53.7
1968	60.0	335.1	1,948.4	15.7	52.3
1967	60.0	406.0	1,606.5	16.7	50.8
1966	60.0	442.0	1,586.5	17.7	49.3
1965	60.0	315.7	1,387.8	18.7	47.9
1964	56.0	424.9	997.0	19.8	46.3
1963	56.0	390.2	945.7	20.8	47.9
1962	55.0	487.3	445.8	21.8	49.6
1961	45.0	674.1	434.3	22.9	51.2
1960	45.0	732.4	444.5	23.9	52.8
1959	45.0	558.2	437.5	25.0	54.3
1958	45.0	258.8	439.4	26.2	55.2
1957	40.0	4.2	434.3	27.3	55.8
1956	40.0	7.2	434.3	28.6	56.8
1955	40.0	10.9	434.3	29.7	57.6
Totals	1,107.3	6,082.0	18,831.2	375.1	938.8

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use				
	Public supply	Industrial	Irrigation	Domestic	Livestock
			Sutton County		
1972	715.8	18.7	2,000.3	148.0	770.9
1971	696.3	12.1	2,000.1	148.8	773.1
1970	843.0	7.0	1,980.6	149.1	773.0
1969	558.1	9.7	2,111.4	149.0	774.0
1968	566.2	12.5	1,992.0	146.3	758.4
1967	723.8	17.9	1,218.3	143.7	742.9
1966	618.1	22.2	2,286.6	141.0	727.3
1965	665.1	21.8	2,704.4	138.4	711.8
1964	662.2	28.4	1,589.6	135.9	696.1
1963	729.2	18.8	888.7	133.2	702.5
1962	711.7	19.2	882.6	130.6	708.9
1961	604.0	14.9	712.2	127.9	715.3
1960	654.2	.6	288.8	125.3	721.7
1959	435.7	18.3	691.4	125.2	728.1
1958	435.7	7.1	691.5	125.1	695.3
1957	336.0	3.4	414.2	125.1	662.3
1956	336.0	4.5	97.2	125.0	629.3
1955	336.0	5.8	146.6	125.0	596.1
Totals	10,627.1	242.9	22,696.5	2,442.6	12,887.0
			Tom Green County		
1972	71.2	23.0	1,045.8	68.0	309.8
1971	–	16.1	1,045.8	68.0	310.3
1970	22.1	2.0	1,045.8	68.3	310.9
1969	–	2.4	1,045.8	68.6	313.8
1968	–	3.7	1,045.8	66.5	303.0
1967	–	3.9	1,045.8	64.7	292.0
1966	–	7.6	1,045.8	62.9	281.2
1965	–	8.2	1,045.8	61.1	270.4
1964	–	6.9	1,045.8	59.3	259.4
1963	–	41.7	1,045.8	57.5	271.6
1962	–	38.9	1,045.8	55.7	277.7
1961	–	5.9	1,045.8	53.9	286.8
1960	–	6.8	1,045.8	52.1	296.0
1959	–	3.9	1,045.8	55.5	305.2
1958	–	5.1	1,045.8	58.9	289.6
1957	–	8.8	1,045.8	62.3	273.9
1956	–	12.1	204.4	65.7	258.1
1955	–	10.9	–	69.1	242.4
Totals	93.3	207.9	16,937.2	1,118.1	5,152.1

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use: Public supply	Industrial	Irrigation	Domestic	Livestock
			Upton County		
1972	260.7	123.7	4,506.3	108.1	76.3
1971	224.0	195.3	4,800.1	108.1	76.8
1970	314.0	234.0	4,780.3	108.2	77.3
1969	405.5	1,376.3	4,850.0	107.3	77.7
1968	231.7	1,166.7	4,629.8	109.8	75.9
1967	214.8	991.0	4,625.0	112.2	74.2
1966	196.1	653.8	4,396.5	114.7	72.7
1965	150.3	354.6	4,325.7	117.2	71.0
1964	154.2	1,059.7	3,235.6	119.6	69.3
1963	135.0	1,051.4	2,704.4	122.0	75.7
1962	135.0	617.5	1,745.7	124.0	82.1
1961	135.0	328.5	1,566.0	126.9	88.5
1960	135.0	446.5	846.5	129.4	95.0
1959	154.2	547.8	816.2	124.7	101.3
1958	154.2	494.7	707.2	120.0	102.8
1957	153.4	326.8	459.9	115.2	103.5
1956	156.5	553.3	459.9	110.4	104.7
1955	161.7	534.9	459.9	105.7	105.9
Totals	3,471.3	11,056.5	49,915.0	2,083.5	1,530.7
			Uvalde County		
1972	–	6.0	–	224.0	524.7
1971	–	6.1	–	223.8	525.4
1970	–	6.0	–	223.8	525.8
1969	–	5.8	–	224.0	526.2
1968	–	3.7	–	229.1	526.7
1967	–	1.0	–	234.2	526.6
1966	–	.2	–	239.3	526.6
1965	–	.7	–	244.3	526.5
1964	–	.1	–	249.4	526.3
1963	–	.2	–	254.5	518.0
1962	–	.1	–	259.5	508.6
1961	–	.1	–	264.7	505.0
1960	–	.2	–	269.7	492.8
1959	–	0	–	302.9	486.3
1958	–	0	–	336.0	488.2
1957	–	–	–	369.2	490.1
1956	–	0	–	402.3	491.9
1955	–	–	–	435.5	493.8
Totals	–	30.2	–	4,986.2	9,209.5

Table 3.—Total Estimated Pumpage From the Edwards-Trinity (Plateau) Aquifer, 1955-72—Continued

(Amounts shown are in acre-feet)

Year	Water use					
	Public supply	Industrial	Irrigation	Domestic	Livestock	Total of all water use by year
			Val Verde County			
1972	48.5	50.2	530.6	336.4	457.2	85,808.4
1971	51.0	50.0	575.8	336.4	459.0	87,047.2
1970	44.0	94.0	600.0	336.8	459.3	91,935.3
1969	40.1	2.1	617.0	336.7	460.1	93,902.0
1968	34.4	.6	505.4	360.4	459.1	94,710.5
1967	42.7	1.4	678.4	384.1	460.9	90,302.2
1966	29.6	.6	566.1	407.8	461.8	88,559.0
1965	18.1	1.4	610.7	431.5	461.5	83,864.4
1964	16.6	3.3	627.0	455.2	461.8	83,365.9
1963	18.1	2.9	630.3	478.9	483.6	72,023.9
1962	14.6	9.6	620.6	502.6	505.2	61,510.3
1961	7.5	.8	553.8	526.3	526.7	56,934.7
1960	9.5	2.7	543.6	550.3	548.4	50,814.8
1959	—	3.3	572.0	515.4	570.1	47,633.3
1958	—	2.3	490.5	480.7	568.4	45,412.1
1957	—	1.9	543.3	446.1	569.4	46,282.8
1956	—	4.2	734.4	411.3	569.1	43,814.3
1955	—	1.9	615.5	376.6	568.8	37,688.3
Totals	374.7	233.2	10,615.9	7,673.5	9,050.4	
Total of all water use for the 18-year period, 1955—72.						1,261,609.4

Most of the pumpage in these two counties is localized in the St. Lawrence area of south central Glasscock County and north central Reagan County. Another area on the Plateau where irrigation pumpage is relatively concentrated is in western Schleicher County where approximately 5,000 acre-feet is pumped annually.

Wells in Sutton County pumped the most water for livestock use with an average of about 700 acre-feet per year.

Hydraulic Characteristics of Aquifers

The factors that influence the manner in which ground water is yielded to a pumping well are called the hydraulic characteristics of the aquifer or water-bearing formation. These characteristics include the porosity, permeability, coefficient of transmissibility, coefficient of storage, specific yield, and specific capacity.

Porosity and Permeability

The physical property that defines the degree to which a rock contains interstices or void spaces that may be filled with fluid or gas is called porosity. It is quantitatively expressed as a percentage of the total volume of the rock. In pervious sedimentary rocks such as sandstone, the porosity is determined by the interrelationship of size, shape, sorting, nature of the matrix, and degree of cementation; whereas, porosity in soluble limestones depends upon size, shape, and pattern of fractures, and the relative purity of the limestones. Pure limestones will dissolve more easily than impure ones. Solution channels are developed in limestones by ground water along fractures such as faults and joints. Vugular limestones are developed by dissolving the material from between fossils. This commonly occurs in fossiliferous rudistid limestones of the lower Edwards Formation. In dense sedimentary, igneous, or metamorphic rocks, porosity depends upon the size, shape, and pattern of fracturing. Porosities may range from zero to greater than 50 percent, depending upon the nature of the sedimentary material.

Listed below are representative ranges of porosity according to Todd (1959, p. 16).

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

Permeability is the capacity of a rock to transmit a fluid. It is measured by the coefficient of permeability which is defined as the rate of flow of water in gallons per day through a cross-sectional area of 1 square foot, under a hydraulic gradient of 1 foot per foot, and at a temperature of 60°F (16°C). Symbolically this is expressed as gallons per day per square foot (gpd/ft^2). Permeability is related to the number and size of the void spaces in the rocks and also to the degree of interconnection of the void spaces. Granular materials have permeabilities that vary with the diameter and degree of assortment of individual particles. A well-sorted coarse sand has a lower permeability than a well-sorted gravel. However, gravel with a moderate percentage of medium- and fine-grained material may be considerably less permeable than a uniformly-sized coarse sand.

Pumping tests of wells on the Edwards Plateau have indicated coefficients of permeability in the Antlers Formation ranging from 13 gpd/ft^2 (well YL-44-49-209) to 38 gpd/ft^2 (well YL-45-23-702).

Measurement of permeability in the Edwards and associated limestones is almost impossible due to the variation in porosity caused by solution channels, cracks, and vugs.

Coefficients of Transmissibility and Storage

The coefficient of transmissibility is the rate of flow of ground water at the prevailing water temperature, in gallons per day, through a vertical strip of the aquifer 1 foot wide extending the full saturated height of the aquifer under a hydraulic gradient of 100 percent. The coefficient of transmissibility is the product of the coefficient of permeability and aquifer thickness, and is expressed as gallons per day per foot (gpd/ft). Determination of the volume of water that will flow through each foot of the aquifer is the product of the hydraulic gradient and the coefficient of transmissibility. For the flow to remain constant, small coefficients of transmissibility require greater hydraulic gradients.

The results of pumping tests were analyzed by either the nonequilibrium formula or by the recovery formula (Theis, 1935) and are listed in Table 4. The range in coefficients of transmissibility was from 1,100 to 6,573 gpd/ft. Calculated from all tests, the average coefficient of transmissibility was 2,728 gpd/ft.

Variations in the coefficient of transmissibility may be caused by either natural characteristics of the aquifer or by the properties of the discharging well. One of the natural characteristics could be the heterogeneity of the aquifer or lack of uniformity of the sediments. For example, the Antlers was deposited by an advancing sea that reworked sediments from the underlying terrain it crossed. This resulted in a conglomeration of sandstones, gravel, and shales within the formation. Shale lenses intermingled with the sandstones alter the water-producing zones for any well penetrating such a section, therefore, influencing the coefficient of transmissibility. Also, the degree of cementation would determine, to some extent, the effective porosity and permeability of the water-bearing formation and, in turn, would affect the coefficient at transmissibility.

Properties of a discharging well that can influence the coefficient of transmissibility are partial penetration of the aquifer, degree of well development at the time of completion, effective well diameter, encrustation of casing or well screen, effective surface area exposed to water-producing zones, and the type of gravel packing.

The effective well diameter is not necessarily the slotted casing or well screen diameter. For instance, if the well is highly developed, the effective diameter may be substantially larger than the casing or screen diameter. Faulty construction or caving may cause a decrease in effective well diameter.

Well deterioration may be caused by encrustation on slotted casing or screens that would result in a lower coefficient of transmissibility. In addition, the finer particles adjacent to the well bore may migrate inward and begin to restrict the flow of water; hence, lowering the coefficient of transmissibility.

From the foregoing, it can be deduced that decreasing coefficients of transmissibility may not be caused entirely by declining water levels, but also by deteriorating well conditions adjacent to the producing zones. This explains, in part, decreasing well efficiencies.

The coefficient of storage is a measure of the volume of water available for withdrawal and is defined as the volume of water released from or taken into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface. Under water-table conditions, the coefficient of storage is practically equal to the specific yield. The quantity of water released by gravity drainage from the saturated zone of a water-bearing formation is the specific yield expressed as a percentage of the total saturated volume.

The coefficient of storage for the Antlers Formation is 0.074, which is an average of all storage coefficients obtained. It is difficult to determine the storage of the Edwards and associated limestones because of the difficulty in obtaining an accurate measurement of the porosity.

Yields of Wells

While performing power-yield tests on the Edwards-Trinity (Plateau) aquifer throughout the Edwards Plateau, yields were determined on 168 irrigation and municipal wells. The high, low, and average yields for 160 of these tests are shown in the following table.

County	Yields (gpm) High	Low	Average	Number of tests
Concho	46.7	---	46.7	1
Crockett	392.3	159.5	242.1	5
Glasscock	1,541.5	59.1	95.8	97
Irion	668.0	153.4	410.7	3
Midland	162.3	50.0	99.5	3
Reagan	185.7	27.8	88.7	33
Schleicher	216.7	144.5	354.6	8
Sutton	668.0	44.4	353.1	4
Upton	272.8	72.0	171.5	6

The largest yield of 1,541 gpm is shown in Glasscock County on the Steve Currie Ranch from well KL-44-14-203. The low yield of 28 gpm was from well UZ-44-28-908 in Reagan County. The high average was 411 gpm in Irion County and the low was 47 in Concho County. However, it must be noted that the number of tests were 3 and 1, respectively, and therefore these

Table 4.—Hydraulic Characteristics of the Antlers Aquifer

Well	Date	Producing interval (feet)	Coefficient of transmissibility (gpd/ft)	Coefficient of permeability (gpd/ft²)	Coefficient of storage	Yield (gpm)	Specific capacity (gpm/ft)	Remarks
REAGAN COUNTY								
UZ-44-28-902	May 19, 1966	185-435	2,808	—	—	383	8.0	Drawdown test.
29-910	May 18, 1966	185-511	3,250	—	—	122	2.7	Do.
902	do	—	6,573	—	0.0423	—	—	Interference test: Well UZ-44-29-910 was pumping 122 gpm.
36-303	May 5, 1966	229-287 305-326	2,464	—	—	56	.85	Drawdown test.
UPTON COUNTY								
YL-44-41-907	Sept. 3, 1966	80-210	1,400	14	—	—	—	Interference test: Well YL-44-41-905 was pumping 23 gpm.[1]
49-209	Nov. 29, 1965	20-170	—	13	—	36	—	Recovery test.[1]
45-23-701	Dec. 8, 1965	140-148 195-218	1,100	32	—	53	—	Do.
702	do	40-210	1,500	38	—	—	—	Interference test: Well TJ-45-23-701 was pumping 52.6 gpm.[1]
MIDLAND COUNTY								
TJ-44-18-200	1971	—	—	—	0.148	—	—	Preston-Shackelford water-well field.[2]
45-07-417	1948	—	10,000	—	—	170	2.200	3
23-909	1959	—	—	—	—	—	.455	—
910	do	—	—	—	—	—	.257	—
911	do	—	—	—	—	—	1.810	—
912	do	—	—	—	—	—	.273	—
913	do	—	—	—	—	—	1.430	—
914	do	—	—	—	—	—	.667	—
GLASSCOCK COUNTY								
—	1971	—	—	—	0.0673	—	—	St. Lawrence area.[2]
STERLING COUNTY								
XP-43-02-700	—	—	—	—	0.0387	—	—	Union-Texas water-well field.[2]

[1] From White, 1968.
[2] Coefficient of storage was determined from volume of dewatered area and volume of water pumped.
[3] From Meyers, 1969.

results are not considered very accurate. Results obtained in Glasscock and Reagan would be more accurate since more tests were performed.

Specific Capacities of Wells

The specific capacity is a function of several factors. The yield of a well in gallons per minute per foot (gpm/ft) of drawdown depends upon the effective diameter of the well, the depth penetrated into the aquifer, the type of perforations in the casing, and the extent to which the well was developed. The following table shows specific capacities determined from power-yield data obtained during this study.

County	Specific capacity (gpm/ft) High	Low	Average	Number of tests
Crockett	9.56	–	9.56	1
Glasscock	3.10	0.17	1.19	27
Midland	0.87	.83	0.85	2
Reagan	2.77	.52	1.17	12
Schleicher	8.40	1.10	4.40	3
Sterling	22.30	1.70	9.19	4
Upton	1.40	.49	.94	2

The more accurate specific capacities shown in the table would probably be in Crockett or Schleicher Counties where open hole wells penetrate the Edwards and associated limestones. Hence, the effect on the well should be at minimum since there is no perforated casing or screens. Specific capacities of wells that have perforated casings are likely to be low because of well deterioration, perforated casing completion, and general overall inefficiency of the well. Pumping levels measured in the casings fall much lower than the pumping levels in the aquifers. Such losses of head result in lower specific capacities and, consequently, lower coefficients of transmissibility.

DEVELOPMENT OF THE EDWARDS-TRINITY (PLATEAU) AQUIFER

The first development of ground water on the Edwards Plateau supplied U.S. Army forts and stagecoach stops where spring and stream supplies were not available. A shallow well was developed in 1852 at Fort McKavett in western Menard County. Other wells were developed during the middle to late 1800's along the Butterfield Stage route which traversed the northern part of the Edwards Plateau.

Development of ground water for livestock and rural domestic use began about 1880 with the introduction of the windmill in the West Texas area. The earliest record of wells developed for public supply on the Edwards Plateau was at Big Spring in Howard County in 1925. Many small towns and communities located on the Edwards Plateau obtain public or private water supplies from the Edwards-Trinity (Plateau) aquifer.

Water from most of the earlier wells developed for industrial purposes during 1920-30 was used to supply water for drilling oil and gas tests and making ice, while later uses were for gasoline plants, refineries, and industrial complexes.

Development of ground water for irrigation began about 1946. The use of water for this purpose developed slowly until about 1960 when the number of wells drilled for irrigation increased rapidly in counties in the northwestern part of the Plateau. From 1946 to 1959, 40 wells were drilled for irrigation use in Glasscock County, and 161 wells were developed from 1960 to 1966. Reagan County experienced a similar development of irrigation wells. Eighty-one wells were drilled from 1960 to 1966. However, 55 wells that were formerly used for irrigation have either been abandoned or unused since development began. Other small areas of irrigation development are: Schleicher County, 69 wells; Midland County, 40 wells; Upton County, 39 wells (White, 1968); Ector County, 22 wells; Crockett County, 17 wells (Iglehart, 1967); Sutton County, 14 wells; Sterling County, 13 wells; and Menard County, 8 wells. The lack of soil cover and the generally rough, rocky terrain are factors that limit the use of ground water for irrigation in parts of the Edwards Plateau rather than the lack of water in the Edwards-Trinity (Plateau) aquifer.

Records of about 5,100 water wells and springs on the Edwards Plateau were tabulated during this investigation. In addition, 101 wells in Menard County and 88 wells in Crockett County were revisited in order to obtain water levels and collect water samples for chemical analysis to update the previous studies conducted in these two counties. An attempt was made to inventory all irrigation, public supply, and industrial wells and a selected number of domestic and livestock wells. Many industrial wells, that were developed to supply water for drilling and development of oil and gas tests, have been abandoned or are unused after drilling ceased. Location of all inventoried wells and related data are shown on well location maps and tables of this report or in reports of other ground-water studies.

Past and Present Development

In 1950, total pumpage of ground water from the Edwards-Trinity (Plateau) aquifer on the Edwards Plateau was about 17,000 acre-feet or about 15 million gallons per day (mgd). Total pumpage for 1972 was about 86,000 acre-feet or about 77 mgd. Table 3 shows the yearly estimated ground-water pumpage from the Edwards-Trinity (Plateau) aquifer for domestic, livestock, public supply, industrial, and irrigation uses, by county, for the period 1955-72. The following table shows the pumpage by use of ground water for 1972.

Use	1972 Pumpage (acre-feet)
Domestic	3,971.9
Livestock	6,684.1
Public supply	6,480.2
Industrial	6,762.0
Irrigation	61,910.2
Total	85,808.4

The amount of water pumped from the Edwards-Trinity (Plateau) aquifer will likely increase due to increase in population and expanded industry. The use of ground water for irrigation will remain fairly constant unless a prolonged drought should occur.

Irrigation

The calculated total amount of ground-water pumpage for irrigation from the Edwards-Trinity (Plateau) aquifer in 1972 was about 62,000 acre-feet, or about 55 mgd, and represents about 70 percent of the total pumpage during the year. Glasscock and Reagan Counties are the principal users of water for irrigation from the Edwards-Trinity (Plateau) aquifer.

Industrial

The calculated total industrial pumpage from the Edward-Trinity (Plateau) aquifer in 1972 was about 6,800 acre-feet or about 6 mgd. This amount is about 7 percent of the total water pumped from the aquifer during the year and about 800 acre-feet more than the approximately 6,000 acre-feet pumped in 1955. This increase in pumpage is due primarily to increased use of water for secondary recovery of oil (waterflood), development and growth of industrial complexes, and drilling for oil and gas. The largest amount of ground water used for secondary recovery of oil on the Edwards Plateau is in Coke, Crockett, Ector, Midland, Reagan, and Upton Counties. Ector and Reagan Counties are the principal users of ground water from the Edwards-Trinity (Plateau) aquifer for industrial purposes having used about 90,000 acre-feet and almost 24,000 acre-feet, respectively, for the 18-year period 1955-72.

Public Supply

The calculated amount of ground water pumped from the Edwards-Trinity (Plateau) aquifer for public supply decreased from about 10,000 acre-feet in 1955 to about 6,500 acre-feet in 1972. The 1972 pumpage represents about 7 percent of the total pumpage for the year. The largest amount, approximately 1,600 acre-feet, was pumped in Ector County and represents about 25 percent of all water pumped for municipal supplies from the Edwards-Trinity (Plateau) aquifer. Wells developed in the Edwards-Trinity (Plateau) aquifer supply water for towns and cities in Crockett, Edwards, Irion, Reagan, Schleicher, Sutton, and Upton Counties. This aquifer also supplements surface-water supplies for cities in Ector and Howard Counties. The town of Eden in Concho County supplements its well field, that is developed in the Edwards and associated limestones, with water from a well developed in the Hickory Sandstone. Other counties on the Plateau—Bandera, Coke, Gillespie, McCulloch, Midland, Kerr, Kimble, Kinney, Real, Sterling, Tom Green, and Uvalde—either use surface water for a municipal supply or pump water from aquifers other than the Edwards-Trinity (Plateau) aquifer. Several small communities located on the Edwards Plateau utilize privately owned, small-capacity, public-supply wells with limited distribution systems for water supply. The amount of water produced by these systems is tabulated as domestic water use.

Domestic and Livestock

In 1972, the amount of water produced from the Edwards-Trinity (Plateau) aquifer for domestic purposes on the Edwards Plateau was about 4,000 acre-feet or 3.5 mgd. This represents about 4 percent of the water pumped from the Edwards-Trinity (Plateau) aquifer during 1972. The amount of water used for domestic purposes has declined from 4,604 acre-feet in 1955 to 3,971 acre-feet in 1972. This estimate is based on the 1970 rural population and on the population of small communities without a public water supply system.

The use of water for livestock purposes pumped from the Edwards-Trinity (Plateau) aquifer in 1972 was almost 7,000 acre-feet or about 6 mgd. This represents about 7 percent of all water pumped from this aquifer during 1972. The amount of water used for livestock purposes was about 6,200 acre-feet in 1955.

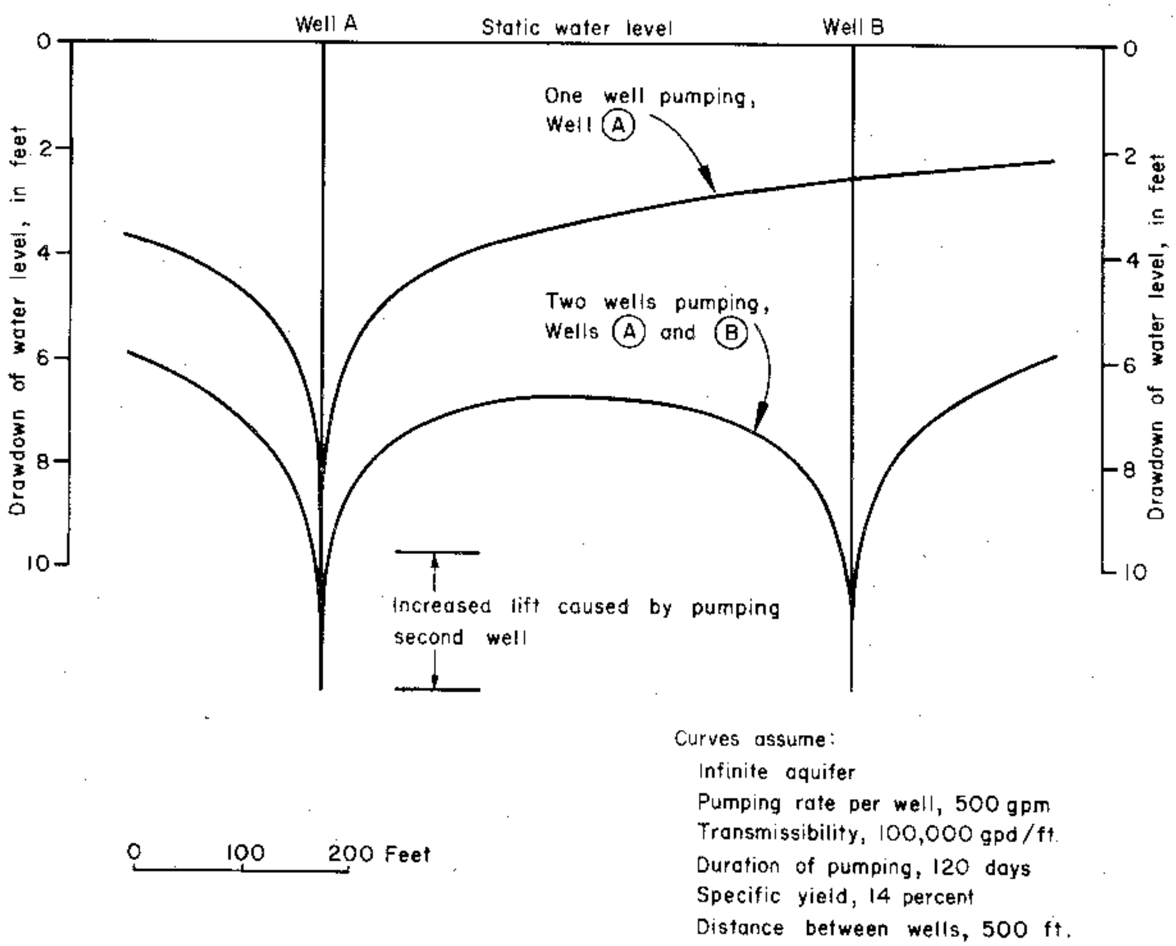
The total pumpage of ground water from the Edwards-Trinity (Plateau) aquifer for domestic and livestock purposes on the Edwards Plateau is likely to remain fairly constant or possibly decrease due to loss of rural population to the urban areas and to frequent droughts which reduce the number of animals on ranches in the region.

Future Development

Future development of the Edwards-Trinity (Plateau) aquifer is dependent upon the amount of annual precipitation, the amount of land converted to farm land, the amounts of cotton-acreage allotments, new industry, and population growth. The Upper Colorado River Authority is developing a supplementary ground-water supply from the Allurosa (Alluvium and Santa Rosa) aquifer in Ward County. The city of San Angelo has contracted with landowners in southern Tom Green and northern Schleicher Counties for a standby source to supplement their surface-water supply. They are also developing a municipal water supply from the Hickory Sandstone Member of the Riley Formation in Concho and McCulloch Counties. The potential for future development of the Edwards-Trinity (Plateau) aquifer is discussed in another part of this report.

Construction of Wells

The type of construction of water wells depends upon the intended use of the water. Wells developed for high capacity such as industrial, irrigation, or public supply are constructed by a different method than wells developed for small pumpage such as domestic and livestock use. The different methods of well construction are shown in the following diagram.



Most of the domestic and livestock wells developed in the Antlers Formation—the basal formation of the Edwards-Trinity (Plateau) aquifer—in Ector, Midland, Glasscock, Upton, and Sterling Counties, and parts of Reagan County, have small diameter casing, generally 5 to 6 inches. The bore hole is generally cased to the bottom of the well and either torch-slotted or perforated opposite the water-bearing portion of the sandstone. Earlier wells drilled into the sand were cased only through the surficial deposits. This resulted in the loss of some wells due to caving of the sand which filled the bore hole. In the central and parts of the southern part of the Edwards Plateau, domestic and livestock wells are developed in the Edwards and associated limestones and do not require casing to prevent caving. Wells developed in the Glen Rose Formation in the southeastern part of the Edwards Plateau often have blank casing through the upper part of the limestone in order to prevent the water, which contains a high sulfate content, from entering the bore hole. Various small capacity, 1/3 to 1 horsepower, cylinder, jet, and submersible pumps are used for domestic wells. Windmills with cylinder pumps are most frequently used for livestock wells.

The two most important factors to be considered in planning domestic and livestock wells are: (1) locate the wells where contaminants from septic tanks, cesspools, privies, and barnyards will not enter the wells through surface drainage or movement of ground water; and (2) fill the annular space between the casing and bore hole with cement, and seal the casing at the top to prevent entry of vermin, insects, or other objectionable material.

The large-capacity wells, such as those used for irrigation, public supply, and industry developed in the Antlers Formation, are drilled in a manner similar to domestic and livestock wells except that the diameter of the bore hole is much larger, and a few are gravel packed. The gravel is placed in the annulus of the well from the surface casing to the bottom of the well hole. Underreaming and gravel packing the well bore below the surface casing increases the effective diameter of the well and decreases the entrance velocity of ground water when the well is pumped. During periods of heavy pumping, gravel packing will increase the specific capacity (gallons per minute per foot of drawdown) of the well, serve as a strainer to prevent entrance of fine-grained sediments into the well bore, and serve as a filling material should cavities be formed by fine-grained sediments entering the well bore when the well is being developed. Gravel packing also tends to prevent encrustation (iron cementation) of the slotted or screened section. Large-capacity wells developed in the Edwards and associated limestones are usually drilled to a large diameter, and are cased and cemented with one joint of casing, generally 10 to 30 feet. The well bore is open to the entire water-bearing section, and the well yield is sometimes increased by use of hydrochloric acid. The acid increases the permeability of the reservoir rock by enlarging the solution cavities, fractures, and joints in the vicinity of the well bore. This process, like gravel packing in a sandstone reservoir, increases the effective well diameter and the specific capacity.

Pumps used on irrigation wells are powered by electric motors or internal combustion engines fueled with gasoline, butane, natural gas, or diesel. Industrial and public supply wells are generally powered by electric motors.

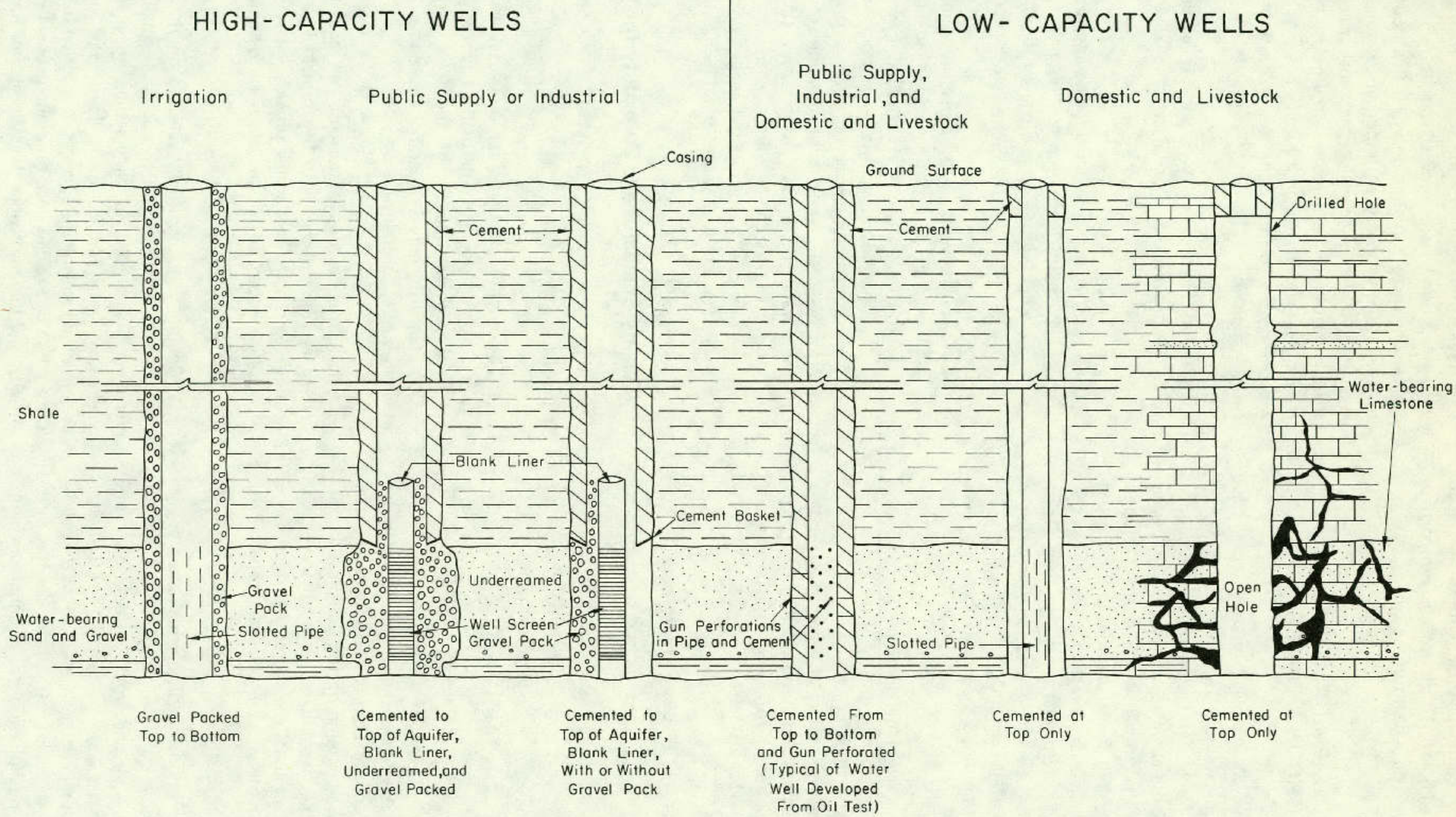
The following discussion suggests some well-completion methods that should result in increased capacity of water wells developed on the Edwards Plateau.

Large capacity wells should be spaced so that the cones of depressions do not overlap thereby causing interference and additional lowering of water levels. The following diagram shows in idealized cross section of the drawdown interference between two pumping wells and the increased lift or additional drawdown.

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

Larger well yields may be obtained from the Edwards and associated limestones by an artificial fracturing process. Water and sand is pumped into the well bore through tubing and into the water-bearing limestone by excessive pump pressure. This water-sand slurry creates new fractures or enlarges existing fractures, solution cavities, and joints much like acid treatment. However, the sand fills the enlarged fractures, cavities, and joints thereby creating "pipes" or conduits which permit water to enter the well bore in a steady flow. This will prevent turbulence when the well is pumped. Gravel packing will increase the specific capacity of wells developed in sandstone aquifers. The production life of a well may be lengthened by use of well screens instead of slotted or perforated casing. The size of screen openings can be made more accurate than torch slots, and the type of metal making up the screen can be selected to prevent corrosion and encrustation.

The well bore should be drilled as near vertical and straight as possible to insure that the pump will operate



Diagrams of Typical Well Construction Used to Produce Water From Sand, Gravel, and Limestone properly and will not come in contact with the casing or well bore (in uncased holes). This is especially important in wells equipped with deep well turbine pumps.

GENERAL CHEMICAL QUALITY OF GROUND WATER

The amounts of dissolved matter found by chemical analysis in ground water from the Edwards Plateau are given in Table 7 and in the referenced county reports. In Table 7, the chemical analyses are presented in milligrams per liter (mg/l) which is the preferred metric system unit. Milligrams per liter and parts per million (ppm) by weight are numerically the same if the concentration of dissolved matter is less than about 7,000 ppm and the specific gravity of the water is approximately 1.0 (Davis and DeWiest, 1966, p. 77). The following equation shows the relation between these units:

$$\text{parts per million} = \frac{\text{milligrams per liter}}{\text{specific gravity of the water}}$$

The general classification of water used in this report is from Winslow and Kister (1956, p. 5). The classification is based on the dissolved-solids concentration as follows:

Description	Dissolved-solids content (mg/l)
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	greater than 35,000

Figure 16 of this report and similar figures in the various referenced county reports illustrate the general quality of ground water found on the Edwards Plateau. The following table from Doll and others (1963, p. 39-43) lists and discusses the source and significance of mineral constituents and the physical properties of natural waters.

The major portion of dissolved matter found in the ground water is from leaching of soluble substances in the soil and rocks with which the ground water comes in contact. The chemical quality of the ground water is thus affected by its environment from its point of impact on the earth as relatively pure precipitation to its final discharge from the aquifer.

Repeated leaching of the soil and rocks through which the ground water moves tends to remove excess soluble substances and thus improves the ground-water quality. This is probably an important reason why the areas of the Plateau receiving the most precipitation generally have ground water with a lower dissolved-solids content than those areas that receive less precipitation. Probable causes for the numerous exceptions to this general trend are:

(1) differences in the ease of ground-water movement that affect the quantity of leaching;

(2) differences in soil and rock composition and, possibly, the presence of original (connate) water with a high dissolved-solids content left when the rocks were deposited; and

(3) activities of man, especially the former practice of disposing of oil-field brines and other industrial wastes in unlined surface-disposal pits and from improper disposal of sewage or other organic waste material. Some contamination of ground water by organic wastes may be due to infiltration or direct entrance through improperly constructed wells. A common source of such wastes could be livestock.

Quality Standards and Suitability for Use

Industrial

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

Industrial ground water use on the Edwards Plateau can be classified into five principal categories: cooling water, boiler-feed water, process water, water for secondary recovery of oil, and water for oil and gas test hole drilling.

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

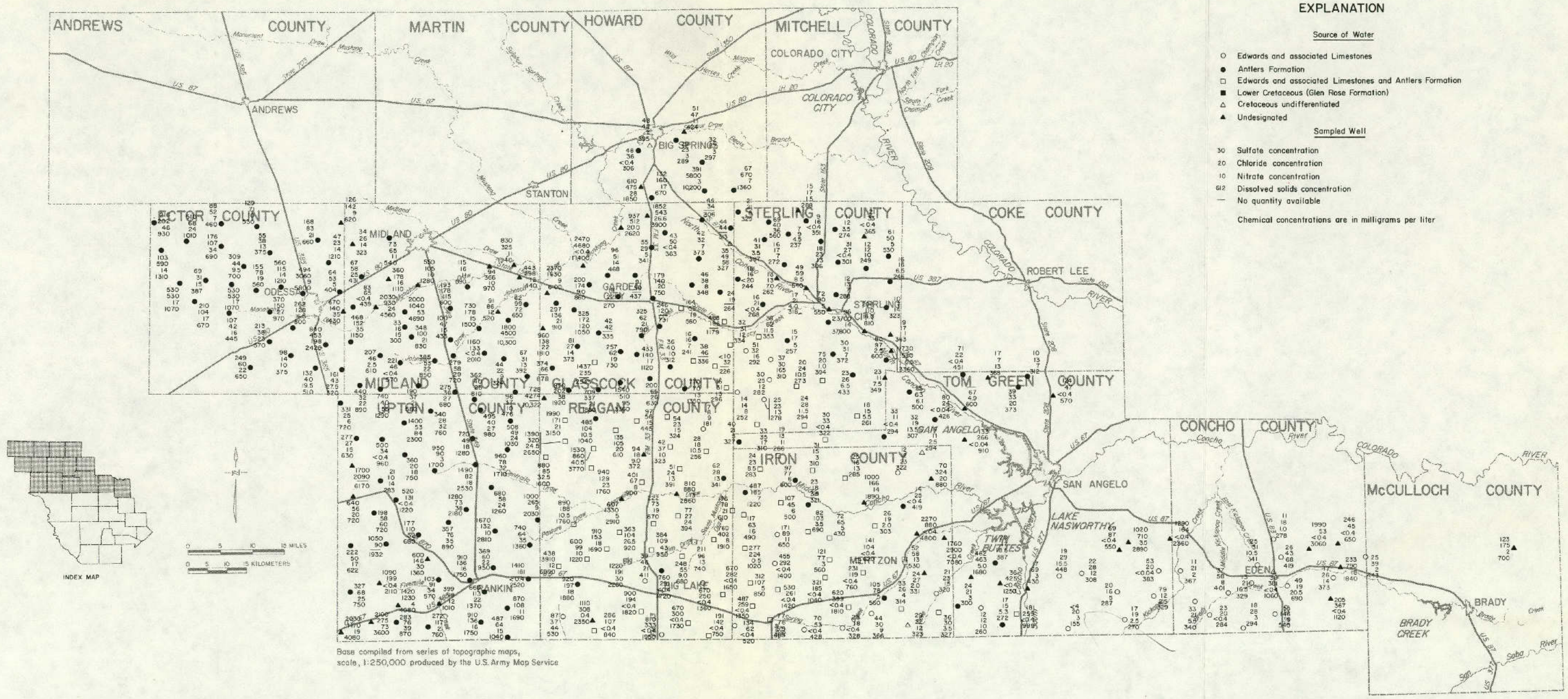


Figure 16

Chemical Quality of Ground Water From Selected Wells

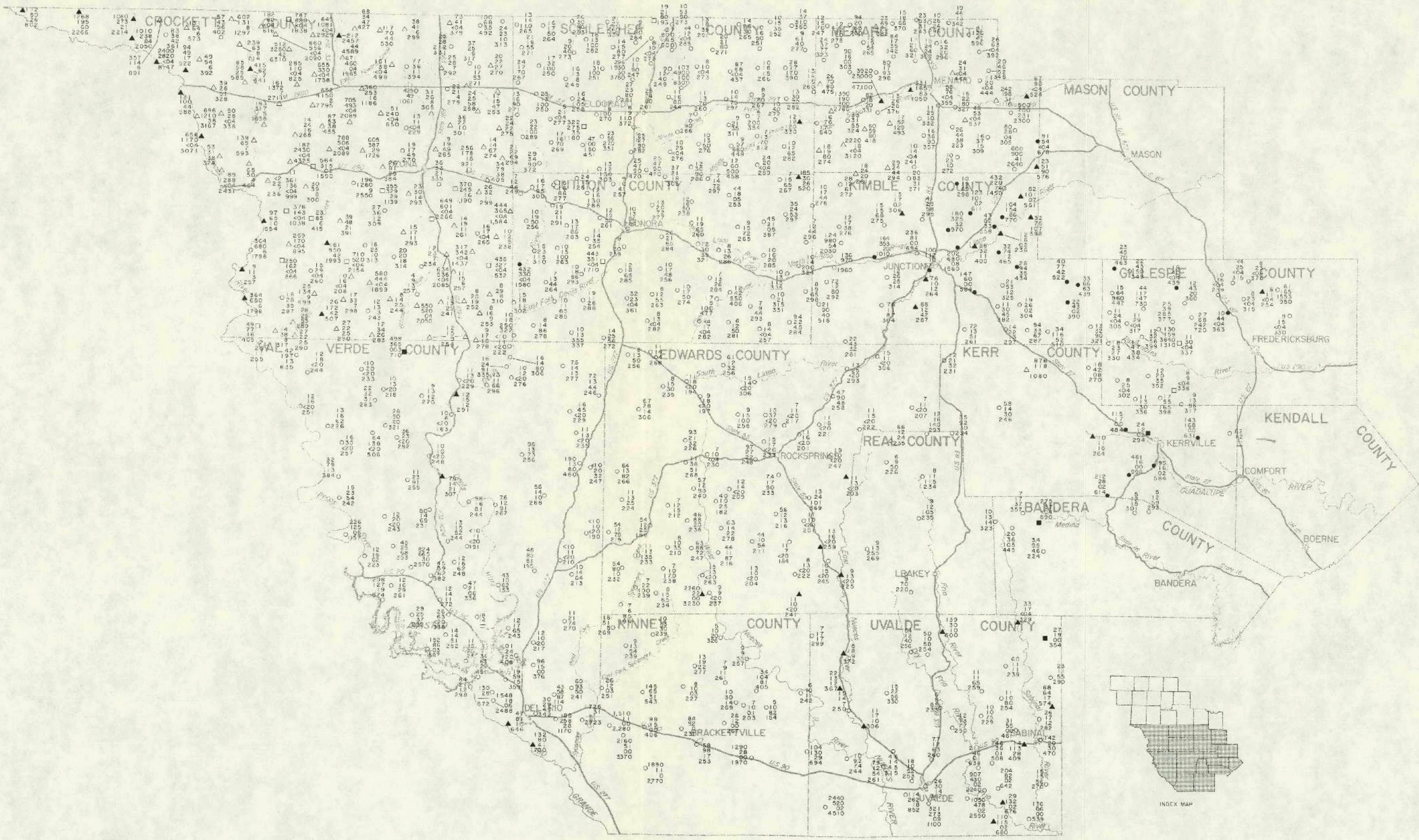


Figure 16 Continued

Source and Significance of Dissolved-Mineral Constituents and Properties of Water

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

Constituent or property	Source or cause	Significance
Silica (SiO_2)	Dissolved from practically all rocks and soils, commonly less than 30 mg/l. High concentrations, as much as 100 mg/l, generally occur in highly alkaline waters.	Forms hard scale in pipes and boilers. Carried over in steam of high pressure boilers to form deposits on blades of turbines. Inhibits deterioration of zeolite-type water softeners.
Iron (Fe)	Dissolved from practically all rocks and soils. May also be derived from iron pipes, pumps, and other equipment. More than 1 or 2 mg/l of iron in surface waters generally indicates acid wastes from mine drainage or other sources.	On exposure to air, iron in ground water oxidizes to reddish-brown precipitate. More than about 0.3 mg/l stains laundry and utensils reddish-brown. Objectionable for food processing, textile processing, beverages, ice manufacture, brewing, and other processes. U.S. Public Health Service (1962) drinking-water standards state that iron should not exceed 0.3 mg/l. Larger quantities cause unpleasant taste and favor growth of iron bacteria.
Calcium (Ca) and magnesium (Mg)	Dissolved from practically all soils and rocks, but especially from limestone, dolomite, and gypsum. Calcium and magnesium are found in large quantities in some brines. Magnesium is present in large quantities in sea water.	Cause most of the hardness and scale-forming properties of water; soap consuming (see hardness). Waters low in calcium and magnesium desired in electroplating, tanning, dyeing, and in textile manufacturing.
Sodium (Na) and potassium (K)	Dissolved from practically all rocks and soils. Found also in ancient brines, sea water, industrial brines, and sewage.	Large amounts, in combination with chloride, give a salty taste. Moderate quantities have little effect on the usefulness of water for most purposes. Sodium salts may cause foaming in steam boilers and a high sodium content may limit the use of water for irrigation.
Bicarbonate (HCO_3) and carbonate (CO_3)	Action of carbon dioxide in water on carbonate rocks such as limestone and dolomite.	Bicarbonate and carbonate produce alkalinity. Bicarbonates of calcium and magnesium decompose in steam boilers and hot water facilities to form scale and release corrosive carbon dioxide gas. In combination with calcium and magnesium, cause carbonate hardness.
Sulfate (SO_4)	Dissolved from rocks and soils containing gypsum, iron sulfides, and other sulfur compounds. Commonly present in mine waters and in some industrial wastes.	Sulfate in water containing calcium forms hard scale in steam boilers. In large amounts, sulfate in combination with other ions gives bitter taste to water. Some calcium sulfate is considered beneficial in the brewing process. U.S. Public Health Service (1962) drinking water standards recommend that the sulfate content should not exceed 250 mg/l.
Chloride (Cl)	Dissolved from rocks and soils. Present in sewage and found in large amounts in ancient brines, sea water, and industrial brines.	In large amounts in combination with sodium, gives salty taste to drinking water. In large quantities, increases the corrosiveness of water. U.S. Public Health Service (1962) drinking-water standards recommend that the chloride content should not exceed 250 mg/l.
Fluoride (F)	Dissolved in small to minute quantities from most rocks and soils. Added to many waters by fluoridation of municipal supplies.	Fluoride in drinking water reduces the incidence of tooth decay when the water is consumed during the period of enamel calcification. However, it may cause mottling of the teeth, depending on the concentration of fluoride, the age of the child, amount of drinking water consumed, and susceptibility of the individual. (Maier, 1950)
Nitrate (NO_3)	Decaying organic matter, sewage, fertilizers, and nitrates in soil.	Concentration much greater than the local average may suggest pollution. U.S. Public Health Service (1962) drinking-water standards suggest a limit of 45 mg/l. Waters of high nitrate content have been reported to be the cause of methemoglobinemia (an often fatal disease in infants) and therefore should not be used in infant feeding. Nitrate has been shown to be helpful in reducing inter-crystalline cracking of boiler steel. It encourages growth of algae and other organisms which produce undesirable tastes and odors.
Dissolved solids	Chiefly mineral constituents dissolved from rocks and soils. Includes some water of crystallization.	U.S. Public Health Service (1962) drinking-water standards recommend that waters containing more than 500 mg/l dissolved solids not be used if other less mineralized supplies are available. Waters containing more than 1,000 mg/l dissolved solids are unsuitable for many purposes.
Hardness as $CaCO_3$	In most waters nearly all the hardness is due to calcium and magnesium. All the metallic cations other than the alkali metals also cause hardness.	Consumes soap before a lather will form. Deposits soap curd on bathtubs. Hard water forms scale in boilers, water heaters, and pipes. Hardness equivalent to the bicarbonate and carbonate is called carbonate hardness. Any hardness in excess of this is called non-carbonate hardness. Waters of hardness as much as 60 ppm are considered soft; 61 to 120 mg/l, moderately hard; 121 to 180 mg/l, hard; more than 180 mg/l, very hard.
Specific conductance (micromhos at 25°C)	Mineral content of the water.	Indicates degree of mineralization. Specific conductance is a measure of the capacity of the water to conduct an electric current. Varies with concentration and degree of ionization of the constituents.
Hydrogen ion concentration (pH)	Acids, acid-generating salts, and free carbon dioxide lower the pH. Carbonates, bicarbonates, hydroxides, phosphates, silicates, and borates raise the pH.	A pH of 7.0 indicates neutrality of a solution. Values higher than 7.0 denote increasing alkalinity; values lower than 7.0 indicate increasing acidity. pH is a measure of the activity of the hydrogen ions. Corrosiveness of water generally increases with decreasing pH. However, excessively alkaline waters may also attack metals.

cooling water. Corrosion can be caused by acids, dissolved oxygen, carbon dioxide, sodium chloride, and magnesium chloride.

Ground water used for boilers generally must meet rigid chemical-quality standards. This is especially true for high-pressure boilers, because the high temperature and pressure cause encrustation, corrosion, and water carry-over. Iron oxides in boiler water can cause priming and foaming. Magnesium chloride breaks down in boiler water to form hydrochloric acid. In addition, the magnesium and calcium present in most waters cause scale on the boiler tubes. Silica is an important constituent to consider in selecting a water supply for boiler feed, as it forms a particularly hard scale. The scale-forming tendency increases with an increase in boiler pressure. The recommended maximum concentration of silica for water used in boilers is as follows (Moore, 1940, p. 263):

Maximum concentration of silica (mg/l)	Boiler pressure (pounds per square inch)
40	less than 150
20	150 to 250
5	251 to 400
1	more than 400

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

The water produced with oil and gas, plus some supplemental water, is generally used in secondary recovery of oil. The injected water must be compatible with the oil-reservoir rock and must not contain substances which could cause plugging. Plugging can be caused by the oxidation of metallic ions, especially iron (Fe^{+++}). Suspended matter, iron bacteria, algae, and fungi can also cause plugging. Sulfate-rich waters may cause a resistant deposit of barium sulfate if mixed with barium-rich waters. Alkaline water promotes iron deposits and the formation of calcium scale. Acid waters can cause corrosion of injection equipment. The water should be free of corrosive gases such as hydrogen sulfide, carbon dioxide, or oxygen.

Oil and gas test hole drilling water is subject to few, if any, quality requirements. In fact, brine is used when drilling through some of the thick salt formations found in the subsurface in some areas of the Edwards Plateau.

Irrigation

The chemical quality of irrigation water can be judged by its electrical conductivity, sodium-adsorption ratio (SAR), residual sodium carbonate (RSC), and concentration of boron. The lower the values of these characteristics, the better the chemical quality of the water. Successful use of some poor quality waters for irrigation may depend on favorable conditions of soil composition and texture, favorable climate, special irrigation practices, and adequate soil drainage. Local conditions, therefore, have much to do with the suitability of a water for irrigation.

The electrical conductivity of water is a useful and fairly accurate expression of the total concentration of soluble salts in the water. High concentrations of soluble salts in irrigation water cause the water to have a high salinity hazard. Water with a high salinity hazard may cause saline conditions to develop in irrigated soil. This limits the kinds of crops which can be grown to those which are salt tolerant, and will eventually destroy the productivity of the land unless adequate leaching and drainage remove the excess salts. Table 5 lists the relative tolerance of crop plants to salinity.

According to the U.S. Salinity Laboratory Staff (1954, p. 71):

> Waters having an electrical conductivity in the range of 750 to 2,250 micromhos per centimeter are widely used, and satisfactory crop growth is obtained under good management and favorable drainage conditions, but saline conditions will develop if leaching and drainage are inadequate. Use of waters with conductivity values above 2,250 micromhos per centimeter is the exception, and very few instances can be cited where such waters have been used successfully. Only the more salt-tolerant crops can be grown with such waters and then only when the water is used copiously and the subsoil drainage is good.

The sodium-adsorption ratio (SAR) is defined by the expression:

Table 5.—Relative Tolerance of Crop Plants to Salinity

(From Hem, 1962)

In each column the plants first named under each class are most sensitive and the last named under that class the most tolerant.

Sensitive	Moderately tolerant	Tolerant
	Forage Crops	
Burnet	Sickle milkvetch	Birdsfoot trefoil
Ladino clover	Sour clover	Barley (hay)
Red Clover	Cicer milkvetch	Western wheatgrass
Alsike clover	Tall meadow oatgrass	Canada wildrye
Meadow foxtail	Smooth brome	Rescue grass
White Dutch clover	Big trefoil	Rhodes grass
	Reed canary	Bermuda grass
	Meadow fescue	Nuttall alkaligrass
	Blue gramma	Saltgrass
	Orchardgrass	Alkali sacaton
	Oats (hay)	
	Wheat (hay)	
	Rye (hay)	
	Tall fescue	
	Alfalfa	
	Hubam clover	
	Sudan grass	
	Dallis grass	
	Strawberry clover	
	Mountain brome	
	Perennial ryegrass	
	Yellow sweet clover	
	White sweet clover	
	Field Crops	
Field beans	Castorbeans	Cotton
	Sunflower	Rape
	Flax	Sugar beet
	Corn	Barley (grain)
	Sorghum (grain)	
	Rice	
	Oats (grain)	
	Wheat (grain)	
	Rye (grain)	

Sensitive	Moderately tolerant	Tolerant
	Fruit Crops	
Avocado	Cantaloupe	Date palm
Lemon	Grape	
Strawberry	Olive	
Peach	Fig	
Apricot	Pomegranate	
Almond		
Plum		
Prune		
Grapefruit		
Orange		
Apple		
Pear		
	Vegetable Crops	
Green beans	Cucumber	Spinach
Celery	Squash	Asparagus
Radish	Peas	Kale
	Onion	Beets
	Carrot	
	Potatoes	
	Sweet corn	
	Lettuce	
	Cauliflower	
	Bell pepper	
	Cabbage	
	Broccoli	
	Tomato	

$$SAR = \frac{Na^+}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}},$$

where NA^+,Ca^{++}, and Mg^{++} represent the concentrations in milliequivalents per liter (me/l) of the respective ions.

According to Hem (1962, p. 148-149):

> When a soil containing exchangeable Ca^{++} and Mg^{++} ions is irrigated with water in which Na^+ greatly outnumbers other . . . positively charged ions, the calcium and magnesium of the soil will tend to be replaced with sodium.

Continued irrigation with such water will cause an alkali soil with poor tilth and low permeability.

The salinity hazard, as measured by electrical conductivity, and the sodium or alkali hazard, as measured by the SAR, were used by the U.S. Salinity Laboratory Staff (1954, p. 69-82) to prepare a classification system for judging the quality of water used for irrigation. A diagram for that classification system is presented in Figure 17. The figure also shows quality of water samples from selected wells.

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

Wilcox (1955, p. 11) gives the following limits for RSC for irrigation waters: water with more than 2.6 milliequivalents per liter (me/l) is not suitable for irrigation, 1.25 to 2.6 me/l is marginal, and water containing less than 1.25 me/l is probably safe.

Boron is necessary for good plant growth, however, excessive boron content will render water unsuitable for irrigation. Wilcox (1955, p. 11) stated that concentrations of boron as high as 1.0 mg/l are permissible for irrigation of sensitive crops, as high as 2.0 mg/l for semitolerant crops, and as much as 3.0 mg/l for tolerant crops. Examples of sensitive crops are deciduous fruit and nut trees and navy beans; semitolerant crops include small grains, cotton, potatoes, and some other vegetables; and tolerant crops are alfalfa and most root vegetables.

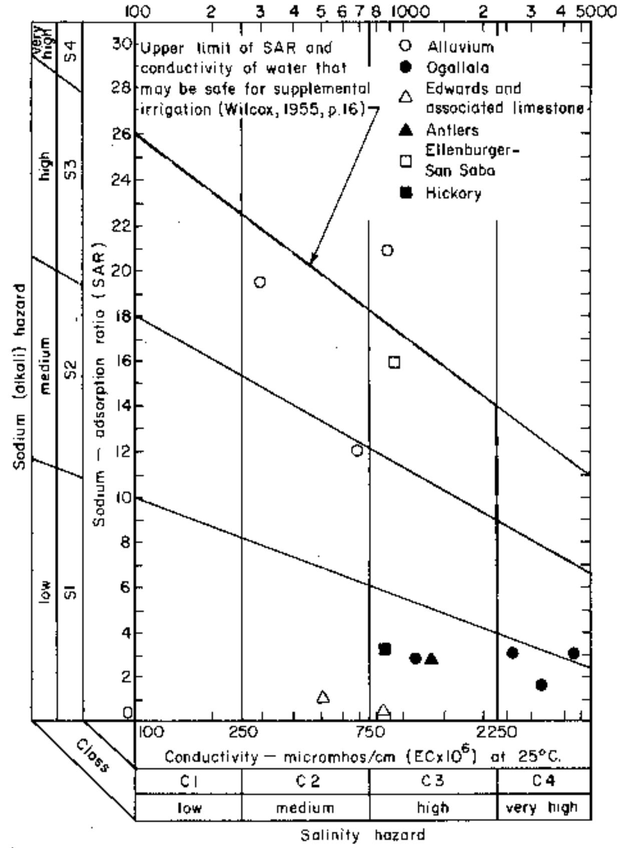


Figure 17.—Diagram for the Classification of Irrigation Waters, Showing Quality of Representative Water Samples (Adapted From United States Salinity Laboratory Staff, 1954, p. 80)

Livestock

The following table, published in 1950 by the Department of Agriculture of the State of Western Australia, shows the upper limits of dissolved-solids concentrations in water to be consumed by livestock.

Type of livestock	Upper limit of dissolved-solids concentration (mg/l)
Poultry	2,860
Pigs	4,290
Horses	6,435
Cattle (dairy)	7,150
Cattle (beef)	10,000
Sheep (adult)	12,900

The limits listed above may be useful as a general guide in some cases, but generally, water of better quality than that recommended in the table is available in all parts of the Edwards Plateau.

Because of the danger of death by nitrate (NO_3) poisoning, livestock should not be allowed to drink water containing more than 220 mg/l nitrate (Burden, 1961). Several livestock deaths have occurred recently from high nitrate ground waters in Runnels County. Also, according to Schmitz (1961), the consumption of water with a high nitrate content may be a cause of natural abortions in livestock.

Domestic

Water supplies for domestic use should be free of undesirable taste and odor and should have no color or sediment. Harmful micro-organisms should not be present.

The water analyses presented in this report describe only the dissolved-mineral matter in the water and not the sanitary condition. Water that is shown to be chemically suitable for domestic use is, therefore, not necessarily safe bacteriologically nor otherwise desirable for domestic use. Most poor water characteristics can be corrected by the proper treatment. A high dissolved-mineral content, however, is difficult and expensive to correct.

The U.S. Public Health Service has established standards for drinking water to be used on common carriers engaged in interstate commerce. The standards are intended to protect the traveling public from poisonous, unpalatable, unsightly, or digestive intolerable water. They are used in this report as a guide in judging the chemical quality of water intended for use as drinking water. According to the standards, the chemical constituents should not be present in a water supply in excess of the listed concentrations, except where more suitable supplies are not available or cannot be made available at a reasonable cost.

The following is a partial list of chemical standards adopted by the U.S. Public Health Service (1962, p. 7 and 8).

Substance	Concentration (mg/l)
Chloride (Cl)	250
Fluoride (F)	(*)
Iron (Fe)	.3
Manganese (Mn)	.05
Nitrate (NO_3)	45
Sulfate (SO_4)	250
Dissolved solids	500

*When fluoride is naturally present in drinking water, the concentration should not average more than the appropriate upper limit in the following table.

County	Annual average maximum air temperature (°F)	Recommended control limits in mg/l Lower	Optimum	Upper
Bandera	81	0.6	0.7	0.8
Crockett	81	.6	.7	.8
Ector	77	.7	.8	1.0
Edwards	81	.6	.7	.8
Gillespie	79	.7	.8	1.0
Kerr	79	.7	.8	1.0
Kimble	80	.6	.7	.8
Kinney	83	.6	.7	.8
Menard	79	.7	.8	1.0
Midland	77	.7	.8	1.0
Real	81	.6	.7	.8
Uvalde	83	.6	.7	.8

These values were derived from the small number of temperature reporting stations in the area for which values of the annual mean of the daily maximum temperature are given in "Climatography of the United States," No. 86-36, published by the National Weather Service in 1965. Because of the sparsity of data points, the variation of temperature with latitude and elevation, and other factors, the value of the annual mean of the daily maximum temperature for an entire county should be used with caution, and it should be recognized that on the Edwards Plateau differences of several degrees in the annual mean may exist in a fairly short horizontal distance.

CHEMICAL QUALITY OF GROUND WATER IN AQUIFERS ON THE EDWARDS PLATEAU

Edwards and Associated Limestones

Although the Edwards and associated limestones and the Antlers Formation are considered a single aquifer from a regional standpoint, they are discussed separately in this section since many wells on the Edwards Plateau produce water from only the Edwards and associated limestones or the Antlers Formation.

The chemical quality of ground water from the Edwards and associated limestones is generally better than that in the other aquifers on the Plateau, and the water is fairly uniform in quality. Water from the Edwards and associated limestones is characteristically very hard, and is typically a calcium bicarbonate type with sulfate and chloride occurring in relatively small quantities, each generally much less than 50 mg/l. The water contains about 200 to 400 mg/l dissolved solids. In some places, however, such as western Irion and in some isolated places in Reagan and Schleicher Counties, the concentration of dissolved solids is greater than 1,000 mg/l. Some wells in Val Verde and Kinney County produce water with 1,000 mg/l or more of dissolved solids. These wells are generally located south of U.S. Highway 90. Restricted circulation of the ground water because of the depth of the aquifer is probably a cause for the poor water quality.

The concentration of calcium is usually 50 to 100 mg/l with an average of about 75 mg/l. Most magnesium concentrations are from 10 to 50 mg/l. The average concentration is about 30 mg/l except in the southeastern counties where the average is about 20 mg/l. Sodium is generally less than 20 mg/l and averages 10 to 15 mg/l except in the northwestern counties where it may average 25 to 30 mg/l. The concentration of bicarbonate averages about 250 mg/l. Fluoride concentrations are generally lower in the southern and southeastern counties, where most of the water contains less than 0.5 mg/l. The water in the northwestern counties averages about 1.0 mg/l but is highly variable. Iron and manganese are not a problem in water from the Edwards and associated limestones.

The nitrate concentration is usually less than 10 mg/l. However, isolated cases of concentrations greater than 45 mg/l have been found in Bandera, Concho, Edwards, Gillespie, Kimble, Menard, Schleicher, Sutton, and Uvalde Counties. Several wells in Gillespie County yield water with a high concentration of nitrate. Most of these wells are near livestock pens or domestic sewerage disposal facilities and may have been contaminated by organic substances from these sources.

The water from the Edwards and associated limestones has a very low sodium hazard, and the percent sodium is usually much less than 30. The salinity hazard is usually medium and occasionally is high.

The few boron analyses which have been made on water from the Edwards and associated limestones are presented in the following table. These analyses indicate that boron is not a problem in water from this aquifer.

County	Well	Boron (mg/l)
Edwards	JJ-55-63-301	0.4
Irion	PK-43-59-104	.2
	PK-43-59-103	.3
Reagan	UZ-44-52-502	.6
Schleicher	WY-55-12-101	.3

In summary, most of the water from the Edwards and associated limestones, with the exception of being very hard, is of excellent quality. However, excess nitrate which indicates possible contamination of the water by organic substances is found in isolated places. The water is generally suitable for irrigation except that it has a medium and occasionally a high salinity hazard.

Antlers

Most of the wells which produce water exclusively from the Antlers Formation are located in Upton, Ector, Midland, Glasscock, Howard, northern Reagan, Sterling, Coke, Tom Green, and Irion Counties. Other wells, most of which are located in Midland, Reagan, Upton, Ector, Glasscock, Crockett, Irion, Sterling, Tom Green, and Schleicher Counties, produce water from the Antlers in conjunction with water from other aquifers. The chemical quality of water from these wells is, therefore, a blend of the waters from the different aquifers.

The chemical quality of the water in the Antlers is generally poorer in the western and central parts than in the northeastern and eastern parts of the aquifer. A few wells located near the edge of the Edwards Plateau have exceptionally good quality water compared with other wells in the same general area. Local differences in ease of recharge and in movement of the ground water are probably responsible for these differences in water quality. The quality of the water in the southern part of the aquifer is not well known because few wells tap the aquifer in that area. A few wells produce water from the Antlers and from the overlying limestone in southwestern Schleicher County and in eastern Crockett County. The water from these wells generally contains more than 1,000 mg/l dissolved solids. This is more than that of water from the Edwards and associated limestones, and indicates that the water in the southern part of the Antlers Formation may be highly mineralized. Three wells in western Sutton County which produce at least part of their water from the Glen Rose Formation, or possibly from the Paluxy Sand, contain water with more than 1,000 mg/l dissolved solids and a noticeable odor of hydrogen sulfide gas. This also indicates that the water in the southern part of the Antlers may be of poor quality. Two samples of water which may be from the Antlers in western Menard County and three samples near the city of Menard indicate the aquifer may have water with from 500 to more than 1,000 mg/l dissolved solids in those areas. Two areas of lower Cretaceous sands in northern Gillespie County, identified by Barnes (1952 and 1956) as the Hensell Sand Member, are located north of the pinch-out of the Glen Rose Formation. These areas are treated as Antlers Formation in this report. The water in the Antlers in these areas is very hard and contains from 400 to about 1,000 mg/l dissolved solids. The nitrate concentration is generally less than 7 mg/l; however, water from well KK-57-34-502 in Gillespie County contained 155 mg/l nitrate. This well is near livestock pens and a residence and may have been contaminated by organic matter from these sources.

Water from the Antlers is of the calcium bicarbonate sulfate type. The water is typically very hard, and the amounts of each of the dissolved substances varies greatly from place to place. The dissolved solids average about 530 mg/l, but water with more than 1,000 mg/l is common in Upton, Ector, southwestern Glasscock, and northern Reagan Counties. The silica content averages about 20 mg/l, calcium about 110 mg/l, magnesium about 35 mg/l, sodium plus potassium about 60 mg/l, bicarbonate about 250 mg/l, and chloride about 70 mg/l. The sulfate content is commonly highest in Upton, Midland, southwestern Glasscock, and northern Reagan Counties, where many samples contained more than 300 mg/l. Many water samples from wells in Ector County have a sulfate content of between 50 to 300 mg/l. Water from the Antlers in Howard and northeastern Glasscock Counties commonly contains about 50 mg/l sulfate. The sulfate content of water in Sterling, Coke, Tom Green, and Irion Counties is commonly less than 20 mg/l. Water samples from a few wells in Menard County, which may produce water from the Antlers, indicate sulfate concentrations of more than 500 mg/l in the western part of the county and less than 50 mg/l in the central part. Most of the water samples from the Antlers in Gillespie County contained less than 50 mg/l sulfate.

The fluoride content of the water is commonly greater than 1.0 mg/l and the average concentration is near 1.6 mg/l. A large number of water samples from the Antlers contained more than the recommended maximum for fluoride on the Edwards Plateau. The nitrate concentrations average about 14 mg/l, and only a few wells produce water with nitrate exceeding the recommended limit of 45 mg/l for drinking water. Almost all the analyses of Antlers water indicate more than 180 mg/l hardness. The water is, therefore, classified as very hard, and softening of the water is desirable for many uses.

Water from the Antlers is used for irrigation in several areas on the Edwards Plateau. The sodium hazard of Antlers water is low, and the percent sodium is characteristically less than 30. A significant characteristic of most Antlers water is that it commonly has a medium or high salinity hazard. Continued use of water with a high salinity hazard may eventually cause high salinity conditions to develop in the soils of the heavily irrigated areas of the Edwards Plateau. A high soil salinity would allow the growing of saline-tolerant crops only.

Only a few boron analyses of Antlers water are available and are listed in the following table:

County	Well	Boron (mg/l)
Ector	JH-45-05-628	0.2
	JH-45-05-629	.2
	JH-45-06-804	.6
	JH-45-06-806	.6
	JH-45-06-906	.3
Glasscock	KL-44-06-501	.13
	KL-44-13-903	.16
	KL-44-20-503	.71
Midland	TJ-45-06-908	.2
Sterling	XP-44-16-402	.01
	XP-44-15-601	.23
	XP-44-15-603	.02
	XP-44-15-604	.10

According to Scofield (1936) irrigation waters with concentrations of boron less than 0.67 mg/l are classified as good for use on boron sensitive crops. According to this classification, boron does not appear to be a problem in water from the Antlers Formation.

The development of a closed system of ground-water circulation, which has occurred in some areas of heavy ground-water pumpage, could eventually degrade the quality of ground water due to repeated reuse of infiltrated irrigation water which has dissolved salts from the soil and deposited them in the aquifer. However, data are not sufficient to indicate if such degrading has occurred in any of the aquifers on the Edwards Plateau.

In summary, the best quality water from the Antlers Formation is found in the northeastern part of the aquifer and in some isolated places near the edge of the Plateau. Water with more than 1,000 mg/l dissolved solids is common in the western part of the aquifer, and the few water samples from the southern part of the aquifer indicate possibly high mineralization in that area. A few wells in the Antlers yield water of fair to good quality in Menard and Gillespie Counties. The water is used in many places on the Edwards Plateau for domestic purposes and is generally of fair quality. In some areas, especially in the western parts of the aquifer, the dissolved solids content is excessive. The fluoride content of the water is commonly near or above the upper limit recommended for drinking water, and the water is characteristically very hard. The medium to high salinity hazard of the water may eventually cause saline conditions to develop in the soils, and possibly in the aquifer, in certain heavily irrigated areas. This could be caused by the development of a closed circulation system of the ground water in which the salinity of the water is increased by reusing the irrigation water.

Alluvium

The chemical quality of water in the alluvium in Glasscock, Howard, Reagan, Sterling, and Upton Counties averages more than 1,500 mg/l dissolved solids. Water from wells developed in the alluvium in Concho, Irion, Kerr, Kimble, Menard, Real, Sutton, Tom Green, Uvalde, and Val Verde Counties contains less than 400 mg/l dissolved solids. The variation in chemical quality is due in part to the movement of ground water, source of recharge, and the presence of effluent in streams. In the north and west parts of the Plateau, the alluvium deposits are in hydraulic continuity with the Antlers Formation which yields water that generally exceeds the recommended limits suggested by the U.S. Public Health Service for dissolved solids, sulfate, fluoride, and chloride. Ground-water discharge (base flow) and underflow in the central and southern parts of the Plateau is from the Edwards and associated limestones into the alluvium. This water is classified as a calcium bicarbonate type, and all chemical constituents are below the recommended limits for drinking-water standards.

Fluoride is a problem in water in the alluvium on the Edwards Plateau. In the north and west parts of the Plateau, fluoride concentrations range from 0.4 mg/l in water from the alluvium in Irion County to 4.6 mg/l in Glasscock County, with a general average of 1.5 mg/l, which is above the recommended maximum. In Kerr, Kimble, Menard, Real, Sutton, Uvalde, and Val Verde Counties, the fluoride content is below the lower recommended limit of 0.6 mg/l. Water from the alluvium which contains the optimum fluoride content is found only in Concho, Howard, Irion, Sterling, and Tom Green Counties.

All water from the alluvium is classified as very hard. The hardness ranges from a low of 219 mg/l in Irion County to a high of 1,710 mg/l in Upton County. The average hardness of water is 831 mg/l in the northwestern part of the Plateau and 324 mg/l in the southern part.

The following table shows a comparison of the averages of several chemical constituents in water from the alluvium in the northwestern and southern parts of the Plateau.

Substance	Average concentration in northwestern part (mg/l)	Average concentration in southern part (mg/l)
Calcium (Ca)	247	87
Magnesium (Mg)	59	24
Sodium (Na)	157	31
Sulfate (SO_4)	628	36
Chloride (Cl)	238	32
Fluoride (F)	2.1	.45

The cities of Junction, Leaky, Menard, and Sterling City obtain water from the alluvium for public supplies. Except for excessive hardness, the water generally meets the suggested standards for drinking-water quality. The dissolved solids concentration is 550 mg/l in water used by Sterling City, 430 mg/l in water used by Menard, 324 mg/l in water used by Leaky, and 226 mg/l in water used by Junction.

Water from the alluvium has been used for irrigation successfully for several years. Data from the chemical analysis of water samples collected show that the salinity hazard (based on the specific conductance) is medium in water from alluvial wells in Menard, Midland, Irion, Real, and Uvalde Counties; high in water from wells in Sterling County; and medium to high in water from wells in Tom Green County. Water having a high to very high salinity hazard should be applied to well-drained soils, and the crops should be salt tolerant.

Lower Cretaceous

Large areas of the Edwards Plateau are without any direct evidence of the quality of the ground water in the lower Cretaceous formations. However, the available evidence indicates that the water in these formations is probably highly mineralized. The major causes for this apparently wide-spread high mineralization are the slow movement of ground water into the lower Cretaceous formations, which causes a slow rate of removal of dissolved salts from the aquifer, and the solution of anhydrite and gypsum beds that are present in some places in the upper member of the Glen Rose Formation.

A relatively impermeable zone at the base of the Edwards and associated limestones restricts movement of water into the underlying Glen Rose Formation and lower Cretaceous sandstones. The presence of this zone is demonstrated by the many springs which flow from the base of the Edwards and associated limestones. These springs are especially common along the southeastern side of the Plateau where the base of the Edwards and associated limestones is exposed.

Gypsum and anhydrite beds in the upper member of the Glen Rose are the probable cause of a high sulfate content in water from this formation in Uvalde, Edwards, Real, Kerr, and Kendall Counties. According to Alexander and Patman (1969, p. 12), the Glen Rose in Kimble County contains some gypsum and anhydrite and yields slightly saline water to only one well in the county. They recommend that wells drilled through the Glen Rose and completed in the lower Cretaceous sandstones be cased to prevent the entrance of water from the Glen Rose. The total extent of the gypsum and anhydrite beds in the Glen Rose is not known. However, water from the Trinity Group is high in sulfate in many places on the Edwards Plateau, and if these beds are encountered when drilling a well, they should be cased and cemented in order to prevent the contamination of better quality water.

Very few wells on the Edwards Plateau produce water exclusively from the Glen Rose or the lower Cretaceous sandstones. A few wells in Crockett, Sutton, and Val Verde Counties produce at least in part from these formations, and a few wells are found along the eastern edge of the Plateau. There are, however, a large number of wells located just off the eastern edge of the Plateau which produce from these formations.

Well HJ-54-27-303, located in western Crockett County, produces water from the lower Cretaceous sandstones. The water from this well contains 1,259 mg/l dissolved solids, 444 mg/l sulfate, 226 mg/l chloride, and is very hard. Well HJ-54-35-803, also located in western Crockett County, probably produces water from the lower Cretaceous sandstones. The water from this well contains 1,505 mg/l dissolved solids, 343 mg/l sulfate, 474 mg/l chloride, and is classified as very hard. These wells are located near the edge of the Plateau where the aquifer is probably subject to better circulation of ground water than in the central areas of the Plateau. The water quality in the lower Cretaceous sandstones may, therefore, be better at these locations than in the central areas of the Plateau.

A number of wells in southern Crockett, northern Val Verde, and western Sutton Counties are known to produce at least part of their water from the Paluxy Sand. The sulfate content of water from these wells ranges from 27 to 710 mg/l and the dissolved-solids content ranges from 360 to 2,154 mg/l. Comparing the quality of water produced by wells developed in the Edwards and associated limestones with the water quality from the lower Cretaceous aquifer, it appears that water from the lower Cretaceous is high in sulfates and dissolved solids in the western part of the Edwards Plateau.

Most of the other wells which produce from the lower Cretaceous aquifer are located on or near the outcrop of the Glen Rose along the edge of the Edwards Plateau in Edwards, Uvalde, Real, Bandera, Kerr, Gillespie, Kimble, and Menard Counties.

According to Long (1962, p. 1), the Glen Rose Formation yields small quantities of rather highly mineralized water to wells in Edwards County. He also stated that springs in the Glen Rose discharge water that is generally less mineralized than that obtained from wells, and that nearly all the wells and springs producing water from the Glen Rose are in the southeastern part of the county, where the Edwards and associated limestones have been removed by erosion or are very thin.

There is no information available on the quality of the ground water in the lower Cretaceous sandstones in Kinney County, and there are no wells in the county which are known to draw water from the Glen Rose (Bennett and Sayre, 1962).

Welder and Reeves (1962, p. 2) reported that the Glen Rose in Uvalde County yields saline water at many locations in the county, and that the principal objectionable constituent is high concentrations of calcium and magnesium sulfate. They also stated that in most places in the county, except in that part on the Edwards Plateau, the water from the Glen Rose is probably too saline for most uses, and that the lower Cretaceous sandstones will likely yield only saline water.

Long (1958, p. 13) reported that little is known regarding the quality of the water in the lower Cretaceous sandstones in Real County. However, he states that eight samples of water from the Glen Rose in Real County contains from 304 to 3,550 mg/l dissolved solids. The samples with the highest dissolved-solids content also contained a high sulfate content which probably was due to the solution of gypsum in the Glen Rose. The water in these eight samples was very hard, ranging from 307 to 2,680 mg/l.

Reeves and Lee (1962, p. 21 and 22) stated that most of the wells in Bandera County yield mixed waters from several formations; therefore, it is difficult to draw reliable conclusions regarding the character of the water supplied by different aquifers for the county as a whole.

The analyses from 4 wells that draw from the Hosston and Sligo Formations . . . in the southeastern part of the county showed a range in dissolved solids from 464 to 561 mg/l and a range in hardness from 166 to 261 mg/l. Available data are too meager to permit a general statement regarding the quality of the water in the Hosston and Sligo throughout the county. However, the few samples taken indicate that the water, though hard, is suitable for most purposes. Most wells that draw from the Pearsall Formation in Bandera County are cased only to the top of the massive limestone beds of the lower member of the Glen Rose Formation; consequently, most of the wells produce a mixture of waters from both formations. Analyses of samples from 4 wells . . . which produce from the Pearsall Formation only, show dissolved-solids contents ranging from 549 to 1,400 mg/l. Sulfate appears to be the most objectionable constituent, ranging from 146 to 810 mg/l.

Water samples were collected from 6 wells that draw from only the lower member of the Glen Rose. The dissolved-solids content ranged from 310 to 601 mg/l and the sulfate content ranged from 16 to 198 mg/l. The most objectionable characteristic of the water is its hardness; all the water samples would be classed as very hard.

The water from the upper member of the Glen Rose varies widely in quality. Many of the wells yield saline water which is particularly high in sulfate content. The dissolved-solids content ranged from 10 to 2,910 mg/l. All the water was very hard. The water of poor quality seems to be associated with the evaporite beds. The anhydrite dissolves fairly readily in the percolating ground water, thus contributing large amounts of sulfate to the water. Where the evaporite beds lie at shallow depth, particularly in the vicinity of streams, they may be highly leached, and the contained water may be of relatively good quality.

On the Edwards Plateau in Bandera County, the quality of the ground water in the Trinity Group is probably greatly influenced by the amount of recharge the formations receive. A relatively impermeable zone at the base of the Edwards and associated limestones, probably allows only small amounts of water to move down through the Edwards and associated limestones into the lower formations. It is probable, therefore, that any good quality water to be found in the Trinity Group on the Edwards Plateau in Bandera County is limited to the edges of the Plateau and in the areas near major streams; in short, wherever recharge is made easier by the absence of an impermeable zone above the aquifers.

One well (RJ-56-52-301) located on the Edwards Plateau in Kerr County produces water from the Hensell Sand Member of the Pearsall Formation. The water is very hard, containing 1,080 mg/l hardness. The water also contains 876 mg/l sulfate and 5.6 mg/l iron, making it undesirable for many uses. The well is located about 9 miles from the nearest outcrop of the Glen Rose Formation, therefore recharge to the Trinity Group in the area of the well must all come from the overlying Edwards and associated limestones. The quality of the water from this well probably is representative of the poor quality water to be found in the Glen Rose Formation and the lower Cretaceous sandstones in the interior areas of the Plateau. In the Glen Rose and lower Cretaceous sandstones located off the edge of the Edwards Plateau, Reeves (1969, p. 10, 19, and 20) found that the water is generally of good quality except that iron and fluoride are commonly excessive, and the water in the upper member of the Glen Rose Formation is usually slightly saline.

Only a few wells are known to produce water from the Trinity Group on the Edwards Plateau in Gillespie County, and no information is available on the chemical quality of the water from these wells. In the areas of Gillespie County which are not on the Edwards Plateau, there are many wells which produce from the Trinity Group. According to Mount (1963, p. 18), the water from the Hensell Sand Member of the Pearsall Formation in the area near the city of Fredericksburg is, with some exceptions, of good chemical quality and satisfactory for public supply. Concentrations of individual constituents and dissolved solids show a large degree of variation from place to place. Chemical analyses show that most of the water is high in bicarbonate and iron. In some instances the nitrate and chloride concentrations are objectionably high. The dissolved-solids concentration of water samples from 20 wells that penetrate the Hensell . . . ranges from 531 to 1,371 mg/l. A well in the south part of Fredericksburg is reported to have produced water containing 7,052 mg/l dissolved solids.

In describing the chemical quality of the water in the lower Cretaceous in Kimble County, Alexander and Patman (1969, p. 28) reported that the fresh water from the Hensell Sand Member of the Pearsall Formation is suitable for most uses, but some of the slightly saline water was unsuitable for domestic, livestock, or irrigation uses. All of the samples from the 27 wells supplied from the Hensell . . . contained very hard water; in 14 samples, the fluoride content ranged from 0.9 to 4.0 mg/l; in 7 samples, the chloride content ranged from 260 to 432 mg/l; and in 16 samples the iron content ranged from 0.37 to 7.6 mg/l. Field determinations of the iron content of water from an additional 69 wells ranged from 0.1 to 5.0 mg/l, and 47 samples exceeded 0.3 mg/l.

Alexander and Patman (1969) also mapped the areas in which the Hensell contains slightly saline water and the areas in which almost all the water is fresh. In general, the line separating these two types of water is parallel to the eroded edge of the contact between the Edwards and associated limestones and the Trinity Group. The slightly saline water is found toward the interior of the Edwards Plateau, and the fresh water is found in the areas on or near the outcrop of the Trinity Group. Greater recharge is evidently the cause of the fresher water in the Trinity Group in its outcrop area than where it is covered by the Edwards and associated limestones.

Baker, Dale, and Baum (1965, p. 19) reported that the Trinity Group yields water to several wells in the outcrop area along the San Saba River valley and in the southeastern part of Menard County. The chemical quality of the water from the Trinity ranges over wide limits. The dissolved-solids content ranged from about 800 to about 2,700 mg/l. In most of the wells in the Trinity, the chloride content was less than 250 mg/l. In general, the water from the Trinity Group is of poorer quality than that in the Edwards and associated limestones; consequently, wells are completed in the Edwards and associated limestones, where possible.

In summary, slow recharge and the presence of gypsum and anhydrite in places probably cause the waters in the Glen Rose Formation and the lower Cretaceous sandstones to be highly mineralized in most areas of the Edwards Plateau.

Only a few wells on the Edwards Plateau tap these formations. However, many wells off the edge of the Plateau, especially on the east side, obtain slightly saline to fresh water from the formations.

Hickory

The Hickory Sandstone Member of the Riley Formation of Cambrian Age contains fresh to slightly saline water from the outcrop area east of the Edwards Plateau to a depth of about 1,800 feet below sea level on the Plateau. The water is a sodium bicarbonate type and, although generally hard, is suitable for most uses. Hardness ranges from a low of 34 mg/l in water from a municipal well (DZ-42-50-101) at Eden in Concho County to 334 mg/l in water from a test well (SS-42-60-502) in McCulloch County.

Iron content in water from the Hickory Member ranges from 0.12 in water from a municipal well at Brady to 4.03 mg/l in a test well in southeastern Concho County. The high iron content in the water appears to occur in the upper part of the Hickory. A water sample collected from a test well (DZ-52-49-301) in southeast Concho County, in which the entire Hickory section was open hole, contains 4.03 mg/l iron. In the second test well (SS-42-60-502) in McCulloch County, about 4 miles east of the test well in Concho County, the upper part of the Hickory was cased off. A water sample collected from this test well contains 0.28 mg/l iron.

The chloride content of water from the Hickory is usually well below the maximum recommended with the exception of water from the municipal well at Eden which contains 350 mg/l chloride. Sulfate like chloride is low. The highest sulfate content is 111 mg/l in the test well (SS-42-60-502) in McCulloch County.

Most of the water from the Hickory is suitable for irrigation. The water has a low sodium hazard and a medium to high salinity hazard. The downdip limit, or the depth at which water may become unsuitable for irrigation use in the Hickory, is about 1,500 feet below sea level. However, local variation in water quality and type of soil to be irrigated may alter individual conditions.

Ellenburger-San Saba

Water contained in the Ellenburger-San Saba aquifer along the eastern edge of the Edwards Plateau is hard but otherwise of good chemical quality. The water is a calcium bicarbonate type which is characteristic of water contained in a limestone-dolomite reservoir. The dissolved solids range from 313 mg/l in water from well TH-56-04-603 in Menard County (Baker, 1965, p. 84) to 1,010 mg/l in water from well C-3 in northern McCulloch County (Mason, 1961, p. 82). Iron content is generally below the maximum concentration of 0.3 mg/l recommended by the U.S. Public Health Service.

The town of Fredericksburg in Gillespie County obtains most of its water supply from two wells developed in the Ellenburger Group. The dissolved solids in water from these wells is 683 and 717 mg/l, which is slightly higher than the maximum recommended for drinking water. The concentrations of other chemical constituents are: bicarbonate, 365 and 437 mg/l; chloride, 74 and 178 mg/l; sulfate, 35 and 66 mg/l; sodium, 46 and 98 mg/l; magnesium, 37 and 51 mg/l; and calcium, 77 and 105 mg/l.

The town of Melvin in western McCulloch County obtains water from a well (SS-42-52-401) developed in both the Ellenburger-San Saba and Hickory aquifers. The water from this well is extremely hard (253 mg/l), and the iron content is 0.68 mg/l, which is more than double the recommended maximum. The water is a sodium bicarbonate type and, except for the hardness and iron content, is of good quality considering the distance the well is located from the surface outcrop of the reservoir rocks.

Water from wells developed in the Ellenburger-San Saba aquifer in east Menard, northeast Kimble, and southeast Gillespie Counties is generally acceptable for irrigation purposes. The sodium hazard is medium in water from wells in Menard County and high in Kimble and Gillespie Counties. The water from wells in northern McCulloch County is marginal to unsuitable for irrigation use unless applied to soils with good drainage and salt-tolerant plants. The sodium hazard range is from 14 to 21, and the salinity hazard is high with specific conductivities above 750 micromhos per centimeter.

Ogallala

Water from the Ogallala in Glasscock and Midland Counties is typically a sulfate chloride type, whereas in Ector County it is a sulfate bicarbonate type.

The quality range is from fresh to moderately saline with dissolved solids ranging from 296 to 6,500 mg/l. The average for dissolved solids in water from the Ogallala in Glasscock, Midland, and Ector Counties is about 2,000 mg/l.

The fluoride content in the water ranges from 0.4 to 7.4 mg/l, with an overall average of 2.8 mg/l. This average content is considerably greater than the recommended upper limit of 1.0 mg/l.

Sulfate in water from the Ogallala creates problems when used for domestic purposes. Sulfate combines with magnesium or sodium and causes a definite laxative effect on persons not used to ingesting water containing magnesium sulfate or sodium sulfate.

The salinity hazard is high to very high in water from the Ogallala. Normally, this water would be unsuitable for irrigation use over a prolonged period; however, due to the sandy soil in this area and growing of relatively salt-tolerant crops, no wide-spread harmful effects have been noted.

Permian

Characteristically, water from Permian rocks is high in sulfate, calcium, and chloride, and is very hard (Table 7 and Figure 16).

Of the 16 wells sampled during this study, 15 yielded water containing more than 250 mg/l of sulfate. The dissolved solids ranged from 367 to 47,100 mg/l, and hardness ranged from 314 to 8,050 mg/l.

Wells developed in the Permian in the common corners of Schleicher, Sutton, Menard, and Kimble Counties yield good quality water which is low in dissolved solids. This is due to recharge from the overlying Cretaceous limestones. One well (WY-55-15-601) in Schleicher County yields a calcium bicarbonate type water with a dissolved solids content of 364 mg/l.

GROUND-WATER PROBLEMS

Decline of Water Levels and Yield of Wells

Declining water levels and decreasing well yields in the Edwards-Trinity (Plateau) aquifer are becoming a problem to water users in the northwestern part of the Edwards Plateau. As shown on Figure 18, the greatest recorded decline is in well KL-44-20-846 in southern Glasscock County, where the water level has declined 114 feet from 1937 to 1966. This is an average decline of 3.9 feet per year. According to Figure 19, which

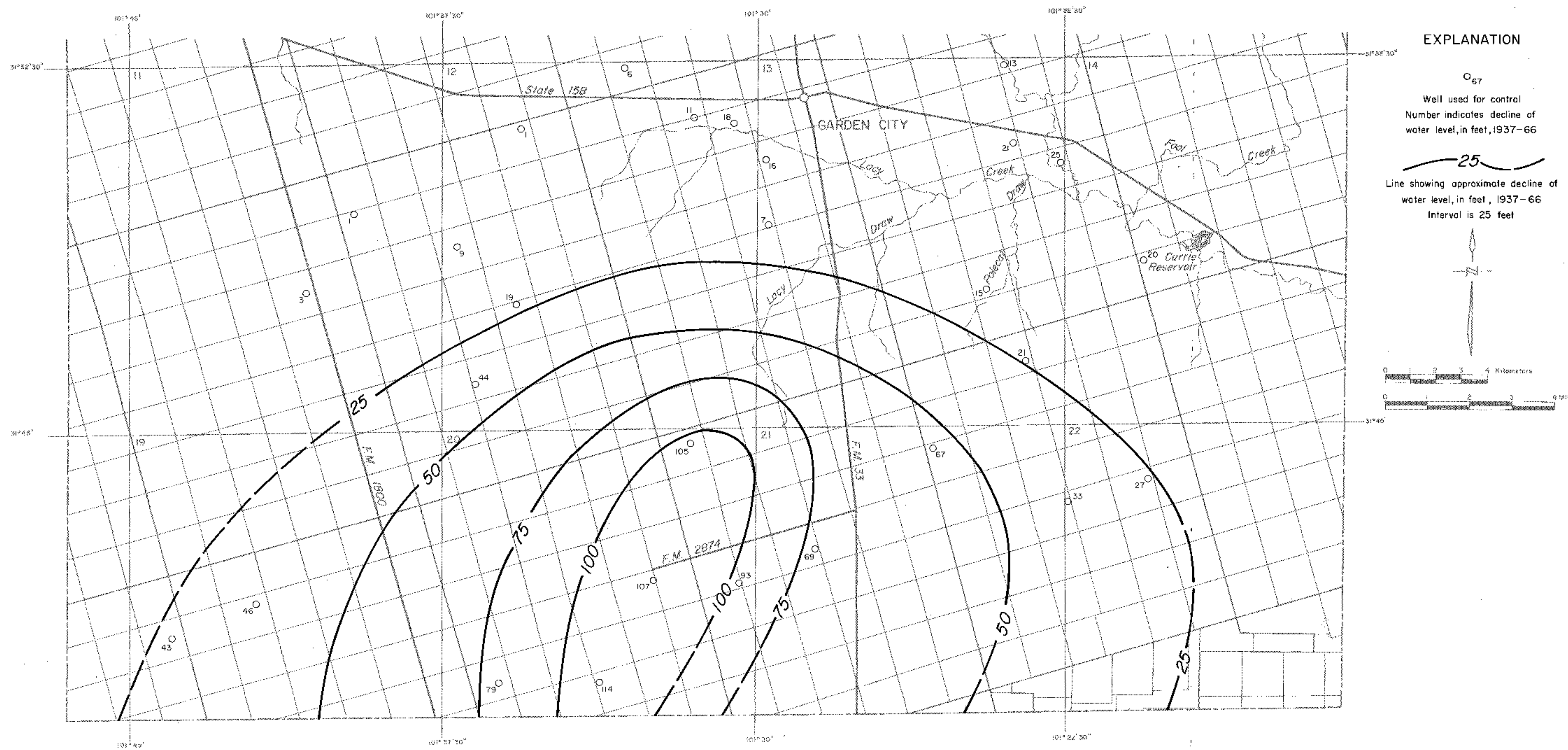
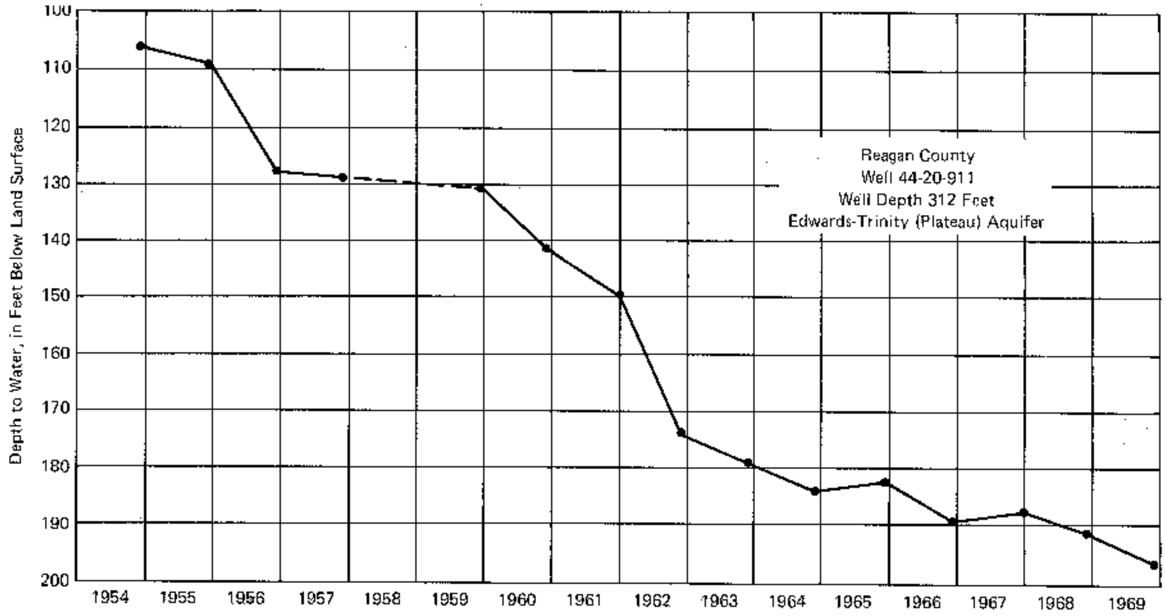


Figure 18

Decline of Water Levels in Southern Glasscock County, 1937-66



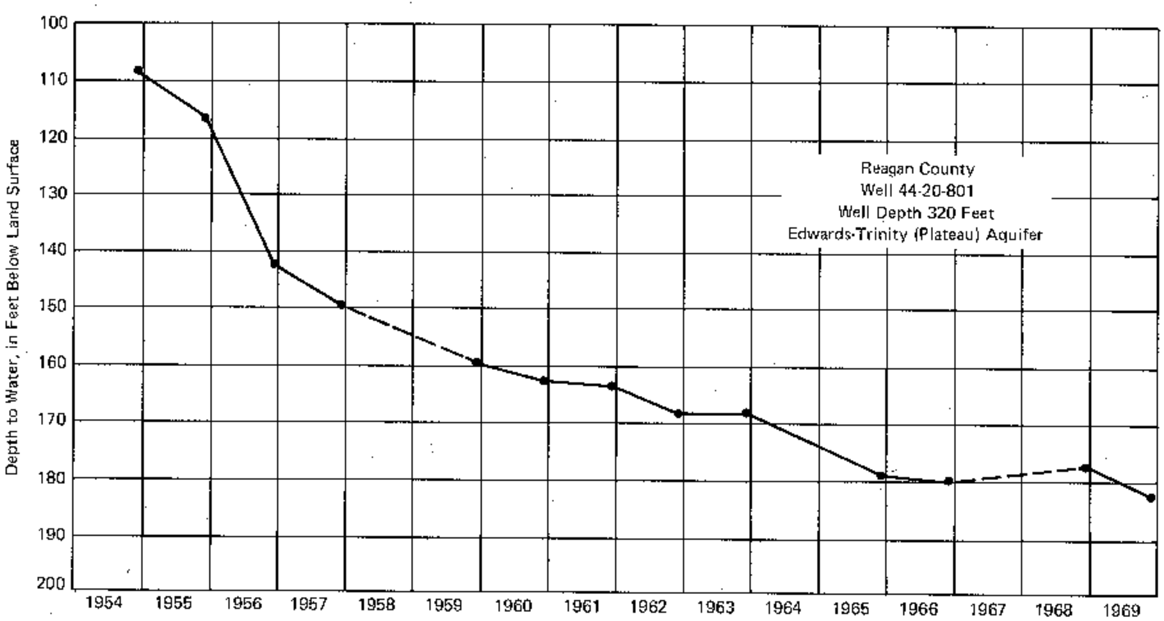


Figure 19.—Hydrographs of Water Levels in Selected Wells

shows hydrographs of selected wells, the water level in well UZ-44-20-911 in northern Reagan County has decline 95 feet in 18 years.

Water levels in public supply wells in Ector County have declined from 15 feet to 67 feet in 21 years. The decline of water levels in the county would likely have been much greater had it not been for the development of a surface water public supply and a saline-water supply for secondary recovery of oil.

Water levels have declined as much as 80 feet in an industrial well field in northeast Sterling County. This well field was developed in 1955 to furnish fresh water for secondary recovery of oil.

Water levels in Schleicher, Upton, and Midland Counties have declined from a few feet to over 50 feet. The water level in well WY-55-03-201 in Schleicher County, declined 51 feet from 1957 to 1970. Decline of water levels in Upton County ranged from 2 feet to 34 feet (White, 1968, p. 32).

Water levels in a small area of southeastern Midland County are presently declining about one foot per year.

The southern and southeastern parts of the Edwards Plateau has experienced little decline of water levels in the Edwards-Trinity (Plateau) aquifer due to a lack of heavy withdrawals by irrigation or industrial water use.

Well yields have declined in the heavily pumped areas due to lowered water levels and plugging or encrustation of the screened or slotted sections opposite the water-bearing zones. A decline in the coefficient of transmissibility due to lowering of water levels and probable encrustation of the screened section has occurred in well UZ-44-36-304 in Reagan County. On January 30, 1959 (well completed November 1958), the coefficient of transmissibility was 3,000 gpd/ft, and on May 5, 1966, the coefficient of transmissibility was 2,155 gpd/ft; a decline of 845 gpd/ft.

Production of Oil-Field Brines and Method of Disposal

The disposal of brines into unlined surface pits is a potential hazard to the fresh-water aquifers on the Edwards Plateau. This brine seeps into the ground much like precipitation on the land surface. Surface disposal pits in the region are generally constructed by explosives, drilling, and bulldozing the surface and near-surface Cretaceous limestones. This method of excavating tends to enlarge the existing fractures in the limestone or create new fractures which facilitates the seepage or downward percolation of brines into the subsurface and thence into the aquifer. Although the lake surface evaporation rate is high (see Table 1), the evaporation rate of brine in surface pits is considerably less than that of fresh water due to oil or oil scum on the brine surface. Even if all the water placed in a surface-disposal pit was evaporated, the accumulation of salts in the pit would remain as a threat to surface drainageways, the land surface, and fresh ground-water aquifers.

Figure 20 shows the reported amounts of oil-field brine produced and the methods of disposal by oil and gas fields in the Edwards Plateau study area for the years 1961 and 1967. The total brine production for the area was 140,977,728 barrels (18,171 acre-feet) in 1961 and 213,932,399 barrels (27,574 acre-feet) in 1967. In 1961, a total of 36,151,638 barrels (4,659 acre-feet), or about 26 percent of the total brine produced, was reportedly placed into surface pits; 104,715,609 barrels (13,497 acre-feet) was reportedly injected into the subsurface by injection wells; and 110,481 barrels (14 acre-feet) was disposed by miscellaneous methods such as dumping into surface drainageways and on county roads. In 1967, a total of 13,442,987 barrels (1,732 acre-feet) or about 6 percent of the total was reported placed into surface-disposal pits; 200,446,658 barrels (25,836 acre-feet) was reported injected into the subsurface by injection wells; and 42,754 barrels (5.5 acre-feet) was disposed by miscellaneous methods described above.

The statewide "no-pit" order of the Railroad Commission of Texas which became effective on January 1, 1969, has considerably reduced the amount of brine being disposed into surface pits. However, the large amount of brine previously disposed by this method not only affects the present chemical quality of ground water but likely will continue to affect the quality for a long period of time at the present rate of ground-water withdrawal.

The natural water contained in the Edwards-Trinity (Plateau) aquifer is characterized by a low chloride to sulfate ratio. Generally a one-to-one chloride to sulfate ratio is typical for water from the Edwards and associated limestones compared to a ratio that ranges from one-to-three to one-to-five in water from the Antlers (Trinity) aquifer. However, selected quality diagrams (Figure 21) of water samples collected from wells in several counties on the Edwards Plateau show the water to contain a chloride to sulfate ratio of almost 40:1 in well UZ-44-36-405. Water from wells in Reagan County shows a wide variation in quality as shown by chemical analysis of water samples from two wells about 4 miles north of the Big Lake oil field in west central Reagan County. Water from well UZ-44-43-804 contains 890 mg/l dissolved solids, 261 mg/l chloride, and 2:1 chloride to sulfate ratio. Water from well UZ-44-43-805, about 200 feet southeast of well UZ-44-43-804, contains 10,100 mg/l dissolved solids, 5,840 mg/l chloride, and a 16:1 chloride to sulfate ratio. A probable cause of the high chloride content in the ground water from some wells in the area is the past practice of disposing brines into a playa lake about 1 mile north of the Big Lake oil field.

Improperly or inadequately cased oil or gas wells are a potential hazard of ground-water supplies in the Edwards Plateau region. The Oil and Gas Division of the Railroad Commission of Texas has been designated as the agency responsible for seeing that oil and gas wells are properly constructed, and the Texas Water Development Board provides information to oil operators and the Railroad Commission concerning the depth to which usable-quality water should be protected during drilling for and production of oil or gas.

The Railroad Commission rules require that aquifers containing usable quality ground water be

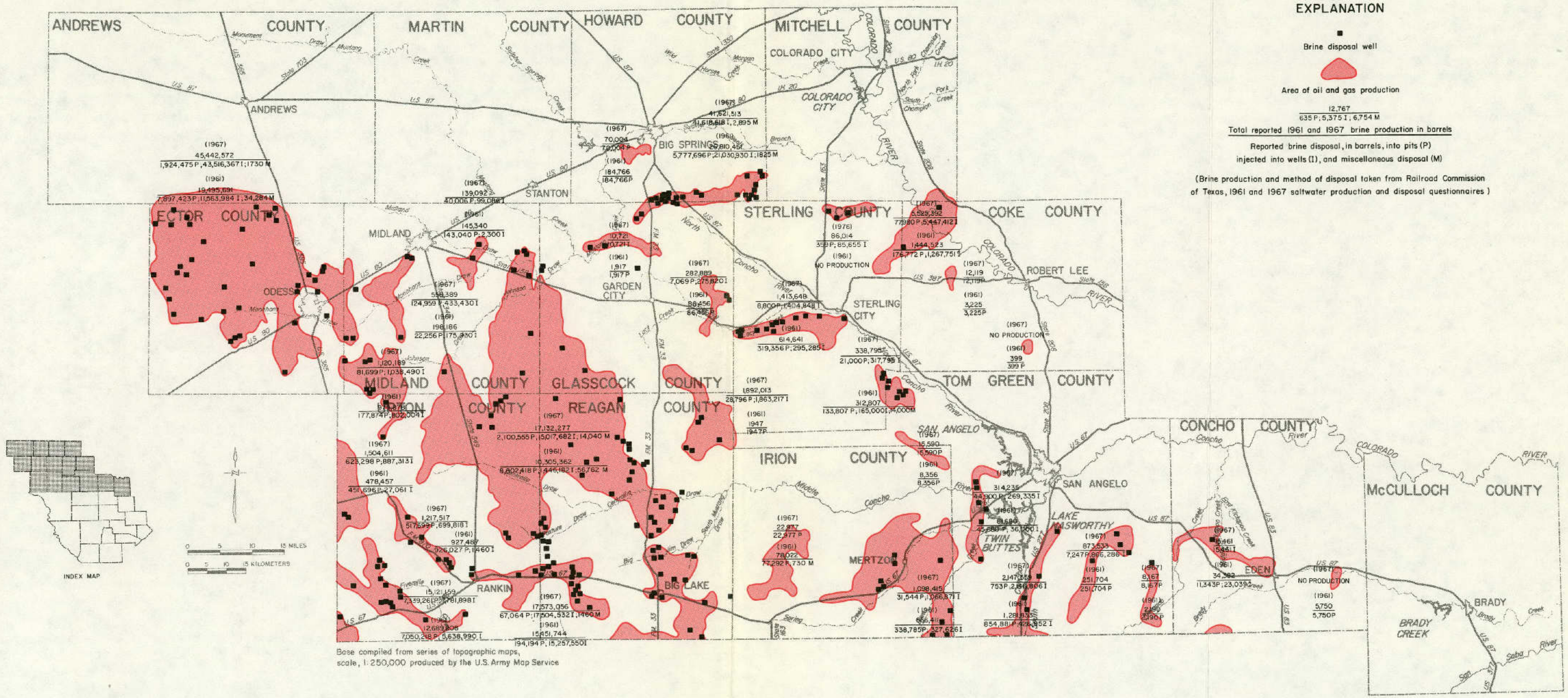


Figure 20

Location and Amounts of Reported 1961 and 1967 Brine Production and Disposal and Location of Brine-Disposal Wells

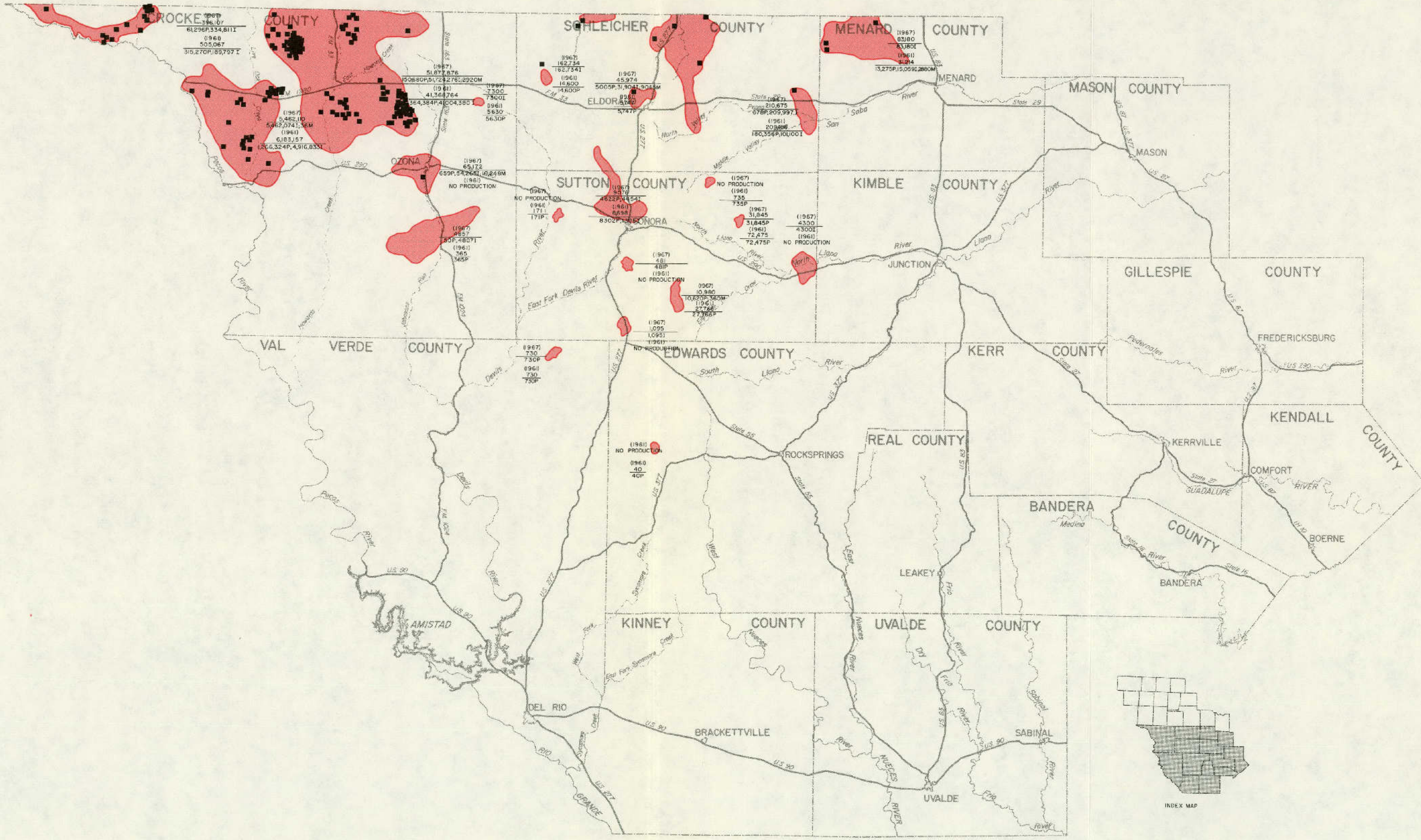
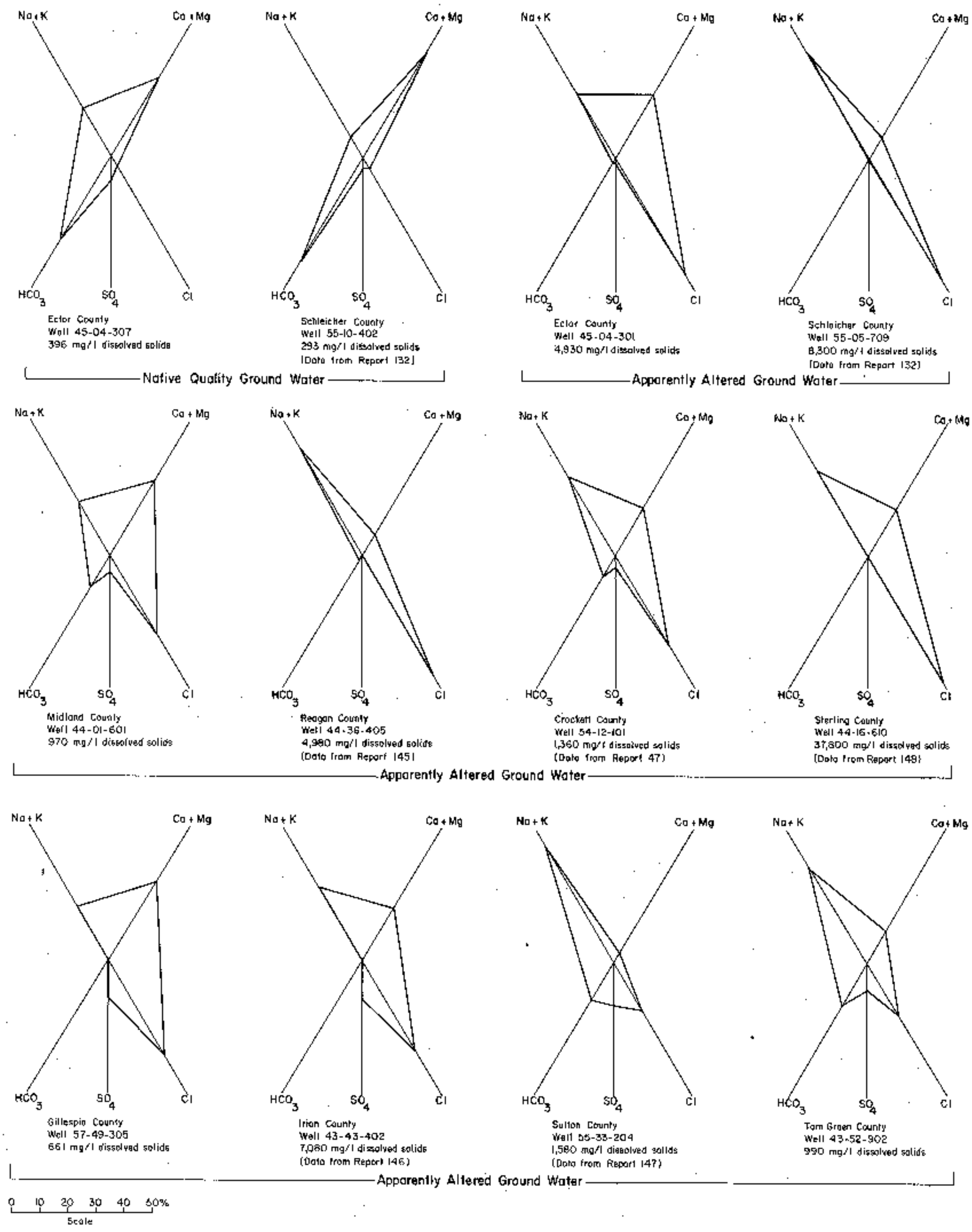


Figure 20 Continued



Distance along each axis shows concentration of the ion (in milliequivalents per liter) expressed as a percentage of the total concentration of dissolved solids

Figure 21

Diagrams of Chemical Analyses of Native Quality Ground Water and Apparently Altered Ground Water in Selected Wells

protected by surface casing that has been set and cemented, or by alternate protection devices. The depth of protection varies from area to area due to varying depths of ground-water aquifers. Some older oil fields were developed before field rules pertaining to surface-casing requirements were adopted. Some examples are the first wells drilled in the Big Lake field of Reagan County, the McCamey field in Upton County, and the Howard-Glasscock field in Howard County. Due to the lack of surface-casing requirements for these earlier wells, they have been inadequately cased, have little or no cement around the casing, or in some instances, have had the casing removed from the bore hole.

AVAILABILITY OF GROUND WATER

Edwards and Associated Limestones Aquifer

In the southern part of the Edwards Plateau, the Antlers Formation thins, becomes shaly, and disappears. Within this area, water is present in the Edwards and associated limestones and in the alluvium which is hydrologically interconnected with the Edwards and associated limestones along the Frio, Nueces, Sabinal, and Guadalupe River. Because the water is contained primarily in solution cavities, caverns, and fractures of the Edwards and associated limestones, estimation of the quantity of water available is extremely difficult. Therefore, water availability is calculated on the basis of perennial yield. This involves estimation of natural discharge (base-flow and spring-flow) and artificial discharge (pumpage). The total natural and artificial discharge within all or parts of the Concho, San Saba, Llano, Devils, Nueces, Frio, and Guadalupe River basins on the Edwards Plateau is about 625,000 acre-feet annually. However, only about 300,000 acre-feet of the water is available on a perennial basis if a system of wells was developed to intercept this amount of water. An attempt to pump as much as 300,000 acre-feet per year of ground water may not be practical or desirable. Because of the large area and the relatively low water-yielding ability of the aquifer, a large number of wells would have to be developed. Also, ground-water development of this magnitude would cause a significant reduction in the base flow of the major streams and many of the spring-fed tributaries.

Antlers Aquifer

The sands of the Antlers Formation occur in the northwestern part of the Edwards Plateau. The highest coefficient of transmissibility was 10,000 gpd/ft in northwest Midland County and the lowest was 1,100 gpd/ft in Upton County. The coefficient of storage ranged from 0.0387 in east central Sterling County to 0.148 in southeast Midland County (Table 4).

About 71 million acre-feet of water is in transient storage in the Antlers Formation on the Edwards Plateau. This estimate is based on the volume of saturated thickness of the sandstone and a specific yield of 0.074. Included in the total volume of the Antlers is the saturated thickness of the Santa Rosa Formation of Triassic Age in those areas where the two formations are in hydraulic continuity (Figures 11 and 12).

The following table shows the estimated water in storage in the Antlers Formation:

County	Water in storage (acre-feet)
Coke	722,198
Crockett	15,338,738
Ector	1,533,399
Glasscock	4,638,209
Howard	284,173
Irion	10,227,428
Kimble	147,361
Menard	52,803
Midland	1,872,685
Reagan	14,398,913
Schleicher	5,590,841
Sterling	2,868,446
Sutton	5,847,677
Tom Green	1,644,248
Upton	6,328,581
Total	71,495,700

The transmission capacity of an aquifer (the ability of a part of the aquifer to transmit water under given hydraulic gradients) is another method for estimating the amount of ground water available. It is known that the amount of water that will move through a segment of an aquifer is dependent upon the coefficient of transmissibility, the hydraulic gradient, and the length of the aquifer segment perpendicular to the flow. These factors can be expressed by the equation

$$Q = TIW,$$

in which Q is the quantity of water in gallons per day; T is the coefficient of transmissibility; I is the gradient (slope) in feet per mile; and W is the width of flow cross section in feet.

With the present water-level gradient of 20 feet per mile, an overall coefficient of transmissibility of 2,720 gpd/ft, and a flow cross section of 125 miles, an estimated 7,600 acre-feet of water is available on a perennial basis from the Antlers in the western part of the Edwards Plateau. This amount includes the water contained in the alluvium which is hydrologically interconnected with the Antlers along the North and Middle Concho Rivers.

Lower Cretaceous Aquifer

The lower cretaceous water-bearing rocks are composed of the Glen Rose Formation, Hensell Sand Member of the Pearsall Formation, and the Hosston and Sligo Formations.

Well development in the Glen Rose is limited to the southern part of the Edwards Plateau and generally in areas where the Edwards and associated limestones are not present or do not contain an adequate water supply.

The amount of discharge from the Glen Rose as base flow to streams in the southern part of the Plateau cannot be accurately determined from streamflow records. However, assuming that 10 percent of the base flow of streams in the southern part of the Plateau is from the Glen Rose, then 20,000 to 30,000 acre-feet is estimated to be discharged annually from the formation.

The Hensell Sand Member of the Pearsall Formation is known to produce water to wells in Bandera, Edwards, Gillespie, Kerr, Kimble, Real, and Uvalde Counties in the southeastern part of the Edwards Plateau. Many of the wells developed in the Hensell are capable of producing only a few gallons of water per minute. The largest reported yields, about 200 gpm, are from wells located in Gillespie County. An aquifer test conducted on a well completed in the Hensell in the Fredericksburg area of Gillespie County (Mount, 1963), indicates the coefficient of transmissibility was about 600 gpd/ft and the coefficient of storage about 0.00007. The data collected during this study are inadequate to determine the availability of water from the Hensell; however, Mount and others (1967, p. 71) stated that the annual yield from the Hensell was perhaps less than 50,000 acre-feet.

The Hosston and Sligo Formations compose the basal rocks of the Cretaceous System in the southern part of the Edwards Plateau. Several wells have been developed in these formations in Kerr, Bandera, and Uvalde Counties along the edge of the Plateau. These formations may be water-bearing on the Plateau; however, because ground water is available in the overlying rocks of the Edwards-Trinity Plateau aquifer, few if any water wells penetrate the Hosston and Sligo. Five aquifer tests were conducted by the U.S. Geological Survey on public-supply wells owned by the city of Kerrville (Reeves, 1969). These tests indicated that the coefficient of transmissibility ranged from 15,000 to 24,000 gpd per foot and averaged about 20,000 gpd per foot. The coefficient of storage ranged from 0.00002 to 0.00005. Results of these tests are not necessarily applicable to other areas on or near the Edwards Plateau due to changes in porosity, permeability, and saturated thickness of the aquifer.

Hickory Aquifer

The Hickory Sandstone Member of the Riley Formation is an important aquifer in Mason and McCulloch Counties. Fresh to slightly saline water is produced by a few wells developed in the Hickory in Gillespie and Concho Counties. However, based on results of aquifer tests, well development, and water quality, less water is available from the Hickory in these counties than in Mason and McCulloch Counties.

Results of several aquifer tests are listed in the following table:

County	Coefficient of transmissibility (gpd/ft)	Coefficient of storage	Specific capacity (gpm/ft)
Gillespie	6,500	0.00004	6.30
Do.	4,000	—	6.20
Mason	14,500		
Do.	43,000	—	8.65
McCulloch	19,000	0.0001	--
Do.	20,000	0.00009	--
Do.	29,000	—	—
Do.	38,000	0.0001	—

The amount of water available from storage in the Hickory is difficult to estimate due to lack of data. Mason (1960, p. 27) estimated that one million acre-feet of ground water was available from storage in McCulloch County. This amount of ground water is based on (1) a storage coefficient of 0.0001 and an assumed specific yield of 0.1 for the part of the Hickory under water-table conditions; and (2) an assumed storage coefficient of 0.0001 and water levels lowered to a depth of 500 feet below land surface in the artesian part of the aquifer.

Mount and others (1967, p. 79) stated that at least 50,000 acre-feet of ground water was available on a perennial basis from the Hickory aquifer. However, this amount appears to be very conservative in view of the areal extent, thickness of the aquifer, and recharge to the aquifer bot' from precipitation and the flow of the San Saba, Llano, and Colorado Rivers across the Hickory outcrops.

Ellenburger-San Saba Aquifer

The Ellenburger Group and the San Saba Limestone Member of the Wilberns Formation contain fresh to slightly saline water along the eastern edge of the Edwards Plateau in Gillespie, Mason, and McCulloch Counties. This aquifer is a potential source of water in parts of Concho, Kimble, and Menard Counties. The coefficient of transmissibility ranges from 75,000 to 100,000 gpd/ft as determined by aquifer tests conducted on public-supply wells in Gillespie County (Mount, 1963). Mount and others (1967, p. 75) estimated that 20,000 or more acre-feet of ground water is available for development on an annual basis from the Ellenburger-San Saba aquifer.

AREAS FAVORABLE FOR FUTURE DEVELOPMENT

The areas most favorable for further development of wells that yield 50 gpm or more are located in the central and southern part of the region. Based on known well yields and approximate saturated thickness of the Edwards-Trinity (Plateau) aquifer, areas favorable for development are: western Schleicher County, northern Sutton County, central and southwestern Edwards County, southern Val Verde County, northeastern Menard County, east central Crockett County, and southern Reagan County.

Areas in Crockett, Irion, Reagan, and Sterling Counties, where the Santa Rosa Formation is in hydrologic contact with the Antlers Formation, are potentially favorable for development of additional ground water. Testing and development of these potential sources of ground water had not been conducted when the field work was done; however, the Santa Rosa produces water in nearby Mitchell County and at Sterling City in Sterling County.

The area least favorable for development is in the northwestern part of the Plateau where the saturated thickness of the Antlers is thin and the water levels are declining (Figure 18).

CONCLUSIONS

Five aquifers underlie the Edwards Plateau region. These are, in order of importance and development, the Edwards-Trinity (Plateau), the alluvium, the lower Cretaceous, the Hickory, and the Ellenburger-San Saba. The Ogallala is adjacent to the northern limit of the Plateau and is an important aquifer locally.

Approximately 308,000 acre-feet of ground water is estimated to be available on a perennial basis from the Edwards-Trinity (Plateau) and the alluvium aquifers. About 40,000 acre-feet is available from the Cow Creek, Hensell, and Glen Rose of the lower Cretaceous, with an additional undetermined amount from the Hosston and Sligo. The amount of ground water available from the Hickory aquifer is not known. Except for public-supply use, only a small amount of well development is expected in the Hickory because of the depth to the aquifer. The amount of ground water available from the Ellenburger-San Saba is not known. The downdip extent of the aquifer containing fresh to saline water is less than that of the Hickory because of a more rapid increase in dissolved minerals with depth in the ground-water in the Ellenburger-San Saba aquifer. It is estimated that 2,015,000 acre-feet of ground water is available from the Ogallala aquifer in Ector, Glasscock, and Midland Counties.

The quantity of ground water pumped during 1972 from aquifers on the Edwards Plateau is estimated to be 86,000 acre-feet or 77 million gallons per day. Of the total quantity of water pumped, about 62,000 acre-feet was used for irrigation and about 6,800 acre-feet was used for industrial purposes.

In the northwestern part of the Plateau, more ground water is being pumped from the Antlers Formation than is being recharged. In the southern part of the Plateau, about 300,000 acre-feet of water is available for development from the Edwards and associated limestones. Areas of the central part of the Plateau which are relatively flat and stream valleys with deeper soils are best suited for irrigation. Development of large-capacity wells in these areas for irrigation of grains and grasses would be of great benefit to increased livestock production, especially in the event of a prolonged drought.

An expanded program of water-level and water-quality monitoring is needed in the northwestern part of the Edwards Plateau where the water levels are declining in the Antlers Formation, and the water is marginal in quality.

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Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Kt, Trinity Group.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps unless otherwise designated by footnotes.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; S, submersible; T, turbine; E, electric; G, gas, butane, or gasoline; W, wind; N, none.
Use of water : Ind, industrial; S, livestock; N, none.

WELL	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
AB-27-51-902	Petroleum Corporation of Texas	--	1968	132	10	17	Kt	3,170	61	Oct. 20, 1968	S, E	Ind	Casing cemented from 0 to 17 feet. Reported yield, 56 gpm on Oct. 20, 1968.
* 59-101	R. B. Cowden	W. H. Cole	--	--	--	--	Kt	3,265	--	--	C, W	S	--
202	Petroleum Corporation of Texas	--	1959	161	10	12	Kt	3,183	53 58.8	Apr. 20, 1959 Sept. 11, 1970	N	N	Casing cemented from 0 to 12 feet. Reported yield, 200 gpm on Apr. 20, 1959; 105 gpm in 1966. Unused industrial well.
203	do	--	1959	163	10	12	Kt	3,187	--	--	S, E	Ind	Casing cemented from 0 to 12 feet. Reported yield, 200 gpm in 1959; 105 gpm in 1966.
204	do	--	1959	173	12	12	Kt	3,200	63	Apr. 11, 1959	S, E	Ind	Casing cemented from 0 to 12 feet. Reported yield, 200 gpm on Feb. 11, 1959; 105 gpm in 1965.
205	do	--	1959	175	--	--	Kt	3,201	--	--	S, E	Ind	Reported yield, 210 gpm on Apr. 9, 1959; 42 gpm in 1965.
* 206	do	--	1959	170	8	12	Kt	3,195	61	Apr. 14, 1959	S, E	Ind	Casing cemented from 0 to 12 feet. Reported yield, 210 gpm in 1959; 105 gpm in 1965.
302	do	--	--	129	10	12	Kt	3,167	51 64	1952 July 1959	T, G	Ind	Casing cemented from 0 to 12 feet. Reported yield, 121 gpm in 1952. Shot with dynamite in 1968. Increased yield from 35 to 66 gpm.
303	do	--	1952	135	10	12	Kt	3,145	43 56 65.41	1952 July 1959 Sept. 15, 1970	T, G	Ind	Casing cemented from 0 to 12 feet. Reported yield, 80 gpm in 1952; 29 gpm in 1965.
304	do	--	1953	109	12	10	Kt	3,140	37	1953	T, G	Ind	Casing cemented from 0 to 10 feet. Reported yield, 320 gpm in 1953; 18 gpm in 1965.
305	do	--	1955	119	12	12	Kt	3,148	39	1952	T, G	Ind	Casing cemented from 0 to 12 feet. Reported yield, 178 gpm in 1952; 36 gpm in 1965.
306	do	--	--	--	8	--	Kt	3,146	64.60	Sept. 15, 1970	T, G	Ind	Shot with dynamite in 1966. Increased yield from 15 to 29 gpm.
307	do	--	--	115	--	--	Kt	3,155	41 63.61	1952 Sept. 15, 1970	T, G	Ind	Reported yield, 172 gpm on Aug. 1, 1958. Shot with dynamite in 1966. Increased yield from 10 to 30 gpm.
* 308	do	--	1952	165	12	10	Kt	3,191	74	Feb. 8, 1952	T, G	Ind	Casing cemented from 0 to 10 feet. Reported yield, 120 gpm on Feb. 8, 1952. Shot with dynamite in 1966. Increased yield from 29 to 52 gpm.
309	do	--	--	146	--	--	Kt	3,173	60 67	1952 1959	T, G	Ind	Reported yield, 93 gpm in 1952.
310	do	--	1952	108	--	--	Kt	3,140	36 45	1952 1955	T, G	Ind	Reported yield, 150 gpm in 1952; 34 gpm in 1965.
311	do	--	1968	134	10	17	Kt	3,169	65	Oct. 29, 1968	S, E	Ind	Casing cemented from 0 to 17 feet. Reported yield, 42 gpm on Oct. 29, 1968.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
AB-27-59-312	Petroleum Corporation of Texas	--	1968	128	10	17	Kt	3,163	65	Sept. 11, 1968	S, E	Ind	Casing cemented from 0 to 17 feet. Reported yield, 85 gpm on Sept. 11, 1968.
313	do	--	1968	120	10	16	Kt	3,160	65 69.3	Sept. 15, 1968 Sept. 11, 1970	T, G	Ind	Casing cemented from 0 to 16 feet. Reported yield, 78 gpm on Sept. 15, 1968.
314	do	--	1965	157	12	10	Kt	3,199	--	--	S, E	Ind	Casing cemented from 0 to 10 feet. Reported yield, 42 gpm in 1965.
315	do	--	1962	132	10	12	Kt	3,162	94.39	Sept. 11, 1970	T, G	Ind	Casing cemented from 0 to 12 feet. Reported yield, 96 gpm in 1963; 60 gpm in 1965.
316	do	--	1963	98	10	12	Kt	3,128	28 54.63	Aug. 15, 1963 Sept. 15, 1970	T, G	Ind	Casing cemented from 0 to 12 feet. Reported yield, 380 gpm on Aug. 15, 1963; 34 gpm in 1965.
60-102	do	--	1952	139	10	12	Kt	3,159	61 68	Dec. 22, 1952 May 1959	T, G	Ind	Casing cemented from 0 to 12 feet. Reported yield, 80 gpm on Dec. 22, 1952; 30 gpm in 1965.
103	do	--	1964	--	--	--	Kt	3,122	--	--	T, G	Ind	--

*Chemical analysis of water given in Table 7.

ANDREWS COUNTY

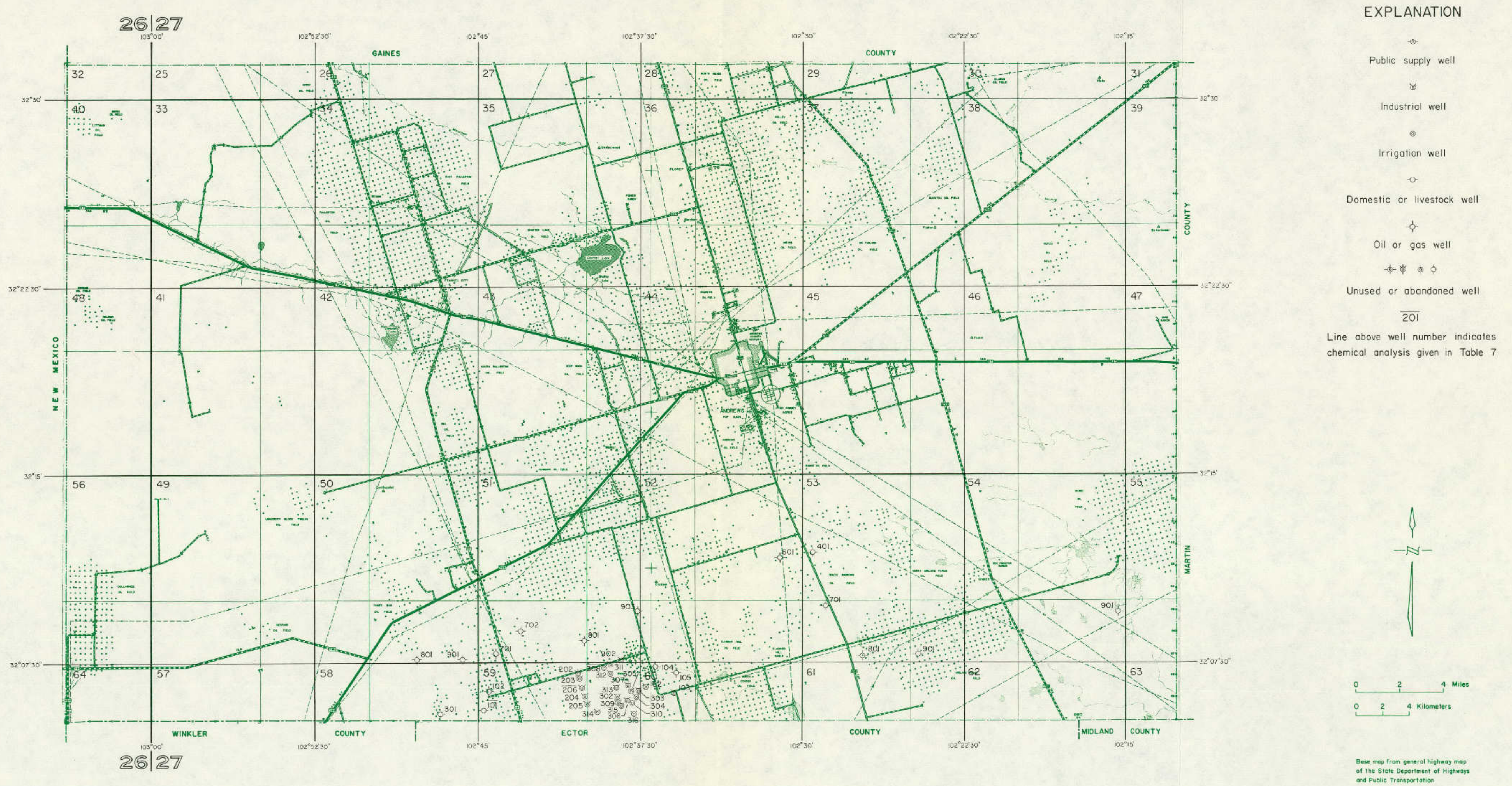
Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Trinity Group											
AB-27-59-101	R. B. Cowden	--	July 23, 1970	47	80	9	38	268	43	42	0.3	1.0	392	239	25.8	596	7.7	1.1
206	Petroleum Corporation of Texas	170	Sept. 11, 1970	49	76	10	25	250	38	25	1.0	< 0.4	347	231	19.1	512	7.5	0.7
306	do	165	Sept. 10, 1970	43	66	9	26	242	26	19	.7	1.5	311	201	21.8	469	7.5	.8

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
AB-27-50-801	Pan American Petroleum Corp.	University Lands No. 1-AD
901	Phillips Petroleum Co.	University Lands No. 1-MM
51-701	do	University Lands No. 73
702	do	University Lands No. 45
801	Miles Kernaghan, Jr.	University Lands No. 1-D
903	Shell Oil Company	University Lands No. 3-EM
52-601	Humble Oil & Refining Co.	University Lands No. 1-Y
53-401	Shell Oil Co.	University Lands No. 3-C
701	Fullerton Oil Co.	University Lands No. 1-F
801	Anderson-Prichard Oil Corp.	Fasken No. 4-24
901	Pan American Petroleum Corp.	David Fasken No. 3-G
54-901	Mallard Petroleum, Inc. & Bobby Holt	Fasken No. 1-A
58-301	J. R. Sharp, Inc.	University Lands No. 1
59-102	Cosden Petroleum Co.	University Lands No. 2-R
60-104	Sinclair Oil & Gas Co.	Emma Cowden No. 29-A
105	Humble Oil & Refining Co.	University Lands No. 3-BH



Location of Selected Water, Oil and Gas Wells in Andrews County

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Kea, Edwards and associated limestones; Kt, Trinity Group.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps unless otherwise designated by footnotes.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth of a foot.
Method of lift and type of power: C, cylinder; S, submersible; T, turbine; E, electric; G, gas, butane, or gasoline; W, wind; N, none.
Use of water : S, livestock; Irr, irrigation; D, domestic; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
AS-69-04-702	Rex Kelley	--	1904	198	6	3	Kea	2,250	189.8 192.3 187.5 188.2	Feb. 6, 1953 Feb. 23, 1954 Mar. 16, 1959 Jan. 22, 1971	C, W	N	Unused livestock well. Well A-1. 1/
801	Mrs. Ollie Short	Lee Short	1911	283	6	--	Kea	2,219	220.2 237.0	Mar. 16, 1959 Jan. 26, 1971	N	N	Unused livestock well. Well A-4. 1/
* 901	Mrs. J. L. Short	A. J. Magill	--	200	6	--	Kea	2,122	100	Feb. 1954	C, E	N	Unused domestic well. Well A-5. 1/
* 902	do	do	1958	180	--	--	Kea	2,125	142.3	Jan. 26, 1971	S, E	D, S	--
05-701	J. F. Camp	--	1965	--	7	--	Kea	2,250	260 239.9	1965 Feb. 3, 1971	C, W	S	--
702	do	--	1953	454	7	10	Kea	2,119	100 91.2	Feb. 1953 Feb. 3, 1971	C, W	S	Well B-1. 1/
703	do	--	1949	405	7	--	Kea	2,226	155.7 183.0	Mar. 3, 1959 Feb. 3, 1971	S, E	D, S	Well B-2. 1/
* 704	do	--	--	--	7	--	Kea	2,245	205.6	do	C, W	S	--
* 07-704	H. E. Butt	--	--	158	--	--	Kea	2,029	148.7	Feb. 4, 1971	C, W	S	--
* 802	do	--	--	690	--	--	Kea, Kt	2,025	--	--	C, E	D, S	--
* 803	do	--	--	Spring	--	--	Kea	1,900	--	--	--	--	''Picnic Spring''. Estimated flow, 25 gpm on Feb. 4, 1971.
* 804	E. W. Brown, Jr.	--	--	Spring	--	--	Kea	1,798	--	--	--	--	Estimated flow, 10 to 15 gpm on Feb. 2, 1971.
* 904	do	--	1955	750	--	--	Kt	1,775	247.2	Aug. 22, 1955	T, G	Irr	Well C-10. 1/
* 12-101	Rex Kelley	--	--	338	6	3	Kea	2,325	257.2 255.9 254.0 267.9	Feb. 6, 1953 Feb. 23, 1954 Mar. 17, 1959 Jan. 22, 1971	C, E	S	Well A-2. 1/
* 102	do	--	1965	350	6	--	Kea	2,325	--	--	S, E	D	--
* 201	Stuart Haby	--	1939	298	6	--	Kea	2,282	230.6	Jan. 26, 1971	C, W	S	--
* 202	do	--	1956	300	6	5	Kea	2,283	--	--	S, E	D	--
* 203	Richard E. Hans	--	1915	310	6	--	Kea	2,237	218.2 214.9 282.6	Feb. 6, 1953 Feb. 23, 1954 Jan. 26, 1971	C, W	S	Well A-3. 1/
* 204	do	--	1955	144	6	--	Kea	2,285	122.0	do	C, W	S	Possibly perched water table.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
AS-69-12-301	J. F. Camp	--	1953	380	7	21	Kea	2,284	178.3 230.5	Mar. 3, 1959 Feb. 3, 1971	C, W	S	Well E-1. 1/
* 302	do	--	--	250	6	20	Kea	2,155	174.5	Feb. 23, 1954	C, E	D, S	Well B-5. 1/
* 601	do	--	--	300	6	20	Kea	2,205	101.4 106.9	Mar. 3, 1959 Jan. 28, 1971	C, W	S	Well E-2. 1/
602	do	--	--	--	7	--	--	2,235	--	--	C, W	S	
* 13-101	do	--	1955	825	7	600	Kt	1,955	28.0 350.0	Feb. 3, 1955 Feb. 4, 1955	S, E	D, S	Well B-3. 1/
* 701	B. H. LeStourgeon	--	1953	155	6	--	Kea	2,100	63.0 118.3	Jan. 25, 1954 Jan. 27, 1971	S, E	D, S	Well F-5. 1/

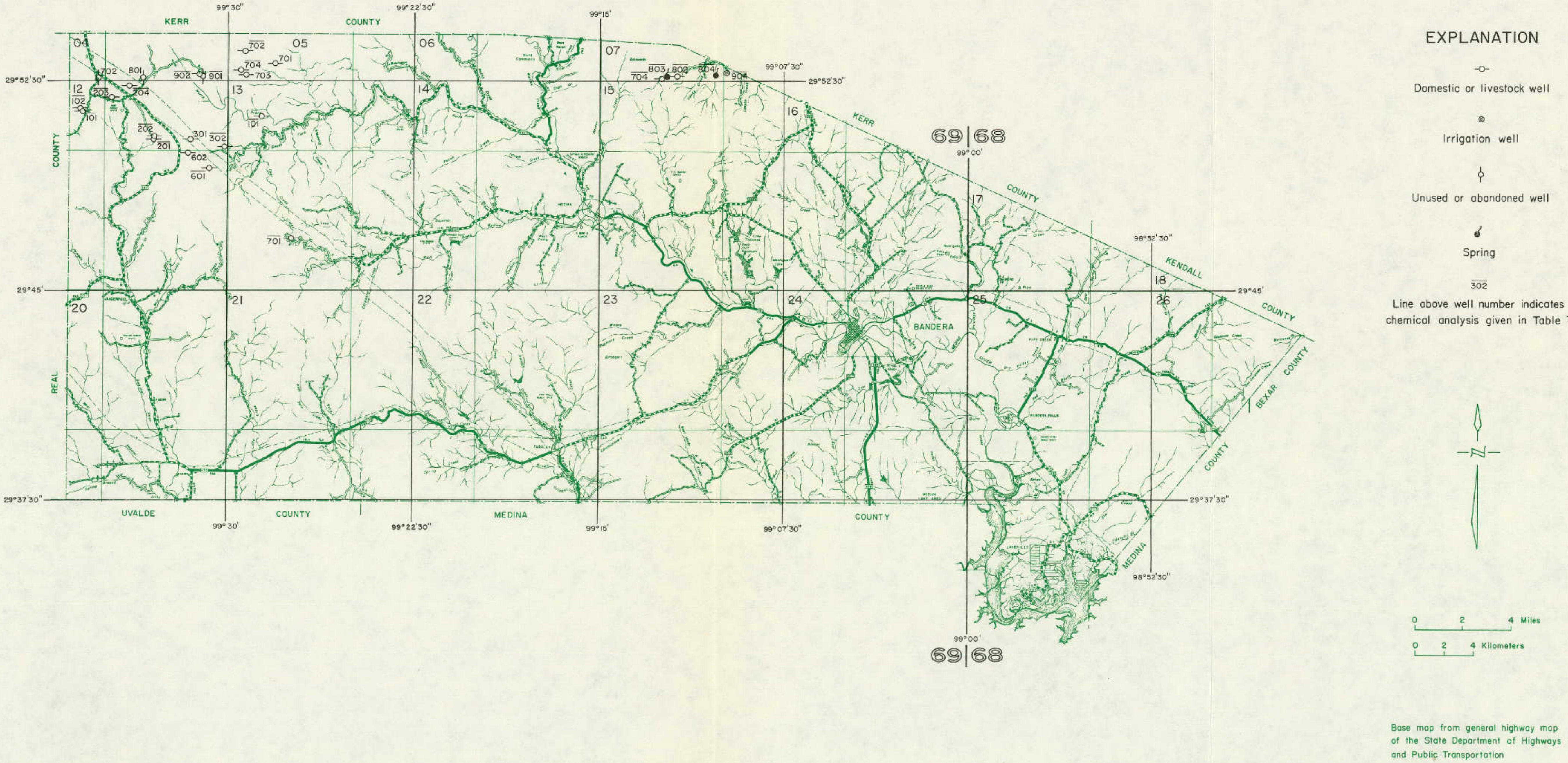
* Chemical analysis of water given in Table 7.
1/ Texas Water Commission Bulletin 6210, "Ground-Water Geology of Bandera County, Texas."

Table 7.--Chemical Analyses of Water From Wells and Springs

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Trinity Group											
1/ AS-69-07-904	E. W. Brown, Jr.	750	Feb. 13, 1957	5.4	54	49	49	338	129	22	--	0.0	485	395	24	772	7.8	1.2
13-101	J. F. Camp	825	Feb. 3, 1971	12	102	65	37	318	275	37	2.8	< .4	690	520	13.4	1,050	7.6	.7
							Edwards and associated limestones and Trinity Group											
07-802	H. E. Butt	690	Feb. 4, 1971	13	82	57	26	362	163	23	1.9	< .4	540	439	11.6	861	7.6	.6
							Edwards and associated limestones											
1/ 04-901	Mrs. J. L. Short	200	Feb. 12, 1957	13	87	16	7.9	304	4.6	16	--	28	322	283	5	569	7.3	.2
902	do	180	Jan. 26, 1971	12	96	20	7	328	7	17	.1	37	357	325	4.3	600	7.6	.2
05-704	J. F. Camp	--	Feb. 3, 1971	10	97	15	5	355	7	10	.1	< .4	319	303	3.3	541	7.4	.1
07-704	H. E. Butt	158	Feb. 4, 1971	14	71	27	6	333	5	12	.2	1.5	301	289	4.3	507	7.8	.2
803	do	Spring	do	13	79	17	6	304	5	12	.1	1.5	283	266	4.3	474	7.5	.1
804	E. W. Brown, Jr.	Spring	Feb. 2, 1971	12	82	18	6	312	5	12	.2	5.4	293	277	4.5	497	7.8	.3
1/ 12-101	Rex Kelley	338	Feb. 12, 1957	13	72	22	10	326	3.4	12	--	5.6	298	273	8	513	7.3	.3
102	do	390	Jan. 22, 1971	13	88	19	7	323	10	13	.1	14	323	299	4.6	540	7.6	.2
201	Stuart Haby	298	Jan. 26, 1971	12	91	18	11	279	12	26	.1	48	355	299	7.3	602	7.8	.3
202	do	300	do	12	110	16	15	266	20	36	< .1	105	445	342	8.7	727	7.8	.4
203	Richard E. Hans	310	Jan. 26, 1971	11	74	19	7	304	5	13	.1	2	280	265	5.5	480	7.7	.2
204	do	144	do	10	98	13	7	338	7	13	< .1	3.5	320	298	4.6	540	7.8	.2
1/ 302	J. F. Camp	250	Feb. 10, 1957 Feb. 3, 1971	9.8 12	89 90	13 18	12 5	345 334	2.6 6	10 12	-- .1	2.0 10	308 317	276 299	8 3.6	529 529	7.4 7.7	.3 .1
601	do	300	Jan. 28, 1971	9	84	10	4	279	6	7	< .1	11	268	253	3.3	457	7.5	.1
1/ 13-701	B. H. LeStourgeon	155	Feb. 7, 1957	8.2	58	16	3.8	246	3.4	9.5	--	4.6	224	219	4	397	7.5	.1

1/ Texas Water Commission Bulletin 6210, "Ground-Water Geology of Bandera County, Texas."



Location of Selected Water Wells and Springs in Bandera County

CONCHO COUNTY

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Qal, Alluvium; Kea, Edwards and associated limestones; P, Permian rocks undifferentiated; Ch, Hickory Sandstone.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and by Paulin altimeter.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; J, jet; S, submersible; T, turbine; E, electric; W, wind; N, none.
Use of water : D, domestic; S, livestock; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
DZ-42-41-301	R. L. Carter	--	--	--	--	--	P	1,980	--	--	C, W	D, S	--
302	do	--	--	97	4	--	P	1,980	72.2	Apr. 24, 1969	N	N	Abandoned well.
* 501	Fritz Speck Estate	Denny R. Speck	1950	225	5	225	P	2,071	171.0	do	C, W	S	--
* 601	James L. Daniel	--	1935	200	6	--	Kea	2,011	39.6 20.9	Oct. 8, 1964 Apr. 24, 1969	C, W	S	--
602	do	--	1935	200	6	--	Kea	2,042	--	--	C, W	S	--
* 604	R. J. Erwin	Herman Price	1947	100	6	--	Kea	2,079	98.0 100.6	Oct. 13, 1964 Apr. 23, 1969	C, W	S	--
605	do	do	--	51	36	--	Kea	2,050	33.5 28.85	Oct. 8, 1964 Apr. 23, 1969	C, W	S	--
* 606	L. G. Watkins	--	1938	70	--	--	Kea	2,046	--	--	C, W	D	--
701	F. M. Ellis Estate	Bill Ellis	1933	140	8	20	P	1,956	44.88 37.0	Oct. 1, 1964 Apr. 21, 1969	N	N	Unused livestock well.
702	do	do	1933	140	6	--	P	1,980	79.0	do	N	N	--
801	do	do	1933	90	6	--	Kea	2,092	25.70 31.26 23.3	June 22, 1961 Oct. 1, 1964 Apr. 21, 1969	C, W	S	Observation well.
* 802	do	do	1965	40	6	--	Kea	2,100	25	Sept. 10, 1964	C, E	D	--
* 803	Mary E. Hutchinson	--	1948	100	8	--	Kea	2,163	93.1 90.85	Sept. 30, 1964 Apr. 25, 1969	C, W	S	--
* 804	do	--	1938	47	6	--	Kea	2,102	40.77 37.5	Oct. 1, 1964 Apr. 25, 1969	C, W	S	--
805	F. M. Ellis Estate	Bill Ellis	1954	200	8	20	Kea	2,089	88.55 23.8	Oct. 1, 1964 Apr. 21, 1969	C, W	S	--
806	Mary E. Hutchinson	--	1963	60	6	--	Kea	2,085	29.8	Aug. 23, 1964	J, E	D, S	--
807	F. M. Ellis Estate	Bill Ellis	1933	140	--	--	--	2,117	45.87	Apr. 21, 1969	C, W	D, S	--
* 808	Mary E. Hutchinson	--	1927	120	8	35	Kea	2,157	82.7 79.8	Sept. 30, 1964 Apr. 25, 1969	S, E	D, S	Drilled as oil test. Plugged back and completed as water well.
809	do	--	1929	45	--	--	Kea	2,065	--	--	C, W	D, S	--
901	do	--	--	140	8	140	Kea	2,174	98.1	Oct. 1, 1964	C, W	S	--
* 902	do	--	--	20	48	20	Kea	2,090	10.2 6.2	do Apr. 25, 1969	C, W	S	Dug well.
* 903	Margaret K. Price	Herman Price	1910	140	8	140	Kea	2,106	--	--	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
DZ-42-41-904	J. A. Hall	A. E. Davis and Son	1954	118	6	--	Kea	2,176	--	--	C, E	N	--
* 905	do	do	--	14	--	--	Kea	2,081	4.0	Oct. 13, 1964	--	N	Owner plans to develop well. Occasionally flows.
906	do	do	1967	206	8-5/8	206	Kea	2,140	--	--	--	N	Unused livestock well.
907	do	do	1968	150	8-5/8	150	Kea	2,080	--	--	--	N	--
908	Margaret K. Price	Herman Price	--	90	5-1/2	--	Kea	2,077	--	--	C, W	S	--
42-402	James L. Daniel	--	1939	110	--	--	Kea	2,111	78.75	Apr. 24, 1969	C, W	N	--
* 403	do	--	1938	110	5-1/2	--	Kea	2,042	82.19 82.1	Sept. 29, 1964 Apr. 24, 1969	C, W	S	--
* 604	T. W. Sparks	--	1964	155	8	--	P	1,895	136.2 142.8	Oct. 15, 1964 Apr. 14, 1969	C, W	S	--
* 702	J. A. Hall	A. E. Davis and Son	1954	122	5-1/2	--	Kea	2,137	55.85 54.7	Sept. 29, 1964 Apr. 24, 1969	C, W	S	--
* 703	Wesley Burk	--	1939	100	6	20	Kea	2,135	74.6 74.2	Oct. 14, 1964 Apr. 14, 1969	C, W	S	--
* 705	J. A. Hall	A. E. Davis and Son	--	85	6	--	Kea	2,130	81.65 58.0	Oct. 13, 1964 Apr. 24, 1969	C, W	S	--
* 706	Wesley Burk	--	1917	100	8	20	Kea	2,153	66.8 65.3	Oct. 13, 1964 Apr. 14, 1969	C, W	D, S	Reported yield, 12 to 15 gpm.
707	J. H. Stansberry	--	1920	100	6	--	Kea	2,131	50.3 49.75	Oct. 15, 1964 Apr. 25, 1969	C, W	S	--
708	do	--	1964	50	5-1/2	--	--	2,101	27.1	Oct. 15, 1964	C, W	D, S	--
709	do	--	1965	50	--	--	Kea	2,108	25.47	Apr. 25, 1969	C, W	S	--
* 710	Burley Burk	Denny R. Speck	--	85	--	--	Kea	2,146	56.7 55.6	Apr. 14, 1964 Aug. 20, 1970	C, W	S	Observation well.
* 711	do	do	1950	96	--	--	Kea	2,150	--	--	C, W	S	--
* 801	Otto Lubke	--	--	103	6-1/2	--	Kea	2,072	84.1 80.1	Oct. 14, 1964 Apr. 25, 1969	C, W	S	--
* 802	J. H. Stansberry	--	1928	53	5-1/2	--	Kea	2,042	50.9 23.5	Oct. 15, 1964 Apr. 25, 1969	C, W	D, S	--
* 803	Burley Burk	--	--	55	52	30	Kea	2,096	31.25 29.95	Oct. 21, 1964 Apr. 14, 1969	C, W	S	Dug well.
804	W. T. Shaver	Denny R. Speck	1930	210	--	--	Kea	2,055	61.35	Apr. 25, 1969	C, W	S	--
805	Burley Burk	do	1947	150	--	--	Kea	2,064	--	--	C, W	S	Reported weak supply.
901	Konita Sparks Choat	--	--	40	36	--	Kea	1,980	12.95	Oct. 15, 1964	C, W	D, S	--
902	T. W. Sparks	--	--	153	6	--	P	2,016	145.25 143.45	do Apr. 14, 1969	C, W	S	--
* 903	J. H. Stansberry	--	1919	30	--	--	Kea	1,998	3.2	Apr. 25, 1969	C, W	S	Dug well.
* 904	Konita Sparks Choat	--	--	20	--	--	Kea	1,986	9.55	Apr. 14, 1969	C, W	S	Observation well. Dug well.
* 905	T. W. Sparks	--	1915	170	8	--	Kea, P	2,024	--	--	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
DZ-42-43-702	E. L. Carter	--	1927	160	--	--	P	2,045	102.8	Apr. 28, 1969	C, W	S	--
703	do	--	1920	--	--	--	Kea	1,990	--	--	C, W	S	--
704	do	--	1920	--	--	--	Kea	1,992	--	--	C, W	S	--
705	do	--	1954	--	5	--	Kea	1,988	14.6	Apr. 28, 1969	C, W	S	--
* 801	T. R. Turner	--	1944	75	5	75	Kea	1,980	22.65	Apr. 7, 1969	C, W	S	--
802	do	--	1925	18	--	--	Kea	1,956	9.95	do	C, W	S	Dug well.
* 803	do	--	1959	35	5	35	Kea	1,962	21.95	do	C, W	D, S	--
* 804	do	--	1941	35	6	35	Kea	1,959	18.35	do	C, W	D	--
805	do	--	1910	65	--	--	Kea	1,965	29.15	do	C, W	S	--
806	M. P. Renfro	--	1917	100	--	--	Kea	1,993	--	--	C, W	D, S	Well caved at 10 feet.
* 807	do	--	1940	100	--	--	Kea	2,001	69.3	Apr. 7, 1969	C, W	S	--
* 808	do	--	1960	100	4	--	Kea	2,022	58.1	do	C, W	S	--
* 809	W. E. Polk	--	1963	90	5	90	Kea, P	2,012	84.15	Mar. 28, 1969	C, W	D, S	--
810	Thomas Nasworthy	Alma Ward	--	90	8	90	Kea	1,985	51.55	Apr. 23, 1969	C, W	S	Observation well.
811	George D. Jenkins	--	--	15	--	--	Kea	1,942	3.7	Apr. 9, 1969	C, W	S	Dug well.
812	do	--	--	70	6	--	Kea	1,940	7.55	do	C, W	S	--
* 901	M. P. Renfro	--	--	90	6	--	Kea, P	2,001	72.62	Apr. 7, 1969	C, W	S	--
* 902	O. K. Kothmann	--	1921	--	6	--	Kea, P	1,948	23.2	Apr. 23, 1969	C, W	S	--
* 44-702	J. T. Rice	--	1949	60	--	--	Qal	1,950	--	--	C, W	D, S	--
703	do	--	1931	136	5	--	P	1,845	37.12	Apr. 2, 1969	N	N	Water reported saline.
* 49-101	Mozelle Nutt	M. R. McClure	--	139	6	--	Kea	2,157	94.55	Sept. 29, 1964	C, W	S	--
102	do	do	--	138	5-1/2	10	Kea	2,156	114.24 116.0	Sept. 30, 1964 May 13, 1969	C, W	D	--
* 201	G. H. Spiser	--	--	81	--	--	Kea	2,154	76.7 76.0	Sept. 23, 1964 May 15, 1969	C, W, E	S	--
* 208	Mrs. Florence Hall	--	--	60	5-1/2	--	Kea	2,155	57.5 55.95	Sept. 29, 1964 May 14, 1969	C, W	S	--
* 209	W. L. Jacoby	Seymour Mullins	--	84	5-1/2	40	Kea	2,140	51.2 51.1	Sept. 30, 1964 May 14, 1969	C, W	S	--
* 302	J. E. Wood	--	--	50	8	--	Kea	2,085	44.5 44.2	Sept. 30, 1964 May 15, 1969	C, W	S	Observation well.
303	Lee Roy Pfluger	--	--	60	5-1/2	--	Kea	2,116	43.50	Oct. 2, 1964	C, W	S	--
* 306	J. M. Simpson	McKee	--	75	--	--	Kea	2,077	30.5 70.95	do May 14, 1969	C, W	S	--
* 403	Milton Schultz	--	1943	78	5-1/2	--	Kea	2,124	67.97	Oct. 23, 1964	C, W	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diam-eter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* DZ-42-49-404	J. E. Henderson	Jess Stephens and Son	1935	111	6-3/4	--	Kea	2,131	67.1 67.0	Oct. 28, 1964 May 6, 1969	C, W	S	--
408	Milton Schultz	--	1906	115	7	--	Kea	2,120	70.0	May 14, 1969	N	N	Abandoned well.
* 501	Anton Lubke	--	1957	105	6-1/2	15	Kea	2,119	47.2 45.9	Oct. 27, 1964 May 14, 1969	S, E	D	--
* 505	do	--	1968	90	6	8	Kea	2,100	46.6	do	S, E	D	--
* 602	B. F. Jacoby	--	--	54	5-1/2	--	Kea	2,064	36.49 31.65	Oct. 23, 1964 May 14, 1969	C, W	S	--
603	D. C. Green	--	--	27	5-1/2	--	Kea	2,048	23.65 24.0	Oct. 23, 1964 May 14, 1969	C, W	S	--
* 801	Melvin Pfluger	--	1927	132	6	--	Kea	2,156	82.4 84.15	Oct. 28, 1964 May 15, 1969	C, W	D, S	--
805	J. C. Sorrell	--	1958	140	6	10	Kea	2,173	--	--	S, E	N	--
806	do	--	--	--	6	--	--	2,184	111.9 112.3	Nov. 5, 1964 May 14, 1969	N	N	Abandoned well. Observation well.
* 902	Raymond Pfluger	--	--	74	5-1/2	--	Kea	2,118	55.55 55.4	Oct. 22, 1964 May 14, 1969	C, W	S	--
* 50-101	City of Eden	--	1955	4,040	10 8-5/8	0 - 1,175 1,175-3,782	Ch	2,044	424.08	Apr. 9, 1969	S, E	P	--
* 102	do	--	1928	36	--	--	Kea	2,044	38.3 27.1	Nov. 13, 1964 Apr. 9, 1969	T, E	P	Dug well. Observation well.
* 104	Albert Fowler	--	1917	26	6	--	Kea	2,023	8.4 6.1	Sept. 22, 1964 May 15, 1969	J, E	D, S	--
108	City of Eden	--	--	23	--	--	Kea	2,036	14.1 13.2	Oct. 9, 1964 Apr. 10, 1969	N	N	Dug well. Unused public-supply well.
110	do	--	1964	35	6	--	Kea	--	15.5	do	N	P	Pump out of hole being worked on.
* 124	J. B. Crunk	--	1953	104	5-1/2	--	Kea	2,098	85.15 94.9	Oct. 21, 1964 May 15, 1969	C, W	S	--
* 406	Raymond Pfluger	--	--	--	6	--	Kea	2,044	19.7 18.4	Oct. 22, 1964 May 16, 1969	J, E	D, S	--
* 502	E. L. Stephens	--	1934	48	8	3	Kea	2,010	25.3	May 19, 1969	C, W	D, S	--
601	Annie Wood	--	--	--	--	--	--	2,019	74.7	May 21, 1969	C, W	S	Observation well.
* 701	Raymond Pfluger	--	--	56	5-1/2	--	Kea	2,066	41.63 40.25	Oct. 22, 1964 May 16, 1969	C, W	S	--
* 702	do	--	1941	167	5-1/2	--	Kea	2,147	88.95 89.05	Oct. 22, 1964 May 19, 1969	C, W	S	--
* 705	Carl Pfluger	--	1941	137	6	--	Kea	2,142	90.0 90.1	Nov. 12, 1964 May 19, 1969	C, W	D, S	--
801	Mrs. I. R. Lockett	T. C. Thorne	1947	50	6-3/4	--	Kea	2,156	--	--	C, W	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* DZ-42-50-803	Luster Lockett	--	1938	72	5-1/2	--	Kea	2,088	56.0 48.8	Nov. 10, 1964 May 19, 1969	C, W	D	--
* 804	Mrs. I. R. Lockett	T. C. Thorne	--	32	--	--	Kea	2,047	28.2 30.3	Nov. 11, 1964 May 21, 1969	C, W	S	--
* 901	F. M. Skinner	--	--	100	--	--	Kea	2,082	53.5 56.4	June 21, 1961 May 19, 1969	C, W	D, S	--
* 51-101	Charles Jacobson	Guice Reed	--	18	--	--	Kea	1,977	4.1 5.4	Oct. 16, 1964 Apr. 28, 1969	C, W	D, S	Dug well.
102	S. M. Skinner	--	--	49	5	--	Kea	1,985	45.8	May 21, 1969	N	N	Abandoned well.
* 201	V. B. Adams	--	--	75	--	--	Kea, P	1,963	34.0 33.4	July 20, 1961 May 1, 1969	C, W	D, S	--
* 202	Allan Ledbetter	--	1954	40	--	--	Kea, P	1,903	8.1	Apr. 10, 1969	S, E	D	--
203	do	--	1930	30	5-1/2	--	Kea	1,954	24.4	do	N	N	--
204	T. R. Turner	--	1952	20	6	20	Qal	1,903	7.1	do	N	N	--
205	Allan Ledbetter	--	1963	45	--	--	Kea	--	--	--	C, W	D, S	--
206	Billy Turner	--	1953	40	6	--	Qal	1,947	6.0	Apr. 9, 1969	C, W	D, S	Observation well.
301	Otice Turner	--	1920	40	36	40	P	1,903	21.4	Apr. 10, 1969	N	N	Dug well.
401	Howard Loveless	--	1930	30	--	--	Kea	1,985	18.9	May 21, 1969	C, W	S	--
* 501	Allan Ledbetter	--	1962	109	--	--	Kea, P	2,020	97.4	Apr. 10, 1969	C, W	S	--
502	do	--	1938	60	--	--	Kea	1,950	--	--	C, W	S	--
* 503	do	--	1912	60	--	--	Kea	1,954	46.1	Apr. 10, 1969	C, W	D, S	--
504	Howard Loveless	--	1929	--	--	--	Kea	1,993	135.3	May 2, 1969	C, N	S	--
601	Taylor Hendley, Administrator	James Cole	1920	100	5-1/2	100	Kea	1,960	46.1	Mar. 27, 1969	C, W	S	--
* 602	Carroll Barnett	--	1925	125	--	--	P	1,915	108.8	May 22, 1969	C, W	S	--
* 701	Daisy M. Brown	W. N. Bryson	1964	85	--	--	Kea	2,029	54.6	May 2, 1969	C, W	S	--
* 801	Howard Loveless	--	1924	100	--	--	Kea, P	1,986	109.7	do	C, W	S	--
802	do	--	1944	85	--	--	Kea	2,007	71.0	do	C, W	S	Observation well.
803	Daisy N. Brown	W. M. Bryson	1929	23	--	--	Kea	2,017	19.1	May 2, 1969	N	N	Dug well.
901	Taylor Hendley, Administrator	James Cole	1900	20	--	--	Kea	1,927	8.1	Mar. 27, 1969	C, W	D	Do.
902	do	do	1900	80	--	--	Kea	1,888	5.8	do	C, W	D	Do.
* 52-101	B. F. Baker	J. D. McMorries	1944	60	6	60	Kea	1,878	48.5	Mar. 28, 1969	C, W	D, S	--
102	Chester Jacoby	--	1942	90	--	--	Kea	1,887	49.4	May 1, 1969	C, W	S	--
103	do	--	1944	73	--	--	Qal	1,864	8.6	do	C, W	S	--
104	J. T. Rice	--	1936	100	6	100	Kea	1,872	49.24	Apr. 2, 1969	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
DZ-42-52-105	J. T. Rice	--	1924	175	5	175	P	1,872	103.68	Apr. 2, 1969	N	N	--
701	G. R. White Estate	Mackey Weaver	--	--	--	--	P	1,865	175.3	May 22, 1969	C, W	S	Observation well.
* 57-103	Dan Sorrell	--	--	185	6	--	Kea	2,249	168.3 167.8	Nov. 5, 1964 May 20, 1969	C, W	D, S	Do.
* 104	do	--	--	263	6-3/4	--	Kea	2,325	234.25 232.75	Nov. 5, 1964 May 20, 1969	C, W	S	--
* 206	John Nichols	--	--	180	6	--	Kea	2,247	166.35 168.15	Nov. 6, 1964 May 20, 1969	S, E	D, S	--
* 301	Walter Hanusch	--	1930	127	5-1/2	--	Kea	2,205	116.7 116.45	Nov. 6, 1964 May 20, 1969	C, W	D, S	--
* 58-101	Carl Pfluger	--	--	160	6	--	Kea	2,215	158.65 157.45	Nov. 12, 1964 May 21, 1969	C, W	S	Observation well.
* 102	J. T. Beauchamp	--	1933	100	5-1/2	--	Kea	2,136	87.8 88.05	Nov. 13, 1964 May 21, 1969	C, W	S	--
203	Joan Auld Trust	--	--	57	--	--	Kea	2,097	48.4 54.65	Nov. 13, 1964 May 21, 1969	C, W	S	Dug well.
* 59-201	Daisy M. Brown	--	1948	35	--	--	Kea	2,024	28.3	May 2, 1969	C, W	S	--
* 43-48-401	Mrs. A. H. Davis, Jr.	A. H. Davis, III	1967	130	--	--	P	1,891	53.01	Mar. 27, 1969	S, E	S	--
* 701	do	do	1955	130	--	--	P	1,900	54.2	Mar. 27, 1969	C, W	S	--
702	do	do	1953	100	--	--	P	1,904	35.4	do	C, W	S	--
* 801	John M. Chambers Estate	John Cauldwell	--	100	--	--	Kea	1,954	107.4	do	C, W	S	--
56-201	do	do	1955	100	5-1/2	100	Kea	2,095	26.73	Mar. 26, 1969	N	N	Abandoned well.
* 202	do	do	1928	120	--	--	Kea	2,116	93.35	do	C, W	S	--
* 401	do	do	--	--	--	--	Kea	2,000	24.8	Mar. 27, 1969	C, E	D, S	--
501	do	do	1928	--	--	--	Kea	2,160	145.55	do	C, W	S	--
* 605	Byrde Cox	Jack Williams	1939	165	8	--	Kea, P	2,160	103.0	Apr. 28, 1969	C, W	D, S	Observation well.
606	do	do	1964	165	--	--	Kea	2,162	102.25	do	C, W	D, S	--
* 801	Nannie Slator	A. E. Davis and Son	--	--	--	--	Kea	--	--	--	C, W	D, S	--
* 802	do	do	--	--	--	--	Kea	2,004	203.8	Apr. 4, 1969	C, W	S	--
803	do	do	--	--	--	--	Kea	--	184.7	Apr. 30, 1969	C, W	S	--
902	do	do	--	145	6-3/4	--	Kea	--	138.8	Oct. 30, 1964	C, W	S	--
* 903	J. R. Canning	--	--	260	6	--	Kea	2,284	180	do	C, W	D, S	--
904	do	--	--	--	--	--	Kea	2,196	112.25	May 22, 1969	C, W	S	Observation well.
* 905	Nannie Slator	A. E. Davis and Son	--	--	--	--	Kea	--	172.3	Apr. 30, 1969	C, W	S	--

* Chemical analysis of water given in Table 7.

CONCHO COUNTY

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health Resources except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Hickory Sandstone											
DZ-42-50-101	City of Eden	4,040	Sept. 16, 1964 Apr. 9, 1969	23 24	7 9	2 3	386 388	406 423	30 30	359 381	2.6 1.0	< 0.4 < .4	1,220 1,060	24 34	97.0 96.2	1,810 1,830	8.1 8.0	34.2 30.2
							Permian rocks undifferentiated											
41-501	Fritz Speck Estate	225	Apr. 24, 1969	12	206	157	550	168	890	940	4.5	< .4	2,840	1,160	51.0	4,120	7.3	7.1
42-604	T. W. Sparks	155	Apr. 14, 1969	18	320	44	19	345	670	27	.8	10.5	1,280	980	4.1	1,560	7.4	.3
51-602	Carroll Barnett	125	May 22, 1969	9	158	74	422	268	331	760	1.7	< .4	1,890	700	56.7	3,060	7.4	7.0
43-48-401	Mrs. A. H. Davis, Jr.	130	Mar. 26, 1969	20	438	115	48	309	1,290	62	1.2	< .4	2,130	1,570	6.3	2,320	7.2	.5
701	do	130	Mar. 27, 1969	18	78	29	17	339	29	25	.4	3.5	367	314	10.7	628	7.6	.4
							Edwards and associated limestones and Permian rocks undifferentiated											
42-42-905	T. W. Sparks	170	Apr. 14, 1969	8	550	176	132	289	1,990	53	3.6	< .4	3,060	2,100	12.0	3,110	7.4	1.3
43-809	W. E. Polk	90	Mar. 28, 1969	9	108	54	33	304	246	45	1.0	< .4	650	489	12.9	970	7.8	.7
1/ 901	M. P. Renfro	90	June 22, 1961 Apr. 7, 1969	19 10	153 72	22 41	48 91	284 360	174 109	106 92	.4 2.6	14 < .4	676 600	472 348	18 43.0	1,080 1,006	7.3 7.5	1.0 2.1
902	O. K. Kothmann	--	Apr. 23, 1969	15	136	32	156	411	146	176	.6	88.0	950	473	41.8	1,540	7.4	3.1
51-201	V. B. Adams	75	May 1, 1969	16	202	43	95	416	94	269	.5	75.0	1,000	680	23.2	1,670	7.2	1.6
202	Allan Ledbetter	40	Apr. 10, 1969	21	298	26	331	248	233	790	.7	18.0	1,840	850	45.8	3,020	7.5	4.9
501	do	109	do	8	80	52	94	315	204	109	1.8	< .4	700	416	33.0	1,139	7.8	2.0
801	Howard Loveless	--	May 2, 1969	9	82	51	258	287	205	367	2.4	< .4	1,120	415	57.6	1,850	7.5	5.5
43-56-605	Byrde Cox	165	Apr. 28, 1969	15	56	29	38	279	27	94	.6	7.0	364	259	24.1	643	7.5	1.0
							Edwards and associated limestones											
42-41-601	James L. Daniel	200	Apr. 24, 1969	12	129	40	32	420	50	72	.4	53.0	600	486	12.4	999	7.4	.4
604	R. J. Erwin	100	Apr. 23, 1969	9	51	39	62	310	112	29	3.1	2.5	460	286	32.2	754	7.6	1.6
606	L. G. Watkins	70	Apr. 24, 1969	12	85	27	7	351	27	6	1.2	10.0	348	321	4.7	592	7.5	.2
1/ 802	F. M. Ellis Estate	40	June 22, 1961 Apr. 21, 1969	13 12	84 86	24 22	11 7	274 259	19 24	20 16	.3 .3	72 72.0	378 366	308 308	7 5.0	639 605	7.2 7.5	.3 .2
803	Mary E. Hutchinson	100	Apr. 25, 1969	23	68	18	27	259	25	27	.5	31.5	348	246	19.4	574	7.6	.8

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
						Edwards and associated limestones--Continued												
DZ-42-41-804	Mary E. Hutchinson	47	Apr. 25, 1969	10	75	21	7	310	9	9	0.4	9.0	292	275	5.2	508	7.6	0.1
808	do	120	Sept. 30, 1964	17	66	18	29	255	25	30	.6	25	466	240	21.2	576	7.5	.8
902	do	20	Apr. 25, 1969	10	60	29	5	311	6	7	.3	9.0	279	270	3.9	485	7.7	.1
903	Margaret K. Price	140	Apr. 23, 1969	14	58	27	8	298	9	10	.4	6.5	280	256	6.6	488	7.5	.2
905	J. A. Hall	14	Apr. 24, 1969	22	87	40	41	418	25	64	.7	< .4	486	381	19.0	836	7.6	.6
42-403	James L. Daniel	110	do	18	42	32	17	281	11	18	.6	1.0	278	234	13.5	486	7.6	.5
702	J. A. Hall	122	Sept. 29, 1964	14	62	23	8	287	9	11	.5	9	424	250	6.7	490	7.4	.2
703	Wesley Burk	100	Oct. 14, 1964	14	61	24	11	262	9	18	.5	25	425	251	8.6	515	7.8	.3
705	J. A. Hall	85	Apr. 24, 1969	15	55	27	13	285	15	14	.7	4.0	284	249	10.3	490	7.8	.4
706	Wesley Burk	100	Apr. 14, 1969	13	72	20	12	262	10	21	.4	33.0	310	263	8.8	571	7.7	.3
710	Burley Burk	89	do	14	65	25	6	309	7	8	.4	1.0	278	266	4.3	479	7.4	.1
711	do	96	do	13	66	20	9	287	9	11	.4	4.0	273	247	7.3	474	7.3	.2
801	Otto Lubke	103	Oct. 14, 1964	13	36	57	94	327	188	35	4.8	< .4	760	325	38.6	950	8.4	2.3
			Apr. 25, 1969	10	58	44	68	339	153	27	3.3	< .4	530	327	31.2	848	7.6	1.6
802	J. H. Stansberry	53	do	17	103	35	70	550	25	47	.7	< .4	570	400	27.6	941	7.2	1.5
803	Burley Burk	55	Apr. 14, 1969	13	87	26	21	275	26	43	.4	68.0	419	327	12.4	695	7.6	.5
903	J. H. Stansberry	30	Apr. 25, 1969	18	111	47	50	393	62	120	1.0	9.0	610	470	18.8	1,056	7.5	1.0
904	Konita Sparks Choat	20	Apr. 14, 1969	15	142	14	29	381	53	58	.5	10.5	510	414	13.1	846	7.2	.6
43-801	T. R. Turner	75	Apr. 7, 1969	16	144	18	27	432	17	51	.2	40.5	530	432	11.9	888	7.4	.5
803	do	35	do	16	247	28	50	398	37	163	.3	315.0	1,050	730	12.9	1,550	7.2	.8
804	do	35	do	12	114	18	34	321	28	86	.5	15.0	466	360	17.0	816	7.4	.8
807	M. P. Renfro	100	do	13	70	33	19	331	26	29	.7	< .4	354	308	11.6	615	7.6	.5
808	do	100	do	18	118	20	29	375	16	54	.3	36.0	475	376	14.5	808	7.3	.7
49-101	Mozelle Nutt	139	Sept. 24, 1964	16	50	28	17	254	18	27	.6	9	420	238	13.6	525	7.4	.5
			May 14, 1969	16	58	24	18	264	14	28	.4	12.5	301	244	13.6	516	7.6	.5
201	G. H. Spiser	81	Sept. 24, 1964	17	58	22	19	226	17	36	.4	31	426	237	15.1	550	7.7	.5
			May 15, 1969	17	58	22	17	249	13	25	2.5	24.0	298	237	13.3	502	7.6	.5
208	Mrs. Florence Hall	60	Sept. 23, 1964	15	64	22	13	268	12	17	.3	23	434	249	9.9	515	7.5	.3
			May 14, 1969	16	65	20	21	267	15	28	.3	20.0	316	248	15.4	539	7.4	.6
209	W. L. Jacoby	84	do	14	87	13	11	304	12	21	.3	4.0	311	273	7.9	535	7.4	.3
302	J. E. Wood	50	Sept. 30, 1964	21	69	35	31	283	25	50	.8	68	580	317	17.3	735	7.3	.1
			May 15, 1969	15	67	22	20	276	17	28	.5	16.5	323	258	14.6	552	7.5	.6
306	J. M. Simpson	75	May 14, 1969	14	64	25	26	292	25	31	.7	10.5	341	263	17.6	577	7.8	.7

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
				Edwards and associated limestones--Continued														
DZ-42-49-403	Milton Schultz	78	May 14, 1969	17	61	24	52	290	37	58	0.6	8.0	401	253	30.9	681	7.4	1.4
404	J. E. Henderson	111	May 6, 1969	16	62	23	40	268	27	59	.5	10.5	371	252	26.0	641	--	1.0
501	Anton Lubke	105	Oct. 27, 1964	17	67	33	27	294	29	71	.5	18	570	304	21.0	730	7.7	.9
			May 14, 1969	16	68	35	159	300	140	169	.8	33.0	770	313	52.5	1,210	7.5	3.9
505	do	90	do	15	66	32	200	289	182	202	.9	24.0	860	297	59.5	1,400	7.5	5.1
602	B. F. Jacoby	54	Oct. 23, 1964	16	61	24	19	287	16	23	.5	14	461	251	13.9	545	7.7	.5
			May 14, 1969	15	71	24	17	305	13	21	.8	16.5	329	278	11.7	557	7.6	.4
801	Melvin Pfluger	132	Oct. 28, 1964	19	57	31	47	271	31	73	.6	25	260	273	27.4	730	7.4	1.2
			May 15, 1969	16	65	31	47	276	33	71	.5	29.0	429	291	26.2	772	7.6	1.2
902	Raymond Pfluger	74	May 14, 1969	16	68	29	40	262	36	73	.5	15.0	407	290	23.0	703	7.5	1.0
1/ 50-102	City of Eden	36	Aug. 1949	20	82	23	49	354	25	64	.4	4.0	--	299	26	--	7.7	1.2
			Oct. 10, 1958	--	72	25	39	332	23	54	.6	18	411	284	--	685	7.5	--
			Apr. 9, 1969	16	95	26	32	360	27	44	.5	24.5	443	345	16.8	730	7.4	.8
104	Albert Fowler	26	Sept. 22, 1964	19	87	23	34	342	25	38	.6	25	590	311	19.2	719	7.2	.8
124	J. B. Crunk	104	May 15, 1969	15	56	25	9	275	9	12	.4	10.0	271	242	7.1	468	7.6	.2
408	Raymond Pfluger	--	May 16, 1969	18	124	28	73	403	48	123	.4	25.5	640	424	27.2	1,060	7.2	1.5
502	E. L. Stephens	48	Nov. 10, 1964	24	110	30	50	444	39	59	.5	29	790	399	21.3	927	7.2	1.1
			May 19, 1969	24	135	36	67	477	49	119	.5	20.5	690	487	23.2	1,137	7.2	1.3
701	Raymond Pfluger	56	Oct. 22, 1964	18	65	22	23	272	18	30	.6	15	484	255	15.6	574	7.8	.6
702	do	167	May 19, 1969	15	47	25	15	248	12	22	.4	6.5	265	218	12.8	462	7.5	.4
705	Carl Pfluger	137	do	15	63	35	84	264	55	146	.6	9.0	540	303	37.8	988	7.7	2.1
			Aug. 11, 1970	16	61	35	79	262	48	142	.5	7.8	520	296	34.2	894	7.6	2.0
803	Luster Lockett	72	May 19, 1969	13	61	25	18	271	24	26	.6	14.0	315	258	13.0	584	7.4	.5
804	Mrs. I. R. Lockett	32	do	17	87	29	26	371	19	36	.3	17.0	413	335	14.3	705	7.3	.6
1/ 901	F. H. Skinner	100	June 21, 1961	16	49	28	34	264	22	44	.6	11	335	238	24	595	7.0	1.0
			May 19, 1969	16	59	29	31	270	24	53	.5	12.5	359	266	20.4	672	7.6	.8
51-101	Charles Jacobson	18	Oct. 16, 1964	21	198	22	243	278	257	375	1.1	116	1,510	590	47.4	2,150	7.2	4.3
503	Allan Ledbetter	60	Apr. 10, 1969	14	93	21	17	348	17	26	.4	14.0	373	319	10.4	639	7.7	.4
701	Daisy M. Brown	85	May 2, 1969	17	64	37	37	325	26	65	.7	4.0	411	313	20.6	722	7.5	.9
52-101	B. F. Baker	60	Mar. 28, 1969	10	102	52	71	460	48	135	1.2	< .4	650	471	24.7	1,135	7.6	1.4
57-103	Dan Sorrell	185	May 20, 1969	14	45	27	15	245	17	24	.5	5.0	268	226	12.6	471	7.4	.4
			Aug. 19, 1970	15	44	29	14	242	14	25	.5	7.5	269	229	11.9	457	7.8	.4
104	do	263	Nov. 5, 1964	16	42	26	13	234	11	24	.4	7	373	213	12.0	457	7.8	.2
			May 20, 1969	14	44	26	13	238	11	23	.4	6.5	255	217	29.5	450	7.6	.4
206	John Nichols	180	Oct. 27, 1964	15	44	26	14	246	13	23	.5	4	386	217	12.5	467	7.8	.4
			May 20, 1969	15	53	26	19	266	18	28	.5	3.0	294	240	14.7	509	7.6	.5
301	Walter Hanusch	127	do	16	83	21	31	254	21	62	.3	46.0	405	593	18.7	684	7.5	.8

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

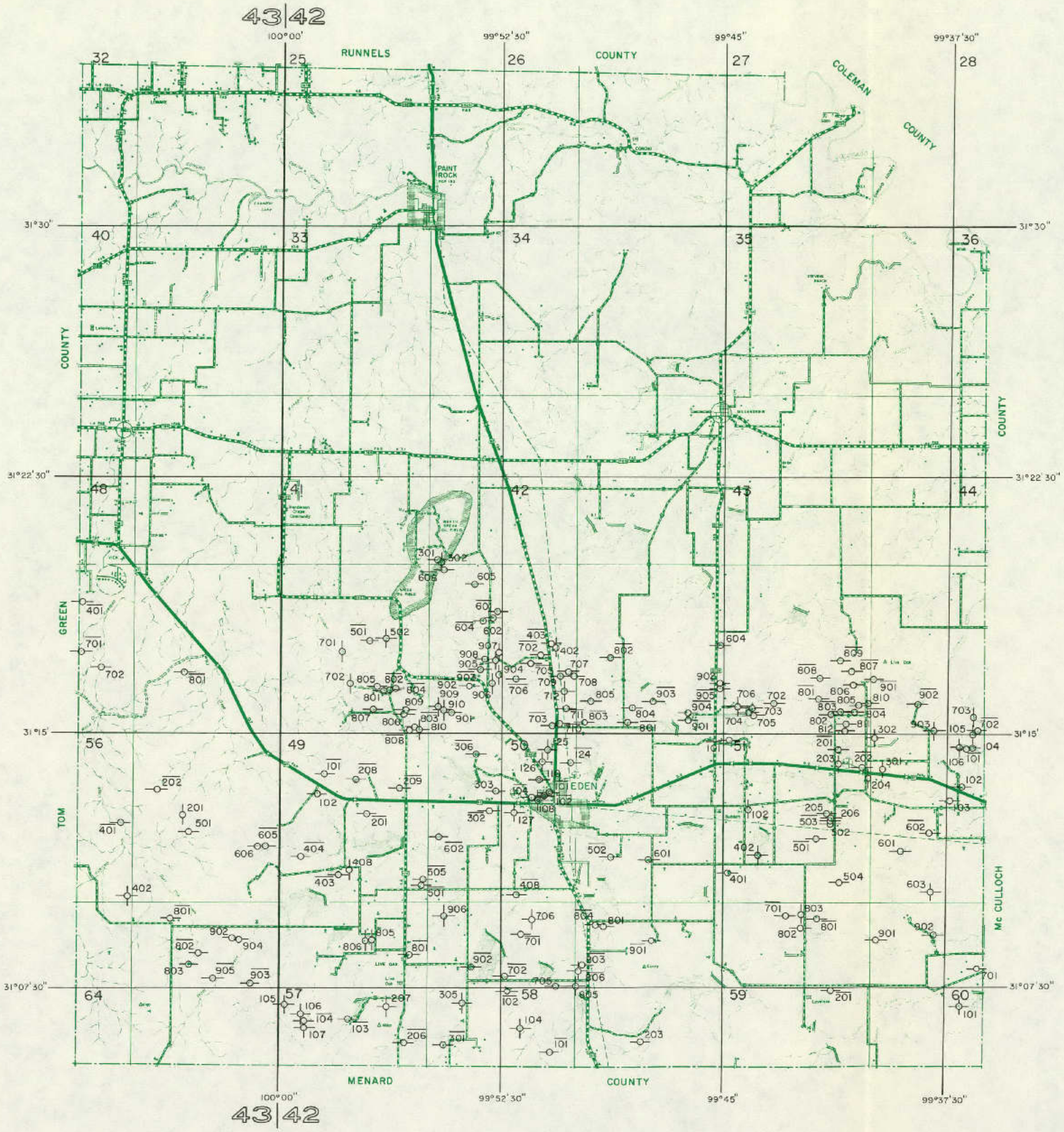
Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Edwards and associated limestones--Continued											
02-42-58-101	Carl Pfluger	160	May 21, 1969	15	61	26	15	281	19	24	0.5	7.5	307	259	11.4	526	7.5	0.4
102	J. T. Beauchamp	100	Nov. 13, 1964	18	65	29	24	337	11	33	.5	< .4	520	280	15.6	610	7.6	.4
			May 21, 1969	18	40	22	25	223	17	32	.4	4.0	268	192	22.3	467	7.8	.8
59-201	Daisy M. Brown	35	May 2, 1969	18	79	32	23	370	19	22	.8	24.5	401	331	13.0	677	7.5	.5
43-48-801	John M. Chambers Estate	100	Mar. 26, 1969	17	86	49	55	420	89	65	.9	6.5	580	417	22.4	950	7.7	1.1
56-202	do	120	do	11	84	32	13	393	11	21	.3	2.0	367	342	7.5	638	7.5	.3
401	do	--	Mar. 27, 1969	23	115	38	20	473	36	38	.4	< .4	500	445	8.7	844	7.6	.4
801	Nannie Slator	--	Apr. 30, 1969	15	74	27	13	307	33	21	.4	5.5	340	295	8.7	576	7.5	.3
802	do	--	do	13	82	13	13	260	37	22	.4	1.5	310	258	10.0	516	7.5	.4
903	J. R. Canning	260	Oct. 30, 1964	17	43	33	16	265	22	21	1.0	1.5	420	241	12.7	501	7.8	.5
			May 22, 1969	14	45	31	17	270	23	20	.9	< .4	284	240	13.1	491	7.6	.5
905	Nannie Slator	--	Apr. 30, 1969	13	51	28	17	275	15	26	.6	< .4	286	243	12.9	503	7.6	.5
							Alluvium											
42-44-702	J. T. Rice	60	Apr. 2, 1969	15	92	28	36	417	25	39	.8	2.0	443	345	18.6	761	7.6	.9

1/ Analysis by U.S. Geological Survey.

CONCHO COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
DZ-42-41-502	Progress Petroleum Co. of Texas	Speck Ranch No. 4
810	Mullins-Davis & Davenport	E. L. Martin No. 1
909	Eltex Ltd.	Do.
910	do	E. L. Martin No. 3
42-712	B. A. Duffy	Burley Burk No. 1
43-706	E. M. Thomasson	C. T. Keys No. 1
903	Walter C. Nelson	Jim Rice No. 1
49-906	Morgan Drilling Co.	Anton Lubke No. 1
50-125	Northern Ordnance, Inc.	Henry Community No. 1
126	do	Leta Sorrell
127	do	Lee Community
706	Signal Oil Corp.	Sam Waring No. 1
805	Murray Petroleum	Luster Lockett No. 1
806	Schimmel Production Corp.	Sam Waring No. 2
51-302	Cosden Petroleum Corp.	G. W. Jenkins No. 1
402	Mae Belcher	Will Loveless No. 1
603	James L. Duffy & Watchern Oil & Gas Co.	Mrs. Lula Noyes No. 2
52-106	Lamb & Ford Drilling Co.	Jim Rice No. 1
57-105	Southern Minerals Corp.	A. R. Henderson No. 1
106	B. A. Duffy	Robert Wilson No. 1
107	El Producto Oil Co.	Do.
207	Dobbs & Bradshaw	J. W. Welty No. 1
305	Nash-Cook Oil Co.	Georgia Wooten, et al. No. 1
58-104	Mintex Oil Co.	Elizabeth Waring Ranch No. 2
60-101	Anzac Oil Corp.	G. R. White No. 1
43-56-402	Progress Petroleum Co. of Texas	Cora A. Henderson No. 1



EXPLANATION

Public supply well

Domestic or livestock well

Oil or gas well

Unused or abandoned well

$\overline{101}$

Line above well number indicates chemical analysis given in Table 7

0 2 4 Miles

0 2 4 Kilometers

Base map from general highway map of the State Department of Highways and Public Transportation

Location of Selected Water, Oil, and Gas Wells in Concho County

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Qal, Alluvium; Kea, Edwards and associated limestones; Kt, Trinity Group; Trs, Santa Rosa Formation.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps unless otherwise designated by footnotes.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; E, electric; G, natural gas, butane, or gasoline; S, submersible; T, turbine; W, wind; N, none.
Use of water : D, domestic; Irr, irrigation; P, public supply; S, livestock; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* HJ-44-60-703	V. J. Powell	Joe Bean	--	--	6	--	Kea	--	--	--	S, E	S	--
* 803	do	do	--	--	4	--	Trs	--	--	--	S, E	D, S	Drilled well 10 to 20 feet below red beds and cased off Trinity sandstone.
* 903	do	do	--	475	8	--	Kea, Kt	2,757	450.4 447.4	Nov. 29, 1964 Feb. 10, 1970	C, W	S	1/
* 61-503	Joe Strauss	--	--	--	6 4	-- --	Kea	2,577	276 275.4	Oct. 16, 1962 Feb. 16, 1970	S, E	S	1/
* 805	do	--	--	275	6	--	Kea	--	--	--	S, E	--	--
* 64-403	University of Texas	E. H. Linthicum	--	400	5-1/2	--	Kea	2,551	279.4 277.97	July 24, 1962 Aug. 25, 1967	C, W	S	1/
* 404	do	do	1940	380	6	20	Kea	2,619	346.34	do	C, W	S	--
* 904	do	Aubrey Delong	--	300	6	--	Kea	2,493	227.2 167.5	July 20, 1962 Apr. 1, 1970	C, W	S	1/
* 45-64-901	Noelke Estate	W. D. Smith	1952	200	8	160	Qal, Kt	2,259	76.5 49.64	Sept. 24, 1960 Dec. 10, 1970	S, E	Irr	Observation well. 1/
54-01-607	Windel Parker	--	--	124	16 14	71 124	Qal, Kt	2,171	33.26 31.14	Dec. 2, 1964 Dec. 10, 1970	T, G	Irr	Perforated casing from 64 to 124 feet. Reported yield, 1,200 gpm in 1964. Observation well. 1/
* 04-101	V. J. Powell	Joe Bean	--	--	8	--	Kea, Kt	2,201	414.9	Nov. 29, 1962	S, E	S	1/
* 303	J. M. Shannon Estate	Bill Black	--	--	6	--	Kea	2,695	401.6 404.4	Nov. 27, 1962 Feb. 16, 1970	C, W	S	1/
* 402	do	Mrs. Charles Black, Jr.	--	450	6	--	Kea, Kt	2,635	350.4 313.1	Nov. 27, 1962 Feb. 10, 1970	C, W	S	1/
* 501	do	Bill Black	--	438	--	--	Kea	2,651	363 334.3	Sept. 22, 1960 Feb. 10, 1970	C, W	S	1/
* 602	do	do	1942	--	6	--	Kea	2,560	301.2 311.9	Nov. 27, 1962 Feb. 16, 1970	C, W	S	1/
* 701	do	Mrs. Charles Black, Jr.	--	--	6	--	Kea	2,582	--	--	C, W	S	--
* 904	do	do	--	335	6	--	Kea	2,500	298.0 296.0	Nov. 27, 1962 Mar. 31, 1970	C, W	S	1/
* 05-103	Carl Pfluger	--	--	350	6	--	Kea	2,557	273.1 271.50	Nov. 19, 1962 Feb. 16, 1970	C, W	S	1/
* 502	J. M. Shannon Estate	Bill Black	--	--	6	--	Kea	2,521	267.3 267.25	Nov. 27, 1962 Feb. 16, 1970	C, W	S	1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* HJ-54-05-702	J. M. Shannon Estate	Joe Mayer	--	--	6	--	Kea	2,432	195.5 196.80	Feb. 19, 1963 Feb. 17, 1970	S, E	D, S	1/
* 801	do	Marvin Doyle	--	--	6	--	Kea	--	--	--	S, E	S	--
* 06-401	University of Texas	L. C. Brooks	--	--	--	--	Kea	--	--	--	S, E	D, S	--
* 503	do	Bud Coats	--	620	--	--	Kea	2,661	423.5 327.60	Oct. 20, 1962 Feb. 9, 1970	C, W	S	Water level questionable for 1970. 1/
505	do	El Paso Natural Gas	--	--	16	--	Kea, Kt	2,652	418.2 408.1 406.33	Oct. 29, 1962 Dec. 9, 1966 Dec. 9, 1970	N	N	Unused industrial well. Observation well. 1/
* 07-604	do	W. R. Bissett	--	--	6	--	Kea	2,619	380.6 385.0	Aug. 11, 1962 Apr. 1, 1970	C, W	S	1/
* 08-702	John Childress	--	--	--	6	--	Kea	2,486	289.4 308.9	Aug. 23, 1962 Apr. 1, 1970	C, W	S	1/
* 10-803	C. W. Meadows, et al.	--	1966	100	10	100	Qal	2,150	19.9	Sept. 15, 1966	N	N	Unused industrial well. Slotted casing from 30 to 100 feet.
* 11-501	A. C. Hoover	Walter W. Owens	--	--	--	--	Kea, Kt	2,335	150.59 150.99 174.42 155.44 159.19	Dec. 9, 1955 Dec. 6, 1961 Nov. 30, 1967 Dec. 2, 1969 Apr. 15, 1971	T, G	Irr	Reported yield, 500 gpm in 1965; 1,200 gpm in 1971. Observation well.
502	do	do	--	260	--	--	--	2,320	138.6 142.19 142.31 141.36	Feb. 2, 1961 Dec. 8, 1966 Dec. 2, 1969 Apr. 15, 1971	N	N	Unused irrigation well. Observation well.
* 508	do	--	--	--	--	--	Qal, Kea	2,298	101.9 114.1	June 4, 1963 Mar. 31, 1970	S, E	D, S	1/
801	do	Amos Owens	--	--	16	--	--	2,255	92.05 89.80 92.75	Dec. 7, 1953 Mar. 6, 1964 Dec. 2, 1969	T, G	Irr	Observation well.
* 806	J. W. Owens	--	-	Spring	--	--	Kea	2,160	--	--	--	Irr	Spring discharge is retained by an earthen dam.
* 903	A. C. Hoover	John Childress	--	--	--	--	Qal, Kea, Kt	2,225	51.30 47.84 50.76 49.89	Dec. 7, 1953 Dec. 7, 1959 Mar. 6, 1964 Dec. 2, 1969	T, G	Irr	Estimated yield, 600 gpm in 1953. Observation well.
* 905	do	--	--	--	6	--	Kea	2,306	139.1 137.5	Dec. 11, 1962 Feb. 12, 1970	C, W	S	1/
* 12-101	J. M. Shannon Estate	Mrs. Charles Black, Jr.	--	--	6	--	Kea	2,653	455.8 459.4	Nov. 27, 1962 Feb. 9, 1970	C, W	S	1/
* 201	J. S. Todd Estate	--	--	--	--	--	Kea	--	--	--	C, W	S	--
* 302	J. M. Shannon Estate	Joe Mayer	--	--	6	--	Kea	--	--	--	C, W	S	--
* 502	J. S. Todd Estate	Vick Montgomery	1958	--	--	--	Kea	2,547	349.6 353.8	Nov. 26, 1962 Feb. 19, 1970	C, W	S	1/
* 602	do	do	--	--	6	--	Kea	2,377	164.4 166.7	Nov. 26, 1962 Feb. 17, 1970	C, W	D, S	1/
* 13-303	J. M. Shannon Estate	Joe Mayer	1934	--	6	--	Kea	2,583	166.2 146.2	Feb. 15, 1963 Feb. 9, 1970	C, W	S	1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* HJ-54-13-401	J. S. Todd Estate	George Bunger	--	--	--	--	Kea	2,342	159 153.8	Dec. 13, 1962 Apr. 2, 1970	N	N	Unused industrial well. 1/
* 405	do	do	1930	--	--	--	Kea, Kt	2,320	248.5 252.7	Dec. 13, 1962 Feb. 9, 1970	C, W	S	1/
* 604	do	Mrs. Bill Fields	--	--	--	--	Kea	2,562	391.8 401.7	Dec. 14, 1962 Feb. 19, 1970	C, W	S	1/
* 801	do	George Bunger	--	--	6	--	Kea, Kt	2,496	340.0 364.0	Dec. 13, 1962 Feb. 17, 1970	C, W	S	1/
* 802	do	Mrs. Bill Fields	--	--	--	--	Kea, Kt	2,451	282.0 287.7	Dec. 14, 1962 Feb. 13, 1970	C, W	S	1/
* 902	Joe Bean	--	--	--	6	--	Kea, Kt	--	--	--	S, E	D, S	--
* 903	University of Texas	George Bunger	--	--	6	--	Kea, Kt	2,629	486.6	Dec. 13, 1962	C, W	S	1/
* 14-201	R. L. Vaughan	--	--	--	6	--	Kea	2,615	369.6	Nov. 2, 1962	C, W	S	1/
* 503	Christine Bean	--	1959	467	6	--	Kea	2,630	429.3	do	S, E	D, S	1/
* 603	do	--	--	458	6	--	Kea	2,592	402.1 400.1	do Feb. 9, 1970	C, W	S	1/
* 15-303	John Childress	--	--	--	6	--	Kea	2,537	362.6 361.0 368.8	Aug. 23, 1962 Dec. 9, 1966 Feb. 17, 1970	S, E	D, S	Observation well. 1/
* 804	W. B. Baggett	--	1933	340	6	--	Kea	--	--	--	C, W	D, S	--
* 16-101	A. C. Luckett	Maurice Black	--	400	6	--	Kea	2,535	357.7	Aug. 23, 1962	C, W	D, S	1/
* 702	John Childress and R. A. Harrell	--	--	--	6	--	Kea	2,493	325.0	Sept. 5, 1962	C, W	S	1/
* 19-301	University of Texas	J. W. Owens	--	--	6	--	Kea	2,201	66.1 61.9	Dec. 12, 1962 Feb. 12, 1970	C, W	S	1/
* 305	do	do	--	--	6	--	Kea	2,371	240.7 237.6	Dec. 12, 1962 Feb. 12, 1970	C, W	S	1/
801	Leo Richardson	--	1947	80	72	--	Kt	2,041	40.48 36.05 35.16 36.17 38.37	Jan. 30, 1953 Dec. 8, 1957 Feb. 8, 1961 Dec. 6, 1965 Dec. 9, 1970	T, E	Irr	Observation well.
901	B. B. Ingram, Jr.	--	1953	101	18	101	--	2,016	23.13 22.89 24.74 22.26	Dec. 9, 1955 Dec. 5, 1961 Dec. 6, 1965 Dec. 9, 1970	T, E	Irr	Slotted casing. Observation well.
* 20-101	University of Texas	J. W. Owens	--	--	--	--	Kea	--	--	--	C, W	S	--
* 301	do	Lee Childress	1900	360	8	--	Kea	2,500	--	--	C, W	S	--
* 21-201	do	Floyd Henderson	--	--	--	--	Kea	2,353	217.9 216.4	Dec. 13, 1962 Feb. 18, 1970	C, W	D, S	1/
* 303	do	George Bunger	--	--	--	--	Kea	2,340	225.4 203.3	Dec. 13, 1962 Feb. 13, 1970	C, W	S	1/
* 602	do	Boyd Clayton	--	300	--	--	Kea	2,373	283.7	June 3, 1963	N	N	Unused domestic and livestock well. 1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* HJ-54-21-801	University of Texas	J. W. Henderson	1940	360	--	--	Kea	2,307	214.4 217.4	Mar. 18, 1963 Feb. 18, 1970	C, W	S	1/
* 802	do	Roy Henderson	--	195	--	--	Kea	--	--	--	C, W	S	--
* 22-302	F. R. Henderson	--	--	--	6	--	Kea	2,553	400.0	Sept. 20, 1962	C, W	S	1/
* 901	Mrs. Ruby Helbing	E. H. Chandler	--	--	--	--	Kea	2,525	412.0	Mar. 19, 1962	C, W	S	1/
23-107	Crockett County Water Control District	--	1963	390	--	--	Kea	2,407	339.8 332.14 308.42	Feb. 10, 1963 Nov. 29, 1967 Dec. 9, 1970	N	N	1/ Abandoned public-supply well. Observation well.
109	do	--	1967	400	--	--	--	--	--	--	T, E	P	--
110	do	--	--	--	--	--	--	--	--	--	S, E	P	--
* 405	C. W. Meadows Estate	E. H. Chandler	--	350	--	--	Kea	--	--	--	C, W	S	--
* 24-201	John Childress	--	--	401	6	--	Kea	--	--	--	C, W	S	--
* 402	Crockett County Water Control District	--	1958	420	8	75	Kea	2,462	361.95 363.2 371.78	Apr. 3, 1962 Dec. 9, 1966 Dec. 8, 1970	N	N	Unused public-supply well. Observation well. 1/
* 502	C. E. Davidson, III	--	--	403	6	--	Kea	2,478	357.0 370.9	Sept. 6, 1962 Feb. 19, 1970	C, W	S	1/
607	Warren and Billy Hemphill	--	--	438	6	--	Kea	2,476	362.8	Feb. 13, 1971	S, E	S	--
* 28-702	L. B. Cox, Jr.	--	--	600	--	--	Kea, Kt	--	--	--	C, W	S	--
* 29-701	S. S. Millspaugh	A. C. Millspaugh	--	--	--	--	Qal, Kea	2,079	82.3 57.1	Mar. 12, 1963 Mar. 31, 1970	C, W	S	1/
* 30-501	Joe Bean	--	--	--	--	--	Kea	2,329	262.6 253.8	Mar. 21, 1963 Mar. 31, 1970	C, W	D, S	1/
* 31-601	C. E. Davidson, III	--	1917	--	8	--	Kea	2,219	215.7 214.1	Sept. 26, 1962 Apr. 3, 1970	C, W	S	1/
* 37-101	J. W. Henderson	--	--	--	--	--	Kea	2,030	53.7 45.6	Mar. 18, 1963 Feb. 18, 1970	C, W	D, S	1/
* 702	Bill Clegg	--	--	140	--	--	Kea	1,943	123.1 121.5	Mar. 14, 1963 Feb. 18, 1970	S, E	D, S	1/
* 39-602	Eugene Miller	--	--	325	6	--	Kea	2,120	277.0 280.0	Oct. 4, 1963 Apr. 3, 1970	S, E	D, S	1/
* 40-702	Emma Adams	George Montgomery	--	--	--	--	Kea	1,980	199.6 199.8	Oct. 2, 1963 Apr. 3, 1970	C, W	D, S	1/
* 46-304	Dempster Jones	--	--	--	--	--	Kea	--	--	--	C, W	D, S	--
* 48-101	Emma Adams	George Montgomery	1947	--	--	--	Kea	2,192	381.6	Oct. 2, 1962	C, W	S	1/
* 301	James Baggett	--	--	400	6	10	Kea	2,040	239.0	Oct. 3, 1962	C, E	D, S	1/
55-09-703	J. R. Bailey	--	1964	440	11	10	--	2,475	341.8 343.6	Dec. 7, 1965 Dec. 8, 1970	S, E	S	Observation well.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* HJ-54-25-401	Hudspeth Memorial Hospital	--	--	345	--	--	Kea	2,279	298 287.8	July 6, 1963 Feb. 13, 1969	C, W	S	1/
* 403	do	--	1944	--	6	--	Kea	2,200	237.8 233.5	July 6, 1963 Feb. 13, 1969	C, W	S	1/

* Chemical analysis of water given in Table 7.
1/ Texas Water Development Board Report 47, "Occurrence and Quality of Ground Water in Crockett County, Texas."

CROCKETT COUNTY

Table 7.--Chemical Analyses of Water From Wells and Springs

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Santa Rosa Formation											
1/ HJ-44-60-803	V. J. Powell	--	Nov. 29, 1962	12	117	134	420	398	837	415	2.8	< 0.4	2,134	834	51.9	3,000	7.4	6.31
			Feb. 10, 1970	6	106	131	404	340	770	430	3.4	< .4	2,020	800	52.2	2,650	7.7	6.2
					Edwards and associated limestones and Trinity Group													
1/ 903	V. J. Powell	475	Nov. 29, 1962	12	216	122	1,650	306	551	2,750	.8	3.1	5,455	1,039	77.5	8,500	7.4	14.04
			Feb. 10, 1970	10	138	109	660	327	540	1,000	2.2	< .4	2,620	800	64.2	3,690	7.5	10.1
1/ 54-04-101	do	--	Nov. 29, 1962	17	280	175	1,910	267	512	3,280	1.2	4.2	6,310	1,414	74.6	9,450	7.4	22.01
			Feb. 10, 1970	11	120	125	286	356	710	272	2.8	< .4	1,700	810	43.3	2,310	7.5	4.4
1/ 402	J. M. Shannon Estate	450	Nov. 28, 1962	13	98	86	200	326	514	148	2.3	< .4	1,221	598	42.1	1,800	7.5	2.48
			Feb. 10, 1970	25	63	17	27	227	39	44	.7	< .4	328	226	20.8	525	7.9	.8
1/ 11-501	A. C. Hoover	--	Jan. 26, 1954	22	83	42	58	281	126	93	1.4	3.2	569	380	--	953	7.6	--
1/ 13-405	J. S. Todd Estate	--	Feb. 19, 1963	14	82	42	166	312	252	162	1.5	4.2	877	377	48.8	1,400	7.5	3.71
			Feb. 9, 1970	13	77	30	102	296	157	96	1.0	4.5	630	317	41.2	994	7.4	2.5
1/ 801	do	--	Feb. 19, 1963	10	156	92	555	371	871	562	2.4	< .4	2,430	770	61.0	3,650	7.4	8.68
			Feb. 17, 1970	8	162	90	540	372	870	550	2.6	< .4	2,410	780	60.2	3,370	8.0	8.4
1/ 802	do	--	Feb. 14, 1963	6	121	98	589	318	913	570	2.5	< .4	2,265	705	64.5	3,625	7.8	9.63
			Feb. 13, 1970	9	138	90	497	375	770	500	2.6	< .4	2,190	720	60.1	3,060	7.4	8.1
1/ 902	Joe Bean	--	Nov. 8, 1963	11	135	90	288	355	713	488	2	< .4	1,901	703	60.1	2,082	7.5	8.01
			Feb. 13, 1970	5	125	90	494	305	780	499	2.4	< .4	2,150	680	60.9	3,110	7.9	8.2
1/ 903	University of Texas	--	Feb. 19, 1963	12	122	78	357	324	605	387	2.1	2.9	1,726	624	55.4	2,650	7.6	6.20
			Feb. 13, 1970	11	124	74	341	323	550	366	2.4	2.0	1,630	610	51.8	2,370	7.6	8.4
1/ 28-702	L. B. Cox, Jr.	600	Mar. 11, 1963	18	51	28	40	239	47	56	3.2	6	367	245	27.2	645	7.5	1.01
			Mar. 31, 1970	8	89	63	198	303	381	197	2.4	< .4	1,090	483	47.2	1,650	7.5	3.9
						Edwards and associated limestones												
1/ 44-60-703	V. J. Powell	--	Nov. 29, 1962	16	294	173	2,961	299	884	4,675	1.5	8	9,160	1,447	81.4	> 12,000	7.1	16.08
			Feb. 10, 1970	16	81	37	50	266	146	60	1.7	4.0	530	354	23.4	823	7.8	1.2
1/ 61-503	Joe Strauss	--	July 3, 1957	--	152	30	327	359	260	372	--	--	--	--	--	--	--	--
1/			Apr. 1958	--	301	53	1,111	314	242	2,039	--	--	4,060	--	--	--	--	--
1/			Oct. 16, 1962	20	160	40	443	330	148	760	.6	4.9	1,738	565	63.0	2,760	7.2	8.09
			Feb. 16, 1970	19	176	29	510	315	133	910	.7	7.0	1,940	560	66.5	3,190	7.2	9.2
1/ 805	do	275	Apr. 1958	--	333	66	2,186	326	321	3,728	--	--	6,860	--	81.1	--	--	29.90
1/			Oct. 16, 1962	21	204	53	1,473	333	212	2,457	.5	4.4	4,589	726	81.5	6,550	7.4	31.30
			Feb. 16, 1970	20	195	31	640	325	138	1,140	.7	7.0	2,330	610	69.4	3,790	7.3	11.2

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
						Edwards and associated limestones--Continued												
1/ HJ-44-64-403	University of Texas	400	July 24, 1962	15	62	38	55	298	108	57	1.2	2.4	486	315	--	828	8.3	--
			Aug. 25, 1967	13	67	39	46	306	103	51	1.6	7.0	478	327	23.2	790	7.8	1.1
404	do	380	do	11	57	32	39	266	74	44	1.1	< .4	389	276	23.3	666	7.9	1.0
1/ 904	do	300	July 20, 1962	26	59	21	22	245	26	27	.6	7	309	233	17.1	550	7.5	.62
			Apr. 1, 1970	15	63	20	22	257	29	26	.8	4.0	306	238	16.5	515	7.6	.6
1/ 54-04-303	J. M. Shannon Estate	--	Nov. 28, 1962	11	115	124	334	377	655	367	2.5	< .4	1,635	796	47.7	2,650	7.4	5.20
			Feb. 16, 1970	< 1	32	48	171	129	266	179	1.1	< .4	770	278	57.2	1,250	6.9	4.4
1/ 501	do	438	Dec. 5, 1962	12	75	75	142	309	354	133	2.3	< .4	945	498	38.3	1,500	7.5	2.53
			Feb. 10, 1970	12	67	83	155	300	376	151	2.7	< .4	1,000	510	39.8	1,510	8.3	3.0
1/ 602	do	--	Nov. 28, 1962	12	118	114	324	371	659	330	2.5	< .4	1,738	763	48.0	2,600	7.4	5.23
			Feb. 16, 1970	5	118	110	317	351	660	339	3.0	< .4	1,730	750	48.0	2,460	7.6	5.0
1/ 701	do	--	Nov. 28, 1962	26	65	28	27	284	44	34	.8	5.6	370	277	17.5	615	7.5	.86
			Apr. 1, 1970	8	62	20	23	201	35	27	.7	< .4	255	190	21.1	445	7.8	.7
1/ 904	do	335	Dec. 5, 1962	28	74	25	43	266	52	70	1.0	6	430	289	24.2	729	7.4	1.10
			Mar. 31, 1970	21	80	21	54	266	47	91	1.0	6.5	453	285	29.2	755	7.6	1.4
1/ 05-103	Carl Pfluger	350	Nov. 19, 1962	9	81	85	417	312	539	400	2.8	< .4	1,687	553	62	2,840	7.4	8.03
			Feb. 16, 1970	4	55	66	317	275	418	305	2.2	< .4	1,300	406	62.6	1,990	7.9	6.8
1/ 502	J. M. Shannon Estate	--	Nov. 28, 1962	11	132	106	544	361	817	553	2.5	< .4	2,344	765	60.7	3,310	7.5	8.56
			Feb. 16, 1970	7	141	108	530	372	830	570	2.9	< .4	2,370	800	59.2	3,340	7.7	8.2
1/ 702	do	--	Feb. 19, 1963	6	82	97	508	249	742	533	2.5	< .4	2,093	602	64.7	3,200	7.7	9.01
			Feb. 17, 1970	5	123	109	530	340	830	550	3.4	< .4	2,320	750	60.3	3,280	8.2	8.3
1/ 801	do	--	Feb. 19, 1963	14	116	61	456	314	251	712	1.0	3.0	1,768	540	64.7	3,050	7.8	8.11
			Feb. 9, 1970	18	111	55	429	311	251	660	1.1	3.5	1,680	500	64.9	2,570	7.9	8.3
1/ 06-401	University of Texas	--	Nov. 21, 1962	16	90	41	230	299	143	350	1	2.1	1,020	392	56.1	1,850	7.5	5.02
			Feb. 17, 1970	6	76	63	384	317	540	342	2.7	< .4	1,570	449	65.1	2,360	7.7	7.0
1/ 503	do	620	Nov. 5, 1962	15	64	39	179	259	104	254	1.2	6	790	321	54.8	1,460	7.9	4.36
			Feb. 9, 1970	13	56	43	192	242	141	282	1.7	2.0	850	318	56.8	1,440	8.3	4.7
1/ 07-604	do	--	Aug. 11, 1962	20	50	24	20	237	25	28	.7	7	292	224	15.9	495	7.4	.66
			Apr. 1, 1970	15	55	20	17	244	23	21	.8	5.0	277	222	14.1	474	7.6	.6
1/ 08-702	John Childress	--	Aug. 22, 1962	17	57	15	10	236	16	14	.4	5.3	251	203	9.3	425	7.6	.29
			Apr. 1, 1970	14	61	14	9	228	14	11	.5	8.0	244	210	8.3	410	7.7	.3
1/ 11-806	J. W. Owens	Spring	Dec. 7, 1959	20	365	98	1,230	218	338	2,450	--	--	4,610	1,310	67.0	7,800	7.2	15.0
1/			Dec. 11, 1962	21	273	80	1,639	264	412	2,791	.3	4.4	5,351	1,009	77.9	8,550	7.8	21.70
			Feb. 12, 1970	26	100	32	41	323	84	83	1.0	4.5	530	384	18.8	839	7.4	.9
1/ 905	A. C. Hoover	--	Dec. 11, 1962	24	260	77	1,370	271	379	2,330	.5	5.5	4,579	965	75.5	7,350	7.2	15.89
			Feb. 12, 1970	1	130	59	990	104	256	1,680	.8	< .4	3,170	570	79.2	4,770	7.1	18.1
1/ 12-101	J. M. Shannon Estate	--	Dec. 5, 1962	26	193	67	763	249	161	1,372	.8	7	2,711	759	68.6	4,600	7.2	12.36
			Dec. 9, 1970	25	119	39	326	266	120	590	1.0	5.5	1,360	459	60.7	2,240	7.5	6.5
1/ 201	J. S. Todd Estate	--	Feb. 26, 1963	18	284	80	1,970	272	520	3,320	1.5	4.2	6,332	1,040	80.7	9,800	7.2	22.28
			Feb. 18, 1970	19	156	34	760	288	207	1,240	.7	7.0	2,570	530	75.7	4,190	7.4	14.3
1/ 302	J. M. Shannon Estate	--	Dec. 19, 1962	17	366	108	2,380	244	652	4,150	.2	2	7,795	1,356	79.3	11,500	7.5	28.60
			Feb. 9, 1970	20	234	58	1,200	290	311	2,010	.7	5.0	3,980	830	75.9	5,730	7.3	18.9

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
					Edwards and associated limestones--Continued													
1/ UJ-54-12-502	J. S. Todd Estate	--	Nov. 26, 1962	13	75	64	207	343	331	180	2.3	< .4	1,041	449	50.1	1,620	7.4	4.28
			Feb. 19, 1970	20	74	17	12	276	17	19	.6	8.5	305	256	8.8	498	7.5	.3
1/ 602	do	--	Feb. 26, 1963	14	59	36	112	277	175	105	2	.5	644	295	46.4	1,066	7.5	2.96
			Feb. 17, 1970	15	71	30	85	299	122	77	1.1	2.0	550	299	38.3	889	7.6	2.0
1/ 13-303	J. M. Shannon Estate	--	Dec. 19, 1962	15	131	51	896	210	243	1,517	.6	4	2,961	539	78.3	5,025	7.6	16.86
			Feb. 9, 1970	22	65	10	17	223	18	22	.6	8.0	273	204	15.4	449	7.6	.5
1/ 401	J. S. Todd Estate	--	Feb. 19, 1963	22	105	18	51	317	86	70	.3	12	520	335	24.9	866	7.3	1.71
			Apr. 2, 1970	21	98	18	42	332	71	43	.5	8.0	465	318	22.5	738	7.6	1.0
1/ 604	do	--	Dec. 14, 1962	8	120	82	497	370	705	493	2.0	< .4	2,089	638	62.8	3,200	7.7	8.57
			Feb. 19, 1970	8	137	81	510	378	730	479	2.7	< .4	2,130	680	61.9	3,020	7.6	8.5
1/ 14-201	R. L. Vaughn	--	Nov. 6, 1962	16	59	34	61	331	4	95	1.5	< .4	434	286	31.8	804	7.4	2.02
			Apr. 1, 1970	17	62	33	110	255	42	190	1.9	11	590	292	45.1	1,039	7.5	2.8
1/ 503	Christine Bean	467	Nov. 5, 1962	16	102	57	932	258	61	1,546	1	6	2,848	490	80.5	5,130	7.7	5.79
			Apr. 1, 1970	15	80	36	580	262	53	970	1.2	< .4	1,860	349	78.3	2,900	7.8	13.4
1/ 603	do	458	Nov. 6, 1962	15	45	26	18	231	15	25	.9	10	269	221	14.9	489	7.7	.52
			Feb. 9, 1970	17	43	25	23	240	17	37	1.0	3.0	284	213	19.4	484	7.4	.7
1/ 15-303	John Childress	--	Aug. 23, 1962	18	59	19	17	242	21	22	1.2	5.3	280	224	13.9	492	7.8	.15
			Feb. 17, 1970	16	60	19	16	244	20	23	1.2	12	287	228	13.5	479	7.7	.5
1/ 804	W. B. Baggett	340	Nov. 7, 1962	16	50	27	14	264	21	18	.5	4.4	281	236	8.6	504	7.4	.45
			Feb. 20, 1970	15	50	28	17	270	25	19	.8	3.5	292	241	13.3	493	7.7	.7
1/ 16-101	A. C. Luckett	400	Aug. 23, 1962	18	53	27	24	248	45	34	1.5	6.2	330	246	17.3	570	7.7	.76
			Apr. 2, 1970	15	57	29	29	253	50	40	2.2	10	356	262	19.1	594	7.7	.76
1/ 702	John Childress and R. A. Harrell	--	Aug. 22, 1962	20	56	20	18	242	24	25	.6	5.8	288	224	15.2	500	7.8	.54
			Apr. 2, 1970	16	59	25	21	238	26	34	.9	20	319	248	15.7	539	7.9	.6
1/ 19-301	University of Texas	--	Dec. 12, 1962	22	292	74	999	261	414	1,884	.4	7	3,820	1,032	67.8	6,200	7.1	13.5
			Feb. 12, 1970	22	135	31	320	316	158	820	.8	8.0	1,850	466	70.9	2,780	7.3	8.8
1/ 305	do	--	July 20, 1963	16	61	24	29	264	41	33	.7	4.9	341	250	20.1	592	7.6	2.50
			Feb. 12, 1970	16	61	22	28	259	42	35	.8	4.5	337	243	20.0	556	7.7	.8
1/ 20-101	do	--	Dec. 11, 1962	5	167	57	1,410	151	182	2,430	.4	< .4	4,325	652	82.5	7,151	6.9	24.00
			Feb. 12, 1970	25	203	41	540	253	150	1,070	.5	8.0	2,160	680	63.3	3,520	7.9	6.7
1/ 301	do	360	Sept. 14, 1960	10	106	82	333	358	564	315	--	.2	1,590	602	55.0	2,430	7.0	5.90
			Feb. 12, 1970	9	114	84	321	361	570	326	2.6	< .4	1,610	630	52.5	2,230	7.7	5.5
1/ 21-201	do	--	Dec. 13, 1962	26	70	24	34	276	49	41	.6	9	390	273	21.3	650	7.7	.89
			Feb. 18, 1970	24	68	21	23	268	37	28	.7	8.5	343	254	16.7	547	7.9	.7
1/ 303	do	--	Feb. 19, 1963	10	133	83	631	338	703	452	2.5	< .4	1,981	671	58.2	3,000	7.6	7.46
			Feb. 13, 1970	3	107	90	473	250	720	490	2.5	< .4	2,010	640	61.7	2,860	8.1	8.1
1/ 602	do	300	Sept. 16, 1954	18	205	58	673	273	196	1,260	--	9	2,550	750	--	4,500	8.0	--
			Feb. 12, 1970	18	100	28	296	309	86	474	.9	7.0	1,160	365	63.9	1,960	7.6	6.1
1/ 801	do	360	June 19, 1963	21	101	27	224	281	69	370	.7	5.5	956	363	57.3	1,700	7.5	5.10
			Feb. 18, 1970	25	51	14	40	199	26	63	.3	< .4	317	186	32.2	529	8.0	1.3
1/ 802	do	195	Mar. 20, 1963	20	152	42	460	278	130	840	.7	6	1,787	550	64.4	3,140	7.3	8.47
			Feb. 19, 1970	15	74	16	12	281	16	16	.6	4.3	292	251	9.1	494	7.6	1.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
					Edwards and associated limestones--Continued													
1/ HJ-54-22-302	F. R. Henderson	--	Sept. 20, 1962	16	56	21	11	253	16	16	0.9	7	268	227	9.6	462	7.7	1.47
			Feb. 20, 1970	16	54	21	12	242	17	17	1.1	8.5	260	223	18.0	443	8.3	.4
1/ 901	Mrs. Ruby Helbing	--	Mar. 19, 1963	18	52	26	22	244	18	36	2.1	13	307	338	16.7	542	7.4	.53
			Mar. 31, 1970	17	54	25	20	238	20	31	2.4	14	300	238	15.8	520	7.7	.5
23-405	C. W. Meadows Estate	350	Apr. 3, 1970	17	82	21	29	312	26	44	1.1	12	385	293	18.0	641	7.6	.8
1/ 24-201	John Childress	401	Aug. 29, 1962	15	50	26	17	237	28	22	2.1	4.9	282	232	14.1	492	7.8	.50
			Apr. 2, 1970	13	51	25	16	238	29	17	2.6	9.0	280	231	12.9	470	7.8	.5
1/ 402	Crockett County Water Control District	420	Aug. 15, 1960	15	54	20	21	227	25	26	2.1	11	296	216	--	482	7.1	--
1/ 502	C. E. Davidson, III	403	Sept. 11, 1962	17	50	26	27	229	35	31	2.7	15	317	233	20.3	535	7.6	2.24
			Feb. 19, 1970	13	51	25	22	224	35	28	2.7	18.5	306	233	17.1	511	7.7	.6
1/ 30-501	Joe Bean	--	Mar. 21, 1963	14	48	19	15	214	17	23	.8	5.5	247	199	14.3	435	7.6	.47
			Mar. 31, 1970	15	53	27	13	266	20	21	1.2	7.0	288	244	10.6	487	7.7	.3
1/ 31-601	C. E. Davidson, III	--	Sept. 26, 1962	25	63	19	13	262	15	17	.5	11	293	234	10.85	505	7.5	.37
			Apr. 3, 1970	18	68	18	12	266	17	15	.6	12	292	244	10.0	483	7.6	.3
1/ 37-101	J. W. Henderson	--	Mar. 18, 1963	21	161	45	497	265	154	940	1.4	7	1,956	580	64.90	3,450	7.3	8.93
			Feb. 18, 1970	15	117	35	308	248	79	580	.7	7.0	1,260	436	60.5	2,220	7.4	6.4
1/ 702	Bill Clegg	140	Mar. 14, 1963	21	126	34	253	275	77	493	1.1	9	1,149	454	34.8	2,090	7.5	15.0
			Feb. 18, 1970	19	102	23	182	295	60	306	.7	9.0	850	349	53.0	1,460	7.5	4.3
1/ 39-602	Eugene Miller	325	Oct. 3, 1963	21	64	17	10	260	8	18	.3	8	274	230	8.4	476	7.4	.28
			Apr. 3, 1970	16	64	18	10	261	12	9	.4	12	269	232	8.8	464	7.7	.3
1/ 40-702	Emma Adams	--	Oct. 5, 1962	17	68	6	11	209	8	20	.1	19	252	195	10.8	422	7.6	.35
			Apr. 3, 1970	12	71	5	17	201	13	25	.2	19	261	198	16.1	454	7.8	.5
1/ 46-304	Dempster Jones	--	May 1, 1963	20	57	24	13	268	13	18	.5	9	287	241	10.7	500	7.6	.37
			Apr. 3, 1970	21	62	23	15	276	17	19	.5	8.0	302	247	11.6	497	7.6	.4
1/ 48-101	Emma Adams	--	Oct. 5, 1963	14	41	24	15	218	13	26	.4	10	250	201	13.9	438	7.8	.46
			Apr. 3, 1970	16	42	23	15	216	15	22	.5	11	251	201	13.9	427	7.9	.5
1/ 301	James Baggett	400	Oct. 3, 1963	16	51	22	10	247	8	16	.3	9	253	218	9.4	436	7.7	.31
			Apr. 3, 1970	16	53	17	9	231	11	12	.4	10	242	203	9.2	402	8.3	.3
1/ 55-25-401	Hudspeth Memorial Hospital	345	July 6, 1963	10	49	24	10	248	11	15	.3	3	244	233	--	435	7.6	--
			Feb. 13, 1969	15	49	24	9	254	8	12	.4	5.0	247	221	8.1	432	7.7	.3
1/ 403	do	--	July 6, 1963	9	47	23	6	242	9	9	.3	1	223	213	--	395	7.7	--
			Feb. 13, 1969	14	46	23	6	245	6	9	.3	3.5	228	210	5.4	397	7.8	.2
					Alluvium and Edwards and associated limestones													
1/ 54-11-508	A. C. Hoover	--	June 4, 1963	42	64	30	87	254	150	23	2.9	5.5	579	284	40.1	889	7.6	2.26
			Mar. 31, 1970	21	90	41	55	333	151	58	1.2	8.5	590	395	23.0	900	7.5	1.2
1/ 29-701	S. S. Millspaugh	--	Mar. 21, 1963	22	109	29	75	276	39	203	.8	< .4	614	390	29.6	1,138	7.2	1.67
			Mar. 31, 1970	21	176	30	254	306	123	520	.6	12	1,290	560	49.1	1,980	7.2	4.6

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
				Alluvium, Edwards and associated limestones, and Trinity Group														
1/ HJ-54-11-903	A. C. Hoover	--	Jan. 26, 1954	31	111	48	62	350	161	100	1.0	4.0	693	474	--	1,120	7.6	--
				Alluvium and Trinity Group														
1/ 45-64-901	Noelke Estate	200	Jan. 26, 1954	20	256	128	232	309	1,010	238	1.4	8.4	2,050	1,160	--	2,750	7.2	--
1/			Sept. 24, 1960	--	--	--	--	257	--	885	--	--	3,255	1,740	--	4,650	6.8	--
				Alluvium														
1/ 54-10-803	C. W. Meadows, et al.	100	Sept. 15, 1966	20	346	149	920	244	900	1,610	1.8	1.5	4,070	1,480	57.4	5,860	7.2	10.4

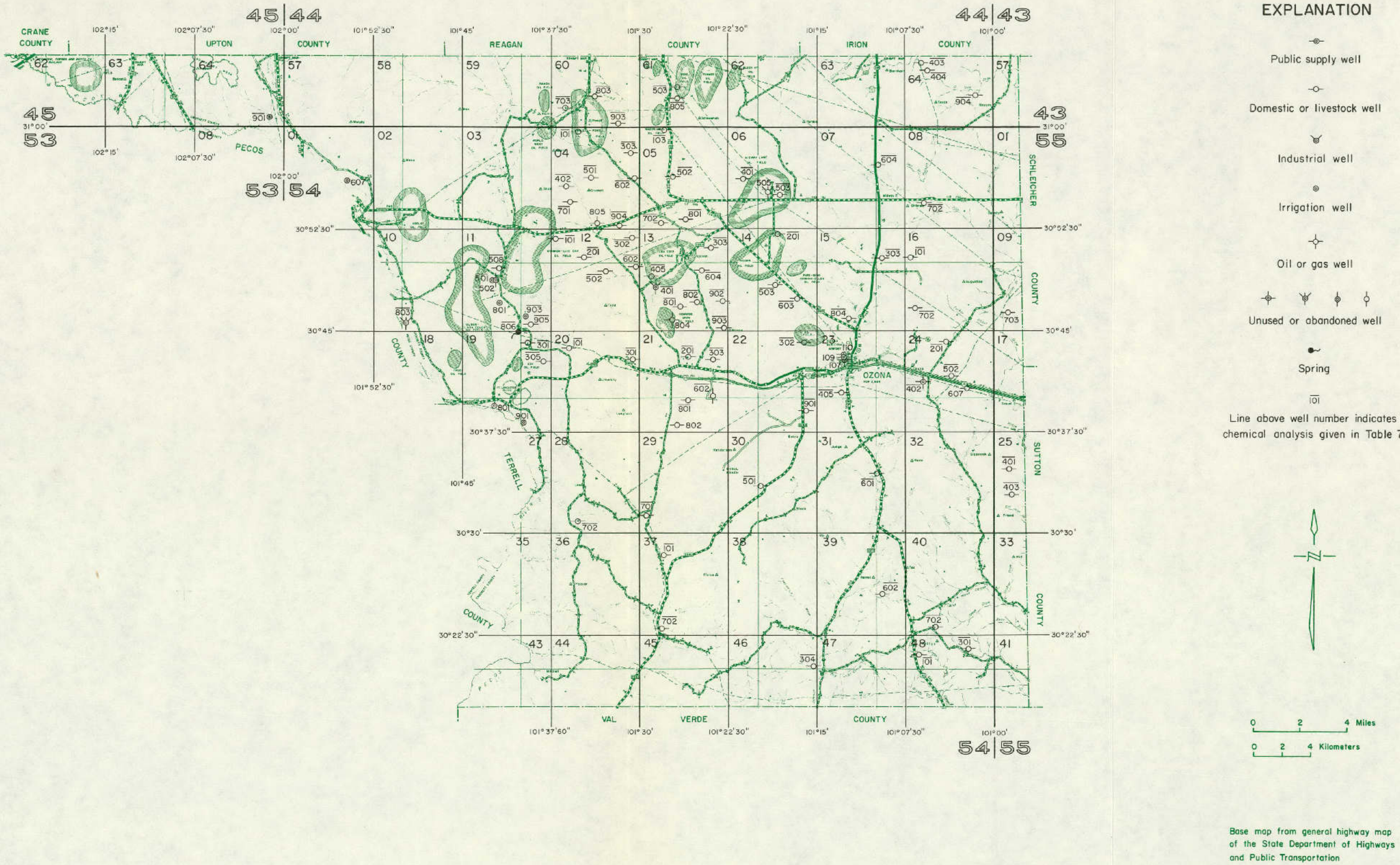
1/ Texas Water Development Board Report 47, ''Occurrence and Quality of Ground Water in Crockett County, Texas.''

CROCKETT COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
HJ-54-04-805	Haynes & V. J. Drilling Co.	Shannon Estate No. 1
13-804	Ralph Pembrook	University Lands No. 1-12

Tabulation of other oil and gas tests used for subsurface control is in Texas Water Development Board Report 47.



Location of Selected Water Wells, Springs, and Oil and Gas Wells in Crockett County

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : To, Ogallala Formation; Kt, Trinity Group; Trs, Santa Rosa Formation.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and a Muldrow surface elevation map.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundreth of a foot.
Method of lift and type of power: C, cylinder; J, jet; S, submersible; T, turbine; E, electric; G, natural gas, butane, or gasoline; W, wind; N, none.
Use of Water : D, domestic; P, public supply; Ind, industrial; Irr, irrigation; S, livestock; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-27-58-601	R. B. Cowden	William H. Cole	--	--	--	--	Kt	3,302	--	--	C, W	S	--
* 602	do	do	--	107	--	--	Kt	3,300	93.9	July 28, 1970	C, W	S	--
603	do	do	--	--	--	--	Kt	3,320	110.5	do	C, E	S	--
* 901	Jessie Mae Williamson	do	--	157	--	--	Kt	3,335	143.4	July 27, 1970	C, W	S	--
59-317	Petroleum Corporation of Texas	--	1952	155	12	10	Kt	3,187	73	Feb. 11, 1952	T, G	Ind	Reported yield, 174 gpm in 1952; 21 gpm in 1965. Well shot with dynamite in 1965. Yield increased from 21 to 78 gpm.
401	R. B. Cowden	William H. Cole	--	120	--	--	Kt	3,265	75.7	July 23, 1970	C, W	S	--
402	William H. Cole	--	--	--	--	--	Kt	3,207	--	--	C, W	S	--
403	R. B. Cowden	William H. Cole	--	82	--	--	Kt	3,256	77.8	July 23, 1970	C, W	S	--
* 601	Petroleum Corporation of Texas	--	1947	127	13	10	Kt	3,150	92 86.53	June 1959 July 29, 1970	N	N	Reported yield, 100 gpm on Dec. 18, 1947; 18 gpm on Aug. 31, 1962. Unused industrial well.
603	Frank Cowden	Dwight Helms	--	98	6	--	Kt	3,130	50.1	Sept. 15, 1970	N	N	Unused industrial well.
604	Petroleum Corporation of Texas	--	1947	142	12	10	Kt	3,145	65 47 85	1947 Oct. 13, 1948 Sept. 27, 1950	T, G	Ind	Reported yield, 115 gpm in 1947; 8 gpm in 1969. Well cleaned out and shot with dynamite in 1966. Yield increased from 10 to 47 gpm.
605	do	--	1947	155	12	10	Kt	3,165	83 103 96	Dec. 15, 1947 Sept. 27, 1950 May 6, 1958	T, G	Ind	Reported yield, 105 gpm on Dec. 15, 1947; 10 gpm in 1965.
606	do	--	1957	135	8	10	Kt	3,124	92.14	Sept. 10, 1970	T, G	Ind	Reported yield, 38 gpm on Sept. 12, 1962; 18 gpm in 1965.
607	do	--	--	87	8	10	Kt	3,115	--	--	T, G	Ind	Reported yield, 42 gpm on Sept. 12, 1962; 13 gpm in 1969.
608	do	--	--	158	12	10	Kt	3,168	--	--	T, G	Ind	Reported yield, 130 gpm in Feb. 1952; 15 gpm in 1965. Well cleaned out and shot with dynamite in 1966. Yield increased from 15 to 81 gpm.
609	do	--	1956	156	12	12	Kt	3,174	98.95	Sept. 10, 1970	T, G	Ind	Reported yield, 130 gpm in Feb. 1952; 15 gpm in 1965. Well cleaned out and shot with dynamite in 1966. Yield increased from 37 to 91 gpm.
610	do	--	1956	156	12	14	Kt	3,174	--	--	T, G	Ind	Reported yield, 130 gpm in Feb. 1952; 30 gpm in 1965. Well cleaned out and shot with dynamite in 1965. Yield increased from 30 to 91 gpm.
611	do	--	--	156	12	10	Kt	3,182	70 95.92	Feb. 24, 1952 Sept. 10, 1970	T, G	Ind	Reported yield, 175 gpm on Feb. 24, 1952; 16 gpm in 1965. Well cleaned out and shot with dynamite in 1966. Yield increased from 16 to 95 gpm.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JH-27-59-612	Petroleum Corporation of Texas	--	1945	147	--	--	Kt	3,157	91 94.33	Sept. 26, 1950 Sept. 10, 1970	S, E	Ind	Reported yield, 105 gpm in 1945; 29 gpm in 1965.
* 701	William H. Cole	--	--	80	--	--	Kt	3,218	--	--	C, W	S	--
* 702	do	--	--	--	6	--	Kt	3,200	--	--	C, W	D, S	--
703	do	--	--	83	--	--	Kt	3,234	62.1	July 23, 1970	C, W	S	--
* 801	do	--	--	59	--	--	Kt	3,189	42.0	do	C, W	S	--
802	do	--	--	--	--	--	Kt	3,185	--	--	C, W	D, S	--
901	Petroleum Corporation of Texas	--	1937	104	10	--	Kt	3,139	75 72 74 76 77 77.92	1951 May 3, 1955 Apr. 1, 1959 Apr. 1, 1960 Mar. 1, 1965 Sept. 10, 1970	N	N	Reported yield, 22 gpm in 1951. Unused industrial well.
902	do	--	1937	92	15	10	Kt	3,139	69.7	do	S, E	Ind	Reported yield, 41 gpm in 1962; 25 gpm in 1965.
903	do	--	1937	96	--	--	Kt	3,139	83.12	do	S, E	Ind	Reported yield, 145 gpm on Sept. 25, 1950; 42 gpm in 1965.
904	do	--	1960	112	8	10	Kt	3,124	--	--	T, G	Ind	Reported yield, 56 gpm on June 13, 1960; 12 gpm in 1965.
905	do	--	1949	125	20	20	Kt	3,115	--	--	T, G	Ind	Reported yield, 105 gpm in 1949; 10 gpm in 1965.
906	do	--	1937	105	10	18	Kt	3,139	70 80.46	Oct. 13, 1948 Sept. 10, 1970	S, E	Ind	Reported yield, 32 gpm on Sept. 25, 1950; 19 gpm in 1965. Well 8-25. 1/
907	do	--	1937	101	12	10	Kt	3,137	88	Sept. 14, 1951	S, E	Ind	Reported yield, 32 gpm on Sept. 25, 1950; 10 gpm in 1965.
908	do	--	1937	98	12	12	Kt	3,135	84	Sept. 15, 1951	S, E	Ind	Reported yield, 65 gpm on June 18, 1949; 18 gpm in 1965.
909	do	--	1945	159	15	8	Kt	3,168	121	Sept. 26, 1950	S, E	Ind	Reported yield, 85 gpm on Sept. 26, 1950; 52 gpm in 1965.
910	do	--	1945	163	15	4	Kt	3,164	125	do	S, E	Ind	Reported yield, 250 gpm on Nov. 11, 1945; 54 gpm in 1965.
911	do	--	1937	120	--	--	Kt	3,139	73	Sept. 27, 1950	S, E	Ind	--
912	do	--	1947	79	12	12	Kt	3,140	71.9	Sept. 10, 1970	S, E	Ind	Reported yield, 35 gpm in 1964.
913	Gulf Oil Corporation	--	1940	110	10-3/4 8-5/8	10 47	Kt	3,118	--	--	T, E	Ind	Steel casing perforated from 47 to 109 feet. Reported yield, 201 gpm on Feb. 2, 1940.
914	do	--	1938	117	10-3/4 8-5/8	10 67	Kt	3,121	--	--	T, E	Ind	Steel casing slotted from 67 to 105 feet. Reported yield, 200 gpm on Feb. 28, 1938. Well 8-38. 1/
60-101	Petroleum Corporation of Texas	--	1962	--	8-5/8 8-5/8	99 117-122	Kt	3,105	38 51.2	Nov. 14, 1962 Sept. 16, 1970	T, G	Ind	Steel casing perforated from 99 to 117 feet. Reported yield, 250 gpm on Nov. 14, 1962; 44 gpm in 1965.
402	do	--	1959	95	12	12	Kt	3,104	39 48.0 66	July 1959 July 29, 1970 Sept. 9, 1970	T, G	Ind	Reported yield, 50 gpm on Mar. 11, 1959; 29 gpm in 1965.
403	do	--	--	106	8	12	Kt	3,104	51.45	Sept. 16, 1970	T, G	Ind	Reported yield, 200 gpm on May 14, 1959; 15 gpm in 1965.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
JH-27-60-404	Petroleum Corporation of Texas	--	1959	--	8	10	Kt	3,102	40	July 1959	T, G	Ind	Reported yield, 50 gpm on Mar. 9, 1959; 23 gpm in 1965.
405	do	--	1962	95	8	14	Kt	3,105	47	Oct. 22, 1962	T, G	Ind	Reported yield, 140 gpm on Oct, 22, 1962.
406	do	--	1949	91	12	10	Kt	3,108	--	--	T, G	Ind	Reported yield, 130 gpm on Sept. 27, 1950; 13 gpm in 1965.
407	do	--	1959	86	10	12	Kt	3,101	42	Mar. 20, 1959	T, G	Ind	Reported yield, 105 gpm on Mar. 20, 1959; 29 gpm in 1965. Well shot with nitroglycerin on Mar. 25, 1959. Increased yield to 120 gpm.
408	do	--	1952	95	--	--	Kt	3,100	43 55.49	Mar. 7, 1952 Sept. 16, 1970	T, G	Ind	Reported yield, 90 gpm on Mar. 7, 1952; 37 gpm in 1965.
409	do	--	1950	103	12	10	Kt	3,102	42	Sept. 27, 1950	T, G	Ind	Reported yield, 90 gpm in 1950; 62 gpm on Sept. 27, 1950; 29 gpm in 1967.
* 701	do	--	1949	117	--	--	Kt	3,112	68 68.97 69.95	Sept. 1960 Dec. 3, 1965 July 29, 1970	N	N	Observation well. Reported yield, 105 gpm on Jan. 29, 1950; 20 gpm on Sept. 25, 1950. Well B-44. 1/
* 702	do	--	1948	118	12	--	Kt	3,106	50 79	July 9, 1948 Sept. 23, 1950	T, G	Ind	Reported yield, 340 gpm on July 9, 1948; 63 gpm in 1965.
* 703	do	--	1949	118	12	18	Kt	3,106	53	Oct. 13, 1948	T, G	Ind	Reported yield, 185 gpm in 1949; 19 gpm in 1965. Well B-43. 1/
704	do	--	1948	118	12	12	Kt	3,110	50 79 98	July 9, 1948 Sept. 23, 1950 Sept. 14, 1962	T, G	Ind	Reported yield, 340 gpm on July 9, 1948; 175 gpm in 1950; 60 gpm on Sept. 14, 1962.
801	Gulf Oil Corporation	--	1947	130	10-3/4 8-5/8	20 104	Kt	3,115	60	June 26, 1947	T, E	Ind	Casing slotted from 104 feet to 126 feet. Reported yield, 91 gpm on June 26, 1947.
802	do	--	1947	115	10-3/4 8-5/8	20 59	Kt	3,094	--	--	T, E	Ind	Steel casing slotted from 59 to 108 feet. Reported yield, 112 gpm in 1947.
* 901	Pan American Petroleum Corporation	--	1950	144	14 10-3/4	78 68-142	Kt	3,079	89 92	1950 Feb. 1957	S, E	Ind	10-3/4 inch No. 6 Armco Shutter well screen from 90 to 131 feet. Reported yield, 134 gpm in 1950.
902	do	--	--	132	--	--	Kt	3,056	57	Feb. 1957	T, E	Ind	Reported yield, 102 gpm in 1950; 96 gpm in 1957; 21 gpm on July 28, 1965.
903	do	--	1944	140	8-5/8	85	Kt	3,049	61.63 62.08 62.80	Dec. 5, 1963 Dec. 6, 1966 Sept. 2, 1970	N	N	Unused industrial well. Observation well.
904	do	Boys Ranch of West Texas	--	--	--	--	Kt	3,062	--	--	C, W	S	--
905	do	do	--	--	--	--	Kt	3,045	--	--	C, W	S	--
* 906	do	--	1950	115	14 10-3/4	75 65-75	Kt	3,058	--	--	T, E	Ind	10-3/4 inch No. 6 Armco Shutter well screen from 75 to 115 feet. Drilled to 125 feet, cemented back to 115 feet.
907	do	--	1950	140	14 10-3/4	72 57-88 130-140	Kt	3,058	--	--	S, E	Ind	10-3/4 inch No. 6 Armco Shutter well screen from 88 to 130 feet.
* 908	do	--	1950	142	14 10-3/4	60 43-89 132-142	Kt	3,060	65	Jan. 16, 1950	T, E	Ind	10-3/4 inch No. 6 Armco Shutter well screen from 89 to 132 feet. Reported yield, 102 gpm on Jan. 16, 1950.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JH-27-60-909	Pan American Petroleum Corporation	--	1950	127	14 10-3/4	58 54-75 117-127	Kt	3,054	43	Feb. 3, 1950	T, E	Ind	10-3/4 inch No. 6 Armco Shutter well screen from 75 to 117 feet.
910	do	--	--	129	--	--	Kt	3,053	--	--	T, E	Ind	--
911	do	--	--	123	--	--	Kt	3,064	--	--	T, E	Ind	--
* 912	do	--	1970	124	10-3/4	124	Kt	3,062	--	--	T, E	Ind	--
913	do	--	1964	128	12-3/4 10-3/4	65 128	Kt	3,064	--	--	T, E	Ind	Steel casing slotted from 64 to 128 feet.
914	do	--	1967	140	10-3/4 6-5/8	55 140	Kt	3,069	--	--	S, E	Ind	Steel casing perforated from 80 to 140 feet.
915	do	--	1968	137	10-3/4 8-5/8	67 67-137	Kt	3,047	--	--	S, E	Ind	Steel casing perforated from 77 to 137 feet.
916	do	--	1969	141	10-3/4 8-5/8	70 70-141	Kt	3,054	58	May 2, 1969	T, E	Ind	Steel casing perforated from 81 to 141 feet.
917	do	--	1969	140	10-3/4 8-5/8	78 78-140	Kt	3,049	55	June 28, 1969	S, E	Ind	Steel casing perforated from 80 to 140 feet.
* 918	do	--	1970	140	10-5/8 8-5/8	70 70-140	Kt	3,049	60	June 9, 1970	S, E	Ind	Steel casing perforated from 100 to 140 feet.
919	do	--	1970	148	10-3/4 8-5/8	72 72-148	Kt	3,050	66	Sept. 2, 1970	S, E	Ind	--
* 61-702	Harold Smith	--	--	89	6	--	Kt	3,029	64.5	June 10, 1970	C, W	S	--
* 703	do	--	--	100	6	--	Kt	3,063	--	--	C, W	S	--
* 901	James R. Hurt, et al.	--	--	41	--	--	Kt	2,974	47.5 57.49 53.38	Mar. 8, 1937 Dec. 3, 1965 Dec. 4, 1969	N	N	Unused livestock well. Observation well. Well C-24. 1/
* 902	do	--	--	87	--	--	Kt	2,992	61.6 57.4 65.1	Apr. 6, 1937 Dec. 13, 1949 June 9, 1970	C, W	S	Well C-23. 1/
903	Ector County Parks Department	--	1970	91	--	--	Kt	2,963	67.2	Sept. 18, 1970	S, E	P	Reported yield, 30 gpm on Sept. 17, 1970.
62-401	Dr. A. B. Finch, et al.	--	--	145	--	--	To	2,954	78.06	Sept. 22, 1970	T, E	Irr	--
402	do	--	--	145	--	--	To	2,962	--	--	T, G	Irr	--
501	Finley Woodul	--	1965	158	10-3/4	158	To	2,949	76.93	Sept. 21, 1970	S, E	Irr	Steel casing slotted from 98 to 158 feet.
502	J. E. Thomas	--	--	115	--	--	To	2,917	89.0	Sept. 22, 1970	S, E	Irr	--
503	do	--	1962	--	10-3/4	99	To	2,919	84.27	do	S, E	Irr	--
602	Merwin H. Haag, et al.	--	1950	175	--	75	To	2,914	96.0	do	T, E	Irr	--
603	do	--	1949	140	--	75	To	2,908	--	--	T, E	Irr	--
701	Selwyn Webber	--	--	--	12	--	Kt	2,966	67.45	June 28, 1961	S, E	Irr	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-27-62-702	James R. Hurt, et al.	--	--	--	--	--	Kt	2,930	39.6 37.60	Mar. 10, 1937 Apr. 5, 1948	N	N	Abandoned livestock well. Well C-37. 1/
703	Delphia Deaton	--	--	--	8	--	--	--	59.60 64.17 65.56 65.16	Dec. 4, 1964 Nov. 28, 1967 Sept. 18, 1970 Jan. 4, 1971	N	N	Observation well.
704	W. R. Paine	--	--	133	10-3/4	--	Kt	2,973	73.2	Sept. 21, 1970	T, E	N	Unused irrigation well.
* 705	James R. Hurt, et al.	--	1965	75	--	--	Kt	2,928	38.75 41.7	Dec. 3, 1965 June 9, 1970	C, W	S	--
* 706	Mrs. Sallie Ratliff, et al.	--	--	69	--	--	Kt	2,948	47.5 47.18 48.50 53.7	Mar. 10, 1937 Dec. 10, 1947 Dec. 13, 1949 June 9, 1970	C, G	S	Pumping water level for 1970. Well F-13. 1/
* 801	L. W. Bell	--	1948	147	10-1/2	--	To	2,926	39.36 85.60 85.93	Oct. 13, 1948 Dec. 3, 1965 Dec. 4, 1969	S, E	Irr	Observation well.
802	do	--	--	147	--	--	To	2,925	94.54	Sept. 22, 1970	S, E	Irr	--
803	Dr. A. B. Finch	--	--	145	10	--	To	2,916	94.38	do	S, E	Irr	--
804	C. W. White	--	1963	130	--	--	To	2,931	88.31	do	T, E	Irr	--
* 805	Dr. A. B. Finch	--	--	145	--	--	To	2,964	--	--	S, E	Irr	--
806	do	--	1965	145	--	--	To	2,961	--	--	S, E	Irr	--
807	do	--	--	145	--	--	To	2,963	--	--	T, E	Irr	--
808	do	--	--	145	--	--	To	2,964	--	--	T, E	Irr	--
809	do	--	1966	145	--	--	To	2,962	94.88	Sept. 22, 1970	S, E	Irr	--
* 902	Robert E. McBryde	--	--	--	--	--	To	2,908	--	--	S, E	Irr	--
903	Dr. A. B. Finch	--	--	145	--	--	To	2,912	93.24	Sept. 22, 1970	S, E	Irr	--
904	do	--	--	145	6-7/8	--	To	2,912	90.87	do	S, E	Irr	--
45-02-201	Texaco Incorporated	William H. Cole	1969	148	6-5/8	25	Kt	3,367	--	--	C, W	S	--
* 301	William H. Cole	--	--	--	--	--	Kt	3,310	--	--	C, W	S	--
302	do	--	1969	169	6	--	Kt	3,318	--	--	C, W	S	--
303	do	--	--	--	--	--	Kt	3,320	--	--	C, W	S	--
601	do	--	1969	--	6	20	Kt	3,320	169.7	July 27, 1970	C, W	S	--
03-201	Paul Slator	--	1939	174	6	--	Kt	3,207	--	--	N	N	Unused livestock well.
* 202	William H. Cole	--	--	93	--	--	Kt	3,201	77.0	July 23, 1970	C, W	S	--
* 301	Clarence Scharbauer, Jr.	--	--	120	--	--	Kt	3,129	54.6 49.92	Apr. 10, 1937 July 24, 1970	C, W	S	Well E-16. 1/
* 302	do	--	1932	135	6	--	Kt	3,176	68.7 71.52	Apr. 10, 1937 July 24, 1970	C, W	S	Well E-17. 1/
* 401	Paul Slator	--	1940	174	--	--	Kt	3,269	--	--	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
JH-45-03-402	Paul Slator	--	1942	174	6	--	Kt	3,307	--	--	N	N	Unused livestock well.
403	do	--	--	186	--	--	Kt	3,268	87.55	June 10, 1970	N	N	Unused domestic and livestock well.
* 502	do	--	1969	125	6	--	Kt	3,196	102.9	June 9, 1970	C, W	S	--
* 503	do	--	1939	174	6	--	Kt	3,250	--	--	C, W	S	--
* 601	Clarence Scharbauer, Jr.	--	--	98	--	--	Kt	3,156	71.4 78.95	Apr. 10, 1937 July 24, 1970	C, W	N	Unused livestock well. Well E-18. 1/
* 701	Texaco Incorporated	Paul Slator	1940	173	6	--	Kt	3,275	166.4	June 9, 1970	C, W	S	--
* 801	Paul Slator	--	1940	174	6	20	Kt	3,250	161.7	Apr. 9, 1937	C, W	S	Well D-6. 1/
802	do	--	1944	174	--	--	Kt	3,239	--	--	C, E	N	Unused industrial well.
803	do	--	--	--	6	--	Kt	3,235	136.8	June 10, 1970	N	N	Do.
* 901	Clarence Scharbauer, Jr.	--	1930	133	6	--	Kt	3,207	40.5	Apr. 10, 1937	C, W	S	Well E-19. 1/
* 04-101	City of Goldsmith	--	1964	150	8	150	Kt	3,166	146.8	May 11, 1960	S, E	P	Pumping water level.
* 102	do	--	--	--	--	--	Kt	3,152	--	--	S, E	P	--
* 103	do	--	1958	160	--	--	Kt	3,162	120	June 8, 1970	S, E	P	--
104	do	--	1964	--	--	--	Kt	3,166	--	--	T, E	P	--
105	do	--	1958	--	--	--	Kt	3,166	--	--	S, E	P	--
106	do	--	1964	145	6	145	Kt	3,152	125.2	June 8, 1970	N	N	Unused public-supply well.
107	do	--	1964	159	--	--	Kt	3,165	124	do	S, E	P	--
* 108	Mansell Brine Sales	--	1969	150	5	150	Kt	3,158	130	Dec. 15, 1969	S, E	Ind	Plastic casing slotted from 120 to 150 feet.
109	do	--	--	150	--	--	Kt	3,155	--	--	S, E	Ind	--
* 110	do	--	--	150	--	--	Kt	3,153	--	--	S, E	Ind	--
111	do	--	1969	149	5	149	Kt	3,155	--	--	S, E	Ind	Plastic casing slotted from 119 to 149 feet.
112	do	--	--	--	--	--	Kt	3,150	--	--	S, E	Ind	--
113	do	--	--	--	--	--	Kt	3,147	--	--	S, E	Ind	--
114	do	--	1970	150	5	150	Kt	3,152	124.9	June 12, 1970	S, E	Ind	Casing slotted from 120 to 150 feet. Reported yield, 12 gpm on June 10, 1970.
115	do	--	--	--	--	--	Kt	3,147	--	--	S, E	Ind	--
116	do	--	1969	147	5	147	Kt	3,151	--	--	S, E	Ind	Plastic casing slotted from 117 to 147 feet.
* 117	S. B. Wight	--	--	81	--	--	Kt	3,092	73.4 72.2	Apr. 23, 1937 June 11, 1970	C, W	S	Well E-12. 1/
* 118	Clarence Scharbauer, Jr.	--	1900	95	--	--	Kt	3,094	55.36	July 24, 1970	C, W	S	Well E-13. 1/
119	Ector County Parks Department	--	--	170	10	--	Kt	3,172	127.75	Sept. 17, 1970	S, E	P	--
120	do	--	1950	170	4	--	Kt	3,168	129.64	do	S, E	P	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-04-201	S. B. Wight, et al.	--	--	105	--	--	Kt	3,075	78.2 78.74 84.89 79.17 81.31	Apr. 23, 1937 Dec. 4, 1963 Nov. 28, 1967 Dec. 4, 1969 Dec. 15, 1970	S, E	S	Observation well. Well E-9. 1/
* 202	do	--	--	--	--	--	Kt	3,082	84.5 86.28	Apr. 23, 1937 June 11, 1970	C, W	S	Well E-10. 1/
* 301	S. B. Wight	--	--	126	--	--	Kt	3,074	77.3	do	N	N	Unused industrial well.
* 302	do	--	--	88	8	--	Kt	3,044	60.8	do	N	N	Do.
303	S. B. Wight, et al.	--	--	--	--	--	Kt	3,074	--	--	T, E	N	Unused public-supply well.
304	do	--	--	--	--	--	Kt	3,076	--	--	C, W	S	--
305	Texaco Incorporated	S. B. Wight	--	87	8	--	Kt	3,050	68.8	June 11, 1970	N	N	Abandoned industrial well.
* 306	do	do	--	--	--	--	Kt	3,050	--	--	C, W	S	--
* 307	do	do	--	135	6	--	Kt	3,083	104.4	June 11, 1970	C, W	S	--
* 501	S. B. Wight, et al.	--	--	122	5	--	Kt	3,062	74.44	do	N	N	Unused industrial well.
* 502	S. B. Wight	--	1958	--	--	--	Kt	3,053	--	--	C, W	S	--
* 503	do	--	--	--	--	--	Kt	3,081	--	--	S, E	D, S	--
* 504	do	--	1967	126	--	--	Kt	3,078	93.2	June 11, 1970	N	N	--
* 601	S. B. Wight, et al.	--	--	122	8	10	Kt	3,037	68.8	do	N	N	Unused industrial well.
* 602	S. B. Wight	--	--	--	--	--	Kt	3,036	--	--	S, E	D, S	--
* 603	do	--	1884	--	--	--	Kt	3,036	--	--	C, W	S	--
604	do	--	1938	135	--	--	Kt	3,036	100	June 11, 1970	C, W	S	--
* 605	J. L. Johnson, Sr, Estate	--	--	113	--	--	Kt	3,027	68.5	July 22, 1970	C, W	S	Pumping water level.
* 701	Clarence Scharbauer, Jr.	--	1932	178	--	--	Kt	3,144	165 165.2	Oct. 18, 1948 July 24, 1970	C, W	S	Well E-21. 1/
702	do	--	--	--	--	--	Kt	3,157	--	--	C, W	S	--
703	do	--	1900	160	--	--	Kt	3,157	--	--	C, W	S	--
801	do	--	1900	120	--	--	Kt	3,088	--	--	S, E	D	--
802	J. L. Johnson, Sr, Estate	--	--	--	--	--	Kt	3,040	--	--	C, W	S	--
901	do	--	--	--	--	--	Kt	3,019	--	--	C, W	S	--
* 902	do	--	--	106	6	--	Kt	3,018	84.7 85.7	Mar. 11, 1937 July 22, 1970	C, W	S	Pumping water level for 1937 and 1970. Well E-25. 1/
* 903	do	--	--	--	--	--	Kt	3,034	80.09	do	C, W	S	--
* 05-101	W. C. Smith	--	1940	142	--	--	Kt	3,039	74.00	Apr. 13, 1948	C, W	S	Well F-2. 1/
* 102	do	--	1902	93	--	--	Kt	3,019	59.21	Apr. 8, 1948	C, W	D	Well F-4. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-05-103	W. C. Smith	--	--	--	--	--	Kt	3,017	--	--	T, E	D, S	--
* 104	Harold Smith	--	1930	--	6	--	Kt	3,032	--	--	C, W	S	--
* 105	W. C. Smith	--	--	93	--	--	Kt	3,019	60.6 60.25	Mar. 9, 1937 Apr. 8, 1948	S, E	D, S	Well F-3. 1/
106	El Paso Products Company	--	--	190	8	--	Kt	3,022	--	--	S, E	Ind	Reported yield, 57 gpm.
* 107	do	--	--	190	8	--	Kt	3,021	--	--	S, E	Ind	Reported yield, 65 gpm.
108	do	--	--	190	8	--	Kt	3,019	--	--	S, E	Ind	Reported yield, 100 gpm.
109	do	--	--	190	8	--	Kt	3,017	--	--	S, E	Ind	Reported yield, 165 gpm on Sept. 4, 1969.
110	do	--	--	190	8	--	Kt	3,019	--	--	S, E	Ind	Reported yield, 50 gpm on Oct. 3, 1969.
111	do	--	--	190	8	--	Kt	3,023	--	--	S, E	Ind	Reported yield, 26 gpm.
112	do	--	--	190	8	--	Kt	3,019	--	--	S, E	Ind	Reported yield, 84 gpm.
113	do	--	--	190	8	--	Kt	3,019	--	--	S, E	Ind	Reported yield, 55 gpm.
* 201	James R. Hurt, et al.	--	--	70	--	--	Kt	3,005	71.1 71.3 63.03	Mar. 31, 1948 Dec. 12, 1949 June 9, 1970	C, W	S	Pumping water level for 1970. Well F-6. 1/
* 202	Hence Barrow	--	--	113	--	--	Kt	3,011	70.7 71.3 82	Mar. 31, 1948 Dec. 12, 1949 June 8, 1970	C, W	S	Well F-7. 1/
* 203	do	--	--	111	--	--	Kt	3,011	53.5 76.32 85.40	Mar. 9, 1937 Mar. 31, 1948 June 9, 1970	C, W	S	Well F-8. 1/
204	El Paso Products Company	--	--	190	8	--	Kt	2,096	--	--	S, E	Ind	Reported yield, 100 gpm.
205	do	--	--	190	8	--	Kt	3,014	--	--	S, E	Ind	Reported yield, 36 gpm.
206	do	--	--	173	8	--	Kt	3,014	80.92	Sept. 22, 1970	S, E	Ind	--
207	do	--	--	190	8	--	Kt	3,016	--	--	S, E	Ind	Reported yield, 45 gpm.
208	do	--	--	190	8	--	Kt	3,008	--	--	S, E	Ind	Reported yield, 40 gpm.
209	do	--	--	190	8	--	Kt	3,007	--	--	S, E	Ind	Reported yield, 24 gpm.
210	do	--	--	190	8	--	Kt	3,007	--	--	S, E	Ind	Reported yield, 60 gpm.
211	do	--	--	186	8	186	Kt	3,010	--	--	S, E	Ind	Reported yield, 90 gpm.
* 301	Hence Barrow	--	--	104	--	--	Kt	3,006	81.5 81.9 86.12 94.52	Mar. 5, 1937 Apr. 5, 1948 Dec. 4, 1963 Dec. 4, 1969	C, W	S	Observation well. Well F-11. 1/
* 304	do	--	--	89	6	--	Kt	2,986	69.0 69.12 83	Mar. 12, 1937 Apr. 7, 1948 June 8, 1970	C, W	S	Well F-18. 1/
* 305	do	--	--	110	8	--	Kt	3,008	92.5 92.0	Apr. 5, 1948 Dec. 12, 1949	C, W	N	Unused livestock well. Well F-12. 1/
306	Mansell Brine Sales	--	1960	185	--	125	Kt	3,006	145	Sept. 8, 1970	S, E	Ind	Steel casing perforated from 125 to 185 feet.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JH-45-05-307	Mansell Brine Sales	--	1960	185	--	125	Kt	3,006	145	Sept. 8, 1970	S, E	Ind	Steel casing perforated from 125 to 185 feet.
* 308	do	--	1960	185	--	125	Kt	3,007	145	do	S, E	Ind	Do.
309	El Paso Products Company	--	--	187	8	187	Kt	3,008	--	--	S, E	Ind	Reported yield, 70 gpm.
310	do	--	--	170	8	170	Kt	3,006	--	--	S, E	Ind	Reported yield, 30 gpm.
311	do	--	--	190	8	--	Kt	3,009	--	--	S, E	Ind	Reported yield, 34 gpm.
312	do	--	--	190	8	--	Kt	3,008	--	--	S, E	Ind	Reported yield, 30 gpm.
313	do	--	--	190	8	--	Kt	2,998	--	--	S, E	Ind	Reported yield, 35 gpm.
* 314	do	--	--	190	8	--	Kt	3,006	--	--	S, E	Ind	Reported yield, 34 gpm.
* 401	W. C. Smith	--	--	120	--	--	Kt	3,029	78.46 79.89 97.5	Apr. 9, 1948 Dec. 13, 1949 Jun. 10, 1970	C, W	S	Well F-21. 1/
* 402	J. L. Johnson, Sr. Estate	--	--	114	--	--	Kt	3,019	79.5	July 22, 1970	C, W	S	--
* 501	Colorado River Municipal Water District	City of Odessa	1949	180	16 10-1/4	20 --	Kt	3,000	83.04 99 107 112	Sept. 20, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 10 gpm on July 5, 1962. Well F-140. 1/
* 502	J. L. Johnson, Sr. Estate	--	--	112	--	--	Kt	2,999	65.43 68.81 77.45 72.63	Apr. 9, 1948 Dec. 4, 1963 Nov. 28, 1967 July 22, 1970	C, W	S	Observation well. Well F-27. 1/
503	Hence Barrow	--	--	98	--	--	Kt	2,993	73.64	Apr. 7, 1948	C, W	N	Caved and abandoned. Well F-19. 1/
* 504	Colorado River Municipal Water District	City of Odessa	1949	170	16 10-1/4	20 --	Kt	2,976	64	1949	T, E	P	Reported yield, 80 gpm on July 11, 1962. Well F-148. 1/
* 505	do	do	1949	165	16	20	Kt	2,984	69.15 89 97 101	Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 95 gpm on July 20, 1962. Well F-146. 1/
506	do	do	1949	182	16 10-1/4	20 --	Kt	2,980	74.33 89 98 107	Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 65 gpm on July 3, 1962. Well F-144. 1/
507	do	do	1949	164	16 10-1/4	20 --	Kt	2,964	73.39 92 98 107	Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 55 gpm on July 3, 1962. Well F-153. 1/
* 508	do	do	1949	191	16	20	Kt	2,996	74.85 92 97 112	Dec. 9, 1949 Dec. 22, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 102 gpm on July 6, 1962. Well F-134. 1/
* 509	do	do	1946	160	-- 10-3/4	21 --	Kt	2,962	64.71 90 96 100	Sept. 29, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 70 gpm on June 27, 1962. Well F-92. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JH-45-05-510	Colorado River Municipal Water District	City of Odessa	1949	165	16 10-1/4	20 --	Kt	2,975	71.13 89 96 104	Dec. 9, 1949 Apr. 26, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 80 gpm on July 20, 1962. Well F-152. 1/
511	do	do	1949	170	16 10-1/4	20 --	Kt	2,987	61 88 99 108	1949 Apr. 26, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 71 gpm on Aug. 7, 1962. Well F-145. 1/
512	do	do	1949	168	16 10-1/4	20 --	Kt	2,997	75.89 91 97 103	Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 15 gpm on July 3, 1962. Well F-139. 1/
513	do	do	1949	--	--	--	Kt	2,996	93 101 110	Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 61 gpm on July 6, 1962.
514	do	do	1949	--	--	--	--	2,995	95 101 110	Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 77 gpm on July 5, 1962.
* 515	do	do	1949	205	16	20	Kt	2,993	77.40 86 100 105	Dec. 11, 1949 Apr. 26, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 71 gpm on Aug. 7, 1962. Well F-135. 1/
516	do	do	1949	185	16 10-1/4	20 --	Kt	3,001	75.40 88 93 100	Sept. 20, 1949 Apr. 20, 1962 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 63 gpm on July 6, 1962. Well F-133. 1/
517	do	do	1947	150	15-1/2 10-3/4	17 80	Kt Kt	2,964	58.26 83 89 92	Sept. 29, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 80 to 150 feet. Reported yield, 30 gpm on June 27, 1962. Well F-93. 1/
518	do	do	1946	160	-- 10-3/4	18 18-	Kt	2,955	59.59 91 96 102	Sept. 29, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 65 gpm on July 16, 1962. Well F-89. 1/
519	El Paso Products Company	--	--	190	8	--	--	3,006	--	--	S, E	Ind	Reported yield, 50 gpm.
520	do	--	--	190	8	--	--	2,998	--	--	S, E	Ind	Reported yield, 24 gpm.
* 521	do	--	--	190	8	--	Kt	2,998	--	--	S, E	Ind	Reported yield, 85 gpm.
* 602	Hence Barrow	--	1948	146	10	146	Kt	2,993	74.01 76.7 113.1	Apr. 7, 1948 Dec. 12, 1949 June 8, 1970	S, E	D, S	Well F-20. 1/
* 603	Colorado River Municipal Water District	City of Odessa	1948	180	16 10-3/4	10 80	Kt	2,956	72.06 94 111	Dec. 11, 1949 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 80 to 180 feet. Well F-85. 1/
* 604	do	do	1946	174	16 10-3/4	8 74	Kt	2,951	54.59 81.3 93 99 104	Sept. 29, 1947 Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 74 to 174 feet. Reported yield, 93 gpm on July 23, 1962. Well F-84. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-05-605	Colorado River Municipal Water District	City of Odessa	--	--	--	--	Kt	2,990	91 102 113	Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 60 gpm on July 10, 1962.
606	do	do	1946	160	-- 10-3/4	20 --	Kt	2,953	54.31 89 96 115	Sept. 29, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 50 gpm on July 16, 1962. Well F-90. 1/
607	do	do	1948	180	16 10-3/4	20 80	Kt	2,956	44.22 104 111	Dec. 11, 1949 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 80 to 180 feet. Reported yield, 95 gpm on June 27, 1962. Well F-83. 1/
608	Miether Machine Works	--	1959	195	--	174	Kt	2,967	160	Sept. 3, 1970	T, E	Ind	Steel casing slotted from 174 to 195 feet.
609	Colorado River Municipal Water District	City of Odessa	1949	175	16	20	Kt	2,971	70 88 92	July 8, 1949 Jan. 13, 1960 Jan. 8, 1963	T, E	P	Well F-154. 1/
610	do	do	1949	189	16	20	Kt	2,967	69 90 98 107	July 8, 1949 Dec. 22, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 110 gpm on July 5, 1962. Well F-155. 1/
611	do	do	1949	185	16	20	Kt	2,966	80.65 96 110	Dec. 11, 1949 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 105 gpm on July 26, 1962. Well F-150. 1/
612	do	do	1949	190	16 10-1/4	20 190	Kt	2,971	87.08 83 92 112 85.88	Dec. 11, 1949 Apr. 26, 1960 Jan. 11, 1965 Feb. 13, 1970 Sept. 2, 1970	T, E	P	Reported yield, 140 gpm on July 11, 1962. Well F-143. 1/
613	do	do	1949	195	16 10-1/4	20 --	Kt	2,974	83.72 91 99 109	Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 68 gpm on July 13, 1962. Well F-149. 1/
614	do	do	1949	195	10-1/4	195	Kt	2,987	76.75 90 94	Dec. 11, 1949 Apr. 26, 1960 Apr. 20, 1962	T, E	P	Reported yield, 63 gpm on July 10, 1962. Well F-136. 1/
615	do	do	1949	182	16	20	Kt	2,967	82.34 89 98 109 113.04	Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970 Sept. 2, 1970	T, E	P	Reported yield, 115 gpm on July 2, 1962. Well F-151. 1/
616	do	do	--	--	--	--	Kt	2,989	93 99 104	Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 70 gpm on July 9, 1962.
* 617	do	do	1949	196	16 10-1/4	20 --	Kt	2,987	80.07 98 102 108	Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 65 gpm on July 9, 1962. Well F-141. 1/
618	do	do	1945	164	16 10	24 64	Kt	2,954	55.55 79.3 96 99 110	Sept. 29, 1947 Dec. 11, 1949 Dec. 22, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 64 to 164 feet. Well F-88. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
JH-45-05-619	Colorado River Municipal Water District	City of Odessa	1947	180	15-1/2 10-3/4	17 80	Kt	2,956	54.04 73.4 90 99 105	Sept. 26, 1947 Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	S, E	P	Steel casing slotted from 80 to 180 feet. Reported yield, 68 gpm on July 2, 1962. Well F-86. 1/
620	do	do	1947	166	15-1/2 10-3/4	17 66	Kt	2,954	55.87 78.6 92 99 110	Sept. 29, 1947 Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	S, E	P	Steel casing slotted from 66 to 166 feet. Reported yield, 52 gpm on July 2, 1962. Well F-87. 1/
621	Sunset Country Club	--	1954	202	8	20	Kt	2,990	--	--	T, E	Irr	--
622	do	--	1954	202	8	20	Kt	2,990	--	--	T, E	Irr	--
623	do	--	1956	202	8	20	Kt	2,990	--	--	S, E	Irr	--
624	do	--	1960	202	8	20	Kt	2,994	--	--	S, E	Irr	--
625	do	--	1961	202	8	20	Kt	2,990	--	--	T, E	Irr	--
626	do	--	1962	202	8	20	Kt	2,984	--	--	S, E	N	Unused public-supply well.
627	do	--	1969	210	8	19	Kt	2,991	105	July 10, 1969	T, E	Irr	Reported yield, 85 gpm.
* 628	do	--	1969	205	8	14	Kt	2,992	97	July 4, 1969	S, E	Irr	Reported yield, 55 gpm on July 4, 1969.
* 629	do	--	--	202	8	20	Kt	2,990	--	--	T, E	Irr	--
701	J. L. Johnson, Sr. Estate	--	--	71	--	--	Kt	2,994	62.2	July 22, 1970	C, W	S	--
* 702	do	--	--	--	--	--	Kt	2,962	--	--	C, W	S	--
* 703	do	--	--	109	6	90	Kt	2,984	57.6	July 22, 1970	C, W	S	Steel casing perforated from 90 to 109 feet.
* 801	do	--	1970	133	6	133	Kt	2,953	75	Jan. 16, 1970	S, E	D, S	Steel casing perforated from 20 to 133 feet.
* 802	do	--	1970	126	6	126	Kt	2,953	67 66.1	Jan. 28, 1970 July 21, 1970	C, W	D, S	--
* 803	do	--	--	90	--	--	Kt	2,978	58.6 56.19 69.7	Mar. 12, 1937 Apr. 12, 1948 July 22, 1970	C, W	S	Well F-96. 1/
* 804	do	--	--	100	--	--	Kt	2,970	53.31 61.4	Apr. 12, 1948 July 22, 1970	C, W	S	Well F-97. 1/
805	do	--	--	72	--	--	Kt	2,951	65.7	July 21, 1970	C, W	S	--
806	do	--	1965	130	6	--	Kt	2,950	--	--	C, W	S	--
807	do	--	--	--	--	--	Kt	2,945	--	--	C, W	S	--
808	do	--	--	--	--	--	Kt	2,944	--	--	C, W	S	--
809	Colorado River Municipal Water District	City of Odessa	1946	147	15-1/2 10-3/4	20 67	Kt	2,953	53.62 85 92 97	Sept. 29, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 67 to 147 feet. Reported yield, 45 gpm on June 26, 1962. Well F-91. 1/
901	do	do	1944	156	10 7	60 56	Kt	2,940	86.56 90.3 93 95	Sept. 26, 1947 May 11, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 56 to 156 feet. Reported yield, 140 gpm on June 20, 1962. Well F-52. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-05-903	Colorado River Municipal Water District	City of Odessa	1946	150	15 10	19 80	Kt	2,949	77.99 76.5 92 99 106	Sept. 26, 1947 Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 80 to 150 feet. Reported yield, 80 gpm on July 26, 1962. Well F-60. 1/
904	do	do	1944	148	10	69	Kt	2,935	79.74 83 81 72	Sept. 26, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 85 gpm on Aug. 30, 1962. Well F-42. 1/
905	do	do	1944	148	10	70	Kt	2,936	--	--	T, E	P	Reported yield, 31 gpm on June 20, 1962. Well F-51. 1/
906	do	do	1945	147	10-3/4	68	Kt	2,937	80.96 91 94 107 102.28	Sept. 26, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970 Aug. 21, 1970	T, E	P	Reported yield, 61 gpm on June 22, 1962. Well F-53. 1/
907	do	do	1944	155	7	--	Kt	2,942	65 75 75	Sept. 25, 1947 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Well F-54. 1/
908	do	do	1946	156	16 10	15 86	Kt	2,949	53.45 79.8 94 98 105	Sept. 29, 1947 Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 86 to 156 feet. Reported yield, 45 gpm on June 25, 1962. Well F-80. 1/
* 909	do	do	1948	170	16	20	Kt	2,949	74.15	Dec. 11, 1949	T, E	P	Steel casing slotted from 70 to 170 feet. Reported yield, 85 gpm on Aug. 30, 1962. Well F-72. 1/
910	do	do	1946	164	16 10	-- 64	Kt	2,948	53.41 76.2 93 97 99	Sept. 26, 1947 Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 64 to 164 feet. Reported yield, 80 gpm on June 25, 1962. Well F-81. 1/
911	do	do	1946	158	16 10-3/4	12 58	Kt	2,953	57.85 76.6 96 98 107	Sept. 29, 1947 Dec. 11, 1949 Apr. 26, 1960 Jan. 11, 1965 Feb. 13, 1970	S, E	P	Steel casing slotted from 58 to 158 feet. Reported yield, 85 gpm on June 25, 1962. Well F-79. 1/
912	do	do	1948	110	15 10-3/4	20 70	Kt	2,955	77.96	Dec. 11, 1949	T, E	P	Steel casing slotted from 70 to 170 feet. Reported yield, 51 gpm on Aug. 30, 1962. Well F-73. 1/
913	do	do	1946	160	15 10	30 100	Kt	2,937	60.30 57.9	Sept. 26, 1947 Dec. 9, 1949	T, E	P	Steel casing slotted from 100 to 160 feet. Reported yield, 71 gpm on June 29, 1962. Well F-62. 1/
914	do	do	--	150	15 10-3/4	32 --	Kt	2,943	86.96 82.1 94 100 100	Sept. 26, 1947 Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 135 gpm on June 22, 1962. Well F-56. 1/
915	do	do	1945	175	10	83	Kt	2,940	45.16 54.4 72 81 93	Sept. 26, 1947 Dec. 9, 1949 Jan. 11, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 83 to 175 feet. Well F-64. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JH-45-05-916	Colorado River Municipal Water District	City of Odessa	1945	155	10	65	Kt	2,951	79.32 98 101 112.68	Sept. 26, 1947 Jan. 13, 1960 Jan. 8, 1963 Sept. 2, 1970	T, E	P	Steel casing slotted from 65 to 155 feet. Reported yield, 55 gpm on June 25, 1962. Well F-58. 1/
917	do	do	1945	165	10	40	Kt	2,947	77.1 95 98 109.20	Sept. 26, 1947 Apr. 26, 1960 Jan. 11, 1965 Sept. 2, 1970	T, E	P	Reported yield, 43 gpm on June 22, 1962. Well F-57. 1/
918	do	do	1948	130	16 10-3/4	20 60	Kt	2,947	75 75	Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 60 to 120 feet. Well F-71. 1/
* 919	do	do	1948	175	16 10-3/4	12 75	Kt	2,948	94 104	Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 75 to 175 feet. Reported yield, 51 gpm on Aug. 30, 1962. Well F-82. 1/
* 920	do	do	1946	156	16 10	21 76	Kt	2,952	53.75 75.6 93 97 101	Sept. 29, 1947 Dec. 11, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Ten inch steel casing slotted from 76 feet to 156 feet. Reported yield, 45 gpm on Jun. 29, 1962. Well F-77. 1/
* 921	do	do	1946	150	16 10	20 70	Kt	2,939	45.97 49.3 71 82 92	Sept. 29, 1947 Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 70 to 150 feet. Well F-63. 1/
* 922	do	do	1945	180	15 10	40 90	Kt	2,938	85.94 81.4 91 94 94	Sept. 26, 1947 Dec. 9, 1949 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Steel casing slotted from 90 to 180 feet. Reported yield, 40 gpm on June 20, 1962. Well F-55. 1/
* 923	do	do	1945	175	15 10	30 --	Kt	2,948	60	Sept. 25, 1947	T, E	P	Reported yield, 25 gpm on June 25, 1962. Well F-59. 1/
* 924	do	do	1944	145	10	68	Kt	2,935	70.79 75 77 78	Sept. 26, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 50 gpm on June 19, 1962. Well F-47. 1/
* 925	do	do	1944	150	10 7	69 65	Kt	2,936	78.9 83 77	Sept. 26, 1947 Jan. 13, 1960 Aug. 18, 1967	T, E	P	Steel casing perforated from 65 to 150 feet. Reported yield, 70 gpm on June 22, 1962. Well F-46. 1/
* 926	do	do	1944	156	10	69	Kt	2,938	85.08 85 80 81	Sept. 30, 1947 Jan. 13, 1960 Jan. 11, 1965 Feb. 13, 1970	T, E	P	Reported yield, 95 gpm on June 19, 1962. Well F-45. 1/
927	Maudie Gist	Richard R. Stewart	--	150	6	--	Kt	2,943	--	--	C, E	P	--
928	do	do	--	150	6	--	Kt	2,943	--	--	S, E	P	--
929	D. L. Harrington	--	--	150	--	--	Kt	2,934	--	--	S, E	P	--
930	do	--	1963	150	10	50	Kt	2,934	--	--	S, E	P	--
* 06-101	Mrs. Sallie Ratliff, et al.	--	--	135	--	--	Kt	2,992	105.2 99.46 105.3	Apr. 6, 1937 Dec. 13, 1949 June 9, 1970	C, W	S	Well F-15. 1/
* 102	do	--	1902	--	--	--	Kt	3,006	--	--	S, E	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells-Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-06-103	Mrs. Sallie Ratliff, et al.	--	--	137	--	--	Kt	3,005	109.1 107.16 108.3 109.7	Apr. 6, 1937 Apr. 5, 1948 Dec. 13, 1949 June 9, 1970	C, W	S	Well F-16. 1/
201	Roy Parks, et al.	Bill Faudree	--	150	--	--	Kt	2,981	102.5	Mar. 17, 1967	C, W	S	--
402	Mrs. Sallie Ratliff, et al.	--	1940	--	--	--	Kt	2,996	109.0	June 9, 1970	C, W	N	Abandoned domestic well.
403	do	--	1940	--	--	--	Kt	2,996	--	--	C, E	N	Do.
404	do	--	1904	105	--	--	Kt	2,996	--	--	S, E	D	--
405	do	--	--	137	--	--	Kt	2,997	106.5	June 9, 1970	S, E	S	--
* 501	Roy Parks, et al.	Bill Faudree	--	177	--	--	Kt	2,990	109.9	Mar. 17, 1967	C, W	S	--
502	Harriet P. Faudree	do	--	--	--	--	Kt	2,961	--	--	C, W	S	--
* 503	Mrs. Sallie Ratliff, et al.	--	--	105	--	--	Kt	2,974	91.95 94.62	Apr. 1, 1948 June 9, 1970	S, E	S	Well F-32. 1/
* 602	Harriet P. Faudree	Bill Faudree	--	66	--	--	Kt	2,898	44.5	Mar. 10, 1967	C, W	S	--
801	Roy Parks, et al.	do	--	79	--	--	Kt	2,896	52.1	do	C, W	S	--
* 802	Sunset Memorial Gardens	--	1963	116	6	--	Kt	2,882	--	--	T, E	Irr	--
803	do	--	1968	116	6	--	Kt	2,883	--	--	S, E	Irr	--
* 804	do	--	1955	116	6	--	Kt	2,882	--	--	S, E	Irr	--
805	do	--	1961	116	6	--	Kt	2,883	--	--	S, E	Irr	--
* 806	Odessa Country Club	--	--	135	8-5/8	--	Kt	2,875	--	--	S, E	Irr	--
807	do	--	--	135	8-5/8	--	Kt	2,875	--	--	S, E	Irr	--
904	do	--	--	135	8-5/8	--	Kt	2,871	--	--	T, E	Irr	--
905	do	--	--	135	8-5/8	--	Kt	2,874	--	--	S, E	Irr	--
* 906	do	--	--	135	8-5/8	--	Kt	2,870	--	--	S, E	Irr	--
907	do	--	--	135	8-5/8	--	Kt	2,869	--	--	S, E	Irr	--
11-201	J. E. Parker, et al.	Hugh Ratliff	--	80	--	--	Kt	3,120	--	--	C, W	S	--
* 202	do	do	--	196	--	--	Kt	3,234	172.3	June 8, 1970	C, W	S	--
* 301	do	do	--	200	--	--	Kt	3,205	--	--	C, W	S	--
302	Texaco Incorporated	J. E. Parker, et al.	--	192	--	--	Kt	3,218	170.4	June 8, 1970	C, W	S	--
601	Paul Slator	--	1914	70	--	--	Kt	3,106	--	--	C, W	S	--
12-101	J. E. Parker, et al.	Hugh Ratliff	--	50	6	--	Kt	3,168	--	--	C, W	S	--
* 102	do	do	--	200	8	--	Kt	3,140	--	--	C, W	S	--
* 103	do	do	--	181	--	--	Kt	3,145	163.9	Apr. 9, 1937	C, W	S	Well E-30. 1/
* 104	do	do	--	200	6	--	Kt	3,140	--	--	S, E	D	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diam-eter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JH-45-12-201	J. E. Parker, et al.	Hugh Ratliff	--	--	--	--	Kt	3,092	126.5	June 9, 1970	C, W	S	--
* 301	Petroleum Corporation of Texas	--	1968	115	12	15	Kt	2,979	65	Dec. 28, 1968	T, G	Ind	Reported yield, 40 gpm on Dec. 28, 1968.
302	do	--	1969	115	12	15	Kt	2,985	65	May 24, 1969	T, G	Ind	Reported yield, 40 gpm on May 24, 1969.
303	El Paso Products Company	--	1955	115	8	--	Kt	2,977	--	--	T, G	Ind	Reported yield, 20 gpm.
304	do	--	--	115	--	--	Kt	2,980	--	--	T, E	Ind	Reported yield, 45 gpm.
305	do	--	--	115	--	--	Kt	2,989	--	--	T, E	Ind	Reported yield, 20 gpm.
306	do	--	--	115	--	--	Kt	2,988	--	--	T, E	Ind	Reported yield, 25 gpm.
307	do	--	--	115	--	--	Kt	2,983	--	--	T, E	Ind	Do.
308	do	--	--	115	6	--	Kt	2,979	--	--	S, E	Ind	Reported yield, 20 gpm.
* 309	do	--	--	115	--	--	Kt	2,977	--	--	T, E	Ind	Reported yield, 25 gpm.
* 13-101	Petroleum Corporation of Texas	--	1947	--	--	--	Kt	2,943	51	June 1958	S, E	Ind	--
102	do	--	1947	--	--	--	Kt	2,941	--	--	S, E	Ind	Reported yield, 29 gpm in Nov. 1967.
* 103	do	--	1947	--	--	--	Kt	2,945	--	--	S, E	Ind	Reported yield, 15 gpm in Nov. 1967.
106	do	--	1966	94	10	8	Kt	2,961	--	--	N	N	Unused industrial well. Reported yield, 20 gpm in Nov. 1967.
* 107	do	--	1963	--	--	--	Kt	2,950	--	--	S, E	Ind	Reported yield, 27 gpm in Nov. 1967.
* 108	do	--	1963	--	--	--	Kt	2,951	--	--	S, E	Ind	Reported yield, 24 gpm in Nov. 1967.
* 201	Pan American Oil Corporation	--	--	1,240	--	--	Trs	--	52.19 51.37	Dec. 5, 1969 Dec. 15, 1970	S, E	Ind	Observation well.
* 202	Shell Oil Company	--	--	1,300	8-5/8	1,076	Trs	2,934	--	--	S, E	Ind	Reported yield, 26 gpm on May 30, 1962.
203	Pan American Oil Corporation	--	--	94	6	--	Kt	--	51.33 50.12 49.49 50.71 49.13	Dec. 5, 1963 Nov. 28, 1967 Dec. 5, 1968 Sept. 17, 1970 Dec. 15, 1970	N	N	Observation well. Unused industrial well.
204	El Paso Products Company	--	--	100	8	--	Kt	2,934	--	--	S, E	Ind	Reported yield, 15 gpm.
* 205	do	--	--	100	8	--	Kt	2,934	--	--	S, E	Ind	Reported yield, 24 gpm on Sept. 15, 1970.
206	do	--	--	100	8	--	Kt	2,928	--	--	S, E	Ind	Reported yield, 27 gpm on Sept. 15, 1970.
* 207	Clyde Tisdale	--	--	99	--	--	Kt	2,933	--	--	S, E	S	Reported yield, 60 gpm on Sept. 16, 1970.
208	Shell Oil Company	--	--	--	--	--	Trs	2,935	--	--	S, E	Ind	--
* 301	El Paso Products Company	--	1946	119	8	--	Kt	2,938	--	--	T, E	Ind	Reported yield, 35 gpm. Well F-102. 1/
* 302	do	--	--	119	8	--	Kt	2,937	--	--	T, E	Ind	Reported yield, 15 gpm.
303	do	--	--	119	8	--	Kt	2,936	--	--	T, E	Ind	Reported yield, 18 gpm.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-13-304	Ector County Independent School District	--	1948	142	10	--	Kt	2,925	--	--	T, E	Irr	Well F-104. 1/
401	Petroleum Corporation of Texas	--	1966	94	12	10	Kt	2,961	--	--	T, G	Ind	Reported yield, 52 gpm in Nov. 1967.
402	do	--	1966	95	12	10	Kt	2,959	--	--	S, E	Ind	Reported yield, 20 gpm in Nov. 1967.
403	do	--	1968	96	8	12	Kt	2,955	55	Feb. 6, 1968	S, E	Ind	Reported yield, 30 gpm on Feb. 6, 1968.
404	do	--	1963	--	--	--	Kt	2,955	--	--	S, E	Ind	Reported yield, 25 gpm on Nov. 1967.
405	do	--	1968	96	8	12	Kt	2,956	55 64.6	Feb. 10, 1968 Sept. 11, 1970	S, E	Ind	Reported yield, 28 gpm on Feb. 10, 1968.
* 501	Paul Moss Estate	Jack Crider	--	--	--	--	Kt	2,930	96.4	Apr. 20, 1968	S, E	S	--
* 601	E. K. Colbert	Edwin Martin, Jr.	1965	104	10-3/4	50	Kt	2,912	57.2	do	S, E	S	--
* 602	Bessye Cowden Ward	T-Bone Moore	--	76	--	--	Kt	2,893	44.0	Apr. 19, 1968	C, W	S	Pumping water level for 1968.
603	Paul Moss Estate	--	--	--	6-1/2	--	Kt	2,919	65.8	Apr. 20, 1968	S, E	D	--
* 604	Big 3 Welding	--	1961	70	8	--	Kt	2,896	--	--	S, E	Ind	--
701	Texaco Incorporated	Rodman and Noel Ranch	1960	184	8	--	Kt	3,045	139.3	Apr. 18, 1968	N	N	--
* 702	Rodman and Noel Ranch	--	--	186	--	--	Kt	3,056	180.5	do	C, W	S	--
703	U.S. Government	--	--	--	7	--	Kt	2,355	--	--	J, E	P	Meteorite Crater well.
801	Rodman and Noel Ranch	--	--	160	--	--	Kt	2,998	145.2	Apr. 17, 1968	C, W	S	--
802	do	--	--	160	--	--	Kt	2,952	100.6	do	C, W	S	--
* 803	Stanto Henderson	Paul Moss Estate	1950	195	9	--	Kt	2,998	135.6	Apr. 20, 1968	C, W	D, S	--
804	Paul Moss Estate	Jack Crider	--	--	8	--	Kt	2,947	91.8	Apr. 20, 1968	N	N	--
* 805	do	--	--	126	--	--	Kt	2,964	102.9	do	C, W	S	--
901	do	Edwin Martin, Jr.	--	--	--	--	Kt	2,905	58.5	do	C, E	N	Unused livestock well.
902	E. K. Colbert	do	1950	62	7	62	Kt	2,900	56.3	do	N	N	Unused industrial well.
903	J. H. Emmons	Floyd Emmons	1928	64	10-3/4	--	Kt	2,900	55.8 57.0	Mar. 27, 1937 Apr. 20, 1968	C, W	N	Unused livestock well. Well I-23. 1/
904	Rodman and Noel Ranch	--	--	106	12	--	Kt	2,924	78.2	Apr. 17, 1968	N	N	Unused industrial well.
905	do	--	--	126	7	--	Kt	2,934	92.7	Apr. 20, 1968	N	N	Do.
906	Texaco Incorporated	Rodman and Noel Ranch	--	146	12	--	Kt	2,956	118.5	do	N	N	Do.
907	Rodman and Noel Ranch	--	--	--	7	--	Kt	2,936	96.61	Apr. 19, 1968	N	N	--
908	do	--	--	80	7	--	Kt	2,911	--	--	C, W	S	--
* 909	Mrs. Daisy Kelly	Rodman and Noel Ranch	--	153	5	--	Kt	2,940	102.3	Apr. 19, 1968	N	N	--

See footnotes at end of table.

Table 6.--Records of Wells-Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-14-102	Sivall Tanks Incorporated	--	1955	140	8	--	Kt	2,922	--	--	T, E	P	--
* 103	do	--	1947	140	12	--	Kt	2,920	--	--	T, E	Ind	Well F-119. 1/
104	do	--	1956	140	8	--	Kt	2,917	--	--	T, E	Ind	--
* 201	Roy Parks, et al.	Bill Faudree	--	--	--	--	Kt	2,881	--	--	C, W	S	--
* 202	do	do	--	--	--	--	Kt	2,861	28.6	Mar. 10, 1967	C, W	S	--
* 203	do	do	--	--	--	--	Kt	2,861	--	--	C, W	S	--
204	Trans-Pecos Materials	--	1950	115	8-5/8	--	Kt	2,904	--	--	S, E	N	Unused industrial well.
* 205	do	--	1950	115	--	--	Kt	2,905	--	--	T, E	Ind	--
* 306	Roy Parks, et al.	Bill Faudree	--	71	--	--	To, Kt	2,852	29.4	Mar. 10, 1967	C, W	S	--
* 401	General Tire and Rubber Company	--	1958	110	8-5/8	--	Kt	2,891	--	--	T, E	Irr	--
402	do	--	1958	132	7	79	Kt	2,879	50	Dec. 17, 1958	N	N	Unused industrial well. Steel casing perforated from 79 to 132 feet.
403	Texas Highway Department	--	1966	98	7-1/2	--	To, Kt	2,870	19.5	Apr. 18, 1968	T, G	Ind	--
* 404	Mrs. Bessye Cowden Ward	T-Bone Moore	--	92	--	10	Kt	2,886	40.7	Apr. 19, 1968	C, W	S	--
405	do	do	--	100	--	--	Kt	2,882	--	--	C, W	S	--
406	do	do	1948	63	5-1/2	10	Kt	2,870	20.8	Apr. 19, 1968	C, W	S	--
* 407	do	--	1967	128	5-1/2	--	Kt	2,879	43.1	do	C, E	D, S	--
* 408	do	--	--	98	--	--	Kt	2,878	--	--	S, E	D, S	--
409	General Tire and Rubber Company	--	--	118	8-5/8	--	Kt	2,883	--	--	T, E	Irr	--
410	Big 3 Welding	--	1962	--	--	--	Kt	2,867	--	--	S, E	Ind	--
411	do	--	1962	--	--	--	Kt	2,866	--	--	S, E	Ind	--
* 412	Jimmy McCutcheon	Lewis Hadid Meat Company	--	140	--	--	Kt	2,873	--	--	S, E	Ind	--
* 502	do	--	1963	104	5-1/2	15	Kt	2,862	43.4	Feb. 15, 1967	C, W	S	--
* 503	Mrs. Bessye Cowden Ward	O. V. Buck	1966	140	5-1/2	20	Kt	2,857	18.8	Apr. 19, 1968	C, W	S	--
504	do	Bill Hale	--	--	6	4	Kt	2,848	8.7	Apr. 17, 1968	N	N	--
505	do	do	1965	70	--	--	Kt	2,840	5.8	do	N	N	Unused test hole.
* 506	do	do	1964	100	6	80	Kt	2,852	--	--	C, W	S	--
* 507	do	do	1964	96	6	80	Kt	2,842	13.8	Apr. 16, 1968	S, E	S	--
701	Floyd Emmons	--	1966	133	7-1/2	8	Kt	2,886	47.2	Apr. 20, 1968	N	N	Unused domestic well.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JH-45-14-702	J. H. Emmons	Floyd Emmons	1954	120	7	10	Kt	2,886	--	--	S, E	D, S	--
703	Mrs. Bessye Cowden Ward	--	1955	112	7	--	Kt	2,863	31.7	Apr. 19, 1968	C, W	S	--
* 704	do	Son Jackson	--	68	--	--	Kt	2,862	35.9	Apr. 17, 1968	C, W	S	--
705	Texaco Incorporated	Rodman and Noel Ranch	--	101	10	--	Kt	2,895	63.2	Apr. 19, 1968	N	N	--
706	Rodman and Noel Ranch	--	1940	96	8	--	Kt	2,908	75.8	Apr. 17, 1968	C, W	S	--
801	Mrs. Bessye Cowden Ward	Bill Hale	--	100	--	--	To, Kt	2,846	23.2	Apr. 16, 1968	C, W	S	--
* 802	do	Son Jackson	--	100	--	--	Kt	2,860	--	--	C, W	S	--
901	Frank B. Waters	--	--	100	--	15	Kt	2,863	78.7	Feb. 15, 1967	C, W	S	--
19-101	C. H. C. Anderson, et al.	Mobil Oil Corporation	--	650	6	--	Trs	2,895	189.13 195.60 211.04	Dec. 5, 1963 Nov. 29, 1967 Dec. 15, 1970	N	N	Unused industrial well. Observation well.
20-201	Southwestern Portland Cement Company	Rodman and Noel Ranch	--	190	8	--	Kt	3,056	173.4	Apr. 19, 1968	N	N	--
* 202	do	--	1958	--	--	--	Trs	3,093	--	--	T, E	Ind	--
203	do	--	--	140	6-5/8	140	Kt	3,010	127	Dec. 31, 1959	T, E	P	--
* 204	do	--	1959	160	6-5/8	155	Kt	3,015	127	Dec. 26, 1959	T, E	P	Reported yield, 10 gpm.
205	do	--	1960	150	6-5/8	150	Kt	3,017	130 128.1	Jan. 8, 1960 Apr. 19, 1968	T, E	P	--
206	do	--	1959	1,400	--	--	Trs	3,089	--	--	T, E	Ind	--
* 301	Texaco Incorporated	Rodman and Noel Ranch	--	153	6	--	Kt	3,011	142.65	Apr. 18, 1968	C, W	S	--
* 302	Rodman and Noel Ranch	--	1930	160	6	12	Kt	3,074	191.6	do	C, W	S	--
* 601	Ector County Land and Cattle Company	--	--	111	6	--	Kt	2,960	105.8	Apr. 19, 1968	C, W	S	--
21-101	do	--	1967	203	6	--	Kt	3,030	197.2	do	N	N	--
* 102	Rodman and Noel Ranch	--	--	195	--	--	Kt	3,027	168.4	Apr. 17, 1968	C, W	S	--
103	do	--	--	--	6-3/8	--	Kt	3,024	145.5	Apr. 18, 1968	N	N	Abandoned industrial well.
104	do	--	1966	182	6	--	Kt	3,026	153.4	do	C, W	S	--
201	Ector County Land and Cattle Company	--	--	--	--	--	Kt	3,003	163.8	Apr. 19, 1968	T	N	--
* 202	Texaco Incorporated	Rodman and Noel Ranch	--	189	8	--	Kt	3,000	159.5	Apr. 18, 1968	C, W	S	--
* 301	Rodman and Noel Ranch	--	1930	150	6	--	Kt	2,922	99.0	Apr. 17, 1968	C, W	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JH-45-21-302	Rodman and Noel Ranch	--	--	170	--	--	Kt	2,945	111.8	Apr. 17, 1968	C, W	S	--
* 303	do	--	--	172	10	--	Kt	2,972	150.6	Apr. 18, 1968	C, W	S	--
304	do	--	1959	154	6	21	Kt	2,520	--	--	T, E	Irr	--
* 305	do	--	1959	150	6	21	Kt	2,520	--	--	S, E	Irr	--
401	Ector County Land and Cattle Company	--	--	72	6	--	Kt	2,931	59.6	Apr. 19, 1968	N	N	--
402	do	--	--	101	6	--	Kt	2,909	77.5	do	C, W	S	--
403	do	--	--	150	--	--	Kt	2,857	84.1	do	C, W	S	--
404	do	--	--	138	--	--	Kt	2,965	129.6	do	C, W	S	--
405	do	--	--	136	--	--	Kt	2,965	129.2	do	C, W	S	--
* 501	do	--	--	188	8	--	Kt	3,004	170.6	do	C, W	S	--
* 601	Ector County Ranch	Jack Nolan	--	202	--	--	Kt	2,978	172.4	Apr. 18, 1968	C, W	S	--
602	Jack Nolan	--	1967	172	--	--	Kt	2,942	128.8	do	C, W	S	--
603	S. F. Gladden	--	--	173	--	--	Kt	2,955	153.0	do	N	N	--
* 604	do	--	--	--	--	--	Kt	2,955	--	--	S, E	D, S	--
605	Ector County Land and Cattle Company	--	--	150	--	--	Kt	2,924	128.0	Apr. 19, 1968	C, W	D, S	--
* 606	do	--	--	--	--	--	Kt	2,924	128.2	do	S, E	D, S	--
607	do	--	--	126	--	--	Kt	2,906	107.2	do	C, W	S	--
608	do	--	--	117	--	--	Kt	2,906	105.6	do	C, W	S	--
901	do	--	--	104	5	--	Kt	2,872	79.8	do	C, W	S	--
22-101	Mrs. Bessye Cowden Ward	Son Jackson and Ray Barrett	--	93	--	--	Kt	2,888	72.0 58.6	Apr. 13, 1937 Apr. 18, 1968	C, W	S	Well I-33. 1/
* 102	Rodman and Noel Ranch	--	--	157	7	--	Kt	2,947	130.3	Apr. 17, 1968	C, W	S	--
* 201	Mrs. Bessye Cowden Ward	Son Jackson and Ray Barrett	--	100	--	--	Kt	2,909	90.2 87.0	Apr. 7, 1937 Apr. 17, 1968	C, W	S	Well I-36. 1/
* 202	do	do	--	140	--	--	Kt	2,913	103.0 102.6	Apr. 7, 1937 Apr. 17, 1968	C, W	S	Well I-35. 1/
401	Jack Nolan	--	--	210	--	--	Kt	2,955	160.0	Apr. 18, 1968	C, W	S	--
501	Josie Peck Estate	Bill Wakefield	--	200	--	--	Kt	2,899	--	--	C, W	S	--
502	Mrs. Bessye Cowden Ward	Son Jackson	--	100	--	--	Kt	2,916	--	--	C, W	D, S	--
* 603	do	do	1950	200	--	--	Kt	2,927	116.8	Apr. 17, 1968	S, E	S	--
701	Paul Slator	--	1926	166	6	--	Kt	2,934	145.7 150.1	Apr. 2, 1937 Apr. 19, 1968	C, W	S	Well I-37. 1/
* 802	do	--	1900	150	--	--	Kt	2,909	132.8	do	C, W	S	--

* Chemical analysis of water given in Table 7.
1/ Texas Board of Water Engineers Bulletin 5210, "Ground-Water Resources of Ector County, Texas."

ECTOR COUNTY

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnotes.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Santa Rosa Formation											
2/ JH-45-13-201	Pan American Oil Corporation	1,240	Aug. 29, 1957	--	--	--	--	--	811	525	--	--	2,631	--	--	--	--	--
2/ 202	Shell Oil Company	1,300	May 23, 1960 Oct. 26, 1970	-- 12	28 14	12 8	1,146 900	671 650	788 710	880 550	-- 6.4	-- < 0.4	3,525 2,530	-- 67	-- 96.8	-- 3,700	8.0 8.1	-- 48.2
20-202	Southwestern Portland Cement Company	--	Apr. 19, 1968	24	6	3	900	700	730	336	11.8	< .4	2,430	28	98.4	3,540	9.0	74.0
							Trinity Group											
27-58-601	R. B. Cowden	--	July 28, 1970	38	89	10	59	287	62	62	.7	7	469	266	32.6	740	7.7	1.6
602	do	107	do	37	75	6	29	221	38	35	.6	5.0	335	214	22.6	520	7.6	1.4
901	Jessie Mae Williamson	157	July 27, 1970	28	163	31	110	264	216	202	2.0	46	930	540	30.8	1,440	7.6	2.1
1/ 2/ 59-601	Petroleum Corporation of Texas	127	Oct. 14, 1948 July 19, 1960	46 43	68 77	15 12	27 41	206 239	58 64	39 42	-- 1.8	6.5 6.6	380 405	231 242	-- 27	-- 631	-- 7.3	-- 1.1
701	William H. Cole	80	July 23, 1970	28	129	29	102	254	267	110	1.7	42	830	442	33.5	1,200	7.6	2.1
702	do	--	do	25	169	40	273	116	124	690	1.7	< .4	1,380	590	50.4	2,340	7.5	4.9
801	do	59	do	47	87	13	83	232	163	65	2.5	5.0	580	270	40.1	848	7.7	2.2
1/ 60-701	Petroleum Corporation of Texas	117	Oct. 14, 1948	42	83	16	41	200	104	58	--	10	477	273	--	--	--	--
702	do	118	Sept. 16, 1970	39	94	13	42	250	88	52	1.6	7.0	460	288	24.2	699	7.7	1.1
1/ 703	do	118	Oct. 14, 1948	42	80	16	42	200	97	59	--	11	467	266	--	--	--	--
2/ 901	Pan American Petroleum Corporation	114	July 19, 1960 Sept. 3, 1970	44 38	136 71	20 11	137 37	216 211	200 60	224 39	1.2 1.5	18 9	886 371	422 225	41 26.2	1,420 572	7.2 7.3	2.9 1.1
906	do	115	do	47	97	21	117	216	113	196	2.4	7	710	327	43.8	1,116	7.4	2.8
908	do	142	do	39	67	10	48	207	72	39	1.8	8	387	210	33.2	594	7.6	1.4
912	do	124	do	40	74	12	35	209	62	42	1.8	7.5	378	232	24.8	573	7.6	1.0
918	do	140	do	44	77	15	76	210	129	71	2.8	10	530	255	39.3	790	7.7	2.1
61-702	Harold Smith	89	June 10, 1970	35	201	44	870	207	284	1,480	1.4	10	3,030	680	73.4	4,590	7.4	14.5
703	do	100	do	38	73	11	48	206	83	45	1.9	11	412	231	31.3	614	7.7	1.4
1/ 901	James R. Hurt, et al.	41	Mar. 8, 1937	--	317	148	155	116	1,380	146	--	--	2,200	1,400	--	--	--	--

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Trinity Group--Continued											
1/ JH-27-61-902	James R. Hart, et al.	87	Apr. 6, 1937	--	--	--	--	116	100	66	--	--	340	--	--	--	--	--
			June 9, 1970	28	96	15	54	249	108	57	1.1	14	495	302	28.0	744	7.5	1.4
1/ 62-702	do	--	Mar. 10, 1937	--	144	40	136	277	265	229	--	--	946	525	--	--	--	--
1/			Apr. 5, 1948	68	88	27	121	285	153	133	--	15	750	330	--	--	--	--
705	do	75	June 9, 1970	37	155	13	67	182	265	95	1.8	14	740	440	25.0	1,055	7.2	1.4
1/ 706	Mrs. Sallie Ratliff, et al.	69	Mar. 10, 1937	--	126	17	152	250	288	150	--	--	856	386	--	--	--	--
			June 9, 1970	36	105	18	94	267	168	83	1.5	21	660	336	37.9	970	7.4	2.2
45-02-301	William H. Cole	--	July 27, 1970	13	213	23	235	238	103	590	1.5	14	1,310	630	44.9	2,240	7.7	4.1
03-202	do	93	July 23, 1970	20	184	35	88	162	510	68	1.2	24	1,010	600	24.0	1,390	7.4	1.5
1/ 301	Clarence Scharbauer, Jr.	120	Apr. 10, 1937	--	--	--	--	122	258	82	--	--	594	--	--	--	--	--
1/ 302	do	135	do	--	--	--	--	201	182	40	--	--	485	--	--	--	--	--
			July 24, 1970	19	105	17	82	237	211	59	2.1	17	630	335	34.8	939	7.6	1.9
2/ 401	Paul Slator	174	July 19, 1960	14	89	23	91	242	223	41	3.0	21	624	316	38	949	7.2	2.2
502	do	125	June 9, 1970	16	58	13	50	237	70	21	2.3	12	359	200	35.2	573	7.3	1.5
503	do	174	June 10, 1970	17	102	6	16	279	33	20	.8	24	356	281	10.8	565	7.6	.4
1/ 601	Clarence Scharbauer, Jr.	98	Apr. 10, 1937	--	--	--	--	244	102	28	--	--	388	--	--	--	--	--
701	Texaco Incorporated	173	June 9, 1970	14	250	30	98	226	18	530	.8	17	1,070	750	22.1	1,950	7.4	1.6
1/ 801	Paul Slator	174	Apr. 9, 1937	--	--	--	--	159	125	36	--	--	363	--	--	--	--	--
			June 10, 1970	16	72	12	39	238	72	22	2.1	19	371	231	27.0	577	7.7	1.1
1/ 901	Clarence Scharbauer, Jr.	133	Apr. 10, 1937	--	--	--	--	61	948	20	--	--	1,420	--	--	--	--	--
			July 24, 1970	16	77	12	41	253	69	31	2.2	15	387	243	26.7	614	7.7	1.1
2/ 04-101	City of Goldsmith	150	May 11, 1960	33	117	25	101	202	250	110	1.8	42	780	395	34	1,200	6.9	2.1
102	do	--	June 8, 1970	28	119	22	97	246	182	132	2.0	20	720	387	35.3	1,104	7.6	2.1
103	do	160	do	30	121	20	84	238	176	107	1.7	34	690	387	32.2	1,050	7.5	1.9
108	Mansell Brine Sales	150	June 12, 1970	29	168	20	121	201	234	232	1.7	22	930	500	34.3	1,440	7.4	2.3
110	do	150	do	28	97	17	60	204	151	64	1.7	20	540	313	29.3	816	7.5	1.5
1/ 117	S. B. Wight	81	Apr. 23, 1937	--	96	15	94	195	239	70	--	--	610	304	--	--	--	--
			June 11, 1970	33	88	21	75	198	187	58	2.3	20	580	306	34.9	863	7.5	1.9
1/ 118	Clarence Scharbauer, Jr.	95	Apr. 21, 1937	--	--	--	--	317	80	68	--	--	480	--	--	--	--	--
			July 24, 1970	40	110	13	42	220	98	60	1.9	56	530	329	21.8	794	7.5	1.0
1/ 201	S. B. Wight, et al.	105	Apr. 23, 1937	--	--	--	--	201	243	66	--	--	612	--	--	--	--	--
			June 11, 1970	34	108	19	76	201	229	71	1.4	17	650	347	32.3	935	7.5	1.8
1/ 202	do	--	Apr. 23, 1937	--	--	--	--	195	61	34	--	--	299	--	--	--	--	--
			June 11, 1970	56	98	20	50	284	113	46	2.9	20	550	328	24.8	778	7.6	1.2
301	S. B. Wight	126	do	39	740	55	1,000	234	181	2,780	.6	20	4,930	2,070	51.2	7,160	7.2	9.6
302	do	88	do	25	105	4	10	240	36	41	.2	17	356	280	7.4	569	7.4	.3

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Trinity Group--Continued											
JH-45-04-306	Texaco Incorporated	--	June 11, 1970	39	69	10	38	212	55	36	1.7	12	365	214	28.1	557	7.5	1.2
307	do	135	do	37	67	12	48	209	77	38	1.7	12	396	215	32.6	595	7.5	1.4
501	S. B. Wight, et al.	122	do	40	82	8	34	209	80	31	2.0	10	390	237	23.6	573	7.5	.9
502	S. B. Wight	--	do	37	128	21	57	177	309	44	2.3	9.5	700	409	23.4	951	7.6	1.2
503	do	--	do	29	145	28	98	178	376	98	2.6	15	880	478	30.9	1,210	7.2	2.0
504	do	126	do	28	149	21	87	161	362	90	2.5	19	840	461	29.1	1,190	7.3	1.8
601	S. B. Wight, et al.	122	do	33	94	8	44	211	89	61	.9	13	447	269	26.2	680	7.3	1.2
602	S. B. Wight	--	do	33	81	13	52	221	112	43	1.4	17	461	259	30.5	687	7.6	1.4
603	do	--	do	35	99	16	62	250	123	59	1.5	27	550	314	30.1	807	7.6	1.5
605	J. L. Johnson, Sr, Estate	113	July 22, 1970	35	93	16	62	204	170	58	1.8	11	550	299	31.1	811	7.7	1.6
[1] 701	Clarence Scharbauer, Jr.	178	Oct. 18, 1948	18	76	19	53	230	130	32	--	16	464	368	--	--	--	--
			July 24, 1970	18	79	15	54	238	118	33	2.2	15	451	262	30.8	692	7.8	1.4
[1] 902	J. L. Johnson, Sr. Estate	106	Mar. 17, 1937	--	112	24	53	301	161	57	--	--	555	381	--	--	--	--
			July 22, 1970	19	96	15	72	201	155	78	1.9	19	560	303	34.2	866	7.4	1.8
903	do	--	do	35	133	18	47	259	168	54	1.7	49	630	406	20.2	915	7.4	1.0
[1] 05-101	W. C. Smith	142	Apr. 13, 1948	42	69	9.4	43	223	55	37	--	15	382	210	--	--	--	--
			June 10, 1970	39	76	9	36	220	55	38	1.4	13	375	226	25.9	549	7.5	1.1
[1] 102	do	93	Apr. 8, 1948	41	80	9.6	34	213	54	55	--	7.0	420	239	--	--	--	--
103	do	--	June 10, 1970	35	112	9	74	216	74	143	1.0	17	570	316	33.8	932	7.8	1.8
104	Harold Smith	--	do	35	73	9	42	215	71	34	1.3	12	383	219	29.2	578	7.7	1.2
105	W. C. Smith	93	do	31	94	12	58	226	74	90	1.1	14	485	283	30.6	762	7.4	1.5
107	El Paso Products Company	190	Sept. 17, 1970	35	74	9	49	218	67	51	1.1	10	403	223	32.2	620	7.5	1.4
[1] 201	James R. Hurt, et al.	70	Mar. 9, 1937	--	86	17	29	234	78	53	--	--	378	285	--	--	--	--
			June 9, 1970	41	122	14	44	259	113	72	1.4	19	550	363	20.7	837	7.3	1.0
[1] 202	Hence Barrow	113	Mar. 9, 1937	--	77	19	43	269	70	50	--	--	392	272	--	--	--	--
[1]			Mar. 31, 1948	46	90	19	58	286	105	55	--	10	534	302	--	--	--	--
			June 9, 1970	44	105	6	45	273	87	41	1.9	7.0	471	286	25.6	688	7.5	1.2
[1] 203	do	111	Mar. 31, 1948	46	79	15	43	242	72	50	--	7.8	448	258	--	--	--	--
			June 9, 1970	36	80	13	40	244	72	44	1.4	3	409	254	25.5	634	7.4	1.1
[1] 301	do	104	Apr. 5, 1948	34	80	13	41	251	65	42	--	13	430	253	--	--	--	--
			June 9, 1970	31	78	12	32	235	60	31	1.2	10	371	244	22.3	576	7.5	.9
[1] 304	do	89	Mar. 12, 1937	--	68	14	38	250	54	36	--	--	--	229	--	--	--	--
[1]			Apr. 7, 1948	38	76	11	44	265	53	36	--	8.5	408	234	--	--	---	--
			June 9, 1970	34	76	12	32	243	53	26	1.5	8.3	362	237	22.6	558	7.3	.9
[1] 305	do	110	Apr. 5, 1948	38	75	14	41	230	76	42	--	8.5	430	244	--	--	--	--
308	Mansell Brine Sales	185	Sept. 8, 1970	36	86	15	318	244	66	486	1.4	4.0	1,130	277	71.4	1,950	7.3	8.3

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Trinity Group--Continued											
JM-45-05-314	El Paso Products Company	190	Sept. 21, 1970	24	71	14	47	234	77	38	1.4	9.5	397	236	30.2	620	7.6	1.3
1/ 401	W. C. Smith	120	Apr. 9, 1948	25	120	26	231	183	85	470	--	8.2	1,060	406	--	--	--	--
			June 10, 1970	35	73	5	39	226	55	33	1.2	9	361	204	29.4	566	7.2	1.2
402	J. L. Johnson, Sr. Estate	114	July 22, 1970	33	76	9	45	207	79	41	1.5	13	400	228	30.1	617	7.7	1.3
2/ 501	Colorado River Municipal Water District	180	May 11, 1960	38	76	7.5	34.9	216	50	36	1.0	14	363	220	24	580	7.0	.9
1/ 502	J. L. Johnson, Sr. Estate	112	Apr. 9, 1948	31	84	11	32	223	66	34	--	13	426	254	--	--	--	--
			July 22, 1970	30	76	9	37	222	64	32	1.3	15	373	230	25.8	584	7.9	1.1
504	Colorado River Municipal Water District	170	Aug. 20, 1970	26	70	10	42	221	60	35	1.2	16	369	217	29.7	567	7.6	1.3
505	do	165	do	22	70	9	43	227	61	33	1.2	9	360	212	30.4	567	7.4	1.3
508	do	191	do	26	70	10	35	226	54	28	1.3	12	347	216	25.8	534	7.7	1.0
1/ 509	do	160	Sept. 22, 1948	32	74	15	33	214	66	39	1.0	16	402	246	--	--	--	--
			Aug. 20, 1970	26	74	10	41	221	69	36	1.2	17	383	224	28.7	581	7.6	1.2
1/ 515	do	205	July 8, 1949	32	70	14	42	215	80	39	--	12	398	232	--	--	--	--
521	El Paso Products Company	190	Sept. 17, 1970	33	74	9	40	218	61	37	1.3	12	374	223	28.2	571	7.7	1.2
1/ 602	Hence Barrow	146	Apr. 7, 1948	53	76	14	36	224	70	41	--	13	454	247	--	--	--	--
			June 8, 1970	40	108	15	79	259	158	67	1.9	36	630	331	34.1	919	7.5	1.9
603	Colorado River Municipal Water District	180	Sept. 2, 1970	31	77	9	32	217	52	38	1.3	10	357	230	23.5	555	7.4	.9
604	do	174	Sept. 3, 1970	26	114	17	242	216	111	421	1.0	11	1,050	357	59.5	1,760	7.5	5.6
605	do	--	Sept. 2, 1970	21	72	12	52	228	83	40	1.4	11	404	228	33.0	630	7.4	1.5
1/ 617	do	196	July 28, 1949	37	68	13	27	229	46	24	--	14	342	223	--	--	--	--
628	Sunset Country Club	205	Sept. 4, 1970	38	76	11	38	226	68	37	1.7	7.5	388	237	25.7	596	7.3	1.1
629	do	202	do	25	71	11	47	224	78	39	1.4	11	393	224	31.3	606	7.7	1.4
702	J. L. Johnson, Sr. Estate	--	July 22, 1970	28	187	43	110	168	570	88	2.7	21	1,130	640	27.1	1,500	7.5	1.9
703	do	109	do	36	106	27	78	183	246	76	2.2	14	670	372	31.2	990	8.1	1.8
801	do	133	July 21, 1970	35	110	31	97	206	147	189	1.6	11	720	401	34.6	1,170	7.7	2.1
802	do	126	do	28	335	91	600	182	283	1,460	1.4	7	2,890	1,210	52.0	4,570	7.5	7.5
1/ 803	do	90	Mar. 12, 1937	--	165	38	113	244	392	146	--	--	99	568	--	--	--	--
1/			Apr. 12, 1948	44	146	36	116	250	338	137	--	18	958	512	--	--	--	--
			July 22, 1970	37	153	29	85	228	348	87	1.9	16	870	500	27.0	1,170	7.7	1.7
1/ 804	do	100	Apr. 12, 1948	48	176	64	106	200	577	112	--	13	1,190	702	--	--	--	--
			July 22, 1970	47	206	48	113	215	560	115	2.1	14	1,210	710	25.7	1,590	7.8	1.8
1/ 903	Colorado River Municipal Water District	150	Sept. 22, 1948	32	72	17	39	214	72	42	1.8	17	406	250	--	--	--	--
909	do	170	Sept. 3, 1970	28	110	13	85	212	152	113	1.2	19	630	328	36.1	969	7.4	2.0

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Trinity Group--Continued											
1/ JH-45-05-919	Colorado River Municipal Water District	175	Sept. 22, 1948	44	66	14	29	220	44	26	2.0	12	364	222	--	--	--	--
920	do	156	Sept. 3, 1970	29	89	9	61	220	104	65	1.4	19	485	261	33.8	744	7.5	1.7
921	do	150	do	17	72	11	48	224	65	47	1.4	13	384	224	31.9	625	7.3	1.4
922	do	180	do	26	590	133	2,320	193	493	4,680	1.2	8	8,300	2,030	71.3	11,580	7.5	22.3
923	do	175	do	27	84	14	55	215	80	80	1.9	8	456	266	31.2	732	7.3	1.5
924	do	145	Aug. 21, 1970	43	140	36	97	279	284	128	1.5	13	880	499	29.6	1,250	7.4	1.9
1/ 925	do	150	Sept. 22, 1948	38	132	34	86	186	255	155	1.4	14	877	470	--	--	--	--
			Aug. 21, 1970	29	440	119	1,520	196	494	3,060	1.4	9	5,800	1,590	67.7	8,290	7.4	16.9
926	do	156	do	31	164	37	296	210	246	570	1.9	4.0	1,450	560	53.4	2,280	7.3	5.5
1/ 06-101	Mrs. Sallie Ratliff, et al.	135	Apr. 6, 1937	--	--	--	--	262	85	50	--	--	413	--	--	--	--	--
1/			Apr. 5, 1948	36	82	15	37	233	74	48	--	13	464	266	--	--	--	--
			June 9, 1970	30	82	13	40	234	75	43	1.2	14	413	259	25.3	640	7.6	1.1
102	do	--	do	30	92	12	41	238	83	50	.7	16	442	279	24.2	686	7.4	1.1
1/ 103	do	137	Apr. 6, 1937	--	--	--	--	232	73	52	--	--	375	--	--	--	--	--
1/			Apr. 5, 1948	27	76	11	35	233	61	36	--	6.2	392	234	--	--	--	--
			June 9, 1970	28	80	10	34	232	60	34	.9	12	373	242	23.6	585	7.6	1.0
501	Roy Parks, et al.	177	Mar. 17, 1967	19	72	9	29	229	47	28	.8	14	332	220	22.5	535	8.0	.9
1/ 503	Mrs. Sallie Ratliff, et al.	105	Apr. 1, 1948	36	79	13	35	232	61	42	--	18	410	250	--	--	--	--
602	Harriett P. Fandree	66	Mar. 10, 1967	30	76	12	42	229	68	48	1.4	15	406	238	28.5	636	8.2	1.2
802	Sunset Memorial Gardens	116	Sept. 4, 1970	29	80	11	44	237	64	53	1.4	5	404	247	27.8	645	7.2	1.2
804	do	116	do	35	149	18	94	237	217	162	1.4	11	800	447	31.4	1,200	7.4	1.9
806	Odessa Country Club	135	Sept. 9, 1970	25	89	15	81	231	71	133	1.4	11	540	283	38.9	894	7.4	2.1
906	do	135	do	27	104	17	74	250	91	130	1.2	14	580	332	32.6	925	7.6	1.8
11-202	J. E. Parker, et al.	196	June 8, 1970	16	124	20	77	207	210	104	2.7	17	670	392	29.9	1,025	7.8	1.7
301	do	200	do	18	204	26	106	206	500	89	2.5	21	1,070	610	27.2	1,420	7.5	1.9
12-102	do	200	do	20	79	18	51	224	107	42	2.1	16	445	271	29.0	689	7.2	1.3
1/ 103	do	181	Apr. 9, 1937	--	--	--	--	226	163	56	--	--	504	--	--	--	--	--
104	do	200	June 8, 1970	11	62	16	55	176	111	45	2.2	11	400	223	34.8	648	7.5	1.6
301	Petroleum Corporation of Texas	115	Sept. 11, 1970	16	72	15	63	214	127	38	2.4	20	458	243	36.0	714	7.4	1.8
309	El Paso Products Company	115	Sept. 16, 1970	16	81	17	59	232	130	40	2.4	18	477	272	32.1	739	7.6	1.5
13-101	Petroleum Corporation of Texas	--	Sept. 11, 1970	17	157	34	117	190	370	150	2.2	27	970	530	32.3	1,400	7.5	2.2
107	do	--	do	16	103	22	74	201	224	60	2.4	36	640	350	31.5	945	7.7	1.9

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Trinity Group--Continued											
JH-45-13-108	Petroleum Corporation of Texas	--	Sept. 11, 1970	16	91	21	107	216	167	130	2.3	17	660	316	42.3	1,043	7.2	2.6
205	El Paso Products Company	100	Sept. 16, 1970	34	206	46	242	215	347	485	1.7	6	1,470	700	42.8	2,250	7.4	4.0
207	Clyde Tisdale	99	do	44	429	59	124	298	1,120	112	2.8	15	2,050	1,320	17.0	2,290	7.6	1.5
1/ 2/ 301	El Paso Products Company	119	May 14, 1937 July 20, 1960	-- 50	-- 418	-- 139	-- 905	268 180	269 442	72 2,110	-- --	-- --	714 4,150	-- 1,610	-- 55	-- 6,930	-- 7.2	-- 9.8
302	do	119	Sept. 16, 1970	40	157	44	164	196	300	308	1.7	13	1,120	570	38.4	1,740	7.6	3.0
1/ 304	Ector County Independent School District	142	Sept. 30, 1948	34	68	20	56	208	112	50	--	19	469	252	--	--	--	--
501	Paul Moss Estate	--	Mar. 20, 1968	19	99	20	142	215	262	128	2.8	16.5	800	329	48.0	1,200	7.7	3.4
601	E. R. Calbert	104	Apr. 20, 1968	34	164	42	141	340	355	148	2.5	29.5	1,080	580	34.5	1,610	7.5	2.5
602	Bessye Cowden Ward	76	Apr. 19, 1968	40	116	19	60	249	205	45	2.3	15.0	620	367	26.2	919	7.5	1.3
604	Big 3 Welding	70	Sept. 10, 1970	39	155	36	115	210	422	122	2.3	17	1,010	540	31.8	1,390	7.4	2.2
702	Rodman and Noel Ranch	186	Apr. 18, 1968	11	92	16	77	206	213	38	1.7	23.0	570	296	36.1	868	7.7	1.9
803	Stanto Henderson	195	Apr. 20, 1968	13	85	16	66	198	178	42	2.5	21.5	520	279	33.8	805	8.2	1.7
805	Paul Moss Estate	126	do	72	269	50	434	416	414	771	2.7	7.5	2,230	880	51.7	3,340	7.5	6.4
909	Mrs. Daisy Kelly	153	Apr. 19, 1968	3	80	10	24	194	50	45	.9	16.5	325	244	17.9	572	7.6	.7
14-102	Sivall Tanks Incorporated	140	Sept. 10, 1970	29	72	11	37	224	60	31	.9	15	366	224	26.7	572	7.6	1.1
1/ 103	do	140	Sept. 28, 1948 Sept. 10, 1970	34 30	70 73	16 11	26 36	224 228	57 57	29 31	-- 1.2	15 12	374 363	240 229	-- 25.5	-- 565	-- 7.6	-- 1.0
201	Roy Parks, et al.	--	Mar. 18, 1967	30	90	15	69	223	124	76	1.2	15	530	287	34.4	804	8.1	1.8
202	do	--	Mar. 10, 1967	37	154	37	271	251	204	355	1.7	8	1,190	540	52.3	2,310	8.0	5.1
203	do	--	do	36	85	17	63	276	93	55	1.8	14	500	280	32.6	760	7.8	1.6
205	Trans-Pecos Materials	115	Sept. 9, 1970	25	90	13	58	249	101	59	.9	20	489	280	30.9	755	7.6	1.5
2/ 401	General Tire and Rubber Company	110	May 11, 1960	46	72	20	69	209	132	59	2.2	17	520	262	36	790	7.3	1.9
404	Mrs. Bessye Cowden Ward	92	Apr. 19, 1968	47	213	36	374	307	184	760	3.1	5.0	1,770	680	54.4	2,970	7.5	6.2
407	do	128	do	34	182	51	136	238	560	124	2.9	15.5	1,220	660	30.8	1,690	7.1	2.3
408	do	98	do	33	112	20	68	227	216	65	2.3	15.0	640	362	29.0	963	7.5	1.5
412	Jimmy McCutcheon	140	Sept. 9, 1970	60	172	43	55	372	324	48	2.4	12	900	600	16.4	1,175	7.5	.9
502	Frank B. Waters	104	Feb. 15, 1967	33	94	25	81	251	178	82	2.0	16	630	338	34.3	985	7.5	1.9
503	Mrs. Bessye Cowden Ward	140	Apr. 19, 1968	40	416	145	700	233	1,870	650	2.9	24.5	3,970	1,640	57.7	4,920	7.5	8.2
506	do	100	Apr. 16, 1968	30	390	116	387	193	1,500	373	3.1	16.5	2,910	1,450	36.8	3,530	7.6	4.4
507	do	96	do	38	276	77	198	178	950	176	2.8	28.5	1,840	1,000	29.9	2,320	7.3	2.7

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Trinity Group--Continued											
JH-45-14-704	Mrs. Bessye Cowden Ward	68	Apr. 17, 1968	44	476	55	232	235	840	453	3.1	198	2,420	1,420	26.3	3,110	7.2	2.7
802	do	100	do	26	231	68	140	190	750	135	2.8	24.5	1,470	860	26.3	1,910	7.6	2.1
20-204	Southwestern Portland Cement Company	160	Apr. 19, 1968	10	96	15	62	222	183	49	2.5	2.0	530	303	30.8	826	7.5	1.6
301	Texaco Incorporated	153	Apr. 18, 1968	11	127	17	65	203	249	60	2.6	22.0	650	388	26.8	975	7.5	1.4
302	Rodman and Noel Ranch	160	do	10	93	19	88	228	242	34	3.0	19.5	620	311	38.2	935	7.6	2.2
601	Ector County Land and Cattle Company	111	Apr. 19, 1968	18	112	22	71	206	277	41	2.5	15.5	660	372	29.4	965	7.4	1.6
21-102	Rodman and Noel Ranch	195	Apr. 17, 1968	11	96	14	43	227	150	25	1.9	20.0	473	295	24.2	725	7.6	1.1
202	Texaco Incorporated	189	Apr. 18, 1968	10	70	12	44	231	98	14	2.5	10.0	379	223	29.8	604	7.6	1.3
301	Rodman and Noel Ranch	150	Apr. 17, 1968	6	70	13	56	161	134	46	2.7	2.0	409	226	34.9	675	7.4	1.6
302	do	170	do	17	107	8	38	282	95	29	1.4	23.0	457	302	21.7	719	7.5	1.0
303	do	172	Apr. 18, 1968	11	86	14	52	205	149	28	2.5	17.0	461	273	29.1	720	7.5	1.4
305	do	150	Apr. 17, 1968	22	166	16	54	338	174	77	1.4	59	740	480	19.6	1,060	7.5	1.8
501	Ector County Land and Cattle Company	188	Apr. 19, 1968	15	104	15	36	251	148	19	2.4	12.0	474	322	19.4	730	7.6	.9
601	Ector County Ranch	202	Apr. 18, 1968	11	116	19	53	257	211	26	2.1	14.0	580	368	23.7	875	7.4	1.2
604	S. F. Gladden	--	do	12	77	10	30	222	74	16	2.2	16.5	347	234	21.6	557	7.4	.8
606	Ector County Land and Cattle Company	--	Apr. 19, 1968	11	118	18	56	246	234	26	2.3	14.0	600	368	24.7	889	7.6	1.3
22-102	Rodman and Noel Ranch	157	Apr. 17, 1968	16	121	9	42	265	132	40	2.3	19.5	510	338	21.4	789	7.9	1.0
1/ 201	Mrs. Bessye Cowden Ward	100	Apr. 7, 1937	--	--	--	--	67	518	88	--	--	927	--	--	--	--	--
			Apr. 17, 1968	21	148	12	65	195	277	58	2.6	27.5	710	421	25.1	1,030	7.8	1.4
1/ 202	do	140	Apr. 7, 1937	--	--	--	--	159	204	44	--	--	488	--	--	--	--	--
603	do	200	Apr. 17, 1968	11	105	15	51	216	161	43	2.1	27.5	520	324	25.8	810	7.3	1.2
802	Paul Slator	150	Apr. 19, 1968	11	98	12	19	257	92	13	2.1	15.0	388	297	12.1	622	7.5	.5
							Ogallala Formation and Trinity Group											
45-14-306	Roy Parks, et al.	71	Mar. 10, 1967	43	214	50	170	212	670	140	2.0	35	1,430	740	33.4	1,840	7.8	2.7
							Ogallala Formation											
27-62-801	L. W. Bell	147	Sept. 22, 1970	50	73	41	76	212	126	142	3.1	9	620	352	31.9	980	7.6	1.8
805	A. B. Finch	145	do	47	60	28	64	227	99	72	3.0	11	496	263	34.5	759	7.6	1.7
902	Robert E. McBryde	--	Sept. 21, 1970	52	185	110	201	204	700	304	3.7	14	1,670	920	32.2	2,230	7.1	2.9

1/ Texas Board of Water Engineers Bulletin 5210, "Ground-Water Resources of Ector County, Texas."
2/ Analyses by U.S. Geological Survey.

Table 8.—Oil and Gas Wells Used for Subsurface Control

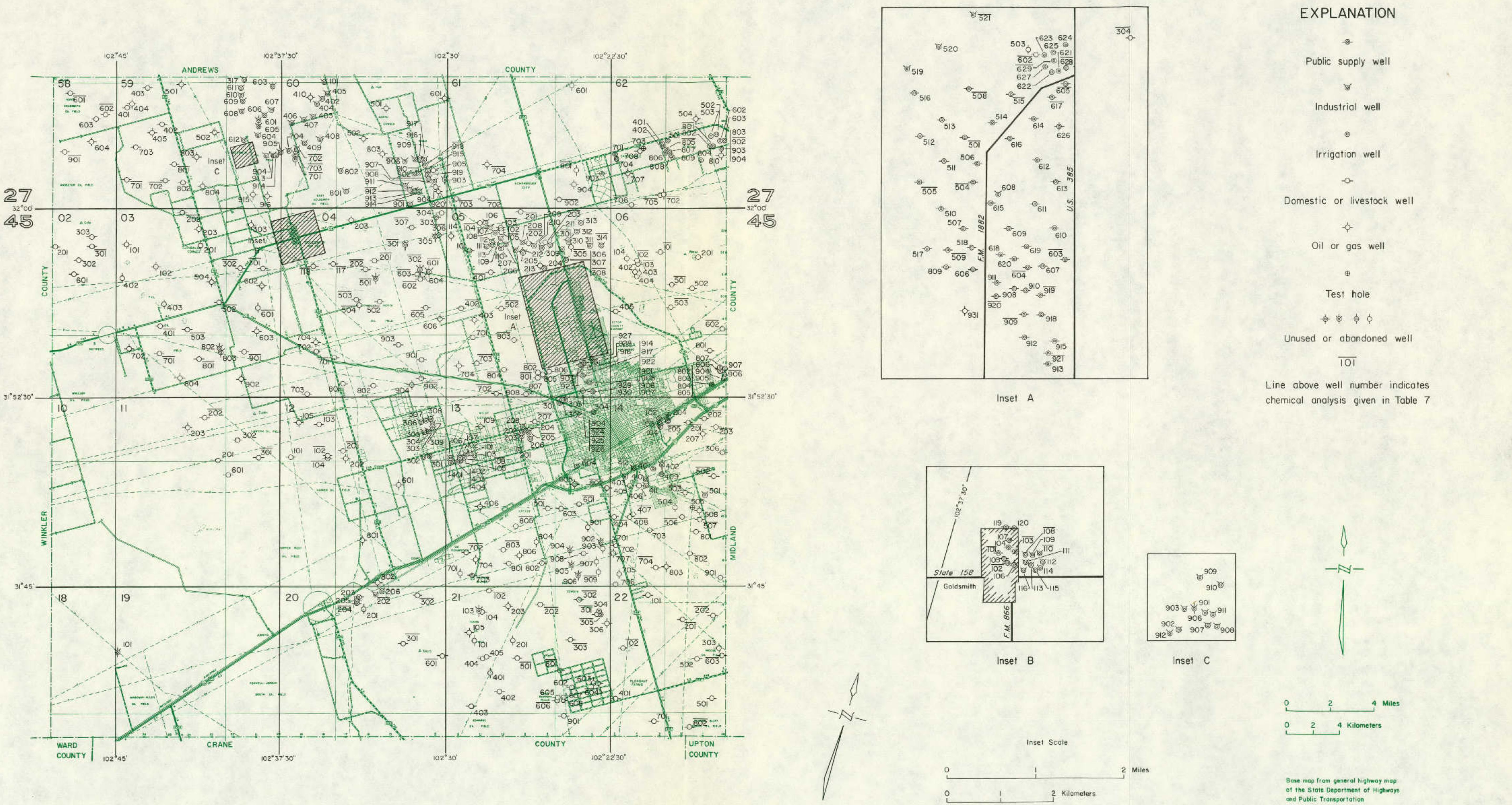
Well	Operator	Lease and well
JH-27-58-604	Texas Company	Texaco Incorporated No. 1-B
59-404	Sinclair Oil & Gas Co.	R. B. Cowden No. 3
405	Coronet Oil Co.	Cummins No. 13
501	Phillips Petroleum Co.	Nobles No. 2
502	do	Embar No. 40
803	Pan American Petroleum Corp.	W. F. Cowden No. 15-C-Deep
804	do	Scharbauer No. 14-P-Deep
915	do	Scharbauer No. 18-M
916	Lario Oil & Gas Co.	Blakeney No. 3-F
60-410	Pan American Petroleum Corp.	W. F. Cowden No. 1-A
501	do	North Cowden Unit Block 13 No. 17
502	do	O. B. Holt No. 9-E
601	do	N. C. Cowden Unit Block 15 No. 5
803	Mid-Continent Petroleum Corp.	Blakeney No. 7-A
920	Pan American Petroleum Corp.	J. M. Cowden No. 27
61-601	do	David Fasken No. 1-AV (Inc.)
704	Ralph Pembrook	Fasken No. 1
904	Herman Brown	Ratliff No. 1
62-504	Pan American Petroleum Corp.	Fasken No. 1-AX
707	Lone Star Producing Co.	Mrs. E. J. Neathery No. 1
708	Blackwood-Nichols	Neathery No. 1-5
810	Sinclair Oil & Gas Co.	David Fasken No. 1
45-03-101	Cities Service Oil Co.	Slator No. 8
102	do	Slator No. 1-F
203	Humble Oil & Refining Co.	W. F. Cowden No. 1
303	Pan American Petroleum Corp.	Scharbauer No. 14-I-Deep

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
JH-45-03-504	Mac Donald Oil Corp.	M. B. Cochran No. 1
602	Gulf Oil Corp.	C. A. Goldsmith No. 489-56
603	do	C. A. Goldsmith, et al. No. 517-56
702	Sunray Mid-Continent Oil Co.	Texaco Incorporated No. 2-A
804	Texaco Incorporated	J. E. Parker No. 1-E
902	Atlantic Richfield	Texaco Incorporated No. 4-N
04-203	Forest Oil Corp.	Texaco Incorporated No. 1-L
606	Cities Service Petroleum Co.	J. L. Johnson San Andres Unit Tr. 7 No. 3
704	Gulf Oil Corp.	Goldsmith No. 743-56
904	M. W. J. Producing Co.	Cowden No. 1
05-114	Sinclair Oil & Gas Co.	L. E. Wight No. 1
212	Humble Oil & Refining Co.	Augusta Barrow No. 1-B
213	do	Augusta Barrow No. 9
403	Cities Service Petroleum Co.	Johnson Unit Tr. 13 No. 14
704	do	Johnson San Andres Unit Tr. 29 No. 3
931	Continental Oil Co.	Johnson No. 11-B
06-104	Texaco Incorporated	S. W. Ratliff No. 1
11-203	Forest Oil Corp.	Pure-Parker No. 1
12-105	Pan American Petroleum Corp.	J. E. Parker No. 1-C
202	Chambers & Kennedy	J. E. Parker No. 1
601	do	Cowden No. 1-A
801	Texaco Incorporated	Ector No. 9-F-Fee
802	Atlantic Richfield	LPG Storage No. 1
13-109	Milestone Drilling Co.	Cowden No. 1-A
406	Pan American Petroleum Corp.	E. F. Cowden No. 1-D
605	E. E. Reigle, et al.	Maurice No. 2-C

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
JH-45-13-704	Amerada Petroleum Co.	Texaco Incorporated No. 1-F
806	Cities Service Oil Co.	Foster No. 6-B
14-207	Forest Oil Corp. & Cities Production Co.	Fee 41 No. 2
508	Ada Oil Co.	W. Cowden No. 1
707	Cities Service Oil Co.	Foster No. 1-J
803	Bright & Schiff	E. W. Cowden No. 1
21-105	Cities Service Oil Co.	Edwards No. 1-C
203	do	Foster No. 4-N
306	Kelly Bell	Foster Unit No. 1
22-303	Texaco Incorporated	Ector No. 2-AG-Fee



Location of Selected Water, Oil and Gas Wells in Ector County

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.

Water-bearing unit : Kea, Edwards and associated limestones.

Altitude of land surface : Determined from U.S. Geological Survey topographic maps and by Paulin altimeter unless otherwise designated by footnotes.

Method of lift and type of power: C, cylinder; E, electric; S, submersible; W, wind; N, none.

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

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

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* JJ-55-43-901	W. T. O. Holman Estate	Claude Graham	1954	413	--	--	Kea	2,236	346.1 356.7	July 20, 1954 Oct. 3, 1969	C, W	S	Well A-13. 1/
* 44-701	do	do	1940	440	--	--	Kea	2,291	384.5 306.9 385.1	July 29, 1954 July 18, 1961 Oct. 14, 1969	C, E	D, S	Well A-3. 1/
* 702	do	do	1930	388	7	20	Kea	2,279	357.8 359.1 368.2	Jan. 30, 1939 July 29, 1954 Oct. 3, 1969	S, E	S	Oil test converted to water well. Well A-2. 1/
* 801	Texas A&M University	Experiment Station #14	1918	417	--	--	Kea	2,284	373	Feb. 10, 1954	C, E	P	Well A-9. 1/
* 901	Mrs. Grady Hill	--	1937	384	--	--	Kea	2,210	285.4 281.0	Apr. 19, 1955 Oct. 21, 1969	C, W	S	Well A-7. 1/
51-601	Fred Earwood Estate	--	1937	--	--	--	Kea	--	229.4	Apr. 18, 1955	N	N	Well A-34. 1/
* 52-601	Ed C. Mayfield	Polo Cervantes	1950	423	--	--	Kea	2,276	353.7 379.4	Nov. 3, 1954 Oct. 9, 1969	C, W	S	Well A-32. 1/
* 54-101	R. W. Wallace	--	1951	403	--	--	Kea	--	323.3 319.2	Apr. 25, 1955 Oct. 22, 1969	C, W	S	Well B-5. 1/
* 401	Frank O. Cloudt	--	1944	375	--	--	Kea	2,283	329.3 327.3	Oct. 28, 1954 Oct. 10, 1969	C, W	S	Well B-20. 1/
61-801	T. A. Rolston	--	--	267	--	--	Kea	2,218	232.3 118.7	Mar. 12, 1954 Sept. 23, 1969	C, W	S	Well G-33. 1/
* 802	Ona Rolston	--	1918	316	--	--	Kea	2,230	234.4	do	S, E	S	Well G-32. 1/
901	do	--	--	300	--	--	Kea	2,271	258.4 258.3	Mar. 12, 1954 Sept. 23, 1969	C, W	D, S	Well G-29. 1/
902	T. A. Rolston	--	1941	239	--	--	Kea	2,226	219.7 220.3	Mar. 12, 1954 Sept. 23, 1969	C, W	S	Well G-31. 1/
* 903	Ona Rolston	--	1929	330	--	--	Kea	2,291	267.7	do	C, E	D, S	Well G-30. 1/
* 904	T. A. Rolston	--	1946	310	--	--	Kea	2,241	304.6	do	C, W	D, S	--
* 62-202	A. P. Shanklin	--	1914	370	--	--	Kea	2,115	265 280.6 246.5	Dec. 31, 1938 Sept. 20, 1954 Oct. 1, 1969	S, E	D, S	Well H-11. 1/
* 63-701	City of Rocksprings	--	1912	562	10	150	Kea	--	420 418.5	Dec. 7, 1953 July 8, 1969	S, E	P	Well H-44. 1/
* 702	do	--	1956	625	10-3/8	150	Kea	--	412	Aug. 16, 1961	S, E	P	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
JJ-70-04-801	Wardlaw Brothers	C. B. Wardlaw	1940	600	--	--	Kea	--	493.0	July 7, 1954	C, W	S	Well L-30. 1/
* 901	E. Varga Estate	Walter Driver	1966	538	--	--	Kea	--	422.1	Aug. 22, 1969	C, W	S	--
05-201	Shaw Ranch, et al.	Roger Hutto	1967	180	--	--	Kea	--	145	Aug. 25, 1969	C, W	S	--
* 301	Bill Seal	--	1920	240	--	--	Kea	2,092	196 193.5	Dec. 8, 1953 Sept. 22, 1969	C, W	D, S	Well M-9. 1/
* 302	do	--	1929	234	6	90	Kea	2,099	202.8 202.3	Mar. 11, 1954 Sept. 22, 1969	C, E	D, S	Well M-8. 1/
07-101	V. L. Freeman	Milton Smith	1953	454	--	--	Kea	2,310	363.9 373.0	Sept. 17, 1954 Aug. 5, 1969	C, W	S	Well N-17. 1/
201	do	do	1951	380	--	--	Kea	2,322	343.3 341.8	Apr. 15, 1955 Aug. 5, 1969	C, W	S	Well N-8. 1/
* 11-501	Carta Valley Independent School District	--	1943	434	--	--	Kea	1,857	391.1	July 23, 1954	C, W	D	Well Q-15. 1/
* 12-201	Paul Rosenow	--	1945	520	--	--	Kea	2,305	486.5	do	C, W	D, S	Well L-40. 1/
* 701	Carl Hutto	--	1900	411	--	--	Kea	1,908	381.7 379.1	Apr. 5, 1954 Aug. 29, 1961	S, E	D, S	Well Q-20. 1/
* 901	E. T. Rucker Estate	Marvin Hutto	1941	320	--	--	Kea	1,972	294.6	May 28, 1954	C, W	S	Well Q-25. 1/
* 19-301	T. E. Harding	--	--	535	--	--	Kea	1,990	499.4	Oct. 15, 1969	C, W	S	--
* 901	do	--	--	390	--	--	Kea	1,553	320.7 313.6	May 21, 1954 Oct. 15, 1969	C, W	S	Well Q-40. 1/
* 20-401	do	--	1933	355	--	--	Kea	1,749	279.3 276.9	Apr. 15, 1954 Oct. 15, 1969	C, W	D, S	Well Q-37. 1/
* 402	do	--	1948	560	--	--	Kea	1,945	536.2	Oct. 16, 1969	S, E	S	Well Q-41. 1/
* 501	T. E. Harding	--	--	360	--	--	Kea	1,820	344.4 345.5	May 20, 1954 Oct. 16, 1969	C, W	D, S	Well Q-36. 1/
* 21-101	E. T. Rucker Estate	Marvin Hutto	1946	569	--	--	Kea	2,235	475.9	June 7, 1954	C, W	S	Well Q-22. 1/

* Chemical analysis of water given in Table 7.
1/ Texas Water Commission, Bulletin 6208, "Ground-Water Geology of Edwards County, Texas."

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Edwards and associated limestones											
JJ-55-43-901	W. T. O. Holman Estate	413	Oct. 3, 1969	12	59	20	9	264	8	13	0.3	5.0	256	231	7.8	446	7.7	0.3
1/ 44-701	do	440	July 29, 1954	14	56	23	9.4	270	7.8	14	--	4.0	265	234	8	474	8.0	--
			Oct. 14, 1969	11	54	22	9	256	11	13	.6	4.5	252	225	8.2	439	7.5	.3
702	do	388	Oct. 3, 1969	12	59	21	9	268	9	14	.4	4.5	261	235	8.1	452	7.5	.3
1/ 801	Texas A&M University	417	Feb. 10, 1954	15	60	22	7.8*	276	7.2	14	.3	4.2	269	240	7	475	7.5	--
			Aug. 5, 1969	13	64	20	9	279	11	14	.3	< .4	268	244	7.3	456	7.7	.3
901	Mrs. Grady Hill	384	Oct. 21, 1969	12	65	18	8	271	8	13	.3	3.5	261	237	7.1	454	7.7	.2
52-601	Ed C. Mayfield	423	Oct. 9, 1969	11	50	21	9	238	8	15	.5	3.0	235	211	8.3	414	7.9	.3
1/ 54-101	R. W. Wallace	403	Apr. 25, 1955	14	54	22	11	270	6.1	12	.6	3.2	256	225	9	457	7.9	--
			Oct. 23, 1969	11	56	23	7	266	7	11	.3	4.5	251	232	6.5	436	7.7	.2
401	Frank O. Cloudt	375	Oct. 10, 1969	10	66	17	7	267	8	12	.3	5.0	256	234	6.2	445	7.6	.2
61-802	Ona Rolston	316	Sept. 23, 1969	11	66	11	7	239	8	12	.2	4.5	238	211	7.1	406	7.5	.2
903	do	330	do	11	46	19	7	218	10	10	1.0	2.0	213	196	6.9	377	7.6	.2
904	T. A. Rolston	310	do	10	64	12	7	244	7	10	.2	< .4	230	210	6.9	401	7.6	.2
1/ 62-202	A. P. Shanklin	341	Dec. 31, 1938	--	--	--	--	195	15	14	--	< 20	203	--	--	--	--	--
			Oct. 1, 1969	11	65	15	9	248	9	15	.3	10.0	256	271	7.6	451	7.2	.2
1/ 63-701	City of Rocksprings	563	Mar. 16, 1954	14	44	18	11.7*	210	6.9	16	.3	2.0	216	184	11	398	8.0	--
			July 8, 1969	11	50	17	10	218	9	17	.6	< .4	221	194	10.2	390	7.8	.3
702	do	625	do	12	50	15	12	207	9	19	.4	5.0	224	187	12.0	390	8.0	.4
70-04-901	E. Varga Estate	538	Aug. 23, 1969	11	41	22	7	224	7	12	.4	1.5	212	194	6.9	379	7.6	.2
05-301	Bill Seal	240	Sept. 22, 1969	12	58	13	3	226	5	4	.1	10.0	216	200	3.2	369	7.5	.9
1/ 302	do	234	Mar. 11, 1954	14	46	16	4.9	215	2.3	5.2	.1	8.5	203	181	3	363	7.7	--
			Oct. 1, 1969	12	56	14	3	222	5	4	< .1	10.0	213	197	3.2	364	7.5	.9
1/ 11-501	Carta Valley Independent School District	434	Sept. 13, 1954	13	62	6.1	4.4	199	4.3	7.2	.0	5.0	217	180	5	365	8.0	--
			Aug. 11, 1969	11	61	5	5	193	7	7	< .1	6.5	198	175	5.7	339	7.7	.2
1/ 12-201	Paul Rosenow	520	July 22, 1954	13	36	20	7.8	201	5.4	12	--	2.5	196	172	9	361	7.7	--
1/ 701	Carl Hutto	411	Apr. 15, 1954	13	66	8.5	7.0	218	4.8	13	.2	9.3	248	200	6	421	7.8	--
			Aug. 8, 1969	12	66	8	7	207	11	13	.1	13.5	233	199	6.8	395	7.7	.2

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
					Edwards and associated limestones--Continued													
JJ-70-12-901	E. T. Rucker Estate	320	Aug. 22, 1969	9	48	19	6	205	7	10	0.7	17.0	238	196	5.8	380	7.4	0.3
19-301	T. E. Harding	535	Oct. 15, 1969	9	62	9	5	211	6	7	.2	10.5	213	193	5.2	363	7.8	.3
901	do	390	do	10	45	16	5	196	7	6	.2	8.5	194	177	7.2	335	7.9	.3
20-401	do	355	do	11	63	14	6	216	7	22	.2	10.0	239	214	6.1	419	7.5	.3
402	do	560	Oct. 16, 1969	--	52	21	8	232	9	14	--	3.5	222	214	7.6	410	7.9	.3
501	do	360	do	10	58	15	8	229	8	15	.2	6.5	234	207	8.0	406	7.7	.3
21-101	E. T. Rucker Estate	569	Aug. 23, 1969	10	58	10	6	212	8	10	.2	3.5	210	189	6.5	361	7.2	.3

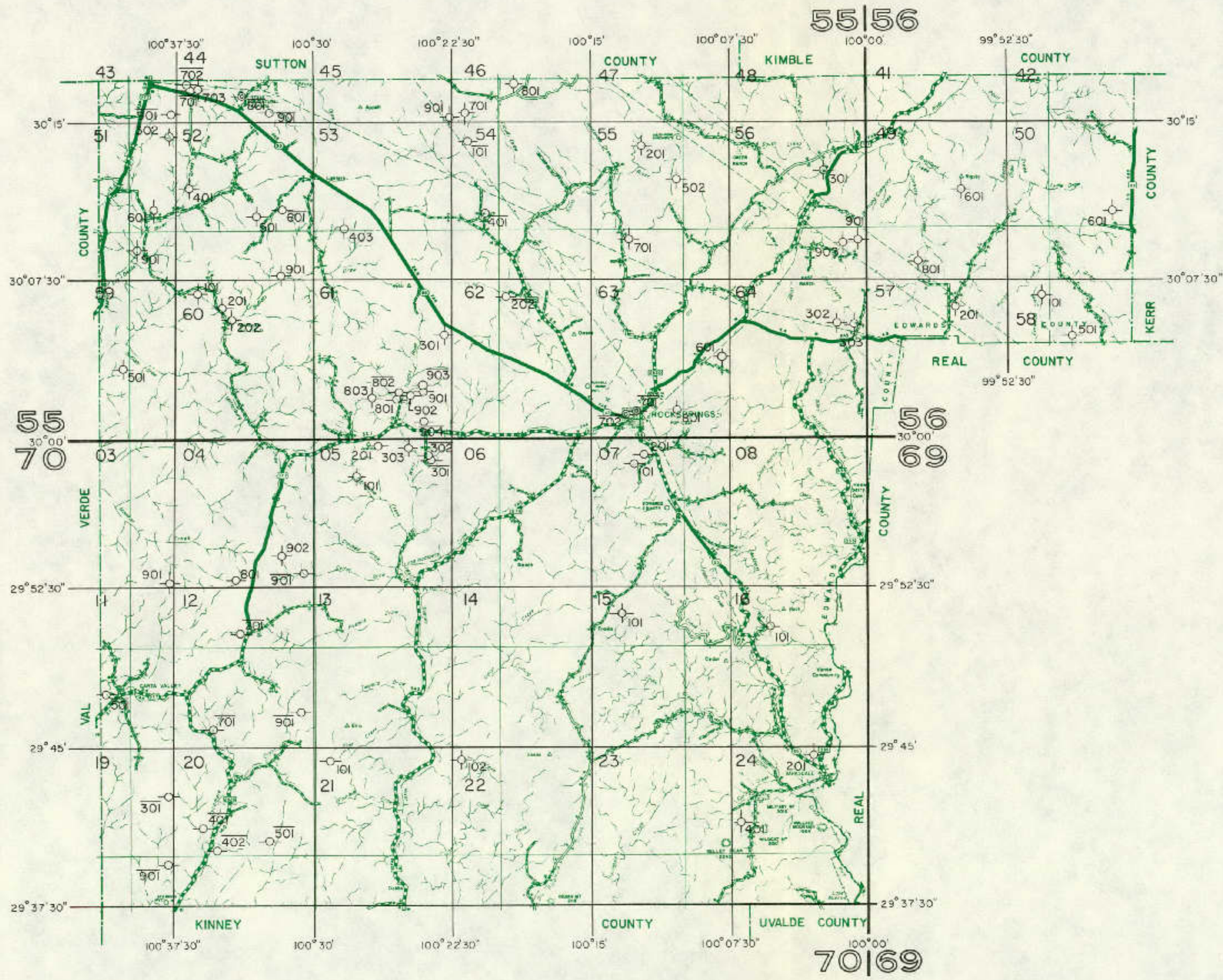
1/ Texas Water Commission, Bulletin 6208, ''Ground-Water Geology of Edwards County, Texas.''

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
JJ-55-44-703	J. S. Cullinan, II, et al.	Holman No. 8-B
45-901	Humble Oil & Refining Co.	W. L. Miers No. 1
46-701	Sinclair Oil & Gas Co.	Do.
801	Humble Oil & Refining Co.	W. L. Miers No. 1-B
51-302	Winters Oil Co., C. A. Young, & H. J. Hodge, Sr.	Paul Turney No. 1
901	Spencer Chemical Co.	Fred T. Earwood No. 1
52-401	H. H. Side	Paul Turney No. 1
501	P. M. Shannon	Ed Jackson
901	Great Expectations Oil Corp.	Ed C. Mayfield No. 2
53-403	V. J. Meyer	Billy Holland No. 2
55-201	Dan Auld	H. L. & Charlie Peterson No. 1
502	Ray Pool Drilling Co.	Peterson
701	Texas Co.	Mrs. H. H. Hough
56-301	Humble Oil & Refining Co.	John H. Guthrie No. 1
901	Humphrey & Wynne	Joe Sid Peterson No. 1
903	Dan Auld	L. K. Henderson No. 1
59-501	Hank Avery	Wardlaw Bros. No. 1
60-101	Sanford & Craig	Mrs. Mira Wardlaw No. 3
201	Creslenn Oil Co.	Mrs. Mira Wardlaw No. 1
202	McBride Oil Co.	Wardlaw No. 3
61-301	Knickerbocker Operating Co.	Sarah Higgins, et al.
803	Shell Oil Co., Inc.	E. Honeycutt No. 1
63-601	Dan Auld, et al.	C. & H. Peterson
801	Amon G. Carter	F. D. Sweeten No. 1
64-302	James Dalglish, et al.	Sid Peterson
303	X. K. Stout	J. S. Peterson No. 1
56-49-601	Dan Auld	Mamie Rigsby No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
JJ-56-49-801	Dan Auld	L. F. Hankins No. 1
50-601	McMan Oil & Gas Co.	Walter Schreiner No. 1
57-201	H. M. Naylor Oil Co.	Loyd Mitchell No. 1
58-101	Lecuno Oil Corp.	Bedford Shelmire No. 1
501	Plateau Oil Co.	Mrs. S. A. Hatch
70-03-901	Albert M. Griffith	C. B. Wardlaw & X. H. Whitehead No. 1
04-902	Tucker Drilling Co., Inc.	Wardlaw Bros., et al. No. 1
05-101	Slagter Producing Co.	W. E. Whittenburg No. 1
303	Richmond Drilling Co.	Brown No. 1
15-101	Humble Oil & Refining Co.	O. D. Collins No. 1
16-101	Paul Teas	B. J. Stewart No. 1
22-102	Empire Gas & Fuel Co.	O. L. McNealy, Jr.
24-201	Gale Oil Co.	Neal Jernigan
401	Phillips Petroleum Co.	Carson No. 1-A



EXPLANATION

Public supply well

Domestic or livestock well

Oil or gas well

Unused or abandoned well

$\overline{101}$

Line above well number indicates chemical analysis given in Table 7

Base map from general highway map of the State Department of Highways and Public Transportation

Location of Selected Water, Oil and Gas Wells in Edwards County

GILLESPIE COUNTY

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Kea, Edwards and associated limestones; Kt, Trinity Group; Cc, Cap Mountain Limestone; Ch, Hickory Sandstone.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and by Pauline altimeter where topographic map coverage not available.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; J, jet; S, submersible; T, turbine; E, electric; G, gas, butane, or gasoline; W, wind; N, none.
Use of water : D, domestic; S, livestock; Irr, irrigation; P, public supply; Ind, industrial; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* KK-56-38-301	Edwin Anderegg	--	1914	170	--	--	Kt	1,874	141.9	Nov. 21, 1969	C, W	D, S	--
* 602	Richard Hoerster	Clinton L. Brown	--	232	7	--	Kea	2,217	203.1	Oct. 24, 1969	S, E	S	--
* 901	do	do	--	82	6	--	Kea	2,076	61.4	do	C, W	S	--
902	do	do	--	76	6-1/2	--	Kea	2,077	61.5	do	C, W	S	--
* 39-101	Lee Schmidt	--	--	162	6	--	Kea	2,070	120.0	Nov. 3, 1969	S, E	S	--
* 102	do	--	1953	16	--	--	Kea	1,988	13.3	do	J, E	S	--
103	Edwin Anderegg	--	1950	147	6	--	Kea	2,043	95.9	Nov. 20, 1969	C, W	S	--
* 401	do	--	1941	218	7	--	Kea	2,151	199.3	do	C, W	S	--
* 402	do	--	--	126	--	--	Kea	2,109	115.9	do	C, W	S	--
801	W. L. McGinley	--	1952	220	--	--	Kt	1,883	192	Dec. 21, 1960	C, W	D	--
* 802	Emil Wahrmund	--	1920	117	5	--	Kea	2,015	30.9	Oct. 24, 1969	C, W	S	--
* 40-401	Marcus Rode	--	1955	149	6	149	Kt	1,840	113.4	Oct. 22, 1969	S, E	D, S	--
501	Otto Dittmar	--	1900	155	--	--	Kt	--	--	--	C, W	D, S	--
* 502	Herbert Feller	--	--	185	6-1/2	--	Kea	2,199	130.1	Oct. 22, 1969	S, E	S	--
* 801	Alvin A. Crenwelge	--	1933	162	--	--	Kea	2,119	125 95.9	Jan. 16, 1961 Oct. 17, 1969	C, W	D, S	--
* 802	Marcus Rode	--	1919	170	6	--	Kea	2,094	128.3	Oct. 22, 1969	C, W	S	--
* 46-301	Alfred Feller Estate	Herbert Feller	1914	241	7	--	Kea	2,199	193.8	Oct. 24, 1969	S, E	S	--
* 302	Lee Schmidt	--	1949	200	7	6	Kea	2,200	181.4	Oct. 28, 1969	C, W	D, S	--
303	do	--	--	75	6-1/4	--	Kea	2,090	73.0	Nov. 3, 1969	C, W	S	--
* 507	John Heinemann	--	--	167	--	--	Kea	2,131	166 168.0 164.6	Mar. 17, 1936 Feb. 24, 1961 Mar. 11, 1970	C, W	S	Well 41. 1/
* 508	Mrs. Max Beckmann	Roy Beckmann	1942	186	6	8	Kea	2,120	147.3	Nov. 19, 1969	C, W	S	--
* 602	Dr. W. J. Jinkins, Jr.	--	1956	169	--	--	Kea	2,057	30	Dec. 20, 1960	T, E	Irr	--
* 603	Mrs. Marie Taylor	--	--	--	--	--	Kea	--	--	--	J, E	D	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
KK-56-46-604	Mrs. Max Beckmann	Roy Beckmann	1919	200	6	6	Kea	2,088	97.7	Nov. 19, 1969	C, W	D, S	--
* 605	do	do	1944	133	6	5	Kea	2,096	103.6	do	C, E	D, S	--
606	do	do	1909	186	6	--	Kea	2,190	181.2	do	C, W	S	--
* 607	Mrs. Frank L. Rischner	--	1910	118	--	--	Kea	2,067	72.3	do	C, W	D, S	--
901	Lewis Lange	--	1954	300	--	8	Kea	2,199	180.4	Oct. 28, 1969	C, W	D, S	--
* 902	do	--	--	95	7	8	Kea	2,169	51.4	do	C, W	S	--
903	do	--	--	105	6	8	Kea	2,105	85.8	do	C, W	S	--
904	do	--	1954	265	--	--	Kea	2,158	130.7	Nov. 4, 1969	C, W	S	--
* 47-101	Herbert Feller	--	1968	186	6	--	Kea	2,164	155.6	Oct. 24, 1969	S, E	D, S	--
* 201	Emil Wahrmund	--	1950	126	--	--	Kea	2,135	104.9	do	S, E	D, S	--
202	do	--	1942	217	6-1/2	--	Kea	2,205	186.6	do	C, W	S	--
203	do	--	1942	96	7	--	Kea	2,103	76.1	do	C, W	S	--
204	do	--	1945	150	6-1/2	--	Kea	2,116	102.6	do	C, W	S	--
205	do	--	1918	182	7-1/2	--	Kea	2,146	127.7	do	C, W	S	--
206	do	--	1956	121	6	--	Kea	2,108	87.1	Nov. 4, 1969	C, W	S	--
* 301	Mrs. Gordon Kidd	Albert Maner	1915	84	6	--	Kea, Kt	1,945	4.42	Nov. 6, 1969	C, W	N	Unused livestock well.
* 302	Albert Maner	--	1945	165	--	--	Kea	2,095	81.7	do	C, W	S	--
* 303	do	--	1920	185	--	--	Kea	2,185	165	Oct. 30, 1969	C, E	D, S	--
* 304	J. T. Maner	--	1920	45	6	--	Kea	2,038	24.2	do	C, W	S	--
* 305	Emil Wahrmund	--	1919	176	7-1/4	--	Kea	2,183	162.4	Nov. 4, 1969	C, W	S	--
* 402	E. D. Hopf	--	1967	205	--	--	Kea	2,102	--	--	S, E	D, S	--
* 403	do	--	1939	90	6	--	Kea	2,081	74.9	Nov. 20, 1969	C, W	S	--
* 404	Mrs. E. R. Dabney	E. D. Hopf	1910	140	--	--	Kea	2,070	54.1	Nov. 21, 1969	C, W	D, S	--
* 405	Harper School System	--	1900	62	--	--	Kea	2,056	49.9	do	S, E	P	--
* 502	Roman Stehling	--	1936	163	7	--	Kea	2,103	84.7	Oct. 21, 1969	S, E	D, S	--
503	do	--	1936	238	--	--	Kea	2,151	138.4	do	C, W	S	--
* 504	Emil Wahrmund	--	1910	77	7	10	Kea	2,077	59.8	Oct. 24, 1969	S, E	D, S	--
505	E. D. Hopf	--	1942	87	8	--	Kea	2,075	56.8	Nov. 21, 1969	C, W	S	--
* 506	do	--	1940	101	5-1/2	--	Kea	2,001	13.2	do	C, W	S	--
* 601	J. T. Maner	--	1919	211	--	--	Kea	2,210	184.8	Oct. 30, 1969	C, W	D, S	--
* 602	Alex Behrends	--	1935	92	6-3/4	--	Kea	2,036	36.3	Nov. 6, 1969	C, W	D, S	--
* 701	E. B. Roach	--	--	Spring	--	--	Kea	1,959	--	--	--	--	"Head of the Pedernales River." Estimated flow, 1,000 gpm on Feb. 13, 1936; 9,000 gpm on Dec. 20, 1960. Spring 47. 1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
KX-56-47-801	E. D. Hopf	--	1950	99	6	--	Kea	2,004	29.3	Nov. 21, 1969	C, W	S	--
901	Ralph Dunn	Marvin Raz	1953	280	--	--	Kt	1,913	212.65	Jan. 27, 1961	T, G	Irr	Reported yield, 200 gpm.
* 902	Alex Behrends	--	1949	90	7 5	5 80	Kea	2,005	45.7	Nov. 6, 1969	C, W	S	--
* 48-101	Walter Roch	--	1869	188	5-1/2	10	Kea	2,203	183.2	Oct. 23, 1969	C, W	D, S	--
* 102	do	--	1966	172	6	--	Kea	2,167	144.5	do	C, W	S	--
* 201	Carl Mazenkin	--	1900	77	7	--	Kea	2,001	54.0	Nov. 19, 1969	C, W	S	Well redrilled in 1956.
* 202	do	--	1915	123	--	4	Kea	2,110	78.5	do	C, E	D, S	--
* 203	do	--	1940	145	7	--	Kea	2,174	140.2	do	C, W	S	--
* 403	Rudolph Ristau	--	--	101	5	--	Kea	2,088	75.10 74.8	Feb. 24, 1961 Mar. 11, 1970	C, W	S	--
* 404	Martin Dittmar	--	1909	102	--	--	Kea, Kt	1,995	13.5	Oct. 14, 1969	C, E	D, S	--
405	do	--	--	Spring	--	--	Kea	1,991	--	--	--	--	''Spring West of House.'' Reported never fails. Estimated flow 10 to 15 gpm.
406	do	--	--	Spring	--	--	Kea	1,991	--	--	--	--	''Spring South of House,'' Estimated flow 2 to 3 gpm.
* 601	Mrs. Carl Lange	Albert Crenwelge	1916	130	7	--	Kea	2,110	106.2	Nov. 6, 1969	C, W	S	--
701	Martin Dittmar	--	--	116	6	--	Kea	2,023	64.4	Oct. 14, 1969	C, W	S	--
702	do	--	1909	225	--	--	Kt	1,918	--	--	C, W	S	--
* 703	Albert Maner	--	1910	97	--	--	Kea	2,010	9.4	Nov. 6, 1969	C, W	S	--
54-303	G. C. Stevens	--	--	100	8	--	Kea	2,077	55.0	Oct. 15, 1969	C, W	S	--
* 602	do	--	1920	135	9	--	Kea	2,120	94.5	Oct. 16, 1969	C, W	S	--
603	do	--	1930	180	6	--	Kea	2,172	158.4	do	C, W	S	--
* 55-101	Elgin Pape	--	--	Spring	--	--	Kea	1,980	--	--	--	--	Estimated flow, 1,500 gpm in 1960; 310 gpm on Mar. 11, 1970.
102	G. C. Stevens	--	1920	34	7	--	Kea	2,010	22.1	Oct. 15, 1969	N	N	Unused domestic well.
* 103	Mart Stevens	G. C. Stevens	--	110	7	--	Kea	2,011	51.9	do	S, E	D, S	--
104	G. C. Stevens	--	1945	92	7	10	Kea	2,065	64.5	do	S, E	D, S	--
* 105	Mrs. Louis Stevens	G. C. Stevens	1934	75	--	--	Kea	2,081	55.0 54.3	Mar. 19, 1937 Oct. 15, 1969	S, E	D, S	Well 74. 1/
106	George Hollkamp	do	1920	70	--	--	Kea	2,059	--	--	C, W	D, S	--
* 107	G. C. Stevens	--	1934	72	5	--	Kea	2,052	31.0	Oct. 16, 1969	C, W	S	--
* 201	Clayton Feller	--	1920	219	7	--	Kt	1,906	216.2	Oct. 15, 1969	C, W	D, S	--
* 202	do	--	--	101	7	--	Kea, Kt	1,984	78.4	do	C, W	D, S	--
* 203	J. B. Johnston, Jr.	--	--	116	6-1/2	--	Kea	2,037	38.7	Oct. 16, 1969	C, W	S	--
301	do	--	--	145	5	--	Kea	2,050	39.5	do	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* KK-56-55-302	J. B. Johnston, Jr.	--	--	168	6	--	Kea, Kt	2,030	123.1	Oct. 16, 1969	C, W	S	--
401	Edwin Dittmar	--	1943	90	6	--	Kea	2,081	45.2	Oct. 17, 1969	C, W	S	--
* 402	do	--	1950	68	8-1/2	5	Kea	2,035	24.8	Oct. 14, 1969	S, E	D, S	--
403	do	--	1930	89	6	--	Kea	2,111	79.6	Oct. 17, 1969	C, W	N	Unused livestock well.
* 404	do	--	1914	206	7	5	Kea	2,181	149.4	Oct. 17, 1969	C, W	S	--
* 405	do	--	1940	107	6	8	Kea	2,085	62.3	do	C, W	S	--
* 406	do	--	1930	59	6	30	Kea	2,078	44.7	do	C, W	S	--
* 501	do	--	--	137	6	--	Kea	2,156	53.5 121.9	Feb. 24, 1961 Oct. 15, 1969	C, W	N	Unused livestock well. Well 69. 1/
* 502	Delton Wilson	--	1961	136	7	8	Kea	2,144	110.6	Oct. 14, 1969	S, E	D, S	--
* 503	J. B. Johnston, Jr.	--	--	125	9	--	Kea	2,130	104.2	Oct. 16, 1969	C, W	S	--
504	do	--	--	153	6	--	Kea	2,104	72.7	do	S, E	D	--
* 602	do	--	--	149	7	--	Kea	2,085	77.1	do	S, E	D, S	--
* 802	do	--	1965	180	--	--	Kea	2,070	--	--	C, W	S	--
* 803	do	--	1969	157	6	--	Kea	2,060	144.2	Nov. 20, 1969	C, W	S	--
804	J. W. McCullough	--	1910	300	--	--	Kea	2,125	--	--	C, E	S	--
* 901	Edgar Ahrens	--	1920	171	8	171	Kea	2,124	121.5	Oct. 23, 1969	C, E	D, S	--
* 56-401	Mrs. J. Hardin Perry	--	1945	129	6-1/2	3	Kea	2,063	99.8	Nov. 20, 1969	C, W	D, S	--
* 402	do	--	1952	229	6	229	Kea, Kt	1,992	80.2	do	C, W	S	--
* 403	do	--	--	Spring	--	--	Kea	2,000	--	--	--	--	''Maner Spring.'' Reported never fails. Estimated flow, 4 to 6 gpm.
* 501	do	--	1948	153	7	3	Kea	2,101	137.6	Nov. 20, 1969	C, W	S	--
701	Arthur Ahrens	--	1949	47	--	--	Kea	1,995	37.6	Oct. 23, 1969	C, W, E	S	--
* 702	do	--	--	137	--	--	Kea	2,192	115.2	do	C, W	D, S	--
* 803	Werner Henke	--	--	Spring	--	--	Kea	1,910	--	--	--	--	Estimated flow, 2,000 gpm on Jan. 18, 1961. Measured flow, 480 gpm on Mar. 11, 1970.
* 57-33-502	Werner Crenwelge	--	1899	152	6	20	Kea	2,100	126.2	Oct. 29, 1969	C, W	D, S	--
* 503	do	--	1960	141	6	--	Kea	2,092	122.8	Nov. 7, 1969	C, W	S	--
* 504	do	--	1900	150	--	--	Kea	2,061	78.4	do	C, W	S	--
602	Loreen Geistweidt	--	--	--	--	--	Kea	2,043	--	--	C, W	S	--
* 701	Alfred Treibs	--	1948	194	7	4	Kea	2,181	158.2	Nov. 5, 1969	C, W	S	--
702	Stella Basse	Gus Basse	1900	101	--	--	Kea	2,113	81.0	do	C, W	S	--
703	Stanley Keyser	--	1915	153	--	--	Kea	2,139	114.3	do	C, W	S	--
* 704	Gus Basse	--	1956	234	6-1/4	--	Kea	2,185	169.2	do	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* KK-57-33-705	Stanley Keysee	--	1940	202	6-1/4	--	Kea	2,122	137.7	Nov. 6, 1969	C, W	S	--
* 901	Fredericksburg Gypsum Company	--	1964	--	--	--	Kea	2,105	--	--	S, E	Ind	--
902	J. B. Boon	--	--	155	--	--	Kea	2,163	151.7	Nov. 21, 1969	C, W	D, S	--
* 34-401	Loreen Geistweidt	--	--	47	--	--	Ch	1,845	35.3	Oct. 29, 1969	C, W	D, S	--
* 402	Louis Lee Bruns	--	1932	217	7	--	Kt, Cc	2,010	133.1	Nov. 7, 1969	C, W	S	--
* 501	Billy Teague	--	1917	30	--	--	Kt	1,705	--	--	J, E	D, S	Dug well.
* 502	Louis Lee Bruns	--	--	68	36	68	Kt	1,770	42.4	Nov. 7, 1969	J, E	S	Do.
* 503	Levy Ersch	--	1919	66	6	--	Kt	1,815	49.1	do	C	N	Unused livestock well.
* 701	Liston Maner	--	1937	175	6	--	Kea	2,070	165.4	Oct. 22, 1969	C, W	S	--
* 802	Elgin Ellebracht	--	1944	73	6-1/4	6	Kea	1,958	48.7	Oct. 30, 1969	C, W	S	--
* 803	Louis Lee Bruns	--	1951	78	--	--	Kt	1,788	16	do	C, E	D, S	--
* 804	Levy Ersch	--	1966	117	8	--	Kt	1,790	45.53	do	S, E	D, S	Slotted casing.
* 41-101	Elgin Fredrich	--	--	Spring	--	--	Kea	1,940	--	--	--	--	Estimated flow, 10 gpm on Mar. 27, 1963.
* 102	Gus Basse	--	1960	220	--	--	Kt, Cc, Ch	1,937	171.3	Nov. 4, 1969	S, E	D, S	--
* 103	do	--	--	134	6-3/4	5	Kea	2,094	125.5	do	C, W	S	--
* 104	do	--	1958	112	6-1/2	2	Kea	2,120	90.1	do	C, W	S	--
* 105	do	--	--	112	6-1/2	5	Kea	2,025	57.0	do	C, W	S	--
106	do	--	1940	320	6-3/4 5-1/2 4-3/4	228- 155-290 280-320	Kt, Cc, Ch	2,001	200	Nov. 5, 1969	C, W	S	--
107	do	--	1963	--	--	--	Kea	2,040	--	--	C, W	S	--
* 108	Stella Basse	Gus Basse	--	99	6	--	Kea	2,116	74.0	Nov. 5, 1969	C, W	S	--
109	do	do	1900	110	6	--	Kea	2,119	74.0	do	C, W	S	--
* 110	Alfred Treibs	--	1904	161	--	10	Kea	2,020	133.2	do	C, W	S	--
* 202	Otto Schuch	--	1942	130	6-1/2	--	Kea	2,110	104.3 89.7	Feb. 24, 1961 Mar. 11, 1970	C, W	S	--
* 203	Fred Mathiesen	--	--	Spring	--	--	Kea	2,000	--	--	--	--	--
204	Gus Basse	--	1900	130	7-3/8	--	Kea	2,122	106.6	Nov. 5, 1969	C, W	S	--
* 304	Paul Stehling	--	1963	225	--	--	Ch	1,959	--	--	S, E	D	--
* 305	do	--	1951	--	--	--	Kea	2,051	93.8	Oct. 29, 1969	C, W	S	--
* 609	do	--	1955	92	--	--	Kt, Cc	1,901	12	do	J, E	D, S	--
610	do	--	1920	87	7	--	Cc	1,890	56.9	do	C, E	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* KX-57-42-302	Texas Highway Department	--	--	Spring	--	--	Kea	1,890	--	--	--	--	Measured flow 2 gpm on Dec. 27, 1962. Spring 339. 1/
* 303	Elgin Ellebracht	--	1934	151	6	151	Kt, Ch	1,890	56.8	Dec. 29, 1969	C, W	D, S	--
304	Harold Kneese	--	1948	177	6	--	Kt	1,986	158.4	Oct. 30, 1969	S, E	D, S	--
305	do	--	1950	207	--	--	Kt	2,022	204.3	do	N	N	Abandoned well.
* 306	do	--	1960	295	--	--	Kt, Ch	2,023	--	--	C, W	S	--
* 307	Mrs. Ben Kneese	Harold Kneese	1945	124	6-1/2	--	Kea	1,980	90.5	Oct. 30, 1969	C, W	S	--

* Chemical analysis of water given in Table 7.

1/ Texas Board of Water Engineers duplicated report, ''Records of Wells, Drillers' Logs, and Water Analyses, and Maps Showing Location of Wells, Gillespie County, Texas,'' June 10, 1937.

GILLESPIE COUNTY

Table 7.--Chemical Analyses of Water From Wells and Springs

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Hickory Sandstone											
KK-57-34-401	Loreen Geistweidt	47	Oct. 29, 1969	13	81	62	25	492	29	33	0.8	34.0	520	458	10.5	867	7.6	0.5
41-304	Paul Stehling	225	do	12	67	39	6	381	8	12	.3	< .4	331	328	4.1	571	7.5	.2
							Hickory Sandstone and Trinity Group											
42-303	Elgin Ellebracht	151	Oct. 29, 1969	12	83	46	9	483	13	21	.3	13.5	413	399	4.7	704	7.5	.2
306	Harold Kneese	295	Oct. 30, 1969	8	52	30	7	292	8	12	.2	< .4	261	254	5.8	460	7.6	.2
							Cap Mountain Limestone and Trinity Group											
34-402	Louis Lee Bruns	217	Nov. 7, 1969	10	42	33	9	289	6	11	.7	< .4	254	240	7.5	451	7.9	.3
41-609	Paul Stehling	92	Oct. 29, 1969	13	59	45	17	372	19	26	.5	< .4	363	334	9.7	645	7.3	.4
							Hickory Sandstone, Cap Mountain Limestone, and Trinity Group											
41-102	Gus Hasse	220	Nov. 4, 1969	11	83	33	16	320	24	32	.3	77.5	451	343	14.0	715	7.9	.4
							Trinity Group											
56-38-301	Edwin Anderegg	170	Nov. 21, 1969	16	91	44	23	436	23	45	.4	7.0	463	410	11.1	781	7.7	.5
40-401	Marcus Rode	149	Oct. 22, 1969	14	84	44	24	434	19	40	.5	< .4	439	392	11.9	754	7.6	.5
55-201	Clayton Feller	219	Oct. 15, 1969	12	79	52	30	372	125	23	1.9	5.0	510	411	13.6	810	7.5	.6
57-34-501	Billy Teague	30	Nov. 7, 1969	19	92	56	23	407	33	94	.5	5.0	520	460	9.8	904	7.4	.5
502	Louis Lee Bruns	68	do	22	81	139	54	560	61	165	1.2	155.3	950	770	13.3	1,510	7.6	.8
503	Levy Ersch	66	do	12	86	57	12	500	12	27	.5	6.0	459	448	5.5	792	7.4	.3
803	Louis Lee Bruns	78	Oct. 30, 1969	13	75	47	24	451	17	27	.5	5.0	431	384	8.3	732	7.6	.5
804	Levy Ersch	117	do	13	78	39	9	397	10	21	.4	3.0	368	353	5.1	632	7.5	.2
							Edwards and associated limestones, and Trinity Group											
56-47-301	Mrs. Gordon Kidd	84	Nov. 6, 1969	6	40	26	20	200	18	44	1.7	3.0	257	208	17.6	476	7.5	.6
48-404	Martin Dittmer	102	Oct. 14, 1969	12	71	29	18	338	11	30	.3	< .4	337	295	11.6	584	7.5	.5

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
				Edwards and associated limestones, and Trinity Group--Continued														
KK-56-55-202	Clayton Feller	101	Oct. 15, 1969	12	81	41	12	436	8	18	0.4	< 0.4	386	373	6.5	666	7.6	0.3
302	J. B. Johnston, Jr.	168	Oct. 16, 1969	12	66	40	13	382	10	21	.4	< .4	350	328	7.7	609	7.6	.3
56-402	Mrs. J. Hardin Perry	229	Nov. 20, 1969	8	71	40	6	398	8	9	.4	< .4	338	344	3.6	595	7.6	.1
				Edwards and associated limestones														
58-602	Richard Hoerster	232	Oct. 24, 1969	12	76	34	27	250	15	64	.3	96.0	447	330	15.3	735	7.5	.1
901	do	82	do	12	82	9	7	179	10	31	.2	68.0	307	241	5.9	504	7.5	.2
59-101	Lee Schmidt	162	Nov. 1969	14	58	29	33	294	22	43	.3	5.0	349	262	21.2	604	7.3	.9
102	do	16	do	14	69	15	10	259	9	18	.3	5.0	267	234	8.4	456	7.6	.3
401	Edwin Anderegg	218	Nov. 20, 1969	11	52	29	32	281	20	47	.5	< .4	330	249	21.6	580	7.7	.9
402	do	126	do	12	68	16	12	243	16	24	.2	8.0	275	236	10.3	473	7.4	.4
802	Emil Wahrmund	117	Nov. 4, 1969	12	132	37	47	342	44	117	.3	147	730	482	22.3	1,146	7.5	.9
60-502	Herbert Feller	185	Oct. 22, 1969	14	51	30	23	292	14	31	.3	< .4	307	251	16.9	534	7.6	.6
801	Alvin A. Crenwelge	162	Oct. 17, 1969	17	75	26	25	326	12	43	.3	2.0	360	293	15.8	609	7.6	.6
802	Marcus Rode	170	Oct. 22, 1969	15	58	32	23	306	16	35	.4	< .4	328	272	15.4	571	7.8	.6
66-301	Alfred Feller Estate	241	Oct. 24, 1969	12	50	32	9	282	11	19	.7	3.5	277	257	6.9	487	7.6	.2
302	Lee Schmidt	200	Oct. 28, 1969	11	64	26	16	312	11	24	.3	< .4	305	269	2.8	535	7.5	.1
1/ 507	John Heinemann	167	Mar. 17, 1936 Mar. 11, 1970	-- 6	61 39	22 22	15 16	159 229	< 10 < 4	104 28	-- .6	-- < .4	281 225	243 190	-- 15.2	-- 423	-- 7.7	-- .6
508	Mrs. Max Beckmann	186	Nov. 19, 1969	12	73	29	25	311	30	49	.5	1.5	370	301	15.3	636	7.4	.6
602	Dr. W. J. Jenkins, Jr.	169	Feb. 1, 1971	19	87	18	45	287	26	72	.3	19	427	292	25.2	722	7.6	1.1
603	Mrs. Marie Taylor	--	Nov. 6, 1969	12	61	33	20	320	12	33	.4	5.5	334	288	13.0	585	7.5	.5
605	Mrs. Max Beckmann	133	Nov. 19, 1969	14	68	34	34	329	16	46	.4	28.0	402	309	19.4	685	7.6	.9
607	Mrs. Frank L. Rischner	118	do	9	82	17	16	281	18	23	.2	27	330	273	11.5	563	7.6	.4
902	Lewis Lange	95	Oct. 28, 1969	8	90	15	14	295	9	31	.3	22.0	334	287	9.3	579	7.3	.4
67-101	Herbert Feller	186	Oct. 24, 1969	13	66	26	19	311	11	29	.3	< .4	317	272	13.3	550	7.6	.5
201	Emil Wahrmund	126	do	13	76	33	44	268	20	76	.3	81.0	475	325	22.4	803	7.5	1.1
302	Albert Maner	165	Nov. 6, 1969	14	60	27	17	283	12	34	.5	< .4	304	262	12.7	532	7.4	.5
303	do	185	Oct. 30, 1969	14	82	20	57	294	32	81	.3	20.5	452	289	29.9	769	7.3	1.5
304	J. T. Maner	45	do	12	78	36	35	329	18	71	.3	25.5	438	343	18.3	765	7.7	.8
305	Emil Wahrmund	176	Nov. 4, 1969	12	60	19	19	260	11	29	.3	3.0	281	230	15.5	490	7.6	.6
402	E. D. Hopf	205	Nov. 21, 1969	13	58	31	18	311	11	32	.4	< .4	316	274	12.6	559	7.5	.5

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
						Edwards and associated limestones--Continued												
KK-56-47-403	E. D. Hopf	90	Nov. 21, 1969	9	63	21	43	276	24	53	0.5	7.0	357	244	27.8	617	7.6	1.2
404	Mrs. E. R. Dahney	140	do	13	67	27	13	300	8	24	.4	13.0	313	279	9.3	536	7.5	.3
405	Harper School System	62	do	13	110	20	21	342	17	47	.2	38	434	359	11.4	739	7.4	.5
502	Roman Stehling	163	Oct. 21, 1969	13	99	18	17	310	12	32	.3	56	399	323	10.5	653	7.7	.4
504	Emil Wahrmund	77	Oct. 24, 1969	12	53	25	32	251	18	48	.3	3.0	312	229	23.2	544	7.5	.9
506	E. D. Hopf	101	Nov. 21, 1969	13	83	26	23	334	18	39	.3	11	377	315	13.6	656	7.5	.6
601	J. T. Maner	211	Oct. 30, 1969	27	122	57	118	366	130	159	.6	384.0	1,310	539	43.9	1,810	7.6	2.2
602	Alex Behrends	92	Nov. 6, 1969	12	78	29	22	364	12	33	.3	< .4	365	336	13.2	633	7.5	.5
701	E. B. Roach	Spring	Feb. 1, 1971	17	95	24	29	371	15	52	.2	8	422	338	15.9	709	7.9	.7
902	Alex Behrends	90	Nov. 6, 1969	12	76	39	12	397	11	20	.3	3.5	369	349	6.7	631	7.5	.3
48-101	Walter Reeh	188	Oct. 23, 1969	15	61	27	31	284	17	50	.3	3.0	344	262	20.4	595	7.3	.8
102	do	172	do	14	71	20	39	284	25	39	.3	28.5	377	259	24.6	624	7.6	1.0
201	Carl Mazenkie	77	Nov. 19, 1969	8	89	17	10	267	11	21	.3	58	345	294	6.8	580	7.9	.3
202	do	123	do	12	134	31	30	300	27	68	.3	242	720	463	20.0	1,067	7.4	.6
203	do	145	do	9	71	18	7	287	6	11	.2	1.5	267	251	5.5	461	7.5	.2
409	Rudolph Rietsu	101	Mar. 11, 1970	11	86	22	24	336	16	31	.3	23	378	307	14.8	637	7.6	.6
601	Mrs. Carl Lange	130	Nov. 6, 1969	12	71	25	14	314	9	24	.3	3.0	312	279	9.6	538	7.5	.4
703	Albert Maner	97	do	12	106	38	24	470	18	40	.3	4.5	474	423	10.9	800	7.3	.5
54-602	G. C. Stevens	135	Oct. 15, 1969	12	65	26	14	307	8	25	.8	< .4	302	270	10.3	530	7.1	.4
55-101	Elgin Pape	Spring	Mar. 11, 1970	12	93	19	12	355	14	18	.2	3.5	347	312	8.0	594	7.5	.3
103	Mart Stevens	110	Oct. 15, 1969	11	62	35	9	333	9	17	.5	14.0	322	298	6.4	555	7.6	.2
1/ 105	Mrs. Louis Stevens	75	Mar. 19, 1936	--	24	5	26	110	< 10	33	--	--	143	81	--	--	--	--
			Oct. 15, 1969	12	99	10	16	299	13	27	.2	26.5	351	291	10.5	586	7.6	.4
107	G. C. Stevens	72	Oct. 16, 1969	11	96	14	7	382	8	15	.1	10.0	349	297	5.1	548	7.7	.2
203	J. B. Johnston, Jr.	116	do	15	87	25	10	365	12	20	.2	3.5	352	323	6.5	596	7.6	.3
402	Edwin Dittmar	68	Oct. 14, 1969	12	65	25	9	301	7	18	.3	< .4	284	263	7.1	496	7.7	.3
404	do	206	Oct. 17, 1969	12	72	33	24	362	12	35	.4	< .4	366	314	14.2	631	7.9	.6
405	do	107	do	12	89	20	10	339	8	20	1.1	8.5	336	306	6.6	568	7.9	.3
406	do	59	do	4	67	11	7	233	9	16	.2	< .4	229	211	7.1	409	7.5	.2
3/ 501	do	137	Mar. 19, 1936	--	227	85	--	98	< 10	440	--	--	801	933	--	--	--	--
502	Delton Wilson	136	Oct. 14, 1969	13	84	31	150	255	70	256	.4	11.5	740	329	49.1	1,270	7.5	3.5

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
						Edwards and associated limestones--Continued												
KR-56-55-503	J. B. Johnston, Jr.	125	Oct. 16, 1969	16	66	23	58	288	28	80	0.3	5.0	418	261	33.2	716	7.5	1.6
602	do	149	do	14	76	30	13	364	8	23	.2	< .4	343	316	8.2	585	7.8	.3
802	J. W. McCullough	180	Oct. 23, 1969	13	70	38	13	355	16	27	.2	15.5	368	334	7.9	631	7.8	.3
803	do	157	Nov. 20, 1969	11	74	34	8	370	11	13	.3	3.0	336	327	5.0	579	7.5	.2
901	Edgar Ahrens	171	Oct. 23, 1969	16	96	17	26	314	17	55	.3	16.5	398	309	15.4	676	7.7	.6
56-401	Mrs. J. Hardin Perry	139	Nov. 20, 1969	10	80	34	6	397	6	10	.2	1.5	343	338	4.0	593	7.4	.2
403	do	Spring	do	12	93	26	7	390	9	11	.3	< .4	350	338	4.1	596	7.6	.2
501	do	153	do	12	93	28	6	405	6	10	.2	< .4	354	349	3.9	604	7.7	.2
702	Arthur Ahrens	137	Oct. 23, 1969	10	83	17	10	300	8	24	.2	3.0	303	275	7.5	520	7.9	.3
803	Werner Henke	Spring	Mar. 31, 1970	12	83	21	7	334	9	13	.2	8.0	317	296	5.1	537	7.5	.2
57-33-502	Werner Crenwelge	152	Oct. 29, 1969	12	61	29	38	346	12	41	.4	< .4	363	271	23.6	635	7.5	1.0
503	do	141	Nov. 7, 1969	15	65	32	12	338	< 4	25	.4	< .4	315	293	7.9	554	7.5	.3
504	do	150	do	9	80	27	35	334	18	60	.3	5.5	399	311	19.8	694	7.7	.9
601	Lorren Geistweidt	86	do	13	76	40	12	415	8	23	.2	< .4	376	357	7.0	653	7.5	.3
701	Alfred Treibs	194	Nov. 5, 1969	12	76	30	14	342	12	32	.3	3.5	348	314	9.0	587	7.5	.4
704	Gus Basse	234	do	11	74	28	14	304	10	28	.3	29.0	343	299	9.4	590	7.5	.3
705	Stanley Keyser	202	Nov. 6, 1969	5	49	24	17	239	10	36	.2	< .4	259	221	14.7	472	7.6	.5
901	Fredericksburg Gypsum Company	--	Nov. 21, 1969	13	71	27	13	325	8	23	.2	< .4	315	287	9.1	550	7.6	.3
34-701	Liston Maner	175	Oct. 22, 1969	9	78	18	9	314	6	14	.2	< .4	288	268	7.1	500	7.8	.3
802	Elgin Ellebracht	73	Oct. 30, 1969	10	79	41	7	420	7	16	.2	5.5	373	366	4.2	640	7.5	.2
41-101	Elgin Fredrich	Spring	Mar. 27, 1963 Mar. 11, 1970	13 12	66 90	36 33	12 14	361 407	10 14	22 27	.4 .3	< .4 < 3.0	520 393	314 363	7.7 7.5	601 671	8.1 7.5	.3 .3
103	Gus Basse	134	Nov. 4, 1969	5	62	29	9	316	7	15	.2	< .4	282	274	6.5	495	7.8	.2
104	do	111	do	12	86	22	11	346	8	19	.4	5.5	334	304	7.2	574	7.5	.3
105	do	112	do	5	34	4	< 1	112	5	2	.1	< .4	105	101	1.0	189	7.2	.02
108	Stella Basse	99	Nov. 5, 1969	8	88	25	14	323	11	37	.3	20.5	363	323	8.4	625	7.4	.3
110	Alfred Treibs	161	do	13	77	36	30	329	24	52	.5	30.5	426	339	16.0	725	7.4	.7
202	Otto Schuch	130	Mar. 11, 1970	10	87	20	25	339	10	44	.2	< .4	363	301	15.4	633	7.7	.6
203	Fred Mathiesen	Spring	Mar. 27, 1963 Mar. 11, 1970	14 13	75 74	28 32	18 14	336 357	12 17	33 22	.2 .2	.7 3.5	520 352	303 318	11.5 8.5	633 603	7.4 7.6	.5 .3
305	Paul Stehling	--	Oct. 29, 1969	12	88	37	9	427	8	19	.2	3.0	386	375	4.8	654	7.6	.2

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

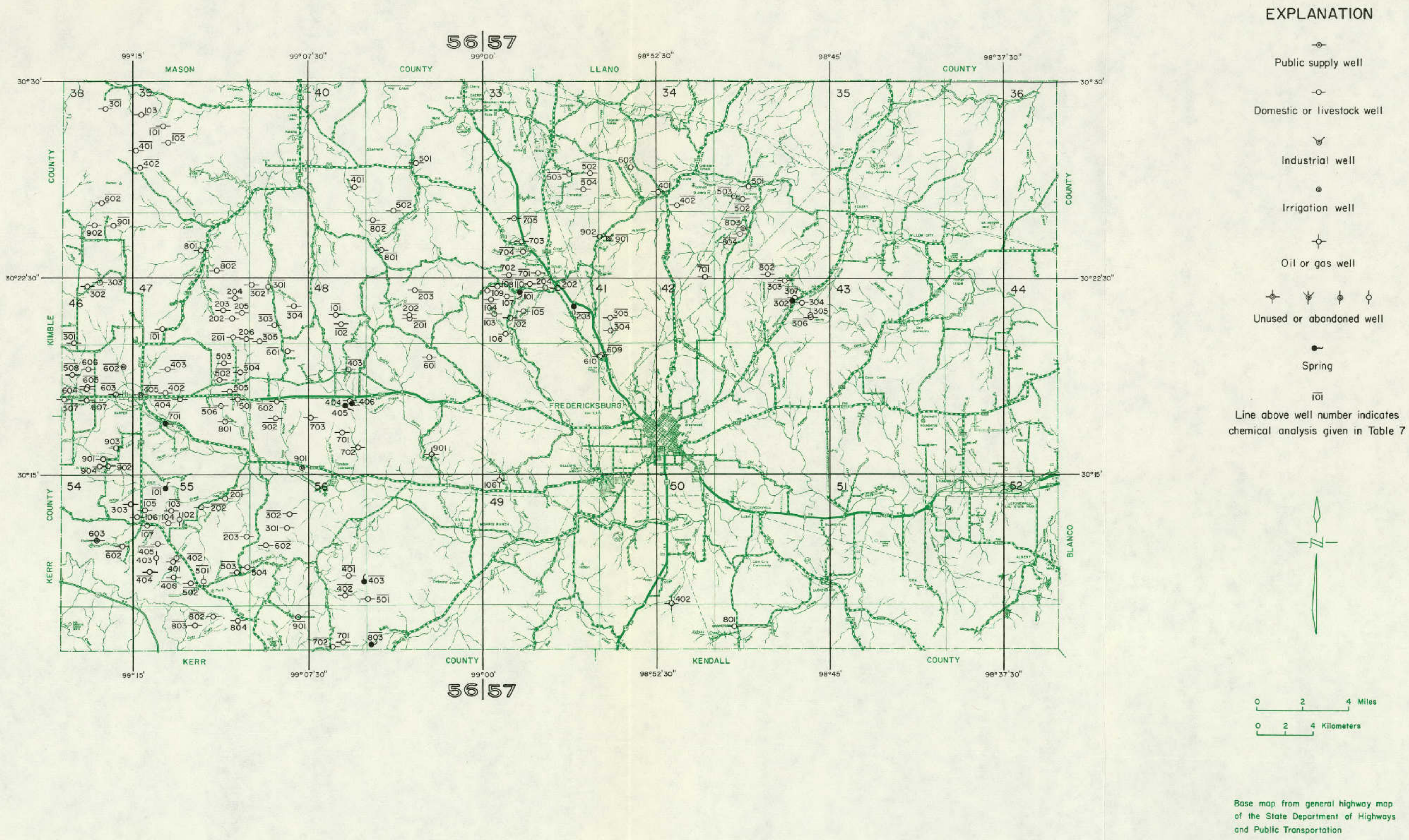
Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
						Edwards and associated limestones--Continued												
3/ KK-57-42-302	Texas Highway Department	Spring	Feb. 20, 1936	--	--	--	--	207	< 10	30	--	--	219	--	--	--	--	--
			Dec. 27, 1962	12	88	41	8	436	28	20	0.1	8	642	390	4.3	730	7.4	0.2
			Mar. 3, 1970	11	86	43	10	443	13	17	.2	7.0	405	392	5.4	685	7.6	.2
307	Mrs. Ben Kneese	174	Oct. 30, 1969	8	67	39	8	375	9	15	.2	< .4	330	325	5.3	578	7.4	.2

3/ Texas Board of Water Engineers duplicated report, ''Records of wells, drillers' logs, and water analyses, and maps showing location of wells, Gillespie County, Texas,'' June 10, 1937.

GILLESPIE COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
KK-56-47-501	C. C. Williams	Oliver Hopf No. 2
48-901	Thousand Island Oil Co.	Hayden Estate No. 1
57-49-106	B. L. Raborn, Jr.	Joe Burkett, Jr., et al. No. 1
50-402	do	E & G Lochte



Location of Selected Water Wells Springs, and Oil and Gas Wells in Gillespie County

GLASSCOCK COUNTY

Table 8.–Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
KL-28-58-902	Pan American Petroleum Corp.	S. C. Houston No. 1-A
59-403	Texas National Petroleum Co.	Edmond Tom No. 1
504	Sun Oil Co.	Grady Cross No. 1
604	Sinclair Oil & Gas Co.	G. T. Hall No. 1
703	Landrath Prod.	Houston No. 1
803	A. K. Guthrie	Spruce No. 1
804	J. Roy Derrick	Sanders No. 1-23
60-406	Mallard Petroleum Inc.	G. T. Hall No. 1
502	Penn	Edwards No. 1
503	World Oil Co.	W. P. Edwards Estate No. 1
610	Simms Oil Co.	Edwards No. 1
611	do	McDowell No. 1
703	Youngblood & Youngblood	Do.
808	Fuhrman Petroleum Corp.	L. S. McDowell No. 1
809	Merriwether, et al.	McDowell No. 2
907	Phillips Petroleum Co.	Do.
908	World Oil Co.	McDowell No. 1-8
61-109	Lion Oil Co.	Coffee No. 5-C
418	Amerada Petroleum Corp.	Coffee No. 6
419	do	R. C. Coffee No. 5
420	California Co.	Baker No. 2
523	do	Jones No. 1
803	do	E. F. Turner No. 1
62-507	Gulf Oil Corp.	H. R. Clay No. 11
609	J. M. Huber	Reed No. 1
706	California Co.	Currie No. 2
707	Standard Oil Co.	W. B. Currie No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
KL-44-02-604	Amerada Petroleum Corp.	Bertie Boone No. 1
904	do	K. S. Boone No. 17-7
03-301	Landreth	Houston No. 1
501	Pan American Petroleum Corp.	E. L. Powell No. 3
603	Mann	Powell No. 1
04-111	Sohio Petroleum Co.	Landamy No. 1
421	Champlin Oil & Refining Co.	E. L. Hillger No. 1
601	Shell Oil Co.	Currie No. 1
810	Ray Smith Drilling Co.	Calverley No. 1
05-118	R. B. Stallworth, Jr.	Barkhurst No. 1
208	Ralph Lowe	Neal-Ballinger No. 1
601	Bond Oil Co.	Schafer No. 1
06-404	Renn Oil	Do.
804	R. S. Anderson	Eva Cole No. 1
10-612	Allison Producing Co.	Judkins Walton No. 2
909	Atlantic Refining Co.	Schrak No. 24-2
11-309	Shell Oil Co.	McDaniel No. 1
509	Jake L. Hamon	Brunson No. 1
807	Golston Oil Corp.	Meadors No. 1
12-109	John Y. Francis	W. H. Clark No. 1
201	Texaco Incorporated	J. B. Calverly
208	R. R. Herrell	Marshall Cook No. 1
608	Texaco Incorporated	Currie No. 1
13-320	Sinclair Oil & Gas Co.	Henrietta Long No. 1
806	Gibson & Johnson	Mann No. 1
14-210	M. W. J. Producing Co.	Clyde Reynolds No. 1
18-306	Sinclair Oil & Gas Co.	Texaco Incorporated No. 1-B
19-306	Hanley Co.	L. C. Clark No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
KL-44-19-412	Amerada Petroleum Co.	Texaco Incorporated No. 2-I
512	Sinclair Oil & Gas Co.	Fannie Boyd No. 3
602	Murphy Corp. & Ashland Oil & Refining Co.	M. L. Couey No. 1
20-113	Sinclair Oil & Gas Co.	L. C. Clark No. 1
421	American Republic Corp.	Buckner Orphan's Home No. 1-17
553	J. J. August & Assnc. & J. Roy Derrick	Jurecek No. 1
606	Placid Oil Co.	Sanders No. 1
21-502	Standard Oil Co. of Texas	Viola Scherz No. 1
806	Union Texas Petroleum Corp.	Rape No. 46-A1
22-201	Seaboard Oil Co. of Delaware	Bishop No. 1-A
404	Humble Oil & Refining Co.	Myrtle B. Frost No. 1
710	Cities Service Oil Co.	Barbee No. 4-A

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Qal, Alluvium; To, Ogallala Formation; Kea, Edwards and associated limestones; Kt, Trinity Group.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and data from the city of Big Spring unless otherwise designated by footnotes.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; S, submersible; T, turbine; E, electric; J, jet; W, wind; N, none.
Use of water : D, domestic; S, livestock; P, public supply; Irr, irrigation; Ind, industrial; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* PR-28-45-902	Mrs. Leora Flanagan	--	--	25	6	--	To	2,348	18.8	Oct. 13, 1966	C, W	S	--
* 52-602	U.S. Government	Webb Air Force Base	1961	158	9-5/8	158	Kt	2,558	63.50 77.87	June 22, 1961 Nov. 23, 1966	T, E	Irr	Reported yield, 400 gpm. Slotted casing from 74 to 154 feet. Slumped area.
* 603	Morris Patterson	--	1920	70	--	--	To, Kt	2,568	62.6	Sept. 29, 1966	C, W	S	Dug well.
604	U.S. Government	Webb Air Force Base	--	158	6-5/8	85	Kea, Kt	2,558	76.50	Nov. 23, 1966	S, E	Irr	Original depth, 85 feet. Deepened to 106 feet. Redeepened to 158 feet. Reported yield, 85 gpm.
902	Bernard and Joe Fisher	Patterson Brothers	--	66	10	--	Kt	2,564	49.0	Oct. 10, 1966	C, W	S	--
* 903	Morris Patterson	--	1930	52	--	--	To, Kt	2,557	44.7	Sept. 29, 1966	C, W	S	Dug well.
* 904	J. F. McKinnon	--	1962	40	6	4	To, Kt	2,548	37.9	Oct. 21, 1966	C, W	D	--
* 905	do	--	1944	46	6	6	To, Kt	2,546	39.1	do	C, E	D, S	--
906	R. C. Dunagan	--	1930	45	6	6	To, Kt	2,546	41.0	do	C, W	D, S	--
907	J. F. McKinnon	--	1962	62	6	6	To, Kt	2,542	46.2	do	S, E	S	--
908	Mrs. Edith K. Fisher	Rose Hill	1940	65	6	65	To, Kt	2,538	--	--	C, W	S	Slotted casing from 55 to 65 feet.
* 909	do	do	1953	70	5-1/2	70	To, Kt	2,557	--	--	J, E	D, S	Slotted casing from 60 to 70 feet.
910	do	do	1965	70	6-5/8	70	To, Kt	2,556	--	--	J, E	D, S	Slotted casing from 40 to 60 feet. Gravel packed.
911	do	do	1954	120	6	120	To, Kt	2,549	54.0	Oct. 13, 1966	C, W	S	Slotted casing from 100 to 120 feet.
912	Bernard and Joe Fisher	Patterson Brothers	--	55	6	--	Kt	2,562	52.3	Oct. 10, 1966	C, W	S	--
53-102	City of Big Spring	--	--	283	8	--	Kt	2,582	--	--	N	N	Abandoned irrigation well. Slumped area.
* 103	do	--	--	279	8	279	Kt	2,584	--	--	T, E	Irr	Slumped area. Slotted casing from 219 to 279 feet. Reported yield, 300 gpm.
104	do	--	--	272	8	272	Kt	2,583	--	--	T, E	Irr	Slumped area. Slotted casing from 212 to 272 feet. Reported yield, 140 gpm.
105	Edward E. Jones	H. S. Russell	1940	190	8	50	Kt	2,685	--	--	S, E	D	--
* 106	B. R. Holcombe	--	--	121	6	10	Kt	2,660	94.5	Nov. 18, 1966	C, W	D	--
* 201	Marshall W. Crawford, Jr.	--	1958	152	7	119-152	Qal	2,495	122.90 123.7	June 22, 1961 Nov. 23, 1966	S, E	D	Slotted casing from 122 to 139 feet.
* 202	Maurine Morgan	--	--	70	6	70	Kt	2,585	65.9	Oct. 6, 1966	C, E	D, S	Slotted casing from 50 to 70 feet.
203	Maurine Morgan, et al.	--	--	243	8	250	Kt	2,770	217.6	Oct. 19, 1966	C, W	S	Slotted casing from 230 to 250 feet.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water-bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
PB-28-53-204	Maurine Morgan	--	--	116	6	20	To, Kt	2,480	103.1	Oct. 19, 1966	C, W	S	--
205	Wayne Basden	Quentin Florence	1963	200	8	10	Kt	--	172.20	Nov. 18, 1966	S, E	D	--
* 301	Mrs. Leora Flanagan	--	1960	28	10 8	5 --	To, Qal	2,360	24.3	Oct. 13, 1966	C, W	S	--
302	do	--	--	35	8	--	To, Qal	2,360	24.1	do	C, W	S	--
303	Maurine Morgan, et al.	--	--	225	6	20	Kt	2,740	--	--	C, W	S	--
* 304	Maurine Morgan	--	--	98	6	20	Qal	2,444	85.9	Oct. 19, 1966	C, W	S	--
* 401	H. L. Morris	--	1961	146	7	146	Kt	2,680	121.6	Nov. 22, 1966	S, E	D	Slotted casing from 126 to 146 feet.
402	M. H. Boatler	--	1963	150	6	18	Kt	2,690	--	--	S, E	D	--
* 403	Eston Hollis	--	1964	225	6	75-225	Kt	--	--	--	S, E	D	Slotted casing from 200 to 225 feet.
501	City of Big Spring	Joe B. Neal	1927	252	8	8	Kt	2,775	222.9 219.7	June 23, 1961 Nov. 17, 1966	N	N	Unused irrigation well.
502	Maurine Morgan, et al.	--	--	98	6	10	Kt	2,680	85.3	Oct. 19, 1966	C, W	S	--
503	Hardy Morgan	--	1956	116	6	116	Kt	2,630	103.7	do	C, W	D, S	Slotted casing from 96 to 116 feet.
504	do	--	1924	220	6	20	Kt	2,782	217.0	do	C, W	S	--
505	Texaco Incorporated	Big Spring Country Club	1929	290	8	290	Kea, Kt	2,627	94.3	Nov. 18, 1966	T, E	Irr	Slumped area. Slotted casing from 210 to 290 feet. Reported yield, 400 gpm.
506	Bill Conger, Jr.	--	1961	250	8	--	Kt	2,756	184.8	Nov. 17, 1966	S, E	D	--
507	U. M. Boatler	--	1963	240	8	240	Kt	--	190.1	Nov. 18, 1966	S, E	D	Slotted casing from 200 to 240 feet.
602	Hardy Morgan	--	1956	110	6	110	Kt	2,596	64.5	Oct. 19, 1966	C, W	S	Slotted casing from 90 to 110 feet.
603	do	--	--	50	6	10	Kt	2,542	41.0	do	C, W	S	--
701	Trinity Memorial Park Incorporated	--	1934	101	8	15	Kt	2,645	60	1961	T, E	Irr	Reported yield, 50 gpm in 1949.
702	Texas Pipe Line Basin System	--	1959	100	6	100	Kt	2,600	64.7	Nov. 2, 1966	S, E	Ind	Slotted casing from 80 to 100 feet.
704	Bernard and Joe Fisher	Patterson Brothers	--	72	7	--	Kt	2,580	58.4	Oct. 10, 1966	C, W	S	--
705	do	do	--	--	6	--	Kt	2,626	--	--	C, E	D, S	--
706	do	do	--	60	6	--	Kt	2,620	44.5	Oct. 11, 1966	C, W	S	--
707	J. F. McKinnon	--	1930	75	6	6	Kt	2,605	65.0	Oct. 20, 1966	C, W	D, S	--
* 708	do	--	1940	75	6	6	Kt	2,590	66.1	do	C, W	D, S	--
* 709	Ross Hill	--	1910	113	6	100-120	Kt	2,689	111.4	Oct. 21, 1966	C, W	S	Slotted casing from 100 to 120 feet.
710	do	--	1951	170	5-1/2	170	Kt	2,740	153.3	do	C, W	S	Slotted casing from 150 to 170 feet.
711	Trinity Memorial Park Incorporated	--	1952	100	8	15	Kt	2,638	--	--	J, E	Irr	Reported yield, 35 gpm in 1952.
* 712	do	--	1953	110	7	20	Kt	2,639	63.2	Oct. 28, 1966	S, E	Irr	Reported yield, 55 gpm in 1953.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
PB-28-53-713	Trinity Memorial Park Incorporated	--	1964	115	10-3/4	115	Kt	2,637	63.6	Oct. 28, 1966	S, E	Irr	Slotted casing from 62 to 107 feet. Reported yield, 70 gpm in 1964.
* 714	L. W. Longshore	R. W. Longshore	1955	73	7	73	Kt	2,630	--	--	J, E	D	Slotted casing from 59 to 73 feet.
715	do	Roy Henderson	1930	85	10	12	Kt	2,584	55.0	Nov. 2, 1966	C, W	S	--
* 716	do	do	1946	83	13	75	Kt	2,662	80.7	do	C, W	S	Slotted casing from 55 to 75 feet. Gravel packed.
801	Bernard and Joe Fisher	Patterson Brothers	--	80	8	--	Kt	2,642	--	--	C, W	S	--
802	do	do	--	116	4	--	Kt	2,690	105.3	Oct. 12, 1966	C, W	S	--
803	do	do	--	180	6	--	Kt	2,758	166.0	do	C, W	S	--
804	Hardy Morgan	--	1946	250	6	20	Kt	2,800	233.4	Oct. 19, 1966	C, W	S	--
805	do	--	1924	220	6	20	Kt	2,758	182.5	do	C, W	S	--
901	do	--	1934	220	6	20	Kt	2,766	196.5	Oct. 14, 1966	C, W	S	--
902	Clayton-Stewart Estate	Marion Wilkerson	--	88	6	6	Kt	2,650	76.6	Nov. 3, 1966	C, W	S	--
903	do	do	--	235	8-5/8	10	Kt	2,742	171.1	do	C, W	S	Deepened in 1959.
* 54-401	Mrs. Leora Flanagan	--	1944	63	6	60	To, Kt	2,515	50.5	Oct. 13, 1966	C, W	D, S	Slotted casing from 55 to 60 feet.
402	Horace Garrett, et al.	--	1962	79	6	10	Kt	2,685	47.3	Sept. 29, 1966	C, W	S	--
* 403	do	--	--	69	8	--	Kt	2,698	63.5	do	C, W	S	--
404	do	--	--	27	6	--	Kt	2,556	13.4	do	C, W	S	--
405	Hardy Morgan	--	--	20	--	--	Kt	2,584	33.7	Oct. 19, 1966	C, W	S	--
406	Mrs. Leora Flanagan	--	1941	69	6	69	To, Kt	2,515	50.3	Oct. 13, 1966	C, W	D, S	Slotted casing from 50 to 69 feet.
407	do	--	1963	67	6	67	To, Kt	2,508	61.1	do	C, W	D, S	Perforated casing from 50 to 67 feet. Water level measured while mill was pumping.
408	do	--	1905	56	6	56	To, Kt	2,516	49.9	do	C, W	S	Slotted casing from 50 to 56 feet.
409	do	--	1963	69	6	69	To, Kt	2,510	45.3	do	C, W	S	Slotted casing from 50 to 69 feet.
* 501	Horace Garrett, et al.	--	--	53	5	--	Qal, Kt	2,455	47.0	Sept. 29, 1969	C, W	S	--
* 701	do	--	--	175	8	--	Kt	2,744	--	--	C, W	S	--
* 702	do	--	--	185	8	--	Kt	2,718	165.7	Oct. 11, 1966	C, W	S	--
703	Hardy Morgan	--	--	190	6	20	Kt	2,725	135.4	Oct. 19, 1966	C, W	S	--
704	do	--	--	18	--	--	Kt	2,515	--	--	C, W	S	Dug well.
705	Clayton-Stewart Estate	Marion Wilkerson	--	115	6	6	Kt	2,668	100.9	Nov. 3, 1966	C, W	D, S	--
801	Horace Garrett, et al.	--	--	40	6	--	Kt	2,535	--	--	C, W	S	--
802	do	--	--	67	5-1/2	--	Kt	2,576	55.1	Sept. 29, 1966	C, W	S	--
803	do	--	--	--	6	--	Kt	2,520	--	--	C, W	S	--
* 804	do	--	1954	34	8	--	Kt	2,536	20.4	Oct. 11, 1966	S, E	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water-bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
PB-28-54-805	Horace Garrett, et al.	--	--	100	8 4	6 --	Kt	2,656	80.9	Oct. 11, 1966	C, W	S	--
806	do	--	--	35	6	--	Kt	2,575	--	--	C, W	D, S	--
807	do	--	--	25	6	--	Kt	2,530	--	--	C, W	D, S	--
808	do	--	--	20	6	--	Kt	2,535	20.3	Oct. 11, 1966	C, W	D, S	--
809	do	--	--	20	8	--	Kt	2,528	--	--	C, W	S	--
* 60-302	Ross Hill	--	1935	54	5-1/2	54	To, Kt	2,575	38.1	Oct. 21, 1966	C, W	S	Slotted casing from 34 to 54 feet.
61-101	Mrs. Edith K. Fisher	Ross Hill	1961	175	5-1/2	160	Kt	2,720	167.3	do	C, W	S	Slotted casing from 140 to 160 feet.
102	L. W. Longshore	Roy Henderson	1930	170	5-1/2	170	Kt	2,750	--	--	S, E	D, S	Slotted casing from 150 to 170 feet.
103	do	do	1943	130	6	10	Kt	2,692	112.3	Nov. 2, 1966	C, W	S	--
104	do	do	1944	90	4	90	Kt	2,696	--	--	C, W	S	Slotted casing from 70 to 90 feet.
* 105	do	do	1941	110	6	12	Kt	2,648	90.0	Nov. 2, 1966	C, W	S	--
* 106	W. W. Posey	--	1940	80	8	10	Kt	2,650	77.0	Nov. 3, 1966	C, E	S	--
* 202	Continental Oil Company	--	1930	240	7	--	Kt	2,752	175.3	Sept. 22, 1966	C, E	Ind	Perforated casing.
* 203	Texaco Incorporated	Walter Gressett	1930	235	6	200	Kt	2,744	173.8	Sept. 27, 1966	C, W	S	--
204	Mrs. Edith K. Fisher	Ross Hill	--	225	5-1/2	225	Kt	2,786	--	--	C, W	S	Slotted casing from 175 to 225 feet.
205	Belle Overton	Jesse W. Overton	--	154	5-1/2	3	Kt	2,690	116.3	Oct. 26, 1966	N	N	Abandoned domestic well.
206	W. B. Currie	Victor E. Phillips	--	--	8-5/8	8	Kt	2,764	--	--	C, W	S	--
303	W. R. Settles	Continental Oil Company	1930	329	8	--	Kt	2,710	--	--	C, E	P	--
304	do	do	1930	320	--	--	Kt	2,703	--	--	N	N	Abandoned public-supply well.
305	do	do	1930	320	8	--	Kt	2,712	--	--	C, E	N	Unused industrial well.
* 306	do	do	1930	330	8	--	Kt	2,705	--	--	C, E	P	Estimated yield, 30 to 40 gpm.
307	do	Humble Oil and Refining Company	1920	250	8-5/8	--	Kt	2,718	--	--	C, E	Ind	--
308	do	Continental Oil Company	1930	193	7	--	Kt	2,710	--	--	C, E	P	Estimated yield, 50 to 60 gpm.
309	do	do	1930	196	8	--	Kt	2,685	--	--	C, E	P	Estimated yield, 35 to 40 gpm.
* 310	do	do	1930	300	--	--	Kt	2,690	--	--	T, E	Ind	--
311	do	Humble Oil and Refining Company	1920	250	8	--	Kt	2,722	--	--	C, E	Ind	--
62-101	Mrs. Odum	--	1930	290	6	290	Kt	2,778	--	--	N	N	Abandoned irrigation well. Slotted casing.
102	City of Forsan	--	1961	285	5-1/2	255	Kt	2,782	--	--	S, E	P	--
103	Clayton-Stewart Estate, et al.	Marion Wilkerson	1940	260	8-5/8	3	Kt	2,797	239.30 235.9	June 27, 1961 Nov. 3, 1966	C, W	S	--
104	City of Forsan	--	1930	280	8	--	Kt	2,785	204.3	Oct. 29, 1966	N	N	Unused public-supply well.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* PR-28-62-105	City of Forsan	--	1964	283	8	283	Kt	2,776	--	--	S, E	P	Slotted casing from 212 to 272 feet. Cemented from 0 to 200 feet. Reported yield, 110 gpm in 1964.
106	do	--	1966	285	8-5/8 7	203 187-285	Kt	2,776	213.4	Oct. 29, 1966	S, E	P	Slotted casing from 212 to 275 feet. Cemented from 0 to 203 feet. Reported yield, 22 gpm.
107	Joe Hound, et al.	--	1955	280	8-5/8	280	Kt	2,778	--	--	C, E	D	Slotted casing from 250 to 280 feet.
108	John Cardwell	--	1956	271	6	271	Kt	2,770	211.1	Oct. 27, 1966	C, E	D	Slotted casing from 250 to 271 feet.
109	Cosden Oil and Chemical Company	--	1941	275	7	275	Kt	2,794	--	--	C, E	Ind	--
* 110	Sun Ray DX Oil Company	--	1976	280	7	280	Kt	2,785	237.4	Nov. 1, 1966	C, E	Ind	Slotted casing from 240 to 280 feet.
111	Amerado Petroleum Corporation	--	1955	274	7	237	Kt	2,780	--	--	C, E	Ind	Slotted casing from 223 to 237 feet.
* 112	do	--	1955	254	7	215	Kt	2,768	211.5	Oct. 29, 1966	C, E	Ind	Slotted casing from 195 to 215 feet.
* 113	Forsan County Line Independent School District	--	1940	280	10-3/4	280	Kt	2,788	227.8	Nov. 1, 1966	S, E	P	Slotted casing.
* 114	do	--	1950	280	8-5/8	280	Kt	2,790	227.7	do	S, E	P	Do.
115	Bob Wash, et al.	--	1961	285	7	285	Kt	2,790	--	--	C, E	D	Slotted casing from 265 to 285 feet.
* 301	W. N. and L. R. Reed	Colorado Oil and Gas	1956	200	8	200	Kt	2,684	--	--	C, E	P	Slotted casing. Estimated yield, 30 to 40 gpm.
303	Dora Roberts Estate and Horace Garrett	--	--	Spring	--	--	Kt	2,490	--	--	--	--	"Spring in Section 112."
304	LeRuth Reed	--	--	130	7	--	Kt	2,558	70.3	Sept. 30, 1966	C, W	S	--
* 305	Mary Chalk Estate and Doris Chalk Cole	Doris Chalk Cole	--	123	--	--	Kt	2,635	111.5	Sept. 22, 1966	C, E	D, S	--
* 306	Otis Chalk Estate	do	--	90	--	--	Kt	2,578	79.7	do	C, -	D, S	Water level measured while mill was pumping.
307	do	do	--	96	--	--	Kt	2,618	81.0	do	C, W	S	--
308	do	do	1930	80	--	--	Kt	2,562	70.7	do	N	N	--
* 309	do	do	--	149	--	--	Kt	2,640	129.3	do	S, E	D, S	--
310	do	do	1926	140	--	--	Kt	2,640	--	--	C, W	D, S	--
311	do	Socony Mobil Oil Company	--	138	--	--	Kt	2,610	114.8	Sept. 22, 1966	C, E	Ind	--
312	do	do	--	174	--	--	Kt	2,620	114.5	do	C, E	Ind	--
313	do	Doris Chalk Cole	--	--	--	--	Kt	2,676	152.3	do	S, E	S	--
63-102	W. N. and L. R. Reed	--	1958	42	5-1/2	42	Kt	2,488	24.7	Sept. 30, 1966	C, W	S	Slotted casing from 30 to 42 feet.

*Chemical analysis of water given in Table 7.

HOWARD COUNTY

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

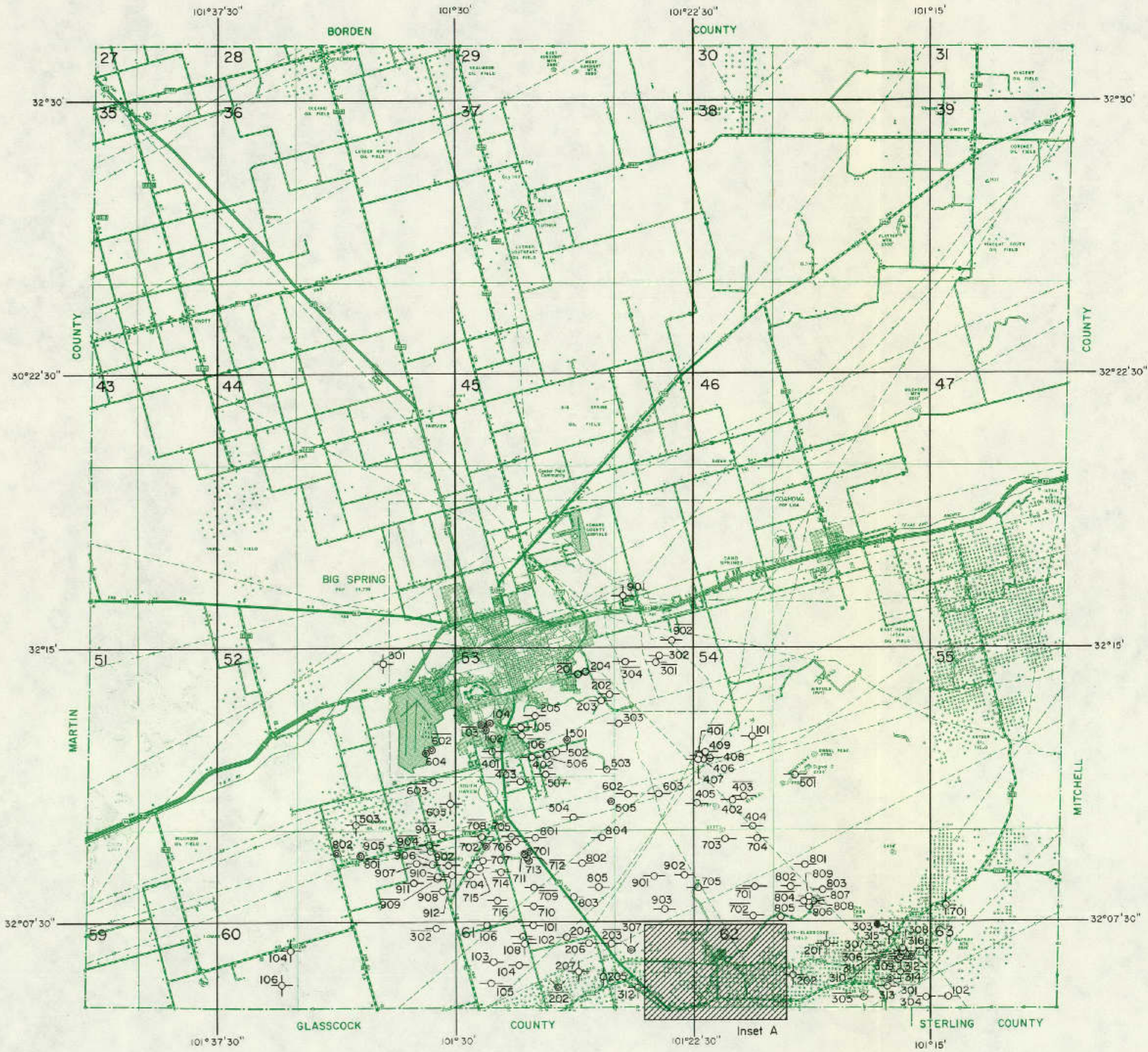
Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Trinity Group											
PX-28-52-602	U.S. Government	158	Nov. 22, 1966	24	96	13	37	349	48	36	0.6	< 0.4	427	296	21.6	712	7.1	0.9
53-103	City of Big Spring	279	Nov. 17, 1966	24	90	8	36	285	48	42	.4	7	395	258	23.2	645	7.4	1.0
106	R. R. Holcombe	121	do	19	125	3	29	267	64	59	.2	33	463	326	16.0	758	7.2	.7
202	Maurine Morgan	70	Oct. 28, 1966	17	67	7	27	233	29	23	.8	3	289	199	22.9	495	7.6	.8
401	H. L. Morris	146	Nov. 22, 1966	18	80	10	54	257	62	58	1.0	7	416	242	32.5	690	7.9	1.5
403	Eston Hollis	225	Nov. 18, 1966	20	71	14	68	226	80	76	1.2	8	449	234	38.6	735	7.4	1.9
708	J. P. McKinnon	75	Oct. 20, 1966	18	150	42	204	309	325	274	1.2	9	1,180	550	44.7	1,840	7.6	3.8
709	Ross Hill	113	Oct. 21, 1966	13	71	8	136	217	99	148	.8	14	590	211	57.9	1,000	7.8	4.0
712	Trinity Memorial Park Incorporated	110	Oct. 28, 1966	18	115	7	18	238	28	91	.3	6	400	315	11.0	720	7.5	.4
714	L. W. Longshore	73	Nov. 2, 1966	21	221	71	387	339	520	570	1.8	18	1,980	840	49.9	3,000	7.6	5.8
716	do	83	do	16	61	18	156	256	115	156	1.6	9	660	225	60.4	1,090	7.8	4.6
54-403	Horace Garrett, et al.	69	Sept. 29, 1966	22	61	7	37	218	32	27	.7	3.0	297	181	31.0	502	7.8	1.2
701	do	175	Oct. 1, 1966	18	76	8	19	261	19	18	.8	1.0	288	222	15.9	500	7.2	.6
702	do	185	Oct. 11, 1966	16	79	11	37	278	33	37	1.1	2.5	354	242	25.2	621	7.5	1.1
804	do	34	do	17	72	11	34	264	32	29	1.2	2.5	329	225	24.5	571	7.5	1.0
61-105	L. W. Longshore	110	Nov. 2, 1966	13	82	16	137	232	132	160	1.6	17	670	272	52.3	1,141	7.7	3.6
106	W. W. Posey	80	Nov. 3, 1966	16	92	34	144	281	156	187	1.5	14	780	369	45.8	1,300	7.7	3.3
202	Continental Oil Company	240	Sept. 22, 1966	16	149	41	200	159	75	540	1.0	9	1,110	540	44.5	2,090	7.7	3.8
203	Texaco Incorporated	235	Sept. 29, 1966	17	66	8	25	231	23	22	.4	2.5	278	197	21.4	486	7.4	.8
306	W. R. Settles	330	Sept. 22, 1966	16	175	24	292	222	67	670	.9	7	1,360	540	54.3	2,580	7.5	5.5
310	do	300	do	16	252	57	840	233	214	1,640	1.0	6	3,150	880	67.5	5,350	7.5	12.4
62-105	City of Forsan	283	Oct. 29, 1966 Apr. 25, 1968	15 15	68 74	10 9	47 43	229 231	48 52	47 50	1.0 1.1	8 10.0	357 368	212 221	32.4 29.8	614 615	7.5 7.8	1.4 1.3
110	Sun Ray DX Oil Company	280	Oct. 27, 1966	16	447	60	1,130	204	169	2,460	1.0	7	4,390	1,370	64.2	6,910	7.4	13.3
112	Amerado Petroleum Corporation	254	Oct. 22, 1966	15	1,020	93	2,780	229	391	5,800	1.3	3	10,200	2,930	67.4	> 12,000	7.3	22.3
113	Forsan County Line Independent School District	280	Nov. 1, 1966	26	117	4	60	249	67	98	2.2	22	520	308	30.0	879	7.7	1.5

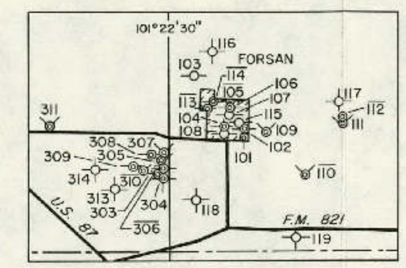
Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
Trinity Group--Continued																		
PB-28-62-114	Forsan County Line Independent School District	280	Apr. 25, 1968	3	72	14	94	82	150	162	1.0	1.0	540	238	46.2	917	7.3	2.6
301	W. N. and L. R. Reed	200	Sept. 20, 1966	18	73	9	24	246	27	26	1.0	4.5	304	223	19.2	542	7.5	.7
305	Mary Chalk Estate and Doris Chalk Cole	123	Sept. 22, 1966	20	84	9	15	265	20	26	.4	3.5	308	249	11.4	529	7.6	.4
306	Otis Chalk Estate	90	do	18	82	9	19	277	17	24	.6	< .4	306	204	14.5	520	7.6	.5
309	do	149	do	18	180	34	137	260	21	404	.4	5	910	510	37.0	1,630	7.4	2.7
Ogallala Formation and Trinity Group																		
52-603	Morris Patterson	70	Sept. 29, 1966	21	145	32	134	245	241	202	.9	42.0	940	496	37.0	1,530	7.3	2.6
903	do	52	do	29	359	134	476	200	905	900	2.1	92.5	3,000	1,450	41.7	4,320	7.2	5.4
904	J. F. McKinnon	40	Oct. 21, 1966	32	242	94	362	483	630	475	1.3	29	2,100	990	44.3	3,050	7.3	5.0
905	do	46	do	20	160	38	126	271	231	248	.7	18	980	560	33.0	1,570	7.4	2.3
909	Mrs. Edith K. Fisher	70	Oct. 13, 1966	22	102	10	44	299	46	44	.6	35	451	298	24.4	750	7.5	1.1
54-401	Mrs. Leora Flanagan	63	do	27	115	11	70	393	64	58	.8	7.5	540	331	31.4	898	7.5	1.7
60-302	Ross Hill	54	Oct. 21, 1966	22	192	69	350	203	610	475	3.9	28	1,850	770	50.0	2,950	7.7	5.5
Alluvium and Trinity Group																		
54-501	Horace Garrett, et al.	53	Sept. 29, 1966	26	69	64	71	575	54	39	.9	1.5	610	438	26.0	1,023	7.9	1.5
Ogallala Formation																		
45-902	Mrs. Leora Flanagan	25	Oct. 13, 1966	71	192	111	362	244	580	620	1.5	20.0	2,080	940	45.7	3,140	7.5	5.2
Alluvium and Ogallala Formation																		
53-301	Mrs. Leora Flanagan	28	Oct. 13, 1966	31	54	19	71	305	51	47	1.1	< .4	424	214	41.8	703	7.5	2.1
Alluvium																		
201	Marshall W. Crawford, Jr.	152	Nov. 23, 1966	22	70	15	45	295	30	46	.8	3	377	237	29.2	636	7.5	1.3
304	Maurine Morgan	98	Nov. 4, 1966	19	65	16	58	277	38	68	.9	< .4	401	229	35.3	705	7.6	1.7

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
PB-28-45-901	Sun Oil Co.	Cosden No. 1
52-301	Woodson Producing Co., et al.	C. R. Creighton No. 1
503	Cosden Petroleum Co.	T. M. Dunagan No. 3
605	do	L. S. Patterson No. 4-B
901	Oil Well Remedial	Fisher No. 1
54-101	J. C. Williamson & J. C. Barnes	Wade No. 1
55-701	Samedan Oil Corp.	Chalk No. 11
60-104	D. O. Huddleston	McDowell No. 1
106	Cosden Petroleum Corp.	L. S. McDowell No. 1
61-108	Pico Drilling Co.	E. K. Fisher No. 1
207	Plymouth Oil Co.	Kloh No. 16
312	Continental Oil Co.	W. K. Settles No. 25-133
313	do	Settles No. 6-5-A
314	do	W. R. Settles No. 36-A
62-116	Amerada Petroleum Corp.	Stewart No. 14
117	do	Roberts No. 16
118	Continental Oil Co.	Settles No. 20-A
119	Sunray Oil Corp.	Dora Roberts No. 12-B
201	Cosden Petroleum Corp.	H. R. Clay No. 10
202	Amerada Petroleum Corp.	Dora Roberts No. 22
314	Sawnie Robertson	Reed No. 8-B
315	Continental Oil Corp.	G. O. Chalk No. 5
316	Drilling & Exploration Co., Inc.	E. W. Douthitt No. 1-2





Inset A

0 2 4 Miles
0 2 4 Kilometers
Inset Scale

EXPLANATION

Public supply well

Domestic or livestock well

Industrial well

Irrigation well

Oil or gas well

Unused or abandoned well

Spring

101

Line above well number indicates chemical analysis given in Table 7

Note: This county is entirely within 1° quadrangle number 28

0 2 4 Miles
0 2 4 Kilometers

Base map from general highway map of the State Department of Highways and Public Transportation

Location of Selected Water Wells, Springs, and Oil and Gas Wells in Howard County

IRION COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
PK-43-25-703	Geochemical Survey	C. Harris Test Hole No. 6
704	do	C. Harris Test Hole No. 10
705	do	C. Harris Test Hole No. 2
802	do	C. Harris Test Hole No. 9
26-906	Honolulu Oil Corp.	Wall No. 1
33-103	Geochemical Survey	C. Harris Test Hole No. 11
104	do	C. Harris Test Hole No. 7
105	do	C. Harris Test Hole No. 8
206	do	C. Harris Test Hole No. 3
706	Alvon Oil & Gas	A. A. Sugg No. 1-AA
41-203	Tucker Drilling Co.	A. A. Sugg No. 1
402	Virgil Latham	J. H. Clark No. 1
604	Pan American Petroleum Corp.	A. A. Sugg No. 1
905	Amerada Petroleum Co.	I. P. Van Keuren No. 1
906	Threeway Drilling Co.	A. A. Sugg No. 2
907	do	A. A. Sugg No. 1
42-104	Monsanto Chemical Co.	Lena No. 1
202	Pan American Petroleum Corp.	A. A. Sugg No. 1-C
503	Hill & Flannery	J. M. Nutt No. 1
43-501	Standard of Texas	Bryant No. 1-B
49-304	Sinclair Oil & Gas Co.	Henry Lindley No. 1
402	do	Lorena Wilson No. 1
507	Clyde Crabb	W. M. Noelke No. 1
610	Sinclair Oil & Gas Co.	Bert Mayse No. 1
611	do	Sammie H. Suggs No. 1
612	British American Oil Producing Co.	Noelke No. 1
613	do	Noelke No. 1-S. W. D.

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
PK-43-49-614	Tom Bomar Well Service	R. A. Manning No. 1
903	Atlantic Refining Co.	Noelke No. 1
50-106	Edwards Petroleum Co.	Frank Lindley No. 1
411	L. E. Scherck & Phillips-Stringer	Leta A. Crawford No. 1
507	William Wolf	J. M. Nutt Estate No. 5
603	Curtis Inman	R. K. McMillan No. 1
702	Williams & Williams Drilling Co.	W. M. Noelke No. 1
58-311	Shell Oil Co., Inc.	Tankersley Estate No. 1
44-38-904	Kirby Petroleum Co.	Sawyer Cattle Co. No. 1
39-206	Furhman	Sugg Estate No. 1
40-203	Signal Oil & Gas Co.	Ela C. Sugg No. 1
801	do	Ela C. Sugg No. 2
47-305	Humble Oil & Refining Co.	W. A. Blakey No. 12
306	Sunray DX Oil Co.	Ela C. Sugg No. 1
702	Humble Oil & Refining Co.	W. A. Blakey No. 9
802	G. C. Bingham	Ela C. Sugg No. 1
805	do	Ela C. Sugg No. 1-C
806	Bobby M. Burns & D & D Drilling Co.	Ela C. Sugg No. 1
902	Frost & Fleming	Sinclair Becton No. 1
48-203	Russell Maguire	Ela C. Sugg No. 1-D
304	Benedum & Trees	A. A. Sugg
404	Rodman, Noel & Black	Sugg No. 1
504	Russell Maguire	Ela C. Sugg No. 1-C
505	do	Ela C. Sugg No. 1-A
705	Sinclair Oil & Gas Co.	Ela C. Sugg No. 1-33
801	Western Drilling Co.	Sugg No. 1-27
55-301	Sunray DX Oil Co.	Ela C. Sugg No. 1-A
306	McIntyre Oil Co.	Ela C. Sugg No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
PK-43-55-510	C. P. Simpson	Mrs. Elta Murphy No. 2
601	Sunray DX Oil Co.	Mrs. Elta Murphy No. 1
603	do	Mrs. Elta Murphy No. 1-A
812	Russell Maguire	Sol Mayer No. 1
813	Austral Oil Exploration Co.	Do.
56-102	Sinclair Oil & Gas Co.	J. R. Scott No. 11
303	Sunray DX Oil Co.	Becton No. 1
401	P. H. Williams	G. J. Ashe No. 1
505	Western Drilling & Murry Petroleum	Do.

KERR COUNTY

Table 8.–Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
RJ-56-43-801	Tucker Drilling Co.	M. B. Schreiner
51-502	Humble Oil & Refining Co.	W. R. Schreiner
62-301	S. W. Forester	Bailey
501	Edmunds Drilling Co.	J. W. Calvin
801	–	Mrs. H. C. Hanszen
804	British-American Oil Co.	Jasper-Moore No. 1
63-502	Edmunds Drilling Co.	W. F. Stelzer
504	do	G. Voss
607	J. R. Johnson	City of Kerrville No. 7
901	do	City of Kerrville No. 9
64-402	Edmunds Drilling Co.	D. Hainlen
403	do	City of Kerrville
701	do	City of Kerrville No. 11
68-01-103	Rowsey & Taylor Oil Co.	G. Walker
204	B. F. Lackey	C. R. Blank
406	L. Bergmann & Sons	R. O. Perkins
69-03-201	Continental Oil Co.	G. F. Schreiner
503	Woodward & Co.	W. Auld
04-601	Phillips Petroleum Co.	C. O. Whitworth
701	Mull Drilling Co.	A. Wilson, Jr.
06-301	E. Schmidt, et al.	H. Real
401	Tucker Drilling Co.	F. F. Fisher
07-902	W. E. Page	E. W. Brown, Jr.
08-101	Edmunds Drilling Co.	City of Kerrville-Airport
704	G. L. Rowsey	Eleanor Henderson Lewis, et al.
16-202	Ohio Oil Co.	J. H. Saul

KIMBLE COUNTY

Table 8.--Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
RK-55-24-207	Lauderdale & Straughan, et al.	Edith Murr No. 1
402	Tucker Drilling Co., Inc.	J. D. Cowsert No. 1-A
404	Sun Oil Co., et al.	-- Trimble No. 1
502	Texas Pacific Coal & Oil Co.	O. T. Murr No. 1
608	King Resources Co.	Johnson No. 1
701	Sunray DX Oil Co.	Ollie T. Murr No. 1
32-202	Aztec Oil Co.	J. S. Farmer No. 1
807	Ben J. Taylor	Grosenbacher No. 1
40-109	Atlantic Refining Co.	John R. Bailey No. 1
110	West Texas Oil & Royalty Corp. & Sojourner Drilling Co.	Mrs. W. Faulkner No. 1
502	Skelly Oil Co.	M. P. Reick No. 1
705	Delvatex Petroleum Corp.	Paterson No. 1
801	H. F. Wilcox	Meta R. Reick No. 1
901	Seneca Development Co.	Mary B. Patterson No. 1
48-301	O. N. Beer, Inc. & Toto Gas Co.	Hill No. 1
602	J. S. Michael	Mary B. Patterson No. 1
56-17-502	G. W. Strake	J. Y. Rust, et al. No. 1
504	Thomas Drilling Co.	A. D. Rust Ranch No. 1
601	Katz Oil Co.	C. B. Nasworthy No. 1
702	Tucker Drilling Co., Inc.	A. D. Rust No. 1
804	Thomas & Ludlaw	Russell No. 1
902	Guffey Drilling Co. & R. F. Schoolfield	Rust No. 1-F
18-402	Phillips Petroleum Co.	Spiller No. 1
605	Brazos-Menard Oil Syndicate & Thomas Ledlow	Mears No. 1
701	G. W. Strake	R. R. Spiller No. 1
19-401	R. H. Erwin	G. R. Kothman No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
RK-56-25-302	J. C. Ranfro & C. L. Richardson	Dan O. Morales No. 1
401	Hunt Oil Co.	Ruth Simon Bode No. 1
505	Casex	Mudge No. 4
909	do	Ethel Mary Mudge No. 2-A
26-111	Anzac Oil Corp.	H. H. Lawler No. 4
201	do	H. H. Lawler No. 1
202	Humble Oil & Refining Co.	Irma Lawler Woodward No. 1
301	Anzac Oil Corp., et al.	W. L. Pfluger, Jr., et al. No. 1
402	Auld, Scrwab, Carlisle	Weaver Baker No. 1
501	Anzac Oil Corp.	Lottie Bolt No. 3
502	Anzac Oil Corp., et al.	H. H. Lawler No. 2
701	Plateau Oil Co.	J. M. Anderson No. 1
27-313	Home Oil & Refining Co.	J. D. Fisher No. 1
705	Ben Banner	Frank Baker No. 1
801	Mudge Oil Co.	P. T. Hodges No. 1-Wilson
33-104	J. W. Hancock	E. H. Harrison No. 1
34-202	Anzac Oil Corp.	— Bolt No. 4
701	Barron Kidd	J. W. Johnson No. 1
703	Mobil Oil Co.	Burt Ranch No. 2
801	Barron Kidd	J. W. Johnson No. 5
804	Mobil Oil Co.	Burt Ranch No. 4
805	do	Burt Ranch No. 5
35-503	Enfield Services, Inc., et al.	John L. Phillips No. 1
803	Delvatex Petroleum Corp.	Beasley No. 1
37-702	Forest Development Corp.	Dillard Stapp
41-403	Cities Service Oil Co.	S. B. Nelson No. 1-B
503	Tucker Drilling Co., Inc.	Coke Stevenson No. 2

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
RK-56-41-504	Tucker Drilling Co., Inc., et al.	Coke Stevenson No. 3
601	Cecil Haden	Stevenson No. 1
46-402	O. W. Killam	A. L. Gibson No. 1

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Kea, Edwards and associated limestones.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps unless otherwise designated by footnotes.
Water levels : Measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; S, submersible; E, electric; W, wind; N, none.
Use of water : D, domestic; S, livestock; N none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* RP-70-27-301	Floyd Hodges	--	--	496	6	4	Kea	1,505	300.5	Feb. 10, 1971	C, W	D, S	Well A-1. 1/
901	Billie C. Lewis	--	--	270	6	--	Kea	1,278	206.3 162.1	Feb. 25, 1939 Feb. 10, 1971	C, W	S	Well A-4. 1/
* 28-401	Mrs. H. B. Horn	--	--	--	6	--	Kea	1,297	99 92.7	Feb. 21, 1939 Feb. 10, 1971	S, E	D, S	Well A-3. 1/
* 501	R. M. Hamilton and Company	Roger Thurmond	--	298	6	--	Kea	1,500	169.7	do	C, W	D, S	Well B-1. 1/
* 29-301	Gene Milam	--	--	347	5	--	Kea	1,830	301.1	Feb. 12, 1971	C, W	S	Well D-1. 1/
* 30-401	Bill Palmer	--	--	126	--	--	Kea	1,568	--	--	S, E	D, S	Well D-3. 1/
402	do	--	1969	160	5	60	Kea	1,568	124.8	Feb. 11, 1971	N	N	--
* 901	L. L. Davis	--	1970	160	6	--	Kea	1,400	--	--	S, E	D, S	--
902	do	--	1923	50	6	--	Kea	1,400	33.5 32.74	Mar. 27, 1939 Feb. 12, 1971	S, E	N	Unused domestic and livestock well. Well E-5. 1/
* 36-101	L. B. Wardlaw, Jr. Trust	Clyde Earwood	1938	352	8	--	Kea	1,286	102.4 103.7	Apr. 23, 1938 Feb. 10, 1971	C, W	S	Well G-4. 1/
* 37-201	Clay Hunt	--	--	--	5	--	Kea	1,363	112.55 139.14 142.29 140.97	Apr. 13, 1938 Apr. 21, 1948 Mar. 13, 1957 Feb. 11, 1971	C, W	S	Well I-3. 1/
* 501	James T. Shahan	--	--	162	6	--	Kea	1,256	62.91 68.55 71.41 111.3	Apr. 13, 1938 Apr. 21, 1948 Mar. 13, 1957 Feb. 11, 1971	C, W	D, S	Well I-9. 1/
38-401	do	--	1940	296	--	--	Kea	1,344	121.9 125.4	Jan. 22, 1941 Feb. 11, 1971	C, W	D, S	Well J-5. 1/
* 601	Tulley Pratt	--	1913	339	6	--	Kea	1,398	190.65 200.49 222.95 209.6	Jan. 27, 1940 Aug. 9, 1950 Mar. 15, 1952 Feb. 12, 1971	C, W	S	Well K-4. 1/
* 39-601	J. B. Herndon	--	--	197	6	--	Kea	1,300	157.4	do	C, W	D, S	--

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

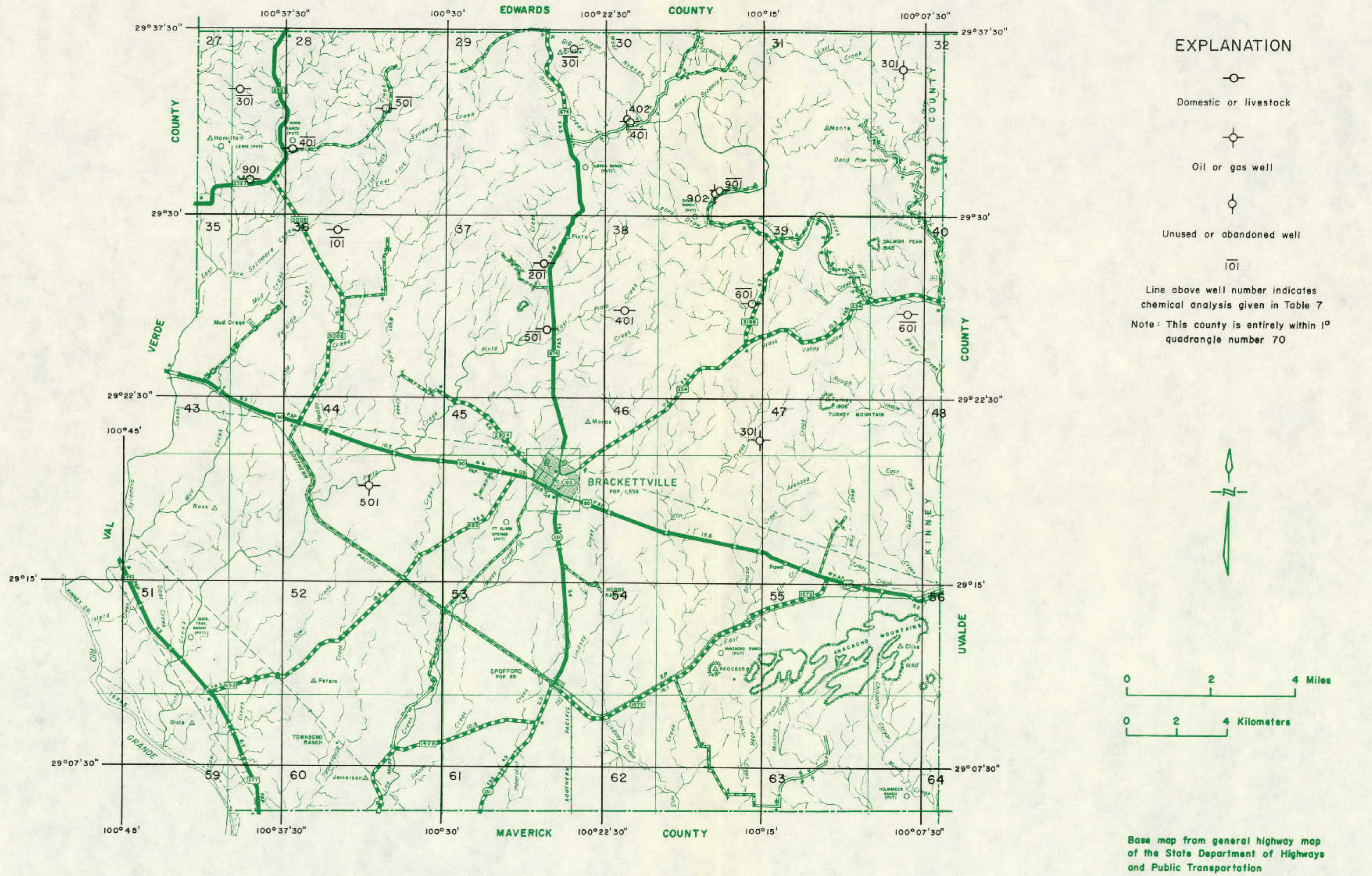
Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
						Edwards and associated limestones												
RP-70-27-301	Floyd Hodges	496	Feb. 10, 1971	18	66	9	29	205	16	51	0.8	5	296	200	24.3	504	7.7	0.9
28-401	Mrs. H. B. Horn	--	do	12	73	7	7	229	9	13	.2	5.4	239	211	6.4	401	7.6	.2
501	R. M. Hamilton and Company	298	do	15	64	9	7	220	10	13	.5	3.0	230	198	7.5	380	7.6	.2
1/ 29-301	Gene Milam	347	Feb. 11, 1939	--	--	--	--	--	3	9.0	--	--	--	--	--	--	--	--
1/ 30-401	Bill Palmer	126	Feb. 25, 1939	--	--	--	29	364	4	10	--	29	--	278	--	--	--	--
			Feb. 11, 1971	14	110	5	4	322	5	10	< .1	20	326	293	3.1	535	7.3	.1
901	L. L. Davis	160	Feb. 12, 1971	13	84	5	5	255	9	9	.6	5.5	257	230	4.4	428	7.4	.1
1/ 36-101	L. B. Wardlaw, Jr. Trust	352	Apr. 23, 1938	--	--	--	--	--	12	8.0	--	11	--	--	--	--	--	--
1/ 37-201	Clay Hunt	--	Apr. 13, 1938	--	86	2.2	11	254	11	13	0	11	259	224	--	--	--	.3
501	James T. Shahan	162	do	--	105	3.8	3.0	294	8	12	.1	22	299	278	--	--	--	.1
			Feb. 11, 1971	13	87	2	6	256	5	10	.1	7.0	256	227	5.0	426	7.9	.2
38-601	Tulley Pratt	339	June 13, 1938	--	94	6.9	49	220	34	104	.3	8.1	405	263	--	--	--	1.3
39-601	J. B. Herndon	197	Feb. 12, 1971	13	79	3	6	231	6	10	< .1	11	242	209	5.4	400	7.4	.2

1/ Texas Water Commission Bulletin 6216, ''Geology and Ground-Water Resources of Kinney County, Texas.''

KINNEY COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
RP-70-31-301	Jack Frost	Silver Lakes Ranch, Inc. No. 1
44-501	L. M. Josey	J. F. Beidler No. 1
46-301	Southern Drilling Co.	Harrison No. 1



Location of Selected Water, Oil, and Gas Wells in Kinney County

MC CULLOCH COUNTY

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks column.
Water-bearing unit : Kt, Trinity Group; P, Permian rocks undifferentiated; Penn, Pennsylvanian rocks undifferentiated.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and by Pauline altimeter.
Water level : Measured water levels are given to nearest tenth of a foot.
Method of lift and type of power: C, cylinder; E, electric; S, submersible; W, windmill, N, none.
Use of water : D, domestic; S, livestock; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
SS-42-44-701	D. G. Bishop, Sr.	B. J. and D. G. Bishop, Jr.	1929	--	36	--	P	1,736	22.25	Mar. 24, 1969	N	N	--
* 47-701	O. J. Scoggins	Carl Donald Scoggins	1960	120	--	--	Kt, Penn	1,810	61.3	Nov. 12, 1969	S, E	D, S	--
1/ 62-801	T. Gray	--	--	20	--	--	Penn	1,707	.84	Nov. 14, 1969	C, W	S	Well L-59. 1/

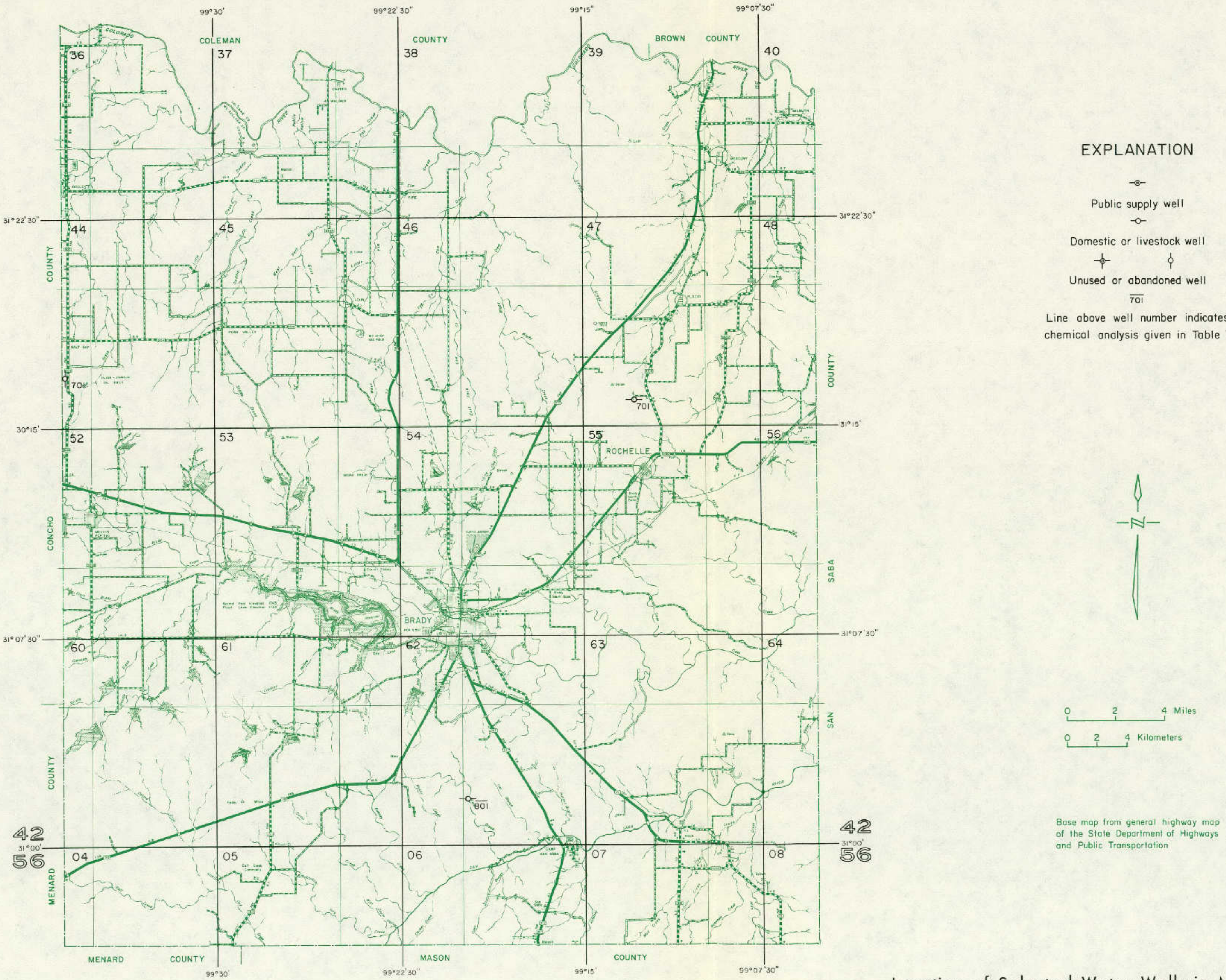
* Chemical analysis of water given in Table 7.
1/ Texas Board of Water Engineers Bulletin 6017, "Ground-Water Geology of the Hickory Sandstone Member of the Riley Formation, McCulloch County, Texas."

MC CULLOCH COUNTY

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
								Permian rocks undifferentiated										
SS-42-47-701	O. J. Scoggins	120	Nov. 12, 1969	11	112	70	40	343	123	175	1.1	2.0	700	570	13.1	1,193	7.4	0.7



Location of Selected Water Wells in McCulloch County

MARTIN COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

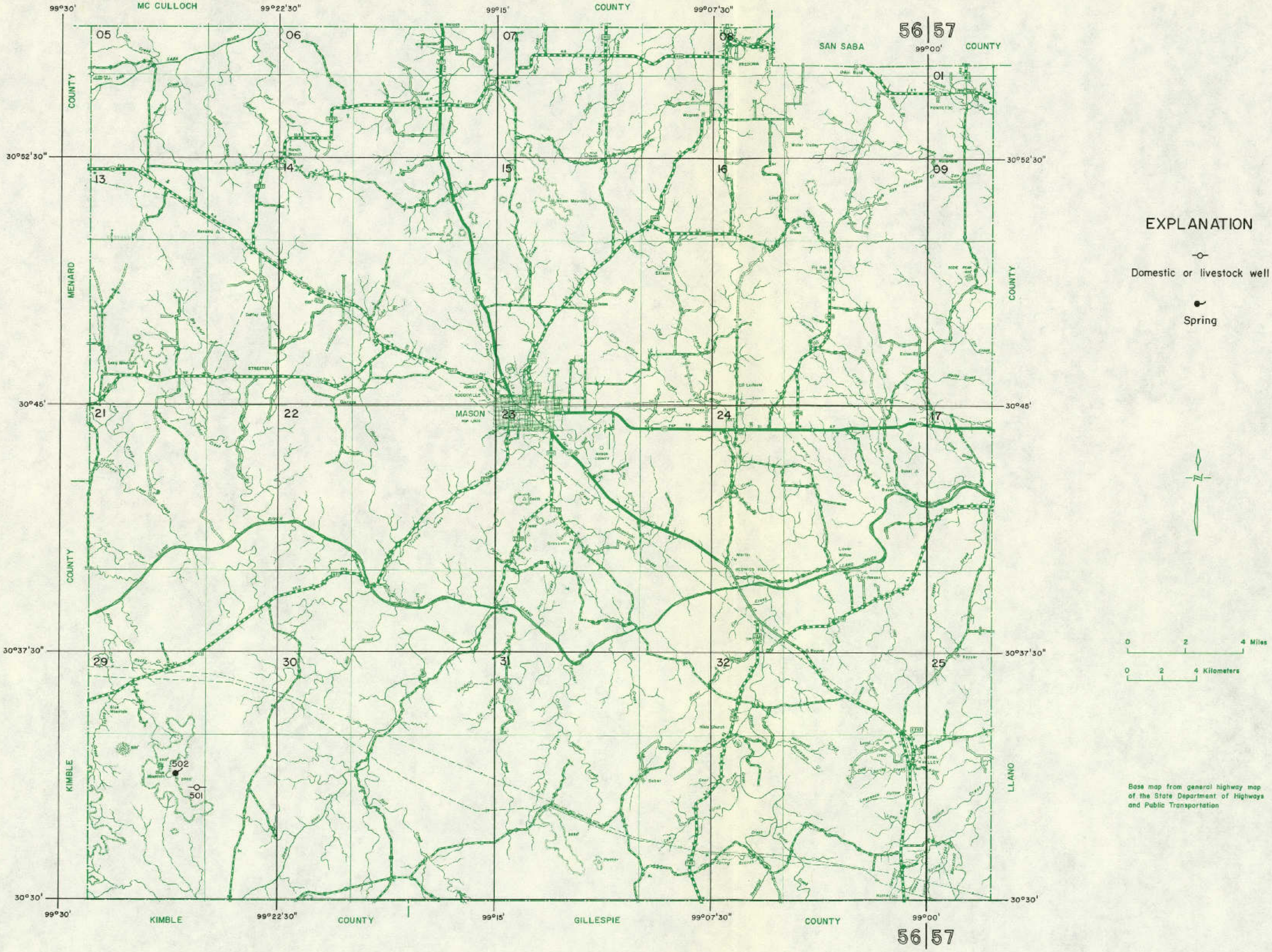
Well	Operator	Lease and well
SY-27-55-801	Pan American Petroleum Corp.	Cowden No. 2
56-701	Gulf Oil Corp.	G. W. Glass No. 1-E-B
901	Ashland Oil & Refining Co.	Tant Lindslay No. 1
63-201	Pan American Petroleum Corp.	Gladis Holt Cowden No. 1
64-101	Blackwood & Nichols	Stimson No. 1
28-49-801	Tide Water Assoc. Oil Co.	Dickenson No. 1
51-701	Pan American Petroleum Corp.	F. E. Mulkey No. 1
58-101	Union Sulphur & Oil Corp.	Snyder & Arnett No. 1
59-101	Central Drilling Co.	Central Drilling Co. No. 1

MASON COUNTY

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Kea, Edwards and associated limestones; Kt, Trinity Group.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps.
Water levels : Measured water levels are given to nearest tenth of a foot.
Method of lift and type of power: C, cylinder; W, wind.
Use of water : S, livestock.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
SZ-56-29-501	Charles Jeffers	Mason Crocker	--	--	--	--	Kt	1,847	195.3	Nov. 13, 1969	C, W	S	--
502	do	do	--	Spring	--	--	Kea	1,945	--	--	--	--	Known as ''Walnut Springs''.



Location of Selected Water Well and Spring in Mason County

MENARD COUNTY

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Qal, Alluvium; Kea, Edwards and associated limestones; Kt, Trinity Group; P, Permian rocks undifferentiated.
Water levels : Reported water levels are given to nearest foot, measured water levels are given to nearest tenth of a foot.
Method of lift and type of power: C, cylinder; S, submersible; T, turbine; G, gas, butane, or gasoline; E, electric; Cf, centrifugal; W, wind; J, jet; N, none.
Use of water : S, livestock; D, domestic; Irr, irrigation; P, public supply; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* TH-42-57-402	Mrs. Victoria Davis	--	--	260	--	--	Kea	2,286	200.0 202.0	Nov. 14, 1961 Nov. 4, 1969	C, W	S	1/
* 802	Walter Menzies	--	1950	290	--	--	Kea	--	--	--	C, W	S	--
* 803	Alex Menzies	--	--	208	--	--	Kea	--	--	--	C, W	S	--
* 804	Mrs. John Lackey, et al.	Walter Menzies	--	--	--	--	Kea	--	--	--	C, W	D, S	--
* 901	George Kothman	--	1948	220	--	--	Kea	2,216	178.6 183.5	Nov. 15, 1961 Oct. 31, 1969	C, W	D, S	1/
* 904	do	--	--	230	--	--	Kea	--	215 186.3	Oct. 15, 1961 Nov. 4, 1969	N	N	--
* 58-801	Mrs. Ada Smith Estate	--	1948	200	--	170	Kea	--	65	1948	C, W	S	--
* 901	Gene Whitehead	--	1903	160	6	--	Kea	2,200	121.1 178.8	Feb. 6, 1963 Oct. 31, 1969	C, W	D, S	1/
* 59-505	Raymond Andrews	--	--	--	6	--	Kea	2,018	27.33 40.6	Mar. 7, 1963 Nov. 5, 1969	C, W	S	1/
* 704	do	--	1939	140	6	--	Kea	2,086	117.72 121.6	Mar. 7, 1963 Nov. 6, 1969	C, W	S	1/
* 804	J. A. Leggett Estate	--	1938	144	6	--	Kea	--	102	Mar. 8, 1963	S, E	D, S	1/
* 43-64-408	Elsie S. Allen	J. A. Sorrell	1940	260	4	--	Kea	--	211.9	Jan. 8, 1962	C, W	S	1/
* 502	Mary L. Haley	--	1915	275	4	--	Kea	2,326	205.8 205.1	Nov. 7, 1961 Nov. 13, 1969	C, E	D, S	1/
* 605	Ed H. Speck	--	--	--	--	--	Kea	2,305	186.9 229.1	Nov. 13, 1961 Nov. 14, 1969	C, W, E	D, S	1/
* 801	U. E. Rogers	--	1947	328	6	--	Kea	2,360	264.7 265.4	Oct. 18, 1961 Oct. 16, 1969	C, W	D, S	1/
* 802	do	--	1935	--	6	--	Kea	2,299	215.5 215.9	Oct. 18, 1961 Oct. 16, 1969	C, W	S	1/
* 803	do	--	--	200	6	--	Kea	--	174.0	do	S, E	S	--
* 804	Mary E. Rogers	--	1935	--	6	--	Kea	--	170.7	do	C, W	S	--
* 805	Mrs. Sam Holliday	--	1950	240	--	--	Kea	2,231	214.5 218.2	Oct. 17, 1961 Nov. 4, 1969	C, W	S	1/
* 905	Mrs. A. W. Brisbin	--	1946	220	--	--	Kea	2,253	202.3 204.1	Nov. 9, 1961 Nov. 6, 1969	C, W	S	1/
* 908	Mrs. Henry Harrison	--	1935	275	--	--	Kea	--	--	--	C, W	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* TH-43-64-910	James Harper	--	1904	160	--	--	Kea	--	--	--	C, W	D, S	--
* 55-08-101	Mrs. Ray Holland	--	1941	--	--	--	Kea	2,313	214.9 220.2	Oct. 18, 1961 Nov. 5, 1969	C, W	S	1/
* 102	Mrs. Annie Leveridge	M. H. Callan	1900	165	6	--	Kea	--	--	--	S, E	S	--
* 104	Mrs. Ray Holland	--	--	180	--	--	Kea	2,231	136.9 142.1	Oct. 19, 1961 Nov. 5, 1969	C, W	D, S	1/
* 105	Mrs. L. E. Callan	--	1947	180	--	--	Kea	--	144.0 144.0	Oct. 19, 1961 Nov. 5, 1969	C, W	D, S	1/
* 201	M. H. Callan	--	1940	265	5	--	Kea	2,303	209.6	Oct. 18, 1961	C, W	D, S	1/
* 202	do	--	1946	200	6	--	Kea	2,231	143.0 146.2	do Nov. 5, 1969	C, W	S	1/
* 203	Edith Runge, et al.	--	--	240	--	--	Kea	--	224.3 227.0	Nov. 9, 1961 Nov. 6, 1969	C, W	S	1/
* 302	Jack Wilkinson	--	1943	240	--	--	Kea	2,195	125.0 206.2	Nov. 8, 1961 Nov. 5, 1969	C, W	S	1/
* 303	do	--	1917	206	4	--	Kea	2,231	200.0 199.0	Nov. 8, 1961 Nov. 5, 1969	C, W	S	1/
* 304	Anita Runge Moore	Richard S. Runge	1905	272	8	--	Kea	2,250	204.3 202.5	Nov. 8, 1961 Oct. 15, 1969	C, W	D, S	1/
* 401	J. M. Treadwell	--	1946	175	--	--	Kea	2,329	115.3	July 7, 1965	C, W	D, S	--
* 403	do	--	1959	135	--	--	Kea	--	88.5	Oct. 6, 1961	S, E	Irr	Reported yield, 150 to 200 gpm. 1/
* 406	J. H. Treadwell	--	--	--	--	--	Kea	--	107.9 110.5	Oct. 17, 1961 July 7, 1965	C, W	S	1/
* 407	do	--	1960	157	5-1/2	142	Kea	--	120	1960	S, E	D, S	1/
* 410	Boy Scouts of America	Mrs. Jim Phillips	1942	--	--	--	Kea	2,171	76.7 77.6	Oct. 19, 1961 Oct. 22, 1969	C, W	S	1/
411	Fred McInnis	--	--	--	--	--	Kea	--	104.8	July 7, 1965	C, W	S	--
* 601	Mrs. Joe Russell	--	1942	55	18	--	Kea	2,102	35.6 36.3	Oct. 19, 1961 Oct. 24, 1969	C, W	S	1/
* 604	Fritz Luckenbach	Dan Kothman	--	--	6	--	Kea	2,187	130.2 127.1	Oct. 25, 1961 Nov. 5, 1969	C, W	S	1/
702	J. H. Treadwell	--	1963	--	6-1/2	30	Kea	--	--	--	S, E	S	--
* 801	Mrs. Joe Russell	--	1909	90	8	--	Kea	2,149	74.2 78.0	Oct. 19, 1961 Oct. 22, 1969	C, C	S	1/
* 804	Boy Scouts of America	--	1945	202	--	--	Kea	2,262	169.0 164.6	Oct. 25, 1961 Nov. 5, 1969	C, W	S	1/
* 903	Fritz Luckenbach	--	--	--	--	--	Kea	2,130	70.4 73.3	Oct. 25, 1961 Oct. 22, 1969	C, W	S	1/
* 16-101	W. W. Sheen	--	--	140	--	--	Kea	--	68.75 68.12 68.09 70.2	Apr. 15, 1958 Dec. 9, 1959 Dec. 6, 1965 Oct. 22, 1969	C, W	S	Observation well. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diam-eter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* TH-55-16-103	George Lehne	--	1949	75	8	75	Qal	2,103	22.3 37.9	Oct. 5, 1963 Oct. 22, 1969	C, W	S	Casing perforated from 55 to 75 feet. 1/
* 201	Bill Morriss	Tom Morris	--	220	--	--	Kea	2,107	90.3 22.4	Oct. 26, 1961 Nov. 5, 1969	C, W	S	Water unfit for human consumption. 1/
* 204	H. H. Mears	--	1948	135	--	--	Kea	2,147	112.0 112.0	Oct. 20, 1961 Oct. 16, 1969	C, W	S	1/
* 205	Robert C. Flutsch	--	1953	60	10	40	Qal	--	38.9 38.5	July 27, 1960 Oct. 22, 1969	T, E	Irr	1/
* 303	Olivia McCutchen	--	--	--	--	--	Kea	--	--	--	C, E	D, S	--
* 903	Joyce McNamara	--	1963	380	6	20	Kea	--	100	Oct. 12, 1962	C, W	S	--
* 24-101	George Lehne	--	1959	180	--	--	Kea	2,241	119.5	July 15, 1965	C, W	S	--
* 201	Henry Mott	--	--	280	--	--	Kea	2,346	247.0 222.4	May 8, 1963 Nov. 13, 1969	C, W	D, S	1/
* 301	Billie C. Gosney	Damon Evans	--	--	--	--	Kea	--	--	--	C, W	N	Unused livestock well.
* 56-01-101	Mrs. Maxine Palmer	Ed L. Mears	1937	200	--	--	Kea	2,092	71.7 72.2	Nov. 8, 1961 Oct. 17, 1969	C, W	S	1/
* 104	W. J. Wilkinson Estate	C. Crisp	1944	200	--	--	Kea	2,200	163.7 151.9	Apr. 5, 1962 Oct. 17, 1969	C, W	S	1/
* 202	do	--	1951	--	--	--	Kea	2,209	--	--	C, W	D, S	--
* 301	R. G. Wilkinson	--	1900	150	6	--	Kea	1,900	--	--	C, W	D, S	--
* 303	Jack Wilkinson	--	1950	125	--	--	Kea	--	82.3 85.5	Oct. 27, 1961 Nov. 4, 1969	C, W	D, S	1/
* 501	Mrs. F. T. Neal	--	--	--	--	--	Kea	2,101	97.7 98.0	Oct. 27, 1961 Oct. 17, 1969	C, W	S	1/
502	W. J. Wilkinson Estate	G. Crisp	--	--	--	--	Kea	--	--	--	T, G	Irr	Reported yield, 600 gpm in 1961.
* 503	do	--	1945	85	4	--	Kea	2,067	64.5 64.4	Nov. 8, 1961 Oct. 17, 1969	C, W	S	1/
* 701	Sam Allison	--	1951	44	6 4	-- --	Kea	2,039	31.8 31.8	Oct. 24, 1961 Oct. 22, 1969	S, E	D, S	1/
* 803	Frank Wilkinson, et al.	Loonie Pollard	1952	50	--	--	Kea	--	21.7	Oct. 31, 1969	S, E	Irr	--
* 805	Carl J. Miller	--	1955	30	--	--	Kea	--	14.0 13.0	Oct. 10, 1962 Oct. 29, 1969	Ct, E	D, S	
* 810	Barley Bradford	--	1945	260	6	--	P	--	--	--	N	N	Well flows saline water.
* 02-101	Grandstaff Ranch	Frank Gainer	1910	40	6	--	Kea	--	--	--	C, W, E	D, S	--
* 601	City of Menard	--	1950	22	--	--	Qal	1,880	10.8 13.3	Apr. 27, 1960 Oct. 28, 1969	Cf, E	P	Dug well. Screened 14 to 22 feet. Reported yield, 400 gpm in 1952; 500 gpm in 1960. 1/
602	do	--	1950	25	--	--	Qal	1,880	9.2 12.3	Apr. 27, 1960 Oct. 28, 1969	N	N	Dug well. Steel casing slotted from 14 to 22 feet. Reported yield, 500 gpm. Unused public-supply well. 1/
603	do	--	1954	20	--	--	Qal	1,880	12.7	do	Cf, E	N	Dug well. Reported yield, 350 gpm. Unused public-supply well.

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TR-56-02-604	City of Menard	--	1950	22	--	--	Qal	1,880	9.3	Oct. 28, 1969	Cf, E	P	Dug well.
* 606	Ernestine Williams	--	1952	--	--	--	Qal	--	22.0	do	S, E	D, S	Do.
* 801	J. H. Cannon	--	--	--	--	--	Qal	--	18	Oct. 31, 1969	S, E	D, S	Do.
* 901	Steve Martin	--	1936	--	--	--	Qal	--	13.8 19.3	Sept. 18, 1962 Oct. 23, 1969	C, W	D	1/
* 902	W. G. Craig	--	--	--	--	--	Qal	--	15.3 17.2	Sept. 18, 1962 Oct. 28, 1969	Cf, E	D	Dug well. 1/
* 909	L. D. Wilkerson	--	1949	13	--	--	Qal	--	--	--	S, E	D	Dug well.
* 918	A. T. Murchison	--	1938	100	6	--	Kea	--	70	Mar. 9, 1963	C, W	S	1/
* 03-301	Mary Heiman, et al.	--	1947	110	--	--	Kea	2,039	88.9 88.1	June 14, 1961 Oct. 28, 1969	C, W	D, S	1/
* 302	do	--	--	--	--	--	Kea	--	60.9 58.9	June 14, 1961 Oct. 28, 1969	T, E	Irr	Reported to irrigate about 2 or 3 acres. 1/
* 601	Damon Kothman	--	1943	--	--	--	Kea	--	41.9 38.2	Oct. 2, 1961 Nov. 5, 1969	C, W	S	1/
* 805	R. R. Ellis	--	1952	24	--	--	Qal	--	11.4 16.3	Oct. 3, 1962 Oct. 28, 1969	Cf, G	Irr	Reported yield, 500 gpm. 1/
* 809	Damon Kothman	--	1967	80	8 6	18 80	Kt	--	--	--	N	N	Well flows saline water. Estimated yield, 5 gpm.
* 902	C. W. Kothman	--	1897	40	--	--	Kt	1,804	30.5 24.5	Oct. 3, 1962 Oct. 28, 1969	C, W, E	N	Emergency domestic and livestock well. 1/
* 09-101	Sam Allison	--	--	--	--	--	Kea	--	--	--	C, W	D, S	--
* 405	Olivia McCutchen	--	--	--	--	--	Kea	--	--	--	C, W	S	--
* 505	Mrs. J. M. Powell	--	--	--	--	--	Kea	2,169	178.5 173.2	Nov. 1, 1962 Nov. 12, 1969	C, W	S	1/
* 904	Mrs. D. F. Smith	--	--	--	--	--	Kea	--	--	--	C, W	D, S	--
* 10-205	Carl Martin, Sr.	--	--	110	6	6	Kea	--	78	Apr. 19, 1963	C, W	D, S	1/
* 801	A. A. Williamson	--	--	210	--	--	Kea	2,145	126.4	Oct. 29, 1969	C, W	D, S	--
* 901	R. Q. Landers	--	1938	260	6	--	Kea	2,175	158.3 161.3	June 9, 1961 Oct. 20, 1969	J, E	D	1/
* 11-112	Seth D. Kothman	--	1950	100	6	6	Kea	2,036	71.0 87.7	Apr. 20, 1963 Oct. 29, 1969	C, W	S	1/
* 702	Carl Ruff	--	1900	200	--	--	Kea	--	110	Oct. 20, 1969	S, E	D, S	--
* 901	F. W. Kidd	--	1940	186	--	--	Kea	--	160	Apr. 19, 1963	C, W, E	D, S	1/
* 12-205	Mrs. Victoria Davis	--	1948	30	6	--	Kt	1,828	19.0 10.5	Apr. 25, 1963 Oct. 29, 1969	C, W	S	1/
* 503	J. E. Rudder	--	1950	310	6	--	Kea	--	180	Oct. 22, 1969	C, W	D, S	--

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner		Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water Level: Below land-surface datum (ft)	Water Level: Date of measurement	Method of lift	Use of water	Remarks
* TH-56-12-506	John Speck	--	--	85	6	10	Kea	--	50	Apr. 25, 1963	C, W	D, S	1/
* 803	J. E. Rudder	--	1941	200	6	--	Kt	1,823	41.9 114.9	Apr. 22, 1963 Oct. 20, 1969	C, W	D, S	1/
* 17-101	Mrs. Lawrence Williamson	--	--	--	--	--	Kea	--	--	--	C, W	S	--
* 18-304	Agnes C. Walston	--	1930	210	6	--	Kea	--	--	--	C, W	S	--
* 20-201	C. L. Brown	--	1952	96	6	--	Kt	1,950	45 70.2	Apr. 22, 1963 Oct. 20, 1963	C, W	D, S	Steel casing slotted from 70 to 96 feet. 1/
* 208	H. D. Hubbard	--	1961	72	7-5/8	--	Kt	1,791	56.5 49.4	Apr. 22, 1963 Oct. 20, 1969	J, E	S	1/

* Chemical analysis of water given in Table 7.
1/ Texas Water Commission Bulletin 6519, "Ground-Water Conditions in Menard County, Texas."

MENARD COUNTY

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
Permian rocks undifferentiated																		
1/ TH-56-01-810	Barley Bradford	260	Oct. 18, 1961	8.5	1,510	1,040	14,900	193	3,920	25,600	--	--	47,100	8,040	--	> 54,400	6.7	72
			Nov. 7, 1969	--	1,590	1,100	14,400	237	3,860	25,200	1.8	< 0.4	46,300	8,500	78.7	12,000	7.5	68.1
Trinity Group																		
03-809	Damon Kothman	80	Nov. 6, 1969	10	314	148	3,140	281	64	5,800	1.3	< .4	9,600	1,390	83.1	> 12,000	7.2	36.6
1/ 902	C. W. Kothman	40	Oct. 3, 1962	23	77	68	80	458	76	108	.8	57	714	471	--	1,160	7.3	--
1/ 12-205	Mrs. Victoria Davis	30	Apr. 25, 1963	56	276	91	440	278	500	700	3.3	231	2,300	1,060	--	3,750	7.6	5.9
			Oct. 29, 1969	56	289	78	421	401	478	560	3.6	348.5	2,430	1,050	46.6	3,390	7.1	4.7
1/ 803	J. E. Rudder	200	Apr. 23, 1963	22	50	88	64	440	122	98	.9	< .4	666	485	--	1,120	8.2	--
1/ 20-201	C. L. Brown	96	Apr. 22, 1963	22	84	72	58	461	139	84	.9	< .4	686	500	--	1,130	7.8	--
			Oct. 20, 1969	15	96	76	55	465	160	84	.9	< .4	720	550	17.9	1,150	7.3	1.0
1/ 208	H. D. Hubbard	72	Apr. 22, 1963	26	456	94	333	366	600	900	.7	41	2,640	1,530	--	4,050	7.2	--
			Oct. 20, 1969	24	317	51	227	409	384	520	.8	35.5	1,760	1,005	32.9	2,650	7.2	3.0
Edwards and associated limestones																		
1/ 42-57-402	Mrs. Victoria Davis	260	Nov. 14, 1961	15	50	29	29	268	19	44	--	5.4	323	244	20	570	7.2	.8
			Nov. 4, 1969	16	50	28	21	256	17	33	.4	5.0	296	239	16.1	512	7.7	.6
1/ 802	Walter Menzies	290	Nov. 15, 1961	16	51	28	20	278	13	28	--	5.6	299	242	15	519	7.1	.6
			Nov. 6, 1969	13	54	28	20	301	4	27	.4	< .4	294	248	14.8	517	7.4	.5
1/ 803	Alex Menzies	208	Nov. 15, 1961	15	55	28	19	280	12	34	--	4.2	305	252	14	540	7.3	.5
			Nov. 6, 1969	13	50	27	21	256	12	36	.4	3.5	289	236	16.3	510	7.7	.6
1/ 804	Mrs. John Lackey, et al.	--	Nov. 15, 1961	15	44	27	15	246	12	26	--	4.2	264	221	13	477	7.1	.4
			Nov. 6, 1969	16	42	28	16	239	15	24	.5	5.5	266	221	13.3	458	7.8	.5
1/ 901	George Kothman	220	Nov. 15, 1961	13	62	30	13	336	6.4	16	--	2.2	308	278	9	537	7.2	.3
			Oct. 31, 1969	12	66	32	8	338	7	13	.2	3.0	307	294	5.8	531	7.5	.2
904	do	230	Nov. 4, 1969	11	63	24	7	299	7	9	.3	< .4	268	258	5.3	456	8.3	.2
1/ 58-601	Mrs. Ada Smith Estate	200	Feb. 7, 1963	16	57	28	14	298	11	23	.1	5.3	301	258	--	538	7.5	--
			Oct. 22, 1969	15	54	27	14	282	11	20	.3	3.5	284	246	10.7	488	7.5	.4
1/ 901	Gene Whitehead	160	Feb. 6, 1963	11	37	38	20	272	16	32	.4	2.0	296	250	--	530	8.5	--
			Oct. 31, 1969	12	54	31	14	295	12	21	.5	4.5	295	264	10.2	517	7.7	.4
1/ 59-505	Raymond Andrews	--	Mar. 7, 1963	16	75	44	77	355	41	126	.4	4.2	596	368	--	1,060	7.4	--
			Nov. 6, 1969	16	66	38	81	288	45	142	.5	4.5	540	322	35.2	935	7.5	1.9
1/ 704	do	140	Mar. 7, 1963	16	57	30	30	294	19	49	.2	5.5	352	267	--	630	7.0	.8
1/ 804	J. A. Loggete	144	Mar. 8, 1963	19	53	32	55	290	26	71	.6	24	424	263	--	765	7.6	--
			Nov. 6, 1969	16	61	32	42	304	23	66	.4	5.5	395	285	24.1	682	7.6	1.1

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
					Edwards and associated limestones--continued													
1/ TH-43-64-408	Elsie S. Allen	260	Jan. 8, 1962	12	50	32	11	295	6.2	22	0.4	0.0	279	256	9	494	7.6	0.3
			Nov. 13, 1969	11	49	22	12	242	12	15	.3	7.0	247	216	10.7	429	7.6	.3
1/ 502	Mary L. Haley	275	Nov. 7, 1961	15	52	28	19	274	11	30	.4	8.9	299	244	15	513	6.9	.5
			Nov. 13, 1969	11	51	29	25	268	15	40	.3	5.0	308	247	17.8	545	7.6	.7
1/ 605	Ed H. Speck	--	Nov. 13, 1961	13	54	22	11	252	9.4	20	--	6.3	260	225	10	460	6.9	.3
1/ 801	U. E. Rogers	328	Oct. 18, 1961	15	46	29	25	260	16	42	--	.5	302	234	19	534	7.0	.7
			Oct. 16, 1969	15	48	29	21	257	16	36	.5	6.5	299	240	16.1	516	7.6	.6
1/ 802	do	--	Oct. 18, 1961	14	45	29	25	261	17	38	--	.0	296	232	19	517	7.1	.7
1/ 803	do	200	Oct. 17, 1961	15	54	25	20	284	12	25	--	.0	291	238	15	501	6.9	.6
			Oct. 16, 1969	15	54	24	14	262	12	22	.3	5.0	275	235	11.6	479	7.5	.4
1/ 804	Mary B. Rogers	--	Oct. 17, 1961	12	75	25	12	337	5.6	24	--	.0	320	290	8	564	6.9	.3
1/ 805	Mrs. Sam Holliday	240	Oct. 17, 1961	15	43	28	12	263	8.2	15	--	3.8	254	222	10	436	7.1	.4
			Nov. 7, 1969	13	44	29	9	262	11	13	.3	< .4	248	228	7.6	438	7.5	.3
1/ 905	Mrs. A. W. Brisbin	220	Nov. 9, 1961	11	52	34	11	326	6.0	13	.4	.0	287	270	8	511	7.1	.3
			Nov. 7, 1969	12	43	28	7	254	8	8	.3	6.5	238	223	6.5	412	7.7	.2
1/ 908	Mrs. Henry Harrison	275	Nov. 1961	12	48	31	9.9	285	6.0	20	.6	.2	268	248	8	489	6.8	.3
			Nov. 4, 1969	13	44	29	10	255	11	15	.5	7.0	255	230	8.5	444	7.7	.3
1/ 910	James Harper	160	Nov. 10, 1961	20	70	36	52	318	38	86	.5	14	472	322	26	803	7.0	1.3
			Nov. 4, 1969	19	70	35	49	295	44	85	.5	17.0	465	321	25.0	783	7.8	1.2
1/ 55-08-101	Mrs. Ray Holland	--	Oct. 18, 1961	12	65	33	15	361	.6	24	--	.0	328	298	10	580	6.9	.4
			Nov. 5, 1969	13	64	33	35	312	10	66	.3	3.0	377	293	20.7	674	7.5	.9
1/ 102	Mrs. Annie Leveridge	165	Oct. 18, 1961	17	54	32	18	270	24	37	--	7.7	323	266	13	556	7.0	.5
			Nov. 5, 1969	15	58	31	18	285	22	34	.5	3.5	323	271	12.7	565	7.3	.5
1/ 104	Mrs. Ray Holland	180	Oct. 19, 1961	13	71	20	12	299	8.4	19	--	6.0	296	259	9	510	6.8	.3
			Nov. 5, 1969	13	72	19	11	293	10	17	.3	7.9	293	261	8.4	507	7.6	.3
1/ 105	Mrs. L. E. Callan	180	Oct. 19, 1961	14	76	20	11	305	9.2	22	--	6.0	308	272	8	525	7.0	.3
			Nov. 5, 1969	12	77	18	12	299	11	20	.2	7.0	304	268	9.2	521	7.6	.3
1/ 201	M. H. Callan	265	Oct. 18, 1961	15	48	30	15	262	22	24	--	5.5	288	244	12	494	7.0	.4
			Nov. 5, 1969	12	52	29	12	268	21	19	.5	4.5	283	249	9.1	437	7.7	.3
1/ 202	do	200	Oct. 18, 1961	15	46	29	13	259	20	18	--	5.1	273	234	11	468	7.0	.4
			Nov. 5, 1969	--	89	47	13	462	7	8	.6	4.4	396	418	6.5	942	6.2	.3
1/ 203	Edith Runge, et al.	240	Nov. 9, 1961	10	62	34	18	371	.4	20	.5	.0	327	294	12	578	7.0	.5
1/ 302	Jack Wilkinson	240	Nov. 8, 1961	13	57	33	12	331	9.0	16	.4	.0	303	278	9	533	7.0	.3
			Nov. 5, 1969	17	292	29	9	218	11	12	.3	< .4	477	192	9.0	372	8.0	.3
1/ 303	do	206	Nov. 8, 1961	15	52	33	8.0	307	6.8	16	.5	.2	282	265	6	501	6.6	.2
			Nov. 5, 1969	12	48	31	9	282	9	13	.3	< .4	261	247	7.1	464	7.5	.2
1/ 304	Anita Runge Moore	272	Nov. 9, 1961	12	56	30	9.4	309	4.0	18	.4	.0	282	263	7	503	6.7	.3
			Oct. 15, 1969	13	57	27	7	298	6	9	.3	< .4	266	253	5.8	464	7.5	.2
1/ 401	J. M. Treadwell	175	Oct. 6, 1961	15	48	28	23	254	16	38	--	7.8	301	235	17	526	7.1	.7
1/ 403	do	135	do	13	75	17	15	306	8.0	18	--	6.5	302	257	11	526	7.0	.4

See footnotes at end of table.

Table 7.--Chemical Analyses of Water from Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Edwards and associated limestones--continued											
1/ TH-55-08-406	J. H. Treadwell	--	Oct. 17, 1961	17	77	32	40	270	26	70	--	80	475	324	21	793	6.9	1.0
1/ 407	do	157	do	15	70	24	10	295	10	21	--	17	312	273	8	531	6.9	.3
1/ 410	Boy Scouts of America	--	Oct. 19, 1961	13	77	21	16	352	.0	18	--	.0	318	278	11	556	6.9	.4
			Oct. 22, 1969	8	77	20	9	322	5	17	0.3	< .4	294	275	6.6	520	7.3	.2
1/ 601	Mrs. Joe Russell	55	Oct. 19, 1961	15	70	17	13	289	7.0	16	--	6.3	286	244	10	482	7.1	.4
			Oct. 24, 1969	20	77	19	10	303	9	17	.3	6.5	308	270	7.4	519	7.5	.3
1/ 604	Fritz Luckenbach	--	Oct. 25, 1961	18	70	45	24	255	144	34	--	5.0	465	360	13	744	7.1	.5
1/ 801	Mrs. Joe Russell	90	Oct. 19, 1961	15	75	18	10	297	8.2	18	--	7.2	297	261	8	504	6.9	.3
1/ 804	Boy Scouts of America	202	Oct. 25, 1961	14	55	28	8.5	292	11	12	--	3.0	276	252	7	493	6.9	.2
			Nov. 5, 1969	13	50	26	8	264	11	12	.3	1.5	252	231	6.9	437	8.1	.2
1/ 903	Fritz Luckenbach	--	Oct. 25, 1961	14	73	18	10	298	7.6	15	--	6.5	291	256	8	512	7.0	.3
1/ 16-101	W. W. Sheen	140	Oct. 5, 1961	16	62	23	19	274	21	23	--	13	312	249	14	534	7.1	.5
			Oct. 22, 1969	17	65	24	15	272	25	23	.4	13.0	316	264	11.0	533	7.6	.4
1/ 201	Bill Morriss	220	Oct. 26, 1961	13	358	258	109	287	1,390	190	--	300	2,760	1,950	11	3,300	6.6	1.1
1/ 204	H. H. Mears	135	Oct. 20, 1961	14	74	19	11	302	8.8	18	--	6.3	300	262	9	511	6.9	.3
			Oct. 16, 1969	10	78	19	9	307	9	15	.3	7.0	298	273	6.9	519	7.6	.3
1/ 303	Olivia McCutchen	--	1962	19	63	36	10	356	14	18	.2	< .4	336	307	--	570	7.8	--
			Nov. 14, 1969	13	53	32	21	273	33	31	.5	5.5	324	264	14.9	550	7.6	.6
1/ 903	Joyce McNamara	380	Dec. 12, 1962	18	53	35	23	275	38	40	.6	3.8	346	275	--	590	7.5	--
			Nov. 14, 1969	13	49	30	66	284	63	61	1.8	3.5	428	247	36.9	730	7.6	1.8
1/ 24-101	George Lehne	180	Oct. 11, 1962	12	342	185	26	244	1,470	12	3.2	< .4	2,170	1,660	--	2,270	7.3	.3
			July 15, 1965	11	229	120	26	253	820	19	2.8	< .4	1,350	1,070	5.1	1,730	7.2	.4
			Oct. 31, 1969	9	280	145	27	235	1,050	18	2.5	< .4	1,650	1,290	4.3	1,880	7.3	.3
1/ 201	Henry Murr	280	Oct. 10, 1962	17	96	22	21	199	27	39	.2	133	453	332	--	730	7.8	--
			Nov. 13, 1969	16	102	21	33	232	33	45	.4	156	520	341	17.6	766	7.6	.8
1/ 301	Billie C. Cosney	--	Oct. 11, 1962	23	37	32	14	209	18	24	1.0	2.0	261	226	--	464	7.9	--
			Nov. 13, 1969	16	68	17	10	234	21	16	.3	20.0	283	238	8.1	471	7.8	.3
1/ 56-01-101	Mrs. Maxine Palmer	200	Nov. 8, 1961	16	71	21	7.4	304	7.2	12	.3	6.0	290	264	6	496	6.8	.2
			Oct. 17, 1969	12	71	22	9	303	11	16	.3	5.0	295	269	7.1	508	7.4	.3
1/ 104	W. J. Wilkinson Estate	200	Apr. 5, 1962	15	51	29	13	286	11	18	--	3.6	282	246	10	507	7.2	.4
			Oct. 17, 1969	11	58	30	7	311	7	11	.3	3.5	281	270	5.1	495	7.3	.2
1/ 202	do	--	Apr. 5, 1962	13	56	29	8.5	306	6.0	14	--	3.6	279	259	7	500	7.1	.2
			Oct. 17, 1969	12	57	29	7	299	7	11	.3	1.5	272	261	5.3	474	7.4	.2
1/ 301	E. G. Wilkinson	150	Oct. 27, 1961	13	83	22	9.4	314	8.4	17	--	35	342	298	6	592	6.7	.2
			Nov. 4, 1969	19	54	25	8	259	8	14	.3	10.5	266	238	6.8	447	8.1	.2
1/ 303	Jack Wilkinson	125	Oct. 27, 1961	14	59	28	14	300	9.2	23	--	6.5	302	262	11	543	6.8	.4
1/ 501	Mrs. F. T. Neal	--	do	15	53	29	13	295	9.4	18	--	3.2	286	251	10	513	6.8	.4
			Oct. 17, 1969	11	55	30	9	295	11	15	.3	3.0	279	262	6.9	495	7.5	.2
1/ 503	W. J. Wilkinson Estate	85	Nov. 8, 1961	16	72	20	9.9	295	8.0	17	.3	9.3	298	262	8	504	7.0	.3
			Oct. 17, 1969	16	74	18	8	296	9	12	.2	3.5	287	258	6.5	490	7.3	.2

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Edwards and associated limestones--continued											
1/ TH-56-01-701	Sam Allison	44	Oct. 23, 1961	16	85	19	13	346	8.2	18	--	2.0	331	290	9	579	6.7	0.3
			Oct. 22, 1969	11	90	20	9	354	9	15	0.3	2.0	330	309	6.3	571	7.5	.2
1/ 803	Frank Wilkinson, et al.	50	Oct. 10, 1962	18	112	27	11	471	12	19	.2	< .4	431	392	--	730	7.3	--
			Oct. 31, 1969	17	119	22	12	442	10	21	.3	8.5	427	390	6.3	706	7.2	.3
1/ 805	Carl J. Miller	30	Oct. 1, 1962	31	91	38	16	463	5.0	24	.5	< .4	433	383	--	731	7.2	--
			Oct. 29, 1969	30	101	38	16	473	6	25	.8	< .4	450	406	8.0	751	7.1	.4
1/ 02-101	Grandstaff Ranch	40	Feb. 8, 1963	20	67	27	11	322	11	21	.2	6.0	321	278	--	565	7.3	.3
			Nov. 6, 1969	13	71	26	11	320	11	18	.3	5.5	313	283	7.7	540	7.3	.3
1/ 918	A. T. Murchison	100	Mar. 9, 1963	25	43	47	43	266	58	76	.5	< .4	329	298	--	766	8.5	--
			Oct. 27, 1969	24	58	35	30	259	56	54	.5	3.0	388	288	18.3	646	7.5	.8
1/ 03-301	Mary Heiman, et al.	110	June 14, 1961	18	54	30	33	292	20	46	.5	5.2	348	258	22	610	7.2	.9
302	do	--	Oct. 28, 1969	17	71	35	30	282	65	57	.5	< .4	415	319	16.8	700	7.2	.7
1/ 601	Damon Kothman	--	Oct. 2, 1962	18	61	33	14	343	11	20	.4	< .4	326	290	--	570	7.7	--
			Nov. 6, 1969	13	79	33	14	404	< 4	19	.5	< .4	358	335	8.1	639	7.2	.3
1/ 09-101	Sam Allison	--	Oct. 11, 1962	17	71	24	16	261	24	26	.3	< .4	306	277	--	568	7.3	--
			Nov. 12, 1969	15	42	37	56	214	68	92	.7	< .4	416	257	32.1	716	7.9	1.5
1/ 405	Olivia McCutchen	--	Oct. 12, 1962	17	51	32	18	280	28	30	.4	4.2	318	258	--	546	7.6	--
			Nov. 14, 1969	11	71	34	10	349	20	19	.4	6.5	344	320	6.3	591	7.2	.2
1/ 505	Mrs. J. M. Powell	--	Nov. 1, 1962	19	50	31	31	265	43	40	.3	3.1	347	252	--	580	8.0	--
			Nov. 12, 1969	15	66	32	26	334	28	37	.6	< .4	369	297	15.9	638	7.3	.7
1/ 904	Mrs. D. F. Smith	--	Oct. 24, 1962	16	63	29	12	307	11	24	.3	6.5	313	276	--	551	7.5	--
			Nov. 12, 1969	16	40	27	13	240	10	24	.4	< .4	248	211	11.6	438	7.8	.4
1/ 10-205	Carl Martin, Sr.	110	Apr. 9, 1963	16	80	22	14	331	11	25	.3	1.0	332	290	--	605	7.5	--
			Oct. 29, 1969	14	83	21	12	328	13	18	.3	10.0	332	295	7.8	566	8.0	.3
1/ 801	A. A. Williamson	210	Nov. 28, 1962	19	78	21	14	312	13	28	.2	18	344	283	--	590	7.3	--
			Oct. 29, 1969	28	103	5	4	318	8	5	.1	15.0	324	281	3.3	520	7.3	.1
1/ 901	R. Q. Landers	260	June 9, 1961	17	48	28	28	256	15	47	.6	3.8	313	235	21	561	7.2	.8
			Oct. 20, 1969	12	56	27	20	257	13	44	.4	4.5	303	251	15.1	544	7.6	.6
1/ 11-112	Seth D. Kothman	100	Apr. 25, 1963	6.0	37	37	21	287	16	31	.5	< .4	290	243	--	550	7.9	--
			Oct. 29, 1969	29	57	32	15	312	16	22	.4	3.0	327	276	10.5	539	7.6	.4
1/ 702	Carl Ruff	200	Apr. 18, 1963	16	56	28	14	294	10	23	.3	< .4	292	255	--	526	7.8	--
			Oct. 17, 1969	11	57	29	12	294	9	21	.3	3.0	287	260	9.1	507	7.5	.3
1/ 901	F. W. Kidd	186	Apr. 19, 1963	16	55	26	15	279	7.0	24	.4	1.0	208	242	--	515	7.4	--
			Oct. 20, 1969	11	59	24	14	278	12	24	.4	3.0	284	247	11.2	500	7.6	.4
1/ 12-503	J. E. Rudder	310	Apr. 24, 1963	14	73	67	28	321	82	112	.9	< .4	537	455	--	975	8.1	--
			Oct. 22, 1969	27	89	62	25	359	86	103	1.0	< .4	570	476	10.3	952	7.4	.5
1/ 506	John Speck	85	Apr. 25, 1963	18	60	31	18	329	8.0	28	.4	< .4	325	277	--	590	7.9	--
			Oct. 29, 1969	21	62	34	20	327	17	29	.4	5.0	349	296	12.7	607	7.4	.5
1/ 17-101	Mrs. Lawrence Williamson	--	Oct. 23, 1962	14	63	21	21	266	13	32	.1	8.5	304	247	--	540	7.6	--
			Nov. 12, 1969	11	67	17	15	264	13	24	.2	4.5	282	239	12.2	439	7.5	.4
18-304	Agnes C. Walston	210	Oct. 20, 1969	11	77	9	13	250	9	20	.2	8.5	271	228	11.1	467	7.6	.4

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

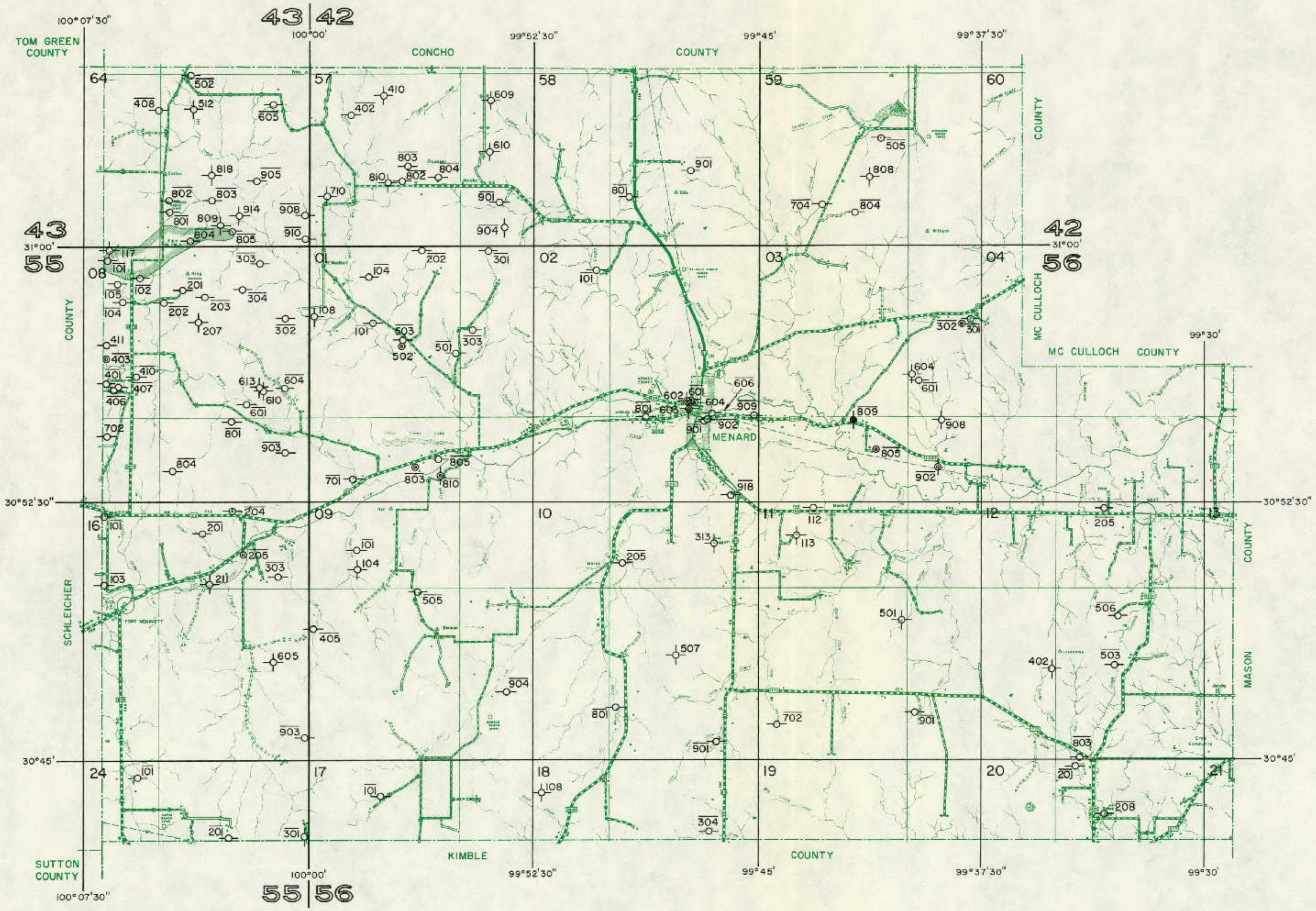
Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Alluvium											
1/ TH-55-16-103	George Lehne	75	Oct. 5, 1961	16	62	23	19	274	21	23	--	13	312	249	14	534	7.1	0.5
1/ 205	Robert C. Pfluetsch	60	July 27, 1960	20	104	23	20	423	14	22	0.3	4.1	415	354	11	708	6.8	.5
			Oct. 22, 1969	13	117	25	13	451	13	22	.3	< .4	425	395	6.7	721	7.1	.3
1/ 56-02-601	City of Menard	22	Mar. 23, 1957	--	73	28	24	318	42	36	.4	3.0	430	300	--	721	7.3	--
			Oct. 29, 1969	30	108	36	26	471	34	32	.3	5.0	500	420	11.9	814	7.2	.6
1/ 606	Ernestine Williams	22	Sept. 18, 1962	20	80	27	13	366	13	21	.1	< .4	354	309	--	607	7.6	--
			Oct. 28, 1969	22	91	27	16	384	12	23	.3	5.0	385	337	9.2	647	7.3	.4
1/ 801	J. B. Canonn	--	Oct. 5, 1962	22	74	25	14	336	11	23	.2	< .4	335	285	--	565	7.5	--
			Oct. 31, 1969	21	82	24	14	364	7	18	.3	< .4	345	306	8.8	581	7.4	.3
1/ 901	Steve Martin	--	Sept. 18, 1962	20	98	29	18	439	13	22	.1	< .4	416	364	--	712	7.3	--
1/ 902	W. G. Craig	--	do	17	88	27	14	394	10	22	.2	< .4	372	334	--	638	7.6	--
			Oct. 28, 1969	16	109	27	19	443	12	31	.3	< .4	432	384	9.8	739	7.3	.4
1/ 909	L. D. Wilkerson	13	Sept. 19, 1962	22	88	29	16	376	19	27	.3	10	396	338	--	667	7.2	--
			Oct. 28, 1969	18	88	24	18	367	22	24	.3	3.5	378	321	10.9	636	7.5	.4
1/ 03-805	R. R. Ellis	24	Oct. 3, 1962	34	157	122	374	527	475	520	.5	30	1,970	895	--	2,900	7.3	5.4
			Oct. 28, 1969	28	272	153	500	465	382	1,090	1.0	43.5	2,700	1,310	45.5	4,160	7.0	6.0

1/ Texas Water Commission Bulletin 6519, "Ground-Water Conditions in Menard County, Texas".

MENARD COUNTY

Table 8.–Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
TH-42-57-410	Wayne Allison	Fritz Volkmann No. 1
609	Tucker Drilling Co.	W. C. McKee No. 1
610	Honolulu Oil Corp.	B. K. Neel No. 1
710	General Crude Oil Co.	Joe Wilhelm No. 1-1
810	C. C. Winn	Walter Menzies No. 1
59-808	J. C. Barnett	Callan City Co. No. 1
43-64-512	L. G. Priest	J. P. Sorrell Ranch No. 1
809	Humble Oil & Refining Co.	Mary E. Rogers No. 1
818	J. H. Rowsey & G. L. Rowsey	Do.
914	Thomas Drilling Corp.	R. S. Winslow Estate No. 1
55-08-117	Fryer & Hanson Drilling Co.	J. M. Treadwell No. 2
207	T. A. Kirk & H. L. Neeb	Edith Runge No. 1-A
610	Furney & Polk, et al.	W. W. Russell Estate No. 1-A
613	Furney & Polk	W. W. Russell Estate No. 1
16-211	B. A. Duffy	Sol Mayers No. 1
605	Deep Rock Oil Corp.	M. C. Bevans No. 1
56-01-108	Carl G. Cromwell, et al. (Reported as Duffey & Loufbourrow)	R. S. Winslow No. 1
03-604	G. A. Clements	Murchison No. 1
908	Carpenter & Robbins	Carpenter & Robbins No. 1
09-104	C. H. Murdick	George S. Allison No. 1
10-313	A. R. Ekholm	Jacoby Brothers No. 1
507	H. F. Wilcox Oil & Gas Co.	Lee Murchison No. 1
11-113	I. A. Stephens	Seth Kothman No. 1
501	American Republic Corp.	Bennie Bradford No. 1
12-402	F. H. Carpenter	Royal No. 1
18-108	H. M. Naylor Oil Co.	C. R. Thos. W. Nasworthy No. 1



EXPLANATION

Public supply well

Domestic or livestock well

Irrigation well

Oil or gas well

Unused or abandoned well

Solid circle indicates flowing well

101

Line above well number indicates chemical analysis given in Table 7

For location of additional water, oil, and gas wells see Baker and others, 1965

N

0 2 4 Miles

0 2 4 Kilometers

Base map from general highway map of the State Department of Highways and Public Transportation

Location of Selected Water, Oil, and Gas Wells in Menard County

MIDLAND COUNTY

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.

Water-bearing unit : Qal, Alluvium; To, Ogallala Formation; Kea, Edwards and associated limestones; Kt, Trinity Group; Trs, Santa Rosa Formation; P, Permian rocks undifferentiated.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps unless otherwise designated by footnotes.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenths or hundredth of a foot.
Method of lift and type of power : C, cylinder; S, submersible; T, turbine; E, electric; G, gas, butane, or gasoline; W, wind; N, none.
Use of water : D, domestic; S, livestock; Irr, irrigation; P, public supply; Ind, industrial; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water-bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-27-62-604	Mervin Haag, et al.	--	1947	136	--	75	To	2,903	91.52	Sept. 22, 1970	T, E	Irr	--
605	do	--	1948	140	--	75	To	2,903	88.78	do	T, E	Irr	--
63-601	Gloria Ruth Evans	--	--	--	--	--	Kt	2,831	89.96 100.52 98.92	Dec. 6, 1963 Dec. 10, 1966 Dec. 3, 1969	T, E	Irr	Observation well.
701	City of Midland	--	--	--	--	--	Kt	2,864	80.10 86.69 87.96 77.41 68.98	Dec. 1, 1960 Apr. 4, 1965 Oct. 3, 1966 Dec. 3, 1969 Jan. 4, 1971	T, E	P	Do.
705	do	--	--	127	--	--	Kt	--	62.65 81.27 52.58 62.66	Apr. 17, 1967 Oct. 17, 1967 Feb. 19, 1968 Apr. 15, 1969	N	N	Unused public-supply well. Observation well with automatic water-level recorder.
* 801	Clarence Scharbauer, Jr.	--	--	66	5-1/2	20	Kt	2,844	33.7	Mar. 9, 1967	C, W	S	--
64-401	Mr. Blakemore	Rainbow Stables	1946	127	12-1/2	22	--	2,802	75.13 94.24 99.37 102.47	Nov. 30, 1960 Dec. 7, 1965 Dec. 3, 1969 Jan. 4, 1971	S, E	D, S	Observation well.
901	Atlantic Tank Farm	--	--	69	--	--	To	2,778	51.34 50.70	Nov. 29, 1960 Dec. 4, 1968	N	N	Do.
28-57-701	Texas Highway Department	--	--	86	--	--	To	--	50.38 52.64 57.84 47.94 47.90	Dec. 2, 1955 Jan. 15, 1960 Dec. 7, 1965 Dec. 3, 1969 Jan. 4, 1971	C, W	P	Do.
901	W. T. Bryant	--	--	--	--	--	To	--	81.58 90.19 91.62 88.48 82.96	Dec. 6, 1963 Dec. 7, 1965 Nov. 30, 1967 Dec. 5, 1969 Jan. 4, 1971	T, E	Irr	Observation well.
58-601	Texas Highway Department	--	--	33	6	--	To	--	20.10 10.60 18.91 17.55 17.50	Dec. 7, 1954 Dec. 4, 1959 Dec. 3, 1964 Dec. 2, 1969 Jan. 4, 1971	C, W	S	Do.
44-01-102	J. C. Brooks, et al.	--	--	--	--	--	To	2,720	43.40 42.02 68.91 51.28 48.90	Dec. 3, 1955 Nov. 30, 1960 Dec. 7, 1965 Dec. 3, 1969 Jan. 5, 1971	T, E	Irr	Do.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-44-01-103	Le Roy Gill	T. C. Tubb	--	--	--	--	--	2,740	53.02 63.07 68.08 61.58 59.16	Dec. 3, 1955 Jan. 15, 1960 Dec. 7, 1966 Dec. 3, 1969 Jan. 5, 1971	T, E	Irr	Do.
* 203	P. Crespi	Dan Sanders	--	78	8	20	To	*2,729	67.0	Feb. 28, 1967	C, W	S	--
* 204	do	do	--	62	6	--	To	2,704	53.4	do	C, W	S	--
301	Alice Buchanan	Robert Turner	--	75	--	--	To	2,693	63.62	Mar. 3, 1961	T, E	Irr	--
* 302	do	do	--	62	6	--	To	2,675	43.19 50.7	July 31, 1937 Feb. 28, 1967	C, W	S	Well 106. 1/
303	do	do	--	34	8	--	To	2,652	27.6	do	C, W	S	--
304	Alice Buchanan, et al.	do	--	48	7-1/2	20	To	2,667	44.4	do	C, W	S	--
305	do	do	--	52	6	--	To	2,663	40.8	do	C, W	S	--
401	Gerhard Synatschk Estate	Martin Synatschk	--	--	10	--	To	--	39.49 48.24 36.96 36.61	Dec. 5, 1963 Dec. 7, 1965 Dec. 3, 1969 Jan. 5, 1971	N	N	Unused irrigation well. Observation well.
501	P. Crespi	Dan Sanders	--	51	6	10	To	2,706	49.0	Feb. 28, 1967	C, W	S	--
502	do	do	--	--	6	--	To	2,706	50.4	do	C, W	S	--
503	do	do	1962	68	7-1/2	15	To	2,693	47.0	do	C, W	S	--
* 601	Alice Buchanan	Robert Turner	--	60	4	--	To	2,668	43.3	Feb. 28, 1967	C, W	S	--
* 602	M. E. Turner Estate	do	--	68	8-5/8	20	To	2,684	64.13 66.6	June 29, 1937 Feb. 28, 1967	C, W	S	Well 155. 1/
603	do	Rosie Turner	--	--	--	--	To	--	--	--	C, W	S	--
604	Alice Buchanan	Robert Turner	--	63	8-5/8	10	To	2,685	59.0	Feb. 28, 1967	C, W	S	--
* 701	W. F. Willis, et al.	Palmer Willis	1961	72	--	--	Kt	2,724	48.5	Jan. 30, 1967	C, W	S	--
* 801	J. J. Willis, et al.	do	1940	80	--	--	To	2,710	58.9	Jan. 31, 1967	C, W	S	--
* 802	do	do	1957	70	--	--	To	2,704	--	--	C, W, S, E	S	--
* 803	do	do	--	85	--	--	To	2,715	--	--	C, W	S	--
* 804	Ben Winkleman, et al.	do	--	--	--	--	To	2,687	38.3	Jan. 31, 1967	C, W	S	--
805	G. N. Donavan	do	1930	80	--	--	To	2,685	--	--	C, W	S	--
* 806	J. J. Willis, et al. and A. H. Halff	do	1941	80	--	--	Kt	2,724	48.5	Jan. 30, 1967	C, W	S	--
* 807	Warren Petroleum Corp.	--	1960	92	6-5/8	92	To	2,702	33.2	Feb. 9, 1967	S, E	Ind	--
901	G. N. Donavan	Palmer Willis	1961	78	--	--	To	2,691	58.3	Feb. 8, 1967	C, W	S	--
902	do	do	--	54	--	--	To	2,663	46.3	do	C, W	S	--
02-201	B. W. Brown	--	1958	62	10	62	To	2,622	40.75 42.8	Mar. 3, 1961 Dec. 29, 1966	S, E	Irr	Slotted steel casing from 40 to 62 feet.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* TJ-44-02-202	B. W. Brown	--	1959	62	10	62	To	2,623	44.2	Dec. 29, 1966	S, E	Irr	Slotted steel casing from 40 to 62 feet.
203	do	--	1960	62	8	32-62	To	2,624	--	--	S, E	Irr	Slotted steel casing from 32 to 62 feet.
204	do	--	1960	62	10	62	To	2,624	--	--	S, E	Irr	Do.
205	do	--	1959	75	10	38-68	To	2,629	49.5	Dec. 28, 1966	S, E	Irr	Slotted steel casing from 40 to 68 feet.
* 206	do	--	1959	60	--	--	To	2,626	49.8	Dec. 29, 1966	T, E	Irr	--
207	Barry Boone	--	1958	70	10-3/4	70	To	2,618	40.66 44.3	Mar. 3, 1961 Dec. 29, 1966	N	N	Abandoned irrigation well. Slotted steel casing from 40 to 70 feet. Gravel packed.
208	do	--	1958	71	12-1/2	10	To	2,618	--	--	T, G	N	Unused irrigation well.
* 209	do	--	1960	71	10	71	To	2,618	44.5	Dec. 29, 1966	S, E	Irr	Slotted steel casing from 40 to 71 feet.
401	O. D. O'Daniel, Sr.	Luther Eggleston	--	58	5-1/2	10	To	2,651	53.1	Jan. 4, 1967	C, W	S	--
402	do	do	--	51	5-1/2	10	To	2,644	42.7	do	C, W	S	--
403	Leach Estate	Mrs. L. E. Floyd	1950	--	6	--	To, Kt	2,639	38.9	Jan. 3, 1967	T, E	Ind	--
404	M. E. Turner Estate	Rosie Turner	--	62	6	20	To, Kt	2,675	56.48 59.0	Sept. 14, 1949 Feb. 28, 1967	C, W	S	--
405	do	do	--	75	--	--	To, Kt	2,655	--	--	C, W	S	--
406	El Paso Natural Gas	--	1957	62	12-1/2	62	To, Kt	2,654	51.5	Mar. 16, 1967	N	N	Abandoned industrial well. Slotted steel casing.
* 407	do	--	1950	67	12-1/2	67	To, Kt	2,657	52.4	do	T, E	Ind	Slotted steel casing. Reported yield, 98 gpm.
408	do	--	1950	63	12-1/2	63	To, Kt	2,657	--	--	T, E	Ind	Slotted steel casing. Reported yield, 72 gpm.
* 409	do	--	1950	71	12-1/2	71	To, Kt	2,658	55.2	Mar. 16, 1967	T, E	Ind	Slotted steel casing. Reported yield, 40 gpm.
* 502	Barry Boone	--	1952	40	6	10	To, Kt	2,619	31.7	Dec. 20, 1966	C, W	S	--
* 503	do	--	1961	30	24	--	To, Kt	2,595	15.20	Dec. 29, 1966	T, E	D, S	--
* 504	O. D. O'Daniel, Sr.	Luther Eggleston	--	45	6	--	To, Kt	2,630	28.85 33.5	Apr. 29, 1937 Jan. 3, 1967	S, E	D, S	Well 141. 1/
505	do	do	--	40	5-1/2	--	To, Kt	2,630	31.0	do	C, W	S	--
506	do	Mobil Oil Corporation	--	41	10-3/4	41	To, Kt	2,615	19.5	do	N	N	Unused industrial well. Slotted steel casing.
* 507	do	Luther Eggleston	--	60	5-1/2	10	To, Kt	2,638	40.0	Jan. 4, 1967	C, W	S	--
508	do	do	1966	73	7	80	To, Kt	2,657	62.6	Jan. 3, 1967	S, E	S	Slotted steel casing from 60 to 80 feet. Sanded from 73 to 80 feet.
* 509	Mrs. L. E. Floyd	--	1903	50	4-1/2	50	To, Kt	2,636	32.95 35.5	Apr. 29, 1937 Jan. 3, 1967	C, W	S	Slotted steel casing from 45 to 50 feet. Well 152. 1/
510	H. A. Ford	--	1950	50	5-1/2	25	To, Kt	2,634	--	--	S, E	D	--
* 602	Barry Boone	--	--	26	6	--	To	2,590	3.25 11.3	Mar. 24, 1937 Dec. 20, 1966	C, W	S	Well 147. 1/
* 603	do	--	--	38	6	--	To	2,575	23.2	Mar. 24, 1937	C, W	N	Unused livestock well. Well 148. 1/
801	El Paso Natural Gas	--	1940	922	9-5/8	--	Trs	--	--	--	N	N	Well abandoned and plugged.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* TJ-44-02-902	Barry Boone	--	1931	55	10	3	To, Kt	2,572	28.35 32.6	Mar. 24, 1937 Dec. 20, 1966	C, W	S	Reported yield, 3 to 5 gpm. Well 149. 1/
* 903	do	--	1939	50	10-3/4	33	To, Kt	2,570	36.48 32.8	Sept. 21, 1949 Dec. 20, 1966	C, W	S	--
* 09-201	Ollie Cox	--	--	44	--	--	To, Kt	2,695	32.0	Jan. 20, 1967	C, W	S	--
202	J. J. Willis, et al.	Palmer Willis	1930	90	--	--	To	2,734	73.5	Feb. 9, 1967	C, W	S	--
301	do	do	1935	80	--	--	To	2,681	78.7	Jan. 31, 1967	C, W	S	--
* 302	Ben Winkleman, et al.	do	--	70	--	--	To	2,649	38.97 43.3	July 14, 1937 Jan. 31, 1967	C, W	S	Well 157. 1/
303	W. F. Willis	do	--	70	--	--	To	2,642	49.8	do	C, W	S	--
304	do	do	--	60	--	--	To, Kt	2,625	50.5	do	C, W	S	--
* 305	do	do	--	70	--	--	To, Kt	2,640	57.6	do	C, W	S	--
* 401	Ollie Cox	--	--	80	--	--	Kt	2,695	66.39 65.6	July 13, 1937 Jan. 20, 1967	C, W	S	Well 244. 1/
* 402	Leona Bryant	Jim Neal	--	67	--	--	To, Kt	2,724	63.8	Feb. 14, 1967	C, W	S	--
403	Wilson Bryant	do	--	112	--	--	To, Kt	2,717	74.6	Feb. 11, 1967	C, W	S	--
501	Ollie Cox	--	--	62	--	--	Kt	2,653	51.7	Jan. 20, 1967	C, W	S	--
502	do	--	--	65	--	--	Kt	2,652	29.3	do	C, W	S	--
* 503	do	--	--	70	--	--	Kt	2,641	42	1966	S, E	D	--
* 504	do	--	--	--	--	--	Trs	2,641	--	--	T, E	S	--
* 601	do	--	--	62	--	--	Kt	2,670	84.31 55.1	July 13, 1937 Jan. 20, 1967	C, W	S	Well 246. 1/
* 602	do	--	--	65	6	8	Kt	2,646	54.48	July 13, 1937	C, W	S	--
* 603	do	--	--	91	12	--	Kt	2,645	44.12 44.2	July 14, 1937 Jan. 20, 1967	C, W	S	Well 245. 1/
701	Wilson Bryant	Jim Neal	--	--	--	--	Kt	2,656	35.4	Feb. 10, 1967	C, W	S	--
702	Texaco Incorporated	do	--	--	--	--	Kt	2,651	--	--	C, W	S	--
* 801	Ollie Cox	--	--	82	--	--	Kt	2,695	63.9	Jan. 20, 1967	C, W	S	--
* 802	do	--	--	--	--	--	Kt	2,681	--	--	C, W	S	--
803	do	--	--	125	6	--	Kt	2,698	66.3	Jan. 20, 1967	N	N	Abandoned industrial well.
* 901	do	--	--	200	6	--	Kt	2,757	123.9	do	C, W	S	Well 247. 1/
902	do	--	--	--	--	--	Kt	2,707	19.2	do	C, W	S	--
903	do	--	--	91	--	--	Kt	2,701	75.0	do	C, W	S	--
* 10-101	Mrs. L. E. Floyd	--	1914	80	6	12	Kt	2,615	--	--	C, W	D, S	--
* 102	do	--	1909	51	6	10	Kt	2,631	47.0 45.4	June 8, 1937 Jan. 4, 1967	C, W	S	Well 151. 1/
103	Jay D. Floyd	--	1963	80	6	10	Kt	2,635	49.6	do	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* TJ-44-10-106	Louise Hutt Shackleford, et al.	Jay B. Floyd	1908	70	6	10	Kt	2,632	91.95 51.6	July 14, 1937 Jan. 4, 1967	C, W	S	Questionable water level for 1937. Well 252. 1/
* 105	do	do	1929	160	8-3/4	10	Kt	2,646	53.02 68.7	July 14, 1937 Jan. 4, 1967	C, W	S	Well deepened in 1965. Well 253. 1/
201	James W. Walton	James Walton, Jr.	--	100	--	--	Kt	2,663	74.9	Dec. 22, 1966	C, W	S	--
202	do	do	--	155	--	--	Kt	2,657	72.4	do	N	N	Unused industrial well.
203	do	do	--	--	--	--	Kt	2,658	--	--	T, E	Ind	--
204	Jay H. Floyd	--	1941	195	6	10	Kt	2,658	78.8	Jan. 11, 1967	C, W	S	--
205	do	--	1949	110	6	110	Kt	2,655	--	--	C, E	D, S	Slotted steel casing from 100 to 110 feet.
206	do	--	1950	100	4	100	Kt	2,634	--	--	T, E	D	Slotted steel casing from 75 to 100 feet.
207	do	--	1950	40	6	40	Kt	2,632	36.3	Jan. 11, 1967	S, E	D, S	Perforated steel casing from 25 to 40 feet.
* 208	do	--	1904	40	6	10	Kt	2,635	--	--	C, W	D	--
209	Louise Hutt Shackleford	Phillips Petroleum Company	1952	212	12-3/4 8-5/8	162 212	Kea, Kt	2,626	--	--	T, E	Ind	Slotted steel casing from 122 to 212 feet.
210	do	do	1952	212	12-3/4 8-5/8	60 212	Kt	2,626	54	July 1952	T, E	Ind	Slotted steel casing from 122 to 212 feet. Cemented to 212 feet. Reported yield, 105 gpm.
* 303	Bryant A. Harris	--	1952	125	6	10	Kt	2,644	77.5	Dec. 20, 1966	C, W	S	Reported yield, 25 to 30 gpm.
304	Jay H. Floyd	--	1962	64	4	10	Kt	2,658	--	--	C, W	S	--
* 401	Texaco Incorporated	Phillips Petroleum Company	1952	186	12-3/4 8-5/8	91 186	Kt	2,602	--	--	T, E	Ind	Slotted steel casing from 96 to 186 feet. Gravel packed to 186 feet. Reported yield, 68 gpm.
402	James W. Walton	James Walton, Jr.	--	--	--	--	Kt	2,647	47.3	Dec. 22, 1966	N	N	Unused livestock well.
403	do	do	1962	110	--	--	Kt	2,654	--	--	S, E	D, S	--
404	do	do	1962	168	6-5/8	168	Kt	2,656	50.6	Dec. 21, 1966	N	N	Perforated casing to 168 feet. Unused irrigation well.
405	do	do	--	80	--	--	Kt	2,649	--	--	C, W	S	--
406	do	do	--	80	--	--	Kt	2,629	41.6	Dec. 22, 1966	C, W	S	--
407	do	do	1964	265	--	--	Kt	2,618	37.3	do	N	N	Unused irrigation well.
408	Texaco Incorporated	do	--	Spring	--	--	Kt	2,590	--	--	--	--	"Peck's Spring."
409	James W. Walton	Phillips Petroleum Company	1953	193	12-3/4 8-5/8	30 193	Kea, Kt	2,618	--	--	T, E	Ind	Slotted steel casing from 103 to 193 feet. Reported yield, 156 gpm.
501	E. P. Driver	--	1960	140	6	10	Kt	2,713	107.9	Nov. 10, 1966	C, W	S	--
502	James W. Walton	James Walton, Jr.	1960	--	10	--	Kt	2,624	44 43.5	1960 Dec. 22, 1966	N	N	Test hole
503	do	do	1960	140	--	--	Kt	2,624	43.7	do	T, C	Irr	Reported yield, 200 gpm.
504	do	do	--	80	--	--	Kt	2,646	67.5	do	C, W	S	--
* 505	do	do	--	80	--	--	Kt	2,653	68.4	do	C, W	S	--
506	do	do	--	100	--	--	Kt	2,645	66.8	do	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* TJ-44-10-507	Louise Butt Shackleford	Phillips Petroleum Company	1952	242	12-3/4 8-5/8	151 242	Kt	2,623	41	June 13, 1952	T, E	P	Slotted steel casing from 155 to 242 feet. Reported yield, 69 gpm.
605	Wrage Ranch	--	1950	--	--	--	Kt	--	--	--	N	N	Unused industrial well.
607	James W. Walton	James Walton, Jr.	--	--	--	--	Kt	2,625	--	--	T	D	--
* 608	do	do	--	120	--	--	Kt	2,619	27.85	Mar. 31, 1937	C, W	S	Well 254. 1/
609	do	do	1960	137	10	110	Kt	2,621	41.2	Dec. 22, 1966	T, G	Irr	Perforated casing from 80 to 110 feet. Reported yield, 250 gpm.
610	do	do	1960	137	10	110	Kt	2,623	41.0	do	T, G	Irr	Perforated casing from 80 to 110 feet.
611	do	do	--	135	10	110	Kt	2,622	--	--	T, G	Irr	Perforated casing from 80 to 110 feet. Reported yield, 150 gpm.
702	Mobil Oil Corporation	--	1965	250	7	250	Kt	2,747	131	1965	N	N	Shackleford Supply Unit, water supply well 22. Slotted casing from 195 to 250 feet. Reported yield, 70 gpm.
703	do	--	1965	222	7	222	Kt	2,717	98	1965	N	N	Shackleford Supply Unit, water supply well 26. Slotted casing from 178 to 222 feet. Reported yield, 90 gpm.
704	Alvin Herron	Jack Hankins	--	140	--	--	Kt	2,703	90.1	Feb. 15, 1967	C, W	S	--
* 705	do	do	--	163	--	--	Kt	2,757	137.5	do	C, W	S	Well 249. 1/
801	E. P. Driver	--	1915	135	--	--	Kt	2,675	--	--	C, W	D, S	--
802	do	--	1940	175	--	--	Kt	2,671	60	Nov. 10, 1966	S, E	D, S	--
803	Texaco Incorporated	E. P. Driver	1955	135	8	10	Kt	2,686	70.1	do	C, W	S	--
804	E. P. Driver	--	1951	142	--	--	Kt	2,694	83.8	do	S, E	D	--
* 805	do	--	1915	90	6	10	Kt	2,677	67.65	Mar. 30, 1937	C, W	S	Well 257. 1/
806	do	--	1951	160	--	--	Kt	2,722	110.9	Nov. 10, 1966	C, W	S	--
* 807	do	--	1900	80	--	--	Kt	2,677	57.7	Mar. 30, 1937	C, W	D, S	Well 258. 1/
* 901	Bryant A. Harris	--	1940	70	8	10	Kt	2,625	16.71 27.5	do June 23, 1966	C, W	S	Well 256. 1/
* 903	E. P. Driver	Atlantic Refining Company	1951	125	4-1/2	--	Kt	2,704	--	--	C, W	D	--
* 905	do	--	1900	37	8	15	Kt	2,626	10.15 11.7	Mar. 30, 1937 Nov. 10, 1966	C, W	S	Well 259. 1/
906	do	--	1950	120	--	--	Kt	2,682	68.3	do	C, W	S	--
907	Texaco Incorporated	E. P. Driver	--	120	6	--	Kt	2,655	50.0	do	N	N	Abandoned industrial well.
* 17-101	Lois Patterson, et al.	Guy Cowden	--	100	10-3/4	--	Kt	2,730	51.0	Jan. 30, 1967	C, W	S	--
* 102	do	do	--	200	6	--	Kt	2,770	123.9	do	C, W	S	--
* 103	Wilson Bryant	Jim Neal	--	--	--	--	Kt	2,705	63.6	Feb. 10, 1967	C, W	S	--
* 201	Ollie Cox	--	--	190	--	--	Kt	2,785	145.9	Jan. 20, 1967	C, W	S	Well 272. 1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-44-17-301	Lillie Midkiff, et al.	Frank Midkiff	1940	190	--	--	Kt	2,785	131.1	Nov. 11, 1966	C, W	S	--
302	Louise Hutt Shackleford	do	1951	170	6	15	Kt	2,800	144.8	do	C, W	S	--
303	do	do	--	160	6	15	Kt	2,810	137.8	do	C, W	S	--
304	Mobil Oil Corporation	--	1965	268	7	268	Kt	2,769	142	1965	S, E	Ind	Shackleford Supply Unit, water supply well 10. Slotted casing from 168 to 268 feet. Reported yield, 72 gpm.
305	do	--	1965	262	7	262	Kt	2,766	140	do	S, E	Ind	Shackleford Supply Unit, water supply well 12. Slotted casing from 156 to 262 feet. Reported yield, 75 gpm.
306	do	--	1965	262	7	265	Kt	2,760	132	do	S, E	Ind	Shackleford Supply Unit, water supply well 13. Slotted casing from 140 to 265 feet. Reported yield, 100 gpm.
401	Tyson Midkiff	--	1958	258	4	100	Kt	--	--	--	S, E	Irr	Perforated casing from 60 to 100 feet. Reported yield, 36 gpm.
* 402	do	--	1902	160	5 5	10 100-160	Kt	2,778	130	June 15, 1937	C, E	D, S	Perforated casing from 100 to 160 feet. Well 274. 1/
* 403	do	--	1903	160	8	10	Kt	2,795	152.7 133.9	do Nov. 19, 1966	N	N	Unused livestock well. Well 276. 1/
* 404	do	--	1905	126	6	10	Kt	2,696	67.9	do	C, W	S	Well 277. 1/
405	do	--	1938	168	6 4-1/2	10 108-168	Kt	2,745	127.1	do	C, W	S	Perforated casing from 108 to 168 feet.
501	Inez Preston	Herd Midkiff	1930	170	--	--	Kt	--	--	--	C, W	S	--
502	Herd Midkiff	--	--	--	--	--	Kt	--	--	--	C, W	S	--
601	Clark Moreland	Sam G. Midkiff	1960	223	12	15	Kt	2,758	130.92 131.3	Mar. 7, 1961 Nov. 18, 1966	N	N	Unused irrigation well. Reported yield, 35 gpm.
602	Hunter Midkiff	do	1957	268	12	15	Kt	2,759	127.54 205.0	Mar. 7, 1961 Nov. 18, 1966	T, G	Irr	Reported yield, 120 gpm. Pumping water level in 1966.
603	do	do	1957	275	--	--	Kt	2,760	131.26 136.3	Mar. 7, 1961 Nov. 18, 1966	T, G	Irr	Reported yield, 70 gpm.
604	Clark Moreland	do	1953	190	--	--	Kt	2,760	134.20 136.50	Mar. 7, 1961 Nov. 18, 1966	T, G	Irr	Reported yield, 90 gpm.
605	Louise Hutt Shackelford	Frank Midkiff	--	170	--	--	Kt	--	--	--	C, W	S	--
606	Lillie Midkiff, et al.	do	1940	167	6	15	Kt	2,772	133.2	Nov. 11, 1966	C, W	S	--
607	Hunter Midkiff	Sam G. Midkiff	1941	160	6	15	Kt	--	--	--	C, W	D, S	--
608	do	do	1951	190	--	--	Kt	2,758	124.9	Nov. 19, 1966	S, E	Irr	Reported yield, 40 gpm.
609	do	do	1960	265	12	15	Kt	2,758	134.4	do	N	N	Unused irrigation well. Reported yield, 65 gpm.
610	do	do	1960	265	12	15	Kt	2,758	131.6	Nov. 18, 1966	T, G	Irr	Reported yield, 70 gpm.
611	Clark Moreland	do	1955	230	12	15	Kt	2,760	136.8	do	N	N	Unused irrigation well. Reported yield, 70 gpm.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-44-17-612	Clark Moreland	Sam G. Midkiff	1951	230	10	230	Kt	2,760	137.0	Nov. 18, 1966	N	N	Unused irrigation well. Perforated casing. Reported yield, 70 gpm.
613	do	do	1956	255	12	255	Kt	2,759	134.9	do	N	N	Unused irrigation well. Slotted casing. Reported yield, 50 gpm.
614	do	do	1956	245	12	15	Kt	2,759	135.8	do	N	N	Unused irrigation well. Reported yield, 55 gpm.
615	Hunter Midkiff	do	1955	--	--	--	Kt	2,759	132.8	do	N	N	Unused irrigation well. Reported yield, 60 gpm.
* 703	Henry Currie	Bud M. Hanson	1964	175	6	40	Kt	--	145	Jan. 1964	C, W	D, S	--
704	do	do	1963	265	8-5/8	6	Kt	2,799	146.42 145.99 145.98 146.17	Dec. 4, 1965 Dec. 15, 1965 Jan. 31, 1966 Feb. 17, 1966	N	N	Reported yield, 175 gpm.
706	Tyson Midkiff	--	1938	168	6 4-1/2	6 128-168	Kt	--	--	--	C, W	S	Perforated casing from 128 to 168 feet.
707	Lois Patterson, et al.	Guy Cowden	--	200	6	--	Kt	2,805	149.6	Jan. 30, 1967	C, W	S	--
* 708	do	do	--	200	8-5/8	15	Kt	2,803	119.5 150.6	June 28, 1937 Jan. 26, 1967	C, W	S	Well 275. 1/
* 804	John Midkiff	--	1925	179	--	--	Kt	2,755	92.3	Dec. 22, 1966	C, W	S	Well 273. 1/
805	R. H. Midkiff	--	1965	272	12 12	20 130-150	Kt	--	--	--	T, G	Irr	Reported yield, 250 gpm.
806	John Midkiff	--	1963	281	10 12	20 150-170	Kt	--	--	--	T, G	Irr	Reported yield, 200 gpm.
807	Herd Midkiff	--	--	179	--	--	Kt	2,760	141.5	Dec. 22, 1966	C, W	S	--
903	Louise Hutt Shackelford et al.	Frank Midkiff	1920	175	--	--	Kt	2,758	145.4	Nov. 10, 1966	C, W	S	--
18-101	Lillie Midkiff, et al.	do	1940	135	--	--	Kt	2,750	119.7	Nov. 11, 1966	C, W	S	--
* 102	Mrs. Billy Babb	P. F. Bridgewater	1920	250	--	--	Kt	2,748	89.5 147.6	June 10, 1937 Jan. 13, 1967	C, W	D, S	Well 271. 1/
* 103	do	do	1920	250	--	--	Kt	--	--	--	T, E	D, S	--
104	do	do	1920	260	--	--	Kt	2,760	148.5	Jan. 13, 1967	C, W	S	--
105	Mrs. Tommie Douglass	do	1920	260	--	--	Kt	2,748	134.3	do	C, W	S	--
* 106	do	do	--	250	--	--	Kt	2,746	98.5 135.2	June 9, 1937 Jan. 13, 1967	C, W	S	Well 270. 1/
107	Mobil Oil Corporation	--	1963	268	8-5/8	268	Kt	2,742	--	--	S, E	Ind	Preston Supply Unit, water supply well 8. Slotted casing from 100 to 190 feet and 225 to 268 feet.
108	do	--	--	--	--	--	Kt	2,743	--	--	S, E	Ind	Preston Supply Unit, water supply well 9.
109	do	--	--	257	--	--	Kt	2,748	--	--	S, E	Ind	Preston Supply Unit, water supply well 14. Reported yield, 60 gpm.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-44-18-110	Mobil Oil Corporation	--	1965	256	7	256	Kt	2,746	105	1965	S, E	Ind	Preston Supply Unit, water supply well 15. Slotted casing from 115 to 256 feet. Reported yield, 88 gpm.
111	do	--	1965	255	7	254	Kt	2,747	112	do	S, E	Ind	Preston Supply Unit, water supply well 19. Slotted casing from 130 to 254 feet. Reported yield, 60 gpm.
112	do	--	1963	263	8-5/8	263	Kt	2,754	--	--	S, E	Ind	Shackelford Supply Unit, water supply well 1. Slotted casing from 90 to 180 feet and 223 to 263 feet.
113	do	--	1963	261	8-5/8	261	Kt	2,753	--	--	N	N	Shackelford Supply Unit, water supply well 2. Slotted casing from 92 to 183 feet and 218 to 261 feet. Reported yield, 22 gpm.
114	do	--	1964	255	8-5/8	245	Kt	2,755	--	--	S, E	Ind	Shackelford Supply Unit, water supply well 3. Slotted casing from 118 to 138 feet and 220 to 245 feet.
115	do	--	1964	255	8-5/8	231	Kt	2,757	--	--	S, E	Ind	Shackelford Supply Unit, water supply well 4. Slotted casing from 120 to 125 feet; 140 to 155 feet; 184 to 204 feet; and 215 to 231 feet.
116	do	--	1964	255	8-5/8	230	Kt	2,750	--	--	S, E	Ind	Shackelford Supply Unit, water supply well 5. Slotted casing from 125 to 155 feet; 170 to 180 feet; and 215 to 230 feet.
117	do	--	1964	257	8-5/8	248	Kt	2,747	--	--	S, E	Ind	Shackelford Supply Unit, water supply well 6. Slotted casing from 125 to 165 feet; 170 to 199 feet; and 210 to 248 feet.
118	do	--	1965	264	7	264	Kt	2,758	142	1965	S, E	Ind	Shackelford Supply Unit, water supply well 8. Slotted casing from 130 to 264 feet. Reported yield, 60 gpm.
119	do	--	1965	265	7	265	Kt	2,766	140	do	S, E	Ind	Shackelford Supply Unit, water supply well 9. Slotted casing from 130 to 165 feet. Reported yield, 80 gpm.
120	do	--	1965	264	7	263	Kt	2,756	130	do	S, E	Ind	Shackelford Supply Unit, water supply well 11. Slotted casing from 130 to 263 feet. Reported yield, 95 gpm.
121	do	--	1965	246	7	246	Kt	2,758	130	do	N	N	Shackelford Supply Unit, water supply well 14. Slotted casing from 190 to 246 feet.
122	do	--	1965	250	--	--	Kt	2,747	--	--	N	N	Shackelford Supply Unit, water supply well 15.
123	do	--	1965	253	7	253	Kt	2,747	130	1965	N	N	Shackelford Supply Unit, water supply well 16. Slotted casing from 198 to 253 feet. Reported yield, 40 gpm.
124	do	--	1965	250	7	250	Kt	2,743	118	do	N	N	Shackelford Supply Unit, water supply well 17. Slotted casing from 165 to 250 feet. Reported yield, 30 gpm.
125	do	--	1965	255	7	255	Kt	2,746	129	do	N	N	Shackelford Supply Unit, water supply well 19. Slotted casing from 200 to 255 feet. Reported yield, 45 gpm.
126	do	--	1965	255	7	255	Kt	2,752	133	do	N	N	Shackelford Supply Unit, water supply well 20. Slotted casing from 200 to 255 feet. Reported yield, 45 gpm.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-44-18-127	Mobil Oil Corporation	--	1965	257	7	257	Kt	2,752	133	1965	N	N	Shackelford Supply Unit, water supply well 21. Slotted casing from 200 to 257 feet. Reported yield, 65 gpm.
128	do	--	1965	257	7	257	Kt	2,747	--	--	N	N	Shackelford Supply Unit, water supply well 23. Slotted casing from 200 to 257 feet.
129	do	--	1965	250	7	250	Kt	2,736	121	1965	S, E	Ind	Shackelford Supply Unit, water supply well 24. Slotted casing from 135 to 250 feet. Reported yield, 80 gpm.
130	do	--	1965	240	7	240	Kt	2,733	112	do	N	N	Shackelford Supply Unit, water supply well 25. Slotted casing from 180 to 250 feet. Reported yield, 70 gpm.
131	do	--	1965	243	--	--	Kt	2,735	--	--	N	N	Shackelford Supply Unit, water supply well 28.
132	do	--	1965	245	7	245	Kt	2,734	111	1965	S, E	Ind	Shackelford Supply Unit, water supply well 29. Slotted casing from 112 to 245 feet. Reported yield, 75 gpm.
133	do	--	1965	245	7	245	Kt	2,726	98	do	S, E	Ind	Shackelford Supply Unit, water supply well 30. Slotted casing from 158 to 245 feet. Reported yield, 100 gpm.
134	do	--	1965	249	7	249	Kt	2,739	120	do	N	N	Shackelford Supply Unit, water supply well 31. Slotted casing from 185 to 249 feet. Reported yield, 70 gpm.
135	do	--	--	245	7	245	Kt	2,730	99	do	S, E	Ind	Shackelford Supply Unit, water supply well 32. Slotted casing from 112 to 245 feet. Reported yield, 80 gpm.
136	do	--	1965	245	7	240	Kt	2,731	110	do	S, E	Ind	Shackelford Supply Unit, water supply well 33. Slotted casing from 112 to 240 feet. Reported yield, 100 gpm.
137	do	--	1965	253	7	253	Kt	2,745	126	do	S, E	Ind	Shackelford Supply Unit, water supply well 18. Slotted casing from 120 to 253 feet. Reported yield, 50 gpm.
* 201	El Paso Natural Gas	--	1953	145	10-3/4	145	Kt	2,722	98.7	Mar. 16, 1967	T, E	Ind	Perforated casing. Reported yield, 43 gpm.
202	E. P. Driver	--	1940	125	--	--	Kt	2,720	82.6	Nov. 10, 1966	C, W	S	--
* 203	P. F. Bridgewater	--	1966	280	--	--	Kt	--	--	--	C, W	S	--
* 204	Johnny Bridgewater	P. F. Bridgewater	1920	260	--	--	Kt	2,723	120.6	Jan. 13, 1967	C, W	S	--
205	Mobil Oil Corporation	--	--	--	--	--	Kt	2,739	--	--	S, E	Ind	Preston Supply Unit, water supply well 10.
206	do	--	--	251	--	--	Kt	2,740	--	--	S, E	Ind	Preston Supply Unit, water supply well 11.
207	do	--	1965	260	7	260	Kt	2,743	117	1965	S, E	Ind	Preston Supply Unit, water supply well 16. Slotted casing from 190 to 260 feet. Reported yield, 40 gpm.
208	do	--	1965	238	--	--	Kt	2,721	94	do	S, E	Ind	Preston Supply Unit, water supply well 17. Reported yield, 84 gpm.
209	do	--	1965	249	7	249	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 18. Slotted casing from 118 to 249 feet. Reported yield, 80 gpm.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-44-18-210	Mobil Oil Corporation	--	1965	255	7	255	Kt	2,745	115	1965	S, E	Ind	Preston Supply Unit, water supply well 20. Slotted casing from 110 to 255 feet. Reported yield, 50 gpm.
211	do	--	1965	242	7	241	Kt	--	111	do	N	N	Preston Supply Unit, water supply well 27. Slotted casing from 195 to 241 feet. Reported yield, 60 gpm.
* 212	Johnny Bridgewater	P. F. Bridgewater	--	280	--	--	Kt	2,735	119.4	Jan. 13, 1967	C, W	S	Well 267. 1/
* 213	El Paso Natural Gas	--	1961	143	10-3/4	143	Kt	2,722	92.83 93.2	Nov. 10, 1966 Mar. 16, 1967	T, E	Ind	Reported yield, 36 gpm. Perforated casing from 103 to 142 feet.
214	do	--	--	175	9-5/8 6-5/8	18 175	Kt	2,720	104.6	do	S, E	Ind	Slotted casing from 100 to 165 feet. Reported yield, 41 gpm.
* 302	E. P. Driver	--	--	120	--	--	Kt	2,740	100.6 99.0	Mar. 30, 1937 Nov. 10, 1966	C, W	S	Well 260. 1/
401	Emily Sanders	P. F. Bridgewater	1960	280	12	--	Kt	2,743	120.43	Mar. 7, 1961	S, E	Irr	--
402	Frank Midkiff	Robert Latzel	1951	180	--	--	Kt	2,730	137.41	do	T, E	Irr	--
403	do	do	1952	180	7	180	Kt	2,742	134.77 137.9	do Nov. 11, 1966	S, E	Irr	Reported yield, 60 gpm.
404	do	do	1958	265	12	23	Kt	2,740	145.28 140.49	Mar. 7, 1961 Nov. 11, 1966	T, G	Irr	Reported yield, 125 gpm.
* 405	do	--	1957	225	12	15	Kt	2,740	139.38	do	N	N	Unused irrigation well. Pumping water level, 176 feet. Reported yield, 100 gpm.
406	T. O. Midkiff, III	--	1952	140	6	8	Kt	2,740	109.7	Oct. 22, 1966	C, W	S	--
* 407	Lillie Midkiff, et al.	T. O. Midkiff, III	--	220	4	220	Kt	2,700	107.3 110.9	June 11, 1937 Oct. 27, 1966	C, W	S	Well drilled deeper in 1966. Perforated plastic casing from 125 to 220 feet. Well 265. 1/
* 408	Frank Midkiff	--	1936	170	--	--	Kt	2,764	129.45	June 11, 1937	C, W	D	Well 268. 1/
409	do	--	1936	170	--	--	Kt	--	--	--	C, W	D	--
410	do	--	1949	170	--	--	Kt	--	--	--	T	D	--
411	do	Robert Latzel	1964	280	--	--	Kt	2,747	142.0	Nov. 11, 1966	T, G	Irr	Reported yield, 200 gpm.
412	do	do	1964	275	--	--	Kt	2,745	139.24	do	T, G	Irr	Do.
413	do	--	1946	170	--	--	Kt	2,742	143.9	do	C, W	S	--
414	do	--	1956	170	--	--	Kt	2,748	134.5	do	C, W	S	--
415	Lillie Midkiff, et al.	Frank Midkiff	1939	165	--	--	Kt	2,736	124.26	do	C, W	S	--
416	Emily Sanders	P. F. Bridgewater	--	--	--	--	Kt	--	--	--	S, E	Irr	--
417	do	do	--	--	--	--	Kt	--	--	--	S, E	Irr	--
418	do	do	--	--	--	--	Kt	--	--	--	T, E	Irr	--
419	do	do	--	--	--	--	Kt	--	--	--	S, E	Irr	--
420	do	do	--	--	--	--	Kt	--	--	--	S, E	Irr	--
421	Mobil Oil Corporation	--	--	--	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 2.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-44-18-422	Mobil Oil Corporation	--	--	--	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 3.
423	do	--	--	--	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 6.
424	do	--	--	--	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 7.
425	S. R. Preston, et al.	P. F. Bridgewater	--	--	--	--	Kt	--	--	--	--	Irr	--
501	Mobil Oil Corporation	--	--	187	10 7	10 187	Kt	2,670	--	--	N	N	Preston Supply Unit, water supply well 10. Reported yield, 40 gpm.
502	L. V. Braden	--	1951	338	10	230	Kea, Kt	2,705	126.71	Mar. 8, 1961	T, G	Irr	Perforated casing from 130 to 230 feet. Reported yield, 90 gpm.
503	do	--	1953	338	12	--	Kea, Kt	--	--	--	T, G	Irr	Reported yield, 150 gpm.
504	Lillie Midkiff, et al.	T. O. Midkiff, III	1966	250	--	--	Kea, Kt	2,702	90.9	Oct. 27, 1966	C, W	S	--
505	El Paso Natural Gas	--	1962	208	8-5/8	208	Kt	2,738	112 128.1	1962 Jan. 13, 1967	S, E	Ind	Slotted casing from 120 to 143 feet and 170 to 190 feet. Reported yield, 170 gpm.
506	do	--	1962	185	--	--	Kt	--	--	--	N	N	Well plugged. Reported yield, 50 gpm.
507	do	--	1962	197	--	--	Kt	--	--	--	N	N	Do.
508	do	--	1962	190	--	--	Kt	--	--	--	N	N	Well capped.
* 509	do	--	1962	200	8-5/8	200	Kt	2,730	115	1962	S, E	Ind	Slotted casing from 138 to 150 feet and 162 to 190 feet.
510	do	--	1962	212	8-5/8	212	Kt	2,730	92 102.7	do Jan. 12, 1967	S, E	Ind	Slotted casing from 114 to 124 feet; 129 to 146 feet; 151 to 197 feet; and 202 to 210 feet. Reported yield, 150 gpm.
511	do	--	1962	230	--	--	Kt	2,735	123	1962	N	N	Unused industrial well.
512	do	--	1962	192	8-5/8	192	Kt	2,725	105	do	S, E	Ind	Slotted casing from 125 to 135 feet and 140 to 170 feet. Reported yield, 60 gpm.
513	do	--	1962	195	--	--	Kt	2,720	109	do	N	N	--
514	do	--	1963	220	12-3/4	17	Kt	2,690	77 85.3	1963 Jan. 12, 1967	N	N	Unused industrial well. Reported yield, 200 gpm.
* 515	Johnny Bridgewater	P. F. Bridgewater	1920	280	--	--	Kt	2,735	116.2	Jan. 13, 1967	C, W	S	--
516	do	do	1966	280	--	--	Kt	--	--	--	C, W	D, S	--
517	D. T. Bowles, et al.	do	1934	280	--	--	Kt	2,735	104.9	Jan. 13, 1967	C, W	S	--
* 518	do	do	--	280	--	--	Kt	2,735	91.7 118.7	Apr. 9, 1937 Jan. 12, 1967	C, W	S	Well 261. 1/
519	Mobil Oil Corporation	--	--	--	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 1.
520	do	--	--	--	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 4.
521	do	--	--	--	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 5.
522	do	--	--	257	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 12.
523	do	--	--	261	--	--	Kt	--	--	--	S, E	Ind	Preston Supply Unit, water supply well 13.
601	Ernest Braden	Jerome H. Hoelscher	1958	280	10	10	Kt	2,724	133.10	Oct. 26, 1966	T, G	Irr	Reported yield, 115 gpm.
602	do	do	1962	255	12	15	Kt	2,722	123.9	do	T, G	Irr	Reported yield, 160 gpm.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
TJ-44-18-603	Ernest Braden	Jerome H. Hoelscher	1960	265	12	10	Kt	--	--	--	T, G	Irr	Reported yield, 150 gpm.
607	do	do	1960	155	--	--	Kt	2,723	138.1	Oct. 26, 1966	S, E	D, S	--
* 702	T. O. Midkiff, III	--	1943	120	6	5	Kt	2,698	--	--	C, E	D, S	--
* 703	do	--	1964	260	6	5	Kt	2,670	80 79.40 82.8	1937 Oct. 22, 1965 Nov. 18, 1966	S, E	D, S	Reported yield, 25 gpm. Well 263. 1/
* 802	L. V. Braden	--	1951	338	12	15	Kea, Kt	--	--	--	T, G	Irr	Reported yield, 200 gpm.
803	do	--	1957	440	10	350	Kea, Kt	--	--	--	S, E	N	Unused irrigation well. Reported yield, 40 gpm.
804	do	--	1955	338	10	240	Kea, Kt	--	--	--	T, E	N	Unused irrigation well. Reported yield, 80 gpm. Perforated casing from 140 to 240 feet.
810	T. O. Midkiff, III	--	1961	280	10-3/8	280	Kea, Kt	2,679	94 71.03	Apr. 1, 1963 Nov. 9, 1966	T, G	Irr	Perforated casing from 100 to 280 feet. Reported yield, 180 gpm.
811	do	--	1963	260	10-3/8	260	Kea, Kt	--	70	Oct. 1963	T, G	Irr	Perforated casing from 100 to 260 feet. Reported yield, 200 gpm.
814	Walter Braden	Ervin Braden	1950	280	10	6	Kea, Kt	2,700	--	--	T, G	Irr	Reported yield, 300 gpm.
826	Jerome H. Hoelscher	--	1966	329	--	--	Kea, Kt	2,705	117.2	Oct. 26, 1966	S, E	Irr	Reported yield, 200 gpm.
904	Mrs. F. A. Braden	F. G. Eggemeyer	1964	305	10 8-5/8	20 120-305	Kea, Kt	--	130	Oct. 20, 1965	T, G	Irr	Perforated casing from 120 to 305 feet. Reported yield, 200 gpm.
905	do	do	1964	350	12 8-5/8	20 120-285	Kea, Kt	2,700	134.02	Oct. 26, 1966	N	N	Unused irrigation well. Perforated casing from 120 to 285 feet. Reported yield, 75 gpm.
* 45-06-301	Clarence Scharbauer, Jr.	--	--	75	10-1/2	10	Qal, Kt	2,918	53.00	July 22, 1937	C, W	S	Well 7. 1/
* 601	do	--	--	89	5-1/2	20	Kt	2,933	73.0	do	C, W	S	Well 9. 1/
603	Roy Parks, Jr. Estate	Bill Faudree	--	--	--	--	Kt	2,936	--	--	C, W	S	--
604	Harriett P. Faudree	do	--	68	7	--	Kt	2,890	34.52 38.2	July 6, 1949 Mar. 17, 1967	C, W	S	--
605	do	do	--	85	--	--	Kt	2,895	47.1	do	C, W	S	--
* 901	Clarence Scharbauer, Jr.	--	-	79	6	10	Kt	2,868	62.5	Mar. 8, 1967	C, W	S	--
* 902	Harriett P. Faudree	Bill Faudree	1937	89	--	--	Kt	2,869	27.21	Aug. 3, 1937	C, W	S	Well 221. 1/
* 903	Roy Parks, et al.	do	--	65	--	--	Kt	2,872	23.59 56.2	June 5, 1937 Mar. 18, 1967	C, W	S	Well 223. 1/
908	Odessa Country Club	--	--	135	8-5/8	--	Kt	2,871	--	--	T, E	Irr	--
07-101	Clarence Scharbauer, Jr.	--	--	113	5-1/2	20	Kt	2,911	59.0	Mar. 9, 1967	C, W	S	--
* 102	do	--	--	61	8-5/8	10	Kt	2,870	31.87 37.5	July 22, 1937 Mar. 9, 1967	C, W	S	Well 10. 1/
201	do	--	--	96	7-1/2	20	Kt	2,882	56.4	do	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-45-07-202	Clarence Scharbauer, Jr.	--	--	83	8-5/8	15	Kt	2,850	35.1	Mar. 9, 1967	C, W	S	--
* 203	do	--	--	75	5-1/2	20	Kt	2,878	63.5	June 24, 1937	C, W	S	Well 11. 1/
204	do	--	1965	96	8-5/8	20	Kt	2,859	53.0	Mar. 9, 1967	C, W	S	--
401	do	--	--	86	--	20	Kt	2,880	39.2	do	C, W	S	--
402	do	--	1964	112	8-5/8	--	Kt	2,877	38.0	do	C, W	S	--
* 403	do	--	--	73	--	--	Kt	2,876	33.45 42.3	July 22, 1937 Mar. 9, 1967	C, W	S	Well 215. 1/
404	Harriett P. Faudree	Bill Faudree	--	92	--	--	Kt	2,896	49.0	Mar. 18, 1967	C, W	S	--
* 405	do	do	--	73	--	--	Kt	2,870	32.28	July 6, 1949	C, W	D, S	--
* 501	Clarence Scharbauer, Jr.	--	--	85	5-1/2	15	Kt	2,872	47.83	Jan. 3, 1943	C, W, S, E	D, S	--
502	do	--	--	53	5-1/2	15	Kt	2,842	37.3	Mar. 8, 1967	C, W	S	--
* 601	do	--	--	69	7	10	Kt	2,843	50.81 43.2	June 5, 1937 Mar. 8, 1967	C, W	S	Well 199. 1/
* 602	do	--	--	89	7	20	To	2,820	61.0 59.3	July 5, 1937 Mar. 9, 1967	C, W, S, E	S	Well 200. 1/
603	do	--	--	52	5-1/2	20	To	2,806	33.4	do	C, W	S	--
604	do	--	--	--	5-1/2	10	To	2,807	--	--	C, W	S	--
605	do	--	1964	110	8-5/8	--	Kt	2,841	60.2	Mar. 9, 1967	C, W	S	--
701	do	--	1965	--	8-5/8	--	Kt	2,852	30.9	Mar. 8, 1967	C, W	S	--
702	do	--	--	108	8-5/8	10	Kt	2,842	44.1	do	C, W	S	--
* 703	do	--	--	81	8-5/8	10	To, Kt	2,840	33.05 36.7	July 7, 1937 Mar. 8, 1967	C, W	S	Well 209. 1/
* 704	Harriett P. Faudree	Bill Faudree	--	62	--	--	Kt	2,862	31.37 33.3	June 5, 1937 Mar. 18, 1967	C, W	S	Well 219. 1/
* 803	Clarence Scharbauer, Jr.	--	--	66	6	10	To	2,820	38.26 32.9	July 5, 1937 Mar. 8, 1967	C, W	S	Well 211. 1/
* 804	do	--	--	70	8-5/8	10	To, Kt	2,800	29.29 33.2	July 5, 1937 Mar. 8, 1967	C, W	S	Well 210. 1/
805	do	--	--	108	6	10	To	2,812	55.9	do	C, W	S	--
806	Roy Parks, et al.	Bill Faudree	--	97	--	--	Kt	2,823	62.7	do	C, W	S	--
* 901	Clarence Scharbauer, Jr.	--	--	83	5-1/2	10	To	2,825	68.96 73.1	July 5, 1937 Mar. 9, 1967	C, W	S	Well 201. 1/
902	do	--	--	70	5-1/2	10	To, Kt	2,794	57.3	Mar. 8, 1967	C, W	S	--
08-504	Carl D. Glaze	--	1948	90	14	5	Kt	--	44.07 61.78 63.78 60.27	Nov. 30, 1960 Dec. 1, 1964 Nov. 29, 1967 Dec. 3, 1969	S, E	Irr	Observation well.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-45-08-602	J. C. Miles	--	--	76	16	20	Kt	2,570	45.00 61.82 62.74	Oct. 17, 1961 Dec. 7, 1966 Dec. 3, 1969	S, E	Irr	Observation well.
* 701	Clarence Scharbauer, Jr.	--	--	85	--	--	To, Kt	2,799	60.76 65.0	Aug. 2, 1937 Mar. 8, 1967	C, W	S	Well deepened in 1959. Well 182. 1/
* 702	do	--	--	39	8-5/8	10	To, Kt	2,759	27.9	do	C, W	S	--
* 703	do	--	--	35	7	10	To	2,752	25.76 27.7	Aug. 2, 1937 Mar. 8, 1967	C, W	S	Well 181. 1/
801	W. N. Lockler	--	1948	68	--	--	Kt	2,770	41.38 49.06 52.03 47.64	Nov. 30, 1960 Dec. 2, 1964 Nov. 29, 1967 Dec. 3, 1969	S, E	Irr	Observation well.
14-301	Roy Parks, Jr. Estate	Bill Faudree	--	--	--	--	Kt	2,886	73.2	Mar. 18, 1967	S, E	D	--
* 302	do	do	--	95	--	--	Kt	2,886	75.8	do	C, W	D	--
* 303	do	do	--	92	--	--	Kt	2,844	45.40 50.9	July 7, 1937 Mar. 9, 1967	C, W	S	Well 226. 1/
* 304	do	do	--	95	--	--	Kt	2,844	45.0	do	C, W	S	--
305	do	do	--	95	--	--	Kt	2,863	40.9	Mar. 10, 1967	C, W	S	--
307	do	do	--	90	--	--	Kt	2,873	64.5	Mar. 9, 1967	C, W	S	--
* 601	Frank B. Waters	Lewis Wortham	--	70	8	15	Kt	2,839	32.05	July 7, 1937	C, W	S	Well 227. 1/
602	do	do	1963	100	8	15	Kt	2,824	--	--	C, W	S	--
* 603	do	do	--	70	8	15	To, Kt	2,820	--	--	C, W	S	--
* 902	do	do	--	89	6	30	Kt	2,856	53.24 50.7	July 9, 1937 Feb. 15, 1967	S, E	D, S	Well 228. 1/
* 903	do	do	--	84	6	15	Kt	2,869	67.4	do	C, W	S	Well 229. 1/
15-101	Roy Parks, Jr. Estate	Bill Faudree	--	--	--	--	Kt	2,852	--	--	C, W	S	--
* 102	do	do	--	96	--	--	Kt	2,829	61.0	Mar. 8, 1967	C, W	S	--
103	do	do	--	66	--	--	Kt	2,838	65.9	Mar. 9, 1967	C, W	S	--
104	Martha Ann Parks, et al.	do	--	--	--	--	Kt	2,810	--	--	C, W	S	--
105	Roy Parks, Jr. Estate	Mobil Oil Corporation	--	137	6	--	Kt	2,848	82.6	Mar. 8, 1967	N	N	Abandoned industrial well.
201	S. Reed	--	1949	92	--	--	--	--	41.11 43.09 39.76	Dec. 5, 1963 Nov. 29, 1967 Dec. 3, 1969	T, E	Irr	Observation well.
* 204	Roy Parks, et al.	Bill Faudree	--	106	--	--	Kt	2,827	67.2	Mar. 1, 1967	C, W	S	--
* 205	do	do	--	34	--	--	To	2,795	13.7	Mar. 8, 1967	C, W	S	--
* 301	do	do	--	115	--	--	Kt	2,799	53.6	Mar. 1, 1967	C, W	S	--
* 302	do	do	--	125	--	--	Kt	2,815	86.2	do	C, W	S	--
* 303	Clarence Scharbauer, Jr.	--	--	72	8	10	To, Kt	2,798	66.56 66.7	Aug. 2, 1937 Mar. 8, 1967	C, W	S	Well 202. 1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
WTJ-45-15-401	Frank B. Waters	Lewis Wortham	--	90	--	--	Kt	2,814	--	--	C, W	S	--
402	do	do	--	101	5-1/2	15	Kt	2,845	46.6	Feb. 15, 1967	C, W	S	--
* 403	Texaco Incorporated	Bill Faudree	--	--	--	--	Kt	2,863	--	--	C, W	S	--
* 404	Martha Ann Parks, et al.	do	--	97	--	--	To, Kt	2,814	23.1	Mar. 8, 1967	C, W	S	--
* 405	do	do	--	47	--	--	To, Kt	2,813	32.7	do	C, W	S	--
501	Roy Parks, et al.	do	--	--	--	--	Kt	2,854	--	--	C, W	S	--
* 502	Martha Ann Parks, et al.	do	--	140	--	--	Kt	2,848	87.59 85.8	July 9, 1937 Mar. 2, 1967	C, W	S	Well 230. 1/
503	do	do	--	102	--	--	Kt	2,835	83.2	Mar. 8, 1967	C, W	S	--
* 504	do	do	--	76	--	--	Kt	2,828	51.0	do	C, W	S	--
505	do	do	--	--	--	--	Kt	2,828	--	--	S, E	D, S	--
506	do	do	--	75	--	--	Kt	2,841	56.2	Mar. 8, 1967	C, W	S	--
* 602	Roy Parks, et al.	do	--	150	6	--	Kt	2,889	122.4	Feb. 28, 1967	C, W	S	Well 232. 1/
603	do	do	--	133	6	--	Kt	2,871	105.1	do	C, W	S	--
* 604	H. F. Timmerman, et al.	do	--	140	6	--	Kt	2,869	130.9	do	C, W	S	--
* 605	Roy Parks, et al.	do	--	110	--	--	Kt	2,817	84.4	do	C, W	S	--
* 606	Florence Hall	--	--	--	--	--	Kt	2,819	--	--	C, W	S	--
607	Mary Gatlin	--	--	62	--	--	Kt	2,818	52.8	Mar. 1, 1967	C, W	S	--
608	do	--	--	104	5	--	Kt	2,809	55.7	do	C, W	S	--
* 701	Frank B. Waters	Cities Services Oil Company Plant	1956	184	7	184	Kt	2,896	104 111.7	Apr. 8, 1956 Mar. 7, 1967	S, E	Ind	Cities Service Plant, water well 1.
* 702	do	Lewis Wortham	--	150	6	10	Kt	2,894	109.3	Feb. 15, 1967	C, W	S	--
703	do	do	--	140	6	15	Kt	2,897	--	--	C, W	S	--
* 704	do	Cities Service Oil Company Plant	1950	185	7	185	Kt	2,895	106.00	Mar. 7, 1967	S, E	Ind	Cities Service Plant, water well 2. Slotted casing from 125 to 180 feet.
705	do	do	1940	185	7	185	Kt	2,898	103.83	do	S, E	Ind	Cities Service Plant, water well 3. Slotted casing from 125 to 185 feet.
706	do	do	--	--	7	185	Kt	2,897	--	--	S, E	Ind	Cities Service Plant, water well 4. Slotted casing from 125 to 185 feet.
707	Martha Ann Parks, et al.	Bill Faudree	--	--	6	--	Kt	2,900	--	--	C, W	S	--
801	Roy Parks, et al.	do	--	170	6	--	Kt	2,892	124.8	Feb. 28, 1967	C, W	S	--
* 802	Martha Ann Parks, et al.	do	--	--	--	--	Kt	2,896	--	--	C, W	S	--
803	do	do	--	--	--	--	Kt	2,903	--	--	C, W	S	--
901	Jeanne B. Ramsey	John Braun	1930	140	7	15	Kt	2,859	107.3	Jan. 21, 1967	C, W	S	--
902	James T. Windham, et al.	--	1930	200	8	15	Kt	2,858	110.0	Jan. 26, 1967	C, W	S	--
* 903	Martha Ann Parks, et al.	Bill Faudree	--	130	6	--	Kt	2,868	105.4	Feb. 28, 1967	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-45-16-101	Georgia Bryant, et al.	Jim Neal	--	114	--	--	Kt	2,820	98.0	Feb. 15, 1967	C, W	S	--
* 102	Wilson Bryant	do	--	95	--	--	Kt	2,789	71.3	do	C, W	S	--
201	Wilson Bryant and Jack Wilkinson	do	--	161	--	--	Kt	2,825	118.7	do	C, W	S	--
* 301	Leona Bryant	do	--	105	--	--	Kt	2,721	58.6	Feb. 14, 1967	C, W	S	--
* 302	Wilson Bryant	do	--	135	--	--	Kt	2,785	100.0	Feb. 15, 1967	C, W	S	--
401	Jeanne B. Ramsey	John Braun	1940	180	8	10	Kt	2,862	131.0	Jan. 21, 1967	C, W	S	--
* 402	do	do	--	200	8	20	Kt	2,852	--	--	C, W	S	Well 235. 1/
* 403	Texaco Incorporated	Jim Neal	--	107	--	--	Kt	2,800	94.4	Feb. 15, 1967	C, W	S	--
* 501	Wilson Bryant	do	--	--	--	--	Kt	2,725	--	--	C, W	S	--
* 601	do	do	--	60	--	--	Kt	2,711	35.8	Feb. 11, 1967	C, W	S	--
* 602	Zula B. Wylie and Wilson Bryant	do	--	--	--	--	Kt	2,704	--	--	C, W	S	--
* 603	Wilson Bryant	do	--	92	--	--	Kt	2,729	43.9	Feb. 14, 1967	C, W	S	--
604	Zula B. Wylie and Wilson Bryant	do	--	40	--	--	Kt	2,716	37.4	Feb. 15, 1967	C, W	D, S	--
* 605	do	do	--	40	--	--	Kt	2,716	32.47	June 28, 1937	C, W	S	Well 237. 1/
* 606	do	do	1966	52	--	--	Kt	2,718	--	--	S, E	D	--
* 701	Jeanne B. Ramsey	John Braun	--	140	8	10	Kt	2,828	122.0	Jan. 21, 1967	C, W	S	Well 234. 1/
* 702	James T. Windham, et al.	--	--	220	5-1/2	15	Kt	2,870	150.9	Jan. 25, 1967	C, W	S	Well 233. 1/
703	Texaco Incorporated	John Braun	1958	180	8	15	Kt	2,780	--	--	C, W	S	--
801	James D. Windham	--	--	120	6	12	Kt	2,780	--	--	C, W	S	--
* 802	Texaco Incorporated	John Braun	1900	120	8	15	Kt	2,798	52.4	Jan. 24, 1967	C, W	S	Well 285. 1/
* 803	Wilson Bryant	Jim Neal	--	161	--	--	Kt	2,787	92.3	Feb. 14, 1967	C, W	S	--
901	James T. Windham	--	1941	225	5-1/2	10	Kt	2,761	73.2	Jan. 25, 1967	C, W	S	--
* 902	James D. Windham	John Braun	1900	120	6	15	Kt	2,722	35.26 34.2	July 30, 1937 Jan. 24, 1967	C, W	S	Well 286. 1/
* 903	Wilson Bryant	Jim Neal	--	--	--	--	Kt	2,703	--	--	C, W	S	--
* 22-301	Texaco Incorporated	--	--	140	10	5	Kt	2,899	90.7	Feb. 15, 1967	C, W	S	--
302	do	--	--	140	10	10	Kt	2,911	--	--	C, W	S	--
601	Midland National Bank Trust	Bill Wakefield	--	220	--	--	Kt	2,899	--	--	C, W	S	--
* 602	do	do	--	220	6	--	Kt	2,916	37.4	June 26, 1937	C, W	S	Well 192. 1/
901	do	--	1958	229	10	--	Kt	2,895	119.98 116.58	Dec. 6, 1959 Nov. 24, 1965	N	N	Abandoned irrigation well.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-45-22-902	Midland National Bank Trust	--	1958	220	10	--	Kt	2,896	119.70 118.50 116.46	Dec. 6, 1959 Dec. 6, 1960 Nov. 24, 1965	N	N	Abandoned irrigation well.
903	do	--	1958	232	12	--	Kt	2,896	119.41 115.54 116.18 116.62	Dec. 6, 1959 Dec. 2, 1964 Dec. 6, 1966 Dec. 3, 1969	N	N	Abandoned irrigation well. Observation well.
23-101	Frank B. Waters, et al.	Lewis Wortham	1963	130	7-1/2	15	Kt	--	--	--	C, W	S	--
102	do	do	--	--	6	10	Kt	--	--	--	C, W	S	--
* 201	June T. Sanders, et al.	G. R. Jackson and Ray Barrett	--	180	6	15	Kt	2,900	126.02 118.6	July 16, 1937 Jan. 31, 1967	C, W	S	Well 295. 1/
202	do	do	1900	--	6	--	Kt	2,890	128.4	do	C, W	S	--
* 301	James T. Windham et al.	--	1930	120	6	15	Kt	2,880	87.5	Jan. 26, 1967	C, W	S	--
302	do	--	--	100	6	10	Kt	2,860	75.4	do	C, W	S	--
* 303	June T. Sanders	G. R. Jackson and Ray Barrett	1900	160	5-1/2	--	Kt	--	--	--	C, W	S	Well 294. 1/
* 304	Texaco Incorporated	do	--	120	6	20	Kt	2,870	92.0	Jan. 31, 1967	C, W	S	--
401	June T. Sanders, et al.	do	1930	160	6	--	Kt	2,910	114.7	Jan. 30, 1967	C, W	S	--
* 402	do	do	1930	156	6	--	Kt	2,896	192 114.3	July 29, 1937 Jan. 30, 1967	C, W	S	Well 297. 1/
* 403	do	do	1900	200	6	--	Kt	2,895	120.8	do	C, W	S	--
404	do	do	1950	156	6	10	Kt	2,895	--	--	C, W	S	--
501	do	do	1900	160	6	15	Kt	2,900	99.7	Jan. 31, 1967	C, W	S	Well 296. 1/
502	June T. Sanders	do	--	200	6	--	Kt	2,880	135.1	Jan. 30, 1967	C, W	S	--
601	Mobil Oil Corporation	--	--	235	6-5/8	235	Kt	2,836	--	--	T, E	Ind	--
602	R. E. Davidson	--	1955	200	6	20	Kt	2,868	150.1	Jan. 19, 1967	C, W	S	--
* 603	do	--	--	177	6	20	Kt	2,850	136.0	do	C, W	S	Well 291. 1/
* 604	June T. Sanders	G. R. Jackson and Ray Barrett	1962	200	6	30	Kt	--	--	--	S, E	D, S	--
605	do	do	1966	200	6	30	Kt	--	--	--	S, E	S	--
* 706	Midland National Bank Trust	Bill Wakefield	--	220	6	220	Kt	2,890	112.6	Feb. 9, 1967	C, W	S	Perforated casing.
* 801	Christian C. Holzgraf, et al.	Conrad Holzgraf	1962	143	8	20	Kt	2,880	125.6	Jan. 20, 1967	C, W	S	--
802	do	do	--	185	6	15	Kt	--	--	--	C, W	S	--
805	Roy Glass	Lewis Moore	--	180	5-1/2	15	Kt	2,860	142.6	Jan. 20, 1967	C, W	S	--
* 904	Mobil Oil Corporation	--	1947	1,317	10-3/4	1,220	Trs	2,885	180 305	Apr. 1958 July 1958	N	N	Pegasus Unit, water well 3.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-45-23-905	Mobil Oil Corporation	--	1956	220	10-3/4	220	Kt	2,877	180 185	1958 Nov. 17, 1965	T, E	Ind	Pegasus Plant, water well 9. Reported yield, 30 gpm.
* 907	do	--	1952	1,300	20	1,217	Trs, P	--	120 444	1955 1958	N	N	Pegasus Unit, water well 1.
908	do	--	1953	225	8-5/8	225	Kt	2,815	166	Apr. 1965	T, E	Ind	Pegasus Plant Camp, water well 3. Reported yield, 28 gpm.
909	do	--	1953	242	8-5/8	170	Kt	2,880	178 154	1953 1965	T, E	Ind	Pegasus Plant, water well 1. Reported yield, 20 gpm.
910	do	--	1951	240	10-3/4	193	Kt	2,871	165	do	T, E	Ind	Pegasus Plant, water well 3. Reported yield, 35 gpm.
911	do	--	1952	225	10-3/4	180	Kt	2,873	154 159	Jan. 1953 Apr. 1965	T, E	Ind	Pegasus Plant, water well 4.
912	do	--	1952	250	10-3/4	180	Kt	2,873	158 166	1952 Apr. 1965	T, E	Ind	Pegasus Plant, water well 5.
913	do	--	1952	242	10-3/4	192	Kt	2,878	168 176 183	Feb. 1952 1958 Apr. 1965	T, E	Ind	Pegasus Plant, water well 6. Reported yield, 22 gpm.
914	do	--	1952	253	8-5/8	181	Kt	2,873	169 180.59	Mar. 1952 Nov. 11, 1965	T, E	Ind	Pegasus Plant, water well 7.
* 915	Roy Glass, et al.	Lewis Moore	--	--	6	15	Kt	2,870	176.5	Jan. 20, 1967	C, W	S	--
* 24-101	James T. Windham, et al.	--	1900	100	6	--	Kt	--	118.82	July 16, 1937	C, W	S	Well 287. 1/
* 102	James T. Windham	--	1920	100	6	15	Kt	--	--	--	C, W	D, S	--
* 103	do	--	1890	100	6	10	Kt	2,780	38.6	Jan. 26, 1967	C, W	S	Well 288. 1/
201	Mrs. Virginia Youngblood	John Braun	1958	160	8	10	Kt	2,682	55	Oct. 4, 1962	C, W	S	--
* 202	Texaco Incorporated	--	1890	100	8	10	Kt	2,715	22.67 16.6	July 30, 1937 Jan. 25, 1967	C, W	S	Well 282. 1/
* 203	Virginia and John Braun	--	1900	100	8	15	Kt	2,775	23.0	do	C, W	S	--
* 204	do	--	1905	100	8	12	Kt	--	41.89	July 20, 1937	C, W	S	Well 284. 1/
301	Virginia Braun	--	1962	150	8	10	Kt	2,765	80.6	Jan. 24, 1967	C, W	S	--
* 302	do	--	--	140	8	15	Kt	2,707	33.28 32.4 34.2	July 30, 1937 Jan. 25, 1962 Jan. 25, 1967	S, E	D, S	Well 281. 1/
303	do	--	1958	228	8-5/8	6	Kt	2,695	17.3	do	C, W	S	--
304	do	--	1966	100	8	8	Kt	2,695	20.0	Jan. 20, 1967	C, W	S	--
* 305	Lois Patterson, et al.	Guy Cowden	--	100	6	--	Kt	2,711	48 43.5	June 28, 1937 Jan. 30, 1967	C, W	S	Well 279. 1/
* 306	Wilson Bryant, et al.	Jim Neal	--	--	--	--	Kt	--	--	--	C, W	S	--
* 402	R. E. Davidson	--	1930	160	6	20	Kt	2,810	92.9	Jan. 19, 1967	C, W	S	--
403	James T. Windham, et al.	--	--	200	6	15	Kt	--	--	--	C, W	S	--
* 501	R. E. Davidson	--	1900	138	6	20	Kt	--	77.39	July 29, 1937	C, W	S	Well 290. 1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
TJ-45-24-502	Texaco Incorporated	John Braun	1934	140	8	--	Kt	2,783	89.2	Jan. 25, 1967	C, W	S	Old oil test converted to water well. Well 289. 1/
503	Lois Patterson, et al.	Guy Cowden	--	200	6	--	Kt	2,750	118.8	Jan. 30, 1967	C, W	S	--
601	Virginia Braun	--	1941	140	8	18	Kt	--	--	--	C, W	S	--
* 602	Texaco Incorporated	John Braun	1954	140	6	8	Kt	2,720	53.7	Jan. 20, 1967	C, W	S	--
603	Lois Patterson, et al.	Guy Cowden	--	200	6	15	Kt	2,790	113.2	Jan. 30, 1967	C, W	S	--
* 604	do	do	--	200	6	15	Kt	2,730	114.8	do	C, W	D, S	--
605	do	do	--	--	6	12	Kt	2,720	88.4	do	C, W	S	--
801	Roy Davidson	--	1930	184	8	5	Kt	--	147.60	Dec. 4, 1965	C, W	S	--
* 802	do	Ellen Davidson	1900	175	6	5	Kt	--	--	--	C, W	D, S	--

1/ Texas Board of Water Engineers duplicated report, "Records of Wells, Drillers' Logs, and Water Analyses, and Map Showing Location of Wells, Midland County, Texas," January 31, 1938; water levels are from measure point and not from land surface.
* Chemical analysis of water given in Table 7.

MIDLAND COUNTY

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
				Santa Rosa Formation and Permian rocks undifferentiated														
5/ TJ-45-23-907	Mobile Oil Corporation	1,300	Jan. 27, 1959	11	169	205	3,538	308	1,811	4,839	--	--	10,900	--	85.9	14,776	7.5	43.3
				Santa Rosa Formation														
44-09-504	Ollie Cox	--	Jan. 20, 1967	16	366	97	486	250	1,380	530	2.6	23	3,020	1,310	44.9	3,820	7.4	6.9
4/ 45-23-900	Mobil Oil Corporation	1,317	Mar. 21, 1958	--	222	183	4,597	304	1,757	6,539	--	--	1,360	--	--	--	7.80	--
				Trinity Group														
27-63-801	Clarence Scharbauer, Jr.	66	Mar. 9, 1967	43	101	11	67	340	73	65	2.1	11	540	300	29.9	836	7.5	.7
44-01-701	W. F. Willis, et al.	72	Jan. 30, 1967	31	95	16	82	244	115	116	1.3	11	590	305	37.0	958	7.8	2.0
806	J. J. Willis, et al. and A. B. Halff	80	do	47	130	18	72	262	158	136	2.0	12	710	401	29.6	1,080	7.4	1.6
1/ 09-401	Ollie Cox	80	July 13, 1937	--	88	22	105	232	197	100	--	-	726	309	--	--	--	--
503	do	70	Jan. 20, 1967	10	248	38	185	183	730	178	2.6	15	1,500	780	3.4	2,000	7.8	.3
1/ 601	do	62	July 13, 1937 Jan. 20, 1967	-- 5	-- 223	-- 37	-- 94	232 127	230 670	30 92	-- 2.6	-- 1.5	563 1,190	-- 710	-- 22.3	-- 1,580	-- 6.7	1.5
1/ 602	do	65	July 13, 1937	--	--	--	--	195	252	64	--	--	617	--	--	--	--	--
1/ 603	do	91	July 14, 1937 Jan. 20, 1967	-- 16	-- 182	-- 19	-- 89	-- 317	136 277	66 131	-- .4	50 2.0	-- 910	-- 530	-- 30.1	-- 1,350	-- 7.8	-- 1.6
801	do	82	do	7	285	93	380	331	1,230	272	3.1	< .4	2,430	1,090	43.1	3,050	7.5	5.1
802	do	--	do	2	45	12	99	272	10	113	3.1	< .4	416	362	56.9	770	7.6	3.4
1/ 901	do	200	July 13, 1937 Jan. 20, 1967	-- 13	64 122	6 11	80 43	293 290	19 31	70 125	-- .4	< 20 < .04	383 488	184 351	-- 21.1	-- 865	-- 7.4	-- 1.0
10-101	Mrs. L. E. Floyd	80	Jan. 11, 1967	38	107	16	124	322	162	107	2.3	16	730	335	44.1	1,080	7.5	2.9
1/ 102	do	51	June 8, 1937	--	--	--	--	317	114	56	--	20	509	--	--	--	--	--
1/ 104	Louise Butt Shackelford, et al.	70	July 14, 1937 Jan. 4, 1967	-- 12	107 132	21 36	52 165	275 292	99 246	98 249	-- 1.5	20 11	512 1,000	353 479	-- 42.9	-- 1,600	-- 7.4	-- 3.3
1/ 105	do	160	July 14, 1937	--	--	--	--	256	132	104	--	20	560	--	--	--	--	--
208	Jay H. Floyd	40	Jan. 11, 1967	40	140	20	46	339	62	99	2.3	72	650	432	18.8	1,034	7.4	1.1
303	Bryant A. Harris	125	Dec. 20, 1966	10	71	30	213	312	219	211	3.2	12	920	300	61.5	1,500	7.7	5.3
2/ 401	Texaco Incorporated	186	July 20, 1960	11	149	69	3,630	354	1,800	4,500	--	--	10,300	656	92	15,200	7.1	6.1
505	James W. Walton	80	Dec. 22, 1966	20	242	48	167	300	670	151	2.5	21	1,470	800	31.2	1,595	7.8	2.6

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Trinity Group--Continued											
1/ TJ-44-10-608	James W. Walton	120	Mar. 31, 1937	--	88	49	125	238	269	154	--	--	802	420	--	--	--	--
1/ 705	Alvin Herron	163	July 13, 1937	--	--	--	--	220	93	24	--	--	349	--	--	--	--	--
			Feb. 15, 1967	52	90	13	29	237	104	24	1.1	15	445	278	18.4	646	7.5	0.7
1/ 805	E. P. Driver	90	Mar. 30, 1937	--	168	32	71	226	430	50	--	--	862	550	--	--	--	--
1/ 807	do	80	do	--	222	46	102	226	630	88	--	--	1,199	744	--	--	--	--
1/ 901	Bryant A. Harris	70	do	--	498	173	385	378	1,958	315	--	--	3,515	1,956	--	--	--	--
903	E. P. Driver	125	Nov. 10, 1966	8	277	43	158	289	670	188	1.5	19	1,510	870	29.2	2,060	7.6	2.3
1/ 905	do	37	Mar. 30, 1937	--	366	55	92	281	983	60	--	--	1,704	1,139	--	--	--	--
17-101	Lois Patterson, et al.	100	Jan. 30, 1967	28	330	47	99	248	730	178	3.0	7	1,540	1,020	17.5	2,050	7.3	1.4
102	do	200	do	9	224	48	108	196	690	63	2.2	33	1,270	760	23.6	1,660	7.4	1.7
103	Wilson Bryant	--	Feb. 10, 1967	45	246	79	249	394	870	172	4.5	11	1,870	940	36.5	2,480	7.5	3.5
1/ 201	Ollie Cox	190	July 13, 1937	--	151	62	115	79	704	60	--	< 20	1,131	633	--	--	--	--
			Jan. 20, 1967	7	337	71	190	218	1,160	133	3.0	< .4	2,010	1,130	21.1	2,390	7.8	2.4
1/ 402	Tyson Midkiff	160	June 15, 1937	--	100	24	35	73	307	32	--	< 20	534	350	--	--	--	--
1/ 403	do	160	do	--	--	--	--	--	177	28	--	< 20	--	--	--	--	--	--
1/ 404	do	126	do	--	--	--	--	--	866	142	--	48	--	--	--	--	--	--
703	Henry Currie	175	Dec. 10, 1965	11	124	33	58	234	275	36	2.8	27	680	445	22.1	1,040	7.4	1.2
1/ 708	Lois Patterson, et al.	200	June 28, 1937	--	--	--	--	85	472	44	--	< 20	808	--	--	--	--	--
1/ 804	John Midkiff	179	June 15, 1937	--	--	--	--	--	449	42	--	< 20	--	--	--	--	--	--
1/ 18-102	Mrs. Billy Babb	250	June 10, 1937	--	--	--	--	244	55	22	--	< 20	312	--	--	--	--	--
103	do	250	Jan. 13, 1967	12	84	12	16	253	44	22	1.1	9	324	258	11.8	546	7.6	4.3
1/ 106	Mrs. Tommie Douglass	250	June 10, 1937	--	--	--	--	189	374	36	--	< 20	714	--	--	--	--	--
2/ 201	El Paso Natural Gas	145	Mar. 7, 1961	--	77	14	45	246	88	26	1.4	17	403	250	28	653	7.0	1.2
203	F. F. Bridgewater	280	Jan. 13, 1967	12	75	11	17	251	32	15	1.2	12	298	234	13.7	500	7.8	.5
204	Johnny Bridgewater	280	do	34	104	31	65	311	123	97	2.6	5.0	620	386	26.9	964	7.9	1.5
1/ 212	do	280	June 10, 1937	--	--	--	--	281	213	70	--	< 20	641	--	--	--	--	--
3/ 213	El Paso Natural Gas	143	Dec. 21, 1961	16.0	200	62	101	190	120	53	--	--	575	262	--	--	7.5	--
			Mar. 16, 1967	22	273	66	268	294	850	304	2.7	15	1,950	960	37.9	2,750	7.3	3.8
1/ 302	E. P. Driver	120	Mar. 30, 1937	--	92	23	62	305	119	60	--	--	506	324	--	--	--	--
2/ 405	Frank Midkiff	225	Mar. 7, 1961	15	185	44	120	214	600	55	1.9	25	1,150	642	29	1,550	7.1	2.1
1/ 407	Lillie Midkiff, et al.	220	June 11, 1937	--	--	--	--	--	28	15	--	< 20	--	--	--	--	--	--
1/ 408	Frank Midkiff	170	do	--	--	--	--	--	110	26	--	< 20	--	--	--	--	--	--

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well		Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
								Trinity Group--Continued											
	TJ-44-18-509	El Paso Natural Gas	200	Nov. 29, 1962	27.6	202	48	101	219	57	80	--	--	625	250	--	--	7.7	--
				Jan. 13, 1967	13	82	17	33	275	67	31	1.2	13	392	276	20.6	648	7.9	2.9
	515	Johnny Bridgewater	280	do	15	99	12	68	220	70	135	.8	6	510	296	33.3	895	8.2	3.6
1/	518	D. T. Bowles, et al.	280	Apr. 9, 1937	--	--	--	--	256	398	84	--	--	905	--	--	--	--	--
	702	T. O. Midkiff, III	120	Oct. 22, 1965	13	97	18	50	312	96	37	1.8	10	476	317	25	785	7.4	1.2
1/	703	do	260	June 11, 1937	--	--	--	--	--	138	92	--	128	--	--	--	--	--	--
				Oct. 22, 1965	13	114	21	66	299	140	60	1.8	41	600	371	28	975	7.4	1.5
1/	45-06-601	Clarence Scharbauer, Jr.	89	July 22, 1937	--	--	--	--	232	44	58	--	< 20	343	--	--	--	--	--
	901	do	79	Mar. 8, 1967	52	112	9	61	332	76	64	1.8	14	550	318	29.4	865	7.3	3.6
1/	902	Harriet P. Faudree	89	Aug. 3, 1937	--	--	--	--	268	71	50	--	< 20	399	--	--	--	--	--
1/	903	Roy Parks, et al.	65	June 5, 1937	--	--	--	--	--	181	88	--	--	--	--	--	--	--	--
1/	07-102	Clarence Scharbauer, Jr.	61	July 22, 1937	--	86	9	29	256	44	40	--	< 20	334	250	--	--	--	--
1/	203	do	75	June 24, 1937	--	--	--	--	--	59	64	--	< 20	--	--	--	--	--	--
1/	403	do	73	July 22, 1937	--	--	--	--	305	125	106	--	< 20	593	--	--	--	--	--
	405	Harriet P. Faudree	73	Mar. 18, 1967	25	85	12	43	233	67	58	.5	25	431	259	26.3	695	7.4	3.1
	501	Clarence Scharbauer, Jr.	85	Mar. 9, 1967	30	79	12	38	237	66	46	1.2	15	404	245	25.2	645	7.6	2.9
	601	do	69	June 5, 1937	--	--	--	--	250	75	34	--	< 20	363	--	--	--	--	--
1/	704	Harriet P. Faudree	62	do	--	--	--	--	--	169	70	--	< 20	--	--	--	--	--	--
	14-302	Roy Parks, Jr. Estate	95	Mar. 18, 1967	31	91	29	68	244	133	94	2.3	22	590	348	29.8	960	7.8	5.3
1/	303	do	92	July 7, 1937	--	--	--	--	--	133	120	--	--	--	--	--	--	--	--
	304	do	95	Mar. 9, 1967	30	65	18	63	231	83	65	1.8	< .4	439	238	36.4	720	7.2	4.8
1/	601	Frank B. Waters	70	July 7, 1937	--	374	97	274	220	1,482	146	--	< 20	2,481	1,335	--	--	--	--
1/	902	do	89	July 9, 1937	--	--	--	--	--	482	170	--	--	--	--	--	--	--	--
				Feb. 15, 1967	37	181	40	131	205	468	152	2.7	35	1,150	620	31.5	1,680	7.5	2.3
1/	903	do	84	July 9, 1937	--	--	--	--	--	356	100	--	--	--	--	--	--	--	--
	15-102	Roy Parks, Jr. Estate	96	Mar. 8, 1967	48	93	30	88	222	158	149	2.5	11.0	690	358	34.9	1,090	7.5	2.0
	204	Roy Parks, et al.	106	do	45	496	178	690	194	2,030	840	2.9	22	4,400	1,970	43.2	5,490	7.3	4.8
	301	do	115	do	30	315	86	190	171	1,070	191	2.9	28	2,000	1,140	26.6	2,540	7.4	2.4
	302	do	125	do	40	520	190	760	161	2,000	1,040	2.9	53	4,690	2,080	44.2	5,960	7.2	6.1
	403	Texaco Incorporated	--	do	26	117	27	116	211	261	148	2.3	17	820	405	38.3	1,290	8.0	2.5
	502	Martha Ann Parks, et al.	140	Mar. 2, 1967	27	130	48	119	222	336	180	2.5	18	970	520	33.1	1,500	7.3	2.3
	504	do	76	Mar. 8, 1967	48	386	33	80	312	310	99	3.3	37	950	600	22.5	1,440	7.1	1.4

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Trinity Group--Continued											
1/ TJ-45-15-602	Roy Parks, et al.	150	July 9, 1937	--	--	--	--	250	108	54	--	--	442	--	--	--	--	--
			Feb. 28, 1967	8	124	21	47	232	176	88	1.9	16	600	396	20.5	947	8.0	1.0
604	H. F. Timmerman, et al.	140	do	15	72	13	16	239	33	16	1.5	15	300	231	13.3	490	7.6	.5
605	Roy Parks, et al.	110	Feb. 8, 1967	16	71	23	97	228	151	72	2.4	22	570	272	43.6	890	7.8	2.5
606	Florence Hall	--	Mar. 1, 1967	53	121	19	89	229	168	129	2.8	28	720	380	33.8	1,105	7.4	2.0
701	Frank B. Waters	184	Mar. 7, 1967	27	163	40	97	182	451	112	2.3	23	1,000	570	26.9	1,450	7.1	1.7
702	do	150	Mar. 15, 1967	31	142	32	81	193	373	76	2.2	19	850	488	26.5	1,210	7.5	1.6
704	do	185	Mar. 7, 1967	29	191	47	123	343	431	163	2.1	< .4	1,160	670	28.5	1,670	7.3	2.1
802	Martha Ann Parks, et al.	--	Mar. 2, 1967	33	92	18	32	223	123	38	1.9	20	468	307	18.7	714	7.5	.8
903	do	130	Feb. 28, 1967	24	102	10	12	246	74	20	1.1	22	386	298	8.0	585	7.5	.3
16-102	Wilson Bryant	95	Feb. 15, 1967	49	69	32	101	339	119	62	3.1	16	620	304	42.0	944	7.5	2.5
301	Leona Bryant	105	Feb. 14, 1967	19	51	22	119	206	193	78	1.8	15	600	219	54.1	931	8.1	3.5
302	Wilson Bryant	135	Feb. 15, 1967	16	102	68	261	232	640	185	2.8	13	1,400	540	51.4	2,060	8.0	4.9
1/ 402	Jeanne B. Ramsey	200	Aug. 2, 1937	--	156	63	280	207	645	295	--	< 20	1,531	649	--	--	--	--
			Jan. 21, 1967	44	152	83	304	203	690	343	3.0	17	1,740	720	47.9	2,460	7.6	4.9
403	Texaco Incorporated	107	Feb. 15, 1967	12	152	44	137	207	447	160	2.4	17	1,070	560	34.6	1,590	7.2	2.5
501	Wilson Bryant	--	Feb. 14, 1967	12	252	112	360	154	1,060	441	1.7	26	2,340	1,090	41.7	3,350	7.9	4.7
601	do	60	Feb. 11, 1967	14	165	36	130	217	404	146	2.6	19	1,020	560	33.5	1,630	7.5	2.4
602	Zula B. Wylie and Wilson Bryant	--	Feb. 14, 1967	48	135	71	375	300	850	242	3.9	14	1,890	630	56.5	2,690	7.7	6.5
603	Wilson Bryant	92	do	18	100	28	121	205	288	119	2.9	14	790	365	41.8	1,260	7.9	6.5
1/ 605	Zula B. Wylie and Wilson Bryant	40	June 28, 1937	--	--	--	--	--	672	240	--	< 20	--	--	--	--	--	--
606	do	52	Feb. 15, 1967	45	126	74	420	262	890	272	3.1	55	2,010	620	59.6	2,760	7.6	7.3
1/ 701	Jeanne B. Ramsey	140	Aug. 2, 1937	--	--	--	--	268	59	28	--	< 20	348	--	--	--	--	--
1/ 702	James T. Windham, et al.	220	July 16, 1937	--	--	--	--	--	352	98	--	< 20	--	--	--	--	--	--
			Feb. 25, 1967	9	132	38	86	200	348	100	2.1	21	830	486	27.8	1,250	7.5	1.7
1/ 802	Texaco Incorporated	120	July 30, 1937	--	111	21	69	238	240	48	--	< 20	606	363	--	--	--	--
803	Wilson Bryant	161	Feb. 14, 1967	14	73	16	56	226	104	43	2.5	21	441	249	32.7	715	7.6	1.5
1/ 902	James D. Windham	120	July 30, 1937	--	--	--	--	238	260	44	--	< 20	632	--	--	--	--	--
903	Wilson Bryant	--	Feb. 10, 1967	14	74	19	49	229	100	47	2.1	15	433	265	28.5	720	7.3	1.3
22-301	Texaco Incorporated	140	Feb. 15, 1967	29	189	24	68	189	410	79	2.0	45	940	570	20.5	1,340	7.5	1.2
1/ 602	Midland National Bank Trust	220	June 26, 1937	--	--	--	--	--	110	92	--	< 20	--	--	--	--	--	--

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
								Trinity Group--Continued										
1/ TJ-45-23-201	June T. Sanders, et al.	180	July 16, 1937 Jan. 31, 1967	-- 11	-- 135	-- 19	-- 43	220 295	204 207	56 46	-- 1.1	< 20 2.5	697 610	-- 416	-- 18.2	-- 936	-- 7.3	-- 0.9
301	James T. Windham, et al.	120	Jan. 25, 1967	13	93	20	29	229	101	63	2.0	13	427	314	16.7	710	8.0	.7
1/ 303	June T. Sanders	160	July 16, 1937	--	--	--	--	214	293	54	--	< 20	675	--	--	--	--	--
304	Texaco Incorporated	120	Jan. 31, 1967	17	117	26	45	233	221	46	2.4	< .4	590	399	19.5	914	7.3	.9
1/ 402	June T. Sanders, et al.	156	July 29, 1937	--	--	--	--	220	158	34	--	< 20	457	--	--	--	--	--
403	do	200	Jan. 30, 1967	17	176	43	43	229	440	32	2.2	22	890	620	13.1	1,200	7.5	.7
603	R. E. Davidson	177	Jan. 19, 1967	12	108	30	75	251	216	78	2.9	20	670	393	29.3	1,022	7.7	1.6
604	June T. Sanders	200	Jan. 31, 1967	11	84	16	21	224	74	25	2.9	23	367	276	14.0	610	7.6	.5
706	Midland National Bank Trust	220	Feb. 9, 1967	11	244	41	37	187	630	21	2.2	18	1,100	780	9.3	1,450	7.5	.6
801	Christian C. Halagraf, et al.	143	Jan. 20, 1967	12	311	38	31	153	740	40	2.5	35	1,290	940	6.6	1,550	7.4	.4
915	Roy Glass, et al.	--	do	7	79	34	67	265	227	27	2.9	< .4	570	337	30.3	875	7.6	1.6
1/ 24-101	James T. Windham, et al.	100	July 16, 1937	--	--	--	--	264	92	30	--	< 20	377	--	--	--	--	--
102	James T. Windham	100	Jan. 26, 1967	8	80	53	45	179	276	61	2.6	3	620	416	19.2	943	7.5	.9
1/ 103	do	100	July 16, 1937	--	--	--	--	342	323	60	--	< 20	831	--	--	--	--	--
1/ 202	Texaco Incorporated	100	do Jan. 25, 1967	-- 14	-- 178	-- 34	-- 47	244 228	92 385	30 53	-- 1.8	< 20 22	377 850	-- 580	-- 24.9	-- 1,180	-- 7.7	-- .8
203	Virginia and John Braun	100	do	30	391	36	34	183	920	43	4.2	33	1,580	1,130	6.1	1,800	7.3	.4
1/ 204	do	100	July 30, 1937	--	--	--	--	202	240	52	--	< 20	586	--	--	--	--	--
1/ 302	Virginia Braun	140	do	--	--	--	--	--	268	82	--	< 20	--	--	--	--	--	--
1/ 305	Lois Patterson, et al.	100	June 28, 1937	--	--	--	--	24	870	70	--	< 20	1,362	--	--	--	--	--
306	Wilson Bryant, et al.	--	Feb. 10, 1967	12	121	27	80	232	279	58	2.5	29	720	417	29.4	1,090	7.9	1.7
402	R. E. Davidson	160	Jan. 19, 1967	16	136	18	31	257	190	37	2.6	21	580	415	13.9	862	7.9	.6
1/ 501	do	138	July 29, 1937	--	251	21	38	250	480	64	--	< 20	977	713	--	--	--	--
602	Texaco Incorporated	140	Jan. 20, 1967	21	235	48	64	218	590	61	3.2	21	1,150	780	15.1	1,500	7.4	1.0
604	Lois Patterson, et al.	200	Jan. 30, 1967	11	141	33	50	211	339	34	2.5	30	750	490	18.1	1,071	7.5	1.0
802	Roy Davidson	175	Dec. 4, 1965	10	87	22	41	231	142	22	2.7	26	467	308	22.4	735	7.8	1.0
								Edwards and associated limestones and Trinity Group										
2/ 44-18-802	L. V. Braden	338	Aug. 8, 1961	12	260	78	322	206	914	372	--	29	2,090	969	42	2,960	6.9	4.5

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
						Ogallala Formation and Trinity Group												
TJ-44-02-407	El Paso Natural Gas	67	Mar. 16, 1967	72	186	98	296	234	820	325	4.5	11	1,940	870	42.5	2,750	7.6	4.4
409	do	71	Jan. 29, 1962	60	234	250	282	194	262	310	--	--	1,290	484	--	--	--	--
502	Barry Boone	40	Dec. 20, 1966	67	185	101	290	329	680	373	4.1	10	1,870	880	42.7	2,600	7.3	4.3
503	do	30	do	69	101	50	229	316	459	170	5.4	6	1,240	460	52.6	1,750	7.6	4.7
1/ 504	O. D. O'Daniel, Sr.	45	Apr. 29, 1937 Jan. 4, 1967	-- 67	-- 126	-- 30	-- 160	262 270	737 356	300 139	-- 5.2	< 20 9	1,694 1,030	-- 437	-- 44.4	-- 1,500	-- 8.0	-- 3.4
507	do	60	do	65	87	45	105	303	202	118	4.3	7	780	403	36.3	1,175	8.0	2.3
1/ 509	Mrs. L. E. Floyd	50	Apr. 29, 1937 Jan. 3, 1967	-- 65	-- 116	-- 83	-- 245	366 353	392 443	205 298	-- 4.3	30 12	1,157 1,440	-- 630	-- 45.9	-- 2,060	-- 7.9	-- 2.7
1/ 902	Barry Boone	55	Mar. 24, 1937	--	417	300	1,267	305	2,461	1,410	--	--	6,005	2,276	--	--	--	--
903	do	50	Dec. 20, 1966	74	650	500	1,760	273	2,880	3,270	5.1	19	9,300	3,700	50.3	10,490	7.0	12.6
09-201	Ollie Cox	44	Jan. 20, 1967	22	85	10	10	278	23	9	.5	17	314	256	7.8	520	7.5	.3
305	W. F. Willis	70	Jan. 31, 1967	36	82	20	66	251	91	86	1.7	12	520	288	3.3	833	7.5	.2
402	Leona Bryant	67	Feb. 14, 1967	30	88	35	195	233	339	160	2.6	15	980	365	4.8	1,580	8.4	.4
1/ 45-07-703	Clarence Scharbauer, Jr.	81	July 7, 1937	--	--	--	--	--	104	88	--	< 20	--	--	--	--	--	--
1/ 804	do	70	July 5, 1937	--	--	--	--	--	45	58	--	--	--	--	--	--	--	--
1/ 08-701	do	85	Aug. 2, 1937	--	74	26	68	268	103	72	--	--	489	291	--	--	--	--
702	do	39	Mar. 8, 1967	53	135	84	458	298	1,010	293	5.4	4.7	2,190	680	59.2	3,150	7.3	12.9
14-603	Frank B. Waters	70	Feb. 15, 1967	67	610	211	540	214	1,720	1,170	2.9	18	4,440	2,390	32.9	5,706	7.2	4.8
1/ 15-303	Clarence Scharbauer, Jr.	72	Aug. 2, 1937	--	--	--	--	287	201	110	--	< 20	692	--	--	--	--	--
404	Martha Ann Parks, et al.	97	Mar. 8, 1967	65	800	328	2,320	151	3,330	3,120	4.9	110	10,200	3,350	60	> 1,200	7.0	3.1
405	do	47	do	19	396	181	630	234	1,790	730	2.6	37	3,900	1,730	44.2	6,060	7.4	5.9
							Ogallala Formation											
TJ-44-01-203	P. Crespi	78	Feb. 28, 1967	65	182	112	217	222	680	342	4.5	21	1,730	920	34.1	2,430	7.6	3.1
204	do	62	do	67	105	67	144	236	362	207	4.5	14	1,080	540	36.8	1,600	7.6	2.7
302	Alice Buchanan	62	do	65	141	89	180	240	520	274	4.8	14	1,410	720	35.2	2,050	7.5	2.9
601	do	60	do	52	110	46	159	257	94	366	2.2	10	970	466	42.9	1,720	7.5	3.2
1/ 602	H. E. Turner, Estate	68	June 29, 1937	--	--	--	--	281	138	122	--	39	616	--	--	--	--	--
801	J. J. Willis, et al.	80	Jan. 31, 1967	44	182	66	177	215	423	351	2.3	23	1,370	720	34.9	2,100	7.7	2.9
802	do	70	do	47	287	97	334	172	650	750	2.6	21	2,270	1,120	39.5	3,330	7.3	4.3
803	do	85	Feb. 9, 1967	55	520	132	311	173	680	1,190	1.9	25	3,000	1,850	24.9	4,550	7.3	3.7
804	Ben Winkleman, et al.	--	Jan. 31, 1967	49	446	100	520	207	1,110	920	2.1	45	3,290	1,530	42.5	4,500	7.2	5.8

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells--Continued

	Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
								Ogallala Formation											
	YJ-44-01-807	Warren Petroleum Corporation	92	Feb. 9, 1967	45	83	30	89	215	125	147	1.8	18	650	332	36.9	1,045	8.1	2.1
	02-202	B. W. Brown	62	Dec. 29, 1966	74	155	93	350	235	710	447	5.0	9	1,960	770	39.1	2,750	7.5	5.5
	206	do	60	do	71	167	121	380	229	840	510	4.7	5	2,210	920	48.3	3,130	7.3	5.5
	209	Barry Boone	71	do	67	190	128	530	231	940	660	5.2	8	2,640	1,000	53.2	3,700	7.3	7.3
1/	602	do	26	Mar. 24, 1937	--	433	328	655	256	2,419	800	--	--	4,761	2,433	--	--	--	--
1/	603	do	38	do	--	--	--	--	494	1,759	960	--	--	4,399	--	--	--	--	--
1/	09-302	Ben Winkleman, et al.	70	July 14, 1937	--	145	51	178	305	308	275	--	< 20	1,107	572	--	--	--	--
1/	45-07-602	Clarence Scharbauer, Jr.	89	July 5, 1937	--	--	--	--	--	74	44	--	--	--	--	--	--	--	--
				Mar. 9, 1967	45	102	31	61	354	108	5	2.1	45	630	384	25.6	948	7.6	3.7
1/	803	do	66	July 5, 1937	--	--	--	--	317	222	140	--	--	794	--	--	--	--	--
				Mar. 8, 1967	44	155	50	140	331	360	178	2.6	16	1,110	590	33.9	1,700	7.4	2.5
1/	901	do	83	July 5, 1937	--	--	--	--	--	41	56	--	--	--	--	--	--	--	--
4/	08-703	do	35	Aug. 2, 1937	--	423	126	282	232	1,555	190	--	140	2,838	1,578	--	--	--	--
				Mar. 8, 1967	53	84	105	185	378	550	105	5.8	10	1,280	640	38.6	1,900	7.6	8.2
	205	Roy Parks, et al.	34	do	75	620	190	590	201	2,030	930	5.2	24	4,560	2,330	35.6	5,800	7.4	5.3
								Alluvium and Trinity Group											
1/	301	Clarence Scharbauer, Jr.	75	Jul. 22, 1937	--	--	--	--	238	29	24	--	< 20	274	--	--	--	--	--
				Mar. 9, 1967	27	72	10	72	237	34	26	1.1	14	323	221	17.5	520	7.5	2.5

1/ Texas Board of Water Engineers duplicated report, "Records of wells, drillers' logs, and water analyses, and map showing location of wells, Midland County, Texas", January 31, 1938.
2/ U.S. Geological Survey.
3/ El Paso Natural Gas.
4/ Magnolia Petroleum Company.
5/ Mobil Oil Corporation.

MIDLAND COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

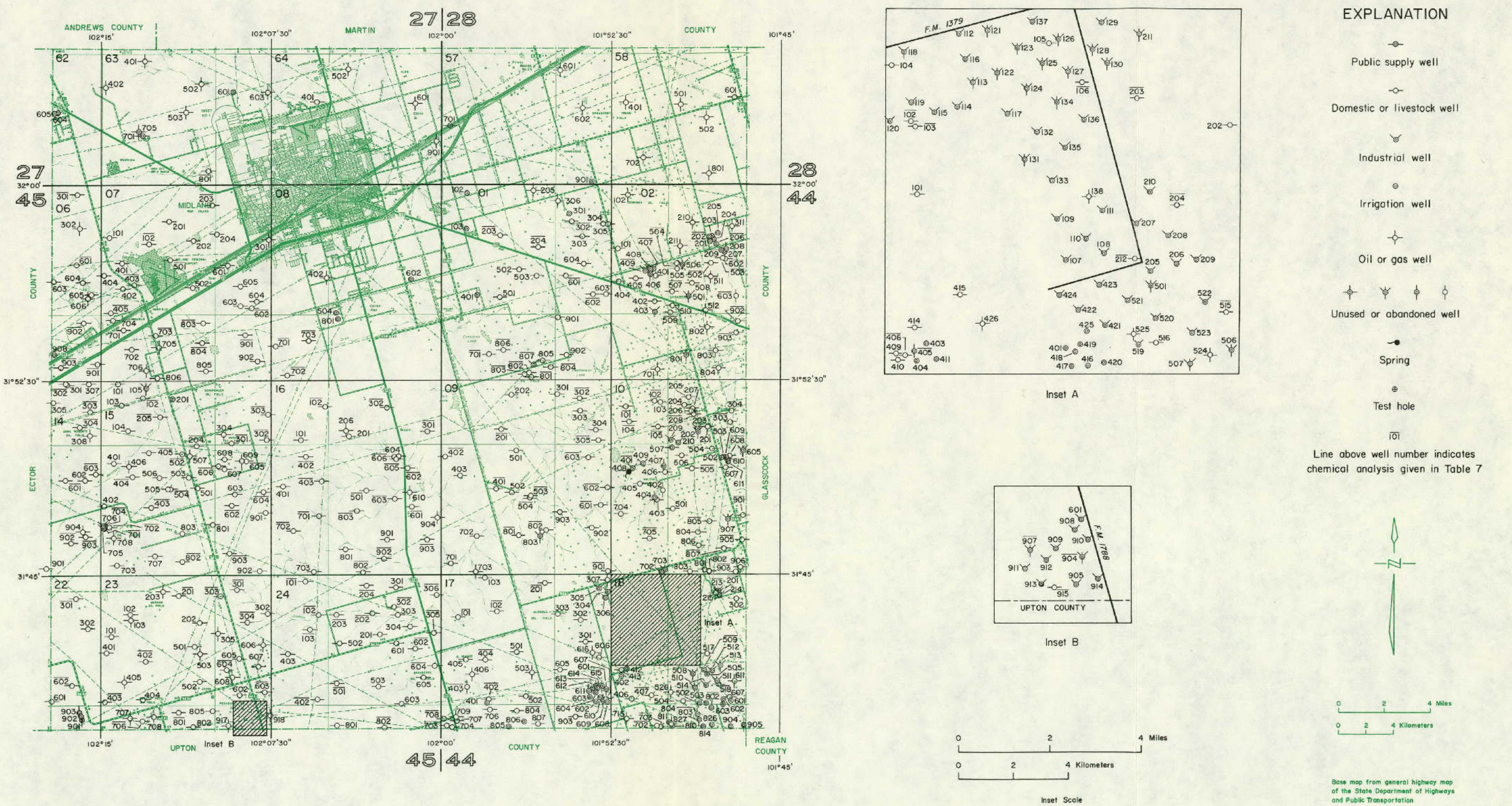
Well	Operator	Lease and well
TJ-27-63-401	Albert Plummer	Mary King No. 1
402	Kern Co. Land Co.	Fasken No. 1
502	Pan American Petroleum Corp.	David Fasken No. 1
503	C. E. Marsh	Barron No. 1-B
603	Blackwood & Nichols	B. L. Moss No. 1
64-502	Seaboard Oil of Delaware	Tillman No. 1
601	Shell Oil Co.	Price Bush Elkin No. 1
28-57-601	F. W. Holbrook & R. S. Brennard, Jr.	H. O. McAlister No. 1
602	Lone Star Producing Co.	L. B. Epley No. 2
58-401	do	Ida Mae Oldham No. 4-D
501	Mobil Oil Co.	Earl Powell No. 1
502	Cumberland & Weiner	Powell No. 1-4
702	Seaboard Oil Co. of Delaware	Hale No. 5-12
801	Mid-Continent Petroleum Corp.	Andrew Fasken No. 1
44-01-205	Gulf Oil Corp.	King No. 1-A
306	Phillips Petroleum Co.	Golladay No. 1-B
02-102	Coastal States Gas Producing Co.	A. Fasken No. 1-A
210	Amerada Petroleum Corp.	McClintic No. 30-1
211	do	McClintic No. 31-2
311	British American & Cabot Carbon	Bergstrom No. 1
511	Amerada Petroleum Corp.	O'Brien No. 43-2
512	do	O'Brien No. 6-6
701	Tex Harvey Oil Co.	Floyd No. 4-15
802	Amerada Petroleum Corp.	Dixon No. 1
803	do	K. S. Boone No. 4-18
804	do	K. S. Boone No. 3-18
09-703	Texaco Incorporated	Bryant No. 1-A

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
TJ-44-17-307	Blackwood & Nichols	Shackleford No. 1
406	Plymouth Oil Co.	Midkiff No. 1
503	Sinclair Oil & Gas Co.	Herd-Midkiff No. 1-A
616	Humble Oil & Refining Co.	Lillie Midkiff No. 1-B
709	J. E. Jones Drilling Co.	Youngblood No. 1-40
18-138	Mobil Oil Co.	Sam Preston No. 21
215	do	Bessie Freeman No. 3
426	Sinclair Oil & Gas Co.	T. O. Midkiff No. 3
524	Mobil Oil Co.	D. T. Bowles No. 8
525	do	Sam R. Preston No. 3
526	Sinclair Oil & Gas Co.	Midkiff No. 59-G
611	Mobil Oil Co.	D. T. Bowles No. 17
715	Sinclair Oil & Gas Co.	Milo Palmer No. 1
827	do	Midkiff No. 36
45-06-302	Odessa Natural Gasoline Co.	Scharbauer No. 2-A
606	Lone Star Producing Co.	H. S. Foster No. 1
07-301	Standard Oil Co.	J. E. Simms No. 1
705	Texaco Incorporated	W. A. McKandles No. 1
706	do	Scharbauer No. 1
08-402	G. H. Vaughn Producing Co.	Elsie & Clara Campbell No. 1
14-308	Forest Oil Corp. & Cities Production Co.	Dora Roberts No. 3-B-1
904	do	Roberts No. 1-D
15-304	Mobil Oil Co.	Roy Parks No. 2
406	Vickers Exploration Co., Ltd.	Roy Parks No. 1
507	Mobil Oil Co.	Texaco Incorporated No. 1-J
609	do	Roy Parks No. 16

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
TJ-45-15-708	Cities Service Petroleum Co.	Roberts Ranch Devonian Unit BF-22 No. 22
16-206	Pan American Petroleum Corp.	Jack B. Wilkinson No. 1
610	York & Harper, Inc.	Texaco Incorporated No. 1-A
904	Gulf Oil Corp.	Bryant No. 1-E
23-103	Forest Oil Corp.	Fee No. 1-45
203	Warren Petroleum Corp.	June T. Sanders No. 3
305	Sinclair Oil & Gas Co.	June Tippett No. 12-J
405	do	Sanders No. 12
503	do	June Tippett No. 9
606	do	June Tippett No. 15
607	do	June Tippett No. 3
608	do	June Tippett No. 1-A
707	do	June Sanders Tract B No. 2
708	General American, et al.	Peck No. 2-E
917	Phillips Petroleum Co.	Texaco Incorporated No. 2-BB
918	Mobil Oil Co.	Texaco Incorporated No. 1-0



Location of Selected Water Wells, Springs, and Oil and Gas Wells in Midland County

REAGAN COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
UZ-44-18-917	El Paso Natural Gas	Weiner Floyd Midkiff Disposal No. 1
918	Pan American Petroleum Corp.	L. C. Proctor No. 1-C
19-707	do	L. C. Proctor No. 1-A
20-924	do	Myrtle McMaster No. 1
21-713	South Royalty Co.	O. N. Lane No. 1
26-305	Sinclair Oil & Gas	W. M. Wilde No. 8
612	General American Oil Co.	L. C. Proctor No. 1-B
27-407	Amerada Petroleum Corp.	G. L. Aldwell No. 1
620	Phillips Petroleum Co.	Malone No. 1
621	Cities Service Oil Co.	Merchant Heirs No. 2-15
622	Cities Production Corp.	Merchant No. 3-16
707	D. D. Strong, et al.	G. L. Aldwell No. 1-A
805	Orlando, et al.	G. L. Aldwell No. 2
28-104	Humble Oil & Refining Co.	Malone No. 1-C
206	MacDonald Oil Corp.	Malone No. 2
623	Sohio Petroleum Co.	E. G. Cauble No. 1-E
712	Mid-Continent Oil Co.	M. Forest No. 1
919	Pan American Petroleum Corp.	Rupert P. Ricker No. 1-H
29-106	do	Thomas E. Cook No. 1
205	Union Texas Petroleum Co.	Calvin H. Sugg No. 1-A
305	Standard Oil Co.	Calvin H. Sugg No. 1
407	Davison & Pembrook	Clarkson Estate No. 1
610	Spartan Drilling Co.	Calvin H. Sugg No. 1-142
719	Pan American Petroleum Corp.	T. R. Sowell No. 1-A
805	McGrath & Smith	Calvin H. Sugg No. 1-A
917	Devonian Co.	Calvin H. Sugg No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
UZ-44-29-918	Atlantic Richfield Co.	Calvin H. Sugg No. 1-137
30-106	Texaco Incorporated	Calvin H. Sugg No. 2
409	York & Harper, Inc.	Calvin H. Sugg No. 1
612	Mid-Continent Petroleum Corp.	T. R. Sowell No. 1
704	Atlantic Refining Co.	Calvin H. Sugg No. 1-B
805	Seaboard Oil Co.	Herbert Cope No. 1
34-303	Humble Oil & Refining Co.	Newmont Oil Co. No. 1-D
35-212	E. E. Fogelson	Frank Boyd No. 7-42
307	Southland Royalty	O. F. Boyd No. 2-5-B
607	Sinclair Oil & Gas Co.	Mrs. J. Weddell No. 1
703	Blackwood & Nichols	L. C. Clark No. 1
805	Phillips Petroleum Co.	S. A. Hartgrove No. 1
36-117	Skelly Oil Co.	Greenlee Heirs No. 2
214	Southwestern Natural Gas, Inc.	Greer Estate No. 1
316	Sohio Petroleum Co.	Katherine Trigg No. 2
508	Advance Petroleum Corp.	Hicks No. 1
509	Lindsey, et al.	Frank Lindley No. 1
611	Humble Oil & Refining Co.	S. E. Hughes No. 1
905	Blackwood & Nichols	D. E. Hughes No. 1
37-105	Humble Oil & Refining Co.	Sawyer No. 1-J
205	Union Texas Petroleum Co.	Calvin H. Sugg No. 1-C
308	do	Calvin H. Sugg No. 1-D
309	Texola Drilling Co., Inc.	Blakley No. 1-8-A
710	Humble Oil & Refining Co.	Zuletle Hughes No. 1-E
711	B. T. A. Oil Producers	Frances H. Crews No. 2
801	do	Rocker No. 3-B
802	do	652 Rocker No. 3-B

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
UZ-44-37-803	John L. Cox	Rocker No. 1-D-B
903	B. T. A. Oil Producers	661 Rocker No. 3-B
38-102	Union Texas Petroleum Co.	Calvin H. Sugg No. 3-D
304	Kern County Land Co.	Calvin H. Sugg No. 1
501	Humble Oil & Refining Co.	Sawyer No. 1-K
702	Jake L. Hamon	Rocker No. 2-A-B
703	do	Rocker No. 1-A-B
42-329	John Emch	Belcher No. 1
43-806	Sinclair Oil & Gas Co.	University Lands No. 1
44-308	Humble Oil & Refining Co.	Cynthia Malone No. 1
606	Gold Metals Consolidated Mining Co. & Santana Petroleum Corp.	Cynthia Malone, et al. No. 1
607	B. T. A. Oil Producers	Kewanee No. 1
608	Pan American Petroleum Corp.	University Lands No. 1-BS
906	Hanley Oil Co.	University Lands No. 1-C-10-9
45-106	John L. Cox	Cynthia Malone No. 1
205	Texola Drilling Co., Inc.	Rocker No. 1-71-T. P.-B
404	B. T. A. Oil Producers	Cynthia Malone No. 5-A-B
405	do	University Lands No. 2-MR T-N
506	Texas, Inc.	Becton No. 1
605	Texola Drilling Co.	Rocker No. 1-99-TP-B
810	Sunray DX Oil Co.	John O. Carr No. 1
811	Texan Oil Co. & Green & Michaelson	Rocker No. 1-149-B
46-203	Humble Oil & Refining Co.	Sawyer Cattle Co. No. 1-D
502	do	W. A. Blakley No. 16
50-301	Cities Service Oil Co.	University Lands No. 1-AX
51-103	Great Western Drilling Co.	University Lands No. 1-AA

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
UZ-44-51-305	Big Lake Oil Co.	Santa Rita No. 13-C
206	Plymouth Oil Co.	University Lands No. 184
207	Continental Oil Co.	University Lands No. 63
306	Kerr-McGee Oil Industries, Inc.	University Lands No. 1-C
803	North Star Oil Corp.	Texas Gulf-University Lands No. 1
904	W. E. Bakke	Do.
905	Rodger Harris	Wiggins-Hyde No. 1
52-605	Union Oil Co.	University Lands No. 1-76
53-206	do	John R. Scott No. 2-D
207	Texas Gulf Production Co.	Isy Schwartz No. 1
303	J. P. Williams, et al.	John R. Scott No. 1
304	W. L. Meadows, Jr.	Scott No. 1
404	Continental Oil Co.	University Lands No. 1-7SWI
410	Yeatman Drilling Co.	University Lands No. 2
507	Lipan Oil Co. & Russell Maguire	R. A. Wolters, et al. No. 1
706	do	University Lands No. 1-31
803	Continental Oil Co.	University Lands No. 1-3
807	Lipan Oil Co.	R. A. Wolters No. 1-1-1
903	H. L. Albaugh	University Lands No. 1-2-49
54-301	Bankline Oil Co.	Bankline Branch No. 1
504	Amerada Petroleum Co.	Ella Owens No. 5
712	do	N. W. Hickman No. 2
903	Jay H. Floyd	T. J. Murphy No. 1
904	Clyde Hurst	University Lands No. 1-CH
59-301	Continental Oil Co.	University Lands No. 7-1
60-101	W. D. Anderson & Sons	University Lands No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
UZ-44-60-301	Ross Brunner	University Lands No. 1-12
61-301	Plymouth Oil Co.	University Lands No. 1-A
62-202	Atlantic Refining Co.	University Lands No. 1-48-C

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Qal, Alluvium; Kea, Edwards and associated limestones; Kt, Trinity Group.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and Paulin altimeter unless otherwise designated by footnotes.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; Cf, centrifugal; S, submersible; T, turbine; E, electric; W, wind; N, none.
Use of water : D, domestic; S, livestock; P, public supply; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* WA-56-57-501	Jerry C. Haeber	--	1930	240	--	--	Kea	2,192	192.7 185.6	Oct. 29, 1954 Nov. 18, 1969	C, W	S	Well A-17. 1/
* 602	Mrs. Myrtle A. Brown	C. H. Bierschwale	--	400	--	--	Kea	2,382	378.4 358.7 359.1 355.8	Feb. 12, 1953 Dec. 18, 1954 June 22, 1955 Nov. 18, 1969	C, W	D, S	Well A-3. 1/
901	Mayfair Minerals Incorporated	Henry Allen	1951	--	--	--	Kea	2,178	156.4 151.0	Apr. 27, 1955 Nov. 7, 1969	C, W	S	Well A-15. 1/
* 902	do	--	1950	293	--	--	Kea	--	243.0	Oct. 11, 1954	S, E	D	Well A-14. 1/
* 58-602	Volney B. Snodgrass	--	1933	175	--	--	Kea	2,192	170.42 170.28 167.1	Feb. 12, 1953 Mar. 23, 1955 Nov. 17, 1969	C, E	D, S	Well B-5. 1/
701	Helen Orr	W. B. Orr	1943	350	--	--	Kea	2,346	311.2 304.8	June 30, 1955 Nov. 7, 1969	C, W	S	Well A-8. 1/
* 59-401	Mrs. E. T. Garven	Talbot Garven	--	--	--	--	Kea	2,230	210.10 206.9	June 27, 1955 Nov. 17, 1969	C, W	S	Well B-10. 1/
69-01-101	Jim Ling	--	--	Spring	--	--	Kea	1,897	--	--	--	--	Spring A-20. 1/
701	Hill and Hill Truck Lines	Daymon Stotts	1940	200	--	--	Kea	1,973	31.9 34.6	July 26, 1955 Nov. 19, 1969	C, W	S	Well A-39. 1/
901	W. A. Stroman	H. F. Jacoby	1947	175	--	--	Kea	2,154	138.82 134.5	July 22, 1955 Nov. 18, 1969	C, W	S	Well A-41. 1/
* 02-201	Ernest Leinweber	--	1943	110	--	--	Kea	2,128	100.3 100.39 93.5	June 22, 1955 Mar. 16, 1956 Nov. 5, 1969	C, W	S	Well B-25. 1/
* 202	do	--	--	286	--	--	Kea	--	200.6 196.7	June 22, 1955 Nov. 5, 1969	C, E	D, S	Well B-26. 1/
203	Carl Secrest	--	1951	335	--	--	Kea	--	269.5	Aug. 8, 1955	C, W	S	Well B-22. 1/
204	do	--	1943	305	--	--	Kea	2,275	274.2	Nov. 7, 1969	C, W	S	--
401	Raymond Dietert	--	1951	300	--	--	Kea	2,311	262.0 257.2	June 30, 1955 Nov. 18, 1969	C, W	S	Well A-30. 1/
402	do	--	1933	275	--	--	Kea	2,364	226.6	June 23, 1955	C, W	D, S	Well A-32. 1/
* 801	C. H. Godbold	--	1948	42	--	--	Kea	2,108	35.54 35.63 37.19 29.6	Feb. 12, 1953 June 23, 1955 July 12, 1956 Nov. 5, 1969	C, W	D, S	Well B-43. 1/

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
WA-69-03-202	O. L. Love	--	1938	294	6	--	Kea	2,336	280.8	Nov. 17, 1969	N	N	Well B-16. 1/
* 801	Dan Auld	Ed McWhorter	1942	300	--	--	Kea	2,327	274.5 272.4	Aug. 6, 1955 Nov. 17, 1969	C, W	S	Well B-53. 1/
* 09-801	George Guthrie, et al.	--	--	Spring	--	--	Kea	1,867	--	--	--	--	Spring C-17. 1/
* 802	Rex Phillips	Tom Spurger	--	209	--	--	Kea	2,327	187.13 184.4	July 22, 1955 Nov. 5, 1969	C, W	S	Both water level measurements made while mill was pumping. Well C-16. 1/
* 901	J. Lent Wells	--	1944	446	--	--	Kea	2,304	361.9 362.8	Aug. 2, 1955 Nov. 4, 1969	C, W	D, S	Well C-9. 1/
* 10-201	Mrs. T. C. Evans	Doyle Hatley	--	Spring	--	--	Kea	1,853	--	--	--	--	Spring B-46. 1/
* 401	H. W. Lewis	Veron Kirkpatrick	--	415	--	--	Kea	2,341	375.5 360.7	Mar. 27, 1956 Nov. 6, 1969	C, W	D, S	Well C-8. 1/
501	Joe Moffett	--	--	Spring	--	--	Kea	1,926	--	--	--	--	Spring D-1. 1/
11-401	Mrs. John Mear	Lanny Leinweber	--	Spring	--	--	Kea	1,904	--	--	--	--	Spring D-11. 1/
402	do	do	1951	257	--	--	Kea	2,109	209.4 218.8	Aug. 4, 1955 Nov. 6, 1969	C, W	S	Well D-12. 1/
17-201	W. A. Maley	R. S. Grantland	--	Spring	--	--	Kea	1,864	--	--	--	--	Spring C-32. 1/
18-301	City of Leakey	--	1950	40	12	34	Qal	1,592	--	--	T, E	P	Reported yield, 75 gpm on Nov. 24, 1970. Well D-28. 1/
* 302	do	--	1950	32	72	32	Qal	1,592	29.3 24.7	Apr. 3, 1956 Nov. 24, 1970	Cf, E	P	Reported yield, 96 gpm on Nov. 24, 1970. Well D-27. 1/
* 303	Texas Highway Department	--	1952	640	6	280	Kt	1,638	280 294.2	1954 Nov. 23, 1970	N	N	Unused irrigation well. Well D-24. 1/
* 501	J. H. Rose, Jr.	--	--	Spring	--	--	Kea	1,901	--	--	--	--	Spring D-34. 1/
19-101	City of Leakey	--	--	12	72	12	Qal	1,570	--	--	N	N	Unused public-supply well. Reported yield, 150 gpm on Nov. 24, 1970.
301	H. E. Wilson	--	1953	198	--	--	Kea	2,106	152.1 185.3	Aug. 3, 1955 Nov. 5, 1969	C, W	S	Well D-44. 1/

* Chemical analysis of water given in Table 7.
1/ Texas Board of Water Engineers Bulletin 5803, "Ground-Water Geology of Real County, Texas."

REAL COUNTY

Table 7.--Chemical Analyses of Water From Wells and Springs

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

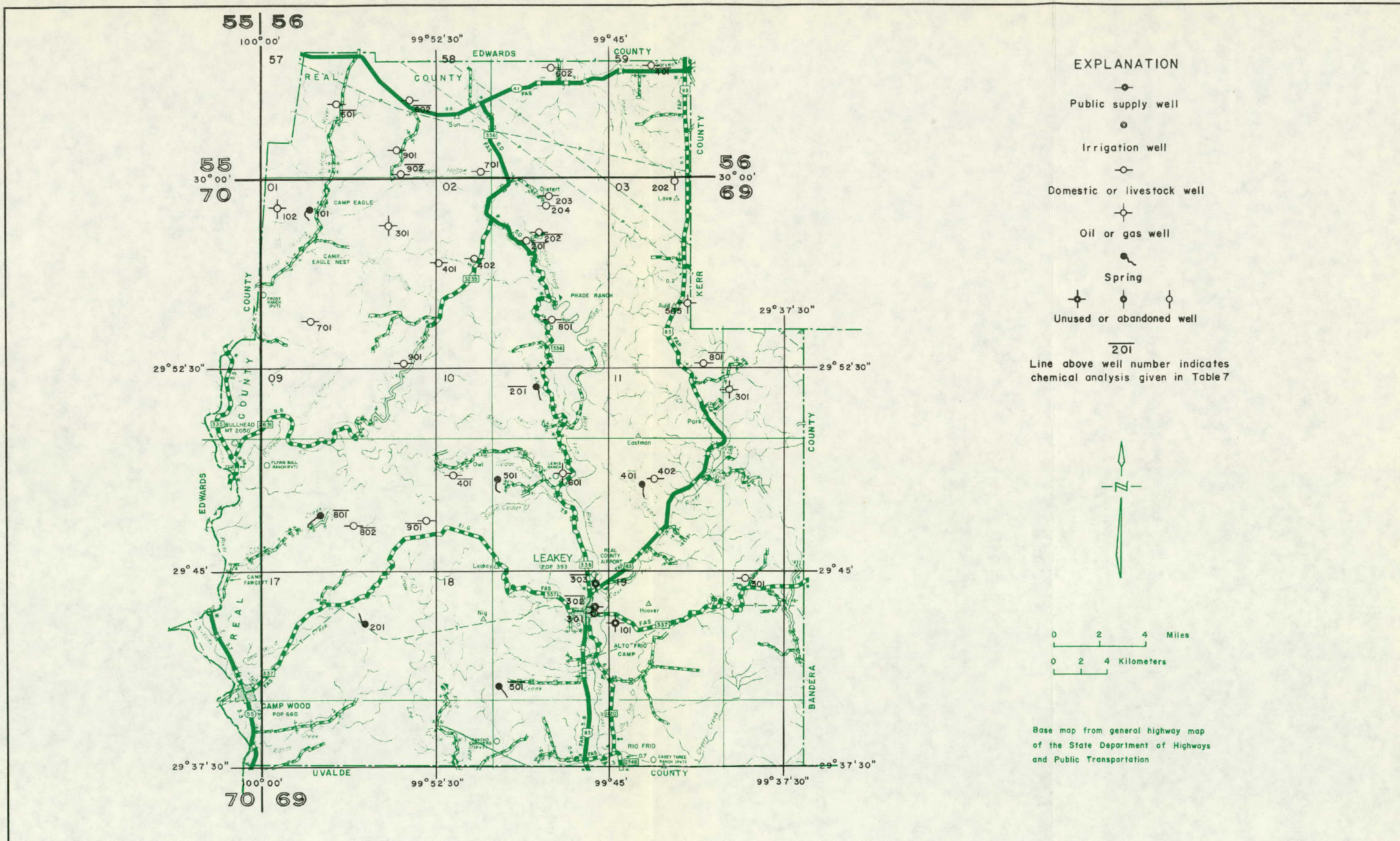
Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Bicar-bonate (HCO_3)	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Dis-solved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorp-tion ratio (SAR)
							Trinity Group											
1/ WA-69-18-303	Texas Highway Department	640	Mar. 28, 1956	11	204	144	151	311	1,050	47	5.2	0.0	1,770	1,100	23	2,210	7.6	2.0
							Edwards and associated limestones											
1/ 56-57-501	Jerry G. Baeber	240	Apr. 19, 1956	12	59	13	6.0	230	5.1	12	.2	4.5	232	200	6	401	7.9	.2
1/ 602	Mrs. Myrtle A. Brown	600	Mar. 22, 1956 Nov. 18, 1969	12 10	57 59	17 16	7.5 8	242 239	6.6 8	12 14	.2 .3	2.4 5.0	235 238	212 212	7 7.4	417 412	7.9 7.5	.2 .2
1/ 902	Maylair Minerals, Incorporated	293	Oct. 11, 1954 Nov. 7, 1969	13 10	58 61	16 13	5.3 5	243 238	5.9 6	9.0 9	.0 .2	4.8 5.0	231 226	210 209	4 4.8	420 396	7.9 7.7	.1 .1
1/ 58-602	Volney B. Snodgrass	175	Mar. 26, 1956 Nov. 17, 1969	13 11	66 83	12 13	7.0 8	245 276	5.4 12	11 16	.0 .2	7.3 14.0	243 293	214 259	6 6.2	429 514	7.7 7.3	.2 .2
1/ 59-401	Mrs. E. J. Carven	--	Mar. 26, 1956	13	62	14	6.3	251	3.5	9.2	--	3.0	234	212	5	414	7.9	.2
1/ 69-02-201	Ernest Leinweber	110	Mar. 22, 1956 Nov. 5, 1969	12 10	58 64	12 10	6.0 6	224 214	4.8 7	10 11	-- .3	5.7 13.5	222 227	194 202	6 5.6	388 385	7.8 7.5	.2 .2
202	do	286	do	8	70	9	6	224	8	11	.1	11.5	234	212	5.8	410	7.5	.2
801	C. B. Godbold	42	do	9	78	10	6	240	9	13	.2	25.5	269	237	5.6	458	7.4	.2
1/ 03-801	Dan Auld	300	Mar. 26, 1956	12	62	14	5.3	244	4.4	4.8	--	3.0	232	212	5	401	7.9	.1
1/ 09-801	George Guthrie, et al.	Spring	Apr. 17, 1956	12	66	11	4.5	237	4.8	9.2	.1	9.2	248	210	4	410	8.0	.1
1/ 802	Rex Phillips	209	Mar. 19, 1956 Nov. 5, 1969	11 9	60 66	3.8 3	4.5 6	198 196	3.1 5	14 13	-- .1	4.0 5.5	205 204	165 176	12 7.4	352 352	7.9 7.7	.4 .3
901	J. Lent Wells	446	Nov. 4, 1969	8	50	4	6	145	5	12	.1	9.0	165	141	8.5	290	7.8	.2
1/ 10-201	Mrs. T. C. Evans	Spring	Mar. 16, 1956 Nov. 6, 1969	11 9	62 64	13 13	5.9 6	241 226	4.9 9	7.0 12	-- .2	6.2 10.5	230 235	208 212	5 5.8	413 405	7.8 7.5	.2 .2
1/ 401	H. W. Lewis	415	Mar. 27, 1956	12	38	25	6.7	229	6.8	10	.3	.8	212	198	6	382	7.8	.2
1/ 18-501	J. H. Rose, Jr.	Spring	Mar. 28, 1956 Nov. 19, 1969	10 8	63 69	8.2 7	4.9 4	222 223	3.3 6	8.8 9	.1 < .1	5.8 7.0	221 220	192 203	5 4.5	378 381	7.9 7.7	.2 .1
							Alluvium											
1/ 302	City of Leakey	32	Apr. 3, 1956 Nov. 24, 1970	13 12	90 90	17 17	8.1 7	336 316	14 13	14 16	.1 .1	4.5 14	326 324	294 294	5 5.2	567 544	7.5 7.6	.2 .2

1/ Texas Board of Water Engineers Bulletin 5803, "Ground-Water Geology of Real County, Texas."

REAL COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
WA-69-01-102	Woodward & Co.	H. & C. Peterson
301	Sun Oil Co.	Oppenheimer & Dietert
03-505	Eastland Oil Co.	A. D. Auld
10-601	Pan American Petroleum Corp.	G. O. Knippa
11-301	Moore Exploration Co.	Claude Haby



Location of Selected Water Wells, Springs, and Oil and Gas Wells in Real County

SCHLEICHER COUNTY

Table 8.–Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
WY-43-57-902	Bobby Manziel	University Lands No. 1
58-607	Pure Oil Co.	R. S. Williams No. 1
59-406	Pan American Petroleum Corp.	Do.
606	Delta Gulf Drilling Co. & W. H. Hunt	R. L. Henderson No. 1
809	Renwar & Delta Gulf Drilling Co.	D. E. Delong No. 1
60-504	Wesley W. West	Christina Mittel No. 2
606	Sinclair Oil & Gas Co.	S. J. Hall No. 1
607	Edwin L. Cox	J. F. Runge No. 2
61-606	Gray Wolfe Co.	Margaret W. Hicks No. 1
62-406	J. R. McDermott & Tucker Drilling Co.	A. B. Thomerson No. 1
504	Tucker Drilling & Jones & Lyons	Pat Jackson No. 1
708	Cosden Petroleum Corp. & Fortune Drilling Corp.	Jim O'Harrow No. 2
63-807	Sinclair Oil & Gas Co.	Lawrence Ruff No. 1
55-02-416	Cities Service Oil Co.	University Lands No. 1-BM
818	Continental Oil Co.	H. G. Moore No. 1
03-211	Gulf Oil Corp.	E. F. Sauer Gas Unit No. 1
709	Texas Crude Oil Co.	N. Daughdrill No. 1
04-105	do	T. C. Meador No. 1
310	Pan American Productions Co.	H. F. Thomson No. 1
311	Sinclair Oil & Gas Co.	J. B. McClatchy No. 4
312	do	McClatchey No. 5
904	Cities Service Oil Co.	Meador No. 1-A
05-111	Sinclair Oil Co.	M. F. McClatchy No. 1
06-404	Ralph Lowe	M. M. Reynolds No. 1
405	Fortune Production Co.	Luke Robinson No. 1
07-507	Lone Star Producing Co.	R. H. Martin No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
WY-55-07-906	El Paso Natural Gas	John Treadwell No. 1
09-605	Dual Production Co.	Powell No. 1
11-413	Humble Oil & Refining Co.	S. L. Stamford No. 1
12-101	Pan American Petroleum Corp.	A. West No. 1
506	Moss Petroleum Co. & Tucker Drilling Co. & L. E. Scherck	Thad A. Thompson No. 1-A
13-212	Humble Oil & Refining	Jess Koy No. 1
706	Tucker Drilling Co.	Bert Page No. 1
14-101	Bryson Oil & Gas & W. Carl Proctor & Magnus Oil Corp.	Judkins-Spencer No. 1
301	Tex-Tor Oil Corp.	Do.
405	C. L. Norsworthy, Jr.	Mary McBurnett No. 1
507	G. W. Strake	Judkins No. 1-C
908	Texaco Incorporated	Judkins No. 1-A
15-210	Sinclair Oil & Gas Co.	Virgil Powell No. 2-B
211	do	V. J. & J. D. Powell No. 2
18-102	Delta Gulf Drilling Co. & Cabot Carbon Co.	Sol Mayer No. 1
20-206	Sinclair Oil & Gas Co.	Margaret D. Thomson No. 1
23-308	Mobil Oil Co.	Mary Ball No. 1

STERLING COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
XP-28-62-610	Humble Oil & Refining Co.	W. N. Reed No. 1-B
901	Ray A. Albaugh	Reed No. 1
63-507	Sunset International Petroleum Corp.	Sellers No. 1-174
508	Shaheen & Son	Sellers No. 2-175
609	Cosden Petroleum Corp.	Parramore No. 2
905	Ike W. Lovelady	Parramore No. 1
29-57-704	Manhatten	E. H. Wood No. 1
43-02-105	John J. Eisner	Knight No. 3
09-112	California Co.	Davis No. 3-1
406	Johnson & Fullick	J. T. Davis No. 1
502	Sun Oil Co.	Fay Hildebrand No. 1
807	Texaco Incorporated	Foster No. 1
10-108	C. J. Wrightman	Claude Collins No. 1
411	Alvon Oil & Gas Co., Midwest Oil Corp. & Lion Oil Co.	Claude Collins, Jr. No. 1
801	Sun Oil Co.	B. L. Stringer No. 2
17-204	Humble Oil & Refining Co.	Mrs. Dayvault No. 1
603	Kanawha-Angelo Oil Co.	L. T. Clark No. 1
801	Duncan Drilling Co.	Harris No. 1
44-07-402	Ray Morris Drilling Co.	W. N. Reed, et al. No. 1
501	Sam D. Ares	George McIntire No. 1
503	J. P. "Bum" Gibbins, Inc.	McIntire No. 1
601	Humble Oil & Refining Co.	G. H. McIntire No. 1
14-607	Amerada Petroleum Corp.	Texaco Incorporated No. 1-E
608	Foster	Glass No. 6
15-401	Texaco Incorporated	Sterling No. 31-B
403	Marathon Oil Co.	Glass No. 3-A

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
XP-44-15-404	Marathon Oil Co.	Texaco Incorporated No. 4-C
502	H. M. H. Operators	Ray No. 1
503	Bay Petroleum Co.	Bade No. 1-B
701	Sun Ray DX Oil Corp.	Glass No. 1
16-406	H. M. H. Operators	Foster No. 2
502	Amerada Petroleum Corp.	McDonald No. 1
504	Abco Oil Co.	Ona Davis No. 9
603	Norfitt Petroleum Co.	Durham No. 1
23-402	Honolulu Oil Corp.	Cope No. 1-A
24-103	Champlin Oil & Refining Co.	Foster Conger No. 2
407	Champlin Petroleum Co.	R. T. Foster No. 1
504	Champlin Petroleum Co. & W. A. Moncrief	Horwood-Hilderbrand No. 1-36
705	Shell Oil Co.	Shell Hildebrand No. 2
30-301	McElroy Ranch Co., et al.	C. H. Sugg No. 1
613	Honolulu Oil Corp.	Cope No. 7

SUTTON COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
XS-55-19-401	Tennessee Production Co.	Alice L. Jones No. 1
603	Sinclair Oil & Gas Co.	Christina Mittel No. 1
704	El Paso Natural Gas	Rose Thorp No. 1
806	do	Meckel No. 2
807	do	Meckel No. 1-D
808	do	Meckel No. 3-B
905	do	B. F. Meckel No. 1-A
906	do	Meckel No. 3-B
20-404	C. L. Norsworthy & Lone Star Gas Co.	Thomson No. 7
405	Sinclair Oil & Gas Co.	R. M. Thomson No. 1
406	C. L. Norsworthy & Lone Star Gas Co.	Do.
505	El Paso Natural Gas	Thomson No. 1-B
603	do	Joe Logan No. 1
702	do	Thompson No. 1-C
703	do	Steen No. 4
704	do	Steen No. 3
705	do	Steen No. 2
706	do	Steen No. 1
808	Pure Oil Co.	Ida Behling No. 1
21-703	C. L. Norsworthy, Jr.	R. A. Halbert No. 1
22-401	Humble Oil & Refining Co.	Stella Lloyd No. 1
25-801	J. B. Moorhead	W. F. Berger
26-204	El Paso Natural Gas	E. S. Mayer No. 1
508	Texas American Oil Co. & Sinclair Oil & Gas Co.	Mayfield No. 1-A
603	do	El Paso Blk. 133 No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
XS-55-27-107	El Paso Natural Gas	DeBerry No. 9-A
207	do	DeBerry No. 4-A
303	do	Davis No. 1-E
502	do	Davis No. 1-D
503	do	E. M. DeBerry No. 1
610	Ada Oil Co.	Rip Ward No. 1
905	Pioneer Production Corp.	H. Fields No. 2
28-110	Pan American Petroleum Corp.	Miers No. 3-A
29-306	Gulf Oil Corp.	G. C. Allison No. 1
401	Texas Gulf Producing Co.	Allison No. 1
703	C. L. Norsworthy	Sam Allison No. 1
30-305	Paul Teas	Mower No. 1
31-102	Phillips Petroleum Co.	Reiley No. 1
404	Mayfair Minerals, Inc.	C. D. Wyatt
703	Hunt Oil Co.	Carnie Wyatt No. 1
34-802	Shell-Sinclair	Aldwell Brothers No. 1
35-204	Delta Drilling Co. & Pauley Petroleum, Inc.	Sawyer No. 1
308	El Paso Natural Gas	C. Shurley No. 1
36-804	Pan American Petroleum Corp.	Thelma Espy No. 1
37-104	Pure Oil Co.	S. H. Allison No. 1
801	Phillips Petroleum Co.	Libb No. 1-A
38-807	Wesley West	Williamson County School Land No. 1
39-604	Bill Holland	J. T. Rieck No. 1
706	Shell Oil Co.	S. B. Roberts No. 1
41-304	Mallard Petroleum, Inc.	Aldwell No. 1
42-104	Amerada Petroleum Corp.	Winne Aldwell Estate No. 1

SUTTON COUNTY

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
XS-55-43-304	John J. Eisner	Mack O. Cauthorn No. 1
44-601	Ray Morris Drilling Co.	D. J. Harrison No. 1
47-603	Nelson & Mellard	O. W. Cardwell No. 1

TOM GREEN COUNTY

Table 6.--Records of Wells and Springs

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Qal, Alluvium; Kea, Edwards and associated limestones; Kt, Trinity Group; P, Permian rocks undifferentiated.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and by Paulin altimeter.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; J, jet; S, submersible; T, turbine; E, electric; G, natural gas, butane, or gasoline; W, wind; N, none.
Use of Water : D, domestic; Irr, irrigation; P, public supply; S, livestock; N, None

	Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
	YB-43-18-701	L. T. Clark	Peb Cope	--	115	6	--	Kt	2,379	86.3	May 1, 1969	C, W	S	--
*	801	George Weddell	--	1922	116	6	--	Kt	2,175	80.03	July 21, 1950	C, W	S	Well A-3. 1/
*	802	L. C. Clark	Peb Cope	--	152	6	152	Kt	2,307	142.3	May 2, 1969	C, W	S	--
*	803	L. T. Clark	do	--	--	--	--	Kt	--	--	--	C, W	S	--
*	804	L. C. Clark	do	--	112	6	--	Kt	2,185	95.68	May 1, 1969	C, W	S	--
*	19-604	J. Z. Harper	Charles Wright	--	--	--	--	P	2,166	--	--	C, W	S	--
	605	W. B. Wilson	Billy Blair	--	--	--	--	--	2,325	--	--	C, W	S	--
	606	J. Z. Harper	Charles Wright	--	--	--	--	--	2,220	--	--	C, W	S	--
*	607	do	do	--	--	--	--	Kt	2,199	96.6	Aug. 22, 1969	C, W	D, S	--
*	901	do	--	1915	79	6	--	Kt	2,200	54.06 54.22	Sept. 12, 1940 June 27, 1950	C, W	S	Well B-5. 1/
	907	W. B. Wilson	Billy Blair	--	--	--	--	Kt	2,248	83.2	Aug. 14, 1969	C, W	S	--
*	20-401	do	do	--	80	6	--	Kt	2,265	39.25 43.35 38.4	June 16, 1950 Aug. 10, 1962 Aug. 14, 1969	C, W	D, S	Well B-2. 1/
	403	do	do	--	--	--	--	Qal	2,131	--	--	C, W	S	--
*	404	do	do	--	--	--	--	Qal	2,131	45.8	Aug. 14, 1969	C, W	S	--
	405	do	do	--	--	--	--	Qal, Kt	2,200	59.8	do	C, W	S	--
	502	A. March	--	--	80	6	80	Kt	2,125	56.00 52.7	Dec. 3, 1940 June 16, 1950	C, W	S	Well C-1. 1/
	801	F. J. Von Rosenburg	C. H. Williams	1940	125	6	--	Kt	2,100	93.28	do	C, W	D, S	Well C-8. 1/
	802	W. B. Wilson	Billy Blair	--	--	--	--	Qal	2,099	59.5	Aug. 14, 1969	C, W	S	--
*	901	R. L. Magill	--	--	--	--	--	Kt	2,248	41.8	do	C, W	S	--
*	21-401	J. F. Sutton	--	--	187	6	--	Kt	2,250	23.75 141.55	Nov. 28, 1940 June 15, 1950	C, W	D, S	Well C-2. 1/
	702	R. L. Magill	--	1962	59	--	--	Qal	2,145	22.9	Aug. 14, 1969	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* YB-43-21-801	Mrs. Elizabeth M. Baker	Japhe Brewer	1932	75	--	--	Qal	2,100	68.9	Sept. 2, 1969	C, W	D, S	--
802	do	do	1937	100	--	--	--	2,119	--	--	C, W	D, S	--
803	do	do	1902	110	--	--	--	2,137	--	--	C, W	S	--
902	do	do	1931	130	--	--	Kt	2,235	51.4	Sept. 2, 1969	C, W	S	--
* 25-702	L. A. Harris Estate	Andrew P. Smith	1946	97	6	97	Kea, Kt	2,445	71.80 66.7	July 25, 1950 Jan. 26, 1968	C, W	D, S	Well E-12. 1/
* 801	do	do	--	--	--	--	Kea, Kt	2,521	149.3	Jan. 25, 1968	C, W	S	--
26-301	Percy R. Turner	--	1918	100	--	--	Kt	2,243	21.6	Sept. 16, 1969	C, W	S	--
* 401	John S. Cargile	--	1940	117	5	117	Kt	2,379	87.5	Sept. 11, 1967	C, W	S	--
402	do	--	1920	120	5	120	Kt	2,380	76.34	Sept. 14, 1967	C, W	S	--
403	do	--	1920	117	5	117	Kt	2,309	94.68	do	C, W	S	--
404	Mrs. D. D. Wall	John S. Cargile	1930	183	8	183	Kt	--	107.86	do	C, W	S	--
* 501	Ike Funk Estate	Demere Brothers	--	148	6	--	Kt	2,350	109.54	July 27, 1950	C, W	S	Well E-5. 1/
502	John S. Cargile	--	1940	117	5	117	Kt	2,310	74.37	Sept. 14, 1967	C, W	S	--
601	Mrs. Barbara Turner, et al.	Percy W. Turner	1904	80	--	--	Qal, Kt	2,341	--	--	C, W	S	--
* 602	Percy W. Turner	--	1904	80	6	--	Kea	2,381	65.5 61.6	July 5, 1950 Sept. 8, 1969	C, W	S	Well E-4. 1/
603	do	--	1956	280	--	--	Qal, Kt	2,320	--	--	C, W	S	Water 10 feet below surface when drilled in 1956.
* 604	Mrs. Barbara Turner, et al.	Percy W. Turner	1904	145	6	--	Kea	2,449	116.30 66.4	July 5, 1950 Sept. 8, 1969	C, W	S	Well E-2. 1/
* 702	John S. Cargile	--	1920	118	5	118	Kt	2,262	55.04	Sept. 14, 1967	C, W	S	--
802	do	--	1944	147	5	147	Kt	--	116.6	Sept. 13, 1967	C, W	S	--
803	do	--	1946	202	5	202	Kt	--	100.7	do	C, W	S	--
27-101	Percy R. Turner	--	--	100	--	--	--	--	--	--	C, W	S	--
102	do	--	1967	157	5-1/2	157	Qal	2,208	90	Sept. 16, 1969	S, E	S	--
301	McKnight State Hospital	--	1938	66	--	--	Qal	--	21.9	May 4, 1960	T, E	P	Dug well.
* 302	do	--	1939	72	--	--	Qal	--	34.27	do	T, E	P	Do.
303	Tom Green Fresh Water District No. 1	--	1955	90	6	--	P	--	32.15	May 3, 1960	T, E	P	--
305	do	--	1958	100	7	100	P	--	32.00	May 3, 1960	T, E	P	--
* 401	Percy W. Turner	--	1922	48	6	48	Qal	2,175	28.52	June 30, 1950	C, W	D	Well deepened during 1950's. Well F-9. 1/
402	do	--	1928	80	--	--	Kea	2,294	--	--	C, W	S	--
* 403	do	--	--	80	6	--	Kt	--	38.8	July 5, 1950	C, W	S	Well F-11. 1/
404	Percy R. Turner	--	1938	70	--	--	Qal	2,165	56.5	Sept. 16, 1969	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* YB-43-27-405	Percy R. Turner	--	1962	146	6-5/8	146	Kt	2,186	106.7	Sept. 16, 1969	S, E	D	--
* 406	Percy W. Turner	--	1952	260	--	--	Qal, Kt, P	2,175	24.3	Sept. 4, 1969	C, W	D, S	--
407	do	--	1954	280	--	--	--	--	--	--	C, W	S	--
* 408	do	--	1935	100	--	--	Qal, Kt	--	--	--	C, W	D, S	--
409	do	--	1955	290	--	--	Qal, Kt, P	2,200	65.9	Sept. 4, 1969	C, W	S	--
501	Kenneth W. Brown	--	--	93	6	93	Qal, Kt	2,140	37.63 38.7 34.3	July 11, 1950 Aug. 11, 1961 Sept. 17, 1969	C, W	S	Well F-13. 1/
502	Percy W. Turner	--	1952	160	--	--	Kt	2,217	--	--	C, W	S	--
503	do	--	1947	137	6	--	Kt	2,216	81.76	July 5, 1950	C, W	S	Well F-8. 1/
504	do	--	1947	180	--	--	Kt	--	--	--	C, W	S	--
601	do	--	1947	80	--	--	Qal	2,079	52.5	Sept. 4, 1969	C, W	S	--
702	do.	--	--	100	--	--	Kea	2,343	--	--	C, W	S	--
801	Kenneth W. Brown	--	1957	276	--	276	Kt	2,337	250	Sept. 17, 1969	C, W	S	--
* 901	do	--	1950	141	8	141	Kt, P	2,185	63.05 96.2	July 11, 1950 Sept. 17, 1969	C, W	D, S	--
* 902	do	--	--	114	6	114	Kt	2,177	77.57 95.5	July 11, 1950 Sept. 17, 1969	C, W	S	Well F-16. 1/
* 28-501	do	--	1936	35	--	35	Qal	1,938	29	do	C, W	D, S	--
* 29-302	Mrs. Elizabeth M. Baker	Japhe Brewer	1909	100	--	--	Kt	2,138	98.8	Sept. 2, 1969	C, W	S	--
35-202	Joe B. Mayer	--	1930	65	--	65	Kt	2,201	64.09	Sept. 7, 1969	C, W	S	--
601	H. R. Wardlaw	W. K. Varnadore	--	51	6	--	Kt	2,100	13.49	July 12, 1950	C, W	S	--
44-401	Mrs. E. H. Jones	Kenneth W. Brown	--	--	--	--	Qal	--	--	--	C, W	S	--
402	do	do	--	--	--	--	Qal	--	--	--	C, E	D, S	--
* 501	do	do	1930	81	6	81	Qal	1,995	22 54.64 51.4	Aug. 21, 1940 Dec. 13, 1950 Sept. 24, 1969	C, W	N	Unused livestock well. Well K-13. 1/
502	do	do	1946	100	--	--	Qal	--	--	--	C, E	S	--
801	do	do	1951	100	--	--	Kt	--	--	--	C, W	S	--
* 802	do	do	--	65	--	--	Kt	--	--	--	C, W	D, S	--
45-801	J. W. Johnson Estate	Merton West	--	--	--	--	--	--	--	--	N	N	Unused livestock well.
46-901	R. S. Waring	--	--	Spring	--	--	Kea	2,048	--	--	--	--	Spring M-78. 1/
902	N. G. Kent Estate	Joe Mertz	--	45	--	--	Qal	1,998	33.7	Oct. 7, 1969	C, W	S	--
* 903	do	do	--	50	--	--	Qal	1,993	13.7	do	C, W	D, S	--
47-401	do	do	--	--	--	--	--	--	--	--	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* YB-43-47-402	N. G. Kent Estate	Joe Mertz	--	--	--	--	Qal, P	1,980	--	--	C, W, S, E	S	--
501	Presley Weishuhn	--	1929	100	--	--	--	--	--	--	C, W	S	--
701	N. G. Kent Estate	Joe Mertz	--	35	--	--	Qal	1,962	21.8	Oct. 7, 1969	C, W	S	--
801	Joe Mertz	--	--	100	--	--	--	--	--	--	C, W	S	--
901	Mrs. D. A. Robertson	Joe Mertz	--	100	--	--	--	--	--	--	C, W	S	--
902	do	do	1967	100	--	--	--	--	--	--	C, W	S	--
* 48-402	Mrs. A. H. Denis, Jr.	A. H. Denis, III	1963	130	--	--	Qal, P	--	--	--	T, E	Irr	Reported yield 1,200 gpm.
403	do	do	1963	130	--	--	Qal, P	1,920	54.9	Mar. 27, 1969	N	N	Abandoned irrigation well.
703	do	do	1928	90	--	--	--	--	56.5	do	C, W	S	--
* 51-201	A. F. Joslin	--	1948	60	6	60	Kt	2,100	40.2	Sept. 21, 1950	C, W	D	Well O-1. 1/
* 301	Mrs. C. A. Atkinson, et al.	Mickey Rathbone	--	90	--	--	Kt	--	--	--	S, E	D, S	
302	do	do	--	87	--	--	Kt	--	--	--	C, W	S	--
* 303	do	do	1948	82	--	--	Kt	--	--	--	C, W	D, S	--
304	do	do	1963	85	--	--	P	2,119	50.7	Aug. 15, 1969	S, E	S	--
* 305	do	do	--	--	--	--	P	2,193	123.8 115.7	do Sept. 16, 1969	C, W	S	--
601	do	do	1948	90	--	--	--	--	--	--	C, W	S	--
602	M. W. Moss Estate	--	--	240	--	--	Kea	2,356	186.4	May 19, 1969	C, W	S	--
603	do	--	1928	160	--	--	Kea	2,284	--	--	C, W	S	--
604	do	--	1952	480	--	--	--	--	--	--	C, W	S	--
* 802	Mrs. Lillian S. Winterbotham	Charles Schriner	1930	360	--	--	Kt	2,388	228.30	Sept. 6, 1967	C, W	S	--
803	do	do	--	194	--	--	Kt	2,281	96.19	do	S, E	D	--
* 804	do	do	--	216	--	--	Kt	2,274	94.71	Sept. 5, 1967	S, E	S	--
* 902	do	do	1965	450	--	--	Kea, Kt	2,516	389.70	Sept. 6, 1967	C, W	S	--
* 903	do	do	1965	315	--	--	Kea	--	223.06	do	C, W	S	--
904	Herman L. Allen	--	--	240	--	--	Kea	2,351	374.9	May 13, 1969	C, W	S	--
* 905	Mrs. G. A. Scroggs	Herman L. Allen	1928	190	--	--	Kea	2,324	129.6	do	C, W	S	--
906	do	do	1957	525	10	60	Kea	2,278	127.4	do	N	N	Drilled as oil test.
52-201	Mrs. E. H. Jones	Kenneth W. Brown	1961	600	--	--	Kea	2,224	34.0	Aug. 18, 1969	C, W	S	Do.
102	do	do	1948	36	--	--	Kea	2,137	11.6	Sept. 18, 1969	C, W	S	--
201	C. D. Atkins Estate	C. L. McMillan	--	150	--	--	Kt	2,186	137.9	May 22, 1969	C, W	S	Water has hydrogen sulfide odor.
* 202	do	do	--	150	--	--	Kt, P	2,156	106.0	do	C, W	S	Water has strong hydrogen sulfide odor.

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
YR-43-52-203	Mrs. E. H. Jones	Kenneth W. Brown	1936	105	6	--	Kt	2,119	45.7 65.2	Dec. 13, 1915 Sept. 18, 1969	C, W	S	Well P-2. 1/
301	do	do	--	59	6	--	Kea	2,035	31.45 30.4	Dec. 13, 1915 Sept. 24, 1969	C, W	S	Well P-3. 1/
* 401	C. D. Atkins Estate	C. L. McMillan	1933	177	6	33	Kt	2,255	127.88	May 19, 1950	C, W	S	Well O-5. 1/
402	do	do	--	150	--	--	Kt	2,258	130.0	May 22, 1969	C, W	S	--
403	do	do	--	--	--	--	Kea	2,335	35.2	do	C, W	S	--
404	M. W. Moss Estate	--	--	240	--	--	Kt	2,294	164.7	May 19, 1969	C, W	D, S	--
405	do	--	1912	120	--	--	--	2,274	--	--	C, W	S	--
406	C. D. Atkins Estate	C. L. McMillan	1960	150	--	--	Kt	2,202	98.8	May 22, 1969	C, W	S	--
601	Wylie Jemeyson Estate	C. M. Arrowt	--	41	6	--	Kea	2,100	30.61	May 18, 1950	C, W	S	Well P-11. 1/
602	Eugene W. Jones	--	1951	42	10	42	Qal	2,036	--	--	T, G	Irr	Reported yield, 333 gpm.
* 701	Herman L. Allen	--	1928	190	--	--	Kea	2,352	--	--	S, E	D, S	--
801	Charles Le Boutillier	--	--	120	--	--	Kea	2,162	--	--	C, W	S	--
901	do	--	--	50	--	--	Kea	2,078	32.3	Aug. 5, 1969	C, W	S	--
* 902	do	--	--	120	--	--	Kea, Kt	2,147	--	--	C, W	S	Water has slight sulfur odor.
* 903	do	--	1969	58	7	58	Kea	2,146	32.2	Aug. 5, 1969	N	N	Unused domestic and livestock well.
904	Edith Anson Boulware	--	--	Spring	--	--	Kea	--	--	--	--	--	Known as "Cole Creek Spring".
53-101	J. W. Johnson Estate	Merton West	--	--	--	--	--	--	--	--	C, W	S	--
201	do	do	--	--	--	--	--	--	--	--	S, E	D, S	--
202	do	do	--	--	--	--	--	--	--	--	C, W	S	--
203	do	do	--	--	--	--	--	--	--	--	C, W	N	Unused domestic well.
* 301	do	do	--	Spring	--	--	Kea	--	--	--	--	--	Spring Q-1. Known as "Pecan Spring". Water flows from crevices in limestone. Dry in summer of 1948. Measured 139 gpm on May 9, 1950. Temperature 68°F. Altitude of springs, about 2,048 feet. 1/
* 302	do	Tip Van Court	1956	80	--	--	Kea	--	--	--	S, E	D, S	--
303	do	do	--	38	--	--	Kea	2,069	24.2	Aug. 25, 1969	N	N	Abandoned domestic well.
304	do	Merton West	1944	150	6	--	Kea	2,200	41.5	Mar. 20, 1950	C, W	S	Well Q-2. 1/
305	do	do	--	40	--	--	--	--	--	--	C, W	S	--
306	do	do	--	--	--	--	Qal	2,017	5.6	Sept. 15, 1969	C, W	S	--
* 401	Tom Green Fresh Water District No. 2	--	1955	85	6	--	Qal	2,000	20	May 24, 1960	T, E	P	--
402	do	--	1957	85	6	--	--	2,000	--	--	S, E	P	--
403	do	--	1957	85	6	--	--	2,000	--	--	S, E	P	--
* 404	Clarice A. McMillan	--	1953	150	--	--	Kea	2,172	133.5	May 22, 1969	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
* YB-43-53-405	C. L. McMillan	--	--	60	--	--	Kea	2,076	--	--	C, W	D, S	--
406	do	--	1950	55	--	--	--	2,059	--	--	C, W	S	--
407	J. W. Johnson Estate	Richard Van Court	--	165	--	--	Kea	2,097	57.8	Aug. 25, 1969	C, W	S	--
501	do	Tip Van Court	1962	200	--	--	Kea	2,230	182.0	do	C, W	S	--
* 502	do	do	1958	180	--	--	Kea	2,189	118.5	do	C, W	S	--
503	do	Richard Van Court	--	186	--	--	--	--	--	--	C, W C, E	D, S	--
* 601	do	Tip Van Court	--	220	--	--	Kea	2,259	184.8	Aug. 25, 1969	S, E	S	--
602	do	do	1955	120	--	--	Kea	2,085	41.2	do	C, W	S	--
* 702	Edith Anson Boulware	--	--	Spring	--	--	Kea	2,075	--	--	--	--	Spring P-21. Known as "Anson Springs". Reported yield 4,040 gpm. Yield varies with amount of rainfall. 1/
703	do	--	--	--	--	--	--	2,079	--	--	T, E	D	--
* 704	do	--	--	35	--	--	Kea	2,079	--	--	C, W	D	--
* 705	do	--	--	45	--	--	Kea	2,087	--	--	J, E	D, S	--
706	do	--	1962	30	--	--	Kea	2,069	23.3	Aug. 6, 1969	C, W	S	--
707	do	--	--	140	--	--	Kea	2,191	128.0	do	C, W	S	--
* 708	do	--	--	Spring	--	--	Kea	--	--	--	--	--	--
801	do	--	--	270	6	--	Kea	2,305	242.5 241.24 241.0	Dec. 2, 1948 May 16, 1950 Aug. 17, 1961	S, E	S	Well P-18. 1/
802	do	--	--	35	--	--	Kea	2,238	19.6	Aug. 6, 1969	C, W	S	--
901	Charles H. Griffith	Ford Boulware	--	200	--	--	Kea	2,281	--	--	C, W	D, S	--
902	J. W. Johnson Estate	Tip Van Court	1950	230	--	--	Kea	2,248	162.8	Aug. 25, 1969	C, W	S	--
903	do	do	1950	220	--	--	--	--	--	--	C, W	S	--
54-101	J. D. Robertson Estate	Horace Edwards	1920	125	--	--	--	2,172	--	--	C, W	S	--
* 102	J. W. Johnson Estate	Merton West	--	--	--	--	Kea	--	--	--	C, W	D, S	--
201	Mary Bunyard, et al.	Ben L. Keyes	--	--	--	--	Kea	2,237	--	--	C, W	S	--
202	W. G. Currie	Horace Edwards	1947	110	--	--	Kea	2,188	105.1	May 13, 1969	C, W	S	--
203	Mary Bunyard, et al.	do	1961	260	--	--	Kea	2,323	252.4	do	C, W	S	--
301	J. D. Robertson Estate	do	--	--	--	--	--	2,128	--	--	C, W	S	--
302	do	do	--	--	--	--	--	2,168	--	--	S, E	S	--
* 401	J. W. Johnson Estate	Wayland Drennan	1920	124	6-1/2	86	Kea	2,175	87.10 73.3 73.9	Oct. 10, 1940 Mar. 20, 1950 Dec. 11, 1967	S, E	D, S	Well Q-5. 1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
YB-43-54-402	J. W. Johnson Estate	Wayland Drennan	--	85	--	--	Kea	2,132	71.8	Aug. 26, 1969	S, E	S	--
403	do	Merton West	--	--	--	--	--	--	--	--	C, W	S	--
* 501	do	Wayland Drennan	--	--	--	--	Kea	2,252	146.6	Aug. 26, 1969	C, W	S	--
502	do	do	--	--	--	--	--	2,297	--	--	C, W	S	--
* 601	Upton and Quillen	Bill Upton	--	190	--	--	Kea	2,231	141.5	May 14, 1969	C, W	D, S	--
701	Charles H. Griffith	Ford Boulware	--	--	--	--	Kea	2,286	206.4	Aug. 6, 1969	C, W	S	--
702	J. W. Johnson Estate	Wayland Drennan	--	175	--	--	Kea	2,269	178.4	Aug. 26, 1969	C, W	S	--
* 801	do	do	1930	175	--	--	Kea	2,265	157.0	Sept. 15, 1969	C, W	S	--
901	A. L. Pfluger	Bill Pfluger	--	200	--	--	Kea	2,341	--	--	C, W	S	--
902	Upton and Quillen	Bill Upton	--	--	--	--	--	--	--	--	C, W	S	--
903	do	do	1960	366	--	--	Kea	2,446	321.0	May 14, 1969	C, W	S	--
55-201	Carl Pfluger, et al.	Bill Pfluger	1956	200	--	--	Kea	2,129	155.7	Apr. 29, 1969	C, W	S	--
* 202	Joe Mertz	--	--	99	--	--	Kea	2,127	81.2	Sept. 23, 1969	C, W	S	--
203	do	--	--	100	--	--	Kea	--	--	--	C, W	S	--
204	do	--	--	147	--	--	Kea	2,140	118.5	Sept. 23, 1969	C, W	S	--
* 205	do	--	--	113	--	--	Kea	2,087	45.2	do	C, W	S	--
206	do	--	1967	100	--	--	--	--	--	--	S, E	S	--
207	do	--	--	100	--	--	--	--	--	--	C, W	S	--
* 301	do	--	--	55	6	50	Kea	--	18.52 18.65 17.3	Oct. 18, 1940 Jan. 20, 1949 Aug. 11, 1961	C, W	N	Unused livestock well. Well R-3. 1/
302	do	--	--	91	6	--	Kea	2,075	36.9 38.9 38.4	do Dec. 11, 1967 Sept. 23, 1969	N	N	Unused livestock well.
* 303	do	--	--	100	--	--	Kea	--	--	--	C, W	D, S	--
304	Mrs. A. H. Denis, Jr.	A. H. Denis, III	1964	120	--	--	--	--	--	--	C, W	S	--
305	do	do	--	120	--	--	P	2,000	72.6	Mar. 27, 1969	N	N	--
501	W. C. Pfluger, et al.	Bill Pfluger	1956	200	--	--	Kea, P	2,157	155.8	Apr. 29, 1969	C, W	S	--
* 502	do	do	1956	201	--	--	Kea, P	2,148	179.8	do	C, W	D, S	--
503	do	do	1956	219	--	--	Kea	2,199	170.2	do	C, W	S	--
504	do	do	1956	205	--	--	Kea	2,264	215	do	C, W	S	--
505	do	do	1956	225	--	--	Kea	2,265	214.0	do	C, W	S	--
* 506	do	do	1956	225	--	--	Kea	2,184	113.7	do	C, W	S	--
507	Joe Mertz	--	--	100	--	--	--	--	--	--	C, W	S	--
* 701	L. H. Lock	--	1916	201	6	--	Kea	2,275	150 174.5	Jan. 5, 1951 Dec. 11, 1967	C, W	S	Well R-5. 1/

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
YB-43-55-702	A. L. Pfluger	Bill Pfluger	--	225	--	--	Kea	2,287	199.8	Apr. 28, 1969	C, W	S	--
703	Upton and Quillen	Bill Upton	--	--	--	--	--	--	--	--	C, W	S	--
704	do	do	--	--	--	--	--	--	--	--	C, W	S	--
705	Bill Upton	--	--	200	--	--	Kea	2,236	165.9	May 14, 1969	C, W	S	--
706	do	--	--	200	--	--	Kea	2,226	147.3	do	C, W	S	--
801	do	--	1943	165	--	--	Kea	2,216	121.5	do	C, W	D, S	--
802	do	--	1941	210	--	--	Kea	2,254	182.0	do	C, W	S	--
803	do	--	--	--	--	--	--	2,254	--	--	C, W	S	Reported yield 60 gpm.
804	do	--	1956	210	--	--	Kea	2,331	142.6	May 14, 1969	C, W	S	Reported yield 4 gpm.
805	do	--	1963	227	--	--	Kea	2,199	99.8	do	C, W	S	Reported yield 8 gpm.
901	do	--	1956	150	--	--	--	--	--	--	T, E	Irr	Reported yield 400 gpm.
* 59-203	Mrs. Lillian S. Winterbotham	Charles Schreiner	--	420	--	--	Kea	2,570	376.3	Sept. 6, 1967	C, W	S	--
* 60-101	Walter McGregor	--	--	270	6	--	Kt, P	2,300	205.87 90	Oct. 14, 1940 May 17, 1950	C, W	D, S	Well O-6. 1/
* 201	H. K. Hinde Estate	J. B. Westfall	--	121	6	--	Kt	2,200	109.92 108.49	Oct. 14, 1940 May 17, 1950	S, E	D, S	Well P-25. 1/
* 301	H. C. Williams	--	1898	90	6	15	Kea	2,175	43.12 43.17 45.56 59.45 62.4	Feb. 17, 1938 Mar. 28, 1939 Oct. 3, 1940 May 17, 1950 Dec. 11, 1967	S, E	D, S	Well P-28. 1/
302	Charles Le Boutillier	--	--	91	6	--	Kea	2,143	71.8 73.4	May 17, 1950 Aug. 5, 1969	C, W	S	Well P-27. 1/
303	do	--	--	130	--	--	--	2,213	--	--	C, W	S	--
304	Hudson Russell, Jr.	Ford Boulware	1969	82	--	--	Kea	2,103	59.5	Aug. 6, 1969	S, E	S	--
305	do	do	--	--	6	10	Kea	2,103	62.2	do	N	N	Abandoned livestock well.
306	Edith Anson Boulware	--	--	82	--	--	Kea	2,112	53.5	Sept. 4, 1969	C, W	S	--
* 61-102	do	--	1964	60	--	--	Kea	2,096	41.7	Aug. 6, 1969	C, W	S	--
103	do	--	--	40	--	--	Kea	2,085	--	--	C, W	S	--
104	W. C. Jones	--	1956	127	12	--	Kea	2,110	--	--	T, E	Irr	Reported yield 1,560 gpm.
201	Bill Upton	--	--	Spring	--	--	Kea	2,175	--	--	--	--	Spring P-19. Known as "Cave Springs". Flows during wet weather. 1/
202	do	--	--	250	--	--	--	--	--	--	C, W	S	--
* 203	Edith Anson Boulware	--	--	80	--	--	Kea	2,166	--	--	C, W	S	--
301	Bill Upton	--	--	--	--	--	--	--	--	--	C, W	S	--
302	do	--	--	200	--	--	Kea	2,257	137.1	May 14, 1969	C, W	S	--

See footnotes at end of table.

Table 6.--Records of Wells and Springs--Continued

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
YB-43-61-303	Bill Upton	--	--	250	--	--	Kea	2,256	141.8	May 14, 1969	C, W	D, S	--
* 304	do	--	1949	180	--	--	Kea	2,261	4.4	do	N	N	Unused industrial well.
305	Charles H. Griffith	Ford Boulware	--	--	--	--	--	2,306	--	--	C, W	N	Well is dry.
306	do	do	--	--	--	--	Kea	2,238	217.2	Aug. 6, 1969	C, W	S	--
62-101	R. L. Stansberry	--	--	292	6	--	Kea	2,300	231.1 275.3	Dec. 2, 1948 May 16, 1950	C, W	D, S	Well Q-12. 1/
* 301	E. W. Greer	Billy Harlin	--	--	--	--	Kea	2,435	328.8	July 22, 1965	C, W	S	--
* 302	H. C. Upton, et al.	Bill Upton	1940	--	--	--	Kea	2,393	291.9 282.3	Aug. 10, 1965 May 14, 1969	C, W	S	--
303	A. L. Pfluger	Bill Pfluger	--	--	--	--	Kea	2,439	322.8	Apr. 28, 1969	C, W	S	--
* 63-103	do	do	1959	--	--	--	Kea	2,334	238.0	do	C, W	D, S	--
104	do	do	--	225	--	--	Kea	2,310	208.6	do	C, W	D, S	--
105	H. C. Upton, et al.	Bill Upton	--	--	--	--	Kea	2,233	134.0	May 14, 1969	C, W	S	--
202	C. L. Whitehead	--	1961	165	--	--	Kea	2,218	144.0	July 13, 1965	C, W	S	--
* 204	H. C. Upton, et al.	Bill Upton	--	235	--	--	Kea	2,238	180.4	May 14, 1969	C, W	S	--
205	Bill Upton	--	--	232	--	--	Kea	2,227	127.4	do	C, W	S	--
302	C. L. Whitehead	--	1925	--	--	--	Kea	2,292	199.8	July 13, 1965	C, W	S	--
* 44-30-607	Calvin H. Sugg, et al.	Claude Collins, et al.	--	--	--	--	Kt	--	97.9	Mar. 8, 1966	C, W	S	--
* 903	do	Claude Collins, Jr.	--	--	--	--	Kt	--	105.0	do	C, W	S	--
* 906	Calvin H. Sugg	J. R. Wales	1962	127	5-1/2	127	Kt	2,474	63.19	Sept. 26, 1967	C, W	S	--
31-501	do	Claude Collins, Jr.	1927	223	7	--	Kea, Kt	2,582	174.3	Jan. 24, 1968	C, W	S	--
* 601	do	do	--	105	--	--	Kea, Kt	2,446	57.9	Jan. 23, 1968	C, W	S	--
702	do	do	1927	180	5-1/2	--	Kea, Kt	2,531	119.59	do	C, W	S	--
* 801	do	do	--	121	5-1/2	--	Kea, Kt	2,481	86.4	do	C, W	S	--
* 802	do	do	--	--	6-1/2	--	Kea, Kt	--	126.7	Mar. 12, 1969	C, W	S	--
32-401	Ela C. Sugg	do	--	--	--	--	Kea, Kt	--	--	--	C, W	S	--
502	do	R. B. Wales	1957	212	6	--	Kt	2,554	162.45 164.91	July 7, 1961 Sept. 26, 1967	C, W	S	--
701	do	do	--	132	--	--	Kea	2,497	116.65 60.44	July 11, 1961 Aug. 14, 1969	N	N	Unused industrial well.
* 702	do	do	1957	--	5-1/2	--	Kt	2,454	--	--	C, W	S	--
* 802	do	do	1958	127	5-1/2	127	Kt	--	99.92	Sept. 22, 1967	C, W	S	--
* 902	V. E. Frohandt, et al.	--	1957	244	6	--	Kea, Kt	2,588	182.3	Mar. 6, 1968	C, W	S	--

* Chemical analysis of water given in Table 7.

1/ Texas Board of Water Engineers Bulletin 5411, "Ground-Water Resources of Tom Green County, Texas."

TOM GREEN COUNTY

Table 7.--Chemical Analyses of Water From Wells and Springs

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
						Permian rocks undifferentiated												
YB-43-19-604	J. Z. Harper	--	Aug. 22, 1969	22	210	67	52	301	590	27	1.1	< 0.04	1,120	800	12.3	1,410	7.7	0.8
51-305	Mrs. C. A. Atkinson, et al.	--	Aug. 15, 1969	10	56	36	493	311	462	463	3.0	5.0	1,680	288	79.1	2,600	7.4	12.6
						Alluvium and Permian rocks undifferentiated												
47-402	N. G. Kent Estate	--	Oct. 7, 1969	8	156	96	710	372	1,020	710	4.2	3.5	2,890	780	66.3	3,960	7.5	11.1
48-402	Mrs. A. H. Denis, Jr.	130	Mar. 27, 1969	15	640	27	66	318	1,290	164	1.2	< .4	2,360	1,710	7.7	2,560	7.2	.7
						Trinity Group and Permian rocks undifferentiated												
27-901	Kenneth W. Brown	141	Sept. 17, 1969	10	64	104	125	414	133	266	2.4	< .04	910	590	31.7	1,570	7.6	2.2
52-202	C. D. Atkins Estate	150	May 22, 1969	11	20	27	443	580	36	425	2.0	< .4	1,250	160	85.7	2,060	7.8	15.3
1/ 60-101	Walter McGregor	270	May 17, 1950	--	--	--	--	320	566	760	--	--	--	306	--	3,870	7.5	--
							Trinity Group											
1/ 18-801	George Weddell	116	July 21, 1950	28	75	54	23	371	55	63	--	6.1	a/ 500	403	11	937	8.0	--
802	L. C. Clark	152	May 1, 1969	17	83	39	24	375	52	34	1.0	< .4	434	367	12.3	726	7.2	.5
803	L. T. Clark	--	May 1, 1969	24	96	62	32	327	194	61	1.0	< .4	630	494	12.4	963	7.5	.6
804	L. C. Clark	112	do	24	111	71	34	190	353	87	1.2	< .4	770	570	11.4	1,110	7.6	.5
19-607	J. Z. Harper	--	Aug. 22, 1969	17	66	45	36	390	71	22	1.0	< .4	451	350	18.3	740	7.5	.8
1/ 901	do	79	Sept. 12, 1940	--	67	42	6.0	378	39	33	--	< 20	373	340	--	--	--	--
1/ 20-401	W. B. Wilson	80	Aug. 14, 1969	15	68	29	9	325	10	13	1.0	7.0	312	289	6.2	532	7.9	.2
901	R. L. Magill	--	do	16	80	25	7	350	11	7	.6	< .4	319	301	4.7	544	7.4	.2
1/ 21-401	J. F. Sutton	187	Nov. 28, 1940	--	80	24	37	354	50	26	1.0	< 20	392	300	--	--	--	--
26-401	John S. Cargile	117	Sept. 14, 1967	10	52	29	17	287	33	11	1.0	< .4	294	248	12.7	518	7.4	.5
1/ 501	Ike Funk Estate	148	July 27, 1950	12	41	36	25	242	81	16	--	.0	a/ 334	250	18	595	8.7	--
702	John S. Cargile	118	Aug. 14, 1967	10	52	28	30	279	67	14	1.0	< .4	339	247	2.1	580	7.9	.8

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Trinity Group--Continued											
1/ YB-43-27-403	Percy W. Turner	80	July 5, 1950	--	--	--	--	192	31	8.0	--	--	--	170	--	307	7.9	--
405	Percy R. Turner	146	Sept. 16, 1969	11	67	42	31	345	80	24	0.9	< .04	426	339	16.5	709	7.5	0.7
1/ 902	Kenneth W. Brown	114	July 11, 1950 Sept. 17, 1969	-- 9	-- 40	-- 26	-- 85	336 296	105 83	58 46	-- 2.6	-- < .04	-- 438	246 209	-- 47.0	837 721	7.6 8.1	-- 2.6
29-302	Mrs. Elizabeth M. Baker	100	Sept. 2, 1969	11	88	123	170	620	234	230	1.6	1.5	1,170	730	33.8	1,840	7.6	2.8
44-802	Mrs. E. H. Jones	65	Sept. 22, 1969	18	94	24	15	365	20	17	.5	18.5	387	332	8.9	634	7.6	.4
1/ 51-201	A. F. Joslin	60	Sept. 21, 1950	11	66	34	289	308	307	252	1.8	2.0	1,110	304	67	1,850	7.9	--
301	Mrs. C. A. Atkinson Estate	90	Aug. 15, 1969	19	81	26	28	386	14	27	.6	5.0	391	310	16.3	651	7.4	.7
303	do	82	do	21	95	27	18	414	14	19	.4	5.5	404	351	9.9	668	7.6	.4
802	Mrs. Lillian S. Winterbotham	360	Sept. 6, 1967	13	46	29	37	281	32	34	.9	3.5	333	233	25.8	591	7.5	1.1
804	do	216	Sept. 5, 1967	12	48	30	21	285	24	21	.7	3.0	300	245	15.5	526	7.6	.6
1/ 52-401	C. D. Atkins Estate	177	May 19, 1950 May 22, 1969	20 13	67 62	25 23	14 18	308 294	16 13	19 24	-- .5	4.8 < .4	3/ 322 299	270 251	10 13.4	559 518	8.0 7.7	-- .5
1/ 60-201	H. K. Hinde Estate	121	Oct. 14, 1940	--	69	16	15	275	17	15	.2	5.3	272	235	--	--	--	--
44-30-607	Calvin H. Sugg, et al.	--	Mar. 8, 1966	4	54	34	28	218	105	25	1.3	17	375	276	18.3	631	7.8	.7
903	do	--	do	13	54	30	22	287	40	21	.9	5	327	261	15.3	565	7.7	.6
906	Calvin H. Sugg	127	Sept. 26, 1967	16	69	27	19	300	33	30	.9	< .4	343	283	12.5	600	7.1	.5
32-702	Ela C. Sugg	--	Sept. 26, 1967	9	58	35	18	275	44	25	2.4	5.5	324	268	12.6	564	7.4	.5
802	do	127	Sept. 22, 1967	16	49	27	21	242	24	31	1.9	10.5	299	233	16.5	526	7.7	.6
							Edwards and associated limestones											
1/ 43-26-602	Percy Turner	80	July 5, 1950 Aug. 8, 1969	-- 11	-- 49	-- 33	-- 15	268 268	47 32	21 19	-- 1.9	-- 13.5	-- 307	254 256	-- 11.6	540 512	7.6 7.8	-- .4
604	Mrs. Barbara Turner, et al.	145	do	17	84	16	8	318	12	12	.5	< .04	306	277	6.0	519	7.3	.2
51-903	Mrs. Lillian S. Winterbotham	315	Sept. 6, 1967	18	64	24	19	287	19	24	.7	8.5	318	258	13.9	552	7.8	.5
905	Mrs. G. A. Scruggs	190	May 13, 1969	12	70	19	11	299	< .4	19	.6	< .4	279	251	8.6	486	7.6	.3
52-701	Herman L. Allen	190	do	12	75	11	6	249	12	12	.3	10.0	260	233	5.6	450	7.6	.2
903	Charles Le Boutillier	58	Aug. 5, 1969	13	85	12	6	283	12	7	.3	20.5	295	260	4.8	500	7.6	.2
904	Edith Anson Boulware	Spring	Mar. 18, 1970	15	93	16	29	320	13	51	.3	12	386	299	17.3	660	7.3	.7
1/ 53-301	J. W. Johnson Estate	Spring	Oct. 10, 1940	--	78	17	32	329	14	31	.2	< 20	334	266	--	--	--	--
302	do	80	Aug. 25, 1969	20	108	25	23	423	19	29	.4	15.5	448	372	11.8	738	7.8	.5
404	Clarice A. McMillen	150	May 22, 1969	15	63	17	11	229	18	22	.4	19.0	278	230	9.3	474	7.9	.3
405	C. L. McMillan	60	May 26, 1969	18	146	31	40	412	42	121	.4	15.0	620	493	15.2	1,071	7.5	.8
502	J. W. Johnson, Estate	180	Aug. 25, 1969	19	64	26	22	285	16	33	.5	9.0	330	265	15.3	561	7.8	.6

See footnotes at end of table.

Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Edwards and associated limestones--Continued											
YB-43-53-601	J. W. Johnson, Estate	220	Aug. 25, 1969	17	67	22	20	289	17	25	0.5	11.5	323	258	14.5	541	7.5	0.4
1/ 702	Edith Anson Boulware	Spring	Aug. 20, 1940	--	60	17	31	287	< 10	27	.4	< 20	--	220	--	--	--	--
704	do	35	Aug. 6, 1969	15	86	19	37	303	12	68	.4	7.0	393	292	21.6	692	7.4	.9
705	do	45	do	16	86	19	35	306	13	67	.4	6.5	393	293	20.7	692	7.4	.9
708	do	Spring	Mar. 18, 1970	15	90	16	35	312	14	64	.3	10	397	292	20.4	679	7.3	.9
54-102	J. W. Johnson Estate	--	Sept. 15, 1969	16	75	14	17	253	22	28	.4	12.0	308	245	13.1	526	7.4	.5
401	do	124	Dec. 16, 1967	16	78	19	16	306	15	23	.3	11	328	275	11.5	574	7.6	.6
501	do	--	Sept. 15, 1969	18	65	27	25	299	24	36	.5	< .04	342	273	16.7	582	7.6	.7
601	Upton and Quillen	190	May 14, 1969	16	70	17	10	270	20	16	.4	5.0	287	247	8.0	483	7.5	.3
801	J. W. Johnson Estate	175	Sept. 15, 1969	20	57	14	12	203	12	25	.4	13.0	253	203	11.8	434	7.6	.4
55-202	Joe Mertz	99	Sept. 23, 1969	12	81	19	9	287	8	24	.2	19.5	314	279	6.2	534	7.6	.2
205	do	113	do	12	68	21	6	268	11	7	.4	28.5	286	255	5.0	474	7.6	.2
1/ 301	do	55	Oct. 18, 1940	--	84	29	23	378	24	27	--	< 20	373	328	--	--	--	--
303	do	100	Sept. 23, 1969	19	88	27	14	328	53	20	.7	< .04	383	331	8.2	631	7.3	.4
506	W. C. Pfluger, et al.	225	Apr. 29, 1969	18	61	30	10	234	79	12	.7	2.5	329	276	7.1	529	8.0	.3
701	L. H. Lock	201	Dec. 11, 1967	16	38	28	13	232	24	17	.5	< .4	251	212	11.5	443	7.6	.4
59-203	Mrs. Lillian S. Winterbotham	420	Sept. 6, 1967	13	47	30	10	260	18	18	2.3	3.0	269	240	8.6	484	7.6	.3
1/ 60-301	H. C. Williams	90	Oct. 3, 1940	--	38	16	24	195	< 10	30	--	< 20	--	160	--	--	--	--
			Dec. 11, 1967	16	81	19	26	295	26	36	.3	14	363	280	7.5	620	7.6	.7
61-102	Edith Anson Boulware	60	Aug. 6, 1969	16	86	20	37	310	15	70	.4	6.5	403	296	21.3	710	7.3	.9
203	do	80	do	16	77	20	22	299	15	35	.3	8.0	340	273	14.7	590	7.5	.6
304	Bill Upton	180	May 14, 1969	--	26	4	20	151	< 4	20	< .1	3.0	155	80	35.8	336	7.2	.9
62-301	B. W. Greer	--	July 22, 1965	13	44	22	9	222	20	12	.6	8	228	200	8.9	400	7.8	.2
302	H. C. Upton, et al.	--	Aug. 10, 1965	12	53	20	10	246	11	14	.3	1.5	243	215	8.9	438	7.2	.3
63-103	A. L. Pfluger	225	Apr. 28, 1969	16	48	27	14	256	17	19	.4	2.5	270	230	11.7	475	7.7	.4
204	H. C. Upton, et al.	235	May 14, 1969	13	52	31	9	285	17	19	.4	1.5	283	212	6.7	486	8.1	.2
							Edwards and associated limestones and Permian rocks undifferentiated											
55-502	W. C. Pfluger, et al.	201	Apr. 29, 1969	20	77	35	19	264	108	30	.9	4.0	424	338	11.1	674	7.8	.5
							Edwards and associated limestones and Trinity Group											
1/ 25-702	L. A. Harris Estate	97	July 25, 1950	14	48	20	12	256	23	18	--	7.2	277	239	10	502	8.3	--
801	do	--	Jan. 25, 1968	13	29	30	6	206	18	12	1.1	5.0	215	194	6.7	388	7.8	.2

See footnotes at end of table.

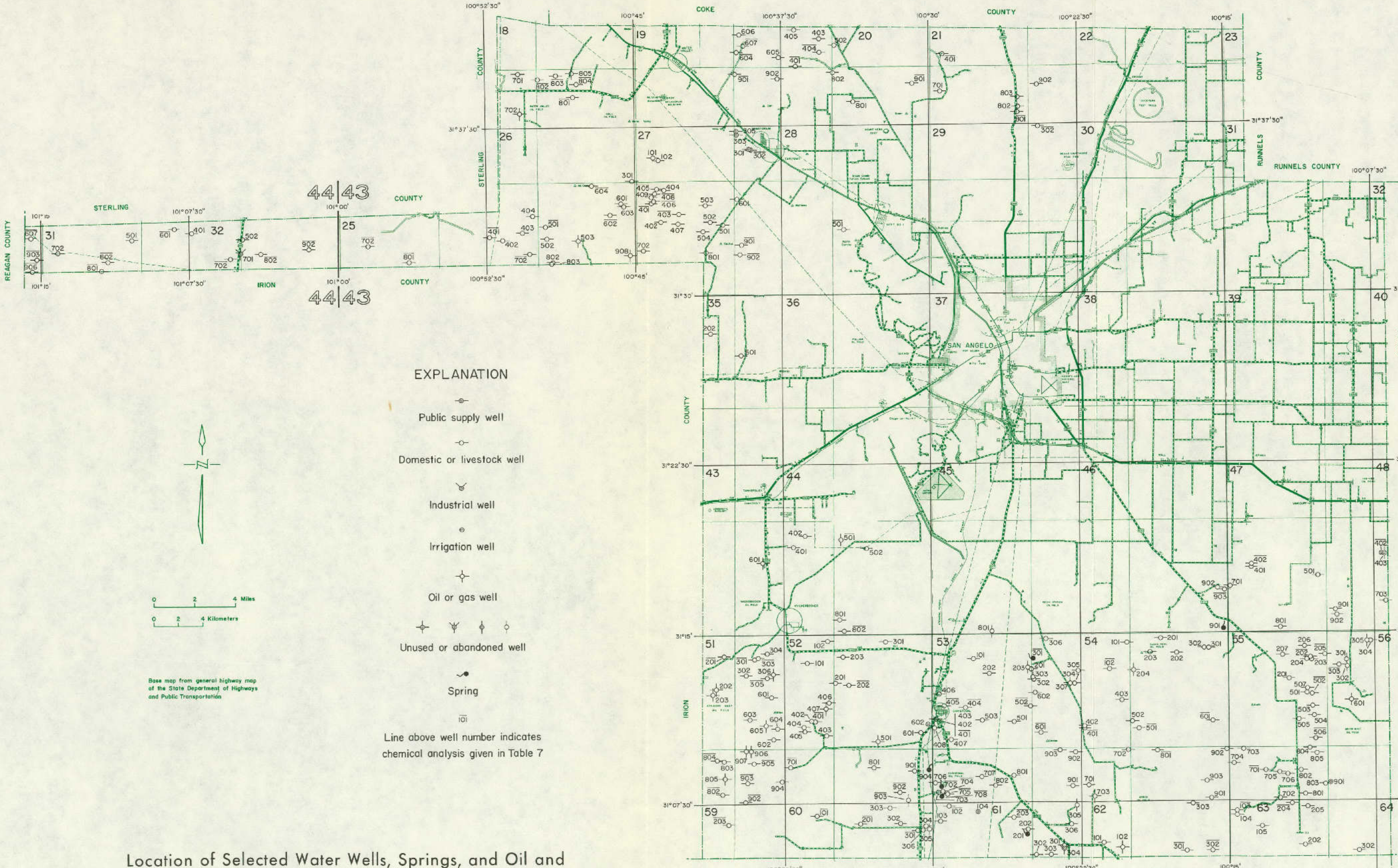
Table 7.--Chemical Analyses of Water From Wells and Springs--Continued

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
						Edwards and associated limestones and Trinity Group--Continued												
YB-43-51-902	Mrs. Lillian S. Winterbotham	450	Sept. 6, 1967	9	58	41	448	307	479	388	2.6	3.0	1,580	313	75.8	2,490	7.7	11.0
52-902	Charles Le Boutillier	120	Aug. 5, 1969	11	49	23	287	353	181	259	3.3	< .4	990	216	74.3	1,660	7.6	8.5
44-31-601	Calvin H. Sugg	105	Jan. 23, 1968	13	43	24	13	224	19	17	1.8	5.5	246	206	12.2	440	7.6	.4
801	do	121	do	13	49	29	17	248	37	20	1.6	11.5	300	241	13.5	506	7.9	.5
802	do	--	Mar. 13, 1969	15	42	29	17	224	25	21	2.3	13.0	274	223	14.4	477	7.6	.5
32-902	V. E. Probandt, et al.	244	Mar. 6, 1968	9	59	31	19	283	30	33	1.5	< .4	322	275	13.3	574	7.6	.5
							Alluvium											
43-20-404	W. B. Wilson	--	Aug. 14, 1969	19	80	31	12	383	17	7	.7	13.0	368	330	7.3	612	7.5	.3
21-801	Mrs. Elizabeth M. Baker	75	Sept. 2, 1969	10	52	45	93	405	124	47	1.9	< .4	570	316	38.9	938	7.8	2.3
27-302	McKnight State Hospital	72	Aug. 19, 1950	25	84	54	38	384	--	67	.6	4.9	600	432	16.1	--	7.3	1.1
[1] 401	Percy W. Turner	48	July 7, 1950	18	84	29	10	382	16	12	--	5.0	[a] 364	328	6	625	7.8	--
28-501	Kenneth W. Brown	35	Sept. 17, 1969	25	96	43	49	425	66	66	.7	< .4	560	415	20.3	907	7.5	1.0
[1] 44-501	Mrs. E. H. Jones	81	Aug. 21, 1940	--	74	7.0	22	275	< 10	20	.1	< 20	--	214	--	--	--	--
46-903	N. G. Kent Estate	50	Oct. 7, 1969	21	95	39	48	379	69	87	.8	< .4	550	397	20.7	894	7.8	1.0
[2] 53-401	Tom Green Fresh Water District No. 2	85	May 24, 1960	16	92	20	45	298	16	101	.3	7.4	445	312	24	813	6.8	1.1
			Mar. 18, 1970	16	95	20	39	348	17	69	.4	3.0	430	318	21.2	733	7.4	1.0
							Alluvium and Trinity Group											
27-408	Percy W. Turner	100	Sept. 4, 1969	18	84	29	8	384	9	8	.5	10.0	356	330	4.8	596	7.4	1.8
						Alluvium and Trinity Group and Permian rocks undifferentiated												
27-406	Percy W. Turner	280	Sept. 4, 1969	18	96	29	10	414	16	11	.8	< .04	385	359	5.5	646	7.3	.2

[1] Texas Board of Water Engineers Bulletin 5411, "Ground-Water Resources of Tom Green County, Texas."
[2] Analytical statement from U.S. Geological Survey.
[a] Residue on evaporation at 180°C.

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
YB-43-18-702	O. E. Schkade	W. C. Weddell No. 3
805	Moore Exploration Co.	E. C. Rawlins No. 1
26-503	E. H. Cox	Funk No. 1
908	Texas Co.	P. W. Turner No. 1
43-601	Sinclair Oil & Gas Co.	M. D. Bryant No. 1-6
51-202	Lipan Oil Co.	Mrs. W. A. Guinn No. 18
203	Texota Oil Co.	Jones No. 4
306	American Republic Corp. & J. K. Dorrance	Charles Atkinson No. 2-A
605	Royal Drilling Co. & Cumberland	Moss No. 1
805	Chase Petroleum Co.	Winterbotham No. 1-A
907	do	Winterbotham No. 1
52-407	J. K. Dorrance Trustee	C. D. & C. L. Atkins No. 1
501	C. L. Norsworthy, Jr.	J. D. Robertson No. 1-A
53-307	Pan American Petroleum Corp.	J. W. Johnson No. 3-A
408	American Republic Corp.	Harrington No. 1
54-204	Ada Oil Co.	J. W. Johnson, Jr. No. 1
703	Phillips Petroleum Co.	Griffith No. 1-A
55-601	Amerada Petroleum Co.	Joan C. Denis No. 1
62-102	Sinclair Oil & Gas Co.	R. L. Stansberry No. 1



Location of Selected Water Wells, Springs, and Oil and Gas Wells in Tom Green County

Table 8.—Oil and Gas Wells Used for Subsurface Control

Well	Operator	Lease and well
YL-44-17-904	Humble Oil & Refining Co.	Shackelford No. 3-B
905	do	Shackelford No. 2-B
18-716	Sinclair Oil & Gas Co.	Midkiff No. 58-E
717	do	Midkiff No. 52-F
830	Amerada Petroleum Co.	Elkins No. 4-19
831	Sinclair Oil & Gas Co.	Midkiff No. 28
25-106	Paul L. Davis	Windham No. 1-9
203	J. E. Jones Drilling Co.	G. E. Atkins No. 1-14
304	Humble Oil & Refining Co.	Tippett No. 1
403	R. B. Stallworth, Jr., et al.	Rutter & Wilbanks No. 2
506	B. L. McFarland Drilling Contractors	Cowden No. 1-37
603	Amerada Petroleum Co.	Tippett No. 1-44
905	do	Horby No. 1
26-115	Gustave Ring	Tippett No. 2-22-B
201	Cameron & Simmons	Elkin No. 1-29
214	Amerada Petroleum Corp.	L. B. Elkin No. 2-30
215	do	Lula B. Elkins No. 1-31
405	do	Tippett No. 2-46
406	Phillips Petroleum Co.	Tippett No. 10-A
407	Amerada Petroleum Corp.	V. P. Tippett No. 1-2
521	Phillips Petroleum Co.	Tippett No. 4-B
522	Sinclair Oil & Gas	J. E. Hill No. 1
602	Ashland Oil & Refining Co.	Sherrod No. 1
33-602	Barnett Sears & Young	Weeks No. 1
901	J. C. Maxwell	H. F. Neal No. 1
34-103	Mobil Oil Co.	Ryburn No. 1
403	Humble Oil & Refining Co.	Z. Oswalt, et al. No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
YL-44-34-602	James G. Brown & Assoc.	Halff Estate No. 1-A
804	Blackwood & Nichols	Humble-Barnett No. 1
809	James G. Brown & Assoc.	J. D. Cristy No. 1
919	Hiawatha Oil & Gas Co.	Rosa Barnett No. 1
41-201	Hunt Oil Co.	Henry Cravens No. 1
42-103	D. D. Feldman, et al.	Max Pray State No. 1
205	Sinclair Oil & Gas Co.	Elliott No. 2-C
502	C. U. Bay	University Lands No. 1
503	Hewgley Drilling Co.	Do.
504	Plymouth Oil Co.	Neal No. 1-8
49-212	Samedan Oil Co.	Neal No. 1
50-104	Texaco Incorporated	University Lands No. 1-DG
202	Cities Service Oil Co.	University Lands No. 1-A-H
702	Gulf Oil Corp.	University Lands No. 1-E-ER
57-103	Sinclair Oil & Gas Co.	J. L. Nutt No. 1
104	Gustave Ring	Noelke No. 1
105	Woodward & Co.	Corbett No. 1
106	Cities Service Oil Co.	Noelke No. 1-B
107	Garrett, Wynne & Black	Sue Noelke Houser No. 1
108	W. R. Goddard	Avery No. 1
45-23-903	Mobil Oil Co.	T. R. Wilson No. 42-15
30-902	Gulf Oil Corp.	McElroy Ranch No. 4-B-F
31-305	Texaco Incorporated	Upton No. 1-L-Fee
504	Bill Roden, et al.	Texaco Incorporated No. 1
505	Sinclair Oil & Gas Co.	Do.
803	do	J. P. Rankin No. 1
32-102	Magnolia Petroleum Co.	American Republic No. 2-A

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
YL-45-32-204	J. J. August & J. Roy Derrick	Windham No. 1
402	Vickers Exploration Ltd.	Powell No. 1
602	Seaboard Oil Co.	Meiners No. 1
702	Josephine P. Bay	V. J. Powell No. 3-B
804	Sunray Mid-Continent	Hazel Neal No. 2-A
39-101	Gulf Oil Corp.	McElroy Ranch No. 2-H
202	Sinclair Oil & Gas Co.	McElroy No. 6
503	Wilshire Oil Co.	McElroy No. 31-130
504	do	McElroy No. 42A-135
505	do	McElroy No. 14-117
506	do	McElroy No. 14-130
507	Sinclair Oil & Gas Co.	McElroy No. 2
602	Humble Oil & Refining Co.	McElroy Ranch No. 1-B
603	Wilshire Oil Co.	Windham No. 23-118
805	Sinclair Oil & Gas Co.	Windham No. 5
905	Wilshire Oil Co.	McElroy No. 13-119
906	Greenbrier Oil Co.	Windham No. 1
907	Gulf Oil Corp.	Ethel Jackson, et al. No. 1
40-103	Texaco Incorporated	Hazel Neal No. 1
104	Sunray Mid-Continent	Do.
204	Texaco Incorporated	J. H. Graf No. 3-(NCT-4)
46-302	Albert C. Bruce, Jr.	M. G. Damron No. 2
303	do	J. T. McElroy No. 1
901	Edwin L. Cox	Gentry No. 1
47-103	Albert C. Bruce	A. J. Sabo No. 1
202	Sinclair Oil & Gas Co.	S. A. Windham No. 1
203	do	Eddleman No. 1

Table 8.—Oil and Gas Wells Used for Subsurface Control—Continued

Well	Operator	Lease and well
YL-45-47-506	Humble Oil & Refining Co.	Rosa H. Barnett No. 5-D
703	Lone Star Producing Co.	Jacobs Livestock No. 1-B
802	Texas Pacific Coal & Oil Co.	W. W. McClure No. 2-acct. No. 1
803	do	W. W. McClure No. 7-acct. No. 1
904	Gulf Oil Corp.	Ernestine Freeman No. 2-E
905	Mobil Oil Co.	Halff Interests No. 1
48-103	Hunt Oil Co.	V. T. Amacker No. 1-62
504	Gulf Oil Corp.	C. M. Bell No. 1
54-502	Buffalo Oil Co.	Sanger Investment Co. No. 1
55-102	James G. Brown & Assoc.	King Ranch Oil & Lignite Co. No. 1-A
203	Gulf Oil Corp.	A. J. Herrington No. 6-(Tract-A)
302	Odessa Natural Gasoline Co.	J. H. Shirk Estate No. 1
303	Neville G. Penrose, Inc.	King Ranch Oil & Lignite Co. No. 1
405	Tennessee Gas & Trans Co.	M. L. Baker No. 11
604	Amerada Petroleum Corp.	Lee R. Lane No. 3
605	Gulf Oil Corp.	J. H. Shirk No. 28-E
56-102	Levin, Patton, et al.	F. Campbell No. 1
304	Standard Oil Co.	C. S. Stevenson No. 1

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Qal, Alluvium; Kea, Edwards and associated limestones; Kt, Trinity Group.
Altitude of land surface : Determined from U.S. Geological Survey topographic maps and by Paulin altimeter, unless otherwise designated by footnotes.
Water levels : Reported water levels are given to nearest foot; measured water levels are given to nearest tenth or hundredth of a foot.
Method of lift and type of power: C, cylinder; S, submersible; T, turbine; J, jet; E, electric; G, gas, butane, or gasoline; W, wind; N, none; Cf, centrifugal.
Use of water : D, domestic; S, livestock; P, public supply; Irr, Irrigation; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
YP-69-25-401	Vanie Cook, Jr.	Herb McDonald	--	78	--	--	Qal	1,356	22.8	Nov. 25, 1970	T, C	N	Well B-7-8. Dug well. Unused irrigation well. 1/
* 27-101	Garner State Park	--	--	58	8	--	Qal	1,400	27.12	Nov. 17, 1970	S, E	P	--
102	do	--	--	58	8	--	Qal	1,400	--	--	S, E	P	--
103	do	--	--	--	8	--	--	1,400	--	--	N	N	Unused public-supply well.
* 28-301	Utopia Community Park	--	--	100	--	--	Qal, Kt	1,354	--	--	J, E	P	--
* 33-701	Bill Winn	W. K. Quillen	--	--	6	--	Kea	--	--	--	S, E	D, S	--
* 35-201	John H. Frazier	--	--	50	--	--	Kt	1,238	32.5	Nov. 18, 1970	J, E	D	--
* 202	do	--	--	50	6	--	Kt	1,250	33.0	do	N	N	Test hole.
* 203	do	--	--	58	6	--	Kt	1,240	28.6	Nov. 23, 1970	N	N	Do.
501	W. E. Fitzgerald	--	1957	237	7	--	Kea	1,171	42.14	Nov. 3, 1967	N	N	--
* 701	Harvey Gulley	--	1900	400	6	20	Kea	1,163	184.1	Aug. 20, 1956	C, W	D, S	Well H-2-24. 1/
* 36-301	Fenley Estate	Louis N. Parker	1956	525	6	40	Kea	1,275	96.3 136.8	Feb. 15, 1956 Jan. 21, 1971	S, E	S	Well H-3-20. 1/
* 41-101	A. T. Crump	--	1951	232	12	84	Kea	1,048	47.6 38.4 42.6	Feb. 1, 1954 Mar. 27, 1958 Nov. 19, 1970	T, G	Irr	Well H-1-1. 1/
102	John Crump	--	--	20	6	20	Qal	1,020	--	--	T, G	Irr	--
* 103	Willard L. Wallace	--	1950	40	6	40	Qal	1,068	20	Nov. 25, 1970	J, E	P	--
* 201	Elmo Jones	--	1958	38	--	--	Qal	1,059	--	--	S, E	P	--
202	Wayne Winn	--	1949	100	10	--	Qal	1,032	26.3 24.7	Feb. 11, 1954 Jan. 16, 1958	T, G	Irr	Well H-1-2. 1/
203	do	--	1953	51	6	--	Qal	1,031	27.4	Nov. 19, 1970	N	N	Unused domestic well.
* 204	do	--	1953	50	6	--	Qal	1,031	--	--	J, E	D, S	--
42-101	Mrs. Elizabeth Raney	Jess Raney	--	267	6	20	Kea	1,135	205.3 179.0 186.6	Aug. 13, 1956 Dec. 3, 1957 Jan. 20, 1971	S, E	S	Well H-1-21. 1/
* YP-70-32-401	J. F. Rogers Estate	Tom and Vic Rogers	--	200	6	--	Kea	1,730	166.2 170.6	May 3, 1956 Jan. 12, 1971	C, W	D, S	Well A-9-22. 1/
601	Mrs. T. L. Witt	Sidney Wells	--	--	12	--	Qal	1,315	39.8	Nov. 25, 1970	N	N	Unused irrigation well.
602	do	do	--	--	--	--	Qal	1,315	40.1	do	T, E	N	Well A-9-15. Unused irrigation well. Questionable measurement on the water level. Reported yield, 500 gpm in 1956. 1/

See footnotes at end of table.

Table 6.--Records of Wells--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Casing: Diameter (in.)	Casing: Depth (ft)	Water bearing unit	Altitude of land surface (ft)	Water level: Below land-surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
YP-70-32-901	Mrs. T. L. Witt	Sidney Wells	--	50	12	--	Qal	1,275	21.8	Nov. 25, 1970	N	N	Well A-9-30. Unused irrigation well. 1/
* 902	H. J. Victor	Bill Victor	--	45	12	--	Qal	1,125	11.5 27.6	May 6, 1956 Nov. 20, 1970	Cf, G	Irr	Well A-9-26. Reported yield, 300 gpm in 1956. 1/
40-701	Louis Herndon	--	--	200	6	--	Kea	1,179	--	--	C, W	S	Well C-3-1. 1/

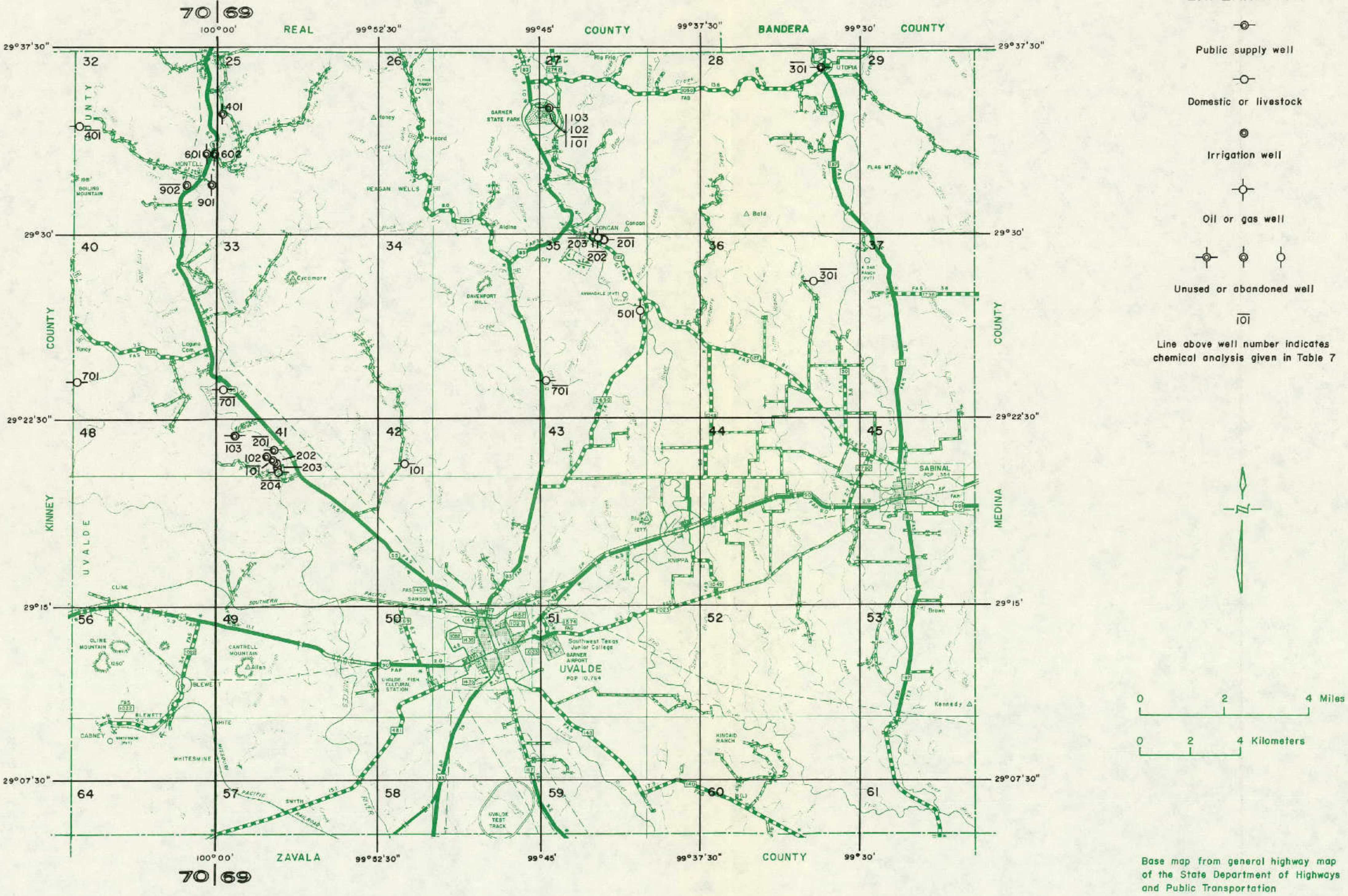
* Chemical analysis of water given in Table 7.
1/ Texas Water Commission Bulletin 6212, ''Geology and Ground-Water Resources of Uvalde County, Texas.''

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health except as indicated by footnote.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
								Trinity Group										
YP-69-35-201	John A. Frazier	50	Nov. 18, 1970	11	101	24	8	353	46	13	0.2	9	386	351	4.6	621	7.6	0.5
202	do	50	do	14	98	14	17	451	< 4	18	.1	< .4	404	303	8.7	703	7.1	.2
203	do	58	Nov. 23, 1970	10	486	166	12	232	1,590	11	2.6	< .4	2,390	1,900	1.4	2,440	7.5	.1
								Alluvium and Trinity Group										
28-301	Utopia Community Park	100	Nov. 17, 1970	13	92	15	9	305	33	17	.2	< .4	329	291	6.6	541	7.5	.4
								Edwards and associated limestones										
33-701	Bill Winn	--	Nov. 25, 1970	11	65	14	7	238	15	14	.1	7	250	220	6.6	421	7.9	.5
35-701	Harvey Gulley	400	Jan. 14, 1971	10	71	8	5	233	6	9	< .1	8.5	233	212	4.9	395	7.5	.2
36-301	Fenley Estate	525	Jan. 21, 1971	8	530	180	17	209	1,810	20	2.8	< .4	2,670	2,070	1.8	2,590	7.4	.2
1/ 41-101	A. T. Crump	232	Apr. 18, 1956	13	66	14	10.4	244	12	18	--	6.1	260	222	8	464	7.5	--
70-32-401	J. F. Rogers Estate	200	Jan. 12, 1971	13	98	5	6	276	7	17	.1	17	299	263	4.4	493	7.5	.1
								Alluvium										
69-27-101	Garner State Park	58	Nov. 17, 1970	17	155	28	14	418	139	30	.5	10	600	500	5.8	898	7.4	.4
41-103	Willard L. Wallace	40	Nov. 25, 1970	11	59	14	8	223	12	15	.1	7	236	203	8.1	402	7.7	.3
201	Elmo Jones	38	Nov. 20, 1970	11	98	6	8	295	11	17	.1	10	306	269	6.3	510	7.5	.2
204	Wayne Winn	50	Nov. 19, 1970	11	61	12	7	221	12	15	.1	5.0	232	203	7.3	396	7.6	.2
70-32-902	H. J. Victor	45	Nov. 20, 1970	12	115	14	8	388	5	18	.1	9	372	347	4.9	629	7.6	.2

1/ Texas Water Commission Bulletin 6212, ''Geology and Ground-Water Resources of Uvalde County, Texas.''



Location of Selected Water, Oil, and Gas Wells in Uvalde County

WINKLER COUNTY

Table 6.--Records of Wells

All wells are drilled unless otherwise noted in remarks.
Water-bearing unit : Kt, Trinity Group; Trs, Santa Rosa Formation.
Altitude of land surface : Determined from Muldrow surface elevation map.
Method of lift and type of power: C, cylinder; E, electric; W, wind.
Use of Water : S, livestock; N, none.

Well	Owner	Lessee or tenant	Date completed	Depth of well (ft)	Casing		Water bearing unit	Altitude of land surface (ft)	Water level		Method of lift	Use of water	Remarks
					Diameter (in.)	Depth (ft)			Below land-surface datum (ft)	Date of measurement			
* ZP-27-58-701	William H. Cole	--	--	--	--	--	Kt	3,200	--	--	C, W	S	--
702	do	--	--	1,200	--	--	Trs	3,200	--	--	C, W	N	Unused livestock well.
* 801	Texaco Incorporated	William H. Cole	--	1,200	--	--	Trs	3,365	--	--	C, E	S	--
802	William H. Cole	--	1969	160	6	160	Kt	3,340	--	--	C, W	S	Casing cemented from 0 to 16 feet. Casing slotted.

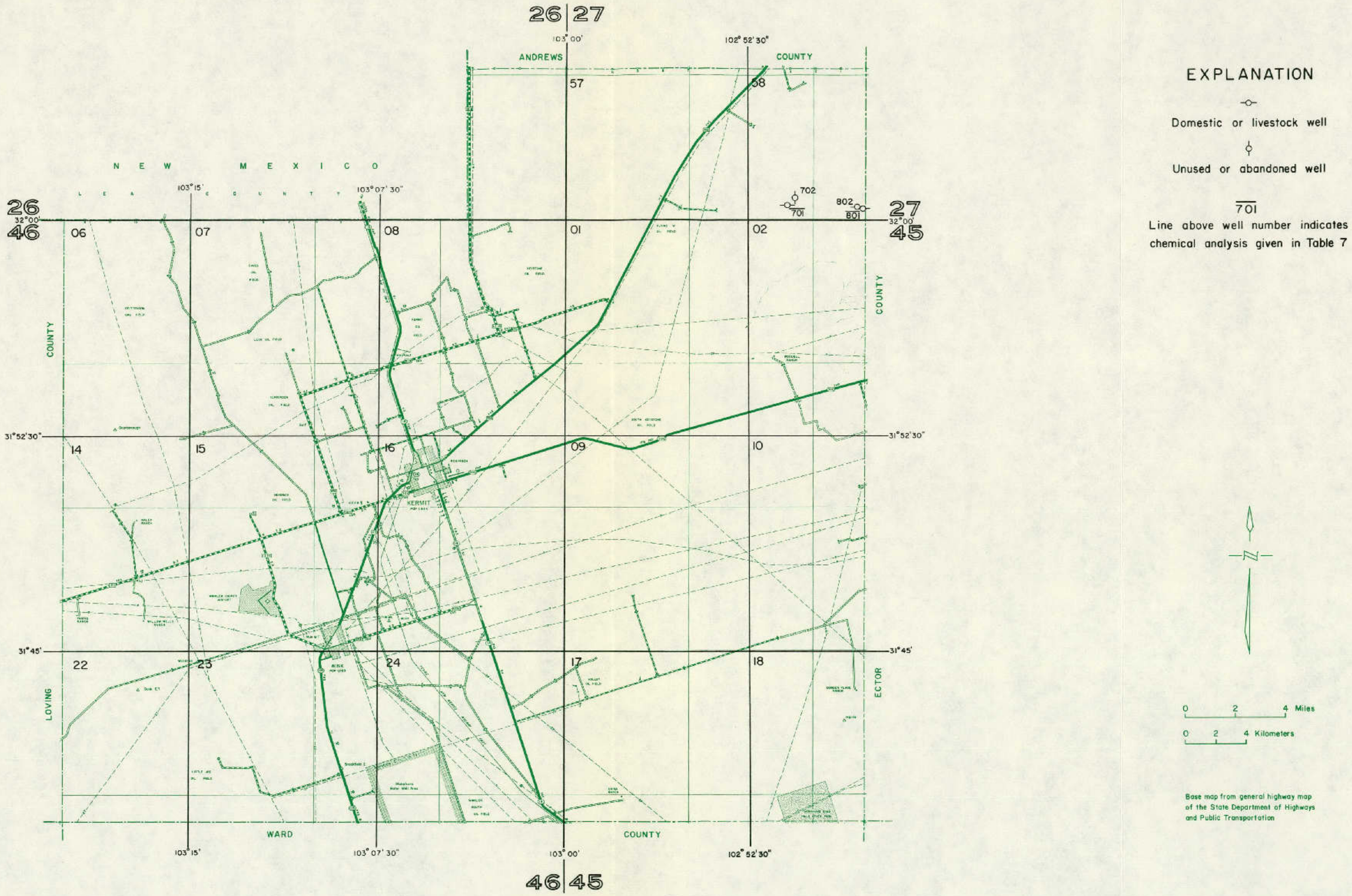
* Chemical analysis of water in Table 7.

WINKLER COUNTY

Table 7.--Chemical Analyses of Water From Wells

(Analyses are in milligrams per liter except percent sodium, specific conductance, pH, and SAR)
Analyses performed by the Texas State Department of Health.

Well	Owner	Depth of well (ft)	Date of collection	Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Specific conductance (micromhos at 25°C)	pH	Sodium adsorption ratio (SAR)
							Trinity Group											
ZP-27-58-701	William B. Cole	--	July 27, 1970	13	119	20	105	200	285	98	2.8	13	750	378	37.7	1,129	7.3	2.4
							Santa Rosa Formation											
801	Texaco Incorporated	1,200	July 27, 1970	5	16	14	1,010	395	1,230	520	3.1	< .4	2,990	99	95.7	4,110	8.1	44.4



Location of Selected Water Wells in Winkler County