TEXAS

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BOARD

REPORT 12

GROUND-WATER RESOURCES OF CALDWELL COUNTY, TEXAS

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TEXAS WATER DEVELOPMENT BOARD

REPORT 12

GROUND-WATER RESOURCES OF CALDWELL COUNTY, TEXAS

By

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FOREWORD

On September 1, 1965 the Texas Water Commission (formerly, before February 1962, the State Board of Water Engineers) experienced a far-reaching realignment of functions and personnel, directed toward the increased emphasis needed for planning and developing Texas' water resources and for administering water rights.

Realigned and concentrated in the Texas Water Development Board were the investigative, planning, development, research, financing, and supporting functions, including the reports review and publication functions. The name Texas Water Commission was changed to Texas Water Rights Commission, and responsibility for functions relating to water-rights administration was vested therein.

For the reader's convenience, references in this report have been altered, where necessary, to reflect the current (post September 1, 1965) assignment of responsibility for the function mentioned. In other words credit for a function performed by the Texas Water Commission before the September 1, 1965 realignment generally will be given in this report either to the Water Development Board or to the Water Rights Commission, depending on which agency now has responsibility for that function.

Texas Water Development Board

John J. Vandertulip

John J. Vandertulip
Chief Engineer

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ABSTRACT

Caldwell County is in the West Gulf Coastal Plain of south-central Texas. It has an area of 544 square miles and had a population of 17,222 in 1960. The economy depends chiefly on the raising of livestock, farming, small industries, and oil production.

The principal fresh to slightly saline water-bearing formations underlying the county, from oldest to youngest, are the Wilcox Group, Carrizo Sand, Reklaw Formation, Queen City Sand, Leona Formation, and Recent alluvium. Of these, the Carrizo Sand and Wilcox Group together constitute the most favorable aquifer for future large-scale ground-water development.

The yields of existing water wells in the county range from a few gallons per minute to as much as 600 gpm (gallons per minute), but much larger yields can be expected from properly constructed gravel-packed wells. The potential yields that can be expected from wells tapping the water-bearing formations are as follows: Carrizo Sand and Wilcox Group, 1,500 gpm; Reklaw Formation, 100 gpm; Queen City Sand, 100 gpm; Leona Formation, 500 gpm; and Recent alluvium, 300 gpm.

In 1963, 2,600 acre-feet or 2.3 mgd (million gallons per day) of ground water was pumped for all purposes in the county. About 1,670 acre-feet (1.5 mgd) was for municipal supply, 380 acre-feet (0.34 mgd) for irrigation, and 560 acre-feet (0.5 mgd) for domestic and stock use. Only 836 acre-feet (0.7 mgd) of surface water was pumped for industrial use and irrigation in 1963.

About 25,000,000 acre-feet of fresh to slightly saline ground water is in storage in the county. Of this amount, 92 percent or 23,000,000 acre-feet of water is stored in the Carrizo Sand and Wilcox Group, 900,000 acre-feet in the Queen City Sand, 700,000 acre-feet in the Reklaw Formation, 50,000 acre-feet in the Leona Formation, and 40,000 acre-feet in the Recent alluvium. However, only a small part of the water in storage is economically recoverable. It is estimated that about 23,000 acre-feet per year or about 20 mgd of water could be pumped perennially from the Carrizo Sand and Wilcox Group, which function as a single aquifer, without depleting the supply. Large quantities may be pumped at the expense of declining water levels--for example, 75 mgd could be pumped for perhaps 75 to 100 years, but after this time, most of the aquifer within 400 feet of the land surface would be dewatered.

Most of the ground water in the county is suitable for public supply and many irrigation and industrial purposes. Chemical analyses indicate that the

dissolved solids in 143 samples ranged from 128 to 3,750 ppm (parts per million), exceeding 1,000 ppm in 51 samples. Highly mineralized water occurs locally in the Wilcox Group, particularly in areas of faulting.

Contamination of the ground water by highly mineralized water is not a serious problem. The high chloride content of water in some places in the Wilcox outcrop is due principally to poor circulation caused by faulting and is not attributed to contamination by oil-field salt water. Although some oil-field contamination has occurred by hazardous disposal of salt water, the situation has been corrected for the most part, and in 1961, about 96 percent of the salt water produced was injected back into the oil-producing zones.

GROUND-WATER RESOURCES OF CALDWELL COUNTY, TEXAS

INTRODUCTION

Location and Extent of Area

Caldwell County is in the West Gulf Coastal Plain of south-central Texas (Figure 1). It is bounded on the northeast by Bastrop County, on the northwest by Travis and Hays Counties, on the southwest by Guadalupe County, and on the southeast by Gonzales County. Lockhart, the county seat, is about 30 miles south of Austin at the junction of U.S. Highway 183 and several State highways. The county has an area of 544 square miles. The U.S. Census listed a county population of 1,329 in 1850; the population increased to a recorded maximum of 31,397 in 1930, and has decreased since then to 17,222 in 1960. The populations of the two incorporated towns in Caldwell County in 1960 were Lockhart, 6,084, and Luling, 4,412. Unincorporated communities are Dale, Fentress, Lytton Springs, McMahan, Martindale, Maxwell, Prairie Lea, Reedville, and Stairtown.

Scope and Purpose of Investigation

The ground-water investigation of Caldwell County was made by the U.S. Geological Survey in cooperation with the Texas Water Development Board, the Guadalupe-Blanco River Authority, Caldwell County, the cities of Lockhart and Luling, the Plum Creek Conservation District, the First National Bank of Lockhart, the Lockhart State Bank, the First National Bank of Luling, and the Luling State Bank. The work was done under the supervision of A. G. Winslow, district geologist in charge of ground-water investigations by the Geological Survey in Texas.

The purpose of the study was to determine the ground-water resources of Caldwell County and to make the results of the study available to the public. The report is based on records of 479 wells, 6 springs, 125 electric logs of wells, 67 drillers' logs, 287 chemical analyses of ground-water samples, climatological data, streamflow data, and the results of 15 pumping tests of 8 wells.

During the course of the investigation, an inventory was made of all municipal, industrial, and irrigation wells, and of enough stock wells, domestic wells, springs, and oil tests to provide basic ground-water data throughout the county (Table 9 and Plate 1). Electric logs of water wells and oil tests and drillers' logs of water wells (Table 10), in conjunction with other data were used to study the subsurface geology and to determine the thickness of sand containing fresh to slightly saline water and the base of this water. An

Figure 1

Index Map Showing Location of Caldwell County

U. S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe-Blanco River Authority inventory was made of the municipal, industrial, and irrigation pumpage as of 1963 and estimates were made of the past pumpage.

Well-Numbering System

The numbers assigned to wells in this report conform to the statewide system used by the Texas Water Development Board and based on the division of Texas into 1-degree quadrangles bounded by lines of latitude and longitude. Each 1-degree quadrangle is divided into 64 smaller quadrangles, $7\frac{1}{2}$ minutes on a side, and each of those is further divided into 9 quadrangles, $2\frac{1}{2}$ minutes on a side. Each of the 1-degree quadrangles in the State has been assigned a 2-digit number for identification. The $7\frac{1}{2}$-minute quadrangles are given 2-digit numbers consecutively from left to right beginning with 01 in the upper left-hand corner of the 1-degree quadrangle, and the $2\frac{1}{2}$-minute quadrangles are similarly designated by 1-digit numbers. The well number thus indicates the well location as follows: from left to right, the first 2 digits identify the 1-degree quadrangle; the next 2 digits identify the $7\frac{1}{2}$-minute quadrangle; the fifth digit indicates the $2\frac{1}{2}$-minute quadrangle, and the last 2 digits designate the well within the $2\frac{1}{2}$-minute quadrangle. In this report, the 1-degree and $7\frac{1}{2}$-minute quadrangles are shown on the maps; the $2\frac{1}{2}$-minute quadrangles are not shown as they would obscure other details. Figure 2 illustrates the well-numbering system. In addition to the 7-digit well number, a 2-letter prefix is used to identify the county. The prefix for Caldwell County is BU.

Previous Investigations

Previous investigations relating to the ground-water resources of Caldwell County have resulted in a well-inventory report, a report on water levels in observation wells, and several reports covering large areas which included all or parts of the county. The well-inventory report (Rasmussen, 1947) contains records of 289 wells, 261 chemical analyses of water samples, drillers' logs of 14 wells, 1 geologic section, and a map showing the outcrops of the geologic formations and the well locations. Some of these data are included in this report. Table 1 lists the well numbers used in this report and the corresponding numbers used in the report by Rasmussen. Descriptions of geologic features in the county are included in the report by Rasmussen and in reports by Deussen (1924) and Sellards, Adkins, and Plummer (1932). The public water supplies of nine towns in the county were described briefly by Broadhurst, Sundstrom, and Rowley (1950, p. 30-36). Swartz (1957) tabulated records of water levels in observation wells in Bastrop and Caldwell Counties. The ground-water resources of an area including most of Caldwell County are discussed in the reconnaissance study of the Guadalupe, San Antonio, and Nueces River Basins by Alexander, Myers, and Dale (1964).

Economic Development

The region including Caldwell County was first settled by English-speaking colonists in the 1840's. Previously, Byrd Lockhart, a surveyor and pioneer, obtained a grant of land around a group of perennially flowing springs that later became the site of the town of Lockhart. The date when the first public water-supply system was established is not known, but the system utilized the

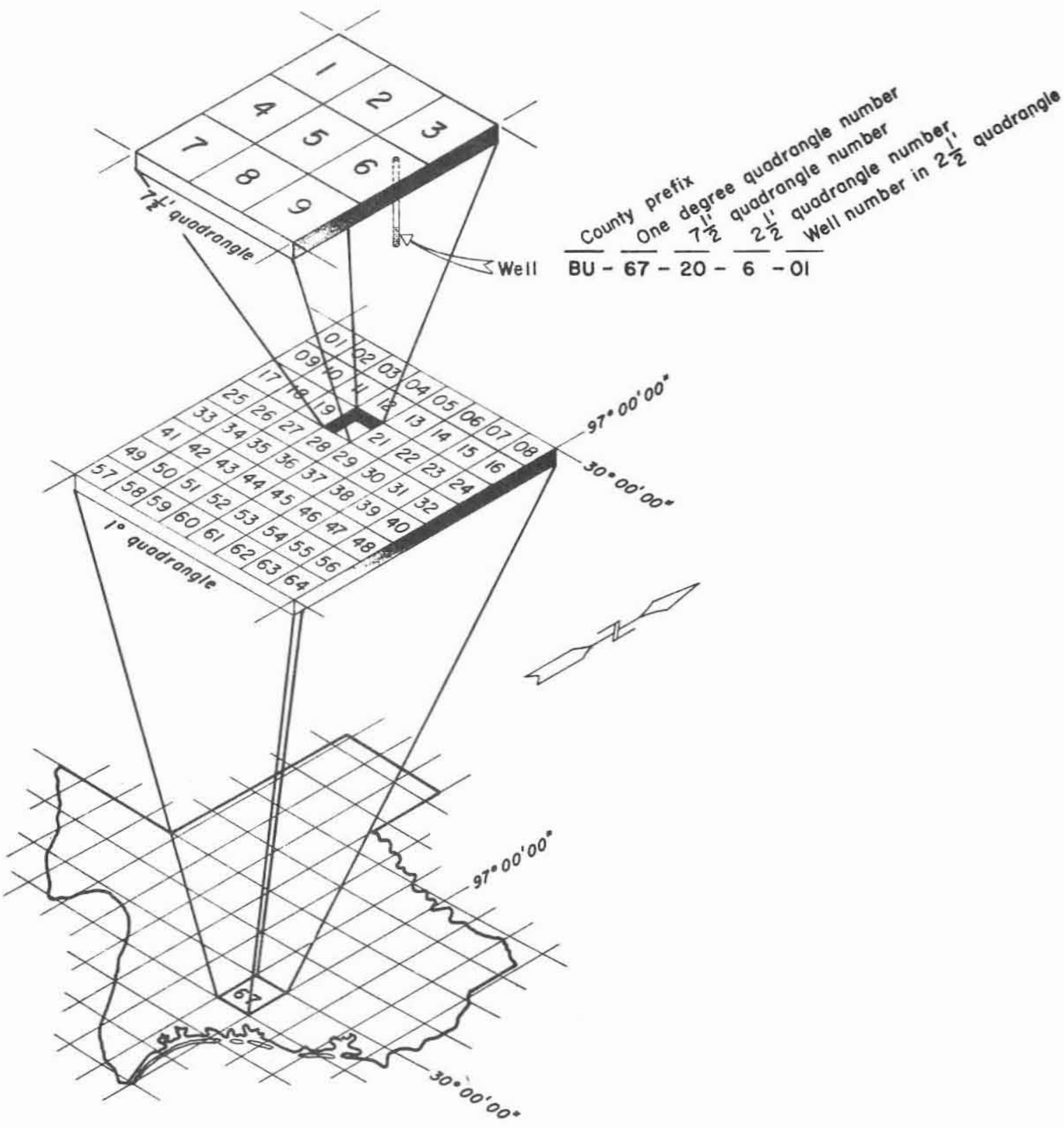


Figure 2

Diagram Showing the Well-Numbering System

U. S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe-Blanco River Authority

Table 1.--Well numbers used in this report and corresponding numbers in the report by Rasmussen (1947)

New no.	Old no.	New no.	Old no.	New no.	Old no.	New no.	Old no.
BU-58-60-703	204	BU-67-03-603	211	BU-67-03-807	42	BU-67-10-101	5
BU-58-60-704	205	BU-67-03-703	22	BU-67-03-808	53	BU-67-10-103	4
BU-58-60-705	203	BU-67-03-705	31	BU-67-03-809	52	BU-67-10-108	3
BU-58-60-706	201	BU-67-03-706	46	BU-67-03-810	43	BU-67-10-201	7
BU-67-02-301	113	BU-67-03-707	24	BU-67-03-811	49	BU-67-10-202	8
BU-67-02-503	12	BU-67-03-708	25	BU-67-04-202	217	BU-67-10-203	6
BU-67-02-507	14	BU-67-03-709	23	BU-67-04-401	215	BU-67-10-301	104
BU-67-02-601	17	BU-67-03-711	28	BU-67-04-502	222	BU-67-10-501	524
BU-67-02-602	18	BU-67-03-712	40	BU-67-04-503	220	BU-67-10-502	523
BU-67-02-603	19	BU-67-03-713	41	BU-67-04-504	218	BU-67-10-504	520
BU-67-02-704	9	BU-67-03-715	26	BU-67-04-506	219	BU-67-10-601	519
BU-67-02-705	10	BU-67-03-717	34	BU-67-04-601	243	BU-67-10-802	521
BU-67-02-706	11	BU-67-03-718	32	BU-67-04-602	242	BU-67-10-803	522
BU-67-02-801	15	BU-67-03-719	30	BU-67-04-701	531	BU-67-10-901	515
BU-67-02-902	103	BU-67-03-720	36	BU-67-04-702	530	BU-67-10-907	516
BU-67-02-905	16	BU-67-03-721	37	BU-67-04-801	240	BU-67-10-908	517
BU-67-03-301	209	BU-67-03-722	33	BU-67-04-901	246	BU-67-11-101	106
BU-67-03-303	207	BU-67-03-723	35	BU-67-04-902	249	BU-67-11-104	105
BU-67-03-304	206	BU-67-03-801	87	BU-67-04-905	247	BU-67-11-105	107
BU-67-03-401	20	BU-67-03-802	62	BU-67-05-402	244	BU-67-11-201	114
BU-67-03-402	21	BU-67-03-803	59	BU-67-05-701	270	BU-67-11-202	108
BU-67-03-601	210	BU-67-03-805	54	BU-67-05-702	271	BU-67-11-203	228
BU-67-03-602	212	BU-67-03-806	55	BU-67-09-303	1	BU-67-11-204	112

Table 1.--Well numbers used in this report and corresponding numbers in the report by Rasmussen (1947)--Continued

New no.	Old no.	New no.	Old no.	New no.	Old no.	New no.	Old no.
BU-67-11-307	230	BU-67-12-203	252	BU-67-13-303	274	BU-67-19-608	453
BU-67-11-308	231	BU-67-12-301	263	BU-67-13-501	405	BU-67-19-609	467
BU-67-11-310	227	BU-67-12-302	255	BU-67-13-601	402	BU-67-19-610	466
BU-67-11-312	226	BU-67-12-303	257	BU-67-13-602	401	BU-67-19-612	461
BU-67-11-501	508	BU-67-12-304	258	BU-67-13-603	403	BU-67-19-613	462
BU-67-11-502	509	BU-67-12-305	259	BU-67-13-604	404	BU-67-20-101	449
BU-67-11-606	444	BU-67-12-306	251	BU-67-13-801	408	BU-67-20-102	402
BU-67-11-607	445	BU-67-12-307	250	BU-67-13-901	407	BU-67-20-202	421
BU-67-11-608	446	BU-67-12-406	441	BU-67-14-701	406	BU-67-20-203	422
BU-67-11-618	447	BU-67-12-407	442	BU-67-19-101	525	BU-67-20-402	419
BU-67-11-701	518	BU-67-12-408	443	BU-67-19-108	514	BU-67-20-404	452
BU-67-11-702	511	BU-67-12-503	439	BU-67-19-201	506	BU-67-20-501	418
BU-67-11-703	512	BU-67-12-518	440	BU-67-19-202	504	BU-67-20-601	535
BU-67-11-704	510	BU-67-12-601	436	BU-67-19-301	450	BU-67-20-602	413
BU-67-11-801	507	BU-67-12-602	437	BU-67-19-302	451	BU-67-20-604	534
BU-67-11-902	448	BU-67-12-603	431	BU-67-19-401	502	BU-67-20-703	415
BU-67-12-106	234	BU-67-12-607	435	BU-67-19-402	503	BU-67-20-704	416
BU-67-12-107	225	BU-67-12-701	425	BU-67-19-502	470	BU-67-20-708	417
BU-67-12-108	276	BU-67-12-702	426	BU-67-19-506	501	BU-67-20-801	414
BU-67-12-110	235	BU-67-12-703	427	BU-67-19-507	471	BU-67-21-101	411
BU-67-12-201	277	BU-67-12-801	430	BU-67-19-601	459	BU-67-21-202	409
BU-67-12-202	236	BU-67-12-803	424	BU-67-19-602	460		

flow of water from the springs. Well BU-67-03-801, a collection-basin type well presently in use, is fed in part by one of these springs.

The public water supply for Luling was obtained from the San Marcos River until 1926. The water-supply system was privately owned at that time and was operated in conjunction with a water-powered feed mill and cotton gin. In 1926, the Central Power and Light Company acquired the ownership of the water and power systems, and wells BU-67-19-601 and BU-67-19-602 were then used to furnish the required water. Later the city of Luling purchased the water and power systems.

The principal farm crops raised in Caldwell County are grain sorghum, cotton, corn, hay, vegetables, peanuts, and certified seeds.

The county has two principal types of soil--a heavy black soil and a sandy soil. The northwestern one-third of the county is in the blackland prairie belt where clay of the Navarro and Midway Groups weathers to form a rich heavy black soil. The southeastern two-thirds of the county is at the northwestern edge of the post-oak belt where the Wilcox Group and younger rocks have weathered to form generally sandy soils.

Occupations in the county include creameries, poultry raising and processing, feed mills, and the manufacture of clothes.

The most important mineral resource is oil. The first oil-producing well in Caldwell County was discovered in 1922 about 4 miles northwest of Luling in an area now a part of the Luling field. The cumulative oil production in the county through 1962 was 192,260,102 barrels; the production in 1962 was 3,663,947 barrels (Railroad Commission of Texas, 1963, p. 48-57). These figures are approximate as they include some production in the adjoining counties where fields extend across the county line.

Topography and Drainage

The land surface of Caldwell County ranges from nearly flat to hilly. The minimum elevation, about 295 feet, is at the southern tip of the county where Plum Creek joins the San Marcos River. The maximum elevation, about 725 feet, is in the area of the so-called "Iron Mountains" peaks southeast and south of McMahan. Regionally the surface rises from southeast to northwest.

Most of the county is drained by the San Marcos River, a tributary of the Guadalupe River; the northeastern part of the county adjacent to Bastrop County is drained by tributaries of the Colorado River. The San Marcos River, a perennial stream, is fed by large springs at San Marcos, which help to maintain the low flow of the river during periods of drought.

Plum Creek, the major tributary to the San Marcos River in Caldwell County, drains about 310 square miles (about 60 percent) of the county. Clear Fork Plum Creek, a tributary of Plum Creek, is fed by springs that flow from the Leona Formation, the flow beginning a short distance upstream from State Highway 142.

A work plan has been designed for the watershed protection, flood prevention, and fish and wildlife development of the Plum Creek and Lower Plum Creek watersheds in Caldwell and Hays Counties. The plan is a cooperative project of the Hays-Caldwell-Travis Soil Conservation District, Plum Creek Conservation District, and the city of Lockhart, with technical assistance by the U.S. Department of Agriculture, Soil Conservation Service, U.S. Department of Interior, Fish and Wildlife Service, and the Texas Parks and Wildlife Department. Figure 3 shows the location of the proposed reservoirs in the Plum Creek and Lower Plum Creek watersheds in Caldwell, Hays, and Travis Counties. As of September 1, 1964, 10 dams had been completed and 1 was under construction.

According to records of the Texas Water Development Board, 836 acre-feet of surface water was used in Caldwell County in 1963; 699 acre-feet was used to irrigate 499 acres and 137 acre-feet was used industrially in the Luling oil field. Most of the water was taken from the San Marcos River; a smaller quantity was from Elm Creek, a tributary of Plum Creek.

Climate

Caldwell County has a subhumid climate coupled with mild winters and hot summers. The average annual precipitation at Luling during the period 1889-1963 was 31.93 inches and ranged from 6.04 inches in 1893 to 59.92 inches in 1919. The average monthly precipitation of 2.66 inches is rather evenly distributed throughout the year, the average ranging from 1.87 inches in August to 3.75 inches in May (Figure 4). During the 75-year period of record, rainfall was above average during 34 years and below average during 41 years. The monthly precipitation during the period ranged from 0 or a trace in 9 individual months to 17.18 inches in May 1929. The occasions of far above-average rainfall usually are caused by tropical storms or hurricanes.

The average annual temperature at Luling was 68.0°F for the period 1889-1963, the average monthly temperature ranging from 51.7°F in January to 86.3°F in August (Figure 5). The highest and lowest temperatures recorded by the U.S. Weather Bureau at Luling were 108°F in August 1962 and 9°F in January 1962. The average annual evaporation for the period 1916-35 and 1942-63 is 72.78 inches at Austin, the weather station nearest Caldwell County having long evaporation records (Figure 5). The monthly evaporation ranged from 1.30 inches in January 1930 to 12.82 inches in August 1951, and the annual evaporation ranged from 60.29 inches in 1930 to 93.17 inches in 1956.

Acknowledgments

The writer expresses his appreciation for the well information and assistance furnished by town officials, farmers, ranchers, and personnel of the U.S. Department of Agriculture. Geologic data were supplied by R. K. Blumberg Interests at Seguin. Special acknowledgment is made to water-well drillers in the area, particularly the Davenport Irrigation Equipment Co. and Layne-Texas Co., Inc.

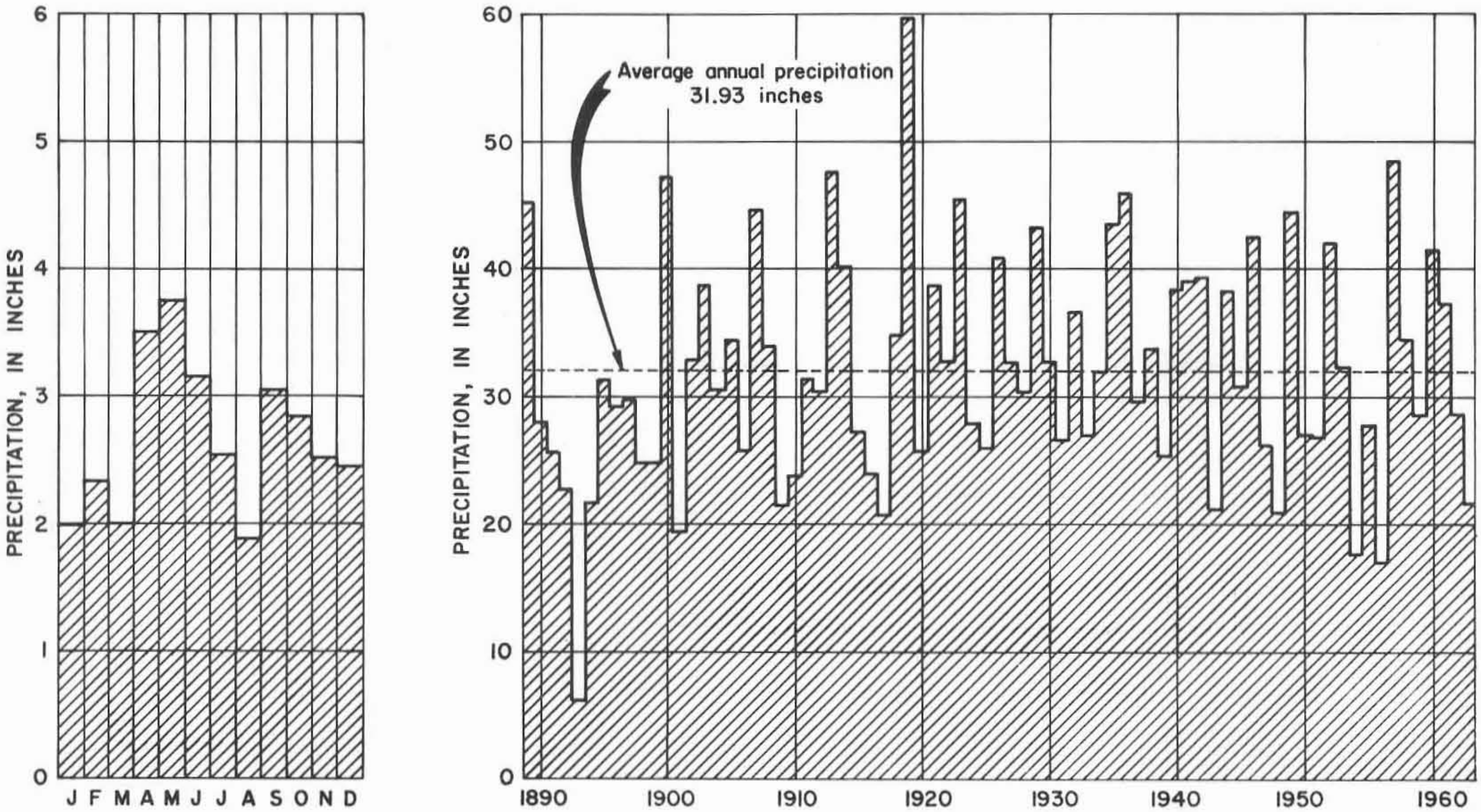


Figure 4
Average Monthly and Annual Precipitation at Luling, 1889—1963
(Data from U.S. Weather Bureau)

U. S. Geological Survey in cooperation with the Texas Water Development Board,
Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

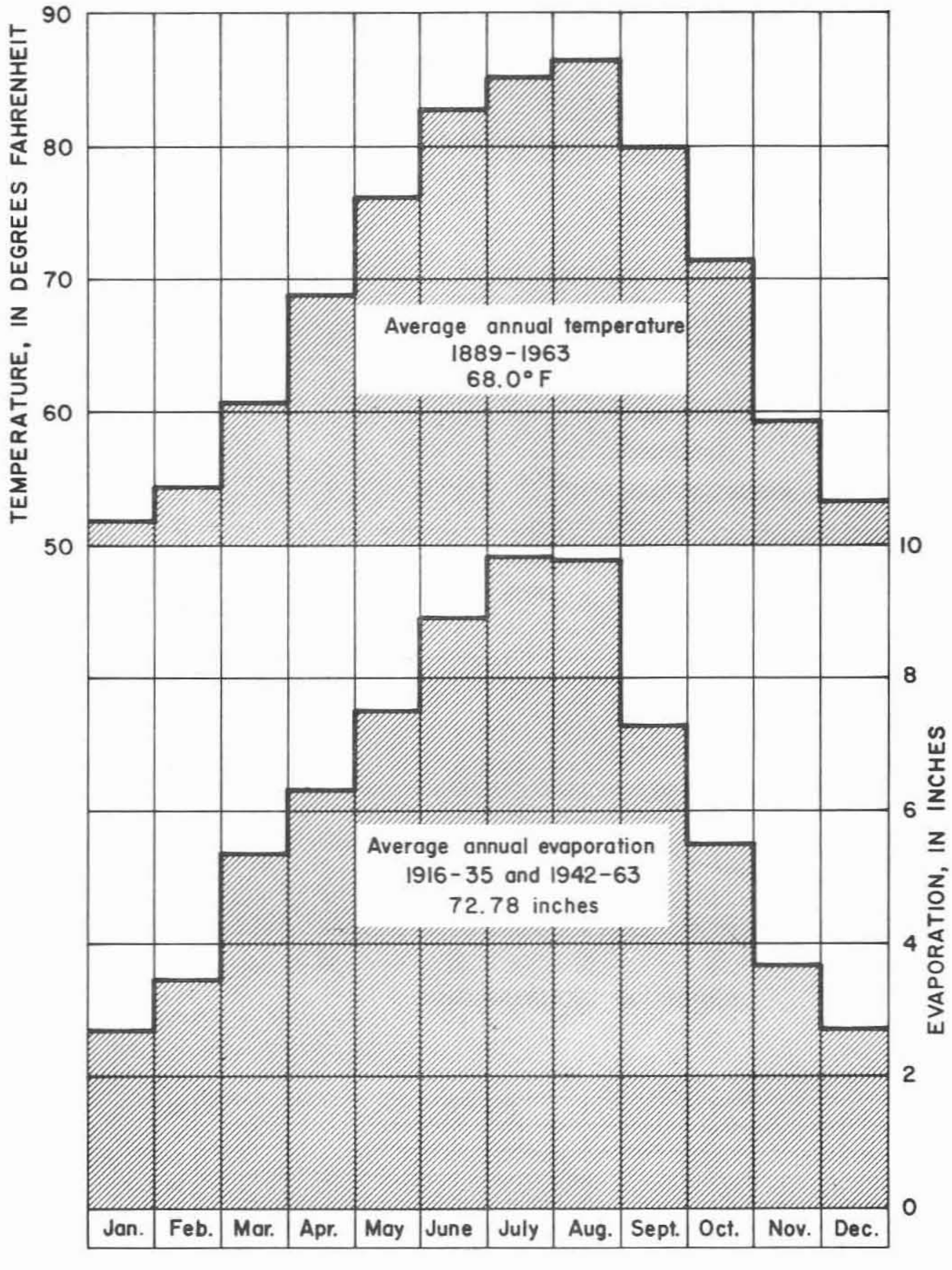


Figure 5

Average Monthly Temperature at Luling and Average Monthly Evaporation at Austin

(From U.S. Weather Bureau and Bloodgood, Patterson, and Smith, 1954)

U. S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

Definitions of Terms

In the following sections of the report, certain technical terms or terms subject to different interpretations are used. For convenience and clarification, these terms are defined as follows:

Aquifer.--A geologic formation, group of formations, or part of a formation that is water bearing.

Artesian water.--Ground water that is under sufficient pressure to rise above the level at which it is found in a well; it does not necessarily rise to or above the surface of the ground.

Coefficient of permeability.--The rate of flow of water in gallons per day through a cross sectional area of 1 square foot under a unit hydraulic gradient.

Coefficient of storage.--The volume of water an aquifer releases from or takes into storage per unit of surface area of the aquifer per unit change in the component of head normal to that surface.

Coefficient of transmissibility.--The number of gallons of water that will move in 1 day through a vertical strip of the aquifer 1 foot wide and having the height of the aquifer when the hydraulic gradient is unity. It is the product of the field coefficient of permeability and the saturated thickness of the aquifer.

Piezometric surface.--The imaginary surface to which water will rise in artesian wells and the surface formed by the water table in the outcrop areas. The terms "water table" and "piezometric surface" are synonymous in the outcrop area, but piezometric surface alone is applicable in artesian areas.

Resistivity.--That property of a material that characterizes its opposition to the flow of electricity. The resistivity of a water-saturated material is a function of both the texture of the material and the contained fluid and is recorded in ohms per square meter per meter (ohms m^2/m) in electric logs of wells.

Safe yield.--The rate at which water can be withdrawn from an aquifer without depleting the supply to such an extent that withdrawal at this rate is no longer economically feasible.

Specific capacity.--The discharge of a well expressed as the rate of yield per unit of drawdown, generally in gallons per minute per foot of drawdown.

Specific conductance (conductivity).--A measure of the ability of a solution to conduct electricity, expressed in micromhos per centimeter at 25°C. It is approximately proportional to the content of dissolved solids. Herein it is used in connection with the description of the quality of water.

Spontaneous potential.--The curve on electric logs which indicates the difference in electrical potential across boundaries of different types of material. Spontaneous potential is recorded in millivolts.

Transmission capacity.--The quantity of water that can be transmitted through a given width of an aquifer at a given hydraulic gradient.

Water level; static level; or hydrostatic level.--In an unconfined aquifer, it is the distance from the land surface to the water table. In a confined (artesian) aquifer, it is the level to which the water will rise either above or below the land surface.

Water table.--The upper surface of a zone of saturation except where that surface is formed by impermeable material.

Yield.--The following ratings apply for general discussion of yields of wells in Caldwell County.

Description	Yield (gallons per minute)
Small	Less than 50
Moderate	50 to 500
Large	More than 500

GEOLOGY AS RELATED TO THE OCCURRENCE OF GROUND WATER

The geologic formations penetrated by water wells in Caldwell County range in age from Cretaceous to Quaternary and are composed chiefly of sand, sandstone, gravel, clay, shale, marl, and some lenses of limestone (Table 2). Ground water is obtained principally from the alluvium, Leona Formation, Queen City Sand, Reklaw Formation, Carrizo Sand, and Wilcox Group. In places very minor amounts of water are obtained from the Midway and Navarro Groups.

Some water may be available in the basal sand and sandstone of the Cretaceous System at a depth of about 3,000 feet in the extreme northwestern part of the county; however, the water is likely to be too highly mineralized for public supply, irrigation, and most industrial uses. Little is known concerning this unit in Caldwell County, and it will not be discussed further in this report.

Except for the Recent alluvium and the Leona Formation, the outcrops of the geologic formations in Caldwell County lie as more or less parallel bands that trend roughly northeastward (Figure 6), the oldest unit, the Navarro Group, cropping out in the northwestern part of the county. The formations dip southeastward and generally thicken in that direction, causing the dip of each overlying formation to be slightly less steep.

The formations are cut by several faults of the Luling-Mexia-Talco fault system that trends northeastward across the county. Formations on the south sides of the faults are generally upthrown relative to those north of the faults.

Plates 2 and 3 are geologic sections constructed from electric logs of wells which show the thicknesses of the various formations or groups of formations. The sections also show the relations between the various formations and the magnitude of the displacements of the faults. The locations of the geologic sections are shown on Plate 1.

Table 2.--Geologic units and their water-bearing properties in Caldwell County

System	Series	Geologic unit	Maximum thickness (feet)	Character of rocks	Water-bearing properties
Quaternary	Recent	Alluvium	45±	Gravel, clay, silt, and sand.	Yields small to moderate quantities of fresh to slightly saline water to numerous wells for domestic and stock use, and some irrigation.
	Pleistocene	Leona Formation	40±	Gravel, sand, marl, silt, clay, caliche, and conglomerate.	Yields small to large quantities of fresh water to numerous wells for domestic and stock use, public supply, and some irrigation.
Tertiary(?)	Pliocene(?)	Uvalde Gravel	5	Predominantly flint gravel and cobbles and some limestone boulders.	Not known to yield water to wells in Caldwell County.
Tertiary	Eocene	Weches Greensand	100	Iron-bearing glauconitic clay and sand.	Do.
		Queen City Sand	500	Massive to thin-bedded fine to medium sand and clay with some lenses of conglomerate containing iron.	Yields small quantities of fresh to slightly saline water to a few wells for domestic and stock use. Capable of yielding moderate quantities of water to properly constructed wells.
		Reklaw Formation	400	Glauconitic sand and silt in the lower part of formation and clay and some thin beds of sandstone in the upper part.	Do.
		Carrizo Sand	400	Fine to coarse, loose, cross-bedded sand; some thin beds of sandstone and clay.	Yields small to moderate quantities of fresh to slightly saline water to wells for domestic and stock use, and some irrigation. Capable of yielding large quantities of water to properly constructed wells.
		Wilcox Group	2,000	Fine to medium sand, clay, sandy clay, sandstone, and silty shale with some lenses of limestone.	Yields small to large quantities of fresh to moderately saline water to a large number of wells for domestic and stock use, public supply, and some irrigation.
	Paleocene	Midway Group	600	Clay, silt, glauconitic sand, and thin beds of limestone and sandstone.	Not known to yield water to wells in Caldwell County.
Cretaceous	Gulf	Navarro Group	600	Predominantly clay and silt and some lenses of bluish sandstone.	Mostly non-water-bearing. Yields small quantities of highly mineralized water to wells in a few places.
		Taylor Marl, Austin Chalk, and Eagle Ford Shale, undifferentiated	1,200	Clay, shale, marl, and limestone.	Not known to yield fresh or slightly saline water to wells in Caldwell County.
	Comanche	Washita Group	200	Limestone and clay.	Do.
		Fredericksburg Group	500	do	Do.

Fredericksburg Group

The Fredericksburg Group, which includes the Edwards Limestone, is not exposed in Caldwell County. The Fredericksburg consists of about 500 feet of chiefly limestone and clay and is part of a unit that is the principal aquifer in Hays County. It yields moderate to large supplies of fresh to slightly saline water to many wells and springs from permeable zones in the aquifer in a large area of south-central Texas. The unit is the source of water for the large springs at Austin in Travis County, San Marcos in Hays County, New Braunfels in Comal County, and San Antonio in Bexar County. However, the Fredericksburg Group is not a source of potable water in Caldwell County; considerable quantities of water are found in the unit by oil wells and oil tests, but the water is salty and in places has a high sulfate content. Large quantities of oil have been produced in the county from the permeable zones in the Edwards Limestone along the upthrown side of the faults in the Luling, Salt Flat, and Larremore oil fields.

Washita Group

The Washita Group ranges in thickness from about 140 to 200 feet and consists of limestone and clay. It is not exposed in Caldwell County, and it is not known to yield fresh or slightly saline water to wells in the county.

Taylor Marl, Austin Chalk, and Eagle Ford Shale, Undifferentiated

The Taylor Marl, Austin Chalk, and Eagle Ford Shale, undifferentiated, ranges in thickness from about 900 to 1,200 feet and consists of clay, shale, marl, and limestone. It is present in the subsurface in Caldwell County, and only the uppermost part of the Taylor Marl is exposed in valley slopes and stream channels in the extreme western tip of the county; however, the exposure is too small to be shown on the geologic map (Figure 6). The Taylor Marl, Austin Chalk, and Eagle Ford Shale, undifferentiated, is not known to yield fresh or slightly saline water to wells in the county.

Navarro Group

The Navarro Group attains a maximum thickness of about 600 feet in Caldwell County and consists of clay, silt, and some lenses of bluish sandstone. Except where it is covered by the Recent alluvium or the Leona Formation, the Navarro crops out in a belt 3 to 6 miles wide along the northwestern county line (Figure 6). The rocks of the Navarro Group weather to form a black soil, which is among the most fertile of the soils in Texas.

Generally, the Navarro does not yield fresh to slightly saline water to wells in Caldwell County, and in the outcrop area, farmers depend mostly upon rainwater stored in cisterns and stock tanks. Well BU-67-02-610 probably derives its water principally from the Navarro although some of it may be from the alluvium in the Plum Creek bottoms, and wells BU-67-02-602 and BU-67-02-701 may derive some of their water from the Navarro Group. The community of Uhland on the outcrop of the Navarro, pipes its water from a spring in Hays County. Well BU-67-10-601, which yielded about 200 gpd (gallons per day), probably derived its water from the Navarro, but the owner reports that the water was unfit for domestic use and that only stock would drink it.

Midway Group

The Midway Group attains a maximum thickness of about 600 feet and consists of clay, silt, glauconitic sand, and thin beds of limestone and sandstone. As a result of faulting, parts of the Midway are repeated in four almost parallel belts that range from one-half to about $4\frac{1}{2}$ miles in width (Figure 6). The most prominent belt extends from Fentress northeastward through Lockhart to the Lytton Springs area. No wells were found which draw water from the Midway, but it may contribute some water to a few wells that penetrate the overlying Leona Formation and extend into the Midway. In the outcrop of the Midway, farmers generally depend upon rainwater stored in cisterns and stock tanks.

Wilcox Group

The Wilcox Group crops out across the central part of the county in a belt ranging in width from about 8 to 14 miles, and in three narrow belts, the result of faulting, northwest of the principal outcrop (Figure 6). The Wilcox dips southeastward at an average of about 150 feet per mile and increases in thickness in the direction of dip. The full thickness ranges from about 1,200 to 2,000 feet, the maximum thickness occurring in the southeastern part of the county in an erosional channel in the underlying Midway Group. The base of the Wilcox is at an altitude of about 600 feet above sea level on the outcrop and about 2,900 feet below sea level in the southeastern corner of the county.

The Wilcox consists chiefly of sand and lesser amounts of clay, sandy clay, sandstone, and silty shale and a few lenses of limestone. The sand is fine to medium and is composed mostly of quartz; however, some organic matter and dark-colored minerals give the sand a "salt and pepper" appearance. In many places the Wilcox has an upper, middle, and lower sand zone. The middle zone, probably equivalent to the Simsboro Sand Member of the Rockdale Formation of Plummer (Sellards, Adkins, and Plummer, 1932, p. 530, 583) in the Brazos River Basin, contains more sand than the other two zones. Individual sand beds are not continuous over long distances, and although some beds are 50 feet or more in thickness, correlation of the beds is difficult even in short distances. The lenticularity of the beds is due to their continental origin as channel and lagoon deposits laid down by rivers shifting in a broad plain. Faults, which complicate correlation, are approximately parallel to the outcrop of the Wilcox and cause the repetition of parts of the formation near Lockhart and Lytton Springs.

Fresh to slightly saline water is found in the Wilcox at depths ranging from about 50 feet near the outcrop to about 2,800 feet near the southeast corner of the county.

The Wilcox Group yields small to large quantities of water to many wells for domestic and stock purposes, public supply, and some irrigation. The Wilcox supplies all the water for Luling and about 75 percent of the water for Lockhart. Most of the irrigation wells, which are used principally for improved pastures, have small yields, but generally larger yields could be obtained from properly constructed gravel-packed wells of large diameter that are screened opposite all the sands. In the southeastern part of the county, the Wilcox is overlain by the Carrizo Sand, and the two probably can be considered as a single hydrologic unit. Figure 16, which shows the thickness of sand containing fresh to slightly saline water in the Wilcox, includes the Carrizo Sand in the southeastern part of the county. The Wilcox generally is not used as a source of water where it is overlain by the Carrizo Sand because the Carrizo is able to yield the needed quantities of water.

Carrizo Sand

The Carrizo Sand unconformably overlies the Wilcox Group and crops out in the southeastern part of the county in a belt $1\frac{1}{2}$ to $3\frac{1}{2}$ miles wide (Figure 6). The outcrop in general is covered by a thick growth of blackjack oak or hickory and brush, but the land gradually is being cleared for pasture improvement. The Carrizo consists chiefly of fine to coarse, loose, cross-bedded sand and some thin beds of sandstone and clay. The sand generally is white and consists largely of rounded to subangular coarse quartz grains. Reddish zones appear in places on the outcrop and indicate iron staining. The strata are massive and cross-bedded and in places are cemented with silica.

The Carrizo dips southeastward at about 140 feet per mile and has a maximum thickness of about 400 feet. The altitude of the top of the Carrizo ranges from about 600 feet above sea level where it disappears beneath the overlying Reklaw Formation to about 500 feet below sea level at the southeast corner of the county. The Carrizo Sand and underlying Wilcox Group are predominantly sandy; they are probably interconnected hydrologically.

Very few wells draw water from the Carrizo in Caldwell County. Generally, the Carrizo outcrop and the area southeastward is very sparsely inhabited so there has been very little need for the development of water supplies. However, some of the land is being cleared and planted to improve pastures, and irrigation of coastal Bermuda grass is being undertaken. Absentee ownership of land for summer recreational use is increasing in the southeastern part of the county, and some Carrizo wells are being drilled on this land to get adequate supplies of water.

The Carrizo yields small to moderate quantities of water of good quality to wells now in use, but much larger yields could be obtained if the entire formation were screened; yields of as much as 1,000 gpm (gallons per minute) could be expected from properly constructed wells.

Reklaw Formation

The Reklaw Formation conformably overlies the Carrizo Sand and crops out across the southeastern part of the county in a belt about 2 to 3 miles wide (Figure 6). The lower part of the formation consists principally of glauconitic sand and silt, commonly more than 100 feet thick. This basal sand, equivalent to the Newby Glauconitic Sand Member of Stenzel (1938, p. 65-71), is finer grained than the underlying Carrizo and more buff colored instead of being white like the Carrizo. It is probably connected hydrologically with the Carrizo, at least in places. The upper part of the Reklaw, equivalent to the Marquez Shale Member of Stenzel (1938, p. 71-78) consists chiefly of clay and a few thin beds of sandstone. The Reklaw Formation dips southeastward at about 140 feet per mile and increases in thickness in the direction of dip from about 300 to 400 feet.

The basal sand of the Reklaw yields small quantities of fresh to slightly saline water to a few wells for domestic and stock use in Caldwell County. Most wells on or near the outcrop of the Reklaw derive their water from the underlying Carrizo Sand which generally yields larger quantities of water of better quality than does the Reklaw.

Queen City Sand

The Queen City Sand overlies the Reklaw Formation conformably and crops out in a northeastward-trending belt about 3 to 4 miles wide in a small area in the southeast corner of Caldwell County (Figure 6). The Queen City is composed of massive to thin-bedded light-gray fine to medium sand and clay and some lenses of iron-bearing conglomerate. The Queen City generally weathers to various shades of red, tan, and brown; however, in some places, the loose sand is light colored and almost white. The Queen City dips southeastward at about 120 feet per mile and has a maximum thickness of about 500 feet.

The Queen City yields small quantities of fresh to slightly saline water to a few wells in its outcrop area, which is devoted principally to ranching and is very sparsely populated. Yields of as much as 100 gpm or more may be expected from properly constructed wells.

Weches Greensand

The Weches Greensand crops out in a small area in the extreme southeastern corner of Caldwell County where it conformably overlies the Queen City Sand (Figure 6). The unit is not present in its full thickness in the county, the maximum thickness there being about 100 feet. The Weches is composed of brown iron-bearing glauconitic clay and sand, and is not known to yield water to wells in the county.

Uvalde Gravel

The Uvalde Gravel ranges in thickness from a few inches to about 5 feet and caps some of the higher divides in Caldwell County, particularly the blacklands of the northeastern part of the county and in widely scattered places on the outcrop of the Wilcox Group. These locations are not shown on the geologic map (Figure 6). The Uvalde Gravel consists of gravel, cobbles, and boulders, chiefly of flint, and to a lesser extent of limestone.

The formation is not known to yield water to wells in Caldwell County, but in some places it probably aids in recharging the Wilcox Group by retarding surface-water runoff. Some stock tanks are reported to receive seepage from the gravel. The principal use of the Uvalde Gravel is for road ballast.

Leona Formation

The outcrop of the Leona Formation is a broad plain 25 miles long and 2 to $4\frac{1}{2}$ miles wide, extending from the vicinity of Kyle in Hays County southeastward through Lockhart to 10 miles southeast of Lockhart (Figure 6). According to Rasmussen (1947, p. 12-13), the Leona near Kyle is about 100 feet above the Blanco River and at an altitude of about 700 feet. At the southeastern extent of the Leona near the junction of Clear Fork and Plum Creeks, the formation is about 80 feet above these streams, and at an altitude of about 440 feet. The gradient of the surface of the Leona thus averages about 10 feet per mile. Except in an area extending from the Hays county line to about $1\frac{1}{2}$ miles north of Maxwell, the plain or terrace formed by the Leona is above the level of the adjacent area.

The Leona Formation is composed of stratified gravel, chiefly flattened limestone pebbles, and minor amounts of sand, caliche, marl, clay, silt, sandstone, and conglomerate. In most places, the gravel is fairly well cemented so that in many dug wells only the uppermost few feet are curbed to prevent caving and for sanitary purposes. In some places the gravel is so well cemented that the result is a hard compact conglomerate resembling concrete. The gravel decreases in size from the northwest to the southeast. The thickness ranges from a few feet at the margins to about 40 feet; however, the saturated thickness in 1963-64 probably did not exceed 7 or 8 feet in most places.

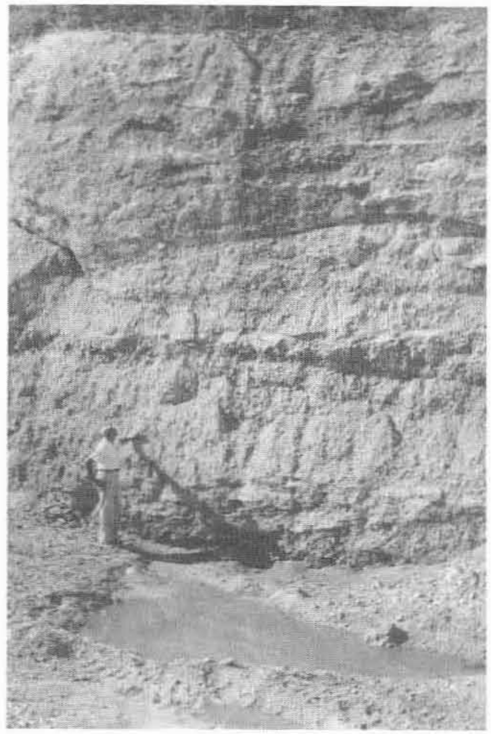
Figures 7, 8, and 9 show views of the Leona Formation in three gravel pits in Caldwell County. The upper photograph of Figure 7 shows the entire section which is about 25 feet thick at the gravel pit about half a mile west of well BU-67-11-309. The lower photo is a lateral extension of part of the upper. Both views show water where the excavation was below the water table. At this location, the Leona rests on the Wilcox Group; the contact between the two is approximately at the water line.

Figure 8 shows two views of the Leona taken in a gravel pit about 200 yards north of well BU-67-12-409. The top view shows most of the exposed section of the Leona while the lower view shows a closeup a few feet to the left. In the upper view, the light-colored part at about waist level is a sand lens, which pinches out within a few feet. Lenses that vary in length, thickness, and size of material are typical of the Leona. The Leona overlies the Wilcox at this location, although the contact is not exposed in this pit.

The photographs in Figure 9 were taken about 300 yards west of well BU-67-12-703 in a gravel pit near the southeast end of the Leona outcrop. The top view shows most of the formation. The lower view, a closeup of part of the upper view, shows the stratification and variation in size of the material. The lighter spots near the pick are clay balls.

The surface of the Leona Formation is a comparatively level alluvial plain having a rich black soil. The plain is believed to have been formed by the ancient Blanco River when the river was about 100 feet above its present level and at a time when the river crossed Caldwell County a little southwest of the present course of Plum Creek. Earth movements along the Balcones fault zone or simple capture by a gully tributary to the San Marcos River probably diverted the Blanco River to its present course. The ancient Blanco River evidently actively eroded the Edwards Plateau and had seasonal velocities high enough to transport pebbles and some cobbles that were previously deposited by the river on the gentle slopes of shale, marl, and sand in Caldwell County.

The Leona Formation supplies water to many shallow wells in an area extending from the southeastern edge of Lockhart northwest to Hays County. Well BU-67-02-801 yields water from the Leona to supply the town of Maxwell. Prior to 1953, Lockhart obtained all of its public supply from Leona wells which were huge pits or collection basins; in 1963, about 25 percent of the city supply came from the Leona and the rest came from the Wilcox Group.



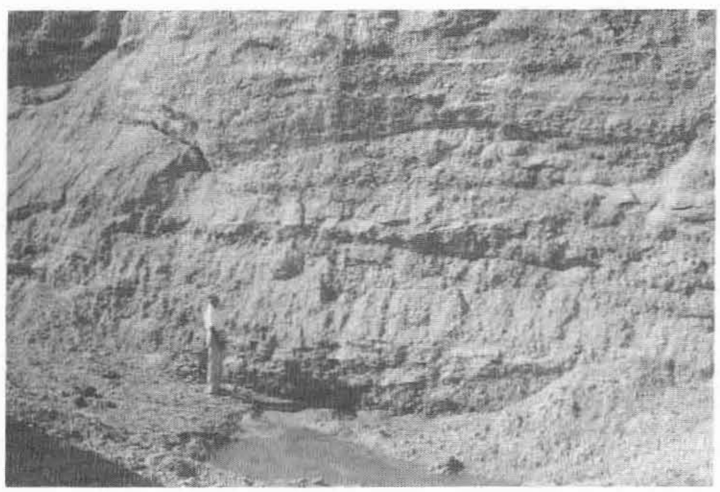


Figure 7
Photographs of Leona Formation About Half a Mile West of Well BU-67-11-309

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

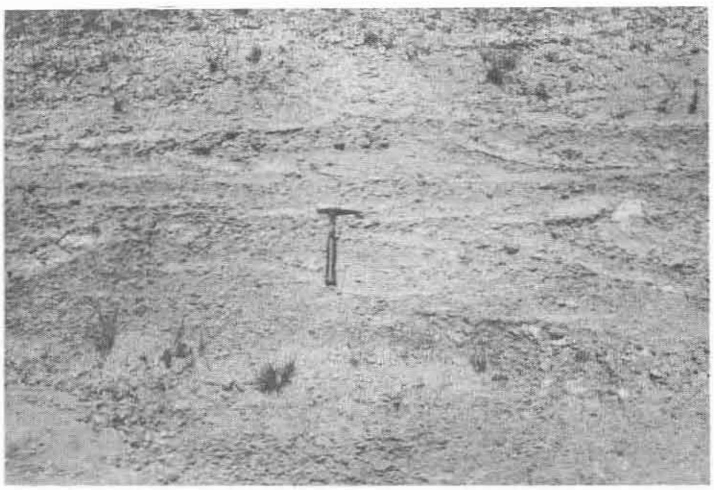


Figure 8

Photographs of Leona Formation About 200 Yards North of Well BU-67-12-409

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

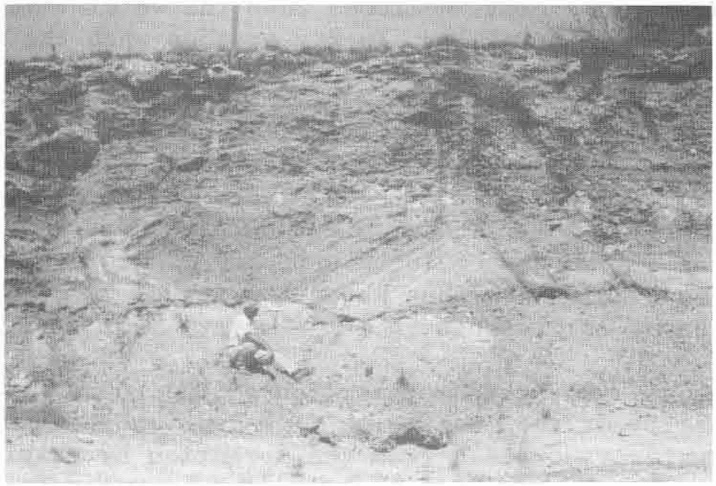


Figure 9

Photographs of Leona Formation About 300 Yards West of Well BU-67-12-703

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

Along the edges of the Leona Formation where it is thin, the underlying formation may protrude above the water table at times, and in these places the Leona itself may not always contain water. For example, well BU-67-02-602, which was dug through the Leona and a few feet into the underlying Navarro Group, is supplied by water from the Leona when the water levels are high during periods of abundant rainfall. In dry seasons when the water level recedes, the well is dry.

Several wells have been used for irrigation in periods of extreme drought such as 1925 and 1955-56, and relatively large yields have been reported. Well BU-67-02-903, a 40 by 200-foot pit, yielded 1,820 gpm for several hours after which the pit was allowed to fill over night before pumping was resumed. Continuous yields of about 500 gpm could be expected from properly constructed wells at the most favorable locations where the gravel is highly permeable and the saturated thickness is greatest.

Because of the high topographic position of the Leona Formation and the relative impermeability of the underlying rocks northwest of Lockhart, at least part of the water is drained from the formation by gravity springs. As evidence, numerous springs and seeps that are fed by water from the Leona occur along Clear Fork Plum Creek and other smaller tributaries to Plum Creek. On April 15, 1964, Clear Fork Plum Creek had a flow of 90 gpm at State Highway 142 and a flow of 410 gpm at the swimming pool in Lockhart State Park about $2\frac{1}{2}$ miles southwest of Lockhart, all of the water coming from seeps and springs in the Leona.

The total spring flow from the Leona Formation probably is large. The movement of water in the formation is generally toward the southeast, following the prevailing slope of the plain. South of Lockhart where the Leona rests upon the Wilcox, a relatively permeable unit, the Leona probably acts as a recharge facility for the underlying Wilcox. This is borne out by the fact that southeast of Lockhart only a few wells obtain all their water from the Leona because most of the water has drained down into the underlying Wilcox. Also, the quality of the water from the Wilcox seems to be improved where the Wilcox is overlain by the Leona. For example, water from well BU-67-11-309, which is on the Leona outcrop but produces from the Wilcox, is of better quality than the water from well BU-67-11-311, which is on the Wilcox outcrop. Leakage from the Leona into the Wilcox also is indicated by fewer and smaller springs along the margin of the Leona plain southeast of Lockhart.

Recent Alluvium

The Recent alluvium in Caldwell County is a continuation of the body of alluvium which starts along the Blanco River near San Marcos in Hays County and extends downstream along the San Marcos River (Figure 6). Numerous wells and cut banks show that the alluvium is resting on almost impermeable clay and shale of the Navarro or Midway Groups in the northwestern part of the county. Rasmussen (1947, p. 13) says that the alluvium consists of two distinct sedimentary units--the lower part is a sheet of stratified, in places crossbedded, gravel and sand about 15 feet thick, and the upper part is massive buff-colored clayey silt, also about 15 feet thick. The writer observed well BU-67-10-110 several times while it was being dug into the alluvium and noted that the material brought up was clay, silt, and gravel and little or no sand. The bottom few feet where water was found was not observed. The maximum thickness of the alluvium is about 45 feet. The downstream gradient of the surface of the alluvium is about 15 feet per mile; the surface also has a component of slope toward the San Marcos River.

The alluvium yields small to moderate quantities of fresh to slightly saline water to numerous dug wells and to springs. The wells are used chiefly for domestic and stock purposes and to a small extent for irrigation. Several springs, which flow from the alluvium at its contact with the underlying rocks, occur along gullies near the San Marcos River and along the bank of the river. No estimate was made of the total natural discharge of these springs, but the flow probably fluctuates over a wide range as indicated by spring BU-67-09-303, which had an estimated flow of 150 gpm on July 3, 1946, and 25 gpm on November 7, 1963.

GROUND WATER

Occurrence of Ground Water

The occurrence of ground water only as it applies to Caldwell County is discussed briefly here. The general principles of the occurrence and movement of ground water in all types of rocks have been described in detail by many writers including Meinzer (1923, p. 2-142), Meinzer and others (1942, p. 385-478), and Tolman (1937).

The source of ground water is precipitation on the surface of the earth. A large part of the precipitation runs off or is soon consumed by evapotranspiration, or is stored in the soil to be evaporated or transpired later. A small part of the water infiltrates through the soil and subsoil, moves downward to the water table, and becomes recharge or part of the ground water in storage. Factors affecting recharge include the intensity and amount of rainfall, the slope of the land surface, the type of soil, the type of material between the soil and the water table, the permeability of the aquifer, the quantity of water in the aquifer, and the rate of evapotranspiration.

In sandy outcrop areas, ground water is unconfined and is under water-table conditions. Downdip from the outcrop or recharge areas where the aquifer is overlain by less permeable material, the water becomes confined and is under artesian conditions.

Water under artesian conditions, if not disturbed by man's withdrawals, will rise in wells to an elevation equal to its elevation in the recharge area less the loss in pressure due to friction. Where the elevation of the land surface near a well is considerably below the general level of the area of outcrop, the pressure may be sufficient to cause the water to rise above the land surface and the well will flow. A few wells in the Plum Creek valley flow small quantities of water.

Ground water moves slowly (tens to hundreds of feet a year) under the influence of gravity from areas of recharge to areas of discharge. The water is discharged naturally through seeps and springs in the outcrop of the aquifer, by transpiration where the water table is close enough to the surface to be reached by the roots of plants or trees, and by seepage through semiconfining beds, or along faults, into another aquifer having a lower pressure. Ground water is also discharged artificially through wells.

Ground-Water Development

Records of 479 water wells, 6 springs, and numerous oil tests in Caldwell County were used during the ground-water investigation (Table 9). The well inventory made during the investigation included only a part of the total number of wells in the county; however, records of all the municipal, industrial, and irrigation wells were obtained. Locations of the wells inventoried are shown in Plate 1.

Records of the average daily use of ground water in Caldwell County for the years 1961-63 are shown in Table 3. About two-thirds of the water was used for municipal supply. The use of ground water is gradually increasing, but the total of 2.3 mgd (2,600 acre-feet) per year in 1963 is still relatively small compared to the quantity available for use.

Between 1955 and 1963, the withdrawals of ground water for municipal supply ranged from about 1,200 acre-feet (1.1 mgd) in 1955 to about 1,700 acre-feet (1.5 mgd) in 1963 (Table 4). The obviously large total pumpage of 1,600 acre-feet (1.4 mgd) in 1956 was due to the low rainfall of 0.49 inch in March, 0.54 inch in April, and 0.55 inch in July, when relatively large quantities of water were used for lawn watering.

Table 3.--Use of ground water, 1961-63

Year	Municipal supply		Irrigation		Domestic and stock		Totals*	
	mgd	ac-ft/yr	mgd	ac-ft/yr	mgd	ac-ft/yr	mgd	ac-ft/yr
1961	1.23	1,379	0.12	130	0.5	560	1.9	2,100
1962	1.36	1,524	.16	180	.5	560	2.0	2,200
1963	1.49	1,670	.34	380	.5	560	2.3	2,600

* Figures are approximate because some of the pumpage is estimated. Municipal-supply figures are shown to the nearest 0.01 mgd and to the nearest acre-foot. Irrigation figures are shown to no more than two significant figures. Totals are rounded to two significant figures.

The cities of Lockhart and Luling are the principal users of water; more than 90 percent of the water used for municipal supply in the county in 1963 was pumped by these two cities. The public-water system of Martindale, which is privately owned, obtains water from two wells that tap the Recent alluvium on the bank of the San Marcos River. The unincorporated towns of Dale, Lytton Springs, Maxwell, McMahan, and Reedville had no public supplies in 1963, their water supplies being obtained from privately owned wells. During 1963, the towns of Fentress, Prairie Lea, and Stairtown, plus a large rural area, changed from privately owned ground-water supply systems to surface water supplied by the Tri-Community Water Supply Corporation. Water from well BU-67-10-801 is pumped across the San Marcos River to supply the town of Staples in Guadalupe County. About 10 percent of the people in Caldwell County depend on cisterns, streams, and earthen reservoirs for water used for domestic and stock purposes; about 90 percent use ground water from public-supply systems or privately owned wells.

Table 4.--Municipal pumpage of ground water, 1955-63.

Year	Lockhart		Luling		Martindale		Fentress		Maxwell		Staples		Totals	
	mgd	ac-ft/yr	mgd	ac-ft/yr	mgd	ac-ft/yr	mgd	ac-ft/yr	mgd	ac-ft/yr	mgd	ac-ft/yr	mgd	ac-ft/yr
1955	0.50	560	0.51	572	0.05	56	0.02	22	0.02	22	0.01	11	1.1	1,200
1956	.60	673	.67	751	.05	56	.02	22	.02	22	.02	22	1.4	1,600
1957	.46	516	.56	628	.05	56	.02	22	.02	22	.02	22	1.1	1,200
1958	.50	560	.60	673	.04	45	.02	22	.02	22	.01	11	1.2	1,300
1959	.57	639	.53	594	.04	45	.02	22	.02	22	.01	11	1.2	1,300
1960	.51	572	.61	684	.04	45	.02	22	.02	22	.01	11	1.2	1,300
1961	.47	527	.69	773	.03	34	.02	22	.01	11	.02	22	1.2	1,300
1962	.55	617	.73	818	.03	34	.02	22	.01	11	.02	22	1.4	1,600
1963	.62	695	.79	886	.03	34	.01	11	.01	11	.02	22	1.5	1,700

* Figures are approximate because some of the pumpage is estimated. Figures are shown to nearest 0.01 mgd and to nearest acre-foot. Totals are rounded to two significant figures.

Ground water is not used extensively for irrigation in Caldwell County. In general, the precipitation is well distributed throughout the year and is adequate for the growing of crops and pasture grass, but when precipitation is below normal during the growing season, ground water is used as a supplementary supply. During the 1925 drought, many dug wells in the Leona Formation and the Recent alluvium were reported to have been used for the irrigation of feed crops. According to the Texas Board of Water Engineers (1960, p. 50), about 255 acres was irrigated with 213 acre-feet (0.19 mgd) of ground water in 1958. Table 5 shows the amount of ground water pumped for irrigation, the acres irrigated, and the number of wells either in use or available for use during the years 1961-63. Of the ground water used for irrigation in 1963, about 10 percent was pumped from the Leona Formation, 20 percent from the Recent alluvium, and 70 percent from the Wilcox Group. The use of ground water for supplemental irrigation of improved pasture grass and other feed crops probably will increase as more land is cleared of brush and mesquite to improve grazing. Most of the future development of ground water for irrigation will be in the southeastern half of the county where a substantial quantity of water is available in the Wilcox Group and the Carrizo Sand.

Table 5.--Acres irrigated, quantity of ground water pumped, and number of irrigation wells, 1961-63

Year	Approximate acres irrigated	Ground water used*		Number of wells available for use
		mgd	acre-feet	
1961	173	0.12	140	20
1962	233	.16	180	20
1963	425	.34	380	28

* Figures are rounded to two significant figures because they are calculated from the well owners' estimate of the number of hours the well was used, pumping rate, and acres irrigated.

Only a small quantity of ground water is used for industrial purposes in Caldwell County; the amount is so small it was not shown in Table 3. The ice plant at Luling, the principal industrial user, pumps 3,500 to 11,000 gpd from well BU-67-19-613.

Aquifer Tests

Aquifer tests were made in eight wells tapping the Wilcox Group in Caldwell County to determine the ability of the aquifer to transmit and store water. The other aquifers were not tested because of a lack of suitable wells. The test data were analyzed by the Theis nonequilibrium method (Theis, 1935) and the Theis recovery method (Wenzel, 1942, p. 95). The results of the tests are shown in Table 6. The coefficients of transmissibility, ranging from 900 to 105,000 gpd per foot, should be considered representative of the producing interval screened in the well and not of the entire formation because each well tested was on the Wilcox outcrop where only part of the formation was present and only a part of the available sand was screened. The coefficients

Table 6.--Summary of aquifer tests

Well tested	Date tested	Intervals screened (feet below land surface)	Pumping rate (gpm)	Coefficient of transmissibility (gpd/ft)	Coefficient of storage	Specific capacity (gpm/ft)	Remarks
BU-67-12-101 City of Lockhart "Wilcox" well 1	Apr. 13, 1964	128-158, 180-200, 216-236	170	1,880	--	1.9	Recovery in pumped well.
BU-67-12-102 City of Lockhart "Wilcox" well 2	Aug. 6, 1952	128-168, 188-198, 258-278	12	900	--	--	Do.
BU-67-12-501 City of Lockhart "Wilcox" well 3	Mar. 23-25, 1953 Apr. 16, 1964	120-160, 210-260, 300-310, 320-330	430 315	12,700 12,400	-- --	5.7 6.2	Do.
BU-67-12-502 City of Lockhart "Wilcox" well 4	May 22-23, 1953	162-192, 212-312	618	9,680	--	6.5	Do.
BU-67-19-601 City of Luling well 1	Mar. 10-11, 1964 do	100-117, 156-176, 239-259	-- --	105,000 87,000	9.3×10^{-4} 8.3×10^{-4}	-- --	Drawdown interference from pumping well 7. Recovery when well 7 shut down.
BU-67-19-605 City of Luling well 5	Mar. 10-11, 1964 do	120-150, 160-190, 220-240, 250-270, 280-305	-- --	79,400 76,100	1.2×10^{-3} 1.2×10^{-3}	-- --	Do.
BU-67-19-606 City of Luling well 6	June 24, 1964	174-224, 305-325, 374-435	--	33,700	--	13.6	Recovery in pumped well.
BU-67-19-607 City of Luling well 7	Mar. 10-11, 1964	114-159, 164-184, 195-205, 235-245, 255-295	485	48,700	--	17.7	Do.

of storage determined from the tests ranged from 8.3×10^{-4} to 1.2×10^{-3} and averaged 1.0×10^{-3}.

No pumping tests were made in wells drawing from the Carrizo Sand in Caldwell County, but Shafer (1965, p. 45) reports that in neighboring Gonzales County the average transmissibility of the producing intervals tested in the Carrizo was 50,000 gpd per foot. Similar coefficients might be expected in Caldwell County.

On the basis of a study of logs of wells and the results of the aquifer tests, the transmissibility of the entire section of fresh to slightly saline water-bearing sands in the Wilcox Group and Carrizo Sand can be estimated. Calculations show that the transmissibility of the Wilcox increases from 0 at the northwest edge of the outcrop to probably more than 10,000 gpd per foot at the middle of the outcrop and to more than 70,000 gpd per foot where the Wilcox passes beneath the Carrizo Sand. The transmissibility of the Carrizo Sand ranges from 0 to probably more than 50,000 gpd per foot. Thus, the composite section of the Carrizo Sand and Wilcox Group probably has a coefficient of transmissibility of at least 120,000 gpd per foot and perhaps as much as 175,000 where the full thickness of both units is present in the southeastern part of the county.

The coefficients of transmissibility and storage determined from aquifer tests may be used to predict the drawdown of water levels caused by pumping a well or by a general increase of pumping in an area. Figure 10 shows the theoretical relation between drawdown of water levels and different coefficients of transmissibility. The calculations of drawdown were based on a well or group of wells pumping 500 gpm continuously for 1 year from an extensive aquifer having a coefficient of storage of 0.0008 and coefficients of transmissibility as shown on the different curves. As a result of pumping 500 gpm continuously for 1 year, the aquifer having an assumed transmissibility of 25,000 gpd per foot, the water level would decline about 18 feet at a distance 1,000 feet from the pumped well; it would decline about 11 feet at 5,000 feet and about 2 feet at 50,000 feet. The drawdown for rates other than 500 gpm can be determined by multiplying the drawdown values shown in Figure 10 by the proper multiple of 500, because the drawdown is directly proportional to the pumping rate.

Figure 11 shows the relation between drawdown of water levels and time in a well pumping 100 gpm from an infinite aquifer having a coefficient of storage of 0.0008 and coefficient of transmissibility of 25,000 gpd per foot. Most of the drawdown takes place in the first few days of pumping, but the water level will continue to decline indefinitely until a source of recharge or discharge is intercepted. Because the drawdown is directly proportional to the pumping rate, the drawdown for rates other than 100 gpm can be determined by multiplying the drawdown values shown in Figure 11 by the proper multiple of 100.

The specific capacity of a well is directly related to the transmissibility of the aquifer. Table 6 shows that the specific capacities of 5 wells ranged from 1.9 to 17.7 gpm per foot. The specific capacities of wells tapping the same formation may differ widely owing to the amount of sand screened, the difference in well construction, the degree of well development, the rate of pumping, and the element of time. The specific capacities shown in Table 6 were determined from pumping tests of two to several hours duration.

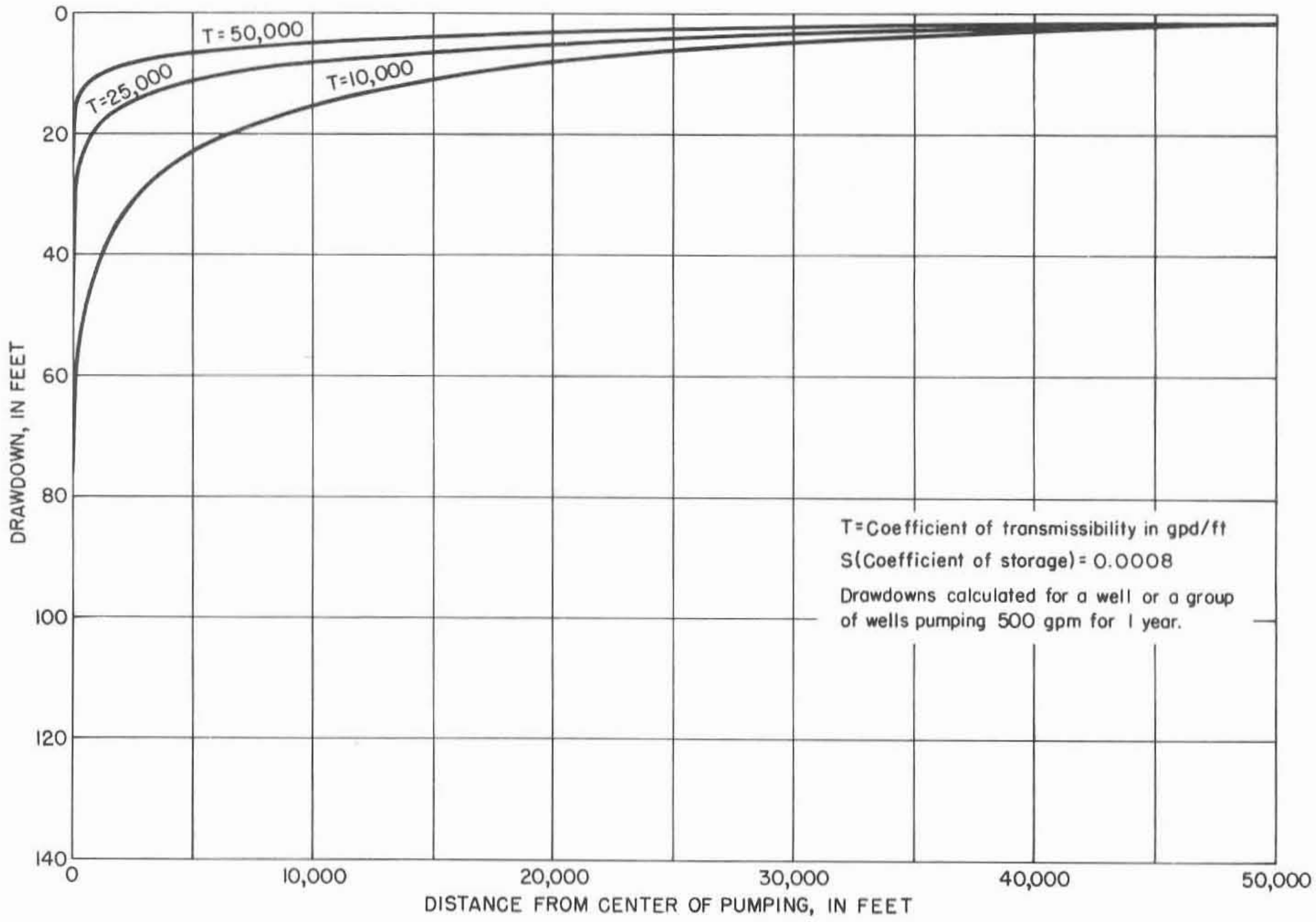


Figure 10

Graph Showing Relation Between Drawdown and Transmissibility

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

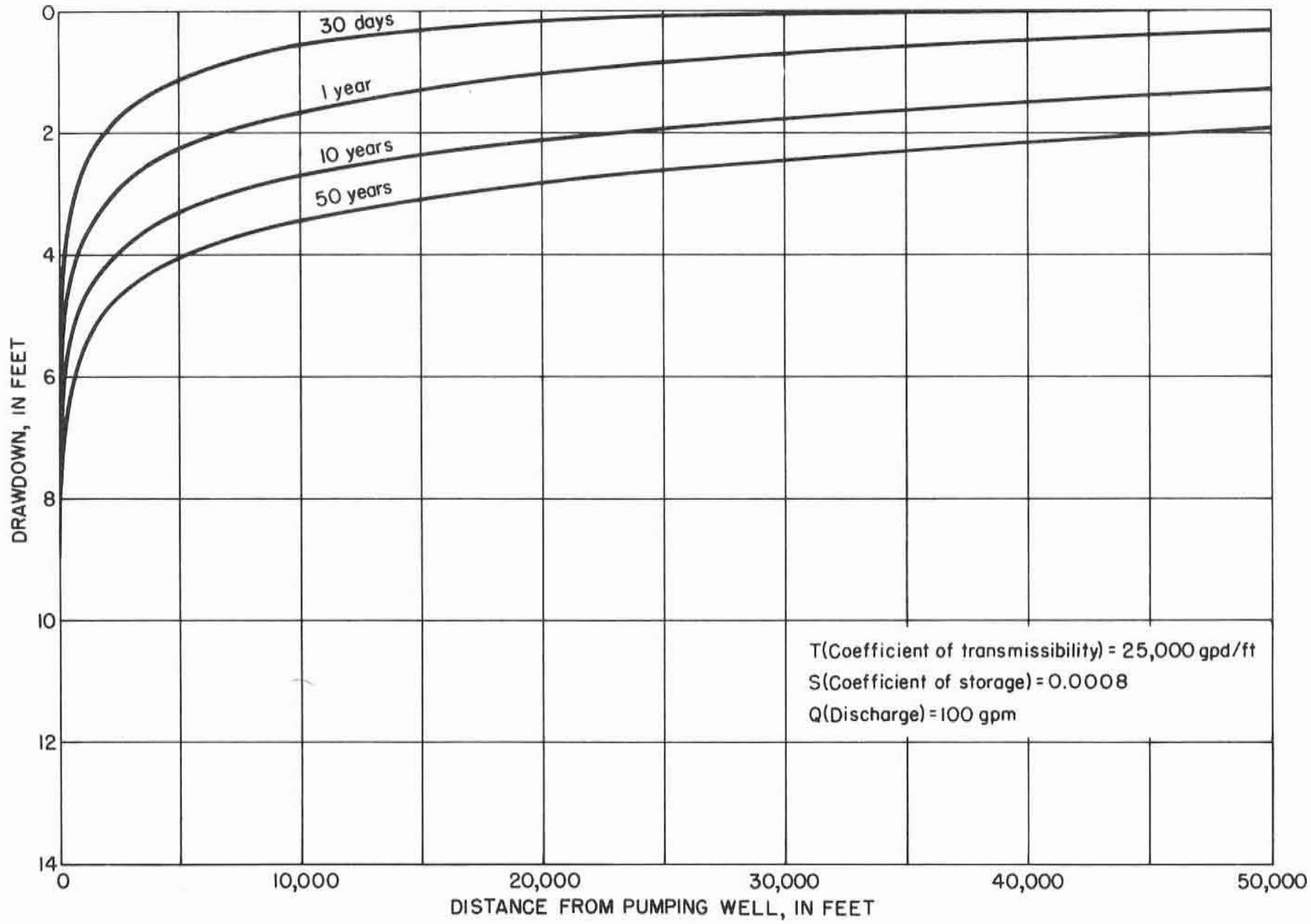


Figure 11

Graph Showing Relation Between Drawdown and Time

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

Changes in Water Levels

Water levels in wells in Caldwell County were measured in connection with previous studies in the county in 1943 and 1946, and as part of the current study in 1963 and 1964. Periodic water-level measurements also have been made in selected observation wells since 1942 as part of the statewide observation well program carried on by the U.S. Geological Survey and the Texas Water Development Board. Although some of these water-level records have been published previously, all are included in this report in Tables 9 and 11.

The water-level measurements made during the period 1946 to 1963-64 indicate a net decline in water levels in wells tapping the various aquifers throughout the county. In the Wilcox Group, water levels in 41 wells declined an average of 3.3 feet. The declines ranged from 0.9 foot to 14.1 feet in 32 wells, rises ranged from 0.4 foot to 6.1 feet in 8 wells, and there was no net change in 1 well. During the same period, water levels in 35 wells in the Leona Formation declined an average of 4.3 feet, the declines ranging from 0.6 foot to 9.5 feet. Declines in 6 wells in the Recent alluvium in the San Marcos River valley averaged 4.6 feet, and ranged from 2.6 to 6.1 feet.

The changes in the water levels in some of the wells reflect the difference in the time of year in which the water levels were measured, the differences in rainfall, and differences in pumping rates in nearby wells. The declines in water levels during the 18-year period 1946-63 were due in part to a cumulative deficiency in rainfall of about 13 inches during that period. The decline also was probably due in part to a more rapid runoff because of overgrazing and removal of brush and other plants that formerly retarded the runoff and allowed more time for water to infiltrate the soil.

Figure 12 shows graphically the record of rainfall at Luling and the water-level fluctuation in three wells that are not affected by nearby large-scale pumping. The water level in well BU-67-13-602, which draws water from sand in the Reklaw Formation, fluctuated less than 2 feet during the 1952-63 period of record. The continued upward trend in water level since 1961 may be due to heavy local rainfall which was not recorded at the gage at Luling. The water level in well BU-67-20-601 in the Carrizo Sand declined during the drought which ended in 1957, after which it rose about 2 feet as a result of the above-normal rainfall during 1957-58. The level fluctuated some during 1958-61, a period of about normal rainfall. Well BU-67-11-501, typical of many of the wells on the outcrop of the Wilcox Group, had a maximum water-level decline of about 6 feet from 1952-64.

Figure 13 shows the relation between the pumpage by the city of Luling and the water levels in two wells about equidistant from the city well field. Well BU-67-19-609 is updip and across a fault from the city well field. Well BU-67-19-608 is on the same side of the fault as the city wells. The fault apparently is a partial barrier to the movement of water, although Plate 3 indicates that some of the sands may be connected across the fault. The water levels in both wells show some of the effects of the city pumpage, particularly the increases in pumpage in 1962 and 1963; the smaller fluctuations in the updip well probably indicate the poor connection across the fault. Although the decline of the water levels is due principally to the municipal pumpage at Luling, which has increased steadily each year except 1957 and 1959, part of the decline probably was the result of the 13-inch deficiency in rainfall during the 1946-63 period.

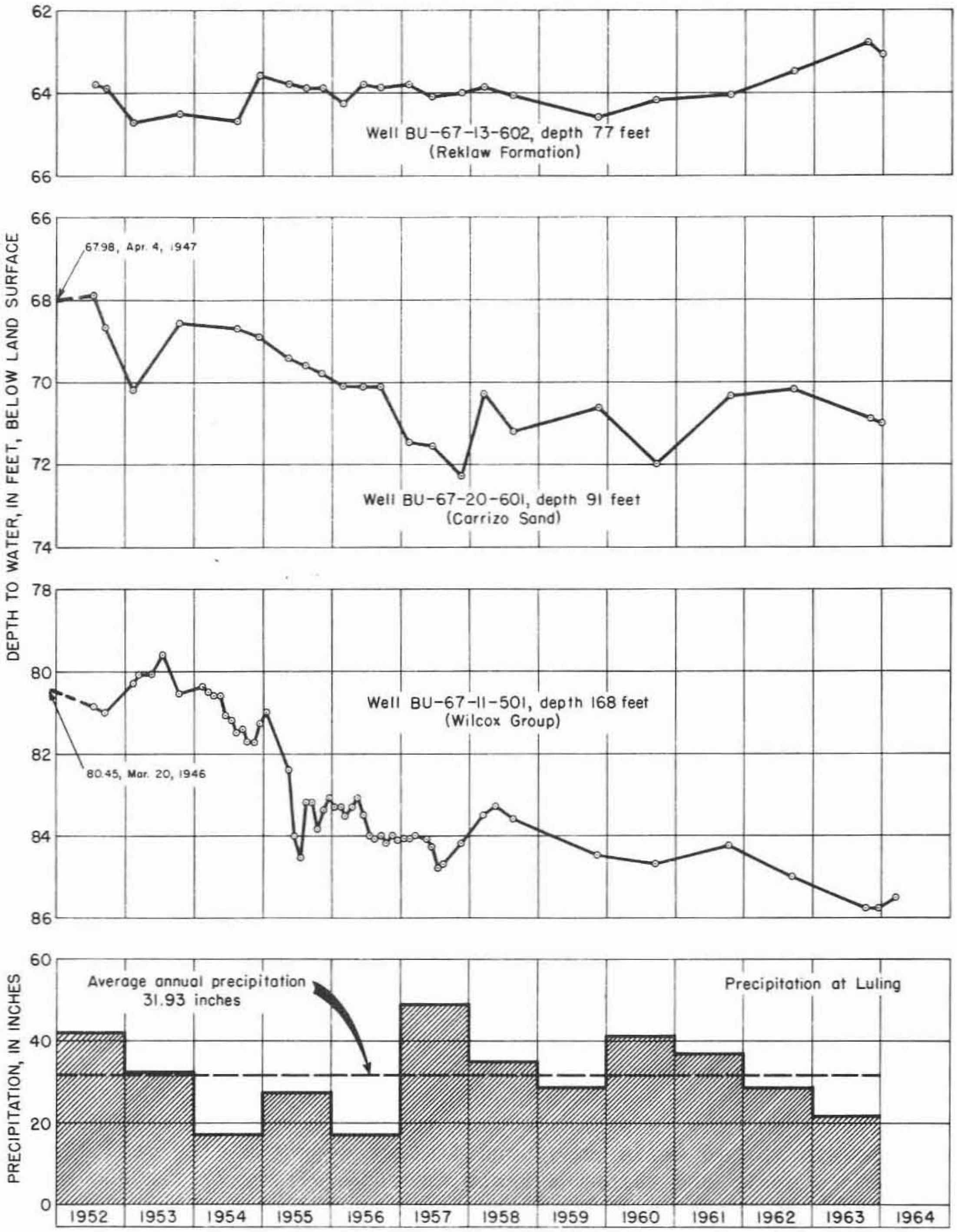


Figure 12

Graph Showing Changes in Water Levels in Wells in Caldwell County and Annual Precipitation at Luling

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

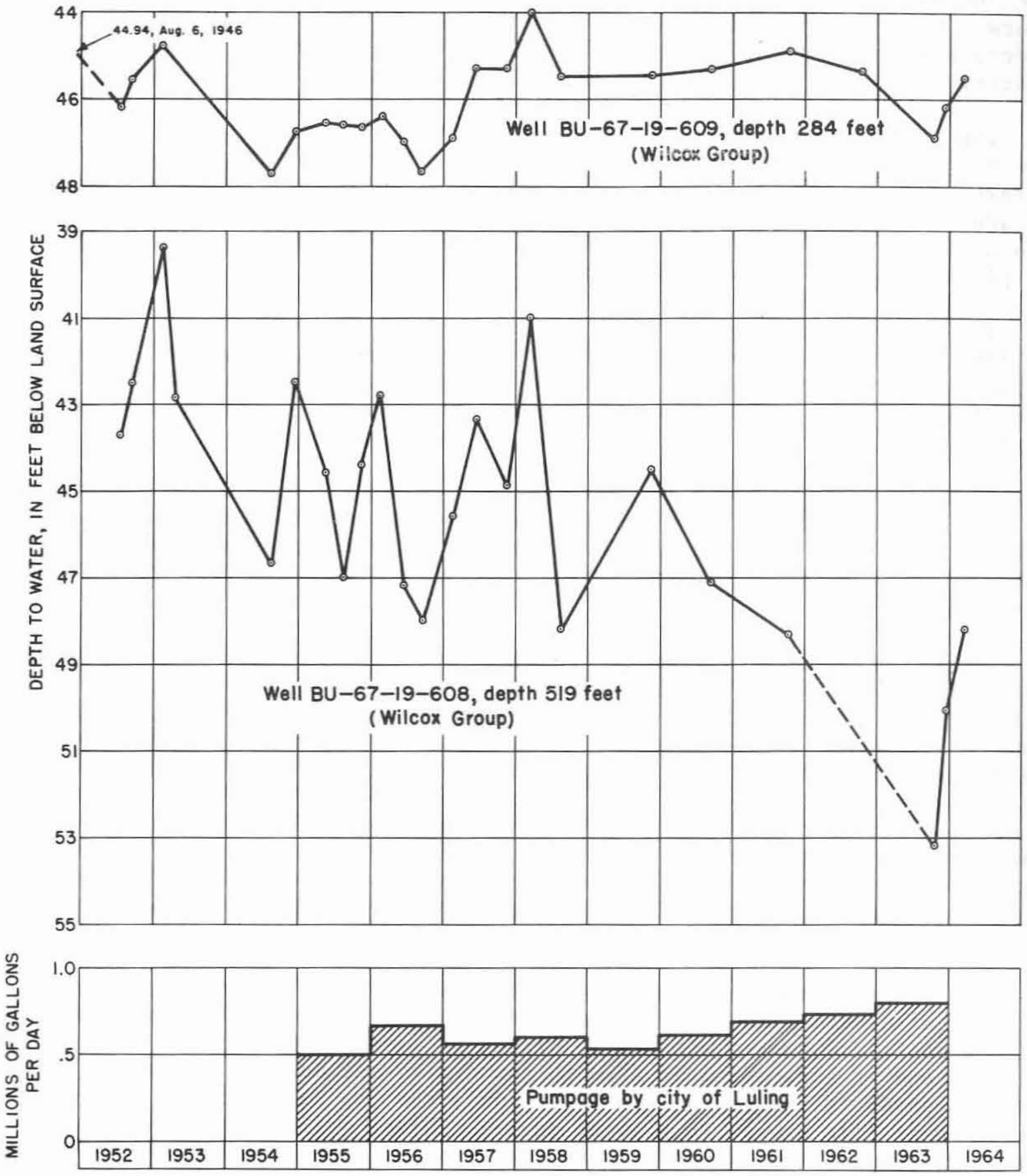


Figure 13

Graph Showing Changes in Water Levels in Wells Tapping the Wilcox Group in Caldwell County and Pumpage by the City of Luling

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe - Blanco River Authority

Well Construction

A few moderate- to large-capacity wells have been completed in the aquifers underlying Caldwell County to supply the needs of municipalities and irrigators. Little or no ground water is available in the outcrop area of the Navarro and Midway Groups, but throughout the rest of the county many small-capacity wells are used to supply water for domestic and stock needs.

The Lockhart municipal wells in the Leona Formation are large pits to provide a larger area for the entrance of water and to serve as collection and storage basins. The pits range in size from 25 by 75 feet to 30 by 200 feet and are generally dug to the base of the formation. Water can be pumped from such a basin-type well at a high rate until the basin is almost drained, then the pit is allowed to refill and pumping can be resumed.

The municipal wells that tap the Wilcox Group at Lockhart and Luling are drilled, underreamed opposite the water sands, screened, and gravel packed. The gravel pack increases the effective diameter of the well, allowing more water to enter at a reduced velocity, thus reducing the drawdown, and it aids in preventing the entrance of sand into the well.

Irrigation wells generally are designed to pump water at the lowest possible cost. The large-capacity irrigation wells in Caldwell County are large-diameter dug wells in the Leona Formation and in the Recent alluvium. They are equipped with centrifugal pumps or small turbine pumps, and they generally pump less than 500 gpm.

Only a few drilled irrigation wells in the county derive water from the Wilcox Group. These are straight-wall wells (not underreamed and gravel packed), cased with torch-slotted casing opposite the water sands, or uncased opposite the sands if the hole will stay open. Little effort is made to relate the width of the slots to the diameter of the sand grains. If the slots are too large, considerable quantities of sand will enter the well, resulting in excessive wear of the pumps. On the other hand, slots that are too small or of insufficient number may cause excessive "entrance losses," thereby increasing the drawdown and decreasing the specific capacity of the wells. Most of the drilled irrigation wells in the Wilcox are equipped with 1- to 3-inch submersible pumps.

The domestic and stock wells generally are of small capacity and are equipped with windmills, pump jacks, jet pumps, or submersible pumps. Many of the dug wells are curbed with rock, brick, or concrete rings, and water enters the open end of the casing or through the cracks between the bricks or rocks. Some are cased to the bottom; in others only the top few feet are cased if the formation is firm enough to prevent caving. Older drilled wells usually were cased with galvanized pipe nearly to the bottom of the well and no screen or slotted casing was used; these are called "open-end" wells. The more recently drilled wells generally are cased to the bottom and have the lowermost 20 to 40 feet torch-slotted. These wells generally are pumped at less than 5 gpm, but they still are vulnerable to sand troubles, and some must be cleaned periodically.

Availability of Ground Water

The availability of water in any given region has a direct bearing on the economic well-being of the region, and an abundance of water is a priceless asset to a particular locality. Sound management of the resource is an absolute necessary, for without it economic growth and development may proceed wastefully, and the water itself may deteriorate both in quantity and in quality.

The geologic formations containing significant quantities of fresh to slightly saline water in Caldwell County include the Recent alluvium, Leona Formation, Queen City Sand, Reklaw Formation, Carrizo Sand, and Wilcox Group. The Carrizo Sand and Wilcox Group are considered as a unit because they are hydrologically connected. Together they form the principal aquifer in the county.

Figure 14 shows the estimated potential yields that might be obtained from wells in the Recent alluvium, the Leona Formation, and the Carrizo Sand and Wilcox Group in different parts of Caldwell County. The estimates of yield are based on the thickness of sand containing fresh to slightly saline water, the estimated composite transmissibility of the water-bearing section, and the specific capacities and yields of existing wells. Furthermore, the estimates are based on the assumption that the wells would be properly constructed and screened opposite all sands containing fresh to slightly saline water.

The estimated potential yields of wells tapping the Recent alluvium along the San Marcos River ranges from 0 to 300 gpm (Figure 14), the thickness of saturation of the alluvium limiting the yields. Little or no water would be yielded to wells along the margin of the alluvium where there is very little saturation or in places where the underlying Navarro or Midway Groups lie above the water table.

About 40,000 acre-feet of fresh to slightly saline water was stored in the Recent alluvium along the San Marcos River during the winter of 1963-64, at a time when the average thickness of saturation was about 8 feet. Here again, much of this water is not available to wells because the water will not drain freely from the sands. The alluvium is recharged rapidly, however, most of the recharge coming from rainfall on the alluvium and runoff from adjacent areas. Some recharge comes from the Blanco River which crosses the alluvium in Hays County when the river is in flood stage. The San Marcos River, when it is in flood stage, also contributes some recharge, but most of the time ground water is discharging from the alluvium into the river. Data are not available for a computation of the annual rate of recharge.

The estimated potential yields of wells tapping the Leona Formation range from 0 to 500 gpm. The yields of wells may vary within short distances, according to the permeability of the sediments, which ranges widely, and the amount of saturation from place to place. Generally, the larger yields can be obtained from wells near the centerline of the outcrop. Well BU-67-02-903, a pit 40 by 200 feet, had a reported yield of 1,800 gpm, but the yield cannot be sustained for long periods; the well must be rested at intervals so that the pit will refill. Southeast of Lockhart, the Leona overlies the sandy Wilcox Group; in this area, water from the Leona infiltrates the underlying Wilcox, and the Leona is not expected to yield large amounts of water. Most of the shallow wells on the outcrop of the Leona southeast of Lockhart are dug entirely through the Leona and into the Wilcox because the water table generally is below the base of the Leona.

An estimated 50,000 acre-feet of fresh to slightly saline water was stored in the Leona Formation in the area between the Hays-Caldwell county line and Lockhart in the winter of 1963-64, on the basis of an average thickness of saturation of about 7 feet. Most of this water is not available to wells because it will not drain freely from the sands. However, the aquifer is replenished rapidly after heavy rainfall because of the high permeability of the formation, and the amount of water in storage could be considerably more than 50,000 acre-feet after long periods of above-normal rainfall. The average rate of recharge is not known.

About 900,000 acre-feet of fresh to slightly saline water is stored in the Queen City Sand. The water is fresh to slightly saline throughout its subsurface extent in the county, and the thickness of saturated sand averages about 200 feet. It seems likely that yields of 100 gpm or more could be obtained from properly constructed wells screened opposite all the sands. According to Shafer (1965, p. 29), yields of as much as 200 gpm were reported in nearby Gonzales County.

About 700,000 acre-feet of fresh to slightly saline water is stored in the Reklaw Formation. The water is fresh to slightly saline throughout the formation's extent in the county, and the thickness of saturated sand averages about 100 feet. Yields of 100 gpm probably could be obtained from properly constructed wells.

The estimated potential yields of wells tapping the Carrizo Sand and Wilcox Group increase from 0 near the northwest margin of the Wilcox outcrop to 1,500 gpm from the combined Carrizo and Wilcox in the southeastern part of the county (Figure 14). In the 0 to 400 gpm area on the Wilcox outcrop, the yields may vary considerably in short distances, such as between wells BU-67-12-109 and BU-67-12-201 where the thickness of the Wilcox decreases from about 550 to 30 feet because of faulting (Plate 2).

The approximate altitude of the base of the fresh to slightly saline water in the Carrizo Sand and Wilcox Group is shown in Figure 15. The effect of faulting on the base is apparent in much of the area causing large variations in the altitude of the base in short distances. The deepest extent of the fresh to slightly saline water is about 2,300 feet below sea level near the southeastern tip of the county.

The approximate thickness of sand containing fresh to slightly saline water in the Carrizo Sand and Wilcox Group ranges from 0 where the saturated sand is first encountered to as much as 950 feet in the Delhi area (Figure 16). In the outcrop area, the maximum sand thickness is about 600 feet; however, large differences in sand thickness occur within short distances in this area, much of which is highly faulted.

The Carrizo Sand and Wilcox Group as a unit is the most favorable aquifer in Caldwell County for future large-scale developments of ground water. The quantity of water perennially available from the Carrizo Sand and Wilcox Group depends chiefly on the rate of recharge. In order to estimate the rate of recharge, it is assumed that the water passes through a vertical section of the aquifer 20 miles long, roughly along the line of contact of the Carrizo Sand and Reklaw Formation in the county. In this vertical section, the composite transmissibility of the sand is estimated to be about 175,000 gpd per foot, and the average hydraulic gradient is about 6 feet per mile. On this basis, the quantity of water that moves through the aquifer as recharge is slightly more than 20 mgd (million gallons per day), or about 23,000 acre-feet per year. In addition, an unknown quantity of potential recharge is rejected to streams as spring flow and seepage on the outcrop, and some is lost to the processes of evaporation and consumption by vegetation. Therefore, the 20 mgd of recharge that is effectively replenishing the aquifer probably represents a minimum quantity of water that is available for development on a perennial basis without depleting the aquifer.

Converted to annual precipitation, the 20 mgd, or 23,000 acre-feet per year, is equivalent to about 2.2 inches of water covering and effectively recharging slightly more than 200 square miles of the sandy part of the Carrizo Sand and Wilcox Group that crops out in the county. The 2.2 inches of recharge is 7 percent of the average annual precipitation. This compares favorably with the 1.5 inches of recharge (also 7 percent of the average annual precipitation) to the Carrizo Sand in the heavily pumped Winter Garden district (Turner and others, 1960, p. 62-65), which receives one-third less precipitation than Caldwell County.

In addition to the 23,000 acre-feet per year that probably is available on a perennial basis, about 23,000,000 acre-feet of water is in transient storage in the Carrizo Sand and Wilcox Group. Most of this water is not available to wells; however, at least a part is available for development. For example, if wells were installed so that the aquifer could be dewatered to about 400 feet below the land surface, 75 mgd could be pumped for perhaps 75 to 100 years. Thereafter, the pumping rate would need to be reduced in order to stabilize the declining water levels. It should be borne in mind, however, that the above computations would be subject to revision if similar large-scale ground-water developments were undertaken in adjoining counties to the east, south, or west.

Quality of Ground Water

The results of chemical analysis of 287 samples of ground water from 227 wells in Caldwell County are shown in Table 12. The wells sampled are identified by means of bars over the well numbers in Plate 1.

The chemical constituents in ground water originate principally from the soil and rocks through which the water has passed; consequently, the differences in chemical character of the water reflect in a general way the nature of the geological formations that have been in contact with the water. Generally, the chemical content of ground water increases with depth. The hardness decreases and the sodium content increases with depth.

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

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

Description	Dissolved-solids content (ppm)
Fresh	Less than 1,000
Slightly saline	1,000 to 3,000
Moderately saline	3,000 to 10,000
Very saline	10,000 to 35,000
Brine	More than 35,000

The dissolved-solids content of 143 water samples collected in Caldwell County ranged from 128 to 3,750 ppm (excluding wells BU-67-03-403, BU-67-03-704, and BU-67-19-313, which produce oil-field salt water), exceeding 1,000 ppm in 51 samples.

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

Substance	Concentration (ppm)
Chloride (Cl)	250
Fluoride (F)	(*)
Iron (Fe)	0.3
Manganese (Mn)	.05
Nitrate (NO_3)	45
Sulfate (SO_4)	250
Total dissolved solids	500

* When fluoride is present naturally in drinking water in Caldwell County, the concentration should not average more than 0.8 ppm, based on an average annual maximum daily air temperature of 79.8°F.

The Public Health standards recommend that the chloride content of drinking water should not exceed 250 ppm. A large amount of chloride in association with an equivalent amount of sodium gives a salty taste to drinking water. Chloride also increases the corrosiveness of water. The chloride content of 269 samples from wells in the county ranged from 6 to 1,410 ppm, exceeding 250 ppm in 67 samples.

The high chloride content is not confined to any one part of the county or to any one formation, but is widely scattered throughout the county (Figure 17). The high chloride content in wells BU-67-10-201, BU-67-10-202, BU-67-10-203, and BU-67-10-502, on the outcrop of the Recent alluvium, probably is because these wells were dug entirely through the alluvium and into the underlying Navarro Group, which normally contains saline water.

Locally it is believed by many that the high chloride found in many wells is the result of oil-field brine entering the aquifer from poorly cased oil wells, from oil-field brine disposal wells, by seepage into the aquifer from reservoirs holding brine for disposal, or where brine is allowed to flow over the land surface and into the natural drainage channels. Some or all these factors probably have contributed to the contamination of the fresh water to some extent at some time. But wells such as BU-67-10-907, BU-67-19-108, and BU-67-11-705 are updip and up the hydraulic gradient from the Luling oil field, the most likely source of oil-field brine in the area, so the brine probably was not the source of the high chloride content in water from these wells. The salinity may be the result of poor ground-water circulation in the Wilcox because of the presence of nearby faults, or it may be the result of upward movement of mineralized water along the fault planes. Conditions that may cause poor circulation are illustrated in Plate 2, where the faults between wells BU-67-12-109 and BU-67-12-201 might prevent or retard movement of water downdip so that the more mineralized water that was left in the Wilcox, possibly from the time of deposition, has never been completely flushed out by the natural downdip movement of water.

Faults elsewhere in the Wilcox in Caldwell County probably prevent free movement of ground water. Well BU-67-19-609 in Luling near well BU-67-19-622 on the cross section (Plate 3) is on the northwest side of a fault and derives its water, which contains 1,410 ppm chloride, from a depth of about 280 feet. Nearby well BU-67-19-502, depth 149 feet, yields water containing only 158 ppm chloride. A possible explanation for this is that the shallow sand beds on the northwest side of the fault are in good hydrologic contact with sand beds on the southeast side so that the movement of water is not restricted, whereas the deeper sand beds are in poor hydrologic contact with sand beds on the opposite side of the fault and ground-water circulation is probably restricted. Probably many minor faults not shown on the geologic map may affect the movement of the water, thus causing the high chloride content found in water from other wells such as BU-67-13-103 and BU-67-20-104. The relatively low chloride content in water from wells between the Luling and Salt Flat oil fields tends to rule out the possibility of widespread contamination of fresh ground water from the disposal of brines from these fields.

Table 12 shows an increasing chloride content in the water from the Luling city wells which derive their water from the Wilcox Group. The chloride content of the water from well BU-67-19-605 (Luling city well 5) has increased from 174 ppm in 1955 to 385 ppm in 1964. That from well BU-67-19-607 (Luling city well 7) has increased from 170 ppm in 1955 to 229 ppm in 1964. The water from well BU-67-19-601 (Luling city well 1) has changed very little, the chloride increasing from 163 ppm in 1943 to 185 ppm in 1951 and 1954, then decreasing to 175 ppm in 1964. A logical explanation for the increase in chloride is that the cone of depression created by pumping well BU-67-19-605 induces some upward movement of the more mineralized water in the sands below 350 feet, shown on the electric log of well BU-67-19-605, or that pumping induces more mineralized water from adjacent sand beds across the fault, which passes near or through the well field (Plate 3). The possibility of contamination from improperly cased oil wells is not likely, because the oil wells were drilled under rigid city ordinances designed to prevent contamination of the fresh water.

The sulfate content of the water is a minor problem in Caldwell County. Of 273 samples, only 30 contained sulfate in excess of 250 ppm, the highest content being 1,460 ppm. Water containing sulfate in excess of 250 ppm may produce a laxative effect when first used for drinking, and in large amounts, sulfate in combination with other ions gives a bitter taste to water. Also, sulfate in water containing calcium forms a hard scale in steam boilers. Most of the high sulfate water is in the Wilcox Group and Reklaw Formation.

The optimum content of fluoride in drinking water reduces the incidence of tooth decay when the water is consumed during the period of enamel calcification. However, excessive fluoride content may cause mottling of the teeth, such action depending on the concentration of fluoride, the age of the child, amount of drinking water consumed, and susceptibility of the individual (Maier, 1950, p. 1120-1132). Presence of fluoride in average concentrations greater than two times the optimum value (0.7 ppm in Caldwell County) is considered grounds for rejection of the supply by the U.S. Public Health Service (1962, p. 8). The fluoride content in 60 samples collected in the county ranged from 0 to 1.1 ppm and exceeded the recommended upper limit of 0.8 ppm in only 3 samples.

Concentrations of nitrate in excess of 45 ppm in water used for infant feeding have been related to the incidence of infant cyanosis (methemoglobinemia or "blue baby" disease), a reduction of the oxygen content in the blood constituting a form of asphyxia (Maxcy, 1950, p. 271). Nitrate is considered a final oxidation product of nitrogenous matter, and its presence in water of more than several parts per million may indicate previous contamination by sewage or other organic matter (Lohr and Love, 1954, p. 10). The nitrate content in 220 samples ranged from 0 to 540 ppm, and in 45 samples it exceeded 45 ppm. Of the 45 samples, 20 were from the Leona Formation, 11 from the Recent alluvium, 11 from the Wilcox Group, 1 from the Carrizo Sand, 1 from the Queen City Sand, and 1 from the Leona Formation and Wilcox Group, undifferentiated. Most of the higher concentrations were from dug wells less than 50 feet deep.

Calcium and magnesium are the principal constituents that cause hardness of water. Water having hardness of 60 ppm or less is classed as soft; 61 to 120 ppm, moderately hard; 121 to 180 ppm, hard; more than 180 ppm, very hard. Excessive hardness causes increased consumption of soap and induces the formation of scale in hot water heaters, boilers, and pipes.

In general, the water from shallow wells in the county is very hard, but softer water can generally be obtained from relatively deep wells. The hardness, as determined in 232 samples, ranged from 1 to 1,830 ppm; in 36 samples it was less than 60 ppm, and in 178 samples it was more than 180 ppm. All of the water samples from the Recent alluvium and the Leona Formation were very hard. The hardness of water from the Queen City Sand, Reklaw Formation, Carrizo Sand, and Wilcox Group was as low as 1 ppm, the softer water generally coming from the deeper wells.

Excessive concentrations of iron in water cause reddish-brown or dark-gray precipitates that stain clothes and plumbing fixtures. Drinking water standards state that the iron content should not exceed 0.3 ppm; larger amounts cause an unpleasant taste and support the growth of iron bacteria. Iron is objectionable in water used for food processing, textile processing, beverages, ice manufacture, brewing, and many other processes. In 73 samples, the iron content ranged from 0 to 16.1 ppm and exceeded 0.3 ppm in 31 samples. Iron is a problem in the county, particularly in the water from parts of the Wilcox Group, Carrizo Sand, Reklaw Formation, and Queen City Sand.

The quality of water for industry does not necessarily depend on its acceptability for human consumption, but varies according to the individual requirements of each process. Ground water used for industry may be classified into three principal use categories--boiler, cooling, and processing. Of these, the quantity used for cooling far exceeds the others. Cooling water is usually selected not only for its temperature and source of supply, but also for its chemical quality. Any water-quality characteristic that may adversely affect heat-exchange surfaces is undesirable. For example, calcium, magnesium, aluminum, iron, and silica may cause scale which reduces heat exchange. Corrosiveness also is an objectionable feature. Acids, oxygen, carbon dioxide, calcium and magnesium chloride, and sodium chloride make water corrosive.

Boiler water for the production of steam must meet rigid chemical-quality requirements because the problems of corrosion and encrustation are intensified. Treatment of boiler water generally is needed, and therefore its suitability for treatment must be considered, since in modern closed systems the boiler water is reused many times. The calcium and magnesium content affects the industrial value of water by contributing to the formation of scale. Silica in boiler water is undesirable because it forms a hard scale, the scale-forming tendency increasing with the pressure in the boiler. The following table shows the maximum suggested concentrations of silica for water used in boilers (Moore, 1940, p. 263).

Concentration of Silica (ppm)	Boiler pressure (pounds per square inch)
40	Less than 150
20	150 - 250
5	251 - 400
1	More than 400

In 120 samples of water from wells in Caldwell County, the silica content ranged from 4.6 to 76 ppm and averaged 25 ppm.

The suitability of water for irrigation depends on the chemical quality of the water and other factors such as soil texture and composition, type of crop, irrigation practices, and climate. Many classifications of irrigation water express its suitability in terms of one or more variables and offer criteria for evaluating the relative overall suitability of irrigation water rather than placing rigid limits on the concentrations of certain chemical constituents. The most important characteristics pertinent to such evaluation of water for irrigation are the proportion of sodium to total cations, an index of the sodium hazard; total concentration of soluble salts, an index of the salinity hazard; amount of boron; and RSC (residual sodium carbonate).

A high percentage of sodium in water tends to break down soil structure by deflocculating the colloidal soil particles. Consequently, the soil may become plastic, the movement of water and air through the soil can be restricted, drainage problems may develop, and cultivation may be rendered difficult. A system of classification commonly used for judging the quality of water for irrigation was proposed by the U.S. Salinity Laboratory Staff (1954, p. 69-82). It is based primarily on the salinity hazard as measured by the electrical conductivity of the water and on the sodium hazard as measured by the SAR (sodium-adsorption ratio). Wilcox (1955, p. 15), a member of the Salinity Laboratory Staff, stated that this system of classification "...is not directly applicable to supplemental waters used in areas of relatively high rainfall," and that, with respect to salinity and sodium hazards, water may be used safely for supplemental irrigation if its conductivity is less than 2,250 micromhos per centimeter at 25°C and its SAR is less than 14.

The system of classification (Figure 18) shows that of 13 water samples (9 from irrigation wells and 4 from public-supply wells), 10 samples could safely be used for irrigation. Water having high SAR and high conductivity, such as the Wilcox samples from wells BU-67-19-601, BU-67-20-707, and BU-67-20-706, may be acceptable for supplemental irrigation where it is used on a well-drained, sandy soil. Thus in Caldwell County, where irrigation is used chiefly to supplement the relatively high rainfall, most of the ground water is suitable for irrigation. There are instances, however, where some of the water may not be suitable, and such factors as soil type, drainage, method of application, and the use of amendments to the water should be considered.

An excessive concentration of boron renders water unsuitable for irrigation. Scofield (1936, p. 286) indicated that boron concentrations of as much as 1 ppm are permissible for irrigating most boron-sensitive crops, and concentrations of as much as 3 ppm are permissible for the more boron-tolerant crops. Table 12 shows that boron is not a problem in Caldwell County. In 10 samples, the boron content ranged from 0.10 to 1.4 ppm.

Another factor used in assessing the suitability of water for irrigation is the RSC (residual sodium carbonate). Excessive RSC will cause the water to be alkaline, and the organic content of the soil on which it is used may become a grayish black. The soil thus affected is referred to as "black alkali." Wilcox (1955, p. 11) states that laboratory and field studies have resulted in the conclusion that water containing more than 2.5 epm (equivalents per million) RSC is not suitable for irrigation; water containing from 1.25 to 2.5 epm is marginal, and water containing less than 1.25 epm probably is safe. However, it is believed that good irrigation practices and proper use of amendments might make it possible to use the marginal water successfully for irrigation. Furthermore, the degree of leaching will modify the permissible limit to some extent (Wilcox, Blair, and Bower, 1954, p. 265). The RSC as determined in 34 samples in Caldwell County ranged from 0.0 to 32.2 epm. Only 7 samples contained more than 2.5 epm and 24 samples contained less than 1.25 epm.

Irrigation in Caldwell County is practiced only during periods of deficient rainfall. Coastal Bermuda grass is the principal irrigated crop and is

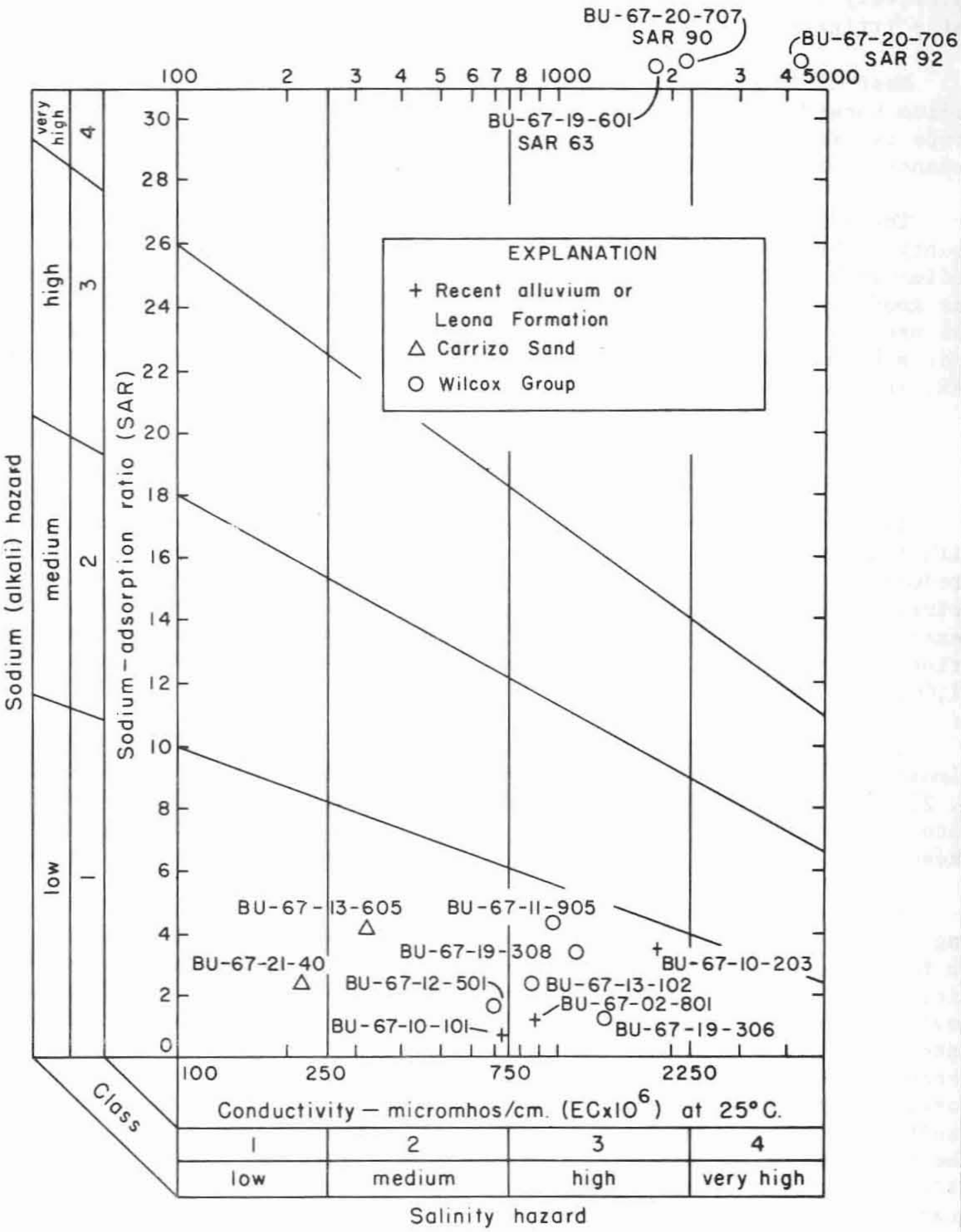


Figure 18

Diagram for the Classification of Irrigation Waters

(After United States Salinity Laboratory Staff, 1954, p. 80)

U.S. Geological Survey in cooperation with the Texas Water Development Board, Caldwell County Commissioners' Court and the Guadalupe-Blanco River Authority relatively tolerant to sodium and salinity hazards. Furthermore, most of the soils irrigated are sandy and have good drainage.

Most of the water from the Recent alluvium and Leona Formation is low in sodium hazard and medium to high in salinity hazard. The irrigation of field crops is practiced principally on the outcrops of these formations and any expansion of field crops seems likely to continue this practice.

The Wilcox Group supplies most of the water for irrigation in Caldwell County. The water ranges from low to very high in sodium hazard and from medium to high in salinity hazard. The soil developed on the Wilcox generally has good subdrainage, which coupled with relatively high rainfall will permit the use of water of higher sodium and salinity hazards than on tight land with poor subdrainage. Care should be observed in the use of water with very high SAR, such as the 63, 90, and 92 shown for 3 wells in Figure 18.

DISPOSAL OF OIL-FIELD BRINE

Large quantities of brine are produced in Caldwell County in conjunction with the production of oil. Table 7 shows the reported amount of salt water produced in 1961 in each oil field and the methods used for the disposal of the brine. The table, which is based on a report of the Texas Water Commission and Texas Water Pollution Control Board (1963, p. 40-56), shows that the total brine production in Caldwell County in 1961 was 85,404,670 barrels (about 11,000 acre-feet).

Brine has been produced in the Luling and Salt Flat fields along with oil almost from the start of production in 1922. Hastings and Broadhurst (1944, p. 2) observed in 1944 that brine was being continuously discharged into surface streams at the rate of about 10 mgd. In 1961, the brine production from these fields was 9.8 mgd, most of which was disposed of through injection wells.

According to Lozo and others (1959, p. 137), about 550 wells were producing oil in the Luling field in 1958 and at least 1,200 wells had been drilled in the field. Present and future water users located downdip from the oil fields are concerned about the danger of salt water from the oil-producing zone moving up the bore holes of improperly plugged oil wells and out into the fresh-water sands of the Wilcox Group. It is not likely that this is occurring now because the artesian head in the Edwards Limestone, the principal oil-producing formation, is lower than the head in the Wilcox except in the vicinity of faults where gas pressure may be high. However, when the fields are abandoned, the head in the Edwards will increase and may become greater than that in the Wilcox. At that time, such contamination may occur unless the wells are adequately plugged.

The Texas Railroad Commission requires that the brine be disposed of in such a manner that it will not contaminate potable water, either surface or ground water. The open-pit method of brine disposal is one of the most hazardous of the methods available to the oil industry. Brine in open pits is allowed to evaporate but is free to soak into the ground and contaminate the ground water, and some may overflow into the natural drainage. Even if the brine were to be evaporated, the salt would remain in the pit as a source of contamination unless the pit were adequately lined.

Table 7.--Oil-field brine production and disposal, 1961 (from Texas Water Commission and Texas Water Pollution Control Board, 1963)

Field name	Brine production (barrels)	Brine Disposal			
		Injection well		Open surface pit	
		Barrels	Percent	Barrels	Percent
Bee Creek	6,008	0	0.0	6,008	100
Buchanan	22,194	0	.0	22,194	100
Buchanan, North Dale Lime	1,095	0	.0	1,095	100
Dale	7,025	0	.0	7,025	100
Dale, west	1,369	0	.0	1,369	100
Dunlap	29,745	0	.0	29,745	100
Dunlap, serpentine	365	0	.0	365	100
Larremore	918,880	918,800	100	0	.0
Luling - Edwards	71,972	0	.0	71,972	100
Luling - Branyon	77,713,241	75,565,400	97.2	2,140,841	2.8*
Lytton Springs	20,891	0	.0	20,891	100
Salt Flat	6,554,986	5,847,201	89.2	707,785	10.8
Spiller	38,880	0	.0	38,880	100
Tenney Creek	18,019	0	.0	17,431	96.7†
County Totals	85,404,670	82,331,481	96.4	3,065,601	3.6‡

* 7,000 barrels unaccounted for.
† 588 barrels unaccounted for.
‡ 7,588 barrels unaccounted for.

An example of contamination of fresh ground water by oil-field brine was observed in the Larremore oil field about 2½ miles northwest of Lockhart. From the beginning of operations in 1928, salt water was produced with the oil. The brine was discharged into ditches on the surface and later into a trench excavated in the Leona Formation. Contamination over a period of several years increased the chloride content of the water in the Leona in a triangular-shaped area, the apex being at the source and contamination extending southeastward at least as far as the city wells in Lockhart. Analyses of water samples by the Texas State Department of Health (Table 8) indicate that the contamination had reached Lockhart municipal well BU-67-03-803 before 1938, as the chloride content in that year was 211 ppm, more than twice the content of the normal uncontaminated water. By 1943, the chloride content had increased to 604 ppm in well BU-67-03-803 and to 1,030 ppm in BU-67-03-802.

Table 8.--Changes in chloride content of water from Lockhart city wells

Well BU-67-03-802		Well BU-67-03-803	
Date	Chloride (ppm)	Date	Chloride (ppm)
Mar. 16, 1943	1,030	Oct. 29, 1938	211
Apr. 2, 1944	724	Mar. 16, 1943	604
Feb. 8, 1946	465	Mar. 31, 1944	540
Aug. 12, 1947	224	Apr. 3, 1945	355
July 16, 1951	85	Feb. 8, 1946	218
		Aug. 12, 1947	142
		May 4, 1951	103
		Jan. 7, 1963	101

In 1943, the Texas Board of Water Engineers at the request of the Texas Railroad Commission and the city of Lockhart made an investigation of the contamination problem. The investigation clearly indicated that brine from the Larremore field was the source of the contamination, and the Texas Railroad Commission closed the field until facilities were installed for an efficient disposal of the oil-field brine. The chloride content of the contaminated water in the Lockhart municipal well BU-67-03-802 decreased from 1,030 ppm in 1943 to 465 ppm in 1946, and continued to decrease until it was only 85 ppm in 1951. Similarly, the chloride content in well BU-67-03-803 decreased steadily from 604 ppm in 1943 to 101 ppm in 1963. The fact that the chloride content of water in the Leona Formation updip from the Larremore field is much lower than that downdip from the field indicates that the brine is still not completely flushed out.

This example of contamination illustrates two significant conditions that occur in the aquifer. First, the brine that is being added to the ground at one point may not affect the quality of the water in wells nearby for many years because of the slow movement of the ground water; consequently, no complaints may be registered and no one may be aware of the damage being done. Second, when the contamination is finally discovered or when the quality of the water supply is degraded, the damage cannot be immediately rectified merely by stopping the contamination at its source, because purification by leaching and dilution will require a longer time than the period of original pollution.

In 1961, only about 4 percent of the brine produced in Caldwell County was disposed in open surface pits, about 96 percent reportedly being injected into formations below the potable-water zones by use of injection wells. The injection method of disposal is good except that generally the brine is gathered and stored in pits and then pumped into the injection wells. Because the pits generally to not have watertight linings, some of this brine can seep into the fresh-water aquifer if the pit is dug into permeable material. Also, leaks from disposal wells are hard to detect before they have damaged the ground-water supply. A disposal system allowing for little or no contamination to the fresh-water aquifer is in operation in the Larremore field. Here the brine produced in the field flows from the separators into a concrete reservoir and is pumped immediately into the injection well. In this case, there is very little opportunity for the brine to contaminate the aquifer.

Observation indicates that most of the oil operators are trying to improve their methods of brine disposal. Grass and brush are beginning to grow where previously brine had killed all vegetation. There is still need for improvement, however, especially in the elimination of unlined pits or reservoirs where the brine is collected before it is pumped into the injection wells. However, additional disposal expenses would reduce the already low profit margin in many fields in Caldwell County, because the production is as low as 4 percent oil and 96 percent brine.

CONCLUSIONS

About 25,000,000 acre-feet of fresh to slightly saline water is in storage in Caldwell County, but only a fraction of this water is economically recoverable by known methods at present costs. Ninety-two percent of the total water in storage, or 23,000,000 acre-feet, is stored in the Carrizo Sand and Wilcox Group, which function as a single aquifer. Other water-bearing formations and the quantity of water stored are the Queen City Sand, 900,000 acre-feet; Reklaw Formation, 700,000 acre-feet; Leona Formation, 50,000 acre-feet; and Recent alluvium, 40,000 acre-feet. The quantity of water available on a perennial basis from the Carrizo Sand and Wilcox Group without depleting the aquifer is about 23,000 acre-feet per year, or about 20 mgd. Larger quantities may be pumped, but the aquifer will be dewatered gradually and water levels will continue to decline. For example, 75 mgd could be pumped for perhaps 75 to 100 years, but after this time, most of the aquifer within 400 feet of the land surface would be dewatered.

The water-bearing formations underlying Caldwell County are practically untapped. In 1963, only 2,600 acre-feet, or 2.3 mgd, of ground water was pumped for public supply, irrigation, and domestic and stock purposes. The yields of wells in Caldwell County ranged from a few gallons a minute to about 600 gpm, whereas yields as large as 1,500 gpm might be obtained from properly constructed wells in the Carrizo Sand and Wilcox Group in the southeastern part of the county, where the greatest sand thickness is found.

The aquifers in the county generally contain water that is suitable for public supply and for many irrigation and industrial purposes. In 143 samples, the dissolved-solids content ranged from 128 to 3,750 ppm, exceeding 1,000 ppm in 51 samples. Generally, the more highly mineralized water occurs locally in areas of faulting in the Wilcox Group. If water of a desired quality is needed, it generally can be obtained by test drilling and selectively screening the wells.

At the present stage of development, contamination of the fresh to slightly saline water by the lateral or vertical movement of more highly mineralized water is not a serious problem. The high chloride content of water in places in the outcrop of the Wilcox Group is due principally to poor circulation caused by faulting and is not generally attributed to contamination by oil-field brine. Some contamination of the fresh to slightly saline ground water probably took place in the oil fields during the period when the oil-field brine was allowed to flow into the natural drainage systems. This has been corrected to the extent that about 96 percent of the brine reportedly is injected back into the oil-producing formations. Usually, however, the brine flows from the oil separators into surface reservoirs prior to injection, and these unlined reservoirs may allow some brine to seep into the fresh-water sands.

A future danger of contamination is that when oil production ends, the artesian pressure will build up in the oil-producing zones so that it may be greater than the pressure in the fresh-water sands. If this happens, brine may move up and out of the abandoned oil wells into the fresh-water sands unless the wells are adequately plugged.

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Table 9.--Records of wells and springs

All wells are drilled unless otherwise noted in Remarks column.

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

Method of lift and type of power : B, bucket; C, cylinder; Cf, centrifugal; E, electric; G, gasoline, butane, or Diesel engine; H, hand; J, jet; N, none; T, turbine; W, windmill. Number indicates horsepower.

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

Water-bearing unit : Ke, Edwards Limestone; Kn, Navarro Group; Qal, alluvium; Ql, Leona Formation; Tc, Carrizo Sand; Tm, Midway Group; Tqc, Queen City Sand; Tr, Reklaw Formation; Twi, Wilcox Formation.

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-58-60-703	Mrs. -- Edwards	--	1910	49	210	Twi	--	47.4	Feb. 26, 1946	N	D,S	Dug well curbed with concrete. Reportedly supplied water formerly for several families, a cotton gin, and an oil field camp in Lytton Springs, in conjunction with Well BU-58-60-704. Temp. 63°F.
* 704	Lytton Springs Park Association	L. Glasscock	--	18	210	Twi	--	16.9	do	N	N	Dug well in rock bottom. Abandoned. Temp. 59°F.
* 705	John E. Coopwood	--	1870	47	33	Twi	--	39.5 46.8	June 11, 1946 Jan. 9, 1964	J,E	D,S	Dug well curbed with rock. Temp. 73°F.
* 706	Alton Gomilion	A. Gomilion	1946	26	30	Twi	--	13.2 22.5	June 11, 1946 Jan. 9, 1964	N	S	Dug well curbed with concrete rings to 23 ft. Temp. 73°F.
* 707	Joe Cheatham	Lockhart Welding Service	1963	150	4	Twi	--	44	May 1963	J,E	D	Cased to 84 ft, slotted from 75 to 84 ft. 1/
802	A. P. Yates well 1	John C. Robbins	1951	2,101	--	--	--	--	--	--	--	Oil test. 2/
67-02-301	-- Becker well 1	Carolina Western Oil Co.	1938	704	--	--	605?	--	--	--	--	Oil test.
502	J. A. Pfeiffer	--	1925	14	42	Ql	--	10.9 11.0	Oct. 24, 1963 Nov. 5, 1964	Cf	Irr	Dug well curbed with rock to 5 ft. Portable pump reported to discharge about 500 gpm, has irrigated about 100 acres. 3/
* 503	Herbert Seeliger	--	--	29	42	Ql	--	16.8 26.3	June 13, 1946 Oct. 24, 1963	J,E	D,S	Dug well curbed to 12 ft. Temp. 72°F.
504	C. B. Pfeiffer	--	--	27	36	Ql	--	23.0	Nov. 5, 1963	N	D	Dug well curbed with brick to 8 ft. Reportedly pumped 3-inch stream on test. Old well.
505	do	--	--	15	36	Ql	--	14.8	do	N	S	Dug well curbed with rock to 6 ft. Reportedly pumped 3-inch stream on test. Old well.
506	do	--	--	16	30	Ql	--	12.6 13.0	Nov. 5, 1963 Dec. 30, 1963	N	S	Dug well curbed with brick to 6 ft. Reported to flow after long wet seasons. Has irrigated 10 acres from this well. Old well.
* 507	Mrs. R. C. Rose	--	1914	21	36	Ql	--	8.5 17.3 17.4	June 12, 1946 Nov. 5, 1963 Dec. 30, 1963	C,E	D,S	Dug well curbed with brick. In 1925, in conjunction with 2 nearby wells, irrigated 20 acres. Temp. 70°F.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-02-508	C. B. Pfeiffer well 1	Joe Bender and S. B. Barnes	1949	2,860	--	--	--	--	--	--	--	Oil test. 2/
* 601	J. A. Pfeiffer	--	1910?	19	42	Ql	--	8.7 15.9	June 12, 1946 Oct. 24, 1963	C,E	D,S	Dug well curbed with rock to 5 ft. Temp. 71°F. 3/
* 602	Alvin Simon	--	1921	21	44	Ql	--	7.5 16.9	June 12, 1946 Oct. 24, 1963	J,E	D,S	Dug well. Used as a cistern when water level declines below base of Leona Formation at 17 ft. Temp. 72°F.
* 603	Mrs. W. C. Blanks	--	1920	35	42	Ql	--	22.4 31.5	June 13, 1946 Nov. 4, 1963	N	N	Dug well curbed with rock to 6 ft. Temp. 73°F.
604	Milton Pfeiffer	--	1955	20	60	Ql	--	13.8	Nov. 5, 1963	N	Irr	Dug well curbed with concrete blocks to 6 ft. When needed is reportedly pumped with portable equipment.
605	Walter Seeliger	--	--	26	42	Ql	--	23.5	do	N	D,S	Dug well curbed with concrete to 6 ft. 3/
606	Milton Pfeiffer	--	1925	15	34, 60	Ql	--	13.6	do	N	N	Dug well curbed with brick to bottom.
607	do	--	--	Spring	--	Ql	--	+	--	Flows	S	Earthen reservoir filled with seeps; estimated flow 5 gpm on Nov. 5, 1963.
608	Mrs. W. C. Blanks	--	--	36	36	Ql	--	29.0	Nov. 5, 1963	B,H	D,S	Dug well curbed with rock to 6 ft.
609	Texas Highway Department	--	--	26	30	Ql	--	15.4 15.6 15.7 15.9	Nov. 19, 1963 Dec. 30, 1963 Apr. 24, 1964 June 20, 1964	N	N	Dug well in highway right-of-way. Old well.
610	Carl Dobie	--	--	20	30	Kn	--	14.2	Dec. 30, 1963	N	D,S	Dug well curbed with concrete rings. Located in Plum Creek bottoms. Reportedly did not fail in 1925 drought, used when creek and earth tanks go dry. Old well.
611	Uhland Catholic Church	--	--	13	30	Ql	--	6.8	Feb. 20, 1964	J,E	D	Dug well curbed with concrete rings.
701	Jack Wiede	--	--	27	42	Qal	--	22.4	Nov. 7, 1963	J,E	D,S	Dug well curbed with brick to 6 ft. Reported used for irrigation in 1925. Old well.
* 704	T. G. Langham	--	1916	31	69	Qal	--	12.7 18.8	Mar. 28, 1946 Nov. 7, 1963	J,E	D,S	Dug well curbed with brick. Reported supply limited during 1955-56 drought. Temp. 70°F.
* 705	C. C. Fehlis	C. C. Fehlis	1895	22	45	Qal	--	11.3 17.2	Mar. 28, 1946 Nov. 7, 1963	J,E	D,S	Dug well curbed with concrete to 13 ft. Temp. 69°F.
* 706	J. T. Ellis	R. S. Reed	1896	25	42	Qal	--	18.3	Mar. 28, 1946	J,E	D,S	Dug well curbed with brick to 6 ft. Reported to have irrigated 30 acres in 1925. Temp. 66°F.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-02-801	Best Bros.	--	1916	22	148, 60	Ql	--	12.4 18.6 19.7 19.9	Feb. 24, 1946 Oct. 24, 1963 Mar. 2, 1964 Apr. 24, 1964	Cf,E 15	P	Dug well curbed with brick and concrete. Supplies water for about 100 connections in Maxwell. Supply weakened in 1955-56. Temp. 67°F.
802	L. H. Meyer	--	1956	26	42	Ql	--	18.7 19.1 19.5 20.0	Nov. 19, 1963 Dec. 30, 1963 Mar. 2, 1964 June 20, 1964	J,E	D,S	Dug well curbed with concrete blocks to 5 ft.
803	O. F. Wiede	--	--	26	42	Ql	--	23.1	Nov. 5, 1963	N	N	Dug well curbed with brick to 9 ft. Old well. 3/
901	Henry Pfeiffer	--	1925	27	30	Ql	--	20.7 21.8 22.6 23.0	Oct. 24, 1963 Dec. 30, 1963 Mar. 5, 1964 Apr. 24, 1964	N	Irr	Dug well curbed with concrete rings. Portable pump used to irrigate 30 acres in 1963.
* 902	G. N. Martindale	--	--	25	48	Ql?	--	16.3	Mar. 28, 1946	J,E	D,S	Dug well curbed with brick to 15 ft. Temp. 69°F. 3/
903	Tom Connolly	--	1963	12	40x 200 ft	Ql	--	6	Nov. 1963	Cf,B	Irr	Pit dug with bulldozer. Test pumped 1,800 gpm for about 36 hours then required 12 hours to refill. Located near Clear Fork Creek.
904	Henry Pfeiffer	--	1956	28	60	Ql	--	22.0	Nov. 5, 1963	N	Irr	Dug well curbed with concrete blocks. Portable pump used to irrigate 20 acres in 1962.
* 905	E. E. Fehlis	--	--	24	40	Ql	--	4.3 10.6 12.4 12.9	Mar. 29, 1946 Nov. 4, 1963 Apr. 24, 1964 June 20, 1964	C,E	D,S	Dug well curbed with brick. Nearby well supplied water to irrigate 70 acres in 1925. Old well. Temp. 69°F.
906	Tom Connolly	--	1937	15	36, 48	Ql	--	10.3 11.1	Nov. 8, 1963 Apr. 24, 1964	B,H	D	Dug well curbed with brick to 6 ft.
907	H. Schulle	--	--	15	42	Ql	--	8.7 5.3 4.7	Nov. 8, 1963 Mar. 2, 1964 June 20, 1964	B,H	D	Dug well curbed with rock. Old well.
* 03-301	Pat S. King	--	--	20	42	Twi	--	3.1 10.8	June 11, 1946 Jan. 9, 1964	J,E	S	Dug well curbed with brick. Old well.
302	do	--	--	41	4	Twi	--	11.4	Jan. 9, 1964	N	S	Not used at present.
* 303	do	--	--	67	42	Twi	--	46.7 47.9	June 11, 1946 Jan. 9, 1964	C,W	S	Dug well curbed with rock. Old well. Temp. 75°F.
* 304	Ben Forister	--	1941	72	33	Twi	--	60.0	Feb. 27, 1946	J,E	D,S	Dug well curbed with concrete. Temp. 71°F.
305	Felipe Moreno well 1	Lost Mule Oil Co. and Preston & Howard Laws	1948	1,855	--	--	--	--	--	--	--	Oil test. 2/

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date com-plet-ed	Depth of well (ft)	Diam-eter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-03-306	Pat King well 1	Rand-Morgan	1954	1,954	--	--	756	--	--	--	--	Oil test. 2/
* 401	A. J. Balser	--	--	14	36	Ql	--	4.8 9.7	June 12, 1946 Nov. 5, 1963	J,E	D,S	Dug well curbed with rock to 6 ft. Old well.
* 402	Bruno Schneider	--	--	30	42	Ql?	--	8.5 13.5	June 12, 1946 Nov. 5, 1963	B,H	D,S	Dug well curbed with rock to 29 ft. Temp. 71°F.
* 403	W. C. Blanks well 1	W. Dietz	1956	1,655	--	Ke?	560	--	--	--	--	Oil test. 2/
501	J. C. Taylor well 1	Woodward & Co.	1956	4,240	--	--	500	--	--	--	--	Do.
* 601	C. C. Chapman	--	--	49	30	Twi	--	44.5	Apr. 12, 1946	J,E	D,S	Dug well curbed with brick to 20 ft. Temp. 71°F.
* 602	J. C. Taylor	--	--	35	36	Twi	--	29.6 25.3	June 11, 1946 Jan. 8, 1964	N	N	Dug well. Now uses surface water. Temp. 73°F.
* 603	James Cardwell	--	1925	28	42	Twi	--	21.4 21.4	June 11, 1946 Jan. 8, 1964	J,E	D,S	Dug well curbed with brick.
701	Bruce Bowers	--	1961	40	12x 20 ft	Ql	--	22	Feb. 1962	N	N	Dug well. Irrigated 35 acres in 1961. Well caved in, plans to fill hole. Reported discharge 450 gpm.
702	T. E. Clark	--	1956	32	72	Ql	--	16 19.5	Feb. 1962 Oct. 24, 1963	Cf,E, 10	Irr	Dug well curbed with brick to bottom. Irrigated 40 acres in 1962 and 1963, and 70 acres in 1961. Reported discharge 450 gpm.
* 703	Edwin Ahlhardt	--	--	25	30	Ql	--	22.9 23.5	Jan. 24, 1946 Oct. 24, 1963	C,W	D,S	Dug well cased with culvert pipe. Temp. 67°F. 3/
* 704	Ed Starke well 1	John R. Black	1940	3,367	--	--	577	--	--	--	--	Oil test. 2/
* 705	A. W. Jolley Estate	--	1896	23	--	Ql	566	14.6	Jan. 25, 1946	J,E	D,S	Dug well curbed with brick. Temp. 71°F. 3/
* 706	E. H. Strandtman	--	--	23	44	Ql	554	17.0	Nov. 6, 1963	C,W	D,S	Dug well curbed with brick to 6 ft. Old well. Temp. 72°F. 3/
* 707	Bruce Bowers	--	--	23	36	Ql	577	16.0 16.5 19.6 20.3	May 8, 1943 Jan. 24, 1946 Nov. 4, 1963 Apr. 24, 1964	C,W	D,S	Dug well curbed with rock to 3 ft. Temp. 71°F.
* 708	do	--	--	16	37	Ql	571	11.9	Jan. 24, 1946	B,H	D	Dug well. Temp. 66°F.
* 709	Mrs. Lawrence Horn	--	--	17	42	Ql	579	14.5	do	N	N	Dug well curbed with rock. Temp. 71°F. 3/
710	do	--	1956	22	42	Ql	579	16.4 17.0 18.2	Nov. 4, 1963 Mar. 2, 1964 Apr. 24, 1964	B,H	D,S	Dug well curbed with brick to 6 ft.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-03-711	A. B. Schaeffer	--	1880	31	44	Ql	587	25.8 26.0 26.9	Jan. 24, 1946 May 8, 1946 Nov. 5, 1963	J,E	D,S	Dug well curbed with brick to 29 ft. Temp. 70°F.
* 712	Carl Walker	--	--	22	36	Ql	573	15.6 15.9 18.9	May 8, 1943 Jan. 24, 1946 Nov. 5, 1963	C,W	D,S	Dug well curbed with rock to 15 ft. Temp. 67°F.
* 713	Emil Wilms	--	--	17	36	Ql	558	10.8 8.8 15.0	May 7, 1943 Jan. 24, 1946 Nov. 6, 1963	C,E	D,S	Dug well curbed with brick to 7 ft. Temp. 70°F.
714	do	--	1955	37	34	Ql?	556	13.4	Nov. 6, 1963	J,E	D,S	Dug well curbed with brick from 0 to 6 ft, and 14 to 37 ft.
* 715	Oak Valley Ranch	--	1850	12	60	Ql	--	5.4 8.1 8.0 7.9	Mar. 28, 1946 Nov. 6, 1963 Dec. 30, 1963 Mar. 2, 1964	B,H	D,S	Dug well curbed with brick to 7 ft. Temp. 64°F.
716	do	--	--	--	42	Ql	--	8.1	Nov. 6, 1963	C,E	D,S	Dug well curbed with brick.
* 717	C. Barrier	--	--	25	38	Ql	555	16.1 15.2 17.7	May 8, 1943 Jan. 25, 1946 Nov. 6, 1963	C,W, Cf,E	D,S, Irr	Dug well curbed with brick. Reported irrigates about an acre of peppers. Old well. Temp. 66°F.
* 718	Mrs. G. J. Merritt	--	--	21	29	Ql	560	13.4 13.0 16.2	May 8, 1943 Jan. 24, 1946 Nov. 6, 1963	J,E	D	Dug well curbed with brick to 15 ft. Temp. 71°F.
* 719	A. W. Jolley	--	--	21	44	Ql	566	14.6 14.5 18.3	May 8, 1943 Jan. 25, 1946 Nov. 6, 1963	C,W	D,S	Dug well curbed with brick. Temp. 69°F.
* 720	Tom Connolly	--	--	25	30	Ql	560	16.4 15.9 18.6	May 8, 1943 Jan. 25, 1946 Nov. 6, 1963	J,E	D,S	Dug well curbed with brick to 22 ft. Temp. 71°F.
* 721	A. W. Livengood	--	--	28	24	Ql	564	25.0 21.1 22.5 22.8	May 8, 1943 Jan. 25, 1946 Nov. 6, 1963 June 20, 1963	J,E	D,S	Dug well curbed with rock. Temp. 71°F.
* 722	C. C. Chapman	--	--	15	40	Ql	553	8.0 7.1 9.4	May 8, 1943 Jan. 24, 1946 Nov. 6, 1963	B,H	D,S	Dug well cased with culvert pipe. Temp. 68°F.
* 723	W. Barrier	--	--	21	100	Ql	556	17.0 15.5	May 8, 1943 Jan. 25, 1946	Cf,G	N	Dug well curbed with concrete. Abandoned. Temp. 62°F.
* 801	City of Lockhart well 1	--	1905	15?	30x 75 ft	Ql	504	7.9 8.9 3.4	June 8, 1943 Mar. 1, 1946 Apr. 3, 1964	Cf,E, 30	P	Dug pit for collection basin. Water from original piped to this basin. Temp. 68°F.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date com-pleted	Depth of well (ft)	Diam-eter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-03-802	City of Lockhart well 2	--	1914	25	25x 75 ft	Ql	530	6.7	Apr. 3, 1964	Cf,E, 30	P	Dug pit for collection basin. Temp. 63°F. 3/
* 803	City of Lockhart well 3	--	1938	15	23x 93 ft	Ql	521	4.0 4.8	May 8, 1943 Feb. 8, 1946	Cf,E, 20	P	Dug pit for collection basin. Temp. 67°F.
804	City of Lockhart well 4	--	1948	25	30x 200 ft	Ql	--	7.0	Apr. 3, 1964	T,E, 20	P	Dug pit for collection basin.
* 805	W. W. Cardwell	--	--	21	36	Ql	537	13.0	Jan. 29, 1946	C,W	S	Dug well curbed with brick to 8 ft. Temp. 65°F. 3/
* 806	W. H. Barsh	--	--	29	38	Ql	546	23.0	do	N	S	Dug well curbed with brick to 8 ft. Temp. 70°F. 3/
* 807	Cardwell Estate	--	--	24	30	Ql	562	15.0 14.0 18.4	May 7, 1943 Jan. 24, 1946 Nov. 6, 1963	N	S	Dug well curbed with brick to 11 ft. Temp. 68°F.
* 808	W. W. Cardwell, Jr.	--	--	18	24	Ql	564	11.8 14.1 15.9	May 7, 1943 Jan. 29, 1946 Nov. 6, 1963	C,W	S	Dug well curbed with brick to bottom. Temp. 68°F.
* 809	--	--	--	28	36	Ql	542	20.3 16.5 20.4	May 7, 1943 Jan. 29, 1946 Nov. 6, 1963	Cf,E	D,S	Dug well curbed with brick to 8 ft. Temp. 72°F.
* 810	Jessie Cardwell	--	--	30	42	Ql	552	18.2 17.5 20.9	May 8, 1943 Jan. 24, 1946 Nov. 6, 1963	C,H	S	Dug well. Temp. 64°F.
* 811	Wiley Kelly	--	--	35	39	Ql	554	28.3 25.9 30.6	May 8, 1943 Jan. 25, 1946 Nov. 6, 1963	J,E	D,S	Dug well. Temp. 68°F.
812	Woody McCrary	--	--	15	42	Ql	--	12.8	Apr. 3, 1964	Cf,E	Irr	Dug well with tunnel to 4 by 10 ft collection pit. Irrigates about 5 acres.
04-101	Clyde Beaty well 8	Millsap Oil & Gas Co.	--	1,300	--	--	--	--	--	--	--	Oil test. 2/
102	M. L. Brewer, et al. well 28	Gulf Oil Corp.	1950	1,172	--	--	--	--	--	--	--	Do.
201	W. C. Franks	--	1940	78	6	Twi	--	54.6	Jan. 6, 1964	B,H	D,S	
* 202	--	--	--	27	24, 36	Twi	--	19.3 21.8	Aug. 7, 1946 Jan. 6, 1964	B,H	D	Dug well curbed with brick. Old well.
203	G. Mackey well 1	Sam Maceo Oil Operations	1949	3,815	--	--	510	--	--	--	--	Oil test. 2/
* 401	W. M. Riddle	Jess Alexander	1902	129	6	Twi	--	95.1	Apr. 12, 1946	N	S	Reported not used since 1952. Temp. 73°F. 3/

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-04-402	R. B. Fowler well 1	Stan-Bond Oil Co.	1954	1,728	--	--	530	--	--	--	--	Oil test. 2/
403	T. H. Brown well 1	Overton Refining Co., Inc.	1949	2,102	--	--	500	--	--	--	--	Do.
* 501	Isaac Cheatham	Mathew Bartsch	1953	120	7	Twi	--	60	July 1953	J,E, 1	D,S	Cased to 110 ft. Temp. 72°F.
* 502	Alton Osteen	Alton Osteen	1927	110	7	Twi	--	71.6	Feb. 27, 1946	C,E	D,S	Cased to 6 ft. Supplies water for 4 families.
* 503	M. R. Riddle	Alexander and Harris	1926	82	6	Twi	--	58.2	Apr. 12, 1946	C,W	D,S	Supplies water for several families. 3/
* 504	J. S. Hellums	--	--	150	6	Twi	--	--	--	C,W	D,S	Old well.
505	do	--	1958	91	10	Twi	--	46.0	Jan. 6, 1964	N	S	Oil test converted to water well. Cased to 10 ft.
* 506	William McClellan	Leland Riddle	1945	97	7	Twi	--	62 68.7	Mar. 1945 Jan. 6, 1964	J,E	D	Cased to 18 ft.
507	L. A. Chambliss	Lockhart Welding Service	1963	230	4	Twi	--	79.0	Jan. 7, 1964	T,E	D,S	Cased to 160 ft; slotted from 140 to 160 ft. Reported pumping level 140 ft after discharging 30 gpm for 4 hours. 1/
508	W. C. Mercer	do	1963	160	4	Twi	--	62.1	Jan. 9, 1964	J,E	D,S	Cased to bottom; slotted from 140 ft to bottom. Reported pumping level 140 ft after discharging 20 gpm for 2 hours. 1/
509	D. L. Jackson	do	1963	120	4	Twi	--	65	Aug. 1963	J,E	S	Cased to bottom; slotted from 100 ft to bottom. Reported pumping level 70 ft after discharging 20 gpm for 1 hour.
* 601	J. L. Lovell	J. Hidgtom	1934	185	6	Twi	--	--	--	C,E	D,S	
* 602	W. E. Dinges	E. Dannelly	1927	174	6	Twi	--	100.1	Jan. 6, 1964	C,E	D,S	Cased to bottom.
603	Grady Cast	J. T. Hall	1963	500	10	Twi	--	38.4	Feb. 3, 1964	N	Irr	Cased to 200 ft, all slotted. Pump not installed. Reported discharge about 600 gpm. 1/
604	Roy Stacy well 1	Walker and Huntzinger	1951	2,312	--	--	480	--	--	--	--	Oil test. 2/
* 701	S. Johnson	E. Dannelly	--	94	6	Twi	--	69.9	Apr. 4, 1947	N	S	Cased to bottom. 3/
702	W. E. Schuelke, Jr.	--	1946	80	4	Twi	--	59.0 59.7 60.1 59.5	Apr. 4, 1947 Sept.30, 1952 Feb. 17, 1953 May 7, 1963	N	N	Cased to bottom; slotted from 60 ft to bottom. Abandoned.
703	City of Lockhart test well 4-A	Layne-Texas Co.	1952	162	--	--	518	--	--	--	--	Test well for water.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-04-704	Mike Terry	--	--	123	4	Twi	--	78.5	Jan. 7, 1964	T,E, 1/4	D,S	
705	do	--	--	125?	4	Twi	--	73.6	do	N	N	
706	E. L. Witter	-- Perryman	1950	66	4	Twi	--	34.2	do	J,E	D,S	Cased to 63 ft.
707	C. L. Witter	--	1962	48	5	Twi	--	36.1	do	C,W	S	
708	Preston Riddle	Davenport Irrigation Equipment Co.	1964	350	4	Twi	--	16.3	Mar. 2, 1964	T,E, 3	Irr	Cased to 210 ft; slotted from 38-41, 68-81, 194-200, and 204-209 ft. Reported test pumped 50 gpm with 134 ft drawdown. 1/
* 709	do	--	1951	136	4	Twi	--	35.0	do	C,W	S	Cased to bottom.
* 710	City of Lockhart test well 3	Layne-Texas Co.	1952	445	--	--	420	--	--	--	--	Test well for water. 1/
711	Ralph J. Branyon well 1	Gordon Reid	1954	2,275	--	--	490	--	--	--	--	Oil test. 2/
* 801	R. M. Medlen	-- Owens	1931	206	7, 4	Twi	--	31.6	Nov. 19, 1963	C,W	D	Cased to bottom.
802	J. J. Brown well 1	B. A. Newman	1954	2,110	--	--	450	--	--	--	--	Oil test. 2/
* 901	Loy Taylor	E. Dannelly	1912	371	5	Twi	--	140.6	Apr. 17, 1946	C,W,E	D,S	Cased to bottom. Supplies water for 4 surrounding houses. Temp. 71°F. 3/
* 902	Dan T. Lockey	--	1930	216	6	Twi	--	120.5	do	N	S	Temp. 77°F. 3/
903	Joe B. Tate well 1	Travis Drillers, Inc.	1956	3,177	--	--	500	--	--	--	--	Oil test. 2/
904	J. A. Baker	Lockhart Welding Service	1963	270	4	Twi	--	106.1 106.4 106.3	Jan. 6, 1964 Feb. 20, 1964 June 24, 1964	T,E, 1	Irr	Cased to 247 ft; slotted from 230 to 250 ft. Reported pumping level 135 ft while pumping 20 gpm. 1/
* 905	do	--	--	200	4	Twi	--	--	--	C,E	D,S	Cased to bottom. Old well.
* 906	Lester Taylor	Lockhart Welding Service	1963	295	4	Twi	--	168	July 1963	T,E	D,S	Cased to 288 ft; slotted from 267 to 288 ft. Reported pumping level 280 ft after pumping 20 gpm for 3 hours.
907	Miers well 2	Riddle Oil Co.	1949	2,463	--	--	500	--	--	--	--	Oil test. 2/
* 05-402	J. R. Pearson	J. Hidgtom	1934	200	6	Twi	--	134.9	Jan. 9, 1964	C,W	D,S	Cased to bottom.
* 701	E. M. Hutcheson	E. Dannelly	1924	165	6	Twi	--	108.0	do	C,W	N	Cased to bottom. Unused.
* 702	Louis Voigt	do	1927	350	6	Twi	--	105.3	Feb. 4, 1964	C,E	D,S	
* 703	F. G. Bell	Lockhart Welding Service	1963	160	4	Twi	--	60	May 1963	J,E	D,S	Cased to bottom; slotted from 120 ft to bottom. 1/

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-05-704	M. C. Corbell well 1	J. D. Hancock Oils, Ltd.	1957	3,214	--	--	550	--	--	--	--	Oil test. 2/
* 801	H. B. Voight	--	--	27	30	Tc	--	16.9 15.8	Jan. 14, 1964 June 24, 1964	J,E	D	Dug well curbed with brick. Old well.
* 802	do	Mathew Bartsch	1956	419	4	Twi	--	85	1956	J,E	S	Cased to bottom; slotted from 393 ft to bottom.
09-303	A. A. Harper	--	--	Spring	--	Qal	--	+	--	Flows	N	Spring in creek bed near San Marcos River. Estimated flow 150 gpm on July 3, 1946 and 25 gpm on Nov. 7, 1963.
304	do	--	--	35	30	Qal	--	28.4 29.0 29.6 28.6	Nov. 7, 1963 Dec. 30, 1963 Apr. 24, 1964 June 20, 1964	N	D	Dug well curbed with brick.
305	do	--	1956	35	30	Qal	--	28.4	Nov. 7, 1963	J,E	D,S	Dug well curbed with concrete rings.
* 10-101	T. B. Martin	--	1924	33	36, 60	Qal	--	16.5 19.1	Apr. 8, 1946 Mar. 3, 1964	Cf,E	P	Dug well curbed with concrete on bank of San Marcos River. Standby well.
102	do	--	1955	45	60	Qal	--	26	1955	T,E, 5	P	Dug well on bank of San Marcos River. Supplies water for 130 connections in Martindale.
* 103	Mrs. Ed Kasch	--	--	29	36	Qal	--	13.5 17.1	June 13, 1946 Nov. 7, 1963	J,E	D,S	Dug well curbed with brick to 10 ft. Supplies water for several families at headquarters.
104	Memory Lawn Memorial Park, Inc.	--	1963	23	30	Qal	--	20.8 20.9 21.0 20.6	Nov. 8, 1963 Dec. 30, 1963 Apr. 24, 1964 June 20, 1964	J,E	Irr	Dug well curbed with concrete rings. Irrigates about 2-acre lawn.
105	D. R. Bagley	--	--	33	96	Qal	--	25.9 25.9	Nov. 7, 1963 Dec. 30, 1963	Cf,B	Irr	Dug well curbed with brick. Irrigates about 5 acres. Reported discharge 300 gpm. Old well.
106	T. D. Bagley	--	--	35?	--	Qal	--	--	--	Cf,E	Irr	Dug well. Irrigates about 2 acres. Old well.
107	W. W. Bagley & Sons	--	1938	35?	--	Qal	--	--	--	Cf,E	Irr	Dug well. Irrigates about 2 acres.
108	Robert Harper	--	1925	34	120	Qal	--	28.9 28.9 28.9 29.0	Nov. 8, 1963 Dec. 30, 1963 Mar. 2, 1964 Apr. 24, 1964	T,E, 15	Irr	Dug well. Irrigates about 40 acres from 2 wells.
109	do	--	--	33	60	Qal	--	28.0 28.2 28.5 28.7	Nov. 8, 1963 Dec. 30, 1963 Mar. 2, 1964 June 20, 1964	T,E, 15	Irr	Dug well curbed with concrete blocks.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-10-110	Garden of the Cross Cemetery	--	1964	27	30	Qal	--	24.2 24.0	Mar. 2, 1964 June 20, 1964	J,E	Irr	Dug well curbed with concrete rings.
* 201	O. M. Hoffman	--	1925	25	69	Qal?	--	8.2 11.5	Feb. 14, 1946 Nov. 7, 1963	C,E	D,S	Dug well curbed with brick and concrete to bottom. Formerly supplied water for part of the town of Maxwell. Reported discharge 400 gpm. Temp. 68°F.
* 202	T. G. Langham	--	--	34	48	Qal	--	14.5 20.4	Apr. 9, 1946 Nov. 7, 1963	N	Irr	Dug well. Reported discharge 750 gpm. Reported irrigated 100 acres in 1946.
* 203	Herbert Conrad	--	--	30	96	Qal	--	9.4 9.0 7.3 7.4	Nov. 13, 1963 Dec. 30, 1963 Mar. 2, 1964 June 20, 1964	Cf,G, 50	D,S, Irr	Dug well curbed with rock. Reported 10 ft drawdown after pumping 500 gpm for 10 hours. Irrigates about 35 acres. Old well.
* 301	C. N. Martindale, Jr.	--	--	--	--	Qal	--	--	--	J,E	S	No flow in 1964, but water stands in pit near ground level. Formerly supplied plantation headquarters. Known as Barber Springs. Temp. 69°F.
* 501	W. R. Krunk	--	--	35	36	Qal	--	32.3	Nov. 12, 1963	J,E	D,S	Dug well curbed with brick to 5 ft. Old well.
* 502	R. C. Hill	--	--	21	42	Qal	--	17.3	do	J,E	D,S	Dug well curbed with concrete and brick.
503	--	--	--	18	36	Qal	--	12.5	do	J,E	S	Dug well curbed with brick.
* 504	M. G. White	--	--	24	40	Qal?	--	21.7 19.5 20.7 20.4	Apr. 8, 1946 Nov. 12, 1963 Dec. 30, 1963 Mar. 2, 1964	C,W	N	Do.
601	P. C. Chaudoin	J. W. McWilliams	1920	630	3	Tm or Kn	--	68.7	Nov. 13, 1963	N	N	Cased to 450 ft. Reported water too mineralized for domestic use but stock drank it; discharged about 200 gpd for 5 years until community water supply became available. Abandoned.
* 801	Staples Farmers Co-op	--	1959	34	36	Qal	--	22.4	Nov. 12, 1963	T,E, 10	P	Dug well curbed with concrete rings to bottom. Reported discharge 200 gpm. Temp. 70°F.
* 802	T. E. Hightower	--	1924	30	72	Qal	--	22.2 23.6	Apr. 8, 1946 Nov. 12, 1963	J,E	D,S	Dug well curbed to bottom with brick. Irrigated 25 acres in 1925. 3/
803	Staples Farmers Co-op	--	1931	17	72	Qal	--	14.2	Nov. 13, 1963	N	P	Dug well curbed with boiler shell. Used by Staples until 1959.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-10-901	Tri-Community Water Supply Corp.	--	--	27	72	Qal	--	24.3 23.4	Feb. 25, 1946 Nov. 13, 1963	N	N	Dug well curbed to bottom with concrete. Wells BU-67-10-901, 67-10-903, and 67-10-904 supply part of public supply for Fentress, Prairie Lea, Stairtown, and a large rural area until surface water became available in November 1963. Temp. 70°F.
903	do	--	--	27	84, 42	Qal	--	23.3	Nov. 13, 1963	Cf,E	N	Dug well curbed to bottom with concrete.
904	do	--	--	28	84, 42	Qal	--	22.4	do	Cf,E	N	Do.
905	Joe Rochill	Lockhart Welding Service	1963	60	4	Qal	--	18	Aug. 1963	J,E	D,S	Cased to 40 ft; slotted from 20 to 40 ft. 1/
906	Joe Waller	--	1952	30	30	Qal	--	24.8 24.9	Nov. 13, 1963 Dec. 30, 1963	N	S	Dug well curbed with concrete rings. Not used since 1955.
* 907	Caldwell County	--	1938	18	30	Tm	--	3.8 11.2	Apr. 3, 1946 Nov. 13, 1963	N	N	Dug well curbed with tile. Temp. 70°F.
* 908	W. E. Langley	--	1937	30	32, 36	Twi	--	12.2 18.1	Apr. 3, 1946 Nov. 13, 1963	C,H	S	Dug well curbed to bottom with brick.
* 11-101	G. A. Borchert	--	1913	20	30	Ql	--	15.6 18.0	Apr. 19, 1946 Nov. 6, 1963	J,E	D,S	Dug well curbed with brick to 10 ft. Temp. 69°F.
102	--	--	--	32	42	Twi	--	30.5	Nov. 13, 1963	C,W	S	Dug well curbed with rock to 6 ft. Temp. 61°F.
103	--	--	--	77	44	Twi	--	70.1	Nov. 15, 1963	J,E	S	Dug well curbed with brick to 2 ft.
* 104	F. M. Thomson	--	--	Spring	--	Ql	--	+	--	Flows	D,S	Spring in bank of Clear Fork Creek. Curbed and pumped to elevated tank. Temp. 68°F.
* 105	Bill Lamb	--	--	Spring	--	Ql	--	+	--	Flows	S	Several springs in bed and banks of Boggy Creek. Estimated flow 300 gpm on Jan. 30, 1946, and 20 gpm on Jan. 24, 1964.
106	--	--	--	88	5	Ql and Twi	--	13.7	Jan. 24, 1964	C,W	S	Old well.
201	Mrs. A. D. Mebane well 1	Lincoln Petroleum Co.	1938	1,980	--	--	--	--	--	--	--	Oil test. 2/
* 202	Lockhart State Park	--	1937	28	72	Ql	--	2.2 6.0	Apr. 19, 1946 Mar. 3, 1964	N	N	Dug well. Supplied water for park until city water became available. Temp. 68°F.
* 203	L. M. Harrison	--	--	74	43	Ql and Twi	--	34.8 34.5	Mar. 20, 1946 Mar. 3, 1964	C,W	S	Dug well curbed with brick and rock. Temp. 67°F.
* 204	Fred J. Adams	--	--	29	35	Ql	--	21.4 21.1	Mar. 20, 1946 Mar. 3, 1964	J,E	S	Dug well. Temp. 69°F.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date com-plet-ed	Depth of well (ft)	Diam-eter of well (in.)	Water-bearing unit	Altitude of land surface	Water level		Method of lift	Use of water	Remarks
								Below land surface datum (ft)	Date of measurement			
*BU-67-11-301	City of Lockhart test well 6	Layne-Texas Co.	1952	324	--	--	475?	4.2	Aug. 7, 1952	--	--	Water test well.
302	City of Lockhart test well 2	do	1952	404	--	--	518?	--	--	--	--	Water test well. 1/
303	City of Lockhart test well 1	do	1952	445	--	--	518?	--	--	--	--	Water test well.
304	Merrill Copeland	--	--	200?	--	Twi	--	--	--	J,E	D,S	
305	Elmo Krueger	--	1860?	58	42	Ql and Twi	--	37.4	Feb. 7, 1964	J,E	D,S	Dug well curbed with concrete to 22 ft.
* 306	J. D. Lay	J. T. Hall	1963	138	4	Twi	--	--	--	J,E	D,S	
* 307	Mrs. Bernice Williams	--	1940?	73	5	Twi	--	37.9 43.4	Apr. 16, 1946 Mar. 3, 1964	C,W	D,S	Temp. 73°F.
* 308	-- Deaton	--	--	52	50	Ql	--	30.0 36.1	Apr. 16, 1946 Mar. 3, 1964	N	S	Dug well curbed with brick to 4 ft. Old well. Temp. 73°F.
* 309	James V. Cowan	Lockhart Welding Service	1959	100	4	Twi	495	51.3	Mar. 4, 1964	T,E	D,S	Cased to 60 ft; slotted from 48 to 60 ft.
* 310	do	--	1905	50	54	Ql and Twi	--	33.8 34.6	Jan. 30, 1946 Mar. 4, 1964	J,E	D,S	Dug well curbed with rock to 5 ft. Temp. 68°F.
* 311	do	Lockhart Welding Service	1959	110	4	Twi	460	26.2	Apr. 2, 1964	T,E	D,S	Cased to 60 ft; slotted from 40 to 60 ft.
* 312	do	-- Patton	--	2,500?	10	Twi(?)	440	+ +	Jan. 30, 1946 Mar. 4, 1964	Flows	S	Reported flow 2 gpm in 1946 and 1964. Water probably from Wilcox Group. Temp. 72°F.
401	Mrs. K. M. Thompson well 1	Sutton Production Co.	1959	4,006	--	--	574	--	--	--	--	Oil test. 2/
* 501	Vernon Blackwell	--	--	168	6	Twi	--	80.4	Mar. 20, 1946	C,W	S	3/
* 502	W. P. Morgan	--	--	94	6	Twi	--	51.8	do	N	S	Not used since 1961. 3/
503	do	Lockhart Welding Service	1963	150	5	Twi	--	55.1 55.5 55.3	Oct. 31, 1963 Dec. 31, 1963 Mar. 3, 1964	T,E	S	Cased to 120 ft; slotted from 85 to 100 ft. 1/
504	S. H. Tabor	-- Perryman	1952	200	5	Twi	--	--	--	C,E	D,S	Cased to 60 ft.
505	do	-- Powell	1949	220	4	Twi	--	80	1949	C,E	D,S	Cased to 180 ft.
506	do	M. H. Hanson	1962	200	4	Twi	--	60	1962	C,E	S	
507	do	--	--	140	4	Twi	--	74.6	Nov. 15, 1963	N	S	Located 7 ft north of Well BU-67-11-506.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-11-508	City of Lockhart test well 8	Layne-Texas Co.	1952	264	--	--	518?	--	--	N	N	Water test well. 1/
* 601	J. S. Noel	-- Owens	1958	125	6	Twi	--	50	May 1958	J,E, 1	D,S	Cased to bottom. Reported water from sand from 50 to 60 ft.
602	Charles P. Ross well 15	Hoxey Oil Co.	1955	2,437	--	--	485?	--	--	--	--	Oil test. 2/
603	Charles P. Ross well 7	Petroleum Corp.	1955	2,353	--	--	490?	--	--	--	--	Do.
604	M. I. Davis well 6	Milbro Development Co.	1955	2,313	--	--	445?	--	--	--	--	Do.
605	M. I. Davis well 7	do	1955	2,325	--	--	445?	--	--	--	--	Do.
* 606	B. E. Noble	--	1920	150	4	Twi	475?	32.6	May 3, 1946	C,E	D,S	Temp. 72°F.
* 607	Alton Rector	--	1860	70	30	Twi	--	47.5 48.8	May 3, 1946 Dec. 4, 1963	B,H	D,S	Dug well steel curbing. Temp. 72°F.
* 608	do	J. Long	1911	86	6	Twi	--	48.5	Dec. 4, 1963	C,W	D,S	
609	Charles P. Ross well 9	Hoxey Oil Co.	1956	2,348	--	--	485?	--	--	--	--	Oil test. 2/
610	M. I. Davis well 1	Milbro Development Co.	1955	--	--	--	450?	--	--	--	--	Do.
611	J. M. Young well 7	Irving A. Shefts	1956	2,246	--	--	492	--	--	--	--	Do.
612	J. M. Young well 5	do	1956	2,243	--	--	493	--	--	--	--	Do.
613	M. I. Davis well 1	H. L. Dillon	1956	2,312	--	--	424	--	--	--	--	Do.
614	--	--	--	21	48	Ql	--	17.5 17.2	Mar. 3, 1964 June 24, 1964	C,W	S	Dug well curbed with concrete rings. Old well.
615	H. G. Pfeiffer well 1	Kilmarnock Oil Co.	1947	2,580	--	--	435?	--	--	--	--	Oil test. 2/
616	M. W. Callihan well 3-A	Joe W. Brown	1959	2,363	--	--	428	--	--	--	--	Do.
617	W. M. Callihan well 1-A	do	1959	2,315	--	--	433	--	--	--	--	Do.
* 618	--	--	--	35	30	Twi	--	29.1	Feb. 3, 1946	N	S	Dug well curbed with brick. Formerly supplied water for Burdett community. Old well.
* 701	John M. Rogers	--	--	30	36	Twi	--	14.8 18.0	Apr. 3, 1946 Nov. 13, 1963	C,W,E	D,S	Dug well curbed with brick.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-11-702	Warner Polk	--	1880	42	24	Twi	--	18.5 25.1	Apr. 3, 1946 Nov. 14, 1963	C,E	D,S	Dug well curbed with rock.
* 703	Claude Giden	--	1928	56	33	Twi	--	49.9 51.3	Apr. 3, 1946 Nov. 14, 1963	J,E	D,S	Dug well curbed with brick.
* 704	Mrs. Charles Clark	--	1908	65	28	Twi	--	55.8 56.7	Apr. 3, 1946 Nov. 14, 1963	J,E	S	Dug well curbed with rock.
* 705	Jack Thompson	--	--	130?	5	Twi	--	--	--	C,G	S	Temp. 72°F.
706	Lon Couser	--	--	65	24	Twi	--	51.5	Nov. 14, 1963	C,W	S	Dug well curbed with rock. Old well.
707	A. J. Gyger	--	--	150	3	Twi	--	--	--	C,E	D,S	Old well.
708	Mrs. H. Hersher	--	--	70	30	Twi	--	61.6	Nov. 14, 1963	J,E	D,S	Dug well curbed with brick and rock. Old well.
* 801	A. B. Etheridge	--	1925	14	36	Twi	--	5.8 14.3	Mar. 20, 1946 Nov. 14, 1963	N	S	Dug well curbed with brick. Temp. 64°F.
802	--	--	--	16	20	Twi	--	13.2	Nov. 14, 1963	C,W	S	Dug well curbed with rock. Old well.
803	BR Ranch	--	--	115	4	Twi	--	64.4	Nov. 15, 1963	C,E	S	
804	Daisey Hughes well 2	Ashley & Co.	1957	2,208	--	--	435	--	--	--	--	Oil test. 2/
805	F. L. Field well 1	H. J. Scibienski	1955	2,278	--	--	440	--	--	--	--	Do.
806	Ola Mae Dozier well 1	M. H. Hanson	1958	2,174	--	--	427	--	--	--	--	Do.
807	Tabor well 28	Magnolia Petroleum Corp. and United North & South Oil Co.	1948	3,020	--	--	437	--	--	--	--	Do.
808	S. Noble well 3	R. M. Jones	1959	2,096	--	--	411	--	--	--	--	Do.
809	Andrew J. Rodenberg well 3	Great National Oil Co.	1963	2,358	--	--	410?	--	--	--	--	Do.
810	N. Harris well 1	M. P. Wilson	1957	1,340?	--	--	415	--	--	--	--	Do.
811	B. E. Noble well 3	M. M. Kinley	1955	2,484	--	--	425	--	--	--	--	Do.
* 902	G. T. Brown	--	--	44	38	Twi	--	32.5	May 7, 1946	C,G	S	Dug well curbed to bottom with brick. Old well. Temp. 72°F.
903	George W. Nanney well 1	James W. Burke	1956	3,496	--	--	405	--	--	--	--	Oil test. 2/
904	S. M. Blackwell well 6	Sun Oil Co.	1959	2,397	--	--	477	--	--	--	--	Do.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-11-905	Thomas Wilson, Jr.	M. H. Hanson	1960	203	7	Twi	--	29.1	Dec. 18, 1963	T,E	S,Irr	Cased to 173 ft. Reported drawdown 30 ft while pumping 150 gpm. Irrigates 30 acres of pasture grass.
906	S. M. Blackwell well 1	Sun Oil Co.	1957	2,249	--	--	444	--	--	--	--	Oil test. 2/
907	W. M. Callahan well 1	Westmoreland & Wadsworth	1956	2,316	--	--	409	--	--	--	--	Do.
910	Abe Levine well 1	Subsurface Reserve Corp.	1956	2,291	--	--	375	--	--	--	--	Do.
911	G. T. Brown well 1	Falcon-Seaboard Oil Co.	1956	2,483	--	--	385	--	--	--	--	Do.
* 12-101	City of Lockhart well 1	Layne-Texas Co.	1952	240	18, 10	Twi	415	+ 5 + 4	Aug. 1952 1964	Flows T,E,15	P	Test well drilled to 368 ft, plugged back to 240 ft. Casing: 18-in. to 120 ft, 10-in. from 58 to 240 ft; screen from 128-158, 180-200, and 216-236 ft. Test on Apr. 13, 1964, drawdown 91 ft after pumping 170 gpm for 2 hours. Underreamed and gravel-walled. Temp. 72°F. 1/ 2/
* 102	City of Lockhart well 2	do	1952	283	18, 10	Twi	405	+ 13.4	Aug. 6, 1952	Flows	S	Test well drilled to 381 ft, plugged back to 283 ft. Casing: 18-in. to 100 ft, 10-in. to 282 ft; screen from 128-168, 188-198, and 258-278 ft. Reported drawdown about 175 ft after pumping 150 gpm for 24 hours. City has never used well. Underreamed and gravel-walled. Temp. 72°F. 2/
* 103	City of Lockhart well 5	do	1950	342	--	Twi	--	+ 3	Feb. 1952	N	N	Water test well. 2/
* 104	City of Lockhart well 9	do	1952	484	--	Twi	--	7	do	N	N	Do.
* 105	City of Lockhart well 11	do	1952	364	--	Twi	518?	7	May 1952	N	N	Water test hole. 1/ 2/
* 106	Marlin Moore	Lex McGee	1926	100	8	Twi	--	86.7	June 17, 1946	N	N	Abandoned. Temp. 81°F. 3/
* 107	W. P. McGee Estate	L. H. Wilson	--	2,539	10	Twi	410	+ +	Jan. 30, 1946 Jan. 7, 1964	Flows	S	Oil test, converted to water well. Water flows from sands of Wilcox Group. Estimated flow 10 gpm on Jan. 30, 1946, and 2 gpm on Jan. 7, 1964. Temp. 72°F.
108	-- Callihan	H. R. Smith, et al.	1930	2,406	--	--	460	--	--	--	--	Oil test. 2/
109	Etheridge well 5	Hoxey Oil Co.	1955	2,415	--	--	395	--	--	--	--	Do.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-12-110	Marlin Moore	--	--	39	30	Twi	--	9.4 14.7	June 27, 1946 Jan. 7, 1964	N	S	Dug well. Supplied water for travelers and meetings at Chapel Hill camp ground. Old well.
111	Paul Mohle	Lockhart Welding Service	1963	175	4	Twi	--	50.9	Jan. 7, 1964	J,E	S	Cased to 160 ft, slotted from 140 to 160 ft. Reported drawdown 90 ft after pumping 30 gpm for 4 hours.
* 112	Orbin E. Voight	do	1963	300	4	Twi	--	26	July 1963	T,E, 3/4	D,S	Cased to 295 ft, slotted from 274 to 295 ft. Reported pumping level 201 ft after pumping 60 gpm for 4 hours. 1/
* 113	City of Lockhart well 12	Layne-Texas Co.	1952	213	--	Twi	430	21.5	June 23, 1952	N	N	Water test well. 2/
* 114	City of Lockhart well 13	do	1952	201	--	Twi	430	9.4	June 24, 1952	N	N	Water test well.
* 115	City of Lockhart well 14	do	1952	552	--	Twi	--	--	--	N	N	Water test well. 1/
201	E. Smith well 1	Ogden B. Klein	1946	2,669	--	--	440	--	--	--	--	Oil test. 2/
* 202	Addis DeViney	--	--	153	6	Twi	--	99	June 1946	J,E	D,S	Temp. 76°F.
* 203	Mrs. J. L. Reed	--	1940	100	6	Twi	--	49.0 48.2	June 19, 1946 Jan. 7, 1964	J,E	D,S	Temp. 79°F.
* 301	James Chamberlin	--	1929	300	5, 4	Twi	--	48 64.8	Nov. 1945 Mar. 1, 1946	J,E, 1-1/2	D,S	Supplies water for several families in McMahon. Temp. 73°F.
* 302	Mrs. Jewel Alexander	--	--	126	8	Twi	--	56.3 56.1 55.6 58.4	July 16, 1946 Feb. 17, 1953 Mar. 21, 1953 Feb. 14, 1957	N	N	
* 303	J. J. Brown	Jenkins & Long	1902	125	5	Twi	--	63.8	June 20, 1946	N	S	Temp. 75°F. 3/
304	do	E. Dannelly	1926	125	5	Twi	--	63.3 63.1 63.2 63.1	Nov. 20, 1957 Mar. 27, 1958 May 27, 1958 Aug. 25, 1958	N	N	
* 305	do	John Reed	1946	345	4	Twi	--	67.6	June 29, 1946	C,E	D,S	Cased to bottom, partly slotted. Temp. 75°F.
* 306	Morris Robuck	--	--	100?	6	Twi	--	48.7	Jan. 7, 1964	C,H	S	Old well.
* 307	Addis DeViney	--	--	140	6	Twi	--	66.4	do	C,W	S	Do.
308	-- Reid	--	--	358	3	Twi	--	--	--	C,W	D,S	
309	Mrs. Jewel Alexander	--	1950	115	7	Twi	--	62.2	Feb. 20, 1964	C,E	D,S	

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-12-310	M. and J. J. Brown well 1	Frank Wilson, Jr.	1957	3,271	--	--	499	--	--	--	--	Oil test. 2/
401	Walter Ellison well 2	Rutter & Wilbanks	1955	2,272	--	--	480	--	--	--	--	Do.
402	Walter Ellison well 1	do	1952	2,229	--	--	480	--	--	--	--	Do.
403	Hal Brown well A-7	Beard & Shefts	1955	2,250	--	--	442	--	--	--	--	Do.
404	Sallie Clark well 2	Morton Shefts	1955	2,242	--	--	454	--	--	--	--	Do.
405	Sallie Clark well 1	Subsurface Research Corp.	1956	2,258	--	--	456	--	--	--	--	Do.
* 406	Elgin Bowers	--	--	47	30	Twi	--	31.8 37.6	Apr. 16, 1946 Nov. 29, 1963	C,W	D,S	Dug well curbed to about 10 ft. Temp. 72°F.
* 407	H. B. Guinn	E. Dannelly	--	92	5	Twi	475	36.0 47.5	May 3, 1946 Dec. 4, 1963	C,W	D,S	
* 408	Tom Blackwell	do	1906	113	5	Twi	--	55 66.6	1906 Dec. 4, 1963	C,W	D,S	
409	Charles Bowers	--	--	70?	42	Ql and Twi(?)	--	62.9	Dec. 4, 1963	C,W	S	Dug well. Old well.
410	do	--	--	--	4	Twi	--	69.9	do	T,E	S	
411	--	--	--	52	42	Ql(?)	--	41.3	do	C,W	D,S	
* 501	City of Lockhart well 3	Layne-Texas Co.	1953	340	10, 8	Twi	406	21.8	May 7, 1953	T,E, 30	P	Cased to bottom, 8-in. liner added in 1961; screen from 120-160, 210-260, 300-310, and 320-330 ft. Test on Apr. 16, 1964 measured pumping level 104 ft after pumping 315 gpm for 2 hours. Underreamed and gravel-walled. Temp. 74°F. 1/ 2/
* 502	City of Lockhart well 4	do	1953	320	10, 8	Twi	--	8.8	Oct. 15, 1953	T,E, 30	P	Test well drilled to 435 ft, plugged back to 320 ft. Cased to 320 ft, 8-in. liner added in 1961; screen from 162-192 and 212-312 ft. Test on May 23, 1953, drawdown 95 ft after pumping 618 gpm for 24 hours. Underreamed and gravel-walled. Temp. 74°F. 1/ 2/
* 503	Howard Taylor	-- Reed	1940	290	4	Twi	--	5	Feb. 1946	C,E	D,S	Temp. 72°F. 3/
504	Daniels Chapel Methodist Church	--	1917	60	36	Twi	--	26.6	Apr. 5, 1947	N	N	Dug well curbed with brick.
505	E. E. Brown well 1	Penn Oil Co.	--	--	--	--	375	--	--	--	--	Oil test.
506	M. E. Hinds well 1	Tauber Oil Co.	1960	2,835	--	--	388	--	--	--	--	Do.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-12-507	M. B. Taylor well 1	Fliatz & Mitchell	1955	2,723	--	--	381	--	--	--	--	Oil test. 2/
508	Otis Owens well 1	W. V. Hauser	1959	2,931	--	--	450	--	--	--	--	Do.
509	W. C. Hill well 2	Colorado Oil & Gas Co.	1963	2,707	--	--	382	--	--	--	--	Do.
510	John Williams	J. T. Hall	1963	241	4	Twi	--	34.9	Jan. 27, 1964	J,E	D,S	Cased to bottom, partly slotted. 1/
511	O. G. Mead	Lockhart Welding Service	1963	160	4	Twi	--	38	Apr. 1963	C,W	D,S	Cased to bottom, slotted from 140 ft to bottom. Temp. 71°F.
512	H. A. Beasley well 3	Jones & Minton	1958	2,340	--	--	--	--	--	--	--	Oil test. 2/
513	Andrew Arnic well 1	E. B. Germany & Sons	1948	3,736	--	--	448	--	--	--	--	Do.
514	A. L. Lipscomb well 1	H. H. Weinert	1949	2,626	--	--	395	--	--	--	--	Do.
515	City of Lockhart well 15	Layne-Texas Co.	1952	590	--	--	400	--	--	--	--	Water test well.
* 516	City of Lockhart well 16	do	1952	482	--	--	400	--	--	--	--	Water test well. 2/
* 517	City of Lockhart well 17	do	1953	456	--	Twi	456	17	Apr. 1953	--	--	Do.
* 518	Fritz Anton	--	--	50	28	Twi	--	35.2 43.9	May 17, 1946 Dec. 4, 1963	N	S	Dug well curbed with brick. Temp. 74°F.
* 601	Mrs. Mamie McGee	-- Powell	1944	352	4	Twi	--	70.0	June 20, 1946	C,E	D,S	Temp. 75°F. 3/
602	C. C. Franks	H. H. Coffield	1935	3,073	--	--	500	--	--	--	--	Oil test. 2/
* 603	A. F. White	-- Reed	1938	171	3, 2	Twi	--	68.6 65.9	Feb. 15, 1946 Nov. 1, 1963	N	N	Temp. 68°F.
604	W. M. Taylor	Lockhart Welding Service	1956	210	--	Twi	--	--	--	C,E	S	Cased to 30 ft. Reported discharge 50 gallons, and then waits to fill.
605	do	--	--	Spring	--	Twi	--	+ 1.4	Jan. 27, 1964	Flows	S	Spring with concrete rings to 8 ft to form catch basin.
606	Cleo Reed	--	--	45	36	Twi	--	28.0	do	C,W,E	D,S	Dug well curbed to bottom with brick. Old well.
607	Mrs. Odus Owen	--	1918	71	52, 36	Twi	--	61.8 55.7	June 19, 1946 Jan. 27, 1964	C,W	S	Dug well curbed with concrete and brick to bottom. Temp. 74°F.
608	do	M. H. Hanson	1958	145	4	Twi	--	--	--	J,E	D,S	Cased to bottom, slotted from 105 to 140 ft.
* 701	Floyd Gray Estate	--	--	49	33	Twi	--	22.9 25	June 14, 1946 1963	N	S	Dug well curbed with rock. Temp. 74°F.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-12-702	Briscoe Estate	--	1896	85	6	Twi	--	65	1946	C,E	D,S	
* 703	W. I. Pope	--	1921	19	42	Ql	--	14.9 15.5	June 14, 1946 Nov. 20, 1963	N	N	Dug well, not curbed.
704	Floyd Gray well 16-C	Humble Oil & Refining Co.	1959	2,600	--	--	373	--	--	--	--	Oil test. 2/
* 801	Mrs. Jeff Connolly	--	1910	34	40	Twi	--	25.8 28.4	May 17, 1946 Nov. 1, 1963	C,W	S	Dug well curbed with brick to 33 ft. Temp. 72°F.
802	do	Ellmag Oil Corp.	1941	2,597	--	--	379	--	--	--	--	Oil test. 2/
* 803	Thorl Watts	--	1912	31	34	Twi	--	20.4 23.0	May 17, 1946 Jan. 23, 1964	B,H	D,S	Dug well curbed to bottom with brick. Temp. 71°F.
* 13-101	Louis Crouch	--	1963	400?	4	Twi	--	131.5	Mar. 5, 1964	T,E	D,S	Cased to 390 ft. Deepened from 150 to 400 ft in 1963. Slotted from 330 to 390 ft.
* 102	do	--	1955	450?	7	Twi	--	165.0	Jan. 14, 1964	T,E	S,Irr	Cased to bottom, slotted from 400 ft to bottom. Estimated discharge 20 gpm. Irrigates about 20 acres of grass. Temp. 74°F.
* 103	Lewis Freeman	Sterzing Drilling Co.	1962	302	4	Twi	--	95.4	Feb. 20, 1964	T,E	D,S	Cased to bottom, slotted from 260 to 300 ft. 1/
104	M. H. Reed Estate	W. E. Rowe, et al.	1949	3,997	--	--	605	--	--	--	--	Oil test. 2/
201	Adolph Goertz	Lockhart Welding Service	--	--	4	Tc	--	--	--	E,-	--	
202	E. W. Garrett	Davenport Irrigation Equipment Co.	1963	780	--	--	--	--	--	N	N	Reported discharge less than 250 gph. Abandoned.
* 303	E. I. Reid	--	--	14	15	Tr	--	7.4	Apr. 18, 1946	N	N	Abandoned.
304	do	--	1947	16	30	Tr	--	12.2	Jan. 13, 1964	B,H	S	Dug well curbed with concrete rings.
501	Kurz Ranch	Kurz Oil Production Co.	1934	4,410	--	--	500?	--	--	--	--	Oil test. 2/
* 502	J. C. Rutten	Lockhart Welding Service	1963	240	4	Tc	--	66.0	Jan. 10, 1964	C,W	S	Cased to bottom, slotted from 220 ft to bottom. 1/
503	do	United Gas Corp.	--	245	4	Tc	--	106.2	Feb. 19, 1964	N	N	Supplied water for drilling tests.
* 601	S. H. McMullen	Floyd Nelley	1929	65	6	Tqc	--	53.0	Apr. 18, 1946	N	N	Abandoned.
* 602	W. A. Cox	W. A. Cox	1920	77	6	Tr	--	66.7	Mar. 1, 1946	C,W	S	Temp. 73°F. 3/
* 603	J. Sherry Estate	A. Powell	1944	171	2	Tr	--	69.9	Apr. 26, 1946	C,H	S	Temp. 72°F. 3/
604	S. H. McMullen	--	--	200?	3	Tc	--	47.5	do	C,E	S	Reported used when earthen tank is dry.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-13-605	C. S. Williams	Lockhart Welding Service	1963	470	4	Tc	--	93.0	Jan. 10, 1964	T,E	D,S, Irr	Cased to 450 ft, slotted from 430 to 450 ft. Reported will irrigate about 2 acres when needed. 1/
606	J. C. Rutten	-- Perryman	1960	490	5	Tc	--	77.9	do	T,E	S	Drilled originally to supply water for charcoal plant.
607	--	--	--	--	--	--	--	--	--	C,W,E	D,S	
608	--	--	--	--	4	--	--	--	--	J,E	D,S	
609	O. H. Hill	--	--	104	2	Tqc	--	76.6	Jan. 14, 1964	C,W,E	S	
610	Ray T. Hay well 1	Rockhill Oil Co., Renick and Weinert	1954	2,551	--	--	488	--	--	--	--	Oil test. 2/
611	C. E. McWhorter well 1	Rockhill Oil Co. & B. C. Renick	1953	5,316	--	--	520	--	--	--	--	Do.
612	Holloway and Mennella well 1	Rockhill Oil Co., Renick and Twin Oak Oil Corp.	1953	5,248	--	--	486	--	--	--	--	Do.
* 613	Delhi Community Center	Lockhart Welding Service	1963	100	4	Tr	--	57.6	Feb. 4, 1964	J,E	D	Cased to bottom, slotted from 80 ft to bottom. Reported pumping level 100 ft after pumping 10 gpm for 2 hours.
614	John F. Neely well 1	Sutton and Renick	1955	--	--	--	503	--	--	--	--	Oil test. 2/
615	S. H. McMullen	-- Owens	1952	93	7	Tr	--	--	--	J,E	D,S	Cased to bottom, slotted from 73 ft to bottom.
701	H. Linder	--	--	175	4	Tc	--	--	--	C,E	D,S	Old well.
* 702	do	Lockhart Welding Service	1963	270	4	Tc	--	137.3	Nov. 1, 1963	C,E	D,S	Cased to 220 ft; slotted from 200 to 220 ft. 1/
* 801	J. J. Holloway	Best Bros.	1923	250	4	Tc	--	40 51.6	1923 Jan. 10, 1964	C,W	S	Cased to bottom.
* 802	T. W. Bates	Leroy Richter	1963	270	4	Tc	--	55	Mar. 1963	J,E	D,S	Drilled to 105 ft in July 1962; water poor quality; deepened to 270 ft and cased to 200 ft. 1/
803	J. C. Rutten	--	1925	61	4	Tr	--	26.8	Feb. 19, 1964	C,W	S	
804	Jeff Davis well 1	Sidney A. Stubbs	1961	4,808	--	--	460	--	--	--	--	Oil test. 2/
* 901	R. L. McCall	--	--	16	36	Tqc	--	7.1 6.6	Apr. 16, 1946 Feb. 6, 1964	N	S	Dug well curbed to bottom with rock. Temp. 67°F.
902	--	--	--	--	4	--	--	23.8	Feb. 6, 1964	C,W	S	

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-13-903	P. A. Parson	Lockhart Welding Service	1963	190	4	Tr	--	80	May 1963	J,E	D,S	Cased to 180 ft; slotted from 160 to 180 ft. Reported pumping level 100 ft after pumping 40 gpm for 3 hours. 1/
* 14-401	Mrs. J. Sherry	do	1963	120	4	Tqc	--	65	June 1963	J,E	D,S	Cased to bottom; slotted from 100 ft to bottom. Reported pumping level 110 ft after pumping 10 gpm for 2 hours.
402	Loy Duddleston	do	1958	110	4	Tqc	--	44.3 44.1	Jan. 13, 1964 Feb. 19, 1964	N	N	Cased to 100 ft. Reported water of poor quality; pumping level 93 ft while pumping 30 gpm.
* 403	do	do	1963	500	4	Tc	--	90	Oct. 1963	J,E	D,S	Cased to bottom; slotted 40 ft. 1/
405	Holloway & Mennella well 1	Rockhill Oil Co., Renick & Twin Oak Oil Co.	1954	3,135	--	--	502	--	--	--	--	Oil test. 2/
* 406	Wilbur Bowyer	--	1963	550	4	Tc	--	49	1963	--	D,S	Cased to 500 ft.
407	J. Sherry well 1	Sutton Petroleum, Ltd.	1956	2,557	--	--	481	--	--	--	--	Oil test. 2/
* 701	Isom Brisco	--	1900	97	48	Tqc	--	80.6 78.8	Apr. 26, 1946 Feb. 6, 1964	C,W	D,S	Dug well curbed with rock. Temp. 72°F.
702	do	Otto Botard	1961	200?	4	Tqc	--	--	--	J,E	S	
703	Walter Johnson	--	1920	100?	4	Tqc	--	--	--	J,E	D,S	
* 704	Walter Phillips	-- Perryman	1963	110	4	Tqc	--	26.2	Feb. 6, 1964	C,W	S	
705	do	--	--	18	30	Tqc	--	12.2	do	N	N	Dug well curbed with rock. Old well.
* 801	William Bowyer	--	--	59	36	Tqc	--	46.4	do	J,E	D,S	Dug well curbed with brick. Old well.
18-301	-- Williamson	Lockhart Welding Service	1963	60	4	Qal	--	18	July 1963	J,E	D,S	Cased to 40 ft; slotted from 20 to 40 ft. Reported pumping level 30 ft after pumping 20 gpm for 2 hours. 1/
19-101	G. Kelley	United North & South Development Co.	1928	7,854	--	--	449	--	--	--	--	Oil test.
102	Hattie Jennings	--	1941	17	42	Twi	--	8.2	Nov. 14, 1963	N	N	Dug well. Reported water was good in 1941, and later was contaminated with oil field brine.
103	H. Page well 1	Doyle Thomas	1957	2,098	449	--	449	--	--	--	--	Oil test. 2/
104	Johnson Salt Water Disposal well 1	Thomas & Whittington	1963	2,527	--	--	443	--	--	--	--	Salt water disposal well. 2/
105	Proctor well 19	--	1954	2,300	--	--	--	--	--	--	--	Do.

See footnotes at end of table.

Well	Owner	Driller	Date com-pleted	Depth of well (ft)	Diam-eter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-19-106	O. F. Stair well 21	Magnolia Petroleum Co.	1952	2,183	--	--	449	--	--	--	--	Oil test. 2/
107	Rios well 25	do	1952	2,187	--	--	--	--	--	--	--	Do.
* 108	N. A. Langley	--	1945	108	--	Twi	--	25.3	Apr. 3, 1946	J,E	D,S	
109	--	--	--	--	5	Twi	--	47.4	Nov. 14, 1964	C,G	S	Old well.
110	--	--	--	--	30	Twi	--	30.5	do	C,W	D,S	Dug well curbed with rock. Old well.
111	State of Texas San Marcos River bed well 1	Ashley & Co.	1958	2,040	--	--	--	--	--	--	--	Oil test. 2/
112	Mary Kelley well 1	do	1957	2,234	--	--	445	--	--	--	--	Do.
113	Eva Shanklin well 1	Fisk & Morehead Oil Interests	1957	2,514	--	--	439	--	--	--	--	Do.
* 201	F. L. Fields	--	1930	182	5	Twi	--	114	Mar. 1946	N	S	3/
* 202	V. M. Sanders	J. Long	1908	123	6	Twi	--	80	1946	N	N	Casing collapsed, abandoned.
203	F. L. Fields	M. H. Hanson	1962	300?	4	Twi	--	116.4	Oct. 31, 1963	C,E	D,S	
204	J. E. Boggus	--	1956	100?	6	Twi	--	78.8	Nov. 14, 1963	J,E	D,S	Drilled to about 400 ft, and plugged back to 100 ft.
205	--	--	--	--	--	Twi	--	--	--	C,E	S	Old well.
206	V. M. Sanders	M. Hanson	1958	160	4	Twi	--	80	1958	T,E	D,S	Cased to bottom, partly slotted.
207	G. C. Walker, Jr. well 1	Gulf Oil Corp.	1955	2,377	--	--	--	--	--	--	--	Oil test. 2/
* 301	Gulf Oil Corp.	--	1930	370	6	Twi	--	56.0	May 8, 1946	N	N	Abandoned. Formerly supplied water for oil field camp. Screened from 270 ft to bottom.
* 302	Mrs. N. Casey	--	--	190	6	Twi	--	--	--	C,E	D,S	Old well.
303	Luling Municipal Airport	--	--	--	--	Twi	--	--	--	C,E	D,S	
* 304	Nortex Oil & Gas Corp.	J. T. Hall	1963	406	7	Twi	--	24.3	Nov. 20, 1963	T,E	Ind	Cased to 360 ft. Estimated discharge 50 gpm. Temp. 74°F. 1/
305	--	--	--	33	24	Twi	--	19.3	do	C,W,G	S	Dug well curbed with brick. Old well.
* 306	H. C. Dismukes	Davenport Irrigation Equipment Co.	1963	330	7	Twi	--	116.7	Jan. 8, 1964	T,E	S,Irr	Cased to 183 ft. Reported discharge 110 gpm. Temp. 74°F. 1/
307	Thomas Wilson, Sr.	M. H. Hanson	1952	300	4	Twi	--	20.2	do	C,W	S	Cased to bottom; slotted from 50 to 70 ft. Reported no water below 70 ft.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-19-308	Thomas Wilson, Sr.	M. H. Hanson	1952	72	7	Twi	--	--	--	T,E, 5	S,Irr	Cased to bottom; slotted from 52 to 72 ft. Reported pumping level 55 ft while pumping 150 gpm. Irrigates about 40 acres of grass. Temp. 73°F.
309	do	do	1951	85	6	Twi	--	--	--	J,E, 2	D,S, Irr	Cased to bottom; slotted from 60 to 85 ft. Reported discharge 50 gpm on test. Irrigates 5 acres of grass.
310	H. C. Dismukes	--	1925	180	6	Twi	--	--	--	C,E	D,S	
311	City of Luling Airport well 1	E. F. Hill & Vick Oil Co.	1956	2,633	--	--	--	--	--	--	--	Oil test. 2/
312	Mathews & Moses well 5	Claude V. Brown	1957	2,646	--	--	--	--	--	--	--	Do.
* 313	Nortex Oil & Gas Corp.	--	--	--	--	--	--	--	--	--	--	Oil test.
* 401	--	--	--	27	6	Qal	--	25.4	June 25, 1946	J,E	D,S	Temp. 72°F.
* 402	W. W. McNeal	John Reed	1944	120	5	Twi	--	--	--	C,E	D,S	Drilled to 300 ft; plugged back to 120 ft. Temp. 77°F.
403	J. T. O'Banion well 7	F. C. Lattner	1961	2,241	--	--	--	--	--	--	--	Oil test. 2/
* 501	Edward Kell	M. H. Hanson	1961	180	4	Twi	--	52	May 1961	T,E, 1	D,S	Cased to 167 ft. Reported discharge 10 gpm. Temp. 75°F.
* 502	Magnolia Petroleum Co.	United North & South Oil Co., Inc.	1926	149	6	Twi	--	88	1926	T,E, 3	S	Supplied water for large oil field camp for several years. Temp. 75°F.
503	Thomas & Whittington Oil Co.	J. T. Hall	1963	236	4	Twi	--	35.2	June 20, 1964	J,E	S	Cased to 203 ft. 1/
504	do	--	--	140	4	Twi	--	37.3	Nov. 15, 1963	N	N	Old well.
505	--	--	--	117	4	Twi	--	62.7	Dec. 5, 1963	C,W	S	Do.
* 506	Pierce Ranch	--	--	36	34	Twi	--	18.0 23.6	June 25, 1946 Dec. 5, 1963	C,W	D,S	Dug well curbed with brick. Temp. 72°F.
* 507	T. L. McWilliams	John Reed	1931	315	8	Twi	--	61.1	Feb. 12, 1946	J,E	D	Temp. 71°F.
508	Mrs. Pat Garrett	--	1943	165	--	Twi	--	--	--	T,E	Irr	Formerly used for irrigation; not used since about 1953.
* 601	City of Luling well 1	Layne-Texas Co.	1924	259	20, 18, 12	Twi	--	20 88.6	1924 Feb. 7, 1964	T,E	P	Test well drilled to 320 ft; plugged back to 259 ft. Cased to 259 ft, screen from 100-117, 156-176, and 239-259 ft. Test when drilled 35 ft drawdown after pumping 460 gpm for 7 hours. Underreamed and gravel-packed.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*BU-67-19-602	City of Luling well 2	Layne-Texas Co.	1926	304	16, 8	Twi	--	--	--	--	--	Cased to bottom; partly screened. Abandoned prior to 1963.
603	City of Luling well 3	do	1948	312	18, 12, 8	Twi	--	--	--	--	--	Cased to 311 ft; screen from 191 to 305 ft. Underreamed and gravel-packed. Abandoned in 1954. 2/
604	City of Luling test well	do	1948	475	--	--	--	--	--	--	--	Test well for water.
* 605	City of Luling well 5	do	1948	307	12, 8	Twi	--	70 91.6	Jan. 1949 Feb. 7, 1964	T,E, 30	P	Test well drilled to 505 ft, plugged back to 307 ft. Casing: 12-in. to 218 ft, and 8-in. from 218 ft to 307 ft. Screen from 120-150, 160-190, 220-240, 250-270, and 280-305 ft. Underreamed and gravel-packed. Test when drilled, pumping level 115 ft after 24 hours pumping 503 gpm. 2/
* 606	City of Luling well 6	do	1957	447	10	Twi	--	64 75.8	Apr. 1957 Feb. 4, 1964	T,E, 40	P	Cased to bottom, screen from 174-224, 305-325, and 374-435 ft. Underreamed and gravel-packed. Test when drilled, pumping level 131 ft after 8 hours pumping 700 gpm. 1/ 2/
* 607	City of Luling well 7	do	1954	331	12, 8	Twi	--	74 87.4	Jan. 1955 May 11, 1964	T,E, 30	P	Test well drilled to 331 ft. Cased to 312 ft; screen from 114-159, 164-184, 195-205, 235-245, and 255-295 ft. Underreamed and gravel-packed. Test on May 11, 1964, measured drawdown 27.4 ft after 10 hours pumping 485 gpm. Temp. 74°F. 1/ 2/
* 608	Mobil Oil Co.	do	1930	519	12	Twi	--	34.1	July 3, 1946	T,E, 40	D,S	Formerly supplied water for tank farm. Temp. 80°F. 1/ 3/
* 609	T. I. Johnson	A. Powell	1946	284	5	Twi	--	44.9	Aug. 6, 1946	N	D	Temp. 75°F. 3/
610	N. O. Stair	John Reed	1945	239	5	Twi	--	45.5	Feb. 7, 1946	J,E	D,S	3/
611	Luling Foundation	-- Perryman	1950	--	--	Twi	--	--	--	T,E, 2	D,S	
* 612	E. L. Schumann	John Reed	1942	300	6	Twi	--	35	1942	--	--	Formerly supplied water for Nehi Bottling Plant.
* 613	Southwestern Ice and Cold Storage Co.	--	1941	150	6	Twi	--	50	1945	T,E	Ind	In 1963 used 3,500 gpd in winter and 11,000 gpd in summer in ice.
* 614	Sinclair Refining Co.	Layne-Texas Co.	1949	260	6, 4	Twi	--	73	Feb. 1949	T,E, 5	D,Irr	Drilled to 448 ft and plugged back to 260 ft. Cased to 260 ft; screen from 187-188, and 207-246 ft. Test on Feb. 5, 1949, pumping level 129 ft after pumping 45 gpm for 3 hours. Irrigates about 5 acres of lawn.

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-19-615	Sinclair Pipe Line Co.	Davenport Irrigation Equipment Co.	1956	230	8	Twi	--	93	Apr. 1956	T,E, 5	D,Irr	Cased to 159 ft. Test pumped at 250 to 350 gpm for 16 hours and 400 gpm for 4 hours. Irrigates about 4 acres of lawn.
616	Wilson well A-5	Riddle Oil Co.	1963	2,660	--	--	--	--	--	--	--	Oil test. 2/
617	City of Luling test well	Layne-Texas Co.	1954	610	--	--	370	--	--	--	--	Water test well. Water from between 375 and 510 ft contained 3,400 ppm sodium chloride and 1,100 ppm bicarbonates. 2/
618	Cora Malone well 1	J-B Construction Co.	1958	2,557	--	--	--	--	--	--	--	Oil test. 2/
619	Quinn Peikert	Davenport Irrigation Equipment Co.	--	160	--	Twi	--	--	--	--	D,S	Cased to 154 ft; slotted from 134 ft to 154 ft.
620	The Luling Foundation well 1	John M. Mouser	1961	2,719	--	--	390	--	--	--	--	Oil test. 2/
621	W. C. Weaver well 1	Vick Oil Co.	1962	2,619	--	--	380	--	--	--	--	Do.
622	Watkins well 1	J. E. Adamson	1961	2,670	--	--	400	--	--	--	--	Do.
623	Southern Pacific Ry. Lines well 1	Colorado Oil & Gas Corp.	1962	2,701	--	--	400	--	--	--	--	Do.
624	-- Bennett well 1	do	1962	2,714	--	--	400	--	--	--	--	Do.
625	N. O. Stair well 1	Goliad Royalty Corp. & W. E. Curlee	1962	2,750	--	--	390	--	--	--	--	Do.
626	W. D. Rogeou	Constock Oil Co.	1961	2,710	--	--	400	--	--	--	--	Do.
627	Vance Glover well 1	Blackmar & Perryman	1962	2,831	--	--	410	--	--	--	--	Do.
902	Luling Golf Club	M. H. Hanson	--	132	--	--	--	--	--	N	N	Reported would not yield enough water for use on golf course.
* 20-101	Humble Oil & Refining Co.	Arnold & Williams	1936	300	9, 6	Twi	--	--	--	N	N	Cased to bottom; screen from 234 to 298 ft. Formerly supplied water for oil field camp. Abandoned. Temp. 78°F.
* 102	Doda Spring	--	--	Spring	--	Twi	--	+	--	Flows	N	Estimated flow 100 gpm into creek in 1946. In 1963 many seeps and probably flowed into creek below water surface.
103	John Davenport	Davenport Irrigation Equipment Co.	1963	288	7	Twi	--	1.0 1.0 .9	Feb. 4, 1964 Mar. 4, 1964 June 20, 1964	T,E	Irr	Cased to bottom; slotted from 208 to 288 ft. Reported test pumped 600 gpm for 90 days.
* 104	do	do	1963	580	4	Twi	--	20	1963	T,E	D,S	Cased to 560 ft; slotted from 540 to 560 ft. 1/
105	do	--	--	--	--	Twi	--	66.3	Mar. 4, 1964	T,E	D,S	

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-20-106	J. R. Tiller well 6	Luling Oil & Gas Co.	1949	2,714	--	--	--	--	--	--	--	Oil test. 2/
201	W. H. and T. Walker well 1	H. F. Wilcox Oil & Gas Co.	1941	3,636	--	--	413	--	--	--	--	Do.
* 202	A. G. Probst	A. G. Probst	1915	14	30	Twi	--	6.3 10.8	July 16, 1946 Nov. 29, 1963	C,W	D,S	Dug well curbed with rock.
* 203	J. C. Mitchell	--	1870	46	40	Twi	--	37.3 41.7	July 16, 1946 Nov. 29, 1963	J,E	D,S	Do.
* 204	J. N. Brigance	--	--	360	4	Twi	--	60.9	Jan. 23, 1964	C,W	D,S	
* 205	Billy Dorris	Davenport Irrigation Equipment Co.	1963	190	4	Twi	--	76.6	do	T,E	S	Cased to 189 ft, open end. 1/
206	John P. Williams well 1	Eddy & Foretich	1947	4,037	--	--	--	--	--	--	--	Oil test. 2/
301	John P. Williams well 2	do	1948	3,633	--	--	--	--	--	--	--	Do.
401	-- Johnson	-- Johnson	--	16	30	Twi	--	11.5	Nov. 29, 1963	Cf,G	S,Irr	Dug well curbed with concrete rings. Irrigates about 1 acre.
* 402	O. R. Hanson	--	1895	24	24	Twi	--	18.5 21.7	July 16, 1946 Nov. 29, 1963	C,W	S	Dug well curbed with rock.
* 403	do	M. H. Hanson	1955	321	4	Twi	--	7 11.0	1955 Nov. 29, 1963	C,E	D,S	Cased to bottom; slotted from 180-200 and 235 ft to bottom.
* 404	Magnolia Pipe-Line Co.	-- Redmond	1922	150	10, 7, 2	Twi	--	--	--	N	N	Formerly supplied water for cooling engines. Flowed 10 gpm in 1946. No longer flowed when capped in 1963.
405	G. T. Brown well 1	Sam Macco Oil Operations	1949	3,211	--	--	360	--	--	--	--	Oil test. 2/
406	J. F. Webb well 1	Luling Oil & Gas Co.	1948	3,232	--	--	400	--	--	--	--	Do.
407	C. G. Crowell well 1	C. E. Starr, et al.	1952	5,949	--	--	376	--	--	--	--	Do.
* 501	Clifford Davis	--	1900	19	30	Twi	--	16.5 16.1	July 3, 1946 Nov. 29, 1963	N	S	Dug well curbed with concrete. Temp. 72°F.
* 601	Abner Moore	--	1932	91	6, 5	Tc	--	67.9	Apr. 4, 1947	N	S	Bored well. 3/
* 602	G. T. Westbrook	--	--	80	6	Tc	--	73.0	May 7, 1946	N	N	Abandoned in 1954. Temp. 75°F. 3/
603	do	--	--	199	4	Tc	--	76.1	Feb. 14, 1957	N	S	Supplied water for drilling oil test. 3/
* 604	Mrs. J. E. Ledbetter	D. H. Williams	1946	117	5, 4	Tc	--	62.3	Apr. 4, 1947	C,W	D,S	Cased to 98 ft. 3/

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level: Below land surface datum (ft)	Water level: Date of measurement	Method of lift	Use of water	Remarks
BU-67-20-605	Mrs. J. E. Ledbetter	--	1942	42	42	Tc	--	33.3 27.2	Oct. 31, 1963 Dec. 31, 1963	C,E	S	Dug well curbed with brick.
608	Harwood Egg Farm	Ralph Sloan	1956	160	4	Tc	--	50	1959	T,E	D,S	Cased to bottom; slotted from 140 ft to bottom. Three wells supply average 10,000 gpd.
609	do	M. H. Hanson	1960	220	4	Tc	--	80	1960	T,E, 1/2	D,S	Cased to 180 ft; slotted 20 ft to bottom.
610	do	do	1961	220	4	Tc	--	--	--	T,E, 1/2	D,S	Do.
611	Abner Moore, Sr.	Ralph Sloan	1962	225	4	Tc	--	70.3	Dec. 31, 1963	C,E	D,S	Cased to 125 ft; slotted 21 ft to bottom.
612	Mrs. L. F. Westbrook well 1	W. L. Hunt	1953	--	--	--	485	--	--	--	--	Oil test. 2/
702	J. W. Webb	--	--	48	48	Twi	--	45.7	Dec. 6, 1963	C,W	D	Dug well curbed with brick to 8 ft. Old well.
* 703	Tom Blackwell	--	1935	285	4	Twi	--	2.8	do	C,W,E	D,S	Temp. 73°F.
* 704	W. J. and C. B. McCleary	--	1934	19	24	Twi	--	16.2	May 7, 1946	N	N	Dug well, abandoned in 1955. Temp. 73°F.
705	do	--	1955	30	6	Twi	--	17.8	Dec. 6, 1963	J,E	D,S	
* 706	Jeff Youngblood	John Perryman Drilling Co.	1964	200?	5	Twi	--	+	Jan. 23, 1964	Flows	Irr	Oil test converted to water well. Cased to 200 ft. Estimated flow 5 gpm. Temp. 75°F.
707	Jack Vicks	Billy Perryman	1963	240	8	Twi	--	--	--	T,E	Irr	Cased to 200 ft. Reported discharge 220 gpm. Irrigated 40 acres in 1963.
* 708	do	W. C. Griffin	1939	81	4	Twi	--	60	1939	N	N	Cased to 79 ft. Temp. 76°F.
* 801	Ben Huff	-- Shannon	1935	120	5	Tc	--	78.1	May 3, 1946	C,E	D,S	Cased to 90 ft. Temp. 74°F. 3/
* 802	Paul Zedler	Davenport Irrigation Equipment Co.	1963	200	4	Tc	--	42	Nov. 1963	T,E	S	Cased to 189 ft; slotted 20 ft to bottom. Temp. 72°F. 1/
803	H. M. Ainsworth well 1	Brown & Callaway	1959	1,795	--	--	--	--	--	--	--	Oil test. 2/
21-101	L. R. Dillon	--	1945	204	5	Tc	--	33.0	May 17, 1946	J,E	S	Deepened to 204 ft in 1955. 3/
102	L. R. Dillon well 1	Travis Drillers	1955	4,732	--	--	445	--	--	--	--	Oil test. 2/
103	L. R. Dillon well 2	do	1956	4,607	--	--	450	--	--	--	--	Do.
* 104	J. Nickel	Lockhart Welding Service	1963	300	4	Tc	--	78.5	Jan. 23, 1964	T,E	D,S	Cased to bottom; slotted from 280 ft to bottom. 1/

See footnotes at end of table.

Table 9.--Records of wells and springs--Continued

Well	Owner	Driller	Date completed	Depth of well (ft)	Diameter of well (in.)	Water-bearing unit	Altitude of land surface	Water level		Method of lift	Use of water	Remarks
								Below land surface datum (ft)	Date of measurement			
*BU-67-21-202	W. W. Wilkinson	Bost Bros.	1925	157	4	Tr	--	47 58.0	1925 Dec. 6, 1963	C,W,G	D,S	Cased to bottom. Temp. 76°F.
* 302	I. O. Stigall	Leroy Richter	1963	334	4	Tc?	--	26	July 1963	T,E, 3/4	D,S	Cased to 284 ft. Reported pumping level 201 ft after pumping 60 gpm for 4 hours. 1/
* 303	-- Gunn	--	1944	148	4	Tqc	--	28.6	Jan. 10, 1964	C,W	S	Temp. 71°F.
304	Matson Davis	--	--	35	30	Tqc	--	20.7	Feb. 5, 1964	J,E	D,S	Dug well curbed with concrete rings. Old well.
* 401	Abner Moore, Jr.	Ralph Sloan	1963	440	4	Tc	--	--	--	T,E	S	Estimated discharge 25 gpm. Temp. 74°F.

* For analyses of water from wells and springs in Caldwell County see Table 12.
1/ For drillers' logs of wells in Caldwell County see Table 10.
2/ Electric log in files of Texas Water Development Board, and U.S. Geological Survey.
3/ For water levels in wells in Caldwell County see Table 11.

Table 10.--Drillers' logs of wells

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)

Well BU-58-60-707

Owner: Joe Cheatham. Driller: Lockhart Welding Service.

Sand----------------	2	2	Rock----------------	4	80
Sand and gravel------	8	10	Sand, fine-----------	1	81
Clay, yellow---------	22	32	Shale, blue----------	27	108
Sand----------------	10	42	Rock----------------	2	110
Shale, blue----------	34	76	Shale, blue----------	40	150

Well BU-67-04-507

Owner: L. A. Chambliss. Driller: Lockhart Welding Service.

Topsoil-------------	6	6	Shale, blue----------	18	128
Sand and shale-------	15	21	Sand----------------	20	148
Rock----------------	3	24	Rock----------------	2	150
Shale and sand-------	36	60	Sand----------------	80	230
Sand----------------	50	110			

Well BU-67-04-508

Owner: W. C. Mercer. Driller: Lockhart Welding Service.

Sand----------------	2	2	Sand and clay--------	47	140
Clay----------------	10	12	Rock----------------	2	142
Sand and clay--------	78	90	Sand----------------	18	160
Rock----------------	3	93			

Well BU-67-04-603

Owner: Grady Cast. Driller: J. T. Hall.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface-------------	2	2	Sand (water)---------	40	290
Sand, tight---------	48	50	Rock----------------	2	292
Sand, red (water)----	10	60	Sand, blue (water)---	23	315
Rock----------------	2	62	Shale---------------	67	382
Shale, sandy---------	88	150	Sand (water) and small shale streaks------	72	454
Shale and boulders---	75	225	Sand (water)---------	31	485
Sand, blue (water)---	25	250	Shale---------------	15	500

Well BU-67-04-708

Owner: Preston Riddle. Driller: Davenport Irrigation Equipment Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay----------------	2	2	Rock----------------	1	138
Sand----------------	8	10	Shale---------------	7	145
Shale---------------	30	40	Rock----------------	1	146
Rock----------------	2	42	Shale---------------	29	175
Sand----------------	3	45	Rock----------------	1	176
Rock----------------	1	46	Shale, sandy---------	24	200
Sand----------------	14	60	Shale---------------	3	203
Rock----------------	2	62	Sand----------------	5	208
Sand----------------	13	75	Rock----------------	4	212
Shale---------------	30	105	Sand----------------	3	215
Rock----------------	1	106	Shale, sandy---------	25	240
Shale, sandy---------	31	137	Shale---------------	30	270

(Continued on next page)

Table 10.--Drillers' logs of wells--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)

Well BU-67-04-708--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Rock-----------------	3	273	Rock-----------------	1	286
Shale----------------	12	285	Shale----------------	64	350

Well BU-67-04-710

Owner: City of Lockhart, test well 3. Driller: Layne-Texas Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Topsoil--------------	1	1	Shale----------------	3	63
Caliche--------------	4	5	Sand, coarse, gray---	30	93
Sand-----------------	3	8	Shale----------------	40	133
Clay and sandy clay--	15	23	Rock-----------------	5	138
Rock-----------------	2	25	Shale----------------	82	220
Sand, brown----------	10	35	Rock-----------------	3	223
Clay, sandy----------	5	40	Shale, sandy, and shale--------------	35	258
Sand, gray with black specks-------------	20	60	Rock-----------------	1	259
			Shale and sandy shale	186	445

Well BU-67-04-904

Owner: J. A. Baker. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand-----------------	2	2	Shale----------------	12	122
Clay-----------------	38	40	Sand, blue-----------	148	270
Sand, brown----------	70	110			

Well BU-67-05-703

Owner: F. G. Bell. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay-----------------	15	15	Clay, yellow---------	25	43
Rock-----------------	3	18	Clay, blue-----------	27	70

(Continued on next page)

Table 10.--Drillers' logs of wells--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well BU-67-05-703--Continued					
Rock----------------	1	71	Sand and shale-------	20	140
Shale, blue----------	49	120	Shale, blue----------	20	160

Well BU-67-10-905

Owner: Joe Rochill. Driller: Lockhart Welding Service.

Dirt, black----------	4	4	Gravel---------------	5	28
Clay-----------------	19	23	Shale----------------	32	60

Well BU-67-11-302

Owner: City of Lockhart, test well 2. Driller: Layne-Texas Co.

Topsoil--------------	2	2	Shale----------------	25	140
Caliche--------------	11	13	Shale, sandy---------	30	170
Gravel---------------	5	18	Rock-----------------	1	171
Clay and sand layers-	24	42	Shale, sandy---------	9	180
Clay, black----------	5	47	Rock-----------------	3	183
Rock-----------------	1	48	Gravel---------------	2	185
Shale----------------	17	65	Shale, sandy---------	78	263
Sand-----------------	2	67	Shale and streaks of gravel------------	20	283
Rock-----------------	2	69	Shale and gravel-----	40	323
Shale, sandy, and shale--------------	16	85	Shale----------------	81	404
Sand, fine with black and white specks---	30	115			

Table 10.--Drillers' logs of wells--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)

Well BU-67-11-503

Owner: W. P. Morgan. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Dirt, black----------	5	5	Shale, blue----------	50	85
Gravel---------------	5	10	Sand, fine-----------	12	97
Clay, yellow---------	25	35	Shale, blue----------	53	150

Well BU-67-11-508

Owner: City of Lockhart, test well 8. Driller:--

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Topsoil--------------	3	3	Shale----------------	10	132
Clay-----------------	18	21	Sand and shale streaks-----------	6	138
Gravel and clay------	7	28	Shale and sandy shale	77	215
Shale and sandy shale	93	121	Rock-----------------	1	216
Rock-----------------	1	122	Shale and sandy shale	48	264

Well BU-67-12-101

Owner: City of Lockhart, well 1. Driller: Layne-Texas Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Topsoil--------------	2	2	Shale, sandy, and layers of rock-----	33	162
Clay-----------------	30	32	Sand, sandy shale, and layers of rock-	44	206
Shale, sandy---------	32	64	Shale and sandy shale	15	221
Sand and streaks of shale--------------	18	82	Sand, fine, gray-----	16	237
Sand, gray with black specks-------------	15	97	Shale and sandy shale	86	323
Shale, sandy---------	30	127	Shale, sandy---------	45	368
Rock-----------------	2	129			

Table 10.--Drillers' logs of wells--Continued

Well BU-67-12-105

Owner: City of Lockhart, test hole 11. Driller: Layne-Texas Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Topsoil--------------	2	2	Sand, fine, gray-----	20	189
Sand-----------------	3	5	Sand, gray with streaks of shale---	15	204
Clay, sandy----------	8	13	Sand, fine, gray-----	28	232
Clay-----------------	20	33	Rock-----------------	2	234
Sand and gravel------	6	39	Sand and sandy shale-	10	244
Shale, black---------	32	71	Sand, coarse, gray---	40	284
Shale, sandy, and streaks of sand----	34	105	Shale, rock layers---	35	319
Shale, sandy, and streaks of shale---	64	169	Shale, sandy, and shale--------------	45	364

Well BU-67-12-112

Owner: Orbin E. Voight. Driller: Lockhart Welding Service.

Sand-----------------	4	4	Clay, sandy----------	117	227
Clay, red------------	6	10	Rock-----------------	2	229
Clay, yellow---------	40	50	Sand-----------------	65	294
Sand-----------------	60	110	Shale----------------	6	300

Well BU-67-12-115

Owner: City of Lockhart, well 14 (test hole). Driller: Layne-Texas Co.

No entry-------------	498	498	Shale----------------	10	521
Sand-----------------	8	506	Shale and sandy shale	9	530
Shale, sandy---------	4	510	Shale----------------	22	552
Rock-----------------	1	511			

Well BU-67-12-501

Owner: City of Lockhart, Wilcox well 3. Driller: Layne-Texas Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil, black	3	3	Shale, blue, gray	18	182
Clay, yellow, and shale	7	10	Shale, blue, and layers of sand	30	212
Clay, white	20	30	Sand, gray	7	219
Rock	3	33	Shale, blue	13	232
Shale, sandy, gray	17	50	Sand, gray, and shale breaks	30	262
Sand, gray	10	60	Shale, blue	5	267
Shale, brown	5	65	Rock	2	269
Sand, gray	19	84	Shale, blue	34	303
Shale, blue	5	89	Sand, gray	13	316
Shale, light gray, and lignite	41	130	Shale, blue	7	323
Sand, gray, and shale breaks	34	164	Sand, gray	10	333
			Shale, blue	7	340

Well BU-67-12-502

Owner: City of Lockhart, Wilcox well 4. Driller: Layne-Texas Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Topsoil	2	2	Sand, fine, gray, and streaks of shale	110	200
Clay	5	7	Shale	8	208
Sand	10	17	Sand, fine, gray, and streaks of shale and lignite	32	240
Shale	41	58	Sand, fine, gray, and streaks of shale	72	312
Rock	1	59			
Shale and sandy shale	31	90			

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Table 10.--Drillers' logs of wells--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well BU-67-12-502--Continued					
Shale----------------	18	330	Sand and shale streaks-----------	17	374
Rock-----------------	1	331	Shale----------------	30	404
Shale----------------	23	354	Shale and streaks of sand and sandy shale--------------	31	435
Rock-----------------	3	357			

Well BU-67-12-510

Owner: John Williams. Driller: J. T. Hall.

Surface--------------	2	2	Rock-----------------	1	97
Clay-----------------	8	10	Sand (water)---------	10	107
Sand, red------------	8	18	Shale----------------	13	120
Soapstone------------	41	59	Sand and shale-------	23	143
Sand, rock-----------	1	60	Shale and boulders---	18	161
Shale, blue----------	36	96	Sand, blue (water)---	80	241

Well BU-67-13-103

Owner: Lewis Freeman. Driller: Sterzing Drilling Co.

Topsoil--------------	2	2	Sand, soft, gray, and shale----------	59	229
Clay, yellow---------	23	25	Cap, hard------------	3	232
Cap, hard------------	1	26	Shale, gray----------	9	241
Shale, blue, gray----	41	67	Sand, soft, gray, and shale----------	41	282
Cap, hard------------	5	72	Shale, hard, gray----	8	290
Shale, blue, gray----	18	90	Sand, gray-----------	12	302
Sand, gray, fine-----	80	170			

Table 10.--Drillers' logs of wells--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)

Well BU-67-13-502

Owner: J. C. Rutten. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand----------------	4	4	Shale, blue---------	120	180
Clay, red-----------	12	16	Sand----------------	60	240
Sand and clay-------	44	60			

Well BU-67-13-605

Owner: C. S. Williams. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand----------------	3	3	Shale---------------	25	260
Clay, red-----------	13	16	Rock----------------	3	263
Clay, yellow--------	24	40	Shale---------------	77	340
Shale, blue---------	120	160	Rock----------------	2	342
Sand----------------	44	204	Shale with sand streaks-----------	28	370
Shale---------------	29	233	Rock----------------	1	371
Rock----------------	2	235	Sand----------------	99	470

Well BU-67-13-702

Owner: H. Linder. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Topsand-------------	4	4	Sand----------------	137	160
Clay, red-----------	6	10	Sand (water)--------	110	270
Clay, yellow--------	13	23			

Table 10.--Drillers' logs of wells--Continued

Well BU-67-13-802

Owner: T. W. Bates. Driller: Leroy Richter.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
No record	105	105	Shale and lignite streaks	60	240
Clay	40	145	Sand	30	270
Sand and sandy clay	35	180			

Well BU-67-13-903

Owner: P. A. Parson. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand	3	3	Clay, blue	60	130
Clay, red	17	20	Rock	1	131
Clay, gray	30	50	Clay, blue	39	170
Rock	2	52	Rock	3	173
Clay, blue	16	68	Sand	12	185
Rock	2	70	Shale, blue	5	190

Well BU-67-14-403

Owner: Loy Duddleston. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand	4	4	Sand, fine, and hard shale layers	74	306
Clay, red, yellow	19	23	Rock	2	308
Sand, red rock, and lignite	21	44	Sand, fine, lignite and rock	128	436
Shale	32	76	Sand, white with lignite	44	480
Sand with lignite	22	98	Sand, fine with lignite	20	500
Shale	132	230			
Rock	2	232			

Table 10.--Drillers' logs of wells--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)

Well BU-67-18-301

Owner: -- Williamson. Driller: Lockhart Welding Service.

Dirt, black----------	4	4	Gravel---------------	7	27
Chalk, white---------	16	20	Shale, blue----------	33	60

Well BU-67-19-304

Owner: Nortex Oil and Gas Corp. Driller: J. T. Hall.

Surface--------------	2	2	Sand, blue (water)---	60	245
Gravel and clay------	10	12	Sand, hard-----------	40	285
Sand, red------------	22	34	Sand, blue (water)---	35	320
Rock-----------------	2	36	Shale, sandy, blue---	20	340
Sand, gray-----------	25	61	Rock-----------------	1	341
Shale----------------	8	69	Sand, blue (water)---	19	360
Rock-----------------	2	71	Rock-----------------	4	364
Sand, hard-----------	114	185	Shale----------------	42	406

Well BU-67-19-306

Owner: H. C. Dismukes. Driller: Davenport Irrigation Equipment Co.

Clay-----------------	5	5	Shale and sand-------	5	163
Sand-----------------	30	35	Lignite--------------	17	180
Clay-----------------	8	43	Rock-----------------	2	182
Sand-----------------	7	50	Sand (good)----------	58	240
Rock-----------------	2	52	Rock-----------------	2	242
Shale, sandy---------	68	120	Sand (good)----------	18	260
Sand-----------------	38	158	Shale----------------	18	278

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	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well BU-67-19-306--Continued					
Shale, sandy---------	7	285	Rock-----------------	3	293
Shale----------------	5	290	Shale----------------	37	330

Well BU-67-19-503

Owner: Thomas and Whittington Oil Co. Driller: J. T. Hall.

Surface--------------	2	2	Rock-----------------	1	151
Gravel---------------	3	5	Shale----------------	4	155
Clay-----------------	5	10	Rock-----------------	1	156
Sand, red------------	10	20	Shale, sandy---------	20	186
Sand, gray-----------	70	90	Rock-----------------	1	187
Shale----------------	25	115	Sand, blue (water)---	4	191
Lignite--------------	1	116	Rock-----------------	1	192
Shale----------------	34	150	Sand, blue (water)---	44	236

Well BU-67-19-606

Owner: City of Luling, well 6. Driller: Layne-Texas Co.

Soil-----------------	1	1	Shale and lignite----	18	120
Gravel---------------	3	4	Shale, sandy---------	11	131
Clay-----------------	31	35	Shale and lignite----	21	152
Clay, sandy----------	7	42	Sand and rock layers-	15	167
Sand and streaks of shale and lignite--	21	63	Sand and streaks of lignite-----------	44	211
Shale and streaks of sand and lignite---	26	89	Rock-----------------	2	213
Sand and lignite-----	13	102	Shale, sandy---------	4	217

(Continued on next page)

Table 10.--Drillers' logs of wells--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)

Well BU-67-19-606--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand and streaks of shale--------------	15	232	Rock-----------------	1	317
Shale----------------	20	252	Sand, streaks, and shale--------------	18	335
Sand-----------------	12	264	Shale and sandy shale--------------	17	352
Shale and streaks of sand---------------	30	294	Sand and streaks of shale and lignite--	85	437
Shale, sandy, and streaks of sand----	22	316	Shale----------------	10	447

Well BU-67-19-607

Owner: City of Luling, well 7. Driller: Layne-Texas Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Soil and gravel------	2	2	Shale----------------	31	217
Clay-----------------	10	12	Rock-----------------	1	218
Clay, sandy and sand-	9	21	Shale----------------	5	223
Rock-----------------	9	30	Sand-----------------	7	230
Clay-----------------	10	40	Shale----------------	10	240
Sand, streaks, and clay---------------	31	71	Sand and shale-------	26	266
			Sand-----------------	8	274
Shale----------------	24	95	Shale----------------	4	278
Sand, streaks, and shale--------------	10	105	Rock-----------------	4	282
Sand, coarse, gray, and streaks of shale--------------	81	186	Shale----------------	49	331

Table 10.--Drillers' logs of wells--Continued

Well BU-67-19-608

Owner: Mobil Oil Co. Driller: Layne-Texas Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay and gravel------	5	5	Shale----------------	18	283
Shale, sandy---------	50	55	Rock-----------------	2	285
Rock-----------------	5	60	Sand, hard (water)---	35	320
Clay, gravel, and lignite-----------	6	66	Sand (water)---------	14	334
Sand-----------------	9	75	Rock-----------------	2	336
Shale, sandy, hard---	41	116	Sand, hard (water)---	8	344
Rock-----------------	2	118	Sand (water)---------	56	400
Shale, sandy---------	18	136	Shale----------------	10	410
Sand, clean, and shale--------------	16	152	Shale, hard----------	15	425
Sand (water)---------	33	185	Shale----------------	9	434
Soapstone------------	5	190	Rock-----------------	2	436
Rock-----------------	1	191	Shale----------------	22	458
Sand-----------------	7	198	Sand (water)---------	17	475
Shale----------------	14	212	Sand (water) and lignite-----------	7	482
Hard layers----------	3	215	Sand (water)---------	18	500
Shale----------------	45	260	Soapstone------------	2	502
Hard layers----------	5	265	Sand-----------------	10	512
			Shale----------------	7	519

Table 10.--Drillers' logs of wells--Continued

Well BU-67-20-104

Owner: John Davenport. Driller: Davenport Irrigation Equipment Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand----------------	3	3	Sand and rock--------	2	237
Caliche--------------	7	10	Shale----------------	3	240
Gravel---------------	10	20	Shale, sandy---------	60	300
Shale----------------	25	45	Sand-----------------	16	316
Rock-----------------	1	46	Rock-----------------	4	320
Sand-----------------	18	64	Sand and rock--------	18	338
Rock-----------------	1	65	Sand-----------------	20	358
Shale----------------	35	100	Sand, hard-----------	2	360
Shale, sandy---------	20	120	Rock-----------------	4	364
Sand-----------------	105	225	Shale----------------	1	365
Shale----------------	10	235	No record------------	215	580

Well BU-67-20-205

Owner: Billy Dorris. Driller: Davenport Irrigation Equipment Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay, sandy----------	10	10	Shale----------------	7	100
Rock-----------------	1	11	Shale, sandy---------	20	120
Shale----------------	47	58	Sand-----------------	25	145
Rock-----------------	6	64	Shale, sandy---------	15	160
Shale, sandy---------	26	90	Sand-----------------	26	186
Rock-----------------	3	93	Shale----------------	4	190

Table 10.--Drillers' logs of wells--Continued

Well BU-67-20-802

Owner: Paul Zedler. Driller: Davenport Irrigation Equipment Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand-----------------	55	55	Sand, fine-----------	10	153
Shale----------------	20	75	Rocks and sandy shale	22	175
Shale, sandy---------	24	99	Rock-----------------	2	177
Rock-----------------	3	102	Shale----------------	3	180
Shale, sandy---------	18	120	Rock-----------------	2	182
Shale----------------	23	143	Sand and rock--------	18	200

Well BU-67-21-104

Owner: J. Nickel. Driller: Lockhart Welding Service.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Sand-----------------	4	4	Shale----------------	51	213
Clay, red, yellow----	76	80	Rock-----------------	4	217
Sand-----------------	30	110	Shale----------------	13	230
Shale----------------	50	160	Sand-----------------	70	300
Rock-----------------	2	162			

Well BU-67-21-302

Owner: I. O. Stigall. Driller: Leroy Richter.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Clay-----------------	8	8	Shale, sandy---------	164	279
Shale----------------	67	75	Rock-----------------	1	280
Sand-----------------	10	85	Sand-----------------	54	334
Shale----------------	30	115			

Table 11.--Water levels in wells

Date	Water level	Date	Water level	Date	Water level
		Well BU-67-02-502			
Owner: J. A. Pfeiffer.					
Oct. 24, 1963	10.90	Dec. 9, 1963	11.46	Apr. 24, 1964	12.21
Nov. 5, 1963	11.07	Dec. 30, 1963	11.65	June 20, 1964	11.74
Nov. 19, 1963	11.24	Mar. 2, 1964	12.03		
		Well BU-67-02-601			
Owner: J. A. Pfeiffer.					
June 12, 1946	8.77	Dec. 30, 1963	16.46	June 20, 1964	16.70
Oct. 24, 1963	15.96	Mar. 2, 1964	16.64		
Nov. 19, 1963	16.23	Apr. 24, 1964	16.60		
		Well BU-67-02-605			
Owner: Walter Seeliger.					
Nov. 5, 1963	23.52	Dec. 30, 1963	24.10	Apr. 24, 1964	24.83
Nov. 19, 1963	23.69	Mar. 2, 1964	24.56	June 20, 1964	24.86
		Well BU-67-02-803			
Owner: O. F. Wiede.					
Nov. 5, 1963	23.18	Dec. 30, 1963	23.57	Apr. 24, 1964	24.24
Nov. 19, 1963	23.30	Mar. 2, 1964	23.98	June 20, 1964	24.50
		Well BU-67-02-902			
Owner: G. N. Martindale.					
Mar. 28, 1946	16.36	Dec. 30, 1963	20.23	Apr. 24, 1964	20.37
Nov. 4, 1963	20.18	Mar. 2, 1964	20.09	June 20, 1964	20.65

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level

Well BU-67-03-703

Owner: Edwin Ahlhardt.

Jan. 24, 1946	22.94	Dec. 30, 1963	23.82	Apr. 24, 1964	23.62
Oct. 24, 1963	23.54	Mar. 2, 1964	23.54	June 20, 1964	23.68

Well BU-67-03-705

Owner: A. W. Jolley Estate.

May 8, 1943	15.5	Mar. 18, 1946	14.52	May 18, 1946	14.30
Jan. 25, 1946	14.60	Mar. 30, 1946	14.56	May 24, 1946	14.26
Feb. 9, 1946	14.85	Apr. 8, 1946	14.62	June 8, 1946	14.06
Feb. 16, 1946	14.93	Apr. 20, 1946	14.69	June 15, 1946	14.10
Feb. 25, 1946	14.77	Apr. 27, 1946	14.63	June 29, 1946	14.14
Mar. 9, 1946	14.93	May 4, 1946	14.52	Nov. 6, 1963	18.29

Well BU-67-03-706

Owner: E. H. Strandtman.

May 8, 1943	18.4	Apr. 8, 1946	16.81	June 29, 1946	16.62
Jan. 25, 1946	17.00	Apr. 20, 1946	16.89	Nov. 6, 1963	19.60
Feb. 9, 1946	17.26	Apr. 27, 1946	17.01	Dec. 30, 1963	19.77
Feb. 16, 1946	17.30	May 4, 1946	16.95	Feb. 20, 1964	19.91
Feb. 25, 1946	17.24	May 18, 1946	16.81	Apr. 24, 1964	20.07
Mar. 9, 1946	17.20	May 24, 1946	16.78	June 20, 1964	20.01
Mar. 18, 1946	16.87	June 8, 1946	16.65		
Mar. 30, 1946	16.78	June 15, 1946	16.62		

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level

Well BU-67-03-709

Owner: Mrs. Lawrence Horn.

May 8, 1943	13.8	Nov. 4, 1963	16.39	Apr. 24, 1964	17.29
Jan. 24, 1946	14.51	Mar. 2, 1964	17.02		

Well BU-67-03-802

Owner: City of Lockhart well 2.

June 3, 1943	17.1	Mar. 9, 1946	15.76	May 4, 1946	16.10
Jan. 12, 1946	16.05	Mar. 18, 1946	15.43	May 24, 1946	15.85
Feb. 9, 1946	15.99	Mar. 30, 1946	15.54	June 8, 1946	16.00
Feb. 16, 1946	16.09	Apr. 8, 1946	15.70	June 15, 1946	16.24
Feb. 25, 1946	15.92	Apr. 27, 1946	15.87	Apr. 3, 1964	18.98

Well BU-67-03-805

Owner: W. W. Cardwell.

May 7, 1943	16.0	Apr. 8, 1946	13.55	June 29, 1946	13.48
Jan. 29, 1946	13.01	Apr. 20, 1946	13.63	Nov. 6, 1963	18.44
Feb. 9, 1946	13.80	Apr. 27, 1946	13.64	Nov. 19, 1963	18.46
Feb. 16, 1946	13.97	May 4, 1946	13.51	Dec. 30, 1963	18.55
Feb. 25, 1946	13.81	May 18, 1946	13.43	Feb. 20, 1964	18.70
Mar. 9, 1946	13.80	May 24, 1946	13.51	Apr. 24, 1964	18.96
Mar. 18, 1946	13.53	June 8, 1946	13.48	June 20, 1964	18.66
Mar. 30, 1946	13.55	June 15, 1946	13.42		

Well BU-67-03-806

Owner: W. H. Barsh.

Date	Water level	Date	Water level	Date	Water level
May 7, 1943	24.3	Apr. 8, 1946	22.8	June 29, 1946	22.7
Jan. 29, 1946	23.1	Apr. 20, 1946	22.8	Nov. 19, 1963	27.00
Feb. 9, 1946	23.1	Apr. 27, 1946	22.9	Dec. 30, 1963	27.09
Feb. 16, 1946	23.2	May 4, 1946	22.8	Feb. 20, 1964	27.28
Feb. 25, 1946	23.1	May 18, 1946	22.7	Apr. 24, 1964	27.50
Mar. 9, 1946	23.1	May 24, 1946	22.8	June 20, 1964	27.58
Mar. 18, 1946	23.1	June 8, 1946	22.7		
Mar. 30, 1946	22.7	June 15, 1946	22.7		

Well BU-67-04-401

Owner: W. M. Riddle.

Date	Water level	Date	Water level	Date	Water level
Apr. 12, 1946	95.17	July 15, 1954	94.81	Oct. 13, 1955	95.07
May 28, 1952	94.87	Aug. 12, 1954	94.80	Nov. 17, 1955	95.03
Sept.30, 1952	94.88	Sept.16, 1954	94.79	Dec. 16, 1955	95.19
Feb. 16, 1953	94.80	Oct. 15, 1954	94.86	Jan. 19, 1956	95.05
Mar. 21, 1953	94.66	Nov. 19, 1954	94.91	Feb. 16, 1956	94.78
July 7, 1953	94.98	Dec. 16, 1954	94.86	Mar. 19, 1956	95.05
Oct. 15, 1953	95.02	Jan. 17, 1955	94.77	Apr. 19, 1956	94.88
Feb. 10, 1954	94.78	May 11, 1955	94.88	May 16, 1956	94.94
Mar. 9, 1954	94.69	June 10, 1955	94.79	June 21, 1956	94.94
Apr. 6, 1954	94.74	July 21, 1955	95.01	July 16, 1956	95.03
May 13, 1954	94.68	Aug. 18, 1955	94.94	Aug. 14, 1956	95.04
June 14, 1954	94.73	Sept.14, 1955	95.06	Sept.13, 1956	95.07

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Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level
		Well BU-67-04-401--Continued			
Oct. 16, 1956	95.07	May 16, 1957	94.76	May 27, 1958	94.98
Nov. 20, 1956	94.87	June 18, 1957	94.93	Aug. 25, 1958	95.00
Dec. 14, 1956	94.81	July 19, 1957	94.97	Nov. 1, 1958	95.13
Jan. 14, 1957	94.94	Aug. 8, 1957	95.00	Dec. 31, 1958	95.34
Feb. 14, 1957	94.91	Nov. 19, 1957	94.98	Feb. 20, 1964	95.01
Mar. 21, 1957	94.69	Mar. 27, 1958	94.81		

Well BU-67-04-503

Owner: M. R. Riddle.

Apr. 12, 1946	58.28	Sept.16, 1954	59.44	Mar. 19, 1956	57.29
May 28, 1952	57.21	Oct. 15, 1954	57.81	Apr. 16, 1956	57.82
Sept.30, 1952	57.16	Nov. 19, 1954	59.17	May 16, 1956	58.73
Feb. 16, 1953	58.60	Dec. 16, 1954	57.80	June 21, 1956	57.49
Mar. 21, 1953	55.90	Jan. 17, 1955	58.42	July 16, 1956	58.91
May 7, 1953	56.74	May 11, 1955	56.96	Aug. 14, 1956	58.98
July 7, 1953	57.99	June 10, 1955	57.18	Sept.13, 1956	57.98
Oct. 15, 1953	57.33	July 21, 1955	59.41	Oct. 16, 1956	57.29
Feb. 10, 1954	57.03	Aug. 18, 1955	58.87	Nov. 20, 1956	57.15
Mar. 9, 1954	57.44	Sept.14, 1955	59.47	Dec. 14, 1956	57.30
Apr. 6, 1954	57.97	Oct. 13, 1955	57.64	Jan. 14, 1957	56.79
May 13, 1954	61.73	Nov. 17, 1955	57.31	Feb. 14, 1957	56.75
June 14, 1954	58.40	Dec. 16, 1955	56.82	Mar. 21, 1957	56.34
July 15, 1954	60.20	Jan. 19, 1956	56.60	May 16, 1957	56.44
Aug. 12, 1954	58.34	Feb. 16, 1956	56.27	June 19, 1957	57.40

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Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level
Well BU-67-04-503--Continued					
July 19, 1957	58.24	May 27, 1958	56.66	Sept.24, 1962	54.40
Aug. 8, 1957	59.61	Aug. 25, 1958	56.96	Nov. 1, 1963	55.03
Nov. 20, 1957	56.28	Nov. 24, 1959	57.04	Dec. 31, 1963	54.61
Mar. 27, 1958	55.76	Sept.12, 1960	55.38	Feb. 20, 1964	54.45

Well BU-67-04-701

Owner: S. Johnson.

Apr. 4, 1947	69.91	Dec. 16, 1954	73.66	Aug. 14, 1956	73.79
Sept.30, 1952	75.70	Jan. 17, 1955	73.37	Sept.13, 1956	73.79
Feb. 17, 1953	74.43	May 11, 1955	74.21	Oct. 16, 1956	73.96
Mar. 21, 1953	73.83	June 10, 1955	73.23	Nov. 20, 1956	73.71
May 7, 1953	74.53	July 21, 1955	74.64	Dec. 14, 1956	73.56
July 7, 1953	74.99	Aug. 18, 1955	73.92	Jan. 14, 1957	73.79
Oct. 15, 1953	75.26	Sept.14, 1955	74.53	Feb. 14, 1957	73.76
Feb. 10, 1954	74.97	Oct. 13, 1955	74.05	Mar. 21, 1957	73.52
Mar. 9, 1954	78.26	Nov. 17, 1955	74.11	May 16, 1957	73.59
Apr. 6, 1954	79.30	Dec. 16, 1955	74.23	June 19, 1957	74.82
May 13, 1954	75.61	Jan. 19, 1956	74.00	July 19, 1957	73.96
June 14, 1954	81.35	Feb. 16, 1956	73.45	Aug. 8, 1957	73.95
July 15, 1954	78.94	Mar. 19, 1956	73.91	Nov. 20, 1957	73.92
Aug. 17, 1954	77.62	Apr. 19, 1956	73.79	Mar. 24, 1958	73.66
Sept.16, 1954	75.86	May 16, 1956	73.84	May 27, 1958	73.64
Oct. 17, 1954	74.94	June 21, 1956	73.63	Aug. 25, 1958	73.63
Nov. 19, 1954	76.00	July 16, 1956	73.77	Nov. 24, 1959	73.50

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Date	Water level	Date	Water level	Date	Water level
Well BU-67-04-701--Continued					
Sept.12, 1960	73.36	Sept.24, 1962	72.91	Dec. 31, 1963	73.28
Oct. 20, 1961	73.16	Nov. 1, 1963	73.00	Feb. 20, 1964	72.95

Well BU-67-04-901

Owner: Loy Taylor.

Apr. 17, 1946	157.79	Aug. 18, 1955	160.89	Mar. 21, 1957	159.37
July 25, 1952	160.23	Sept.14, 1955	159.67	May 16, 1957	159.31
Sept.30, 1952	163.35	Oct. 13, 1955	159.70	June 19, 1957	159.46
Mar. 21, 1953	160.42	Nov. 17, 1955	159.78	July 19, 1957	159.61
Oct. 15, 1953	159.77	Dec. 16, 1955	159.64	Aug. 8, 1957	159.66
Mar. 9, 1954	159.76	Jan. 19, 1956	159.58	Nov. 19, 1957	159.14
May 13, 1954	159.59	Feb. 16, 1956	159.22	Mar. 27, 1958	158.68
Sept.16, 1954	160.33	Apr. 19, 1956	159.94	May 27, 1958	159.89
Oct. 15, 1954	160.69	May 16, 1956	159.68	Nov. 25, 1959	159.17
Nov. 19, 1954	160.62	July 16, 1956	170.18	Sept.12, 1960	159.21
Dec. 16, 1954	161.40	Aug. 14, 1956	159.82	Sept.24, 1962	162.18
Jan. 15, 1955	161.61	Sept.13, 1956	160.84	Nov. 1, 1963	158.88
May 11, 1955	159.96	Oct. 16, 1956	159.74	Dec. 31, 1963	158.68
June 10, 1955	160.30	Dec. 14, 1956	160.28	Feb. 20, 1964	158.59
July 21, 1955	160.00	Feb. 13, 1957	160.19		

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level
		Well BU-67-04-902			
Owner: Dan T. Lackey.					
Apr. 17, 1946	120.37	Jan. 17, 1955	121.24	Oct. 16, 1956	117.26
July 25, 1952	117.33	May 11, 1955	117.07	Nov. 20, 1956	117.54
Sept.30, 1952	115.91	June 10, 1955	117.33	Dec. 14, 1956	117.33
Feb. 16, 1953	116.37	July 21, 1955	118.13	Mar. 21, 1957	121.62
Mar. 21, 1953	116.21	Aug. 18, 1955	118.76	May 16, 1957	130.67
May 7, 1953	116.21	Sept.14, 1955	119.08	July 19, 1957	126.73
July 7, 1953	116.43	Oct. 13, 1955	119.51	Aug. 8, 1957	124.63
Oct. 15, 1953	116.03	Nov. 17, 1955	119.69	Nov. 19, 1957	118.22
Feb. 10, 1954	116.60	Dec. 16, 1955	119.42	Mar. 27, 1958	117.41
Mar. 9, 1954	117.28	Jan. 19, 1956	119.17	May 27, 1958	117.45
Apr. 6, 1954	117.35	Feb. 16, 1956	119.12	Aug. 25, 1958	117.32
May 13, 1954	116.94	Mar. 19, 1956	119.28	Nov. 25, 1959	116.50
June 14, 1954	117.46	Apr. 19, 1956	119.13	Sept.12, 1960	115.97
July 15, 1954	117.19	May 16, 1956	118.56	Oct. 20, 1961	116.62
Aug. 12, 1954	119.29	June 21, 1956	117.15	Sept.24, 1962	114.08
Oct. 15, 1954	120.78	July 16, 1956	117.24	Nov. 1, 1963	113.41
Nov. 19, 1954	121.87	Aug. 14, 1956	117.27	Dec. 31, 1963	113.33
Dec. 16, 1954	121.61	Sept.13, 1956	117.24	Feb. 20, 1964	113.12
		Well BU-67-10-802			
Owner: T. E. Hightower.					
Apr. 8, 1946	22.23	Dec. 30, 1963	22.89	Apr. 24, 1964	22.79
Nov. 12, 1963	22.94	Mar. 2, 1964	22.73		

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level
		Well BU-67-11-501			
Owner: Vernon Blackwell.					
Mar. 20, 1946	80.45	May 11, 1955	82.42	Jan. 14, 1957	84.14
July 25, 1952	80.85	June 10, 1955	84.00	Feb. 14, 1957	84.13
Sept.29, 1952	80.97	July 21, 1955	84.54	Mar. 21, 1957	84.03
Feb. 16, 1953	80.29	Aug. 18, 1955	83.23	May 16, 1957	84.14
Mar. 21, 1953	80.11	Sept.14, 1955	83.18	June 18, 1957	84.27
May 7, 1953	80.07	Oct. 13, 1955	83.85	July 19, 1957	84.84
July 7, 1953	79.63	Nov. 18, 1955	83.39	Aug. 8, 1957	84.74
Oct. 15, 1953	80.56	Dec. 16, 1955	83.13	Nov. 19, 1957	84.24
Feb. 10, 1954	80.42	Jan. 19, 1956	83.31	Mar. 24, 1958	83.52
Mar. 9, 1954	80.52	Feb. 28, 1956	83.31	May 27, 1958	83.32
Apr. 6, 1954	80.61	Mar. 19, 1956	83.49	Aug. 25, 1958	83.64
May 13, 1954	80.59	Apr. 19, 1956	83.33	Nov. 24, 1959	84.53
June 14, 1954	81.12	May 16, 1956	83.12	Sept. 9, 1960	84.69
July 15, 1954	81.18	June 20, 1956	83.51	Oct. 20, 1961	84.25
Aug. 12, 1954	81.50	July 16, 1956	83.99	Sept.24, 1962	85.04
Sept.16, 1954	81.43	Aug. 14, 1956	84.07	Oct. 31, 1963	85.77
Oct. 15, 1954	81.72	Sept.13, 1956	83.95	Dec. 30, 1963	85.82
Nov. 19, 1954	81.72	Oct. 16, 1956	84.16	Mar. 3, 1964	85.56
Dec. 17, 1954	81.28	Nov. 20, 1956	84.00		
Jan. 17, 1955	81.03	Dec. 14, 1956	84.08		

Well BU-67-11-502

Owner: W. P. Morgan.

Date	Water level	Date	Water level	Date	Water level
Mar. 20, 1946	51.85	Nov. 17, 1955	52.82	May 16, 1957	53.98
July 25, 1952	50.86	Dec. 16, 1955	52.60	June 18, 1957	54.49
Sept.29, 1952	50.74	Jan. 19, 1956	53.20	July 19, 1957	56.19
Feb. 16, 1953	50.82	Feb. 16, 1956	53.01	Aug. 8, 1957	55.84
Mar. 21, 1953	50.52	Mar. 19, 1956	55.22	Nov. 19, 1957	54.38
May 7, 1953	51.48	Apr. 19, 1956	54.51	Mar. 24, 1958	54.27
July 7, 1953	51.50	May 16, 1956	53.35	May 27, 1958	53.99
Oct. 15, 1953	50.86	June 20, 1956	53.42	Aug. 25, 1958	54.73
Feb. 10, 1954	50.70	July 16, 1956	55.14	Nov. 25, 1959	54.97
May 13, 1954	51.45	Aug. 14, 1956	55.59	Sept. 9, 1960	55.38
June 14, 1954	51.75	Sept.13, 1956	55.20	Oct. 20, 1961	56.19
May 11, 1955	52.60	Oct. 16, 1956	54.26	Sept.24, 1962	55.19
June 10, 1955	53.17	Nov. 20, 1956	59.88	Oct. 31, 1963	55.45
July 21, 1955	52.53	Dec. 14, 1956	55.76	Dec. 31, 1963	55.75
Aug. 18, 1955	53.00	Jan. 14, 1957	53.94	Mar. 3, 1964	55.22
Sept.14, 1955	52.76	Feb. 13, 1957	54.13		
Oct. 13, 1955	53.32	Mar. 21, 1957	53.61		

Well BU-67-12-106

Owner: Marlin Moore.

Date	Water level	Date	Water level	Date	Water level
June 17, 1946	86.76	Feb. 17, 1953	49.66	July 7, 1953	49.90
July 25, 1952	85.16	Mar. 21, 1953	49.58	Oct. 15, 1953	50.28
Sept.29, 1952	49.70	May 7, 1953	75.46	Feb. 10, 1954	50.32

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Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level
Well BU-67-12-106--Continued					
Mar. 9, 1954	50.37	July 15, 1954	50.03	Nov. 19, 1954	50.39
Apr. 6, 1954	49.97	Aug. 12, 1954	50.13	Dec. 16, 1954	50.45
May 13, 1954	49.24	Sept.16, 1954	50.23	Jan. 17, 1955	50.41
June 14, 1954	50.07	Oct. 15, 1954	50.24	May 11, 1955	50.76

Well BU-67-12-303

Owner: J. J. Brown.

Date	Water level	Date	Water level	Date	Water level
June 20, 1946	63.81	Dec. 16, 1954	61.64	Aug. 14, 1956	62.28
Sept.29, 1952	61.24	Jan. 17, 1955	61.24	Sept.13, 1956	63.14
Feb. 16, 1953	60.80	May 11, 1955	61.38	Oct. 16, 1956	62.56
Mar. 21, 1953	60.55	June 10, 1955	61.46	Nov. 20, 1956	63.85
May 7, 1953	60.76	July 21, 1955	61.77	Dec. 12, 1956	62.68
July 7, 1953	60.57	Aug. 18, 1955	61.30	Jan. 17, 1957	62.68
Oct. 15, 1953	60.55	Sept.14, 1955	63.06	Feb. 13, 1957	63.05
Feb. 10, 1954	60.26	Oct. 13, 1955	63.08	Mar. 21, 1957	62.51
Mar. 9, 1954	61.88	Nov. 17, 1955	61.63	May 16, 1957	63.03
Apr. 6, 1954	60.38	Dec. 16, 1955	61.77	June 19, 1957	62.98
May 13, 1954	60.36	Jan. 19, 1956	61.89	July 19, 1957	63.60
June 14, 1954	60.52	Feb. 16, 1956	61.77	Aug. 8, 1957	63.69
July 15, 1954	60.74	Mar. 19, 1956	61.95	Nov. 20, 1957	63.22
Aug. 12, 1954	60.86	Apr. 19, 1956	61.78	Mar. 27, 1958	63.40
Sept.16, 1954	60.83	May 16, 1956	62.12	May 27, 1958	63.28
Oct. 15, 1954	61.24	June 22, 1956	62.13	Aug. 25, 1958	64.50
Nov. 19, 1954	61.69	July 17, 1956	62.98	Nov. 24, 1959	62.27

(Continued on next page)

Date	Water level	Date	Water level	Date	Water level
Well BU-67-12-303--Continued					
Sept.12, 1960	62.12	Sept.24, 1962	62.72	Dec. 31, 1963	63.69
Oct. 20, 1961	62.45	Nov. 1, 1963	62.55	Feb. 20, 1964	63.32

Well BU-67-12-503

Owner: Howard Taylor.

Feb. 15, 1946	5.0	May 11, 1955	15.16	Nov. 20, 1956	18.03
Feb. 17, 1953	12.7	June 10, 1955	14.99	Dec. 14, 1956	18.16
Mar. 21, 1953	12.06	July 21, 1955	15.36	Jan. 14, 1957	18.19
May 7, 1953	11.96	Aug. 18, 1955	15.58	Feb. 13, 1957	18.24
July 7, 1953	12.22	Sept.14, 1955	16.00	Mar. 21, 1957	17.96
Oct. 15, 1953	13.50	Oct. 13, 1955	16.08	May 16, 1957	17.46
Feb. 10, 1954	13.62	Nov. 17, 1955	16.50	June 19, 1957	16.91
Mar. 9, 1954	13.07	Dec. 16, 1955	16.40	July 19, 1957	16.96
Apr. 6, 1954	12.87	Jan. 19, 1956	16.35	Aug. 8, 1957	17.30
May 13, 1954	12.89	Feb. 16, 1956	16.18	Nov. 20, 1957	16.56
June 14, 1954	13.29	Mar. 19, 1956	16.49	Mar. 27, 1958	14.78
July 15, 1954	13.78	Apr. 19, 1956	16.63	May 27, 1958	14.69
Aug. 12, 1954	13.89	May 16, 1956	16.80	Aug. 25, 1958	16.01
Sept.16, 1954	14.23	June 21, 1956	16.83	Nov. 24, 1959	16.64
Oct. 15, 1954	14.75	July 16, 1956	17.15	Sept.12, 1960	16.28
Nov. 19, 1954	14.83	Aug. 14, 1956	17.52	Oct. 20, 1961	14.50
Dec. 16, 1954	14.79	Sept.13, 1956	17.77	Nov. 1, 1963	17.68
Jan. 17, 1955	14.79	Oct. 16, 1956	18.01	Feb. 20, 1964	17.41

Table 11.--Water levels in wells--Continued

Well BU-67-12-601

Owner: Mrs. Mamie McGee.

Date	Water level	Date	Water level	Date	Water level
1/ 1944	70.0	Dec. 16, 1954	75.92	Feb. 13, 1957	78.20
Feb. 17, 1953	75.02	Jan. 17, 1955	76.02	Mar. 21, 1957	78.07
Mar. 21, 1953	73.65	May 11, 1955	79.10	May 16, 1957	78.41
May 7, 1953	74.19	June 10, 1955	76.06	June 19, 1957	77.85
July 7, 1953	74.43	July 21, 1955	78.49	July 19, 1957	76.83
Feb. 10, 1954	79.92	Aug. 18, 1955	77.52	Aug. 8, 1957	76.17
Apr. 6, 1954	75.00	Nov. 17, 1955	78.06	Mar. 27, 1958	76.74
May 13, 1954	75.14	Dec. 12, 1955	76.93	May 27, 1958	76.45
June 14, 1954	75.45	Feb. 16, 1956	76.58	Aug. 25, 1958	76.88
July 15, 1954	76.30	May 16, 1956	77.07	Nov. 24, 1959	77.49
Aug. 12, 1954	76.32	June 21, 1956	79.37	Oct. 20, 1961	76.24
Sept.16, 1954	79.20	Oct. 16, 1956	76.57	Sept.24, 1962	76.63
Oct. 15, 1954	75.95	Dec. 14, 1956	78.27	Dec. 31, 1963	80.24
Nov. 19, 1954	79.83	Jan. 14, 1957	78.24		

1/ Reported.

Well BU-67-13-602

Owner: W. A. Cox.

Date	Water level	Date	Water level	Date	Water level
July 25, 1952	63.84	Dec. 17, 1954	63.63	June 20, 1956	63.84
Sept.30, 1952	63.87	May 13, 1955	63.78	Sept.13, 1956	63.86
Feb. 16, 1953	64.7	Aug. 22, 1955	63.94	Feb. 14, 1957	63.81
Oct. 20, 1953	64.54	Nov. 18, 1955	63.94	June 18, 1957	64.09
Aug. 17, 1954	64.69	Feb. 28, 1956	64.25	Nov. 19, 1957	64.01

(Continued on next page)

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level

Well BU-67-13-602--Continued

Date	Water level	Date	Water level	Date	Water level
Mar. 27, 1958	63.94	Sept. 9, 1960	64.19	Oct. 31, 1963	62.84
Aug. 25, 1958	64.06	Oct. 20, 1961	64.08	Dec. 31, 1963	63.09
Nov. 24, 1959	64.59	Sept.24, 1962	63.51	Feb. 20, 1964	62.98

Well BU-67-13-603

Owner: J. Sherry Estate.

Date	Water level	Date	Water level	Date	Water level
Mar. 26, 1946	87.96	Aug. 22, 1955	90.04	Nov. 19, 1957	89.77
July 25, 1952	89.21	Nov. 18, 1955	90.13	Mar. 27, 1958	88.51
Sept.30, 1952	89.16	Feb. 28, 1956	90.16	Aug. 25, 1958	87.93
Feb. 16, 1953	89.34	June 20, 1956	90.30	Nov. 24, 1959	86.89
Oct. 20, 1953	89.41	Sept.13, 1956	90.44	Oct. 31, 1963	85.13
Aug. 17, 1954	89.66	Feb. 14, 1957	90.57	Dec. 31, 1963	84.97
Dec. 17, 1954	89.07	June 18, 1957	90.44	Feb. 20, 1964	84.89
May 13, 1955	89.83				

Well BU-67-19-201

Owner: F. L. Fields.

Date	Water level	Date	Water level	Date	Water level
Mar. 20, 1946	113.4	Feb. 10, 1954	118.16	June 20, 1956	118.27
July 25, 1952	118.54	May 13, 1954	118.24	July 16, 1956	118.39
Feb. 16, 1953	119.79	Aug. 17, 1954	119.85	Sept.13, 1956	118.25
Mar. 21, 1953	118.78	Dec. 17, 1954	118.42	Oct. 16, 1956	119.78
May 7, 1953	120.17	May 13, 1955	118.28	Feb. 14, 1957	119.35
July 7, 1953	119.38	Aug. 22, 1955	118.47	Mar. 21, 1957	118.38
Oct. 15, 1953	118.43	Feb. 28, 1956	118.52	May 16, 1957	118.77

(Continued on next page)

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level
Well BU-67-19-201--Continued					
June 18, 1957	118.90	May 27, 1958	119.10	Sept.24, 1962	118.81
July 19, 1957	119.08	Aug. 25, 1958	120.47	Oct. 31, 1963	117.16
Aug. 8, 1957	119.47	Nov. 25, 1959	119.76	Dec. 30, 1963	117.95
Nov. 19, 1957	118.65	Sept. 9, 1960	118.76	Mar. 3, 1964	117.52
Mar. 24, 1958	119.25	Oct. 20, 1961	118.30		

Well BU-67-19-608

Owner: Mobil Oil Co.

July 3, 1946	34.10	Aug. 22, 1955	46.99	Mar. 24, 1958	40.90
July 24, 1952	43.69	Nov. 18, 1955	44.43	Aug. 25, 1958	48.23
Sept.29, 1952	42.49	Feb. 28, 1956	42.81	Nov. 24, 1959	44.50
Feb. 16, 1953	39.40	June 20, 1956	47.20	Sept. 9, 1960	47.11
Oct. 20, 1953	42.85	Sept.13, 1956	48.02	Oct. 20, 1961	48.35
Aug. 17, 1954	46.70	Feb. 14, 1957	45.57	Oct. 31, 1963	53.23
Dec. 17, 1954	42.52	June 18, 1957	43.36	Dec. 31, 1963	50.11
May 13, 1955	44.59	Nov. 19, 1957	44.85	Mar. 3, 1964	48.18

Well BU-67-19-609

Owner: T. I. Johnson.

Aug. 6, 1946	44.94	Dec. 17, 1954	46.75	June 20, 1956	46.95
July 24, 1952	46.19	May 13, 1955	46.56	Sept.13, 1956	47.66
Sept.29, 1952	45.55	Aug. 22, 1955	46.59	Feb. 14, 1957	46.92
Feb. 16, 1953	44.79	Nov. 18, 1955	46.65	June 18, 1957	45.30
Aug. 17, 1954	47.74	Feb. 28, 1956	46.37	Nov. 19, 1957	45.30

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Table 11.--Water levels in wells--Continued

Well BU-67-19-609--Continued

Date	Water level	Date	Water level	Date	Water level
Mar. 24, 1958	44.00	Sept. 9, 1960	45.32	Oct. 31, 1963	46.90
Aug. 25, 1958	45.51	Oct. 20, 1961	44.93	Dec. 31, 1963	46.18
Nov. 24, 1959	45.45	Oct. 24, 1962	45.36	Mar. 3, 1964	45.48

Well BU-67-19-610

Owner: N. O. Stair.

Date	Water level	Date	Water level	Date	Water level
Feb. 7, 1946	45.52	Aug. 22, 1955	52.27	Sept. 9, 1960	50.74
July 24, 1952	49.12	Nov. 18, 1955	51.98	Oct. 20, 1961	51.00
Sept.29, 1952	48.71	Feb. 28, 1956	55.38	Sept.24, 1962	54.23
Feb. 16, 1953	46.90	June 20, 1956	53.48	Oct. 31, 1963	55.89
Oct. 20, 1953	55.54	Feb. 14, 1957	51.16	Dec. 31, 1963	51.71
Aug. 17, 1954	56.83	June 18, 1957	48.80	Mar. 3, 1964	49.57
Dec. 17, 1954	50.38	Mar. 24, 1958	46.30		
May 13, 1955	51.97	Nov. 24, 1959	49.24		

Well BU-67-20-601

Owner: Abner Moore.

Date	Water level	Date	Water level	Date	Water level
Apr. 4, 1947	67.98	Aug. 22, 1955	69.60	Mar. 24, 1958	70.29
July 25, 1952	67.90	Nov. 18, 1955	69.80	Aug. 25, 1958	71.23
Sept.29, 1952	68.68	Feb. 28, 1956	70.12	Nov. 24, 1959	70.64
Feb. 16, 1953	70.17	June 21, 1956	70.11	Sept. 9, 1960	72.00
Oct. 20, 1953	68.55	Sept.13, 1956	70.07	Oct. 20, 1961	70.35
Aug. 17, 1954	68.67	Feb. 14, 1957	71.46	Sept.24, 1962	70.21
Dec. 17, 1954	68.92	June 18, 1957	71.55	Oct. 31, 1963	70.90
May 13, 1955	69.44	Nov. 19, 1957	72.29	Dec. 31, 1963	70.96

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level

Well BU-67-20-602

Owner: G. T. Westbrook.

May 7, 1946	73.08	Sept.29, 1952	74.78	Oct. 20, 1953	76.18
July 25, 1952	75.14	Feb. 16, 1953	75.39		

Well BU-67-20-603

Owner: G. T. Westbrook.

Feb. 14, 1957	76.14	Aug. 25, 1958	76.80	Sept.24, 1962	77.27
June 18, 1957	76.39	Nov. 24, 1959	77.20	Oct. 31, 1963	77.68
Nov. 19, 1957	76.63	Sept. 9, 1960	77.35	Dec. 31, 1963	77.63
Mar. 24, 1958	76.71	Oct. 20, 1961	77.15		

Well BU-67-20-604

Owner: Mrs. J. E. Ledbetter.

Apr. 4, 1947	62.39	Aug. 22, 1955	65.68	Mar. 24, 1958	67.88
July 25, 1952	65.26	Nov. 18, 1955	65.33	Aug. 25, 1958	68.13
Sept.29, 1952	65.23	Feb. 28, 1956	67.17	Sept. 9, 1960	68.67
Feb. 16, 1953	65.12	June 20, 1956	67.19	Oct. 20, 1961	68.33
Oct. 20, 1953	65.39	Sept.13, 1956	69.26	Sept.24, 1962	68.53
Aug. 17, 1954	70.13	Feb. 14, 1957	67.31	Oct. 31, 1963	69.20
Dec. 17, 1954	68.72	June 18, 1957	70.70	Dec. 31, 1963	68.90
May 13, 1955	64.13	Nov. 19, 1957	67.97		

Table 11.--Water levels in wells--Continued

Date	Water level	Date	Water level	Date	Water level
		Well BU-67-20-801			
Owner: Ben Huff.					
May 3, 1946	78.17	Dec. 17, 1954	79.61	Sept.13, 1956	81.93
July 24, 1952	79.75	May 13, 1955	80.97	Feb. 14, 1957	82.23
Sept.29, 1952	79.90	Aug. 22, 1955	81.13	June 18, 1957	82.40
Feb. 16, 1953	80.11	Nov. 18, 1955	81.35	Nov. 19, 1957	82.38
Oct. 20, 1953	80.04	Feb. 28, 1956	81.60	Mar. 24, 1958	81.66
Aug. 17, 1954	80.42	June 20, 1956	81.68		
		Well BU-67-21-101			
Owner: L. R. Dillon.					
May 17, 1946	33.00	Oct. 20, 1953	34.07	Nov. 24, 1959	37.75
July 25, 1952	34.13	Nov. 19, 1957	37.28	Sept. 9, 1960	34.38
Sept.30, 1952	34.26	Mar. 24, 1958	37.18	Oct. 20, 1961	32.34
Feb. 16, 1953	33.78	Aug. 25, 1958	37.46	Sept.24, 1962	33.86

Table 12.--Chemical analyses of water from wells and springs

(Analyses given are in parts per million except specific conductance, pH, percent sodium, sodium adsorption ratio, and residual sodium carbonate)

Water-bearing unit: Ke, Edwards Limestone; Kn, Navarro Group; Qal, alluvium; Ql, Leona Formation; Tc, Carrizo Sand; Tm, Midway Group; Tqc, Queen City Sand; Tr, Reklaw Formation; Twi, Wilcox Formation.

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3) a/	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Boron (B)	Dis-solved solids	Hard-ness as $CaCO_3$	Per-cent so-dium	Sodium adsorp-tion ratio (SAR)	Residual sodium carbon-ate (RSC)	Specific conduct-ance (micromhos at 25°C)	pH
BU-58-60-703	49	Mar. 26, 1946	Twi	--	--	--	--	--	--	66	28	41	--	62	--	--	165	--	--	--	--	--
704	18	Feb. 27, 1946	Twi	35	1.7	46	6.7	36	4.6	153	20	51	0.2	9.8	--	298	142	--	--	--	470	7.2
705	47	July 1, 1946	Twi	--	--	--	--	--	--	84	13	102	--	41	--	--	255	--	--	--	--	--
706	26	do	Twi	--	--	--	--	--	--	328	.16	84	--	2.2	--	--	210	--	--	--	--	--
707	150	Jan. 9, 1964	Twi	16	--	24	7.8	*150		334	37	74	.6	.0	--	473	92	78	6.8	3.63	795	7.6
67-02-503	29	June 13, 1946	Ql	--	--	--	--	--	--	270	16	16	--	30	--	--	248	--	--	--	--	--
507	21	June 12, 1946	Ql	--	--	--	--	--	--	246	20	16	--	41	--	--	240	--	--	--	--	--
601	19	do	Ql	--	--	--	--	--	--	226	32	26	--	34	--	--	240	--	--	--	--	--
602	21	do	Ql	--	--	--	--	--	--	160	13	28	--	60	--	--	232	--	--	--	--	--
603	35	June 13, 1946	Ql	--	--	--	--	--	--	253	25	27	--	55	--	--	225	--	--	--	--	--
704	31	Mar. 28, 1946	Qal	--	--	--	--	--	--	294	65	71	--	59	--	--	315	--	--	--	--	--
705	22	do	Qal	--	--	--	--	--	--	286	34	64	--	47	--	--	300	--	--	--	--	--
706	25	do	Qal	--	--	--	--	--	--	356	65	141	--	176	--	--	525	--	--	--	--	--
801	22	Feb. 14, 1946	Ql	--	--	122	5.1	*38		268	40	81	--	40	--	513	326	--	.9	.00	--	--
902	25	Mar. 28, 1946	Ql?	--	--	--	--	--	--	264	110	358	--	58	--	--	450	--	--	--	--	--
905	24	Mar. 29, 1946	Ql?	--	--	--	--	--	--	248	65	239	--	38	--	--	405	--	--	--	--	--
03-301	20	June 11, 1946	Twi	--	--	--	--	--	--	340	1,150	1,240	--	--	--	--	--	--	--	--	--	--
303	67	do	Twi	--	--	--	--	--	--	298	24	54	--	0	--	--	225	--	--	--	--	--
304	72	Feb. 27, 1946	Twi	--	--	--	--	--	--	336	85	560	--	1.5	--	--	668	--	--	--	--	--
401	14	June 12, 1946	Ql	--	--	--	--	--	--	308	65	32	--	25	--	--	255	--	--	--	--	--
402	30	do	Ql	--	--	--	--	--	--	284	54	70	--	33	--	--	248	--	--	--	--	--
403	--	Mar. 5, 1964	Ke(?)	1.3	--	332	280	*4,550		89	1,660	7,140	--	--	--	14,000	1,980	--	--	.00	20,800	6.9
601	49	Apr. 12, 1946	Twi	--	--	--	--	--	--	412	80	94	--	.5	--	--	315	--	--	--	--	--
602	35	June 11, 1946	Twi	--	--	--	--	--	--	340	765	148	--	--	--	--	--	--	--	--	--	--
603	28	do	Twi	--	--	--	--	--	--	338	430	800	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3) a/	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Boron (B)	Dis-solved solids	Hard-ness as $CaCO_3$	Per-cent so-dium	Sodium adsorp-tion ratio (SAR)	Residual sodium carbon-ate (RSC)	Specific conduct-ance (micromhos at 25°C)	pH
BU-67-03-703	25	Jan. 24, 1946	Ql	--	--	--	--	--	--	326	46	22	--	26	--	--	322	--	--	--	--	--
† 704	--	Feb. 20, 1964	Ke(?)	17	--	894	433	*2,480		547	2,130	4,770	--	--	--	11,000	4,010	--	--	0.00	15,800	6.9
705	23	Jan. 25, 1946	Ql	--	--	--	--	--	--	278	45	27	--	--	--	--	--	--	--	--	--	--
706	23	July 14, 1943	Ql	--	--	--	--	--	--	--	--	195	--	--	--	--	--	--	--	--	--	--
706	23	Aug. 23, 1943	Ql	--	--	--	--	--	--	--	--	209	--	--	--	--	--	--	--	--	--	--
706	23	Jan. 25, 1946	Ql	--	--	--	--	--	--	274	60	42	--	16	--	--	292	--	--	--	--	--
707	23	Jan. 24, 1946	Ql	--	--	--	--	--	--	272	26	20	--	20	--	--	315	--	--	--	--	--
708	16	do	Ql	--	--	--	--	--	--	253	35	26	--	--	--	--	--	--	--	--	--	--
709	17	do	Ql	--	--	--	--	--	--	282	26	38	--	39	--	--	300	--	--	--	--	--
711	31	do	Ql	--	--	--	--	--	--	316	45	37	--	26	--	--	285	--	--	--	--	--
712	22	do	Ql	--	--	--	--	--	--	298	45	30	--	--	--	--	--	--	--	--	--	--
713	17	do	Ql	--	--	--	--	--	--	303	90	100	--	--	--	--	--	--	--	--	--	--
715	12	Mar. 28, 1946	Ql	--	--	--	--	--	--	310	34	32	--	30	--	--	338	--	--	--	--	--
717	25	July 14, 1943	Ql	--	--	--	--	--	--	--	--	370	--	--	--	--	--	--	--	--	--	--
717	25	Aug. 23, 1943	Ql	--	--	--	--	--	--	--	--	390	--	--	--	--	--	--	--	--	--	--
717	25	Jan. 25, 1946	Ql	--	--	--	--	--	--	251	70	191	--	--	--	--	--	--	--	--	--	--
718	21	do	Ql	--	--	--	--	--	--	276	45	32	--	--	--	--	--	--	--	--	--	--
719	21	do	Ql	--	--	--	--	--	--	260	22	30	--	--	--	--	--	--	--	--	--	--
720	25	Aug. 23, 1943	Ql	--	--	--	--	--	--	--	--	30	--	--	--	--	--	--	--	--	--	--
720	25	Jan. 25, 1946	Ql	--	--	--	--	--	--	274	28	32	--	48	--	--	285	--	--	--	--	--
721	28	July 2, 1943	Ql	--	--	158	12	*121		299	127	215	--	32	--	812	444	--	--	.00	1,380	--
721	28	July 14, 1943	Ql	--	--	--	--	--	--	--	--	210	--	--	--	--	--	--	--	--	--	--
721	28	Aug. 23, 1943	Ql	--	--	--	--	--	--	--	--	197	--	--	--	--	--	--	--	--	--	--
721	28	Jan. 25, 1946	Ql	--	--	--	--	--	--	320	70	155	--	--	--	--	--	--	--	--	--	--
721	28	June 20, 1964	Ql	21	0.27	119	9.0	*80		314	54	112	0.4	45	--	594	334	--	1.9	.00	986	6.8
722	15	Jan. 25, 1946	Ql	--	--	--	--	--	--	277	40	29	--	--	--	--	--	--	--	--	--	--
723	21	July 14, 1943	Ql	--	--	252	9.0	*112		226	108	402	--	55	--	1,009	666	--	--	--	--	--
723	21	Jan. 25, 1946	Ql	--	--	--	--	--	--	358	60	102	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3) [a]	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
[1] BU-67-03-801	15	Mar. 16, 1943	Q1	17	0.16	142	7	*75		278	49	160	<0.4	53	--	667	384	--	--	--	--	7.2
[1] 801	15	Mar. 31, 1944	Q1	20	.04	142	7	*70		293	69	128	< .4	55	--	651	384	--	--	--	--	7.2
[1] 801	15	Apr. 3, 1945	Q1	21	.04	125	8	*86		299	70	91	.4	106	--	628	345	--	--	--	--	7.5
801	15	Feb. 8, 1946	Q1	14	.04	126	6.1	54	12	322	47	82	.0	54	--	566	340	--	--	--	941	7.3
[1] 801	15	Aug. 12, 1947	Q1	19	.14	122	14	*25		336	47	43	.2	40	--	484	362	--	--	--	--	7.2
[1] 801	15	May. 4, 1951	Q1	21	.08	107	7	*50		336	49	43	.2	23	--	481	296	--	--	--	--	7.4
[1] 802	25	Mar. 16, 1943	Q1	25	.2	420	29	*304		223	187	1,030	< .4	20	--	2,092	1,167	--	--	--	--	7.1
[1] 802	25	Apr. 2, 1944	Q1	32	.08	343	21	*276		241	292	724	< .4	27	--	1,924	943	--	--	--	--	7.2
[1] 802	25	Apr. 3, 1945	Q1	32	.23	346	25	*359		250	370	781	.5	71	--	2,193	1,167	--	--	--	--	7.2
[1] 802	25	Feb. 8, 1946	Q1	12	.96	246	15	269	15	293	321	465	.6	60	--	1,550	676	--	--	--	2,560	7.4
[1] 802	25	Aug. 12, 1947	Q1	25	.13	158	11	*212		342	263	224	.2	38	--	1,084	439	--	--	--	--	7.5
[1] 802	25	July 16, 1951	Q1	20	.05	109	7	*116		329	141	85	.3	22	--	705	301	--	--	--	--	7.5
[1] 803	15	Nov. 29, 1938	Q1	27	.05	168	15	*99		290	86	211	.4	89	--	887	482	--	--	--	--	7.7
[1] 803	15	Mar. 16, 1943	Q1	24	.08	286	19	*167		183	121	604	< .4	35	--	1,457	792	--	--	--	--	7.1
[1] 803	15	Mar. 31, 1944	Q1	30	.12	285	18	*204		250	220	540	.4	44	--	1,529	785	--	--	--	--	7.2
[1] 803	15	Apr. 3, 1945	Q1	23	.06	207	14	*199		281	200	355	.44	84	--	1,281	574	--	--	--	--	7.2
803	15	Feb. 8, 1946	Q1	15	.14	166	10	147	11	308	174	218	.0	60	--	979	456	--	--	--	1,600	7.4
[1] 803	15	Aug. 12, 1947	Q1	21	.09	133	13	*121		329	141	142	.2	40	--	785	387	--	--	--	--	7.4
[1] 803	15	May 4, 1951	Q1	24	.06	104	8	*116		323	109	103	.5	27	--	680	293	--	--	--	--	7.6
[1] 803	15	Jan. 7, 1963	Q1	--	.02	114	9	*85		311	72	101	.3	54	--	684	323	--	--	--	1,140	7.5
[1] 804	25	May 4, 1951	Q1	21	.05	88	9	*106		311	96	78	.4	26	--	582	257	--	--	--	--	7.6
805	21	July 14, 1943	Q1	--	--	--	--	--	--	--	--	262	--	--	--	--	--	--	--	--	--	--
805	21	Aug. 23, 1943	Q1	--	--	--	--	--	--	--	--	315	--	--	--	--	--	--	--	--	--	--
805	21	Jan. 29, 1946	Q1	--	--	--	--	--	--	361	60	162	--	--	--	--	--	--	--	--	--	--
806	29	July 14, 1943	Q1	--	--	--	--	--	--	--	--	88	--	--	--	--	--	--	--	--	--	--
806	29	Aug. 23, 1943	Q1	--	--	--	--	--	--	--	--	84	--	--	--	--	--	--	--	--	--	--
806	29	Jan. 29, 1946	Q1	--	--	--	--	--	--	278	34	43	--	61	--	--	300	--	--	--	--	--
807	24	Jan. 24, 1946	Q1	--	--	--	--	--	--	381	90	72	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3) a/	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Boron (B)	Dis-solved solids	Hard-ness as $CaCO_3$	Per-cent so-dium	Sodium adsorp-tion ratio (SAR)	Residual sodium carbon-ate (RSC)	Specific conduct-ance (micromhos at 25°C)	pH
BU-67-03-808	18	Jan. 29, 1946	Ql	--	--	--	--	--	--	268	95	93	--	165	--	--	405	--	--	--	--	--
809	28	do	Ql	--	--	--	--	--	--	332	105	292	--	--	--	--	--	--	--	--	--	--
810	30	Jan. 24, 1946	Ql	--	--	--	--	--	--	340	230	327	--	102	--	--	525	--	--	--	--	--
811	35	Jan. 25, 1946	Ql	--	--	--	--	--	--	330	40	46	--	--	--	--	--	--	--	--	--	--
04-202	27	Aug. 7, 1946	Twi	--	--	--	--	--	--	317	46	38	--	.0	--	--	300	--	--	--	--	--
401	129	Apr. 12, 1946	Twi	--	--	--	--	--	--	508	90	408	--	2.5	--	--	465	--	--	--	--	--
501	120	July 27, 1953	Twi	47	--	--	--	--	--	159	137	119	0.1	.2	--	653	300	--	--	--	1,090	8.2
501	120	Feb. 12, 1962	Twi	49	4.7	194	20		*81	264	332	128	.2	.0	--	934	566	--	1.5	0.00	1,330	7.0
502	110	Mar. 14, 1946	Twi	36	.88	132	18	36	17	376	72	85	.0	.8	--	647	404	--	--	--	961	7.4
503	82	Apr. 12, 1946	Twi	--	--	--	--	--	--	100	75	374	--	5.5	--	--	420	--	--	--	--	--
504	150	Aug. 7, 1946	Twi	--	--	--	--	--	--	339	60	44	--	.0	--	--	228	--	--	--	--	--
506	97	do	Twi	--	--	--	--	--	--	332	45	101	--	--	--	--	267	--	--	--	--	--
601	185	Aug. 5, 1946	Twi	--	--	--	--	--	--	416	220	372	--	.0	--	--	1,140	--	--	--	--	--
602	174	do	Twi	--	--	--	--	--	--	622	200	141	--	.0	--	--	525	--	--	--	--	--
701	94	Apr. 4, 1947	Twi	--	--	118	23		*43	236	120	116	--	2.0	--	614	389	--	--	--	909	--
2/ 709	136	Sept. 26, 1963	Twi	--	--	172	45	545	16	305	725	650	--	--	--	2,508	--	--	9.6	--	4,044	7.1
3/ 710	445	Feb. 4, 1952	Twi	22	5.0	67.2	13.5		*65.5	158.6	108.6	86	--	--	--	561	224	--	--	--	--	7.38
801	206	Aug. 2, 1946	Twi	--	--	--	--	--	--	370	26	35	--	--	--	--	132	--	--	--	--	--
901	371	Aug. 3, 1946	Twi	--	--	--	--	--	--	266	25	152	--	--	--	--	210	--	--	--	--	--
902	216	Apr. 17, 1946	Twi	--	--	--	--	--	--	592	480	180	--	--	--	--	675	--	--	--	--	--
905	200	Aug. 3, 1946	Twi	--	--	--	--	--	--	352	20	76	--	--	--	--	237	--	--	--	--	--
906	295	June 24, 1964	Twi	19	.64	108	88		*451	604	244	610	.1	2.0	--	1,820	632	61	7.8	.00	3,000	7.3
05-402	200	Aug. 5, 1946	Twi	--	--	--	--	--	--	517	70	308	--	--	--	--	802	--	--	--	--	--
701	165	Aug. 3, 1946	Twi	--	--	--	--	--	--	662	95	332	--	--	--	--	495	--	--	--	--	--
702	350	Aug. 5, 1946	Twi	--	--	--	--	--	--	364	130	205	--	--	--	--	292	--	--	--	--	--
703	160	June 24, 1964	Twi	15	.05	178	88		*474	636	216	770	.3	3.0	--	2,060	806	56	7.3	.00	3,410	7.0
801	27	do	Tc	95	.00	26	13		*60	32	17	96	1.1	83	--	407	118	53	2.4	.00	565	6.0
802	419	do	Twi	38	5.6	80	16		*99	236	4.8	200	.2	.2	--	554	266	45	2.6	.00	1,010	7.4

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3) a/	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Boron (B)	Dis-solved solids	Hard-ness as $CaCO_3$	Per-cent so-dium	Sodium adsorp-tion ratio (SAR)	Residual sodium carbon-ate (RSC)	Specific conduct-ance (micromhos at 25°C)	pH
BU-67-10-101	33	Feb. --, 1943	Qal	14	0.08	90	23	18	3.4	325	19	21	0.2	57	--	406	319	--	0.4	0.00	--	7.6
103	29	June 13, 1946	Qal	--	--	--	--	--	--	265	60	102	--	60	--	--	300	--	--	--	--	--
201	25	Feb. 14, 1946	Qal(?)	14	.06	244	28	155	22	265	183	426	.6	99	--	1,300	724	--	--	.00	225	7.2
202	34	Apr. 9, 1946	Qal(?)	--	--	--	--	--	--	244	170	450	--	52	--	--	518	--	--	--	--	--
203	30	June 20, 1964	Qal	22	.40	178	19	*189		268	273	268	.7	62	--	1,140	522	44	3.6	.00	1,780	6.8
301	--	Mar. 28, 1946	Qal(?)	--	--	--	--	--	--	306	240	248	--	81	--	--	405	--	--	--	--	--
501	35	Aug. 9, 1946	Qal	--	--	--	--	--	--	268	65	126	--	108	--	--	258	--	--	--	--	--
502	21	May 9, 1946	Qal	--	--	--	--	--	--	420	210	443	--	168	--	--	765	--	--	--	--	--
504	24	Apr. 8, 1946	Qal(?)	--	--	--	--	--	--	296	55	30	--	38	--	--	270	--	--	--	--	--
801	34	Feb. 13, 1962	Qal	12	.00	78	16	11	.7	275	26	22	.3	3.8	0.10	305	260	8	.3	.00	538	6.7
802	30	Apr. 8, 1946	Qal	--	--	--	--	--	--	391	24	28	--	.5	--	--	248	--	--	--	--	--
901	27	Feb. --, 1943	Qal	15	.05	67	19	12	3.4	257	26	20	.6	10	--	300	245	--	--	--	--	8.0
907	18	Apr. 3, 1946	Twi	--	--	--	--	--	--	309	1,460	467	--	--	--	--	--	--	--	--	--	--
908	30	do	Twi	--	--	--	--	--	--	638	340	308	--	23.1	--	--	405	--	--	--	--	--
11-101	20	Apr. 19, 1946	Ql	--	--	--	--	--	--	308	75	98	--	86	--	--	315	--	--	--	--	--
104	Spring	Mar. 29, 1946	Ql	--	--	--	--	--	--	300	36	27	--	19	--	--	270	--	--	--	--	--
105	Spring	Jan. 30, 1946	Ql	--	--	--	--	--	--	261	36	36	--	49	--	--	308	--	--	--	--	--
202	28	Apr. 19, 1946	Ql	--	--	--	--	--	--	304	40	72	--	62	--	--	300	--	--	--	--	--
203	74	Mar. 20, 1946	Ql and Twi	--	--	--	--	--	--	346	100	770	--	260	--	--	765	--	--	--	--	--
204	29	do	Ql	--	--	--	--	--	--	357	20	157	--	150	--	--	502	--	--	--	--	--
3/ 301	324	Feb. 14, 1952	Twi	16	5.0	85.8	9.6	*81.2		373.3	27.7	67	--	--	--	685	254	--	--	--	--	7.35
306	138	Mar. 3, 1964	Twi	33	b/ .00	155	22	*177		486	66	265	.2	24	--	981	477	45	3.5	.00	1,680	7.4
307	73	Apr. 16, 1946	Twi	--	--	--	--	--	--	292	12	80	--	118	--	--	442	--	--	--	--	--
308	52	do	Ql	--	--	--	--	--	--	292	15	20	--	20	--	--	270	--	--	--	--	--
309	100	Apr. 2, 1964	Twi	20	.10	92	2.6	*17		272	15	20	.3	13	--	314	240	14	.5	.00	532	7.0
310	50	Jan. 30, 1946	Ql and Twi	--	--	--	--	--	--	309	16	36	--	32	--	--	315	--	--	--	--	--
311	110	Apr. 2, 1964	Twi	28	1.8	168	29	*165		308	181	322	.5	1.2	--	1,050	538	40	3.1	.00	1,780	7.1
312	2,500?	Jan. 30, 1946	Twi	--	--	66	19	*279		356	50	358	--	1.2	--	970	242	--	--	--	--	--

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3) a/	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
BU-67-11-501	168	Mar. 20, 1946	Twi	--	--	--	--	--	--	344	140	156	--	0.5	--	--	300	--	--	--	--	--
502	94	do	Twi	--	--	--	--	--	--	300	650	430	--	30	--	--	930	--	--	--	--	--
601	125	May 9, 1958	Twi	32	1.5	82	5.8	*49		358	15	17	0.4	.0	--	377	228	32	1.4	0.00	611	7.8
606	150	May 3, 1946	Twi	--	--	--	--	--	--	252	14	30	--	85	--	--	232	--	--	--	--	--
607	70	do	Twi	--	--	--	--	--	--	258	22	35	--	126	--	--	322	--	--	--	--	--
608	86	do	Twi	--	--	--	--	--	--	265	16	33	--	130	--	--	322	--	--	--	--	--
618	35	Feb. 2, 1946	Twi	--	--	364	67	*172		432	613	400	--	1.5	--	1,830	1,180	--	--	--	--	--
701	30	Apr. 3, 1946	Twi	--	--	--	--	--	--	478	300	480	--	540	--	--	870	--	--	--	--	--
702	42	do	Twi	--	--	--	--	--	--	542	55	104	--	0	--	--	225	--	--	--	--	--
703	56	do	Twi	--	--	--	--	--	--	408	44	42	--	1.0	--	--	240	--	--	--	--	--
704	65	do	Twi	--	--	--	--	--	--	38	850	190	--	--	--	--	900	--	--	--	--	--
705	130?	Nov. 14, 1963	Twi	28	b/ .03	280	61	*290		360	240	730	--	6.7	--	1,810	950	40	4.1	.00	3,130	7.6
801	14	Mar. 20, 1946	Twi	--	--	--	--	--	--	106	100	49	--	110	--	--	270	--	--	--	--	--
902	44	May 7, 1946	Twi	--	--	--	--	--	--	302	360	184	--	8.7	--	--	390	--	--	--	--	--
905	203	Jan. 8, 1964	Twi	23	9.3	54	16	138	3.6	370	68	97	.3	.0	--	582	200	59	4.2	2.05	972	7.6
3/ 12-101	197	Feb. 18, 1952	Twi	11	1.1	98.4	10	*85.9		395.3	31.5	82	--	--	--	743	287	--	--	--	--	7.3
101	240	Aug. 11, 1952	Twi	38	.01	98	12	61	1.2	367	28	71	.2	.0	0.13	494	294	--	--	--	878	7.7
3/ 102	140	Apr. 24, 1952	Twi	15	16.1	34.4	6.8	*197.0		339	44.3	154	--	--	--	811	114	--	--	--	--	7.8
3/ 102	276	May 22, 1952	Twi	21	2.0	15.7	5.0	*206.4		375	33.4	116	--	--	--	803	60	--	--	--	--	8.12
102	283	Aug. 6, 1952	Twi	22	.37	19	6.6	201	.4	354	39	124	1.0	2.0	.40	591	74	--	--	.00	1,030	7.8
3/ 103	342	Feb. 9, 1952	Twi	26.8	1.0	88.6	18.4	*69.7		363.6	27.3	86	--	--	--	717	298	--	--	--	--	7.25
3/ 104	180	Feb. 22, 1952	Twi	8	.5	24.6	7.8	*159.1		293	81.5	80	--	--	--	683	93	--	--	--	--	7.9
3/ 105	253	May 17, 1952	Twi	14	12.5	13	3.2	*226.1		423	0	136	--	--	--	835	46	--	--	--	--	8.0
106	100	June 17, 1946	Twi	--	--	--	--	--	--	57	140	179	--	34	--	--	315	--	--	--	--	--
107	2,539?	Aug. 23, 1943	Twi	37	.06	87	20	*104		369	26	139	0	.2	--	595	299	--	--	--	986	7.8
107	2,539?	Jan. 30, 1946	Twi	--	--	--	--	--	--	374	26	126	--	--	--	--	--	--	--	--	--	--
110	39	June 27, 1946	Twi	--	--	--	--	--	--	294	90	209	--	1.0	--	--	330	--	--	--	--	--
112	300	June 7, 1964	Twi	22	--	35	12	*154		214	168	85	.3	.0	--	581	137	71	5.7	.77	921	7.6

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3) a/	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
3/ BU-67-12-113	136	June 23, 1952	Twi	51	4.0	43.2	6.2		*40.1	124.4	35.2	58	--	--	--	397	134	--	--	--	--	7.22
3/ 114	56	June 24, 1952	Twi	28	.1	74.8	5.5		*44.3	209.8	35.8	68	--	--	--	506	210	--	--	--	--	7.25
3/ 115	370	Oct. 29, 1952	Twi	15.0	.1	9.6	3.5		*221.3	398	26.2	116	--	--	--	809	38	--	--	--	--	8.4
202	153	June 17, 1942	Twi	--	--	--	--	--	--	322	120	158	--	1.8	--	--	210	--	--	--	--	--
203	100	June 19, 1946	Twi	--	--	--	--	--	--	164	50	206	--	.0	--	--	315	--	--	--	--	--
301	300	Mar. 14, 1946	Twi	22	.19	96	59	134	16	430	96	229	0.6	22	--	946	482	--	--	--	1,580	7.5
302	126	July 16, 1946	Twi	--	--	--	--	--	--	358	60	230	--	.0	--	--	315	--	--	--	--	--
303	125	June 20, 1946	Twi	--	--	--	--	--	--	360	250	550	--	6.5	--	--	900	--	--	--	--	--
305	345	do	Twi	--	--	--	--	--	--	296	150	375	--	--	--	--	555	--	--	--	--	--
306	100?	Aug. 2, 1946	Twi	--	--	--	--	--	--	302	40	80	--	.5	--	--	237	--	--	--	--	--
307	140	do	Twi	--	--	--	--	--	--	446	45	181	--	22	--	--	420	--	--	--	--	--
406	47	Apr. 16, 1946	Twi	--	--	--	--	--	--	330	16	22	--	45	--	--	330	--	--	--	--	--
407	92	May 3, 1946	Twi	--	--	--	--	--	--	549	65	755	--	125	--	--	915	--	--	--	--	--
408	113	do	Twi	--	--	--	--	--	--	307	17	25	--	.8	--	--	202	--	--	--	--	--
501	340	Mar. 25, 1953	Twi	45	.96	55	14		*51	241	21	60	.1	.0	--	365	194	--	--	--	619	7.5
501	340	Apr. 14, 1964	Twi	43	1.7	62	17	57	3.1	232	44	85	.3	.0	0.11	426	224	35	1.7	0.00	708	6.8
3/ 502	225	Apr. 28, 1953	Twi	20	.2	56	9.6		*60.2	212	30	74	--	--	--	486	180	--	--	--	--	7.97
502	320	May 23, 1953	Twi	65	.84	60	14		*63	208	44	89	.4	.2	--	438	207	--	--	--	701	7.4
502	320	Apr. 15, 1964	Twi	48	1.7	55	14	56	4.2	212	43	75	.2	.0	.11	400	194	38	1.7	.00	654	6.8
503	290	Feb. 15, 1946	Twi	--	--	--	--	--	--	82	70	104	--	--	--	--	240	--	--	--	--	--
3/ 516	163	Nov. 10, 1952	Twi	14.0	.9	58.8	13.8		*50.8	251.3	20.6	54	--	--	--	513	204	--	--	--	--	8.0
3/ 516	266	Nov. 13, 1952	Twi	36	1.4	66	14.4		*59	246.4	26	86	--	--	--	571	223	--	--	--	--	7.3
3/ 516	325	Nov. 14, 1952	Twi	12	.4	28	6.3		*155	327	37	88	--	--	--	683	96	--	--	--	--	7.85
3/ 517	275	Apr. 22, 1953	Twi	8	.05	51	12.8	154.6	--	336	31.8	146	--	--	--	767	180	--	--	--	--	8.3
518	50	May 17, 1946	Twi	--	--	--	--	--	--	312	56	286	--	.5	--	--	390	--	--	--	--	--
601	352	June 20, 1946	Twi	--	--	--	--	--	--	390	30	106	--	--	--	--	330	--	--	--	--	--
603	171	Feb. 15, 1946	Twi	--	--	--	--	--	--	101	7	181	--	.8	--	--	278	--	--	--	--	--
607	71	June 19, 1946	Twi	--	--	--	--	--	--	50	764	338	--	1.5	--	--	990	--	--	--	--	--

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3) a/	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
BU-67-12-701	49	June 14, 1946	Twi	--	--	--	--	--	--	394	80	224	--	0	--	--	382	--	--	--	--	--
703	19	do	Ql	--	--	--	--	--	--	230	16	6	--	3.2	--	--	270	--	--	--	--	--
801	34	May 17, 1946	Twi	--	--	--	--	--	--	122	40	57	--	9.6	--	--	72	--	--	--	--	--
803	31	do	Twi	--	--	--	--	--	--	170	848	658	--	--	--	--	--	--	--	--	--	--
13-101	400?	Mar. 5, 1964	Twi	4.6	--	12	1.5	102	4.5	122	78	60	0.2	1.2	0.2	324	36	84	7.4	1.28	566	7.9
102	450?	do	Twi	19	--	67	17	81	7.9	209	103	106	.2	.0	.2	504	237	42	2.3	.00	846	7.9
103	302	Feb. --, 1964	Twi	30	20	535	120	*190		374	802	780	.0	1.0	--	2,640	1,830	18	1.9	.00	3,850	7.4
303	14	Apr. 18, 1946	Tr	--	--	--	--	--	--	16	200	154	--	40	--	--	300	--	--	--	--	--
502	240	Jan. 10, 1964	Tc	53	7.6	5.5	4.4	30	8.4	0	80	53	.2	.2	--	236	32	39	2.3	.00	424	c/ 4.0
601	65	Apr. 18, 1946	Tqc	--	--	--	--	--	--	72	90	96	--	76	--	--	96	--	--	--	--	--
602	77	Mar. 1, 1946	Tr	--	--	--	--	--	--	0	300	738	--	1.0	--	--	645	--	--	--	--	--
603	171	Apr. 26, 1946	Tr	--	--	--	--	--	--	0	1,100	700	--	--	--	--	--	--	--	--	--	--
605	470	Feb. 20, 1964	Tc	37	2.4	14	1.2	*55		95	33	32	.4	.0	--	220	40	75	3.8	.76	326	6.8
613	100	June 20, 1964	Tr	25	16	118	57	*131		94	99	448	.2	1.8	--	927	529	35	2.5	.00	1,730	6.1
702	270	do	Tc	25	1.6	6.0	9.5	*20		65	15	20	.0	.0	--	128	54	44	1.2	.00	206	6.1
801	250	May 17, 1946	Tc	--	--	--	--	--	--	0	114	240	--	0	--	--	285	--	--	--	--	--
802	270	Feb. 19, 1964	Tc	37	--	195	41	*104		225	356	230	.2	.2	--	1,070	655	26	1.8	.00	1,660	6.9
901	16	Apr. 26, 1946	Tqc	--	--	--	--	--	--	238	35	102	--	110	--	--	240	--	--	--	--	--
14-401	120	Jan. 14, 1964	Tqc	76	4.0	39	19	*114		48	186	135	.1	.2	--	593	176	59	3.7	.00	912	6.1
4/ 403	500	Oct. 3, 1963	Tc	--	--	48	9	*90		0	270	50	--	--	--	470	150	--	--	--	--	4.3
403	500	Feb. 19, 1964	Tc	27	--	.2	.1	*174		90	240	39	.2	.0	--	524	--	--	76	1.46	808	7.1
406	550	June 20, 1964	Tc	10	.49	105	26	*41		268	199	22	.0	.0	--	535	369	19	.9	.00	868	7.3
701	97	May 2, 1946	Tqc	--	--	--	--	--	--	65	45	256	--	3.5	--	--	292	--	--	--	--	--
704	110	Feb. 6, 1964	Tqc	49	34	6.0	2.0	*66		70	88	12	.2	.2	--	258	23	86	6.0	.68	338	6.9
801	59	Feb. 19, 1964	Tqc	45	--	74	20	*78		66	6.0	261	.3	9.6	--	526	267	39	2.1	.00	997	6.7
19-108	108	Apr. 3, 1946	Twi	--	--	--	--	--	--	308	260	845	--	1.5	--	--	1,220	--	--	--	--	--
201	182	Mar. 20, 1946	Twi	--	--	--	--	--	--	226	500	231	--	.5	--	--	780	--	--	--	--	--
202	123	Aug. 9, 1946	Twi	--	--	--	--	--	--	242	1,110	468	--	.0	--	--	1,080	--	--	--	--	--

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3) a/	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Boron (B)	Dis-solved solids	Hard-ness as $CaCO_3$	Per-cent so-dium	Sodium adsorp-tion ratio (SAR)	Residual sodium carbon-ate (RSC)	Specific conduct-ance (micromhos at 25°C)	pH
BU-67-19-301	370	May 17, 1946	Twi	--	--	--	--	--	--	226	120	196	--	2.0	--	--	248	--	--	--	--	--
302	190	Aug. 9, 1946	Twi	--	--	--	--	--	--	118	13	70	--	.0	--	--	120	--	--	--	--	--
304	406	Jan. 8, 1964	Twi	11	--	13	8.1	*846		720	16	920	--	1.8	--	2,170	66	97	45	10.5	3,840	8.1
306	330	do	Twi	43	10	142	31	92	5.3	240	190	212	0.8	.0	--	834	482	29	1.8	.00	1,370	6.7
308	72	do	Twi	45	10	75	21	117	4.3	190	172	146	.6	.0	--	674	274	48	3.1	.00	1,080	6.6
† 313	--	Nov. 20, 1963	Ke(?)	29	--	1,720	646	*11,000		562	751	21,000	--	--	--	35,400	6,950	77	57	.00	48,200	6.7
401	27	June 25, 1946	Qal	--	--	--	--	--	--	538	140	164	--	24	--	--	525	--	--	--	--	--
402	120	Aug. 6, 1946	Twi	--	--	--	--	--	--	407	50	83	--	.0	--	--	382	--	--	--	--	--
501	180	Feb. 12, 1962	Twi	33	.98	58	27	72	4.1	290	42	98	.3	1.8	0.28	479	256	38	2.0	.00	826	7.4
502	149	Apr. 22, 1946	Twi	--	--	--	--	--	--	258	55	158	--	.8	--	--	144	--	--	--	--	--
506	36	June 25, 1946	Twi	--	--	--	--	--	--	360	8.0	18	--	9.6	--	--	330	--	--	--	--	--
507	315	Feb. 12, 1946	Twi	--	8.5	--	--	--	--	366	3	84	--	.0	--	--	285	--	--	--	--	--
1/ 601	259	Oct. 22, 1942	Twi	16	.24	12	5	*409		653	163	167	<.4	< .4	--	1,094	51	--	--	--	--	8.5
601	259	Feb. --, 1943	Twi	6.0	b/ .02	2.7	1.7	419	5.0	628	178	163	.2	.0	--	1,085	14	--	--	--	--	8.4
1/ 601	259	Aug. 19, 1943	Twi	21	.05	29	7	*385		628	180	168	.5	< .4	--	1,133	102	--	--	--	--	8.3
1/ 601	259	May 8, 1945	Twi	14	.05	5	1	*430		609	196	176	.9	.9	--	1,070	17	--	--	--	--	8.4
1/ 601	259	July 23, 1947	Twi	16	.25	10	4	*444		732	161	170	.2	1.3	--	1,127	42	--	--	--	--	8.5
1/ 601	259	Jan. 25, 1951	Twi	12	.06	11	6	*430		652	183	185	.1	< .4	--	1,220	52	--	--	--	--	8.6
1/ 601	259	June 21, 1954	Twi	10	.1	2	4	*451		634	211	185	.3	.9	--	1,175	22	--	--	--	--	8.7
1/ 601	259	Dec. 12, 1955	Twi	12	.05	2	1	*440		591	221	178	.2	< .4	--	1,102	9	--	--	--	--	8.8
1/ 601	259	June 6, 1960	Twi	--	.04	3	1	*405		597	215	183	.2	< .4	--	1,150	13	--	--	--	1,916	8.5
601	259	June 24, 1964	Twi	14	.00	2.0	1.0	433	1.6	570	227	175	.5	.2	.84	1,140	9	99	63	9.17	1,840	8.3
1/ 602	304	Oct. 22, 1942	Twi	17	.26	15	6	*405		560	223	174	.6	.7	--	1,084	62	--	--	--	--	8.7
602	304	Feb. --, 1943	Twi	8.0	.09	2.0	1.4	416	5.2	545	227	170	.0	.0	--	1,097	11	--	--	--	--	8.4
1/ 602	304	Aug. 19, 1943	Twi	23	.06	27	6	*393		569	226	173	.5	< .4	--	1,126	92	--	--	--	--	8.5
1/ 602	304	May 8, 1945	Twi	15	.06	7	1	*404		546	218	174	.8	< .4	--	1,068	22	--	--	--	--	8.4
1/ 602	304	July 23, 1947	Twi	19	.3	7	4	*441		629	222	174	.2	1.3	--	1,133	34	--	--	--	--	8.5
1/ 605	307	Dec. 12, 1955	Twi	12	.03	12	3	*450		707	157	174	.2	< .4	--	1,182	12	--	--	--	--	9.0

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3) a/	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Residual sodium carbonate (RSC)	Specific conductance (micromhos at 25°C)	pH
1/ BU-67-19-605	307	June 6, 1960	Twi	--	0.05	6	2	*500		666	170	343	0.2	< 0.4	--	1,545	24	--	--	--	2,575	8.4
605	307	June 20, 1964	Twi	14	.00	5.8	3.8	575	2.2	686	171	385	.4	.8	1.0	1,500	30	97	46	10.6	2,500	8.2
606	447	June 24, 1964	Twi	14	.00	1.5	1.8	505	2.3	718	202	220	.6	2.5	1.4	1,300	11	99	66	11.5	2,100	8.3
1/ 607	312	Dec. 12, 1955	Twi	15	.18	2	1	*441		731	123	170	.4	< .4	--	1,100	9	--	--	--	--	9.0
1/ 607	312	June 7, 1960	Twi	--	.04	2	--	*425		732	138	200	.3	< .4	--	1,174	12	--	--	--	1,956	8.5
607	312	June 20, 1964	Twi	14	.17	1.2	1.7	488	3.4	716	155	229	.4	1.0	1.1	1,250	10	99	67	11.5	2,040	8.2
608	519	Feb. 7, 1946	Twi	15	.12	2.2	1.3	525	22	786	212	222	.4	1.2	--	1,390	11	--	--	--	2,310	8.3
609	284	Aug. 6, 1946	Twi	--	--	--	--	--	--	803	3	1,410	--	--	--	--	--	--	--	--	--	--
612	300	Feb. 7, 1946	Twi	26	.62	122	6.1	78	9.9	427	63	68	.0	.5	--	584	330	--	--	--	981	7.4
613	150	do	Twi	21	2.2	90	23	65	6.5	419	23	72	.0	.2	--	507	319	--	--	--	923	7.7
3/ 614	260	Feb. 11, 1949	Twi	8	.3	77	26	*101		215	76	188	--	--	--	716	301	--	--	--	--	8.05
20-101	300	May 7, 1946	Twi	--	--	--	--	--	--	292	120	153	--	3.5	--	--	195	--	--	--	--	--
102	Spring	Feb. 2, 1946	Twi	--	--	4.6	1.9	*786		1,144	2	558	--	2.0	--	1,918	20	--	--	--	--	--
104	580	Mar. 4, 1964	Twi	12	b/ .00	3.0	1.3	*756		1,090	.0	540	--	.2	--	1,850	13	99	91	14.9	3,140	8.6
202	14	July 16, 1946	Twi	--	--	--	--	--	--	62	190	83	--	76	--	--	210	--	--	--	--	--
203	46	do	Twi	--	--	--	--	--	--	410	17	146	--	9.4	--	--	360	--	--	--	--	--
2/ 204	360	June 11, 1956	Twi	--	--	24	32	*690		1,020	17	599	--	--	--	2,251	198	--	--	--	--	--
205	190	June 24, 1964	Twi	44	16	320	88	*127		296	467	500	.5	2.0	--	1,690	1,160	19	1.6	.00	2,540	6.6
402	24	July 16, 1946	Twi	--	--	--	--	--	--	281	60	39	--	7.6	--	--	180	--	--	--	--	--
403	321	Nov. 29, 1963	Twi	15	--	1.0	2.3	*713		1,010	.0	520	--	1.8	--	1,750	12	99	89	16.3	3,020	8.0
404	150	July 26, 1946	Twi	--	--	--	--	--	--	1,114	2	498	--	.0	--	--	48	--	--	--	--	--
501	19	July 3, 1946	Twi	--	--	--	--	--	--	76	32	78	--	100	--	--	232	--	--	--	--	--
601	91	Apr. 4, 1947	Tc	--	--	23	10	*70		20	55	116	--	16	--	324	98	--	--	--	547	--
602	80	May 7, 1946	Tc	--	--	--	--	--	--	0	85	69	--	0	--	--	52	--	--	--	--	--
604	117	Apr. 4, 1947	Tc	--	--	32	22	*118		8	185	154	--	15	--	655	170	--	--	--	934	--
703	285	May 7, 1946	Twi	--	--	--	--	--	--	1,090	1	1,210	--	0	--	--	--	--	--	--	--	--
703	285	Dec. 6, 1963	Twi	13	--	14	14	*1,510		2,080	.0	1,180	--	.0	--	3,750	92	97	68	32.2	6,130	7.7
704	19	May 7, 1946	Twi	--	--	--	--	--	--	145	280	246	--	3.0	--	--	308	--	--	--	--	--

See footnotes at end of table.

Table 12.--Chemical analyses of water from wells and springs--Continued

Well	Depth of well (ft)	Date of collection	Water bearing unit	Silica (SiO_2)	Iron (Fe) (total)	Cal-cium (Ca)	Magne-sium (Mg)	Sodium (Na)	Potas-sium (K)	Bicar-bonate (HCO_3) a/	Sul-fate (SO_4)	Chlo-ride (Cl)	Fluo-ride (F)	Ni-trate (NO_3)	Boron (B)	Dis-solved solids	Hard-ness as $CaCO_3$	Per-cent so-dium	Sodium adsorp-tion ratio (SAR)	Residual sodium carbon-ate (RSC)	Specific conduct-ance (micromhos at 25°C)	pH
BU-67-20-706	200?	Jan. 23, 1964	Twi	14	--	1.8	0.4	*517		876	125	198	0.7	0.2	--	1,290	6	99	92	14.2	2,130	8.1
707	240	do	Twi	13	--	6.0	3.2	*1,100		1,940	.2	590	--	.5	--	2,670	28	99	90	31.2	4,270	7.8
708	81	May 7, 1946	Twi	--	--	--	--	--	--	978	55	215	--	0	--	--	165	--	--	--	--	--
801	120	May 3, 1946	Tc	--	--	--	--	--	--	29	14	57	--	0	--	--	30	--	--	--	--	--
802	200	Jan. 23, 1964	Tc	30	--	16	14	*41		80	23	68	.1	.2	--	231	98	48	1.8	.00	399	6.2
21-104	300	June 20, 1964	Tc	50	2.3	13	5.2	23	9.5	0	59	44	.0	.0	--	204	56	40	1.3	.00	303	d/ 4.3
202	157	May 17, 1946	Tr	--	--	--	--	--	--	109	360	165	--	0	--	--	465	--	--	--	--	--
302	334	Jan. 10, 1964	Tc(?)	17	--	48	30	*78		334	18	85	.3	.0	--	440	244	41	2.2	.60	771	7.6
303	148	do	Tqc	33	55	430	148	137	23	100	1,440	365	--	2.0	--	2,630	1,680	15	1.5	.00	3,250	6.4
401	440	Dec. 31, 1963	Tc	47	--	6.2	2.6	*27		0	32	27	.1	.2	--	152	26	70	2.3	.00	224	4.8

* Sodium and potassium calculated as sodium (Na).
† Composite of brine from this and several other oil wells.
a/ Includes the equivalent of any carbonate (CO_3) present.
b/ Iron (Fe) in solution.
c/ Contains 1.2 ppm acidity as H^{+1}.
d/ Contains 0.2 ppm acidity as H^{+1}.
1/ Analysis by Texas State Department of Health.
2/ Analysis by Texas A & M University.
3/ Analysis by Curtis Laboratories.
4/ Analysis by Trinity Testing Laboratories.