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GEOLOGY AND GROUND-WATER RESOURCES OF WINKLER COUNTY, TEXAS

By

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Prepared in cooperation with the United States Geological Survey
and Winkler County

November 1959

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ABSTRACT

Winkler County is in West Texas adjacent to the southeast corner of New Mexico. Most of the county lies in the Pecos River Valley; the remainder, the northeast portion, is part of the High Plains. Its principal industries are those related to the production and refining of oil, but ranching is also of importance. The county has an arid to semiarid climate, an area of about 887 square miles, and a population of about 12,000, in 1957.

The principal fresh-water-bearing formations in Winkler County are the Cenozoic alluvium which mantles the surface of most of the county, and the Santa Rosa sandstone of Late Triassic age. The alluvium is saturated at a depth ranging from a few feet below the land surface to about 150 feet, and the ground water is unconfined. The Santa Rosa sandstone is fully saturated throughout most of the county, the water occurring under both unconfined and confined conditions. The underlying older formations contain water too highly mineralized for most uses, but they are important because water from these underlying beds, which is produced with oil, is a source of pollution to the fresh-water aquifers. The formations also are a source of water to waterflooding projects for the secondary recovery of oil.

The alluvium is replenished chiefly by precipitation throughout the county. The sand-dune area in the eastern part is the most favorable area of natural recharge. The Santa Rosa sandstone is recharged through the alluvium where the two formations are in contact.

Infiltration of saline water that has been produced with oil and waste water from industrial plants has been taking place through surface earthen pits. About 18 mgd (million gallons per day) of saline water was being produced from the many oil fields throughout the county during August 1957, and almost all this water was placed in surface pits. The Hendrick oil field alone was producing about 14.5 mgd during that month; an estimated 800,000 acre-feet was produced from this field from 1937 to 1957.

Approximately 20 million acre-feet of fresh water is stored in the explored ground-water aquifers of Winkler County, of which an estimated 5 to 7 million acre-feet can be practicably recovered. A daily average of about 8.2 million gallons (9,200 acre-feet per year) of fresh water was used in the county during 1956. Public and industrial use accounted for about 6.8 mgd; irrigation, domestic, and stock uses accounted for 1.4 mgd. Projects engaged in the secondary recovery of oil were the largest consumers, using an average of about 3 mgd of fresh water and about 2.7 mgd of saline water during 1956.

Water wells drilled in the deep trough of Cenozoic alluvium south of Wink may yield 1,000 gpm (gallons per minute or more). A pumping test of the alluvium in that area indicated a coefficient of transmissibility of about 25,000 gpd (gallons per day) per foot. Wells, other than windmill wells, drawing water from thinner sections of alluvium in the rest of the county yield between 100 and 300 gpm. Most of the wells in the Santa Rosa sandstone yield between 30 to 400 gpm. Two municipal wells at Kermit tapping the Santa Rosa sandstone had test yields of 1,200 and 1,875 gpm. The large yield of these wells probably results from the presence of fractures in the structurally deformed aquifer. Pumping tests in the Kermit area indicate that locally a full section of the Santa Rosa sandstone has an average coefficient of transmissibility of about 25,000 gpd per foot and a coefficient of storage of about 0.0003. The transmissibility in two other tested areas is much less.

The chemical quality of the water in the principal aquifers is generally acceptable for industry and for public supply. About two-thirds of the samples collected from fresh-water wells had a dissolved-solids content of less than 1,000 ppm (parts per million); however, some samples in a few areas were hard and high in fluoride and silica. Samples from wells in polluted areas contained dissolved solids ranging from about 1,400 to 71,100 ppm. Two comprehensive analyses of water samples from the Rustler formation showed a dissolved-solids content of 18,400 ppm and 157,000 ppm. In most of the water produced with the oil in the Hendrick oil field, the content of dissolved solids ranged from about 4,000 to about 10,000 ppm. The water produced with the oil in the rest of the oil fields in Winkler County was mainly brine.

INTRODUCTION

Purpose and Scope

In 1956 an investigation of the ground-water resources of Winkler County was begun through a cooperative agreement among the U. S. Geological Survey, the Texas Board of Water Engineers, and the Commissioners' Court of Winkler County. The purpose was to obtain information as to the source, occurrence, utilization, quantity, and quality of ground water in the county. As the work progressed, the pollution of ground water by oil-field waste water through surface pits became a principal subject of study.

Field data were gathered from September 1956 through September 1957 and included records of 747 wells (see table 7) and 176 drillers' logs (see table 8). The table of well records includes 189 altitudes of water wells determined by the U. S. Geological Survey, 198 altitudes of oil and water wells furnished by oil companies, and records of 136 oil tests and oil wells. All electric and radioactivity logs used in this study have been placed in the permanent file of well logs maintained by the Texas Board of Water Engineers. Pumping tests were made on wells to determine the hydraulic properties of the aquifers. The water samples collected in 1956 and 1957 were analyzed in the laboratory of the Geological Survey in Austin. The table of 167 chemical analyses of water from wells in Winkler County (see table 9) includes 25 made by the Works Progress Administration in 1940 (Forbes and others, 1941, p. 31-35), although they were made by methods that are not sufficiently accurate for the results to be closely comparable to those of later analyses. Chemical analyses of saline water produced by oil wells, mostly made by commercial laboratories, are compiled in table 6.

The study was made under the direct supervision of R. W. Sundstrom, district engineer in charge of ground-water investigations in Texas.

Acknowledgments

Appreciation is expressed to all who contributed information and assistance in the field and in the preparation of the report. City officials of Kermit and the Commissioners' Court of Winkler County provided manpower and equipment on several occasions; the Court also furnished office space. Oil companies furnished records, including pumpage data and altitudes, of both water and oil wells. Particular recognition is due the geologic staff of Magnolia Oil Company's Midland office for technical assistance and access to its log file. The water-well drillers and the ranchers of the area gave free access to their records.

Previous Investigations

An inventory of water wells in Winkler County was made in 1940 as a project of the Works Progress Administration in cooperation with the Texas Board of Water Engineers and the U. S. Geological Survey (Forbes and others, 1941).

A. H. Dunlap of the State Board of Water Engineers, in 1939, and J. W. Lang of the U. S. Geological Survey, in 1947, made brief field investigations of the ground water in the vicinity of Kermit, but formal reports of the investigations were not made. The results of those studies are incorporated in this report.

Well-Numbering System

In the report by Forbes and others (1941) the wells were numbered consecutively in one series. Those well numbers have since been changed to conform to a grid system designed to facilitate location of the wells (see table 1). In this report the county is divided into separate units by means of grids. Lines of latitude and longitude were used to determine the grids, which constitute a modified 10-minute grid system. The grids are identified by letters of the alphabet, from A through H, starting with the northwest grid and moving in a west-to-east, north-to-south succession. Inside the grids the individual wells are numbered consecutively, beginning in the northwest corner.

Table 1 is an index of previously published well numbers and corresponding numbers in this report.

Location and Economic Development

Winkler County is an 887-square-mile area in West Texas, immediately adjoining the southeast corner of New Mexico. (See fig. 1.) Like Andrews County on the north, Ward County on the south, and Ector County on the east, Winkler County owes its economic importance to the production of oil. Kermit, the county seat and center of the oil industry in the county, had an estimated population of more than 10,000 in 1957; the total county population was estimated at about 12,000.

New oil fields are being developed, and old ones are being restored by new processes of recovery. The production of oil in Winkler County, according to the Railroad Commission of Texas, was 15,661,412 barrels in 1956. Other industries are the production of natural gas, gasoline, liquefied gas products, carbon black, and sulfur. The location of oil fields in Winkler County is shown in figure 2.

Most of the county is used for grazing cattle. Although the severe drought in this area from 1945 to 1957 resulted in the destocking of much rangeland, cattle raising is still an important industry.

Physical Features

Winkler County occupies parts of two sections of the Great Plains physiographic province--the High Plains and the Pecos Valley (Fenneman, 1931, pl. 1). The High Plains, or Llano Estacado, in the northeastern part of Winkler County, is bounded by a westward-facing escarpment called Concho Bluff. The land surface is highest--about 3,400 feet--in the High Plains part of the county. The High Plains gently slope toward the southeast. The nearly flat surface is poorly drained, and large depressions called "playas" are common. Smaller depressions are numerous.

The surface of the rest of the county, the Pecos Valley section, slopes to the southwest and south from Concho Bluff. The altitude in the county is lowest--about 2,670 feet--near the southern edge in the Pecos Valley section.

Surface drainage leaving Winkler County is insignificant. Small gullies head along Concho Bluff, extending to the sandy belt in front of the bluff where

Table 1 --Index of previously published well numbers[1/] and corresponding numbers in this report

New	Old	New	Old	New	Old	New	Old
B-10	143	D-181	31	F-2	287	G-21	193
B-15	139	D-185	20	F-3	286	G-49	265
B-20	146	D-186	74	F-5	283	G-66	202
C-2	4	D-204	126	F-6	274	G-76	191
C-18	58	D-205	122	F-11	273	G-78	189
C-20	7	D-208	120	F-15	264	G-112	255
C-21	11	D-209	2	F-16	259	G-120	207
C-22	8	D-235	21	F-22	275	G-122	206
C-25	43	D-236	27	F-23	281	G-129	188
C-33	41	D-257	271	F-25	288	G-136	212
C-34	32	D-269	76	F-26	279	G-138	213
D-4	66	D-270	77	F-27	278	G-139	210
D-5	64	D-273	90	F-29	289	G-140	209
D-9	135	D-275	87	F-30	276	G-141	208
D-23	52	D-279	83	F-32	262	G-146	251
D-39	57	D-285	85	F-41	277	G-150	214
D-41	49	D-307	196	F-43	291	H-15	181
D-42	46	D-309	127	F-44	292	H-16	183
D-57	70	E-22	148	G-7	270	H-24	187
D-101	132	E-23	150	G-11	267	H-25	186
D-135	73	E-24	151	G-18	195	H-26	182
D-180	29	E-32	156	G-19	194	H-80	216

1/ Forbes and others (1941)

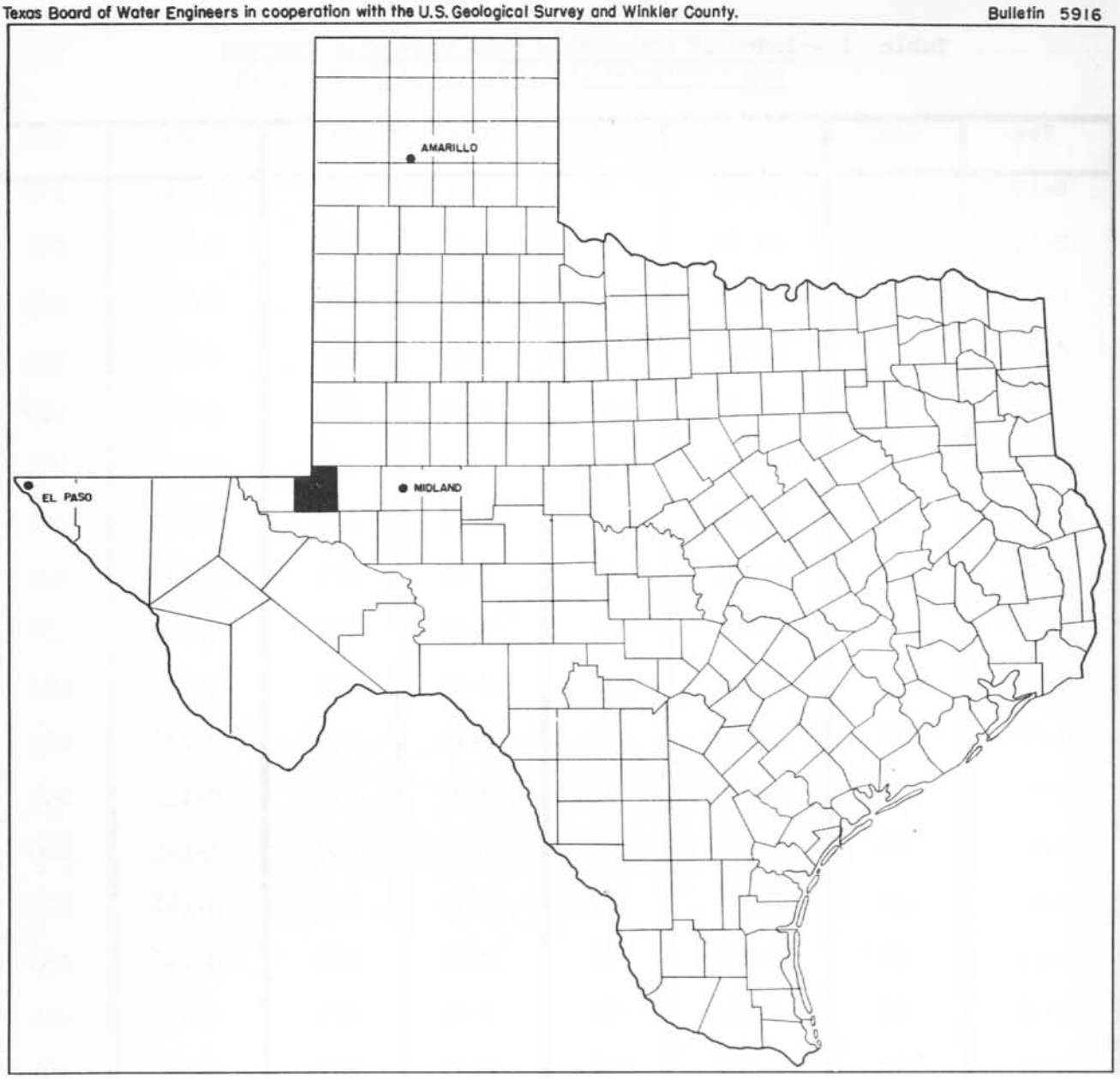


FIGURE 1.— Map of Texas showing location of Winkler County.

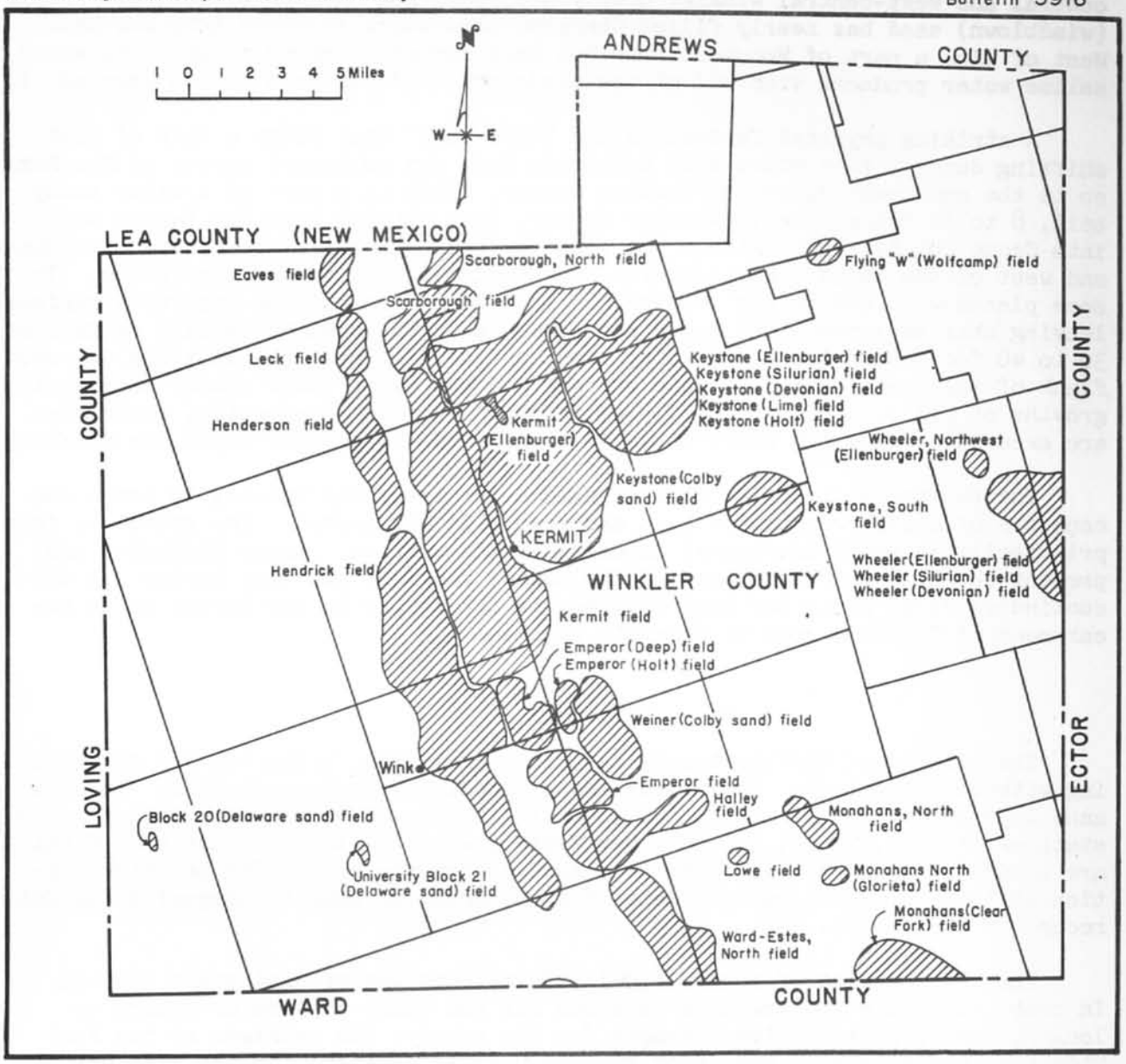


FIGURE 2.–Map showing location of oil fields in Winkler County, Tex.

storm waters quickly infiltrate the sand. Cheyenne Draw and Monument Draw in central and west-central Winkler County are ephemeral and discontinuous. Eolian (windblown) sand has nearly filled Cheyenne Draw where it heads into New Mexico. West of Wink a part of Monument Draw has been dammed, forming a lake into which saline water produced with oil at the Hendrick field has been placed (see pl. 1).

A striking physical feature is the "blow sand" that forms a belt of high, shifting dunes 2 to 4 miles wide extending from the southeast corner of New Mexico to the southeast corner of Winkler County. This is a part of a wider sandy belt, 8 to 15 miles wide in Winkler County, that extends into New Mexico and into Crane County, Tex. Within the area covered principally by active sand dunes, and west of the dunes also, captured dune sand supports sparse vegetation. In some places wind action has removed all free sand from caliche-indurated surfaces, leaving shallow depressions known as "blowouts." The sand dunes rise as much as 30 to 40 feet above the surrounding land surface. At many places along the west flank of the area, where the dune surface and the water table almost intersect, growths of willow trees and wild plum thickets abound. Frequently, waterholes are excavated below the water table in these areas to provide water for drilling.

The surface west of the belt of sand dunes is gently rolling to level and consists of caliche-indurated sand and some silt and gravel. The gravel is found principally in small lag-gravel deposits on the surface. Large sinkholes are present in the High Plains part of the county and near the west border. A discontinuous ridge along the west boundary is attributed to the burial of an escarpment of Triassic rock by Cenozoic alluvium.

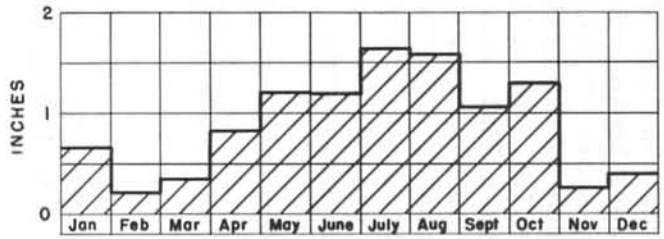
Climate

The climate of Winkler County is arid to semiarid, being too dry for farming without irrigation. The average mean annual temperature is 63°F. The mean annual precipitation is only about 13 or 14 inches. Precipitation data for the stations at Wink, Texas, and Jal, New Mexico, which is 18 miles north of Kermit, are shown on figure 3. In order to assume a complete record for the Wink station in 1941, 5 inches was estimated for the month of June by comparing the Jal record of that month.

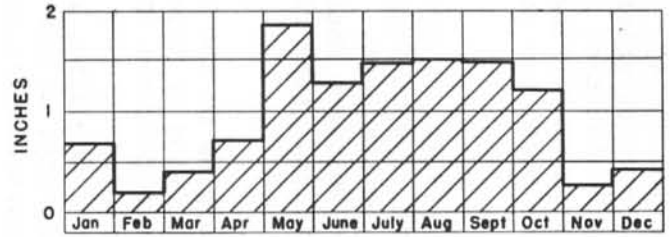
The short period of record (1941-56) includes the drought years 1945-56. In order to relate the averages obtained for the short periods of record to longer, more representative averages for the county, the averages at the Fort Stockton (Pecos County) and Pecos (Reeves County) stations for the same period (1941-56) were compared to averages for longer periods of record at these stations. The averages for the shorter period (1941-56) were found to be approximately 2 inches less than for the period of record at the Fort Stockton station and approximately 3 inches less than for the period of record at the Pecos station. The averages shown for the Wink and Jal stations probably are between 2 and 3 inches below what they would be if longer, more representative periods of record were available.

GENERAL GEOLOGY

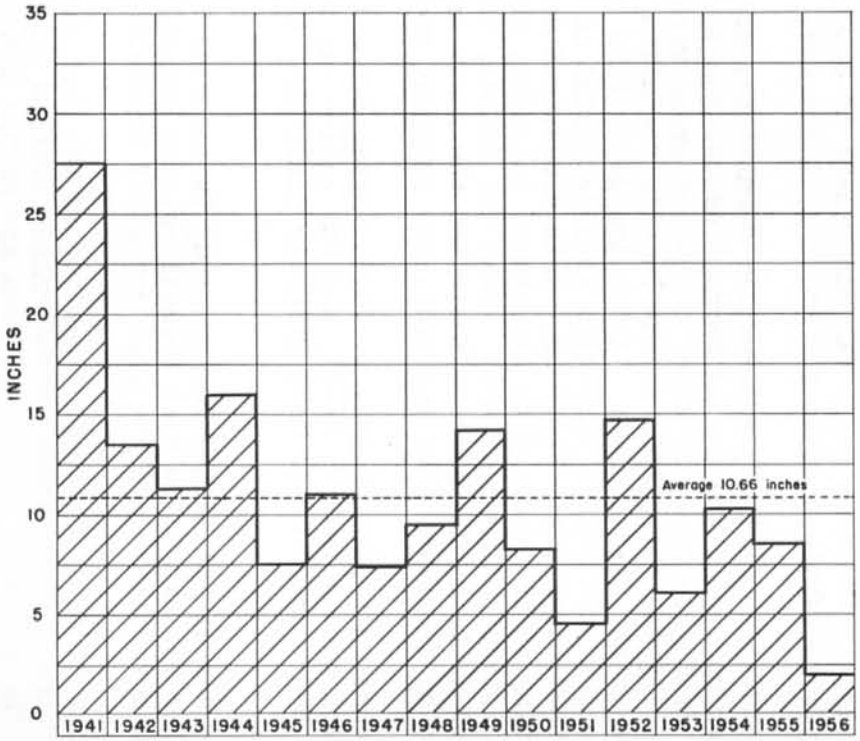
The oldest explored rocks in Winkler County are igneous rocks approximately 10,000 feet below the surface in the Keystone oil field, about 4 miles northeast of Kermit. Sedimentary rocks of Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian, Permian, Triassic, Cretaceous, and Tertiary ages are shown by



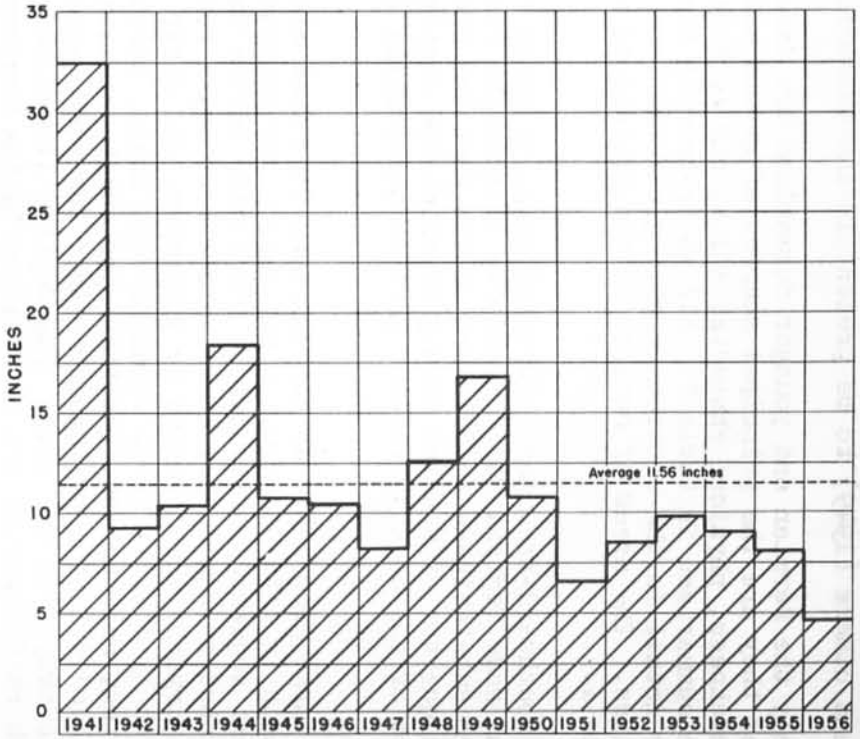
A. Average monthly precipitation, Wink, Tex.



C. Average monthly precipitation, Jal, N. Mex.



B. Annual precipitation, Wink, Tex.



D. Annual precipitation, Jal, N. Mex.

FIGURE 3.-Graphs showing monthly and annual precipitation at Wink, Tex., and Jal, N. Mex.

(From records of U. S. Weather Bureau.)

Jones and others (1949) to be present in the subsurface.

Only the Permian and younger formations are discussed in detail in this report, as they are the principal sources of ground water in Winkler County. Their age, thickness, physical characteristics, and importance as sources of water supply are summarized in table 2. All water-bearing formations are discussed in greater detail in the section on geologic formations and their water-bearing properties. The areas of outcrop of the Cretaceous and younger rocks are shown on plate 1.

A southward-trending structural high, to which Cartwright (1930, p. 970) gave the name Central Basin Platform, divides the Permian Basin of West Texas into two sub-basins--the Delaware on the west and the Midland on the east. The western quarter of Winkler County overlies the east rim of the Delaware Basin. The rest of the county overlies part of the Central Basin Platform. (See fig. 4.)

A large reef known as the Capitan, deposited along the margins of the Delaware Basin in late Guadalupe time, caused contemporaneous deposition of three different sequences of rocks: a deep-water marine facies in the Delaware Basin, represented by sandstone, shale, and limestone; a reef zone, represented by massive crystalline dolomite or limestone; and shelf or lagoonal deposits, represented by fossiliferous limestone and shale, dolomitic limestone, saline evaporites, and onshore clastics. The shelf deposits are characteristically thin-bedded dolomite or limestone near the reef, grading into evaporites and clastics away from the reef. The Capitan limestone represents the reef deposits. The back-reef deposits are represented by the Grayburg, Queen and Seven Rivers formations, the Yates sandstone and the Tansill formation of the Whitehorse group. In the Delaware Basin the sandstones of Guadalupe age are succeeded by the anhydrite of the Castile formation of Ochoa age.

The Castile, Salado, and Rustler formations, and Dewey Lake red beds of the Ochoa series record the end of Permian deposition in the Delaware Basin. The Central Basin Platform and other back-reef areas were probably above or near sea level during the deposition of the Castile formation, a sequence of evaporites in front of the Capitan reef. After the deposition of the Castile, the sedimentary rocks of the Salado formation were deposited in the Delaware Basin and across the Central Basin Platform. This widespread deposition of evaporites, alternating at intervals with limestone, dolomite, shale, and sand, continued through Salado and Rustler time. Like the Salado, the Rustler formation was deposited in both the Delaware Basin and the shelf area. The evaporites were overlain by the Dewey Lake red beds, the youngest rocks of the Ochoa series.

According to King (1942, p. 763), "After Ochoa time, a long interval of nondeposition ensued in West Texas, and the region was probably land. Deposition did not begin again until late Triassic time, when the Dockum group was laid down."

The deposition of the Dockum group is recorded by the terrestrial sediments of the Tecovas and Santa Rosa formations, and Chinle the formation equivalent. The Dockum sediments are the last record of Triassic deposition in the area.

Rocks of Early Cretaceous age record the next deposition in Winkler County. Sands of the Trinity group unconformably overlie rocks of the Triassic Dockum group. The youngest Cretaceous beds are marine limestones of the Fredericksburg

Table 2.--Stratigraphic units and their water-bearing properties in Winkler County, Tex.

Era	System	Series or group		Stratigraphic unit	Approximate thickness (feet)	Character of rocks	Water-bearing properties
Cenozoic	Quaternary			Dune sand	0- 250	Windblown sand.	Principally a recharge facility for underlying formations. Furnishes small supplies of fresh water, principally from pits.
	Quaternary and Tertiary			Alluvium	0-1,050	Unconsolidated sand, gravel, silt, clay, and caliche.	Water ranges from fresh to slightly saline. Yields range from few gallons per minute to more than 1,000 gpm.
Mesozoic	Cretaceous	LOWER CRETACEOUS	Fredericksburg group		0- 50	Gray to cream and brown hard to earthy fossiliferous sandy marine limestone.	Not an aquifer in Winkler County.
			Trinity group		0- 100	Sandstone, siltstone, conglomerate, and gravel.	Yields small quantities of water of good chemical quality in extreme northeastern part of county.
	Triassic	Dockum group		Chinle formation equivalent	0-1,000	Brick-red to maroon and purple shale, thin beds of fine red or gray sandstone and siltstone.	Not known to yield water to wells in Winkler County.
				Santa Rosa sandstone	0- 350	Reddish-brown and gray medium- to coarse-grained crossbedded arkosic, micaceous, and conglomeratic sandstone, interbedded with red and green shale.	Yields small to large quantities of fresh to slightly saline water.
				Tecovas formation	0- 270	Red shale, siltstone, and very fine-grained sandstone.	Not known to yield water to wells in Winkler County.

Table 2.--Stratigraphic units and their water-bearing properties in Winkler County--Continued

Era	System	Series or group	Stratigraphic unit	Approximate thickness (feet)	Character of rocks	Water-bearing properties
Paleozoic	Permian	Ochoa series	Dewey Lake red beds	230- 580	Thin-bedded siltstone cemented with gypsum and calcite.	Not known to yield water to wells in Winkler County.
			Rustler formation	300- 500	Dolomite, anhydrite, and limestone, basal zone of sand, conglomerate, and variegated shale.	Yields highly saline water or brine.
			Salado formation	400-2,000	Mostly salt (halite); subordinate amounts of anhydrite, sylvite, and orange polyhalite.	Not known to yield water to wells in Winkler County.
			Castile formation	0-1,700	Calcareous anhydrite, some salt.	Do.
		Whitehorse group of Guadalupe series	*CAPITAN LIMESTONE: Tansill formation	0- 200	Dolomite, some anhydrite and salt.	Do.
			*CAPITAN LIMESTONE: Yates sandstone	0- 300	Gray and red sandstone, a few thin beds of dolomite, and red and gray shale.	Yields small quantities of brine in conjunction with oil production.
			*CAPITAN LIMESTONE: Seven Rivers formation	0- 550	Anhydrite, red sandstone, shale, and dolomite.	Yields large quantities of moderately saline water.
			*CAPITAN LIMESTONE: Queen formation	0- 400	Red and gray sandstone interbedded with dolomite and some anhydrite and salt.	Not known to yield water to wells in Winkler County.
			*CAPITAN LIMESTONE: Grayburg formation	0- 300	Dolomite, red and gray sandstone, and some anhydrite.	Probable source of large quantities of moderate-16 saline water to deep wells between Kermit and Wink.
			*Capitan limestone	0-2,000	Reefy limestone and dolomite.	Not known to yield water to wells in Winkler County. Probably capable of yielding large quantities of moderately saline water.

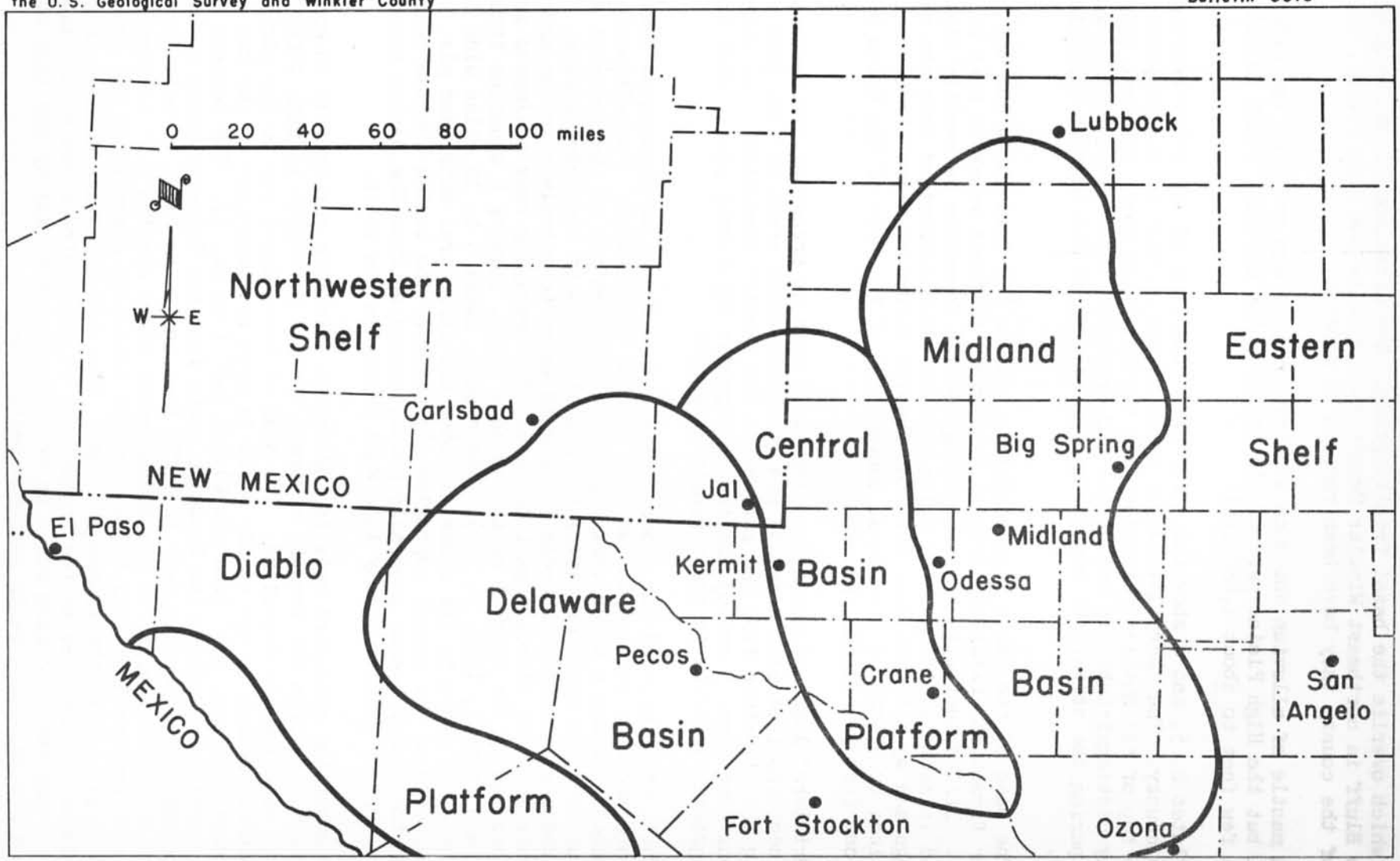


FIGURE 4.- Map of parts of west Texas and New Mexico showing Permian structural features.

group which overlie the basal Trinity group. The Cretaceous rocks crop out in Concho Bluff in northeast Winkler County and underlie the High Plains, but in the rest of the county they have been removed by erosion.

A mantle of alluvium and dune sand of Cenozoic age overlies the older rocks in all but the High Plains part of the county. The deposits range in thickness from a few feet to about 1,050 feet.

Plates 2, 5, and 6 show the structural relations of the water-bearing rocks of the county. The sharp lithologic break at the contact of the anhydrite bed at the top of the Rustler formation with the overlying Dewey Lake red beds is readily distinguishable in mechanical and drillers' logs. This contact was used in preparing the structural contour map of the top of the Rustler formation (see pl. 3).

The base of the Santa Rosa sandstone, 300 to 850 feet above the top of the Rustler formation, marks the deepest occurrence of fresh water in most of Winkler County. Its contact with the underlying Tecovas formation is readily distinguished in mechanical logs. By using the altitudes determined from the mechanical logs and by interpolating from the Rustler structure where the contact was indistinct or absent, a structural contour map of the base of the Santa Rosa sandstone (see pl. 4) was prepared.

Drillers' logs and mechanical logs were used in preparing two east-west cross sections (see pls. 2 and 5) and one north-south cross section (see pl. 6) showing the structure from the surface to the Rustler formation. Two other cross sections (see figs. 5 and 6), having an expanded horizontal scale, show the same stratigraphic interval in the vicinity of Kermit.

The contour map and the cross sections show two major structural features which are probably related to the same crustal deformation. Post-Triassic crustal movements formed a structural high along the east rim of the Delaware Basin and fractured the rocks overlying the soluble salts of the Ochoa series. The rock fractures provided channels for ground water to circulate in the underlying sediments and thus dissolve part of them. The overlying beds collapsed into the voids created by the removal of the soluble salts, forming a slumpage trough (Adams and Frenzel, 1950, p. 301). The trough, about 5 to 10 miles wide in Winkler County, is shown on the cross sections and structural maps (see pls. 2-5). The east edge of the trough approximately overlies the buried Capitan reef. The axis of the trough trends generally south, extending from New Mexico through the western part of Winkler County into Ward County on the south.

Because the collapsed beds in the trough were more susceptible to erosion than those away from the trough, a stream channel developed in them before the Cenozoic alluvium was deposited. The head of the channel was to the north and the channel drained to the south. This is seen by comparison of the two east-west cross sections, A-A' (see pl. 2) and B-B' (see pl. 5). The deepest erosional surface separating the Cenozoic rocks from the Triassic rocks in the northernmost cross section A-A' is 2,270 feet above sea level at well C-3. The deepest erosional surface in the southernmost cross section B-B' is about 1,670 feet above sea level at well G-144. Buried tributary channels in the erosional surface drain toward the slumpage trough. One such tributary channel or system of channels is suggested by the formational relationships shown by the logs of well D-10 and the adjoining wells on cross section A-A' and by the logs of well G-79 and its adjoining wells on cross section B-B'.

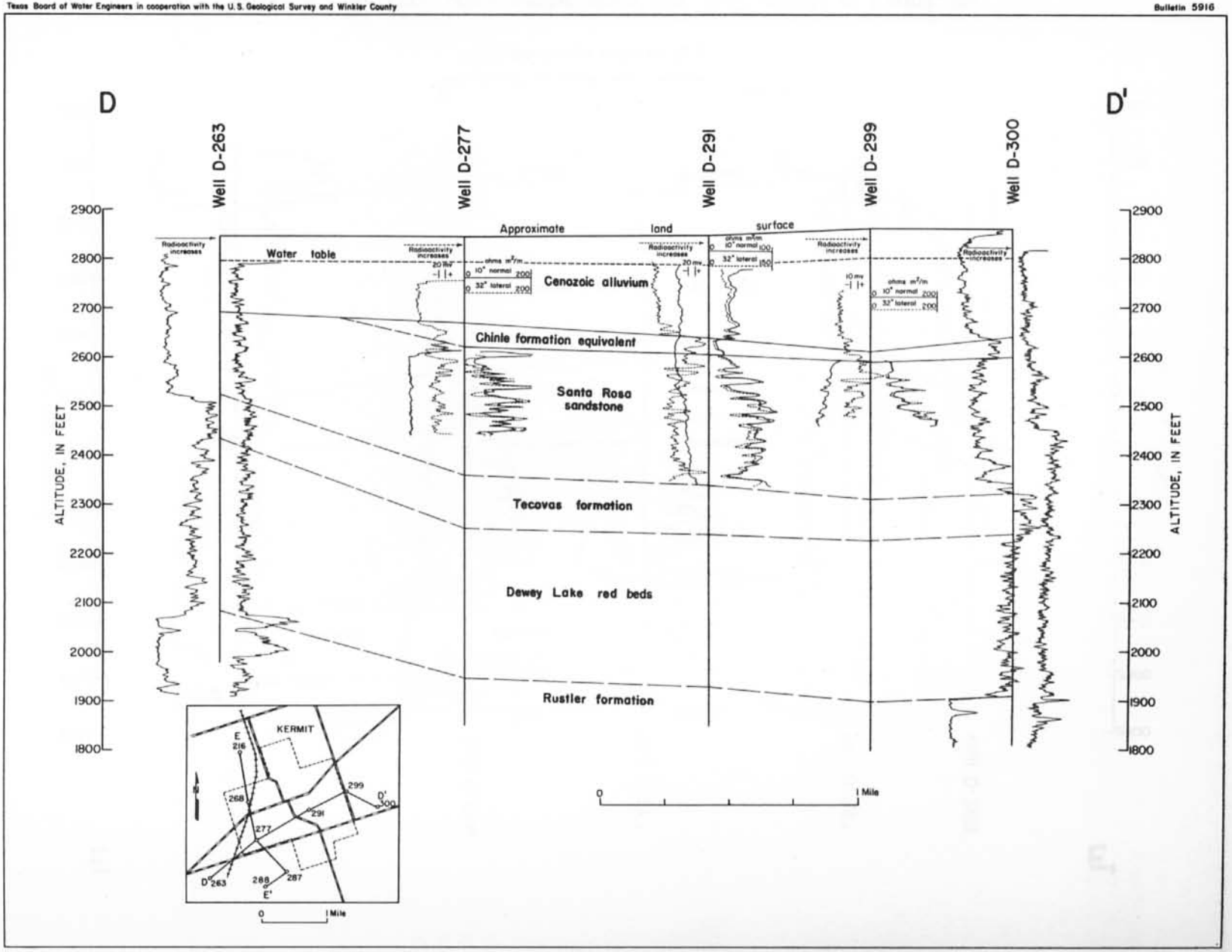
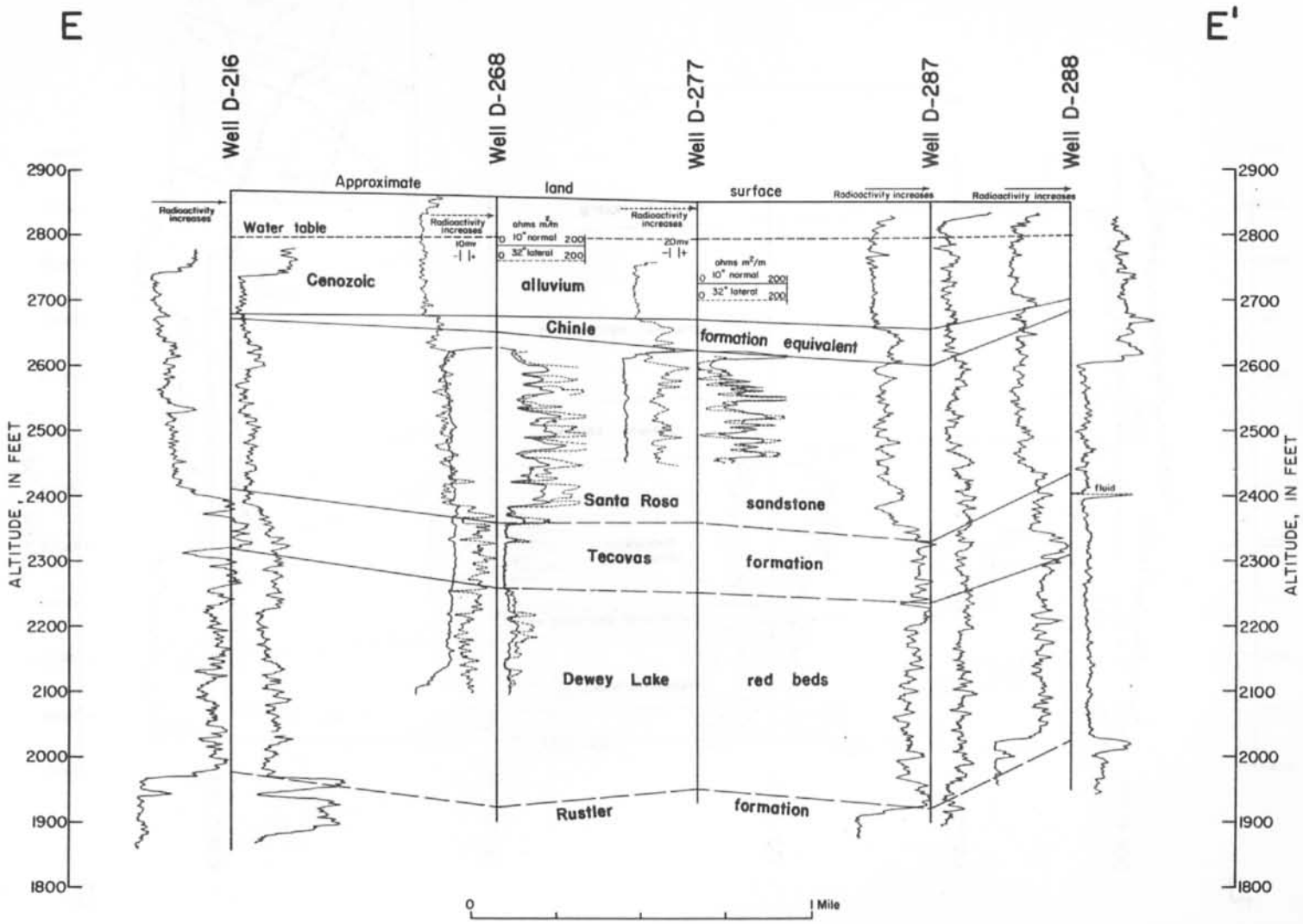


FIGURE 5 - Geologic cross section along line D-D', vicinity of Kermit, Tex.



For location of cross section see fig. 5.

FIGURE 6. Geologic cross section along line E-E', vicinity of Kermit, Tex.

The second major structural feature is a structural high, the axis of which extends southwestward from near the corner of New Mexico through the central part of the county to a point just west of Kermit, where it curves southeastward, the high disappearing about 12 miles southeast of Kermit. East of the axis of the high, the rocks dip slightly to the east or northeast. Kermit lies nearly across a saddle on the high between locally higher areas to the northeast and south. This regional high overlies the back-reef sediments of the underlying Permian reef complex. On the west side of the high, the Santa Rosa sandstone plunges into the slumpage trough. Farther west the Santa Rosa rises from the trough and again assumes a fairly level attitude.

There is little doubt that the rocks in Winkler County are faulted, but no faults are shown on the geologic map, the structural maps, or the cross sections. The cross sections and structural maps show deformation of the rocks on the southwestward-trending high and in the slumpage trough in west-central Winkler County, but the sand mantle prevents the detection at the surface of any fault traces.

GEOLOGIC FORMATIONS AND THEIR WATER-BEARING PROPERTIES

Paleozoic Era

Permian System

Guadalupe series

Guadalupe time in Winkler County and vicinity was characterized by a restriction of the areas of marine environment. This condition resulted partly from the general retreat of the Permian seas from the continent and partly from the growth of reefs around the Delaware Basin. The reefs caused large lagoonal areas to be shut off from free access to the sea so that the salinity of the lagoons was greatly increased by evaporation. In late Guadalupe time sedimentation was continuing at different levels simultaneously: in the lagoon behind the reef barrier, on the reef itself near sea level, and on the floor of the sea.

In the following discussion of the individual formations of the Guadalupe series, only the Capitan limestone and its back-reef equivalents are considered. The equivalents in the Delaware Basin are not known to yield water and are not discussed.

Capitan limestone.--The Capitan limestone, 1,500 to 2,000 feet thick (Newell and others, 1953, p. 105) is late Guadalupe in age. The sediments, originally deposited as a reef, consist of limestone, dolomite, and talus characteristic of reefs. Adams and Frenzel (1950, p. 295, fig. 1) show the Capitan as a north-south-trending belt of rocks approximately 6 miles wide near the center of the west half of Winkler County. The Capitan is found at depths greater than 2,000 feet throughout its extent in the county; it interfingers with rocks of the Whitehorse group to the east.

There is no known production of water from the Capitan limestone in Winkler County. However, the Capitan yields about 1,000 gpm moderately saline water to an irrigation well in Pecos County and it is possible it would yield similar supplies in Winkler County.

Whitehorse group.--The five formations of the Whitehorse group--the Grayburg, Queen, Seven Rivers, Yates, and Tansill--are back-reef equivalents of the Capitan reef sediments. Along the west side of the Central Basin Platform, the Whitehorse is predominantly dolomite interbedded with sand and some anhydrite and salt, the proportion of anhydrite and salt increasing to the east.

Grayburg formation.--The Grayburg formation (Dickey, 1940, p. 44-47), approximately 300 feet thick in Winkler County, is the lowest formation of the Whitehorse group. It consists of dolomite and sandy dolomite interbedded with red and gray sandstone; some anhydrite is present locally. The depth to the Grayburg ranges from about 3,200 to 4,000 feet in Winkler County.

The Grayburg yields large quantities of moderately saline water, which is used for waterflooding in the oil fields between Kermit and Wink.

Queen formation.--The Queen formation (Lang, 1937, p. 856-859; King, 1942, p. 705, 707), approximately 400 feet thick in Winkler County, overlies the Grayburg formation. It consists of red and gray sandstone interbedded with dolomite and some anhydrite and salt. The Queen is found at depths ranging from about 2,800 to 3,600 feet in the county.

The Queen formation is not known to yield water to wells in Winkler County.

Seven Rivers formation.--The Seven Rivers formation (Lang, 1937, p. 856-860), approximately 550 feet thick in Winkler County, overlies the Queen formation. The Seven Rivers consists of anhydrite and some red sandstone, shale, and dolomite. Toward the reef the dolomite content of the formation increases as the anhydrite content decreases. The depth to the Seven Rivers in Winkler County ranges from about 2,500 to 3,000 feet.

Large quantities of moderately saline water are produced with the oil from this formation, and much of it is used for waterflooding.

Yates sandstone.--The Yates sandstone was named by Cartwright and Adams (Gester and Hawley, 1929, p. 487) from the type locality in the Yates oil field in Pecos County. It is approximately 300 feet thick in Winkler County and overlies the Seven Rivers formation. The Yates consists of gray and red sandstone having scattered large frosted quartz grains, a few thin beds of dolomite, and beds of red and gray shale. The depth to the Yates in Winkler County ranges from about 2,300 to 2,800 feet.

The Yates yields small quantities of brine in conjunction with oil production in the county.

Tansill formation.--The Tansill formation (DeFord and Riggs, 1941), which is approximately 200 feet thick in Winkler County, overlies the Yates sandstone and is the top formation in the Whitehorse group. The rocks are predominantly dolomite near the reef, grading away from the reef into anhydrite and to anhydrite and salt. The Tansill is found at depths ranging from about 2,100 to 2,700 feet in the county.

The Tansill formation is not known to yield water to wells in Winkler County.

Ochoa series

Throughout Permian time a deep embayment linked the broad, shallow seas of the Permian Basin with the ocean to the south. In the Capitan stage a continuous barrier reef separated the deep seaward waters from the shallow, back-reef lagoons. At the close of Capitan deposition the lagoonal sea expanded when the Delaware Basin was uplifted and tilted slightly eastward. The first deposits in the expanded lagoon were anhydrite, and these were followed by a thick section of salt interbedded in places with potash salts and other late-stage evaporites. The Dewey Lake red beds, the last in the Ochoa series, mark the end of marine deposition in the Permian Basin.

Castile formation.--The Castile formation, approximately 1,700 feet thick in Winkler County, (Lang, 1937, p. 876) is the bottom formation of the Ochoa series. The evaporites of the Castile formation filled the basin in front of the previously deposited Capitan reef sediments. The Castile is not present on the Central Basin Platform. The evaporites consist largely of calcareous anhydrite and some fairly widespread salt beds. The Castile is found at depths greater than 3,000 feet in Winkler County.

The Castile formation is not known to yield water in the county.

Salado formation.--The Salado formation (Lang, 1935, p. 262-270), approximately 400 to 2,000 feet thick in Winkler County, overlies the Castile formation in the Delaware Basin and the Tansill formation on the Central Basin Platform. The Salado is thinnest where it underlies the slumpage trough of west-central Winkler County. The difference in thickness is due principally to the removal of salts by subsurface solution (Maley and Huffington, 1953, p. 543). The Salado in the Delaware Basin was truncated and overlapped by the Rustler formation. The upper salt beds extend northeastward from the reef rim of the Delaware Basin across most of the Central Basin Platform.

The Salado formation differs from the Castile formation in that it is composed mostly of salt (halite) and a suboridnate amount of anhydrite. Another important difference is the presence in the Salado of potash minerals such as sylvite and orange polyhalite instead of calcite as in the Castile. The Salado has small amounts of dolomite and magnesite. The depth to the Salado in Winkler County ranges from 1,100 to about 2,300 feet.

The formation is not known to yield water in the county.

Rustler formation.--Deposition of the Rustler formation (Richardson, 1904, p. 44) was preceded by a period of uplift and erosion. The Rustler, 300 to 500 feet thick in Winkler County, unconformably overlies the Salado formation. It consists largely of dolomite and anhydrite and has a basal zone of sand, conglomerate, and variegated shale. Locally the Rustler contains minor amounts of salt, and in places limestone replaces the dolomite. The dolomite and limestone contain many of the openings known as vugs, and cavernous conditions are reported in many places. The altitude of the Rustler is shown in plate 3.

Production of water from the Rustler is sporadic, owing to the irregular occurrence of cavernous openings; however, yields up to 800 gpm have been reported. Most wells drilled into or through the Rustler in Winkler County yield artisian water. The water is either highly saline or briny and is used for waterflooding.

Dewey Lake red beds.--The Dewey Lake red beds (Page and Adams, 1940, p. 62-63), 230 to 580 feet thick in Winkler County, are the youngest formation of the Ochoa series. The individual beds are uniformly thin and consist of siltstone cemented with gypsum and calcite. The contact between the red beds and the underlying Rustler formation is easily distinguished by the change in lithology between the red beds and the anhydrite member of the Rustler. On most radioactivity logs the top of the Dewey Lake is marked by a distinct zone, generally 10 to 30 feet thick, of decreased natural radioactivity as measured by the gamma-ray curve. In electric logs the same zone is outlined by the self-potential curve, which is sharply depressed opposite the zone. (See wells H-34 and H-41, pl. 5.) The zone is considered to be the "zone of bleaching" noted by Page and Adams (p. 62). The Dewey Lake is found in the county at depths ranging from 250 to about 1,650 feet.

The Dewey Lake red beds are not known to yield water to wells in Winkler County.

Mesozoic Era

Triassic System

Dockum group

The Dockum group is exposed in scattered small outcrops in the Southern High Plains and the Pecos River Valley. The group has been divided into three formations: the lower red shale, siltstone, and very fine-grained sandstone called the Tecovas formation; the middle reddish-brown and gray sandstone called the Santa Rosa sandstone; and the upper brick-red to maroon and purple shale with thin beds of fine red or gray sandstone and siltstone called the Chinle formation equivalent.

The Dockum group is almost the exact equivalent of the Chinle formation of the Colorado Plateau region (Reeside and others, 1957, p. 1476). However, local usage has included only the upper part of the Dockum group as equivalent to the Chinle formation of the type area. The term Chinle formation equivalent will be used in this report.

Tecovas formation.--The Tecovas formation, ranging from 0 to 270 feet in thickness in Winkler County is the bottom formation of the Dockum group. The Tecovas, laid down on an erosional surface in the Dewey Lake red beds, consists of red shale, silt, and very fine-grained sandstone grading into the overlying Santa Rosa sandstone. The Tecovas is readily distinguished in radioactivity logs by its high degree of natural radioactivity as measured by the gamma-ray curve. In electric logs it is distinguished by a higher self-potential than that of either the top zone of the underlying Dewey Lake red beds or of the overlying Santa Rosa sandstone. (See wells H-34 and H-41, pl. 5.) The Tecovas is present in most places in Winkler County; however, in a small area southwest of Wink it has been removed, apparently by erosion (well F-31, pl. 5). The Tecovas is found at depths ranging from about 100 to 1,450 feet in the county.

The Tecovas formation is not known to yield water to wells in Winkler County.

Santa Rosa sandstone.--The Santa Rosa sandstone, 220 to 350 feet thick where the full section is present in Winkler County, overlies the Tecovas formation and underlies the Chinle formation equivalent, or Cenozoic alluvium where that unit is absent. A full or partial section of Santa Rosa sandstone is present everywhere in the county except in the area southwest of Wink, where the entire Triassic section has been removed by erosion (well F-31, pl. 5). Plate 4 shows the altitude of the base of the Santa Rosa throughout the county.

The Santa Rosa sandstone consists of reddish-brown and gray medium-to-coarse-grained, subangular arkosic, micaceous, and conglomeratic sandstone cemented with calcite and some silica. The sandstone is typically crossbedded and is interbedded with soft red and green shale and siltstone.

The Santa Rosa sandstone is the principal fresh-water aquifer in the county. The occurrence of ground water in the Santa Rosa and associated alluvial deposits is discussed in detail on pages 21-25.

Chinle formation equivalent.--The Chinle formation equivalent, ranging in thickness from 0 to approximately 1,000 feet in Winkler County, is the top formation of the Dockum group. It conformably overlies the Santa Rosa sandstone and unconformably underlies Cretaceous and Cenozoic rocks. The Chinle formation equivalent crops out in a very narrow band near Concho Bluff; however, owing to the small extent of the outcrop, it is not shown on the geologic map. The formation is present in the subsurface of the eastern part of the county and much of the northern part, but owing to erosion it is absent in the southwestern part of the county and on the structural high in the west-central part (see pls. 2, 6, and 7).

The Chinle formation equivalent consists of brick-red to maroon and purple shale and thin beds of fine red or gray sandstone and siltstone. Green and gray mottling and yellow streaks are common in the shale. The beds of sandstone are of a finer testure than those of the underlying Santa Rosa. Locally, limestone beds several feet thick are found in the formation.

The Chinle formation equivalent is not known to yield water to wells in Winkler County.

Cretaceous System

Trinity group

The Trinity group, which has a maximum thickness of about 100 feet where it crops out to form the base of Concho Bluff in northeastern Winkler County, unconformably overlies the Chinle formation equivalent. The Trinity consists of sandstone, siltstone, conglomerate, and gravel cemented with carbonate minerals. In a few places silica-cemented zones are found.

Although the Trinity group is the principal source of water in neighboring Ector County, it yields only small quantities of water of good chemical quality to a few wells in the extreme northeastern part of Winkler County. Most of the beds of the Trinity group lie above the water table in the county.

Fredericksburg group

The Fredericksburg group, 0 to 50 feet thick, overlies the Trinity group in northeastern Winkler County. The Fredericksburg consists of gray to cream and brown hard to earthy fossiliferous and sandy marine limestone. Solution cavities, some of which may be seen in the face of Concho Bluff, are common in the limestone.

Like most of the Trinity group, the rocks of the Fredericksburg group are not water bearing in Winkler County.

Cenozoic Era

Tertiary and Quaternary Systems

Cenozoic alluvium

The Cenozoic alluvium unconformably overlies rocks of Permian, Triassic, and Cretaceous ages in Winkler County. The thickest alluvial sediments were deposited in the slumpage trough on the eroded surface of the rocks of Triassic age. The final establishment of the erosional surface took place in Cenozoic time prior to and during the deposition of the alluvium.

Consisting of unconsolidated sand, silt, gravel, clay, and caliche the alluvium has an average thickness of about 100 feet except in the trough, where it has a maximum thickness of 1,050 feet. Thin beds of gravel are reported in the alluvium in the Central Basin Platform, whereas in the slumpage trough in west-central Winkler County individual gravel beds have been found to be as much as 90 feet thick. Clay beds as much as 200 feet thick also occur in the deep alluvium.

The alluvium is similar in color to the underlying Triassic and Permian red beds and is difficult to distinguish on the basis of color; however, the two may be distinguished readily by differences in radioactivity. Except where the Cenozoic rocks are in contact with the Santa Rosa sandstone, their radioactivity as measured by the gamma-ray curve of radioactivity logs is considerably less than that of the underlying Triassic and Permian rocks (wells D-10, E-14, and E-5, pl. 2). Where the Cenozoic and Santa Rosa are in contact, the drillers' logs generally are the best means of determining the contact.

The occurrence of water in the Cenozoic alluvium is discussed in detail on pages 21-25.

Quaternary System

Sand dunes

A belt of sand dunes 8 to 15 miles wide extends southeastward through the eastern part of Winkler County (see pl. 1). A part of the belt (2 to 4 miles wide) consists of high shifting dunes, making up an area almost entirely devoid of vegetation. The remainder of the dunes are captured and support sparse vegetation. The dune sand ranges in thickness from 0 to about 250 feet, the thickness being greatest in the area of the high dunes.

Although the dune sand yields small quantities of water of good quality to pits and a few wells, its chief importance is as an excellent recharge facility to the underlying formations.

GROUND WATER

Source and Occurrence

The principal fresh-water aquifers underlying Winkler County are the saturated zones in the Santa Rosa sandstone and the Cenozoic alluvium. They are part of extensive aquifers underlying a large area in West Texas and eastern New Mexico. The source of all fresh water to the aquifers is precipitation, part of the water being derived from precipitation within the county and part from areas to the north and northeast. The Santa Rosa obtains its water principally from water percolating through the Cenozoic deposits where the two formations are in contact and the base of the Santa Rosa is the lower limit of fresh water in the county. The source of water to the older saline water-bearing formations is, in addition to that entrapped in the formations at the time of their deposition, underflow into the county from their outcrop areas and leakage from overlying or underlying formations.

The Santa Rosa sandstone and Cenozoic alluvium are separate aquifers where the relatively impermeable material of the Chinle formation equivalent is present between them. The Chinle formation equivalent confines water in the Santa Rosa under artesian pressure, whereas water in the Cenozoic alluvium is unconfined and occurs under water-table conditions. Where the Chinle formation equivalent is absent the Santa Rosa and alluvium are in contact, forming a single unconfined aquifer.

The Santa Rosa sandstone is the most extensive of the two aquifers and has no lateral boundaries in Winkler County. The Cenozoic alluvium extends into New Mexico and adjoining counties, but as an aquifer it is discontinuous in areas where it is non-water-bearing, and it is missing where older formations crop out (see pl. 1).

Water fills the pore spaces of the granular material of the aquifers. The porosity is the proportion of pore space to the total volume of material and is independent of grain or pore size. Thus, a unit volume of clay or silt may contain as much water as, or more water than, a unit volume of sand or gravel. The ability of the aquifers to transmit water is called "permeability" and is largely a function of the pore size--the larger the pore spaces the more readily the material will transmit water. The Santa Rosa generally stores less water and is less permeable than the unconsolidated materials of the Cenozoic alluvium because it is more compact and cementing material fills some of the pore space. However, in some places the Santa Rosa has been fractured and large openings created which locally may make the aquifer more permeable than the coarsest material in the Cenozoic alluvium.

The occurrence of water in the older, saline-water-bearing formations is discussed in this report only as it pertains to the pollution of the fresh-water aquifers.

Movement of Ground Water

Plate 7 shows by contours the configuration of the water table in the Cenozoic alluvium in Winkler County in 1956. Insufficient data are available to contour the piezometric surface of the water in the Santa Rosa, but the altitudes of water levels in a few wells in the Santa Rosa are shown on plate 7.

The configuration of the water table is related to the direction of ground-water movement but also is a reflection of such things as differences in recharge rates and transmitting properties of the aquifer, of discharge areas, and of irregularities of the underlying confining beds. From all available hydrologic data, ground water in Winkler County is believed to move as follows: A relatively small amount of water moves into the county from the northeast. Recharge from the land surface increases the quantity as flow continues southwestward, the natural recharge being greatest in the sand-dune area in the eastern part of the county. The flow through the Cenozoic alluvium is decreased in an area north-northeast of Kermit, where a part of the water moves downward from the Cenozoic into the underlying Santa Rosa forming the chief means of recharge of that formation in the report area. In the vicinity of Kermit withdrawals from industrial and public-supply wells also tend to decrease the flow through the Cenozoic alluvium. West of Kermit a few miles, the flow tends to be increased substantially by recharge from industrial wastes. Underflow from this area, where the contours on plate 7 are widely spaced, appears to be divided principally into two components--one toward the thick deposits in the structural trough to the west and the other toward the south to the county line in the area east of the trough. The alluvium at the east edge of the county is not waterbearing; consequently, the water moving into the trough is presumed to move southward through the trough.

The altitudes of water levels in wells tapping the Santa Rosa (see pl. 7) in the area north-northeast of Kermit are higher than those in surrounding areas in the county east of the structural trough. Thus, water in the Santa Rosa appears to move in all directions away from the area where it enters the formation from the overlying Cenozoic alluvium.

Water from the Santa Rosa sandstone generally is more mineralized in the far northern and eastern parts of the county than in the central and southern areas. The higher mineralization suggests that the movement of water toward the east and north is very slow compared to movement toward and south of Kermit, where the quality of the water in the Santa Rosa sandstone is similar to that of the fresh water in the alluvium. The chemical quality of the water and its relative rate of movement in the Santa Rosa sandstone in the rest of the county east of the structural trough is unknown.

The altitudes of water levels in wells in the Santa Rosa west of the trough suggest that water moves into the trough and southeastward along it. Water west of the trough is of good quality.

Recharge

Natural Recharge

Most of the precipitation in Winkler County is evaporated or consumed by plants; only a small part recharges the aquifers. The aquifer is substantially recharged only when intense storms of long duration or of frequent occurrence

moisten the soil enough that deep percolation takes place. However, such climatic conditions are infrequent.

The area most favorable for recharge is a belt of sand dunes 8 to 15 miles extending northwestward across the eastern part of the county (see pl. 1). The thickness and permeability of the material in this area are such as to permit much of the water to percolate rapidly past the soil and shallow subsoil, from which water is discharged by evaporation and transpiration. Elsewhere in the county the sandy mantle absorbs water rapidly but may be underlain at shallow depths by finer material which retards downward percolation. A determination of the amount of natural recharge in Winkler County is beyond the scope of this investigation.

Artificial Recharge

The Cenozoic alluvium is and for some time has been recharged at a substantial rate by oil-field waste water in parts of the county. The area most heavily recharged is about $4\frac{1}{2}$ miles west-southwest of Kermit. Although the nature of the surface material does not make this area more favorable for recharge from precipitation than other areas in the county, plate 7 shows that the water table is mounded beneath the area. Waste water leaking from earthen disposal pits for many years appears to be the cause of the greater rate of recharge. Many pits, generally near the separators that gather fluid from producing oil wells in the Hendrick oil field, are the receptacles for the waste water. Ideally they lose water only by evaporation, but evaporation losses are retarded by the film of oil that floats on the surface of the water, and much of the water is lost by seepage through the bottoms and sides of the pits. Other areas in the county where oil is produced also are recharged with waste water, but to a lesser extent than in the Hendrick field. Further evidence of recharge from industrial wastes is discussed on pages 45-47.

Generally, oil-well waste water is highly mineralized, and the amount of evaporation that does take place increases the concentration. Thus, recharge from this source pollutes the fresh-water aquifer. The amounts and chemical quality of the produced waste water and its effect on the chemical quality of ground water are discussed on page 45.

The amount of artificial recharge from other sources, such as irrigation waste water and sewage is not known but is probably small.

Discharge

Ground water is discharged at the land surface in Winkler County through wells and by evapotranspiration where the water table is close to the land surface. Underflow from the county southward ultimately is discharged in the Pecos River Valley. There is no spring flow or effluent seepage to streams in the county.

In 1956, water wells discharged about 8 mgd of fresh water and about 3 mgd of saline water. More than half of the fresh water and nearly all the saline water is pumped by the oil industry. In addition to the production from water wells, more than 20 mgd of saline water was produced with the oil from oil wells in 1956.

The fresh water is derived from both the Cenozoic alluvium and the Santa Rosa sandstone; the saline water is derived from numerous older formations, but pricipally those producing appreciable quantities of oil. A more detailed summary of withdrawals from wells by use and by location is included in following sections of this report.

The principal area of natural ground-water discharge is along the base of the sand dunes on the southwest side, where the water table is very close to the land surface. Large but undetermined quantities of water are evaporated from the soil and transpired by the vegetation, which is considerably denser here than elsewhere in the county. Ground water is discharged by evapotranspiration also in a few other scattered areas in the county where the water table is close to the land surface. The areas were not mapped nor was the quantity of discharge from them determined.

The concentration of withdrawals from wells in Kermit and the industrial area north-northwest of the city has noticeably depressed the water table in the Cenozoic alluvium. (See pl. 7.) Water moves laterally toward the pumped wells, and cone-shaped depressions are formed in the water table in the centers of withdrawal. The quantity of water pumped is directly related to the volume of the cones because practically all of it is derived from storage. The cones will continue to enlarge until they intercept an area where the recharge can be increased or the natural discharge can be decreased enough to equal the rate of pumping. This balanced condition is unlikely to occur within the foreseeable future because of the slow rate of development of the cones and the remoteness of areas where enough water can be intercepted. Thus, water will continue to be withdrawn principally from storage except as it is replaced by oil-field waste water.

Storage of Fresh Water

Some tens of millions of acre-feet of fresh water is stored in the Cenozoic alluvium and Santa Rosa sandstone beneath Winkler County. Parts of the formations are unexplored and accurate estimates of the quantity of water in them cannot be made with present data. However, the explored part of the aquifers contains about 20 million acre-feet. The deep alluvium and Santa Rosa sandstone in the structural trough form the largest unexplored part of the aquifers; the deposits of the Santa Rosa in the eastern third of the county also are unexplored. Part of the unexplored rocks may contain saline water, but a substantial part probably contain fresh water.

It is impractical to recover all the ground water in storage. The amount that will drain from the deposits by gravity may be as little as 50 percent of the total quantity, and the amount economically recoverable from wells may be only one-half to two-thirds of that amount. Thus, the quantity of water available for development from the explored rocks is probably about 5 to 7 million acre-feet.

Utilization

Before the discovery of oil in 1926, fresh-water pits dug in the sand-dune area and shallow windmill wells scattered throughout the county supplied water to the population of less than 100 and to the stock on the extensive ranches.

More and deeper wells were drilled to meet the demand for more water as the oil industry grew and the population increased. By 1956 most of the water was pumped from deep wells equipped with electrically poweredturbine pumps. The following table shows the range in yields of wells and the estimated withdrawal of fresh water by use in Winkler County in 1956.

Use	Number of wells	Yield per well (gpm)	Average pumpage (mgd)	
Public supply:				
Kermit	9	160-400	1.67	
Wink	2	100-300	.08	
Oil-field camps	29	30-180	.18	
Schools	2	--	.07	
				2.00
Industrial:				
Gasoline and other plants	77	30-300	1.82	
Waterflooding 1/	61	30-200	2.98	
				4.80
Irrigation:				
Includes parks and golf course	7	100-1,200	1.06	
				1.06
Stock and domestic:	--	--	.31	
				.31
TOTAL				8.17

1/ Waterflooding is the process of injecting water into oil-bearing formations to facilitate the recovery of the oil.

Public Supplies

City of Kermit

In 1941 the city of Kermit assumed control of the municipal water system, which was formerly operated by the Community Public Service Company. The system at that time was supplied from two wells tapping the Cenozoic alluvium. Well D-279, a well in the Santa Rosa sandstone, was incorporated into the system late in 1941.

In 1956 the city was using six wells tapping both the alluvium and the Santa Rosa sandstone, the wells yielding 200 to 300 gpm each. All the wells are about 300 feet deep. In most of these wells the upper section of the saturated alluvium is cased off, because it contains large amounts of loose fine sand.

The wells tapping only the Santa Rosa sandstone ranged in yield from 160 to 400 gpm in 1956. Well D-291, 570 feet deep in the Santa Rosa sandstone drilled by the city in 1957, yields about 400 gpm. Two other wells in the Santa Rosa,

D-277 and D-299, drilled in 1957 were the most successful in the county. On test the wells yielded 1,200 and 1,875 gpm, respectively. Permanent pumps for the wells are designed to yield about 750 gpm.

In 1957 the capacity of the city's ground and overhead water-storage reservoirs was 1,655,000 gallons and 150,000 gallons, respectively.

Figure 7 shows the increase in pumpage from the municipal wells from 1943 through 1956. The large increase in withdrawals during the summer months is due chiefly to lawn irrigation and to cooling. The annual pumpage increased from 71 million gallons in 1943 to about 610 million gallons in 1956.

City of Wink

From 1930 to 1953 the city of Wink had three wells tapping the alluvium for its municipal water supply. The wells, 165 to 250 feet deep, yielded 30 to 210 gpm. Well G-109, the last of these wells to be used, was abandoned in April 1957 because of an increase in the mineralization of the water.

After April 1957 all the water for the city of Wink was supplied by wells G-110 and G-111, drilled in 1953. Both wells, 240 feet deep, are cased with 16-inch pipe to about 180 feet and uncased below that depth. Well G-110 yields about 300 gpm, whereas well G-111 yields only about 180 gpm with a drawdown of about 80 feet after pumping 2 hours.

In 1956 the total capacity of the overhead and ground-storage reservoirs was 96,000 gallons. In 1957 the city installed another ground-storage tank having a capacity of 420,000 gallons.

The water system of the city of Wink had about 450 customers in 1956, and the pumpage for the year was about 30 million gallons.

Oil-field camps

Twelve large camps have been built in Winkler County for the families of oil-company personnel. Each camp has from 5 to 43 houses and its own water wells and distribution system. Smaller camps, serving as field offices and having housing facilities for employees, also have their own water wells and distribution systems. The combined withdrawal by the 12 major camps in Winkler County averaged about 180,000 gpd in 1956.

Of the 12 large camps, 9 are in the industrial area north-northwest of Kermit (grid D, pl. 1). Of the 24 wells serving the camps, 13 draw water from the Cenozoic alluvium, 2 draw water from the Santa Rosa sandstone, and 9 draw water from both aquifers. The wells yield 30 to 180 gpm and range in depth from 156 to 600 feet. The pumpage in 1956 for the 9 camps was about 53 million gallons of water--an average of about 145,000 gpd.

The 3 other camps are at or in the vicinity of Wink. The camp at Wink has a field office and about 25 houses, and the water is supplied from 2 wells tapping the alluvium. A large camp 2 miles west-southwest of Kermit and another camp 5 miles east of Wink are supplied by 3 wells tapping both the alluvium and the Santa Rosa sandstone. About 12 million gallons of water was used by the 3 camps in 1956.

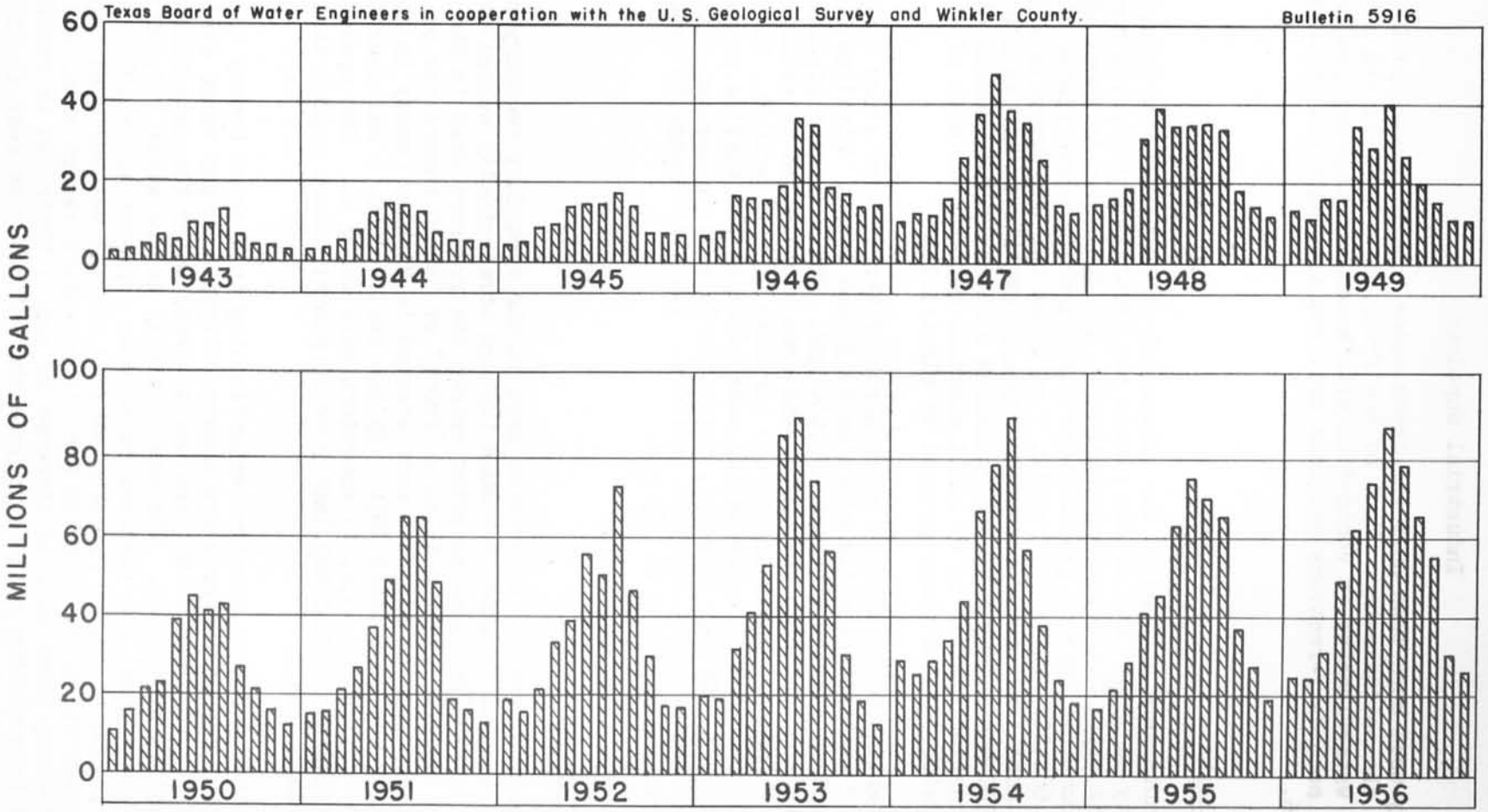


FIGURE 7. - Monthly pumpage from municipal wells in Kermit, Winkler County, Tex.

Industrial Supplies

Industry used more than half the fresh water pumped in Winkler County in 1956 and all the saline water. Most of the fresh water and all the saline water was used for waterflooding in connection with secondary-recovery projects in oil fields. The secondary-recovery projects used about as much saline water as fresh water in 1956.

Industrial plants

Four plants were engaged in the extraction of gasoline from natural gas in Winkler County in 1956. Two of the plants are about 3½ miles north-northwest of Kermit, one is about 6 miles north-northeast, and the other is about 4½ miles south. The combined rate of ground-water withdrawal by these plants in 1956 averaged about 660,000 gpd from 17 wells, 7 of which tap the Cenozoic alluvium and 10 the Santa Rosa sandstone. The wells range in depth from 110 to 275 feet and yield 30 to 300 gpm. Some have reciprocating cylinder pumps powered either by internal-combustion engines or by small electric motors, but most of the wells are equipped with turbine pumps powered by electricity.

A carbon-black plant about 4 miles north of Kermit used about 400,000 gpd in 1956 from 2 wells tapping the alluvium D-136 and D-137. Pipeline and compressor plants used an average of about 480,000 gpd. The 9 largest pipeline and compressor plants are scattered throughout the area represented by grids D and G on plate 1; the 2 largest plants are in the northern half of grid D. In 1956 the 9 largest plants operated 17 water wells, most of which had turbine pumps powered by electric motors. Of the 17 wells, 8 tap the Cenozoic alluvium, 2 tap the Santa Rosa sandstone, and 7 tap both aquifers. The wells range in depth from 120 to 600 feet and yield 30 to 185 gpm.

Waterflood projects

Waterflooding, one of the methods used in the secondary recovery of oil, involves injecting water under pressure through strategically spaced wells tapping the oil zone. The injected water raises the pressure head in the reservoir and displaces the oil, pushing it as a "front" or "bank" toward the oil-producing wells. Waterflooding projects were started in Winkler County in 1943, and only fresh water was used until 1952. By the end of 1950, 5 oil operators were using the process, and in 1956, 17 operators were using it. One operator reports that a waterflooding project may last 9 or 10 years; others report that their projects may last longer.

Some of the operators consider waterflooding in Winkler County an economically successful venture; others are unsure without a longer range evaluation of the results. Figure 8 shows that the use of fresh water for waterflooding has increased steadily since 1943. The use of highly saline water (10,000 to 35,000 ppm of dissolved solids) has remained relatively constant since 1953; moderately saline water (3,000 to 10,000 ppm of dissolved solids) was not used in appreciable quantities until 1956. Some of the oil operators report that, although their waterflooding programs will increase in scope, their use of fresh water will decrease because they plan to recycle the saline water that is produced with the oil. Table 3 shows that large quantities of saline water are available from oil wells.

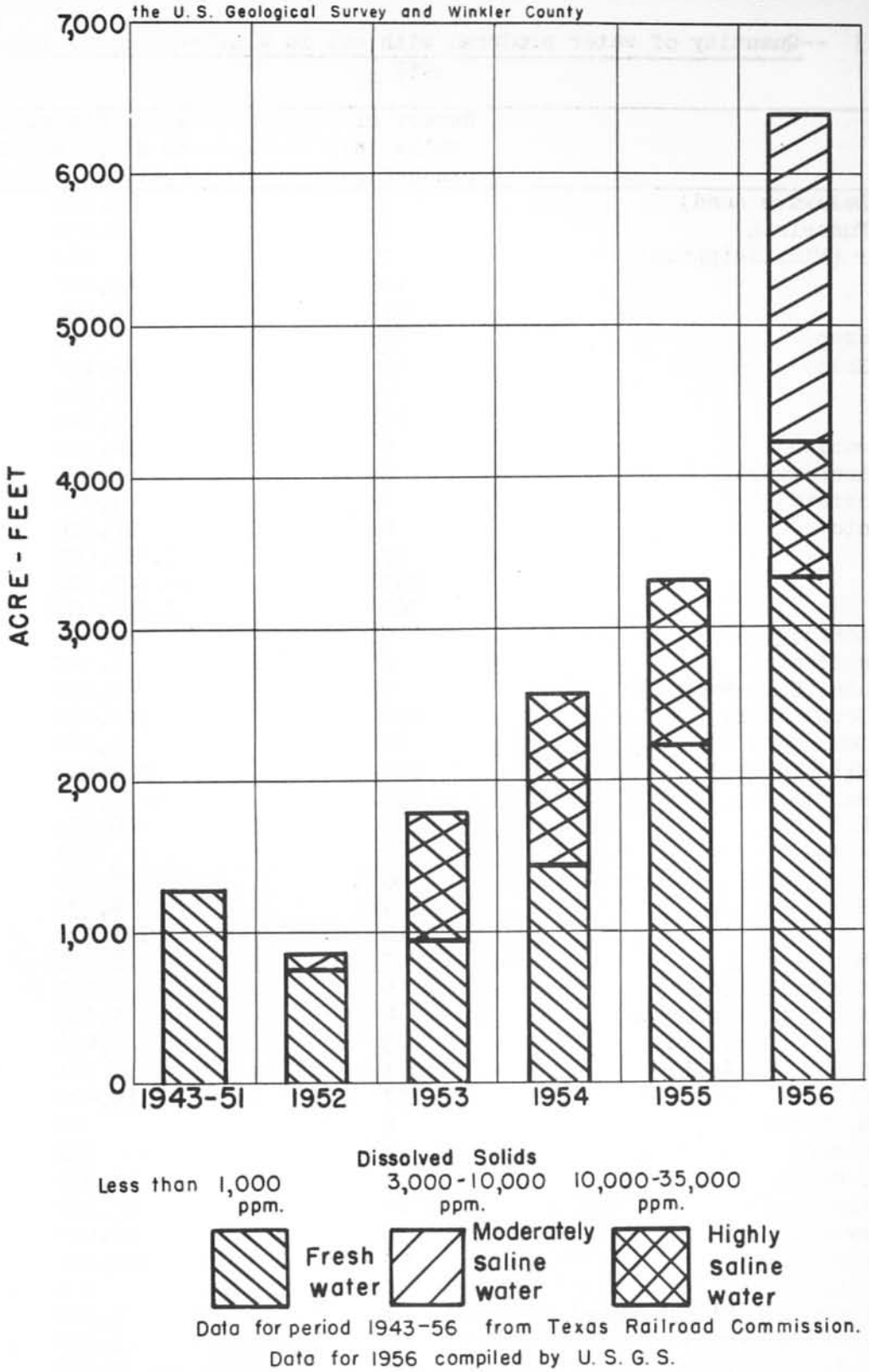


FIGURE 8. — Quantity and quality of water used in waterflooding projects in Winkler County, Tex.

Table 3 --Quantity of water produced with oil in Winkler County, Tex. 1957 1/

	Number of wells in production	Water diverted to disposal pits (gallons per day)
Block 20 (Delaware sand)	3	2,650
Circle 2 (Fusselman)	2	5,630
East Jasper (Mississippian)	?	210
Eaves	10	49,000
Emperor	199	72,800
Emperor (deep)	60	4,830
Emperor (Holt)	46	12,100
Flying "W"	4	7,600
Halley	65	4,840
Halley (Devonian)	5	24,500
Halley (Ellenburger)	2	5,370
Halley (Glorieta)	?	1,770
Halley (Montoya)	4	20,900
Henderson	37	1,520,000
Hendrick	255	14,500,000
Kermit	762	1,100,000
Kermit (Ellenburger)	9	630
Kermit (Fusselman)	2	6,340
Kermit, South (Ellenburger)	3	2,230
Keystone (Colby sand)	436	108,000
Keystone (Devonian)	84	3,280
Keystone (Ellenburger)	128	207,000
Keystone (Holt)	109	24,300
Keystone (Lime)	117	60,300
Keystone (McKee)	?	504
Keystone (Silurian)	48	36,400
Keystone ,South	14	4,370
Leck	18	141,000
Monahans, North	7	1,070
Monahans, North (Devonian)	5	232
Monahans, North (Ellenburger)	4	2,500
Monahans, North (Glorieta)	3	2,450
Monahans, North (Waddell)	1	581
Scarborough	117	19,400
Scarborough, North	2	88
TXL (San Andres)	?	252
Ward-Estes, North	?	2,310
Weiner (Colby sand)	64	14,800
Wheeler (Devonian)	35	16,000
Wheeler (Ellenburger)	29	153,000
Wheeler (Silurian)	8	746
Wheeler, Northwest (Ellenburger)	1	9,500
Wight Ranch (Clear Fork)	2	1,680
Wight Ranch (Ellenburger)	1	7,460
TOTAL (rounded)	2,700	18,000,000

1/ Data from operating companies

Fresh water.--About 3,340 acre-feet, or more than 1 billion gallons, of fresh water was used in waterflooding projects in Winkler County in 1956, making this industry the largest single consumer of fresh water. Sixty-one fresh water wells were used in 1956 as supply wells for waterflooding; 31 tap the Cenozoic alluvium, 5 tap the Santa Rosa sandstone, and 25 tap both aquifers. All the wells have turbine pumps powered by electric motors. Some wells are about 100 feet deep, but most are between 200 and 500 feet deep. Forty-six of the wells are in grid D, 12 are in the northern half of grid G, and 3 are in the western half of grid C. (See pl. 1.)

Saline water.--In 1952 several oil operators started using saline water for waterflooding. The water is treated before it is injected to inhibit corrosion. Some operators use moderately saline water from the oil strata in the Seven Rivers and Grayburg formations; others use water from the Rustler formations. Most of the water from the Rustler formation used for waterflooding in 1956 was highly saline. Some was moderately saline, and a small part was considered a brine, having more than 35,000 ppm of dissolved solids.

Some test wells drilled to the Rustler formation have produced no water; others have produced as much as 800 gpm. The variation in yield from place to place results from the irregular occurrence of cavernous openings in the limestone formation. Six wells, 1,000 to 1,300 feet deep, in grid D (pl. 1) produce water from the Rustler formation for waterflooding.

One oil company drilled wells G-9, G-37, G-40, G-41, and G-42 into the Grayburg formation in Winkler County for waterflooding at Goldsmith, in Ector County. The wells average about 3,550 feet in depth and are equipped with deep-well turbine pumps powered by electric motors. The water is piped from these wells in Winkler County about 30 miles to Goldsmith, where approximately 1 mgd was used for waterflooding in 1956. The same company also used more than 1 mgd for waterflooding in Winkler County in 1956. This supply came from several oil wells in the Hendrick field which produce large amounts of water from the Seven Rivers formation.

Other industrial uses

Other industrial uses of fresh water include (1) to use as a drilling fluid for the drilling of oil wells by the rotary method; (2) to flush out underground salt deposits to make storage space for liquefied petroleum gases; and (3) to seal wooden tanks used to store crude oil.

During 1956 several counts were made of the number of rotary drilling rigs in operation. The number varied from about 30 to 40. Generally a water well is drilled close to the oil test, but in a few places several rigs are served from one well through a common distribution system. One driller estimated his daily use of water per well to be between 1,500 and 2,500 gallons. Some of the water wells have been abandoned because oil tests were unsuccessful, or because drilling was terminated when the field was fully developed, but most of the wells have been placed on "standby" to be used when drilling is resumed.

One oil operator is using water to flush salt from the ground to create storage space for liquefied gas. He estimated that he used more than 30 million gallons of fresh water for this purpose in 1956.

Wooden oil-storage tanks are still used in Winkler County. Several oil operators use fresh water to expand the wood in order to keep the tanks leakproof.

Irrigation Supplies

Irrigation in Winkler County is still in the experimental stage. In most of the county the root zone is deep and the soil has a low moisture-holding capacity, moderate to low fertility, a high susceptibility to wind erosion, and a high water-intake rate, owing to its coarse texture (Soil Conservation Service, 1953, p. 5). Because of the excellent subsurface drainage in most places, rather highly mineralized water may be used for irrigation with little danger of salts accumulating in the soils. Some farmers in the area report that they are able to use water having between 1,000 and 2,000 ppm of dissolved solids.

Four wells were used to irrigate feed crops and vegetables in Winkler County in 1956. Three of the wells, G-161, G-162, and G-163, tap the deep Cenozoic alluvium about 5 miles south of Wink. They apparently produce enough water of suitable quality for irrigation of a few hundred acres of land. In 1956 the wells produced nearly 1,000 acre-feet of water. Well D-261, which taps the Santa Rosa sandstone near Kermit, yields considerably less water; it is used to irrigate one acre of feed crops and vegetables.

Wells F-8 and C-52 irrigate the Winkler County golf course and G-298 irrigates the Winkler County park, in the eastern part of Kermit. About 38 million gallons of water was used from these wells in 1956. The total use of water for irrigation in 1956 averaged only about 1 mgd.

Stock and Domestic Supplies

Most of the stock and domestic wells in Winkler County are equipped with windmills; the rest are equipped with pumps powered by electricity or gasoline.

Some of the wells are as much as 1,200 feet deep, but most are less than 300 feet. The yields range generally from 1 to 5 gpm. About 200 domestic and stock wells tap the Cenozoic alluvium, 18 tap the Santa Rosa sandstone, 12 tap both formations, and 2, B-9 and B-14, in the northeastern part of the county draw water from rocks probably of Cretaceous age. The combined withdrawal for stock and domestic use in 1956 was small in comparison to the total withdrawal for all uses and is estimated to have been about 310,000 gpd.

Pumping Tests

Pumping tests were made on a few wells in Winkler County to determine locally the water-bearing properties of the fresh-water aquifers tapped by the wells. Owing to the lack of suitable wells, testing of a representative sample of wells throughout the county was impossible. The results of the tests are applicable only within a small area around the tested wells and should not be the basis for predictions of well-field performance over long periods of time.

The principal hydraulic characteristics of a water-bearing material are the coefficient of transmissibility and the coefficient of storage. These characteristics, which govern the ability of aquifers to transmit and store water, may be determined from pumping tests.

The coefficient of transmissibility is expressed as the amount of water, in gallons per day at the prevailing temperature of the water, that will flow through a vertical strip of the aquifer 1 foot wide extending the full saturated height of the aquifer under a hydraulic gradient of 1 foot per foot (Theis, 1935, p. 520). It may be expressed also as the volume of water, in gallons per day, that will flow through a vertical strip of the aquifer 1 mile wide extending the height of the saturated aquifer under a hydraulic gradient of 1 foot per mile. The coefficient of storage is the volume of water released from or taken into storage per unit surface area of the aquifer per unit change in the component of head normal to that surface. Under artesian conditions the volume of water released from or taken into storage is determined by the compressibility of the aquifer and expansion of the water. Under water-table conditions the coefficient of storage is practically equal to the specific yield, which is the volume of water involved in gravity drainage or refilling, divided by the volume of the material drained or filled.

The yield per unit drawdown of a well would be greater than that of a similarly constructed well if the coefficient of transmissibility and the coefficient of storage were greater for the former. Other things being equal, well yield is approximately proportional to the coefficient of transmissibility.

In this investigation the Theis nonequilibrium formula (Theis, 1935, p. 519-524) was used to analyze the pumping tests, and the Theis recovery method (Wenzel, 1942, p. 95-97) was used to analyze the recovery data of pumped wells.

Cenozoic Alluvium

Most wells tapping the alluvium produce water only from the lower part of the saturated sand and gravel. The upper part in many places contains fine sand, which is difficult to screen, and in some areas the shallow alluvium contains polluted water. Wells that tap a representative section of the alluvium and that are suitable for testing were found only in the area of the slumpage trough.

A pumping test was made in March 1957 at well G-163, which taps the deep Cenozoic alluvium in the trough about 5 miles south of Wink (see fig. 9). The well taps the Cenozoic alluvium at a depth interval of 320 to 400 feet. The radioactivity log of a nearby well, G-165, indicates that the section of alluvium is at least 600 feet thick, about 475 to 500 feet of which may be saturated. The coefficient of transmissibility as determined during the recovery of the water level in the well was 25,000 gpd per foot; however, this is not representative of the thickness of the alluvium which may be considerably greater than the screened section.

On the basis of the coefficient of transmissibility derived from the test, the theoretical drawdowns for different periods of continuous pumping at different distances from a well discharging 1,000 gpm have been computed by assuming a coefficient of storage of 0.15 (see fig. 10). The assumed coefficient of storage is typical of many areas where ground water occurs under water-table conditions. The figure illustrates conditions in an extensive and homogeneous aquifer. Actual drawdowns may be appreciably greater or less than those indicated because of inhomogeneities or boundaries.

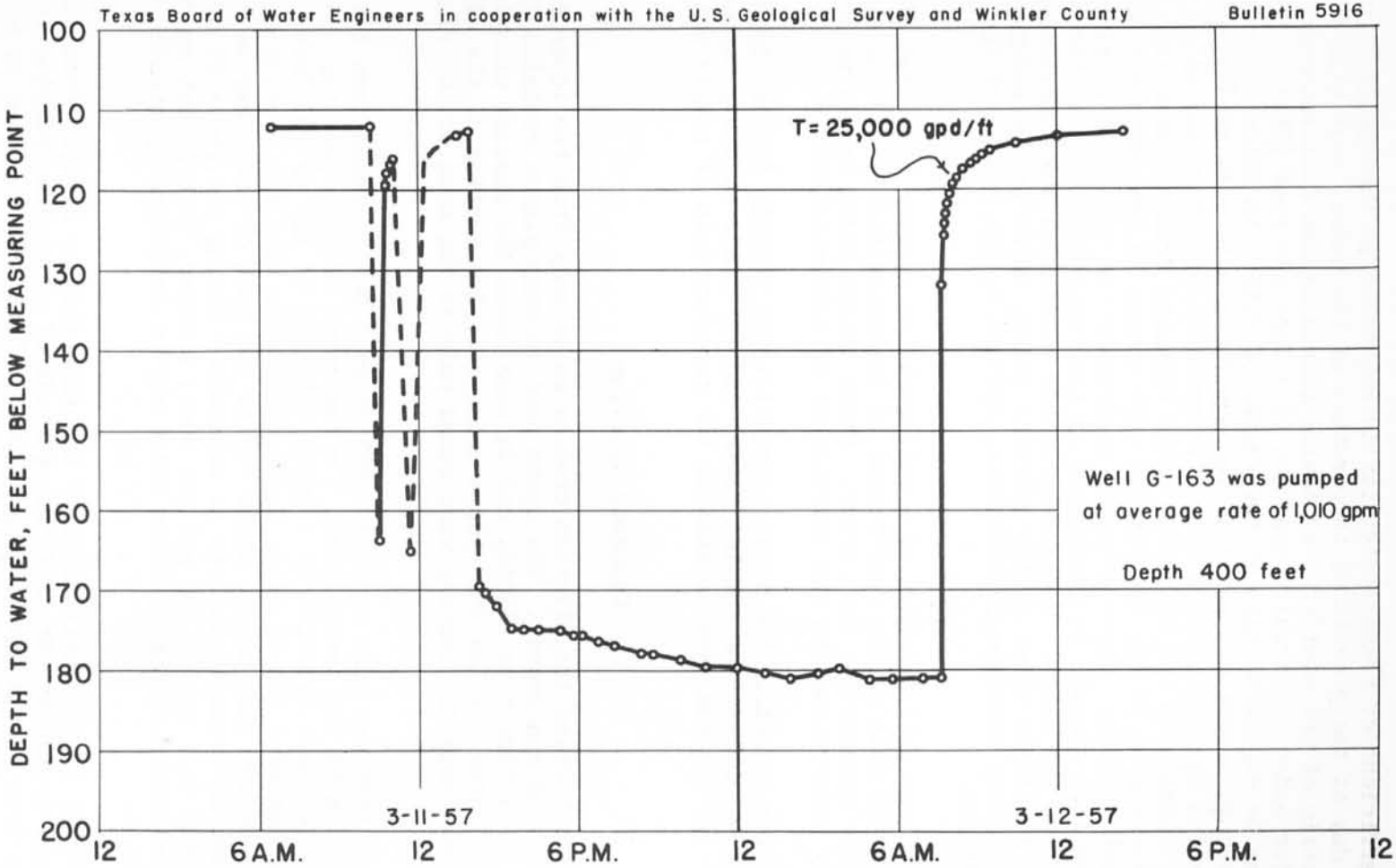


FIGURE 9. - Results of pumping test of well G-163, Winkler County, Tex.

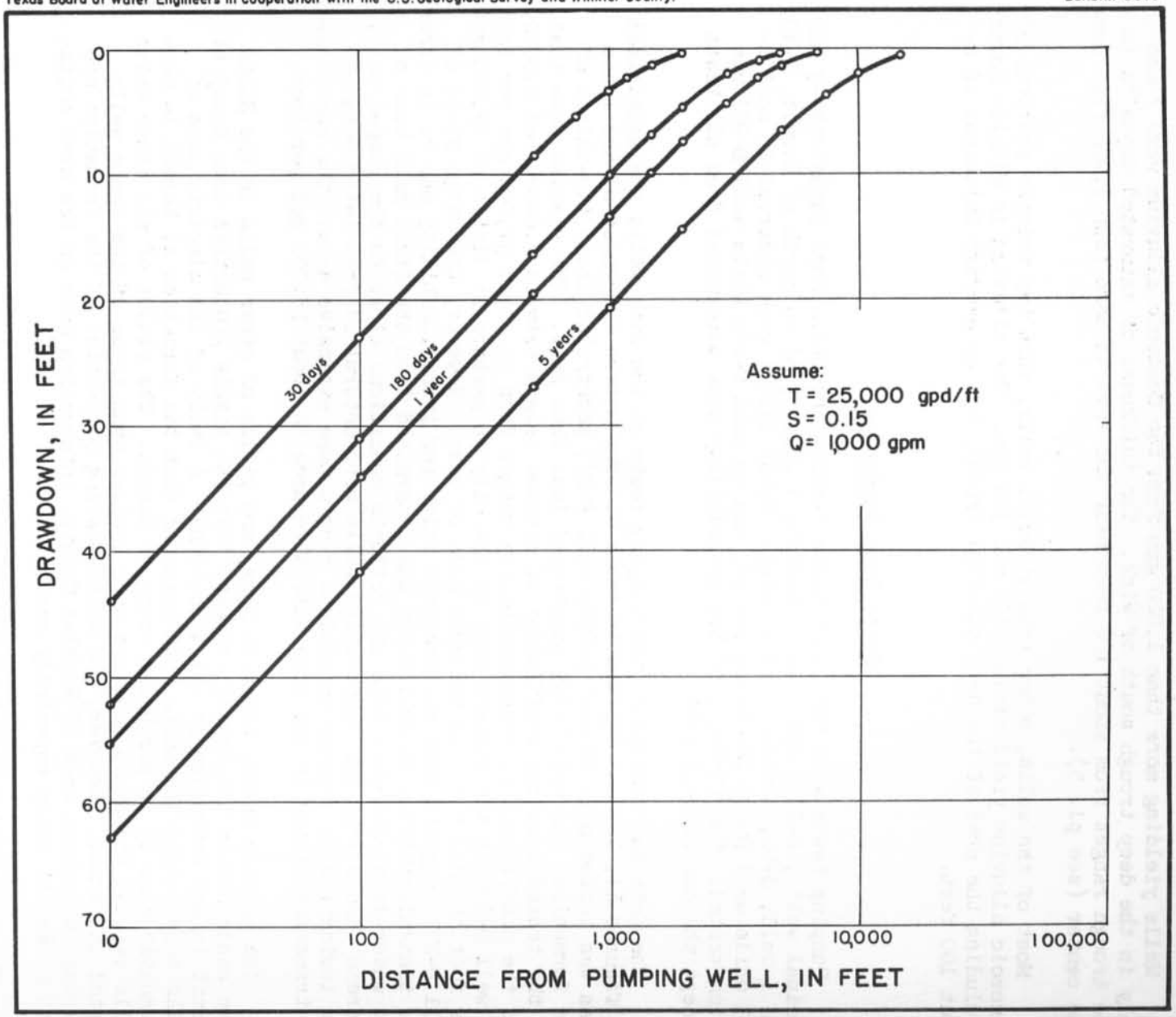


FIGURE 10.- Theoretical drawdown in an infinite aquifer due to pumping.

Wells yielding more than 1,000 gpm from the Cenozoic alluvium were found only in the deep trough south of Wink. The thickness of saturated deposits in the trough ranges from about 100 feet near the edge to more than 1,000 feet near the center (see pl. 5).

Most of the wells, other than windmill wells, that tap thinner sections of Cenozoic alluvium yield between 100 and 300 gpm. The alluvium in Winkler County, excluding the area of the deep alluvial trough, has an average thickness of about 100 feet.

Santa Rosa Sandstone

Pumping tests were made on 5 wells tapping the Santa Rosa sandstone--3 municipal wells, D-277, 291, 299 in Kermit, 1 well $5\frac{1}{2}$ miles north of Kermit, D-49, and 1 well, G-92, 4 miles east of Wink. Water levels were observed in well D-293 while well D-299 was being tested, and in well D-279 while well D-291 was being tested. Coefficients of transmissibility were determined from all tests except the one on well G-92.

The data and results of the pumping tests on the city wells are summarized on figures 11, 12, and 13, and in table 4. The entire thickness of the Santa Rosa was tested only in well D-291; well D-277 penetrated about two-thirds of the formation, and well D-299 penetrated less than half. The results show that in the tested area the coefficient of storage ranges between 0.00024 and 0.00029, and the coefficient of transmissibility ranges from at least 37,000 gpd per foot at well D-299 at the eastern edge of the city to perhaps as little as 12,000 gpd per foot at well D-277 on the west side of town. However, the large yield of well D-277 suggests that the computed value for transmissibility may be in error. The transmissibility at well D-299 was determined from the first half hour of the water-level-recovery data and reflects conditions close to the pumped well, whereas values from the observation wells were determined from later data and are indicative of average conditions over a more extensive area. The coefficient of transmissibility in the more extensive area is about 25,000 gpd per foot.

The pumping tests, electric logs, and yields of other wells in the Santa Rosa sandstone in the county indicate that the highly productive zone found at Kermit is not extensive in all directions. A study of the electric logs of wells penetrating the Santa Rosa suggests that the formation at Kermit is more permeable than it is north and south of Kermit. The yields of all other water wells tapping the Santa Rosa are much smaller than those of the three wells tested at Kermit. However, the water-bearing properties of the formation are unknown throughout most of Winkler County, informative data on the area southeast of Kermit being especially scarce.

The analysis of data from the pumping test suggests a hydrologic barrier, probably a less permeable portion of the aquifer near pumped well D-299. Data from the two observation wells, D-291 and D-293, may be used to determine the position of a point on the boundary if the boundary actually does prevent the movement of water and if the aquifer has certain other idealized properties. Although conditions are not ideal and the boundary undoubtedly is only a less permeable part of the aquifer, the position as calculated from the data may be considered approximately correct.

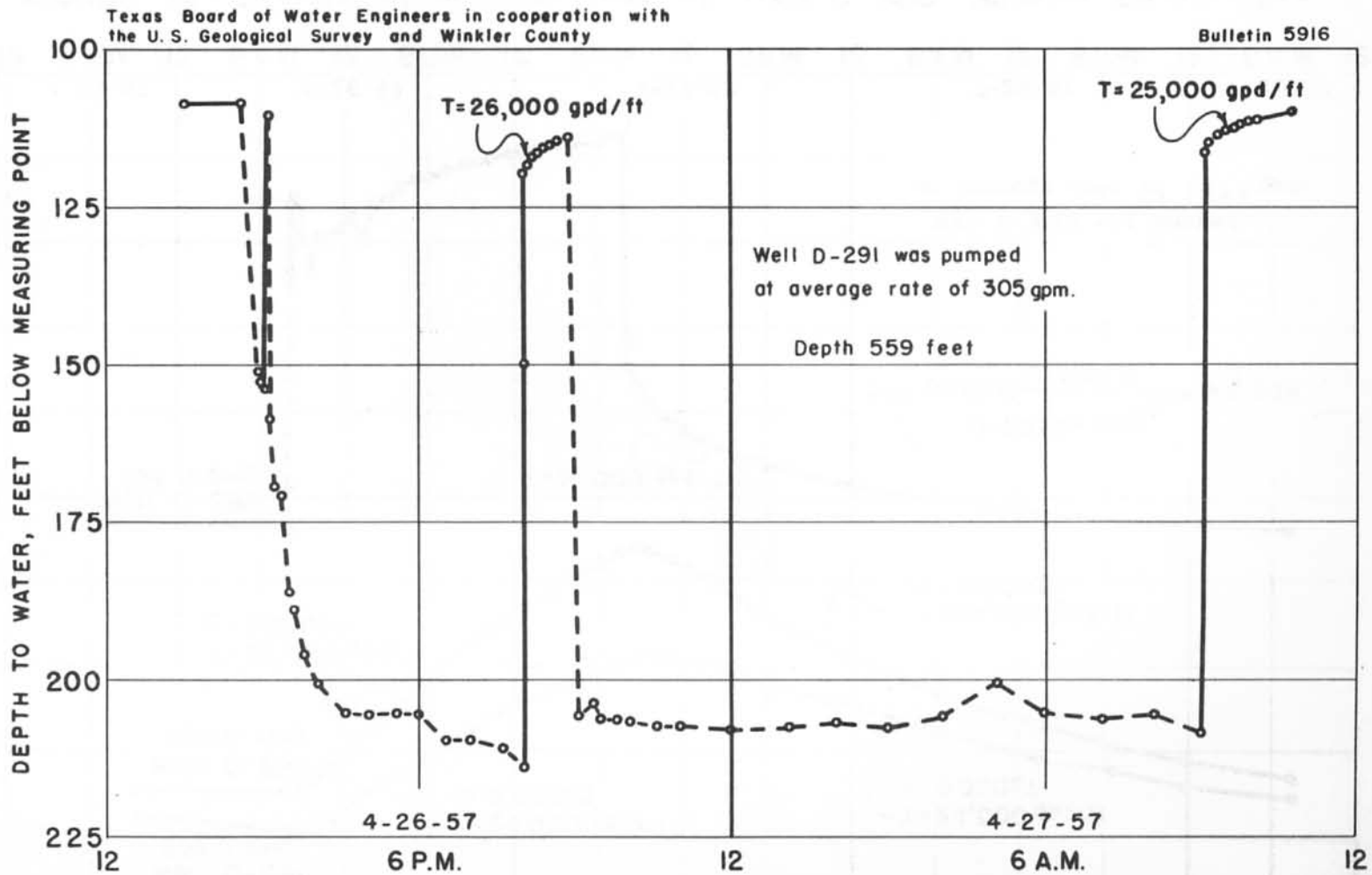


FIGURE 11.- Results of pumping test of well D-291, Winkler County, Tex.

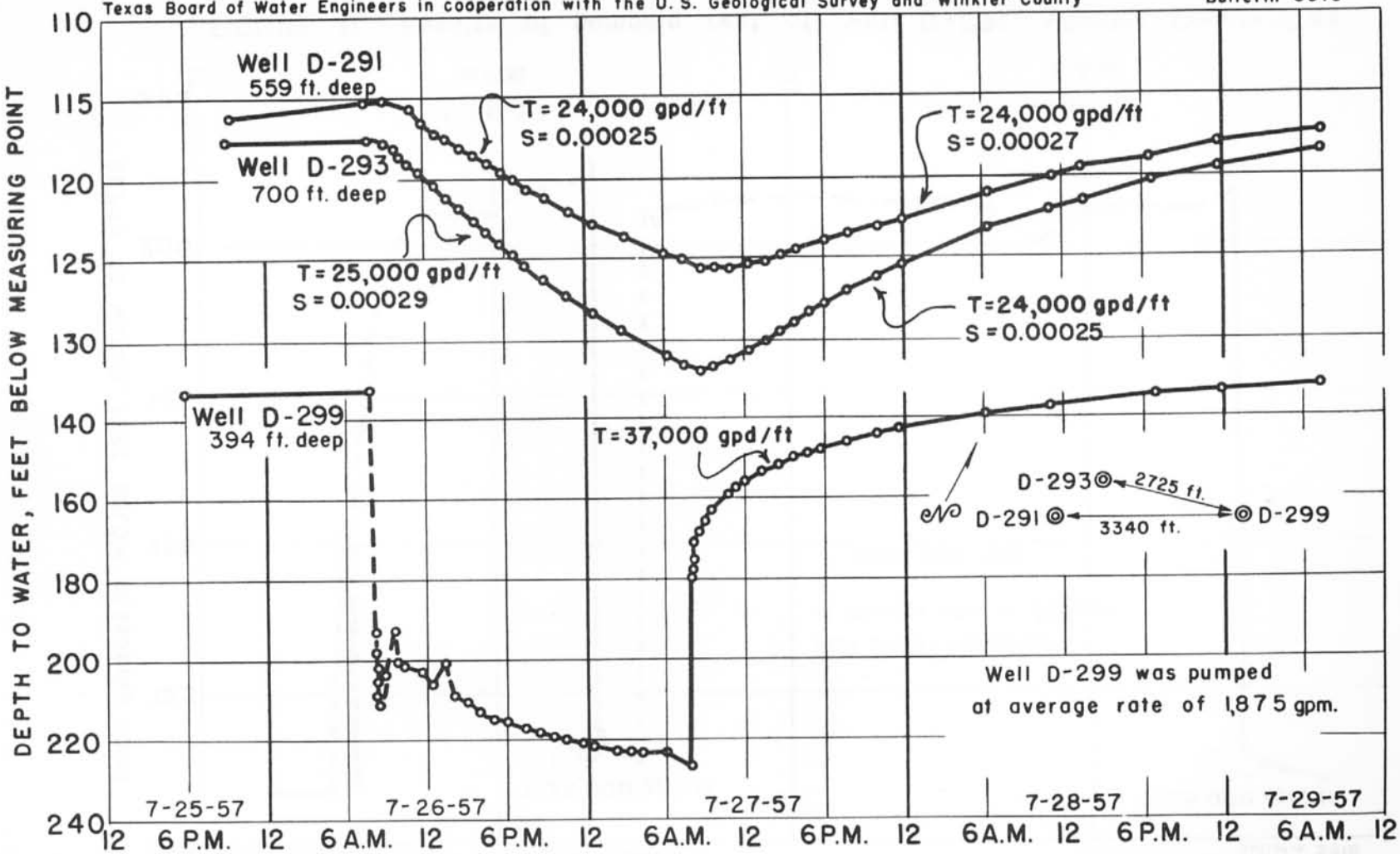


FIGURE 12.- Results of pumping test of well D-299, Winkler County, Tex.

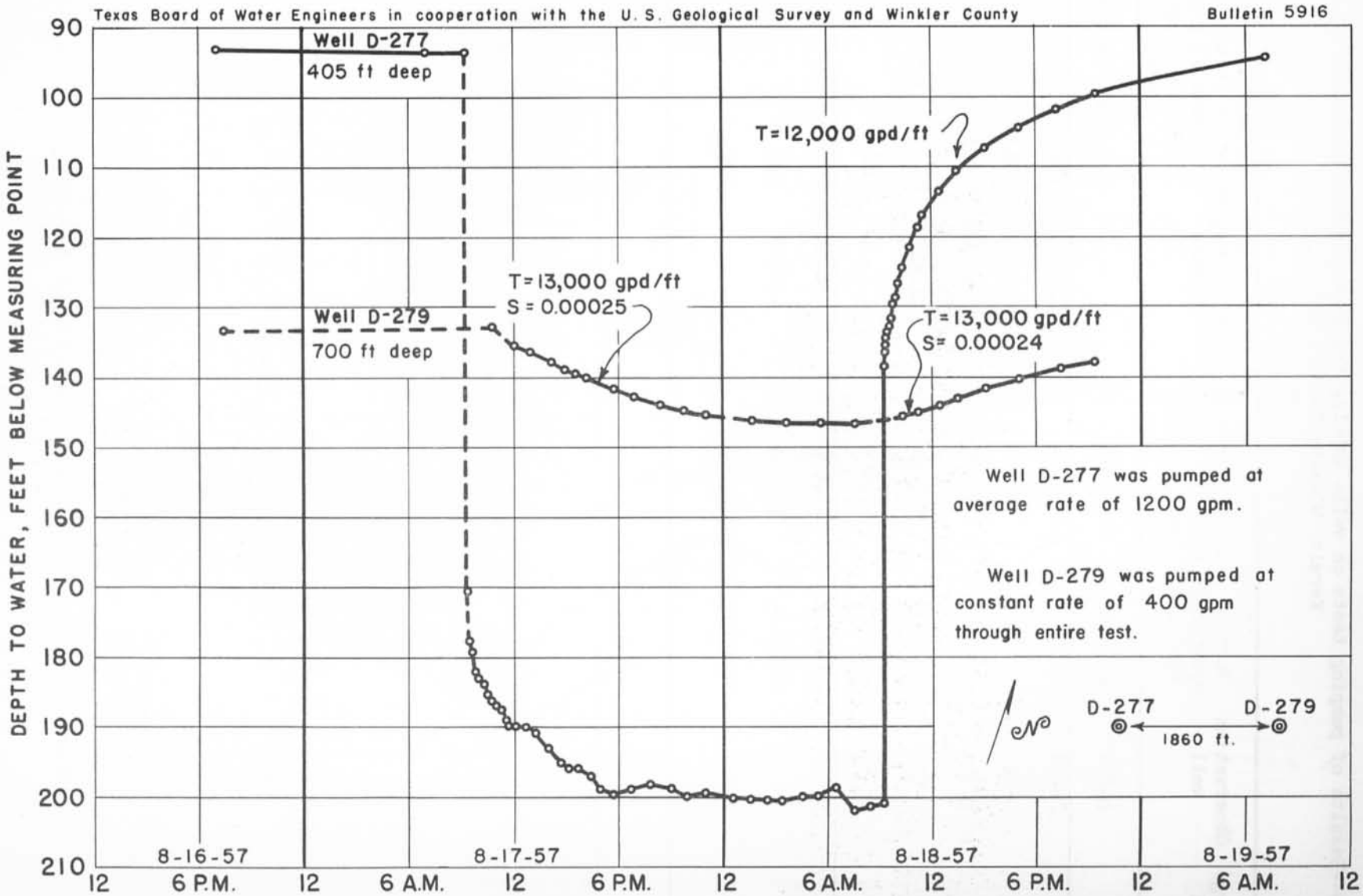


FIGURE 13.- Results of pumping test of well D-277, Winkler County, Tex.

Table 4--Results of pumping tests on wells tapping the Santa Rosa sandstone at Kermit, Winkler County, Tex.

Discharge well	Observation well	Part of hydrograph analyzed	Coefficient of transmissibility (gpd per foot)	Coefficient of storage	Thickness of sandstone section as determined from electric logs (feet)
D-291	D-291	Recovery	25,000	-	192 (full section)
D-299	D-291	Drawdown	24,000	0.00025	192
D-299	D-291	Recovery	24,000	.00027	192
D-299	D-293	Drawdown	25,000	.00029	-
D-299	D-293	Recovery	24,000	.00025	-
D-299	D-299	Recovery	37,000	-	66
D-277	D-279	Drawdown	13,000	.00025	192
D-277	D-279	Recovery	13,000	.00024	192
D-277	D-277	Recovery	12,000	-	107

The data were analyzed by the "method of images" described by Ferris (Wisler and Brater, 1949). The position of the point on the hypothetical boundary was determined by a graphical method devised by Moulder (Knowles and others, 1952, p. 94-95). Figure 14 shows the point to be about half a mile north of well D-299. Some of the test data from the other wells in the city also suggests that the highly productive zone in the Santa Rosa sandstone is limited in extent, but the data are not adequate for determining boundary locations.

Plates 4 and 6 show Kermit to be structurally lower than the area north and south. Whether the structure is related to the boundary condition is unknown. However, it is postulated that the permeable zone in the Santa Rosa at Kermit is due to fracturing associated with the structural pattern, and is not extensive to the north. Further test drilling and test pumping are needed to define more accurately the extent and hydraulic characteristics of the highly productive fractured zone.

The pumping tests of wells D-49 and G-92 show that the transmissibilities at these sites are much less than those in Kermit.

QUALITY OF GROUND WATER

The quantity and character of the dissolved minerals in natural ground water depend on the physical structure and chemical composition of the rocks and soils that have been in contact with the water. The duration of contact, the temperature and pressure, and the minerals already dissolved are other factors that determine the chemical quality of the water. Contamination or pollution by various means may change the character of a water. Organic materials are the common polluting agents. However, pollution may result from mixing with highly mineralized water; such may be the case in some areas of Winkler County where highly mineralzed water produced with oil is placed in earthen pits.

The largest use of ground water in Winkler County is that by industry and for public supply; consequently, importance is placed on the mineral constituents affecting the character of the water for such uses. Partial and preliminary analyses of 166 samples from 158 wells (table 9) include the determination, in parts per million, of silica, iron, calcium, magnesium, sodium and potassium bicarbonate, carbonate, sulfate, chloride, fluoride, nitrate, and dissolved solids. A part per million is a unit weight of a constituent in a million unit weights of water.

An earlier investigation of the chemical character of ground water in Winkler County (Forbes, Lang, and Lance, 1941) gave results of analyses by chemists of the Works Progress Administration. The analytical methods used are not of the same order of accuracy as those of later analyses, but the results may be used to estimate the general quality of the water.

The chemical suitability of drinking water may vary from place to place. Standards set forth by the U. S. Public Health Service (1946) for water used by common carriers in interstate commerce and generally accepted as standards for public supplies, and the commonly accepted standard for nitrate are given below. The concentrations of chemical substances preferably should not exceed the following limits:

Constituent	Parts per million
Iron (Fe and manganese (Mn) together	0.3
Magnesium (Mg)	125
Sulfate (SO_4)	250
Chloride (Cl)	250
Fluoride (F)	1.5
Nitrate (NO_3)	45
Dissolved solids	500 (1,000 permitted)

Table 5 shows the chemical suitability, as compared to these standards, of ground water of various formations in Winkler County. Samples were collected from particular areas throughout the county and are considered representative of such areas.

More than half the samples analyzed for fluoride had concentrations exceeding the limit of 1.5 ppm. Most of the public-supply wells, however, yielded water having concentrations within the limits, although some had water whose fluoride content was as high as 2.6 ppm. Data collected by various agencies have demonstrated that fluoride in the drinking water of children reduces the incidence of tooth decay (Dean, Arnold, and Elvave, 1942), but that concentrations exceeding 1.5 ppm may cause mottling of tooth enamel when the water is used continuously (Dean, Dixon, and Cohen, 1935).

Samples whose nitrate concentration exceeded 45 ppm came from 9 wells that were less than 150 feet deep. The high nitrate content may be the result of pollution from surface sources. In places where it is necessary to tap the extremely shallow water, special precautions should be taken during well construction to exclude possible seepage from surface sources. However, high nitrate content of some waters may be natural and not necessarily the result of pollution. Nitrate concentrations exceeding 45 ppm have been related to the occurrence of the disease methemoglobinemia ("blue babies") in infants (Maxcy, 1950).

About two-thirds of the determinations from 158 wells show that the water contains less than 1,000 ppm of dissolved solids, and more than 80 percent of the analyses show less than 2,000 ppm of dissolved solids.

The principal constituents causing hardness of water are calcium and magnesium. An increase in hardness causes an increase of soap consumption in washing and laundering processes and of formation of scale in boilers and other equipment. About two-thirds of the samples from 148 wells for which hardness determinations were made show that the water needs to be softened for most domestic and many industrial uses. A hardness classification commonly used by municipalities is as follows: Less than 60 ppm. soft; 61-120 ppm, moderately hard; 121 to 200 ppm, hard; and more than 200 ppm, very hard. Water whose hardness exceeds 200 ppm generally requires some softening before being used for most purposes.

Silica in certain concentrations forms a hard scale in boiler equipment. Moore (1940, p. 263) proposes the following permissible concentrations: Less than 150 psi (pounds per square inch of steam pressure), 40 ppm; 150-250 psi, 20 ppm, 251-400 psi, 5 ppm; and more than 400 psi, 1 ppm. Of 129 samples from wells of all formations 46 contained more than 40 ppm.

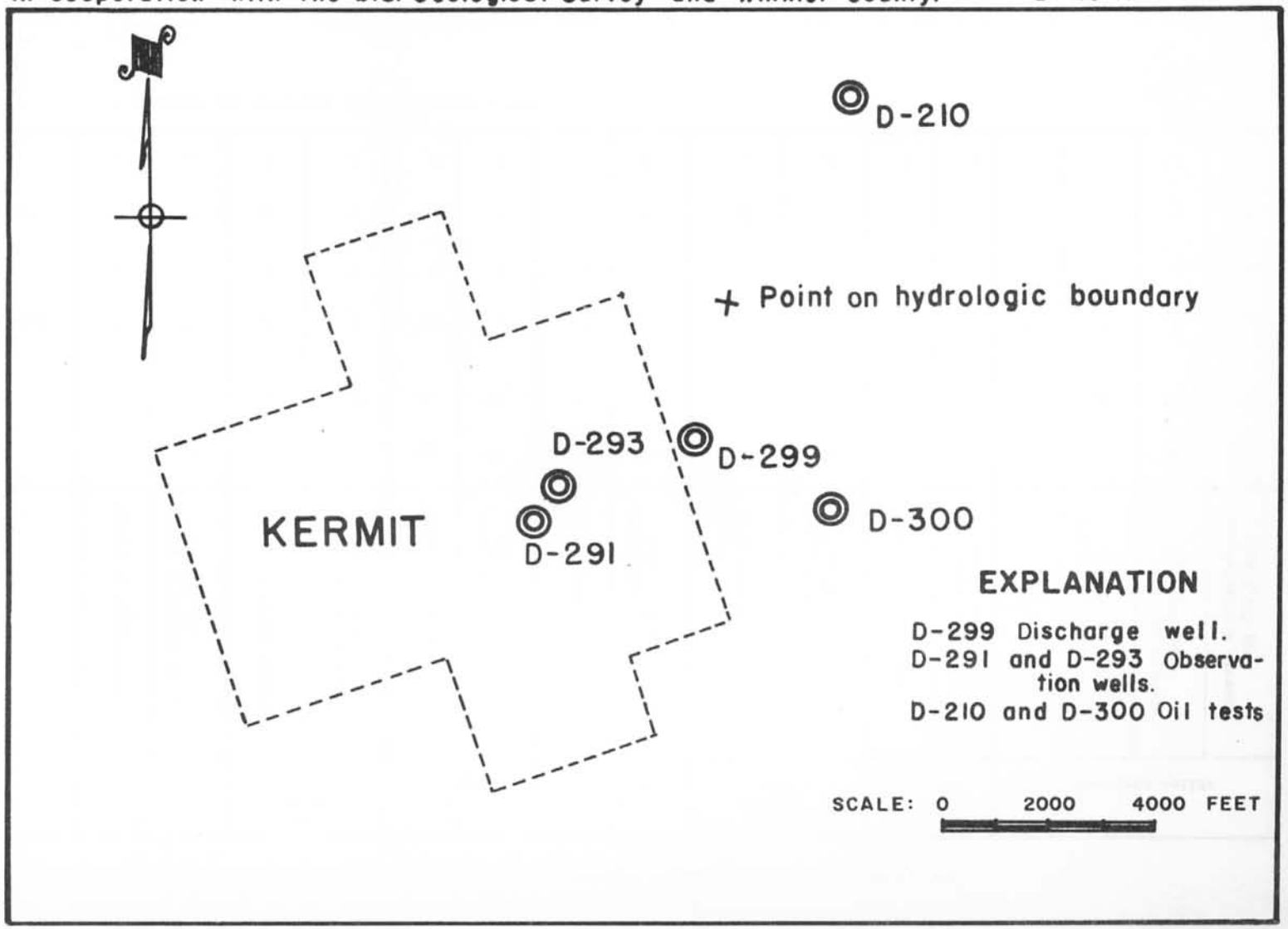


FIGURE 14.–Location of a point on a hypothetical hydrologic boundary, near Kermit, Winkler County, Tex.

Table 5.--Chemical suitability of ground water, by geologic formation, in Winkler County, Tex.

Geologic units	Fe (Iron)		Mg (Magnesium)		SO_4 (Sulfate)		F (Fluoride)		Cl (Chloride)		NO_3 (Nitrate)		Dissolved solids			
	Number of determinations	Member of Values exceeding 0.3 ppm	Number of determinations	Number of Values exceeding 125 ppm	Total determinations	Determinations exceeding 250 ppm	Total determinations	Determinations exceeding 1.5 ppm	Total determinations	Determinations exceeding 250 ppm	Total determinations	Determinations exceeding 45 ppm	Total determinations	Determinations exceeding 500 ppm	Determinations exceeding 1,000 ppm	Determinations exceeding 2,000 ppm
All wells*:	4	0	151	10	157	64	106	64	158	38	134	9	158	86	56	24
Cenozoic rocks	1	0	104	7	110	47	71	45	111	29	89	6	111	61	40	17
Cenozoic rocks and Santa Rosa sandstone	2	0	23	1	23	5	17	6	23	4	21	1	23	9	6	3
Cretaceous rocks	0	0	2	0	2	0	2	2	2	0	2	1	2	1	0	0
Santa Rosa sandstone	1	0	18	0	18	9	13	8	18	1	18	1	18	11	7	2
Rustler formation	0	0	2	2	2	2	2	2	2	2	2	0	2	2	2	2

* Includes two wells not identified with a formation.

Most of the ground water in the fresh-water aquifers of the county is suitable for irrigation. However, new supplies should be tested and compared with standards proposed by the U. S. Salinity Laboratory Staff (1954, p. 69-82) before using them for irrigation. These standards characterize irrigation water by the content of dissolved salts, the relative proportion of sodium to the other cations, the concentration of boron and other toxic elements, and sometimes the bicarbonate concentration in relation to the sum of the calcium and magnesium concentrations.

Cenozoic Alluvium

Most of the public-supply wells tapping the Cenozoic alluvium yield water of a chemical quality acceptable for drinking. However, table 9 shows that the fluoride content of public-supply wells, D-47, D-137, D-138, D-278, D-294, E-15, and G-111 exceeds the limit set by the U. S. Public Health Service and may cause mottling of children's teeth.

Wells B-6, C-2, E-12, E-19, E-24, and H-64 in alluvium yield water having a nitrate content exceeding 45 ppm. These are shallow windmill wells supplying water to ranches, and may be polluted with organic matter from the surface.

About two-thirds of 102 samples collected from wells tapping the alluvium had a hardness of more than 200 ppm, but most of the public-supply wells yield water having a hardness between 28 and 200 ppm. However, some wells tapping the alluvium in areas that have been polluted by oil-field wastes yield water having a hardness as much as 6,330 ppm. Half of 86 water samples had silica concentrations of more than 40 ppm and in many of the remainder the concentrations exceeded 20 ppm.

Waterflooding projects in Winkler County use both fresh and saline water; much of the saline water is treated to reduce its corrosiveness. Most of the wells tapping the alluvium which are used in waterflooding yield fresh water; however, well D-245, a polluted well, yields water having a dissolved-solids content of 71,100 ppm.

Areas of Ground-Water Pollution

The ground water in the Cenozoic alluvium appears to have been polluted in several areas in Winkler County. Probably most of the pollution has been caused by leakage from earthen disposal pits for saline water produced from oil wells. Plate 8 shows by a diagrammatic method (Stiff, 1951, p. 15-17) the relationship of the principal ions in water from selected wells tapping the Cenozoic alluvium. The diagrams in figure 15 represent water from the oil-producing strata in the Hendrick field (table 5). The chemical constituents are represented by two diagrams. The shaded diagrams show the concentrations of cations and anions, in equivalents per million. The blank diagrams show the percentage relationship of equivalents per million of the cations and the anions, commonly called "percentage reacting values."

The distinct similarity of the diagrams representing the water from wells C-50, F-15, F-21, F-30, F-37, G-4, G-38, G-60, and G-109 (pl. 8), which tap the Cenozoic alluvium in the vicinity of the Hendrick oil field, and the diagrams representing the water produced with the oil in the Hendrick field (fig. 15)

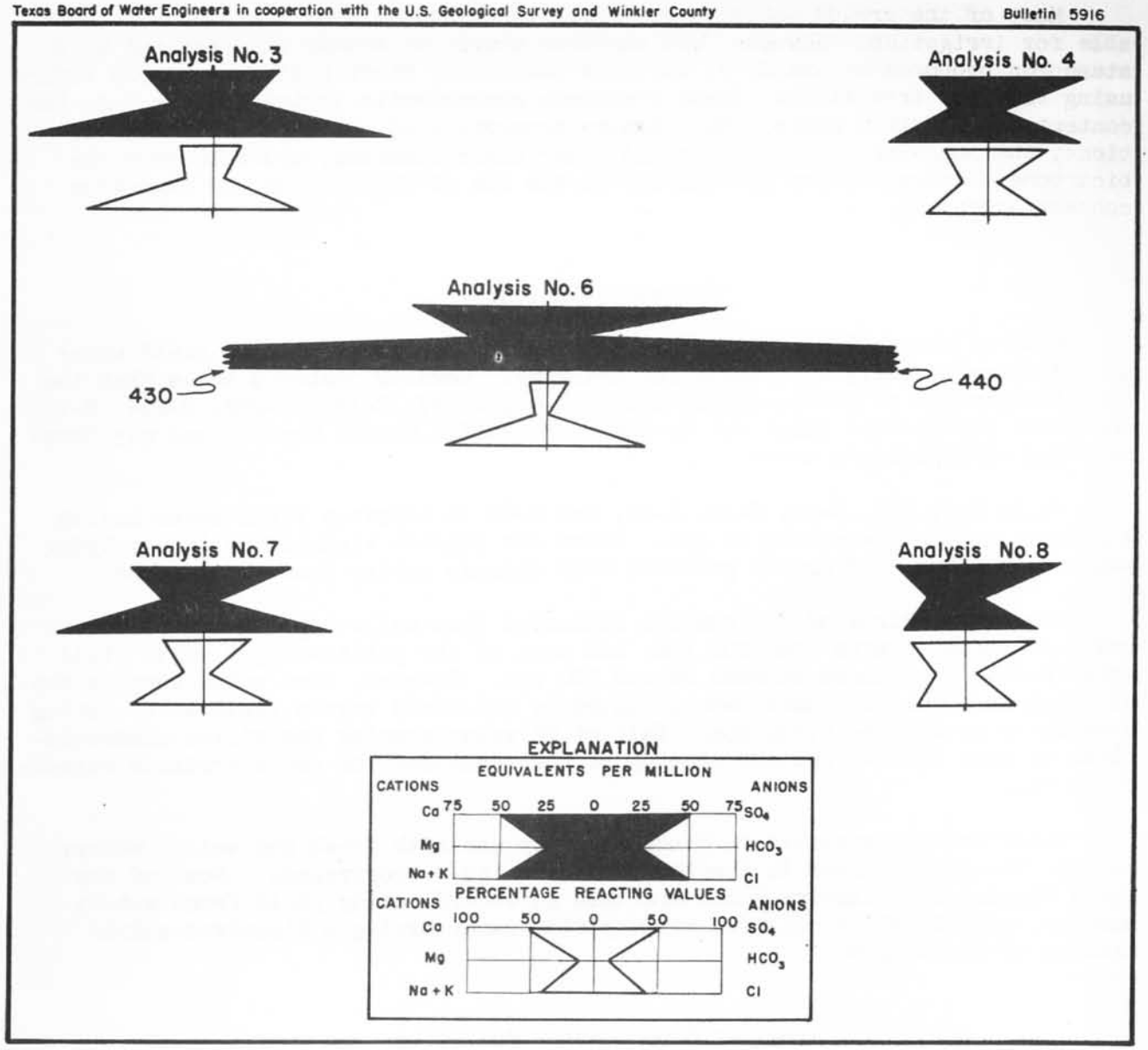


FIGURE 15.- Diagrams showing relationship of the principal ions in water produced with the oil in the Hendrick oil field, Winkler County, Tex. (See pl. 8 for locations.)

suggests that the alluvium is being polluted. Chemical analyses of samples from the water wells (table 9) show a dissolved-solids range between 1,430 ppm at well G-109 and 4,670 ppm at well F-21. The wells range in depth from 90 to 210 feet and draw water from the top or near the top of the saturated alluvium. The chloride content of the samples from the Hendrick oil field range between 1,190 ppm and 15,600 ppm (table 6). A comparison of analyses of samples taken from well F-15 in 1940 and in 1956 (table 9) indicates that most of the pollution has taken place since 1940. Two other water wells in the area, F-14 and G-111, draw water from the alluvium below 180 feet and probably have not yet been polluted.

A short history of the Hendrick oil field will help to explain the source and extent of pollution in the area. Oil was found in the Seven Rivers formation in 1926 in the area that is now the Hendrick oil field. At first, oil production was rapid, but within 2 years the annual production began to decrease, so that by 1956 the field had been classified as a "stripper field" (Phifer, 1956, p. 29). Some wells were producing water in late 1927, and 3 months later the wells were producing 0.5 to 98 percent water (Ackers, De Chicchis, and Smith, 1930). By 1930 all the 562 oil wells in the field were producing large amounts of water. Correlation between the yearly water production reported by some oil operators and the number of producing wells each year shows that about 800,000 acre-feet of water was produced from the field from 1937 to 1957 -- an average of about 36 mgd during this 20-year period. As oil production per well decreased, the water production per well probably increased; however, the total fluid production has decreased and there have been fewer producing wells each year. In 1957 the operators of the Hendrick field reported a water-production rate of about 14.5 mgd (table 3), about 13.7 mgd of which was placed in surface pits or directed to a communal disposal lake, about 1.5 miles northwest of Wink; the rest was used in secondary-recovery projects.

The production of saline waste water in the other oil fields of Winkler County was about 3.7 mgd (table 3), 3.4 mgd of which was placed in earthen surface pits. More than 1 mgd was placed in surface pits in the Kermit oil field, where chemical analyses show evidence of severe pollution in one area. A sample of water from well D-245 had a chloride concentration of 41,000 ppm and a specific conductance of 82,200 micromhos (pl. 8 and table 9). The oil-field water going into a surface pit about 100 feet away had a concentration of 40,900 ppm of chloride and a specific conductance of 82,100 micromhos (table 6, analysis 9).

Well D-93 (pl. 8) was polluted probably by brine associated with projects of dissolving underground salt sediments for storing liquefied-petroleum gases. Undoubtedly, other localized areas near surface sources of highly mineralized oil-field disposal water are being similarly polluted.

Other areas possibly polluted are shown on plate 8 by the diagrams for wells C-5, D-29, D-154, D-163, and H-81. However, it is uncertain whether these wells are polluted from surface sources or if the water is naturally highly mineralized, owing to poor circulation of water.

Areas of Fresh and Naturally Saline Water

The water in some wells that tap the Cenozoic alluvium is naturally saline. Saline water is produced from wells C-39 and F-5 in the western part of the county, wells E-24, H-7, and H-35 in the eastern part, and wells A-1, B-6, B-14, B-17, B-18, and D-5 in the northern and northeastern parts which either are remote from

Table 6.--Analyses of ground water produced from oil wells, Winkler County, Texas

Analysis No.	Owner and source of sample	Oil field	Producing horizon	Analyst	Date of collection	Constituents in parts per million: Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Hardness as $CaCO_3$	Dissolved solids	pH	Remarks
1	Ralph Lowe Salt water disposal pit	Block 21 (Delaware sand)	"Delaware" sand Permian	U.S.G.S.	8-16-57	-	-	-	-	-	-	138,000	-	-	-	Two producing oil wells in this lease.
2	Ohio Oil Co. M. J. Hill well 1	Halley	Devonian	Dowell, Inc.	11-20-56	-	4,470	975	25,600	623	1,180	49,700	-	-	-	
3	Stanolind Oil & Gas Co. Ida Hendrick well A-1	Hendrick	Seven Rivers formation Permian	U.S. Bur. of Mines	1935	-	679	258	2,160	1,180	1,630	3,400	-	9,320	-	Well depth 3,077 ft.
4	Gulf Producing Co. Hendrick well B-20	do	do	do	1935	-	709	243	1,150	372	2,350	1,700	-	6,600	-	
5	Lion Oil Co. Ida Hendrick well D-1	do	do	do	1935	-	918	1,060	7,820	1,320	5,270	12,100	-	28,600	-	Well depth 2,885 ft.
6	J. W. Starr Ida Hendrick well 1	do	do	The Western Co.	1956	-	1,400	510	9,950	763	4,520	15,600	-	-	7	
7	Atlantic Oil & Refining Co. Separator water going into pit on Hendricks "F" lease	do	do	U.S.G.S.	6-28-57	15	710	236	1,720	615	2,310	2,520	2,740	7,820	7.1	Separator gathers fluid produced by oil wells on this lease.
8	Skelly Oil Co. Hendrick well 1	do	do	do	5-15-47	-	720	244	755	407	2,330	1,190	2,800	5,440	-	Well pumped 5,000 bbls of water to 25-30 bbls of oil in 1947.
9	Harlon Producing Co. Separator water going into pit on Central State Bank lease	Kermit	Yates sandstone Permian	do	6-26-57	-	-	-	-	566	-	40,900	6,560	-	-	Specific conductance 82,100 micromhos.
10.	Prairie Oil & Gas Co. J.B.Leck well 1	Leck	Seven Rivers formation Permian	U.S. Bur. of Mines	1931	-	176	156	2,020	1,318	95	3,050	-	6,6	-	H_2S present.

Table 6.--Analyses of ground water produced from oil wells, Winkler County, Texas--Continued

Analysis No.	Owner and source of sample	Oil field	Producing horizon	Analyst	Date of collection	Constituents in parts per million									pH	Remarks
						Silica (SiO_2)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Hardness as $CaCO_3$	Dissolved solids		
11	Superior Oil Co. Wheeler Devonian well 3	Wheeler (Devonian)	Devonian	The Western Co.	1949	104	16,500	4,280	48,600	227	773	110,000	-	180,000	6.2	
12	Superior Oil Co. Wheeler Ellenburger well 1	Wheeler (Ellenburger)	Ellenburger group Ordovician	do	12-13-49	410	1,720	909	15,200	711	617	27,400	-	46,500	8.0	H_2S present.
13	Superior Oil Co. Wheeler Fusselman well 3	Wheeler Northwest (Fusselman)	Fusselman limestone Silurian	do	7-23-49	1,236	13,400	2,060	31,100	425	1,140	78,000	-	126,000	6.2	
14	Superior Oil Co. J. B. Walton well 1-A	Wildcat	Ellenburger group Ordovician	do	10-18-56	-	2,360	1,290	25,100	314	3,400	44,000	-	-	7	H_2S present.
15	Stanolind-Westbrook Salt-water lake	West of Hendrick field	-	U.S.G.S.	10-10-56	-	393	297	5,390	91	3,090	8,420	3,450	18,300	7.9	Some oil operators divert the water produced with oil to this lake.

apparent sources of pollution or contain water of a different chemical character than that of the possible pollutants. In general, these wells are found in areas where the configuration of the water-table surface suggests a very slow rate of ground-water movement, and this slow rate is probably responsible for the salinity.

The remainder of the alluvium that is remote from polluting sources contains fresh water. Most of the wells samples yield water having a dissolved-solids content of less than 500 ppm. Several wells close to areas of probable pollution or naturally occurring saline water have a dissolved-solids content less than 1,000 ppm.

Santa Rosa Sandstone

The analyses of water samples from 18 wells tapping the Santa Rosa sandstone (table 9) indicate that the water is more mineralized in the eastern half of the county than in the western half. Water having the least mineralization is found in the vicinity of Kermit, which is near the main recharge area to the Santa Rosa. The samples from 3 wells more than 1,000 feet deep in the eastern part of the county had dissolved-solids contents ranging from 1,110 to 4,090 ppm; samples from wells in the rest of the county generally contained less than 1,000 ppm dissolved solids. Well G-3, whose water contained 1,260 ppm of dissolved solids, may be polluted by waste water from a nearby oil field.

The samples from 23 wells tapping both the Cenozoic alluvium and the Santa Rosa sandstone ranged in dissolved solids from 128 ppm to 10,700 ppm (table 9). Six of the more mineralized samples came from wells that may have been polluted, probably through the Cenozoic alluvium, from saline water and brine from nearby oil fields. The other 17 samples contained less than 1,000 ppm of dissolved solids.

Hard water high in sulfate and fluoride apparently is common in the Santa Rosa sandstone. Nine samples had a hardness of more than 200 ppm and more than 250 ppm of sulfate. Eight of the 13 determinations of fluoride exceeded 1.5 ppm. Concentrations of fluoride and sulfate generally were lower in samples from wells tapping both the Santa Rosa and the alluvium.

Other Aquifers

The water samples collected from two wells tapping the Rustler formation were either highly saline or briny (table 9). The sample from well D-193 contained 18,400 ppm dissolved solids, and the sample from D-160 contained 157,000 ppm.

Two samples from wells probably tapping Cretaceous formations in the northeastern part of the county contained less than 1,000 ppm of dissolved solids. The sample from well B-9 had a hardness of 186 ppm and the sample from well B-10, taken in 1957, had a hardness of 414 ppm and a nitrate content of 49 ppm.

Chemical analyses of water produced with oil from strata of Ordovician to Permian age are shown in table 6. The analyses are incomplete, but they evaluate the most important constituents. Nearly all the water produced from oil wells in the Hendrick and Leck fields is only moderately saline. The rest of the oil fields in Winkler County apparently produce brine with the oil.

CONCLUSIONS

Winkler County has a large supply of fresh ground water in storage. About 5 to 7 million acre-feet of stored ground water is available for recovery through wells in the explored area, and an unknown quantity of fresh water is available in the unexplored areas. A small amount of water from precipitation recharges the aquifers. The average rate of withdrawal from wells in 1956 was about 8.2 mgd, or about 9,200 acre-feet per year, most of the water being used by industry and for public supply.

Some of the water wells in the Santa Rosa sandstone at Kermit and in the alluvium south of Wink yield more than 1,000 gpm each. In the vicinity of Kermit the larger capacity wells yielding 400 to 1,875 gpm tap fractures in the Santa Rosa sandstone. In other areas the Santa Rosa is much less productive. The potential yield of the Santa Rosa sandstone in several areas, chiefly in the eastern part of the county, has not yet been determined.

The alluvium is more productive south of Wink, in the deep alluvium-filled trough, than elsewhere in the county. Most of the wells in the thinner alluvium are completed in the bottom gravels of the aquifer to avoid pumping excessively fine sand commonly found in the upper section. Wells in the alluvium constructed to screen the largest sections of the formation available will have the largest yields.

Fresh water has been displaced or has become polluted by mixing with saline water in areas where oil fields continually discharge waste water into earthen surface pits. The extent and the significance of the pollution are chiefly dependent on the amount of oil-field water being discharged and its degree of mineralization. Pollution will continue to be a serious threat to the fresh-water supplies in Winkler County until a more effective waste-disposal system is adopted.

Generally, water from the Cenozoic alluvium and the Santa Rosa sandstone in Winkler County has a moderate mineral content; however, the high content of fluoride and silica, and extreme hardness in some areas make it undesirable for certain uses. Saline water from the Rustler formation is used only for water-flooding in the production of oil by secondary-recovery methods. Some oil operators are recycling the saline water being produced with the oil in such recovery operations. The recycling, or injection of the saline water or brine back into the oil-producing formations, lessens the danger of ground-water pollution and also decreases the consumption of fresh water.

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Table 7.--Records of wells in Winkler County, Tex.

All wells are drilled unless otherwise noted in remarks column. Logs (electric, radioactivity, and micro) in files of Texas Board of Water Engineers.

Water level: Reported water levels and altitudes of land surface given in feet; measured water levels and altitudes of land surface given in feet and tenths.

Method of lift and type of power: A, airlift; B, butane; C, cylinder; E, electric; G, gasoline; N, none; Ng, natural gas; T, turbine; W, windmill. Number indicates horsepower.

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

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*A-1	Allen Cowden	--	3064.7	Old	87	14	Cenozoic alluvium	70.8	Nov. 1, 1956	C,W	S	
A-2	R. M. Evans well 1	Humble Oil & Refining Co.	3105	1951	13,615	--	--	--	--	N	N	Oil Test. Electric log Q-17. 1/
*A-3	B. F. Jenkins	--	--	--	100	6	Cenozoic alluvium	45.3	Jan. 12, 1957	C,W	S	
A-4	Tom Lineberry	--	2998.6	1952	80	5	do	36.7	Sept.19, 1956	C,W	S	
B-1	Mary K. E. Bauer	--	--	Old	90	6	do	73.6	Jan. 29, 1957	C,W	S	East Witcher well.
*B-2	do	--	--	--	75	6	do	64.1	do	C,W	S	Cased to bottom; slotted and gravel-packed.
B-3	do	--	--	1948?	75	6	do	69.7	do	N	N	Abandoned temporarily.
*B-4	do	--	--	1945?	75	6	do	67.7	do	C,W	S	Owner's "Double well."
B-5	do	Humble Oil & Refining Co.	3165.2	1951	101	8	do	73.4	do	N	N	Supplied water for drilling oil test.
*B-6	Mary K. E. Bauer	--	--	1945?	88	6	Cenozoic alluvium	85.0	Jan. 29, 1957	C,W	S	Cased to bottom; slotted. Water reported unfit for domestic use.
B-7	do	--	--	1945?	85	6	do	--	--	C,W	S	Water reported unfit for domestic use.
B-8	R. M. Evans well C-2	Humble Oil & Refining Co.	3184	1952	8,872	--	--	--	--	N	N	Oil test. Electric log Q-19. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*B-9	Ratcliff & Bedford	--	--	1948	52	6	Trinity group(?)	44.9	Feb. 12, 1957	C,W	D,S	
*B-10	do	--	--	Old	72	72, 6	do	56.5	Feb. 5, 1957	C,W	S	Consists of two wells connected at bottom by tunnel; one drilled with 6-in. casing, the other dug; 6 ft square at top.
B-11	Bedford & Cowden well 1-3T	B. F. Wiseman, Jr. and F. M. Jackson	3228	1955	9,236	--	--	--	--	N	N	Oil test. Electric log Q-18. 1/
B-12	R. M. Evans well 1	Humble Oil & Refining Co.	3216	1951	11,745	--	--	--	--	N	N	Oil test. Electric log Q-20. 1/
B-13	Mary K. E. Bauer	--	--	1957	85	8	Cenozoic alluvium	72.7	Jan. 29, 1957	C,W	S	Cased to bottom; slotted and gravel-packed.
*B-14	Allen Cowden	--	--	Old	83	14	do	63.0	Nov. 1, 1956	C,W	S	
*B-15	B. F. Jenkins	--	--	Old	80	6	do	49.4	Jan. 13, 1957	C,W	S	In sand dunes.
B-16	do	--	--	--	115	6	Cenozoic alluvium	54.6	Jan. 13, 1957	C,W	S,D	
*B-17	do	--	--	--	115	6	do	--	--	C,W	S,D	
*B-18	John Henry Wallace Estate	--	--	--	115	6	do	--	--	C,W	S	Pumping level 78.5 ft, Feb. 4, 1957.
B-19	do	--	3136.8	--	115	6	do	72.5	Jan. 31, 1957	C,W	S	
*B-20	do	C. F. Wheeler	--	1940	1,025	8, 4	Santa Rosa sandstone	--	--	C,W	S	Strong supply reported at 1,025 ft; encountered salt water at 828 ft. Cased off.
*B-21	J. M. Williams et al.	Gulf Oil Corp.	3348.3	1944 ?	1,180	6	do	503.5	Apr. 14, 1957	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*C-1	J. B. Tubb Estate	--	2938.3	Old	220	7	Santa Rosa sandstone	205	1940	C,W	S	
				?				195.3	Sept. 7, 1956			
*C-2	do	--	2882.7	Old	140	5	Cenozoic alluvium	119.7	Sept. 7, 1956	C,W	D,S	
C-3	Cities Service Oil Co.	Cities Service Oil Co.	2860	1952	3,743	--	--	--	--	N	N	Oil test. Beckham well 1. Radioactivity log Q-128. 1/
C-4	W. L. Beckham	--	--	--	150	6	Cenozoic alluvium	128.8	Sept. 8, 1956	C,W	S	
*C-5	W. P. Edwards	--	2917.6	--	260	6	do	151.0	do	C,W	S	
C-6	The Texas Co.	The Texas Co.	2910	1944	3,228	--	--	--	--	N	N	Oil test. Lum Dougherty well 2. Electric log Q-129. 1/
C-7	J. B. Walton	--	--	--	--	6	--	115.4	June 28, 1957	C,W	S	
C-8	Continental Oil Co.	Continental Oil Co.	2934	1947	3,213	--	--	--	--	--	--	In New Mexico. Oil test. Eaves B-30 well 2. Electric log Q-130. 1/
C-9	S. G. Dunn et al.	J. D. Cole	--	1956	160	6	Cenozoic alluvium	99.1	Apr. 23, 1957	C,Ng	Ind	Cased to bottom; slotted from 140 to 160 ft. Supplies water for drilling oil test.
C-10	Gulf Oil Corp.	J. R. Marshall	--	1942	360	7	Santa Rosa sandstone	--	--	C,B	Ind	Cased to 213 ft. Daugherty well 8. Supplies water for drilling oil test. 2/
C-11	Gulf Oil Corp.	do	2914.4	1944	128	10	Cenozoic alluvium	100.5	Sept.28, 1956	N	N	Cased to 104 ft. Daugherty well 9. 2/
C-12	do	Gulf Oil Corp.	2904	1956	3,037	--	--	--	--	--	--	Oil test. Daugherty well 73. Radioactivity log Q-131. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*C-13	W. D. Harrison	Bob Glenn	--	1946	300	6	Cenozoic alluvium and Santa Rosa sandstone	105.8	Sept.10, 1956	T,E, 1	D,S	Cased to 200 ft.
C-14	Sinclair Oil & Gas Co.	Perkins & Reynolds	--	1928	222	6	Cenozoic alluvium	--	--	N	N	Plugged. Leck well 2. 2/
C-15	do	Reese & Griggs	--	1928	230	8, 6	Cenozoic alluvium	--	--	N	N	Cased to 217 ft; plugged. Leck well 1. 2/
C-16	do	do	--	1928	340	8, 6	Santa Rosa sandstone	--	--	N	N	Plugged. Lum Daugherty well 2. 2/
*C-17	do	do	2882.3	1928 ?	455	8	do	109.1	Apr. 23, 1957	C,E, 5	D	Cased to 215 ft. Lum Daugherty well 1. 2/
*C-18	Tom Lineberry	--	--	Old	130	5	Cenozoic alluvium	103.8	Sept. 8, 1956	C,W	S	
C-19	do	--	2903.9	1948	150	7	do	97.0	do	C,W	D	
*C-20	W. L. Beckham	--	2856.2	--	134	6	do	113.3	Sept. 7, 1956	C,W	D,S	
*C-21	J. B. Tubb Estate	--	2875.3	Old	151	6	do	144 137.0	Mar. 1940 Sept. 7, 1956	C,W	S	
*C-22	J. B. Walton	--	2845.5	1935	118	6	do	103 103.0	Jan. 1940 Sept. 7, 1956	C,W	S	
C-23	The Texas Co.	The Texas Co.	2855	1955	7,515	--	--	--	--	N	N	Oil test. J. L. Desmond well 1. Electric log Q-132. 1/
C-24	Tom Lineberry	--	2860.9	1951	--	6	Cenozoic alluvium	100.5	Sept. 7, 1956	C,W	S	
*C-25	J. B. Walton	J. B. Marshall	2860.5	1939	165	7	do	68.9	Sept.10, 1956	C,W	S	Cased to 161 ft. 2/
C-26	Humble Oil & Refining Co.	Humble Oil & Refining Co.	2871	1954	3,053	--	--	--	--	--	--	Oil test. Walton well C-12. Radioactivity log Q-133. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
C-27	Humble Oil & Refining Co.	C. W. Howard	--	--	--	8	--	81.8	Sept.10, 1956	C,E, 5	Ind	Supplies water for drilling oil test well.
C-28	J. B. Walton	--	--	--	--	--	--	--	--	C,W	S	
C-29	Humble Oil & Refining Co.	Fannin Drilling Co.	--	1956	196	7	Cenozoic alluvium	--	--	T,E, 10	Ind	Cased to bottom: slotted from 110 to 196 ft. J. B. Walton well 10. 2/
C-30	do	do	--	1955	198	7	do	--	--	T,E, 10	Ind	Cased to bottom; slotted from 95 to 196 ft. J. B. Walton well 9. 2/
C-31	do	do	--	1955	188	7	do	107.7	Sept.26, 1956	T,E, 10	Ind	Cased to bottom; slotted from 170 to 188 ft. J. B. Walton well 8. 2/
C-32	do	Humble Oil & Refining Co.	2899	1957 ?	3,034	--	--	--	--	--	--	Oil test. J. B. Walton well D-32. Radioactivity log Q-134. 1/
*C-33	J. B. Walton	--	--	Old ?	95	8	Cenozoic alluvium	92.3	Sept.10, 1956	C,W	S	
C-34	do	--	2872.9	Old	88	6	do	77.3	Sept.12, 1956	C,W	S	
C-35	Sinclair Oil & Gas Co.	J. R. Marshall	2871.7	1936	231	8, 6	do	71.6 72.3	Sept.12, 1956 June 11, 1957	C,W	Ind	Leck A well 1. 2/
C-36	Atlantic Refining Co.	--	2867.7	--	--	6	--	67.0 67.5	Sept.23, 1956 June 11, 1957	N	N	
*C-37	Olsen Oil Co.	--	--	1952	250	7	--	--	--	T,E, 2	D	
C-38	J. B. Walton	J. R. Marshall	--	1939	155	7	Cenozoic alluvium	90.9	Sept.12, 1956	C,W	S	Cased to 149 ft. 2/
*C-39	Tom Lineberry	--	--	--	--	--	--	--	--	T,E, 5	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*C-40	Evelyn Lineberry	--	2840.3	--	125	6	Cenozoic alluvium	103.9 102.2	Sept.11, 1956 Apr. 1, 1957	C,W	S	
C-41	Tom Lineberry	--	--	--	--	6	--	--	--	C,W	S	
C-42	do	--	--	Old	211	6	Santa Rosa sandstone(?)	190.7 190.4	Sept. 4, 1956 June 27, 1957	C,W	S	
C-43	Evelyn Lineberry	--	2971.0	1947 ?	--	--	do	215.6 215.5	Apr. 3, 1957 June 27, 1957	C,W	S	
C-44	do	J. R. Marshall	2945.1	Old ?	230	6	do	218.5 217.8	Sept.11, 1956 June 27, 1957	C,W	S	
C-45	J. E. Haley	Victor Brookfield	2890.5	Old	200	6	do	175.6 175.5	Sept.13, 1956 Apr. 11, 1957	C,W	S	
C-46	Jack Lineberry	--	2838.7	--	230	6	Cenozoic alluvium	84.3	Sept.11, 1956	C,W	D,S	
*C-47	Stanolind Oil & Gas Co.	--	--	--	212	8	do	--	--	T,Ng	D, Ind	
C-48	Sinclair Oil & Gas Co.	J. R. Marshall	2861.9	1938	230	7	do	52.6 52.5 52.0	Oct. 22, 1956 Nov. 15, 1956 June 11, 1957	N	N	Cased to 227 ft; slotted from 87 to 106 ft, and 203 to 227 ft. Cummins well 1. 2/
C-49	J. H. Elder	J. H. Elder	2850	1953	3,045	--	--	--	--	--	--	Oil test. Ida Hendricks well 7. Radioactivity log Q-135. 1/
*C-50	Jack Lineberry	--	2858.2	1948	90	6	Cenozoic alluvium	59.8	Sept.11, 1956	C,W	S	
C-51	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2869	1956	2,900	--	--	--	--	--	--	Oil test. T-88-N well 8. Radioactivity log Q-136. 1/
C-52	Winkler County Country Club	I. O. Fannin Drilling Co.	--	1955	200	7	Cenozoic alluvium	119.5	Sept.18, 1956	T,E, 10	Irr	
*C-53	J. E. Haley	--	2871.2	1938	297	5	do	162.5	do	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*D-1	Tom Lineberry	--	2961.5	1947	--	8	Santa Rosa sandstone(?)	172.1 178.2	Jan. 12, 1957 June 4, 1957	C,W	S	
D-2	Wood River Oil & Refining Co.	--	--	1948	432	7	Santa Rosa sandstone	211.8	Feb. 27, 1957	C,B, 18	D, Ind	
*D-3	do	J. D. Cole	2967.5	1956	540	15, 10	do	164.0	Sept.12, 1956	T,E, 20	Ind	Cased to bottom; slotted from 350 to 360 ft, and 398 to 535 ft; gravel-packed. Reportedly pumped 80 gpm with water level at bottom of hole when completed.
D-4	Brooks and Ewing	J. R. Marshall	--	1938	110	8	Cenozoic alluvium	--	--	N	N	2/
*D-5	Tom Lineberry	--	2928.2	Old	80	6	Cenozoic alluvium	48.9	Sept.12, 1956	C,W	S	
D-6	W. F. Scarborough Estate	J. D. Cole	2947.1	1951	110	8	do	45.0 45.0	Jan. 7, 1957 June 6, 1957	N	N	Supplied water for drilling oil test. 2/
D-7	Ben J. Taylor	Ben J. Taylor	2967	1952	3,804	--	--	--	--	N	N	Oil test. Lineberry well 1. Radioactivity log Q-89. 1/
D-8	Tom Lineberry	--	--	1941	146	8	Cenozoic alluvium	69.5	Jan. 4, 1957	C,W	S	
D-9	Ben Jenkins	--	--	Old	92	5	do	35.8 35.9	Sept.19, 1956 Jan. 3, 1957	C,W	D,S	
D-10	The Texas Co.	The Texas Co.	2983	1950	8,641	--	--	--	--	--	--	Oil test. H. T. Jones well 2. Electric log Q-90. 1/
D-11	Phillips Petroleum Co.	--	--	1949	174	7	Cenozoic alluvium	38.2	Nov. 1, 1956	N	N	Cased to bottom, cemented; Perforated from 152 to 174 ft. Reported yield 31 gpm on test. Supplied water for drilling oil test.

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-12	B. F. Jenkins	--	2981.9	Old	115	6	Cenozoic alluvium	44.4	Nov. 5, 1956	C,W	S	
D-13	Zapata Petroleum Corp.	Zapata Petroleum Corp.	2990	1956	4,261	--	--	--	--	--	--	Oil test. M. J. Bashara well 1. Radioactivity log Q-91. 1/
D-14	Stanolind Oil & Gas Co.	--	2976.2	--	305	7, 5	Santa Rosa sandstone	151.9 153.2	Nov. 5, 1956 Apr. 13, 1957	N	N	Cased to 270 ft. Reported yield 15 gpm when drilled. Supplied water for drilling oil test. 2/
D-15	Richardson & Bass	--	2973.0	--	300	8	Cenozoic alluvium and Santa Rosa sandstone	106.1 103.7	Nov. 5, 1956 June 10, 1957	N	N	Cased to 149 ft. Supplied water for drilling oil test.
D-16	Continental Oil Co.	Continental Oil Co.	2975	1950	7,969	--	--	--	--	--	--	Oil test. B. F. Jenkins well 12-5-D. Electric log Q-92. 1/
D-17	do	J. D. Cole	2970.9	1950	300	10	Cenozoic alluvium and Santa Rosa sandstone(?)	63.5 63.9	Sept.19, 1956 June 6, 1957	N	N	Cased to 149 ft. Supplied water for drilling oil test.
D-18	B. F. Jenkins	--	--	--	149	6	Cenozoic alluvium	64.7	Jan. 4, 1957	C,W	S	
D-19	Richardson & Bass	--	2978.9	--	480	8	Santa Rosa sandstone	153.5 153.4	Jan. 4, 1957 June 6, 1957	N	N	Supplied water for drilling oil test. Well is obstructed to measuring line at 174 ft.
D-20	do	--	--	--	445	8	Santa Rosa sandstone and cenozoic alluvium	107.6	Sept.13, 1956	N	N	Cased to 185 ft.
D-21	Sun Oil Co.	Flack Water Well Co.	--	1936	175	8	Cenozoic alluvium	67.9	Jan. 3, 1957	N	N	Cased to 142 ft. 2/
D-22	Texas-New Mexico RR. Co.	L. L. Dorn	2951	1929	160	8, 6	Cenozoic alluvium	70.3	Sept.12, 1956	C,W	D	Cased to bottom. Screened from 139 to 159 ft. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-23	Texas-New Mexico RR. Co.	L. F. Buchanan	2952	1930	148	10, 8	Cenozoic alluvium	75	1940	N	N	Hole filled to 30 ft by blowsand in September 1956. 2/
D-24	Shell Oil Co.	Shell Oil Co.	2917	1955	3,338	--	--	--	--	--	--	Oil test. Shell-Scarborough well 7. Radioactivity log Q-93. 1/
D-25	Hudson & Hudson Inc.	--	2913.2	--	300	8	Santa Rosa sandstone and Cenozoic alluvium(?)	107.2	Oct. 11, 1956	C,Ng	Ind, D	
D-26	Richardson Oil Inc.	--	--	Old	167	8	Cenozoic alluvium	82.0	Oct. 10, 1956	N	N	
D-27	do	--	--	--	100	8	do	--	--	T,E, 5	D, Ind	Reported that water mottles childrens' teeth. Cheyenne Camp Well 1.
D-28	do	--	--	--	231	8	do	--	--	C,E, 3	D, Ind	Cased to 151 ft. Cheyenne Camp well 2.
*D-29	Tom Lineberry	--	2906.4	--	100	6	do	49.2	Oct. 10, 1956	C,W	S	
D-30	Hudson & Hudson, Inc.	--	--	Old	165	6	do	--	--	C,Ng	D, Ind	
D-31	Ambassador Oil, Inc. Well 3	J. D. Cole	2930	1956	225	8	do	80	June 1956	T,E, 7½	Ind	2/
D-32	Ambassador Oil, Inc. Well 2	do	--	1955	210	8	do	80	Dec. 1955	T,E, 5	Ind	Cased to 152 ft; perforated from 124 to 140 ft. Reported initial test pumped 60 gpm with 35 ft of drawdown. 2/
D-33	Sinclair Oil & Gas Co.	--	2933.9	--	448	10	Santa Rosa sandstone	129.3	Oct. 11, 1956	N	N	Cased to 191 ft. Reported used intermittently. Supplied water for drilling oil test. 2/

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-34	Sinclair Oil & Gas Co.	Darrell W. Smith	2931	1950	3,070	--	--	--	--	--	--	Oil test. Scarborough well 1. Electric log Q-94. 1/
D-35	Richardson Oils, Inc.	Richardson Oils, Inc.	2907	1957	508	13, 7	Santa Rosa sandstone and Cenozoic alluvium	76.2	Feb. 15, 1957	T,Ng	Ind	Oil test converted into water well. Casing perforated from 97 to 133 ft. Slotted 7-in. casing from 369 to 469 ft. Gravel-packed.
D-36	do	--	--	--	88	8	Cenozoic alluvium	69.8	Oct. 8, 1956	N	N	Supplied water for drilling oil test.
D-37	do	Richardson Oils, Inc.	2917	1956	3,010	--	--	--	--	--	--	Oil test. W. F. Scarborough well E-5. Radioactivity log Q-95. 1/
*D-38	do	do	2921.3	1956	1,280	13	Santa Rosa sandstone and Cenozoic alluvium	91.6	Nov. 5, 1956	T,E, 15	Ind	Drilled to Rustler formation. Plugged back to 531 ft: perforated casing from 113 to 148 ft; open hole from 250 to 531 ft. 2/
D-39	do	J. R. Marshall	--	1938	420	10	Santa Rosa sandstone	104.8 104.0	Oct. 8, 1956 Feb. 15, 1957	N	N	Reported used intermittently. Open hole from 291 to 420 ft. Supplied water for drilling oil test. 2/
D-40	Magnolia Petroleum Co.	--	--	Old	165	8	Cenozoic alluvium	80.2	Sept.20, 1956	N	N	Supplied water for drilling oil test.
D-41	do	J. R. Marshall	--	1938	143	10, 6	do	85.5	do	N	N	Supplied water for drilling oil test. 2/
D-42	J. B. Walton	--	--	Old	85	6	do	76.0	do	C,W	S	
D-43	Humble Oil & Refining Co. well 7	I. O. Fannin	--	1954	200	7	do	109.8	Sept.26, 1956	N	N	Cased to 188 ft. 2/

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-44	Humble Oil & Refining Co. well 2	I. O. Fannin	--	1954	205	7	Cenozoic alluvium	96.5	Sept.26, 1956	N	N	Cased to 180 ft.
D-45	Humble Oil & Refining Co. well 4	J. J. Harrell and R. P. Tone	2897.8	1951	238	7	do	95.5	Apr. 23, 1957	N	N	Cased to bottom; slotted from 124 to 238 ft. 2/
D-46	Humble Oil & Refining Co. well 6	I. O. Fannin	--	1953	185	6	do	--	--	T,E, 5	Ind	Cased to bottom; slotted. 2/
*D-47	El Paso Natural Gas Co. well 1	J. D. Cole	2937.6	1949	166	16, 12	do	64.5	Oct. 17, 1956	T,E, 5	Ind, P	Cased to bottom; slotted from 126 to 166 ft; 107 ft of 16-in casing cemented. Gravel-packed. 2/
*D-48	El Paso Natural Gas Co. well 2	do	2938.1	1949	600	16, 10	Santa Rosa sandstone	145.6 117.0	Oct. 17, 1952 Feb. 18, 1957	T,E, 15	P, Ind	Cased to 224 ft. Reported filled to 433 ft. 2/
D-49	El Paso Natural Gas Co. well 5	J. D. Cole	--	1953	404	16	Santa Rosa sandstone	115.7	Feb. 20, 1957	T,E, 20	Ind, P	Cased to 166 ft. 2/
D-50	El Paso Natural Gas Co.	--	--	--	250	--	--	--	--	N	N	Test hole 3, section 18. 2/
D-51	do	--	--	--	219	--	--	--	--	N	N	Test hole 1, section 18. 2/
D-52	do	--	2925.2	--	219	8	Santa Rosa sandstone(?)	147.5 112.0	Oct. 18, 1956 Feb. 20, 1957	N	N	Reported static water-level 81 ft, originally, and produced 37 gpm. Supplied water for road-building.
D-53	do	J. D. Cole	2924.0	1949	260	10	Cenozoic alluvium and Santa Rosa sandstone	116.2	Feb. 18, 1957	T,E, 15	Ind, P	Cased to 165 ft; slotted from 90 to 165 ft. Gravel-packed from 80 to 165 ft. 2/
D-54	do	do	2926.5	1949	224	16, 10	do	98.4	Feb. 18, 1957	T,E, 10	Ind, P	Cased to bottom; slotted. Gravel-packed. 2/
D-55	do	--	--	--	280	--	--	--	--	N	N	Test hole 2, section 18. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-56	El Paso Natural Gas Co.	--	--	--	175	--	--	--	--	N	N	Test hole 1, section 19. 2/
D-57	J. B. Walton	--	--	Old	80	6	Cenozoic alluvium	70.4	Oct. 22, 1956	C,W	S	
D-58	El Paso Natural Gas Co.	--	--	--	125	--	--	--	--	N	N	Test hole 4, section 3. 2/
D-59	do	--	--	--	220	--	--	--	--	N	N	Test hole 2, section 3. 2/
D-60	do	--	--	--	210	--	--	--	--	N	N	Test hole 3, section 3. 2/
D-61	do	--	--	--	220	--	--	--	--	N	N	Test hole 1, section 3. 2/
D-62	J. R. Sharp	--	--	--	170	6	--	--	--	C,Ng	D, Ind	
D-63	El Paso Natural Gas Co.	--	--	--	160	--	--	--	--	N	N	Test hole 3, section 20. 2/
D-64	do	--	--	--	220	--	--	--	--	N	N	Test hole 3, section 2. 2/
D-65	do	--	--	--	200	--	--	--	--	N	N	Test hole 2, section 2. 2/
D-66	do	--	--	--	187	--	--	--	--	N	N	Test hole 1, section 2. 2/
D-67	do	--	--	--	234	--	--	--	--	N	N	Test hole 2, section 20. 2/
D-68	Sinclair Oil & Gas Co.	Sinclair Oil & Gas Co.	2859	1956	10,023	--	--	--	--	--	--	Oil test. J. B. Walton A well 7. Radioactivity log Q-96. 1/
D-69	J. B. Walton	--	2950.7	1953	185	4	Cenozoic alluvium	65.7 65.8	Sept.19, 1956 June 6, 1957	C,W	S	
D-70	Sinclair Oil & Gas Co.	--	2967	--	129	8	do	65.8	Nov. 8, 1956	N	N	Abandoned.

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-71	Sinclair Oil & Gas Co.	E. & L. Water Well Service	2972	1945	150	10	Cenozoic alluvium	69.6	Nov. 8, 1956	N	N	Cased to 135 ft. 2/
D-72	El Paso Natural Gas Co.	--	--	--	160	--	--	--	--	N	N	Test hole 4, section 20. 2/
D-73	do	--	--	--	252	--	--	--	--	N	N	Test hole 1, section 20. 2/
D-74	Sinclair Oil & Gas Co.	J. R. Marshall	2964	1937	282	8, 7	Santa Rosa sandstone and Cenozoic alluvium	72.1	Nov. 8, 1956	N	N	Cased to bottom; slotted. 2/
D-75	do	E. & L. Water Well Service	2965	1945	157	8	Cenozoic alluvium	72.6	do	N	N	Cased to 133 ft. 2/
D-76	do	do	2965	1945	202	10, 7	do	73.0	do	N	N	Cased to 197 ft; slotted. 2/
D-77	Richardson & Bass Well 19	--	--	--	220	10	do	--	--	T,E, 15	Ind, P	
D-78	Richardson & Bass	Richardson & Bass	2955	1954	5,050	--	--	--	--	--	--	Oil test. J. B. Walton well 44-H. Radioactivity log Q-97. 1/
D-79	Richardson & Bass Well 15	--	--	--	188	8	Cenozoic alluvium	--	--	T,E, 15	Ind, P	Cased to 164 ft.
D-80	Richardson & Bass Well 16	--	--	--	240	10	do	--	--	T,E, 10	Ind, P	
D-81	Richardson & Bass Well 1	--	--	--	325	10 8	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 15	Ind, P	Cased to 250 ft.
D-82	Richardson & Bass Well 2	--	--	--	210	8	Cenozoic alluvium	--	--	T,Ng	Ind, P	Cased to 190 ft.
D-83	J. B. Walton	--	--	--	174	7	do	69.9	Oct. 22, 1956	C,W	S	
D-84	El Paso Natural Gas Co.	--	--	--	200	--	--	--	--	N	N	Test hole 1, section 1. 2/

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*D-85	El Paso Natural Gas Co. Well 5	J. D. Cole	--	1953	250	16	Cenozoic alluvium and Santa Rosa sandstone(?)	65.5	Feb. 14, 1957	T,E, 10	Ind	Reported removed from camp system and used only in cooling towers due to increasing mineralization of water.
D-86	El Paso Natural Gas Co. Well 4	--	--	1953	164	10, 8	Cenozoic alluvium	--	--	T,E, --	P, Ind	Cased to bottom; bottom 40 ft slotted.
D-87	El Paso Natural Gas Co. Well 3	--	--	--	160	10, 8	do	65	Dec. 1954	T,E, 15	P, Ind	Cased to 157 ft; slotted from 135 to 157 ft.
D-88	Richardson & Bass	Richardson & Bass	2951	1954	4,920	--	--	--	--	--	--	Oil test. J. B. Walton well 38-H. Radioactivity log Q-98. 1/
*D-89	El Paso Natural Gas Co.	--	--	--	156	10,	Cenozoic alluvium	61.8 61.4	Nov. 5, 1956 Feb. 14, 1957	T,E, 5	P, Ind	Cased to bottom; slotted from 126 to 156 ft.
D-90	Richardson & Bass	--	--	--	220	8	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,E, 15	P, Ind	Cased to 123 ft.
D-91	do	--	--	--	155 --	8	Cenozoic alluvium	--	--	T,E, 15	N	Cased to 117 ft. Reported discontinued because of salt water contamination.
D-92	do	--	2957.0	--	155	10	do	65.9	Nov. 5, 1956	T,E, 15	N	Cased to 128 ft. Reported discontinued use because of salt water contamination.
*D-93	do	--	--	--	210	--	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,Ng	Ind	Cased to 135 ft. Reported water taste of salt.
D-94	Richardson Gasoline Plant Well 3	--	--	--	200	13	do	--	--	T,E, 20	Ind,	2/

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-95	Richardson Gasoline Plant Well 1	--	--	--	200	13	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	--	Ind	Cased to 130 ft.
D-96	Richardson Gasoline Plant Well 2	--	2962.9	--	200	13	do	62.8	Nov. 7, 1956	T,E, 20	Ind, D	Cased to 130 ft; cemented.
D-97	Carter Foundation --	--	--	--	--	8	--	--	--	C,Ng	Ind	Supplies water for Richardson Gasoline Plant.
*D-98	do	--	--	--	200	8	Cenozoic alluvium and Santa Rosa sandstone(?)	50	Sept. 1956	T,Ng	Ind	do
D-99	Stanolind Oil & Gas Co.	--	--	--	200	7, 4	do	--	--	C,E, 3/4	Ind	2/
D-100	Richardson & Bass	--	2973.9	--	220	8	Cenozoic alluvium	44.3 51.7	Nov. 3, 1956 June 6, 1956	N	N	
D-101	B. F. Jenkins	--	--	--	107	6	Cenozoic alluvium	38.0	Nov. 3, 1956	C,W	S	Cased to 100 ft. Reported producing from gravel at 100-107 ft.
D-102	Stanolind Oil & Gas Co.	--	--	--	170	8	do	40.1	do	N	N	Cased to bottom; slotted. Supplied water for drilling oil test.
D-103	Gulf Oil Corp.	J. D. Cole	2958	1947	300	10, 8	do	55.5	Oct. 23, 1956	N	N	Casing: 156 ft of 10-in., cemented slotted from 156 to 300 ft. 2/
D-104	Phillips Petroleum Co.	--	--	1946	190	6	do	48.8	Nov. 1, 1956	N	N	
D-105	do	--	--	1945	190	6	do	52.3	do	N	N	
D-106	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2978	1946	8,110	--	--	--	--	--	--	Oil test. Mack Taylor Well B-1. Radioactivity log Q-99. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*D-107	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2955.4	--	10	--	Cenozoic alluvium	6.0	June 7, 1957	N	S	Dug with bulldozer about 15 by 25 ft. Altitude of water level June 7, 1957 was 2949.4 ft above mean sea level. Supplied water for drilling oil test.
*D-108	J. B. Walton	The Texas Co.	2974.1	1952	11	--	do	5.8	do	N	S	Dug. Altitude of water level June 7, 1957 was 2968.3 ft. Supplied water for drilling oil test.
D-109	Stanolind Oil & Gas Co.	--	--	--	--	6	Cenozoic alluvium	52.6	Nov. 3, 1956	N	N	Supplied water for drilling oil test.
D-110	Gulf Oil Corp.	Gulf Oil Corp.	2966	1956	8,310	--	--	--	--	--	--	Oil test. Keystone well 178-D. Radioactivity log Q-100. 1/
D-111	do	J. E. Germiller	2963.1	1948	250	10, 8	Cenozoic alluvium	64.3 64.4	Oct. 23, 1956 June 10, 1957	N	N	Cased to bottom; slotted from 192 to 250 ft. Keystone Cattle Co. well 9. Supplied water for drilling oil test. Reported maximum yield 40 gpm. 2/
D-112	J. R. Sharp	--	--	1945	--	8	do	--	--	C,Ng	D, Ind	
D-113	Gulf Oil Corp.	G. S. Taylor	2962	1947	250	10, 8	do	67.4	Oct. 23, 1956	N	N	Cased to bottom; slotted from 162 to 240 ft. Keystone Cattle Co. well 13. Supplied water for drilling oil test. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-114	Gulf Oil Corp.	J. E. Germiller	2953	1945	227	10, 8	Cenozoic alluvium	60.0 60.0	Oct. 23, 1956 June 8, 1957	T,Ng	Ind	Cased to bottom; slotted from 170 to 226 ft. Keystone Cattle Co. well 8. 2/
D-115	do	J. R. Marshall	2952.4	--	270	10, 8	do	70.6 70.3	Oct. 23, 1956 June 8, 1957	N	N	Cased to bottom; slotted from 220 to 270 ft. Gravel-packed. Keystone Cattle Co. Well 3. 2/
D-116	Martex Oil & Gas Co. Well 2	--	2953	--	152	8	Cenozoic alluvium	--	--	C,E, 3	D, Ind	
*D-117	Humble Oil & Refining Co.	--	--	--	200	7	do	--	--	C,E, 3	D, Ind	
D-118	do	--	--	--	216	8, 7	do	72.9	Nov. 6, 1956	N	N	
D-119	do	--	--	--	220	8, 7	do	71.8	Oct. 23, 1956	N	N	
D-120	S. W. Richardson well 17	--	--	--	225	8, 7	do	--	--	N	N	Cased to bottom; slotted from 193 to 215 ft. 2/
D-121	Phillips Petroleum Co.	--	--	1944	210	7	do	68.8	Nov. 1, 1956	C,E, 3	D, Ind	
D-122	S. W. Richardson well 18	--	--	--	206	8, 6	do	--	--	N	N	Cased to bottom. 2/
D-123	Gulf Oil Corp.	Gulf Oil Corp.	2961	1947	7,732	--	--	--	--	--	--	Oil test. Keystone well 115-Si. Radioactivity log Q-101. 1/
D-124	do	Earl Scott	--	1946	250	10, 8	Cenozoic alluvium	69.2	Nov. 6, 1956	N	N	Cased to bottom. Keystone Cattle Co. well 10. 2/
D-125	do	J. J. Bush	--	1935	357	10, 8	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,Ng	Ind	Cased to bottom; slotted from 289 to 357 ft. Keystone Cattle Co. well 5. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-126	Gulf Oil Corp.	F. C. Ingham	--	1935	250	10, 8	Cenozoic alluvium	--	--	T,Ng	Ind	Cased to 195 ft. Keystone Cattle Co. well 7. 2/
D-127	do	G. S. Taylor	2941	1947	250	10, 8	do	65.2	Oct. 22, 1956	T,E, 25	Ind	Cased to bottom; cemented to 168 ft; slotted. 2/
D-128	do	F. C. Ingham	2942.0	1935	332	10, 8 6	Cenozoic alluvium and Santa Rosa sandstone	76.9 76.1 80.7	Oct. 23, 1956 Feb. 14, 1957 June 10, 1957	N	N	Keystone Cattle Co. well 1. 2/
*D-129	do	J. R. Marshall	2940	1935	250	10, 8	Cenozoic alluvium	--	--	T,E, 25	Ind	Cased to 216 ft; slotted from 179 to 216 ft. Keystone Cattle Co. well 2. 2/
D-130	Carter Foundation	Cole & Powell	--	1953	248	10, 8	do	--	--	T,E, 25	P, Ind	Cased to bottom; slotted from 175 to 240 ft. 2/
D-131	J. B. Walton	--	2933.6	--	188	6	do	80.3	Oct. 22, 1956	C,W	S	
D-132	Carter Foundation	Carter Foundation	2932	1956	3,353	--	--	--	--	--	--	Oil test. Pure-Walton well 5. Radioactivity log Q-102. 1/
D-133	Standard of Texas	Harry Bass	--	1938	202	8	Cenozoic alluvium	86.8	Nov. 14, 1956	N	N	Baird well 1. 2/
D-134	do	--	--	--	130	10	do	76.0	Nov. 21, 1956	N	N	
*D-135	J. B. Walton	J. R. Marshall	--	1937	155	6	Cenozoic alluvium	81.4	Oct. 20, 1956	C,W	S	Cased to 125 ft.
*D-136	Cabot Carbon Black Co.	do	--	--	180	12, 10	do	85.4	do	T,E, 25	Ind	Cased to bottom; slotted from 148 to 180 ft. 2/
*D-137	do	J. D. Cole	--	1947	230	16, 10	do	--	--	T,E, 20	Ind, P	Cased to bottom; slotted from 144 to 226 ft. Gravel-packed. 2/
*D-138	do	--	2908.8	--	215	10	do	75.5	Oct. 20, 1956	T,E, 10	P	

*See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-139	Magnolia Petroleum Co.	Bethel & Matthews	2899	1950	219	10, 7	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,E, 25	P, Ind	Cased to bottom; slotted. 2/
D-140	do	Magnolia Petroleum Co.	2913	1955	8,131	--	--	--	--	--	--	Oil test. State-Walton well 25-E. Radioactivity log Q-103. 1/
*D-141	do	J. R. Marshall	2899	1934	225	10	Cenozoic alluvium and Santa Rosa sandstone(?)	89.1	Sept.20, 1956	T,E, 5	P, Ind	
D-142	do	Magnolia Petroleum Co.	2896	1954	2,965	--	--	--	--	--	--	Oil test. J. B. Walton well 68. Radioactivity log Q-104. 1/
D-143	do	H. U. Barnes	--	1955	274	20, 10	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 25	Ind	Cased to bottom; 3 joints of casing slotted. Water Flood well 2. 2/
*D-144	do	J. R. Marshall	2880	1936	250	12	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,E, 25	P, Ind	
D-145	do	do	2875	1934	245	10	do	--	--	T,E, 15	P, Ind	Cased to 200 ft; slotted.
D-146	do	do	2880	1936	250	12, 8	do	--	--	T,E, 15	P, Ind	Cased to 225 ft; slotted.
D-147	do	O. C. Reynolds	--	1934	165	12	Cenozoic alluvium	--	--	T,E, 15	P, Ind	Cased to bottom; slotted.
D-148	do	H. R. Bethal	2872	1957	275	20, 10	Cenozoic alluvium and Santa Rosa sandstone	95.9	Apr. 15, 1957	T,E, 25	P, Ind	Cased to bottom; slotted from 135 to 235 ft. Gravel-packed. 2/
D-149	do	--	--	1937	196	15	Cenozoic alluvium	96.2	Sept.22, 1956	T,E, 15	Ind	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-150	Magnolia Petroleum Co.	--	2879.2	1936	201	15, 12	Cenozoic alluvium	95.8 95.8	Sept.20, 1956 June 11, 1957	N	N	Cased to 188 ft; plugged back to 183 ft; slotted from 118 to 183 ft. 2/
D-151	do	O. C. Reynolds	2870	1934	165	20	do	113.9	Sept.20, 1956	N	N	
D-152	do	do	--	1935	168	12	do	100	Sept. 1956	T,E, 15	P, Ind	Cased to 125 ft.
D-153	do	Magnolia Petroleum Co.	2889	1956	3,000	--	--	--	--	--	--	Oil test. J. B. Walton well 242. Radioactivity log Q-105. 1/
*D-154	Sun Oil Co.	Dixon Well Service	--	1953	143	--	Cenozoic alluvium	105	May 1956	T,E, 5	Ind	
D-155	Amerada Petroleum Corp.	--	--	1956	200	12	Cenozoic alluvium	--	--	T,E, 5	Ind, D	
D-156	Texas Pacific Coal & Oil Co.	Clark Drilling Co.	2885	1954	1,305	10	Rustler Formation	375	Mar. 1954	T,E, 37½	Ind	Yields salt water from open hole 1,135 ft to 1,305 ft. 2/
D-157	do	--	--	--	187	8, 5	Cenozoic alluvium	90.1	Sept.24, 1956	N	N	Cased to bottom; slotted from 147 to 187 ft.
D-158	do	Texas & Pacific Coal & Oil Co.	2885	1954	3,080	--	--	--	--	--	--	Oil test. Lum Daugherty well 17. Radioactivity log Q-106. 1/
D-159	do	--	--	1937	204	8	Cenozoic alluvium	--	--	T,E, 5	D, Ind	
*D-160	do	Atwood & Clark Drilling Co.	2880	1954	1,234	13, 10	Rustler formation	375	July 1954	T,E, 37½	Ind	Yields salt water from open hole 1,135 to 1,234 ft. Temp. 67°F. 2/
D-161	D. H. Bolin	--	2880	1935	200	8, 7	Cenozoic alluvium	--	--	T,E, 7½	Ind	Cased to bottom; slotted from 140 to 200 ft.

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-162	D. H. Bolin	--	2879.8	1935	200	8, 7	Cenozoic alluvium	92.4 98.2	Sept.24, 1956 June 11, 1957	N	N	Cased to bottom; slotted from 140 to 200 ft.
*D-163	Sinclair Oil & Gas Co. well 3	F. C. Ingham	--	1934	200	10, 8	do	91	Sept. 1956	T,E, 10	Ind	Cased to bottom; slotted. 2/
D-164	Sinclair Oil & Gas Co. well 4	--	--	--	180	8	--	--	--	N	N	2/
D-165	Sinclair Oil & Gas Co.	F. C. Ingham	2870	1934	215	8	Cenozoic alluvium	88.8	Oct. 22, 1956	C,G, 5	Ind	Cased to 165 ft. 2/
D-166	Atlantic Refining Co.	J. D. Cole	2865	1956	190	10	do	91.2	Nov. 17, 1956	T,E, 5	Ind	Cased to 114 ft; cemented. 2/
D-167	do	do	2862	1956	190	10	do	84.0	Sept.25, 1956	T,E, 3	--	Cased to 103 ft; cemented. 2/
D-168	D. H. Bolin	--	2868	1935	201	8, 7	do	84.5	Sept.24, 1956	T,E, 7½	Ind	Cased to bottom; slotted from 139 to 201 ft. Reported to pump 118 gpm on 9-hour test.
D-169	D. D. Feldman Oil & Gas Co.	D. D. Feldman Oil & Gas Co.	2872	1952	3,134	--	--	--	--	--	--	Oil test. Daugherty well 4-A. Electric log Q-107. 1/
D-170	Cabot Gasoline Plant	J. D. Cole	--	1953	212	12	Cenozoic alluvium	--	--	T,E, 30	Ind	Reported to yield 300 gpm.
D-171	do	--	--	1936	200	8	do	--	--	T,E, 10	P	Reported yield 60 gpm.
D-172	J. B. Walton	--	--	Old	125	6	do	75.5	Nov. 17, 1956	C,W	N	
D-173	Gulf Oil Corp. well 7	J. R. Marshall	2883.2	1937	225	8	Cenozoic alluvium and Santa Rosa sandstone	89.2 88.7	Nov. 16, 1956 June 11, 1957	T,Ng	Ind	2/
D-174	do	Gulf Oil Corp.	2882	1955	3,100	--	--	--	--	--	--	Oil test. Lum Daugherty well 7. Radioactivity log Q-108. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-175	Gulf Oil Corp. well 5	R. E. Griggs	--	1937	218	8	Cenozoic alluvium and Santa Rosa sandstone	89.5	Nov. 19, 1956	N	N	Cased to 117 ft. 2/
D-176	Gulf Oil Corp. well 6	do	--	1937	216	8	do	91.3	do	N	N	Cased to 106 ft. 2/
D-177	Gulf Oil Corp. well 1	J. R. Marshall	--	1936	180	8	Cenozoic alluvium	91.8	do	N	N	Cased to 85 ft. 2/
D-178	Sunray Mid-Continent Oil Co.	--	2885.5	1934	175	8	do	96.5	Nov. 16, 1956	T,E, 7½	Ind	
D-179	Humble Oil & Refining Co.	F. C. Ingham	2894	1936	175	8, 6	do	--	--	T,E, 10	Ind	Cased to bottom; slotted. J. F. Howe well 2. 2/
D-180	do	do	--	1936	186	8, 6	do	--	--	T,E, 3	Ind	Cased to bottom; slotted. J. F. Howe well 3. 2/
D-181	do	do	2894	1935	173	8, 6	do	--	--	T,E, 10	Ind	Cased to bottom; 45 ft slotted. J. F. Howe well 1. 2/
D-182	do	do	--	1936	195	8, 6	do	--	--	N	N	Cased to bottom; slotted. Abandoned. J. F. Howe well 4.
D-183	J. B. Walton	--	2888.4	--	130	6	do	87.4	Nov. 17, 1956	C,W	S	
D-184	Standard Oil Co. of Texas	Standard Oil Co. of Texas	2901	1957	10,642	--	--	--	--	--	--	Oil test. H. E. Lovett well 2. Radioactivity log Q-109. 1/
*D-185	J. B. Walton	--	--	Old	87	8	Cenozoic alluvium	75.8 75.8	Oct. 20, 1956 Nov. 21, 1956	C,W	S	
*D-186	do	--	--	Old	87	--	do	72	1940	C,W	S	
D-187	Standard Oil Co. of Texas	Standard Oil Co. of Texas	2916	1953	3,284	--	--	--	--	--	--	Oil test. W. E. Baird well 13-21. Radioactivity log Q-110. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-188	Standard Oil Co. of Texas	--	--	1956	160	8	Cenozoic alluvium	78.4	June 25, 1957	T,B	Ind	Supplies water for drilling oil tests.
D-189	Quinette & Leiderman	--	--	1948	200	7	do	--	--	C,E, 3	D	
D-190	do	--	--	Old	100	8	do	74.6	Nov. 21, 1957	N	N	
*D-191	Standard Oil Co. of Texas	J. R. Marshall	2905.4	1940	195	8	do	--	--	T,E, 5	D	Cased to 167 ft. Baird well 3. 2/
D-192	J. B. Walton	J. D. Cole	2905.4	1955	150	6	do	67.2	Nov. 21, 1956	C,W	S	Cased to bottom; slotted.
*D-193	Standard Oil Co. of Texas	Richardson Drilling Co.	--	1953	1,062	13	Rustler formation	--	--	T,E, 75	Ind	Cased to 902 ft. 2/
D-194	do	Sidwell & Imler	2906.5	1952	409	13, 9	Cenozoic alluvium and Santa Rosa sandstone	100.7 103.7 108.0	Nov. 14, 1956 Apr. 15, 1957 June 10, 1957	T,E, 10	Ind	Cased to 387 ft. Gravel-packed. Radioactivity log Q-111. 1/ 2/
D-195	do	Richardson Drilling Co.	--	1953	1,023	13	Rustler formation	189.9	Nov. 14, 1956	T,Ng	Ind	Cased to 815 ft. 2/
*D-196	do	--	--	1951	425	13	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,E, 30	Ind	Cased to bottom; slotted. 2/
D-197	do	Sidwell & Imler	--	1952	412	13, 9	Santa Rosa sandstone	123.1	Nov. 14, 1956	T,E, 20	Ind	Cased to bottom; slotted. 2/
D-198	Richardson Oils, Inc.	--	--	--	195	8	Cenozoic alluvium	82.3	Nov. 21, 1956	N	N	Cased to 180 ft.
D-199	do	--	--	--	--	8	do	--	--	N	N	Cased to 154 ft.
D-200	do	Richardson Drilling Co.	--	1954	1,020	9	Rustler formation	--	--	T,E, 30	Ind	Cased to 895 ft.
D-201	do	Richardson Oil Inc.	2922	1954	3,353	--	--	--	--	--	--	Oil test. W. E. Baird well 4. Radioactivity log Q-1. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-202	Gulf Oil Corp.	Gulf Oil Corp.	2918	1953	3,400	--	--	--	--	--	--	Oil test. Keystone Cattle Co. well 162. Radioactivity log Q-112. 1/
D-203	do	W. D. Holt	2939	1935	220	10, 8	Cenozoic alluvium	75.4	Oct. 23, 1956	N	N	Cased to 200 ft; slotted from 138 to 200 ft. Keystone Cattle Co. well 4. 2/
D-204	Seth Campbell	-- Hammett	2919.0	1935	158	6	do	61.4	Oct. 7, 1956	C,W	S	Cased to bottom; slotted.
D-205	do	O. C. Reynolds	--	1940	178	6	do	61.1	do	C,W	S	do
D-206	do	do	--	1938	180	6	do	62.4	Dec. 6, 1956	C,W	S	do
D-207	The Texas Co.	--	2909.1	1957	100	6	do	68.7	June 8, 1957	N	N	Supplied water for drilling oil test.
*D-208	Seth Campbell	-- Wade	--	1935	175	7	Cenozoic alluvium	65.0	Oct. 24, 1956	C,W	S	
*D-209	The Texas Co.	Bob Glenn	2885.5	1935	140	7	do	70.6	do	T,E, 3	D	
D-210	The Texas Co. well 1	Martin Drilling Co.	2888	1957	1,045	16, 11	Rustler formation	181.3	Jan. 31, 1957	T,E, .50	Ind	Radioactivity log Q-113. 1/
D-211	do	--	--	Old	200	--	Cenzoic alluvium	73.2	Nov. 21, 1956	N	N	
D-212	Seth Campbell	--	2893.6	--	200	6, 4	do	74.0 74.0	Nov. 21, 1956 June 8, 1957	C,W	S	Cased to bottom; slotted.
D-213	Bashara & Protho Oil Co.	Pekoe Drilling Co.	--	1956	1,015	13, 9	Rustler formation	177.2	Nov. 21, 1956	N	N	Reported yield, 290 gpm on 48-hour test.
D-214	do	--	2877.0	--	160	6	Cenozoic alluvium	68.8	do	T,E, 3	D, Ind	
D-215	J. B. Walton	--	--	--	180	6	do	68.2	Nov. 17, 1956	C,W	S	

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-216	Humble Oil & Refining Co.	Humble Oil & Refining Co.	2866	1955	3,017	--	--	--	--	--	--	Oil test. W. A. McCutcheon well 9. Radioactivity log Q-114. 1/
D-217	do	R. E. Griggs	--	1936	300	8, 6	Santa Rosa sandstone	--	--	T,E, 7½	Ind	Cased to bottom; slotted from 268 to 300 ft. 2/
D-218	do	F. C. Ingham	2867.9	1936	301	8, 6	Cenozoic alluvium and Santa Rosa sandstone(?)	72.2	Nov. 22, 1956	T,E, 10	Ind	Cased to bottom; slotted from 274 to 301 ft. 2/
D-219	J. M. Sharp Oil Co.	--	--	--	--	7	--	--	--	T,E, 10	Ind	
*D-220	Ambassador Oil Inc.	J. D. Cole	2876.7	1953	200	7, 5	Cenozoic alluvium and Santa Rosa sandstone(?)	79.3	Nov. 17, 1956	T,E, 7½	Ind	Cased to bottom
D-221	Sinclair Oil & Gas Co.	Sinclair Oil & Gas Co.	2872	1956	2,900	--	--	--	--	--	--	Oil test. J. B. Walton C well 8. Radioactivity log Q-115. 1/
D-222	do	J. R. Marshall	2875	1936	178	6	Cenozoic alluvium	75.8	Oct. 19, 1956	T,E	Ind	Cased to 133 ft. J. B. Walton well 2. 2/
D-223	do	do	2875	1936	165	6	do	--	--	T,E	Ind	Cased to 129 ft. J. B. Walton well 1. 2/
*D-224	Rock Hill Oil Co. well 2	--	2875	1936	150	8	do	65	Oct. 1956	T,E, 5	D	Cased to 120 ft.
D-225	Rock Hill Oil Co. well 1	--	2875	1936	150	8	do	65	Oct. 1956	T,E, 7½	Ind	do
D-226	Tidewater Oil Co.	--	--	1936	300	8, 7	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 5	Ind	Cased to 210 ft.
D-227	do	J. D. Cole	--	1952	355	7	do	--	--	T,E, 10	Ind	Cased to 160 ft.

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-228	Tidewater Oil Co.	Bob Glynn	--	1951	285	7	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 5	Ind	Cased to 147 ft. 2/
D-229	J. B. Walton	J. D. Cole	--	1953	145	8	Cenozoic alluvium	--	--	T,E, 5	D	
D-230	do	J. R. Marshall	--	1940	100	6	do	68.3	Mar. 18, 1957	C,W	D,S	
D-231	do	J. D. Cole	--	1953	200	8	do	78.4	do	T,E, ½	D,S	
D-232	do	Bob Glynn	--	1949	200	8	do	--	--	T,E, 5	D	
D-233	Sunray-Mid-Continent Oil Co.	--	--	--	175	8	do	--	--	T,E, 7½	D, Ind	
D-234	do	--	2858.0	--	175	7	do	59.4 59.5	Nov. 16, 1956 June 11, 1957	N	N	
D-235	Humble Oil & Refining Co.	R. E. Griggs	--	1936	300	10, 6	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 15	Ind	Cased to bottom; slotted from 103 to 300 ft. 2/
D-236	do	do	--	1936	300	8, 6	do	59.5	Nov. 22, 1956	T,E, 7½	Ind	Cased to bottom; slotted from 124 to 300 ft. 2/
D-237	J. B. Walton	J. D. Cole	--	1955	--	8	--	--	--	T,E, 1	D	
D-238	Gulf Oil Corp.	R. E. Griggs	--	1937	205	8	Cenozoic alluvium	--	--	N	N	Cased to 76 ft. Reported caved. 2/
D-239	Shell Oil Co.	--	--	--	230	8	do	60.9	Nov. 17, 1956	N	N	
D-240	J. B. Walton	--	--	--	--	6	Cenozoic alluvium	29.7	Nov. 15, 1956	C,W	S	
D-241	Humble Oil & Refining Co.	I. O. Fannin	--	1955	195	6	do	--	--	T,E, 7½	D	Cased to bottom; slotted. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-242	Skelly Oil Co.	J. J. Bush	--	1936	185	8, 7	Cenozoic alluvium	--	--	T,Ng	Ind	Cased to 153 ft; slotted from 105 to 153 ft. 2/
D-243	Maxwell Oil, Inc.	--	--	1936	110	7	do	55	Nov. 1956	T,E, 5	D, Ind	Cased to 70 ft.
*D-244	Harlan Producing Co.	--	--	1935	230	7	Cenozoic alluvium and Santa Rosa sandstone	--	--	C,Ng, 3	D	Cased to 230 ft; slotted from 175 to 230 ft.
*D-245	do	J. D. Cole	--	1957	148	7	Cenozoic alluvium	44.3	Jan. 31, 1957	T,E, 5	Ind	Probably contaminated by salt water.
D-246	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2871	1955	2,950	--	--	--	--	--	--	Oil test. Hendrick T-88, well 2. Radioactivity log Q-116. 1/
D-247	Gulf Oil Corp.	Gulf Oil Corp.	2846	1955	3,115	--	--	--	--	--	--	Oil test. O. Clapp well 19. Radioactivity log Q-117. 1/
D-248	do	J. R. Marshall	--	1937	200	8	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	C,Ng	Ind	Cased to 68 ft. 2/
D-249	do	do	2846.5	1936	199	10	do	43.7 41.4	Nov. 16, 1956 June 11, 1957	N	N	Cased to 85 ft. 2/ --
D-250	Ambassador Oil Inc.	J. D. Cole	--	1954	150	8	do	47	1954	T,E, 10	Ind	Cased to 96 ft.
D-251	do	--	--	--	106	7	Cenozoic alluvium	52.4	Oct. 19, 1956	N	N	
D-252	Texas & Pacific Coal & Oil Co.	Texas & Pacific Coal & Oil Co.	2858	1957	3,083	--	--	--	--	--	--	Oil test. Duval Royalty well 2. Radioactivity log Q-118. 1/
D-253	Sinclair Oil & Gas Co.	J. R. Marshall	2860	1936	250	8, 6	--	--	--	N	N	Abandoned. 2/
D-254	do	--	--	--	200	6, 5	--	--	--	N	N	do

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-255	Sinclair Oil & Gas Co.	--	--	1939	150	7	Cenozoic alluvium	--	--	C,W	Ind	Cased to 136 ft. 2/
*D-256	Standard Well Service	J. D. Cole	--	1951	200	7	do	--	--	T,E, ½	D	
D-257	Humble Oil & Refining Co.	R. E. Griggs	--	1937	300	10, 6	--	--	--	N	N	Abandoned. 2/
*D-258	Skelly Oil Co.	J. D. Cole	--	1954	210	7	Cenozoic alluvium and Santa Rosa sandstone	--	--	C,E, 3	P	
D-259	J. W. Peery	--	--	--	100	5	Cenozoic alluvium	30.0	Nov. 15, 1956	N	N	
D-260	Veterans of Foreign Wars	J. D. Cole	2843.4	1954	200	7	Cenozoic alluvium and Santa Rosa sandstone(?)	42.6 42.4	Oct. 11, 1956 June 11, 1957	T,E	D	
D-261	-- Autry	Bob Glynn	--	1951	205	7	Santa Rosa sandstone	35.5	Dec. 5, 1956	T,Ng	D, Irr	Cased to 150 ft. Irrigates 1 acre.
D-262	Eastland Oil Co.	--	--	--	135	6	Cenozoic alluvium	56.3	Nov. 7, 1956	C,Ng	D	
D-263	do	Eastland Oil Co.	2846	1953	3,162	--	--	--	--	--	--	Oil test. Clapp well 5. Radioactivity log Q-119. 1/
D-264	J. B. Walton	--	--	--	110	5	Cenozoic alluvium	45.3	Nov. 7, 1956	C,W	S	
D-265	J. C. Maxwell Oil Co.	--	--	1935	150	7	do	60.9	Nov. 16, 1956	N	N	
D-266	do	--	2849.7	1935	190	6	do	50.4 50.2	Nov. 15, 1956 June 11, 1957	N	N	
D-267	J. B. Walton	--	--	--	100	7	do	59.1	Oct. 16, 1957	C,W	S	
D-268	Russ Imlec Drilling Co.	--	2858	1957	751	--	--	--	--	--	--	Oil test. Barton well 1. Electric log Q-152. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-269	Humble Oil & Refining Co.	R. E. Griggs	--	1936	300	8, 6	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 10	Ind	Cased to bottom; slotted below 152 ft. 2/
D-270	do	F. C. Ingham	--	1936	175	8, 7	Cenozoic alluvium	--	--	T,E, 10	Ind	Cased to bottom; slotted. 2/
D-271	J. C. Maxwell Oil Co.	J. C. Maxwell Oil Co.	2868	1952	3,390	--	--	--	--	--	--	Oil test. Gartex B well 5. Radioactivity log Q-120. 1/
D-272	City of Kermit	Glynn & Wade	2865.5	1948	312	13	Cenozoic alluvium and Santa Rosa sandstone(?)	67.7	Mar. 18, 1957	T,E, 20	P	Cased to 257 ft. Community well 2. 2/
D-273	do	-- Wheeler	--	Old	265	--	Cenozoic alluvium	71.3 69.7	Oct. 11, 1956 Apr. 18, 1957	T,E, 30	P	Cased to bottom; slotted Community well 1.
D-274	Mrs. -- Underwood	J. R. Marshall	2855.5	1933	200	6	do	62.8	Dec. 5, 1956	C,W	D	
D-275	Kermit Public School System	J. R. Marshall	--	1936	235	8	Cenozoic alluvium	51.8	Apr. 25, 1957	T,E, 7½	N	Located in basement of school. Measuring point for depth to water about 20 ft below ground level.
D-276	do	--	--	--	200	10	do	--	--	T,E, 7½	P	
*D-277	City of Kermit	Homer Shutten	2845.4	1957	405	16	Santa Rosa sandstone	90.0 70.4	Aug. 16, 1957 Jan. 1, 1958	T,E	N	Cased to 230 ft; cemented, 15-in. open hole to total depth. Radioactivity, electric and micro log Q-121. 1/ Santa Rosa well 3.

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*D-278	City of Kermit	Bob Glynn	--	1949	300	13	Cenozoic alluvium and Santa Rosa sandstone	62.1	Mar. 18, 1957	T,E, 25	P	Casing cemented at 220 ft. Reported yield 278 gpm in 1954; pumping level 152.9 ft, Oct. 11, 1956. Underwood well 2. 2/
*D-279	do	Kermit Oil & Development Co.	--	1929	700	12	Santa Rosa sandstone	63.3	Oct. 7, 1939	T,E, 25	P	Cased to 274 ft; drilled as oil test, converted to water well in 1939. Underwood well 1.
*D-280	do	Permian Well Service	2853	1946	501	13	do	68. 90.9	1946 Nov. 23, 1956	T,E, 25	P	Cased to 236 ft. Underwood well 5. 2/
D-281	City of Kermit	J. D. Cole	2844.3	1957	300	13	Cenozoic alluvium and Santa Rosa sandstone	54.9 57.5	Mar. 11, 1957 Jan. 3, 1958	T,E, 25	P	Cased to 171 ft; cemented. 2/
D-282	do	do	--	1952	300	13	do	61.8	Mar. 18, 1957	T,E, 25	P	Cased to 173 ft; cemented. Underwood well 3. 2/
D-283	do	Glynn & Wade	2851.7	1948	300	13	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,E, 40	P	Cased to 197 ft; cemented. Underwood well 4.
D-284	C. B. Parker	Bob Glynn	--	1954	200	7	Cenozoic alluvium	--	--	T,E, 5	D	Cased to bottom; slotted.
*D-285	do	-- Redman	--	1938	200	5	do	66.3	Dec. 5, 1957	C,W	D	
D-286	Westbrook Oil Corp.	--	--	Old	230	7	do	57.9	Nov. 7, 1956	N	N	
D-287	Skelly Oil Co.	Skelly Oil Co.	2846	1951	3,250	--	--	--	--	--	--	Oil test. F. Getty II - Brown Altman well 1. Radioactivity log Q-122. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-288	Gulf Oil Corp.	Gulf Oil Corp.	2848	1954	3,230	--	--	--	--	--	--	Oil test. O. Clapp well 31. Radioactivity log Q-123. 1/
D-289	Skelly Oil Co.	--	--	Old	100	6	Cenozoic alluvium	56.2	Nov. 7, 1956	N	N	Cased to 85 ft.
D-290	L. S. Bogart	J. D. Cole	--	1950	209	7	do	--	--	C,W	D	
*D-291	City of Kermit	Bud Carr & J. D. Cole	2858.2	1957	559	8	Santa Rosa sandstone	107.7 97.9	Apr. 26, 1957 Jan. 4, 1958	T,E, 40	P	Cased to 262 ft. Santa Rosa well 1. Radioactivity, electric and micro log Q-16. 1/
*D-292	do	Crandell, Osmond & J. C. Marshall	2858.0	1935	545	12	Cenozoic alluvium and Santa Rosa sandstone(?)	76.9	Nov. 23, 1956	T,E, 25	P	Walton Station well 2.
D-293	do	--	--	Old	700	--	Santa Rosa sandstone	115.9	July 9, 1957	T,E, 20	P	Converted oil test. Walton Station well 1.
*D-294	do	--	--	1946	471	20, 13	Cenozoic alluvium and Santa Rosa sandstone(?)	94.8	Nov. 23, 1956	T,E, 40	P	Walton Station well 4.
D-295	Kermit High School	J. D. Cole	--	1950	250	16, 10	Cenozoic alluvium	--	--	T,E, 20	P, Irr	
D-296	City of Kermit	Glynn & Wade	--	1948	335	13, 9	Santa Rosa sandstone	96.1	Feb. 15, 1957	N	N	Cased to bottom; slotted. 2/
D-297	J. A. Crossno	J. D. Cole	--	1950	200	7	Cenozoic alluvium	--	--	T,E, 5	D	Cased to 176 ft.
*D-298	Winkler County	do	--	1953	252	16, 10	do	62	1953	T,E, 15	Irr	Cased to bottom; slotted from 215 to 252 ft. Gravel-packed. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*D-299	City of Kermit	Homer Shutten	2861.6	1957	394	16	Santa Rosa sandstone	129.5 105.4	July 28, 1957 Jan. 3, 1958	T,E	P	Cased to 265 ft; 14-in. hole from 265 to 394 ft; drawdown 94 ft after pumping 24-hours at 1,875 gpm. Santa Rosa well 2. Radioactivity, electric, and micro logs Q-124. 1/
D-300	Southern California Petroleum Corp.	Southern California Petroleum Corp.	2860	1955	3,503	--	--	--	--	--	--	Oil test. C. A. Robinson well 1. Radioactivity log Q-125. 1/
D-301	Skelly Oil Co.	Skelly Oil Co.	2862	1955	3,357	--	--	--	--	--	--	Oil test. Seth Campbell B well 1. Radioactivity log Q-7. 1/
*D-302	C. M. Chastain	Noll Drilling Co.	2867.2	1957	375	6	Cenozoic alluvium and Santa Rosa sandstone	66.3	Mar. 20, 1957	T,E 1½	D	Cased to 210 ft. 2/
D-303	Southern California Petroleum Corp.	Southern California Petroleum Corp.	2866	1955	3,485	--	--	--	--	--	--	Oil test. Brown and Altman well 1. Electric log Q-126. 1/
D-304	Earl Vest	--	2855.9	Old	165	6	Cenozoic alluvium	62.0	Dec. 6, 1956	C,W	S	Cased to bottom; slotted.
D-305	Bettis & Shepherd	Bettis & Shepherd	2881	1956	4,047	--	--	--	--	N	N	Oil test. Seth Campbell well 1. Electric log Q-127. 1/
D-306	Seth Campbell	Bob Beaty	2880.3	Old	199	7	Cenozoic alluvium	66.7	Oct. 24, 1956	C,W	D,S	
*D-307	do	-- Wade	--	1935	168	7	do	61.2	do	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
D-308	Seth Campbell	-- Wade	--	Old	175	7	Cenozoic alluvium	--	--	C,W	S	
D-309	do	O. C. Reynolds	--	Old	160	6	do	61.8	Dec. 7, 1956	C,W	S	
E-1	Gulf Oil Corp.	G. S. Taylor	3112.3	1948	135	12, 7	Cenozoic alluvium	65.3 65.0	Jan. 8, 1957 June 11, 1957	N	N	Supplied water for drilling oil test. Keystone Cattle Co. well 16. 2/
E-2	do	do	--	1948	135	7	do	--	--	N	N	Supplied water for drilling oil test. Keystone Cattle Co. well 19. 2/
E-3	do	J. D. Cole	--	1948	135	8, 5	do	--	--	N	N	Supplied water for drilling oil test. Keystone Cattle Co. well 18. 2/
E-4	do	do	3118.5	1948	890	7	Dockum group	311.4	Jan. 24, 1957	N	N	Cased to 700 ft. Top of Santa Rosa at 850 ft. Supplied water for drilling oil test. Keystone Cattle Co. well 15. 2/
E-5	do	Gulf Oil Corp.	3119	1949	9,744	--	--	--	--	--	--	Oil test. Keystone Cattle Co. well 135-E. Electric log Q-21. 1/
E-6	do	J. D. Cole	--	1948	135	10	Cenozoic alluvium	--	--	N	N	Reported dry when drilled. Keystone Cattle Co. well 17. 2/
E-7	do	Flack & Felton	--	1949	185	7	do	65.4	Jan. 24, 1957	N	N	Reported dry when drilled. Keystone Cattle Co. well 20. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
E-8	Chas. W. Hawkins well 1	TXL Oil Co.	3225	1956	4,950	--	--	--	--	N	N	Oil test. Radioactivity log Q-11. 1/
E-9	M. B. Cochran well 1	Macdonald Oil Corp.	3342	1956	8,265	--	--	--	--	N	N	Oil test. Radioactivity log Q-22. 1/ In Ector County.
E-10	John Henry Wallace Estate	Richardson & Bass	--	1948	138	8	Cenozoic alluvium	60.3	Jan. 24, 1957	N	N	Supplied water for drilling oil test.
E-11	B. F. Jenkins	--	--	--	115	8	do	--	--	C,W	S	
*E-12	John Henry Wallace Estate	--	--	--	115	8	do	--	--	C,W	S	
E-13	B. F. Jenkins	--	--	--	115	8	do	52.3	Jan. 31, 1957	C,W	S	
E-14	do	Signal Oil & Gas Co.	3089	1955	7,160	--	--	--	--	N	N	Oil test. Hardie well 1. Electric log Q-23. 1/
*E-15	Texas State Highway Department	--	3051.2	1950	120	6	Cenozoic alluvium	34.2 34.4	Sept.12, 1956 June 11, 1957	C,W	P	Supplies water for Sandhills Park.
E-16	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	3036	1956	5,250	--	--	--	--	--	--	Oil test. M. G. Damron well 1. Radioactivity log Q-24. 1/
E-17	do	J. D. Cole	3035.3	1955	105	8	Cenozoic alluvium	27.3 27.5	Nov. 3, 1956 June 11, 1957	--	--	Supplied water for drilling oil test.
E-18	Larry Fernandes	--	--	--	70	6	do	41.3	Nov. 2, 1956	C,W	S	
*E-19	Waddell Bros. & Co.	--	3089.3	--	75	6	Cenozoic alluvium	47.9	Feb. 7, 1957	C,W	S	Open hole from 70 to 75 ft. North well. 2/
E-20	do	--	3098.7	1949	125	5	do	73.9	do	C,W	S	
E-21	Waddell Bros. & Co. well 13	--	3109.4	1939	125	6	do	93.0	do	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*E-22	Waddell Bros. & Co.	--	--	1885	65	5	Cenozoic alluvium	50.1	Feb. 7, 1957	C,W	D,S	Originally dug. Casing and gravel placed in well in the 1920's. Reported water level 50 ft in 1940. Old place well.
E-23	do	--	3086.4	1907	98	6	do	83.0	do	C,W	D,S	Cased to 90 ft. Gravel-packed. Reported water level 84 ft in 1940.
*E-24	do	--	3087.4	1907	96	6	do	84.3	do	C,W	D,S	Reported water level 84 ft in 1940.
E-25	Humble Oil & Refining Co.	Branhare Drilling Co.	--	1956	102	7	do	54.2	Dec. 14, 1956	N	N	Bottom 25 ft slotted. Supplied water for drilling oil test.
E-26	do	Humble Oil & Refining Co.	3041	1956	11,432	--	--	--	--	--	--	Oil test. Waddell Bros. well 1. Electric log Q-25. 1/
E-27	do	Branhare Drilling Co.	3041.5	1956	108	12, 7	Cenozoic alluvium	54.7	Mar. 31, 1957	N	N	Bottom 25 ft slotted. Gravel-packed. Supplied water for drilling oil test.
*E-28	Larry Fernandez	--	--	Old	60	6	Cenozoic alluvium	42.6	Nov. 2, 1956	C,W	S	
E-29	do	--	--	1937	102	6	do	62.0	do	C,W	S	
E-30	Gulf Oil Corp.	J. D. Cole	2971.7	1947	426	10, 8	Cenozoic alluvium and Chinle formation equivalent	55.6	do	N	N	Supplied water for drilling oil test. 2/
E-31	do	Gulf Oil Corp.	2970	1948	11,502	--	--	--	--	--	--	Oil test. Keystone Cattle Co. well 125-T. Electric log Q-26. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
E-32	Waddell Bros. & Co.	--	--	1912	80	6	Cenozoic alluvium	48.4	Feb. 7, 1957	C,W	S	
E-33	T. B. Harris, et al.	--	--	Old	100	6	do	58.4	Jan. 28, 1957	C,W	S	
E-34	W. B. Collins	--	--	--	100	6	do	59.4	Jan. 25, 1957	N	N	
E-35	Tidewater Oil Co.	Harry Bass	3027.7	1956	100	7	do	54.2	do	--	--	Supplied water for drilling oil test.
E-36	C. O. Wheeler	--	--	--	90	6	do	56.8	Dec. 12, 1956	C,W	S	
E-37	Phillips Petroleum Co.	Phillips Petroleum Co.	3107	1950	10,775	--	--	--	--	--	--	Oil test. Waddell well 1. Electric log Q-3. 1/
E-38	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	3074	1946	10,657	--	--	--	--	--	--	Oil test. R. A. Wheeler well 1. Radioactivity log Q-145. 1/
*E-39	do	Noble Drilling Co.	--	1943	1,113	7, 5	Santa Rosa sandstone	--	--	C,Ng	D	Pump set at 684 ft.
E-40	Sun Oil Co.	B. L. Wheeler	--	1944	1,188	7	do	--	--	C,Ng	D	
E-41	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	3060	1944	10,646	--	--	--	--	--	--	Oil test. Wheeler well B-1. Electric log Q-27. 1/
*E-42	Waddell Bros. & Co.	--	--	Old	75	6	Cenozoic alluvium	50.7	Jan. 28, 1957	C,W	S	
E-43	Cosden Oil Co.	--	--	1955	115	6	do	72.5	Dec. 7, 1956	--	--	Supplied water for drilling oil test.
E-44	S. B. Wight	--	--	1956	120	6, 5	do	59.3	do	--	--	do.
E-45	C. O. Wheeler well 1	Magnolia Petroleum Co.	2997	1947	7,155	--	--	--	--	N	N	Oil test. Electric log Q-28. 1/
E-46	C. O. Wheeler	--	--	--	100	6, 4	Cenozoic alluvium	59.6	Dec. 7, 1956	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
E-47	Larry Fernandez	-- Hammett	--	1945	105	6	Cenozoic alluvium	63.9	Nov. 1, 1956	C,W	S	Reported good water.
E-48	do	Pete Smith	--	Old	93	6	do	63.5	do	C,W	D	do.
E-49	C. O. Wheeler	--	2906.9	--	100	6	do	61.2	Dec. 17, 1956	C,W	D,S	do.
E-50	do	--	--	Old	90	6	Cenozoic alluvium	61.6	Jan. 28, 1957	C,W	S	Reported good water.
*E-51	do	--	2925	1942	140	6	do	57.1	Dec. 7, 1956	C,W	S	Oil test; plugged back and converted to water well.
E-52	Humble Oil & Refining Co.	--	2920.4	1953	100	7	do	58.0	do	--	--	Supplied water for drilling oil test.
E-53	C. O. Wheeler	Frank & George Frankel	2932	1953	11,927	--	--	--	--	N	N	Oil test. Driver well 1. Electric log Q-29. 1/
F-1	Hissom Drilling Co.	Hissom Drilling Co.	--	1955	5,172	--	--	--	--	N	N	In Loving County. Oil test. Tennessee Mac well 1. Radioactivity log Q-137. 1/
F-2	J. E. Haley	--	2869.4	Old	250	5	Santa Rosa sandstone	188.7	Apr. 10, 1957	C,W	S	
F-3	do	--	2855.6	--	--	6	--	158.6	Sept.13, 1956	C,W	D,S	
F-4	do	--	2855.3	1947	200	6	--	156.5	do	C,W	S	
*F-5	L. W. Anderson	J. O. Jorman	2846.9	1938	184	6	Cenozoic alluvium	140.5 139.2	Sept.12, 1956 Apr. 1, 1957	C,W	S	Cased to bottom; slotted from 165 to 175 ft. 2/
*F-6	C. E. Wilson	O. C. Reynolds	--	--	290	5	do	127 96.8	Apr. 1940 Sept.13, 1956	C,W	S	
F-7	C. F. Garlitz	C. F. Garlitz	2795	1952	3,285	--	--	--	--	N	N	Oil test. T. G. Hendricks well 1. Electric log Q-138. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*F-8	Winkler County Country Club	Bob Glynn	--	1946	190	7	Cenozoic alluvium	--	--	T,E, 15	Irr	
*F-9	Jack Lineberry	--	2826.7	1953	130	6	do	118.3	Sept.12, 1956	C,W	S	
F-10	do	Charles F. Gerlitz	2820	1953	130	7	do	95.9	do	C,W	S	Oil test. Hendrick well 2. Plugged back and converted to water well. Electric log Q-139. 1/
*F-11	Hulda J. Wilson	--	--	Old	100	5	do	--	--	N	N	Casing blocked. Abandoned.
F-12	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2845	1956	2,925	--	--	--	--	--	--	Oil test. T-88-M well 16. Radioactivity log Q-140. 1/
F-13	Humble Oil & Refining Co.	G. P. Mizell	2846.1	1928	240	8, 6	Cenozoic alluvium	15.8	Nov. 15, 1956	N	N	Cased to bottom; slotted. Abandoned. Ida Hendrick C well 4. 2/
*F-14	Hulda J. Wilson	--	2833.9	-- ?	230	6	do	47.3	Sept.19, 1956	C,W	S	
*F-15	do	--	--	Old ?	96	6	do	63 31.4	Apr. 1946 Nov. 15, 1956	C,W --	S	
*F-16	Permian Ice Co.	--	2809	Old	219	6	do	59.5	Sept.19, 1956	C,W	N	Abandoned.
F-17	Atlantic Pipeline Co.	--	--	Old ?	120	6	Cenozoic alluvium	--	--	C,E, 2	D	
*F-18	Pasotex Pipeline Co. well 4	Layne-Texas Co.	2804	1953	468	12, 6	do	47 70	Sept. 1953 Sept. 1956	C,E, 5	D, Ind	Casing: 408 ft. of 12-in. cemented. Screen from 418 to 438 ft. 2/
F-19	Pasotex Pipeline Co. well 1	L. F. Buchanan	2804	1928	438	6	do	--	--	J,A	D	2/
F-20	Pasotex Pipeline Co. well 2	do	2804	1928	542	6	do	--	--	J,A	D	2/

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*F-21	Wink City Airport	--	2807.7	1942	210	5	Cenozoic alluvium	110 99.8	July 1943 Sept.19, 1956	C,E, 15	D	2/
*F-22	L. W. Anderson	--	--	--	176	6	do	137	Apr. 1940	C,W	S	
F-23	Hulda J. Wilson	J. R. Marshall	--	1938	235	7	--	159.1	Sept.13, 1956	C,G	S	Reported bad water.
F-24	G. P. Mitchell	--	--	1948 ?	--	6	--	--	--	C,W	S	do.
*F-25	do	--	2870.9	Old ?	300	7	Santa Rosa sandstone(?)	218.7	Sept.13, 1956	C,W	D,S	
*F-26	D. P. Anderson	--	2829.4	Old	152	6	--	135.5	Sept.19, 1956	C,W	D,S	
*F-27	University of Texas	L. F. Buchanan	2794.0	1940	208	5	Santa Rosa sandstone(?)	123.7 123.8	Sept.20, 1956 Apr. 1, 1957	C,W	S	Cased to 164 ft; slotted from 144 to 164 ft. 2/
F-28	do	Magnolia Petroleum Co.	2787	1953	5,260	--	--	--	--	N	N	Oil test. Texas University well A-1. Electric log Q-141. 1/
F-29	University of Texas	--	2775.6	Old ?	127	5	Santa Rosa sandstone(?)	112 107.4 107.9	Sept. 1940 Sept.20, 1956 Apr. 1, 1957	C,W	S	
*F-30	do	--	2798.4	Old	136	6	Cenozoic alluvium	121.3 121.0	Sept.21, 1956 Apr. 1, 1957	C,W	S	
F-31	Shell Oil Co.	Shell Oil Co.	2763	1957	5,106	--	--	--	--	--	--	Oil test. University well 21-A-1. Radioactivity log Q-142. 1/
F-32	D. P. Anderson	J. R. Marshall	2797.7	1938	160	6	Cenozoic alluvium	98.5	Sept.20, 1956	C,W	S	2/
F-33	City of Wink	--	2787.8	Old	250	8	do	48.3	Sept.21, 1956	T,E, 7½	P	Used as standby well in September 1956.

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
F-34	Ralph Lowe	Ralph Lowe	2760	1954	7,586	--	--	--	--	N	N	Oil test. University well C-1. Radioactivity log Q-143. 1/
F-35	do	do	2752	1954	7,150	--	--	--	--	--	--	Oil test. University well 2-E. Radioactivity log Q-144. 1/
F-36	do	do	2750	1953	7,505	--	--	--	--	--	--	Oil test. University well E-1. Electric log Q-146. 1/
*F-37	University of Texas	--	2740.6	1946	140	5	Cenozoic alluvium	119.1	Sept. 21, 1956	C,W	S	
F-38	Ralph Lowe	--	2725.2	--	190	6	do	112.9 112.6	Jan. 24, 1957 Apr. 2, 1957	N	N	Supplied water for drilling oil test.
F-39	do	Ralph Lowe	2725	1953	10,216	--	--	--	--	--	--	Oil test. University well 1-C. Electric log Q-147. 1/
F-40	Magnolia Petroleum Co.	Magnolia Petroleum Co.	2770	1954	5,241	--	--	--	--	N	N	Oil test. University of Texas D well 1. Radioactivity log Q-148. 1/
*F-41	University of Texas	--	2774.7	Old	128	--	Santa Rosa sandstone(?)	116.2	Sept. 20, 1956	C,W	S	
F-42	do	--	2778.0	1946	125	6	do	114.1	Apr. 1, 1957	C,W	S	
*F-43	do	L. F. Buchanan	2783.3	1940	151	6	do	108.6 108.5	Sept. 20, 1956 Apr. 1, 1957	C,W	S	Cased to 3 ft.
F-44	do	--	2731.6	1938	160	6	do	78.8 80.7	Sept. 20, 1956 Apr. 1, 1957	C,W	S	
F-45	Gulf Oil Corp.	Gulf Oil Corp.	2729	1954	5,145	--	--	--	--	N	N	Oil test. State GV well 1. Radioactivity log Q-149. 1/
*F-46	University of Texas	J. D. Cole	2760.4	1955	200	10	Cenozoic alluvium ?	162.5	Sept. 21, 1956	N	N	Supplied water for drilling oil test.

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
F-47	Shell Oil Co.	Shell Oil Co.	2764	1955	8,187	--	--	--	--	--	--	Oil test. University well 17-A. well 1. Radioactivity log Q-150. 1/
F-48	George Sealy Estate	--	--	--	135	6	Cenozoic alluvium	112.3	Sept.21, 1956	C,W	S	Unused in September 1956.
G-1	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2852	1946	13,446	--	--	--	--	--	--	Oil test. Hendricks T-88-M well 35-A. Radioactivity log Q-48. 1/
G-2	Sinclair Oil & Gas Co.	John J. Bush	2847.0	--	217	8, 6	Cenozoic alluvium	20.4	Nov. 20, 1956	N	N	Cased to bottom; slotted. J. G. Hendricks well 3. 2/
*G-3	Skelly Oil Co.	J. D. Cole	2837.8	1951	354	7	Santa Rosa sandstone(?)	33.1	Oct. 19, 1956	C,Ng	Irr	Cased to 237 ft. 2/
*G-4	do	--	--	--	180	--	Cenozoic alluvium	--	--	N	N	Abandoned.
G-5	J. H. Elder	J. H. Elder	2835	1954	3,200	--	--	--	--	--	--	Oil test. Ida Hendrick D well 1. Electric log Q-49. 1/
G-6	Buck Drilling Co.	Buck Drilling Co.	2825	1955	3,031	--	--	--	--	--	--	Oil test. Fields-Atlantic G well 2. Electric log Q-50. 1/
G-7	Humble Oil & Refining Co.	Roy Griggs	--	1937	250	10, 6	Cenozoic alluvium (?)	--	--	C,W	Ind	Cased to bottom; slotted from 214 to 250 ft. 2/
G-8	Atlantic Oil & Refining Co.	--	2831.0	Old	38	7	do	27.4	Oct. 16, 1956	C,W	Ind	
G-9	Gulf Oil Corp.	--	2821	1954	3,550	20, 13, 9	Capitan reef	--	--	T,E, 100	Ind	Grisham-Hunter well 2. 2/
*G-10	Humble Oil & Refining Co.	N. B. Oliver	2838.4	1928	110	8, 6	Cenozoic alluvium	43.9 43.8	Oct. 11, 1956 Apr. 15, 1957	C,E, 5	Ind	J. B. Walton "B" well 4. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-11	Humble Oil & Refining Co.	--	--	1928	105	6	Cenozoic alluvium	38.4	Nov. 3, 1956	N	N	2/
G-12	do	--	2843	1956	3,090	--	--	--	--	--	--	Oil test. J. B. Walton A well 2. Radioactivity log Q-51. 1/
G-13	Gulf Oil Corp.	J. R. Marshall	2845	1931	200	10	Santa Rosa sandstone(?)	54.1	Nov. 7, 1956	N	N	2/
*G-14	Earl Vest	--	2837.8	--	146	6	Cenozoic alluvium	57.0	Jan. 27, 1957	C,W	S	
G-15	Delhi-Taylor Oil Corp.	Delhi-Taylor Oil Corp.	2846	1955	3,284	--	--	--	--	--	--	Oil test. Brown & Altman well 2. Radioactivity log Q-52. 1/
*G-16	Seth Campbell	-- Wheeler	--	1935	155	7	Cenozoic alluvium	60.5	Oct. 24, 1956	C,W	S	Reported cased almost to bottom.
G-17	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2849	1948	11,905	--	--	--	--	--	--	Oil test. Campbell well 2. Radioactivity log Q-53. 1/
*G-18	Seth Campbell	--	--	1906	179	7, 4	Cenozoic alluvium	69.6	Oct. 24, 1956	C,W	S	Cased to bottom; slotted. Gravel-packed.
G-19	do	-- Wade	--	1935	168	7	do	67.7	do	C,W	S	Reported cased almost to bottom.
G-20	Sun Oil Co.	Sun Oil Co.	2835	1954	8,796	--	--	--	--	N	N	Oil test. F. H. Hogg well 1. Electric log Q-2. 1/
G-21	Seth Campbell	-- Wade	--	Old	155	7	Cenozoic alluvium	--	--	C,W	S	Reported cased almost to bottom.
G-22	D. D. Feldman Oil & Gas Co.	--	--	1956	303	7	Cenozoic alluvium and Santa Rosa sandstone	85.6	Oct. 23, 1956	N	N	Cased to 210 ft.
G-23	Earl Vest	--	--	--	--	5	Cenozoic alluvium	62.9	do	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*G-24	D. D. Feldman Oil & Gas Co.	Moore & Russell Drilling Co.	--	1956	310	20, 10	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 7½	Ind	Cased to 309 ft. Reported to yield 51 gpm with pump set at 200 ft.
G-25	do	do	--	1956	402	12, 7	Santa Rosa sandstone	--	--	T,E, 20	Ind	Cased to bottom; slotted from 275 to 290 ft, and 395 to 402. ft.
G-26	Humble Oil & Refining Co.	I. O. Fannin	2838.3	1954	188	6	Cenozoic alluvium	60.3	Feb. 7, 1957	N	N	Cased to bottom; slotted from 95 to 168 ft. Supplied water for drilling oil test.
G-27	Vests, Dorbrandt & Ross	do	--	1953	125	6	do	60.7	Oct. 21, 1956	N	N	Supplied water for drilling oil test.
G-28	Humble Oil & Refining Co.	J. J. Harrell	--	1950	125	10, 7	do	58.7	Oct. 24, 1956	N	N	Cased to bottom; two bottom joints of casing slotted. Supplied water for drilling oil test. 2/
G-29	Amerada Petroleum Corp.	Amerada Petroleum Corp.	2811	1948	4,839	--	--	--	--	--	--	Oil test. Brown well 2. Electric log Q-54. 1/
G-30	Earl Vest	--	2811	Old	62	5	Cenozoic alluvium	53.4	Oct. 23, 1956	C,W	S	
G-31	Humble Oil & Refining Co.	-- Parker	--	1955	200	8	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,Ng	Ind	Supplies water for drilling oil tests.
G-32	do	--	--	Old	125	7	Cenozoic alluvium	54.7	Nov. 7, 1956	N	N	Cased to bottom; slotted.
*G-33	Earl Vest	--	--	--	120	6	do	44.3	Oct. 23, 1956	C,W	S	

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-34	Shell Oil Co.	Shell Oil Co.	2819	1955	11,624	--	--	--	--	N	N	Oil test. Shell-Phillips McCabe well 1. Radioactivity log Q-8. 1/
G-35	do	--	--	--	--	6	Cenozoic alluvium and Santa Rosa sandstone	39.4	Nov. 3, 1956	N	N	Supplied water for drilling oil test.
G-36	Shell Oil Co. & The Texas Co.	--	--	--	--	6	do	31.6	do	N	N	do.
G-37	Gulf Oil Corp.	--	2825	1954	3,550	13, 9, 8	Capitan reef	--	--	T,E, 75	Ind	Grisham-Hunter well 3. Radioactivity log Q-55. 1/
*G-38	Wink Basin System	H. E. Turbeville	--	1954	248	10, 8 6	Cenozoic alluvium and Santa Rosa sandstone(?)	25	1954	T,E, 3	Ind	Reported 100 ft drawdown while pumping 100 gpm. 2/
*G-39	Shell Pipeline Co.	--	2838.1	--	200	8	Cenozoic alluvium	41.2	Oct. 24, 1956	T,E, 5	Ind	Reported yield 40 gpm.
G-40	Gulf Oil Corp.	--	2826	1954	3,550	13, 9, 8	Capitan reef	--	--	T,E, 40	Ind	Grisham-Hunter well 5. Radioactivity log Q-56. 1/ 2/
G-41	do	--	2829	1953	3,550	20, 13, 9	do	--	--	T,E, 60	Ind	Grisham-Hunter well 1. 2/
G-42	do	--	2843	1954	3,551	13, 9, 8	do	--	--	T,E, 50	Ind	Grisham-Hunter well 4. Radioactivity log Q-57. 1/ 2/
G-43	do	--	--	--	160	6	Cenozoic alluvium	29.3	Nov. 6, 1956	N	N	Supplied water for drilling oil test.

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-44	Lion Oil & Refining Co.	--	--	--	160	7	Cenozoic alluvium	30.1	Nov. 6, 1956	N	N	Reported water smelled of hydrogen sulfide (H_2S), and left black residue on tape when water level was measured.
G-45	Bradberry & Sasser	Bradberry & Sasser	2848	1952	5,400	--	--	--	--	--	--	Oil test. Hendricks A well 4. Radioactivity log Q-58. 1/
G-46	Lion Oil & Refining Co.	--	--	--	--	--	--	--	--	C,E, 2	D	
*G-47	Gulf Oil Corp.	--	2818.7	1937	273	6, 5	Cenozoic alluvium	20.7	Nov. 6, 1956	C,Ng	Ind	Cased to bottom; slotted from 173 to 273 ft.
G-48	do	Roy Griggs	--	1930	271	6	do	22.7	do	N	N	
G-49	Humble Oil & Refining Co.	--	--	1927	150	8, 6	do	--	--	C,W	Ind	Cased to bottom; slotted. Reported bad water. 2/
G-50	do	Humble Oil & Refining Co.	2820	1956	2,863	--	--	--	--	--	--	Oil test. T. C. Hendrick well 2. Radioactivity log Q-59. 1/
G-51	Lion Oil & Refining Co.	--	--	--	100	5	Cenozoic alluvium	36.9	Nov. 6, 1956	N	N	Supplied water for drilling oil test.
G-52	Humble Oil & Refining Co.	--	--	1927	185	6	do	13.8	do	N	N	Cased to bottom; slotted. Reported salt water. 2/
G-53	Stanolind Oil & Gas Co.	--	2815.0	Old	80	6	do	29.5	Nov. 5, 1956	N	N	
G-54	do	--	--	Old	90	6	do	34.0	do	N	N	
G-55	do	Stanolind Oil & Gas Co.	2812	1956	3,000	--	--	--	--	--	--	Oil test. T-88-G, well A-3. Radioactivity log Q-60. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-56	Earl Vest	--	--	--	90	6	Cenozoic alluvium	31.6	Oct. 23, 1956	C,W	S	
G-57	Bates-Reading Oil Co.	--	--	--	105	6	do	32.9	Nov. 6, 1956	T,E, 1	D	Reported bad water.
*G-58	Rycade Oil Corp.	Permian Well Service	--	1945	110	6	do	41.0	Oct. 24, 1956	C,G	Ind	Cased to bottom; slotted.
*G-59	do	do	--	1945	110	6	do	--	--	C,E	Ind	do.
*G-60	do	do	--	1945	200	10, 6	do	--	--	T,G	Ind	Cased to bottom; slotted.
*G-61	Earl Vest	--	--	--	100	6	do	--	--	C,W	S	
G-62	do	--	2799.6	--	95	6	do	38.1	Oct. 23, 1956	N	N	Cased to bottom; slotted.
G-63	Continental Oil Co.	Continental Oil Co.	2805	1956	2,930	--	--	--	--	--	--	Oil test. E. W. Cowden 27 well 6. Radioactivity log Q-61. 1/
G-64	Earl Vest	--	--	Old ?	100	5	Cenozoic alluvium	39.4	Oct. 23, 1956	N	N	
G-65	Bert Fields Oil Co.	--	--	Old ?	--	7	--	--	--	J,Ng	D	Reported good water.
*G-66	do	--	2810.3	1937	200	6	Cenozoic alluvium and Santa Rosa sandstone	53.7	Oct. 23, 1956	C,W	D	Reported cased to about 100 ft.
G-67	Texas Pacific Coal & Oil Co.	--	--	--	120	6	Cenozoic alluvium	69.8	Oct. 20, 1956	N	N	
G-68	Mabee Drilling Co.	--	--	Old	180	6	Cenozoic alluvium and Santa Rosa sandstone	73.7	Mar. 18, 1957	N	N	Cased to bottom; slotted. Supplied water for drilling oil test.

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-69	Sun Oil Co.	-- Hines	--	1942	129	7	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	J,E, 1	D	Cased to bottom; slotted. Reported good water. 2/
*G-70	Barron Kidd	J. D. Cole	--	--	120	7	do	100	Oct. 1956	T,E, 3	D	Cased to bottom; slotted.
G-71	Earl Vest	--	2780.4	--	90	5	Cenozoic alluvium	64.1	Oct. 16, 1956	C,W	S	Reported good water.
G-72	Barron Kidd	--	--	Old	120	8	do	69.9	Oct. 22, 1956	N	N	
G-73	do	J. D. Cole	--	1953	252	8	Cenozoic alluvium and Santa Rosa sandstone(?)	--	--	T,E, 7½	Ind	Cased to bottom; slotted. Reported good water.
*G-74	do	do	--	1953	251	8	do	--	--	T,E, 7½	Ind	Cased to bottom; slotted.
G-75	Humble Oil & Refining Co.	I. O. Fannin	--	1956	142	12, 7	Cenozoic alluvium	59.8	Mar. 19, 1957	N	N	Cased to bottom; slotted from 102 to 136 ft. Supplied water for drilling oil test. 2/
G-76	G. P. Mitchell	Bill Batey	2810.9	--	284	6	do	80.6	Dec. 12, 1956	C,W	S	Cased to bottom; slotted. Reported good water.
G-77	do	Hunt Oil Co.	2805.3	1946	120	7	do	70.2 70.4	Mar. 19, 1957 June 4, 1958	N	N	Supplied water for drilling oil test.
*G-78	do	Roy Griggs	--	1934	85	6	do	47.2	Oct. 5, 1956	N	N	Cased to 83 ft.
G-79	Skelly Oil Co.	Skelly Oil Co.	2772	1956	12,819	--	--	--	--	N	N	Oil test. S. M. Halley well 111. Radioactivity log Q-62. 1/
G-80	do	J. D. Cole	2773.2	1956	130	9, 6	Cenozoic alluvium and Santa Rosa sandstone(?)	54.7	Oct. 5, 1956	N	N	Cased to bottom; slotted from 90 to 130 ft. Supplied water for drilling oil test. 2/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-81	The Texas Co.	--	--	Old	185	8	Cenozoic alluvium and Santa Rosa sandstone(?)	56.7	Oct. 16, 1956	C,W	D	Reported good water.
G-82	Magnolia Pipeline Co.	--	--	Old	120	6	do	60	Oct. 1956	C,E, 1½	D, Ind	Cased to bottom; slotted. Reported good water.
G-83	Skelly Oil Co.	J. D. Cole	--	1953	325	8	Santa Rosa sandstone(?)	60	Feb. 1953	T,E, 15	Ind	Cased to 264 ft; slotted from 81 to 264 ft. Reported 56 ft drawdown at 70 gpm in 1-hour bailer test. 2/
G-84	do	do	--	1954	316	8	Santa Rosa sandstone(?)	--	--	T,E, 15	Ind	Cased to bottom; slotted from 81 to 306 ft. Pumping level 73 ft, Sept. 27, 1956. 2/
G-85	do	J. R. Marshall	--	1944	111	8, 7	Cenozoic alluvium	65	Oct. 1956	C,Ng	P	Open hole from 101 to 111 ft. 2/
*G-86	Earl Vest	Bill Batey	2753.9	1950	110	6	do	66.0	Oct. 8, 1956	T,E, 1½	D,S	Cased to bottom; slotted.
*G-87	do	--	--	1944	110	6	do	64.0	do	T,E, 2	S	
G-88	F. W. Estill	--	--	1936	310	7	Santa Rosa sandstone	60	Oct. 1956	T,E, 7½	Ind	Open hole from 230 to 310 ft.
G-89	Hudson & Hudson	--	--	1951	106	6	Cenozoic alluvium (?)	--	--	T,E	D	
G-90	do	Hudson & Hudson	2769	1954	2,905	--	--	--	--	--	--	Oil test. S. M. Halley well 3. Radioactivity log Q-5. 1/
G-91	do	do	2760	1954	2,896	--	--	--	--	--	--	Oil test. S. M. Halley well 7. Radioactivity log Q-4. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*G-92	Hudson & Hudson	Donnell Drilling Co.	2774	1954	510	10	Cenozoic alluvium and Santa Rosa sandstone	--	--	T,E, 7½	Ind	Cased to bottom; slotted from 100 to 510 ft. Gravel-packed. Reported yield 200 gpm with about 170 ft drawdown. 2/
G-93	do	do	2783	1954	310	10	do	--	--	T,E, 7½	Ind	Cased to bottom; slotted. 2/
G-94	Phillips Petroleum Co.	J. D. Cole	--	1955	154	8	do	--	--	T,E, 10	Ind	Cased to bottom; slotted from 84 to 154 ft. McCabe well 2. Reported yield 150 gpm when drilled. Reported pumping level 138 ft.
G-95	Hudson & Hudson	do	2775	1956	325	10	do	--	--	T,E, 7½	Ind	Cased to bottom; slotted.
G-96	Phillips Petroleum Co.	--	--	Old	--	--	--	--	--	C,E, 3	D	Reported good water.
G-97	do	Phillips Petroleum Co.	2785	1955	2,770	--	--	--	--	--	--	Oil test. McCabe well 11. Radioactivity log Q-63. 1/
G-98	do	J. D. Cole	2785	1955	350	20, 10	Cenozoic alluvium and Santa Rosa	60	Sept. 1955	T,E, 5	Ind	Cased to bottom; slotted from 85 to 350 ft. Reported yield 525 gpm when drilled. McCabe well 1.
G-99	Champlin Oil & Refining Co.	--	--	1955	100	--	Cenozoic alluvium	48.2	Oct. 23, 1956	N	N	Plugged when revisited Mar. 29, 1957.
G-100	Daniel & Clark	Daniel & Clark	2771	1956	2,897	--	--	--	--	--	--	Oil test. Morton well 10. Radioactivity log Q-64. 1/

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-101	Montex Drilling Co.	Montex Drilling Co.	2798	1954	2,945	--	--	--	--	--	--	Oil test. Cowden well 1. Radioactivity log Q-65. 1/
G-102	Noel & Rodman	Noel & Rodman	2748	1955	2,786	--	--	--	--	--	--	Oil test. Hendricks well C-3. Radioactivity log Q-66. 1/
G-103	T. G. Hendricks	--	2755.0	--	175	6	Cenozoic alluvium	59.6	Oct. 10, 1956	C,W	S	
G-104	Noel & Rodman	J. D. Cole	2765.4	--	200	8	do	16.6	Nov. 23, 1956	N	N	Supplied water for drilling oil test.
G-105	do	Noel & Rodman	2752	1956	3,000	--	--	--	--	--	--	Oil test. Hendricks well 3. Radioactivity log Q-67. 1/
G-106	do	do	2760	1956	3,003	--	--	--	--	--	--	Oil test. Ida Hendricks E well 1. Radioactivity log Q-68. 1/
G-107	-- Kelly	--	2795.8	Old	100	5	Cenozoic alluvium	46.7	Nov. 14, 1956	C,W	D	Cased to bottom; slotted.
*G-108	City of Wink	--	--	--	165	--	do	--	--	N	N	Plugged and abandoned.
*G-109	City of Wink well 3	-- Taylor	--	1930	250	7	do	--	--	N	N	Abandoned in 1957 because well contaminated after casing corroded at 130 ft.
G-110	City of Wink well 5	J. D. Cole	2789	1953	240	16, 10	do	90	Sept. 1956	T,E, 25	P	Casing: 180 ft of 16-in. cemented to surface, 10-in. to bottom; slotted. Reported yield 300 gpm with pumping level 220 ft.

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Table 7.-- Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*G-111	City of Wink well 6	J. D. Cole	2789	1955	240	16, 7	Cenozoic alluvium	90	Sept. 1956	T,E, 10	P	Casing: 183 ft of 16-in.; cemented to surface, 10-in. to bottom; slotted. Reported yield 80 gpm with pumping level of 170 ft.
G-112	Humble Oil & Refining Co.	--	--	1927	212	8, 6	do	94	Sept. 1956	T,E, 5	P	Cased to bottom; slotted. Pyote District Campsite well 1. 2/
G-113	do	I. O. Fannin	--	1955	188	10, 6	do	98	Oct. 1956	T,E, 5	P	Cased to bottom; slotted. Pyote District Campsite well 4. 2/
G-114	Tobe Morton	--	2748.9	--	130	5	do	52.7	Oct. 8, 1956	N	N	
*G-115	A. C. Morton et al	--	--	--	90	6	do	57.9	Oct. 11, 1956	C,W	S	
G-116	Humble Pipeline Co.	--	2747.2	1931	316	8	do	38.9	Oct. 8, 1956	N	N	Cased to bottom; slotted from 296 to 316 ft.
*G-117	do	--	--	1929	182	8	do	45	Oct. 1956	T,E 5	D, Ind	do.
G-118	do	--	--	1942	150	8	do	33.5	Oct. 8, 1956	C,G	Ind	Cased to bottom; slotted. Reported hard water.
G-119	Humble Oil & Refining Co.	Humble Oil & Refining Co.	2722	1954	2,904	--	--	--	--	--	--	Oil test. T. G. Hendricks well 4. Radioactivity log Q-69. 1/
G-120	do	Earnest Oliver	--	1929	290	6, 5	Cenozoic alluvium	24.3	Oct. 4, 1956	C,W	Ind	Cased to bottom; perforated from 222 to 290 ft.
G-121	Noel & Rodman	Noel & Rodman	2730	1956	3,000	--	--	--	--	--	--	Oil test. Hendricks A well 1. Radioactivity log Q-70.1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
*G-122	Sinclair Oil Co.	Perkins & Perkins	--	--	151	6	Cenozoic alluvium	48	Oct. 1956	C,E, 3	D	Cased to bottom; slotted.
G-123	A. C. Morton et al.	--	2734.9	1948	90	5	do	50.1	Oct. 4, 1956	C,W	S	Converted oil test.
G-124	Skelly Oil Co.	Skelly Oil Co.	2749	1956	4,000	--	--	--	--	--	--	Oil test. S. M. Halley well 116. Radioactivity log Q-71. 1/
G-125	do	do	2774	1956	2,860	--	--	--	--	--	--	Oil test. S. M. Halley well 115. Radioactivity log Q-72. 1/
G-126	do	Ken Woods Co.	--	1956	1,220	9, 7	Rustler formation	--	--	--	--	Reported yielded 136 barrels of water in 6 hours after acidizing and fracturing. 2/
G-127	do	J. D. Bush	--	1935	280	10, 6	Santa Rosa sandstone(?)	55.2	Oct. 4, 1956	N	N	Cased to 238 ft. Supplied water for drilling oil test. 2/
G-128	Earl Vest	--	--	--	100	5	Cenozoic alluvium	49.9	Oct. 15, 1956	C,W	S	Reported good water.
*G-129	G. P. Mitchell	Bill Batey	2756.5	1939	101	6	do	51.6 52.4	Oct. 5, 1956 June 4, 1958	C,W	S	
G-130	Richardson Oils Inc.	Bud Tone	--	1955	260	10, 8	Santa Rosa sandstone	44.8	Oct. 6, 1956	T,B	Ind	Cased to bottom; slotted. Reported yield 60 gpm on 12-hours test. 2/
G-131	Richardson Oils Inc.	Richardson Oil Inc.	2750	1956	12,402	--	--	--	--	--	--	Oil test. M. F. Hill and G. P. Mitchell well 1. Radioactivity log Q-10. 1/
G-132	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2750	1957	12,220	--	--	--	--	--	--	Oil test. G. P. Mitchell B well 3. Radioactivity log Q-15. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-133	Gulf Oil Corp.	White Well Service	2714.7	1941	240	10, 5	Santa Rosa sandstone	47.2	Oct. 3, 1956	T,G	Ind	Cased to 187 ft. Reported yield 135 gpm when drilled. Yielded 45 gpm in 1956 with pump set at 82 ft. 2/
G-134	Skelly Oil Co.	J. J. Bush	--	1934	275	8, 5	Cenozoic alluvium	--	--	C,G	Ind	Cased to 270 ft; slotted. 2/
G-135	S. M. Halley	--	--	--	90	6	do	50.2	Oct. 6, 1956	N	N	
*G-136	Sun Oil Co.	--	--	1936	205	7, 5	do	52.7	do	N	N	Abandoned.
G-137	do	Sun Oil Co.	2720	1955	2,889	--	--	--	--	--	--	Oil test. S. M. Halley well 11. Radioactivity log Q-73. 1/
*G-138	Earl Vest	--	--	--	82	6	Cenozoic alluvium	38.5	Oct. 4, 1956	C,W	S	
*G-139	Texas & New Mexico RR.	--	2715.0	--	80	6	do	51.5	Oct. 10, 1956	C,W	D	
*G-140	Tobe Morton	--	2743.5	--	110	7	Cenozoic alluvium	66.9	Oct. 10, 1956	C,W	S	
*G-141	do	--	2730.7	Old	89	6	do	49.5 49.4	Oct. 8, 1956 Mar. 28, 1957	N	N	
G-142	A. C. Morton et al.	--	2755.0	--	170	--	do	110.3 110.3	Oct. 10, 1956 Mar. 28, 1957	N	N	
G-143	Ralph Lowe	J. D. Cole	--	1953	169	6	do	--	--	N	N	Supplied water for drilling oil test. Reported abundance of good water for this purpose.
G-144	do	Ralph Lowe	2731	1953	3,540	--	--	--	--	--	--	Oil test. Tobe Martin C well 1. Electric log Q-74. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-145	Ralph Lowe	Ralph Lowe	2731	1953	3,510	--	--	--	--	--	--	Oil test. Tobe Martin B well 1. Electric log Q-75. 1/
*G-146	University of Texas	Lang Buchanan	2719.9	Old	130	6	Cenozoic alluvium	102.2	Sept.21, 1956	C,W	D,S	
G-147	Gulf Oil Corp.	Gulf Oil Corp.	2705	1956	2,875	--	--	--	--	--	--	Oil test. G. W. O'Brien et al well 451. Radioactivity log Q-76. 1/
G-148	do	do	2706	1957	2,896	--	--	--	--	--	--	Oil test. G. W. O'Brien et al well 507. Radioactivity log Q-77. 1/
G-149	do	J. R. Marshall	--	1940	201	8	Santa Rosa sandstone(?)	60	Sept. 1956	N	N	2/
G-150	G. W. O'Brien et al.	--	--	--	75	6	Cenozoic alluvium	47.0	Oct. 3, 1956	C,W	S	
G-151	do	--	2671.1	Old	62	7	do	39.7	Oct. 4, 1956	C,W	S	Reported good water.
G-152	Gulf Oil Corp.	Gulf Oil Corp.	2669	1950	3,230	--	--	--	--	--	--	Oil test. G. W. O'Brien et al well 300. Radioactivity log Q-78. 1/
G-153	do	do	2675	1956	2,800	--	--	--	--	--	--	Oil test. G. W. O'Brien et al well 501. Radioactivity log Q-79. 1/
G-154	G. W. O'Brien et al.	--	2677.5	Old	90	6	Cenozoic alluvium	58.7	Oct. 15, 1956	N	N	Abandoned. Formerly used as stock well.
G-155	Gulf Oil Corp.	Gulf Oil Corp.	2687	1956	2,920	--	--	--	--	--	--	Oil test. G. W. O'Brien et al well 526. Radioactivity log Q-80. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-156	Gulf Oil Corp.	Gulf Oil Corp.	2690	1956	2,930	--	--	--	--	--	--	Oil test. G. W. O'Brien et al well 524. Radioactivity log Q-81. 1/
*G-157	Fay H. Hogg	Stanolind Oil & Gas Co.	2726.6	1942	180	6	Cenozoic alluvium	145.9	Oct. 18, 1956	C,W	S	Converted oil test.
G-158	do	Sun Oil Co.	2720.5	1929	150	6	Cenozoic alluvium	130.8 131.1	Oct. 18, 1956 Mar. 29, 1957	C,W	N	Converted oil test.
G-159	Wink Industrial Corp. well 1	-- Hamblin	--	1956	485	4	do	112	Sept. 1956	N	N	Abandoned. Electric log Q-82. 1/
G-160	Wink Industrial Corp. well 2	Layne-Texas Co.	2719.7	1956	396	12	do	127.1	Feb. 26, 1957	N	N	Reported yield 1,000 gpm with drawdown of 50 ft on 12-hour pumping test. Electric log Q-83. 1/
G-161	John Witt	-- Hamblin	2709.5	1956	400	12	do	113.6 113.8	Nov. 7, 1956 Feb. 2, 1957	T,B, 75	Irr	Cased to bottom; slotted from 320 to 400 ft. 2/
*G-162	do	do	--	1956	223	12	do	110.2	Feb. 26, 1957	T,B, 90	Irr	Cased to bottom; slotted from 163 to 223 ft.
*G-163	do	do	--	1956	400	12	do	109.1 120.9	Nov. 7, 1956 Jan. 4, 1958	T,Ng, 72	Irr	Cased to bottom; slotted from 320 to 400 ft.
G-164	George Sealy Estate	--	2691.7	--	135	6	do	105.6	Nov. 7, 1956	N	N	
G-165	Ralph Lowe	Ralph Lowe	2710	1956	3,190	--	--	--	--	N	N	Oil test. University H well 1. Electric log Q-151. 1/
*G-166	J. D. Cole	J. D. Cole	--	1956	300	--	Cenozoic alluvium	103.2	Nov. 7, 1956	T,B	Irr	
G-167	Fay H. Hogg	--	2690.1	Old	125	6	do	109.1 106.1	Nov. 16, 1956 Mar. 29, 1957	C,W	N	

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
G-168	City of Monahans	Layne-Texas Co.	2700	1957	433	--	Cenozoic alluvium	110	May 1956	N	N	Test hole 9-A. Reported water of good quality at 200 ft; below 200 ft water quality deteriorates with depth. Electric log Q-84. 1/ 2/
G-169	do	do	2704	1957	402	--	do	117	May 1957	N	N	Test hole 8. Reported water good to 340 ft. Electric log Q-85. 1/ 2/
G-170	do	do	2715	1957	419	--	do	--	--	N	N	Test hole 7-A. 2/
G-171	Fay H. Hogg	--	--	1937	180	7	do	98	Oct. 1956	C,W	D	
G-172	Gulf Oil Corp.	Gulf Oil Corp.	2728	1956	2,950	--	--	--	--	--	--	Oil test. G. W. O'Brien et al. well 525. Radioactivity log Q-86. 1/
G-173	Gulf Oil Corp. well 18	--	2721.6	1948	200	8	Cenozoic alluvium	144.9	Mar. 28, 1957	N	N	Supplied water for drilling oil test.
G-174	Gulf Oil Corp.	Gulf Oil Corp.	2718	1956	2,925	--	--	--	--	--	--	In Ward County. Oil test. G. W. O'Brien et al well 509. Radioactivity log Q-87. 1/
G-175	Gulf Oil Corp.	Gulf Oil Corp.	2706	1955 ?	2,890	--	--	--	--	--	--	Oil test. G. W. O'Brien et al. well 444. Radioactivity log Q-88. 1/
G-176	G. W. O'Brien et al.	--	2699.7	Old	130	5	Cenozoic alluvium	112.6	Oct. 15, 1956	C,W	N	
H-1	C. O. Wheeler	--	--	--	100	6	do	52.5	Dec. 11, 1956	C,W	S	

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-2	S. B. Wight	--	2995.5	--	100	5	Cenozoic alluvium	66.8	Dec. 7, 1956	C,W	S	
H-3	do	--	--	--	100	6	do	69.1	Dec. 11, 1956	C,W	S	
H-4	Stanolind Oil & Gas Co.	Noble Drilling Co.	--	1952 ?	100	5	do	70.4	Dec. 14, 1956	N	N	Supplied water for drilling oil tests.
H-5	W. D. Amburgey	--	--	Old	100	6	do	61.7	Jan. 28, 1957	N	N	
H-6	Stanolind Oil & Gas Co.	Noble Drilling Co.	--	1952 ?	100	5	do	68.3	Dec. 14, 1956	N	N	Supplied water for drilling oil test.
*H-7	W. D. Amburgey	--	2969.2	Old	100	6	do	61.5	do	C,W	S	
H-8	do	--	2968.8	--	100	6	do	61.8	do	C,W	S	Reported water of poor quality.
H-9	do	--	2960.3	1953	115	6	do	69.5	Dec. 10, 1956	N	N	Supplied water for drilling oil test.
H-10	do	--	2957.9	--	100	5	do	69.5	Dec. 10, 1956	C,W	S	
H-11	Sun Oil Co.	Delta Gulf Drilling Co.	2963.4	1953	120	8	do	69.7	do	N	N	Cased to bottom; slotted. Supplied water for drilling oil test.
H-12	W. D. Amburgey	--	--	--	230	6	do	63.6	Dec. 13, 1956	C,W	S	
H-13	W. D. Amburgey well 1-7	Blackwood & Nichols Co.	2941	1954	6,528	--	--	--	--	N	N	Oil test. Electric log Q-30.1/
H-14	W. D. Amburgey	do	2941.5	1954	90	6	Cenozoic alluvium	68.6	Dec. 10, 1956	N	N	Supplied water for drilling oil test.
H-15	Fay H. Hogg	--	--	Old	70	4	do	51.4	Dec. 13, 1956	C,W	S	Cased to 50 ft. Reported can be pumped dry.
H-16	do	Geo. D. Hogg	2926.0	1939	114	8, 6	do	60.2	Dec. 10, 1956	C,W	S	Casing: 6-in. to 107 ft.

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Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-17	Fay H. Hogg	--	--	1943	120	6	Cenozoic alluvium	62.7	Dec. 10, 1956	C,W	D,S	Cased to bottom; slotted.
H-18	do	Amon G. Carter	2859	1948	12,562	--	--	--	--	N	N	Oil test. Fay H. Hogg Fee well 1. Radioactivity log Q-31. 1/
H-19	do	do	--	1948	110	7	Cenozoic alluvium	63.2	Dec. 13, 1956	N	N	Cased to bottom; slotted. Supplied water for drilling oil test.
H-20	G. P. Mitchell	--	--	--	90	8	do	62.4	Feb. 8, 1957	C,W	S	Reported good water.
*H-21	Fay H. Hogg	--	2838.5	--	105	5	do	63.8	do	C,W	S	
H-22	G. P. Mitchell	White Eagle Oil Co.	2821	1957	6,485	--	--	--	--	N	N	Oil test. Cornell Hogg well 1. Radioactivity log Q-32. 1/
H-23	do	--	--	--	--	--	Santa Rosa sandstone(?)	--	--	T,G	D,S, Ind	Reported Triassic sediments in well cuttings.
H-24	do	Roy Griggs	--	1938	260	6	Cenozoic alluvium and Santa Rosa sandstone(?)	60	1940	C,W	S	Cased to 115 ft.
*H-25	do	--Perkins	--	1930	250	7	do	50.5	Oct. 4, 1956	C,W	D,S	Cased to 140 ft.
H-26	do	Bill Batey	2782.1	Old	90	7	Cenozoic alluvium	51.8 70.8	Oct. 4, 1956 June 4, 1958	C,W	S	Cased to 75 ft.
H-27	W. D. Amburgey	--	2908.9	Old	70	6	do	65.0 66.1	Oct. 4, 1956 Jan. 4, 1958	N	N	
*H-28	do	--	2939.7	--	100	6	do	72.5	Dec. 10, 1956	C,W	S	
H-29	Earl Vest well 1	Tidewater Oil Co.	2946	1955	11,526	--	--	--	--	N	N	Oil test. Radioactivity log Q-33. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-30	Humble Oil & Refining Co.	G. S. Taylor	2935.3	1947	610	9, 7	Santa Rosa sandstone	202.0	Dec. 8, 1956	N	N	Cased to bottom; slotted. Supplied water for drilling oil test. In Ector County. 2/
H-31	Earl Vest	--	2941.2	Old	90	6	Cenozoic alluvium	77.0	Feb. 7, 1957	C,W	S	In Ector County.
H-32	do	--	--	Old	94	7	do	67.2	Feb. 7, 1957	C,W	S	Reported good water.
H-33	do	--	2918.2	Old	90	6	do	60.6	Feb. 7, 1957	C,W	D,S	do.
H-34	Sealy & Smith Foundation well 7-A	Stanolind Oil & Gas Co.	2900	1945	6,500	--	--	--	--	N	N	Oil test. Electric log Q-34. 1/
*H-35	Sealy & Smith Foundation	Noble Drilling Co.	2895.5	1945	120	8	Cenozoic Alluvium	64.8	Oct. 4, 1956	C,W	S	Supplied water for drilling oil test. Converted to ranch use.
H-36	do	--	--	--	85	--	do	55.8	Feb. 12, 1957	C,W	S	
H-37	do	--	--	1947	90	8	do	48.0	Feb. 8, 1957	N	N	Supplied water for drilling oil test.
H-38	do	--	--	--	80	6	do	51.6	do	C,W	S	Reported good water.
H-39	do	John Drilling Co.	--	1956	130	6	do	56.3	Jan. 4, 1958	N	N	Gravel-packed. Supplied water for drilling oil test.
H-40	Stanolind Oil & Gas Co. well 8	G. S. Taylor	2762	1946	109	8	do	49.6	Oct. 3, 1956	N	N	Supplied water for drilling oil test.
H-41	do	Stanolind Oil & Gas Co.	2767	1955	13,200	--	--	--	--	--	--	Oil test. Sealy & Smith Foundation A well 20. Electric log Q-35. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-42	Stanolind Oil & Gas Co. well 8	Stanolind Oil & Gas Co.	2760	1956	12,795	--	--	--	--	--	--	Oil test. Sealy & Smith Foundation A well 23. Electric log Q-14. 1/
H-43	Stanolind Oil & Gas Co.	do	2760	1944	6,305	--	--	--	--	--	--	Oil test. Sealy & Smith Foundation well 4. Electric log Q-36. 1/
*H-44	Stanolind Oil & Gas Co. well 3	Noble Drilling Co.	--	1944	95	?	Cenozoic alluvium	--	--	C,G	D, Ind	Cased to 83 ft. Supplied water for drilling oil test.
H-45	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2760	1956	12,025	--	--	--	--	--	--	Oil test. Sealy & Smith Foundation A well 26. Radioactivity log Q-37. 1/
H-46	do	do	2760	1945	6,143	--	--	--	--	--	--	Oil test. Sealy & Smith Foundation well 6. Electric log Q-12. 1/
H-47	do	Noble Drilling Co.	2760.8	1945	125	8	Cenozoic alluvium	51.8	Oct. 3, 1956	N	N	Supplied water for drilling oil test.
H-48	The Texas Co.	--	--	--	120	6	do	59.6	Dec. 13, 1956	N	N	Cased to bottom; slotted. Supplied water for drilling oil test.
H-49	Stanolind Oil & Gas Co.	Stanolind Oil & Gas Co.	2752	1946	6,500	--	--	--	--	N	N	Oil test. Sealy & Smith Foundation A well 16. Electric log Q-38. 1/
H-50	do	Noble Drilling Co.	2752	1946	145	7	Cenozoic alluvium	53.9	Oct. 4, 1956	N	N	Supplied water for drilling oil test.
H-51	Sealy & Smith Foundation	Stanolind Oil & Gas Co.	2749	1946	5,320	--	--	--	--	N	N	Oil test. A-well 13. Radioactivity log Q-39. 1/

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-52	Gulf Oil Corp.	--	--	1957	--	8, 6	--	--	--	C,G	Ind	Supplies water for drilling oil tests.
H-53	Sealy & Smith Foundation	--	2736.0	--	60	--	Cenozoic alluvium	53.5	Oct. 4, 1956	C,W	S	
H-54	do	--	--	--	100	6	do	60.4	Dec. 17, 1956	N	N	Supplied water for drilling oil test.
H-55	do	Stanolind Oil & Gas Co.	2731	1946	5,366	--	--	--	--	N	N	Oil test. A-well 12. Electric log Q-40. 1/
H-56	do	do	--	1945	120	7	Cenozoic alluvium	47.6	Oct. 4, 1956	N	N	Supplied water for drilling oil test.
H-57	do	do	2729	1946	6,501	--	--	--	--	N	N	Oil test. A well 11. Electric log Q-41. 1/
H-58	do	--	--	--	--	6	--	--	--	C,W	S	
H-59	do	Stanolind Oil & Gas Co.	2745	1952	6,252	--	--	--	--	N	N	Oil test. A well 25. Radioactivity log Q-9. 1/
H-60	Stanolind Oil & Gas Co.	do	2744	1946	5,230	--	--	--	--	--	--	Oil test. Sealy & Smith well 9. Electric log Q-42. 1/
H-61	do	Noble Drilling Co.	2738.4	1946	135	7	Cenozoic alluvium	40.7	Sept.27, 1956	N	N	Supplied water for drilling oil test.
H-62	Sealy & Smith Foundation	do	--	1946	105	6	do	50.9	Dec. 17, 1956	N	N	do.
H-63	do	Stanolind Oil & Gas Co.	2802	1946	6,390	--	--	--	--	N	N	Oil test. Sealy & Smith A well 10. Electric log Q-43. 1/
*H-64	do	--	2813.7	--	60	4	Cenozoic alluvium	47.6	Feb. 12, 1957	C,W	S	
H-65	Glenn Allen	--	2834.0	Old	75	6	do	42.0	do	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-66	Glenn Allen	--	--	--	91	6	Cenozoic alluvium	62.9	Feb. 12, 1957	C,W	S	Reported water has gypsum taste.
H-67	Sealy & Smith Foundation	Stanolind Oil & Gas Co.	2753	1947	9,000	--	--	--	--	N	N	Oil test. Sealy & Smith Foundation A well 14. Radioactivity log Q-44. 1/ In Ward County.
*H-68	do	Shell Oil Co.	2729.0	--	--	--	Cenozoic alluvium	6.0	July 4, 1957	N	Ind	Dug with bulldozer about 20 by 50 ft and 1 to 10 ft deep. Altitude of water table July 4, 1957 was 2723.0 ft above mean sea level. In Ward County.
*H-69	do	do	2734.0	--	--	--	do	4.9	do	N	Ind	Dug with bulldozer about 20 by 20 ft and 1 to 4 ft deep. Altitude of water table July 4, 1957 was 2729.1 ft above mean sea level.
H-70	do	do	2712.0	--	--	--	do	5.9	July 4, 1957	N	Ind	Dug with bulldozer about 5 by 10 ft and 1 to 2 ft deep. Altitude of water table July 4, 1957 was 2706.1 ft above mean sea level. In Ward County.
H-71	do	do	2715.0	--	--	--	do	4.8	do	N	Ind	Dug with bulldozer about 20 by 30 ft and 1 to 6 ft deep. Altitude of water table July 4, 1957 was 2710.2 ft above mean sea level.

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-72	Shell Oil Co.	Shell Oil Co.	2715	1956	4,885	--	--	--	--	--	--	Oil test. Sealy & Smith Foundation well 72. Radioactivity log Q-45. 1/
H-73	do	do	2730	1954	4,968	--	--	--	--	--	--	Oil test. Sealy & Smith Foundation well 60. Radioactivity log Q-6. 1/
H-74	Sealy & Smith Foundation	do	2728.0	--	--	--	Cenozoic alluvium	4.7	July 4, 1957	N	Ind	Dug with bulldozer about 20 by 50 ft and 1 to 10 ft deep. Altitude of water table July 4, 1957 was 2723.3 ft above mean sea level.
H-75	Shell Oil Co.	--	2710.1	--	40	7	do	29.0 29.1	Nov. 8, 1956 Jan. 4, 1958	N	N	
H-76	do	Shell Oil Co.	2714.0	1952	60	7	do	39.9 41.2	Oct. 9, 1956 Jan. 4, 1958	N	N	
H-77	do	do	2715	1952	4,952	--	--	--	--	N	N	Oil test. Sealy & Smith well 52. Radioactivity log Q-46. 1/
*H-78	Sealy & Smith Foundation	--	--	--	60	6	Cenozoic alluvium	--	--	C,W	S	
H-79	do	--	--	--	--	6	--	--	--	C,W	S	
H-80	do	--	--	Old	--	--	--	33.5	May 16, 1940	C,W	S	
*H-81	do	Frank Anthony	2675.9	1956	300	6	Cenozoic alluvium and Santa Rosa sandstone	32.7	Oct. 8, 1956	C,W	S	

* See footnotes at end of table.

Table 7.--Records of wells in Winkler County--Continued

Well No.	Owner	Driller	Altitude of land surface (ft.)	Date completed	Depth of well (ft.)	Diameter of well (in.)	Water-bearing unit	Water level: Below land-surface datum (ft.)	Water level: Date of measurement	Method of lift	Use of water	Remarks
H-82	Sealy & Smith Foundation well 1	Dunnigan Bros. & -- Brahaney	2673	1946	6,505	--	--	--	--	N	N	Oil test. Radioactivity log Q-47. 1/
H-83	Magnolia Petroleum Co.	--	--	1935	155	6	Cenozoic alluvium	55.8	Oct. 8, 1956	N	N	2/
H-84	Sealy & Smith Foundation	--	--	--	100	6	do	--	--	C,W	S	Supplied water for drilling oil test. Reported good water.

* See table 9 for chemical analysis of the water.
1/See log in files of Texas Board of Water Engineers.
2/See table 8 for driller's log.

Table 8.--Drillers' logs[1] of wells in Winkler County, Tex.

Well C-10

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand, red---------	10	10	Sand, red, and red clay--	5	205
Sand, gray----------	25	35	Red beds----------	40	245
Sand, red----------	65	100	Sand and clay----------	5	250
Sand, gray----------	12	112	Rock, red----------	26	276
Sand, red; water----------	3	115	Sand, brown; water-------	4	280
Sand, red----------	20	135	Red beds----------	60	340
Sand, gray----------	15	150	Sand, gray; water--------	10	350
Sand, red----------	50	200	Rock, red----------	10	360

Well C-11

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Surface sand----------	8	8	Clay----------	7	112
Caliche----------	7	15	Sand; water----------	3	115
Sand----------	75	90	Sand, red----------	13	128
Sand and clay----------	15	105			

[1] Wording has been changed slightly to improve readability.

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well C-14

Owner: Sinclair Oil & Gas Co. Driller: Perkins & Reynolds.

Surface sand----------	12	12	Quicksand, red----------	8	152
Caliche----------	8	20	Sand, red----------	9	161
Sandrock, red----------	10	30	Sand, red, hard----------	14	175
Sand, white----------	5	35	Shale, red----------	34	209
Sandrock, red----------	10	45	Sand and gravel; water---	2	211
Sand, red----------	45	90	Sand and gravel, hard----	8	219
Red beds----------	20	110	Gravel, soft----------	2	221
Shale, red----------	34	144	Rock, red, hard----------	1	222

Well C-15

Owner: Sinclair Oil & Gas Co. Driller: Reese & Griggs.

Surface sand----------	3	3	Clay----------	10	190
Sand, white----------	10	13	Sand, red----------	5	195
Caliche----------	7	20	Shale, sandy----------	11	206
Sand, red----------	100	120	Gravel, hard----------	20	226
Sand, water----------	6	126	Clay, red----------	4	230
Quicksand----------	54	180			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well C-16

Owner: Sinclair Oil & Gas Co. Driller: Reese & Griggs.

Surface sand----------	5	5	Rock, red----------	5	260
Caliche----------	10	15	Sand----------	7	267
Sand, red----------	100	115	Rock, red----------	33	300
Quicksand----------	70	185	Sand----------	10	310
Red beds----------	25	210	Rock, red----------	10	320
Gravel----------	10	220	Sand, water----------	15	335
Red beds----------	30	250	Rock, red----------	5	340
Sand----------	5	255			

Well C-17

Owner: Sinclair Oil & Gas Co. Driller: Reese & Griggs.

Surface sand----------	4	4	Sand, red----------	16	334
Caliche----------	12	16	Rock, red----------	2	336
Sand, red----------	108	124	Sand, red----------	12	348
Quicksand----------	66	190	Rock, red----------	2	350
Rock, red----------	22	212	Sand, red----------	27	377
Sand, red----------	12	224	Rock, red----------	8	385
Rock, red----------	41	265	Sand, gray----------	45	430
Sand, red----------	10	275	Rock, red----------	5	435
Rock, red----------	43	318	Sand, gray----------	20	455

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well C-25

Owner: J. B. Walton. Driller: J. B. Marshall.

Surface sand----------	4	4	Sand, red----------	25	145
Caliche----------	16	20	Clay, red----------	15	160
Sand, red----------	60	80	Sand and gravel, water---	5	165
Clay, red----------	40	120			

Well C-29

Owner: Humble Oil & Refining Co. Driller: Fannin Drilling Co.

Surface sand----------	5	5	Sand, water----------	45	160
Caliche----------	6	11	Sand and gravel, water---	29	189
Rock, red----------	41	52	Shale, red----------	7	196
Sand, red----------	63	115			

Well C-30

Owner: Humble Oil & Refining Co. Driller: Fannin Drilling Co.

Surface sand----------	10	10	Gravel, water----------	20	190
Caliche----------	15	25	Rock, gray----------	4	194
Sand, red----------	85	110	Shale, red----------	4	198
Sand and gravel, water----	60	170			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well C-31

Owner: Humble Oil & Refining Co. Driller: Fannin Drilling Co.

Surface sand----------	2	2	Sand, water----------	15	155
Caliche----------	13	15	Sand and gravel----------	28	183
Sand, red----------	110	125	Shale, red----------	5	188
Shale, red----------	15	140			

Well C-35

Owner: Sinclair Oil & Gas Co. Driller: J. R. Marshall.

Surface sand----------	4	4	Sand, red----------	10	145
Caliche----------	18	22	Clay, sandy, red---------	20	165
Sand, white----------	13	35	Sand and gravel, water---	5	170
Sand, red----------	45	80	Clay, sandy, red---------	45	215
Rock, red----------	15	95	Sand, red----------	10	225
Clay, sandy, red----------	30	125	Red beds----------	6	231
Sand, white----------	10	135			

Well C-38

Owner: J. B. Walton. Driller: J. R. Marshall.

Surface sand----------	4	4	Sand, red----------	25	135
Caliche----------	16	20	Clay, red----------	15	150
Sand, red----------	50	70	Sand, gravel; water------	5	155
Clay, red----------	40	110			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well C-48

Owner: Sinclair Oil & Gas Co. Driller: J. R. Marshall.

Surface sand----------	8	8	Sand, red----------	65	160
Caliche----------	15	23	Clay, red----------	15	175
Sand, red----------	52	75	Rock, red----------	35	210
Clay, red----------	12	87	Sand and gravel; water---	10	220
Sand, water----------	8	95	Sand, red----------	10	230

Well D-4

Owner: Brooks & Ewing. Driller: J. R. Marshall.

Sand----------	70	70	Rock, red----------	5	100
Clay, sandy, red----------	10	80	Sand, water----------	10	110
Sand, water----------	15	95			

Well D-6

Owner: W. F. Scarborough Estate. Driller: J. D. Cole.

Sand----------	8	8	Shale, sandy----------	19	95
Caliche----------	10	18	Sand and gravel----------	15	110
Sand----------	58	76			

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-14					
Owner: Stanolind Oil & Gas Co. Driller: --					
Sand----------	120	120	Red beds----------	91	250
Red beds----------	20	140	Red beds, and shale------	30	280
Quicksand----------	10	150	Sand----------	12	292
Red beds----------	7	157	Red beds----------	8	300
Gravel----------	2	159	Red beds and shale-------	5	305
Well D-21					
Owner: Sun Oil Co. Driller: Flack Water Well Co.					
Sand----------	139	139	Sand, water----------	4	145
Clay----------	2	141	No record----------	30	175
Well D-22					
Owner: Texas-New Mexico R.R. Co. Driller: L. L. Dorn.					
Sand, loose----------	124	124	Gravel----------	11	158
Sand, hard----------	23	147	Red beds----------	2	160
Well D-23					
Owner: Texas-New Mexico R.R. Co. Driller: L. F. Buchanan.					
Sand----------	70	70	Sandstone, red----------	4	148
Quicksand----------	74	144			

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-31					
Owner: Ambassador Oil Inc. Driller: J. D. Cole.					
Sand----------	6	6	Clay, sandy, and gravel--	27	112
Sand and caliche----------	12	18	Gravel, sandy; water-----	36	148
Sand, brown----------	37	55	Red beds----------	68	216
Sand----------	25	80	Sandstone----------	5	221
Sand, gravel; water-------	5	85	Red beds----------	4	225
Well D-32					
Owner: Ambassador Oil Inc. Driller: J. D. Cole.					
Surface sand----------	8	8	Sand, gravel----------	110	150
Sand, caliche----------	10	18	Red beds----------	60	210
Sand----------	22	40			
Well D-33					
Owner: Sinclair Oil & Gas Co. Driller: --					
Surface sand----------	15	15	Sand----------	80	220
Caliche----------	5	20	Rock, red----------	80	300
Sand----------	30	50	Shale, blue----------	10	310
Sand, red----------	10	60	Sand, water----------	12	322
Sand----------	70	130	Rock, red----------	22	410
Red beds----------	10	140	Sand, water----------	38	448

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-38

Owner: Richardson Oils, Inc. Driller: Richardson Oils, Inc.

Surface sand----------	7	7	Shale, blue----------	1	461
Caliche----------	12	19	Shale, red----------	627	1,088
Sand----------	129	148	Anhydrite----------	21	1,109
Shale, sandy----------	20	168	Shale, red----------	5	1,114
Shale, red----------	87	255	Anhydrite----------	71	1,185
Shale, sandy, red---------	38	293	Salt----------	32	1,217
Sand----------	13	306	Anhydrite, salt----------	3	1,220
Shale, red----------	6	312	Anhydrite----------	9	1,229
Sand----------	22	334	Limestone (Rustler)------	36	1,265
Shale, sandy----------	36	370	Shale, red----------	15	1,280
Sand, water----------	90	460			

Well D-39

Owner: Richardson Oils, Inc. Driller: J. R. Marshall.

Surface sand----------	10	10	Sand, water----------	5	310
Sand red----------	130	140	Shale, red----------	60	370
Sand, gravel; water-------	6	146	Rock, red----------	10	380
Rock, red----------	44	190	Sand, water----------	15	395
Shale, red----------	30	220	Red beds----------	5	400
Sand, water----------	5	225	Sand, water----------	10	410
Red beds----------	65	290	Red beds----------	10	420
Rock, red----------	15	305			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-41

Owner: Magnolia Petroleum Co. Driller: J. R. Marshall.

Surface sand----------	10	10	Sand and clay----------	5	130
Caliche----------	10	20	Sand, gravel; water------	11	141
Sand, red----------	105	125	Red beds----------	2	143

Well D-43

Owner: Humble Oil & Refining Co. Driller: I. O. Fannin.

Surface sand----------	15	15	Sand, gravel; water------	55	185
Caliche----------	10	25	Rock, gray----------	5	190
Sand, pink----------	100	125	Shale, red----------	10	200
Sand, red----------	5	130			

Well D-45

Owner: Humble Oil & Refining Co. Driller: J. J. Harrell & R. P. Tone.

Surface sand----------	5	5	Shale, red----------	35	170
Caliche----------	15	20	Sand, brown----------	10	180
Sand, white----------	15	35	Sand, hard----------	2	182
Sand, red----------	25	60	Gravel----------	24	206
Gravel----------	10	70	Shale, red----------	9	215
Sand, brown----------	30	100	Gravel----------	10	225
Sand, and red beds--------	15	115	Sand----------	7	232
Sand, white----------	5	120	Shale, sandy, red--------	6	238
Sand, and red beds--------	15	135			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-46

Owner: Humble Oil & Refining Co. Driller: I. O. Fannin.

Surface sand----------	10	10	Sand, red----------	40	165
Caliche----------	10	20	Gravel, water----------	15	180
Sand, red----------	100	120	Rock----------	4	184
Sand, white----------	5	125	Shale, red----------	1	185

Well D-47

Owner: El Paso Natural Gas Co. Driller: J. D. Cole.

Surface sand----------	4	4	Sandstone, red----------	10	108
Caliche----------	3	7	Shale, sandy, pink-------	34	142
Sand, yellow----------	11	18	Sand, gravel----------	23	165
Quicksand, brown----------	55	73	Rock, red----------	1	166
Sand, pink----------	25	98			

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-48					
Owner: El Paso Natural Gas Co. Driller: J. D. Cole.					
Surface sand----------	4	4	Shale, red, sandy--------	65	345
Sand, gypsum----------	8	12	Sand and gravel----------	23	368
Shale, sandy, yellow------	6	18	Sand, course, and shale--	3	371
Quicksand, brown----------	76	94	Shale, red----------	4	375
Rock, and red sand--------	15	109	Sand----------	7	382
Shale, sandy, pink--------	37	146	Shale, white, sandy------	22	404
Sand and gravel----------	16	162	Sand, white----------	11	415
Rock, red----------	27	189	Rock, red----------	10	425
Shale, brown, and lime shells----------	11	200	Sand, course, brown------	3	428
Lime, brown----------	18	218	Rock, red and lime shells----------	57	485
Rock, red, and lime shells----------	12	230	Shale, brown----------	33	518
Shale, sandy, red and yellow----------	10	240	Rock, red----------	34	552
Sand----------	9	249	Shale, brown----------	16	568
Shale----------	4	253	Rock, red----------	32	600
Sand----------	27	280			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-49

Owner: El Paso Natural Gas Co. Driller: J. D. Cole.

Sand----------	88	88	Rock, red----------	6	266
Clay, pink, sandy---------	30	118	Sandstone----------	22	288
Sand, and gravel----------	12	130	Red beds----------	2	290
Red beds----------	37	167	Rock, red----------	36	326
Sandstone----------	63	230	Red beds----------	4	330
Red beds----------	20	250	Sandstone----------	44	374
Sand, and clay----------	5	255	Rock, red----------	6	380
Clay, sandy----------	5	260	Red beds----------	24	404

Well D-50

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	87	87	Sandstone, red----------	1	176
Clay, sandy----------	29	116	Clay, gray----------	4	180
Gravel----------	6	122	Sandstone, red----------	1	181
Clay, sandy, and gravel---	32	154	Clay, gray, red streaks--	3	184
Sandstone----------	1	155	Sandstone, brown---------	13	197
Gravel----------	1	156	Red beds, yellow clay----	3	200
Limestone, gray----------	1	157	Sandstone----------	2	202
Sandstone----------	1	158	Red beds----------	3	205
Clay, blue and gray-------	1	159	Sandstone----------	4	209
Red beds, sandy----------	10	169	Clay, yellow----------	35	244
Sandstone, red----------	4	173	Sand----------	6	250
Clay, red----------	2	175			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-51

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	97	97	Gravel----------	2	178
Clay, sandy, and gravel---	55	152	Red beds----------	19	197
Limestone, gray----------	9	161	Shale, gray----------	5	202
Red beds----------	12	173	Sandstone, red----------	3	205
Limestone----------	3	176	Clay, yellow----------	14	219

Well D-53

Owner: El Paso Natural Gas Co. Driller: J. D. Cole.

Surface sand----------	4	4	Sandstone, red----------	1	158
Sand and caliche----------	10	14	Red beds, sandy----------	8	166
Sand----------	41	55	Sandstone, red----------	8	174
Clay, pink, sandy, and gravel----------	68	123	Red beds----------	4	178
Gravel, water----------	10	133	Clay, yellow----------	1	179
Clay, red, sandy----------	9	142	Sandstone, brown---------	8	187
Gravel, water----------	5	147	Clay, pink, sandy--------	4	191
Red beds----------	7	154	Sandstone, yellow--------	39	230
Gravel, water----------	3	157	Red beds----------	30	260

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-54

Owner: El Paso Natural Gas Co. Driller: J. D. Cole.

Surface sand----------	5	5	Rock, red, and gravel----	14	159
Caliche----------	14	19	Sandstone----------	15	174
Sand----------	61	80	Clay, yellow, sandy------	3	177
Clay, pink, sandy---------	34	114	Clay, red----------	1	178
Shale, white, and gravel--	5	119	Sandstone and red beds---	17	195
Sand, red and gravel------	15	134	Sandstone, yellow--------	26	221
Red beds----------	11	145	Red beds----------	3	224

Well D-55

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	52	52	Sand----------	2	152
Sand, water----------	26	78	Limestone, gray----------	3	155
Sand, red----------	18	96	Sand, and gravel---------	2	157
Clay, sandy----------	37	133	Gravel----------	4	161
Gravel----------	6	139	Red beds----------	6	167
Clay, sandy, and gravel---	9	148	Gravel----------	6	173
Clay, gray----------	2	150	Sand, red----------	107	280

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-56					
Owner: El Paso Natural Gas Co. Driller: --					
Surface sand----------	9	9	Clay, pink----------	1	166
Quicksand----------	107	116	Gravel----------	3	169
Clay, pink, sandy---------	45	161	Clay, pink, sandy--------	4	173
Gravel----------	4	165	Red beds----------	2	175
Well D-58					
Owner: El Paso Natural Gas Co. Driller: --					
Surface sand----------	4	4	Quicksand----------	121	125
Well D-59					
Owner: El Paso Natural Gas Co. Driller: --					
Surface sand----------	8	8	Red beds----------	21	207
Caliche----------	6	14	Sandstone, white---------	4	211
Quicksand----------	138	152	Clay, red----------	4	215
Clay, pink and gravel-----	18	170	Sandstone, white---------	5	220
Gravel----------	16	186			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-60

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	9	9	Gravel----------	5	165
Caliche----------	4	13	Clay, and gravel---------	9	174
Sand----------	123	136	Red beds, blue clay------	33	207
Clay, pink, sandy---------	24	160	Sandstone----------	3	210

Well D-61

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	6	6	Red beds----------	2	193
Caliche----------	2	8	Clay, white----------	3	196
Sand, red----------	13	21	Red beds----------	1	197
Quicksand----------	113	134	Sandstone, white---------	4	201
Clay, pink, sandy---------	25	159	Limestone----------	6	207
Gravel, and red clay------	13	172	Sandstone----------	7	214
Clay, pink, sandy---------	19	191	Sand----------	6	220

Well D-63

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	14	14	Gravel----------	2	146
Quicksand----------	123	137	Red beds----------	14	160
Clay, pink, sandy---------	7	144			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-64

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	15	15	Gravel----------	4	194
Quicksand----------	139	154	Sand, and gravel---------	17	211
Clay, pink, sandy---------	29	183	Clay, red, sandy---------	6	217
Clay, red----------	7	190	Red beds----------	3	220

Well D-65

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	12	12	Clay, red----------	3	188
Quicksand----------	139	151	Gravel----------	2	190
Clay, pink, sandy---------	14	165	Sand, and gravel---------	8	198
Clay, red, sandy----------	17	182	Red beds----------	2	200
Gravel----------	3	185			

Well D-66

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	12	12	Clay, sandy----------	40	172
Caliche----------	4	16	Gravel----------	8	180
Quicksand----------	22	38	Clay, sandy----------	5	185
Sand, white; water--------	12	50	Red beds----------	2	187
Quicksand----------	82	132			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-67

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	8	8	Clay, pink, sandy--------	19	143
Quicksand----------	116	124	Red beds----------	91	234

Well D-71

Owner: Sinclair Oil & Gas Co. Driller: E & L Water Well Service.

Sand----------	130	130	Red beds----------	2	139
Red beds----------	3	133	Quicksand----------	2	141
Gravel, water----------	1	134	Red beds----------	2	143
Quicksand----------	2	136	Sand, water----------	4	147
Gravel, water----------	1	137	Red beds----------	3	150

Well D-72

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	14	14	Gravel----------	2	146
Quicksand----------	123	137	Red beds----------	14	160
Clay, pink, sandy---------	7	144			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-73

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	12	12	Gravel----------	10	181
Quicksand----------	124	136	Red beds----------	35	216
Clay, pink, sandy---------	21	157	Sandstone, red----------	10	226
Gravel----------	6	163	Red beds----------	25	251
Clay, pink, white streaks-	8	171	Sandstone, gray----------	1	252

Well D-74

Owner: Sinclair Oil & Gas Co. Driller: J. R. Marshall.

Surface sand----------	15	15	Sand, fine----------	5	195
Sand, white----------	55	70	Sand, red, hard----------	32	227
Quicksand----------	76	146	Clay, sandy, and gravel--	8	235
Sand, red----------	14	160	Red beds----------	33	268
Sand, white and clay------	18	178	Rock, red----------	10	278
Sand, white----------	7	185	Sand, water----------	4	282
Sand, water----------	5	190			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-75

Owner: Sinclair Oil & Gas Co. Driller: E. & L. Water Well Service.

Surface sand----------	130	130	Sand, brown----------	12	154
Red beds----------	4	134	Red beds----------	3	157
Sand, white----------	8	142			

Well D-76

Owner: Sinclair Oil & Gas Co. Driller: E. & L. Water Well Service.

Sand----------	150	150	Gravel----------	9	192
Red beds----------	18	168	Sand, water----------	8	200
Gravel----------	4	172	Red beds----------	2	202
Red beds----------	11	183			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-84

Owner: El Paso Natural Gas Co. Driller: --

Surface sand----------	17	17	Clay, red, sandy---------	3	177
Quicksand----------	121	138	Gravel----------	17	194
Clay, white, sandy--------	9	147	Clay, red, sandy---------	4	198
Clay, pink, sandy---------	25	172	Red beds----------	2	200
Gravel----------	2	174			

Well D-94

Owner: Richardson Gasoline Plant. Driller: --

Surface sand----------	6	6	Shale, red, sandy--------	11	135
Caliche----------	14	20	Sand, and gravel---------	12	147
Sand, yellow----------	40	60	Rock, red----------	8	155
Quicksand----------	40	100	Sand, and gravel---------	10	165
Sand, brown----------	18	118	Rock, and red sand-------	15	180
Chalk, white----------	6	124	Shale, red----------	20	200

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-99

Owner: Stanolind Oil & Gas Co. Driller: --

Surface sand----------	25	25	Quicksand----------	10	155
Sand, yellow----------	30	55	Shale, red----------	11	166
Quicksand----------	15	70	Sand, and gravel---------	9	175
Sand, red----------	50	120	Sand----------	25	200
Red beds----------	25	145			

Well D-103

Owner: Gulf Oil Corp. Driller: J. D. Cole.

Surface sand----------	6	6	Rock, red, and gravel----	24	185
Caliche----------	19	25	Rock, red----------	5	190
Sand, yellow----------	28	53	Rock, red, blue shale----	5	195
Quicksand----------	69	122	Red beds----------	17	212
Sand, pink----------	8	130	Rock, red----------	6	218
Shale, red, sandy---------	15	145	Shale, red, blue, and gray----------	7	225
Shale, pink, and gravel---	8	153	Rock, red, and sand------	10	235
Rock, red----------	5	158	Shale, red----------	25	260
Sand, gravel; water-------	3	161	Sand, brown----------	40	300

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-115					
Owner: Gulf Oil Corp. Driller: J. R. Marshall.					
Sand----------	150	150	Clay, red----------	20	220
Clay, red----------	20	170	Shale, blue----------	10	230
Sand, gravel; water-------	8	178	Rock, red----------	20	250
Clay, red----------	2	180	Red beds----------	20	270
Rock, red sand----------	20	200			
Well D-120					
Owner: S. W. Richardson. Driller: --					
Surface sand----------	40	40	Gravel; water----------	15	210
Quicksand----------	145	185	Red beds----------	15	225
Red beds----------	10	195			
Well D-122					
Owner: S. W. Richardson. Driller: --					
Sand----------	40	40	Red beds----------	48	193
Quicksand----------	105	145	Gravel; water----------	13	206

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-124					
Owner: Gulf Oil Corp. Driller: Earl Scott.					
Surface sand----------	10	10	Sand, white----------	16	193
Caliche----------	5	15	Rock, red----------	1	194
Sand----------	130	145	Sand, gravel; water------	26	220
Chalk----------	20	165	Rock, red----------	13	233
Rock, red----------	3	168	Sand; water----------	6	239
Sand, white; water--------	4	172	Rock, red----------	2	241
Rock, red----------	5	177	Sand, gravel; water------	9	250
Well D-125					
Owner: Gulf Oil Corp. Driller: J. J. Bush.					
Sand----------	86	86	Rock, red----------	26	228
Quicksand----------	64	150	Shale, red, sandy--------	102	330
Sand, white----------	20	170	Sand; water----------	12	342
Shale, red, sandy---------	20	190	Shale, red, sandy--------	15	357
Clay, red, and gravel-----	12	202			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-126

Owner: Gulf Oil Corp. Driller: F. C. Ingham.

Quicksand----------	152	152	Rock, red----------	16	198
Clay, red, sandy----------	16	168	Clay, red----------	32	230
Sand; water----------	10	178	Rock, red----------	15	245
Clay, sandy----------	4	182	Clay, red----------	5	250

Well D-127

Owner: Gulf Oil Corp. Driller: G. S. Taylor.

Sand----------	155	155	Sand, and gravel---------	8	208
Clay, red, sandy----------	7	162	Red beds, and sand-------	3	211
Red beds----------	12	174	Rock, red----------	39	250
Sand; water----------	26	200			

Well D-128

Owner: Gulf Oil Corp. Driller: F. C. Ingham.

Surface sand----------	80	80	Rock, and sand----------	30	240
Quicksand----------	60	140	Clay, red----------	10	250
Rock, and sand----------	20	160	Rock, red----------	20	270
Clay, red----------	15	175	Clay, red----------	35	305
Sand, and gravel; water---	5	180	Sand; water----------	10	315
Shale, red, sandy---------	30	210	Clay, red, sandy---------	17	332

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-129

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Sand----------	80	80	Sand, gravel; water-----	5	180
Quicksand----------	60	140	Sand, and shale---------	30	210
Sand, red----------	20	160	Sandstone----------	30	240
Clay----------	15	175	Clay, red----------	10	250

Well D-130

Owner: Carter Foundation. Driller: Cole & Powell.

Surface sand----------	5	5	Rock, red----------	7	177
Caliche----------	10	15	Gravel; water----------	8	185
Sand----------	127	142	Rock, red, and gravel---	39	224
Rock, red----------	8	150	Rock, red----------	24	248
Sand, red----------	20	170			

Well D-133

Owner: Standard of Texas. Driller: Harry Bass.

Red beds and sand--------	78	78	Sand, and red rock-----	37	202
Red beds, and shale------	87	165			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-136

Owner: Cabot Carbon Black Co. Driller: J. R. Marshall.

Surface sand----------	8	8	Clay, red----------	15	155
Caliche----------	12	20	Sand, gravel; water------	10	165
Sand, red----------	45	65	Clay, red----------	10	175
Quicksand----------	75	140	Sand, coarse; water------	5	180

Well D-137

Owner: Cabot Carbon Black Co. Driller: J. D. Cole.

Surface sand----------	5	5	Rock, red----------	10	180
Caliche----------	13	18	Shale, red, yellow, and blue----------	5	185
Sand----------	112	130	Rock, red----------	25	210
Red beds----------	25	155	Shale, red----------	8	218
Rock, red----------	5	160	Sand; water----------	10	228
Sand, and gravel; water---	5	165	Red beds----------	2	230
Rock, red, and gravel-----	5	170			

Well D-139

Owner: Magnolia Petroleum Co. Driller: Bethel & Matthews.

Surface sand----------	2	2	Sand and gravel; water---	35	195
Caliche----------	33	35	Shale, red----------	5	200
Sand----------	90	125	Sand, and water----------	16	216
Red beds----------	15	140	Red beds----------	3	219
Gravel----------	20	160			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-143

Owner: Magnolia Petroleum Co. Driller: H. U. Barnes.

Sand----------	75	75	No record----------	60	225
Shale, sandy, red---------	35	110	Shale, red----------	11	236
Sand, water----------	50	160	Sand----------	38	274
Rock----------	5	165			

Well D-148

Owner: Magnolia Petroleum Co. Driller: H. R. Bethal.

Sand----------	6	6	Sand, and gravel---------	30	150
Caliche----------	19	25	Red beds----------	40	190
Sand----------	81	106	Sand, brown----------	15	205
Red beds----------	9	115	Red beds----------	70	275
Rock----------	5	120			

Well D-150

Owner: Magnolia Petroleum Co. Driller: --

Sand----------	6	6	Gravel; water----------	17	145
Caliche----------	22	28	Gumbo----------	15	160
Quicksand----------	42	70	Sand, and gravel---------	10	170
Sand, red----------	40	110	Rock, and sand----------	20	190
Red beds----------	8	118	Sand, gravel, and clay---	11	201
Sand; water----------	10	128			

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)
Well D-156		
Owner: Texas Pacific Coal & Oil Co. Driller: Clark Drilling Co.		
Sand, caliche, white, soft----------	19	19
Sand, red, soft----------	87	106
Red beds, red, soft-------	79	185
Rock, red, hard----------	25	210
Sand, shells, white, hard----------	5	215
Sand, gravel, red beds, red, soft----------	10	225
Red beds, soft----------	5	230
Rock, sandy, red, medium--	5	235
Rock, red, hard----------	8	243
Sand, red, soft----------	2	245
Rock, and sand, red, hard-	15	260
Sand, white, soft---------	47	307
Shale, sandy, gray, medium----------	10	317
Rock, red, hard----------	18	335
Shale, sandy, medium------	70	405
Rock, red, hard----------	15	420
Sand, red, soft----------	15	435
Rock, red, hard----------	5	440
Sand, red, soft----------	14	454
Rock, red, hard----------	36	490
Lime, gray, hard---------	10	500
Rock, red, hard----------	25	525
Shale, sandy, red, hard--	25	550
Rock, red, hard----------	40	590
Shale, red, hard---------	30	620
Sand, brown, hard--------	13	633
Shale, sandy, red, hard--	10	643
Rock, red, hard----------	47	690
Shale, sandy, red hard---	30	720
Rock, red, hard----------	17	737
Sand, shale, red, hard---	8	745
Rock, red, hard----------	15	760
Shale, red, hard---------	30	790
Rock, red, hard----------	22	812
Shale, sandy, red, hard--	5	817
Rock, red, hard----------	200	1,017
Sand, rock, red, hard----	20	1,037
Rock, red, hard----------	18	1,055
Anhydrite, gray and white, hard----------	55	1,110
Limestone, gray, hard (Rustler)----------	14	1,124

(Continued on next page)

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-156--Continued					
Anhydrite, white, hard----	59	1,183	Anhydrite, blue, white, hard----------	15	1,267
Lime, gray, hard----------	48	1,231	Lime, gray, hard---------	6	1,273
Rock, anhydrite, red, hard----------	4	1,235	Rock, red, hard----------	2	1,275
Rock, red, hard----------	5	1,240	Shale, sandy, red, hard--	15	1,290
Lime, gray, hard----------	12	1,252	Shale, gray, hard--------	15	1,305

Well D-160

Owner: Texas Pacific Coal & Oil Co. Driller: Atwood & Clark Drilling Co.

Caliche, sand, white, soft----------	40	40	Lime, gray, hard---------	10	1,145
Sand, and gravel, red soft----------	70	110	Anhydrite, gray, hard----	2	1,147
Red beds, rock, red, hard-	672	782	Lime, gray, hard---------	6	1,153
Anhydrite, shale, rock, red, hard----------	145	927	Anhydrite, white, hard---	19	1,172
Anhydrite, rock, red, hard----------	63	990	Lime, gray, hard---------	60	1,232
Red beds, rock, red hard--	90	1,080	Shale, brown, hard-------	2	1,234
Anhydrite, gypsum, white hard----------	55	1,135			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-163

Owner: Sinclair Oil & Gas Co. Driller: F. C. Ingham.

Sand----------	8	8	Rock, red, sandy---------	20	145
Caliche----------	12	20	Rock, red----------	25	170
Sandrock----------	100	120	Sand and gravel----------	25	195
Sand----------	5	125	Rock, red----------	5	200

Well D-164

Owner: Sinclair Oil & Gas Co. Driller: --

Surface sand----------	6	6	Rock, red----------	20	140
Caliche----------	14	20	Gravel; water----------	5	145
Sand, red----------	75	95	Sand, red----------	25	170
Clay, red----------	10	105	Sand, and gravel; water--	8	178
Rock, red----------	10	115	Red beds----------	2	180
Sand, water----------	5	120			

Well D-165

Owner: Sinclair Oil & Gas Co. Driller: F. C. Ingham.

Surface sand----------	8	8	Rock and sand----------	25	165
Caliche----------	17	25	Gravel----------	10	175
Sandrock----------	90	115	Rock and sand----------	20	195
Sand----------	5	120	Sand and gravel----------	20	215
Rock, red----------	20	140			

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well D-166					
Owner: Atlantic Refining Co. Driller: J. D. Cole.					
Surface sand----------	8	8	Sand----------	7	112
Caliche----------	4	12	Red beds----------	8	120
Sand, and caliche---------	20	32	Gravel and sand----------	48	168
Sand----------	36	68	Red beds----------	7	175
Clay, sandy, red----------	34	102	Sand and gravel----------	13	188
Red beds----------	3	105	Red beds----------	2	190
Well D-167					
Owner: Atlantic Refining Co. Driller: J. D. Cole.					
Surface sand----------	6	6	Clay, red----------	8	108
Caliche----------	6	12	Sand, and gravel---------	17	125
Sand----------	33	45	Red beds----------	45	170
Clay, red, sandy----------	10	55	Sand and gravel----------	15	185
Clay, red, sandy and gravel----------	45	100	Rock, red----------	5	190

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-173

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Surface sand----------	10	10	Rock, red, sand----------	26	168
Caliche----------	15	25	Red beds----------	7	175
Sand----------	15	40	Gravel and sand; water---	5	180
Rock, red, sand----------	35	75	Rock, red----------	10	190
Rock, red----------	40	115	Red beds----------	10	200
Sand; water----------	5	120	Sand and rock, red-------	23	223
Sand, red----------	15	135	Gravel----------	2	225
Sand, and gravel; water---	7	142			

Well D-175

Owner: Gulf Oil Corp. Driller: R. E. Griggs.

Surface sand----------	7	7	Sand----------	36	184
Caliche----------	14	21	Sand and clay, red-------	4	188
Sand----------	69	90	Clay----------	10	198
Rock, red, sandy----------	10	100	Sand; water----------	5	203
Clay----------	20	120	Clay----------	10	213
Sand and gravel; water----	3	123	Sand----------	2	215
Sand----------	7	130	Clay----------	3	218
Gravel; water----------	18	148			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-176

Owner: Gulf Oil Corp. Driller: R. E. Griggs.

Sand----------	6	6	Gravel; water----------	10	152
Caliche----------	14	20	Sand----------	8	160
Sand----------	65	85	Clay----------	2	162
Clay, sandy----------	13	98	Sand----------	14	176
Clay----------	15	113	Clay----------	10	186
Gravel; water----------	2	115	Sand; water----------	18	204
Sand----------	27	142	Clay----------	12	216

Well D-177

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Sand----------	12	12	Rock, red----------	15	135
Caliche----------	8	20	Sand and gravel; water---	5	140
Sand----------	60	80	Rock, red----------	25	165
Rock, red----------	35	115	Sand and gravel; water---	5	170
Sand and gravel; water----	5	120	Red beds----------	10	180

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-179

Owner: Humble Oil & Refining Co. Driller: F. C. Ingham.

Caliche----------	20	20	Sand; water----------	32	170
Sand----------	90	110	Clay, red----------	5	175
Sand and rock----------	28	138			

Well D-180

Owner: Humble Oil & Refining Co. Driller: F. C. Ingham.

Caliche----------	18	18	Sand and clay----------	10	135
Sand----------	57	75	Sand and gravel----------	25	160
Rock, red----------	35	110	Rock, red----------	26	186
Sand, red----------	15	125			

Well D-181

Owner: Humble Oil & Refining Co. Driller: F. C. Ingham.

Surface sand----------	4	4	Red beds----------	22	110
Caliche----------	16	20	Sand; water----------	62	172
Sand----------	68	88	Red beds----------	41	173

Well D-191

Owner: Standard Oil Co. of Texas. Driller: J. R. Marshall.

Red beds and sand---------	50	50	Red beds----------	10	170
Quicksand----------	110	160	Sand; water----------	25	195

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-193

Owner: Standard Oil Co. of Texas. Driller: Richardson Drilling Co.

Surface sand and caliche--	15	15	Anhydrite and red rock---	70	885
Caliche, sand, and shells-	233	248	Anhydrite and red beds---	19	904
Rock, red----------	226	474	Anhydrite and lime-------	61	965
Red beds and red rock-----	82	556	Sand, lime and anhydrite-	97	1,062
Red beds, red rock, and anhydrite----------	259	815			

Well D-194

Owner: Standard Oil Co. of Texas. Driller: Sidwell & Imler.

Sand----------	12	12	Red beds, and shale------	35	265
Caliche----------	13	25	Red beds----------	35	300
Sand----------	120	145	Sand----------	35	335
Shale, red----------	28	173	Shale, red----------	25	360
Gravel----------	7	180	Sand----------	5	365
Shale, red, sandy, gravel----------	15	195	Shale, red----------	25	390
Red beds----------	16	211	Sand----------	13	403
Sand----------	4	215	Red beds----------	6	409
Gravel----------	15	230			

Table 8.--Drillers' logs of wells in Winkler County--Continued

Well D-195

Owner: Standard Oil Co. of Texas. Driller: Richardson Drilling Co.

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Surface sand----------	15	15	Sand, red rock, and gypsum----------	22	770
Sand, gravel, and red beds----------	235	250	Anhydrite----------	16	786
Rock, red----------	278	528	Rock, red----------	33	819
Sand, and red rock--------	43	571	Anhydrite and red rock---	9	828
Anhydrite, and red rock---	78	649	Anhydrite----------	90	918
Sand, anhydrite, and red rock----------	37	686	Dolomite----------	32	950
Anhydrite and red rock----	28	714	Sand and dolomite--------	73	1,023
Gypsum, and red rock------	34	748			

Well D-196

Owner: Standard Oil Co. of Texas. Driller: --

Surface sand----------	8	8	Gravel and red rock------	18	225
Caliche----------	10	18	Red beds and sandy shale----------	125	350
Sand----------	155	173	Rock, red----------	15	365
Red beds----------	7	180	Rock, and sandy shale, red----------	15	380
Sand and gravel----------	5	185	Red beds, sandy shale----	22	402
Red beds, and gravel------	5	190	Rock, sandy, red---------	8	410
Sand----------	4	194	Shale, sandy----------	8	418
Rock, red----------	9	203	Shale, brown----------	7	425
Sand and gravel----------	4	207			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-197

Owner: Standard Oil Co. of Texas. Driller: Sidwell & Imler.

Caliche, surface sand-----	7	7	Red beds----------	6	218
Sand----------	168	175	Gravel, large----------	3	221
Rock, red----------	10	185	Sand, and red rock-------	114	335
Gravel----------	5	190	Shale----------	15	350
Sand----------	22	212	No record----------	62	412

Well D-203

Owner: Gulf Oil Corp. Driller: W. D. Holt.

Surface sand----------	22	22	Sand, shale, and gravel--	33	190
Caliche and sand----------	18	40	Sandstone----------	4	194
Sand----------	117	157	Rock, red----------	26	220

Well D-217

Owner: Humble Oil & Refining Co. Driller: R. E. Griggs.

Surface sand----------	5	5	Clay----------	4	204
Caliche----------	9	14	Sand, red----------	16	220
Sand----------	140	154	Clay, red----------	25	245
Clay, red----------	16	170	Sand, brown----------	10	255
Gravel----------	5	175	Clay, red----------	5	260
Clay, red----------	10	185	Sand, brown----------	24	284
Gravel----------	10	195	Clay, red----------	5	289
Sand, red----------	5	200	Sand, brown----------	11	300

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-218

Owner: Humble Oil & Refining Co. Driller: F. C. Ingham.

Surface sand----------	6	6	Gravel----------	13	210
Caliche----------	15	21	Red beds----------	17	227
Sand----------	145	166	Sand and gravel----------	8	235
Sand and clay----------	8	174	Sand, red----------	22	257
Sand and gravel----------	6	180	Red beds----------	7	264
Red beds----------	3	183	Sand and gravel----------	21	285
Gravel and sand----------	10	193	Rock, red----------	16	301
Red beds----------	4	197			

Well D-222

Owner: Sinclair Oil & Gas Co. Driller: J. R. Marshall.

Surface sand----------	10	10	Sand, gravel; water------	2	145
Caliche----------	15	25	Rock, red----------	15	160
Sand----------	105	130	Sand, and gravel; water--	10	170
Red beds----------	13	143	Sand, red----------	8	178

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-223

Owner: Sinclair Oil & Gas Co. Driller: J. R. Marshall.

Surface sand----------	10	10	Sand; water----------	5	135
Caliche----------	15	25	Rock, red----------	20	155
Sand----------	100	125	Sand; water----------	10	165
Red beds----------	5	130			

Well D-228

Owner: Tidewater Oil Co. Driller: Bob Glynn.

Surface sand----------	5	5	Sand, red----------	15	180
Caliche----------	10	15	Rock, red----------	10	190
Sand----------	125	140	Sand----------	50	240
Red beds----------	15	155	Rock, red----------	20	260
Sand, red----------	5	160	Sand, brown----------	20	280
Gravel; water----------	5	165	Red beds----------	5	285

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-281

Owner: City of Kermit. Driller: J. D. Cole.

Caliche----------	28	28	Red beds, and blue shale----------	5	168
Sand----------	32	60	Rock, red----------	8	176
Clay, sandy----------	70	130	Gravel and red beds------	32	208
Red beds----------	8	138	Rock, red----------	2	210
Gravel and red beds-------	16	154	Gravel----------	10	220
Sandstone, red----------	9	163	Sandstone, red, broken---	80	300

Well D-282

Owner: City of Kermit. Driller: J. D. Cole.

Surface sand----------	4	4	Sandstone, red----------	11	166
Caliche----------	16	20	Shale, blue----------	3	169
Sand----------	43	63	Rock, red----------	6	175
Sandstone----------	7	70	Sand and gravel----------	12	187
Sand----------	48	118	Rock, red----------	33	220
Sandstone----------	14	132	Sandstone----------	18	238
Clay, pink, sandy---------	10	142	Rock, red----------	16	254
Red beds and gravel-------	13	155	Sandstone----------	46	300

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-296

Owner: City of Kermit. Driller: Glynn & Wade.

Surface sand----------	5	5	Sand and gravel; water---	20	315
Caliche----------	10	15	Red beds----------	15	330
Sand----------	215	230	Sand; water----------	5	335
Red beds----------	65	295			

Well D-298

Owner: Winkler County. Driller: J. D. Cole.

Surface sand----------	6	6	Sand and gravel----------	3	220
Caliche----------	24	30	Rock, red----------	7	227
Sand----------	135	165	Sand and gravel----------	23	250
Clay, sandy----------	45	210	Rock, red----------	2	252
Red beds----------	7	217			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-302

Owner: C. M. Chastain. Driller: Noll Drilling Co.

Sand----------	15	15	Red beds, sand and gravel----------	75	255
Caliche----------	20	35	Sandstone----------	36	291
Sand----------	95	130	Sand and gravel; water---	4	295
Clay and sand, red--------	15	145	Clay and shale, red------	3	298
Clay, red----------	15	160	Sand and gravel----------	16	314
Quicksand----------	15	175	Sandstone----------	29	343
Sand and clay, red--------	5	180	Sand, red----------	32	375

Well E-1

Owner: Gulf Oil Corp. Driller: G. S. Taylor.

Surface sand----------	15	15	Sand and gravel----------	25	100
Gypsum and caliche--------	15	30	Gravel and red beds------	18	118
Gravel and red rock-------	33	63	Red beds----------	17	135
Shale, red, sandy---------	12	75			

Well E-2

Owner: Gulf Oil Corp. Driller: G. S. Taylor.

Surface sand----------	5	5	Rock, red----------	40	78
Sand and gypsum----------	15	20	Gravel and sand----------	22	100
Shale, sandy, pink--------	18	38	Rock, red----------	35	135

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well E-3

Owner: Gulf Oil Corp. Driller: J. D. Cole.

Surface sand----------	20	20	Gravel and sand----------	25	100
Shale, red----------	30	50	Sand, red----------	20	120
Rock, red----------	25	75	Rock, red and lime shells----------	15	135

Well E-4

Owner: Gulf Oil Corp. Driller: J. D. Cole.

Surface sand----------	30	30	Red beds and shale-------	330	595
Shale, sandy----------	10	40	Sand----------	25	620
Rock, red----------	8	48	Rock, red----------	40	660
Gravel and red rock-------	17	65	Sand----------	75	735
Shale, sandy----------	10	75	Lime, sandy----------	5	740
Gravel and red rock-------	40	115	Shale----------	25	765
Shale, sandy----------	20	135	Rock, red----------	85	850
Rock, red, and shells-----	15	150	Sand----------	12	862
Shale, and red rock-------	10	160	Rock, sandy----------	8	870
Red beds and shale--------	58	218	Sand----------	10	880
Shale, gray and shells----	47	265	Rock, red----------	10	890

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well E-6

Owner: Gulf Oil Corp. Driller: J. D. Cole.

Surface sand----------	15	15	Rock, sandy, red---------	20	80
Caliche and sand----------	10	25	Sand and gravel----------	20	100
Sand and gravel----------	20	45	Rock, sandy, red---------	35	135
Rock, red----------	15	60			

Well E-7

Owner: Gulf Oil Corp. Driller: Flack & Felton.

Sand----------	15	15	Clay----------	26	76
Sand and gravel----------	10	25	Rock, red, sandy---------	9	85
Clay----------	10	35	Sand and gravel----------	30	115
Sand----------	15	50	Rock, red----------	70	185

Well E-19

Owner: Waddell Bros. & Co. Driller: --

Sand----------	68	68	Sand; water----------	3	75
Clay, red----------	4	72			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-235

Owner: Humble Oil & Refining Co. Driller: R. E. Griggs.

Surface sand----------	5	5	Sandstone----------	3	208
Caliche----------	9	14	Sand----------	7	215
Sand----------	76	90	Clay, red----------	3	218
Gravel; water----------	5	95	Sand, red----------	25	243
Sand, and gravel----------	26	121	Gravel----------	5	248
Clay, red----------	6	127	Sand, and gravel---------	17	265
Sand and gravel----------	68	195	Sand, brown----------	32	297
Clay, red----------	3	198	Clay, red----------	3	300
Sand, red----------	7	205			

Well D-236

Owner: Humble Oil & Refining Co. Driller: R. E. Griggs.

Surface sand----------	8	8	Sand, and gravel---------	23	256
Caliche----------	11	19	Sand, brown----------	8	264
Sand----------	68	87	Clay, red----------	4	268
Sand and gravel----------	55	142	Sand----------	12	280
Clay, red----------	6	148	Clay, red----------	4	284
Gravel and sand; water----	10	158	Sand, red----------	16	300
Sand, clay----------	75	233			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-238

Owner: Gulf Oil Corp. Driller: R. E. Griggs.

Surface sand----------	8	8	Sand----------	24	134
Caliche----------	15	23	Clay, red----------	3	137
Sand----------	39	62	Sand, brown----------	12	149
Sand and shale----------	13	75	Clay, sandy, red---------	23	172
Clay, sandy----------	12	87	Clay, red----------	17	189
Clay----------	8	95	Sand----------	5	194
Gravel and sand; water----	15	110	Clay, red----------	11	205

Well D-241

Owner: Humble Oil & Refining Co. Driller: I. O. Fannin.

Rocky soil----------	5	5	Sand, and gravel; water--	80	150
Sand----------	50	55	Rock----------	15	165
Rock and sand----------	15	70	Shale, red----------	30	195

Well D-242

Owner: Skelly Oil Co. Driller: J. J. Bush.

Sand----------	2	2	Sand, and gravel; water--	5	120
Caliche----------	13	15	Red beds----------	50	170
Sand----------	45	60	Sandstone----------	15	185
Red beds----------	55	115			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-248

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Surface sand----------	5	5	Rock, red----------	47	187
Caliche----------	20	25	Sand; water----------	8	195
Sand----------	115	140	Rock, red----------	5	200

Well D-249

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Caliche----------	25	25	Rock, red----------	15	180
Sand----------	65	90	Red beds----------	5	185
Rock, red----------	70	160	Sand----------	5	190
Sand and gravel; water----	5	165	Rock, red----------	9	199

Well D-253

Owner: Sinclair Oil & Gas Co. Driller: J. R. Marshall.

Surface sand----------	6	6	Rock, red----------	20	165
Caliche----------	14	20	Sand, and gravel---------	20	185
Sand----------	90	110	Rock, red----------	55	240
Clay, sandy, red----------	4	114	Sand; water----------	10	250
Sand; water----------	31	145			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-254

Owner: Sinclair Oil & Gas Co. Driller: --

Surface sand----------	7	7	Sand; water----------	7	145
Caliche----------	13	20	Rock, red----------	35	180
Sand, red----------	45	65	Shale, red----------	10	190
Quicksand----------	60	125	Sand, and gravel; water--	7	197
Red beds----------	13	138	Red beds----------	3	200

Well D-255

Owner: Sinclair Oil & Gas Co. Driller: --

Surface sand----------	6	6	Red beds----------	15	140
Caliche----------	14	20	Sand, and gravel; water--	10	150
Sand----------	105	125			

Well D-257

Owner: Humble Oil & Refining Co. Driller: R. E. Griggs.

Surface sand----------	6	6	Sand----------	45	209
Caliche----------	17	23	Sand and clay----------	41	250
Sand----------	61	84	Rock, red----------	50	300
Sand and clay----------	80	164			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-269

Owner: Humble Oil & Refining Co. Driller: R. E. Griggs.

Sand----------	5	5	Sand----------	107	125
Caliche----------	13	18	Sand, clay, alternating--	175	300

Well D-270

Owner: Humble Oil & Refining Co. Driller: F. C. Ingham.

Surface sand----------	7	7	Gravel sand----------	21	164
Caliche----------	17	24	Red beds----------	6	170
Sand----------	119	143	Rock and sand----------	5	175

Well D-272

Owner: City of Kermit. Driller: Glynn & Wade.

Surface sand----------	15	15	Sand----------	10	275
Caliche----------	10	25	Gravel; water----------	10	285
Sand----------	220	245	Sand; water----------	15	300
Red beds----------	20	265	Red beds----------	12	312

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well D-278

Owner: City of Kermit. Driller: Bob Glynn.

Surface sand----------	5	5	Sand; water----------	5	235
Caliche----------	10	15	Gravel; water----------	10	245
Sand----------	200	215	Sand, red----------	50	295
Red beds----------	15	230	Red beds----------	5	300

Well D-280

Owner: City of Kermit. Driller: Permian Well Service.

Caliche----------	44	44	Rock, red----------	8	308
Sand----------	156	200	Gravel and sand----------	7	315
Red beds----------	10	210	Red beds----------	15	330
Sand and gravel----------	13	223	Sand----------	5	335
Shale, red----------	3	226	Red beds----------	81	416
Red beds----------	16	242	Sand----------	19	435
Gravel; water----------	6	248	Red beds----------	21	456
Red beds----------	32	280	Sand----------	5	461
Sand----------	5	285	Red beds----------	40	501
Red beds----------	15	300			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well E-30

Owner: Gulf Oil Corp. Driller: J. D. Cole.

Sand----------	60	60	Rock, red and shale, blue----------	72	260
Sand and shale----------	30	90	Rock, red----------	20	280
Shale, sandy----------	10	100	Shale, blue, sandy-------	35	315
Sand and gravel----------	1	101	Sand, brown----------	35	350
Rock, red, and gravel-----	16	117	Rock, red, sandy---------	35	385
Red beds----------	17	134	Sand, brown----------	39	424
Shale, red and blue-------	54	188	Rock, red----------	2	426

Well F-5

Owner: L. W. Anderson. Driller: J. O. Jarman.

Surface material----------	3	3	Sand----------	136	158
Rock, and lime----------	4	7	Shale, red----------	6	164
Caliche----------	12	19	Shale, red, sandy--------	10	174
Shells and lime----------	3	22	Sand; water----------	10	184

Well F-13

Owner: Humble Oil & Refining Co. Driller: G. P. Mizell.

Sand, brown----------	5	5	Sand and clay----------	33	220
Caliche----------	20	25	Clay, red----------	20	240
Sand----------	162	187			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well F-18

Owner: Pasotex Pipeline Co. Driller: Layne-Texas Co.

Caliche----------	8	8	Sand; water----------	15	429
Sand----------	111	119	Shale, sandy----------	4	433
Clay, red----------	16	135	Sand; water----------	3	436
Sand----------	3	138	Shale----------	16	452
Shale, red----------	137	275	Sand----------	4	456
Sand----------	5	280	Shale, red----------	12	468
Shale----------	134	414			

Well F-19

Owner: Pasotex Pipeline Co. Driller: L. F. Buchanan.

Surface soil----------	2	2	Clay, red, dense---------	352	420
Caliche----------	12	14	Sand, red----------	2	422
Sandstone----------	54	68	Clay, red----------	16	438

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well F-20

Owner: Pasotex Pipeline Co. Driller: L. F. Buchanan.

Surface soil----------	2	2	Sand----------	2	484
Caliche----------	12	14	Clay, red----------	12	496
Sandstone----------	54	68	Gravel----------	6	502
Clay, red----------	352	420	Clay, red----------	14	516
Sand; water----------	2	422	Gravel----------	6	522
Clay, red----------	60	482	Clay, red----------	20	542

Well F-21

Owner: Wink City Airport. Driller: --

Surface soil----------	5	5	Caliche----------	30	70
Caliche----------	25	30	Sand----------	140	210
Sand----------	10	40			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well F-27

Owner: University of Texas. Driller: L. F. Buchanan.

Surface sand----------	4	4	Clay, gray----------	15	160
Caliche----------	11	15	Sandstone, brown; water--	17	177
Sand, reddish-brown-------	50	65	Clay, gray----------	8	185
Sand, fine, gray---------	40	105	Rock, red sand, and red clay----------	23	208
Shale, sandy, yellow; water----------	40	145			

Well F-32

Owner: D. P. Anderson. Driller: J. R. Marshall.

Surface sand----------	8	8	Quicksand----------	110	145
Caliche----------	12	20	Clay, red----------	8	153
Sand, white----------	15	35	Sand; water----------	7	160

Well G-2

Owner: Sinclair Oil & Gas Co. Driller: John J. Bush.

Surface sand----------	3	3	Sand, white----------	20	140
Gypsum and caliche--------	12	15	Clay, red----------	30	170
Sand, white----------	89	104	Sand, white----------	15	185
Clay, red----------	16	120	Clay, red----------	32	217

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-3

Owner: Skelly Oil Co. Driller: J. D. Cole.

Surface sand----------	4	4	Rock, red----------	29	205
Caliche----------	14	18	Rock, gray, and sand-----	10	215
Sand----------	40	58	Red beds----------	5	220
Clay, red sandy, and gravel----------	2	60	Rock, gray, and sand-----	8	228
Quicksand----------	22	82	Rock, red----------	13	241
Red beds----------	20	102	Sand; water----------	5	246
Sand and gravel----------	8	110	Red beds----------	22	268
Clay and gravel----------	10	120	Sand----------	7	275
Rock, red, and gravel-----	8	128	Sand and red beds--------	31	306
Sandstone, gray----------	39	167	Rock, red----------	16	322
Lime, gray, sandy---------	4	171	Red beds----------	22	344
Red beds----------	5	176	Sand----------	10	354

Well G-7

Owner: Humble Oil & Refining Co. Driller: R. E. Griggs.

Surface sand----------	4	4	Sand----------	16	152
Caliche----------	14	18	Clay----------	9	161
Sand----------	66	84	Sand----------	53	214
Gravel----------	2	86	Clay----------	5	219
Sand----------	48	134	Sand----------	11	230
Gravel----------	2	136	Clay----------	20	250

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-9

Owner: Gulf Oil Corp. Driller: --

Sand and caliche----------	115	115	Anhydrite and lime-------	36	2,314
Red beds and shale--------	706	821	Anhydrite and gypsum-----	103	2,417
Red beds, anhydrite and shale----------	481	1,302	Anhydrite and lime-------	738	3,155
Anhydrite and salt--------	976	2,278	Lime----------	395	3,550

Well G-10

Owner: Humble Oil & Refining Co. Driller: N. B. Oliver.

Surface sand----------	6	6	Sand, red----------	53	91
Gypsum----------	12	18	Sand and gravel----------	7	98
Quicksand----------	20	38	Rock, and red sand-------	12	110

Well G-11

Owner: Humble Oil & Refining Co. Driller: --

Surface sand----------	6	6	Sand, red----------	47	86
Gypsum----------	15	21	Sand and gravel; water---	11	97
Quicksand----------	18	39	Rock and red sand--------	8	105

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-13

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Sand----------	10	10	Rock, red----------	8	120
Caliche----------	15	25	Sand; water----------	4	124
Sand----------	87	112	Rock, red, sandy---------	76	200

Well G-28

Owner: Humble Oil & Refining Co. Driller: J. J. Harrell.

Sand----------	6	6	Sand and gravel----------	30	100
Caliche----------	14	20	Shale, red----------	2	102
Sand and gypsum----------	25	45	Sand, red----------	19	121
Sand, red----------	25	70	Shale, red----------	4	125

Well G-37

Owner: Gulf Oil Corp. Driller: --

Caliche----------	24	24	Anhydrite and salt-------	1,260	2,131
Red beds----------	252	276	Anhydrite and lime-------	463	2,594
Anhydrite and red rock----	595	871	Lime----------	956	3,550

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-38

Owner: Wink Basin System. Driller: H. E. Turbeville.

Surface sand----------	6	6	Sand, shale streaks------	144	215
Caliche----------	6	12	Rock----------	7	222
Quicksand----------	57	69	Sand; water----------	26	248
Rock----------	2	71			

Well G-40

Owner: Gulf Oil Corp. Driller: --

Sand and caliche----------	70	70	Anhydrite and lime-------	844	2,713
Red beds and anhydrite----	750	820	Lime----------	151	2,864
Anhydrite and gypsum------	615	1,435	Anhydrite and lime-------	206	3,070
Anhydrite and lime--------	233	1,668	Lime----------	480	3,550
Salt----------	201	1,869			

Well G-41

Owner: Gulf Oil Corp. Driller: --

Sand and red beds---------	227	227	Anhydrite, lime and gypsum----------	810	2,963
Anhydrite, gypsum and salt----------	1,787	2,014	Lime and sand----------	587	3,550
Anhydrite and lime--------	139	2,153			

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well G-42					
Owner: Gulf Oil Corp. Driller: --					
Caliche	65	65	Anhydrite and salt	493	2,163
Red beds, sand and shale	1,073	1,138	Anhydrite and lime	892	3,055
Anhydrite and shale	338	1,476	Lime	496	3,551
Anhydrite and lime	194	1,670			
Well G-49					
Owner: Humble Oil & Refining Co. Driller: --					
Rock, white	12	12	Sand, red	57	107
Quicksand	26	38	Sand, white; water	43	150
Sand, white	12	50			
Well G-52					
Owner: Humble Oil & Refining Co. Driller: --					
Sand	1	1	Sand	28	140
Gypsum	16	17	Shale, sandy	11	151
Sand	56	73	Gravel and sand	11	162
Shale	19	92	Sand and gravel	11	173
Sand	15	107	Shale	12	185
Sand and gravel; water	5	112			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-69

Owner: Sun Oil Co. Driller: -- Hines.

Sand----------	4	4	Sand; water----------	5	80
Caliche----------	16	20	Rock and sand----------	20	100
Sand----------	35	55	Red beds----------	10	110
Shale and sand----------	20	75	Sand----------	19	129

Well G-75

Owner: Humble Oil & Refining Co. Driller: I. O. Fannin.

Sand and red beds---------	90	90	Sand; water----------	34	136
Sand and gravel----------	12	102	Sand and gravel---------	6	142

Well G-80

Owner: Skelly Oil Co. Driller: J. D. Cole.

Surface sand----------	10	10	Sand----------	32	60
Caliche----------	18	28	Sandstone, gravel and shells----------	70	130

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-83

Owner: Skelly Oil Co. Driller: J. D. Cole.

Sand----------	2	2	Rock, red----------	25	150
Caliche----------	21	23	Sandstone, brown---------	22	172
Sand, brown----------	20	43	Red beds----------	4	176
Clay, sandy, red----------	22	65	Sandstone, brown---------	79	255
Red beds----------	18	83	Rock, red----------	10	265
Sand, red----------	5	88	Sandstone----------	30	295
Sand and gravel----------	14	102	Red beds----------	30	325
Gravel and red rock-------	23	125			

Well G-84

Owner: Skelly Oil Co. Driller: J. D. Cole.

Surface sand----------	4	4	Sandstone----------	50	148
Caliche----------	14	18	Red beds----------	3	151
Clay, red, sandy----------	57	75	Sandstone, brown---------	116	267
Rock, red----------	7	82	Red beds----------	38	305
Sandstone----------	8	90	Red beds and sand--------	11	316
Rock, red----------	8	98			

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-85

Owner: Skelly Oil Co. Driller: J. R. Marshall.

Sand----------	3	3	Sand; water----------	3	81
Caliche----------	17	20	Clay, red----------	25	106
Sand, red----------	35	55	Sand and gravel; water---	4	110
Clay, red----------	15	70	Clay, red----------	1	111
Sand and clay, red--------	8	78			

Well G-92

Owner: Hudson & Hudson. Driller: Donnell Drilling Co.

Sand----------	55	55	Sand and red shale-------	80	295
Sand and gravel----------	50	105	Red beds----------	30	325
Sand and red shale--------	25	130	Shale, red----------	130	455
Sand and gravel----------	27	157	Shale, and sand----------	5	460
Sand----------	8	165	Sand, red----------	42	502
Sand and shale----------	50	215	Shale, red----------	8	510

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-93

Owner: Hudson & Hudson. Driller: Donnell Drilling Co.

Sand----------	3	3	Shale, sandy----------	45	245
Caliche----------	4	7	Shale, red----------	41	286
Sand----------	70	77	Shale and gravel---------	19	305
Sand and gravel; water----	93	170	Shale, red----------	5	310
Gravel and red shale------	30	200			

Well G-112

Owner: Humble Oil & Refining Co. Driller: --

Surface sand----------	1	1	Gravel; water----------	9	149
Caliche----------	8	9	Red beds----------	11	160
Caliche, sandy----------	33	42	Sand, red----------	4	164
Shale, red, sandy---------	60	102	Gravel----------	18	182
Gravel; water----------	5	107	Sand, red----------	30	212
Sand, red----------	33	140			

Well G-113

Owner: Humble Oil & Refining Co. Driller: I. O. Fannin.

Caliche----------	10	10	Gravel----------	93	168
Red beds----------	65	75	Sand and gravel----------	20	188

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-126

Owner: Skelly Oil Co. Driller: Ken Woods Co.

Sand and caliche----------	12	12	Red beds and sand--------	99	800
Sand and red beds---------	100	112	Red beds----------	52	852
Red beds----------	264	376	Red beds and shale-------	134	986
Red beds and lime---------	72	448	Anhydrite----------	12	998
Red beds and sand---------	114	562	Red beds----------	69	1,067
Red beds----------	108	670	Anhydrite, gypsum and shale----------	153	1,220
Red beds, sand and gypsum----------	31	701			

Well G-127

Owner: Skelly Oil Co. Driller: J. D. Bush.

Sand----------	4	4	Shale, red----------	5	135
Caliche----------	21	25	Rock, red----------	45	180
Sand----------	94	119	Sand, red----------	10	190
Shale and red rock--------	3	122	Rock, red----------	90	280
Sand; water----------	8	130			

Well G-130

Owner: Richardson Oils Co., Inc. Driller: Bud Tone.

Caliche----------	20	20	Sand----------	5	155
Sand----------	35	55	Shale, sandy----------	37	192
Red beds----------	61	116	Sand----------	28	220
Shale, red----------	34	150	Shale, sandy----------	40	260

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-133

Owner: Gulf Oil Corp. Driller: White Well Service.

Surface sand----------	8	8	Rock, red----------	11	210
Caliche----------	12	20	Sand; water----------	3	213
Sand----------	65	85	Rock, red----------	3	216
Sand and clay, red--------	25	110	Sand; water----------	4	220
Sand; water----------	3	113	Sand, and clay, red------	4	224
Rock, red----------	83	196	Red beds----------	16	240
Sand, coarse----------	3	199			

Well G-134

Owner: Skelly Oil Co. Driller: J. J. Bush.

Sand, red----------	4	4	Sand, red----------	73	98
Caliche----------	2	6	Shale, red----------	22	120
Sand----------	2	8	Sand, brown----------	14	134
Caliche----------	17	25	No record----------	141	275

Table 8.--Drillers' logs of wells in Winkler County--Continued

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

Well G-149

Owner: Gulf Oil Corp. Driller: J. R. Marshall.

Caliche----------	20	20	Rock, red----------	20	160
Sand----------	65	85	Red beds----------	32	192
Rock, red----------	23	108	Sand; water----------	5	197
Red beds----------	32	140	Rock, red----------	4	201

Well G-161

Owner: John Witt. Driller: -- Hamblin.

Caliche----------	30	30	Gravel, fine, sand-------	40	310
Shale, sandy----------	85	115	Gravel, coarse----------	90	400
Sand and red clay streaks-	155	270			

Table 8.-- Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)
Well G-168		
Owner: City of Monahans. Driller: Layne-Texas Co.		
Surface soil	4	4
Caliche	12	16
Caliche, hard brown limerock	13	29
Sand, hard brown, sandy caliche	9	38
Sand, red, red sandrock, and sandy clay	27	65
Caliche, hard, pea gravel, cemented	10	75
Sand, brown, sandy yellow clay, and gravel	11	86
Clay, red	9	95
Caliche, hard, lime and red clay streaks	31	126
Clay, sandy	3	129
Sand, coarse, medium coarse gravel	21	150
Gravel, large, and brown sand	30	180
Gravel, large, and clay	15	195
Gravel, medium coarse, sand and red clay	13	208
Clay, soft red, and sand streaks	29	237
Clay, hard red, and soft brown clay streaks	48	285
Sand, brown, broken, red clay, and small gravel	25	310
Sand, and red clay layers	31	341
Clay and sand layers	20	361
Sand, and clay layers	21	382
Clay, red, streaked brown, sandy streaks	26	408
Sand	6	414
Sand, brown broken, red clay and hard gravel layers	15	429
Sandrock, layers, broken	4	433

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)
Well G-169		
Owner: City of Monahans. Driller: Layne-Texas Co.		
Surface sand	2	2
Caliche	13	15
Caliche, sandy, and red sandrock	16	31
Caliche, sandy, and hard sand	5	36
Caliche, red sandy clay	30	66
Sandrock, and red sandy clay	11	77
Clay, soft brown sandy, with hard layers	15	92
Clay, hard, tough, red	46	138
Sand, brown and small gravel	12	150
Clay, red	2	152
Sand, brown, and small gravel	6	158
Clay, red	19	177
Clay, and dirty brown sand	32	209
Sand, brown	20	229
Sand, brown, clay streaks	18	247
Clay, sandy, red	4	251
Clay, and sand streaks	15	266
Sand, medium brown	43	309
Sand, coarse brown, and fine gravel	17	326
Sand, coarse brown, fine gravel, thin hard layers	5	331
Sand, coarse, and fine gravel	40	371
Gravel and hard sand	24	395
Lime, soft, gravel cemented	7	402

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)
Well G-170		
Owner: City of Monahans. Driller: Layne-Texas Co.		
Surface sand	1	1
Caliche	6	7
Sandrock, red, and sandy caliche	19	26
Sand, hard, red, and sandy caliche	20	46
Clay, red, sandy, and sandrock	23	69
Sandrock, red and sandy clay	18	87
Clay, soft, red, sandy, with hard streaks	13	100
Clay, hard, tough, red	29	129
Clay, red, and soft sandy clay	14	143
Clay, red, and fine gravel and sand	10	153
Sand, medium-brown, and soft light-brown clay, some gravel	13	166
Layers, medium, hard	2	168
Sand and soft clay, traces of gravel	12	180
Sand and fine gravel	3	183
Clay, light-brown, sandy	11	194
Clay, tough, brown	15	209
Clay and hard layers	3	212
Clay, red and brown, sandy clay, sand streaks	15	227
Limerock, honeycombed, sand and clay	15	242
Sand, coarse brown, broken, fine gravel, and clay	31	273
Sand, coarse packed, fine gravel, hard	31	304
Sand, coarse packed, fine gravel	43	347

(Continued on next page)

Table 8.--Drillers' logs of wells in Winkler County--Continued

	Thickness (feet)	Depth (feet)
Well G-170--Continued		
Sand, coarse brown, broken, clay----------	56	403
Sand, broken, red clay layers----------	16	419

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well H-30					
Owner: Humble Oil & Refining Co. Driller: G. S. Taylor.					
Sand----------	30	30	Sand, red----------	5	290
Red beds, and sand--------	10	40	Rock, red----------	5	295
Sand, red----------	20	60	Red beds, and red rock---	100	395
Red beds----------	15	75	Red beds----------	10	405
Sand----------	9	84	Rock, red----------	40	445
Red beds----------	6	90	Red beds----------	85	530
Sand----------	8	98	Sand; water----------	20	550
Red beds----------	187	285	Red beds----------	60	610
Well H-83					
Owner: Magnolia Petroleum Co. Driller: --					
Sand----------	5	5	Sand; water----------	10	95
Caliche----------	40	45	Rock, sandy, red---------	15	110
Sand----------	20	65	Sand----------	25	135
Rock, sandy, red----------	10	75	Rock, sandy, red---------	20	155
Gravel and red sand-------	10	85			

Table 9.--Analyses of water from wells in Winkler County, Tex.
(Water-bearing unit: C, Cenozoic alluvium, Ch, Chinle formation equivalent; R, Rustler formation; S, Santa Rosa sandstone; T, Trinity group.)

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	(Results are in parts per million) Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
A-1	Allen Cowden	87	C	Nov. 1, 1956	57	-	139	46	308	206	578	302	2.0	2.8	-	1,610	535	56	5.8	2,260	7.6
A-3	B. F. Jenkins	100	C	Jan. 13, 1957	73	-	98	29	98	236	286	55	2.6	1.0	-	759	364	37	2.2	1,060	7.8
B-2	Mary K. E. Bauer	75	C	Jan. 29, 1957	68	-	100	21	145	220	263	131	2.4	8.1	0.11	847	336	48	3.5	1,280	7.4
B-4	do	75	C	do	68	-	129	18	105	188	273	109	1.4	37	.18	833	396	37	2.3	1,200	7.4
B-6	do	88	C	do	38	-	468	47	389	137	1,420	370	3.0	107	.78	2,910	1,360	38	4.6	3,660	7.5
B-9	Ratcliff & Bedford	52	T	Feb. 12, 1957	88	-	53	13	41	214	46	32	2.8	.2	-	379	186	33	1.3	535	7.7
*B-10	do	72	T	Apr. 26, 1940	-	-	112	16	191	238	255	200	-	22	-	913	345	-	-	-	-
B-10	do	72	T	Feb. 12, 1957	79	-	116	30	139 3.7	241	230	175	3.2	49	-	972	414	42	3.0	1,420	7.7
B-14	Allen Cowden	83	C	Nov. 1, 1956	54	-	267	115	228	212	1,140	175	2.4	28	-	2,110	1,140	30	2.9	2,650	7.5
B-15	B. F. Jenkins	80	C	Jan. 13, 1957	45	-	101	23	77	234	230	54	2.2	.8	-	648	346	33	1.8	963	7.7
B-17	do	115	C	do	79	-	347	74	173	334	791	308	2.6	9.1	-	1,950	1,170	24	2.2	2,690	7.4
B-18	John Henry Wallace Estate	115	C	Feb. 4, 1957	52	-	429	78	198 7.0	161	1,460	138	2.8	14	-	2,460	1,390	24	2.3	2,860	7.3
B-20	do	1,025	S	Feb. 2, 1957	11	-	21	13	936	491	795	640	2.8	1.5	-	2,660	107	95	39	4,180	8.2
B-21	J. M. Williams et al	1,180	S	do	12	-	57	27	1,380	352	1,180	1,230	1.8	.5	-	4,060	254	92	38	6,310	8.1
C-1	J. B. Tubb Estate	220	S	Sept. 7, 1956	22	-	75	29	147	180	395	45	-	4.5	-	816	306	51	3.7	1,200	7.4
C-2	do	140	C	do	44	-	82	41	100	246	200	88	4.4	57	-	749	373	37	2.3	1,140	7.8
C-5	W. P. Edwards	260	C	Sept. 8, 1956	12	-	86	50	418	253	854	165	-	.0	-	1,710	420	68	8.9	2,500	7.5
C-13	W. D. Harrison	300	C,S	Sept.10, 1956	13	-	54	27	266	231	440	120	2.8	.0	-	1,040	246	70	7.4	1,620	7.4
C-17	Sinclair Oil & Gas Company	455	S	Oct. 22, 1956	11	-	53	41	291	325	465	130	-	.0	-	1,150	300	68	7.3	1,790	7.9

*See footnotes at end of table.

Table 9.--Analyses of water from wells in Winkler County--Continued

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
*C-18	Tom Lineberry	130	C	Mar. 16, 1940	-	-	102	50	313	268	561	230	4.4	-	-	1,390	460	-	-	-	-
*C-20	W. L. Beckham	134	C	Apr. 1, 1940	-	-	52	33	49	220	120	43	2.9	-	-	408	265	-	-	-	-
*C-21	J. B. Tubb Estate	151	C	Mar. 16, 1940	-	-	-	-	-	220	220	98	-	-	-	645	-	-	-	-	-
*C-22	J. B. Walton	118	C	do	-	-	-	-	-	177	154	76	-	-	-	482	-	-	-	-	-
C-25	do	165	C	Sept.10, 1956	44	-	49	26	126	242	152	103	-	4.0	-	630	230	55	3.6	1,010	7.6
*C-33	do	95	C	Mar. 21, 1940	-	-	189	42	233	177	629	250	-	-	-	1,430	646	-	-	-	-
C-37	Olsen Oil Co.	250	-	Sept.12, 1956	56	-	99	21	52	176	197	66	.9	1.5	-	600	334	25	1.2	864	7.4
C-39	Tom Lineberry	-	-	Sept.11, 1956	50	-	87	32	452	257	455	450	2.6	7.3	-	1,660	348	74	11	2,660	7.8
C-40	Evelyn Lineberry	125	C	do	44	-	51	30	319	325	435	158	-	3.0	-	1,200	250	73	8.8	1,840	7.8
C-47	Stanolind Oil & Gas Co.	212	C	Mar. 18, 1957	55	-	52	10	23	147	54	26	1.8	4.5	-	308	171	23	.8	430	7.7
C-50	Jack Lineberry	90	C	Sept.11, 1956	70	-	646	100	481	198	1,270	1,120	-	6.0	-	3,790	2,020	34	4.6	5,300	7.1
C-53	J. E. Haley	297	C	Sept.18, 1956	48	-	211	149	1,100	245	2,180	740	3.2	1.5	-	4,550	5,970	68	14	5,970	7.5
D-1	Tom Lineberry	-	S	Jan. 12, 1957	1.5	-	5.6	5.1	208	a283	129	80	3.4	.0	-	572	35	93	15	974	9.1
D-3	Wood River Oil & Refining Co.	540	S	Apr. 13, 1957	13	-	42	38	317	343	507	100	-	1.8	-	1,190	262	72	8.6	1,800	7.7
D-5	Tom Lineberry	80	C	Oct. 17, 1956	58	-	102	44	234	286	511	115	2.6	9.3	-	1,220	435	54	4.9	1,720	7.7
D-29	do	100	C	Oct. 10, 1956	64	-	102	39	261	278	383	242	4.0	5.0	-	1,240	415	58	5.6	1,860	7.6
D-38	Richardson Oils, Inc.	531	C,S	Jan. 8, 1957	54	-	125	48	245	215	561	195	3.0	.8	-	1,340	510	51	4.7	1,940	7.7
D-47	El Paso Natural Gas Co. well 1	166	C	Oct. 17, 1956	44	-	94	19	41	192	188	27	1.8	8.7	-	543	313	22	1.0	755	7.5
D-48	El Paso Natural Gas Co. well 2	600	S	Oct. 19, 1956	43	-	74	5	43	166	167	12	2.2	7.0	-	452	247	28	1.2	635	7.6

*See footnotes at end of table.

Table 9.--Analyses of water from wells in Winkler County--Continued

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
D-85	El Paso Natural Gas Co. well 5	250	C,S	Feb. 14, 1957	34	-	87	9.8	27	164	40	98	.6	1.5	-	436	258	18	.7	651	7.3
D-89	El Paso Natural Gas Co.	156	C	do	34	-	133	16	44 2.2	143	61	227	.8	3.5	-	591	398	19	1.0	1,070	7.4
D-93	Richardson & Bass	210	C,S	Apr. 15, 1957	28	-	846	81	3,160	68	70	6,520	-	-	-	10,700	2,440	74	28	17,900	7.7
D-98	Carter Foundation	200	C,S	Feb. 14, 1957	30	-	21	2.9	9.4 1.5	80	7.4	3.2	1.4	6.9	-	128	64	24	.5	175	7.7
D-107	Stanolind Oil & Gas Co.	10	C	June 25, 1957	-	-	-	-	-	86	-	4,080	-	-	-	-	735	-	-	9,260	6.7
D-108	J. B. Walton	11	C	Mar. 28, 1957	10	-	31	9.2	36	75	63	46	0.6	0.0	-	268	115	40	1.5	422	7.4
D-117	Humble Oil & Refining Co.	200	C	Apr. 15, 1957	32	-	38	6.7	25	134	19	26	2.2	6.0	-	221	123	30	1.0	351	7.7
D-129	Gulf Oil Corp.	250	C	Feb. 14, 1957	36	-	65	8.3	20	103	20	89	.8	7.0	-	334	196	18	.6	504	7.5
*D-135	J. B. Walton	155	C	Mar. 21, 1940	-	-	28	11	9	122	18	9	2.2	-	-	137	117	-	-	-	-
D-136	Cabot Carbon Black Co.	180	C	May 15, 1947	-	-	34	7.1	18	140	25	7.0	-	4.3	-	225	114	-	-	336	-
D-137	do	230	C	Feb. 14, 1957	40	-	34	6.7	20	132	24	7.5	2.6	5.2	-	213	112	27	.8	303	7.8
D-138	do	215	C	Oct. 20, 1956	42	-	51	10	24	145	48	29	2.2	5.1	-	290	168	23	.8	434	7.8
D-141	Magnolia Petroleum Co.	225	C,S	Sept.20, 1956	44	-	200	29	84	219	209	278	1.0	12	-	965	618	23	1.5	1,580	7.4
D-144	do	250	C,S	Apr. 16, 1957	47	-	112	18	69	130	112	195	1.4	3.5	-	622	354	30	1.6	1,050	7.9
D-154	Sun Oil Co.	143	C	Sept.10, 1956	52	-	187	31	138	183	496	158	1.2	2.0	-	1,200	594	34	2.5	1,640	7.4
D-160	Texas Pacific Coal & Oil Co.	1,234	R	Sept.25, 1956	10	-	1,380	1,400	57,400	56	7,140	89,700	2.3	-	-	157,000	9,200	93	260	-	6.5
D-163	Sinclair Oil & Gas Co. well 3	200	C	Oct. 22, 1956	40	-	86	12	41	166	134	54	-	1.2	-	463	264	25	1.1	693	8.0
*D-185	J. B. Walton	87	C	Mar. 21, 1940	-	-	-	-	-	104	14	13	-	-	-	125	-	-	-	-	-

*See footnotes at end of table

Table 9.--Analyses of water from wells in Winkler County--Continued

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
*D-186	J. B. Walton	87	C	Apr. 21, 1940	-	-	-	-	-	122	16	19	-	-	-	152	-	-	-	-	-
D-191	Standard Oil Co. of Texas	195	C	May 14, 1947	-	-	33	4.0	10	117	15	5.0	-	3.8	-	215	99	-	-	250	-
D-193	do	1,062	R	Jan. 25, 1957	16	-	627	845	4,810	133	4,320	7,720	2.8	-	-	18,400	5,040	67	29	24,500	7.3
D-196	do	425	C,S	do	28	-	82	16	46	138	69	127	1.8	2.8	0.10	441	270	27	1.2	781	7.7
D-208	Seth Campbell	175	C	May 14, 1947	-	-	44	5.7	20	123	42	20	-	5.1	-	258	133	-	-	381	-
D-209	The Texas Co.	140	C	Oct. 24, 1956	32	-	39	6.1	22	146	30	9.5	1.2	3.8	-	209	123	28	.9	369	7.7
D-220	Ambassador Oil, Inc.	200	C,S	Oct. 19, 1956	36	-	34	3.4	11	102	16	14	-	4.0	-	165	99	20	.5	249	8.1
D-224	Rock Hill Oil Co. well 2	150	C	do	38	-	31	2.8	12	96	16	12	.4	1.5	-	157	88	23	.6	248	7.9
D-231	J. B. Walton	200	C	Mar. 18, 1957	41	-	39	4.8	19	124	22	18	1.8	3.5	-	210	117	26	.7	305	7.6
D-244	Harlan Producing Co.	230	C,S	do	39	-	75	7.7	15 2.0	94	32	101	.6	2.0	-	320	218	13	.4	554	7.5
D-245	do	148	C	do	34	-	1,320	739	25,100	221	2,820	41,000	-	-	-	71,100	6,330	90	137	82,200	6.8
D-256	Standard Well Service	200	C	Oct. 17, 1956	40	-	53	4.9	18	107	21	55	.6	.0	-	266	150	20	.6	390	7.5
D-258	Skelly Oil Co.	210	C,S	Oct. 18, 1956	34	-	123	15	28	84	138	152	.6	.0	-	532	368	14	.6	872	7.6
D-277	City of Kermit	405	S	Aug. 18, 1957	32	-	34	5.1	12 1.7	118	22	7.0	1.2	4.8	.06	178	106	19	.5	259	7.9
D-278	do	300	C,S	Jan. 30, 1957	29	0.00	30	5.4	17 2.0	120	21	6.0	1.8	2.1	-	173	97	27	-	263	7.7
D-278	do	300	C,S	Mar. 18, 1957	30	-	31	5.3	22	127	24	7.2	1.8	3.0	-	186	99	32	0.9	273	7.8
D-279	do	700	S	June 3, 1940	29	0.12	34	6.0	14 2.4	96	44	6.0	1.1	3.4	0.2	197	110	21	-	280	-
D-280	do	501	S	May 15, 1947	-	-	37	6.7	47	136	93	8.0	-	3.0	-	266	120	-	-	-	-
*D-285	C. B. Parker	200	C	Apr. 18, 1940	-	-	-	-	-	171	45	23	-	-	-	240	-	-	-	-	-

*See footnotes at end of table.

Table 9.--Analyses of water from wells in Winkler County--Continued

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
D-291	City of Kermit	559	S	Apr. 27, 1957	28	-	36	6.8	20	138	29	7.0	1.6	5.0	-	201	119	26	.8	307	7.8
D-292	do	545	C,S	Mar. 18, 1957	32	-	85	14	29	127	94	86	1.2	6.3	-	410	270	19	.8	673	7.5
D-294	do	471	C,S	May 15, 1947	26	.02	40	7.2	25 4.6	146	34	19	1.8	3.0	-	232	129	-	-	354	7.5
D-298	Winkler County	252	C	Oct. 23, 1956	28	-	40	7.4	29	146	40	20	-	5.0	-	241	130	33	1.1	394	7.9
D-299	City of Kermit	394	S	July 25, 1957	24	-	42	8.1	23	158	38	8.0	1.4	4.5	-	227	138	26	.8	358	8.0
D-302	C. M. Chastain	375	C,S	Mar. 21, 1957	30	-	39	6.0	28	127	42	18	1.8	6.9	-	234	122	34	1.1	367	7.6
D-307	Seth Campbell	168	C	Oct. 24, 1956	24	-	40	6.8	35	150	58	12	-	5.0	-	255	128	37	1.4	413	8.0
E-12	John Henry Wallace Estate	115	C	Feb. 12, 1957	49	-	161	28	86 5.5	181	310	43	2.2	213	-	1,030	516	26	1.6	1,350	7.6
E-15	Texas State Highway Dept.	120	C	Nov. 8, 1956	35	-	127	18	65	166	292	59	2.0	5.0	-	729	392	26	1.4	1,010	7.9
E-19	Waddell Bros. & Co.	75	C	Feb. 7, 1957	34	-	84	21	34 6.5	167	109	26	1.8	104	-	498	296	20	.9	743	7.6
*E-22	do	65	C	Mar. 7, 1940	-	-	-	-	-	195	276	34	-	-	-	604	-	-	-	-	-
*E-24	do	96	C	Mar. 14, 1940	-	-	581	103	319	104	2,070	180	-	96	-	3,400	1,880	-	-	-	-
E-24	do	96	C	Feb. 7, 1957	28	-	596	110	232 12	99	1,960	146	2.8	210	-	3,590	1,940	21	23	3,720	7.4
E-28	Larry Fernandez	60	C	Nov. 2, 1956	30	-	44	6.9	89	192	64	44	4.4	42	-	418	138	58	3.3	599	7.8
E-39	Stanolind Oil & Gas Co.	1,113	S	Jan. 28, 1957	12	-	5.6	3.4	406	459	342	119	4.4	.0	0.79	1,110	28	97	33	1,760	7.2
E-42	Waddell Bros. & Co.	75	C	Feb. 7, 1957	37	-	33	7.5	18	137	20	7.0	1.6	7.2	-	209	113	26	.7	304	7.7
E-51	C. O. Wheeler	140	C	Jan. 28, 1957	34	-	48	12	49	144	125	19	-	2.5	-	374	170	39	1.6	544	8.1
F-5	L. W. Anderson	184	C	Apr. 23, 1940	-	-	138	94	1,380	376	1,980	970	-	1.0	-	4,750	731	-	-	6,650	-
F-5	do	184	C	Sept.12, 1956	40	-	139	118	1,410	356	2,110	1,000	-	2.5	-	4,990	832	79	21	6,950	7.6

*See Footnotes at end of table.

Table 9.--Analyses of water from wells in Winkler County--Continued

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
*F-6	C. E. Wilson	290	C	Apr. 23, 1940	-	-	373	288	2,090	281	3,930	1,650	-	-	-	8,470	2,120	-	-	-	-
F-8	Winkler County Country Club	190	C	Mar. 18, 1957	50	-	97	61	436	270	810	262	1.8	2.5	-	1,850	493	66	8.5	2,660	7.5
F-9	Jack Lineberry	130	C	Sept.12, 1956	34	-	52	18	347	297	543	105	-	1.0	-	1,250	204	79	11	1,860	8.1
*F-11	Hulda J. Wilson	100	C	Apr. 23, 1940	-	-	198	43	257	159	696	265	-	-	-	1,540	671	-	-	-	-
F-14	do	230	C	Mar. 16, 1957	18	-	52	25	104 6.4	231	184	56	3.0	5.0	-	567	232	48	3.0	885	7.6
*F-15	do	96	C	Apr. 23, 1940	-	-	137	39	69	140	219	220	-	-	-	753	504	-	-	-	-
F-15	do	96	C	Nov. 5, 1956	27	-	610	130	301	115	1,200	970	-	.2	-	3,300	2,060	24	2.9	4,610	8.0
*F-16	Permian Ice Co.	219	C	May 1, 1940	-	-	97	25	114	201	139	195	2.3	-	-	675	345	-	-	-	-
F-18	Pasotex Pipeline Co. well 4	468	C	Sept.19, 1956	16	-	51	18	94	221	161	34	2.2	4.5	-	490	201	50	2.9	773	7.7
F-21	Wink City Airport	210	C	Sept.16, 1957	46	-	746	241	454	142	1,810	1,300	1.6	3.0	-	4,670	2,850	26	3.7	6,150	7.3
F-22	L. W. Anderson	176	C	Apr. 10, 1940	-	-	163	71	357	171	876	294	-	10	-	1,860	-	-	-	2,640	-
F-25	G. P. Mitchell	300	S	Sept.13, 1956	16	-	68	37	115	278	276	37	1.2	1.0	-	696	322	44	2.8	1,040	7.4
F-26	D. P. Anderson	152	-	Aug. 23, 1940	-	-	97	38	43	256	189	53	-	12	-	636	-	-	-	951	-
F-27	University of Texas	208	S	Sept.20, 1956	16	-	98	40	184	284	411	102	1.6	.0	-	1,020	409	49	3.9	1,500	7.2
F-30	do	136	C	Apr. 10, 1940	-	-	254	97	900	203	1,040	1,240	-	4.0	-	3,640	-	-	-	5,570	-
F-37	do	140	C	Sept.21, 1956	45	-	390	143	592	85	876	1,320	1.6	2.0	-	3,410	1,560	45	6.5	5,180	7.4
F-41	do	128	S	Sept.19, 1940	-	-	112	40	83	227	228	112	-	54	-	741	-	-	-	1,230	-
F-43	do	151	S	Sept.20, 1956	50	-	51	19	21	243	25	10	1.6	10	-	309	205	18	.6	464	7.4
F-46	do	200	C	Sept.21, 1956	44	-	50	19	122	227	157	75	2.2	7.7	-	596	203	57	3.7	916	7.7
G-3	Shelly Oil Co.	354	S	Oct. 18, 1956	26	-	198	50	144 5.0	115	451	330	.8	2.0	0.77	1,260	700	31	2.4	1,930	7.7

*See footnotes at end of table.

Table 9.--Analyses of water from wells in Winkler County--Continued

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH
G-4	Skelly Oil Co.	180	C	May 15, 1947	-	-	608	85	379	112	1,100	1,030	-	2.0	-	3,260	1,870	-	-	4,610	-
G-10	Humble Oil & Refining Co.	110	C	June 28, 1957	23	-	114	15	44	228	41	150	-	-	-	499	346	22	1.0	899	7.3
G-14	Earl Vest	146	C	June 26, 1957	17	-	48	11	39	186	75	9.8	1.4	2.0	-	298	165	34	1.3	483	7.5
G-16	Seth Campbell	155	C	Oct. 24, 1956	26	-	38	5.9	25	125	44	15	-	5.0	-	220	119	31	1.0	350	8.1
G-18	do	179	C	do	33	-	60	6.0	18	148	59	20	-	4.0	-	273	174	19	.6	421	8.0
G-24	D. D. Feldman Oil & Gas Co.	310	C,S	Oct. 23, 1956	15	-	50	21	45	214	99	21	-	2.0	-	358	212	32	1.4	593	7.8
G-33	Earl Vest	120	C	Oct. 24, 1956	31	-	58	9.6	29	180	54	29	0.8	0.2	-	301	184	25	0.9	531	7.5
G-38	Wink Basin System	248	C,S	Nov. 5, 1956	34	-	610	132	563	168	1,320	1,260	-	-	-	4,000	2,060	37	5.4	5,670	7.4
G-39	Shell Pipeline Co.	200	C	Oct. 24, 1956	30	-	605	145	209	163	1,220	820	-	.2	-	3,110	2,110	18	2.0	4,290	7.4
G-47	Gulf Oil Corp.	273	C	Nov. 6, 1956	32	-	127	42	65	146	130	265	-	3.2	-	834	490	22	1.3	1,290	7.6
G-58	Rycade Oil Corp.	110	C	Oct. 24, 1956	22	-	363	67	138	73	332	760	.8	.5	-	1,720	1,180	20	1.7	2,920	7.5
G-59	do	110	C	do	26	-	374	70	194	113	621	640	.4	.2	-	1,980	1,220	26	2.4	3,010	7.5
G-60	do	200	C	do	27	-	377	68	196	114	623	640	.8	.5	-	1,990	1,220	26	2.4	3,020	7.7
G-61	Earl Vest	100	C	do	60	-	149	30	84	173	144	268	1.6	3.8	-	825	495	27	1.6	1,530	7.9
G-66	Bert Fields Oil Co.	200	C,S	Oct. 23, 1956	35	-	75	12	32	149	58	84	1.0	2.8	-	388	236	23	.9	695	7.6
G-70	Barron Kidd	120	C,S	Oct. 20, 1956	38	-	665	92	280	167	1,600	560	-	67	-	3,380	2,040	23	2.7	4,150	7.6
G-74	do	251	C,S	Oct. 20, 1956	34	-	66	8.8	28	149	66	48	.4	2.8	-	330	201	23	.9	580	7.7
*G-78	G. P. Mitchell	85	C	Apr. 9, 1940	-	-	33	12	42	103	71	47	-	-	-	256	133	-	-	-	-
G-86	Earl Vest	110	C	Oct. 9, 1956	30	-	44	8.2	29	147	42	27	1.4	.2	-	254	144	30	1.0	404	7.5
G-87	do	110	C	do	42	-	203	42	156	297	432	215	1.0	24	-	1,260	679	33	2.6	1,810	7.1

*See footnotes at end of table.

Table 9.--Analyses of water from wells in Winkler County--Continued

Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25°C)	pH
G-92	Hudson & Hudson	510	C,S	Oct. 22, 1956	22	-	42	11	42	175	65	21	-	1.0	-	290	150	38	1.5	472	8.1
G-108	City of Wink	165	C	June 3, 1940	35	0.10	43	13	30 3.3	153	57	24	2.0	3.8	0.6	293	161	-	-	446	-
G-109	City of Wink well 3	250	C	Sept.23, 1956	40	-	230	63	161	154	412	438	1.4	7.2	-	1,430	833	30	2.4	2,270	7.4
G-111	City of Wink well 6	240	C	do	25	-	40	14	50	191	68	22	2.6	2.0	-	318	158	41	1.7	513	7.5
G-115	A. C. Morton et al	90	C	Oct. 11, 1956	48	-	78	19	67	240	121	62	2.2	2.0	-	518	272	35	1.8	778	8.2
G-117	Humble Pipeline Co.	182	C	Oct. 8, 1956	32	-	36	9.4	33	148	46	19	1.4	.0	-	250	128	36	1.3	381	7.9
*G-122	Sinclair Oil Co.	151	C	Apr. 9, 1940	-	-	84	19	47	207	157	38	-	-	-	450	287	-	-	-	-
*G-129	G. P. Mitchell	101	C	do	-	-	80	13	72	226	133	60	-	-	-	469	253	-	-	-	-
G-129	do	101	C	Oct. 5, 1956	34	-	63	9.0	89	174	150	62	.8	.0	-	494	194	50	2.8	750	7.5
*G-136	Sun Oil Co.	205	C	Apr. 9, 1940	-	-	46	10	39	189	53	20	1.2	-	-	262	156	-	-	-	-
G-138	Earl Vest	82	C	Oct. 4, 1956	46	-	82	14	39	168	102	60	1.8	17	-	462	262	24	1.0	678	7.8
*G-139	Texas & New Mexico RR	80	C	Apr. 9, 1940	-	-	58	13	37	183	47	55	-	-	-	301	198	-	-	-	-
*G-140	Tobe Morton	110	C	do	-	-	-	-	-	207	77	51	-	-	-	359	-	-	-	-	-
*G-141	do	89	C	do	-	-	90	20	22	183	134	32	-	24	-	412	307	-	-	-	-
G-146	University of Texas	130	C	Aug. 23, 1940	-	-	82	47	183	308	367	110	-	6.8	-	948	398	50	-	1,520	-
G-146	do	130	C	Oct. 8, 1956	47	-	55	30	177	278	289	71	3.6	9.3	-	819	260	60	4.8	1,190	7.9
G-157	Fay H. Hogg	180	C	Oct. 18, 1956	45	-	50	15	40	182	75	28	1.8	2.0	-	355	186	32	1.3	520	7.7
G-162	John Witt	223	C	Jan. 25, 1957	42	-	211	93	331 14	153	474	740	1.8	4.5	0.31	1,990	910	44	4.8	3,290	7.8
G-163	do	400	C	Mar. 14, 1957	35	-	75	40	367 10	220	258	492	2.6	3.0	.37	1,390	352	69	8.5	2,310	7.6

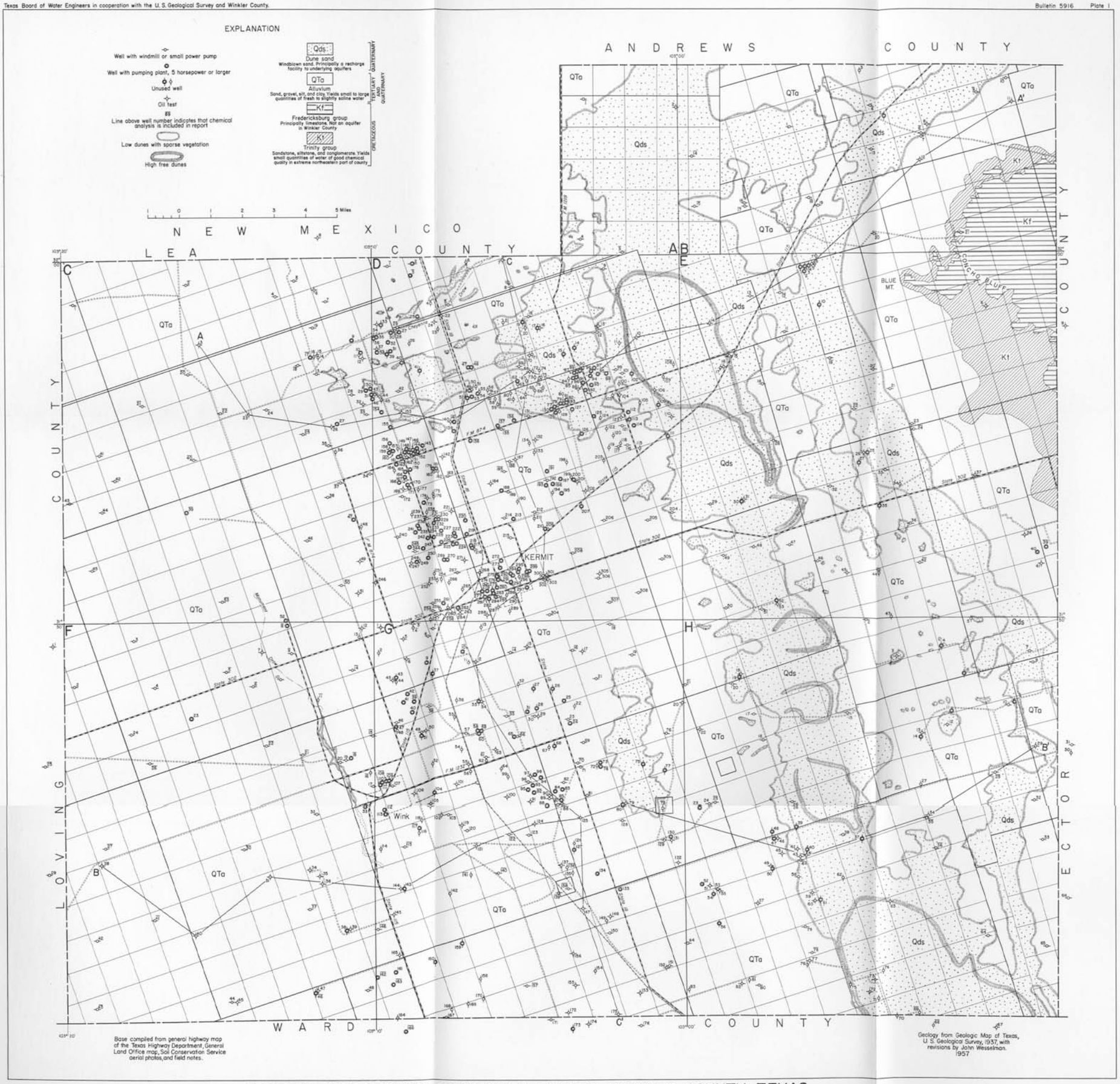
*See footnotes at end of table.

Table 9.--Analyses of water from wells in Winkler County--Continued

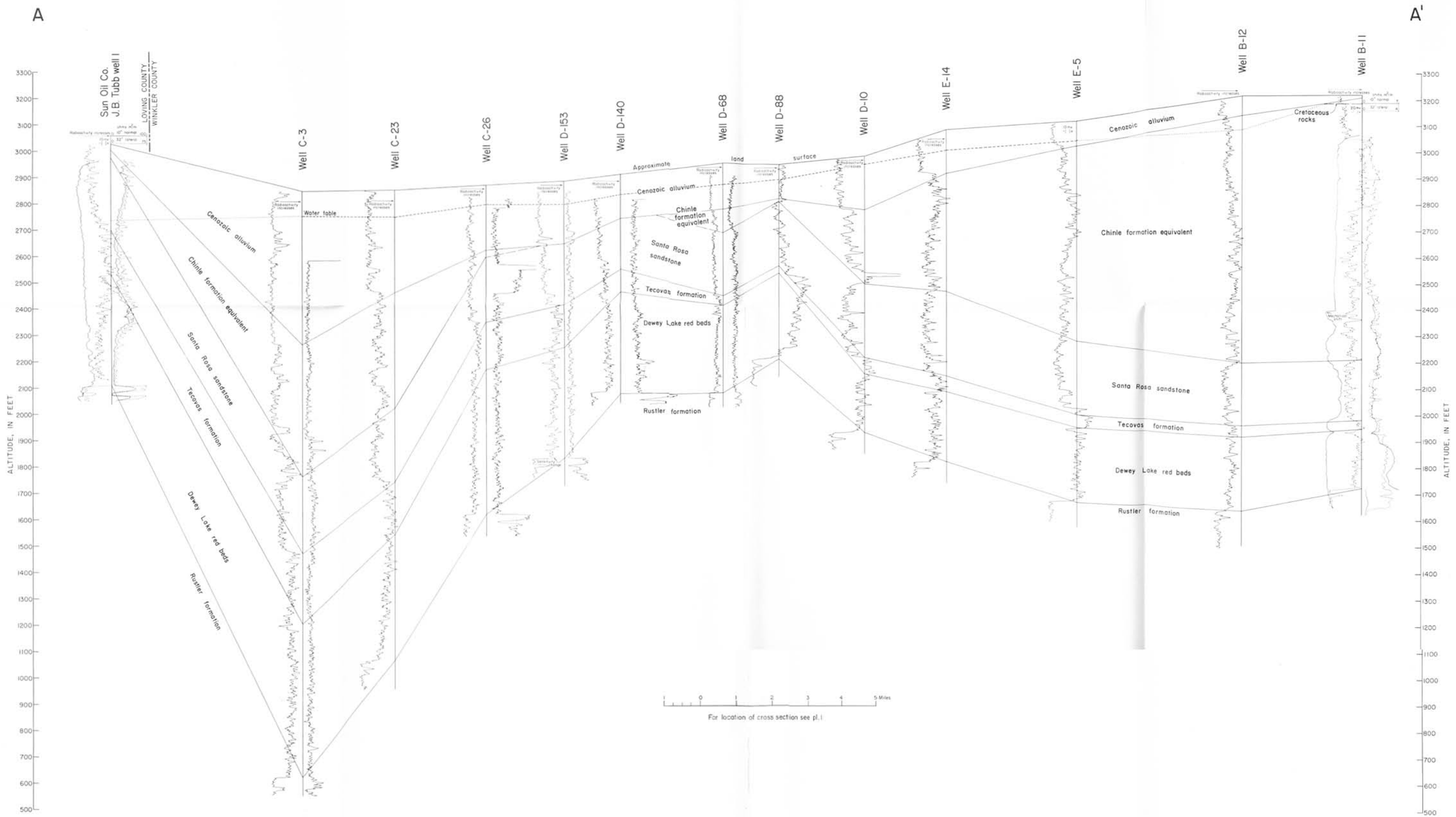
Well	Owner	Depth of well (ft.)	Water-bearing unit	Date of collection	Silica (SiO_2)	Iron (Fe)	Calcium (Ca)	Magnesium (Mg)	Sodium and potassium (Na + K)	Bicarbonate (HCO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrate (NO_3)	Boron (B)	Dissolved solids	Total hardness as $CaCO_3$	Percent sodium	Sodium adsorption ratio (SAR)	Specific conductance (micromhos at 25° C)	pH
G-166	J. D. Cole	300	C	Oct. 21, 1956	48	-	211	102	400	186	531	780	2.6	3.2	-	2,170	945	48	5.7	3,470	7.5
H-7	W. D. Amburgey	100	C	Jan. 28, 1957	24	-	578	75	311	123	1,810	290	2.2	32	-	3,180	1,750	28	3.2	3,670	7.4
H-21	Fay H. Hogg	105	C	Feb. 8, 1957	33	-	47	12	61	203	82	27	2.6	1.5	-	370	166	44	2.0	583	7.7
*H-25	G. P. Mitchell	250	C,S	Apr. 9, 1940	-	-	77	14	64	195	165	40	-	-	-	456	249	-	-	-	-
H-25	do	250	C,S	Oct. 4, 1956	34	-	78	12	58	186	136	49	1.4	2.8	-	462	244	34	1.6	692	7.7
H-28	W. D. Amburgey	100	C	Oct. 8, 1956	44	-	128	13	100	168	314	77	1.2	18	-	789	373	37	2.2	1,080	7.8
H-35	Sealy & Smith Foundation	120	C	Oct. 4, 1956	52	-	207	28	175	171	546	199	1.2	25	-	1,320	632	38	3.0	1,810	7.8
H-44	Stanolind Oil & Gas Co. well 3	95	C	Oct. 3, 1956	44	-	89	10	56	204	135	49	1.0	6.2	-	490	263	32	1.5	720	7.7
H-64	Sealy & Smith Foundation	60	C	Feb. 12, 1957	73	-	153	33	95 5.3	165	288	180	.7	56	-	997	516	28	1.8	1,430	7.8
H-68	do	-	C	Apr. 26, 1957	4.2	-	53	7.5	11	96	77	18	-	1.2	-	237	162	12	.4	373	7.0
H-69	do	-	C	Oct. 9, 1956	19	-	38	8.9	31	20	87	64	.4	.8	-	259	132	34	1.2	429	6.7
H-78	do	60	C	Oct. 8, 1956	38	-	31	3.3	11	121	7.6	4.5	.4	.5	-	156	90	22	.5	210	7.9
H-81	do	300	C,S	do	40	-	198	24	137	210	390	220	.8	1.2	-	1,110	592	34	2.5	1,640	7.7

*Analyzed by Works Progress Administration

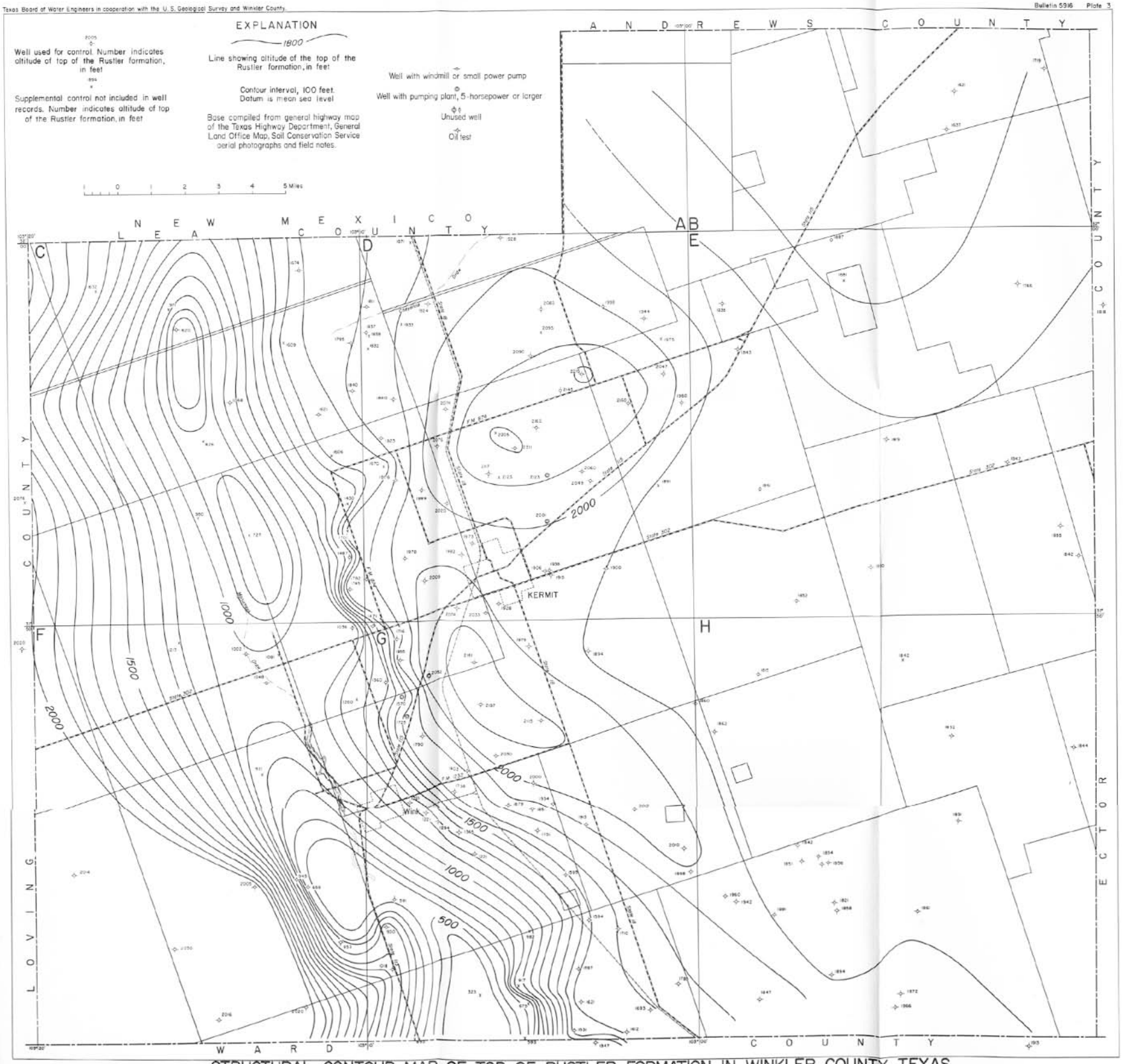
a Includes equivalent of 31 ppm carbonate (CO_3).



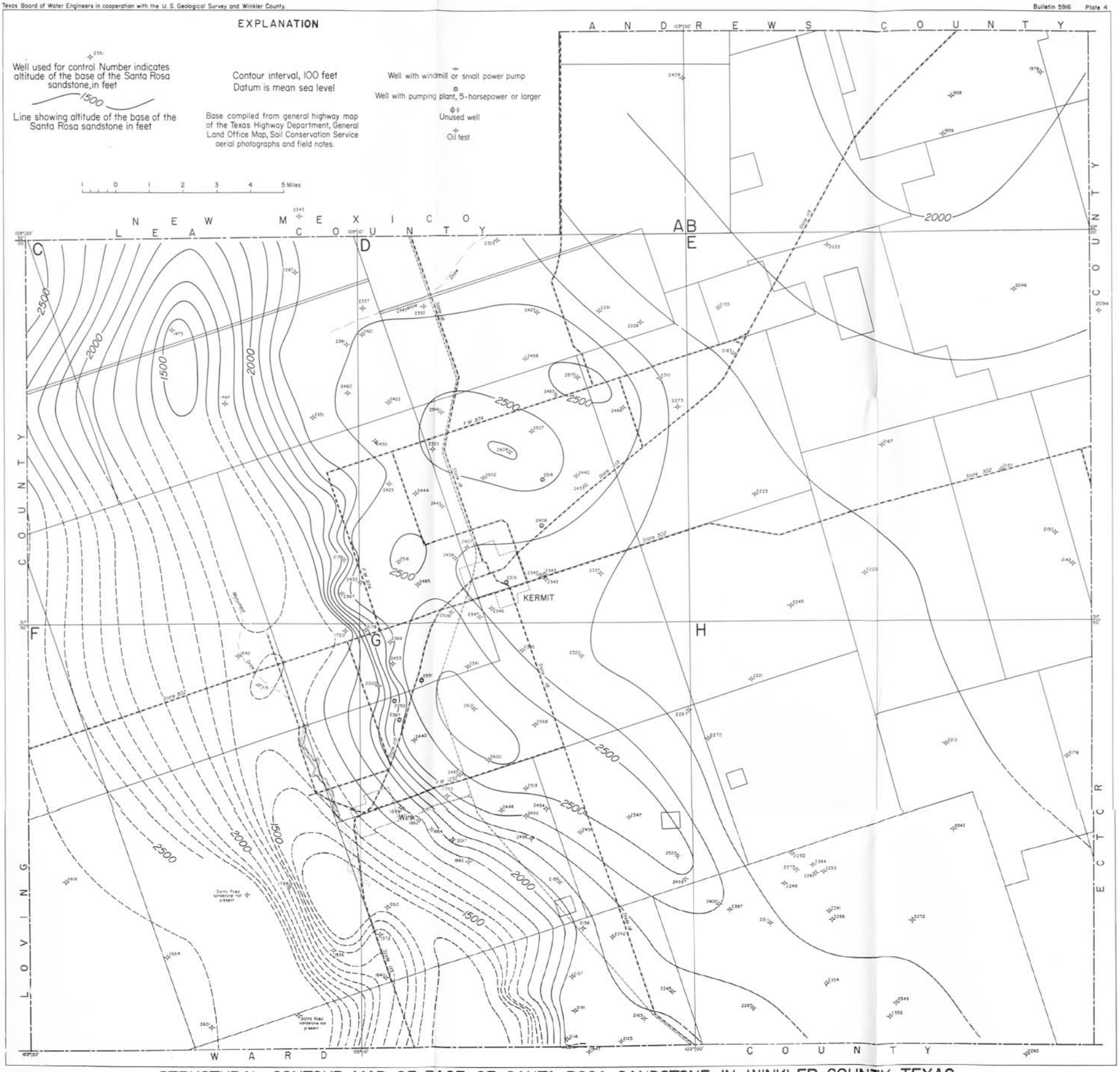
GEOLOGIC MAP SHOWING LOCATION OF WELLS, WINKLER COUNTY, TEXAS.



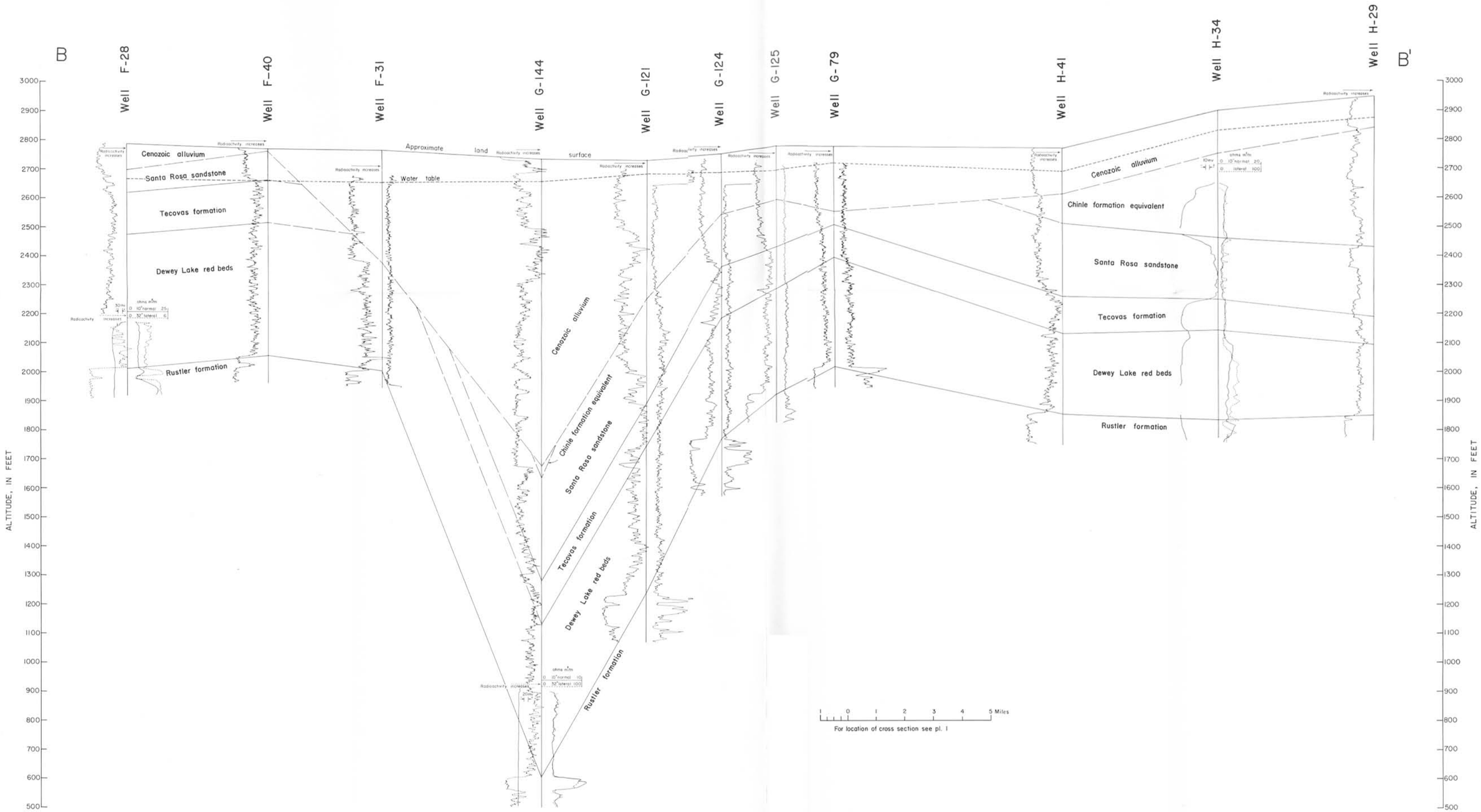
GEOLOGIC CROSS SECTION ALONG LINE A-A', WINKLER COUNTY, TEXAS



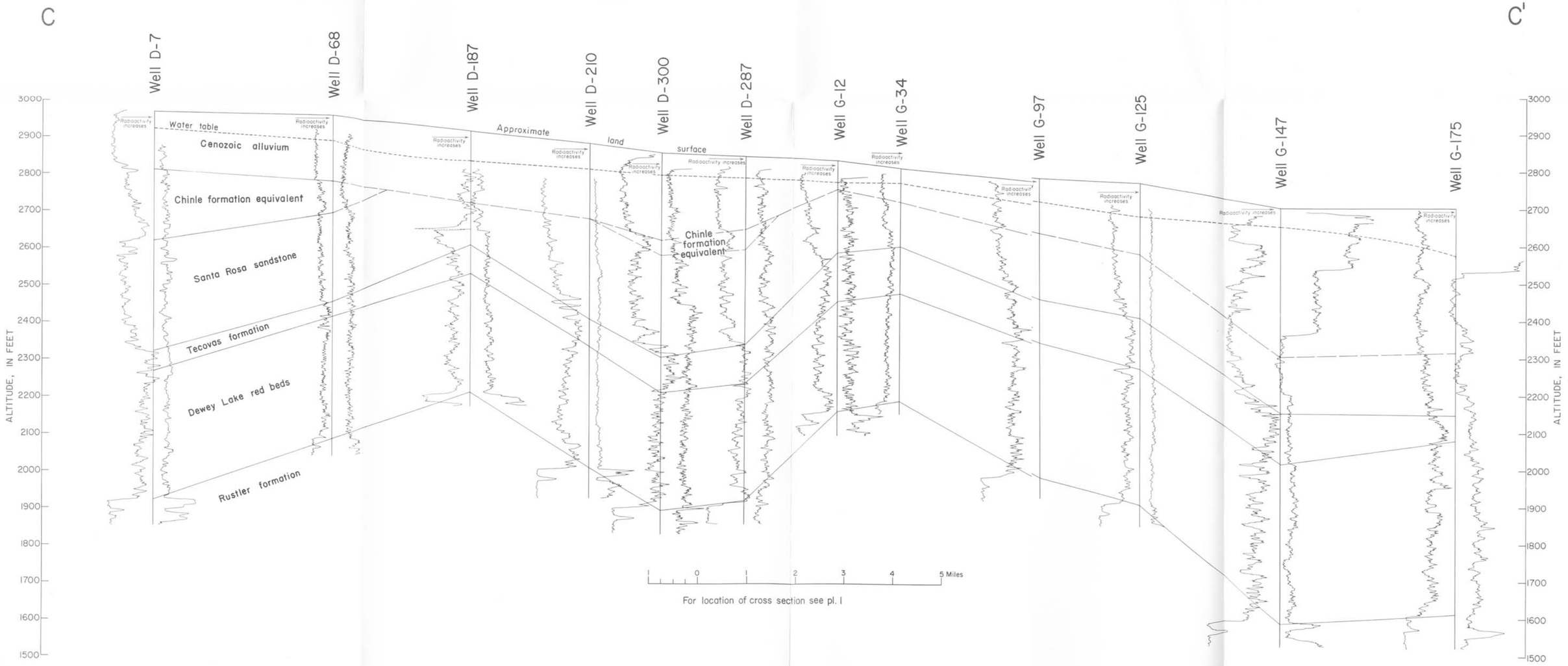
STRUCTURAL CONTOUR MAP OF TOP OF RUSTLER FORMATION IN WINKLER COUNTY, TEXAS



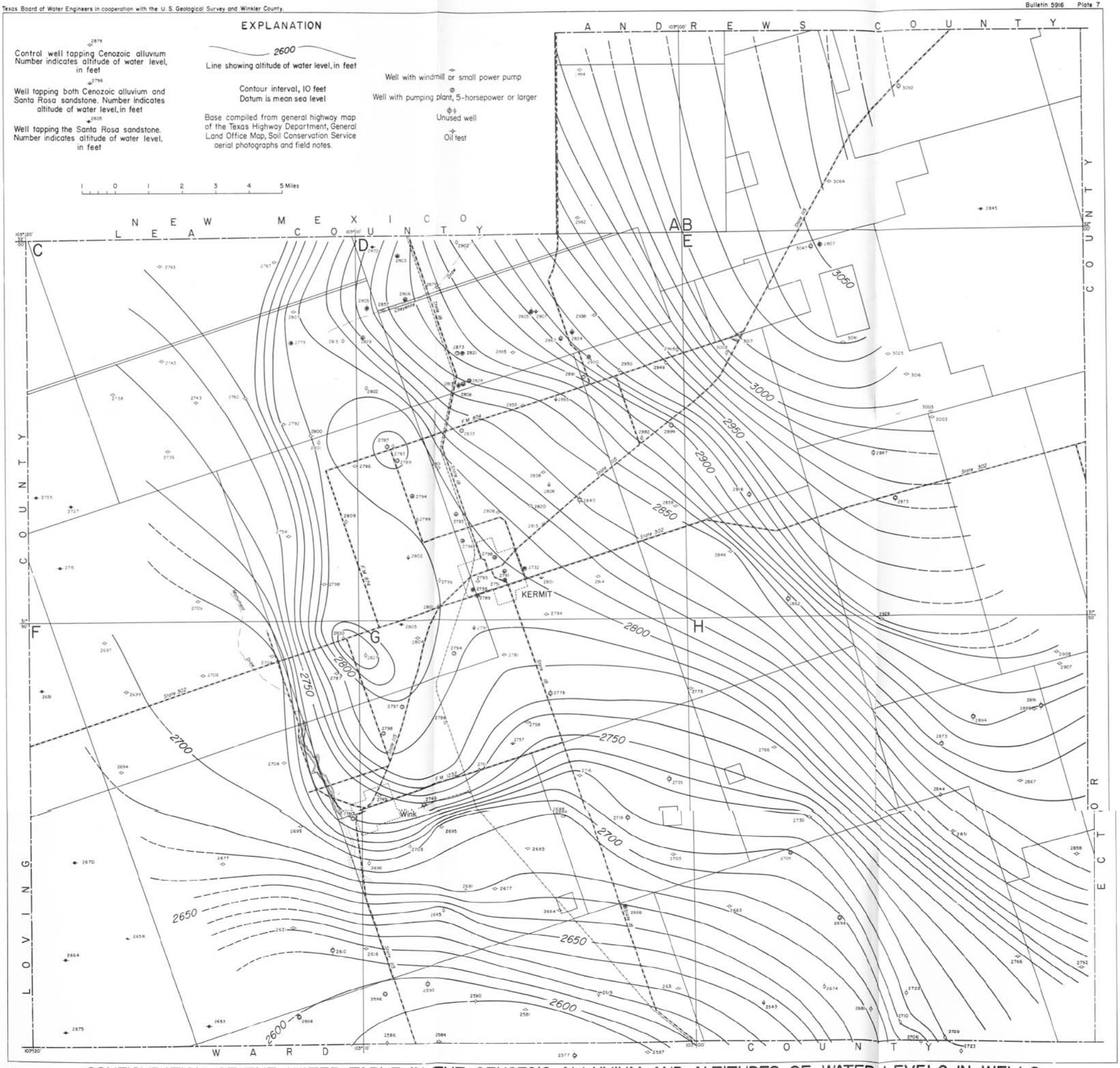
STRUCTURAL CONTOUR MAP OF BASE OF SANTA ROSA SANDSTONE IN WINKLER COUNTY, TEXAS



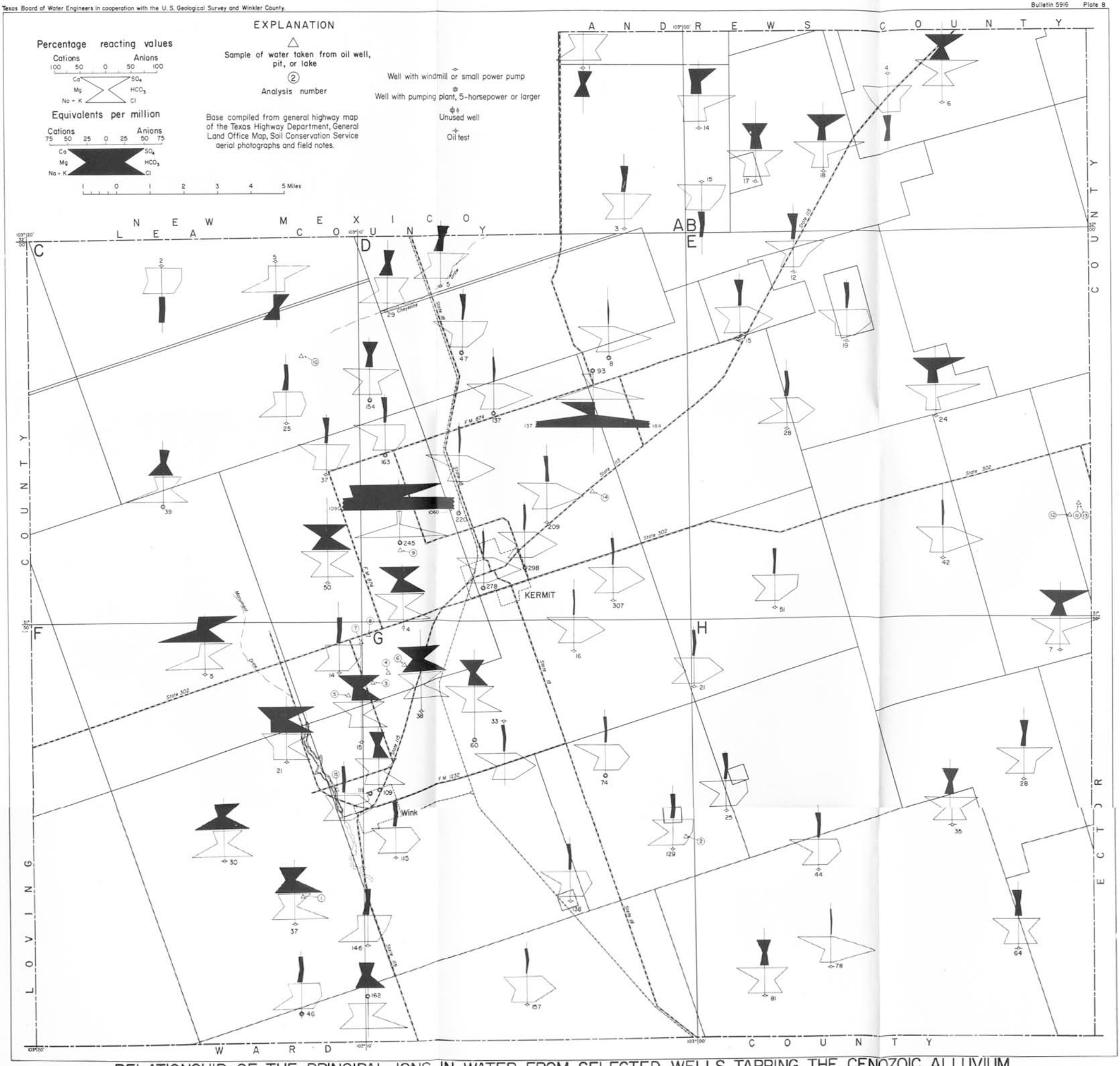
GEOLOGIC CROSS SECTION ALONG LINE B-B', WINKLER COUNTY, TEXAS



GEOLOGIC CROSS SECTION ALONG LINE C-C', WINKLER COUNTY, TEXAS



CONFIGURATION OF THE WATER TABLE IN THE CENOZOIC ALLUVIUM AND ALTITUDES OF WATER LEVELS IN WELLS TAPPING THE SANTA ROSA SANDSTONE IN WINKLER COUNTY, TEXAS



RELATIONSHIP OF THE PRINCIPAL IONS IN WATER FROM SELECTED WELLS TAPPING THE CENOZOIC ALLUVIUM IN WINKLER COUNTY, TEXAS