

TEXAS BOARD OF WATER ENGINEERS

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BULLETIN 5706

THE USE OF GROUND WATER FOR IRRIGATION IN
CHILDRESS COUNTY, TEXAS

By

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Texas Board of Water Engineers

Prepared in cooperation with the Geological Survey,
United States Department of the Interior

March 1957

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ABSTRACT

Childress County, in northwestern Texas, is in the area of outcrop of consolidated rocks of Permian age. Although ground water in small quantities generally is available in most parts of the county, supplies large enough for use in irrigation are available only locally. Areas most likely to yield additional supplies of ground water for irrigation are in the northeastern and eastern parts of the county.

The water derived from the Permian rocks generally is of poor chemical quality; however, its use for irrigation during the past few years has been successful for the most part. Prior to 1950 there were only about 10 irrigation wells in the county, but by the end of 1955 there were about 80 irrigation wells. The irrigation wells range in depth from 120 to 250 feet and yield water from the Blaine formation.

INTRODUCTION

PURPOSE AND SCOPE OF THE INVESTIGATION

This report was prepared as part of a Statewide investigation of the ground-water resources of Texas which is being made by the U. S. Geological Survey in cooperation with the Texas Board of Water Engineers. The report is based on a brief investigation made during part of September 1953, but it includes records of irrigation wells north of the Prairie Dog Town Fork of the Red River obtained in 1955 by Chris Gard, Engineer of the Texas Board of Water Engineers. Records of 74 irrigation wells, drillers' logs of 14 wells, and chemical analyses of samples of water from 20 wells are given in tables 2, 3, and 4, respectively. The locations of the wells are shown in figure 3. In this figure, Childress County has been divided into 9 areas labeled A through J, each embracing all or part of a 10-minute quadrangle. In tables 2, 3, and 4 the wells in each lettered area are numbered, beginning with 1, the number being preceded by the letter of the area, as C-5 and G-1. Water-level measurements made annually in a few selected wells in Childress County also are given in table 2. The measurements usually are made in January when there is little or no pumping that might influence ground-water levels.

The investigation was made under the general supervision of A. N. Sayre, chief of the Ground Water Branch, U. S. Geological Survey, and under the direct supervision of R. W. Sundstrom, district engineer of the Survey in charge of ground-water investigations in Texas.

LOCATION AND GEOGRAPHY OF THE AREA

Childress County, in northwestern Texas, is bounded on the north by Collingsworth County, on the west by Hall County, on the south by Cottle County, and on the east by Hardeman County, Tex., and Harmon County, Okla. (fig. 1). The population of Childress County in 1950 was 12,123, and that of the city of Childress, the county seat, was 7,619. Smaller towns in the county are Arlie, Loco, Carey, Tell, and Kirkland.

Childress County has an area of 701 square miles and consists of rolling to level land most of which has a sandy loam soil ranging in color from gray to red. Farming is confined largely to the southern third and the extreme northeastern corner of the county, and the principal crops are cotton, small grains, forage, and feed. Much of the remaining area is suitable only for livestock range.

According to records of the U. S. Weather Bureau, the average temperature at the Childress airport for the 40-year period 1915-54 was 62°F, the average precipitation for the 56-year period 1899-1954 was 22.31 inches, and the growing season generally is from April through October.

PREVIOUS INVESTIGATIONS

Records of wells, drillers' logs of wells and test holes, and chemical analyses of water from wells in Childress County were obtained by George and Foster (1942) in 1940 and 1941 as a project of the Work Projects Administration in cooperation with the Texas Board of Water Engineers, the U. S. Geological Survey, and the city of Childress. A report by Broadhurst, Sundstrom, and Weaver (1951) which describes the public water supply at the city of Childress, includes records of wells, drillers' logs, and chemical analyses.

ACKNOWLEDGMENTS

Appreciation is expressed to the residents of Childress County who furnished information and assisted in the collection of well data, and to the local well drillers who supplied valuable information during the investigation. Acknowledgment is due Mr. V. E. Hafner, County Agent, for his assistance and cooperation.

GEOLOGY AND WATER-BEARING PROPERTIES OF THE ROCKS

PERMIAN ROCKS

The rocks that crop out in Childress County are of Permian age. In ascending order the formations include the Blaine gypsum, Dog Creek shale, Whitehorse group, Cloud Chief formation, and Quartermaster formation. They consist principally of sand, sandstone, sandy shale, shale, dolomite, and gypsum. The dip of the strata is slightly westward, in contrast to an eastward slope of the land surface (Gordon, 1913, p. 60), and the combined thickness of the formations named ranges from 1,500 to 2,000 feet (Sellards, Adkins, and Plummer, 1932, p. 177).

The conditions under which ground water occurs in the Permian rocks that underlie Childress County are varied. Water has been found in sand, sandstone, dolomite, gypsum, and interstratified shale and gypsum. The dolomite and gypsum beds contained in the Blaine gypsum have proved to be the most prolific aquifers in the county, and probably all the water used for irrigation comes from the Blaine. Lloyd and Thompson (1929, p. 951) describe the Blaine as follows:

The Blaine comprises a wide belt forming a rough, hilly topography through Hardeman and Childress Counties. It converges to a narrow strip in western Taylor and eastern Nolan Counties where it becomes thinner, only about 375 feet thick. The Blaine formation is about 600 feet thick in Hardeman and Childress Counties. The dip in the northern area is abnormally low, which tends to widen the outcrop.

The gypsum beds range in thickness from about 2 to 10 feet, they are lenticular, and in some places contain large cavernous openings resulting from solution by ground water. The dolomite beds also range in thickness from about 2 to 10 feet, and locally grade into gypsum. The sands, sandstones, and gypsiferous shales in the Blaine yield water in variable quantities, according to the size, shape, and sorting of the sand grains and the extent of jointing and solution in the gypsiferous shale beds. Local well drillers report water in caves in very gypsiferous shale beds in some places; the caves apparently are the result of a combined process of jointing and solution.

The Dog Creek shale, Whitehorse group, Cloud Chief formation, and Quartermaster formation are not known to yield water in quantities suitable for irrigation in Childress County; however, small quantities are derived from these formations for domestic and stock use.

QUATERNARY ROCKS

Unconsolidated deposits of Quaternary age overlie the Permian rocks in parts of Childress County. They occur as terrace deposits along the Prairie Dog Town Fork of Red River north to northeast of Childress, as sand dunes in the northern part of the county, and as an elevated terrace deposit in the Michie sandhills northwest of Childress. This terrace deposit consists primarily of sand but includes some intermixed clay, sandy clay, and gravel and has a maximum thickness of 200 feet (Broadhurst, Sundstrom, and Weaver, 1951, p. 27).

In 1947 the yields of 10 city wells producing from terrace deposits ranged from 64 to 340 gallons per minute (gpm) and averaged 195 gpm (Broadhurst, Sundstrom, and Weaver, 1951, p. 24-25).

GROUND WATER

USE

A previous investigation in Childress County (George and Foster, 1942) indicated that ground water for domestic and stock use is available in most parts of the county. Yields generally are small, however, and the water is of poor chemical quality.

The city of Childress has been unable to obtain a suitable water supply in its immediate vicinity. The municipal supply is derived partly from 10 wells in terrace deposits in the Michie sandhills northwest of Childress and partly from Lake Childress. Both sources are about 9 miles from the city.

Since 1950 the use of ground water for irrigation in the county has increased at a rather steady rate, particularly east and northeast of the city of Childress. Prior to 1950 records were available for about 10 irrigation wells; by September 1953 the number had increased to about 45, and by late 1955, 80 irrigation wells were in use. In September 1953 about 2,500 acres were irrigated by wells, and by late 1955 the total acreage had increased to about 3,000. It is expected that the use of ground water for irrigation in the county will continue to increase.

QUALITY

Chemical analyses of water collected from 20 selected irrigation wells in Childress County indicate that the water developed for irrigation is rather highly mineralized and generally unsuitable for domestic use, chiefly because of large concentrations of calcium sulfate. (See table 4.)

Waters represented by the analyses are plotted in figure 2 according to the method of Richards (1954, p. 80). According to this classification, most of the waters show a low sodium hazard but a very high salinity hazard. However, the predominant dissolved constituent in the irrigation waters is calcium sulfate. Because of its low solubility, it is doubtful that sufficiently high concentrations of calcium sulfate could be developed in the root zone by evapotranspiration to be harmful to plant growth, especially where large quantities of water are applied and drainage is good. The true salinity hazard is therefore probably considerably less than indicated by the plot, and is difficult to predict from the water analyses. However, water from wells F-5, F-9, and F-16, which plotted high to medium in sodium hazard and which contained the largest amounts of chloride, would be most likely to reduce crop yields.

No residual sodium carbonate would be formed by evaporation of any of the waters. On the whole, it is unlikely that there would be any harmful effect on soils by irrigation with the analyzed waters.

Table 1 shows the permissible limits of boron for several classes of irrigation water. The boron content of water from wells F-5, F-9, and F-16 exceeded the maximum specified for class 5 waters used on boron-tolerant crops.

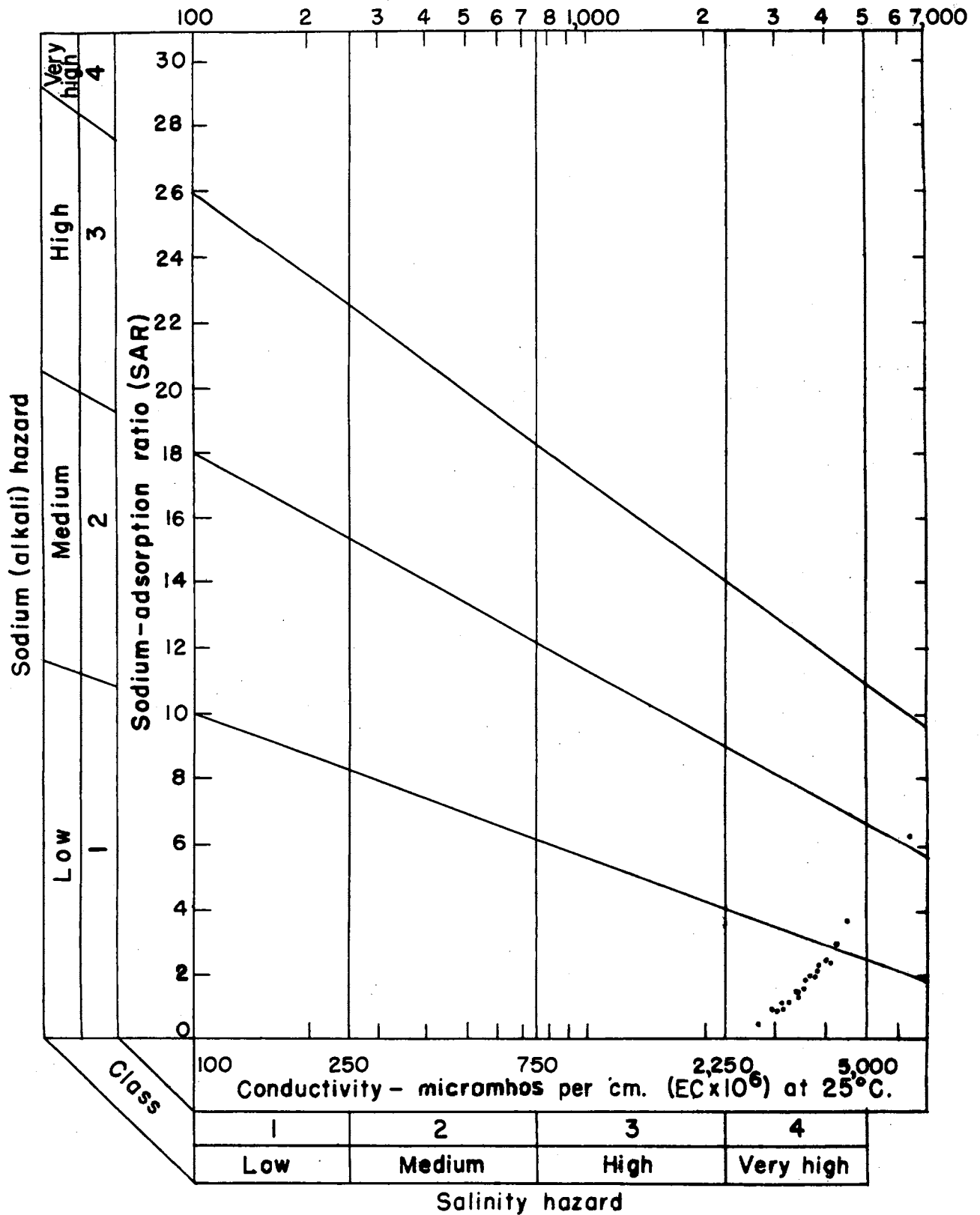


FIGURE 2.-Classification of irrigation waters in Childress County, Tex.
(After Richards, 1954, p. 80)

Table 1.- Permissible limits of boron for several classes of irrigation waters
(Richards, 1954, p, 81).

Boron class	Sensitive crops	Semitolerant crops	Tolerant crops
1	< 0.33	< 0.67	< 1.00
2	0.33 to .67	0.67 to 1.33	1.00 to 2.00
3	.67 to 1.00	1.33 to 2.00	2.00 to 3.00
4	1.00 to 1.25	2.00 to 2.50	3.00 to 3.75
5	> 1.25	> 2.50	> 3.75

SUMMARY OF WELL DATA

Most of the irrigation wells are equipped with turbine pumps driven by engines using butane or natural gas. The wells range in depth from 60 to 357 feet but most of them are 120 to 250 feet deep. Most of the wells are cased with 14- to 16-inch pipe having perforations opposite the water-bearing strata. Yields are reported to range from 178 to 1,500 gpm; most commonly, however, the yields are between 600 and 900 gpm. The measured depth to water in 27 of the wells ranged from 21 to 116 feet below the land surface and averaged 69 feet in September 1953. Water levels measured in several selected wells in September 1953 and in January 1954 and 1955 (table 2) showed minor fluctuations which probably were due to local pumping.

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All wells are drilled unless otherwise noted in remarks column.

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

Method of lift and type of power: E, electric motor; G, gasoline, butane or natural gas engine; J, jet; N, none; T, turbine.
Number indicates horsepower.

Use of water : D, domestic; Irr, irrigation; N, none.

Well	Owner	Driller	Year completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
B-1	Pat Bouchelle	H. & R. Drilling Co.	1955	266	16.12	a/48	1955	T	Irr	Reported yield 600 gpm in 1955. See log.
B-2	Mrs. -- Vernon	Carter Drilling Co.	1955	210	12%	a/50	1955	T	Irr	Cased to 183 ft. Pump set at 193 ft. Reported yield 700 gpm in 1955. See log.
C-1	Pete Nippert	H. & R. Drilling Co.	1955	320	16	a/72	1955	T	Irr	Cased to 130 ft. Reported yield 500 gpm in 1955. Water reported in rock at 305 ft. See log.
C-2	L. L. Collins	do	1955	250	12	a/70	1955	T	Irr	Cased to 247 ft; bottom 177 ft perforated. Pump set at 190 ft. Reported yield 500 gpm in 1955. See log.
C-3	Ed Crowder	do	1955	270	16	a/125	1955	T	Irr	Cased to 270 ft; perforated 200 to 230 ft. Pump set at 230 ft. Reported yield 600 gpm in 1955. Water reported at 207 ft.
C-4	C. E. Crosnoe	--	1955	320	16	a/20	1955	T	Irr	Cased to 20 ft. Pump set at 300 ft. Reported yield 600 gpm in 1955.
C-5	H. P. Scott	H & R. Drilling Co.	1955	307	16	a/30	1955	T	Irr	Cased to 212 ft. Pump set at 250 ft. Reported yield 600 gpm in 1955. See log.
C-6	Bob Younger	do	1955	317	14	--	--	T, G, 100	Irr	Cased to 92 ft. Reported yield 900 gpm in 1955. See log.
C-7	Bill Younger	do	1955	310	16	a/70	1955	T	Irr	Cased to 125 ft; perforated 65 to 85 ft. Reported yield 800 gpm in 1955. See log.
C-8	Francis Younger	do	1955	300	16	a/95	1955	T	Irr	Cased to 165 ft. Reported yield 500 gpm in 1955.
C-9	M. I. Wilkes	do	1955	227	--	a/40	1955	--	Irr	Pump set at 150 ft. Reported yield 500 gpm in 1955. See log.
C-10	do	do	1955	208	--	a/40	1955	--	Irr	Pump set at 175 ft. Reported yield 500 gpm in 1955. See log.
C-11	do	do	1955	215	--	a/40	1955	--	Irr	Pump set at 175 ft. Reported yield 900 gpm in 1955. See log.
C-12	John Sherman	Ivan Owens	1953	206	16	82.8 73.6 75.6	Sept. 28, 1953 Jan. 11, 1954 Jan. 11, 1956	T, G	--	Cased to 65 ft. Pump set at 130 ft. Reported yield 250 gpm in 1955.
C-13	L. C. Hill	do	1953	176	16	a/100	1955	T, G	Irr	Cased to 155 ft. Pump set at 133 ft. Reported yield 925 gpm in 1955.
C-14	do	do	1952	184	14	93.7 a/90	Sept. 30, 1953 1955	T, G	Irr	Cased to 55 ft. Pump set at 133 ft. Reported yield 900 gpm in 1955.
C-15	do	H. & R. Drilling Co.	1955	375	16	a/90	1955	T	Irr	Cased to 200 ft. Pump set at 190 ft. Reported yield 900 gpm in 1955. Reported hard lime at 150, 183, and 205 ft; gumbo 300 to 375 ft.

* Chemical analyses given in table 4.

a/ Reported by owner or driller.

Table 2.- Records of irrigation wells in Childress County--Continued

Well	Owner	Driller	Year completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
C-16	Hugh Painter	Max Crenshaw	1954	272	16	a/ 62	1955	T	Irr	Cased to 96 ft. Pump set at 200 ft. Drilled from 162 to 272 ft in 1955.
C-17	do	Elmo Crenshaw	1949	196	16	102.8 90.2 97.8	Sept. 29, 1953 Jan. 11, 1954 Jan. 11, 1956	T,G	Irr	Cased to 130 ft; bottom 55 ft perforated. Pump set at 135 ft. Reported yield 800 gpm in 1955. Deepened from 96 to 196 ft in 1955.
C-18	A. D. Lewis	--	1955	242	16	a/ 90	1955	T,G	Irr	Cased to 242 ft; perforated 115 to 242 ft. Pump set at 150 ft. Reported yield 900 gpm in 1955. Reported well drilled in 1948 caved-in. Water reported 225 to 240 ft.
C-19	Mrs. A. K. Whiteside	--	--	200	--	--	--	--	Irr	Reported yield 1,000 gpm in 1955.
C-20	L. C. Hill	Ivan Owens	1952	176	16	71.3 a/ 80	Sept. 30, 1953 1955	T,G	Irr	Cased to 170 ft. Pump set at 130 ft. Reported yield 900 gpm in 1955. Water reported in porous rock at 170 ft.
C-21	do	do	1950	305	16	a/ 44 70.0 a/ 80	1950 Sept 30, 1953 1955	T,G	Irr	Cased to 130 ft; perforated 75 to 85 ft and 95 to 125 ft. Pump set at 105 ft. Reported yield 700 gpm in 1955. Deepened from 130 to 305 ft in 1955.
C-22	John Sherman	John Jenkins	1953	205	16	76.7	Sept. 28, 1953	T,G	Irr	Cased to 146 ft; perforated 120 to 140 ft. Reported yield 1,200 gpm in 1953. Originally drilled to 205 ft; reported filled to 146 ft.
C-23	H. C. Norman	H. & R. Drilling Co.	1955	338	--	--	--	--	N	Reported insufficient water for irrigation. See log.
C-24	Mrs. W. D. Durfey	John Jenkins	1953	178	16	47.5 42.1 43.9 41.6	Sept. 26, 1953 Jan. 11, 1954 Jan. 12, 1955 Jan. 11, 1956	T,G	Irr	Cased to 67 ft. Pump set at 170 ft. Reported yield 600 gpm in 1953. Originally drilled to 205 ft; reported filled to 178 ft. See log.
C-25	L. M. Bartlett	John Moore Duke	1955	200	16	a/ 42	1955	T	Irr	Cased to 60 ft. Pump set at 100 ft. Reported yield 1,000 gpm in 1955. Water reported at 164 ft.
*C-26	do	George Darnell	1953	177	16	72.7 65.7 61.9 55.7	Sept. 26, 1953 Jan. 9, 1954 Jan. 12, 1955 Jan. 11, 1956	T,G	Irr	Cased to 6 ft. Pump set at 150 ft. Reported yield 500 gpm in 1955. Reported gypsum 174 to 177 ft.
*C-27	Dewey Scott	M. D. Scott	1953	170	16	--	--	T,G	Irr	Cased to 60 ft. Pump set at 150 ft. Reported yield 1,200 gpm in 1953. Temp. 67°F.
C-28	L. C. Hill	Max Crenshaw	1949	225	--	a/ 78	1955	T	Irr	Reported yield 500 gpm in 1955.
C-29	J. B. Walker	--	1954	165	--	--	--	--	Irr	
C-30	Lynn Garrison	H. & R. Drilling Co.	1955	265	16	a/ 50	1955	T	Irr	Cased to 230 ft; bottom 20 ft perforated. Pump set at 235 ft. Reported yield 500 gpm from cavity in rock.

Table 2.- Records of irrigation wells in Childress County--Continued

Well	Owner	Driller	Year completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
C-31	Ray Fitzer	Elmo Crenshaw	1950	120	16	a/44 59.6 a/80	Jan. 9, 1954 1955	T, G	Irr	Cased to 90 ft; bottom 20 ft perforated. Pump set at 100 ft. Reported drawdown 30 ft after pumping several hours at 1,100 gpm. Water reported from cavity in rock.
C-32	G. C. Richardson	John Jenkins	1953	185	16	80.0 73.9 81.9	Sept. 28, 1953 Jan. 9, 1954 Jan. 11, 1956	T, G	Irr	Cased to 100 ft; 30 ft perforated. Pump set at 150 ft. Reported yield 1,000 gpm in 1953.
C-33	do	Elmo Crenshaw	1951	130	14	a/50	1951	T	Irr	Cased to 130 ft. Pump set at 110 ft. Reported yield 500 gpm in 1955.
C-34	Mrs. Eva Young	Arlie Cole	1954	255	16	--	--	T	Irr	Cased to 160 ft. Reported yield 900 gpm in 1955.
C-35	Mrs. W. D. Ewing	Ivan Owens	1954	85	14	--	--	--	Irr	Cased to 20 ft. Reported yield 500 gpm in 1955.
*C-36	G. E. Clark	"Check" Anderson	1953	150	16	42.8	Sept. 26, 1953	T, G	Irr	Cased to 80 ft. Pump set at 130 ft. Reported yield 700 to 800 gpm in 1953. Driller reported water at 50, 65, and 85 ft Temp. 65°F.
*C-37	do	Tom Darnell	1953	153	14	21.2 17.6 18.5	Sept. 26, 1953 Jan. 9, 1954 Jan. 11, 1956	T, G	Irr	Cased to 140 ft. Pump set at 130 ft. Reported yield 900 gpm in 1955.
C-38	do	DeLacy & Hall	1955	48	14	a/28	1955	--	N	Cased to 48 ft; perforated 30 to 48 ft. Recently completed; not in use when visited in 1955.
C-39	Donald Crook	Max Crenshaw	1955	155	16, 14	a/35	1955	T	Irr	Casing: 55 ft of 16-in., 45 ft of 14-in. bottom 40 ft perforated. Pump set at 141 ft. Reported yield 700 gpm in 1955.
*C-40	C. A. Mitchell	Warren Mitchell	1953	170	12	46.4 45.4 46.9 44.8	Sept. 26, 1953 Jan. 9, 1954 Jan. 12, 1955 Jan. 10, 1956	T, G	Irr	Cased to 70 ft. Pump set at 120 ft. Reported yield 900 gpm in 1955.
*C-41	A. L. Clements	"Dutch" Humphreys	1953	220	8	93.1	Sept. 26, 1953	T, G	Irr	Cased to 210 ft. Reported yield 700 gpm in 1955.
C-42	John Cates	Max Crenshaw	1954	240	18	a/95	1954	T	Irr	Cased to 30 ft. Reported yield 600 gpm in 1955. Reported porous rocks, gyp, lime, and red shale 178 to 184 ft.
*C-43	C. A. Mitchell	Warren Mitchell	1953	170	14	89.7 87.2 88.8 85.6	Sept. 26, 1953 Jan. 9, 1954 Jan. 12, 1955 Jan. 11, 1956	T, G	Irr	Cased to 6 ft. Pump set at 165 ft. Reported yield 1,000 gpm in 1953.
C-44	Steve Owens	--	1955	60	16	a/28	1955	T	Irr	Perforated casing 40 to 60 ft. Reported yield 1,200 gpm in 1955.
*C-45	do	A. Cattlett	1953	100	16	45.2	Sept. 26, 1953	T, G	Irr	Cased to 97 ft; perforated 40 to 100 ft. Pump set at 78 ft. Reported yield 900 gpm in 1955.

Table 2.- Records of irrigation wells in Childress County--Continued

Well	Owner	Driller	Year completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
C-46	J. I. Crawford	Ivan Owens	1951	200	--	29.3	Sept. 30, 1953	T,G	--	No casing. Reported yield 1,300 to 1,500 gpm in 1953.
C-47	do	do	1951	200	19	26.6	do	T,G	Irr	Cased to 50 ft. Pump set at 130 ft. Reported yield 700 to 800 gpm in 1953.
C-48	Loren & Warren Rice	do	1950	186	18	a/40	do	T	Irr	Cased to 40 ft. Reported yield 900 gpm in 1955.
C-49	Tom Darnell	do	1950	78	12	31.5	Sept. 28, 1953	--	Irr	Cased to 60 ft. Reported yield 600 gpm in 1953.
*C-50	do	Elmo Crenshaw	1949	172	16	a/30	1949	T,G	Irr	Cased to 60 ft. Pump set at 90 ft. Reported yield 300 gpm in 1953. Driller reported water at 44 and 138 ft.
C-51	Mrs. A. K. Whiteside	John Jenkins	1954	150	16	a/37	1954	T	Irr	Cased to 90 ft. Pump set at 60 ft. Reported yield 1,500 gpm. Water reported in porous rock and cavities.
E-1	--	--	1955	--	16	50.3	Jan. 12, 1955	N	N	Pump not installed. Will be used for irrigation.
F-1	K. M. Watters	-- Bynum	1952	115	12	--	--	T,G	Irr	Cased to 115 ft. Pump set at 100 ft. Reported yield 1,200 gpm in 1953.
F-2	Dave Brummett	J. H. King	--	130	16	a/72	1953	T,E	N	Cased to 70 ft. Yield reported insufficient for irrigation.
F-3	Wilbur Rutledge	--	1947	122	10	94.5 90.8	Sept. 24, 1953 Jan. 9, 1955	T,E	Irr	Cased to 122 ft. Reported yield 500 gpm in 1953. Water reported at 112 ft.
F-4	do	--	1953	305	24	100.2 91.2	Sept. 24, 1953 Jan. 9, 1954	N	N	Cased to 10 ft. Yield reported insufficient for irrigation.
*F-5	J. J. Goodnight	Nippert Bros.	1953	270	16	a/75	1953	T,G	Irr	Cased to 30 ft. Reported drawdown 72 ft after pumping 2 weeks at 1,100 gpm. Temp. 65°F.
*F-6	Clyde Nippert	Clyde Nippert	1952	180	16	112.6 100.5 104.5	Sept. 23, 1953 Jan. 9, 1954 Jan. 9, 1955	T,G	Irr	Casing: 140 ft of 16-in., 180 ft of 8-in. Pump set at 180 ft. Reported yield 600 gpm in 1953. Originally drilled to 287 ft, reported filled to 180 ft. Temp. 67°F.
F-7	Irby Loter	Earl Hackler	1953	325	--	a/108	1953	N	N	No casing. Yield reported insufficient for irrigation. Reported cavity at 120 ft.
F-8	Earl Hackler	do	1952	165	--	115.8	Sept. 24, 1953	N	N	No casing. Small quantity of water reported at 128 ft, insufficient for irrigation.
*F-9	do	do	1953	323	16	a/97	1953	T,G	Irr	Cased to 7 ft. Reported yield 1,000 gpm in 1953. See log.
F-10	John Patterson	John Bynum	1952	155	--	a/110	1952	N	N	No casing. Yield reported insufficient for irrigation. Water reported 130 to 140 ft.

Table 2.- Records of irrigation wells in Childress County--Continued

Well	Owner	Driller	Year completed	Depth of well (ft.)	Diameter of well (in.)	Water level		Method of lift	Use of water	Remarks
						Below land-surface datum (ft.)	Date of measurement			
F-11	J. H. Garner	Earl Hackler	1953	152	16	111.6 101.2 106.0 101.6	Sept. 24, 1953 Jan. 9, 1954 Jan. 9, 1955 Jan. 10, 1956	T,G	N	Cased to 15 ft. Yield reported insufficient for irrigation.
*F-12	Troy Billingsley	George Luke	1949	101	16	79.7	Sept. 24, 1953	T,G	Irr	Cased to 101 ft; bottom 50 ft perforated. Pump set at 100 ft. Reported yield 1,300 gpm in 1953. See log.
*F-13	G. W. Hale	do	1948	120	18	43.2 45.9 51.0 47.7	Jan. 10, 1953 Jan. 9, 1954 Jan. 9, 1955 Jan. 10, 1956	T,G	Irr	Cased to 120 ft. Pump set at 70 ft. Reported drawdown 17 ft after pumping 1 week at 1,300 gpm. Temp. 65°F.
F-14	Herbert Loter	Earl Hackler	1953	192	--	64.8	Sept. 25, 1953	N	N	No casing. Yield reported insufficient for irrigation.
*F-15	do	-- Koger	1951	117	--	20.2	do	J, E, ½	D	Do.
*F-16	Pink Close, Jr.	-- Humphries	1953	312	16	a/108	1953	T,G	Irr	Cased to 15 ft. Pump set at 250 ft. Reported drawdown 90 ft after pumping several days at 700 gpm. Temp. 68°F.
*G-1	Ray Grimes	"Dutch" Humphries	1953	278	16	55.4 50.5 43.9 49.6	Sept. 25, 1953 Jan. 12, 1954 Jan. 12, 1955 Jan. 12, 1956	T,G	Irr	Cased to 150 ft; perforated below 20 ft. Pump set at 257 ft. Reported yield 178 gpm. Irrigated 5 acres in 1953.
J-1	Ralph Sides	--	--	--	--	91.1 90.8 92.7	Sept. 25, 1953 Jan. 9, 1954 Jan. 9, 1955	T,G	Irr	Equipped with 4-in. pump.
J-2	E. J. Holt	-- Koger	1951	100	--	33.5	Sept. 25, 1953	T,G	Irr	Pump set at 50 ft. Irrigated 10 acres of alfalfa in 1953.
*J-3	Virgil Ellis	Nippert Bros.	1953	168	16	76.5 81.1	Jan. 8, 1954 Jan. 9, 1955	T,G	Irr	Cased to 70 ft. Pump set at 159 ft. Reported yield 400 gpm in 1953.

* Chemical analyses given in table 4.

a/ Reported by owner or driller.

Table 3.- Drillers' logs of irrigation wells in Childress County, Tex.

		Thickness (feet)	Depth (feet)			Thickness (feet)	Depth (feet)
Well B-1							
Owner: Pat Bouchelle. Driller: H. & R. Drilling Co.							
No record -----		69	69	Clay, blue, sticky -----		10	179
Clay, blue -----		44	113	Clay, blue -----		30	209
Clay, red -----		2	115	Clay, red -----		4	213
Rock -----		16	131	Rock -----		6	219
Clay, blue -----		4	135	Gravel and sand, gray -----		8	227
Clay, red -----		5	140	Rock -----		8	235
Clay, sandy, and gravel -----		15	155	Clay, blue -----		31	266
Rock -----		14	169				
Well B-2							
Owner: Mrs. --- Vernon. Driller: Carter Drilling Co.							
Soil -----		5	5	Rock and clay streaks -----		13	84
Clay -----		5	10	Gypsum -----		26	110
Sand -----		12	22	Clay -----		3	113
Clay -----		18	40	Rock -----		17	130
Caliche -----		3	43	Caliche -----		5	135
Clay -----		12	55	Shale and clay -----		15	150
Caliche -----		2	57	Clay -----		3	153
Rock -----		5	62	Rock -----		6	159
Clay -----		6	68	Rock and clay streaks -----		11	170
Rock -----		2	70	Rock -----		10	180
Clay -----		1	71	Rock and clay streaks -----		30	210
Well C-1							
Owner: Pete Nippert. Driller: H. & R. Drilling Co.							
Clay, rock, and sand; water 156 to 162 ft. -----		200	200	Rock -----		28	273
Rock -----		43	243	Packsand, hard -----		17	290
Mud, red -----		2	245	Rock, clay, gravel; water		30	320
Well C-2							
Owner: L. L. Collins. Driller: H. & R. Drilling Co.							
Sand and clay -----		70	70	Gypsum -----		3	181
Rock -----		5	75	Clay, blue -----		5	186
Clay, red -----		20	95	Rock -----		12	198
Rock -----		31	126	Shale, broken -----		5	203
Sand; water -----		9	135	Rock -----		8	211
Shale, broken -----		15	150	Sand; water -----		5	216
Clay -----		22	172	Limestone -----		20	236
Gravel -----		6	178	Clay, red, and sand -----		14	250

Table 3.- Drillers' logs of irrigation wells in Childress County--Continued

		Thickness (feet)	Depth (feet)			Thickness (feet)	Depth (feet)
Well C-5							
Owner: H. P. Scott. Driller: H. & R. Drilling Co.							
Clay, rock, sand and shale and salty water 189 to 195 ft -----	212	212	Clay, blue -----	8	276		
Clay, red and blue -----	23	235	Gypsum -----	19	295		
Gravel -----	8	243	Clay, blue -----	7	302		
Packsand, red; water at 248 ft -----	25	268	Gypsum -----	4	306		
			Clay, blue -----	1	307		
Well C-6							
Owner: Bob Younger. Driller: H. & R. Drilling Co.							
Clay, red -----	42	42	Rock -----	16	208		
Rock -----	8	50	Limestone -----	3	211		
Clay, blue -----	9	59	Clay, blue -----	3	214		
Clay, red -----	28	87	Clay, red -----	12	226		
Rock -----	14	101	Clay, blue -----	5	231		
Clay, blue -----	3	104	Rock -----	3	234		
Clay, red -----	8	112	Clay, red -----	2	236		
Rock -----	10	122	Rock -----	20	256		
Clay, blue -----	4	126	Clay, red -----	10	266		
Rock -----	5	131	Rock -----	10	276		
Sand, water -----	2	133	Sand, fine-grained -----	2	278		
Rock -----	23	156	Gypsum and limestone -----	13	291		
Sand, red, and gravel -----	3	159	Clay, blue -----	7	298		
Rock -----	27	186	Clay, blue, and rock -----	19	317		
Clay, red -----	6	192					
Well C-7							
Owner: Bill Younger. Driller: H. & R. Drilling Co.							
Sand, red, and clay -----	50	50	Clay, blue -----	3	224		
Clay, red, and gypsum -----	20	70	Clay, red -----	3	227		
Sand; water -----	10	80	Rock -----	11	238		
Clay, red -----	16	96	Sand, fine-grained, and rock fragments -----	2	240		
Rock -----	12	108	Clay, blue -----	6	246		
Clay, blue -----	15	123	Clay, red -----	13	259		
Rock -----	12	135	Rock -----	11	270		
Clay, blue -----	6	141	Sand and gravel; water -----	10	280		
Rock -----	24	165	Sand, gray -----	8	288		
Sand and gravel; water -----	7	172	Limestone -----	17	305		
Rock and shale, broken -----	19	191	Clay, blue -----	5	310		
Clay, blue -----	4	195					
Rock -----	26	221					

Table 3.- Drillers' logs of irrigation wells in Childress County--Continued

	Thickness (feet)	Depth (feet)		Thickness (feet)	Depth (feet)
Well C-9					
Owner: M. I. Wilkes. Driller: H. & R. Drilling Co.					
Sand, red, and gravel -----	92	92	Shale, broken -----	3	160
Sand and gravel; water -----	6	98	Gypsum -----	9	169
Rock -----	19	117	Shale and gravel -----	26	195
Gravel and shale -----	5	122	Clay and gravel -----	16	211
Rock -----	17	139	Sand; water -----	2	213
Gravel -----	18	157	Rock -----	14	227
Well C-10					
Owner: M. I. Wilkes. Driller: H. & R. Drilling Co.					
Sand, red, gravel and clay -----	118	118	Clay, sandy -----	8	178
Gravel, water -----	8	126	Rock -----	8	186
Clay, sandy -----	10	136	Gravel -----	4	190
Gravel and shale -----	2	138	Clay, blue -----	4	194
Rock -----	16	154	Rock -----	8	202
Shale -----	11	165	Sand, water -----	6	208
Sand, blue, water -----	5	170			
Well C-11					
Owner: M. I. Wilkes. Driller: H. & R. Drilling Co.					
Sand and clay, red -----	45	45	Gravel and rock -----	22	120
Rock -----	5	50	Gravel and shale -----	16	136
Clay, sandy, and gravel -----	8	58	Rock and gravel -----	13	149
Clay, red -----	8	66	Shale, blue -----	7	156
Clay, blue, and gravel -----	6	72	Rock -----	15	171
Rock -----	8	80	Clay, red, and gravel -----	13	184
Clay, blue, and gravel -----	12	92	Rock -----	9	193
Rock -----	6	98	Gravel and shale, blue -----	22	215

Table 3.- Drillers' logs of irrigation wells in Childress County--Continued

		Thickness (feet)	Depth (feet)			Thickness (feet)	Depth (feet)
Well C-23							
Owner: H. C. Norman. Driller: H. & R. Drilling Co.							
Clay, and sand, red -----	73	73	Rock -----	48	223		
Gravel -----	7	80	Sand and gravel; water -----	7	230		
Clay, sandy -----	18	98	Clay, red, and rock -----	15	245		
Rock -----	7	105	Clay, blue -----	5	250		
Gravel and shale; water -----	8	113	Clay, red, and gravel -----	16	266		
Clay, red -----	8	121	Rock -----	14	280		
Rock -----	12	133	Clay, blue -----	5	285		
Rock and sand; water -----	10	143	Clay, red and blue -----	6	291		
Clay -----	3	146	Rock -----	21	312		
Rock -----	9	155	Clay, blue -----	3	315		
Clay, red, and blue -----	8	163	Clay, red -----	4	319		
Rock -----	9	172	Rock -----	19	338		
Clay, blue -----	3	175					
Well C-24							
Owner: Mrs. W. D. Durfey. Driller: John Jenkins.							
Soil, sandy, red -----	50	50	Shale, red -----	20	137		
Rock -----	1	51	Sand, fine-grained -----	4	141		
Lime, porous -----	8	59	Shale, red and blue -----	19	160		
Shale, red and broken -----	11	70	Water -----	2	162		
Gypsum -----	44	114	Shale, gray -----	18	180		
Shale and gypsum, water -----	3	117	Shale, gypsum, water -----	25	205		
Well F-9							
Owner: Earl Hackler. Driller: Earl Hackler.							
Sand, red -----	17	17	Gypsum -----	14	174		
Gypsum -----	6	23	Clay, blue, loose; water -----	9	193		
Clay, red and blue -----	67	90	Gypsum -----	17	200		
Gypsum -----	10	100	No record -----	70	270		
Shale, blue, hard -----	8	108	Rock? hard; water -----	8	278		
Clay, blue, loose; water -----	6	114	Rock, hard -----	11	289		
Gypsum -----	11	125	Shale, blue, hard -----	18	307		
Clay, red and blue -----	35	160	Clay, red -----	16	323		
Well F-12							
Owner: Troy Billingsley. Driller: George Luke.							
Surface soil -----	7	7	Shale, red -----	8	60		
Shale, sandy -----	41	48	Sand; water -----	15	75		
Sand; water -----	4	52	Shale, gray, and caliche; water -----	26	101		

Table 4.- Analyses of water from irrigation wells in Childress County, Tex.
(Mineral constituents are in parts per million)

Well	Owner	Depth of well (ft.)	Date of collection	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Bicarbonate (HCO ₃)	Sulfate (SO ₄)	Chloride (Cl)	Nitrate (NO ₃)	Boron (B)	Dissolved solids	Hardness as CaCO ₃	Percent sodium	Sodium-adsorption ratio	Specific conductance (micromhos at 25°C)	pH
C-13	L. C. Hill	176	Sept. 30, 1953	18	606	73	50	236	1,580	55	31	0.41	2,530	1,810	6	0.5	2,740	7.4
C-22	John Sherman	205	Sept. 28, 1953	16	564	114	91	224	1,670	110	16	.93	2,690	1,880	10	.9	2,980	7.4
C-26	L. M. Bartlett	177	Sept. 26, 1953	18	604	151	260	162	1,950	380	3.2	1.2	3,450	2,130	21	2.5	4,030	7.5
C-27	Dewey Scott	170	Sept. 28, 1953	15	584	150	164	207	1,900	230	5.1	1.3	3,150	2,070	15	1.6	3,550	7.5
C-36	G. E. Clark	150	Sept. 26, 1953	16	606	129	204	201	1,850	310	5.1	.78	3,220	2,040	18	2.0	3,690	7.5
C-37	do	153	do	17	602	139	240	190	1,890	360	4.6	.93	3,350	2,070	20	2.3	3,890	7.4
C-40	C. A. Mitchell	170	do	18	594	129	230	143	1,860	350	6.5	.62	3,260	2,010	20	2.2	3,850	7.8
C-41	A. L. Clements	220	do	18	600	117	124	190	1,770	185	4.5	.62	2,910	1,980	12	1.2	3,250	7.5
C-43	C. A. Mitchell	170	do	18	604	149	216	181	1,890	330	4.6	.66	3,300	2,120	18	2.0	3,800	7.4
C-45	Steve Owens	100	do	18	608	158	256	162	1,890	460	7.2	.50	3,480	2,170	20	2.4	4,120	7.5
C-50	Tom Darnell	172	Sept. 28, 1953	16	610	125	182	197	1,810	290	9.7	.88	3,140	2,040	16	1.8	3,580	7.5
F-5	J. J. Goodnight	270	Sept. 24, 1953	16	620	232	730	220	2,400	1,040	.2	4.7	5,150	2,500	39	6.3	6,490	7.5
F-6	Clyde Nippert	180	Sept. 23, 1953	18	570	144	157	104	1,950	200	.0	2.2	3,090	2,010	14	1.5	3,450	7.3
F-9	Earl Hackler	323	Sept. 24, 1953	15	578	184	402	153	2,200	480	.5	4.6	3,940	2,200	28	3.7	4,640	7.5
F-12	Troy Billingsley	101	Sept. 25, 1953	15	590	151	150	259	1,870	190	6.9	1.6	3,100	2,090	13	1.4	3,490	7.4
F-13	G. W. Hale	120	Sept. 24, 1953	16	606	128	152	279	1,780	210	11	1.2	3,040	2,040	14	1.5	3,460	7.3
F-15	Herbert Loter	117	Sept. 25, 1953	18	568	163	90	203	1,930	75	16	.76	2,960	2,090	9	.9	3,190	8.0
F-16	Pink Close, Jr.	312	do	15	582	174	322	169	2,110	400	.2	4.0	3,690	2,170	24	3.0	4,300	7.5
G-1	Ray Grimes	278	do	17	570	130	.83	104	1,790	102	12	.41	2,760	1,960	8	.8	3,050	7.9
J-3	Virgil Ellis	168	do	17	608	101	116	223	1,710	162	6.3	.90	2,830	1,930	12	1.1	3,190	7.4

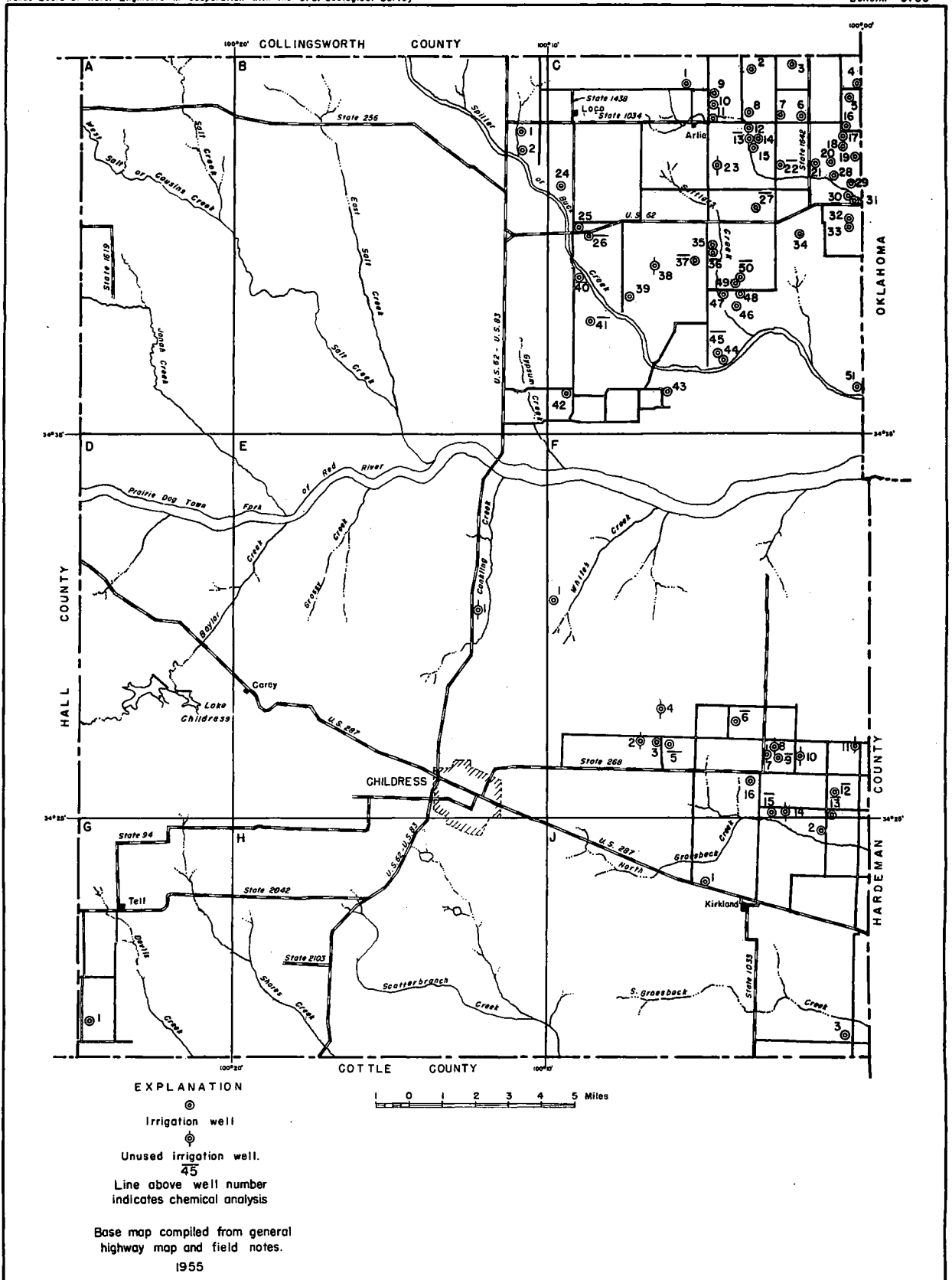


FIGURE 3.-Map of Childress County showing location of irrigation wells.