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STATE OF NEW MEXICO
State Engineer Office

John R. Erickson
State Engineer

RECONNAISSANCE OF GROUND-WATER CONDITIONS IN CURRY COUNTY, NEW MEXICO

Prepared in cooperation with the Geological Survey,
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December 1954

STATE OF NEW MEXICO

STATE ENGINEER OFFICE
TECHNICAL DIVISION

Reconnaissance of Ground-Water Conditions in Curry County, New Mexico

By
James W. Howard, Jr.
U. S. Geological Survey

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RECONNAISSANCE OF GROUND-WATER CONDITIONS IN CURRY COUNTY, NEW MEXICO

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INTRODUCTION

Curry County is in east-central New Mexico on the High Plains. Clovis, the county seat and one of the largest cities in the State, is estimated to have had a population of more than 20,000 in 1953. The city is considered one of the Nation's leading cattle markets. It is estimated that 85 to 90 percent of the 1,400 square miles of the county is in farms or ranches. Satisfactory pasture is generally produced and dry farming is carried on with some success during years of normal rainfall.

During the past few years, however, rainfall has been below average and it has been only with the development of irrigation in the area that successful crops have been grown. In 1953 William Mabe, at that time with the State Engineer Office, reported that 88 irrigation wells had been drilled in the county and that an estimated 200 additional wells were scheduled to be drilled within the next year or so.

Purpose, Scope, and Methods of Investigation

With the rapid development of irrigation in Curry County it became desirable to obtain information on the number and location of irrigation wells in the county and, in particular, to obtain information on the initial position of the water table, the thickness and character of the water-bearing formation,

the quality of the water, and the characteristics of the wells. These data would provide information to the public on the general ground-water conditions in this newly developed irrigated area and would assist the State Engineer in his administration of the use of ground waters of the State.

Accordingly, the Geological Survey in cooperation with the State Engineer made a reconnaissance of Curry County in February and March 1954. All known irrigation wells were visited at that time. Data gathered on wells included information on reported production and pumping levels and measurements of the discharge and nonpumping water levels where feasible. Estimates of the amount of land irrigated were obtained from the farmers where possible. Samples of water were collected from 27 wells for determination of the chemical quality and drillers' logs were obtained for several water wells.

The field work was done by C. F. Berkstresser and the author under the direct supervision of W. E. Hale and the general direction of C. S. Conover, District Engineer. Data and valuable suggestions were given by personnel of the Soil Conservation Service in Clovis and are gratefully acknowledged. Thanks are expressed to the various well owners, well contractors, and pump dealers who contributed information on the wells and pump installations in the area.

Topography and Drainage

Curry County lies in the west-central part of the Llano Estacado, or Staked Plains which in turn is a part of the High Plains section of the Great Plains province. The topography, in general, is characterized by long, gentle, undulating slopes, broken occasionally by a few scattered, generally narrow, ridges capped with caliche. The axes of these ridges, in general, parallel

that of the main drainage system which is southeastward. Depressions are prominent throughout the High Plains. Numerous depressions are present in Curry County; however, they are relatively small compared with those farther east. A few scattered small sand and silt dunes are present in the southern part of the county. Steeper slopes are formed by a few valleys which traverse the area north of Clovis. Valleys of considerable size are Blanco Canyon and the valleys occupied by Sierra Blanco Creek and Blanco Creek. These valleys, with their ephemeral streams, trend east-southeast and provide the main drainageways for Curry County. Elevations above mean sea level range from about 4,700 along the northwest border of the county to slightly less than 4,100 feet in the southeast part of the county, in a distance of 45 miles.

Climate

The climate of Curry County is semiarid, typical of that of the High Plains region, with a mean annual temperature of about 58°F. Records for the past several years show maximum temperatures exceeding 100 degrees and mimimum temperatures ranging below 0 degrees. Sunny days are prevalent and the humidity is very low. High winds are frequent in the early part of the year.

The average annual precipitation at Clovis is 18.19 inches, based upon a 42-year record. The heaviest rainfall occurs during the summer months, in which there are short periods of intense showery rainfall followed by long periods of drought. Owing to the erratic rainfall, an assured income has never been realized from dry farming. For the years 1951, 1952, and 1953 the annual precipitation was 13.53, 12.33, and 12.22 inches, respectively, considerably below normal, and as a result many of the farmers suffered heavily from loss of their crops.

Well-Numbering System

The system used by the Geological Survey of numbering wells in New Mexico is based on the common system of subdivision of public lands into sections. By means of it the well number, in addition to designating the well, locates its position to the nearest 10-acre tract in the land net. The well number is divided by periods into four segments. The first segment denotes the township north or south of the New Mexico base line; the second denotes the range east or west of the New Mexico principal meridian; and the third denotes the section.

The fourth segment of the number, which consists of three digits, denotes the particular 10-acre tract in which the well is situated. For this purpose, the section is divided into four quarters, numbered 1, 2, 3, and 4, in the normal reading order, for the northwest, northeast, southwest, and southeast quarters, respectively. The first digit of the fourth segment gives the quarter section. Similarly, the quarter section is divided into four 40-acre tracts numbered in the same manner, and the second digit denotes the 40-acre tract. Finally, the 40-acre tract is divided into four 10-acre tracts, and the third digit denotes the 10-acre tract. Thus, a well in the NE¼NW¼SE¼ sec. 29, T. 2 N., R. 36 E., in Curry County is designated 2.36.29.412. If a well cannot be located accurately within a 10-acre tract, a zero is used as the third digit, and if it cannot be located accurately within a 40-acre tract, zeros are used for both the second and third digits. If the well cannot be located more closely than the section, the fourth segment of the well number

is omitted. When it becomes possible to locate more accurately a well in whose number zeros have been used, the proper digit or digits are substituted for the zeros. Letters a, b, c,.....are added to the last segment to designate the second, third, fourth and succeeding wells in the same 10-acre tract.

The following diagrams show the method of numbering sections within a township and tracts within a section.

METHOD OF NUMBERING SECTIONS WITHIN A TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

6 miles

METHOD OF NUMBERING TRACTS WITHIN A SECTION

111	112	121	122	211	212	221	222
(110)		(120)		(210)		(220)	
113	114	123	124	213	214	223	224
[100]				[200]			
131	132	141	142	231	232	241	242
(130)		(140)		(230)		(240)	
133	134	143	144	233	234	243	244
311	312	321	322	411	412	421	422
(310)		(320)		(410)		(420)	
313	314	323	324	413	414	423	424
[300]				[400]			
331	332	341	342	431	432	441	442
(330)		(340)		(430)		(440)	
333	334	343	344	433	434	443	444

1 mile

GENERAL GEOLOGY

The oldest rocks exposed in Curry County are those represented by red beds of the Dockum group of Triassic age. These exposures occur along the scarp of the High Plains which borders the county on the north. Elsewhere the Triassic red beds are mantled by deposits of Tertiary and Quaternary age.

The red beds are composed mostly of pink to red sandstones and red to reddish-brown sandy shales. The beds of sandstone may yield some water, but nearly all the irrigation wells drilled in Curry County are finished above or at the top of the red beds. Southeast of Clovis in Curry County, where the surface relief is small, the reported depths to the red beds range between 350 and 400 feet, suggesting a mild local relief in the red-bed topography. Northeast of Clovis in T. 3 N., Rs. 36 and 37 E., the top of the red beds is reported to be somewhat more than 400 feet below the surface. About 15 miles north-northwest from Clovis the depth to the red beds below the upland surface approaches 500 feet. West of Clovis the red-bed surface is encountered at lesser depths; and in the vicinity of Melrose, about 25 miles west of Clovis, it is reported to be about 125 feet below the land surface. The surface of the red beds slopes in a general eastward direction, at a somewhat steeper gradient than the land surface.

The Ogallala formation of late Tertiary age mantles the red beds in essentially the entire county. The formation is composed mostly of fine sand, which is poorly consolidated in most of the area. Thin layers of clay and silt are common throughout the formation, and siliceous gravels occur in places, most commonly near the base of the formation. On the basis of several drillers' logs, the basal gravels, where present, are estimated to range in thick-

ness from 5 to 120 feet. Inasmuch as the Ogallala extends from near the land surface to the top of the red beds, the thickness of the formation is essentially the same as the depth to the red beds. Caliche commonly has developed at the top of the Ogallala formation, forming in places a very dense "cap rock." The caliche is, in turn, covered by a few feet of windblown silt and sand in a large part of the area. The silt and sand are the parent material for the soil of Curry County. It is within the Ogallala formation that nearly all wells in Curry County have been developed.

GROUND WATER

Occurrence

The principal water-bearing beds in Curry County are those in the Ogallala formation. In general, moderate to large yields of water have been obtained from wells drilled through the formation to the top of the red beds at depths of less than 500 feet. The water is of fairly good quality. The water in the formation occurs under water-table conditions and is moving in a general southeastward direction with an apparent gradient of 10 to 15 feet a mile. In the extreme southeastern part of the county the depth to water in the Ogallala formation is about 130 feet. Northwestward from this place the depth to water increases. In the vicinity of Clovis, water levels in wells are between 220 and 240 feet below the surface. About 6 miles northwest of Clovis the depth to water in the Ogallala formation is about 300 feet. Farther north, in sec. 35, T. 5 N., R. 35 E., the depth to water is about 375 feet. About 25 miles west of Clovis, in the vicinity of Melrose, the red beds are within 125 feet of the surface and here the water table in the Ogallala formation is

within 80 feet of the land surface.

The saturated thickness of the Ogallala formation appears to be greatest in the southeastern part of the county where it approaches 200 feet. From this area the saturated sediments decrease in thickness to the north and west. In the vicinity of Melrose the thickness of the saturated sediments in the Ogallala formation is about 45 feet.

Irrigation wells finished in the Ogallala formation in Curry County require casing to keep the sand from collapsing the well. Much sand is usually pumped from the wells during the development period, and difficulty with sand is commonly a continuing problem with the present method of construction. In general, the wells have not been in use in this area for a period long enough to provide information on the sanding hazard and on the methods of construction necessary to handle this difficulty.

Quantity of Water Developed from the Ogallala Formation

Moderate to large quantities of water have been developed from wells finished in the Ogallala formation in Curry County. The yield measured from 9 wells ranged from 400 gallons a minute to 950 gallons a minute. The average yield of these wells was 600 gallons a minute. The drawdown reported for 37 wells ranged from 5 feet after 36 hours of pumping at 1,000 gallons a minute to 126 feet after 36 hours of pumping at 1,250 gallons a minute. The reported specific capacity of the irrigation wells ranged between 10 and 200 gallons a minute per foot of drawdown.

In general, the most satisfactory wells are those which have penetrated the gravels that occur in places near the base of the Ogallala formation. In

some areas, particularly where no gravel is present, the water developed has not been sufficient for an irrigation supply. Records of irrigation wells in Curry County are presented in table 1, and the location of most of the wells is shown on figure 1.

Quality of Water in the Ogallala Formation

The water in the Ogallala formation is of fairly uniform chemical quality in Curry County. The water is low in chloride and sulfate. A typical water contains approximately 25 parts per million of calcium, 20 parts per million of magnesium, 50 parts per million of sodium and potassium, 240 parts per million of bicarbonate, 15 parts per million of sulfate, and 10 parts per million of chloride. The available determinations of fluoride, five in number, show a range from 2.0 to 2.8 ppm, which is somewhat in excess of the upper limit of 1.5 ppm as set by the Public Health Service for drinking water. The nitrate content was high in 2 of the 6 samples analyzed for that constituent (table 2). In the southeastern part of the county the water is somewhat more mineralized than that in the area to the north and west. Chemical analyses of samples of water collected from several irrigation wells in the county are listed in table 2.

IRRIGATION

Development

Curry County is one of the areas in the State in which use of ground water for irrigation has begun most recently. In 1952 an estimated 3,500 acres of land were under irrigation. In 1953 approximately 90 irrigation wells

were in use to irrigate an estimated 20,000 acres. About 150 wells had been developed by March 1954 and wells for irrigation use were being drilled at the rate of about 20 per month during March. During 1954 an estimated 40,000 acres will be under irrigation, and by the end of the year about 250 wells should have been completed. Most of the irrigation wells are in the southeastern part of the county in Tps. 1 to 3 N., Rs. 35 to 37 E.

Practice

The amount of land reported to be irrigated from single wells ranges from about 60 acres to 300 acres. The average acreage irrigated per well was estimated to be 200 acres in 1953, based on the reported acreage irrigated by 40 wells. This value of 200 acres irrigated per well is very high when compared to 50 to 80 acres irrigated per well in the older established irrigation areas. In part, the type of crop now grown in the area, such as wheat, sorghum, and other row crops, requires less water than the cotton and alfalfa usually irrigated in the areas to the south and, hence, will permit the irrigation of more land with the same amount of water.

Further, as the practice of irrigation becomes better established, the trend probably will be to reduce the acreage irrigated from a single well. Preplanting irrigation may require from 0.5 to 1 acre-foot per acre, supplemented by approximately the same amount during the drier part of the growing season.

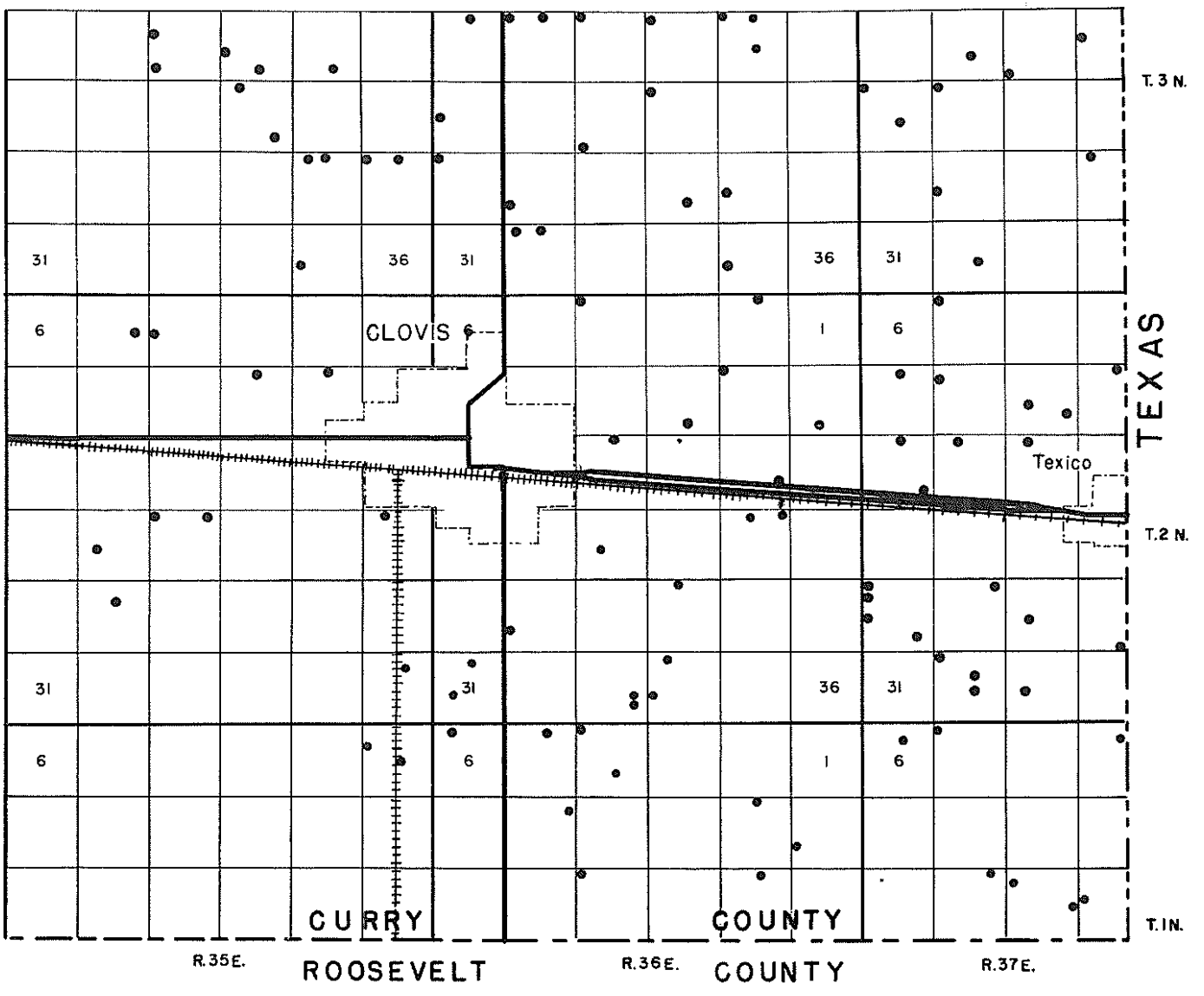

FIGURE 1. LOCATION OF IRRIGATION WELLS IN SOUTHEASTERN CURRY COUNTY, NEW MEXICO

TABLES

Notes: All irrigation wells obtain water from the Ogallala formation.

In table 1 the depth, depth to which well is cased, yield and drawdown of the well, duration of test, depth to red beds, and irrigated acreage are reported. Measured depths to water are given to tenths of a foot: reported water levels are given to nearest foot.

Table 1.--Records of irrigation wells in Curry County, N.Mex., March 1954

Well location Number	Owner or name	Driller	Year completed	Diameter of well (in.)	Depth of well (ft)	Depth to which well is cased (ft)	Depth to red beds (ft)
1.33.16.124	Hardwick and Sons	-	-	-	-	-	-
1.35.1.312	Joe Patterson	S.& M.Drilling Co.	1954	16	380	380	380
1.411	Mr.Hart	do.	1954	16	380	380	370
1.36.4.111	J. E. Wall	Tom House	1953	16	300	300	-
4.413	H. W. Martin	Bill Morgan	1953	16	327	325	-
5.211	J. E. Wall	Tom House	1952	16	292	292	-
6.121	R. W. Hyman	-	1953	16	317	317	-
8.223	Layton Woody	Tom House	1953	16	310	310	-
11.211	J. J. Albright	do.	1954	16	340	318	-
12.313	C. C. Curry	Whiteside Bros.	1953	16	407	407	-
14.211	T. F. Martin	Tom House	-	-	-	-	-
16.111	H. E. Hathorn	do.	1953	16	264	264	-
1.37.3.224	Joe Blair	Simpson Pump Co.	-	18	345	313	-
5.111	H. B. Honea	Bill Morgan	1953	16	400	383	-
6.213	Orville Frances	Whiteside Bros.	1954	-	387	387	385
15.133	W. J. Matthews	Tom House	1953	16	290	290	-
16.113	J. R. Hadley	do.	1950	18	224	224	-
16.422	Sam McLarty Jr.	J. M. Vestal	1954	16	338	310	-
17.221	J. O. Landon	Tom House	1950	16	262	262	-
21.411	D. J. Brown	H. Hathorn	1953	18	239	239	-
27.221	do.	Tom House	1949	16	208	192	-
2.31.1.311	Ernest Cooper	Lee Watson (?)	-	8	127	0	-
2.122	Hugh Warren	Lee Williams	1954	16	103	90	-
2.221	G. W. Burdine	do.	1954	16	127	100	126
2.34.36.222	Mrs. Martha Dorris	S & M. Drilling Co	1953	16	307	302	300

Well location number	Yield (gpm)	Drawdown: Amount (ft)	Drawdown: Duration of test (hours)	Water level: Below land surface (ft)	Water level: Date of measurement 1954	Description of measuring point	Distance of M. P. above land surface (ft)	Irrigated acreage 1953	Estimated irrigated acreage 1954
1.33.16.124	-	-	-	25.2	Feb. 18	Top of casing	1.9	-	-
1.35.1.312	1,000	74	24	162.3	Mar. 5	Top of conc.base	1.8	320	200
1.411	1,000	17	24	162.0	Mar. 5	do.	1.0	160	160
1.36.4.111	1,000	-	-	164.7	Mar. 4	do.	2.4	160	160
4.413	1,000	27	36	196.3	Feb. 23	do.	1.0	250	260
5.211	1,000	56	8	163.2	Mar. 1	do.	1.1	160	160
6.121	-	-	-	166.3	Feb. 24	do.	1.8	160	160
8.223	-	-	-	186.2	Feb. 24	do.	.8	-	160
11.211	-	-	-	-	-	-	-	-	160
12.313	1,200	38	36	171.7	Feb. 18	Top of conc.base	.8	-	-
14.211	-	45	72	163.9	Feb. 18	do.	1.0	-	-
16.111	1,000	27	36	156.5	Feb. 23	do.	.9	150	200
1.37.3.224	-	-	-	154	Feb. 24	do.	1.0	-	-
5.111	1,000	27	72	181.9	Feb. 23	do.	1.0	160	160
6.213	1,000	49	36	169.5	Feb. 26	do.	1.0	-	160
15.133	1,000	46	72	137.7	Feb. 17	do.	.6	285	285
16.113	1,400	20	72	132.3	Feb. 17	do.	.0	240	240
16.422	1,100	47	36	137.4	Feb. 17	do.	.0	-	-
17.221	1,100	10	72	128.5	Feb. 18	do.	1.0	-	-
21.411	-	-	-	116.8	May 7	do.	1.5	160	160
27.221	1,000	-	-	103.1	Mar. 7	do.	1.2	-	-
2.31.1.311	75	-	-	77.9	Feb. 17	Edge of metal pl.	.0	-	10
2.122	450	-	-	65.2	Feb. 17	Top of conc.base	.7	-	25
2.221	300(?)	-	-	78.1	Feb. 17	do.	1.67	-	80
2.34.36.222	1,000	35	6 (?)	214.1	Feb. 10	do.	1.83	-	-

Table 1.--Records of irrigation wells in Curry County, N. Mex., March 1954.--Continued

Well location number	Owner or name	Driller	Year completed	Diameter of well (in.)	Depth of well (ft)	Depth to which well is cased (ft)	Depth to red beds (ft)
2.35.4.311	J. R. Vivian	Howard Bros.	1953	16	400	400	-
5.421	R. W. Worrell	S. & M. Drilling Co.	-	16	398	398	-
10.211	Harold House	do.	-	16	419	419	-
11.211	L. A. Madole	do. (?)	1954	16	367	-	-
20.312	Oscar Willman	-	-	16	365	365	-
21.111	M. R. Blackburn	Tom House	1953	16	334	-	-
21.221	do.	-	1948	16	332	-	-
24.121	A. F. Jones	-	-	-	-	-	-
29.213	W. E. Willman	Tom House	-	16	365	365	-
36.213	P. C. Edwards	-	1948	16	311	-	-
2.36.2.211	A. R. Mitzelfelt	-	-	-	-	-	-
4.111	Nelia Cox	-	-	-	-	-	-
10.431	T. D. Humphrey	Ingram Bros.	1953	-	388	388	383
11.111	Harold Holland	-	-	-	-	-	-
12.342	Otto Smith	Ingram Bros.	1954	16	400	400	-
14.441	W. W. Bomar	Ingram Bros.	-	16	387	387	-
16.211	Edmund Dillon	do.	1953	16	350	350	350
21.321	R. B. Ingram	Tom House	1953	16	328	328	328
23.122	J. S. Putnam	Smith and Morgan	-	16	356	356	-
23.222	Harold Holland	do.	1953	16	356	356	-
27.122	J. F. Peterson	Tom House	1953	16	300	300	-
29.313	Homer Ramsey	do.	1953	16	310	310	-
31.211	C. L. Lockmiller	Ingram Bros.	1953	16	337	60	-
31.321	Mrs. Carrie H. Taylor	S. and M. Drilling Co.	1953	16	325	325	323
33.421	G. C. Ware	do.	1953	16	300	-	-
33.423	do.	Whiteside Bros.	1953	16	365	365	-
34.121	T. B. McGregor	Tom House	1952	16	280	280	-
34.311	Bert Albright	do.	1952	14	274	274	-

Well location number	Yield (gpm)	Drawdown		Water level		Description of measuring point	Distance of M.P. above land surface (ft)	Irrigated acreage 1953	Estimated irrigated acreage 1954
		Amount (ft)	Duration of test (hours)	Below land surface	Date of measurement 1954				
2.35.4.311	1,000	-	-	295.5	Apr. 21	Top of conc.base.	1.15	-	-
5.421	-	-	-	-	-	-	-	-	-
10.211	650	-	-	-	-	-	-	-	-
11.211	-	-	-	-	-	-	-	-	-
20.312	-	44	-	223.9	Feb. 10	Top of conc.base.	.64	-	-
21.111	1,000	30	-	232.9	Feb. 10	do.	1.91	140	140
21.221	1,000	50	-	-	-	-	-	-	-
24.121	-	-	-	239.1	Feb. 10	Top of conc.base.	.94	-	-
29.213	-	-	-	222.8	Feb. 11	do.	1.12	-	-
36.213	-	-	-	-	-	do.	.7	-	-
2.36.2.211	-	-	-	242.5	Mar. 1	do.	.8	-	-
4.111	-	-	-	266.0	Mar. 1	do.	1.39	-	-
10.431	1,250	126	36	131.9	Mar. 4	do.	1.5	280	280
11.111	-	-	-	239.5	Mar. 4	do.	1.5	-	-
12.342	1,000	35	36	233	Mar. 3	do.	1.0	-	-
14.441	1,000	-	-	230.9	Mar. 1	do.	1.7	-	200
16.211	1,000	39	36	229.3	Mar. 1	do.	1.4	-	160
21.321	1,000	34	8	216	Mar. 1	do.	1.2	-	-
23.122	1,000	-	36	-	-	do.	2.0	150	150
23.222	1,000	21	36	226.2	Feb. 25	do.	1.0	160	160
27.122	1,000	38	36	190.8	Mar. 1	do.	1.0	-	-
29.313	1,000	-	-	189.5	Feb. 12	do.	1.0	-	-
31.211	1,000	-	36	-	-	do.	1.5	160	160
31.321	1,000	52	36	178	Feb. 28	-	-	-	180
33.421	-	-	-	174.6	Feb. 28	Hole in casing	.45	-	-
33.423	1,000	28	672	172.5	Feb. 28	Top of conc. base	1.0	100	100
34.121	1,000	31	36	171.0	Feb. 25	do.	1.5	160	160
34.311	1,000	-	-	167.6	Feb. 28	do.	1.2	160	160

Table 1.--Records of irrigation wells in Curry County, N. Mex., March 1954.--Continued

Well location number	Owner or name	Driller	Year completed	Diameter of well (in.)	Depth of well (ft.)	Depth to which well is cased (ft.)	Depth to red beds (ft.)
2.37.5.111	T. T. Doolittle	-	-	-	-	-	-
7.211	L. A. Pearce	Massey Bros.	1952	18	394	394	394
8.113	Earl Hartley	J. C. Howard	-	16	412	412	-
9.321	Gene Lovelace	Mr. Fish	1953	16	362	362	-
9.425	do.	Massey Bros.	1950	18	415	415	-
10.211	do.	S. & M. Drilling Co.	1953	16	429	429	-
16.121	J. C. Howard	J. C. Howard	-	14	340	340	337
17.121	E. C. Burns	-	-	-	-	-	-
18.211	John Lewis	-	-	-	-	-	-
18.444	Stanley Powell	Bill Morgan	1953	16	379	-	371
27.444	Frank Seale	Ray Tharp	1950	16	285	285	-
28.321	Jerry Paul	-	-	-	-	-	-
29.221	Dick Dosher	Massey Bros.	1952	16	340	340	-
30.111	Albert Mageras	-	1949	16	285	285	-
30.113	do.	-	1953	16	345	345	-
30.311	do.	-	1953	16	347	347	-
30.441	Dick Dosher	Massey Bros.	1952	18	350	350	-
32.133	Leroy Fowille	do.	1952	16	385	385	-
32.231	Travis Brown	-	-	16	338	338	-
32.411	Joseph D. Crump	Tom House	1952	16	296	296	-
33.321	W. W. Engram Est.	White Wright	1954	16	432	432	-
3.34.23.433	Archie Baker	Howard Bros.	1954	16	418	418	-
3.35.1.333	E. C. Kelso	S. & M. Drilling Co.	-	16	436	436	-
11.111	L. Hickman	-	-	-	-	-	-
14.431	Mrs. H. W. Jennings	Haynes Equip.Co.	1954	16	440	-	-
15.311	Nolan Beaver	-	-	-	-	-	-
15.431	J. L. Beaver	-	-	-	-	-	-

Well location number	Yield (gpm)	Drawdown: Amount (ft)	Drawdown: Duration of test (hours)	Water level: Below land surface (ft)	Water level: Date of measurement 1954	Description of measuring point	Distance of M. P. above land surface (ft)	Irrigated acreage 1953	Estimated irrigated acreage 1954
2.37.5.111	-	-	-	227	Mar. 4	Top of conc.base.	2.0	-	-
7.211	1,050	42	72	230.3	Mar. 2	do.	1.35	152	152
8.113	-	-	-	-	-	do.	1.0	300	300
9.321	1,000	-	-	191.9	Mar. 3	do.	1.7	-	160
9.423	1,000	-	-	188.6	Mar. 3	do.	1.5	160	160
10.211	950	10	36	210	Mar. 5	do.	1.0	160	160
16.121	-	-	-	185.1	Mar. 8	do.	.4	-	-
17.121	-	-	-	190.5	Mar. 8	do.	1.6	-	-
18.211	-	-	-	225.9	-	do.	2.0	-	-
18.444	1,000	-	-	456	Mar. 8	do.	1.0	-	160
27.444	600-700	54	36	191.5	Mar. 2	do.	.0	135	135
28.321	-	-	-	170.6	Mar. 2	do.	1.5	-	-
29.221	1,000	5	36	187.7	Feb. 26	do.	1.5	160	160
30.111	800	-	-	194.3	Feb. 26	do.	1.0	160	160
30.113	-	-	-	190.9	Feb. 26	do.	1.0	-	200
30.311	1,000	-	-	187.5	Feb. 26	do.	1.0	160	200
30.441	1,000	16	36	184.8	Feb. 26	do.	1.5	160	160
32.133	1,000	17	168	181	Feb. 27	do.	1.5	160	160
32.231	1,000	-	-	179.3	Feb. 27	do.	.0	160	160
32.411	690	-	-	171.4	Mar. 1	do.	1.0	100	160
33.321	1,000	35	36	167	Mar. 1	do.	1.0	-	-
3.34.23.433	-	-	-	341.7	April 21	do.	.9	-	-
3.35.1.333	675	-	-	300	Mar. 5	do.	1.6	-	-
11.111	-	-	-	-	-	do.	-	-	-
14.431	-	-	-	333.0	April. 21	do.	1.15	-	-
15.311	750	-	-	-	-	-	-	-	-
15.431	600	-	-	-	-	Top of conc.base.	-	-	-

Table 1.--Records of irrigation wells in Curry County, N. Mex., March 1954.--Continued

Well location number	Owner or name	Driller	Year completed	Diameter of well (in.)	Depth of well (ft.)	Depth to which well is cased (ft.)	Depth to red beds (ft.)
3.35.16.131	Damon Matlock	Howard Bros.	1954	16	421	420	-
16.311	do.	do.	1954	16	418	418	-
22.121	Leon Beavers	Wallace Bros.	-	-	910+	-	-
22.411	N. B. Lockmiller	Bill Morgan	1953	16	416	416	406
25.111	Bob Spencer	Mr. Jeeter	1954	16	427	427	-
25.211	E. H. Cooper	Mr. Gates	1954	-	437	-	-
26.112	Leon Beavers	-	-	-	430+	-	-
26.122	do.	-	-	-	-	-	-
35.311	A. F. Priebe	Howard Bros.	1954	16	387	387	-
3.36.6.133	-	-	1954	-	-	-	-
6.333	Robert Vineyard	S. & M. Drilling Co.	1954	-	437	437	430
9.331	Edmond Dillon	Howard Bros.	1954	16	-	-	-
9.433	Hammond Bros.	Tom House (?)	1952	16	398	398	-
10.331	do.	Howard Bros.	1953	16	413	413	-
10.433	L. Conrad Pippin	Whiteside Bros.	1954	16	-	-	415
14.111	K. B. McCullough	S. & M. Drilling Co.	1954	16	408	408	-
14.211	Roy Williams and Son	Massey Bros.	1951	18	420	420	-
14.211	do.	Big T Pump Co.	1950	16	421	421	-
14.411	do.	-	-	-	-	-	-
15.111	K. B. McCullough	N. L. Tharp	1948	16	384	384	-
16.111	Carl B. Moore & Son	Tom House	1953	16	390	390	-
17.111	Roy Williams	-	1953	16	420	420	-
17.211	do.	-	1954	16	418	418	418
18.211	Claude O. Daniels	Mr. Jeeter	1954	16	426	426	-
19.311	C. E. Green	Howard Bros.	1954	16	430	430	430
21.333	M. W. Hetch	S. & M. Drilling Co.	1954(?)	-	-	-	-

Well location number	Yield (gpm)	Drawdown: Amount (ft)	Drawdown: Duration of test (hours)	Water level: Below land surface (ft)	Water level: Date of measurement 1954	Description of measuring point	Distance of M. P. above land surface (ft)	Irrigated acreage 1953	Estimated irrigated acreage 1954
3.35.16.131	700	–	–	375	Feb. 18	Top of conc.base	–	–	–
16.311	–	–	–	–	–	–	–	–	–
22.121	–	–	–	–	–	–	–	–	–
22.411	500	–	–	–	–	Top of conc.base	–	–	–
25.111	–	–	–	–	–	do.	0.85	–	–
25.211	1,000	–	–	312.6	Mar. 4	do.	1.0	–	–
26.112	–	–	–	–	–	do.	–	–	–
26.122	700	–	–	–	–	do.	–	–	–
35.311	650	–	–	295.5	April 21	do.	1.0	–	–
3.36.6.133	–	–	–	290.8	Apr. 21	do	.9	–	–
6.333	600	–	–	313.9	Apr. 20	do.	.25	–	–
9.331	–	–	–	283.6	Apr. 20	do.	–	–	–
9.433	–	–	–	285.2	–	do.	.7	–	–
10.331	1,000	–	–	284.5	Mar. 6	do.	.8	240	240
10.433	–	–	–	–	–	–	–	–	–
14.111	670	37	167	–	–	Top of conc.base	1.5	–	–
14.211	–	–	–	–	–	–	–	–	–
14.211	–	–	–	279.2	Mar. 9	Top of conc.base	1.0	–	–
14.411	–	–	–	284.7	Mar. 9	do.	1.0	–	–
15.111	–	–	–	–	–	do.	1.0	–	–
16.111	–	–	–	286.4	Mar. 6	do.	1.0	–	–
17.111	–	–	–	295.1	Mar. 5	do.	.6	320	160
17.211	–	–	–	–	–	–	–	–	–
18.211	–	–	–	340	Mar.	Top of conc.base	1.0	–	–
19.311	–	–	–	328	–	do.	1.8	–	–
21.333	–	–	–	292.7	Mar. 3	do.	.0	–	–

Table 1.--Records of irrigation wells in Curry County, N. Mex., March 1954--Continued

Well location number	Owner or name	Driller	Year completed	Diameter of well (in.)	Depth of well (ft)	Depth to which well is cased (ft)	Depth to red beds (ft)
3.36.22.111	Mr. Williams (?)	-	1951	18	420	-	416
26.311	C. B. Erdworn and Geo. Hammond	Jeeter and Ray	1954	-	-	-	-
27.413	Moore Oliver Co.	Howard Bros.	1954	16	416	416	416
29.313	Z. A. McCassland	-	-	-	-	-	-
30.111	Arthur Wilhite	Ketcham and Dennis	1949	18	406	410	-
32.112	Dr. J. D. Johnson and Cotton Simms	Whiteside Bros.	1953	16	404±	404	-
32.211	do.	Bill Morgan	1953	-	-	-	-
35.311	A. R. Mitzelfelt	John Gallager	1954	-	413	-	413
3.37.4.211	Glen A. Singleterry	-	-	-	-	-	-
9.211	S. J. Jarrell	-	-	-	-	-	-
15.133	Mrs. Martha Heinz	-	-	-	-	-	-
16.333	C. H. Whitener	Howard and Jeeters	1953	16	419	419	419
17.413	do.	N. L. Tharp	1949	16	419	319	419
19.111	H. Gradie Pierce	Tom House	-	16	390	390	390
19.411	Oris Eschleman	-	-	-	-	-	-
20.111	do.	-	-	-	-	-	-
27.112	Olan N. Schlueter	-	1952(?)	-	400(?)	-	-
29.311	J. M. White	J. W. Hornbrook	1950(?)	16	387	387	387
32.413	B. O. Faville	Ingram Bros.	1953	16	408	408	400
4.32.24.333	Gaston McDaniel	Mr. Jeeter	1953	16	350±	350	-
4.33.15.322	W. L. Lockmiller	Bill Morgan	1953	16	345.4	362	345
4.35.2.Lot 4	Sam and Sid Pipkin	S. And M. Drilling Co.	-	-	528	-	-

Well location number	Yield (gpm)	Drawdown		Water level		Description of measuring point	Distance of M.P. above land surface (ft)	Irrigated acreage 1953	Estimated irrigated acreage 1954
		Amount (ft)	Duration of test (hours)	Below land surface (ft)	Date of measurement 1954				
3.36.22.111	-	-	-	-	-	-	-	-	-
26.311	660	-	-	-	Apr. 20	-	-	-	-
27.413	-	-	-	289	July 15	Top of conc.base	1.3	-	-
29.313	-	-	-	289.1	Mar. 3	do.	.5	-	-
30.111	625	-	-	321.2	Mar. 4	do.	3.9	200	200
32.112	700	-	-	286.9	Mar. 3	do.	1.0	-	-
32.211	750	-	-	286.7	Mar. 3	do.	1.1	-	-
35.311	-	-	-	-	-	-	-	-	-
3.37.4.211	-	-	-	192.4	May 3	Top of conc.base	.5	-	-
9.211	-	-	-	179	May 3	do.	1.0	-	-
15.133	-	-	-	215.9	Mar. 3	do.	1.7	-	-
16.333	-	-	-	253	Mar. 3	do.	.65	-	-
17.413	-	-	-	256.6	Mar. 4	do.	.55	-	-
19.111	1,000	-	-	271.8	Mar. 4	do.	1.2	-	-
19.411	-	-	-	259.6	Mar. 4	do.	.9	-	-
20.111	-	-	-	264.3	Mar. 4	do.	1.1	-	-
27.112	-	-	-	247.6	Mar. 3	do.	1.82	-	-
29.311	-	-	-	241.6	Mar. 2	do.	.0	-	-
32.413	-	-	-	233.5	Mar. 2	do.	1.55	-	-
4.32.24.333	-	-	-	292.4	Feb. 17	do.	.65	-	-
4.33.15.322	-	-	-	335.8	Feb. 18	do.	1.12	-	-
4.35.2.Lot 4	650	-	-	-	-	-	-	-	-

Table 1.--Records of irrigation wells in Curry County, N. Mex., March 1954.--Continued

Well location number	Owner or name	Driller	Year completed	Diameter of well (in.)	Depth of well (ft)	Depth to which well is cased (ft)	Depth to red beds (ft)
4.36.10.111	O. E. Pattison	Wingate Pump Co.	1954	18	411	411	-
22.311	Leslie Pattison	Mr. Fish	1954	18	430	430	-
22.233	L. R. Talley	do.	1953	18	450	450	-
23.211	do.	do.	1952	18	412	412	412
24.211	Sherman Horton	Mr. Vestal	1953	16	414	414	-
24.111	L. R. Talley	Jess Ketchum	1949	20	402	402	-
25.311	do.	Dub Jones	1951	18	408	408	-
26.211	do.	Mr. Fish	1952	18	410	410	-
27.211	do.	Jack Porter	1953	18	412	412	-
4.37.28.211	Roy Williams	Massey Bros.	1951	16	-	-	-
28.411	do.	do.	1949	-	-	-	-
5.34.34.111	John Garrett	S. and M. Drilling Co.	1954	16	525	495	512
36.111	B. P. Davis	Haynes Mach. Co.	1954	16	489	489	489
5.35.35.313	Sam Pipkin	Smith and Morgan	1953	16	527	527	-
6.36.23.144	L. E. Madole	-	-	-	-	-	-
35.122	Paul Harrison	Ingram Bros.	1953	16	373	373	-
36.311	Virgil Harrison	do.	1953	16	386	386	-
6.37.30.111	Earl Tompkins	Ed Ingram	-	-	-	-	-
32.111	Finnis Jenning	do.	-	16	380	380	-
7.37.31.121	Sam Campbell	Howard Bros.	1954	16	262	262	-
31.321	Edgar Campbell	Jack Porter	1954	18	274	274	-
32.131	Roy M. Potts	-	-	-	-	-	-

Well location number	Yield (gpm)	Drawdown		Water level		Description of measuring point	Distance of M. P. above land surface (ft)	Irrigated acreage 1953	Estimated irrigated acreage 1954
		Amount (ft)	Duration of test (hours)	Below land surface (ft)	Date of measurement 1954				
4.36.10.111	-	-	-	330.3	Mar. 6	Top of conc. base	1.7	-	460
22.311	1,000	-	-	279.1	Mar. 26	do.	2.7	-	225
22.233	700	-	-	-	-	do.	-	-	290
23.211	520	-	-	-	-	do.	1.7	1.0	180
24.211	-	-	-	281.7	Mar. 10	do.	2.0	300	300
24.111	1,100	-	-	280.8	Mar. 9	do.	1.7	310	310
25.311	950	42	36	-	-	do.	-	400	400
26.211	-	-	-	-	-	-	-	291	291
27.211	-	-	-	-	-	-	-	-	320
4.37.28.211	1,000	-	-	222	Mar. 10	Top of conc. base	1.8	-	-
28.411	1,000	-	-	213.3	Mar. 10	do.	1.35	-	-
5.34.34.111	900	-	-	391.6	Apr. 20	do.	1.9	-	-
36.111	-	-	-	398.5	Apr. 20	do.	1.5	-	-
5.35.35.313	-	-	-	376.4	Mar. 26	do.	1.5	-	270
6.36.23.144	-	-	-	325.5	Mar. 27	do.	1.5	-	-
35.122	-	-	-	300.5	Mar. 27	do.	1.65	-	-
36.311	750	-	-	300	-	do.	-	-	-
6.37.30.111	-	-	-	316	-	do.	-	-	-
32.111	750	22	36	300	-	do.	-	160	160
7.37.31.121	410	-	-	230	-	do.	-	-	120
31.321	400	-	-	230	-	do.	-	-	100
32.131	-	-	-	225.8	Mar. 26	do.	1.5	-	-

Table 2.--Analyses of well water in Curry County, N.Mex.

Analyses by U. S. Geological Survey (Parts per million)

Location number	1.37.3.224	2.35.10.211	2.35.36.213	2.36.12.342	2.36.21.321	2.36.21.321
Owner or name	Joe Blair	Harold House	P. C. Edwards	Otto Smith	Roy B. Ingram	Roy B. Ingram
Well depth (ft)	345	419	311	400	328	a/
Date of collection	2-24-54	3-10-54	3-5-54	3-3-54	3-1-54	3-1-54
Silica (SiO_2)		30		32	40	
Calcium (Ca)		23		25	69	
Magnesium (Mg)		20		23	58	
Sodium (Na)		.)		.)	.)	
Potassium (K)		.) 47		.) 36	.) 66	
Bicarbonate (HCO_3)	208	239	220	229	349	494
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)		16		16	72	
Chloride (Cl)	46	13	29	12	97	78
Fluoride (F)		2.8		2.8	2.0	
Nitrate (NO_3)		4.7		9.3	62	82
Dissolved solids (sum)		274		269	638	
Tons/a ft		.37		.37	.87	
Hardness (as $CaCO_3$)		140		157	410	
Noncarbonate		0		0	124	
Specific conductance (micromhos at 25°C)	642	456	553	442	1,050	1,090
Percent sodium (Na)		42		33	26	
Temperature (°F)		65		65	65	

a/ Water sample from canal. Canal water is mixture of well water and sewage from Clovis.

Location number	2.36.23.122	2.36.31.211	2.37.10.211	2.37.32.411	3.35.1.333	3.35.15.311
Owner or name	J. S. Putnam	C. L. Lock-miller	Gene Lovelace	Joseph D. Crump	E. C. Kelso	Noland Beaver
Well depth (ft)	356	337	429	296	436	-
Date of collection	2-27-54	3-3-54	3-5-54	3-1-54	3-9-54	3-9-54
Silica (SiO_2)		37				
Calcium (Ca)		33				
Magnesium (Mg)		30				
Sodium (Na)		32				
Potassium (K)						
Bicarbonate (HCO_3)	247	233	242	221	237	242
Carbonate (CO_3)	0	0	0	0	0	0
Sulfate (SO_4)		38				
Chloride (Cl)	10	24	10	43	6	10
Fluoride (F)		2.0				
Nitrate (NO_3)		6.2				
Dissolved solids (sum)		317				
Tons/a ft		.43				
Hardness (as $CaCO_3$)		206				
Noncarbonate		15				
Specific conductance (micromhos at 25°C)	456	526	451	657	445	445
Percent sodium (Na)		25				
Temperature (°F)	65	65	66	65	65	67

Table 2.--Analyses of well water in Curry County, N. Mex.--Continued

Analyses by U. S. Geological Survey (Parts per million)

Location number	3.35.15.431	3.35.16.131	3.35.22.411	3.35.26.112	3.35.35.311	3.36.6.333
Owner or name	J. L. Beaver	Damon Matlock	N. B. Lock-miller	Leon Beavers	A. F. Priebe	Robert Vineyard
Well depth (ft)	-	421	416	430	387	437
Date of collection	3-9-54	3-9-54	3-9-54	3-10-54	3-10-54	3-6-54
Silica (SiO_2)				31		
Calcium (Ca)				25		
Magnesium (Mg)				24		
Sodium (Na)				} 31		
Potassium (K)						
Bicarbonate (HCO_3)	235	235	234	232	242	224
Carbonate (CO_3)	0	0	0	0	0	8
Sulfate (SO_4)				15		
Chloride (Cl)	11	11	11	8	8	9
Fluoride (F)				2.4		
Nitrate (NO_3)				5.9		
Dissolved solids (sum)				256		
Tons/a ft				.35		
Hardness (as $CaCO_3$)				161		
Noncarbonate				0		
Specific conductance (micromhos at 25°C)		442	440	424	432	444
Percent sodium (Na),				30		
Temperature (°F)	67	65	65	65	65	65

Location number	3.36.14.111	3.36.19.311	3.36.30.111	3.36.32.112	3.36.32.211	.4.35.2.Lot 4
Owner or name	K. B. McCullough	C. E. Green	Arthur Wilhite	I. D. Johnson, Cotton Simms	I.D. Johnson, Cotton Simms	Sam and Sid Pipkin
Well depth (ft)	408	430	406	-	404	528
Date of collection	3-5-54	3-5-54	3-9-54	3-8-54	3-9-54	3-8-54
Silica (SiO_2)						
Calcium (Ca)						
Magnesium (Mg)						
Sodium (Na)						
Potassium (K)						
Bicarbonate (HCO_3)	234	224	222	228	226	238
Carbonate (CO_3)	0	12	0	0	0	0
Sulfate (SO_4)						
Chloride (Cl)	11	11	13	13	12	8
Fluoride (F)						
Nitrate (NO_3)						
Dissolved solids (sum)						
Tons/a ft						
Hardness (as $CaCO_3$)						
Noncarbonate						
Specific conductance (micromhos at 25°C)	445	453	448	443	444	458
Percent sodium (Na)						
Temperature (°F)	65	66	66	65	66	66

Table 2.--Analyses of well water in Curry County, N. Mex.--Continued

Analyses by U. S. Geological Survey (Parts per million)

Location number	4.36.22.233	4.36.25.311	6.36.36.311	7.37.31.121
Owner or name	L. R. Talley	L. R. Talley	Virgil Harrison	Sam Campbell
Well depth (ft)	450	408	386	262
Date of collection	3-9-54	3-9-54	3-27-54	3-26-54
Silica (SiO_2)				
Magnesium (Mg)				
Calcium (Ca)				
Sodium (Na)				
Potassium (K)				
Bicarbonate (HCO_3)	226	240	225	188
Carbonate (CO_3)	0	0	0	21
Sulfate (SO_4)				
Chloride (Cl)	14	10	9	9
Fluoride (F)				
Nitrate (NO_3)				
Dissolved solids (sum)				
Tons/a ft.				
Hardness (as $CaCO_3$)				
Noncarbonate				
Specific conductance (micromhos at 25°C)	461	458	450	419
Percent sodium (Na)				
Temperature (°F)	65	65	65	65

Table 3.--Drillers' logs of water wells in Curry County, N. Mex.

1.35.1.312 Joe Patterson

Material	Thickness (feet)	Depth (feet)
Surface soil	8	8
Caliche	7	15
Sand	25	40
Sand rock	20	60
Sand clay	10	70
Rock	20	90
Sand rock	30	120
Sand	90	210
Gravel, Coarse	20	230
Clay and sand, fine	5	235
Sand, coarse	10	245
Sand rock	15	260
Sand	45	305
Gravel	75	380

Note: Red beds at 380 feet.

1.36.4.413 H. W. Martin

Material	Thickness (feet)	Depth (feet)
Surface soil	5	5
Caliche	5	10
Sand rock	10	20
Sand	15	35
Rock	15	50
Sand	15	65
Rock	10	75
Sand and gravel	15	90
Rock	10	100
Sand	70	170
Rock	20	190
Sand	60	250
Rock	10	260
Sand and gravel	67	327

Note: Did not drill to red beds.

Table 3.--Drillers' logs of water wells in Curry County, N. Mex.--Continued

1.37.6.213 Orville Frances

Material	Thickness (feet)	Depth (feet)
Top soil, caliche and clay	170	170
Sand	95	265
Gravel, coarse	120	385
Red beds	2	387

2.31.2.221 G. W. Burdine

Material	Thickness (feet)	Depth (feet)
Surface soil	4	4
Caliche	46	50
Clay, sandy, red	30	80
Sand and gravel (water)	12	92
Clay, yellow	4	96
Gravel, dry	15	111
Clay, yellow	8	119
Sand, dry	7	126

Note: Red clay (red beds?) at 126 feet.

2.34.36.222 Mrs. Martha Dorris

Material	Thickness (feet)	Depth (feet)
Surface soil	5	5
Caliche	10	15
Sand and rock	30	45
Limestone rock, white	15	60
Sand	145	205
Sand rock	25	230
Sand and clay	10	240
Sand	55	295
Sand and gravel	5	300
Red bed	15	315

Table 3.--Drillers' logs of water wells in Curry County, N. Mex.--Continued

2.35.5.421 Raymond W. Worrell

Material	Thickness (feet)	Depth (feet)
Surface soil	8	8
Caliche	7	15
Rock	15	30
Sand	40	70
Rock, lime	10	80
Sand rock	40	120
Sand	135	255
Sand and clay	10	265
Sand rock	80	345
Sand	20	365
Gravel	43	408

Note: Red beds at 408 feet.

2.36.31.321 Mrs. Carrie H. Taylor

Material	Thickness (feet)	Depth (feet)
Surface soil	5	5
Caliche	3	8
Sand	17	25
Rock	15	40
Sand	15	55
Sand rock	35	90
Sand	100	190
Sand rock	15	205
Sand and clay	25	230
Sand	20	250
Sand rock	25	275
Sand	5	280
Gravel	45	325
Red beds	15	340

2.36.34.121 T. B. McGregor

Material	Thickness (feet)	Depth (feet)
Top soil	5	5
Caliche	25	30
Sand, dry	144	174
Sand, wet	31	205
Clay	5	210
Gravel	70	280

Table 3.--Drillers' logs of water wells in Curry County, N. Mex.--Continued

5.34.36.111 B. P. Davis

Material	Thickness (feet)	Depth (feet)
Surface soil	8	8
Caliche	8	16
Caliche and clay, sandy	25	41
Sand	223	264
Sand and sand rock	54	318
Sand	54	372
Sand and sand rock	24	396
Sand, coarse	47	443
Clay, whitish, looked like soap	6	449
Sand and gravel	32	481
Clay, reddish (red beds?)	8	489