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Rural Water Supplies in South Dakota : Campbell County

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Rural Water Supplies in South Dakota

Campbell County

January, 1940
Special Extension Circular
Number 47



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RURAL WATER SUPPLIES
IN
SOUTH DAKOTA
CAMPBELL COUNTY

BY
WALTER V. SEARIGHT
AND
ELMER E. MELEEN

PREPARED BY THE WORK PROJECTS ADMINISTRATION
AS A REPORT ON THE WELL SURVEY CONDUCTED
AS WORK PROJECTS ADMINISTRATION OFFICIAL PROJ-
ECT 665-74-3-126; SPONSORED BY THE EXTENSION
SERVICE AND THE EXPERIMENT STATION SOUTH DAK-
OTA STATE COLLEGE, IN COOPERATION WITH THE
STATE GEOLOGICAL SURVEY.

JANUARY 1940

FOREWORD

This study was first proposed as a project of the Mineral Resources Committee of the State Planning Board under the direction of the State Geological survey and undertaken as a Work Projects Administration project sponsored by the State Planning Board, and was continued under the Planning Board until that body was abolished July 1, 1939 by the State Legislature. At that time sponsorship was transferred to the South Dakota Agricultural Experiment Station and the State College Extension Service, South Dakota State College. Field work was begun October 1, 1938 and was practically completed by February 15, 1939. Workers were assigned in the several counties under the supervision and direction of the County Agricultural Agents and Field Supervisors who were employed by the Work Projects Administration. Questionnaires were mailed out from the offices of the County Agents and were checked and tabulated in these offices. The material was then forwarded to the central office for final tabulation and analysis under the direction of Elmer E. Meleen and Walter V. Searight.

Particular credit should be given to the individual County Agricultural Agents in the various counties of the state who arranged the contacts with the individuals from whom these data were collected, furnished a large portion of the necessary supplies for field work, and directed the workers engaged in collecting field data. Without this assistance in gathering basic data, this study could not have been conducted. The value of the report is therefore in direct proportion to the accuracy and adequacy of these basic data.

INTRODUCTION

PURPOSE

This report on rural water supplies of South Dakota has been prepared to present data recently made available on the types and the sources of water supply, exclusive of stream, lake and dam waters. The information presented is of importance to evaluate present supplies. It should also prove useful as a basis for further development of supplies where they are needed or become necessary. Further, it is hoped that the facts presented may prove of value in any program of water conservation.

SOURCES OF INFORMATION

Questionnaires were sent to all, or essentially all of the farmers of the state, asking for complete data on farm wells and supplementary supplies, with the exception of the supplies above noted. A most gratifying number returned questionnaires, actually 60.1% average for the entire state. The coverage is probably more than 60.1% since it is likely that many unanswered inquiries were those to farmers who were without wells, the type of supply emphasized in the questionnaires. The data thus obtained were supplemented with information contained in the files of the State Geological Survey, the office of the State Engineer, and reports of the United States Geological Survey. This supplementary information, together with that contained in questionnaires was used in making the well location maps included in this report.

PROCEDURE

All data from the questionnaires were tabulated and analyzed statistically by counties, which were made the areal units of study. Within the county,

Acknowledgments - The authors wish especially to acknowledge and commend the conscientious assistance of Mr. E. L. Woodburn, Supervisor, for careful and painstaking supervision of statistical work. The authors also desire to express appreciation for the constant interest and support of this project by Mr. Bob Butts, Director of Research and Records Projects, South Dakota Work Projects Administration.

supplies were allocated as to kind on county maps. Since shallow waters are the most important source of rural supply in South Dakota, wells 200 feet deep and less were plotted on county maps from which maps indicating depths of wells by 50 foot intervals were made. Springs, shown on the well location map, and cisterns were also tabulated as important supplementary supplies, although the latter do not appear on maps or in the tables in this report.

PRESENTATION OF DATA

For convenience and utility, this report has been divided into sections each covering one county, and each county section bound separately. Each county report contains the following material wherever possible.

1. Well Location Map: This map shows the location of all wells and springs within the county, so far as information is now available. These have been plotted in such a manner that artesian and shallow wells can be differentiated readily by the reader. Artesian wells, where they occur, are divided into flowing and pumped. Artesian wells showing decreased flow and those reported as controlled are also indicated by symbols. Shallow wells are differentiated as adequate and inadequate, and dry holes as of 1938 are located. Wells from other sources of information other than questionnaires collected by this survey are shown in blue.

2. Shallow Well Map: This map shows, as accurately as possible, in 50 foot intervals, the depths at which shallow supplies are commonly obtained. Where shallow wells are abundant, as indicated by the well location map, the map is as accurate as the information on which it is based, but where such wells are sparsely distributed errors are likely to occur. In many places reports of shallow wells are absent in which case the area has been left blank.

3. Table of Pumped Wells, from 0 to 200 feet (inclusive) in depth: This table shows minimum, maximum, and average depths of wells within the county, as reported in the questionnaires. Tabulations are by townships. The general character of the water, hard, medium, and soft, as reported by farm-

ers, and the number of wells suitable or unsuitable for drinking are shown in this table. Further, the adequacy of supply, as indicated on the questionnaires, and use for irrigation are shown here.

4. Table of Wells greater in depth than 200 feet: Minimum, maximum, and average depths are indicated. Character, reported as hard, medium or soft is tabulated. Adequacy and use for irrigation are shown as in the preceding table.

5. Table of Flowing Wells: Minimum, maximum, and average depths are shown together with general character and use for irrigation. The volume of flow as reported, and the number of flowing wells reported as equipped with control valves is also included in this table.

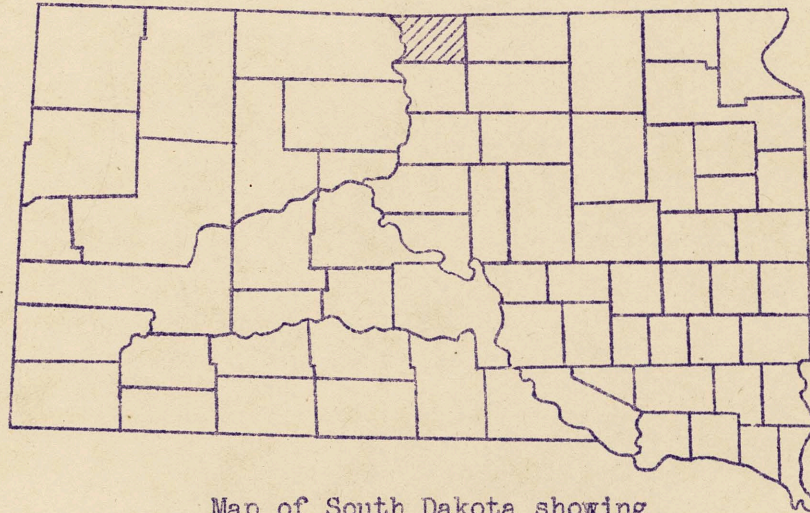
SUMMARY OF STATE SUPPLIES

In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than this number since several counties with large numbers of wells returned over 75% of the questionnaires and since many farmers without wells did not reply because they were not requested to do so in the formal questionnaire. Of the wells reported, 16.2% are artesian, including both pumped and flowing wells. Shallow wells are 83.8% of the wells reported. Wells from shallow sources are thus obviously by far the most important means for obtaining water in rural South Dakota.

Important supplementary supplies are cisterns and springs. Roughly, there is more than one cistern to each 40 wells. Many springs are reported, however, in counties with very few wells, so that in some localities they are of considerable importance.

Campbell County

Campbell county lies in the north central part of South Dakota. It is bounded on the north by North Dakota, on the east by McPherson county, on the south by Walworth county, and on the west by the Missouri river.



Map of South Dakota showing location of Campbell county

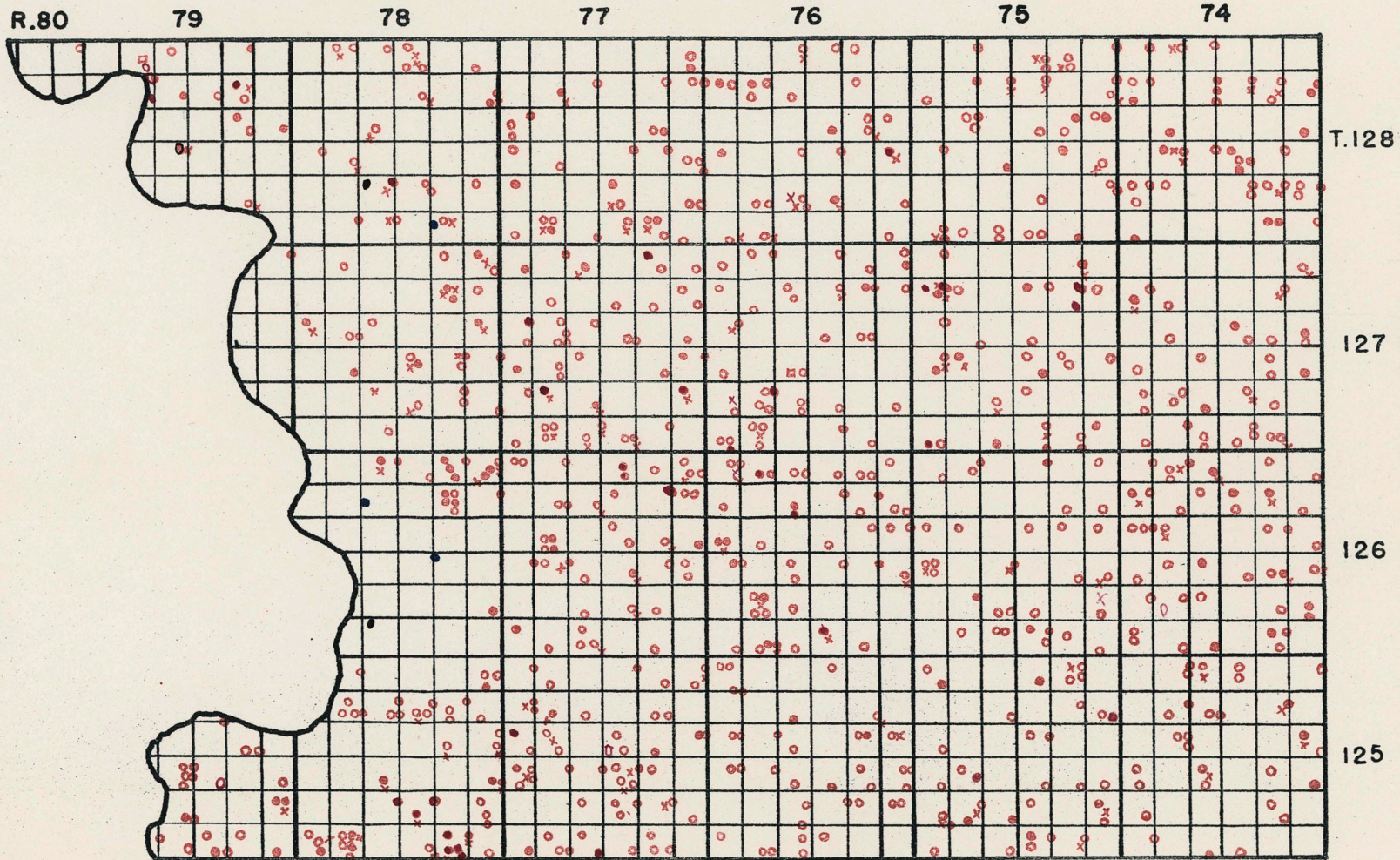
Campbell county is mainly devoted to agriculture, with 440,322 acres (88.9 per cent) out of a total area of 495,360 acres in farms. There are 865 farms in the county, with an average size of farm unit of 509 acres. Wheat, corn, barley, oats, and rye are the important field crops, being produced in the order named. Livestock is also important, cattle, sheep and lambs, horses and mules, and hogs being produced in the order named.*

Farm areas devoted to livestock and dairy cattle require generally distributed sources of water supplies. The supplies required are not great, but adequate and constant supplies of suitable water at relatively low cost are necessary to operate farms of these sizes and organization profitably. The well location map of Campbell county indicates that, in general, such supplies are available and widely distributed.

On the well location map of Campbell county, all flowing and all deep pumped wells obtaining water from the Dakota-Lakota sandstones are shown in black as artesian wells. All other wells are shown in red and are called

*South Dakota Agricultural Statistics, Annual Report, 1937.

LOCATION OF ARTESIAN AND SHALLOW WELLS IN CAMPBELL COUNTY



SHALLOW WELLS

- | | | | |
|---|-------------------|---|-----------|
| ○ | ADEQUATE SUPPLY | X | DRY WELLS |
| ● | INADEQUATE SUPPLY | □ | SPRINGS |

● WELLS FROM OTHER SOURCES

shallow wells, regardless of depth. In all other maps and in tables and text of this report, the term shallow wells applies to all wells of 200 feet depth or less, and those greater than 200 feet deep are treated as deep wells, including all artesian wells except those flowing wells 200 feet or less in depth.

Questionnaires from Campbell county totaled 603 or 83.2 per cent coverage, with information on 715 wells, 104 cisterns, and 7 springs over the county.

DEPTH AND DISTRIBUTION

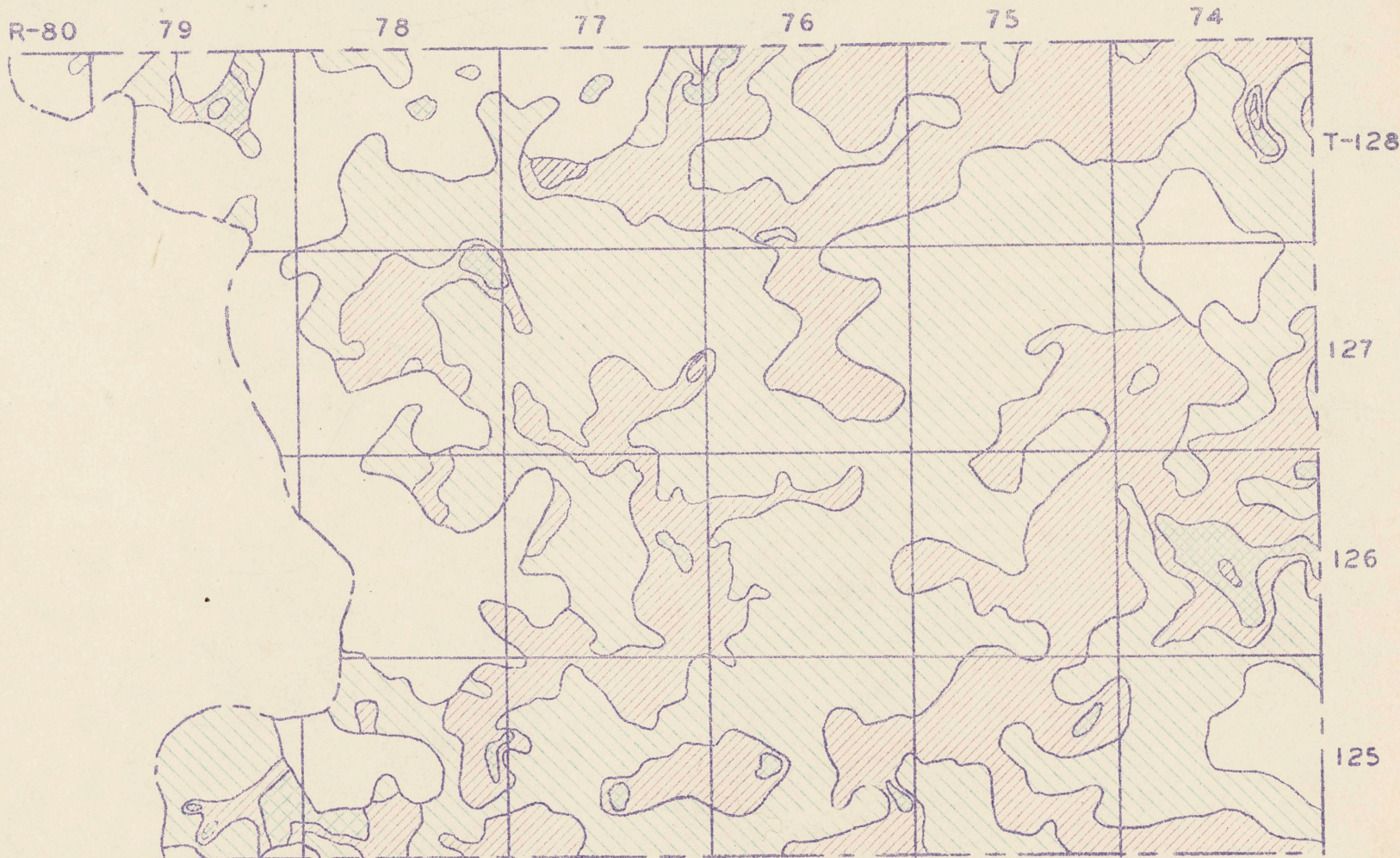
Most of the well water of Campbell county is obtained from shallow pumped wells distributed fairly evenly over the county. With a total area of approximately 768 square miles, the average number of all types of wells reported is somewhat less than one well to each square mile.

Shallow pumped: The greater number, 698 (97.6 per cent) of all wells reported in the county were shallow pumped wells. The number and distribution of these wells, on the whole, are uniform with the exception of an area in the northwest and extreme west central portion of the county (see shallow well map). In these areas the number of wells reported per township was considerably fewer in number. The average number of all types of wells reported per township is 32.5. The average per township of shallow wells, which comprised 97.6 per cent of the total wells reported, is 32 wells. The following tabulation shows those areas of few wells compared with the average for the county.

Twp.	Rge.	Total Wells	Total Shallow Wells
127N	78W	23	22
128	78	21	20
126	78	18	16
128	79	13	12 (fractional twp.)


More than 90 per cent of shallow wells reported were 100 feet or less in depth. A total of 442 (63.3 per cent) of all shallow wells were from 0 to 50


CAMPBELL COUNTY





SHALLOW WELLS (0-200 FT.)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED

 0-50 FT.

 50-100 FT.

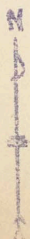
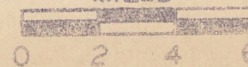
 100-150 FT.

 150-200 FT.

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MILES



feet deep; 204 (29.2 per cent) between 50 to 100 feet deep; 40 (5.8 per cent) from 100 to 150 feet deep; and only 12 (1.7 per cent) from 150 to 200 feet in depth.

Deep wells: Only 14 (2 per cent) of the total wells reported in the county were deep pumped wells and only 3 (.4 per cent) were deep flowing wells. Township 125N., R.74W., reported 5 deep pumped wells for the largest percentage in the county with the remaining distributed among 7 townships. Eight (57 per cent) were reported from two southeastern townships, 5 were reported above and 3 in T.126N., R.74W. (See map)

Only three deep flowing wells were reported in the north and west portions of the county, with one well each in T.126N., R.78W., T.128N., R.78W., and T.123N., R.79W.

The type of well reported, percentage of the total wells, and average depths are tabulated below:

Type of Well	Number	Percentage	Average Depth
Shallow Flowing	0	0	0
Shallow Pumped	698	97.6	43
Deep Pumped	14	2.0	285
Deep Flowing	<u>3</u>	<u>0.4</u>	2284
	715	100.	

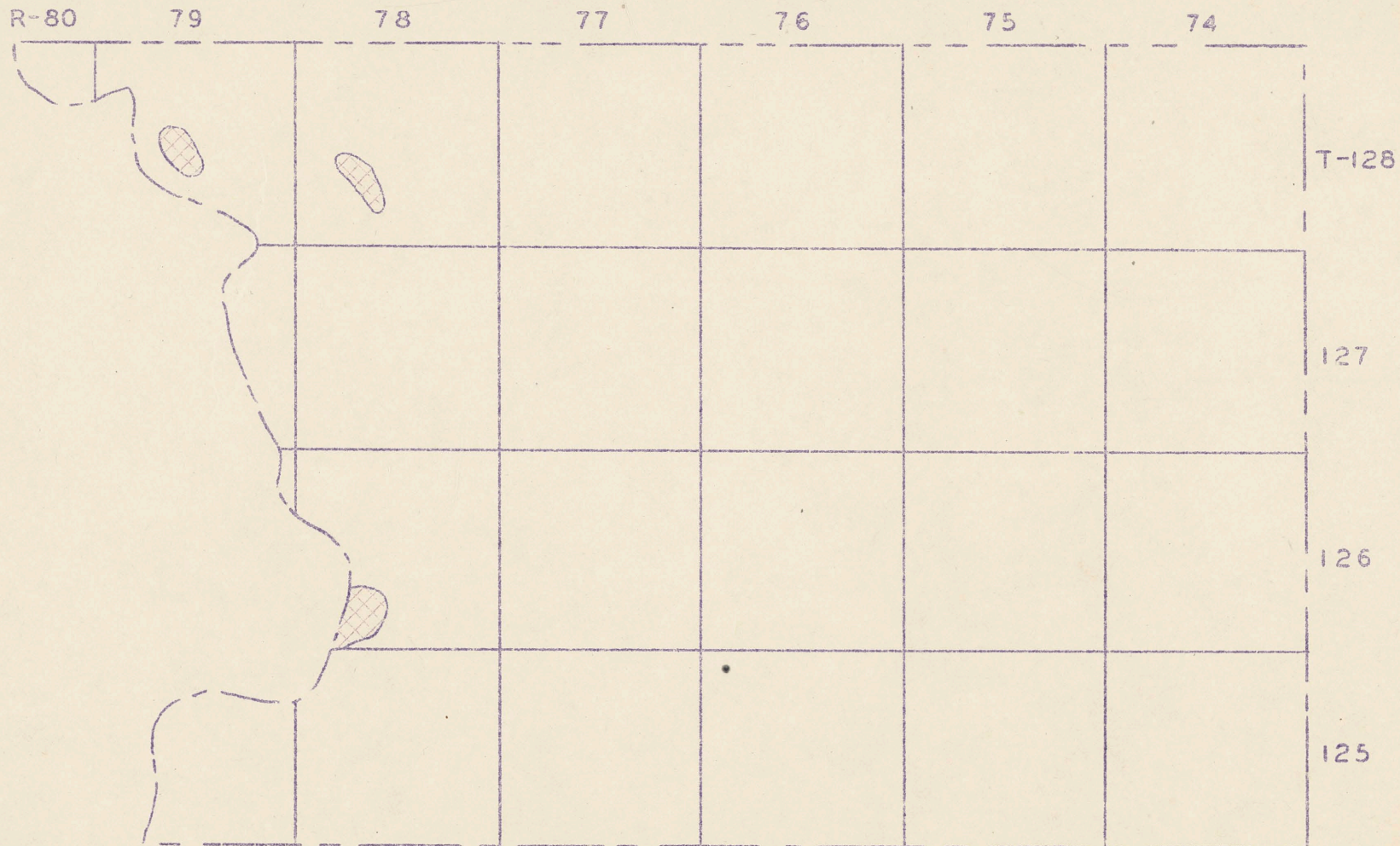
Average depths ranged from 43 feet in the shallow wells to 2284 feet in the few deep flowing wells reported. The average minimum and maximum depth of all types of wells reported have been tabulated for Campbell county and appear in the following table:

Type of Well	Average Minimum Depth	Average Maximum Depth
Shallow Pumped	11	122
Deep Pumped	265	297
Deep Flowing	2284	2284


CHARACTER OF WATER

In order to determine the character of the water, users were asked to indicate whether they considered supplies to be hard, moderately hard, or soft. Out of a total of 673 shallow wells reported, 303, or 45 per cent, were said to supply hard water, 292, or 43.4 per cent moderately hard, and 78, or 11.6

ARTESIAN AREAS 1938



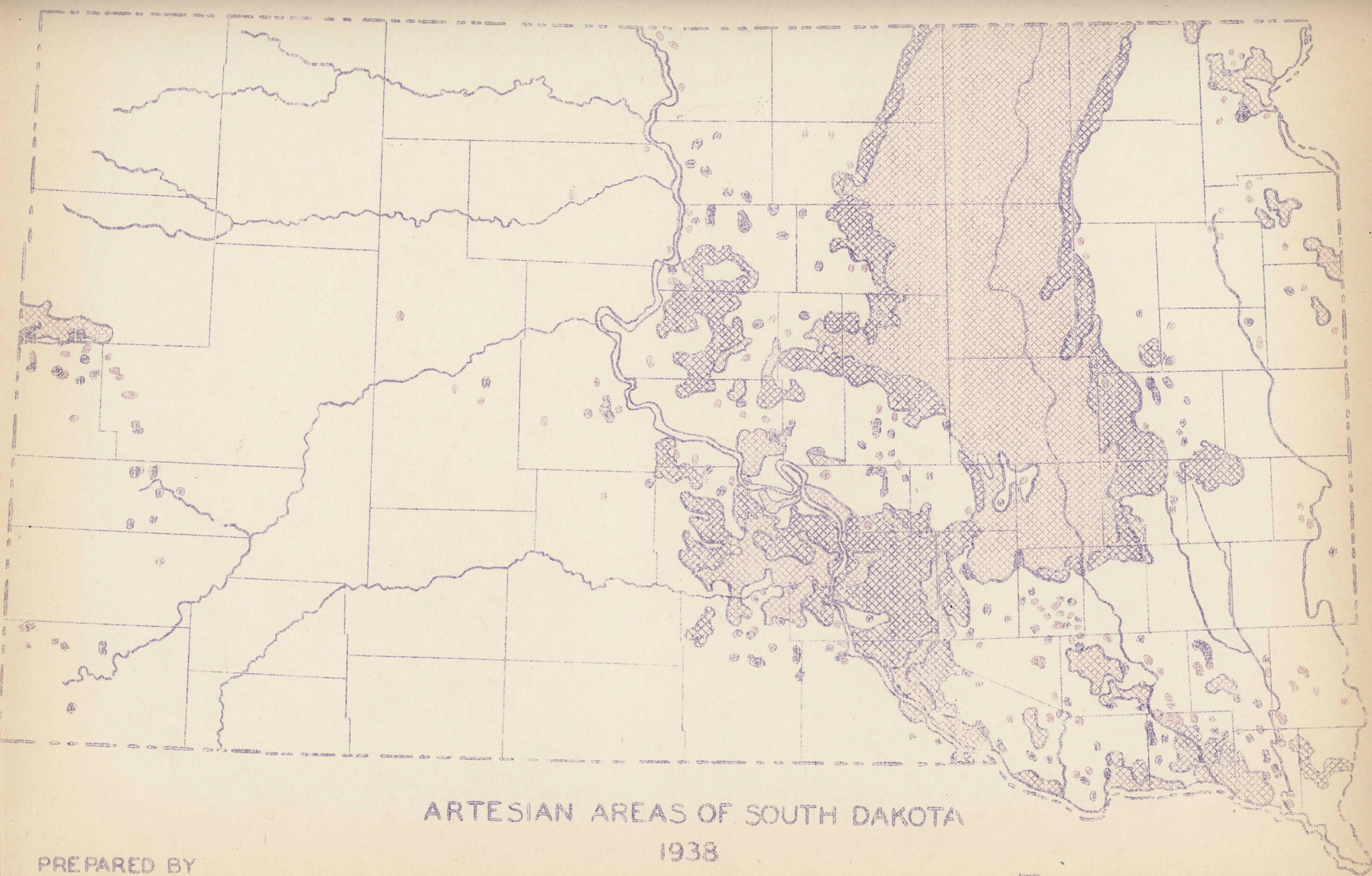
CAMPBELL COUNTY

 FLOWING WELLS

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ARTESIAN AREAS OF SOUTH DAKOTA

1938

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OP 665-74-3-126

WP 3636

 FLOWING WELLS

 PUMPED ARTESIAN WELLS

per cent, soft. Thus, for 88 per cent of the shallow wells, definitely or moderately hard water was reported.

Of the deep pumped wells reported, one supplied hard water, six moderately hard, and seven soft water. Of the flowing wells, two produced soft water and one moderately hard water. Thus, deep wells seem more likely to furnish soft water.

Of reports received on shallow pumped wells, only 83 wells, or 12 per cent, were unsuitable for drinking, indicating that in general, the shallow well water is potable. Of deep pumped wells, only one out of 14 was declared unsuitable for drinking.

The water from all three deep flowing wells was reported unsuitable for drinking, suggesting that this type of well is likely not to furnish a suitable drinking supply in this area.

Accurate chemical analyses were not available for the determination by farmers, but use is probably a fairly good criterion of character and must be accepted until laboratory analyses are available.

ADEQUACY OF WELL WATERS .

Present supplies were reported adequate for current needs in Campbell county. However, needs vary and changes in rainfall in this or surrounding land areas will modify all water supplies excepting those from artesian sources.

A total of 518 (74.2 per cent) of shallow wells reported were said to furnish an adequate supply. More than one-fourth, 180, (25.8 per cent) of the shallow wells were said to be inadequate. Half of the deep pumped wells, a total of seven, were reported inadequate. In Campbell county, as in some nearby areas, deep pumped wells are commonly unsatisfactory.

All three flowing wells reported furnished an adequate supply. Of the two deep flowing wells reported on as to flow, one furnished an average of three gallons per minute and the other six gallons per minute.

IRRIGATION

A total of 70 shallow pumped wells were reported as used to irrigate approximately 26 1/2 acres.

SUPPLEMENTARY SUPPLIES

Springs are an important source of supplementary supplies, with 7 being reported in the county. Of the seven springs reported, six furnished an adequate supply of water and none were considered unsuitable for drinking. Three springs furnished moderately hard water and one was a soft water supply.

One hundred four cisterns were reported. The cisterns in most cases were supplied by rain, only 16 reporting their cistern water to be hauled. Cisterns are generally used to supplement inadequate supplies for drinking, or as a substitute for regular supplies where the water is too hard for laundry purposes. This latter use is the most important part played by cisterns in the state.

CAMPBELL COUNTY

Table 1.

DATA ON PUMPED WELLS FROM 0 TO 200 FEET (INCL.) IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approximate Acres Irrigated
125	74	23	7	90	24	12	6	3	4	2	21	2	7	1/8
125	75	33	9	106	44	16	15	1	6	6	24	9	5	7/8
125	76	34	12	149	42	17	14	3	3	3	31	3	4	7/8
125	77	47	6	120	49	24	17	5	7	8	37	10	2	1/4
125	78	43	8	140	52	20	19	4	6	7	28	15	3	7/8
125	79	21	6	132	47	6	9	5	1	3	15	5	-	-
126	74	39	8	190	56	18	13	6	5	5	28	11	2	1/8
126	75	31	10	90	43	15	14	2	4	1	26	5	2	1/8
126	76	43	7	80	26	11	25	4	7	2	31	12	4	1 1/4
126	77	38	6	120	50	15	17	6	1	2	31	7	2	1/4
126	78	16	16	142	46	7	6	3	-	2	5	11	-	-
127	74	32	11	97	48	21	10	-	7	4	27	5	6	8 3/4
127	75	31	18	112	37	18	7	3	7	6	17	14	-	-
127	76	37	12	117	33	13	18	4	4	6	31	6	6	1/2
127	77	40	10	200	41	15	17	6	2	4	29	11	5	6 3/8
127	78	22	14	130	96	4	17	1	3	4	15	7	-	-
127	79	1	14	14	14	-	1	-	-	-	1	-	-	-
128	74	39	8	180	36	13	16	10	1	1	23	16	8	1 3/4
128	75	35	12	110	48	16	13	3	12	6	27	8	4	6/8
128	76	26	14	135	59	11	13	1	2	2	21	5	2	1
128	77	34	8	180	40	13	14	6	4	6	24	10	3	1/2
128	78	20	12	128	31	11	8	-	1	1	18	2	2	1
128	79	12	20	155	59	7	3	1	5	2	6	6	3	1 1/8
128	80	1	14	14	14	-	-	1	-	-	1	-	-	-
Total		698				303	292	78	92	83	518	180	70	26 1/2

CAMPBELL COUNTY

Table 2.

DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

LOCATION		Number of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY			
Twp.	Rge.		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inadequate	Number used for Irrigation	Approximate Acres Irrigated
125	74	5	345	414	385	1	3	1	2	-	2	3	1	7/8
125	77	1	-	-	250	-	-	1	1	1	1	-	-	-
126	74	3	202	386	224	-	3	-	1	-	3	-	2	1/2
126	77	1	-	-	252	-	-	1	-	-	-	1	-	-
126	78	1	-	-	265	-	-	1	-	-	-	1	-	-
127	77	1	-	-	225	-	-	1	-	-	-	1	-	-
127	78	1	-	-	300	-	-	1	-	-	-	1	-	-
128	76	1	-	-	280	-	-	1	-	-	1	-	-	-
Total		14				1	6	7	4	1	7	7	3	1 3/8

Note: No wells reported for this group from the following townships and ranges: T.125N.,R.75,76,78,79W - T.126N., R.75,76W - T.127N.,R.74,75,76,79W - T.128N.,R.74,75,77,78,79,80W

CAMPBELL COUNTY
Table 3.
DATA ON FLOWING WELLS

LOCATION		Num- ber of Wells	DEPTH OF WELLS			CHARACTER OF WATER					ADEQUACY OF SUPPLY					
Twp.	Rge		Min.	Max.	Ave.	Hard	Med.	Soft	Corrode Casing	Unsuitable for Drinking	Adequate	Inade- quate	Number used for Irrigation	Approx. Acres Irrigated	Ave. Gallon Per Min	Number Con- trolled
126	78	1	-	-	2300	-	1	-	1	1	1	-	-	-	-	-
128	78	1	-	-	2252	-	-	1	-	1	1	-	-	-	3	-
128	79	1	-	-	2300	-	-	1	1	1	1	-	-	-	6	-
Total		3				-	1	2	2	3	3	-	-	-	-	-

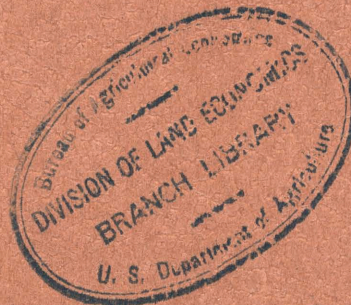
Note: No wells reported for this group from the following townships and ranges:

T.125N.,R.74 to 79, Incl. - T.126N.,R.74 to 77, incl. - T.127N., R.74 to 79 incl. - T.128N.,R.74 to 77, incl. & 80W.

CAMPBELL COUNTY WELL NOTES

The following are pertinent remarks quoted from questionnaires returned by farmers and are included opinions of the water situation as expressed by the individual farmers and must be so applied.

- T.124N., R.74W.
NE $\frac{1}{4}$ Sec. 11 400 feet:
"Difficulty on account fine sand."
- T.125N., R.74W.
NW $\frac{1}{4}$ Sec. 13 414 feet:
"Had difficulty with fine sand at 308 feet account clogging. However, had it opened up again and recased 165 ft. with 2 inch casing, setting them down right on vein of water and ever since my water is clear, which it never had been before."
- T.126N., R.76W.
NW $\frac{1}{4}$ Sec. 34 34 feet:
"Difficulty on account fine sand."
- T.125N., R.79W.
SE $\frac{1}{4}$ Sec. 28 110 feet:
"Difficulty is securing water at shallow depths and in sufficient quantity. Has to be dug thro hardest gumbo. Our present drilled well furnishes water suitable for stock but not for drinking and cooking. Supply is now insufficient but believe the water is still there only the pipe is clogged or rusted shut at the vents."
- T.125N., R.79W.
NW $\frac{1}{4}$ Sec. 35 35 feet:
"Difficulty in construction due to quicksand."
- T.125N., R.78W.
NE $\frac{1}{4}$ Sec. 27 40 feet:
"Hard to get wells because we have no water bearing sand strata so our wells are in shale and whenever we have continued dry weather our wells go dry. I should have an artesian well to carry proper amount of livestock,"
- T.126N., R.77W.
SE $\frac{1}{4}$ Sec. 13 90 feet:
"Difficult to get a well in which the water supply will hold out."
- T.128N., R.75W.
SE $\frac{1}{4}$ Sec. 3 62 feet:
"There seems to be a substance down about 40 ft. being about 3 to 5 feet thick. Looks exactly like cement, which makes it impossible to keep a curbing. I would suggest you secure a sample and analyze same."
- T.128N., R.75W.
NE $\frac{1}{4}$ Sec. 17 60 feet:
"Difficulty on account of quicksand."
- T.128N., R.76W.
NW $\frac{1}{4}$ Sec. 7 130 feet:
"Difficulty on account of quicksand."
- T.128N., R.77W.
SE $\frac{1}{4}$ Sec. 8 22 feet:
"Difficulty on account of fine sand."
- T.128N., R.78W.
NE $\frac{1}{4}$ Sec. 27 18 feet:
"The sand is so fine that we can't get any deeper. If we could get deeper it would be a good well."



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