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## Rural Water Supplies in South Dakota : Deuel County

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# Rural Water Supplies in South Dakota

## DEUEL County

January, 1940  
Special Extension Circular  
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South Dakota State College  
Brookings, S. D.

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# RURAL WATER SUPPLIES

IN

SOUTH DAKOTA

## DEUEL 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

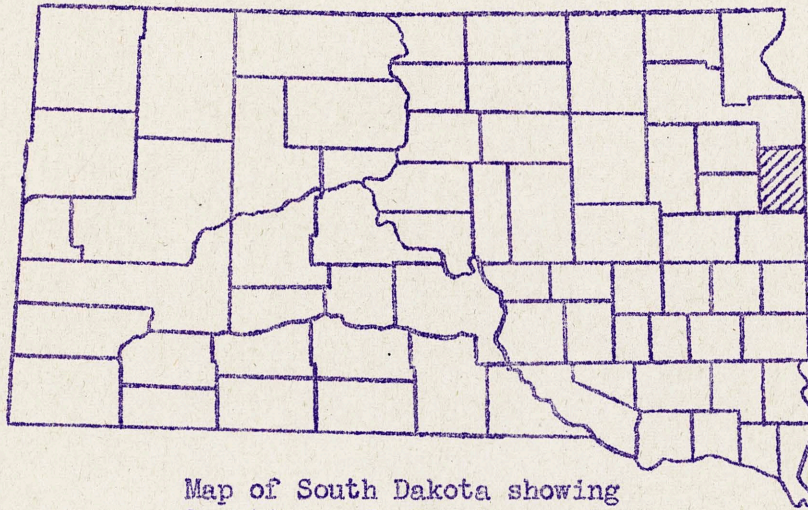
In the entire state, a total of 48,479 wells were reported in response to questionnaires, returned by 60.1% of the recipients. If those who did not respond have a number of wells in proportion to those who reported, there are approximately 80,000 wells in South Dakota. There are possibly many less than 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.



### Deuel County

Deuel county lies in the northeastern part of South Dakota. It is bounded on the north by Grant county, on the east by the state of Minnesota, on the south by Brookings county and on the west by Codington and Hamlin counties.



Map of South Dakota showing location of Deuel county

Most of the county is in farms, 92.9 per cent of the area (404,480 acres) being divided into 1,355 farm units, which average 298 acres to each farm unit. Corn, oats, wheat, barley, potatoes, tame and wild hay, rye and flax are the important field crops, the first four being the most important crops. Livestock is also important; cattle, horses and mules, hogs and sheep being produced in the order named. Dairy products are important but subordinate.\*

Agricultural areas, such as Deuel county, composed of relatively small farm units which livestock, hogs and dairy cattle are important, require generally distributed sources of water. Supplies required are not great but adequate and constant supplies of suitable water, at relatively low cost are necessary to profitably operate farms of these sizes and organization. The well location map of Deuel county indicates that, in general, such water supplies are available and are widely distributed.

On the well location map of Deuel county, all flowing and all deep pumped wells obtaining water from the Dakota-Lakota sandstones are shown in black as

\*South Dakota Agricultural Statistics, Annual Report, 1937

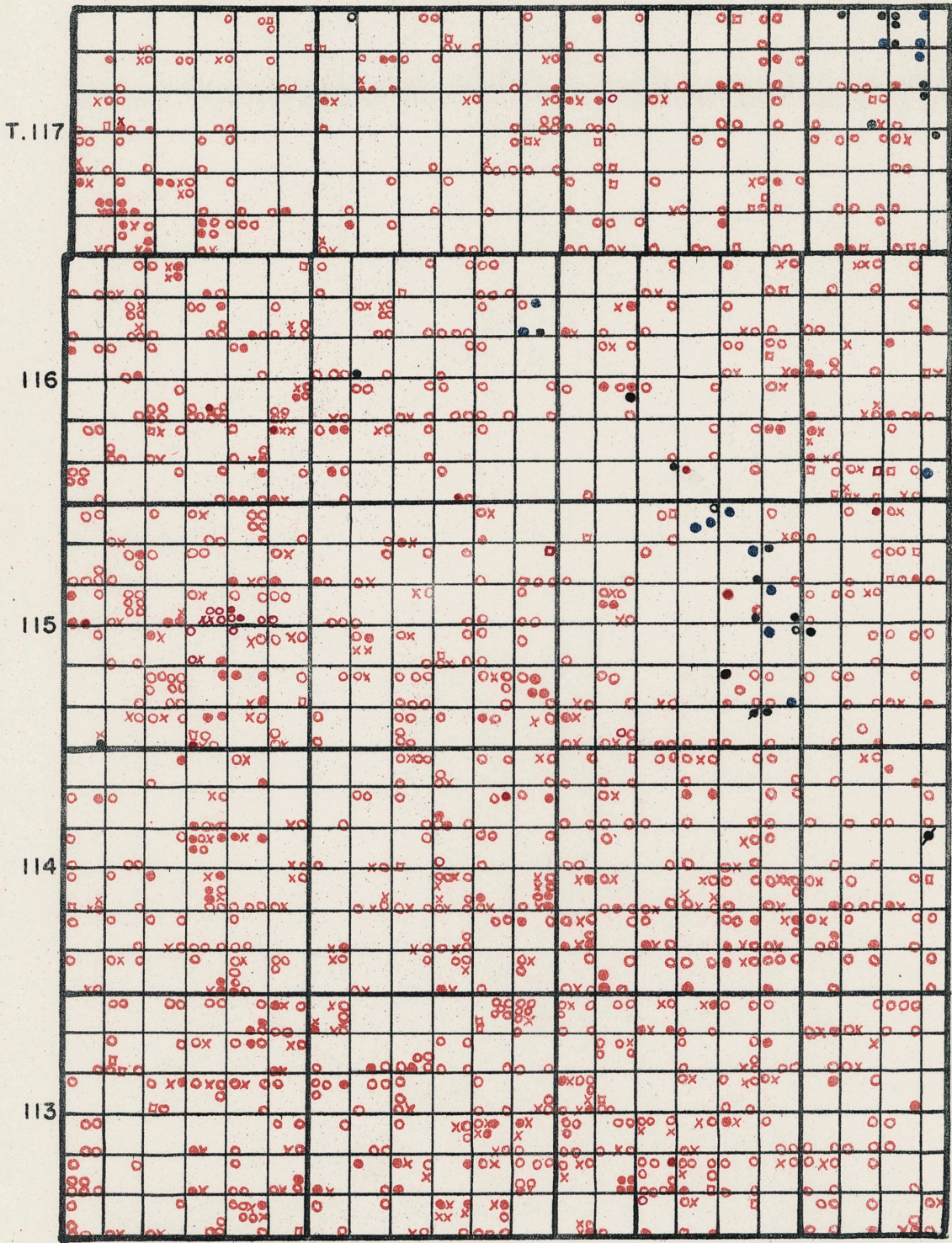
LOCATION OF ARTESIAN AND SHALLOW WELLS IN DEUEL COUNTY

R.50

49

48

47



T.117

116

115

114

113

- |                       |                                    |                      |                   |
|-----------------------|------------------------------------|----------------------|-------------------|
| <b>ARTESIAN WELLS</b> |                                    | <b>SHALLOW WELLS</b> |                   |
| ○                     | FLOWING WELLS—STEADY OR INCREASING | ○                    | ADEQUATE SUPPLY   |
| ●                     | FLOWING WELLS—DECREASED FLOW       | ●                    | INADEQUATE SUPPLY |
| /                     | CONTROLLED WELLS                   | X                    | DRY WELLS         |
|                       |                                    | □                    | SPRINGS           |
| ●                     | WELLS FROM OTHER SOURCES           |                      |                   |

artesian wells. All other wells are shown in red and are called shallow wells regardless of depth. On all other maps, however, and in the tables and text of this report, the term shallow wells is applied to all wells of 200 feet depth or less, unless otherwise stated, and those more than 200 feet deep are referred to as deep wells and include all artesian wells except those flowing wells 200 feet or less in depth.

DEPTH AND DISTRIBUTION

Wells are widely distributed in Deuel county and most of the rural water supplies are obtained from shallow sources. Fourteen townships report more than one well per square mile and six report more than two per square mile. The average is almost two wells to each section.

A total of 1,171 wells were reported in returns from 75 per cent of the questionnaires sent out to Deuel county, a remarkably good coverage. Of these wells, 988 were shallow pumped wells 200 feet deep or less. In addition, 23 wells in Deuel county 200 feet or less were reported to be flowing wells. Thus a total of 1,011 wells or 86.3 per cent of all wells reported in the county are 200 feet or less in depth, indicating that approximately 86 per cent of all wells in Deuel county are shallow.

Ten townships reported more than 90 per cent (average 93.2 per cent) of all wells to be shallow. These are listed as per cent of all wells in the table which follows:

| Twp. | Rge. | Per cent Shallow | Twp. | Rge. | Per cent Shallow |
|------|------|------------------|------|------|------------------|
| 113N | 48W  | 93.5             | 116N | 48W  | 90.0             |
| 113  | 50   | 92.              | 116  | 49   | 94.4             |
| 114  | 47   | 94.1             | 116  | 50   | 94.              |
| 114  | 48   | 90.7             | 117  | 47   | 96.9             |
| 116  | 47   | 93.5             | 117  | 49   | 93.2             |

Six townships reported that between 80 and 90 per cent (average 84.4 per cent) of the wells were shallow. These wells have been tabulated as percentages of total wells as follows:

# DEUEL COUNTY

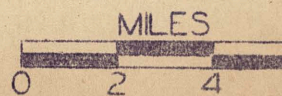


## SHALLOW WELLS (0-200 FT)

DEPTHS AT WHICH SUPPLIES ARE COMMONLY OBTAINED



PREPARED BY  
 WORK PROJECTS ADMINISTRATION  
 OP 665-74-3-126 WP 3636



| Twp. | Rge. | Per cent Shallow | Twp. | Rge. | Per cent Shallow |
|------|------|------------------|------|------|------------------|
| 113N | 47W  | 86.5             | 115N | 49W  | 85.2             |
| 115  | 47   | 84.8             | 117  | 48   | 80.4             |
| 115  | 48   | 85.2             | 117  | 50   | 83.6             |

Four townships reported between 70 and 80 per cent (average 76.2 per cent) to be shallow wells. These are listed as percentages of total wells in the table which follows:

| Twp. | Rge. | Per cent Shallow | Twp. | Rge. | Per cent Shallow |
|------|------|------------------|------|------|------------------|
| 113N | 49W  | 77.1             | 114N | 50W  | 76.5             |
| 114  | 49   | 77.3             | 115  | 50   | 73.9             |

These data suggest that in townships with low percentages of shallow wells, particularly those less than 90 per cent, farmers have been forced to penetrate deeper in order to obtain adequate or satisfactory supplies.

Of the shallow wells reported, slightly more than half (50.7 per cent) are less than 50 feet in depth and 28 per cent are between 50 and 100 feet deep. Thus, nearly four fifths (78.7 per cent) of the shallow wells of Deuel county are 100 feet deep or less. The remaining shallow wells include 11.5 per cent between 100 and 150 feet deep and 9.8 per cent between 150 and 200 feet in depth.

The areas from which shallow wells obtain water at various depths are shown on the shallow well map which shows areas of shallow wells by 50 foot depth intervals. It may be used also to indicate probable additional sources of supply, the accuracy of prediction depending on the profusion of present wells reported and the constancy of the ground water table.

In Deuel county only 157 wells from a total of 1,171 wells (13.4 per cent) are deep pumped wells. In addition three flowing wells were reported to be more than 200 feet deep. Deep wells make up from 3.1 per cent to 22.9 per cent of the wells in each township and vary in depth from 205 to 786 feet. They are generally distributed over the county although most of them occur in six townships: Twp. 113N., Rge. 49W., Twp. 114N., Rge. 49W., Twp. 114N., Rge. 50W., Twp. 115N., Rge. 50W., Twp. 117N., Rge. 48W., and Twp. 117N., Rge. 50W. The number of these wells in

each township and the minimum and maximum depths have been tabulated as follows:

| Twp. | Rge. | Number of Wells | Min. | Max. | Twp. | Rge. | Number of Wells | Min. | Max. |
|------|------|-----------------|------|------|------|------|-----------------|------|------|
| 113N | 47W  | 5               | 206  | 364  | 115N | 49W  | 9               | 220  | 450  |
| 113  | 48   | 6               | 265  | 400  | 115  | 50   | 24              | 215  | 786  |
| 113  | 49   | 19              | 205  | 550  | 116  | 47   | 2               | 229  | 280  |
| 113  | 50   | 6               | 220  | 500  | 116  | 48   | 4               | 205  | 293  |
| 114  | 47   | 2               | 230  | 280  | 116  | 49   | 3               | 371  | 545  |
| 114  | 48   | 8               | 214  | 360  | 116  | 50   | 5               | 225  | 685  |
| 114  | 49   | 15              | 210  | 407  | 117  | 47   | 1               | 207  |      |
| 114  | 50   | 16              | 230  | 385  | 117  | 48   | 10              | 215  | 305  |
| 115  | 47   | 5               | 205  | 263  | 117  | 49   | 3               | 230  | 300  |
| 115  | 48   | 7               | 208  | 315  | 117  | 50   | 10              | 210  | 670  |

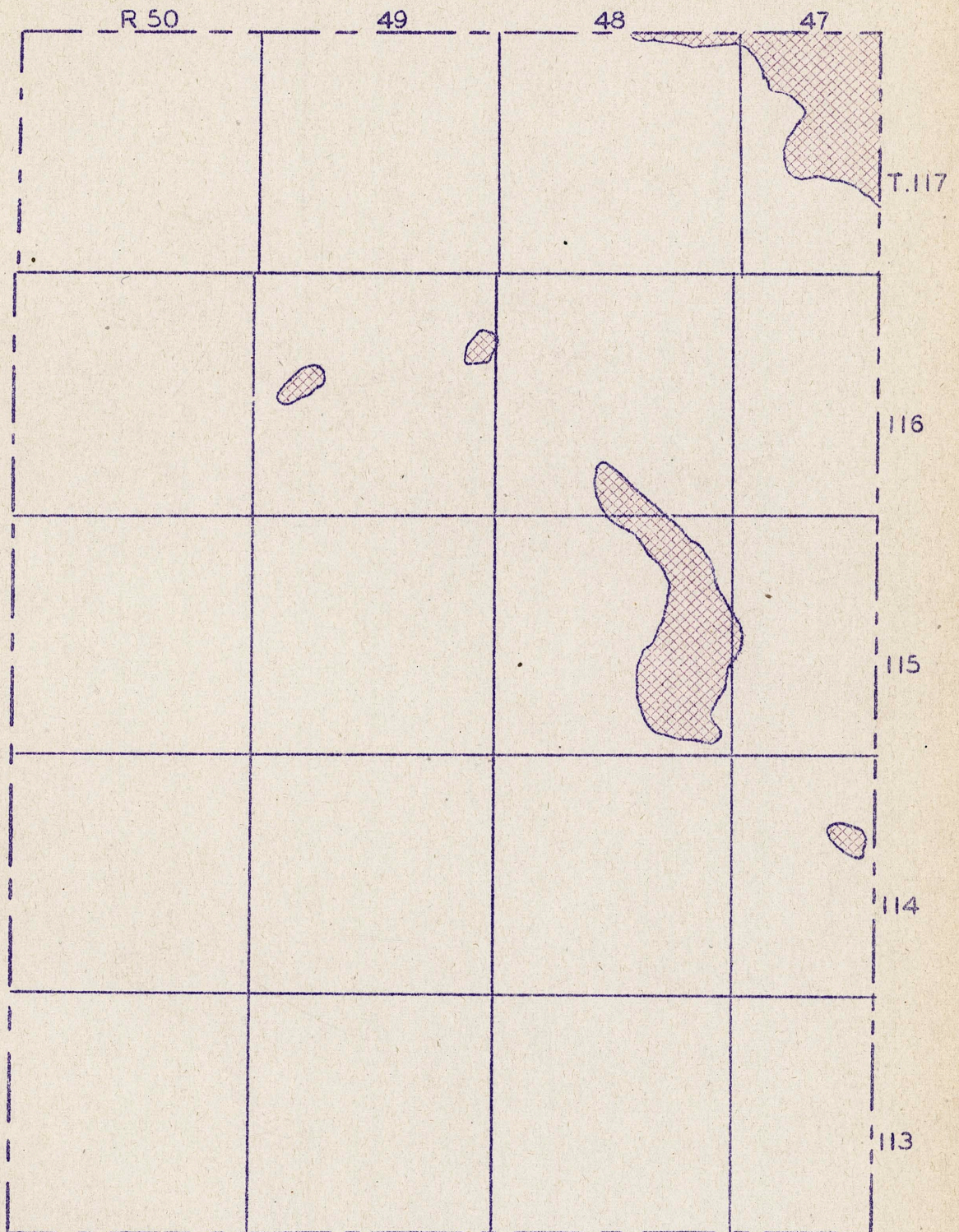
In order to indicate the localities in which the deeper wells of the county occur, those reported 400 feet deep and more were also tabulated by depth and these appear in the table which follows:

| Depth Range     | Twp. | Rge. | Number of wells at this depth range |
|-----------------|------|------|-------------------------------------|
| 400 to 450 feet | 113N | 48W  | 1                                   |
|                 | 113  | 49   | 4                                   |
|                 | 114  | 49   | 1                                   |
|                 | 115  | 49   | 2                                   |
|                 | 115  | 50   | 5                                   |
| 450 to 500 feet | 115  | 49   | 1                                   |
|                 | 115  | 50   | 2                                   |
| 500 to 550 feet | 113  | 49   | 1                                   |
|                 | 113  | 50   | 1                                   |
|                 | 115  | 50   | 3                                   |
| 650 to 700 feet | 116  | 49   | 1                                   |
|                 | 116  | 50   | 1                                   |
| 750 to 786 feet | 117  | 50   | 1                                   |
|                 | 115  | 50   | 1                                   |


Flowing wells have been reported from restricted areas in the county. None are reported from the southern third of the county. Twenty three flowing wells were reported to range in depth from 36 down to 200 feet and three from 205 to 220 feet, (see table 3.) The distribution of these wells and their relations to the pumped wells is shown on the artesian map of Deuel county and the relations of the Deuel county artesian area to other areas of South Dakota is shown on the artesian area map of South Dakota.

The volume of flow was not reported for all flowing wells but those reported show variations in volume of flow ranging from one to 5 3/4 gallons per minute. The flowing wells were reported to be equipped with control valves.

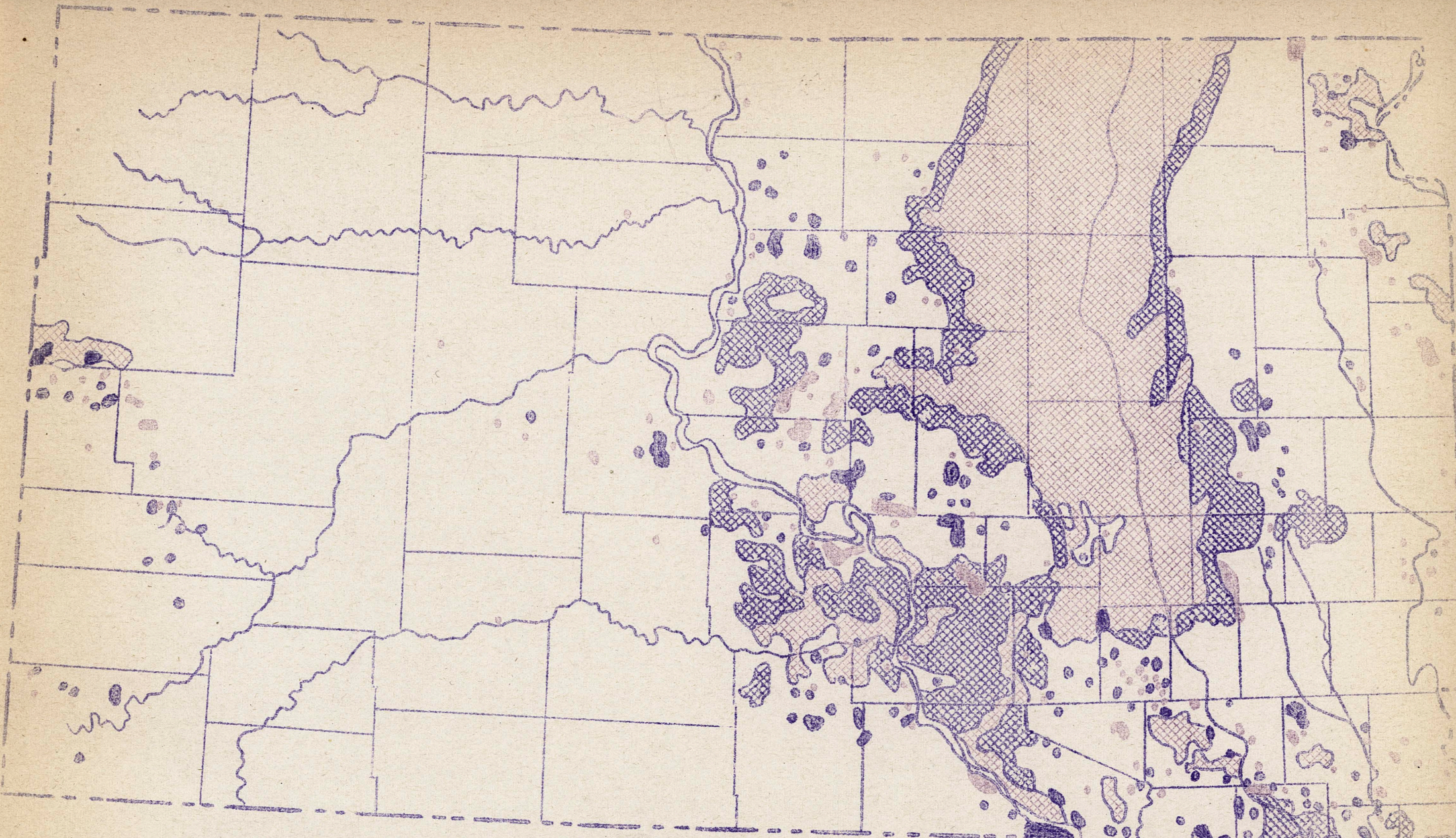
# ARTESIAN AREAS 1938



DEUEL COUNTY

 FLOWING WELLS

PREPARED BY  
WORK PROJECTS ADMINISTRATION  
O.P. 665-74-3-126 W.P. 3636



ARTESIAN AREAS OF SOUTH DAKOTA  
1938

PREPARED BY  
WORK PROJECTS ADMINISTRATION  
O.P. 665-74-3-126  
WP 3636

□ ■ FLOWING WELLS  
▨ ■ PUMPED ARTESIAN WELLS



## CHARACTER OF WELL WATERS

The general character of well waters of Deuel county has been determined from replies by users to questionnaires. On the questionnaires farmers were asked whether water supplied by their wells was considered to be hard, moderately hard, or soft. Although most farmers do not have access to chemical analyses of water supplies, usage is probably a fairly good criterion of general character and quality and must suffice until accurate and adequate chemical analyses are available.

Data on 528 of the shallow pumped wells, 200 feet deep and less, indicates the 47.2 per cent were considered hard and that 46.8 per cent were considered to be moderately hard. Thus, 94 per cent of the rural shallow wells reported were considered to be moderately or definitely hard. Distribution of waters of this character is general, indicating that shallow water sources produce and will continue to produce moderately hard to hard water. Of the shallow wells reported, only six per cent were considered to be soft and these are scattered at random over the county.

Although shallow waters are hard, most shallow wells produce satisfactory drinking water. A total of 106, or 10.6 per cent, reported were considered to be unsuitable for drinking. There are several possible reasons for unsuitability. Surface contamination is possible, disagreeable chemical compounds possibly occur or harmful or objectionable chemical salts may be dissolved in the water. Definite conclusions concerning causes must await more accurate laboratory data.

Data is available on 146 deep pumped wells. Of these, 67.8 per cent were considered to be hard and 32.2 per cent were moderately hard. None were considered to be soft. These figures suggest that water from deep wells in Deuel county are even more consistently hard than that from shallow wells. Thirty two of these wells were reported to be unsatisfactory for drinking purposes.

Flowing wells of Deuel county produce water which, according to the users, is moderately to definitely hard. Reports by farmers on 25 wells consider 44 per cent to be hard and 56 per cent to be moderately hard. None of these wells was reported unsatisfactory for drinking purposes.

#### ADEQUACY OF SUPPLY

In general, according to reports by farmers, wells supply waters sufficient for current needs. Whether or not supplies are adequate for future requirements, depends on changes in land utilization and future variations in water supply at the source.

Shallow well supplies are generally adequate where they are used, although a fifth of them are reported inadequate. Inadequate wells are distributed fairly evenly over the county except in a few townships where the supply at the source appears definitely insufficient.

Deep pumped wells appear to be more of a reliable source for adequate supplies since only 12 of these (7.6 per cent) are reported inadequate.

One flowing well was reported inadequate in Twp. 115N., Rge. 48W.

#### IRRIGATION

Well waters are used in Deuel county in many places to irrigate small garden plots. Six shallow wells were reported in use to irrigate a total of  $3 \frac{1}{8}$  acres, one well in Twp. 116N., Rge. 49W., being used to irrigate a three acre tract. Three pumped wells were used to irrigate a total of  $\frac{3}{4}$  of an acre and three flowing wells were used to irrigate plots varying in size from  $\frac{1}{8}$  acre to two acres.

#### DRY HOLES

A total of 255 dry well holes were reported from Deuel county. Most of

these holes were reported shallow and 100 feet or less in depth. The depths of 184 of these were reported and these are tabulated by number of holes and percentage of the total dry holes in the table which follows:

| Depth Range  | Number of Dry Well Holes | Per cent Total Dry Holes Reporting Depth |
|--------------|--------------------------|--|
| 0 to 50 feet | 127                      | 69.9                                     |
| 50 to 100 "  | 46                       | 25.                                      |
| 100 to 150 " | 3                        | 1.6                                      |
| 150 to 200 " | 4                        | 2.1                                      |
| 200 to 250 " | 2                        | .8                                       |
| 320 "        | 1                        | .3                                       |
| 700 "        | 1                        | .3                                       |

#### SUPPLEMENTARY WATER SUPPLIES

Springs and cisterns are important supplementary water supplies in Deuel county. A total of 51 springs were reported. These are tabulated below by township location, the number of springs, number of springs and wells and the proportion of springs to springs and wells.

| Twp. | Rge. | Number of Springs | Per cent Springs | Number of Wells and Springs |
|------|------|-------------------|------------------|-----------------------------|
| 113N | 47W  | 0                 | -                | 37                          |
| 113  | 48   | 4                 | 4.2              | 96                          |
| 113  | 49   | 2                 | 2.4              | 85                          |
| 113  | 50   | 4                 | 5.               | 79                          |
| 114  | 47   | 1                 | 2.8              | 35                          |
| 114  | 48   | 1                 | 1.2              | 87                          |
| 114  | 49   | 1                 | 1.5              | 67                          |
| 114  | 50   | 1                 | 1.4              | 69                          |
| 115  | 47   | 2                 | 5.7              | 35                          |
| 115  | 48   | 3                 | 6.               | 50                          |
| 115  | 49   | 2                 | 3.2              | 63                          |
| 115  | 50   | 2                 | 2.1              | 94                          |
| 116  | 47   | 7                 | 18.4             | 38                          |
| 116  | 48   | 2                 | 4.8              | 42                          |
| 116  | 49   | 1                 | 1.8              | 55                          |
| 116  | 50   | 2                 | 2.3              | 86                          |
| 117  | 47   | 3                 | 8.6              | 35                          |
| 117  | 48   | 7                 | 12.1             | 58                          |
| 117  | 49   | 3                 | 6.4              | 47                          |
| 117  | 50   | 3                 | 4.7              | 64                          |

The character of water of 23 springs was reported. Of these, 39.1 per cent were reported to be hard, 43.5 per cent moderately hard and 17.4 per cent soft. One spring in Twp.117N.,Rge.48W., was reported unsuitable for drinking; none

were reported inadequate and one was used to irrigate a small garden plot. The springs are used for stock and domestic purposes. Of those reported, 13 were used for both livestock water and domestic purposes and 15 for livestock alone.

In areas such as Deuel county where many of the water supplies produce hard water and where supplies are inadequate, cisterns are very important supplementary supplies. Farmers have approximately one cistern to each two wells in the county. In Twp.113N.,Rge.50W., Twp.114N.,Rge.50W.,Twp.116N.,Rge.50W., and Twp.117N.,Rge.50W., less than one cistern to each two wells are reported. A total of 573 was reported. They are used generally for laundry purposes (88 per cent reported) and doubtless to a lesser degree for drinking and cooking, where well waters are not potable or satisfactory.

DEUEL 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 |
| 113      | 47   | 32              | 10             | 175  | 80   | 15                 | 13   | 1    | 6              | 3                       | 28                 | 4          | -                          | -                           |
| 113      | 48   | 86              | 6              | 190  | 45   | 28                 | 32   | 6    | 9              | 11                      | 69                 | 17         | -                          | -                           |
| 113      | 49   | 64              | 10             | 200  | 57   | 26                 | 14   | 4    | 3              | 8                       | 49                 | 15         | -                          | -                           |
| 113      | 50   | 69              | 12             | 160  | 57   | 17                 | 33   | 3    | 4              | 6                       | 60                 | 9          | 1                          | 1/8                         |
| 114      | 47   | 31              | 10             | 160  | 85   | 10                 | 16   | 2    | 6              | 2                       | 25                 | 6          | -                          | -                           |
| 114      | 48   | 78              | 9              | 155  | 77   | 33                 | 32   | 3    | 16             | 14                      | 65                 | 13         | 1                          | -                           |
| 114      | 49   | 51              | 9              | 184  | 81   | 25                 | 13   | 4    | 7              | 11                      | 41                 | 10         | -                          | -                           |
| 114      | 50   | 52              | 5              | 180  | 48   | 15                 | 26   | 3    | 7              | 4                       | 36                 | 16         | -                          | -                           |
| 115      | 47   | 28              | 15             | 160  | 74   | 8                  | 15   | -    | 3              | -                       | 24                 | 4          | -                          | -                           |
| 115      | 48   | 33              | 10             | 190  | 71   | 9                  | 15   | 1    | 5              | -                       | 28                 | 5          | -                          | -                           |
| 115      | 49   | 52              | 8              | 180  | 59   | 14                 | 23   | 3    | 3              | 3                       | 44                 | 8          | -                          | -                           |
| 115      | 50   | 67              | 12             | 200  | 58   | 39                 | 15   | 3    | 9              | 10                      | 52                 | 15         | -                          | -                           |
| 116      | 47   | 27              | 14             | 180  | 73   | 17                 | 7    | 1    | 8              | 5                       | 17                 | 10         | -                          | -                           |
| 116      | 48   | 34              | 8              | 200  | 75   | 16                 | 14   | 1    | 6              | 6                       | 25                 | 9          | -                          | -                           |
| 116      | 49   | 51              | 10             | 198  | 75   | 21                 | 23   | 2    | 4              | 3                       | 47                 | 4          | 1                          | 3                           |
| 116      | 50   | 79              | 10             | 116  | 45   | 31                 | 30   | 3    | 8              | 9                       | 63                 | 16         | 1                          | -                           |
| 117      | 47   | 22              | 9              | 190  | 67   | 7                  | 12   | 1    | 4              | 1                       | 20                 | 2          | 2                          | -                           |
| 117      | 48   | 41              | 8              | 200  | 64   | 25                 | 15   | -    | 4              | 2                       | 33                 | 8          | -                          | -                           |
| 117      | 49   | 40              | 8              | 191  | 55   | 14                 | 20   | 4    | 3              | 4                       | 32                 | 8          | -                          | -                           |
| 117      | 50   | 51              | 7              | 175  | 44   | 21                 | 20   | 4    | 5              | 4                       | 33                 | 18         | -                          | -                           |
| Total    |      | 988             |                |      |      | 391                | 388  | 49   | 120            | 106                     | 791                | 197        | 6                          | 3 1/8                       |

DEUEL 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 |
| 113      | 47   | 5               | 206            | 364  | 252  | 1                  | 3    | -    | 1              | 1                       | 5                  | -          | -                          | -                           |
| 113      | 48   | 6               | 265            | 400  | 331  | 3                  | 3    | -    | -              | 1                       | 6                  | -          | -                          | -                           |
| 113      | 49   | 19              | 205            | 550  | 341  | 12                 | 3    | -    | 2              | 8                       | 18                 | 1          | -                          | -                           |
| 113      | 50   | 6               | 220            | 500  | 313  | 4                  | 2    | -    | 2              | 3                       | 5                  | 1          | -                          | -                           |
| 114      | 47   | 2               | 230            | 280  | 255  | 1                  | 1    | -    | 1              | -                       | 2                  | -          | -                          | -                           |
| 114      | 48   | 8               | 214            | 360  | 286  | 6                  | 2    | -    | 4              | 5                       | 6                  | 2          | -                          | -                           |
| 114      | 49   | 15              | 210            | 407  | 297  | 12                 | 1    | -    | 3              | 6                       | 15                 | -          | -                          | -                           |
| 114      | 50   | 16              | 230            | 385  | 307  | 11                 | 3    | -    | 3              | 3                       | 15                 | 1          | -                          | -                           |
| 115      | 47   | 4               | 210            | 263  | 231  | -                  | 4    | -    | -              | -                       | 4                  | -          | -                          | -                           |
| 115      | 48   | 5               | 220            | 315  | 269  | 2                  | 3    | -    | 1              | -                       | 5                  | -          | 1                          | 1/2                         |
| 115      | 49   | 9               | 220            | 450  | 246  | 8                  | 1    | -    | 3              | -                       | 9                  | -          | -                          | -                           |
| 115      | 50   | 24              | 215            | 786  | 406  | 17                 | 5    | -    | 7              | 2                       | 20                 | 4          | 1                          | 1/8                         |
| 116      | 47   | 2               | 229            | 280  | 252  | 1                  | 1    | -    | -              | -                       | 2                  | -          | -                          | -                           |
| 116      | 48   | 4               | 205            | 293  | 245  | 1                  | 3    | -    | -              | -                       | 4                  | -          | -                          | -                           |
| 116      | 49   | 3               | 371            | 545  | 430  | 2                  | 1    | -    | 2              | 1                       | 3                  | -          | -                          | -                           |
| 116      | 50   | 5               | 225            | 685  | 400  | 5                  | -    | -    | -              | -                       | 4                  | 1          | -                          | -                           |
| 117      | 47   | 1               | -              | -    | 207  | 1                  | -    | -    | 1              | -                       | -                  | 1          | -                          | -                           |
| 117      | 48   | 10              | 215            | 305  | 254  | 2                  | 8    | -    | -              | -                       | 10                 | -          | -                          | -                           |
| 117      | 49   | 3               | 230            | 300  | 252  | 1                  | 2    | -    | 1              | 1                       | 3                  | -          | -                          | -                           |
| 117      | 50   | 10              | 210            | 670  | 297  | 9                  | 1    | -    | 3              | 1                       | 9                  | 1          | 1                          | 1/8                         |
| Total    |      | 157             |                |      |      | 99                 | 47   | -    | 34             | 32                      | 145                | 12         | 3                          | 3/4                         |

DEUEL COUNTY  
Table 3.  
DATA ON FLOWING WELLS

| LOCATION |     | Number of Wells | DEPTH OF WELLS |      |      | CHARACTER OF WATER |      |      |                 |                         | ADEQUACY OF SUPPLY |            |                            |                         |                     |                   |
|----------|-----|-----------------|----------------|------|------|--------------------|------|------|-----------------|-------------------------|--------------------|------------|----------------------------|-------------------------|---------------------|-------------------|
| Twp.     | Rge |                 | Min.           | Max. | Ave. | Hard               | Med. | Soft | Corroded Casing | Unsuitable for Drinking | Adequate           | Inadequate | Number used for Irrigation | Approx. Acres Irrigated | Ave. Gallon Per Min | Number Controlled |
| 114      | 47  | 1               | -              | -    | 117  | -                  | 1    | -    | -               | -                       | 1                  | -          | -                          | -                       | -                   | 1                 |
| 115      | 47  | 1               | -              | -    | 205  | -                  | 1    | -    | -               | -                       | 1                  | -          | -                          | -                       | -                   | -                 |
| 115      | 48  | 9               | 58             | 220  | 141  | 2                  | 6    | -    | 1               | -                       | 8                  | 1          | 1                          | 1/8                     | 5 3/4               | 1                 |
| 115      | 50  | 1               | -              | -    | 80   | 1                  | -    | -    | -               | -                       | 1                  | -          | -                          | -                       | 1                   | -                 |
| 116      | 48  | 2               | 75             | 113  | 94   | 1                  | 1    | -    | 2               | -                       | 2                  | -          | -                          | -                       | 1                   | -                 |
| 116      | 49  | 2               | 50             | 155  | 103  | -                  | 2    | -    | 1               | -                       | 2                  | -          | -                          | -                       | 1                   | -                 |
| 117      | 47  | 9               | 36             | 191  | 134  | 7                  | 2    | -    | 4               | -                       | 9                  | -          | 2                          | 3                       | 4 1/2               | -                 |
| 117      | 49  | 1               | -              | -    | 115  | -                  | 1    | -    | 1               | -                       | 1                  | -          | -                          | -                       | 1                   | -                 |
| Total    |     | 26              |                |      |      | 11                 | 14   | -    | 9               | -                       | 25                 | 1          | 3                          | 3 1/8                   | -                   | 2                 |

Note: No wells reported from the following townships and ranges for this group: T.113N.,R.47,48,49,50W; T.114N.,R.48,49,50W; T.115N.,R.49W; T.116N.,R.47,50W; T.117N.,R.48,50W.

DEUEL 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.113N., R.48W. 190 feet:  
NW 1/4 Sec. 15 "Difficulty in construction account quicksand."
- T.113N., R.50W. 15 feet:  
NE 1/4 Sec. 29 "There is difficulty in construction on account of fine sand. Cannot get a sandpoint fine enough to keep sand out."
- Twp.114N., R.48W. 12 feet:  
NE 1/4 Sec. 25 "Water has an oily taste."
- T.114N., R.49W. 79 feet:  
NE 1/4 Sec. 12 "An oily film appears on water after it stands. Water is laxative and makes some of the family sick at times."
- T.115N., R.48W. 18 feet:  
SE 1/4 Sec. 28 "Difficulty in construction account of fine sand."
- T.116N., R.48W. 61 feet:  
SE 1/4 Sec. 13 "Water contains a great amount of alkali. Unfit for household use."



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