Rural Water Supplies in South Dakota: Lincoln County

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Rural Water Supplies in South Dakota

LINCOLN County

January, 1940
Special Extension Circular
Number 47

Extension Service
South Dakota State College
Brookings, S. D.
RURAL WATER SUPPLIES
IN
SOUTH DAKOTA
LINCOLN 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 PROJECT 665-74-3-126; SPONSORED BY THE EXTENSION SERVICE AND THE EXPERIMENT STATION SOUTH DAKOTA 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.
Lincoln County

Lincoln county is in the southeastern corner of South Dakota. It is bounded on the north by Minnehaha county, on the east by the Sioux river, on the south by Clay and Union counties, and on the west by Turner county.

Lincoln county is an area devoted mostly to agriculture, with approximately 356,486 (97 per cent) of the total area of 367,360 acres in farms. The farmed area is divided into 1,876 farm units of approximately 190 acres each. Corn, oats, barley, wheat and rye are the important field crops, being produced in the order named. Livestock is also important; cattle, hogs, sheep, lambs, horses, and mules are of greatest value.

In order that farm units of this type may be operated successfully, it is necessary that suitable and adequate supplies of underground water be available and that it be obtained at relatively low cost. The supplies required are not great, but they should be constant and generally distributed. The well location map of Lincoln county indicates that, in general, such supplies are available and widely distributed.

On the well location map of Lincoln county, all flowing and deep pumped wells obtaining water from artesian sources, mostly the Dakota sandstone, are shown in black as artesian wells. All other wells are shown in red and are

# South Dakota Agricultural Statistics, Annual Report, 1937#
LOCATION OF ARTESIAN AND SHALLOW WELLS IN LINCOLN COUNTY

ARTESIAN WELLS
0 FLOWING WELLS—STEADY OR INCREASING
• FLOWING WELLS—DECREASED FLOW
/ CONTROLLED Ø

SHALLOW WELLS
O ADEQUATE SUPPLY
Ø INADEQUATE SUPPLY
X DRY WELLS
□ SPRINGS

• WELLS FROM OTHER SOURCES
★ CITY WELLS
called shallow wells regardless of depth. On all other maps and in the tables and text of this report, the term shallow wells applies to those 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 were sent to 2,021 farmers and land owners of Lincoln county, of whom 1,006 responded with information on 1,032 wells, 7 springs, and 735 cisterns throughout the county. This represented a coverage of 49.8 per cent for Lincoln county.

DEPTH AND DISTRIBUTION

Rural water supplies of Lincoln county were obtained from pumped and flowing wells, both shallow and deep. These supplies were rather widely distributed over the county.

Shallow wells: Approximately 90 per cent of all wells reported in Lincoln county were shallow (pumped and flowing). Of the 927 shallow wells reported, 913 were pumped and 14 flowing. Of these shallow wells, 31.9 per cent were from 0 to 50 feet deep; 27.6 per cent from 50 to 100 feet; 26.9 per cent from 100 to 150 feet; and 13.6 per cent from 150 to 200 feet. Thus, approximately three fifths (59.5 per cent) of all shallow wells were less than 100 feet in depth. Wells of the various depths were reported in all parts of the county with the deeper shallow wells in the northern and southern areas. One township, T.100N., R.50W., reported the greatest number of shallow wells, 91 being listed. The smallest number of shallow wells was 19, and was reported in T.97N., R.48W. The shallow wells exceeded the deep wells in every township of Lincoln county. But one township, however, T.100N., R.50W., reported all wells shallow.

Fourteen shallow flowing wells were reported in the southwest areas of Lincoln county. These wells ranged in depth from 22 feet to 140 feet.
SHALLOW WELLS 0-200FT.

DEPTH AT WHICH SUPPLIES ARE COMMONLY OBTAINED

- □ 0-50 FT.
- □ 50-100 FT.
- □ 100-150 FT.
- □ 150-200 FT.

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Deep wells: Approximately 10 per cent of the rural water supplies of Lincoln county were obtained from 105 deep wells. Of these, 104 were pumped and one was flowing. The deepest well was reported in T.97N., R.48W., and was flowing. Of those deep wells which reported depths, 49 per cent were between 200 and 300 feet; 25 per cent between 300 and 400 feet; 20.8 per cent between 400 and 500 feet; and 5.2 per cent between 500 and 700 feet deep. Thus, approximately 83 per cent of the total number of wells reported for Lincoln county were less than 300 feet in depth.

Only one township, T.100N., R.50W., did not report any deep wells. Most of the deep wells were distributed generally throughout the county.

CHARACTER OF WELL WATERS

In order to determine character of water in the county, users were asked to indicate whether they considered supplies to be hard, moderately hard, or soft. Chemical analyses are not generally available to farmers. Usage of the water is, however, a fairly satisfactory criterion of general character.

Well supplies, in general, produced moderately or definitely hard water in Lincoln county. Of all the shallow wells reported in the county, 57.3 per cent produced hard water; 39.7 per cent moderately hard; and only three per cent soft. Thus, the moderately or definitely hard water comprised approximately 97 per cent of all shallow water. Shallow soft water wells were distributed over the county, since 13 townships reported 24 soft water wells.

Water from the deep wells is more commonly soft than among the shallow wells, although, in general, hard water predominates. A total of 35.9 per cent of deep well water was hard; 35.9 per cent moderately hard; and 28.2 per cent soft. The following townships reported most of the deep wells with soft water:

<table>
<thead>
<tr>
<th>Twp.</th>
<th>Rge.</th>
<th>Per cent Soft</th>
</tr>
</thead>
<tbody>
<tr>
<td>97N</td>
<td>51W</td>
<td>53.9</td>
</tr>
<tr>
<td>98</td>
<td>49</td>
<td>83.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Twp.</th>
<th>Rge.</th>
<th>Per cent Soft</th>
</tr>
</thead>
<tbody>
<tr>
<td>98N</td>
<td>51W</td>
<td>70.0</td>
</tr>
<tr>
<td>99</td>
<td>49</td>
<td>66.6</td>
</tr>
</tbody>
</table>

Well waters in Lincoln county were, in general, suitable for drinking
purposes. Of the 1032 wells reported, there were 246 (23.8 per cent) unsuitable for drinking. Of the unsuitable wells, 228 were shallow wells and 18 were deep. Nine townships reported a notably large percentage of shallow pumped wells unsuitable. These townships, in the central and southwest areas of the county, are tabulated below:

<table>
<thead>
<tr>
<th>Twp</th>
<th>Rge</th>
<th>Per cent Unsuitable</th>
<th>Twp</th>
<th>Rge</th>
<th>Per cent Unsuitable</th>
</tr>
</thead>
<tbody>
<tr>
<td>99N</td>
<td>50W</td>
<td>53.</td>
<td>96N</td>
<td>50W</td>
<td>35.</td>
</tr>
<tr>
<td>100</td>
<td>51</td>
<td>51.</td>
<td>97</td>
<td>51</td>
<td>34.</td>
</tr>
<tr>
<td>96</td>
<td>49</td>
<td>42.</td>
<td>97</td>
<td>49</td>
<td>32.5</td>
</tr>
<tr>
<td>99</td>
<td>49</td>
<td>39.</td>
<td>97</td>
<td>50</td>
<td>31.</td>
</tr>
<tr>
<td>98</td>
<td>50</td>
<td>35.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Fourteen shallow flowing wells were reported unsuitable for drinking purposes. In T. 97N., R. 51W., three of four such wells were unsuitable; and in T. 96N., R. 51W., two out of three shallow flowing wells were unsuitable.

Water from deep wells was generally reported suitable for drinking. Only a few townships reported less than 83 per cent suitability in deep wells, and these townships were not localized.

There are several reasons for unsuitability of well waters, including surface contamination and objectionable or unpalatable ingredients in the water.

ADEQUACY OF WELL WATERS

Supplies were, in general, adequate for present needs in Lincoln county. These needs vary, however, and changes in land usage, modification of farm management, or dry cycles in this and surrounding land areas would affect both the supply and demand for water.

Of the 1032 wells reported in Lincoln county, a total of 105 was reported to be inadequate for current needs. There were 96 (11.7 per cent of the shallow pumped wells) inadequate; seven deep pumped wells were insufficient; and two flowing wells were inadequate. In the following townships more than 10 per cent of the shallow wells were reported to be inadequate:
### Table

<table>
<thead>
<tr>
<th>Twp.</th>
<th>Rge.</th>
<th>Total No.</th>
<th>Wells</th>
<th>Inadequate</th>
<th>Per cent</th>
<th>Twp.</th>
<th>Rge.</th>
<th>Total No.</th>
<th>Wells</th>
<th>Inadequate</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>97N</td>
<td>49W</td>
<td>40</td>
<td></td>
<td>32.5</td>
<td></td>
<td>96N</td>
<td>51W</td>
<td>45</td>
<td></td>
<td>15.6</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>51</td>
<td>47</td>
<td></td>
<td>23.4</td>
<td></td>
<td>96</td>
<td>49</td>
<td>51</td>
<td></td>
<td>13.7</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>49</td>
<td>49</td>
<td></td>
<td>16.3</td>
<td></td>
<td>97</td>
<td>48</td>
<td>19</td>
<td></td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>99</td>
<td>49</td>
<td>64</td>
<td></td>
<td>15.6</td>
<td></td>
<td>100</td>
<td>51</td>
<td>57</td>
<td></td>
<td>10.5</td>
<td></td>
</tr>
</tbody>
</table>

Most of the townships reported approximately seven per cent or more of the shallow wells inadequate with the exceptions of T. 97N., R.50W., which reported only one of 58 wells inadequate, and T.10CN., R.50W., with only two of 91 wells inadequate.

Deep pumped wells were most nearly adequate of the wells of the county, since only seven of the 104 were insufficient for current needs. Of the 15 flowing wells, shallow and deep, which were reported in Lincoln county, only two (13 per cent) were inadequate for present needs.

Four of the fifteen flowing wells were reported with increased flow; two wells were equipped with control valves, and but one of these was in use. The rate of flow was reported to range from 2 gallons per minute to 20 gallons per minute. The average flow per township is listed on table 3 of this report.

### Irrigation

Twenty four of the 913 shallow pumped wells were used for the irrigation of 5 1/4 acres. Six of the 104 deep pumped wells were used to irrigate approximately 1 1/8 acres, and the one flowing well (deep) irrigated 1/8 acre. Most of the areas irrigated were small garden plots.

### Supplementary Supplies

Springs are not an important source of supplementary supplies in Lincoln county, since only seven were reported. All of these springs were reported from the eastern part of the county near the Sioux river. All springs were adequate for present needs. Water from these springs was reported moderately hard and none were unsuitable for drinking purposes. The following table indicates the location and number of springs reported from Lincoln county:
Cisterns are an important source of supplementary supplies in Lincoln county since 735 were reported. These cisterns are used for laundry purposes in hard water areas, and for drinking and cooking where supplies are inadequate or unsuitable. A total of 651 cisterns were reported used for laundry purposes and 523 for drinking and cooking purposes. Sixty eight cisterns were supplied by water hauled from other sources.

<table>
<thead>
<tr>
<th>Twp.</th>
<th>Rge.</th>
<th>Number Springs</th>
<th>Twp.</th>
<th>Rge.</th>
<th>Number Springs</th>
</tr>
</thead>
<tbody>
<tr>
<td>96N</td>
<td>48W</td>
<td>1</td>
<td>98N</td>
<td>49W</td>
<td>2</td>
</tr>
<tr>
<td>97</td>
<td>48</td>
<td>1</td>
<td>99</td>
<td>49</td>
<td>1</td>
</tr>
<tr>
<td>97</td>
<td>49</td>
<td>1</td>
<td>100</td>
<td>49</td>
<td>1</td>
</tr>
<tr>
<td>LOCATION</td>
<td>Number of Wells</td>
<td>DEPTH OF WELLS</td>
<td>CHARACTER OF WATER</td>
<td>ADEQUACY OF SUPPLY</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>----------------</td>
<td>---------------</td>
<td>-------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>Twp. Rge.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>96 48</td>
<td>59</td>
<td>15</td>
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<td>60</td>
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<td>96 49</td>
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<td>10</td>
</tr>
<tr>
<td>96 50</td>
<td>66</td>
<td>10</td>
<td>200</td>
<td>108</td>
<td>36</td>
</tr>
<tr>
<td>96 51</td>
<td>45</td>
<td>14</td>
<td>175</td>
<td>76</td>
<td>34</td>
</tr>
<tr>
<td>97 48</td>
<td>19</td>
<td>10</td>
<td>92</td>
<td>43</td>
<td>4</td>
</tr>
<tr>
<td>97 49</td>
<td>40</td>
<td>12</td>
<td>200</td>
<td>69</td>
<td>26</td>
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<tr>
<td>97 50</td>
<td>58</td>
<td>20</td>
<td>200</td>
<td>105</td>
<td>32</td>
</tr>
<tr>
<td>97 51</td>
<td>41</td>
<td>14</td>
<td>164</td>
<td>79</td>
<td>26</td>
</tr>
<tr>
<td>98 49</td>
<td>54</td>
<td>8</td>
<td>169</td>
<td>49</td>
<td>34</td>
</tr>
<tr>
<td>98 50</td>
<td>57</td>
<td>13</td>
<td>135</td>
<td>66</td>
<td>36</td>
</tr>
<tr>
<td>98 51</td>
<td>60</td>
<td>9</td>
<td>200</td>
<td>88</td>
<td>19</td>
</tr>
<tr>
<td>99 49</td>
<td>64</td>
<td>15</td>
<td>195</td>
<td>90</td>
<td>45</td>
</tr>
<tr>
<td>99 50</td>
<td>55</td>
<td>6</td>
<td>184</td>
<td>90</td>
<td>38</td>
</tr>
<tr>
<td>99 51</td>
<td>47</td>
<td>8</td>
<td>198</td>
<td>83</td>
<td>22</td>
</tr>
<tr>
<td>100 49</td>
<td>49</td>
<td>12</td>
<td>200</td>
<td>122</td>
<td>37</td>
</tr>
<tr>
<td>100 50</td>
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</tr>
<tr>
<td>100 51</td>
<td>57</td>
<td>12</td>
<td>200</td>
<td>124</td>
<td>24</td>
</tr>
<tr>
<td>Total</td>
<td>913</td>
<td></td>
<td></td>
<td></td>
<td>445</td>
</tr>
</tbody>
</table>
LINCOLN COUNTY
Table 2.
DATA ON PUMPED WELLS OVER 200 FEET IN DEPTH

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>Number of Wells</th>
<th>Depth of Wells</th>
<th>Character of Water</th>
<th>Adequacy of Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 48</td>
<td>1 300</td>
<td>1 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 - 1 2 2</td>
</tr>
<tr>
<td>96 49</td>
<td>5 300</td>
<td>5 1 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>96 50</td>
<td>2 300</td>
<td>2 1 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>96 51</td>
<td>6 300</td>
<td>6 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>97 48</td>
<td>8 300</td>
<td>8 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>97 49</td>
<td>26 300</td>
<td>26 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>97 50</td>
<td>1 300</td>
<td>1 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>97 51</td>
<td>13 300</td>
<td>13 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>98 49</td>
<td>6 300</td>
<td>6 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>98 50</td>
<td>1 300</td>
<td>1 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>98 51</td>
<td>10 300</td>
<td>10 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>99 49</td>
<td>3 300</td>
<td>3 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>99 50</td>
<td>2 300</td>
<td>2 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
</tr>
<tr>
<td>99 51</td>
<td>8 300</td>
<td>8 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
<td>1 4 1 2</td>
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<tr>
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<td>8 300</td>
<td>8 0 4 - 1 2 2</td>
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<tr>
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<td>4 300</td>
<td>4 0 4 - 1 2 2</td>
<td>1 4 1 2</td>
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<tr>
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<td>104</td>
<td>36 37 29 18 18</td>
<td>36 37 29 18 18</td>
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</table>

Note: No wells reported for this group from Twp. 100N., R.50W.
## Table 3
### DATA ON FLOWING WELLS

<table>
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<tr>
<th>LOCATION</th>
<th>Number of Wells</th>
<th>DEPTH OF WELLS</th>
<th>CHARACTER OF WATER</th>
<th>ADEQUACY OF SUPPLY</th>
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<tr>
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<td></td>
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<td>52</td>
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<td>95</td>
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<td>95</td>
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<th>Inadequate</th>
<th>Number used for Irrigation</th>
<th>Approx. Acres Irrigated</th>
<th>Ave. Gallon Per Min</th>
<th>Number Controlled</th>
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<td>1/8</td>
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**Note:** No wells reported for this group from the following townships and ranges: T.96N.,R.49,50W - T.97N.,R.48,49W - T.98N.,R.49,51W - T.99N.,R.49,50,51W - T.100N.,R.49,50 and 51W.
Lincoln 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.96N., R.48W. Sec. 11 65 feet:
"Blue clay."

T.96N., R.48W. Sec. 18 200 feet:
"The well on the S. E. 1/4 has a poor casing or a hole in the casing, a poor sand point, the water is rather hard."

T.96N., R.48W. Sec. 33 42 feet:
"When I started digging for water, we bored 2 holes 84 ft. deep, and hit hard slate, another was dry at 48 ft. The 4th well was very successful, it is 42 ft. deep. Has 32 ft. water in it."

T.96N., R.48W. Sec. 18 75 feet:
"In digging for water in 1927, the 1st hole we dug was 82 ft. deep, went through blue clay, some rocks, no sign of water. The second hole on the south end of place, went down 35 ft., all blue clay. No water. The third one, we struck water at 27 ft. but only produced about 40 gal. per day. So went down 35 ft. the following year. Had plenty of water since."

T.96N., R.49W. Sec. 19 29 feet:
"Clay gravel bottom."

T.96N., R.49W. Sec. 27 160 feet:
"Water flow has decreased lately, because of corroded screen which has never been renewed. Water level has lowered 5 ft. in last 5 years."

T.96N., R.50W. Sec. 28 137 feet:
"Medium sand."

T.96N., R.51W. Sec. 7 175 feet:
"Run into rock twice in construction, and run into dry sand three times, before obtaining water fit for stock, a total of 6 times."

T.96N., R.51W. Sec. 10 353 feet:
"In 1912, we drilled near a seepage in our pasture to the depth of 23 ft. into coarse gravel, here we struck a flow, which struck a flow that filled a 2 in. pipe, the water seemed hard after a few years, the casing rusted out, but lately there is a water hole, where the cattle stand. There seems to be shallow springs around here, that have caused a few wells to flow around here. When the rainfall is plentiful."

T.96N., R.51W. Sec. 22 56 feet:
"The water comes up clear from this well, and does not rust any container, it might be left in. It seems to come up
quite near the surface. I don't know how long the casing has been in this well. The sand point has to be changed every seven years. I think this well was drilled a long time ago. As I have not seen any signs of other wells, this place has been farmed for a long time."

T.96N., R.51W.  
Sec. 26  
80 feet:  
"Every third year, this well has to be cleaned out. It fills up with sand and scales. The water can be used for drinking, when it is cold, but tastes bad, when it gets warm. We never drink it our self."

T.96N., R.51W.  
Sec. 31  
92 feet:  
"Iron. Well 92 ft. Bored through a hard pan, 4 in. casing, and there is a 2 in. casing inside which the water is pumped. Fine sand at bottom of well, so we couldn't use a point, it would fill and corrode. We pumped out sand and gravel at bottom, to open up pipe and cylinder. Hard water, some iron. OK for stock and drinking. We bored in different places, but no water. One place we struck gas, it just roared and had pressure that would blow a post up out of the hole we bored. There was terrible hard-pan to go through on this farm."

T.97N., R.48W.  
Sec. 34  
392 feet:  
"We had lots of trouble with shallow wells on this farm. So we drilled a deep well 12 years ago. Plenty of water to take care of livestock in Lincoln county."

T.97N., R.49W.  
Sec. 11  
70 feet:  
"Shale. There has always been plenty of water for stock. But I do know its terrible water, not fit, only for stock. I'd hate to drink it if I was a cow. It cannot be used for the house at all. Use a cistern for the house supply. We haul water the largest part of the year. What we would not give to have a well with decent water. Our water is like a stirred up mess of rust. It looks like it went through a manure pile. O its a mess."

T.97N., R.49W.  
Sec. 12  
Spring:  
"There have been a few wells sunk on the farm but after a few months the nature of the soil (blue clay) seems to give some unpleasant odor, or sometimes rotting logs gives the same effect."

T.97N., R.49W.  
Sec. 15  
70 feet:  
"Eluish mud. I am sending you a sample of what forms on the pipes, and the water, sometimes has just like oil on top, it smells like cod liver oil."

T.97N., R.49W.  
Sec. 17  
14 feet:  
"Coarse gravel and clay. This well is located on a gentle slope, it is 12 ft. down to blue clay. This clay no doubt forms a valley which holds the water. I also have a dry hole about 12 rds. to the north of well. This well was also dug by hand, to a depth of 16 ft. I went down with a tent auger 14 ft. more and there was no sign of blue clay. This proves
the blue clay ends abruptly between the two wells, around 16 ft. I struck a vein of gravel at 45 degrees. There is no water close, only yellowish clay. This well has been dry 3 different times in dry seasons. The water level in well raises with each rain."

T.97N., R.49W.  
Sec. 36  
218 feet:
"Sandy shale. At the time I purchased this farm (1920) I had a well boring machine, and I bored 15 wells on this place, ranging from 76 to 132 ft, but could not find enough water to supply 3 to 4 head of cattle. In the year of 1933, I sold my boring machine, bought a drilling machine, and drilled a well. This well has supplied plenty of water at all times for my needs. There were 3 dry wells bored on this place, before I bought it. The shallow wells of this community are no longer to be depended on. Only a very few which stand up under pumping."

T.97N., R.50W.  
Sec. 3  
44 feet:
"Blue clay. No difficulties on finding plenty of water at 30 to 60 ft, but harder to find free from odor and taste. I think the blue clay runs deeper in this vicinity."

T.97N., R.50W.  
Sec. 7  
37 feet:
"There is 2 wells on the farm near barn. One with windmill, south of barn 37 ft, deep. Another one 20 ft, deep, pumped by hand, and a dandy. The two wells are on the same 1/4. Both have a strong vein of water, never have gone dry."

T.97N., R.50W.  
Sec. 13  
150 feet:
"There is no trouble getting water in this section of S. D. In this county, wells from 50 to 200 ft, furnish unlimited supply of water. Wells sunk below the 500 ft, level has soft water."

T.97N., R.50W.  
Sec. 21  
60 feet:
"Had trouble with fine sand. When well was quite new, but since cannot pump dry. As when in need of an abundance of water, let the mill run most of time. At this particular location one can find water from 45 to 60 ft, most anywhere. However, the water is very hard, and unfit for use, other than stock. I think most of the wells in this district are about similar to this description."

T.97N., R.50W.  
Sec. 30  
50 feet:  
"Have been here 4 years, and the well was here when I came. The cylinder is small, so it does not pump very fast. But there seems to be plenty of water. I think the windmill could run day and night, and not pump it dry. The water is no good for drinking, due to alkali, I think."

T.97N., R.51W.  
Sec. 11  
78 feet:  
"Flowing wells can be found along Snake Creek."

T.97N., R.51W.  
Sec. 25  
74 feet:  
"Chalk rock. The well on this farm flowed, but ceased, and finally got so it could not be pumped. So the loan co., drilled a new well. This well supplies plenty of water. There is a spring on line west of me. I think I would be safe in saying
it would furnish water for 1000 head of stock. There are many artesian wells in this territory. Some are flowing, some pumped. Most wells run shallow in this part of the county."

T.9EN., R.49W.  
Sec. 3  
438 feet:  
"There has been difficulty in getting water from shallow wells. This well is so deep, the soft water is fed from the Missouri river springs."

T.9EN., R.49W.  
Sec. 28  
40 feet:  
"There is a grand pit on the farm, on which FWA workers dug and obtained soft water which really is as soft as cistern water. Creek indicated on map is full of springs."

T.9EN., R.50W.  
Sec. 11  
27 feet:  
"Unknown. This farm was operated and improved by a bachelor for many years, and he is now deceased. So the character of water bearing material is unknown to me. The well is old, only 12 in. in diameter, has always furnished plenty of water for stock on this farm. The water is hard and bitter. All farms in this neighborhood use cisterns. Rain water for household use and drinking."

T.9EN., R.50W.  
Sec. 15  
50 feet:  
"The difficulty in getting a good well, has been getting through the fine sand, and keeping it out. Or keeping it from packing in the bottom of the well."

T.9EN., R.50W.  
Sec. 27  
43 feet:  
"Buildings were all blown away in 1926. This well did not flow when dug, but water was about 4 ft. below surface. Has flowed now 40 years or more. An easy flow constantly, and enough for 60 head of stock. It runs off into shallow ditch for 20 rods, then spreads out, and settles away."

T.9EN., R.50W.  
Sec. 27  
56 feet:  
"There is a shallow soft water well 14 ft. deep. Furnishes an limited supply, which is good for house use. Very good drinking water."

T.9EN., R.50W.  
Sec. 32  
43 feet:  
"Chalk. Dug down 40 ft. and could not get water, run out of blue clay into shale."

T.9EN., R.51W.  
Sec. 6  
20 feet:  
"The N. E. 1/4 is owned by Anna Smit. There is no well on that place. But the land is underlaid with gravel and sand; we have had several wells on this place; the water is good, medium hard and clear. Can get a well almost any place on this farm by driving down a sandpoint."

T.9EN., R.51W.  
Sec. 16  
14½ feet:  
"I think our well went dry in 1929 - we could not make it any deeper, as there is blue clay. And we went 300 ft. farther west where the sand is deeper, drove down a sandpoint, had plenty of water, but the next spring we got more sub-soil moisture; we started to use the old well. Have had plenty of water up to now."
130 feet:  
"A few miles from my place, by going down from 400 to 450 ft., they get soft water and east of my place 3 or 4 miles, they get flowing wells from 100 to 300 ft., this water is not soft."

24 feet:  
"The deep well that is dry never was put in right. There is plenty of water on that level, but it is so hard and bitter for use. Good water can't be had at 35 to 55 ft. down, that is good for any purpose. Again at 180 to 450 ft., you get real soft water."

130 feet:  
"There is a small cistern here but have to haul water part of the time. The well water is poor, can't use for drinking or cooking; it is very hard and turns red when boiled."

16 feet:  
"I have a well 30 rods east of the house 60 ft. deep but the water is blackish in color and the stock do not like it. It has a wood casing."

180 feet:  
"I purchased this farm in 1926 and at that time there was a 3 ft. board wall cased up with a broken piece of tile in the bottom so it couldn't be used; there was some water in it but not enough for our purposes. There was also a 2 1/4 inch drilled well about 30 ft. deep upon which was erected a windmill. The water had a great deal of iron in it and corroded the casing quite rapidly. The casing finally collapsed and we had a lot of difficulty with this well trying to clean it out, and finally abandoned it and dug a new well and got down 180 ft. and got away from that kind of water which was rusting out the casing and also that was filled with different minerals so it was disagreeable to the taste."

184 feet:  
"When well does not supply enough water I have to haul from neighbors. In wet weather I get enough water from shallow well. The difficulty here in getting a well is fine sand - sandpoints are necessary. Well was drilled in 1931 and stopped in 1936 it was fixed up again but went out of order in 1938. It is now giving a small amount of water which takes care of my livestock - I am not using a sandpoint now. I am using the well with gravel in the bottom to keep out fine sand. Water comes in about 30 or 35 gallons an hour."

143 feet:  
"We hit Sioux Falls rock at 120 ft."

400 feet:  
"I have struck Sioux Falls rock at 212 ft. five different times."
T.100N., R.49W.  Sec. 7
282 feet:
"Up until 1926 my parents depended on shallow wells (up to 20 ft. or to blue clay). The present well is 282 ft. deep, struck fine sand at 200 ft. with plenty of water. The sand 40 ft. deep was too fine for a screen so drilled another 42 ft. in granite where we got a good flow of water and the well casing was driven hard on the rock to stop the sand. Plenty of water."

T.100N., R.49W.  Sec. 23
60 feet:
"Well is not much good here. I haul water as well cannot be depended on to furnish a reasonable supply."

T.100N., R.49W.  Sec. 35
15 feet:
"I tried to dig a well, went down 100 ft. diggers passed up a good vein and struck shale which continued all the way down so they gave it up."

T.100N., R.49W.  Sec. 35
"The well is in good condition and water is good but has a little iron in it. We have two other wells on farm but they are in quicksand."