CANADA
DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF TECUMSEH No. 65 SASKATCHEWAN

BY

B. R. MacKay, H. N. Hainstock & G. L. Scott

Water Supply Paper No. 14

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CONTENTS

Illustrations

GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF TECUMSEH, NO. 65 SASKATCHEWAN

INTRODUCTION

Lack of rainfall during the years 1930 to 1934 over a large part of the Prairie Provinces brought about an acute shortage both in the larger supplies of surface water used for irrigation purposes and the smaller supplies of ground water required for domestic and stock-raising purposes by settlers, villages, and Indian reserves. The drought conditions resulted in repeated crop failures, and in a large number of farms in the acute drought areas of Saskatchewan and Alberta being abandoned. In an effort to relieve the serious situation a number of special studies of the water problem were begun by both Federal and Provincial Governments and allied organizations. The Federal Department of Agriculture undertook among other phases of the drought problem an investigation into the existing supplies of surface water, their conservation by means of dams and dug-outs, and how they could be made more generally available for irrigation. The Geological Survey of the Federal Department of Mines began an extensive study of the underground water conditions of southern Saskatchewan, this water being used principally for domestic and stock-raising purposes. For many years past the water problems in this and other provinces of Canada have engaged the attention of the Geological Survey, and considerable information had already been collected. A number of short reports dealing with the ground water conditions of special areas in Manitoba, Saskatchewan and Alberta have been published by both the Federal and Provincial Geological Surveys, but no systematic study of the ground water resources has been made up to the present.

Field Work

The senior author was in charge of this investigation and was instructed to cover as much of the territory as possible in the season. To effect this it was decided to maintain an office at Regina and to have a large party consisting of twenty-six units, each to consist of three men who would cover their respective areas and visit every farm. In order that the information gathered by these different party units would be as complete and uniform as possible a questionnaire was prepared on which could be tabulated answers to all the essential questions required for a detailed study of the ground water conditions. An effort was made in the field by each party unit to fill in the questionnaire as completely as possible. In many instances, however, it was found that wells had either been abandoned, or the resident had little or no knowledge of the character of the water-bearing horizon and associated beds. When a party unit had completed the survey of a township the set of questionnaires and a report describing the characteristic features pertaining to the underground water conditions were mailed to the field office. Messrs. D.C. Maddox, F.H. Edmunds, H.H. Beach, H.N. Hainstock, R.D. MacDonald, and D.P. Goodall acted as supervisors in inspecting the work of the field units.

During the field season an area of 80,000 square miles, comprising 2,200 townships, was systematically examined, and records of approximately 60,000 wells were obtained, together with water samples for analyses obtained from 720 representative wells. These are systematically classified so that information pertaining to any well may be readily consulted. These records are supplemented by a set of 24 sectional sheets which cover all of southern Saskatchewan north to include township 32. Each sectional sheet comprises 120 townships. On these are indicated by symbol the location, type, and source of water of each of the 60,000 wells.

Publication of Results

The publication of such a great mass of detailed information is out of the question. This forms the permanent record of the Geological Survey. It is highly desirable, however, that a digest of the essential information pertaining to the ground water conditions of each municipality be furnished in convenient form to the municipality offices, to certain Provincial and Federal departments, and to allied organizations, at which centres it will be possible for any resident of the municipality or other party interested in any particular area to consult these reports. Should anyone find that he requires more detailed data than that contained in the report such additional information as the Geological Survey possesses can be procured on application to the Director, Bureau of Economic Geology, Department of Mines, Ottawa. In making such request the applicant should indicate the exact location of the area by giving the quarter section, township, range and meridian.

The reports have been prepared principally for farm residents, municipal bodies, and well drillers who are either contemplating sinking a well for the first time or considering deepening their well to a lower horizon in order to obtain a more abundant supply of water. In describing the water and geological conditions a certain number of technical terms must of necessity be used, and in case the reader should not be familiar with them their meanings have been defined in the glossary.

How to Use the Report

It is advisable that anyone desiring water information pertaining to a particular section of the municipality read over first the section dealing with the municipality as a whole, as by so doing he will be in a much better position to understand the section of the report dealing with the ground water conditions of the area in which he is particularly interested. As he reads the text he should keep open before him for constant reference the accompanying map of the municipality on which are two figures, one showing the surface and bedrock geology of the area as they affect the ground water supply, and the other the relief and the location and type of water wells. The land relief is shown by means of lines of equal elevation, termed "contours", which lie generally at vertical intervals of 50 feet. The elevation above sea-level of each fourth line is indicated on the map. The statistical summary that follows the text gives at a glance the main characteristics of the wells in each township of the municipality and of the municipality as a whole as listed under the various sub-headings. This is followed by a section dealing with the analyses and quality of the water derived from the unconsolidated deposits and from bedrock. The table of well records gives the detailed information pertaining to each well. In this are tabulated the altitude of the well, its depth, the height to which the water will rise, and the elevation of the water horizon. The wells are grouped in the table by townships and are numbered from the lower right corner of the township westward and northward, and the location of each well by its quarter section is given. The elevations used were determined by aneroid barometer and were checked frequently by elevations on the published maps or by instrument surveys.

Where the ground surface of an area is comparatively flat an effort has been made to indicate the position of the water-bearing horizon in feet below the surface. In rolling country where there is a considerable difference of elevation within short distances a uniform figure for the depth to the water horizon is not generally possible. It then becomes necessary to indicate the position in terms of the elevation of a water-bearing bed in feet above sea-level.

Should one desire to ascertain at any location at which no well has as yet been sunk, the approximate depth at which a particular water-bearing horizon can be reached it is necessary to know two things--first, the elevation of the land surface, and second, the probable elevation of the water-bearing bed, or aquifer. The elevation of the land surface can be obtained by noting the position of the well site on the map. Figure 2, with respect to the two bounding contour lines of known elevation, and estimating either how far above the lower, or how far below the upper, control elevation line the well site lies. The approximate elevation of the water-hearing horizon at the well site can be obtained by noting on the table of well records the elevation of the horizon in the wells adjacent to the proposed location and from the range of elevations given and the relative positions of the wells shown on the map to select what appears to be its most probable elevation at the new well site. Having determined this elevation the depth that it is necessary to sink in order to tap it is the difference between its elevation and the elevation of the land surface. This method is especially applicable when the water-bearing horizon is in bedrock. In unconsolidated deposits the water horizon either conforms to the rolling land surface or occurs in isolated sand beds at various horizons that do not form a continuous water-bearing bed over a large area. Care should be taken in making any calculations for depth of water-bearing horizons to be sure that the elevations selected for the determinations occur in the same geological horizon, that is they should be either all in glacial drift or in the same bedrock formation.

The table of well records also contains notes on the temperature, quality, and quantity of the water being obtained from the various wells, and from this it is possible to draw reasonable conclusions as to the character and quantity of the water likely to be encountered at the proposed well site.

Glossary of Terms Used

Alluvium. Deposits of earth, silt, sand and gravel, and other transported material laid down by rivers, floods, or other causes upon land that has been submerged beneath the waters of lakes or rivers.

Aquifer. Layers or pockets of water-bearing sand or gravel that occur in unconsolidated deposits or as beds forming part of a bedrock formation.

Buried Pre-glacial Stream Channels. A channel carved into the bedrock by a stream before the advance of the continental ice-sheet, and subsequently either partly or wholly filled in by sands, gravels, and boulder clay deposited by the ice-sheet or later agencies.

Bedrock. Bedrock, as here used, refers to deposits of gravel, sand, silt, and marl that have been laid down by the agency of water and which through a long period of time and the weight of the overlying sediments have become cemented into a solid rock.

Coal Seam. The same as a coal bed. A deposit of carbonaceous material formed from the remains of plants by partial decomposition and burial.

Contour. A line on a map joining points that have the same elevation above sea-level.

Continental Ice-sheet. The great ice-sheet that covered most of the surface of Canada many thousands of years ago.

Escarpment. A cliff or a relatively steep slope separating level or gently sloping areas.

Flood-plain. A flat section in a river valley that is covered by water when the river is in flood.

Glacial Drift. The loose, unconsolidated surface deposits of sand, gravel, and clay, or a mixture of these, that were deposited by the continental ice-sheet. Clay containing boulders forms part of the drift and is referred to as glacial till or boulder clay. The glacial drift occurs in several forms:

1. Ground Moraine. A boulder clay or till plain (includes areas where the glacial drift is very thin and the surface uneven).

2. Terminal Moraine or Moraine. A hilly tract of country formed by glacial drift that was laid down at the margin of the continental ice-sheet during its retreat. The surface is characterized by irregular hills and undrained basins.

3. Glacial Outwash. Sand and gravel plains or deltas formed by streams that issued from the continental ice-sheet.

4. Glacial Lake Deposits. Sand and clay plains formed in glacial lakes during the retreat of the ice-sheet.

Ground Water. Sub-surface water, or water that occurs below the surface of the land.

Hydrostatic Pressure. The pressure exerted by the water at any given point. It is due mainly to the weight of the column of water occurring at higher levels in the same aquifer or water-bearing bed.

Impervious or Impermeable. Beds, such as fine clays or shale, are considered to be impervious or impermeable, when they do not permit of the passage or movement of the ground water.

Pervious or Permeable. Beds are pervious when they permit of the passage or movement of ground water, as for example porous sands, gravel, and sandstone.

Potable. Suitable for drinking.

Pre-glacial Land Surface. The surface of the land before it was covered by the continental ice-sheet.

Recent Deposits. Deposits that have been laid down by the agencies of water and wind since the disappearance of the continental ice-sheet.

Unconsolidated Deposits. The mantle or covering of alluvium and glacial drift consisting of loose sand, gravel, clay, and boulders that overlie the bedrock.

Water Table. The upper limit of the part of the ground wholly saturated with water. This may be very near the surface or many feet below it.

Wells. Holes sunk into the earth so as to reach a supply of water. When no water is obtained they are referred to as dry holes. Wells in which water is encountered are of three classes.

(1) Wells in which the water is under sufficient pressure to flow above the surface of the ground. These are called Flowing Artesian Wells.

(2) Wells in which the water is under pressure but does not rise to the surface. These wells are called Non-Flowing Artesian Wells.

(3) Wells in which the water does not rise above the water table. These wells are called Non-Artesian Wells.

Water-bearing Horizon. A layer in either unconsolidated deposits or in bedrock formations that is water-bearing; same as aquifer.

Zone of Saturation. An area in which the permeable rocks are saturated with water that will move under ordinary hydrostatic pressure.

Names and Descriptions of Geological Formations, Referred to in These Reports

Wood Mountain Formation. The local name given to a series of gravel and thin sand beds which have a maximum thickness of 50 feet, and which occurs as isolated patches on the higher elevations of Wood mountain. They are the youngest of the consolidated rocks and, where present, rest upon the beds of the Ravenscrag formation.

Cypress Hills Formation. The local name given to a series of conglomerates and sand beds occurring in the southwest corner of Saskatchewan, which rests upon the Ravenscrag or older formations. The thickness of this formation varies from 30 to 125 feet.

Ravenscrag Formation. The local name given to a thick series of light-coloured sandstones and shales containing one or more thick lignite coal seams. This formation varies from 500 to 1,000 feet in thickness, and covers a large part of southern Saskatchewan. The principal coal deposits of the province occur in this formation.

Whitemud Formation. The local name given to a series of white, grey, and buff coloured clays and sands that varies in thickness from 10 to 75 feet. The base of this formation grades in places into a coarse, limy sand having a maximum thickness of 40 feet.

Eastend Formation. The local name given to a series of fine-grained sands and silts. It has been recognized at various localities over the southern part of the province, from the Alberta boundary east to the eastern escarpment of the Missouri coteau. The The thickness of the formation seldom exceeds 40 feet.

Marine Shale Formation. The general name given to the thick deposit of incoherent, dark grey to dark brownish grey, plastic shales, which weather light grey to buff in places. It forms the uppermost bedrock formation over the greater part of eastern and central Saskatchewan. In the western part of the province it consists of a series of dark shales termed the Bearpaw formation. This is underlain by a series of sands, shales, and coal seams, known as the Belly River formation.

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Tecumseh is an area of 324 square miles in the southeastern part of Saskatchewan, the centre of the municipality lying 90 miles southeast of Regina. It consists of nine townships described as townships 7, 8, and 9, ranges 7, 8, and 9, west of the 2nd meridian.

Water-bearing Horizons in the Unconsolidated Deposits

A mantle of boulder clay, sand and gravel occurs in varying thicknesses throughout the entire municipality. Immediately to the west of Moose Mountain creek there is a thick accumulation of drift, termed a terminal moraine, approximately 2½ to 3 miles wide. Its western boundary runs in a north and south direction through the centre of township 8 and 9, range 7, then curves eastward through the centre of township 7, range 7. This natural barrier on the west caused the formation of a glacial lake between it and Moose mountain. The approximate location of this lake basin is shown on the accompanying map. Deposits of fine lake sands at least 15 feet thick occur in this basin.

The remainder of the municipality is covered with a mantle of yellow, red, grey, and blue boulder clay and sand and gravel beds, which varies in thickness from 60 to 300 feet. The deposits of sand and gravel form the water-bearing horizons for the great majority of the wells in the municipality. Due to the manner in which these gravel and sand deposits have been formed, their thickness, extent, and water-carrying ability vary greatly within a small area.

In general there are two, and sometimes three, definite water-bearing horizons in the glacial drift. The first horizon occurs beneath the yellow clay, and is formed by deposits of sand, boulders, and, more often, gravel, ½ a foot to 10 feet in thickness. This horizon furnishes a medium hard, usable water which is not under pressure. The amount of water contained in the horizon is governed almost wholly by rainfall. In years of normal rainfall 25 to 60 head of stock may be watered at one well, but in dry years the well may become entirely dry, or so low that not more than 10 head of stock can be watered. These wells furnish excellent household water, but are totally unreliable as stock wells. Wells up to 45 feet in depth in townships 7 and 8, ranges 7, 8, 9, and township 9, range 8, have tapped this water-bearing horizon. The more dependable wells are located in the eastern townships, but the supply becomes gradually less reliable and more difficult to find in the western townships. The manner in which the aquifer has been laid down in glacial times, whether in pockets or in hump-shaped formation, determines, along with weather conditions, the reliability of the well.

The second horizon occurs in the blue clay, not more than 60 feet from the surface. It supplies a highly "alkaline", non-usable type of water, which is sometimes under a slight hydrostatic pressure. Wells dug into this aquifer are also undependable in drought years, this type being represented in township 9, range 9, of the municipality. The first and second horizons may occur in the same well, in which case it will be found that the second horizon provides the bulk of the water.

The third horizon is formed by a bed of fine sand, 5 feet to 20 feet thick, lying beneath the blue clay and immediately above the coal seams of the Ravenscrag bedrock formation. The water is under high pressure and in the wells rises to within 30 feet to 40 feet of the ground surface. It is hard and "alkaline" and fairly abundant. The fine sand that forms this horizon often plugs the sand screens in the deep wells, but if this difficulty is overcome the wells will yield an abundant supply of water that is suitable for stock requirements. However in drilling, this horizon is usually passed through and the wells are drilled into the bedrock to obtain a better grade of water.

Wells or sand-points sunk in the glacial lake sand in township 9, range 7, furnish an inexhaustible supply of excellent, medium hard water, the quantity being independent of rainfall conditions, except that in dry years the water level is lowered slightly.

Water-bearing Horizons in the Bedrock

The Ravenscrag formation underlies the glacial drift, and occurs only in townships 7, 8, and 9. This formation is composed of a series of beds of sandstone, shale, and sandy shale, and it contains one or more seams of lignite coal. An abundance of water can always be obtained in this formation; sometimes in coal seams, but more commonly in sandstone, or grey and black sand underlying the coal. If the aquifer is formed by coal or sandstone, the water is soft and usable. In this municipality the hydrostatic pressure of the water in the sandstone is much greater than that from the coal. Water from the coal seam is brownish coloured, and the wells can be pumped dry but always refill, the pressure causing the water to rise only 40 feet to 50 feet above the top of the aquifer. The water in the wells that are drilled into sandstone rises to within 15 to 20 feet of the ground surface and this level cannot be lowered by pumping. No difficulty is experienced with sand plugging the seams in these wells. The sandstone is encountered at a depth of 175 feet in the southern part of township 8, range 8, and it is the source for the best water, in the largest quantities, of any wells in the municipality. The water from the grey and black quicksand is soft and salty, abundant, and unfit for household purposes, but suitable for stock. The hydrostatic pressure causes it to rise to within 50 feet to 60 feet of the ground surface.

The northern limits of the Ravenscrag formation follow very closely the division between townships 8 and 9 in this municipality. North of this boundary, a formation known as the Marino shale formation forms the bedrock underlying the glacial drift. The Marino shale bedrock formation is non-water-bearing, resulting in the condition that water cannot be obtained at depth in township 9, ranges 8 and 9. The contact between the glacial blue clay and bedrock Marino shale is not accurately placed on account of the similarity in appearance of the two materials, but it is undoubtedly within 200 feet of the ground surface.

WATER CONDITIONS BY TOWNSHIPS

Township 7, Range 7

In order to give a more clear and detailed description of the water horizons, this township is divided into three parts:

(1) Southeast part, including sections 1,2,3,4,9,10,11, and 12.

(2) Southwest and westerly part including sections 5,8,16,17,18, and 20.

(3) North and northeast part, including sections 15,22,23,24,26, 31,33, and 34.

(1) Southeast Part.

There are two gravel beds found in this area and they are located between depths of 12 feet and 30 feet from the ground surface. The first gravel layer is 2 to 3 feet thick, and is overlain by approximately 8 feet of yellow glacial clay and a 3- to 4-foot strip of blue clay.

The second layer of gravel is 4 to 6 feet from the ground surface and is separated from the first layer by blue clay.

A limited supply of hard, usable water is to be found in both gravel layers, the amount depending largely on the rainfall--hence in times of prolonged drought wells tapping these gravel aquifers will not yield enough water to supply 10 to 15 head of stock. Attempts have been made to secure a reliable water supply up to a depth of 50 feet without success, the impervious blue clay being found up to that depth.

(2) Southwest and Westerly Part

In this section a 3-foot layer of gravel forms a water-bearing horizon at a depth of 25 to 30 feet below the ground surface. In digging a well, the following formations will probably be pierced, 6 feet of yellow clay, 20 feet of blue clay, 3 feet of gravel. The supply of water in this gravel layer is affected by rainfall conditions, but not to the same extent as in the south-eastern part of the township. The water is hard and usable, with one exception, and wells can be depended upon to yield sufficient water for no more than 20 head of stock in dry years. The one exception is in SE.$\frac{1}{4}$, section 18, where the water, although readily found, is heavily "alkaline" and has been condemned by analysts.

(3) North and Northeast Part

In the extreme northeastern part, in sections 25, 26, 27, 34, 35, and 36, yellow sand occurs directly beneath the top soil and extends to a depth of 6 feet, gradually grading into a gravel at 15 feet from the surface. Westerly, in sections 31 and 33, a 4-foot layer of yellow clay overlies the sand and gravel. Medium hard, clear, usable water is readily found anywhere in this area within 15 feet of the ground surface, the water supply being only slightly affected by the 1930 to 1934 drought period. Individual wells supply 30 head of stock without difficulty.

A second water-bearing sand layer is located at a depth of 50 feet in SW.$\frac{1}{4}$, section 34, and a third in NW.$\frac{1}{4}$, section 23, at a depth of 140 feet. The hydrostatic pressure in both cases causes the water to rise to within 40 feet of the surface, but in the deeper well the water is a greenish colour, and is not suitable for household use.

Township 7, Range 8

A good supply of water can be obtained at depths of 35 to 40 feet anywhere in this township. In digging a well, the following formations will probably be encountered, 18 to 30 feet of yellow boulder clay with small sand streaks, 5 to 10 feet of sand, followed by a layer of boulders cemented together by clay. Beneath this boulder layer, at approximately 35 feet, sand is struck followed by blue clay. Water is located immediately above the stony layer and also beneath it in the sandy gravel bed, the latter giving the better supply. In sections 19,20,21,22,23,27, 28,29, and 30 the wells that tap this sandy gravel bed are usually around 30 feet deep, and yield an abundance of water. They were affected very slightly by the lack of rainfall in 1930-1934. In almost every case the water from these wells is slightly "alkaline" due to the seepage water from the overlying clay, but it is not so "alkaline" that it cannot be used for household purposes.

A second water-bearing horizon is located at 106 feet below the surface, and it is formed by a sand bed underlying the blue clay. The water was too highly mineralized to be usable for humans and the supply was not sufficient for stock use.

In SW.$\frac{1}{4}$, section 19, and NE.$\frac{1}{4}$, section 33, are located two drilled wells 185 feet and 160 feet in depth, respectively. The water-bearing horizon for these wells is quicksand, which underlies a coal seam. This horizon yields an abundant supply of soft water, which is stained a brownish colour by the coal, but it is usable for both humans and stock. It has been found injurious to plants and garden produce, however. The hydrostatic pressure causes the water to rise to within 25 feet of the surface.

Township 7, Range 9

Water is difficult to locate in the glacial drift except in isolated cases where sand pockets are tapped. Red or yellow clay occurs at the surface, and extends to a depth of from 3 feet to 20 feet. It is followed by a shallow sand seam, $\frac{1}{2}$ foot to 4 feet thick, furnishing a very limited supply of hard, usable water.

Three wells, 9 to 12 feet in depth, located in S.$\frac{1}{2}$, section 6, and in SE.$\frac{1}{4}$, section 18, have for many years furnished an inexhaustible supply of medium hard water to neighbouring farmers for domestic and stock use. In these wells a sand bed, at least 10 feet thick, occurs directly beneath the top soil.

Three wells, located in NW.$\frac{1}{4}$, section 26, SW.$\frac{1}{4}$, section 27, and NE.$\frac{1}{4}$, section 34, have tapped a sandy gravel pocket beneath the yellow clay at a depth of 25 to 40 feet.

Generally speaking, there is no dependable water horizon in this township until the bedrock is reached. For this reason the township contains a comparatively large number of deep drilled wells varying from 80 feet to 440 feet in depth.

The Ravenscrag bedrock formation underlies the glacial blue clay, and is located at a depth of 90 feet where a 2-foot coal seam is reported. Underlying this coal seam is a 10-foot deposit of bluish black, fine sand, which yields a good supply of hard, slightly "alkaline", usable water. The hydrostatic pressure is sufficient to cause the water to rise to within 30 to 40 feet of the surface. Wells using this sand seam as an aquifer experience difficulty with the very fine sand particles plugging the sand screens on the pipes.

A second water-bearing horizon in the bedrock occurs at a depth of 350 feet in the southeast part of the township and at approximately 300 feet in the west and northwest parts. It is formed by a 20-foot layer of black sand and is separated from the uppermost horizon by blue clay which contains layers of hardpan and non-water-bearing sands. The majority of the deep wells have this sand seam as their water source, and the water rises to within 30 to 50 feet of the ground surface. The water is soft and salty and is not suitable for domestic use or for irrigation purposes. The fact that these wells cannot be pumped dry, and that the supply is independent of weather conditions, makes them ideal for stock purposes.

A well located in SE.$\frac{1}{4}$, section 2, is deriving its water from a dark sand layer which underlies a 10-foot bed of shale at a depth of 430 feet. The quality of the water is the same as that found in the horizon occurring at a depth of 350 feet, except that it is of a yellowish colour whereas the other is clear. It is not usable for humans.

Township 8, Range 7

This township has numerous shallow wells, due to the presence and depth of the glacial sand deposits which contain a good supply of usable water.

Usually yellow or red clay underlies the top soil from a depth of 4 feet to 14 feet, followed by sandy gravel to a depth of 25 to 30 feet. In some cases there is a 2-foot strip of blue clay separating the yellow clay from the sandy gravel. In sections 25,26,35,and 36 sand occurs at the surface and extends to a depth of 8 feet, being underlain by blue clay.

The sandy gravel bed produces a medium hard, and in a few cases, slightly "alkaline" water, the quantity of which was affected slightly by the 1930-1934 drought. The water is not under pressure and the wells can be pumped dry, but they always refill in a short space of time. Farmers usually have three or four wells, since water is found readily at a depth of 20 feet, and they are easily dug.

A second water-bearing horizon occurs at a depth of from 75 to 90 feet. It is formed by a sand bed that underlies the blue clay. A third water-bearing sand bed located at a depth of 185 feet is tapped by a drilled well in NW.$\frac{1}{4}$, section 32. The water in these deeper wells is medium hard to soft and "non-alkaline", and the hydrostatic pressure is sufficient to cause the water to rise to within 15 to 30 feet of the ground surface.

This township possesses an abundant supply of usable water, the quantity of which is independent of rainfall conditions.

Township 8, Range 8

There are two possible sources of water in the glacial drift in this township, both providing an abundance of water, the quantity of which is independent of rainfall conditions.

The majority of the existing wells have as their water-bearing horizon the first sandy gravel or gravel, 2 to 4 feet thick, located 30 to 40 feet below the ground surface. In sections 18,19,20,29,30,31, and 32, yellow clay overlies this gravel seam, but in the remainder of the township there is a bed of grey or white clay separating the yellow clay from the gravel. The water is hard and, in most cases, too heavily "alkaline" to be usable for humans.

The above-mentioned gravel layer is underlain by blue clay to a depth of 60 to 80 feet below the surface. At this depth a second aquifer is formed by a 10-foot bed of fine sand. Four wells located in NW.¼, section 11, NW.¼, section 20, NW.¼, section 26, and NE.¼ section 33, have tapped this water-bearing horizon and the water obtained is soft and "alkaline." The water rises to within 25 to 30 feet of the ground surface.

A third horizon is found in the Ravenscrag bedrock formation at a depth of 140 to 170 feet, and it is formed by a coal seam from 5 to 15 feet thick. The water is soft and usable but has a dark brownish colour. It is not under great pressure and rises only 50 feet above the top of the water-bearing horizon. Wells having this coal seam as the aquifer will pump dry and refill slowly. It is recommended in drilling a well that this coal seam be passed through and the drilling continued until a cemented sand or sandstone bed at least 5 feet thick is reached at a depth of 10 to 35 feet below the coal. This sandstone provides an abundant supply of usable, soft water. The water is under high pressure and rises to within 15 feet of the surface, and the wells cannot be pumped dry.

Contrary to the general rule, the deep 160-foot wells in this township provide excellent water for household use (drinking, cooking, and washing), whereas the shallower, 35- and 60-foot, wells provide water that is hard and "alkaline."

Township 8, Range 9

The entire township is overlain by a deposit of yellow clay 10 to 30 feet thick. This clay is underlain in most areas by a sandy gravel seam $\frac{1}{2}$ foot to 10 feet thick. This gravel deposit is the aquifer in almost all the existing wells in the township and the drought years of 1930-1934 have proved it to be an unreliable source; it cannot be depended upon to yield enough water for 15 head of stock at one well except in isolated cases. The best supply from this horizon is obtained from wells occurring within a narrow strip, not more than a mile wide, running in a south to north direction through sections 4,10,14,22,23,27,28, and 34.

A well located in SW.$\frac{1}{4}$, section 5 encounters a second water-bearing horizon at a depth of 90 feet. It yields an abundant supply of very hard, heavily "alkaline" water, which rises to within 25 feet of the surface.

Another well, located in SW.$\frac{1}{4}$, section 7, struck a coal seam at a depth of 75 feet but the supply of water was very limited.

In NE.$\frac{1}{4}$, section 13, a well encountered a fine sand aquifer at a depth of 280 feet, and it also gave an abundant supply of water until the screens became plugged with fine sand and the well rendered useless.

The construction of dugouts is recommended for this territory, the shallow wells proving unreliable, and drilled wells, although obtaining plenty of water, are troubled with sand plugging.

Township 9, Range 7

Due to the presence of an old glacial lake whose borders lie within this township, a deposit of lake sand was laid down, the depth of which is in excess of 15 feet. Roughly the western boundary is on a straight line running from section 3 to NW. corner, section 30, and the eastern boundary lies just east of Moose Mountain creek. Within these boundaries shallow wells or sand points yield an inexhaustible supply of medium hard, usable water.

Outside these boundaries of the glacial lake sands, however, yellow clay is encountered. It extends from 10 to 40 feet in depth, and overlies a small water-bearing gravel bed. In some localities, as in NE.$\frac{1}{4}$, section 34, blue clay underlies the yellow clay without the intervening gravel, and in such cases water cannot be obtained. The blue clay extends to an unknown depth.

At best, only small supplies of highly mineralized water can be obtained at depth in this township. The Ravenscrag formation thins out and disappears to the south of the township, and the glacial drift is underlain by the Marine shale formation. This formation does not contain any sandy layers and, as a result, is non-water-bearing.

Township 9, Range 8

This township is overlain to a depth of from 10 to 40 feet by a deposit of yellow or grey, glacial clay containing small sand streaks. Gravel, sand, or quicksand up to 10 feet in thickness may occur beneath the yellow clay. These deposits form the water-bearing horizon to which the majority of the wells of the township have been dug. The quantity and pressure of the water contained in it vary within short distances. This condition is due to the irregular manner in which the deposit has been laid down, being in the form of pockets. A well striking a pocket of gravel or sand will water 50 to 60 head of stock, whereas another well dug a short distance away will not yield a sufficient amount to water 10 head of stock.

The drought of 1930-1934 has affected these wells to such an extent that many have gone dry, or nearly so.

Wells located in SW.¼, section 3, SW.¼, section 6, NW.¼, section 6, and SW.¼, section 10, strike a quicksand aquifer, at a depth of 18 to 40 feet, which yields a fair supply of hard, slightly "alkaline" water, containing iron. Shallow, 12- to 25-foot, wells in the extreme eastern part, in sections 12, 13, 24, 25, and 36, obtain a good supply of hard, slightly "alkaline" water from sand and gravel pockets. The remaining wells are heavily "alkaline" and are unsuitable for house use.

One 70-foot well was sunk in NW.¼, section 18, but the water was too "alkaline" to be used.

Unless an aquifer is found within 40 feet of the ground surface it is safe to say that it is useless digging farther into the blue clay. No drilled wells were reported, and it is very doubtful if water can be obtained over 70 feet in depth in this township. The underlying bedrock Marine shale formation is non-water-bearing, as is the blue clay lying immediately above it.

The construction of small, deep dugouts is the alternative method of obtaining water for stock purposes, where shallow well digging will not give results.

Township 9, Range 9

All existing wells in this township, with one exception, are dug or bored to a depth of 25 to 45 feet. The water-bearing horizon for these wells is a small gravel or sand seam. In boring a well to this aquifer the following formations will be pierced, yellow or reddish clay 10 to 20 feet thick, and blue clay 3 to 15 feet thick. The water-bearing horizon is not more than 5 feet thick, and underlies the blue clay. In a few cases the gravel occurs beneath the yellow or grey clay, but not generally.

This aquifer produces a heavily "alkaline" water, due to the dissolving out of the "alkaline" salts from the blue clay layer lying immediately above it. In many cases it is too "alkaline" for stock use. Consequently, water for house use is very scarce. Farmers have dug numerous shallow wells in an effort to secure potable water, and where they have been successful they have encountered a sand seam at a depth of 18 to 20 feet, underlying the yellow clay, with no intervening blue clay stratum.

The water in the township is under little or no hydrostatic pressure. The quantity has been affected greatly by the drought period of 1930-1934, and water had to be hauled for stock use. Wells will not water 20 head of stock at most in dry years. A municipal well located in SE.$\frac{1}{4}$, section 18, has been used by neighbouring farmers when their own wells have become unreliable.

A well drilled to a depth of 180 feet in SE.$\frac{1}{4}$, section 21, encountered a quicksand pocket at a depth of 50 feet, which yields a non-potable, heavily "alkaline" water containing iron. Similar pockets of sand may occur elsewhere in the township.

In NW.$\frac{1}{4}$, section 11, a 450-foot dry hole has been drilled, which gives a good indication of water possibilities at depth. Underlying the general water horizon at 40 feet, there is blue clay to a depth of 200 feet. At this depth a small dry sand seam was encountered. Solid blue clay or Marine shale occurred between depths of 200 feet and 450 feet without the slightest indication of water.

It may be said that in digging or boring a well, that unless water is struck within 50 feet of the ground surface it is useless to continue. Drilling operations in the vicinity of the town of Creelman corroborate the evidence given by the 450-foot hole in NW.$\frac{1}{4}$, section 11, that water cannot be obtained at depth.

Small dugouts are the only means of securing and conserving a water supply for stock use in this township where shallow wells do not yield a sufficient amount of water.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL
MUNICIPALITY OF TECUMSEH, NO. 65, SASKATCHEWAN

Township	7	7	7	8	8	8	9	9	9	Total No. in municipality
West of 2nd mer. Range	7	8	9	7	8	9	7	8	9	
Total No. of Wells in Township	52	107	109	95	87	67	20	119	151	807
No. of wells in bedrock	2	3	13	2	10	2	-	-	-	32
No. of wells in glacial drift	50	104	96	93	77	65	20	119	151	775
No. of wells in alluvium	-	-	-	-	-	-	-	-	-	-
Permanency of Water Supply										
No. with permanent supply	20	59	47	42	50	28	17	36	45	344
No. with intermittent supply	7	14	24	14	3	5	2	11	7	87
No. dry holes	25	34	38	39	34	34	1	72	99	376
Types of Wells										
No. of flowing artesian wells	-	-	-	-	-	-	-	-	-	-
No. of non-flowing artesian wells	2	2	16	6	23	3	-	12	10	74
No. of non-artesian wells	25	71	55	50	30	30	19	35	42	357
Quality of Water										
No. with hard water	26	71	53	48	43	33	9	43	49	375
No. with soft water	1	2	18	8	10	-	10	4	3	56
No. with salty water	-	1	8	-	-	-	-	2	-	11
No. with alkaline water	1	42	14	16	30	12	2	12	32	161
Depths of Wells										
No. from 0 to 50 feet deep	50	99	85	88	70	64	18	99	142	715
No. from 51 to 100 feet deep	-	4	12	6	8	3	2	15	5	55
No. from 101 to 150 feet deep	1	1	1	-	3	-	-	4	-	10
No. from 151 to 200 feet deep	1	2	-	1	4	-	-	1	1	10
No. from 201 to 500 feet deep	-	1	11	-	2	-	-	-	3	17
No. from 501 to 1,000 feet deep	-	-	-	-	-	-	-	-	-	-
No. over 1,000 feet deep	-	-	-	-	-	-	-	-	-	-
How the Water is used										
No. usable for domestic purposes	24	52	53	50	40	23	19	39	33	333
No. not usable for " purposes	3	21	18	6	13	10	-	8	19	98
No. usable for stock	27	72	69	56	52	32	19	46	46	419
No. not usable for stock	-	1	2	-	1	1	-	1	6	12
Sufficiency of Water Supply										
No. sufficient for domestic needs	21	60	45	46	50	27	17	37	46	349
No. insufficient for domestic "	6	13	26	10	3	6	2	10	6	82
No. sufficient for stock needs	16	42	24	33	35	16	15	28	24	233
No. insufficient for stock needs	11	31	47	23	18	17	4	19	28	198

ANALYSES AND QUALITY OF WATER

General Statement

Samples of water from representative wells in surface deposits and bedrock were taken for analyses. Except as otherwise stated in the table of analyses the samples were analysed in the laboratory of the Borings Division of the Geological Survey by the usual standard methods. The quantities of the following constituents were determined; total dissolved mineral solids, calcium oxide, magnesium oxide, sodium oxide by difference, sulphate, chloride, and alkalinity. The alkalinity referred to here is the calcium carbonate equivalent of all acid used in neutralizing the carbonates of sodium, calcium and magnesium and unless the figure is very high it does not imply that the water is too alkaline for irrigation purposes. The analyses are given in parts per million--that is, in parts by weight of the constituents in 1,000,000 parts by volume of water; for example, 1 ounce of material dissolved in 10 gallons of water is equal to 625 parts per million. The samples were not examined for bacteria, and thus a water that may be termed suitable for use on the basis of its mineral salt content might be condemned on account of its bacteria content. Waters that are high in bacteria content have usually been polluted by surface waters.

Total Dissolved Mineral Solids

The term "total dissolved mineral solids" as here used refers to the residue remaining when a sample of water is evaporated to dryness. It is generally considered that waters that have less than 1,000 parts per million of dissolved solids are suitable for ordinary uses, but in the Prairie Provinces this figure is often exceeded. Nearly all waters that contain more than 1,000 parts per million of total solids have a taste due to the dissolved mineral matter. Residents accustomed to the waters may use those that have much more than 1,000 parts per million of dissolved solids without any marked inconvenience, although most persons not used to highly mineralized water would find such waters highly objectionable.

Mineral Substances Present

Calcium and Magnesium

The calcium (Ca) and magnesium (Mg) content of water is dissolved from practically all rocks, but in larger amounts from limestone, dolomite, and gypsum. The calcium and magnesium salts impart hardness to water. The magnesium salts are laxative, especially magnesium sulphate (Epsom Salts, $MgSO_4$), and they are more detrimental to health than the lime or calcium salts. The calcium salts have no laxative or other deleterious effects. The scale found on the inside of steam boilers and teakettles is formed from these mineral salts.

Sodium

The salts of sodium are next in importance to those of calcium and magnesium. Of these, sodium sulphate,(Glauber's salt, Na_2SO_4) is usually in excess of sodium chloride,(common salt, $NaCl$). These sodium salts are dissolved from rocks and soils. When there is a large amount of sodium sulphate present the water is laxative and unfit for domestic use. Sodium carbonate (Na_2CO_3) "black alkali", sodium sulphate "white alkali", and sodium chloride are injurious to vegetation, and waters that contain a large amount of them cannot be used for irrigation.

Sulphates

Sulphates (SO_4) are one of the common constituents of natural water. The sulphate salts most commonly found are sodium sulphate (Glauber's Salt, Na_2SO_4), magnesium sulphate (Epsom

Salts, $MgSO_4$) and calcium sulphate ($CaSO_4$). Waters that contain these sulphate salts are called "sulphate waters". When the water contains large quantities of the sulphate of sodium ("White Alkali") it is injurious to vegetation and cannot be used for irrigation. According to Thresh and Beale, London, the continued use of water that contains 1,200 parts or more per million of magnesium sulphate and 500 parts or more per million of sodium sulphate causes diarrhoea and scour among stock, and one half this quantity makes the water unfit for domestic use.

Chlorides

Chlorides are common constituents of all natural water and are dissolved in small quantities from rocks. They usually occur as sodium chloride (common salt, NaCl) and if the quantity of salt is much over 400 parts per million the water has a brackish taste and is too salty for drinking.

Iron

Iron (Fe) is dissolved from many rocks and the surface deposits derived from them, and also from well casings, water pipes, and other fixtures. More than 0.1 part per million of iron in solution will settle out as a red precipitate upon exposure to the air. A water that contains a considerable amount of iron will stain porcelain, enamelled ware, and clothing that is washed in it, and when used for drinking purposes has a tendency to cause constipation.but the iron can be almost completely removed by aeration and filtration of the water.

Hardness

Calcium and magnesium salts impart hardness to water. Hardness of water is commonly recognized by its soap-destroying powers as shown by the difficulty of obtaining lather with soap. The total hardness of a water is the hardness of the water in its original state. Total hardness is divided into "permanent hardness" and "temporary hardness". Permanent hardness is the hardness of the water remaining after the sample had been boiled and it represents the amount of mineral salts that cannot be removed by boiling. Temporary hardness is the difference between the total hardness and the permanent hardness and represents the amount of mineral salts that can be removed by boiling. Temporary hardness is due to the bicarbonates of calcium and magnesium, and permanent hardness to the sulphates, and chlorides of calcium and magnesium. The permanent hardness can be partly eliminated by adding simple chemical softeners such as ammonia or sodium carbonate, or many prepared softeners. Water that contains a large amount of sodium carbonate and small amounts of calcium and magnesium salts is soft, but if the calcium and magnesium salts are present in large amounts the water is hard. The following table from "The Examination of Water and Water Supplies" by Thresh and Beale, London, 1925 , can be used for determining the relative hardness of a water.

Total Hardness	Character
Less than 50 parts per million.	Very soft
50 - 100 " " "	Moderately soft
100 - 150 " " "	Slightly hard
150 - 200 " " "	Moderately hard
200 - 300 " " "	Hard
Over 300 " " "	Excessively hard

Many of the Saskatchewan water samples analysed by the Geological Survey have a total hardness greatly in excess of 300 parts per million; when the total hardness exceeded 3,000 parts per million no exact hardness determination was made. Also no determination for temporary hardness was made on waters having a total hardness less than 50 parts per million.

The term "alkaline" has been applied rather loosely to some ground waters. Its original meaning was a chemical one and it implied that the substance in question would neutralize acids. The carbonates of calcium, magnesium, and sodium are the only compounds found in ground water that would make it alkaline chemically. A later application of the term "alkaline" was to soils that contain sufficient "black alkali" or "white alkali" to make them unfit for vegetation. In the Prairie Provinces a water is usually considered to be alkaline when it contains so much dissolved solids that it is not very suitable for human consumption; except that water that tastes strongly of common salt is described as "salty". Many alkaline waters may be used for stock. Most of the so-called alkaline waters are more correctly termed "sulphate waters".

Analyses of Water Samples from the Municipality of Tecumseh, No. 65, Saskatchewan

LOCATION						Depth of Well, Ft.	Total dis'vd Solids	HARDNESS			CONSTITUENTS AS ANALYSED						CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS									Source of Water
No.	Qtr.	Sec.	Tp.	Rge.	Mer.			Total	Perm	Temp.	Cl.	Alka-linity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	MgCO.	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	Fe	
1.	NW.	33	7	8	2	106	3,597											(3)	(1)		(2)				(4)	ж 1
2.	NW.	20	8	8	2	48	5,220												(2)		(3)	(4)	(1)	(5)		ж 1
3.	NE.	33	8	8	2	63	1,900	100	60	40	72	610	10	18	750	887	1,865	18		38		580	1,110	119		ж 2
4.	NE.	15	9	9	2	40	1,657												(2)		(4)	(3)	(1)	(5)		ж 1

Water samples indicated thus, ж 1, are from glacial drift,
Water samples indicated thus, ж 2, are from bedrock, Ravenscrag formation.
Analyses are reported in parts per million; where numbers (1), (2), (3), (4), and (5) are used instead of parts per million, they represent the relative amounts in which the five main constituents are present in the water.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).

Analyses Nos. 1, 2, and 4, by Provincial Analyst, Regina.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

In this municipality the waters from the wells in the glacial drift show great variation in the amount, but marked similarity in the composition of the salts in solution in the water. The waters from two wells, one in the NE.$\frac{1}{4}$, sec. 15, tp. 9, range 9, and one in the NW.$\frac{1}{4}$, sec. 20, tp. 8, range 8, west of the 2nd meridian, the analyses of which are given in the accompanying table, may be used as examples. These wells are 40 and 48 feet deep respectively, and both tap a sandy gravel layer in the glacial drift. The 48-foot well has a total dissolved solid content of 5,220 parts per million, whereas the 40-foot well has 1,657 parts per million. This shows a wide difference, yet the relative amounts of the different salts in solution in the water are very nearly the same.

Most of the waters from the shallow wells are described by the farmers as being "alkaline". These waters are sulphate waters that usually contain in solution sodium sulphate (Glauber's Salt) and magnesium sulphate (Epsom Salts) which render the water laxative. In the glacial lake sands of township 9, range 7, the water does not come in contact with the clays, from which the salts seem to be mainly derived; it is low, therefore, in dissolved mineral salts, and is of better quality than that obtained from the other deposits forming the glacial drift. The waters from the drift in this municipality are hard. In dry periods, such as was experienced in the years 1930 to 1934, water of shallow origin became increasingly hard due to the concentration of the salts by a decrease in the available water supply. In general, the waters from the glacial drift in this municipality are reported to be usable for drinking as well as for stock, but in some cases the high dissolved solid content renders them unfit for use.

Water from the Bedrock

A sample of water from a well drilled into the Ravenscrag formation in the NE.$\frac{1}{4}$, section 33, township 8, range 8, probably is characteristic of the type of water that is derived from most of the deep wells in this municipality. It has a total dissolved solid content of 1,900 parts per million, of which over half is sodium sulphate (Glauber's Salt). Sodium carbonate (black alkali) is second in abundance and renders the water unfit for irrigation. It also imparts a "soda" taste to the water, and this is especially noticeable when the water is warm. Common salt is third in order of abundance. The water is suitable for stock but unpalatable and not very satisfactory for drinking because of the fairly large amounts of sodium sulphate and sodium carbonate in solution in the water.

WELL RECORDS—RURAL MUNICIPALITY OF TECUMSEH, NO. 65.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	HEIGHT TO WHICH WATER WILL RISE Elev.	PRINCIPAL WATER-BEARING BED Depth	PRINCIPAL WATER-BEARING BED Elev.	PRINCIPAL WATER-BEARING BED Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	NE.	5	7	7	2	Dug	28	1,965	− 1	1,964	26	1,939	Glacial gravel	Hard, clear, iron		D, S.	Abundant supply for 24 head stock.
2	NW.	8	"	"	"	"	26	1,985	− 15	1,970	24	1,961	" "	Hard, alkaline, yellow		S	Waters 15 head stock.
3	SE.	9	"	"	"	"	36	1,990	− 10	1,980	30	1,960	" " sand	Hard, clear		D, S	Not sufficient or dependable for 15 head stock.
4	SE.	10	"	"	"	"	30	1,980	− 24	1,956	26	1,954	Glacial "	" "		D, S	Sufficient, but not abundant for 17 " " .
5	SW.	12	"	"	"	"	18	1,985	− 15	1,970	15	1,970	" sand	" "		D, S	Poor supply; only waters 10 head stock.
6	NW.	12	"	"	"	"	24	1,980	− 12	1,968	20	1,960	" gravel	" "		D, S	" " ; insufficient for 20 head stock.
7	SE.	15	"	"	"	"	20	1,990	− 8	1,982			" "	" "		D, S	Waters 20 head stock.
8	SW.	16	"	"	"	"	30	2,000	− 18	1,982	28	1,972	" sand	" "		S.	" 22 " " .
9	NE.	17	"	"	"	Bored	35	2,000	− 20	1,980	32	1,968	" "	" "		D, S	Not dependable for over 12 head stock.
10	SE.	18	"	"	"	"	32	1,985					" "	" "		S	Waters 30 head stock.
11	SW.	18	"	"	"	Dug	33	1,985	− 18	1,967	6	1,979	" "	" "		D, S, I	Abundant supply.
12	NW.	20	"	"	"	"	25	1,985	− 18	1,967	23	1,962	" gravel	" "		D, S, I	Insufficient in winter for 18 head stock.
13	NW.	23	"	"	"	Drilled	148	1,990	− 40	1,950	138	1,852	Ravenscrag, quicksand	" green		S	Abundant supply for 17 head stock.
14	NW.	24	"	"	"	Dug	8	1,980			2	1,978	Glacial sand	" clear		D, S	Good supply for 18 head stock.
15	NE.	26	"	"	"	"	15	1,990	− 9	1,981	9	1,981	" gravel	Soft, cloudy		D, S, I	" " " 25 " " .
16	SE.	31	"	"	"	"	18	1,985	0	1,985	16	1,969	" "	Hard, clear		D, S, I	Waters at least 25 " " ; passed by analyst.
17	NE.	33	"	"	"	"	8	2,000	− 3	1,997	5	1,995	" "	" "		S	Limited supply; only waters 19 head stock.
18	SW.	34	"	"	"	"	50	1,990	− 35	1,955			" sand	" "		D, S	Abundant supply.
19	NE.	34	"	"	"	"	17	2,000	−14½	1,985½			" gravel	" "		D, S, I	" " for 39 head stock.
1	SW.	2	7	8	2	Dug	35	1,985	− 15	1,970	18	1,967	" sand	" "	40	D, S, I	Will water 70 head stock; pumps dry.
2	NW.	3	"	"	"	Bored	45	1,990	− 30	1,960	44	1,946	" "	" " alkaline		D, S	Waters at least 25 head stock; pumps dry.
3	SE.	4	"	"	"	Dug	20	1,990	− 5	1,985	10	1,980	" "	Hard, clear		S	Poor supply; especially in winter.
4	SE.	5	"	"	"	"	12	1,985	0	1,985	5	1,980	" "	" "		D, S	Yields 1 bbl. a day in winter.
5	NE.	7	"	"	"	Bored	50	1,985	− 10	1,975	50	1,935	" stone	" " alkaline			Water supply poor.
6	NE.	8	"	"	"	"	30	2,005	− 18	1,987	23	1,982	" gravel	Hard, clear, alkaline	41	D, S, I	Will water 50 head stock.
7	NE.	8	"	"	"	Drilled	30	1,995	− 10	1,985	16	1,979	"	Hard, clear, alkaline	42	D, S	Sufficient for house; will water 6 head stock.
8	SE.	9	"	"	"	Dug		1,990					"	Hard, clear	42	D, S	Sufficient supply; poor quality.

NOTE:—All depths, altitudes, heights and elevations given above are in feet.

(D) Domestic; (S) Stock; (I) Irrigation; (M) Municipality; (N) Not used.
(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF TECUMSEH, NO. 65.

WELL NO.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
9	SW.	10	7	8	2	Bored	30	1,985	- 3	1,982			Glacial	Hard, clear, alkaline		D, S	Very poor supply; harmful to plants.
10	NW.	10	"	"	"	Dug	38	1,995	- 22	1,973	34	1,961	" sandy clay	Hard, clear, alkaline	43	D, S	Will water at least 60 head stock.
11	SE.	12	"	"	"	"	45	1,995	- 18	1,977	18	1,977	" gravel, sand	Hard, clear, iron	40	D, S	" " 25 head stock.
12	SW.	14	"	"	"	Bored	35	1,995	- 15	1,980	34	1,961	Glacial sand, boulders	Alkaline, clear		D, S	" " 30 " " at least.
13	NW.	15	"	"	"	"	36	1,990	- 24	1,966	34	1,956	Glacial gravel, sandy clay	Hard, clear	42	D, S	Good supply; waters at least 25 head stock.
14	SW.	16	"	"	"	Dug	24	1,995	- 12	1,983	23	1,972	Glacial gravel	" " alkaline	43	D, S	Waters at least 20 head stock.
15	SW.	18	"	"	"	"	30	1,995	- 5	1,990	27	1,968	" sand	Hard, clear, alkaline	45	D, S	" " " 15 " " .
16	NE.	19	"	"	"	"	30	2,005	- 19	1,986	29	1,976	" clay, possibly sand	Hard, very alkaline, clear	43	D, S	Good supply; waters 30 head stock.
17	SW.	19	"	"	"	Drilled	185	2,015	- 22	1,993	185	1,830	Ravenscrag coal	Soft, soda, brown	42	D, S	Abundant supply; poor for irrigation.
18	NW.	20	"	"	"	Dug	27	2,010	- 13	1,997	13	1,997	Glacial gravel	Hard, clear, alkaline	41	D, S	" " ; kills plants; laxative effect on human beings.
19	SW.	22	"	"	"	Bored	23	1,995	- 19	1,976	20	1,975	" sandy clay	Hard, clear, alkaline	40	S	Barely sufficient; hauled water from 1932 to 1934. Laxative effect.
20	SE.	22	"	"	"	Dug	30	1,995	- 15	1,980	30	1,965	" stony layer	Hard, clear, alkaline	42	S	Abundant supply; water too bitter for domestic use.
21	NE.	22	"	"	"	"	32	2,000	- 17	1,983	22	1,978	Glacial sand	Hard, clear, alkaline	41	D, S	Waters 70 head stock; kills plants.
22	SE.	24	"	"	"	"	18	2,005	- 15	1,990	15	1,990	" Quicksand	Hard, clear, alkaline	43	D, S	Fair supply; has sulphur odour.
23	NE.	24	"	"	"	Bored	44	2,000	- 32	1,968	32	1,968	" gravel	Hard, iron, clear	42	D, S	Will water 60 head stock.
24	NW.	25	"	"	"	Dug	36	2,015	- 21	1,994	34	1,981	" sand	Hard, clear, alkaline, iron	42	S	Waters 50 head of stock; haul drinking water.
25	NE.	26	"	"	"	Bored	40	2,010	- 20	1,990	37	1,973	" gravel	Hard, iron, clear	41	D, S	Insufficient supply; haul water for stock.
26	SW.	27	"	"	"	"	28	2,005	- 15	1,990	26	1,979	" "	Hard, clear	39	D, S	Over supply.
27	NW.	28	"	"	"	"	35	2,010	- 25	1,985	32	1,978	" " sand	" " alkaline		D, S	" " ; laxative effect on man; poor for garden.
28	SE.	30	"	"	"	"	28	2,000	- 23	1,977	23	1,977	" sand	Hard, clear	41	D, S	Sufficient supply.
29	SW.	30	"	"	"	Dug	20	2,020	- 10	2,010	18	2,002	" gravel	" " alkaline, iron	41	D, S, I	Over-supply; fair for irrigation.
29a	NW.	30	"	"	"	Bored	35	2,020	- 20	2,000			" clay			D, S	Sufficient in wet years.
30	NW.	33	"	"	"	"	106	2,010	- 30	1,980	31	1,979	" sand	Hard, cloudy, alkaline	41	S	Poor supply; highly mineralized; #.
31	NE.	33	"	"	"	Drilled	160	2,010	- 25	1,985	157	1,853	Ravenscrag, quick sand	Soft, clear		D, S	Yields 15 tanks a day.
32	NW.	36	"	"	"	Bored	46	2,010	- 19	1,991	25	1,985	Glacial Quicksand	Hard, " alkaline	41	S	Supplies 70 head stock.
33	NE.	36	"	"	"	Dug	30	2,010	- 3	2,007			Glacial clay, sand	Hard, clear, alkaline	4[illegible]	D, S	Poor supply; well has caved in.
34	SE.	36	"	"	"	"	17	2,025	- 5	2020	16	2009	Glacial sand	Hard, clear	42	D, S	Over supply.

NOTE:—All depths, altitudes, heights and elevations given above are in feet.

(D) Domestic; (S) Stock; (I) Irrigation; (M) Municipality; (N) Not used.
(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF TECUMSEH, NO. 65

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SE.	2	7	9	2	Drilled	435	1,985	− 20	1,965	433	1,552	Black Ravenscrag sand	Soft, salty, yellow	41	S	Waters at least 50 head stock.
2	SW.	2	"	"	"	"	325	1,975	− 60	1,915	305	1,670	Ravenscrag black sand	Soft, salty, soda, clear	42	S	Sufficient supply; kills plants.
3	SE.	3	"	"	"	"	330	1,980	− 50	1,930	325	1,655	Ravenscrag fine sand	Soft, salty, clear	43	S	Will water 100 head stock.
4	SE.	6	"	"	"	Dug	9	1,965	− 4	1,961	3	1,962	Glacial blue, fine sand	Soft, rain-water colour		D. S.	Supply excellent; supply neighbors' tank from this well.
5	SW.	6	"	"	"	"	12	1,975	− 5	1,970	8	1,967	Glacial yellow sand	Hard, clear		D. S. I.	Good supply; irrigation results fair.
6	NW.	6	"	"	"	Drilled	84	1,980	− 25	1,955	74	1,906	Ravenscrag, blue sand	" , alkaline iron		S.	Excellent supply before being plugged with sand.
7	NW.	7	"	"	"	"	275	1,975	− 30	1,945	245	1,730	Ravenscrag, blue sand	Soft, sediment white, soda		S.	Waters 60 head stock; poor drinking water; unsucessful for irrigation.
8	SW.	10	"	"	"	Dug	30	1,975	−0	1,975	8	1,967	Glacial sand, gravel	Soft, iron, clear		D, S	Insufficient for 34 head stock.
9	SE.	10	"	"	"	Drilled	310	1,990	− 9	1,981	309	1,681	Ravenscrag coal	Soft, salty, white sediment	44	S.	Abundant supply; not suitable for drinking.
10	NW.	12	"	"	"	"	365	1,995	− 33	1,962	363	1,632	" sandstone	Soft, salty, soda, clear	42	D, S	Analyst reports water not fit for man or beast; kills plants.
11	SE.	12	"	"	"	"	371	1,990	− 40	1,950	368	1,622	" "	Soft, salty, soda clear	42	D, S	Abundant supply; kills plants.
12	SW.	13	"	"	"	Dug	30	2,005	− 15	1,990	30	1,975	Glacial gravel	Hard, " alkaline	40	D, S	Over supply.
13	NE.	13	"	"	"	Bored	54	2,005	− 44	1,961	54	1,951	" sand	Hard, clear, alkaline	41	S	Poor " ; laxative effect on man.
14	SW.	14	"	"	"	"	70	1,990	− 54	1,936	70	1,920	" " gravel	Hard, clear, alkaline	41	S	Insufficient for 15 head stock; laxative effect on man.
15	SE.	16	"	"	"	Dug	22	1,990	− 6	1,984	1	1,989	Glacial Quick-sand	Soft, clear		D, S	Insufficient for 13 head stock.
16	NW.	17	"	"	"	Drilled	253	1,980	−243	1,737	243	1,737	Ravenscrag fine sand	" " salty		S	Waters 30 head stock; too salty for house use; kills plants.
17	SE.	18	"	"	"	Dug	12	1,975	− 1	1,974	4	1,971	Glacial sand	Hard "		S	Waters 75 head stock; has watered 150 head.
18	NE.	18	"	"	"	"	12	1,980	0	1,980	5	1,975	" yellow sand	" "		D, S	Insufficient for 15 head stock.
19	NW.	20	"	"	"	Drilled	294	1,995	− 40	1,955	287	1,708	Ravenscrag sandstone	Soft, " soda		S	Abundant supply; kills plants.
20	NE.	20	"	"	"	"	147	1,995	− 40	1,955	117	1,878	Ravenscrag quicksand	Hard, "		D, S	" " before becoming plugged.
21	SE.	20	"	"	"	Dug	30	1,995	− 22	1,973	28	1,967	Glacial sand, gravel	" "		D	Neither abundant nor dependable.
22	NE.	24	"	"	"	Bored	28	2,010					Glacial clay	" " alkaline		N	Dry hole. *Intermittent Supply.*
23	SE.	26	"	"	"	"	91	2,015	− 20	1,995	70	1,945	" gravel, quicksand	Hard, salty, clear	43	D, S	Smells of gas; waters at least 40 head stock.
24	NW.	26	"	"	"	Dug	22	2,020	− 8	2,012	19	2,001	Glacial gravel	Soft, clear	40	D, S	Over supply for 40 head stock.
25	SW.	27	"	"	"	Bored	40	2,000	− 30	1,970	40	1,960	" sand	Hard, " alkaline	40	S	Supplies 50 head stock; laxative effect on man.
26	SE.	30	"	"	"	Dug	8	1,990	− 3	1,987	5	1,985	" "	Hard, clear		D	Insufficient for 38 head of stock.

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(D) Domestic; (S) Stock; (I) Irrigation; (M) Municipality; (N) Not used.
(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF TECUMSEH, NO. 65.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
27	NE.	30	7	9	2	Dug	20	2,000	-16	1,984	18	1,982	Glacial sand	Hard, clear		D, S	Waters 12 head stock.
28	NW.	30	"	"	"	Bored	26	1,995	- 10	1,985	24	1,971	" "	" "		D, S	Fair supply; will water 24 head stock.
29	SW.	32	"	"	"	Dug	25	2,000	- 6	1,994	21	1,979	" "	" " alkaline		S.	Poor " ; insufficient for 18 head stock.
30	NE.	32	"	"	"	Drilled	290	2,005	- 40	1,965	270	1,735	Ravenscrag, Quicksand	Soft, soda, clear		S	Abundant supply; now choked with sand.
31	NE.	33	"	"	"	Dug	30	2,005			27	1,978	Glacial sand	Hard, alkaline iron, clear		D, S	Insufficient for 20 head stock; laxative effect on man.
32	NE.	34	"	"	"	Bored	32	2,010	- 22	1,988	22	1,988	" "	Hard, iron, clear		D, S	Abundant supply; will water at least 60 head stock.
33	NE.	36	"	"	"	Drilled	21	2,000	- 18	1,982			" clay	Hard, clear	44	D	Barely enough for the house.
1	SW.	2	8	7	2	Dug	20	2,005	- 13	1,992	17	1,988	" gravel	Soft, " alkaline		S	Good supply.
2	NW.	4	"	"	"	"	24	1,990	- 19	1,971	16	1,974	" " sand	Hard, iron, clear		D, S, I	Insufficient for 70 head stock.
3	SE.	5	"	"	"	"	26	1,995	- 5	1,990			" sand?	Hard, clear		S	Sufficient for 30 head stock at least.
4	NE.	6	"	"	"	"	13	1,990	- 11	1,979	5	1,985	" " gravel	" "		S	Abundant supply.
5	SE.	7	"	"	"	Bored	16	1,990	- 12	1,978	14	1,976	Glacial, gravel, sand	" "		D, S	Supplies at least 18 head stock.
6	SE.	9	"	"	"	"	30	2,020	- 15	2,005	20	2,000	Glacial, " sand	" "		D, S	" " " 75 " " .
7	SW.	12	"	"	"	Dug		2,020						" "		D, S	" 22 " " .
8	NW.	12	"	"	"	"	15	1,990	- 10	1,980	12	1,978	Glacial sand	Soft, "		D, S	Not abundant supply; insufficient for 10 head stock.
9	SW.	13	"	"	"	"	35	2,000	- 15	1,985	10	1,990	" yellow sand	Hard, "		D, S	Sufficient for at least 100 head stock; analysed and found to be good.
10	SW.	14	"	"	"	"	22	2,010	- 7	2,003	4	2,006	Glacial, gravel, sand	" "		D, S	Supply never abundant; will water 25 head stock.
11	NE.	15	"	"	"	"	30	2,012	- 6	2,006	28	1,984	Glacial sand	" " alkaline		D, S	Yields 3,000 gals. a day.
12	NE.	15	"	"	"	Drilled	100	2,012	- 15	1,997	100	1,912	" " ?	Soft, clear		D, S	" 2,000 " " " .
12a	NW.	15	"	"	"	"	394	2,020					Ravenscrag			N.	
12b	NW.	15	"	"	"	"	92	2,020	- 8	2,012			Glacial sand	Hard, "		D, S, I	Abundant supply for 20 head stock.
13	SE.	16	"	"	"	Dug	24	2,005	- 20	1,985	21	1,984	" " gravel	" "		D, S, I	Abundant supply for 20 head stock.
14	NW.	16	"	"	"	"	22	2,035	- 6	2,029	19	2,016	Glacial gravel	" "		D, S, I	Supplies at least 10 head stock.
15	SE.	18	"	"	"	"	8	2,025	- 4	2,021	0	2,025	" yellow sand	Iron, Soft, "		D, S, I	Insufficient for 9 head stock.
16	SW.	18	"	"	"	Bored	60	2,020	- 20	2,000	60	1,960	Glacial black sand	Hard, " sand		S	Supplies at least 40 head stock.
17	SW.	20	"	"	"	Dug	17	2,030	- 13	2,017	2	2,028	Glacial gravel	Hard, clear, alkaline		D, S	" " " 20 " " .
18	NW.	20	"	"	"	Bored	85	2,035	- 35	2,000	85	1,950	" blue sand	Soft, clear		D, S	Abundant supply for at least 28 head stock.

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF TECUMSEH, NO. 65

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
19	SE.	20	8	7	2	Dug	35	2,035	− 5	2,030	29	2,006	Glacial gravel, sand	Hard, clear, alkaline		D. S	Fairly abundant; waters about head stock 20.
20	NW.	22	"	"	"	"	22	2,010	0	2,010			Glacial sand	Soft, clear		D, S	Sufficient for 23 head stock at least.
21	SW.	22	"	"	"	"	12	2,020	− 9	2,011	5	2,015	" " gravel	Hard, "		D, S	Limited supply for 10 head stock but constant.
22	SW.	25	"	"	"	"	65	1,990	− 15	1,975			Glacial yellow sand	" "		D, S, I	Sufficient for 20 head stock at least.
23	SE.	27	"	"	"	Bored	32	2,000	− 24	1,976	32	1,968	Glacial yellow sand	" alkaline, iron, clear		S	Insufficient for 37 head stock.
24	SE.	28	"	"	"	Dug	9	2,040	− 4	2,036	6	2,034	Glacial gravel	Soft, "		D, S	Abundant supply for 30 head stock at least.
25	SW.	28	"	"	"	"	14	2,040	− 3	2,037			" yellow clay	Hard, "		D, S	Very poor supply.
26	SE.	29	"	"	"	"	12	2,045	− 6	2,039			" grey sand	" " iron		D, S	Sufficient for 17 head stock.
27	SE.	30	"	"	"	"	30	2,040	− 27	2,013	27	2,013	" sand	Hard, clear		D, S	Plentiful supply.
28	SW.	30	"	"	"	Bored	24	2,050	− 19	2,031	16	2,034	" yellow sand	" "		D, S	Insufficient for 15 head stock.
29	NW.	32	"	"	"	"	60	2,045	− 30	2,015	59½	1,985½	Ravenscrag coal	" "		D, S	Abundant supply.
30	SW.	34	"	"	"	Dug	35	2,000	− 10	1,990	30	1,970	Glacial sand	" alkaline, cloudy, yellow		S	Limited supply; laxative effect on man.
31	NW.	34	"	"	"	"	13	1,990	− 5	1,985			" gravel	Hard, clear		D, S	Sufficient for 30 head stock at least.
32	SE.	36	"	"	"	"	8	1,985	− 3	1,982	0	1,985	" quicksand	" "		D, S	Limited supply.
1	SW.	2	8	8	2	Bored	32	2,010	− 18	1,992	30	1,980	" sand	" " alkaline		S	Sufficient for at least 75 head stock.
2	SW.	3	"	"	"	"	36	2,020	− 24	1,996	35	1,985	" sandy gravel	" , clear, Hard, iron		D, S	" " 40 head stock; laxative effect.
3	NW.	3	"	"	"	Drilled	150	2,020	− 18	2,002	150	1,870	Ravenscrag quicksand	Soft, soda, clear		D, S, I	" " at least 30 head stock.
4	NE.	4	"	"	"	"	150	2,020	− 22	1,998	148½	1,871½	Ravenscrag sandstone	Soft, " clear		D, S, I	Abundant supply for at least 45 head stock.
5	SW.	5	"	"	"	Dug	21	2,000	− 10	1,990	16	1,984	Glacial sand	Hard, clear		D, S	Barely enough for 15 head stock.
6	SE.	6	"	"	"	Bored	30	2,010	− 13	1,997	30	1,980	" blue sand	Soft, " iron		D, S, I	Sufficient for 23 head stock.
7	SW.	7	"	"	"	"	45	2,000	− 25	1,975			" sand?	Hard, " "		D, S	Good supply for 21 head stock.
8	NW.	8	"	"	"	"	40	2,015	− 20	1,995			" " ?	" " alkaline		D, S	Sufficient for 16 head stock.
9	NE.	9	"	"	"	Drilled	140	2,025	− 15	2,010	135	1,890	Ravenscrag sandstone	Soft, soda, clear		D, S, I	Excellent supply for at least 80 head stock.
10	NW.	10	"	"	"	"	175	2,025	−125	1,900	160	1,865	Ravenscrag coal	Soft, soda, iron, dark		D, S, I	Very good supply.
11	NW.	11	"	"	"	Bored	80	2,020	− 30	1,990	65	1,955	Glacial sand	Hard, alkaline sulphur, clear		S	Abundant supply but condemned by analyst.
12	NE.	12	"	"	"	Dug	26	1,995	− 16	1,979	8	1,987	" "	Hard, "		D, S	Sufficient for at least 80 head stock.

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF TECUMSEH NO. 65.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
13	NW.	14	8	8	2	Bored	35	2,030	− 20	2,010	25	2,005	Glacial sand	Hard, clear, alkaline		D, S	Sufficient for 15 head stock.
14	NW.	15	"	"	"	Dug	45	2,045	− 31	2,014	42	2,003	" gravel	" , clear, hard, iron		S	Excellent well for stock purposes.
15	SE.	17	"	"	"	Bored	28	2,035	− 8	2,027			" " or sand?	" alkaline, iron, clear		D, S	Will supply at least 60 head stock.
16	SE.	18	"	"	"	Drilled	250	2,020	− 50	1,970			Ravenscrag bed-rock	Soft, " soda		D, S, I	Plentiful supply.
17	NW.	18	"	"	"	Bored	40	2,015	− 26	1,989	37	1,978	Glacial gravel	Hard, "	40	D, S, I	Good supply; can be pumped dry.
18	NW.	20	"	"	"	Drilled	66	2,040	− 4	2,036	56	1,984	" quicksand	Alkaline " iron, soft		D, S	Insufficient for 80 head stock. Sample analysed from 49-60 ft well #
19	NE.	20	"	"	"	Bored	35	2,045	− 10	2,035	31	2,014	" fine sand	Hard, alkaline soda, clear		D, S	Good supply; laxative effect; white sediment.
20	SE.	20	"	"	"	Dug	32	2,030	− 18	2,012	32	1,998	" sand	Hard, alkaline iron, clear		D, S	Not dependable in dry years.
21	NE.	21	"	"	"	Drilled	175	2,035	−100	1,935	100	1,935	" gravel	Soft, " soda		D, S, I	Insufficient for 50 head stock.
22	NE.	22	"	"	"	Bored	40	2,045					" sand?	Hard, alkaline iron, clear		S	" " 22 " " .
23	NW.	23	"	"	"	Dug	30	2,040	− 21	2,019	30	2,010	" " gravel	Hard, iron, alkaline, clear		D, S	Abundant supply before the drought.
24	SE.	25	"	"	"	"		2,040					"	Alkaline, " hard, iron		D, S	Good supply, but kills plants.
25	SE.	26	"	"	"	"	35?	2,040					"			N.	Dry hole.
26	NW.	26	"	"	"	Bored	60	2,050	− 30	2,020	50	2,000	" sand	Hard, clear		D, S	Sufficient for 30 head stock at least.
27	NW.	27	"	"	"	"	33	2,050	− 19	2,031	33	2,017	" sandy clay	" " alkaline		D, S	Will water 25 head stock; slightly laxative; white sediment.
28	SE.	28	"	"	"	"	40	2,050	− 20	2,030	36	2,014	" sand	", clear, hard, iron		D, S	Will water at least 60 head stock.
29	SW.	28	"	"	"	"	40	2,050	− 10	2,040			" "	", alkaline, clear		D, S	Good supply.
29a	NE.	28	"	"	"	"	160	2,050					Ravenscrag coal				
30	SE.	31	"	"	"	Dug	35	2,040	− 17	2,023	17	2,023	Glacial sand	Hard, clear, alkaline		D, S	Insufficient for 23 head stock; laxative effect on man.
31	SE.	32	"	"	"	Bored	35	2,050	− 23	2,027	29	2,021	" " gravel	Hard, clear		D, S, I	Sufficient for at least 45 head stock.
32	NE.	32	"	"	"	"	35	2,050	− 25	2,025	32	2,018	Glacial sand	" "		D, S	" " " " 20 " " .
33	SE.	33	"	"	"	Dug	32	2,055	− 20	2,035	30	2,025	" gravel	" " alkaline		D, S	Abundant " " " 50 " " .
34	NE.	33	"	"	"	Drilled	63	2,055	− 25	2,030	53	2,002	Ravenscrag sand	Soft, soda, clear		D, S, I	" supply; water sold to people in Stoughton; #.
35	SE.	34	"	"	"	Dug	35	2,050	− 25	2,025	32	2,018	Glacial gravel	" alkaline hard, iron		D, S	Insufficient for 45 head stock.
1	SE.	4	8	9	2	Bored	36	2,000	− 12	1,988			"	" " clear		D, S, I	Supplies 30 head stock.
2	SW.	5	"	"	"	"	90	2,010	− 35	1,975			Ravenscrag bed-rock	Hard, clear, alkaline		S	Abundant supply but only suitable for stock.

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(#) Sample taken for analysis.