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DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF WALPOLE No. 92 SASKATCHEWAN

BY

B. R. MacKay & H. N. Hainstock

Water Supply Paper No. 23

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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF WALPOLE, NO. 92, 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 problem 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-bearing 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 Walpole is an area of approximately 306 square miles in southeastern Saskatchewan. The centre of the municipality lies 18 miles west of the Manitoba border and 60 miles north of the International Boundary line.

The municipality of Walpole is covered by a mantle of unconsolidated glacial drift that was deposited by the continental ice-sheet and by the waters that resulted from its melting. Due to the uneven preglacial bedrock land surface upon which these deposits were laid down the thickness of the glacial drift varies greatly within a distance of a few miles. The evidence presented by the well data gathered indicates that a preglacial drainage system, having four or more channels, is traceable throughout much of the municipality. The approximate configuration of this buried drainage system is shown on the accompanying map. The main channel occurs along the western edge of the municipality. The smaller channel starts in the northeast corner of the municipality and runs in a southerly direction along the eastern edge of townships 12 and 11, range 32, then swings to the southwest, passing through Walpole, and continues south 4 miles to join with a tributary from the east. From there it continues in a southwesterly direction, joining the main channel in township 10, range 33. At the northern boundary of township 9, about the middle of range 33, it is joined by a small tributary from the southeast in which the glacial covering runs from 220 feet to 300 feet in thickness. In the northern part of the municipality the glacial deposits in these channels are from 80 to 150 feet thick and in the southern part from 200 feet to 300 feet.

The area between the two channels in the northern part of the municipality has a drift covering of from 7 to 50 feet in thickness, but from a few miles north of the southern boundary of township 11, to near the junction of the channels, the drift has an approximate thickness of 100 feet. In the southeastern corner of

township 11, range 32, and in the northern part of township 10, range 32, the drift is only from 10 to 60 feet thick. In the southern part of the municipality the glacial deposits are much thicker and extend to a depth of from 120 to 200 feet in the southeastern corner, and from 200 to 300 feet in the southwestern corner.

Water-bearing Horizons in the Unconsolidated Deposits.

The upper 10 to 30-foot zone of these glacial deposits is composed principally of yellow clay. Along the present stream channels and ravines, fairly extensive deposits of sand and gravel are found. On the uplands, however, the sands and gravels occur as lenses within the yellow clay or as small patches of glacial outwash in the form of gravel knolls or ridges. The approximate locations of the more extensive sand and gravel deposits are shown on the accompanying map. In the areas where the glacial drift is quite thin the yellow clay usually extends down to the bedrock. Where the drift has a thickness of 60 feet or more, however, the yellow clay is underlain by a fine-textured, blue to grey clay. Sand pockets occur at various localities in this clay deposit. In the old preglacial drainage channels the blue clay is underlain by sand and gravel deposits which in places have a thickness of 20 to 40 feet and lie directly on the bedrock, but on the uplands the clay usually rests immediately on the surface of the bedrock.

This deposit of glacial drift contains three water-bearing horizons. The sand and gravel deposits that occur in the upper 30-foot zone form the uppermost horizon. This horizon is found at an elevation of from 1,975 feet to 1,848 feet in the eastern part of the municipality, and at 1,950 feet to 2,150 feet in the western part, sloping to the northeast and southeast of the height of land that occurs around the boundary between townships 10 and 11. The majority of the shallow wells derive their supplies of ground water from this horizon and in years of normal rainfall the supply is sufficient for farm needs. The water is hard, but is not too highly mineralized to be used for drinking.

Sand lenses within the blue clay form the second water-bearing horizon. Wells tapping these lenses produce only a small supply of water which is often "alkaline" in character. Water that is derived from seepage from the blue or yellow clays alone is usually too "alkaline" for human use and insufficient for stock requirements.

The sand and gravel deposits that underlie the blue clay in the preglacial drainage channels constitute the third water-bearing horizon. In general the elevation of the top of this horizon varies from 2,090 feet to 2,045 in the north, and from 1,980 feet to 1,890 feet in the southern part of the municipality. Wells tapping this horizon obtain an abundant supply of hard water that is usable for drinking, and the pressure is sufficient to cause it to rise to within 30 to 80 feet of the surface. The water contains a large amount of iron in solution but when the water stands for a period of time the iron becomes oxidized and settles as a reddish precipitate of iron oxide.

Water-bearing Horizons in the Bedrock

The Ravenscrag formation underlies the glacial drift in the southern part of the municipality and its approximate northern limit is shown on the accompanying map. This formation is from 35 to 140 feet in thickness and its sandy shale beds form a water-bearing horizon. The elevation of this horizon is generally from 1,775 feet to 1,850 feet, but along the centre of the eastern edge of township 9, range 32, the horizon is encountered at a depth of 290 to 320 feet, or at an elevation of 1,660 feet. The water is medium hard to soft, usually slightly salty, and in many cases has a definite "soda" taste, but it is usable for domestic purposes as well as for stock. The supply is adequate for farm needs.

The Marine shale formation underlies the Ravenscrag sediments where they are present, but elsewhere in the municipality it directly underlies the glacial drift. No water-bearing horizons

have been encountered in this formation in the areas where it is overlain by the Ravenscrag sediments or by thick deposits of glacial drift. In the areas where the formation comes close to the surface, however, a moderate supply of water is obtained from the upper 50 feet of the shale beds. As this formation is nearly impervious to water no supply can be expected at depth or in those areas where the surface water is prevented from seeping into it by the overlying thick deposits of impervious blue clay. The water that is obtained from the upper 50 feet of the Marine shale formation is medium soft to hard in character. In a number of wells, however, the water is "alkaline", due to the dissolving of various salts from the shale itself and also from the overlying deposits of clay. The hydrostatic pressure is not great, and the water rarely rises above the contact of the shale and the glacial drift. The supply is not abundant, but the majority of the wells produce sufficient water for local needs.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 9, Range 32

Two water-bearing horizons occur in the glacial drift that mantles this township. The sand and gravel deposits that occur either as lenses within the upper 30 feet of the drift, or as stream and glacial outwash gravels along the creeks and ravines, constitute the uppermost horizon. The elevation of the top of this aquifer varies from 1,940 to 2,010 feet above sea-level, the rise corresponding to the increase in surface elevation. All of the shallow wells in the township derive their water from this horizon. In years of normal rainfall the water supply from these wells is sufficient for local needs, but in drought periods only those wells that are dug into fairly large gravel lenses give an adequate supply. This necessitates the hauling of water from neighbouring wells that have a permanent supply. The water is usually hard, and is used for domestic purposes as well as for stock. The best

locations for wells that may derive an adequate supply of water from this horizon are in the so-called "Buffalo Wallows", along the ravines, and on or near the gravel knolls. By damming the ravines or by digging dugouts a supply of water can be retained through the summer months that will be sufficient for stock use.

The sand and gravel deposits that occur at the base of the blue clay and rest on the bedrock, form the second water-bearing horizon in the glacial drift. As these deposits appear to have been laid down in a preglacial stream channel the water-bearing horizon formed by them is not continuous, or of large areal distribution. Two wells located in the SW. $\frac{1}{4}$, section 15, and in the NW. $\frac{1}{4}$, section 18, are obtaining an abundant supply of hard, but **usable** water from this horizon, at depths of 200 and 190 feet, respectively. The water rises to within 15 to 30 feet of the surface and a reddish precipitate of iron oxide settles out of the water after it has been exposed to the air for some period of time. This horizon may occur in other locations in the township.

The Ravenscrag formation, which underlies the glacial drift, contains one water-bearing horizon. In the southern part of the township the formation is quite thin, ranging from 35 feet in thickness in the west to 50 feet in the east. It increases in thickness to the north and is 80 feet thick in section 20, and 150 feet in section 24. An abundant supply of soft, saline water is obtained by wells tapping this formation at depths of 140 to 290 feet. In the western part of the township the elevation of the top of the aquifer **ranges** from 1,775 to 1,860 feet, and in section 24 it is 1,660 feet above sea-level. The hydrostatic pressure is sufficient to cause the water to rise to within 30 feet of the surface. Should other wells be drilled into this water-bearing horizon throughout the township a supply of water sufficient for farm needs **probably will be obtained.**

Township 9, Range 33

The glacial drift of this township also contains two water-bearing horizons. All of the shallow wells in the township are obtaining water from the sand and gravel deposits that lie above the blue clay and form the highest water-bearing horizon. The best supplies are obtained along the creeks and ravines where the gravel deposits are fairly extensive. Elsewhere, the gravel occurs as lenses and pockets within the yellow clay and wells tapping these pockets yield a sufficient supply in years of normal rainfall. In drought periods, however, the wells become intermittent in character, or are entirely dry. The yellow clay may yield a small amount of seepage water which is often "alkaline" in character.

Some lenses of sand may occur in the blue clay, but wells tapping these lenses will produce only a very small supply of water.

The sand and gravel deposits that underlie the blue clay and rest upon the bedrock form the second water-bearing horizon in the glacial drift. This horizon has been encountered at three localities in the township and it is not known if it occurs as a continuous horizon or as deposits in a preglacial drainage channel. In the NW. $\frac{1}{4}$, section 13, it was located at a depth of 130 feet, or at an elevation of 1,930 feet; in the SE. $\frac{1}{4}$, section 27, at a depth of 240 feet, and in the SE. $\frac{1}{4}$, section 34, at a depth of 220 feet or at an elevation of 1,890 feet. The water rises to within 20 to 50 feet of the surface, is hard, and is used for drinking as well as for stock. It contains a large concentration of iron, but when the water stands exposed to the air the iron content is oxidized and settles as a reddish precipitate of iron oxide. In the northeastern corner of the township it is possible that other wells will encounter this same horizon.

The Ravenscrag formation, which underlies the glacial deposits, contains one water-bearing horizon at a depth of approximately 400 feet. Only three wells have been drilled into this horizon and each obtained a good supply of soft, saline water with

a fairly high iron content. The water rises to within 20 feet of the surface. Should other deep wells be drilled into this horizon an adequate supply of water should be obtained throughout most of the township.

Township 9, Range 34

Two water-bearing horizons occur in the glacial drift. The sand and gravel deposits that occur as lenses within the yellow clay and as extensive stream or glacial outwash deposits along the creeks form a water-bearing horizon at an elevation of from 2,125 to 2,140 feet. The shallow wells derive their water from this horizon, and those that are dug into the deposits along the creeks produce an adequate supply at all times of the year. Those that are dug into the gravel lenses, however, in drought periods do not yield a supply that is sufficient for local needs. Little trouble should be experienced in obtaining an adequate supply of water from shallow wells in this township.

In the SW. $\frac{1}{4}$, section 24, a well obtains an abundant supply of water at a depth of 240 feet. The water is hard and contains a large amount of iron which settles on exposure to the air as a red precipitate of iron oxide. The writer is of the opinion that this supply of water is being derived from a second water-bearing horizon formed by sand and gravel deposits lying above the bedrock and the blue clay. Its areal distribution is unknown.

The Ravenscrag formation contains one water-bearing horizon. The formation is 35 feet thick in the NW. $\frac{1}{4}$, section 12, and a supply of hard, saline water is encountered in it at a depth of 265 feet. The water rises to within 60 feet of the surface, and it is used for stock, but is not suitable for human consumption. In the northern part of the township the Ravenscrag formation disappears and the Marine shale formation underlies the blue clay. Little or no water can be expected from this formation, but a

supply which might be suitable for farm needs probably could be obtained by drilling into the Ravenscrag formation in the southern part of the township.

Township 10, Range 32

Ground water is obtained from three horizons in the glacial drift in this township. The sand and gravel deposits that occur as lenses within the yellow clay, and as more extensive deposits along the ravines, form the uppermost water-bearing horizon. The elevation of the top of this horizon varies from 1,940 feet in the southeast to 1,980 feet in the northwest, the rise corresponding to the increase of surface elevation in the same direction. The wells tapping this horizon are from 5 to 20 feet in depth and in years of normal rainfall produce an adequate supply of hard water. The best supply is obtained from those wells that are located along the ravines, the approximate locations of which are shown on the accompanying map. In the northeastern part of the township shallow wells in general are poor as the bedrock comes very close to the surface and the sand deposits are almost entirely lacking in the thin mantle of yellow clay.

In the NE. $\frac{1}{4}$, section 10, a small supply of hard, "alkaline" water was encountered in a lens of black sand at a depth of 90 feet in the blue clay. This deposit forms a second water-bearing horizon. Similar sand lenses may be found elsewhere in the thick deposits of blue clay, but if so it is probable that they will produce only a small supply of water.

The sand and gravel deposits that lie beneath the blue clay, and above the bedrock, form a third water-bearing horizon in the glacial drift. This horizon is confined to the western row of sections and to the two southern rows of sections in the township, where it is encountered at depths of 104 to 172 feet. The sand and gravel deposits were probably derived from the highland area to the northeast and deposited in a stream channel in the old pre-glacial land surface. The water is hard, slightly saline in some

cases, and contains a large amount of iron which settles as a a red precipitate of iron oxide. The hydrostatic pressure is sufficient to cause the water to rise to within 30 to 60 feet of the surface. Should this horizon be tapped by other wells an abundant supply of water can be expected.

The Ravenscrag formation underlies the glacial drift in the SE. $\frac{1}{4}$, section 4. At this location the formation is 40 feet thick, but it disappears within $1\frac{1}{2}$ miles to the north, and its approximate northern limit is shown on the accompanying map of the municipality. At the location mentioned above a water-bearing horizon in the formation is tapped at a depth of 145 feet or at an elevation of 1,825 feet. The water obtained from it is soft and slightly salty, abundant in quantity, and rises to within 10 feet of the surface. It is the writers' opinion that this horizon will be confined to the southern row of sections in the township.

The Marine shale formation underlies the Ravenscrag sediments in the southern part of the township. In the north-eastern corner, however, this Marine shale is overlain by from 10 to 60 feet of glacial drift. Little or no water is obtained from this formation where it is overlain by the Ravenscrag sediments or by thick deposits of glacial drift, but in that area where the shale comes close to the surface a fairly abundant supply of water is obtained from the upper 50 feet of the formation. The water is medium hard to soft, but is slightly "alkaline" in wells that derive part of their supplies by seepage from the overlying clay. The water rises to within 20 to 40 feet of the surface.

Township 10, Range 33

As is the case in the other townships the sand and gravel deposits that occur as lenses within the yellow clay or as glacial outwash and stream gravels along the creeks and ravines

form the upper water-bearing horizon in the glacial drift in this township. Shallow wells located along the ravines obtain an abundant supply of hard water that is used for drinking. The supply from those that tap the sand or gravel lenses is sufficient in years of normal rainfall. Gravel knolls are fairly common throughout the township, and mark the location of fairly large lenses of sand and gravel. Little trouble should be experienced in obtaining a satisfactory supply of water from this upper horizon, especially along the ravines, and on or near the knolls or gravel ridges.

In the SE. $\frac{1}{4}$, section 16, a sand lens was encountered in the blue clay at a depth of 40 feet. It forms a second water-bearing horizon, but the supply of water from it is insufficient for local needs. Doubtless similar lenses occur throughout the township, but should they be tapped by wells abundant supplies of water are not to be expected.

The sand and gravel deposits that underlie the blue clay and overlie the bedrock and are thought to occur in a buried stream channel, form the third water-bearing horizon in the glacial drift. As far as can be determined this horizon is confined to the western row of sections and to a few sections in the northeastern corner of the township. The horizon is tapped at depths of 119 to 160 feet or at an elevation of 1,840 to 2,000 feet. The water is hard, in many cases slightly salty, and contains a large amount of iron. It rises to within 30 to 60 feet of the surface and the supply is sufficient for farm needs.

Shale underlies the glacial drift throughout the township. This shale is believed to be part of the Marine shale formation, but it is possible that some of it belongs to the Ravenscrag formation. Only three wells have been drilled into the bedrock and in each case water was encountered in the upper 50 feet of the shale, or at depths of 138 feet in the northeastern corner of the

township and at slightly greater depths in section 16. The water is soft and slightly salty, and rises to within 60 feet of the surface. An abundant supply is obtained in sections 26 and 36, but in section 16 the supply is sufficient for local needs.

Township 10, Range 34

Three water-bearing horizons occur in the glacial drift. The upper horizon consists of the sand and gravel lenses within the yellow clay and the stream and glacial outwash sands and gravels along the creeks and ravines. Wells that obtain their water supply from this horizon are rarely over 20 feet in depth. In years of normal rainfall this horizon yields sufficient water for local needs.

In the NW. $\frac{1}{4}$, section 1, a sand deposit lying within the blue clay at a depth of 50 to 65 feet forms a second water-bearing horizon. The water rises to within 40 feet of the surface, but there is not an abundant supply. Similar sand pockets may occur elsewhere in the township.

Deposits of sand and gravel lying at the base of the blue clay and above the bedrock constitute a third water-bearing horizon in the glacial drift. It has been encountered in two localities; in the NW. $\frac{1}{4}$, section 1, at a depth of 190 feet, and in the NW. $\frac{1}{4}$, section 35, at a depth of 125 feet. The water is hard and slightly salty, and contains a high concentration of iron. It rises to within 40 feet of the surface and the supply obtained in section 35 is abundant, but in section 1 it is barely sufficient for local needs. This horizon may be encountered at other locations in the township.

Only one well has been drilled into the bedrock in this township. In the NW. $\frac{1}{4}$, section 1, the Marine shale formation was encountered at a depth of 200 feet and pierced to a depth of 500 feet without obtaining any water. Little or no water can be expected at depth from this formation throughout the township.

Township 11, Range 32

The glacial drift varies greatly in thickness. In the southwest corner it is from 70 to 80 feet thick, thinning out to 6 to 50 feet in the central and northwestern parts, and attaining a maximum thickness of 120 feet in the northeastern corner of the township. The ground water supply from this mantle of drift is derived from three water-bearing horizons. The sand and gravel deposits that occur in the upper 6 to 20 feet of the drift, or above the blue clay, form the uppermost horizon. These sand and gravel deposits occur as stream and glacial outwash gravels along the creeks and ravines, and as lenses within the clay. The shallow wells dug into these deposits produce a fairly abundant supply of hard usable water, and little trouble should be experienced in obtaining a satisfactory supply from this horizon throughout the township.

Where the drift is of greater thickness blue clay underlies the yellow clay and contains some sand lenses. These lenses lying within the blue clay form a second water-bearing horizon. A well in the SE. $\frac{1}{4}$, section 14, is deriving its water from this horizon at a depth of 40 feet. The water is hard and"alkaline", fairly abundant in quantity, and rises to within 10 feet of the surface. Similar sand lenses doubtless occur elsewhere in the blue clay.

Sand and gravel deposits lying below the blue clay and above the bedrock constitute the third water-bearing horizon in the glacial deposits. This horizon is mainly confined to the northeastern corner of the township, but may occur wherever there is a deep depression in the preglacial land surface. It has been encountered in three locations, namely; NE. $\frac{1}{4}$, section 10; NE. $\frac{1}{4}$, section 23; and the SE. $\frac{1}{4}$, section 36; at depths of 80, 120, and 100 feet, respectively. The water is hard and rises to within 30 to 115 feet of the surface. As a rule the supply is abundant, but

it may become partly sealed off by sand plugging the casings.

The Marine shale formation underlies the glacial drift throughout the township. With the exception of the northeastern corner of the township, where the glacial drift is over 120 feet in thickness, this formation is encountered at depths of from 6 to 80 feet. It has been drilled into for a depth of 200 feet, but only the upper 50 feet contain water. A fairly abundant supply of medium hard to soft water, in some cases slightly salty, is obtained from wells tapping the upper part of this formation. Similar types of wells will doubtlessly result upon further drilling or digging.

Township 11, Range 33

The glacial drift of this township contains two water-bearing horizons. The sand and gravel deposits that occur within the upper 30 feet of the glacial drift form the uppermost horizon. Along the ravines these gravel deposits are fairly extensive and an abundant supply of hard water can be obtained from shallow wells dug into them. A fairly large deposit of glacial outwash gravel occurs in the form of a northwest-southeast trending ridge in section 23, and parts of sections 14 and 27. Wells dug into this ridge produce an adequate supply of drinking water. The approximate locations of the ravines and gravel deposits are shown on the accompanying map of the municipality. In the higher areas between the ravines the gravel occurs as lenses, and the supply of water obtained from them depends largely upon the size of the lens encountered and the amount of annual precipitation.

The second water-bearing horizon occurs at a depth of from 60 to 180 feet, and is confined to the western half of the township. In this area there appears to be a buried preglacial stream channel in which deposits of sand and gravel are found immediately overlying the bedrock and underlying the blue clay.

An abundant supply of hard water is obtained from this horizon, and as a rule it contains a large amount of iron, which settles as a red precipitate. The hydrostatic pressure is sufficient to cause the water to rise to within 30 to 100 feet from the surface.

The Marine shale formation underlies the glacial deposits throughout the township. Six wells have been drilled into this formation at various localities and hard, salty water is encountered in the upper 80 feet of the formation. The water is under hydrostatic pressure and rises to within 20 to 85 feet of the surface, but the supply is usually barely sufficient for local needs. An abundant supply cannot be expected from this formation, although some water can be obtained from its upper beds.

Township 12, Range 32

The sand and gravel deposits in the upper 30 feet of the glacial drift form the only productive water-bearing horizon in this township. All of the shallow wells in the township derive their water from this horizon. In the proximity of the two valleys shown on the map the water conditions are very good. Here the sand and gravel deposits are fairly extensive along the ravines and draws and wells tapping these deposits yield good supplies of water. Gravel or sandy knolls are quite common throughout the township and in years of normal rainfall wells dug on or near them produce a sufficient supply of hard water that is used for drinking. Two fairly extensive gravel ridges occur in sections 16 and 10, and an abundant supply of water can be obtained from wells dug into these deposits.

In the SE. $\frac{1}{4}$, section 12, a well obtains water from a sand bed at a depth of approximately 75 feet. In this well the water-level rises when the atmospheric pressure is low and becomes lower when the atmospheric pressure is high. Wells of this character are known as "barometric" or "breathing" wells. This phenomenon was also noted in a well situated in the SE. $\frac{1}{4}$, section 6.

In the NE. ¼, section 26, water-bearing quicksand was encountered below blue clay at a depth of 135 feet, but the fine sand plugged the casing and the well was abandoned.

The Marine shale formation underlies the glacial drift throughout the township. Three wells obtain their water from the upper 50 feet of this formation at depths of 28 to 60 feet. The water is medium hard, but the supply is not abundant and is barely sufficient for local needs. An abundant supply of water is not to be expected from this bedrock formation.

Township 12, Range 33

Two water-bearing horizons occur in the glacial drift. As in the other townships, the sand and gravel deposits occurring along the ravines and as lenses within the yellow clay, constitute the uppermost horizon. This horizon produces an adequate supply of hard usable water. The best locations for shallow wells in this township are along the ravines, and on or near the small knolls.

In the SW. ¼, section 7, a sand deposit lying below the blue clay at a depth of 105 feet forms a second water-bearing horizon in the glacial deposits. The water is hard and rises to within 80 feet of the surface. This horizon was not encountered elsewhere in the township and is probably of only minor extent.

Two wells, located in the NE. ¼, section 2, and the SE. ¼, section 20, are deriving their supply of water from the Marine shale formation at depths of 160 and 80 feet, respectively. The water is hard and slightly saline, and rises to within 30 feet of the surface. The upper part of this formation yields only a small supply of water, and little or no water can be expected from it at depth.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF Walpole, NO. 92 , SASKATCHEWAN

Township	9	9	9	10	10	10	11	11	11	12	12	12	Total No. in Municipality
West of 1st meridian Range	32	33	34	32	33	34	32	33	34	32	33	34	
Total No. of Wells in Township	51	64	10	40	75	48	49	74	1	46	65	2	525
No. of wells in bedrock	13	7	3	12	10	1	17	6	0	5	8	0	82
No. of wells in glacial drift	38	57	7	28	65	47	32	68	1	41	57	2	443
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply													
No. with permanent supply	40	27	8	38	39	9	42	54	1	41	54	2	355
No. with intermittent supply	2	10	2	2	6	3	2	1	0	2	1	0	31
No. dry holes	9	27	0	0	30	36	5	19	0	3	10	0	139
Types of Wells													
No. of flowing artesian wells	0	0	0	1	0	0	0	1	0	0	0	0	2
No. of non-flowing artesian wells	10	9	3	16	10	3	15	20	0	7	5	0	98
No. of non-artesian wells	32	28	7	23	35	9	29	34	1	36	50	2	286
Quality of Water													
No. with hard water	37	32	10	30	39	10	32	45	0	40	47	2	324
No. with soft water	5	5	0	10	6	2	12	10	1	3	3	0	62
No. with salty water	7	4	1	8	6	3	5	6	0	1	1	0	42
No. with alkaline water	0	5	0	5	2	2	4	0	0	7	3	1	29
Depths of Wells													
No. from 0 to 50 feet deep	36	55	7	25	54	46	37	50	1	42	54	2	409
No. from 51 to 100 feet deep	0	0	0	5	6	0	6	11	0	1	4	0	33
No. from 101 to 150 feet deep	0	1	0	5	6	0	4	10	0	1	1	0	28
No. from 151 to 200 feet deep	5	0	0	4	6	1	0	3	0	2	3	0	24
No. from 201 to 500 feet deep.	10	8	3	1	3	1	2	0	0	0	3	0	31
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	0	0	0	0	0	0	0
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0	0	0	0
How the Water is used													
No. usable for domestic purpos.	40	31	10	35	41	9	40	52	1	39	50	2	350
No. not usable for domestic purposes	2	6	0	5	4	3	4	3	0	4	5	0	36
No. usable for stock	42	35	10	40	45	11	44	55	1	41	55	2	381
No. not usable for stock	0	2	0	0	0	1	0	0	0	2	0	0	5
Sufficiency of Water Supply													
No. sufficient for domestic needs	42	35	10	40	45	12	44	54	1	42	55	2	382
No. insufficient for domestic needs	0	2	0	0	0	0	0	1	0	1	0	0	4
No. sufficient for stock needs	31	25	7	30	37	9	42	44	1	32	43	2	303
No. insufficient for stock needs	11	12	3	10	6	3	2	11	0	11	12	0	83

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 "sulphated 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 Walpole, No. 92, Saskatchewan.

LOCATION					Depth of Well, Ft	Total dis'vd Solids	HARDNESS				CONSTITUENTS AS ANALYSED					CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source of Water
Qtr.	Sec.	Tp.	Rge.	Mer.			Cl.	Total	Perm.	Temp.	Alka-linity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	CaCl	
NW.	9	9	32	1	250	2,340	452	130		130	765	60	18	631		2,475	107		38		650	934	746		* 2
NE.	10	9	32	1	8	120	4	100	60	40	100	40	11	4		109	72		23		1	6	7		* 1
SE.	17	9	32	1	235	2,606										2,606		(3)		(5)	(4)	(1)	(2)		* 2
NE.	6	9	33	1	20	2,300										2,300		(3)		(2)	(5)	(1)	(4)		* 1
SE.	27	9	33	1	300	3,340	1,830	300	300		180	60	50	193		3,463	107		61	63		212	3020		* 1
NW.	12	9	34	1	285	2,703										2,703		(2)		(3)	(4)	(1)	(5)		* 2
SE.	13	9	34	1	28	617										617	(3)	(1)		(2)		(4)		(5)	* 1
SW.	14	9	34	1	240	2,580										2,580		(2)		(3)	(4)	(1)	(5)		* 2
SW.	6	11	32	1	150	2,820	1,200	100	50	50	840	50	14	16		2,881	90		29		758	24	1980		* 2
NE.	3	12	32	1	40	10,160	120	3,000	3,000		330	370	1,458	6,150		8,813	330	352		4,345		3,588	198		* 1
NW.	13	12	32	1	175	2,020	117	240	210	30	275	40	65	882		1,794	72		136		43	1,305	195		* 1

Water samples indicated thus, *1, are from glacial drift.
Water samples indicated thus, *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. 3, 4, 6, 7, and 8, by Provincial Analyst, Regina.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

The waters from the glacial drift vary greatly in quantity. They contain the same mineral salts in solution, but in nearly every sample analysed the relative proportions of the individual mineral salts differs greatly. It has been found that the purest water is desirved from large deposits of sand or gravel that lie close to the surface. Water that is derived by seepage from ponds and dugouts is usually fairly low in dissolved mineral salts, whereas that from the boulder clay alone is excessively high in total dissolved solids. This fact is well shown in the results of the samples of water that were collected and analysed from the glacial drift of this municipality.

The water sample from the Mair municipal well, which contains most of its water from a drainage ditch, has a total dissolved solid content of only 109 parts per million. This water is medium soft, and the mineral content is exceptionally low. If its bacteria content is not injurious to health it is an excellent water for all purposes.

Two samples of water were taken from wells of depths of 20 and 28 feet. These waters contain 2,300 and 617 parts per million of dissolved solids, respectively and are excessively hard. In the 20-foot well sodium sulphate (Glauber's Salts) is the most abundant mineral salt present. In the 28-foot well this salt is fourth in abundance and calcium sulphate (gypsum) is the predominant salt. In both samples, magnesium sulphate (Epsom Salts) is second in abundance.

The water that was derived from the clay alone is unfit for both domestic and stock use. It has a total hardness in excess of 3,000 parts per million, and a total dissolved solid content of 8,813 parts per million. Of this content 4,345 parts per million are composed of magnesium sulphate (Epsom Salts), and

3,588 parts per million of sodium sulphate or Glauber's Salts. Smaller amounts of calcium sulphate, calcium carbonate, and sodium chloride occur, their abundance decreasing in the order given.

Two samples of water obtained from the base of the glacial drift were also analysed. That obtained from a depth of 175 feet has a total dissolved solid content of 1,794 parts per million, and that from a depth of 300 feet, has 3,463 parts per million. In the sample from the shallower well, sodium sulphate (Glauber's Salts) is the predominant mineral salt with 1,305 parts per million. Smaller amounts of sodium chloride, magesium carbonate, calcium carbonate, and sodium carbonate (black alkali) also occur. This water is usuable for drinking as well as for stock but may act as a slight laxative upon those not accustomed to the use of highly mineralized water. In the water from the 300-foot well, 3,020 parts per million of the total dissolved solid content is formed by sodium chloride (common salt). This amount gives the water a strong, salty taste and renders it unfit for drinking. Small amounts of sodium sulphate, calcium carbonate, magnesium sulphate, and magnesium carbonate also occur. The writer is of the opinion that this water is being derived from the Marine shale formation, and notfrom gravel deposits at the base of drift, as was reported.

Water from the Bedrock

Four samples of water from the Ravenscrag formation were collected and analysed. The water-bearing horizon from which the samples were obtained occurs at an approximate depth of 250 feet. The waters analysed are medium soft to hard. They contain an average total dissolved solid content of 2,500 parts per million. In all the samples, sodium sulphate (Glauber's Salts) is the predominant mineral salt. In two samples common salt is second in abundance; in the other two it is fifth, with calcium sulphate (gypsum) being second. The sodium chloride (common salt) content

is sufficient to give the water a salty taste. Owing to the high mineral content the waters are not very suitable for drinking but can be used for stock.

One sample of water from the Marine shale formation was collected and analysed. It is moderately hard in character and has a total dissolved content of 2,881 parts per million. Of this content 1,980 parts are composed of sodium chloride, (common salt) and 758 parts of sodium carbonate (black alkali). Small amounts of calcium carbonate, magnesium carbonate, and sodium sulphate are also present. This water is too salty to be satisfactory for human use, but can be used for stock.

WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN.

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	NW.	2	9	32	1	Dug	22	1,970	- 2	1,968	?	?	Glacial sand	Hard, clear		D, S	Waters 100 head stock.
2	NW.	3	"	"	"	"	9	1,992	- 5	1,987	5	1,987	" "	" "	48	D, M	Used for school use.
3	NW.	4	"	"	"	"	16	1,993	- 10	1,983	10	1,983	" gravel	" "		S,	Poor supply. Hauls water in winters.
4	NE.	4	"	"	"	"	10	1,990	- 6	1,984	6	1,984	" sand	" "		S,	Sufficient in years of normal rainfall.
5	SW.	6	"	"	"	"	20	2,030	- 16	2,014	16	2,030	" gravel	" "		D, S	Insufficient supply.
6	NW.	6	"	"	"	"	12	2,030	- 9	2,021	9	2,021	" "	" "		D, S	Waters 65 head stock.
7	NE.	7	"	"	"	Drilled	227	2,035	- 12	2,023	227	1,808	Ravenscrag sandy shale	Soft, clear		D, S	Abundant supply.
8	SE.	8	"	"	"	Dug	16	2,010	- 13	1,997	16	1,994	Glacial gravel	Hard, clear		D,	Domestic supply only.
9	NW.	9	"	"	"	Drilled	250	2,015	- 20	1,995	240	1,775	Ravenscrag sandy	Soft, "		D, S	Good steady supply; has iodine taste. #
10	SW.	10	"	"	"	Dug	16	1,985	- 8	1,977	8	1,977	Glacial clay and gravel	Hard, "		D,	Domestic supply only.
11	SW.	11	"	"	"	"	12	1,980	- 2	1,978	4	1,976	Glacial gravel	" "		D, S	" " and some stock.
12	NE.	10	"	"	"	"	8	1,982	- 4	1,978	4	1,978	" "	" "		D, S, M	Abundant supply. Has a sulphur smell.
13	SE.	12	"	"	"	"	10	1,951	- 9	1,942	9	1,942	" "	" "		D, S	Insufficient in winters.
14	NE.	13	"	"	"	Drilled	351	1,950					Ravenscrag marine shale				Dry hole.
15	NE.	14	"	"	"	Dug	9	2,000	- 6	1,994	6	1,994	Glacial gravel	Hard, clear		D, S	Waters55 head stock.
16	SW.	15	"	"	"	Drilled	216	1,995	- 14	1,981	200	1,795	Sand below blue clay	" yellowish		D, S	Abundant supply.
17	NW.	16	"	"	"	Dug											All dry holes.
18	NE.	16	"	"	"	"	9	1,990	- 4	1,986	4	1,986	Glacial gravel	Hard, clear		D, S	Waters 15 head stock.
19	SE.	17	"	"	"	Drilled	235	2,025	- 38	1,987	205	1,820	Ravenscrag sandy	" salty		D, S, M	Abundant supply. #
20	SW.	17	"	"	"	Dug	8	2,010	- 6	2,004	6	2,004	Glacial gravel	Hard, clear		D, S, M	Abundant supply for farmers, and town of Mair.
21	NW.	18	"	"	"	Drilled	190	2,038	- 20	2,008	190	1,848	" " below blue clay	" saline	42	D, S	" " .
22	NW.	20	"	"	"	"	180	2,000	- 30	1,970	140	1,860	Ravenscrag sandy shale	" " yellowish		D, S	" " .
23	SW.	21	"	"	"	Dug	10	2,000	- 2	1,998	5	1,995	Glacial grave	Hard, clear		D, S	Sufficient in years of normal rainfall.
24	SE.	22	"	"	"	"	12	1,968	- 6	1,962	6	1,962	" sand	" "		D, S	Waters 40 head stock.
25	SW.	23	"	"	"	"	10	2,000	- 44	1,996	4	1,996	" "	" "		D, S	" 70 " " .
26	S½	23	"	"	"	"	12	2,000	- 8	1,992	8	1,992	" gravel	" "		D, S, M	Very strong supply.
27	SE.	24	"	"	"	Drilled	325	1,960	- 15	1,945	300	1,660	Ravenscrag sandy shale	Soft, salty		D, S	Fair 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 WALPOLE NO. 92, SASKATCHEWAN.

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
28	SW.	24	9	32	1	Dug	14	1,955	- 9	1,946	9	1,946	Glacial gravel	Hard, clear		D, S	Abundant supply.
29	NE.	24	"	"	"	Drilled	318	1,958	-100	1,858	290	1,668	Ravenscrag sandy shale	Soft, salty		D, S	" " .
30	NW.	30	"	"	"	Dug	12	1,990	- 7	1,983	11	1,979	Glacial gravel	Hard, clear		D, S	Waters 45 head stock.
31	SE.	32	"	"	"	"	7	1,992	- 3	1,989	3	1,989	" "	" "		S,	" 40 " " .
32	NW.	32	"	"	"	Drilled	200	1,996	- 10	1,986	190	1,806	Ravenscrag sandy shale	Soft, clear		D, S	Abundant supply.
33	SE.	33	"	"	"	Dug	7	1,980	- 3	1,977	3	1,977	Glacial sand	Hard, clear	52	D, S	" " .
34	NE.	33	"	"	"	"	25	1,983					" clay				Dry hole.
35	SW.	35	"	"	"	"	12	1,965					" "				" ", uses dugout.
36	NW.	35	"	"	"	"	7	1,960	- 3	1,957	3	1,957	" sand	Hard, clear		D, S	Waters 40 head stock.
37	SE.	36	"	"	"	Drilled	169	1,950	- 24	1,926	140	1,810	Ravenscrag sandy shale	Soft, salty		D, S	Abundant supply.
1	NE.	2	9	33	1	Dug	10	2,100	- 3	2,097	3	2,097	Glacial gravel	Hard, clear		D, S	" in 1935.
2	NW.	4	"	"	"	"	8	2,100	- 4	2,096	4	2,096	" "	" "		D, S	" supply.
3	NE.	5	"	"	"	"	16	2,115					" clay				Dry holes on this quicksand.
4	SW.	6	"	"	"	"	15	2,125	- 12	2,113	12	2,113	" sand	Hard, clear		D, S	Insufficient supply.
5	NE.	6	"	"	"	"	20	2,120	- 8	2,112	18	2,102	" gravel	"alkaline"		D, S	Sufficient for local needs, "alkaline" water on quciksand.
6	SW.	8	"	"	"	"	7	2,100	- 2	2,098	3	2,097	" "	Soft, "alkaline"		D, S	Abundant supply.
7	NW.	10	"	"	"	Drilled	338	2,110	- 50	2,060	300?	1,810	Ravenscrag sandy shale	Soft, salty, cloudy		D, S	Red precipitate on standing. Good supply.
8	NW.	12	"	"	"	Dug	6	2,080	- 3	2,097	3	2,097	Glacial sand	Soft, clear		S,	Strong supply.
9	SE.	13	"	"	"	"	12	2,075	- 3	2,072	7	2,068	" gravel	Hard, clear		D, S	Sufficient for local needs.
10	NE.	13	"	"	"	Drilled	150	2,060	- 38	2,022	130	1,930	Gravel below blue clay	" "		D, S	Abundant supply.
11	SE.	14	"	"	"	Dug	12	2,100	- 7	2,093	7	2,093	Glacial sandy clay	" "		D, S	Poor supply.
12	SW.	16	"	"	"	"	50	2,100					Glacial clay				Dry hole.
13	NE.	16	"	"	"	"	8	2,100	- 3	2,097	5	2,095	" sand	Hard, clear		D, S	Good supply.
14	SE.	18	"	"	"	"	38	2,136	- 36	2,100	36	2,100	" gravel	"alkaline"		D, S	Sufficient for local needs.
15	SW.	20	"	"	"	"	15	2,100	- 14	2,086	15	2,085	" sand	" clear		D,	Insufficient.
16	SE.	20	"	"	"	Drilled	400	2,100	- 20	2,080	400	1,700	Ravenscrag shale	?			Supply lost in casing well.
17	NE.	22	"	"	"	Dug	7	2,100	- 6	2,094	7	2,093	Glacial sand	Hard, clear		D,	Water hauled for stock; domestic supply only.

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

WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN.

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
18	NE.	27	9	33	1	Dug	18	2,100	- 8	2,092	10	2,090	Glacial sand	Hard, clear		D, S	Abundant supply.
19	SE.	27	"	"	"	Drilled	428	2,100	- 50	2,060	300	1,800	Sand below clay	" saline		S,	2 barrels a day.
											428	1,672	Ravenscrag shale				
20	SE.	27	"	"	"	"	300	2,100	- 50	2,060	300	1,800	Gravel below blue clay	" soda		D,	5 pails a day. #
21	SW.	30	"	"	"	Bored	38	2,100	- 23	2,077	38	2,062	Glacial gravel	" clear		D, S	Abundant supply.
22	NW.	30	"	"	"	"	40	2,150	- 35	2,115	40	2,110	" "	"alkaline"	39	D, S	Sufficient for local needs.
23	SE.	32	"	"	"	Dug	18	2,100	- 16	2,084	2	2,098	" "	" clear		D, S	" " " " .
24	SW.	33	"	"	"	"	25	2,100									Dry hole.
25	SE.	34	"	"	"	Drilled	238	2,100	- 20	2,090	220	1,890	Gravel below blue clay	Hard, clear	46	D, S	Abundant supply.
26	SW.	35	"	"	"	Dug	16	2,100	- 14	2,086	14	2,086	Glacial sandy clay	"alkaline"		S,	Insufficient.
27	SE.	36	"	"	"	"	20	2,090	- 16	2,074	16	2,074	Glacial sand	" clear		D,	Domestic supply only.
1	SE.	12	9	34	1	Dug	18	2,146	- 12	2,134	12	2,134	" gravel	" "		D, S	Poor supply.
2	SW.	12	"	"	"	"	16	2,134	- 8	2,126	10	2,124	" "	" "		D, S	Sufficient for local needs.
3	NW.	12	"	"	"	Drilled	285	2,142	- 60	2,082	265	1,877	Ravenscrag sandy shale	" salty, cloudy		D, S	" " " " . #
4	NW.	12	"	"	"	"	253	2,140	- 30	2,110	240	1,900	Ravenscrag sandy shale	Hard, saline		S,	6 feet away from above well.
5	SE.	13	"	"	"	Dug	28	2,145	- 22	2,123	24	2,121	Glacial sand	" yellow		D, S	Fair supply. #
6	SW.	14	"	"	"	Drilled	240	2,158	- 30	2,128	240	1,918	Ravenscrag sandy shale	" reddish		D, S	Abundant supply. Brown iron precipitate on standing.
7	SW.	24	"	"	"	Dug	24	2,154	- 6	2,149	20	2,134	Glacial sand	" clear		D, S	Normally a poor supply.
8	NW.	26	"	"	"	"	30	2,162	- 25	2,137	25	2,137	" "	" "		D, S	Fair supply.
9	SE.	36	"	"	"	"	14	2,150	- 2	2,148	?	?	" clay	" "		D, S	Poor supply.
1	SE.	1	10	32	1	Dug	8	1,948	- 4	1,944	5	1,943	" gravel	Soft, clear		D, S	Waters 40 head stock.
2	NE.	1	"	"	"	"	5	1,944	- 3	1,931	3	1,931	" "	Hard, "alkaline"		D, S	Abundant supply.
3	SE.	4	"	"	"	Drilled	184	1,970	- 10	1,960	145	1,825	Ravenscrag shale	Soft, salty		D, S	" " .
4	NE.	4	"	"	"	Dug	14	1,975	- 12	1,963	12	1,963	Glacial sand	" clear		D,	Domestic supply only.
5	NW.	8	"	"	"	"	8	1,992	- 2	1,990	8	1,984	" "	" "		D, S	Abundant supply.
6	SE.	9	"	"	"	"	20	1,990	- 18	1,972	18	1,972	" gravel	" "		D, S	Small supply. Use dugout.
7	NE.	10	"	"	"	Drilled	173	1,965	- 27	1,938	173	1,792	Gravel base of blue clay	Salty, cloudy	48	S,	
8	NE.	10	"	"	"	Bored	90	1,965	- 85	1,880	90	1,875	Sand in blue clay	Hard, "alkaline"		S,	Poor supply.

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN

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.	11	10	32	1	Dug	10	1,958	- 5	1,953	5	1,953	Glacial gravel	Hard, clear		D, S	Abundant supply..
10	NW.	11	"	"	"	"	8	1,960	- 5	1,955	5	1,955	" "	Soft, clear	52	D, S	" " .
11	NW.	14	"	"	"	Bored	42	1,963	- 20	1,943	42	1,921	Ravenscrag sandy shale	Hard, alkaline#	44	D, S	Strong supply.
12	NW.	18	"	"	"	Drilled	110	2,004	- 30	1,974	104	1,900	Gravel base of blue clay	Hard, clear		D, S	Abundant supply.
13	NE.	18	"	"	"	Dug	10	1,995	- 7	1,988	7	1,988	Glacial gravel	" "		D, S	" " .
14	SW.	19	"	"	"	Drilled	182	1,998			140	1,858	Gravel below blue clay	" cloudy	41	D, S	" " .
15	NE.	20	"	"	"	"	130	1,980			125	1,855	Ravenscrag sandy shale	Soft, salty		D, S	Waters 40 head stock.
16	NW.	21	"	"	"	Dug	12	1,978	- 10	1,968	10	1,968	Glacial gravel	Hard, clear		D, S	Abundant supply.
17	NW.	22	"	"	"	Drilled	80	1,965	- 20	1,945	80	1,885	?	" "		D, S	Waters 30 head stock.
18	NW.	23	"	"	"	"	90	1,955	- 40	1,915	90	1,865	Gravel base of blue clay	" "		D, S	Sufficient for local needs.
19	SE.	24	"	"	"	"	137	1,946	- 22	1,924	125	1,821	Ravenscrag sandy shale	Soft, salty	42	S,	Abundant supply.
20	NE.	24	"	"	"	Dug	11	1,948	- 5	1,943	5	1,943	Glacial gravel	Hard, clear	49	D, S	" " .
21	NW.	28	"	"	"	Drilled	85	1,975			85	1,890	Ravenscrag sandy shale	Soft, salty		D, S	Waters 150 head stock.
22	NE.	29	"	"	"	"	140	1,980		1,980	140	1,840	Bodrock	?			Reported to have flowed.
23	SW.	30	"	"	"	"	202	2,000	?	?	200	1,800	Shale	Hard, salty		S,	Poor supply. Hauls drinking water.
24	NW.	30	"	"	"	"	182	2,005	- 60	1,945	167	1,838	Gravel base of blue clay	" "		S,	Sufficient for local needs.
25	NW.	31	"	"	"	Dug	30	1,995	- 23	1,972	18	1,977	Glacial gravel	" "	42	D, S	Sufficient in years of normal rainfall.
26	SE.	32	"	"	"	"	45	1,980	?		45	1,935	Shale ?	Soft, salty		D, S	" for local needs.
27	SE.	32	"	"	"	"	34	1,985	- 6	1,979	25	1,970	Marine shale	Hard, alkaline#		D, S	Small supply.
28	SE.	34	"	"	"	Drilled	60	1,950	- 18	1,932	?		" "	Hard, clear		D, S	Abundant supply.
29	SW.	35	"	"	"	Dug	28	1,952	- 24	1,928	24	1,928	" "	" "		D, S	Poor supply.
30	NE.	36	"	"	"	"	12	1,952	- 6	1,946	6	1,946	Glacial	" "		D, S	Waters 30 head stock.
1	NW.	4	10	33	1	Dug	8	2,115	- 2	2,113	5	2,110	" gravel	" "		D, S	" 50 " " .
2	NW.	4	"	"	"	"	12	2,127	- 7	2,120	7	2,120	" sand	" "		D, S	Abundant supply.
3	NE.	6	"	"	"	"	32	2,140	- 15	2,125	30	2,110	" "	Soft, "		D, S	Sufficient for local needs.
4	SW.	7	"	"	"	"	45	2,148					" blue clay				Dry hole. Water hauled.
5	SE.	8	"	"	"	"	13	2,118	- 4	2,114	8	2,110	" sand	Hard, clear	48	D, S	Strong supply.

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WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN.

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
6	NE.	8	10	33	1	Dug	22	2,120	- 9	2,111	9	2,111	Glacial sand	Hard, clear		D, S	Abundant supply.
7	SE.	10	"	"	"	"	16	2,120					" clay				Dry hole, water hauled.
8	NE.	12	"	"	"	"	25	2,010	- 11	1,999	11	1,999	" sand	Hard, clear		D, S	Sufficient in years of normal rainfall.
9	SW.	14	"	"	"	"	8	2,040	- 3	2,037	5	2,035	" "	" "		D, S	" for local needs.
10	SE.	15	"	"	"	"	12	2,060	- 9	2,051	9	2,051	" gravel	Soft, clear		D, S	Waters 50 head stock.
11	NW.	15	"	"	"	"	28	2,090	- 10	2,080	10	2,080	" "	Hard, alkaline		S,	" 4 horses. Haul water.
12	SE.	16	"	"	"	"	40	2,110	- 15	2,095	39	2,071	" sand	Hard, clear		D,	3 pails a day, haul water.
13	NE.	16	"	"	"	Drilled	325	2,110	- 30	2,080	300	1,810	Ravenscrag shale	Soft, salty		S,	Poor supply.
14	SE.	18	"	"	"	Dug	12	2,130	- 1	2,129	?		Glacial sandy clay	Hard, clear		D,	Domestic supply only. Haul water from quicksand.
15	NE.	18	"	"	"	Drilled	168	2,140	- 30	2,110	160	1,980	Sand base of blue clay	" "		D, S	Abundant supply. Red precipitate.
16	NE.	19	"	"	"	"	150	2,175	- 35	2,140	142	2,033	Sand base of blue clay	" salty		D, S	Waters 150 head stock.
17	SE.	20	"	"	"	Dug	12	2,120	- 10	2,110	10	2,110	Glacial sand	" clear		D, S	Abundant supply.
18	NE.	20	"	"	"	"	16	2,110	- 7	2,103	9	2,101	" "	" "		D, S	" " .
19	SE.	20	"	"	"	"	15	2,120	- 10	2,110	10	2,110	" gravel	" "	47	D, S	" " .
20	SW.	23	"	"	"	"	8	2,102	- 4	2,098	4	2,098	" "	" "		S,	Waters 180 head stock.
21	NW.	24	"	"	"	"	7	2,005	- 3	2,002	3	2,002	" "	" "		S,	Strong supply.
22	NW.	26	"	"	"	Drilled	137	2,003	- 40	1,963	133	1,870	Ravenscrag sandy shale	Soft, salty		D, S	Abundant supply.
23	NE.	26	"	"	"	"	150	2,010	- 30	1,980	149	1,831	Sand base of blue clay	Hard, clear		S,	Strong supply.
24	NE.	26	"	"	"	Dug	11	2,008	- 7	2,001	7	2,001	Glacial sand	" "		D, S	Sufficient for local needs.
25	SE.	27	"	"	"	"	16	2,015	- 13	2,002	15	2,000	" gravel	" "		D, S	Strong supply.
26	SW.	28	"	"	"	"		2,025									All dry holes.
27	NW.	28	"	"	"	"	8	2,105	- 6	2,099	7	2,098	Glacial gravel	Hard, clear		D, S	Abundant supply.
28	SE.	31	"	"	"	Drilled	121	2,125	- 60	2,065	119	2,006	Gravel base of blue clay	" reddish		D, S	Strong supply. Red precipitate on standing.
29	NW.	32	"	"	"	Dug	6	2,125	- 1	2,124	4	2,121	Glacial sand	" clear		D, S	Abundant supply.
30	NW.	32	"	"	"	Bored	90	2,125	- 30	2,095	90	2,035	Sand in blue clay	" "		S,	Good supply.
31	NE.	32	"	"	"	Dug	9	2,050	- 6	2,044	6	2,044	Glacial gravel	" "		D, S	Waters 50 head stock.
32	SW.	33	"	"	"	"	20	2,080	- 16	2,064	20	2,060	" "	" "		D, S	" 100 " " .

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN

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
33	SE.	34	10	33	1	Dug	10	2,015	- 8	2,007	8	2,007	Glacial gravel	Hard, clear		D, S	Poor supply. Hauls water.
34	SE.	36	"	"	"	Drilled	180	1,997	- 40	1,957	160	1,837	Gravel base of blue clay	" "		D, S	Sufficient for local needs.
35	SW.	36	"	"	"	"	130	2,002	- 33	1,969	127	1,875	Shale?	Soft, saline		D, S	" supply.
36	NW.	36	"	"	"	Dug	14	1,995	- 7	1,988	10	1,985	Glacial sand	Hard, clear		D, S	" " .
37	NE.	36	"	"	"	Drilled	142	1,999	- 60	1,939	138	1,861	Ravenscrag shale	Soft, salty		D, M	Town of Walpole.
1	NW.	1	10	34	1	Drilled	500	2,152	- 20	2,132	200	1,952	Gravel base of blue clay	Hard, alkaline		N,	Poor supply. Marine shale? from 200 feet down.
2	SW.	2	"	"	"	Dug	16	2,154	- 14	2,140	12	2,142	Glacial sand	Hard, clear		D, S	Sufficient supply.
3	NE.	2	"	"	"	"	16	2,146	- 6	2,140	12	2,134	" gravel	Soft, saline		N,	Analysis showed water unfit for use. #
4	SW.	12	"	"	"	"	23	2,155	- 4	2,151	10	2,145	" sand	Hard, alkaline		D, S	Hauls water in winters.
5	SW.	13	"	"	"	"	14	2,157	- 12	2,145	20	2,137	" "	Hard, clear		D, S	Sufficient supply.
6	NE.	13	"	"	"	"	20	2,148	- 10	2,138	12	2,136	" gravel	" "		D, S	" " .
7	SW.	14	"	"	"	"	22	2,168	- 13	2,155	15	2,153	" sand	" "		D, S	Waters 20 head stock.
8	NW.	14	"	"	"	"	10	2,166	- 3	2,163	8	2,158	" "	" yellow		D, S	Abundant supply.
9	SW.	24	"	"	"	"	23	2,161	- 14	2,147	20	2,141	" "	" clear		D, S	Poor supply. Hauls water.
10	NW.	35	"	"	"	Drilled	160	2,157	- 60	2,097	125	2,032	Sand base of blue clay	" salty		D, S	Abundant supply. Reddish sediment, iodine smell.
11	SE.	11	"	"	"	Dug	25	2,160									Dry hole.
1	SW.	3	11	32	1	Dug	16	1,982	- 12	1,970	12	1,970	Glacial gravel	Hard, clear		D, S	Waters 100 head stock.
2	NW.	3	"	"	"	"	10	1,975	- 4	1,971	6	1,969	" "	" "		D, S	Sufficient supply.
3	SE.	4	"	"	"	"	12	1,995	- 3	1,992	8	1,987	" "	" "		D, S	Abundant supply.
4	NE.	5	"	"	"	Drilled	100	1,985	- 35	1,950			Shale	Soft, salty		D, S	" " .
5	SW.	6	"	"	"	"	150	2,015	?		130	1,885	Marine shale	Hard, salty		D, S	Waters 25 head stock. #
6	NW.	6	"	"	"	"	101	2,010	- 40	1,970	75	1,935	" "	Soft, "		D, S	Sufficient supply.
7	NW.	9	"	"	"	Dug	12	1,971	- 4	1,967	6	1,965	Glacial sand	Hard, clear		D, S	Abundant supply.
8	NE.	9	"	"	"	"	45	1,970	- 5	1,965	40	1,930	Marine shale	Soft, clear		D, S	" " .
9		10	"	"	"	Drilled	86	1,958	- 31	1,927	80	1,878	Gravel base of blue clay	Hard, clear		D, S	Waters 50 head stock.
10	SE.	11	"	"	"	"	68	1,953	- 16	1,937	67	1,886	Marine shale	" salty		S,	Sufficient for stock.
11	NE.	12	"	"	"	Dug	8	1,948	- 4	1,944	6	1,942	Glacial sand	" clear		D, S	" supply.

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
12	NW.	13	11	32	1	Dug	8	1,948	- 5	1,943	6	1,942	Glacial sand	Hard, clear		D, S	Sufficient supply.
13	SE.	14	"	"	"	"	40	1,949	- 10	1,939	34	1,915	" sand in blue clay	" *alkaline*		S,	Waters 30 head stock.
14	NW.	14	"	"	"	"	18	1,949	- 16	1,933	17	1,932	Glacial gravel	" clear		D, S	Sufficient supply.
15	NW.	15	"	"	"	Drilled	65	1,962	- 8	1,954	35	1,927	Marine shale	Soft, clear		D, S	Abundant supply.
16	SE.	16	"	"	"	"	96	1,965	- 9	1,956	96	1,869	" "	" "		D, S	" " .
17	NW.	16	"	"	"	Dug	40	1,969	- 2	1,967	14	1,955	Glacial gravel	Hard, clear		D, S	Meagre supply.
18	NE.	16	"	"	"	Drilled	108	1,965	- 16	1,949	106	1,559	Shale	Soft, salty		D, S	Abundant supply.
19	NW.	18	"	"	"	Dug	45	2,000	- 15	1,985	43	1,957	Marine shale	" clear	41	D, S	Waters 40 head stock.
20	NW.	20	"	"	"	"	16	1,968	- 10	1,958	16	1,952	Glacial gravel	Hard, *alkaline*		D, S	Abundant supply.
21	NW.	22	"	"	"	"	28	1,957	- 16	1,939	23	1,934	" "	Hard, clear		D, S	Waters 40 head stock.
22	SW.	23	"	"	"	"	14	1,948	- 8	1,940	12	1,935	" "	" "		D, S	Abundant supply.
23	NE.	23	"	"	"	Drilled	203	1,946	-117	1,829	200	1,746	Gravel base of blue clay	" "		S,	" " .
24	NW.	24	"	"	"	Dug	11	1,945	- 6	1,939	8	1,937	Glacial gravel	" "		D, S	" " .
25	NE.	26	"	"	"	"	35	1,943	- 25	1,918	?		" clay	" "		D, S	Poor supply.
26	SW.	30	"	"	"	Drilled	204	2,002	- 16	1,986	65	1,937	Marine shale	Soft, clear		D, S	Abundant supply.
27	SE.	32	"	"	"	Dug	23	1,965	- 21	1,944	10	1,955	" "	" "		D, S	Waters 100 head stock.
28	NW.	33	"	"	"	"	30	1,950	- 10	1,940	30	1,920	" "	Hard, *alkaline*		D, S	Moderate supply.
29	NW.	34	"	"	"	"	11	1,949	- 2	1,949	9	1,940	Glacial gravel	Hard, clear		D, S	Waters 60 head stock.
30	SE.	35	"	"	"	"	34	1,942	- 18	1,924	18	1,924	" sand	" "		D, S	Abundant supply.
31	NE.	36	"	"	"	"	10	1,935	- 1	1,934	4	1,931	" "	" "		D, S	Sufficient supply.
32	NE.	36	"	"	"	Drilled	130	1,935			100	1,835	Sand base of blue clay	" "			Abundant supply but sand plugs the casing.
1	SW.	2	11	33	1	Dug	10	2,038	- 4	2,034	6	2,032	Glacial sand	" "		D, S	Cannot be pumped dry.
2	NE.	2	"	"	"	Drilled	180	2,065	- 85	1,980	180	1,885	Marine shale	" salty		S,	Poor supply.
3	NW.	2	"	"	"	Dug	20	2,045	- 18	2,027	18	2,027	Glacial sand	Soft, clear		D, S	Waters 10 head stock.
4	NE.	3	"	"	"	"	44	2,075	- 40	2,035	41	2,034	" "	Hard, clear	40	D, S	" 60 " " .
5	SE.	4	"	"	"	"	8	2,090	- 2	2,088	3	2,087	" gravel	" "		D, S	" 40 " " .
6	NW.	4	"	"	"	Drilled	134	2,110	- 50	2,060	134	1,976	Sand base of blue clay	" salty		D, S	Abundant supply.

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN.

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
7	SW.	5	11	33	1	Dug	14	2,130	- 4	2,126	5	2,125	Glacial gravel	Hard, clear		D, S	Sufficient supply.
8	NW.	5	"	"	"	"	12	2,135	- 6	2,129	6	2,129	" "	" "		D, S	Waters 20 head stock.
9	SE.	6	"	"	"	Drilled	119	2,151	- 30	2,121	119	2,032	Gravel base of blue clay	" cloudy		D, S	Abundant supply.
10	SW.	6	"	"	"	"	145	2,155	- 60	2,090	142	2,013	Gravel base of blue clay	" "	42	D, S	Waters 100 head stock.
11	NE.	6	"	"	"	"	120	2,145	- 50	2,095	118	2,027	Gravel base of blue clay	" "		D, S	Abundant supply. Red precipitate on standing.
12	SE.	7	"	"	"	Dug	12	2,140	- 6	2,134	6	2,134	Glacial gravel	" clear		D, S	Sufficient supply.
13	NW.	7	"	"	"	Drilled	115	2,151	- 60	2,091	115	2,036	Sand in shale	" salty		D, S	Abundant supply.
14	NE.	7	"	"	"	"	178	2,140	- 60	2,080	158	1,982	Sand base of blue clay	" iron		S,	" " ; red precipitate on standing.
15	SE.	8	"	"	"	"	105	2,105	- 40	2,065	102	2,003	Gravel base of blue clay	" cloudy		D, S	" " , " " " " .
16	NW.	9	"	"	"	"	80	2,105	- 60	2,045	69	2,036	Sand base of blue clay	" clear		D, S	Strong supply.
17	SE.	10	"	"	"	Bored	32	2,040	- 28	2,012	28	2,012	Glacial gravel	" "		D, S	Unlimited supply.
18	SW.	11	"	"	"	Dug	8	2,030	- 6	2,024	6	2,024	" sand	" "	48	D, S	Moderate supply.
19	SE.	12	"	"	"	Drilled	50	2,025	- 24	2,001	50	1,975	" sand	Soft, clear		D, S	Waters 100 head stock.
20	SW.	13	"	"	"	Dug	13	1,985	- 8	1,977	8	1,977	" gravel	Hard, clear		D, S	" 80 " " .
21	NE.	14	"	"	"	"	11	2,025	- 9	2,016	9	2,016	" sand	" "		D,	Strong supply, uses similar well for stock.
22	SW.	15	"	"	"	"	9	2,045	- 8	2,037	8	2,037	" gravel	" "		D, S	Abundant supply.
23	NE.	17	"	"	"	Drilled	180	2,105	- 76	2,029	180	1,925	Sand base of blue clay	" "		D, S	Strong supply.
24	NE.	18	"	"	"	Dug	50										Dry hole.
25	SW.	19	"	"	"	Drilled	132	2,140	- 90	2,050	132	2,008	Gravel base of blue clay	Hard, iron		N,	Casing corroded by water. Red precipiate on standing.
26	SW.	20	"	"	"	Dug	6	2,075	- 4	2,071	4	2,071	Glacial gravel	" clear		S,	Strong supply.
27	SE.	22	"	"	"	Drilled	108	2,015	- 28	1,987	108	1,907	Sandy shale	Soft, salty		D, S	Waters 50 head stock. Laxative for humans.
28	SE.	27	"	"	"	"	64	1,990	- 30	1,960	55	1,935	Gravel base of blue clay	" clear		D, S	Waters 60 head stock.
29	SW.	28	"	"	"	"	60	2,085	- 20	2,065	55	2,030	Gravel base of blue clay	Hard, iron	40	D, S	Sufficient supply.
30	NW.	28	"	"	"	"	61	2,090	- 25	2,065	48	2,042	Sandy shale	" clear		D, S	Waters 100 head stock.
31	NE.	28	"	"	"	Dug	15	2,060	- 11	2,049	11	2,049	Glacial sand	" "		D, S	Moderate supply.
32	SE.	29	"	"	"	Spring		2,035		2,035			Gravel	" "		D, S	Abundant supply.
33	SE.	30	"	"	"	Drilled	128	2,125	- 55	2,070	106	2,019	Sand base of blue clay	" salty		D, S	Good supply, slightly laxative.

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WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN.

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
34	SW.	30	11	33	1	Drilled	102	2,130	- 90	2,040	84	2,036	Sandbase of blue clay	Hard, clear		D, S	Strong supply.
35	NE.	30	"	"	"	"	88	2,120	- 80	2,040	88	2,032	Gravel base of blue clay	" iron		D, S	Red precipitate on standing, strong supply.
36	NE.	31	"	"	"	Dug	10	2,095	- 3	2,092	3	2,092	Glacial gravel	" clear		S	Waters 100 head stock.
37	NE.	32	"	"	"	"	25	2,085	- 15	2,070	17	2,068	" sand	" "		D	Domestic supply for town of Kelso.
38	NE.	32	"	"	"	Drilled	90	2,086	- 20	2,066	90	1,996	Gravel base of blue clay	" "		M	Usec for rink in Kelso.
39	SW.	33	"	"	"	Dug	14	2,070	- 10	2,060	12	2,058	Glacial gravel	Soft, clear		D, S	Domestic supply only.
40	NW.	33	"	"	"	"	12	2,005	- 8	2,047	8	2,047	" "	Hard, clear	46	D, S	Cannot be pumped dry.
41	NW.	35	"	"	"	Drilled	96	2,025	- 20	2,005	96	1,929	Marine shale	" "		D	6 pails per day.
42	NE.	35	"	"	"	Dug	5	2,010	- 2	2,008	2	2,008	Glacial gravel	" "		D, S	Waters 25 head stock.
43	NW.	36	"	"	"	"	14	1,990	- 5	1,985	6	1,984	" sand	" "		D, S	" 40 " " .
44	NE.	36	"	"	"	Drilled	120	1,980			120	1,860	Marine shale	" salty		N	1 barrel a day.
1	SE.	36	11	34	1	Dug	14	2,128	- 7	2,121	7	2,121	Glacial sand	" clear		D, S	Waters 20 head stock.
1	NE.	2	12	32	1	Dug	11	1,950	- 6	1,944	9	1,941	" gravel	" "		D, S	" 350 " " .
2	SE.	2	"	"	"	"	7	1,950	- 3	1,947	3	1,947	" sand	"alkaline"		D, S	Sufficient for 20 head stock.
3	NE.	3	"	"	"	Bored	40	1,950	- 10	1,940			" clay	" clear		N	Stock won't drink this water.
4	SE.	6	"	"	"	Drilled	120	1,965	- 20	1,945	60	1,905	Marine shale	" salty		S	Waters 12 head stock only.
5	SW.	7	"	"	"	Dug	30	1,965	- 14	1,951	27	1,938	Glacial gravel	Soft, hard		D, S	" 100 " " .
6	SW.	8	"	"	"	"	44	1,940	- 18	1,922	18	1,922	Marine shale	Hard clear		D	
7	NE.	10	"	"	"	"	30	1,935	- 18	1,917	30	1,905	Glacial sand	" "alkaline"		S	Waters 100 head stock.
8	SW.	11	"	"	"	"	47	1,920	- 30	1,890	36	1,884	" "	" clear		D, S	Sufficient supply.
9	SE.	12	"	"	"	"	75	1,920	- 72	1,848	72	1,848	" "	" "		D, S	Constant supply.
10	NW.	13	"	"	"	Drilled	175	1,875	-120	1,755	120	1,755	Blue sand base of blue clay	"alkaline"		D, S	Abundant supply.
11	SE.	14	"	"	"	Dug	10	1,905	- 5	1,900	10	1,895	Glacial gravel	" "		D, S	Waters 100 head stock.
12	NE.	18	"	"	"	"	9	1,945	- 3	1,942	3	1,942	" sand	" clear		D, S	Strong supply.
13	NW.	18	"	"	"	"	30	1,945	- 23	1,922	28	1,917	" gravel	" "		D, S	Sufficient supply.
14	SE.	19	"	"	"	"	22	1,947	- 19	1,928	19	1,928	" "	" "		D, S	Waters 50 head stock.
15	SE.	20	"	"	"	"	20	1,945	- 14	1,931	14	1,931	" "	" "		D, S	Waters 50 head stock.

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WELL RECORDS—RURAL MUNICIPALITY OF WALPOLE NO. 92, SASKATCHEWAN.

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
16	NE.	22	12	32	1	Dug	10	1,915	- 8	1,907	8	1,907	Glacial gravel	Hard, clear		D, S	Waters 50 head stock.
17	SE.	22	"	"	"	"	20	1,910	- 8	1,902	10	1,900	" sand	" "		D, S	Moderate supply.
18	SW.	25	"	"	"	"	10	1,900	- 7	1,883	7	1,883	" "	" "		S	Used occassionally.
19	NE.	26	"	"	"	"	50	1,910					" clay	"alkaline"		N	Very small supply.
20	NE.	26	"	"	"	Drilled	135	1,910			135	1,775	" quicksand	" clear		N	Plugged by sand.
21	SW.	26	"	"	"	Dug	10	1,915	- 7	1,908	7	1,908	" sand	" "		D, S	Good supply.
22	NW.	27	"	"	"	"	10	1,910	- 4	1,906	4	1,906	" "	Soft, "		D, S	Strong supply.
23	NE.	28	"	"	"	"	15	1,900	- 12	1,888	12	1,888	" "	Hard, "		D, S	Waters 300 head stock.
24	NE.	32	"	"	"	"	20	1,890	- 18	1,872	18	1,872	" "	" "		D,	Domestic supply only. 8 foot well for stock.
25	NW.	32	"	"	"	Bored	40	1,940	- 37	1,903	37	1,903	" "	" "		D	Domestic use only.
26	NW.	34	"	"	"	Dug	34	1,930	- 31	1,899	31	1,899	" gravel	" "		D, S	Sufficient supply.
27	SW.	34	"	"	"	"	30	1,905	- 10	1,895	30	1,875	Marine shale	Hard, sulphur		D, S	Very strong supply.
28	NW.	35	"	"	"	"											All dry holes.
29	NW.	35	"	"	"	"	7	1,925	- 2	1,923	2	1,923	Glacial gravel	Hard, clear		D, S	Moderate supply.
1	SW.	2	12	33	1	Dug	10	2,020	- 5	2,015	5	2,015	" "	" "		D, S	Sufficient supply.
2	NE.	2	"	"	"	Drilled	160	2,005	- 30	1,975	160	1,845	Marine shale	" cloudy		S	400 foot dry hole. Poor supply.
3	SE.	4	"	"	"	Dug	27	2,060	- 24	2,036	27	2,033	Glacial gravel	" clear		D, S	Waters 45 head stock.
4	SE.	5	"	"	"	"	25	2,085	- 15	2,070	15	2,070	" "	" "		D, S	Strong supply.
5	NW.	6	"	"	"	"	43	2,105	- 40	2,065	15	2,090	" "	" "		D, S	Waters 20 head stock.
6	NE.	6	"	"	"	Bored	86	2,098	- 68	2,030	60	2,038	" sand and gravel	" "		D, S	" 60 " " .
7	SW.	7	"	"	"	"	110	2,102	- 80	2,022	105	1,997	Sand base of blue clay	" "		D, S	" 50 " " .
8	NE.	7	"	"	"	Dug	32	2,080	- 23	2,057	32	2,048	Glacial clay	" "		S,	Moderate supply.
9	NE.	8	"	"	"	"	18	2,055	- 12	2,043	12	2,043	" sand	" "		D	Domestic supply only.
10	SW.	12	"	"	"	"	8	1,980	- 4	1,976	4	1,976	" gravel	" "		S	Waters 70 head stock. 13 foot well for domestic use.
11	NW.	12	"	"	"	"	8	1,985	- 4	1,981	4	1,981	" "	" "		D, S	Good supply.
12	SW.	14	"	"	"	"	20	2,002	- 8	1,994	13	1,989	" sand	" "		D, S	Waters 80 head stock.
13	NW.	14	"	"	"	"	24	2,002	- 20	1,982	21	1,981	" gravel	" "		D, S	Sufficient supply.
14	SW.	15	"	"	"	"	10	2,010	- 6	2,004	6	2,004	" "	" sulphur		D, S	Waters 50 head stock.

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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
15	SE.	16	12	33	1	Dug	23	2,025	- 18	2,007	20	2,005	Glacial gravel	Hard, "alkaline"		D, S	Similar well used.
16	NW.	16	"	"	"	"	20	2,038	- 14	2,024	14	2,024	" "	Hard, clear		D, S	Strong supply.
17	SE.	17	"	"	"	"	40	2,048	- 34	2,014	35	2,013	" sand	" "alkaline"		D, S	Waters 100 head stock.
18	SE.	18	"	"	"	"	33	2,075	- 21	2,054	30	2,045	" gravel	" clear		D, S	" 40 " " .
19	SE.	20	"	"	"	Drilled	84	2,028	- 30	1,998	84	1,944	Marine shale	" "		D, S	Abundant supply.
20	NE.	20	"	"	"	Dug	34	2,020	- 33	1,987	20	2,00	Glacial gravel	" "		D, S	Household supply only, use ravine for stock.
21	SE.	21	"	"	"	"	18	2,020	- 8	2,012	14	2,006	" "	" "		D, S	Waters 35 head stock.
22	NE.	21	"	"	"	"	10	2,001	- 6	1,995	6	1,995	" "	" "		D, S	Good supply.
23	SE.	22	"	"	"	"	16	2,000	- 15	1,985			" clay	"alkaline"		S	Poor supply. Hauls water.
24	NW.	22	"	"	"	"	30	1,995	- 10	1,985	30	1,965	" gravel	" clear		D, S	Strong supply.
25	SE.	24	"	"	"	"	25	1,965	- 24	1,941	24	1,941	" sandy clay	" "		D, S	Constant supply.
26	NW.	24	"	"	"	"	17	1,970	- 14	1,956	14	1,956	" gravel	" "		D, S	Sufficient supply.
27	SE.	26	"	"	"	"	8	1,968	- 3	1,965	3	1,965	" "	" "		D, S	Waters 30 head stock.
28	NE.	27	"	"	"	"	42	1,975	- 41	1,934	41	1,934	" sand	Soft, clear		D, S	Sufficient supply.
29	NW.	28	"	"	"	"	12	1,996	- 8	1,988	10	1,986	" sand	" "		D, S	Insufficient supply alone. Use similar well.
30	NW.	30	"	"	"	"	18	2,052	- 10	2,042	16	2,036	" gravel	Hard, clear		D, S	" in dry years.
31	NE.	30	"	"	"	Bored	100	2,052									No water 5 dry holes.
32	SE.	32	"	"	"	Dug	18	1,997	- 15	1,982	13	1,984	Glacial sand	Hard, clear		D, S	Poor supply.
33	NW.	32	"	"	"	"	10	1,997	- 4	1,993	6	1,991	" "	" "		D, S	Many dry holes dug. Waters 25 head stock.
34	NW.	33	"	"	"	"	18	1,985	- 14	1,971	18	1,967	" "	" "		D, S	Waters over 50 head stock.
35	NE.	34	"	"	"	"	18	2,002	- 4	1,998			" "	" "		D, S	Abundant supply.
36	SW.	36	"	"	"	"	10	1,952	- 2	1,950	6	1,946	" "	" "		D, S	Waters 30 head stock.
37	NW.	36	"	"	"	"	18	1,953	- 10	1,943	16	1,937	" gravel	" "		D, S	Abundant supply, two similar wells.
1	SE.	13	12	34	1	Dug	14	2,100	- 9	2,091	12	2,088	Glacial sand	"alkaline"		D, S	Sufficient supply.
2	NE.	24	"	"	"	"	10	2,075	- 4	2,075	4	2,073	" gravel	" clear		D, S	Abundant supply, two similar wells.

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.