CANADA
DEPARTMENT OF MINES
AND
TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

WATER SUPPLY PAPER No. 42

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF MORRIS NO. 312 SASKATCHEWAN

By

B. R. MacKay, H. N. Hainstock, & G. Graham

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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 and the smaller supplies of ground water required for domestic purposes and for stock. In an effort to relieve the serious situation the Geological Survey began an extensive study of the problem from the standpoint of domestic uses and stock raising. During the field season of 1935 an area of 80,000 square miles, comprising all that part of Saskatchewan south of the north boundary of township 32, was systematically examined, records of approximately 60,000 wells were obtained, and 720 samples of water were collected for analyses. The facts obtained have been classified and the information pertaining to any well is readily accessible. The examination of so large an area and the interpretation of the data collected were possible because the bedrock geology and the Pleistocene deposits had been studied previously by McLearn, Warren, Rose, Stansfield, Wickenden, Russell, and others of the Geological Survey. The Department of Natural Resources of Saskatchewan and local well drillers assisted considerably in supplying several hundred well records. The base maps used were supplied by the Topographical Surveys Branch of the Department of the Interior.

Publication of Results

The essential information pertaining to the ground water conditions is being published in reports, one being issued for each municipality. Copies of these reports are being sent to the secretary treasurers of the municipalities and to certain Provincial and Federal Departments, where they can be consulted by residents of the municipalities or by other persons, or they may be obtained by writing direct to the Director, Bureau of Economic Geology, Department of Mines, Ottawa. Should anyone require more detailed information than that contained in the reports such additional information as the Geological Survey possesses can be obtained on application to the director. In making such request the applicant should indicate the exact location of the area by giving the quarter section, township, range, and meridian concerning which further information is desired.

The reports are written principally for farm residents, municipal bodies, and well drillers who are either planning to sink new wells or to deepen existing wells. Technical terms used in the reports are defined in the glossary,

How to Use the Report

Anyone desiring information about ground water in any particular locality should read first the part dealing with the municipality as a whole in order to understand more fully the part of the report that deals with the place in which he is interested. At the same time he should study the two figures accompanying the report. Figure 1 shows the surface and bedrock geology as related to the ground water supply, and Figure 2 shows the relief and the location and type of water wells. Relief is shown by lines of equal elevation called "contours". The elevation above sea-level

is given on some or all of the contour lines on the figure.

If one intends to sink a well and wishes to find the approximate depth to a water-bearing horizon, he must learn: (1) the elevation of the site, and (2) the probable elevation of the water-bearing bed. The elevation of the well site is obtained by marking its position on the map, Figure 2, and estimating its elevation with respect to the two contour lines between which it lies and whose elevations are given on the figure. Where contour lines are not shown on the figure, the elevations of adjacent wells as indicated in the Table of Well Records accompanying each report can be used. The approximate elevation of the water-bearing horizon at the well-site can be obtained from the Table of Well Records by noting the elevation of the water-bearing horizon in surrounding wells and by estimating from these known elevations its elevation at the well-site.[1] If the water-bearing horizon is in bedrock the depth to water can be estimated fairly accurately in this way. If the water-bearing horizon is in unconsolidated deposits such as gravel, sand, clay, or glacial debris, however, the estimated elevation is less reliable, because the water-bearing horizon may be inclined, or may be in lenses or in sand beds which may lie at various horizons and may be of small lateral extent. In calculating the depth to water, care should be taken that the water-bearing horizons selected from the Table of Well Records be all in the same geological horizon either in the glacial drift or in the bedrock. From the data in the Table

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[1] If the well-site is near the edge of the municipality, the map and report dealing with the adjoining municipality should be consulted in order to obtain the needed information about nearby wells.

of Well Records it is also possible to form some idea of the quality and quantity of the water likely to be found in the proposed well.

GLOSSARY OF TERMS USED

Alkaline. The term "alkaline" has been applied rather loosely to some ground-waters. In the Prairie Provinces, a water is usually described as "alkaline" when it contains a large amount of salts, chiefly sodium sulphate and magnesium sulphate in solution. 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".

Alluvium. Deposits of earth, clay, silt, sand, gravel, and other material on the flood-plains of modern streams and in lake beds.

Aquifer or Water-bearing Horizon. A water-bearing bed, lens, or pocket in unconsolidated deposits or in bedrock.

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 partly or wholly consolidated deposits of gravel, sand, silt, clay, and marl that are older than the glacial drift.

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 age.

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

Flood-plain. A flat part in a river valley ordinarily above water but 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 that causes water in a well to rise above the point at which it is struck.

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

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

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.

NAMES AND DESCRIPTIONS OF GEOLOGICAL FORMATIONS, REFERRED TO IN THESE REPORTS

Wood Mountain Formation. The name given to a series of gravel and sand beds which have a maximum thickness of 50 feet, and which occur as isolated patches on the higher parts of Wood Mountain. This is the youngest bedrock formation and, where present, overlies the Ravenscrag formation.

Cypress Hills Formation. The name given to a series of conglomerates and sand beds which occur in the southwest corner of Saskatchewan, and rests upon the Ravenscrag or older formations. The formation is 30 to 125 feet thick.

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

Whitemud Formation. The name given to a series of white, grey, and buff coloured clays and sands. The formation is 10 to 75 feet thick. At its base this formation grades in places into coarse, limy sand beds having a maximum thickness of 40 feet.

Eastend Formation. The 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 escarpment of Missouri coteau. The thickness of the formation seldom exceeds 40 feet.

Bearpaw Formation. The Bearpaw consists mostly of incoherent dark grey to dark brownish grey, partly bentonitic shales, weathering light grey, or, in places where much iron

is present, buff. Beds of sand occur in places in the lower part of the formation. It forms the uppermost bedrock formation over much of western and southwestern Saskatchewan and has a maximum thickness of 700 feet or somewhat more.

Belly River Formation. The Belly River consists mostly of non-marine sand, shale, and coal, and underlies the Bearpaw in the western part of the area. It passes eastward and northeastward into marine shale. The principal area of transition is in the western half of the area where the Belly River is mostly thinner than it is to the west and includes marine zones. In the southwestern corner of the area it has a thickness of several hundred feet.

Marine Shale Series. This series of beds consists of dark grey to dark brownish grey, plastic shales, and underlies the central and northeastern parts of Saskatchewan. It includes beds equivalent to the Bearpaw, Belly River, and older formations that underlie the western part of the area.

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Morris, No. 312, covers an approximate area of 340 square miles and comprises eight full townships and parts of five others, lying west of the 2nd meridian. The centre of the area is near Young, approximately 50 miles southeast of Saskatoon.

As the northern boundary of township 32 was the northern limit of the area covered during the field season, only the southern part of this municipality is covered in the present report, comprising an area of approximately 260 square miles. It embraces township 31, ranges 25, 26, 27, 28, and 29; township 32, ranges 27, 28, and 29; and that part of township 32 in ranges 25 and 26 south of lake Manitou.

The municipality has a relief of 525 feet, rising from an elevation of 1,625 feet above sea-level at Little Manitou lake to an elevation of 2,150 feet in township 31, range 29. The land surface slopes generally eastward with a slight turn towards the north as the valley of Little Manitou lake is approached. The area in the extreme west is rough and rolling. This smooths out in the central part of the municipality and thence remains practically flat to the valley slopes of lake Manitou, where it drops abruptly 175 feet in elevation.

Water-bearing Horizons in the unconsolidated deposits

The glacial drift covering in some parts of this municipality has a thickness of 400 feet, but the average thickness is believed to range from 250 to 300 feet. Boulder clay in the form of terminal moraines and boulder clay or till, which has been modified by water action in the vicinity of Little Manitou lake, are the dominant glacial deposits encountered in this municipality. The northeastern part is mantled with the till or boulder clay deposits, whereas in the southeastern, and a part of the southwesterr areas, deposits

of the morainic type are found. These areas are outlined on the map that accompanies this report.

With a few exceptions, referred to later, no persistent water-bearing horizons are encountered in this municipality. Pockets of sand and gravel occur within the upper part of the drift, which is usually referred to as the weathered zone, and between it and the blue clay. Water that percolates downward from the surface is retained in these scattered gravel pockets, being prevented from seeping farther by the underlying impervious blue clay. These pockets form what is designated as the uppermost or first water-bearing horizon. Wells tapping this horizon are non-artesian. As a rule they are dependent upon annual precipitation for their supply, but the yield from a few that tap large pockets does not appear to be affected by rainfall. The wells of this type vary in depth from 10 to 35 feet and yield water varying from medium soft to medium hard, that in most cases is usable for both humans and stock. In periods of normal rainfall this type of well, with few exceptions, yields a sufficient quantity of water for local needs. Because of the scattered distribution of the sand and gravel lenses or pockets dry holes may be encountered within short distances of producing wells.

What may be termed a second water-bearing horizon is formed by pockets of sand and gravel that occur in the part of the drift lying between the bedrock and the weathered zone. A number of wells in this municipality, except in township 32, range 26 and townships 31 and 32, range 29 derive their water supplies from this aquifer. These wells are not so directly affected by drought conditions, but over a long period of drought their supply has also been noticeably curtailed. This aquifer is non-continuous and the pockets, for the most part, are widely scattered. Many dry holes have been dug into this part of the drift, especially in townships 31 and

32, range 27.

The usual depths at which this aquifer is encountered range from 40 to 90 feet, and there is sufficient hydrostatic pressure in the majority of the wells to raise the water from 20 to 30 feet above the top of the aquifer. Wells of this type are classified as non-flowing artesian. The quantity of water yielded varies greatly but in most cases there is sufficient for stock requirements, but the high iron and other mineral salt content in solution makes the water from a number of the wells unfit for human consumption.

A third aquifer in the drift is 160 to 250 feet from the surface or from 1,500 to 1,600 feet above sea-level. The majority of the wells tap it at approximately 1,575 feet above sea-level. It is encountered in the northeastern part of township 31, range 25, the north part of township 31, range 26, and the southern part of township 32, range 26, as well as in an isolated area in section 12, township 32, range 26. It is probable that this aquifer consists of sand and gravel immediately overlying the bedrock, which forms a nearly impervious layer. The water from this horizon is very hard and sometimes contains iron, but it is generally usable for both humans and stock. The yield is more than sufficient for local needs, and the water is under sufficient pressure to rise as high as 100 feet above the top of the aquifer. These wells belong also to the non-flowing artesian class. The presence of this gravel bed underlying impervious glacial boulder clay suggests that it may have been deposited during the retreat of an earlier ice-sheet, and if so this aquifer should be fairly continuous throughout the eastern part of the municipality.

Water-bearing Horizons in the Bedrock

The dark grey to greyish brown shales of the Marine Series underlie the glacial deposits throughout this municipality. It is not known at what depth this formation is reached, but a fairly definite sand aquifer occurs at an approximate elevation of 1,300 feet above sea-level. This aquifer, however, may be in sandy beds above the Marine shales.

This water-bearing horizon has been penetrated in the northeastern part of township 32, range 28, and in the southwestern corner of township 32, range 27. The map accompanying this report shows its approximate boundary. The wells range in depth from 380 to 500 feet and the elevation of the aquifer above sea-level ranges from 1,250 feet in the southeastern part to 1,380 in the northwestern. The similarity of the waters derived from these wells leaves little doubt that the aquifer is continuous over the area mentioned. The water is under sufficient hydrostatic pressure to cause it to rise in the wells to within 10 to 40 feet of the surface. The supply in all cases is more than sufficient for stock requirements, but the water is too salty for human consumption, although sometimes used. With so definite an aquifer underlying this particular area, it is probable that it extends over a much larger area. However, a dry hole to a depth of 800 feet a few miles southeast of the area mentioned, makes it appear as if the horizon thins out or terminates in that direction.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 31, Range 25

This township is covered with a mantle of glacial drift that may be 200 feet thick or more. In the northeastern part this drift is in the form of glacial till or boulder clay, whereas in the southwestern part it is in the form of terminal morainic deposits.

What is termed the first water-bearing horizon is formed by sand and gravel pockets that are interspersed through the weathered part of the drift. These pockets vary in depth from 10 to 30 feet from the surface. They yield varying amounts of water, which is usually hard. In the southeastern corner the aquifer appears to be more continuous, and a softer water is obtained at depths of 9 to 16 feet. Here the yield is larger, being sufficient for local needs.

A second aquifer is formed by pockets of sand and gravel in the lower part of the drift, below the base of the weathered zone. These pockets occur at depths of 40 to 80 feet below the surface. The yield of water depends largely on the size of the pocket tapped, and the water is invariably hard and usually contains iron salts in solution. Many dry holes may be dug before locating a sand or gravel pocket that will yield a supply of usable water sufficient for local needs.

Three wells located on NW.$\frac{1}{4}$, section 24, SE.$\frac{1}{4}$, section 26, and section 22, derive their water supply from a depth between 160 and 185 feet below the surface. The elevation of this water-bearing horizon is between 1,575 and 1,625 feet above sea-level. Insufficient data is at hand to determine whether this is a continuous aquifer or merely sand and gravel pockets occurring at slightly greater depths in the drift than those that form the second water-bearing horizon.

Township 31, Range 26

This township has a drift covering ranging from approximately 200 to 260 feet in thickness. In the northwestern corner, and over a narrow belt from there to the southeastern corner, this drift is made up of glacial till or boulder clay, whereas the remainder is formed of morainic material.

There does not appear to be any severe shortage of water in this township. The first aquifer is formed of scattered deposits of sand and gravel that occur as pockets at depths of 15 to 35 feet. The wells tapping this horizon yield a clear, hard water, that is usually sufficient for local requirements.

Below the upper part of the drift pockets of sand and gravel occur in the boulder clay, at depths ranging from 50 to 70 feet below the surface. These pockets form a second water-bearing horizon that yields a reasonably good supply of hard water. The water from some of the wells tapping this horizon cannot be used for domestic purposes due to its high mineral salt content, but most of the waters are usable.

The wells located in the northern part of the township, and also the well located on SW.$\frac{1}{4}$, section 12, furnish evidence that a third water-bearing horizon is present in this area. These wells vary in depth from 190 to 260 feet and the aquifer tapped occurs at approximate elevations of 1,540 to 1,620 feet above sea-level. It is probable that this aquifer is formed of deposits of sand and gravel overlying the bedrock. The aquifer appears to be fairly continuous in the northern part, but not sufficient evidence is available to say that it extends over all the township. The above-mentioned wells yield a good supply of hard, usable water, which contains some iron salts in solution.

Township 31, Range 27

Terminal moraine deposits cover this township, with the exception of the northeastern corner, where glacial till or boulder clay occurs.

The first aquifer is formed of pockets of sand and gravel that occur in the upper weathered zone of the drift. In the southern and northeastern parts of the township the yield from this aquifer is sufficient for local needs, but in the northwestern part the supply is usually only sufficient for domestic use. These water-bearing pockets are tapped at depths ranging from 15 to 35 feet from the surface. The water is hard,and with the exception of a small area in the northeastern part, contains very little iron.

Throughout the township wells have tapped sand and gravel pockets at depths ranging from 40 to 90 feet. These pockets are isolated and the amount of water obtained from wells tapping them depends largely on the size of the pocket. The quality of the water from these wells is not as good as that from the shallower wells of the drift, and in many cases it is used only for stock. Many dry holes have been bored throughout this township, showing the local distribution of these sand and gravel pockets.

On NW.$\frac{1}{4}$, section 32, a hole was drilled into bedrock and reached a depth of 800 feet without obtaining water. To the northwest of this location water is obtained from the bedrock at depths of 300 to 500 feet. It is possible that in the above-mentioned well the aquifer is absent, or was passed through unnoticed by the driller.

Township 31, Range 28

Except for a part in the extreme northwestern corner that is covered with glacial till or boulder clay, this township is mantled with terminal moraine deposits having a possible

thickness of 200 feet or more.

In this glacial drift there are deposits of sand and gravel that occur as pockets in the clay of the upper weathered zone, and they form the uppermost water-bearing horizon. This aquifer yields a hard, but usable water. In the southwestern part of the township the quantity is insufficient, but in its northeastern part the yield is sufficient for local needs.

Other pockets of sand and gravel occur at depths ranging from 40 to 80 feet. They form a second water-bearing horizon that yields varying quantities of hard water. This water is usually satisfactory for stock, but in certain areas, as in the northeastern part of the township, it is not suitable for human consumption because of its laxative effect.

Township 31, Range 29

As the information regarding water conditions in this township is very scanty, only a few generalizations will be made.

The township is mantled with terminal morainic deposits, with the exception of a small strip along the northern boundary, which is boulder clay. All the wells on which data are available obtain their water supply from sand and gravel deposits that occur as pockets in the boulder clay. The supplies vary with the size and extent of the water-bearing pockets. The depths range from 10 to 40 feet from the surface and the water is hard but usable in all cases.

It is probable that sand and gravel pockets similar to those found in tp. 31, range 28, W.2nd mer., and tp. 31, range 1, W.3rd mer., occur at greater depths in the drift, but as long as a supply can be obtained at shallow depths it is not advisable to go deeper,as the quality of the water will be inferior to that obtained nearer the surface.

Township 32, Range 25

Since Little Manitou lake forms the northern boundary of this municipality, this township report only covers the section to the south of the lake. Along the bank of the lake the drift is composed of modified glacial till, whereas the remainder of the area is mantled with boulder clay or unmodified till.

Lack of information does not permit of a detailed discussion of the water conditions of this township being given. It is likely that sand and gravel pockets occur throughout the drift, and where encountered, a satisfactory water supply can be obtained from them. The wells recorded yield water of good quality and in fairly abundant quantity.

One well located on NE.$\frac{1}{4}$, section 3, is drilled to a depth of 198 feet and is obtaining a good supply of hard, potable water. It is possible that this well is drilled to near the top of the bedrock and is obtaining its supply from the same, or a similar aquifer, as that mentioned in township 31, range 25.

Township 32, Range 26

With the exception of part of section 1, and sections 2 and 3, which are mantled with terminal morainic deposits, the remainder of this township is covered with boulder clay or till, the area bordering the lake being modified by water whereas the remainder is of the unmodified type. This township, like the one immediately to the east, is cut in half by Little Manitou lake and only the part to the south of the lake is referred to in this report.

The only water-bearing horizon known to occur in this township is formed by sand and gravel deposits that occur as pockets in the boulder clay. These pockets occur at depths

ranging from 15 to 40 feet in the upper or oxidized zone, and up to 95 feet in the lower part of the drift. There is a great diversity in the amounts of water obtained from these pockets, but invariably the quality is good.

From the data supplied by the wells it seems probable that the aquifer overlying the bedrock in township 31, range 26 extends into this township. If so, it should be encountered at depths ranging from 200 to 250 feet or at elevations above sea-level from 1,525 to 1,600 feet. However, if a shallower supply can be obtained, it is inadvisable to drill to this depth as the quality of the water often restricts its use to the watering of stock.

Township 32, Range 27

The northeastern corner of this township, which is a continuation of the valley of Little Manitou lake, is mantled by drift which is composed of boulders and glacial till or boulder clay. The southwestern corner is covered with terminal morainic deposits, and the remainder of the area has a blanket of glacial till or boulder clay. The wells of this township yield water of fair quality, but in the majority of them the supply is insufficient for local requirements.

There are a few wells obtaining their water supply from sand and gravel pockets that occur in the weathered zone of the drift at depths ranging from 5 to 30 feet. These pockets are of very local distribution and the supply obtained from them is generally insufficient for local needs.

Another aquifer is present at depths ranging from 40 to 100 feet from the surface. This is also formed by sand and gravel deposits that occur as pockets in the drift below the weathered zone. The water from this horizon is poor and the supply is small. Many dry holes have been encountered throughout this township, proving the very local distribution

of the sand and gravel pockets.

In township 32, range 28, there appears to be a bedrock aquifer at a depth of approximately 500 feet from the surface, and it is probable that this water-bearing horizon extends into the western part of the township under discussion. This aquifer should be present at an approximate elevation of 1,250 feet above sea-level in the western half of the township. The water is confined generally to stock use as its high saline content makes it unfit for human consumption, although in some cases it has to be so used. It is assumed that this aquifer extends over the remainder of the township.

Township 32, Range 28

The southeastern part of this township is mantled with morainic deposits, and the remainder is of glacial till or boulder clay. It is probable that the drift in this area attains a maximum thickness of 350 feet.

Sand and gravel deposits, occurring as pockets in the upper or weathered zone of the drift, form the first water-bearing horizon. Many wells of the township tap this aquifer and obtain varying quantities of water. The quantities and qualities are so widely diversified within narrow limits that no particular section can be isolated and said to offer better possibilities than any other section. The depth to this horizon varies from a few feet up to as high as 40 feet.

Only a very few wells obtain their water supply from pockets of sand and gravel in the clay below the weathered zone. Numerous dry holes have been dug to a maximum depth of 100 feet. The quality and quantity of the water derived from this horizon vary greatly. In a great number of instances the iron and other mineral salts content of the water is so high that the waters are usable only for stock.

Four wells, namely those located on sections 13, 28, 32, and 34, obtain a large yield of salty water from a bedrock aquifer. These wells range in depth from 380 to 500 feet, and the elevation of the aquifer above sea-level ranges from 1,250 to 1,390 feet. There seems little doubt that this horizon is in the upper part of the Marine shales and that it underlies the whole township.

The water is used for domestic purposes, but is much too salty to be palatable, and its use should be confined to stock.

Township 32, Range 29

This township is approximately 1½ miles in width, lying adjacent on the east to the 3rd meridian. It is mantled, with the exception of an isolated area in the southern section, with boulder clay or till to a depth possibly exceeding 300 feet.

All the wells examined obtain their water supply from scattered sand and gravel pockets in the glacial boulder clay. The depths to these pockets vary from 15 to 50 feet from the surface. The water is invariably hard, often containing iron salts, and is usually "alkaline".

It is probable that the bedrock aquifer in township 32, range 28, may extend into this township and be at about the same elevation above sea-level, but as long as a usable supply can be obtained at shallow depths, it is not advisable to drill to this deeper horizon.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF MORRIS, NO.312, SASKATCHEWAN.

West of 2nd meridian — Township	31	31	31	31	31	32	32	32	32	32	Total No. in municipality
West of 2nd meridian — Range	25	26	27	28	29	25	26	27	28	29	
Total No. of Wells in Township	41	44	74	35	16	7	15	47	57	9	345
No. of wells in bedrock	0	1	1	0	1	0	0	0	4	0	7
No. of wells in glacial drift	41	43	73	35	15	7	15	47	53	9	338
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply											
No. with permanent supply	31	39	39	29	16	6	15	27	35	9	246
No. with intermittent supply	1	2	2	1	0	0	0	2	1	0	9
No. dry holes	9	3	33	5	0	1	0	18	21	0	90
Types of Wells											
No. of flowing artesian wells	0	0	0	0	0	0	0	0	0	0	0
No. of non-flowing artesian wells	18	25	27	14	7	4	10	13	16	3	137
No. of non-artesian wells	14	16	14	16	9	2	5	16	20	6	118
Quality of Water											
No. with hard water	27	35	37	30	12	6	14	23	31	8	223
No. with soft water	5	6	4	0	4	0	1	6	5	1	32
No. with salty water	0	0	0	0	1	0	0	0	4	0	5
No. with alkaline water	3	4	9	6	3	0	3	5	5	6	44
Depths of Wells											
No. from 0 to 50 feet deep	32	31	48	24	15	4	13	22	35	8	232
No. from 51 to 100 feet deep	5	7	25	9	0	2	2	24	13	1	88
No. from 101 to 150 feet deep	2	0	0	2	0	0	0	1	3	0	8
No. from 151 to 200 feet deep	2	3	0	0	0	1	0	0	1	0	7
No. from 201 to 500 feet deep	0	3	0	0	0	0	0	0	5	0	8
No. from 501 to 1,000 feet deep	0	0	1	0	1	0	0	0	0	0	2
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0	0
How the Water is Used											
No. usable for domestic purposes	27	37	28	25	15	6	14	16	27	9	204
No. not usable for domestic purposes	5	4	13	5	1	0	1	13	9	0	51
No. usable for stock	31	41	41	30	16	6	15	29	36	9	254
No. not usable for stock	1	0	0	0	0	0	0	0	0	0	1
Sufficiency of Water Supply											
No. sufficient for domestic needs	32	40	41	30	16	6	15	29	33	9	251
No. insufficient for domestic needs	0	1	0	0	0	0	0	0	3	0	4
No. sufficient for stock needs	21	30	25	14	8	5	9	10	16	6	144
No. insufficient for stock needs	11	11	16	16	8	1	6	19	20	3	111

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. The results of the analyses are given in parts per million--that is, parts by weight of the constituents in 1,000,000 parts 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 rocks and soils, but mostly 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 boilders and tea-kettles 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.

Sulphates

Sulphates (SO_4) are one of the common constituents of natural water. The sulphate salts most commonly found are sodium sulphate, magnesium sulphate, and calcium sulphate ($CaSO_4$). When the water contains large quantities of the sulphate of sodium it is injurious to vegetation.

Chlorides

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

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 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 has 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 mainly to the bicarbonates of calcium and magnesium and iron, 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. Water that has a total hardness of 300 parts per million or more is usually classed as excessively hard. Many of the Saskatchewan water samples 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. As the determinations of the soap hardness in some cases were made after the samples had been stored for some time, the temporary hardness of some of the waters as they come from the wells probably is higher than that given in the table of analyses.

Water from the Unconsolidated Deposits

No water samples were obtained from this municipality for chemical analysis. However, all waters from the glacial drift show certain marked characteristics, and from the information available in the surrounding areas a few generalizations can be made. The waters from the unconsolidated deposits are generally excessively hard due to the presence of dissolved mineral salts, but except in a few wells these have no very harmful effects on humans or stock. When the mineral content is greater than 1,000 parts per million the water often has a disagreeable taste. Iron is present in some of the waters.

The total dissolved solid content of water from wells in the glacial drift usually depends directly on the depth of the well. It appears that the greater the depth of drift occurring over the water-bearing horizon, the higher the water is charged with mineral salts. The water as it seeps through the sands, clays, and gravels takes into solution mineral salts that are contained in these materials. Since the glacial deposits show varied characteristics within small areas, it is to be assumed that waters from the drift will also show wide variations in quality. This is very often the case, so that the finding of water unfit for use in one locality does not necessarily indicate widespread conditions in that locality.

It is probable that the water in the northeastern part of township 31, range 28, is highly charged with sulphates of magnesium ($MgSO_4$, Epsom Salts), and of sodium (Na_2SO_4, Glauber's Salt). These salts are usually found in waters derived from the drift, and if they are present in large amounts the water is unfit for drinking.

Waters in which the salts of sodium predominate, which is unusual for drift water, are usually soft. This type of water is more common from bedrock aquifers. Should the water from a drift well be soft, the supply is probably being obtained by direct seepage from a slough or other surface water.

A number of wells in this municipality contain water in which the iron content is high. Such water should be let stand in contact with the air for a considerable length of time before using and most of the iron will be precipitated. Agitation of the water, with as much water in contact with the air as possible, will speed up this process. A simple expedient is to allow the water to pass over a sheet of corrugated iron between pump and trough and the iron will settle as reddish brown precipitate.

Water from the Bedrock

Without chemical analyses at hand only a few generalizations on the waters from bedrock aquifers can be made. It is known that the waters are salty, and common salt (NaCl) probably is the most abundant mineral present, with Na_2SO_4 (Glauber's Salt) second in abundance, and Na_2CO_3 occurring in lesser amounts. The latter probably is present in waters that have a soda taste, and when it is present in large amounts is especially injurious to vegetation. When the water is hard the salts of calcium and magnesium will probably be next to NaCl in order of abundance. Both these cases seem to be borne out from the evidence at hand regarding the deeper wells in township 32, range 28. There is no doubt that the waters from these wells contain a great deal more than 400 parts per million of common salt, and when this is exceeded they are usually unfit for human consumption. If the water is soft and has a soda taste it is probable that Na_2CO_3 is present in fairly large quantities and the NaCl content is reduced.

WELL RECORDS—Rural Municipality of MORRIS, NO. 312, SASKATCHEWAN. (Part only)

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	NE.	1	31	25	2	Dug	13	1,765	- 9	1,756	13	1,752	Glacial quick-sand	Hard, iron		D, S	Sufficient for 35 head stock.
2	SW.	2	"	"	"	Dug	16	1,800	- 7	1,793	16	1,784	Glacial quick-sand	Soft		D, S	Sufficient for 16 head stock; another 16 foot well, poor supply.
3	NE.	2	"	"	"	Dug	12	1,775	- 8	1,767	12	1,763	Glacial gravel	Hard, iron		D, S	More than sufficient for local needs.
4	NW.	3	"	"	"	Dug	30	1,800	- 28	1,772	30	1,770	Glacial gravel	Hard, "alk-aline"		S	Sufficient for 25 head stock.
5	NE.	5	"	"	"	Bored	38	1,800	- 26	1,774	38	1,762	Glacial sand	Hard, "alk-aline"		D, S	More than sufficient for local needs.
6	SE.	6	"	"	"	Dug	14	1,800	- 8	1,792	14	1,786	Glacial sand, gravel	Soft		D, S	2 bbls. a day; insufficient supply. Other seepage wells; poor supply.
7	NE.	9	"	"	"	Dug	9	1,800	- 0	1,800	9	1,791	Glacial drift	Hard		D, S	Insufficient for local needs. Water hauled.
8	SE.		"	"	"	Dug	9	1,775	- 6	1,769	9	1,766	Glacial gravel	Soft		D, S	Sufficient for 40 head stock. 112 foot dry hole.
9	SW.	12	"	"	"	Bored	34	1,775	- 10	1,765	34	1,741	Glacial gravel	Hard, iron		S	More than sufficient for 10 head stock.
10	NW.	13	"	"	"	Bored	55	1,760	- 40	1,720	55	1,705	Glacial sand	Hard, iron, "alkaline"		S	Sufficient for 20 head stock. Water hauled for domestic purposes.
11	SW.	14	"	"	"	Dug	18	1,800	- 13	1,787	18	1,782	Glacial sand	Hard		D	Sufficient only for house. Dugout for stock.
12	NE.	15	"	"	"	Dug	12	1,800	- 5	1,795	12	1,788	Glacial gravel	Hard		D, S	Sufficient for more than 12 head stock.
13	NE.	15	"	"	"	Dug	25	1,800	- 3	1,797	25	1,775	Glacial gravel	Hard		?	Large supply.
14	SE.	16	"	"	"	Bored	78	1,800	- 50	1,750	78	1,722	Glacial sand	Hard, iron		S	Insufficient supply; 2 bbls. a day. Also an 86 foot dry hole.
15	NE.	17	"	"	"	Bored	42	1,800	- 37	1,763	42	1,758	Glacial quick-sand	Hard, iron		D	Insufficient supply; 5 bbls. a day. Several dry holes, 20 to 50 feet deep.
16	NE.	20	"	"	"	Dug	16	1,800	- 12	1,788	16	1,784	Glacial gravel	Hard		D	Insufficient supply; used only for house. Another well 20 feet deep.
17	SW.	21	"	"	"	Bored	72	1,800	- 50	1,750	72	1,728	Glacial drift	Hard, "alk-aline"		N	Stock won't drink this water.
18		22	"	"	"		157	1,780			157	1,623	Glacial gravel, sand				
19	NW.	24	"	"	"	Drilled	170	1,750	- 35	1,715	170	1,580	Glacial sand	Hard, iron		D, S	Abundant supply. Another well 65 feet deep, base in glacial drift.
20	SW.	25	"	"	"	Dug	24	1,800	- 21	1,779	24	1,776	Glacial sand	Hard, "alk-aline"		D, S	More than sufficient for 20 head stock.
21	S½.	25	"	"	"	Dug	41	1,760	- 1	1,759	41	1,719	Glacial gravel			D, S	Sufficient supply.
22	SE.	26	"	"	"	Drilled	185	1,760	-135	1,625	185	1,575	Glacial drift	Hard, iron	35	D, S	Sufficient for local needs.
23	NW.	26	"	"	"	Dug	16	1,785	- 14	1,771	16	1,769	Glacial sand	Hard		D, S	Sufficient only for domestic use.
24	NW.	28	"	"	"	Bored	50	1,800	- 43	1,757	50	1,750	Glacial drift	Hard, iron		D, S	Insufficient supply; not used for cooking. Stock well, 40 feet deep.
25	NW.	31	"	"	"	Bored	60	1,800	- 48	1,752	60	1,740	Glacial sand	Hard, iron		D, S	Sufficient for 15 head stock.
26	NE.	32	"	"	"	Dug	20	1,800	- 13	1,787	20	1,780	Glacial sand	Soft		D, S	Oversufficient for local needs.
27	SE.	36	"	"	"	Bored	28	1,750	- 26	1,724	28	1,722	Glacial gravel	Hard		D, S	Oversufficient for 25 head stock.

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 MORRIS, NO. 312, SASKATCHEWAN, (Part only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SE.	1	31	26	2	Dug	18	1,790	- 14	1,776	18	1,772	Glacial sand, gravel	Hard,		D	2 bbls. a day.
2	SE.	1	"	"	"	Bored	52	1,790	- 20	1,770	52	1,738	Glacial sand, clay	Hard, iron, "alkaline"		S	Sufficient for 12 head stock. Also a 220 foot well now plugged.
3		1	"	"	"		116	1,791			116	1,675	Glacial drift				Fair supply.
4	SW.	2	"	"	"	Dug	15	1,800	- 13	1,787	15	1,785	Glacial sand	Soft		D, S	Sufficient for 15 head stock.
5	NE.	3	"	"	"	Dug	20	1,790	- 16	1,774	20	1,770	Glacial sand	Hard		D, S	Sufficient supply; 12 bbls. a day. 25 foot well now dry.
6	SE.	4	"	"	"	Dug	21	1,840	- 19	1,821	21	1,819	Glacial gravel	Hard		D, S	Sufficient supply; 2 bbls. a day.
7	NW.	4	"	"	"	Dug	15	1,825	- 10	1,815	15	1,810	Glacial sand	Hard		D, S	Abundant supply.
8	SE.	5	"	"	"	Bored	95	1,850	- 70	1,780	95	1,755	Glacial drift	Hard, iron		D, S	Good supply.
9	SW.	5	"	"	"	Bored	85	1,850	- 70	1,780	85	1,765	Glacial gravel	Hard, iron		D, S	Oversufficient for 25 head stock; laxative.
10	NW.	9	"	"	"	Dug	9	1,770	- 4	1,766	9	1,761	Glacial sand	Hard		D, S	Abundant supply.
11	SW.	12	"	"	"	Drilled	190	1,810	-140	1,670	190	1,620	Glacial gravelly clay	Hard		D, S	Sufficient supply; 5 bbls. a day. 18 foot well used for house when it has water.
12	NW.	12	"	"	"	Bored	68	1,810	- 66	1,744	68	1,742	Glacial sand, gravel	Hard		D, S	Sufficient for 30 head stock.
13	NE.	12	"	"	"	Dug	16	1,810	- 9	1,801	16	1,794	Glacial sand	Hard		D, S	Insufficient supply. Chiefly a seepage well.
14	SE.	14	"	"	"	Dug	20	1,810	- 15	1,795	20	1,790	Glacial sand	Hard		D, S	Insufficient supply; 1 bbl. a day. 2 other seepage wells.
15	SW.	14	"	"	"	Bored	70	1,810	- 23	1,787	70	1,740	Glacial gravel	Hard, "alkaline"		D, S	Insufficient supply; 1 bbl. a day; laxative.
16	NW.	16	"	"	"	Drilled	72	1,810	- 57	1,753	72	1,738	Glacial drift	Hard, iron		D, S	Abundant supply.
17	NE.	18	"	"	"	Bored	37	1,800	- 30	1,770	37	1,763	Glacial gravel	Hard		D, S	Insufficient supply; 5 head stock; water haul
18	NW.	18	"	"	"	Bored	77	1,800	- 27	1,773	77	1,723	Glacial sand	Hard		S	Sufficient for stock; 10 bbls. a day.
19	NW.	20	"	"	"	Dug	11	1,790	- 7	1,783	11	1,779	Glacial sand	Hard		D, S	Abundant supply; 100 head stock.
20	NE.	21	"	"	"	Dug	11	1,780	- 7	1,773	8	1,772	Glacial gravel	Soft		D, S	Abundant supply; 75 head stock.
21	SW.	22	"	"	"	Dug	14	1,780	- 10	1,770	14	1,766	Glacial gravel	Hard		D, S	Sufficient for 15 to 25 head stock.
22	NE.	22	"	"	"	Dug	14	1,800	- 10	1,790	14	1,786	Glacial gravel	Hard		D, S	Sufficient supply; 15 bbls. a day. Dry hole 21 feet deep.
23	NE.	23	"	"	"	Dug	48	1,815			48	1,767	Glacial drift	Hard		D, S	Abundant supply.
24	NE.	24	"	"	"	Dug	14	1,815	- 10	1,805	14	1,801	Glacial sandy clay	Soft		D, S	Sufficient supply; 2 bbls. a day. Dry hole 18 feet deep.
25	NE.	27	"	"	"	Dug	11	1,800	- 6	1,794	6	1,794	Glacial gravel	Soft		D, S	Sufficient supply; 6 bbls. a day.
26	SW.	27	"	"	"	Dug	30	1,800	- 17	1,783	30	1,770	Glacial sand	Soft		D, S	More than sufficient for local needs.
27	SW.	28	"	"	"	Bored	57	1,800	- 45	1,755	57	1,743	Glacial sand, gravel	Hard, iron sulphur.		D, S	Insufficient for local needs. 14 foot well, good supply.

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

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of MORRIS, NO. 312, SASKATCHEWAN. (Part only)

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	NE.	30	31	26	2	Bored	35	1,775	- 15	1,760	35	1,740	Glacial gravel	Hard, "alkaline"		D, S	Insufficient supply ; waters only 15 head stock; laxative.
29	NW.	30	"	"	"	Bored	30	1,800	- 20	1,780	30	1,770	Glacial sand	Soft		D, S	Sufficient supply; 6 bbls. a day.
30	NW.	31	"	"	"	Drilled	180	1,760	- 60	1,700	180	1,580	Glacial sand	Hard, iron		D, S	Sufficient supply; 20 bbls. a day.
31	NE.	32	"	"	"	Drilled	180	1,780	-100	1,680	180	1,600	Glacial sand	Hard, iron		D, S	Sufficient for local needs.
32	SE.	33	"	"	"	Drilled	225	1,800			225	1,575	Glacial drift	Hard		D, S	Abundant supply.
33	SW.	35	"	"	"	Bored	30	1,800	- 26	1,774	30	1,770	Glacial drift	Hard, iron		D, S	Sufficient for 15 head stock.
34	NW.	35	"	"	"	Drilled	284	1,800	-184	1,616	284	1,536	Glacial gravel	Hard, iron		S	Very large supply. House water hauled.
35	SW.	36	"	"	"	Dug	18	1,810	- 12	1,798	18	1,792	Glacial drift	Hard		D, S	Sufficient supply; 1 bbl. a day.
1	SW.	3	31	27	2	Bored	40	1,900	0	1,900	40	1,860	Glacial drift	Soft		D, S	Goes dry. Dry holes to 90 feet in depth.
2	NW.	4	"	"	"	Bored	43	1,900	- 6	1,894	43	1,857	Glacial gravelly clay	Hard, iron		S	Abundant supply; 100 head stock. House water hauled.
3	NW.	5	"	"	"	Bored	24	1,955	- 16	1,939	34	1,921	Glacial drift	Hard		D, S	More than sufficient for 20 head stock.
4	SW.	7	"	"	"	Bored	28	1,970	- 14	1,956	28	1,942	Glacial gravel	Hard		D, S	More than sufficient for 50 head stock.
5	SE.	7	"	"	"	Bored	50	1,940	- 40	1,900	50	1,890	Glacial gravel	Hard		S	More than sufficient for 30 head stock.
6	NW.	8	"	"	"	Bored	59	1,945	- 45	1,900	59	1,886	Glacial drift	Hard		D, S	Abundant supply.
7	NW.	9	"	"	"	Bored	80	1,890	- 54	1,836	80	1,810	Glacial quicksand	Hard, iron		S	Sufficient supply; 3 tanks a day. House water hauled.
8	NE.	9	"	"	"	Dug	16	1,880	- 13	1,867	16	1,864	Glacial sand	Hard		D, S	More than sufficient for 20 head stock.
9	SW.	10	"	"	"	Bored	20	1,870	- 12	1,858	20	1,850	Glacial sand	Hard, "alkaline"		D, S	Sufficient supply; 6 bbls. a day.
10	SE.	10	"	"	"	Dug	12	1,860	- 8	1,852	12	1,848	Glacial gravel	Hard		D, S	Also dry hole, 30 feet deep.
11	NE.	10	"	"	"	Dug	9	1,850	- 5	1,845	- 9	1,841	Glacial gravel	Hard		D, S	More than sufficient for 50 head stock.
12	NE.	13	"	"	"	Dug	33	1,910	- 25	1,885	33	1,877	Glacial gravel	Hard, "alkaline"		D, S	Abundant supply; 20 bbls. a day.
13	NE.	20	"	"	"	Bored	25	1,840	- 20	1,820	25	1,815	Glacial gravel	Hard, "alkaline"		S	Insufficient supply; 6 head stock. 3 other similar wells.
14	NW.	21	"	"	"	Bored	20	1,840	- 10	1,830	20	1,820	Glacial drift	Hard		D	Insufficient supply; house use only; dry holes to 100 feet.
15	NE.	22	"	"	"	Bored	65	1,815	- 50	1,765	65	1,750	Glacial drift	Hard, iron		S	More than sufficient for 25 head stock.
16	NW.	23	"	"	"	Bored	39	1,810	- 12	1,798	39	1,771	Glacial sand	Hard, iron		S	2 tanks a day; laxative effect on man. Seepage well for house use.
17	SE.	24	"	"	"	Dug	48	1,790	- 30	1,760	48	1,742	Glacial sand	Hard, "alkaline"		D, S	Insufficien supply; water hauled.
18	NE.	25	"	"	"	Bored	65	1,760	- 53	1,707	65	1,695	Glacial drift	Hard, iron		D, S	Oversufficient for 20 head stock.
19	NW.	25	"	"	"	Bored	80	1,775	- 64	1,711	80	1,695	Glacial gravel	Hard		D, S	Oversufficient for 50 head stock.

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

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WELL RECORDS—Rural Municipality of MORRIS, NO. 312, SASKATCHEWAN. (Part only).

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
20	SE.	26	31	27	2	Bored	80	1,800	- 45	1,755	80	1,720	Glacial sand	Hard, iron		S	Over ufficient for 20 head stock.
21	SE.	29	"	"	"	Dug	12	1,840	- 9	1,831	12	1,828	Glacial gravel	Soft		D	Sufficient only for house.
22	NW.	29	"	"	"	Bored	60	1,840	- 10	1,830	60	1,780	Glacial gravel, sand	Hard, iron		D, S	Sufficient for 24 head stock.
23	NE.	30	"	"	"	Bored	34	1,850	- 9	1,841	34	1,816	Glacial drift	Hard, "alkaline"		D, S	Insufficient supply; ½ bbl. a day. Water hauled.
24	SW.	30	"	"	"	Bored	35	1,890	- 31	1,859	35	1,855	Glacial drift	Hard, "alkaline"		I S	Insufficient supply; very poor.
25	NW.	31	"	"	"	Bored	22	1,850	- 4	1,846	22	1,828	Glacial drift	Hard		D S	Insufficient supply; 5 bbls. a day. 80 foot dry hole.
26	NW.	32	"	"	"	Bored	90	1,810	- 84	1,726	90	1 720	Glacial sand	Hard, iron		D, S	Insufficient supply. 800 foot dry hole in Bearpaw.
27	SW.	33	"	"	"	Bored	20	1,810	- 12	1,798	20	1,790	Glacial gravel	Hard		D, S	Sufficient supply; 15 bbls. a day.
28	SE.	34	"	"	"	Dug	22	1,785	- 14	1,771	22	1,763	Glacial gravel	Hard		S	Sufficient supply; 20 bbls. a day.
29	SW.	35	"	"	"	Dug	20	1,785	- 10	1,775	20	1,765	Glacial drift	Soft		D, S	Insufficient for local needs. Dry holes to 50 feet.
30	NE.	35	"	"	"	Bored	65	1,775	- 50	1,725	65	1,710	Glacial sand	Hard, iron		D, S	Sufficient for 15 head stock.
31	SW.	36	"	"	"	Bored	65	1,775	- 45	1,730	65	1,710	Glacial sand	Hard, iron		D, S	More than sufficient for 40 head stock.
32	NE.	36	"	"	"	Bored	62	1,790	- 61	1,729	62	1,728	Glacial sand	Hard, iron		S	Good supply; 15 bbls. a day.
1	NE.	1	"	28	2	Bored	60	1,980	- 40	1,940	60	1,920	Glacial drift	Hard		S	Good supply. Similar well, 58 feet deep used for house.
2	NW.	4	"	"	"	Bored	95	2,100									Dry hole.
3	SW.	5	"	"	"	Dug	12	2,100	- 8	2,092	12	2,088	Glacial drift	Hard, "alkaline"		D, S	Sufficient only for 10 head stock.
4	SE.	6	"	"	"	Dug	10	2,100	- 8	2,092	10	2,090	Glacial gravel	Hard		D, S	Sufficient for 15 head stock.
5	NW.	7	"	"	"	Dug	8	2,140	- 5	2,135	8	2,132	Glacial gravel	Hard, "alkaline"		D, S	Insufficient supply; 12 bbls. a day;laxative.
6	NE.	12	"	"	"	Bored	40	1,930	- 30	1,900	40	1,890	Glacial gravel, sand	Hard, iron		D, S	More than sufficient for 10 head stock.
7	SW.	14	"	"	"	Bored	60	2,000	- 3	1,997	60	1,940	Glacial sand	Hard, iron		S	Abundant supply.
8	SE.	15	"	"	"	Dug	14	2,010	- 9	2,001	14	1,996	Glacial drift	Hard		D, S	Insufficient supply; 2 bbls. a day. Water hauled.
9	NW.	15	"	"	"	Dug	15	2,050	- 10	2,040	15	2,035	Glacial sand	Hard		D, S	Insufficient supply; 10 head stock.
10	NE.	16	"	"	"	Bored	40	2,050			40	2,010	Glacial drift	Hard, "alkaline"		S	Insufficient for stock needs.
11	NW.	22	"	"	"	Bored	40	2,000	- 30	1,970	40	1,960	Glacial sandy clay	Hard		D	Insufficient supply; house use only.
12	NE.	22	"	"	"	Bored	17	1,950	- 7	1,943	17	1,933	Glacial gravel	Hard, "alkaline"		S	Sufficient supply; 10 bbls. a day; laxative for man.
13	NE.	23	"	"	"	Bored	28	1,925	- 25	1,900	28	1,897	Glacial gravel	Hard, "alkaline"		D, S	More than sufficient for 40 head stodk ; laxative.
14	SE.	24	"	"	"	Bored	64	1,915	- 34	1,881	64	1,851	Glacial sand	Hard, "alkaline"		D, S	Good supply; laxative.

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 MORRIS, NO. 312, SASKATCHEWAN, (Part only).

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	NW.	24	31	28	2	Bored	35	1,915	- 20	1,895	35	1,880	Glacial gravel	Hard		D, S	More than sufficient for 50 head stock.
16	SE.	25	"	"	"	Bored	78	1,900	- 28	1,872	78	1,822	Glacial gravel	Hard, iron		D, S	More than sufficient; 10 bbls. a day. Seepage well, 27 feet deep.
17	NE.	25	"	"	"	Bored	70	1,890	- 40	1,850	70	1,820	Glacial drift	Hard, iron		S	Sufficient supply; unfit for humans.
18	NE.	26	"	"	""	Bored	22	1,900			22	1,878	Glacial sand	Hard, iron		D, S	Insufficient for 5 head stock; seepage well to
19	SE.	27	"	"	"	Dug	14	1,975	- 11	1,964	14	1,961	Glacial sand	Hard		D, S	Sufficient supply; 2 to 3 bbls. a day. 28 foo dry hole.
20	SW.	27	"	"	"	Bored	82	2,000	- 72	1,928	82	1,918	Glacial gravel	Hard		S	Insufficient supply; 3 bbls. a day. Seepage well for house.
21	NW.	28	"	"	"	Bored	12	2,000	- 9	1,991	12	1,988	Glacial gravel	Hard		D, S	Sufficient for 40 head stock.
22	SE.	32	"	"	"	Bored	35	1,950	- 20	1,930	35	1,915	Glacial gravel	Hard		D, S	Very good supply.
23	NE.	32	"	"	"	Dug	11	1,950	- 8	1,942	11	1,939	Glacial quick-sand	Hard, "alk-aline"		D, S	Sufficient supply; 3 head stock.
24	NE.	33	"	"	"	Bored	40	1,940	- 28	1,912	40	1,900	Glacial gravel	Hard, iron		S	Sufficient supply; 15 bbls. a day. House water hauled.
25	SW.	34	"	"	"	Bored	24	1,940	- 10	1,930	24	1,916	Glacial sand	Hard		D, S	Sufficient supply part of year. Goes dry.
26	SE.	36	"	"	"	Bored	72	1,870	- 42	1,828	72	1,798	Glacial drift with stones	Hard, iron		D, S	Abundant supply. Dry hole. 100 feet deep.
1	SE.	1	31	29	2	Bored	18	2,040	- 14	2,026	18	2,022	Glacial sand	Hard, "alk-aline"		D	Sufficient only for house use. Stock use a spring.
2	SW.	1	"	"	"	Dug	14	2,060	- 10	2,050	14	2,046	Glacial sand	Hard		D, S	Sufficient only for 17 head stock. Stock use a spring.
3	SE.	2	"	"	"	Bored	40	2,170	- 30	2,140	40	2,130	Glacial gravel	Hard		D, S	Insufficient supply; 6 bbls. a day; other similar wells.
4	SW.	12	"	"	"	Dug	8	2,100	- 5	2,095	8	2,092	Glacial gravel	Soft		D, S	Oversufficient for 54 head stock. Also has a spring on this ¼.
5	NE.	12	"	"	"	Dug	16	2,150	- 13	2,137	16	2,034	Glacial gravel, sand	Soft		D, S	Insufficient supply; 1 bbl. a day. 30 foot well in sand; "alkaline".
6		12	"	"	"	Drilled	650	2,100					Bedrock Bearpaw formation				No other information.
7	SE.	13	"	"	"	Dug	24	2,150	- 15	2,135	24	2,126	Glacial gravel, sand	Hard, "alk-aline"		D, S	Oversufficient supply; 15 bbls. a day.
8	NE.	13	"	"	"	Dug	14	2,150	- 12	2,138	14	2,136	Glacial gravel, sand	Hard, iron		D, S	Sufficient for 20 head stock.
9	NE.	14	"	"	"	Bored	36	2,100	- 30	2,070	36	2,164	Glacial gravel	Hard		D, S	Insufficient supply; 7 bbls. a day. Well in valley, 16 feet, good supply from gravel.
10	SE.	24	"	"	"	Bored	17	2,130	- 15	2,115	17	2,113	Glacial gravel	Hard		D, S	Sufficient supply; 3 bbls. a day.
11	NE.	24	"	"	"	Dug	20	2,120	- 14	2,106	20	2,100	Glacial gravel, sand	Soft		D, S	Sufficient for 15 head stock.
12	NW.	25	"	"	"	Bored	24	2,050	- 23	2,027	24	2,026	Glacial quick-sand	Hard		D	Sufficient only for house. Stock water hauled.
1	SE.	2	32	25	2	Dug	8	1,750	- 3	1,747	8	1,742	Glacial sand	Hard		D, S	Large supply. 100 foot dry hole.
2	SW.	2	"	"	"	Dug	18	1,755	- 15	1,740	18	1,737	Glacial drift	Hard		D, S	Sufficient for 10 head stock. 14 foot seepage well.
3	NE.	3	"	"	"	Drilled	198	1,710	-103	1,607	198	1,512	Glacial sand				No other information.

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 MORRIS, NO. 132, SASKATCHEWAN. (Part only).

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
4	NW.	3	32	25	2	Bored	50	1,780	- 14	1,766	50	1,730	Glacial drift	Hard, iron		D, S	Oversufficient for local needs.
1	SE.	1	32	26	2	Bored	6	1,790	- 3	1,787	6	1,784	Glacial quick-sand	Hard		D, S	Abundant supply.
2	SE.	2	"	"	"	Bored	25	1,795	- 12	1,783	25	1,770	Glacial sand	Hard		D, S	Insufficient supply; 2 similar wells yield similar water.
3	SW.	2	"	"	"	Bored	25	1,793	- 10	1,783	25	1,768	Glacial gravel	Hard		D, S	Sufficient for local needs.
4	N½	5	"	"	"	Bored	40	1,800	- 32	1,768	40	1,760	Glacial drift	Hard, "alkaline"		D,	Insufficient supply; used only for domestic needs.
5	SE.	6	"	"	"	Bored	42	1,750	- 8	1,742	42	1,708	Glacial sand	Soft		D, S	Sufficient for local needs.
6	SW.	6	"	"	"	Bored	95	1,750	- 40	1,710	95	1,655	Glacial sand	Hard, iron		D, S	Sufficient for local needs.
7	SE.	11	"	"	"	Bored	52	1,800	- 10	1,790	52	1,748	Glacial gravel	Hard		D, S	More than sufficient for 25 head stock.
8	NE.	12	"	"	"	Dug	14	1,800	- 8	1,792	14	1,786	Glacial gravel	Hard		D, S	Sufficient for local needs.
9	SW.	13	"	"	"	Dug	36	1,775	- 33	1,742	36	1,739	Glacial sand	Hard		D, S	Sufficient for 10 head stock. Some water haule
10	NE.	14	"	"	"	Dug	12	1,630	- 10	1,620	12	1,618	Glacial drift	Hard		D	Sufficient only for house.
11	SW.	15	"	"	"	Bored	50	1,775	- 25	1,750	50	1,725	Glacial sand	Hard, iron		D, S	Sufficient for more than 8 head stock.
12	SE.	16	"	"	"	Dug	16	1,800	- 12	1,788	16	1,784	Glacial sand	Hard		S	Insufficient supply; 1 bbl. a day. A 70 foot well gave a bitter water, unfit for use.
13	SW.	18	"	"	"	Bored	35	1,725	- 34	1,691	35	1,690	Glacial gravel	Hard, iron		D, S	Sufficient for 27 head stock.
1	SE.	2	32	27	2	Bored	40	1,760	- 20	1,740	40	1,720	Glacial drift	Hard		S	Insufficient for local needs.
2	NW.	5	"	"	"	Bored	30	1,800	- 3	1,797	30	1,770	Glacial sand	Hard		S	Insufficient supply; 2 bbls. a day. 2 similar well.
3	NE.	5	"	"	"	Bored	90	1,800	- 60	1,740	90	1,710	Glacial gravel	Hard, iron, "alkaline"		S	Sufficient for local needs.
4	NW.	6	"	"	"	Bored	20	1,750	- 5	1,745	20	1,730	Glacial sand	Iron, "alkaline, hard		S	Insufficient for local needs.
5	NE.	6	"	"	"	Bored	30	1,800	- 3	1,797	30	1,770	Glacial drift	Soft		D	Insufficient for local needs.
6	NW.	10	"	"	"	Bored	65	1,775	- 20	1,755	65	1,710	Glacial drift	Hard		S	Insufficient supply; dry holes to 90 feet.
7	NE.	10	"	"	"	Dug	42	1,780	- 8	1,772	42	1,738	Glacial sand	Hard		D, S	Insufficient supply; 2 bbls. a day. 2 other wells, 35 feet deep, poor supply.
8	NW.	11	"	"	"	Bored	60	1,750	- 40	1,710	60	1,690	Glacial gravel	Hard, iron		S	Insufficient supply; 4 bbls. a day.
9	SE.	13	"	"	"	Dug	3	1,725	- 2	1,723	3	1,722	Glacial gravel	Soft		S	Oversufficient for stock needs.
10	SE.	17	"	"	"	Bored	96	1,745	- 94	1,651	96	1,649	Glacial drift	Hard		S	Insufficient supply; 1 bbl. a day.
11	SE.	20	"	"	"	Bored	45	1,750	- 25	1,725	45	1,705	Glacial drift	Hard, "alkaline"		S	Sufficient for stock needs. Dry holes to 120 feet deep.
12	SE.	22	"	"	"	Bored	36	1,730	- 18	1,712	36	1,694	Glacial sand	Hard, iron		D, S	Oversufficient for 16 head stock. A 70 foot well yields poor water.
13	SE.	27	"	"	"	Bored	67	1,730	- 45	1,685	67	1,663	Glacial drift	Hard, iron		D	Sufficient supply; used by town residents. Many dry holes on this section.

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 MORRIS, NO. 132, SASKATCHEWAN. (Part only).

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
14	NW.	27	32	27	2	Bored	65	1,730	- 30	1,700	65	1,665	Glacial quick-sand	Hard, iron		D, S	Oversufficient for local needs.
15	SE.	28	"	"	"	Bored	35	1,750	- 25	1,725	35	1,715	Glacial drift	Hard, iron		D, S	Sufficient for local needs.
16	SE.	29	"	"	"	Bored	30	1,740	0	1,740	30	1,710	Glacial drift	Hard, iron "alkaline"		S	Sufficient while slough has water.
17	SW.	29	"	"	"	Dug	16	1,750	- 12	1,738	16	1,734	Glacial drift	Hard			Insufficient for local needs.
18	SW.	30	"	"	"	Bored	37	1,740			37	1,703	Glacial gravel	Hard		, S	Insufficient for local needs.
19	NE.	30	"	"	"	Dug	14	1,750	- 11	1,739	14	1,736	Glacial gravel	Soft		, S	Insufficient supply; 2 bbls. a day. A 60 foot well gives a small supply.
20	SE.	32	"	"	"	Bored	30	1,730			30	1,700	Glacial drift	Soft		S	Insufficient for local needs.
21	SW.	32	"	"	"	Bored	73	1,750	- 70	1,680	73	1,677	Glacial drift	Hard, iron, "alkaline"		S	Insufficient for local needs.
22	NE.	32	"	"	"	Bored	55	1,740			55	1,685	Glacial drift	Hard, iron, "alkaline"		D, S	Insufficient supply; waters 15 head stock sometimes.
23	SE.	35	"	"	"	Bored	32	1,700	- 15	1,685	32	1,668	Glacial drift	Hard		D	Insufficient for local needs.
24	NE.	35	"	"	"	Bored	38	1,750	- 30	1,720	38	1,712	Glacial sand	Soft		D, S	Sufficient for 50 head stock; no shortage of water on this ¼.
25	NE.	36	"	"	"	Dug	14	1,750			14	1,736	Glacial sand, gravel	Soft		S	Insufficient for local needs.
1	SE.	1	32	28	2	Dug	28	1,750	0	1,750	28	1,722	Glacial drift	Soft		D, S	Suffcient only in spring. Dry holes to 225 fee
2	SW.	2	"	"	"	Spring		1,830	0	1,830	0	1,830	Glacial drift	Hard		D, S	Large supply.
3	SW.	4	"	"	"	Bored	45	1,915	- 35	1,880	45	1,870	Glacial sand	Hard, iron		D, S	Only sufficient for 15 head stock.
4	NE.	8	"	"	"	Dug	7	1,800	0	1,800	7	1,793	Glacial sand	Hard, iron		D, S	Sufficient supply; 8 bbls. a day.
5	NW.	10	"	"	"	Bored	74	1,830			74	1,756	Glacial gravel	Hard		S	Good supply. Similar quality water from 35 foot well.
6	SW.	12	"	"	"	Bored	32	1,750	- 20	1,730	32	1,718	Glacial drift	Hard		S	Over sufficient for 20 head stock.
7	SW.	12	"	"	"	Dug	18	1,750	- 8	1,742	18	1,732	Glacial sand	Hard		D, S	Oversufficient for 25 head stock.
8	NW.	12	"	"	"	Dug	20	1,760	0	1,760	20	1,740	Glacial drift	Soft		D, S	Insufficient supply; beside a slough.
9	SE.	13	"	"	"	Drilled	500	1,750	- 10	1,740	500	1,250	Bedrock, Bear-paw sand	Hard, salty		S	Sufficient for 50 head stock. Several other shallow wells.
10	SW.	13	"	"	"	Dug	15	1,720	- 10	1,710	15	1,705	Glacial gravel	Soft		D, S	Sufficient for 12 head stock.
11	SE.	14	"	"	"	Dug	15	1,760	- 6	1,754	15	1,745	Glacial gravel	Soft		D, S	Oversufficient for local needs.
12	NW.	16	"	"	"	Bored	23	1,800	- 21	1,779	23	1,777	Glacial gravel	Hard		D	Insufficient supply; used only for house. Dry holes to 60 feet deep.
13	NE.	17	"	"	"	Bored	50	1,810	- 40	1,770	50	1,760	Glacial gravel	Hard, "alk-aline"		D, S	Sufficient supply; 10 bbls. a day.
14	NW.	21	"	"	"	Bored	115	1,800	- 75	1,725	115	1,685	Glacial drift	Hard, iron "alkaline"		D, S	Oversufficient for 25 head stock; laxative.
15	SE.	23	"	"	"	Bored	25	1,770	- 18	1,752	25	1,745	Glacial sand	Hard, iron		S	Sufficient supply; 6 bbls. a day.

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 MORRIS, NO. 312, SASKATCHEWAN, (Part only)

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	SE.	24	32	28	2	Bored	32	1,785	- 28	1,757	32	1,753	Glacial drift	Hard		D, S	Insufficient supply. Dry holes to 60 feet.
17	SW.	24	"	"	"	Dug	11	1,770	0	1,770	11	1,759	Glacial gravel	Soft		D	Insufficient supply. Located in slough.
18	NW.	24	"	"	"	Bored	30	1,760	- 10	1,750	30	1,730	Glacial drift	Hard		D, S	Insufficient supply; waters 10 head stock.
19	SW.	28	"	"	"	Drilled	430	1,780	- 40	1,740	430	1,350	Bedrock, Bear-paw sand	Soft, salty, soda		D, S	Abundant supply; also 110 foot dry hole.
20	NE.		"	"	"	Bored	70	1,750			70	1,680	Glacial drift	Hard, "alkaline"		S	Sufficient for 15 head stock, in wet years.
21	SE.	30	"	"	"	Bored	32	1,800	- 22	1,778	32	1,768	Glacial sand	Hard, iron, "alkaline"		S	Abundant supply; laxative for man.
22	NE.	31	"	"	"	Bored	60	1,760			60	1,700	Glacial drift	Hard, "alkaline"		S	Insufficient supply; will water 20 head stock.
23	NE.	31	"	"	"	Dug	15	1,760	- 10	1,750	15	1,745	Glacial drift	Hard		D	Insufficient supply; sufficient only for domestic use.
24	SE.	32	"	"	"	Bored	85	1,780			85	1,695	Glacial gravel	Iron, hard		S	Poor supply.
25	NE.	32	"	"	"	Drilled	382	1,770	- 25	1,745	382	1,388	Bedrock, Bear-paw sand	Hard, salty		S	Good supply; 12 bbls. a day.
26	SW.	33	"	"	"	Dug	15	1,780	- 10	1,770	15	1,765	Glacial gravel	Hard		D, S	Poor supply; sufficient for 10 head stock.
27	SE.	34	"	"	"	Drilled	465	1,740	- 10	1,730	465	1,275	Bedrock, Bear-paw sand	Salty		S	Abundant supply. Another 20 foot well for house use.
1	SE.	1	32	29	2	Dug	14	1,925	- 4	1,921	14	1,911	Glacial sand	Hard, "alkaline"		D, S	Oversufficient for 30 head stock. Also springs
2	NE.	1	"	"	"	Dug	18	1,925	- 15	1,910	18	1,907	Glacial sand, gravel	Hard, iron		D, S	Sufficient supply; 15 bbls. a day.
3	NW.	12	"	"	"	Bored	38	1,900	- 37	1,863	38	1,862	Glacial gravel	Hard, "alkaline"		D, S	Just sufficient supply; 1 bbl. a day.
4	NE.	12	"	"	"	Bored	56	1,900	- 48	1,852	56	1,844	Glacial sand	Hard, iron, "alkaline"		D, S	Oversufficient for local needs.
5	SW.	13	"	"	"	Dug	14	1,900	- 12	1,888	14	1,886	Glacial drift	Hard		D, S	Insufficient for local needs.
6	NE.	14	"	"	"	Bored	18	1,900	- 15	1,885	18	1,882	Glacial sand	Hard, "alkaline"		D	Sufficient only for house.
7	SW.	24	"	"	"	Bored	30	1,850	- 28	1,822	30	1,820	Glacial gravel	Hard, iron, "alkaline"		D, S	Sufficient for 30 head stock; also has spring.
8	NE.	36	"	"	"	Bored	50	1,800	- 48	1,752	50	1,750	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 15 bbls. day. 14 foot seepage well beside slough.

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.