CANADA
DEPARTMENT OF MINES

HON. T. A. CRERAR, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF MORSE No. 165 SASKATCHEWAN

BY

B. R. MacKay, & D. C. Maddox

Water Supply Paper No. 141

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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF HORSE, NO.165 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 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 fine the approximate depth to a water-bearing horizon, be 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 ago.

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 Morse covers an area of 324 square miles in southern Saskatchewan, and includes tps. 16, 17, and 18, ranges 7, 8, and 9, W. 3rd mer. The town of Morse, which is about 2 miles south of the centre of the municipality, is about 66 miles west of Moose Jaw, about 120 miles southwest of Saskatoon, and about 35 miles northeast of Swift Current. The main line of the Canadian Pacific railway and No. 1 highway pass in a general westerly direction through township 17. Herbert, Morse, and Ernfold, located on the railway, are the chief centres of population. With the exception of some of the low, marshy areas and of some of the more hilly part of the municipality, the country is fairly thickly settled. Over most of the municipality the surface has low, rounded elevations and undrained depressions. In townships 16 and 17, ranges 8 and 9, a low, flat area lies at less than 2,300 feet above sea-level and is marshy in wet seasons and occasionally in the spring. Towards the west this low area extends to the northwest corner of township 17, range 9, and slightly north of it. In that part of the municipality north of this depressed area are many northwesterly trending drift ridges. South of the depressed area, within the municipality, the lineal arrangement of the hills is less marked, especially in the eastern half of this part of the municipality. Many of the rounded highlands and the ridges rise to 2,500 feet above sea-level, and in the northwest and southwest some hills are over 2,600 feet above sea-level. A large part of the municipality drains to the depressed area mentioned. An intermittent stream connects this basin with the bed of Rush lake, west of this municipality. In the northern third of townships 18, ranges 3, 4, and 5, there are

a few small lakes. A number of dry lake beds and low, marshy areas are distributed irregularly through the remainder of the municipality.

Glacial lake clays underlie and border the low, flat area in townships 16, 17, and 18, ranges 8 and 9, except the part north of Herbert near the western boundary of the municipality which is underlain by boulder clay. A very irregular belt of glacial outwash sands and gravels extends through the northeast and northern parts of the municipality from the eastern boundary to a point about 1½ miles west of the western boundary of range 8. The low, flat area in the eastern half of township 18, range 8, is also underlain by and bordered with glacial lake sands and gravels.

The remainder of the municipality is underlain by moraine and boulder clay which are distributed in irregular belts and areas, as indicated on the accompanying map, Figure 1.

Water-bearing Horizons in the Unconsolidated Deposits

The glacial lake clay in this municipality is not a good source of ground water, and most of the wells in the glacial lake clay area obtain water from the underlying glacial till or the moraine. The depths of the wells in this area range from 12 to 90 feet, but most of the wells are over 35 feet deep. They obtain moderate supplies of water which in the western part of the area is "alkaline".

Supplies of water sufficient for farm use are found in the glacial outwash sands and gravels at depths of 4 to 20 feet, but several wells in this area have passed through the sands and gravels into the underlying moraine. In several of the shallow wells in the eastern part of the area, which is underlain by glacial sands and gravels, the water is soft, in

several wells the water is "alkaline", and in a few wells the water is too "alkaline" for drinking.

In the till plain and moraine, ground water is found in lenses or discontinuous beds of sand and gravel. The depth of the wells in the boulder clay and moraine varies widely, and no definite zones of depth to water can be outlined. In that part of townships 16, ranges 7, 8, and 9, that is underlain by boulder clay and moraine, the water in a large proportion of the wells is "alkaline". Most of the wells in the western part of township 17, range 9, yield "alkaline" water, and elsewhere in the moraine and glacial till many wells yield "alkaline" water.

In the southern half of townships 16 and 17, ranges 7 and 8, an aquifer about 2,340 to 2,380 feet above sea-level supplies a number of wells 58 to 115 feet deep. This aquifer comes to the surface and feeds a spring on the NW.$\frac{1}{4}$, sec. 10, tp. 16, range 8. The aquifer is probably an interglacial deposit of outwash sands which slopes northward. There are several other aquifers in the municipality but they do not, so far as known, cover large areas, and they are described in the reports on the individual township.

The thickness of the unconsolidated deposits in this municipality is not known. In the vicinity of Morse several wells from 140 to 210 feet deep reach bedrock, but the elevation of the contact is not known. In the northern part of township 17, range 8, a well 250 feet deep did not encounter bedrock, and over a large part of the municipality the unconsolidated deposits are at least 100 feet thick.

Water-bearing Horizons in the Bedrock

The Bearpaw formation underlies the unconsolidated deposits over the greater part of the southern two-thirds of

the municipality, most of the southern half of township 18, range 7, and the southwestern part of township 18, range 9. The Eastend formation is thought to overlie the Bearpaw formation and to underlie the unconsolidated deposits over the greater part of the northern third of the municipality, the greater part of the northern two-thirds of township 17, range 8, and the adjacent parts of township 17, range 7. An area of about 3 square miles in the southwest part of the municipality is underlain by the Cypress Hills formation which overlies the Eastend formation. There are no rock outcrops in the municipality and the geological boundaries are largely conjectural.

The Bearpaw formation consists chiefly of dark grey, impervious shale, but generally contains beds of sand that contain soft water. The thickness of the Bearpaw formation in this municipality is not known and no detailed logs of the deep bedrock wells are available. It seems probable that some of the deeper bedrock wells have passed into the Belly River formation which underlies the Bearpaw formation, and which contains a number of sandy beds. The water in some of the deep wells in Herbert and vicinity is brown, probably coloured by contact with coal, and is probably derived from an aquifer in the Belly River formation.

An aquifer that is about 1,750 feet above sea-level supplies water to a well, 640 feet deep, on sec. 34, tp. 18, range 9. No other wells in the municipality obtain water from this aquifer which is probably in the Belly River formation.

An aquifer about 1,810 to 1,862 feet above sea-level supplies soft water to four wells, 443 to 615 feet deep, in this municipality. The aquifer appears to dip towards the southeast from an elevation of about 1,855 feet above sea-level at Herbert to about 1,810 feet above sea-level in sec. 21, tp.16,

range 7. The well, 560 feet deep, on sec. 15, tp. 18, range 8, obtains water from an aquifer that is about 1,795 feet above sea-level. This may be the same aquifer as the one just mentioned, but this well may have been drilled farther into the aquifer than the other four wells. The aquifer or aquifers that supply these five wells are probably in the upper part of the Belly River formation.

In Herbert and the vicinity, three wells, 400 to 425 feet deep, obtain soft water from an aquifer that is about 1,894 to 1,919 feet above sea-level. This aquifer is about 50 feet above the previous one and is probably near the top of the Belly River formation.

An aquifer about 1,900 feet above sea-level supplies soft water to a well, 320 feet deep, in Herbert, and is probably in the lower part of the Bearpaw formation. An aquifer about 2,105 feet above sea-level supplies a well 280 feet deep on sec. 10, tp. 18, range 9. An aquifer about 2,210 to 2,235 feet above sea-level supplies water to a well 180 feet deep near Morse, and to a well, 280 feet deep, on sec. 16, tp. 18, range 9. This aquifer also dips to the southeast. The number of wells drilled into the bedrock is not sufficient to accurately determine the extent of the several aquifers but the aquifer that is about 1,800 to 1,860 feet above sea-level appears to underlie most of the municipality. However, wells on sec. 21, tp. 17, range 9, and sec. 18, tp. 18, range 9, were dug to elevations of 1,720 and 1,677 feet above sea-level, respectively, before striking water. The aquifers that are about 1,895 to 1,920 feet above sea-level seem to occur only at the western edge of the municipality, as several wells east and northeast of Herbert did not obtain water from them. The aquifer that is about 2,210 to 2,235 feet above sea-level

appears to be a northwesterly trending lens of sand only a few miles wide, as several wells in the municipality a few miles from the general line of the aquifer obtained no water at or near the elevations mentioned.

The aquifer that is about 2,100 feet above sea-level seems to be confined to the northwestern part of the municipality, as the wells in and near Herbert, and a well on sec. 15, tp. 18, range 8, di not obtain water at this horizon.

In drilling in search of water in the bedrock, the elevation of the ground surface, the probable extent of the aquifer, and the probable elevation of the aquifer at the well site, should be considered.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 16, Range 7

A large part of the southern two-thirds of this township is over 2,400 feet above sea-level, and several of the rounded elevations rise to over 2,500 feet above sea-level. From this elevated area the land slopes gently northwards and eastwards to a minimum of 2,250 feet above sea-level in the northeast corner of the township. Most of the township is rolling country and the slopes are comparatively gentle. There are no permanent supplies of surface water. Some long, narrow valleys near the southern boundary might possibly be dammed to store surface water. The township is underlain by moraine, except for an area of about three-quarters square mile in the southwest corner which is underlain by glacial till. The Bearpaw formation is thought to underlie the unconsolidated deposits over the entire township. There are no streams or permanent lakes in the township.

The depths of the producing wells in this township range from 10 to 120 feet. In the southern third of the township, the producing wells, with two exceptions, are less than 30 feet deep. Several dry holes 60 to 100 feet deep were put down in this part of the township. A bed of gravel 22 to 28 feet thick provides two wells in section 9 with ample supplies of water, and a well on section 3 also obtains water from gravel. This gravel may have been deposited in an old stream channel. In two wells, 22 feet deep, the water is soft; the water in the remaining wells is hard but drinkable. The supply of water at most of the farms in this part of the township is sufficient for all purposes.

In the northern two-thirds of the township several of the deeper wells yield water that is too "alkaline" for drinking.

An aquifer about 2,200 feet above sea-level supplies several wells in the eastern part of this area with water that is too "alkaline" for human use. The aquifer previously mentioned, about 2,360 feet above sea-level, underlies the southwestern part of the township. The well logs available show a great thickness of boulder clay, the upper few feet of which is reported as "sandy". On section 18 the yellow, oxidized boulder clay is 30 feet thick. Beds of sand and gravel are reported in the boulder clay at various depths, and provide a limited supply of water to wells put down to them. The supply of water in most of the wells is sufficient for farm purposes. In sections 22 and 23 an aquifer about 2,280 feet above sea-level provides ample supplies of water to several wells. In section 18 a dry hole was put down to 90 feet and ground water conditions are not favourable. Dams are used to supplement the well water supply at many farms. No springs are reported.

One well, 615 feet deep, obtained soft water from a horizon about 1,810 feet above sea-level that is probably in the upper part of the Belly River formation. It is probable that this aquifer underlies the entire township.

Township 16, Range 8

The land surface slopes generally northward and westward from elevations of over 2,500 feet above sea-level in the southeast to the low area in the north, where elevations are less than 2,300 feet above sea-level. The country is rolling and the slopes are gentle. Direction of surface run-off is to the depressions on and near the northern boundary of the township or to a depressed area less than 2,350 feet above sea-level in sections 15 and 16.

A belt of glacial lake clays with an average width of about 1½ miles underlies and borders the low, flat area in the northern part of the township. The remainder of the township is underlain by glacial till and moraine, and all records obtained were from wells in these deposits.

The depths of the wells in the unconsolidated deposits range from 12 to 115 feet. The aquifer previously mentioned, about 2,360 feet above sea-level, underlies the southern part of the township. An aquifer about 2,224 to 2,240 feet above sea-level supplies two wells, 106 and 110 feet deep, in the northern half of the township with a moderate supply of water that is not too "alkaline" for human use.

In many of the wells in this township the water is "alkaline", but in only one well, 84 feet deep, is it too "alkaline" and laxative for human use.

In the southeast part of the township two wells, 40 and 115 feet deep, yield large supplies of water, and two springs supplement the supply of well water. At six farms the supply of well water is insufficient for local use. Four dry holes, 40 to 100 feet deep, were put down. Dams for storage of surface water are used on three farms. The boulder clay on section 2 is 100 feet thick. Elsewhere the thickness of the unconsolidated deposits is not known, but it appears to be at least 100 feet over most of the township. The yellow, oxidized boulder clay is 6 feet thick on section 25; the thickness elsewhere is not known.

A well, 468 feet deep, on section 27, obtains an ample supply of soft water, which can be used for all purposes except irrigation, from a sand aquifer, about 1,832 feet above sea-level, which is probably in the upper part of the Belly River formation. This aquifer probably underlies the entire township.

Township 16, Range 9

A hilly area, in part over 2,600 feet above sea-level, occupies most of the southern third of the township. From this high area the land slopes northward to a depression less than 2,300 feet above sea-level. There are no permanent lakes or streams in the township. Surface run-off is to undrained depressions in the hilly area and to the low area near the northern boundary.

A band of glacial lake clays about 1½ miles in average width underlies the low, flat area in the northern part of the township and extends a short distance south of it. The remainder of the township is underlain by glacial till and moraine.

The depth of the wells in this township ranges from 10 to 98 feet, but in the northern two-thirds of the township most of the wells are more than 40 feet deep. In the southern third of the township several wells, 9 to 16 feet deep, located on the northward slope of the hills obtain small supplies of soft water. In the area including sections 2, 3, and 4, and extending 4 miles north of them, a large proportion of the wells yield "alkaline" water, and in two wells, 65 and 90 feet deep, respectively, the water is too "alkaline" for human use. In a well 40 feet deep on section 31, the water is also too "alkaline" for human use.

At six wells in this township the supply of water is insufficient for local requirements. Dams are used to supplement well water supply at six farms. Springs occur on sections 23 and 24 at elevations of about 2,350 and 2,400 feet above sea-level, and there is a spring about 2,325 feet above sea-level in section 31 that discharges into an undrained hollow. Two dry holes, 75 and 80 feet deep, respectively, were put down in this township. The thickness of the yellow, oxidized boulder

clay in four wells in the township is 10 to 16 feet. In sections 21 to 23, two beds of sand are found in the clay at depths of 8 to 15 feet and 3[illegible] to 40 feet, respectively, but the upper sand appears to contain little or no water.

No wells have been drilled to bedrock in this township, but it is probable that the soft water aquifer in the Belly River formation underlies the township at elevations of about 1,840 to 1,850 feet above sea-level.

Township 17, Range 7

Northwest of Ernfold a hill rises to over 2,450 feet above sea-level, but the slopes are gentle. In the northwest the country is more hilly and elevated than in the southeast where the land surface falls to less than 2,250 feet above sea-level near the southeast corner of the township.

An area of about 2½ square miles in the northeast and an area of about ½ square mile in the northwest are underlain by glacial outwash sands and gravels. Moraine underlies the remainder of the township. There are no permanent lakes or streams in the township. Drainage is towards the undrained depressions.

In that part of the township underlain by glacial outwash sands and gravels most of the wells are less than 30 feet deep. Supplies of water sufficient for farm use are usually found in these sands, but some of the deeper wells have passed into the underlying boulder clay of the moraine. In two of the shallower wells the water is soft; in the deeper wells in the moraine the water is "alkaline". In that part of the township underlain by moraine the depth of the producing wells ranges from 9 to 101 feet, but most of them are less than 40 feet deep. Three dry holes from 100 to 180 feet deep were put down on sections 9, 10, and 14.

In the southeast quarter of the township most of the shallow wells yield soft water, and several wells 14 to 20 feet deep in the southwest quarter also yield soft water. In four wells, 16 to 101 feet deep, the water is too "alkaline" for human use, but in the remaining wells the water is hard, and is not too "alkaline" for drinking.

Several springs supplement the well water supply and appear to be fed by aquifers that are about 2,300 to 2,350 feet above sea-level. Few well-defined aquifers appear to exist. An aquifer about 2,243 to 2,258 feet above sea-level supplies hard water to two wells in section 16, but a well 150 feet deep on section 10 and a well 180 feet on section 11 failed to obtain water from this aquifer.

The supply of water from several wells in the southern third of the township is not sufficient for local use, and in the northern two-thirds a few wells yield an intermittent supply.

The thickness of the unconsolidated deposits in this township is not known, but it is probably at least 100 feet. The logs of two wells in the southern half of the township show the presence of 85 feet and 100 feet of boulder clay, respectively. In one well the yellow boulder clay is reported to be 45 feet thick.

No wells obtain water from the bedrock. The aquifer in the Belly River formation probably underlies this township at an elevation of about 1,800 to 1,835 feet above sea-level.

Township 17, Range 8

From a low, flat area less than 2,300 feet above sea-level on and near the southern boundary of the township the land rises towards the north. Several elevations at and near the northern boundary of the township are over 2,550 feet above sea-level. In sections 31 to 36 the country is hilly, but south of these sections the slopes are comparatively gentle.

Glacial lake clays underlie the low, flat area in the south. A belt of glacial till lies north of the lake clays. Elsewhere in the township moraine occurs. The general direction of surface run-off is southwards towards the low area mentioned. There are no permanent surface waters.

A few wells have been put down in the northern part of the area underlain by glacial lake clays, but they probably pass through into the underlying moraine. Elsewhere in the township the producing wells in the unconsolidated deposits are 10 to 250 feet deep. In the vicinity of Morse a number of wells 140 to 210 feet deep have been put down. The town of Morse obtains a large supply of good water from two wells, 197 feet and 210 feet deep, respectively. A well 150 feet deep obtains mineralized water.

North of Morse an aquifer that is from 2,275 to 2,287 feet above sea-level supplies water to two wells, 75 and 80 feet deep, on sections 15 and 16. In sections 33 and 34, two wells, 246 and 250 feet deep, obtain water from an aquifer that is about 2,300 feet above sea-level. Two wells on section 12 obtain water from an aquifer that is about 2,260 feet above sea-level. On section 25 a spring about 2,350 feet above sea-level supplies water to a farm, and on the NW. corner of section 29 a spring occurs about 2,400 feet above sea-level.

In the northeast part of the township several shallow wells on the southern slope of a hill yield soft water. Two wells in the vicinity of Morse obtain mineralized water from an aquifer that is about 2,130 to 2,150 feet above sea-level. The water in the remaining wells is not too mineralized for human use.

At a number of farms the supply of water from the wells is not sufficient and dams are used to supplement the well water. In the northern third of the township three dry holes, from 144 to 600 feet deep, were put down, and there appears to be a great thickness of boulder clay in this part.

A well 180 feet deep near Morse obtained soft water from an aquifer that is probably in the Bearpaw formation. This aquifer does not extend far south, as a deep well 2 miles south of Morse did not obtain water from this horizon.

Township 17, Range 9

The country in this township is flat to gently rolling. In the northwest and southeast there are low, flat areas that are occasionally marshy. From the northeast the land slopes southwestwards from about 2,400 feet above sea-level at the northeast corner of the township. An intermittent stream passes through sections 5 and 6.

Glacial lake clays underlie the southern third of the township and extend in a belt with an average width of about 1½ miles through the western two-thirds of the township to the northern boundary. Glacial till underlies the remainder of the township.

The glacial lake clays in this township are not a good source of water, and most of the wells in this area have passed through the glacial lake clays into the underlying boulder clay.

The depths of the wells in the unconsolidated deposits of this township range from 7 to 90 feet, but most of the wells are over 35 feet deep.

In sections 1 to 4 an aquifer that is about 2,254 to 2,272 feet above sea-level supplies "alkaline" or hard water to four wells, 38 to 60 feet deep. In sections 15 to 18 an

aquifer that is about 2,255 to 2,280 feet above sea-level provides five wells with a moderate supply of "alkaline" water. In sections 28 to 3[illegible] an aquifer that is about 2,256 to 2,275 feet above sea-level supplies "alkaline" water to three wells, 40 to 45 feet deep. It is possible that the three groups of wells may be obtaining water from the same aquifer, and it would be advisable to attempt to reach this aquifer in the western half of the township, but in the eastern half of the township several dry holes, 65 to 600 feet deep, show that the aquifer is not continuous.

The supply of ground water from the unconsolidated deposits of this township is not satisfactory. In most of the wells the water is mineralized, and in several wells the water is too "alkaline" for human use. The supply of water is insufficient for local use at several farms. Six wells in this township obtain ample supplies of soft water, which can be used for all purposes except irrigation, from aquifers in the bedrock. An aquifer that is about 2,000 feet above sea-level supplies a well, 320 feet deep, in Herbert. An aquifer that is about 1,894 to 1,919 feet above sea-level supplies three wells in Herbert. An aquifer that is about 1,855 to 1,862 feet above sea-level supplies two wells east of Herbert, and it is probable that this latter aquifer underlies most of the township although a dry hole 600 feet deep was put down in section 22.

Township 18, Range 7

At the northern boundary of the township there is an elevation 2,400 feet above sea-level. In the southeast a dry lake bottom is less than 2,200 feet above sea-level. There are three dry lake bottoms in the southern third of the township and three very small lakes in section 36. Surface run-off

is accommodated in these depressions or in low, marshy areas which are irregularly distributed over the township.

A belt of glacial outwash sand and gravel trends in a general northwesterly direction across the township. In the south part it is over 5 miles in width, but to the northwest it narrows to 2 miles.

In the area underlain by glacial outwash sands and gravels the depths of the producing wells range from 4 to 23 feet. A well 65 feet deep, on section 11, passed through the sands and did not obtain water in the underlying moraine. There are two springs about 2,230 feet and 2,300 feet above sea-level in the southern part of this township, and springs are reported in sections 9, 11, and 13 to 16. In four of the wells, 4 to 16 feet deep, in the southern part of the sand-covered area the water is soft; in three wells the water is "alkaline", but in only one is the water too "alkaline" for human use.

In that part of the township underlain by moraine lying to the north and east of the glacial outwash sands and gravels, the depths of the wells range from 12 to 70 feet. An aquifer that is about 2,230 to 2,260 feet above sea-level supplies water to three wells 56 to 70 feet deep.

In that part of the township south and west of the glacial outwash sands and gravels the depth of the wells range from 11 to 90 feet. In the northern part of this area two wells, 11 and 36 feet deep, respectively, yield water that is "alkaline", although not too "alkaline" for human use. A spring on section 20, about 2,285 feet above sea-level, yields a large supply of water.

No wells in this township have been drilled into the bedrock, but it seems probable that the aquifer that is about 1,795 feet above sea-level on section 15 in the next township to the west underlies this township.

Township 18, Range 8

In sections 2 to 6 the country is high and hilly and rises to over 2,550 feet above sea-level. Most of the western half of the township slopes gently eastwards from elevations of about 2,500 feet above sea-level at the western boundary of the township to a little less than 2,300 feet above sea-level at the lowest of a group of small lakes which extend south for about 2 miles from the centre of the northern boundary. In the eastern half of the township the country slopes northwards from the southern boundary of the township towards the dry lake bottom in sections 14, 23, and 24. There is a small lake in section 36.

The northern part of the township is underlain by a belt of glacial outwash sands and gravels that has an average width of about 2 miles. The sands and gravels underlie and form a belt about $\frac{1}{2}$ mile wide around the low, flat area in sections 14, 23, and 24. Elsewhere in the township moraine lies at the surface.

Several wells, 7 to 16 feet deep, obtain water from the glacial outwash sands and gravels. South of the low, flat area mentioned, two wells, 44 and 70 feet deep, passed into the underlying moraine.

In the area covered by moraine the depth of the wells ranges from 11 to 175 feet. In the southern half of the township most of the wells contain "alkaline" water, and in five of the deeper wells the water is too "alkaline" for human use. Several springs flow at the lower slopes of the hills in the southern part of the township and there is a spring about 2,340 feet above sea-level in section 27. The supply of ground water in this township is generally sufficient for local needs.

A well 560 feet deep in section 15 obtains a large supply of soft water, which can be used for all purposes except irrigation, from an aquifer that is probably in the upper part of the Belly River formation. This aquifer probably underlies the entire township.

Township 18, Range 9

A series of low, northwesterly trending ridges and depressions crosses the township. Northeast of this elevated belt are several irregularly shaped hills, one of which is over 2,600 feet above sea-level. The lowest part of the township is in the southwest where a low area through which an intermittent stream passes is less than 2,300 feet above sea-level. West of the northwestward trending belt, direction of surface run-off is towards the west and south to the valley of an intermittent stream or to the depressed area in the southwest. East of the northwestward trending belt, surface run-off is to a small lake in section 28 or to several low, marshy areas.

About 1½ square miles in the southern part of sections 4, 5, and 6 are underlain by glacial lake clays. A belt of glacial till with an average width of about three-quarters mile extends in a general northwesterly direction north of this area of lake clays. On and near the eastern boundary of the township an area underlain by glacial outwash sands and gravels extends from the northern boundary of the township southward for about 4½ miles. Elsewhere in the township moraine lies at the surface.

A well on section 24 obtains soft water from the glacial sands and gravel. Records of other wells in the area underlain by glacial sands and gravels show that the wells passed through them into the underlying moraine.

The depth of the producing wells in the moraine ranges from 9 to 138 feet. An aquifer that is about 2,350 to 2,375 feet above sea-level supplies water to five wells, 50 to 138 feet deep, in the southern half of the township. An aquifer that is about 2,390 feet above sea-level supplies two wells in sections 28 and 33 with water. Several dry holes to 114 feet deep were put down on section 18.

Springs occur on the southward slope of the hill in sections 5 and 6, and on the westward slope of a hill in section 28. In a large proportion of the wells the water is "alkaline", although not too "alkaline" for human use. At four farms in the southern half of the township the supply of well water is insufficient for local needs.

Three wells, 280 to 640 feet deep, obtain ample supplies of soft water from three aquifers in the bedrock. An aquifer about 1,750 feet above sea-level supplies a well 640 feet deep on section 34. An aquifer about 2,100 feet above sea-level supplies a well, 365 feet deep, on section 16. An aquifer about 2,235 feet above sea-level supplies water to a well 280 feet deep on section 9. A dry hole was put down on section 18 to a depth 1,677 feet above sea-level and it seems probable that none of the aquifers extends far westward or southward of this township, as a dry hole was put down to about 1,720 feet above sea-level on sec. 22, tp. 17, range 9. The aquifers at about 2,100 and 2,235 feet above sea-level probably do not extend far north or west of the well sites, but may underlie the southeastern part of the township. The aquifer about 1,750 feet above sea-level probably underlies all the township except the southwestern part.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF MORSE, NO.165, SASKATCHEWAN

West of 3rd mer. Township	16	16	16	17	17	17	18	18	18	Total No. in municipality
West of 3rd mer. Range	7	8	9	7	8	9	7	8	9	
Total No. of Wells in Township	51	52	52	59	55	60	32	51	36	448
No. of wells in bedrock	1	1	0	0	2	7	0	1	4	16
No. of wells in glacial drift	49	51	51	59	53	53	32	50	32	430
No. of wells in alluvium	1	0	1	0	0	0	0	0	0	2
Permanency of Water Supply										
No. with permanent supply	42	34	41	42	46	36	31	50	29	351
No. with intermittent supply	5	2	6	10	6	2	0	0	3	34
No. dry holes	4	16	5	7	3	22	1	1	4	63
Types of Wells										
No. of flowing artesian wells	0	0	0	0	0	0	0	0	1	1
No. of non-flowing artesian wells	21	20	19	10	22	20	4	12	12	140
No. of non-artesian wells	26	16	28	42	30	18	27	38	19	244
Quality of Water										
No. with hard water	43	35	42	38	41	30	24	42	27	322
No. with soft water	4	1	5	14	11	8	7	8	5	63
No. with salty water	0	0	0	0	0	0	0	0	0	0
No. with "alkaline" water	9	9	13	15	10	20	7	17	7	107
Depths of Wells										
No. from 0 to 50 feet deep	30	22	30	48	28	23	26	39	20	266
No. from 51 to 100 feet deep	18	23	22	3	16	23	6	8	10	129
No. from 101 to 150 feet deep	2	6	0	5	4	7	0	2	2	28
No. from 151 to 200 feet deep	0	0	0	3	3	0	0	1	0	7
No. from 201 to 500 feet deep	0	1	0	0	3	6	0	0	2	12
No. from 501 to 1,000 feet deep	1	0	0	0	1	1	0	1	2	6
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0
How the Water is Used										
No. usable for domestic purposes	38	28	41	40	41	28	23	30	27	296
No. not usable for domestic purposes	9	8	6	12	11	10	8	20	5	89
No. usable for stock	45	34	46	49	51	38	30	49	31	373
No. not usable for stock	2	2	1	3	1	0	1	1	1	12
Sufficiency of Water Supply										
No. sufficient for domestic needs	37	25	43	38	38	32	26	50	28	317
No. insufficient for domestic needs	10	11	4	14	14	6	5	0	4	68
No. sufficient for stock needs	31	22	38	34	35	28	20	45	26	279
No. insufficient for stock needs	16	14	9	18	17	10	11	5	6	106

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 boilers 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 harness 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.

Analyses of Water Samples from the Municipality of Morse, No. 165, Saskatchewan.

LOCATION						Depth of Well, Ft.	Total dis'vd solids	HARDNESS			CONSTITUENTS AS ANALYSED						CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source of Water
No.	Qtr.	Sec.	Tp.	Rge.	Mer.			Total	Perm.	Temp.	Cl.	Alkalinity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	$CaCl_2$	
1	NW.	17	1o	7	3	83	1,860	1,000	900	100	20	440	270	173	902	305	1,710	440	58		516		663	33		#1
2	NW.	19	1o	7	3	120	3,537												(2)		(3)	(4)	(1)	(5)		#1
3	SW.	21	16	7	3	75	2,5o6											(4)	(1)		(2)		(3)		(5)	#1
4	SW.	27	1o	7	3	95	2,680	1,200	1,000	200	16	625	320	248	1,283	497	2,418	573		44	677		1,098	26		#1
5	NE.	2	1o	8	3	101	1,703												(2)		(3)		(1)	(4)		#1
6	SE.	13	16	8	3	115	1,240	400	300	100	11	545	60	97	373	371	1,088	107		202		209	552	18		#1
7	NW.	27	16	8	3	468	2,160	150	50	100	42	795	10	47	771	942	2,027	18		98		702	1,140	69		#3
8	NW.	15	17	7	3	8	603											(3)	(1)		(2)				(4)	#1
9	SW.	1o	17	7	3	90	3,080	1,500	900	6oo	20	540	430	274	1,615	495	2,801	540	308		818		1,102	33		#1
10	NE.	9	17	8	3	40	2,257												(2)		(5)	(3)	(1)		(4)	#1
11	SE.	9	17	8	3	197	1,640												(2)		(4)	(3)	(1)	(5)		#1
12	NE.	9	17	8	3	12	489											(4)	(1)		(3)		(2)		(5)	#1
13	NE.	9	17	8	3	Reser-voir												56	26	38			10	7		#1
14	SE.	32	17	8	3	79	68o	480	340	140	8	330	50	65	176	169	583	89		136		85	260	13		#1
15	NW.	34	17	8	3	250	1,620	900	500	400	8	550	30	137	672	534	1,513	53		287		166	994	13		#1
1o	NE.	7	17	9	3	400	1,509												(2)		(5)	(3)	(1)	(4)		#3
17	SE.	15	18	8	3	56o	900	15			24	745	10	4	0	481	829					789		40		#3
18	NE.	9	18	9	3	280	1,280	400	80	320	12	450	20	68	529	503	1,240	36		142		260	782	20		#2
19	NW.	16	18	9	3	3b5	1,140	10			12	540	10	4	357	574	1,120					572	528	20		#2

Water from the Unconsolidated Deposits

The wide variation in the composition of water from the unconsolidated deposits is shown in the list of analyses in which the total dissolved solids in the waters analysed range from 489 to 3,537 parts per million. As a rule, sulphates are the principal salts in ground water from the glacial drift, calcium sulphate ($CaSO_4$), which is tasteless, usually predominates over magnesium sulphate ($MgSO_4$), which is laxative and bitter. Sodium sulphate, which is laxative, is usually present and may be the predominant constituent, but is generally subordinate in amount to calcium sulphate. Calcium and magnesium sulphate give permanent hardness to water.

The carbonates are usually present in smaller proportions than the sulphates. Calcium carbonate ($CaCO_3$) and magnesium carbonate ($MgCO_3$) are present in considerable amounts in many of these waters; they make the waters hard, but they may be thrown out of solution by boiling the water. Sodium carbonate (Na_2CO_3) is usually absent or present in small amounts.

The chlorides of sodium (NaCl) and calcium ($CaCl_2$) are either absent or present in such small proportions that they do not affect the use or taste of the water.

The total dissolved solids in water from the unconsolidated deposits are seldom less than 1,000 parts per million, and are often several thousand parts per million. The upper limit of the total dissolved solids in water that can be safely used for stock or for drinking varies widely, as the nature of the constituents varies and no arbitrary upper limit for the total dissolved solids can be fixed, but if the total solids exceed 2,000 parts per million it is generally advisable to seek another source of drinking water. Water that has a laxative effect on persons not accustomed to drinking it may often be used by the well owners.

The list of analyses shows that waters Nos. 8 and 12 contain less than 1,000 parts per million of total solids. Both waters are from shallow wells and sample No. 8 was taken from a shallow well that is close to a spring. Here the circulation of water in the aquifer would be comparatively rapid, so that the water should be similar to the spring water.

Water from the deep wells usually contains more dissolved solids than water from the shallower wells. Water No. 6 is an exception to this rule, but the aquifer that supplies well No. 14 is thought to outcrop at a spring about 1½ miles west of the well. Waters Nos. 1, 5, and 14 are also unusually pure for deep wells. The wells from which they were taken are on the side of a hill, and ground water circulation at depths on the slope is probably more rapid than on a plain.

Waters Nos. 2, 4, and 9 contain over 2,650 parts per million of total solids. They are very hard and boiling will not soften them, although it will slightly reduce the hardness of waters Nos. 4 and 9. These waters are all laxative due to the presence of sodium and magnesium sulphate, and are not desirable for human use, but they might be used for stock.

Waters Nos. 3 and 10 contain over 2,000 parts per million of total solids, but are probably less laxative than the three waters mentioned, and they are used for drinking.

Water No. 11 is from one of the wells that supply the town of Morse. The water is very hard but does not seem to be very laxative, and it does not contain a large proportion of magnesium sulphate.

Water No. 13 was taken from a reservoir made by the Canadian Pacific Railway Company at Morse. The water contains less than 150 parts per million of total solids. Most of the solids are salts of calcium and magnesium, but the total amount of solids is so small that the water is comparatively soft.

Water from the Bedrock

There are several types of water from the bedrock. Most of the waters are soft; the hardness of water No. 16 may be due to mixture with water from the glacial drift. Water No. 18 is from the shallowest wells of the series and it is also slightly hard. The remaining bedrock waters are soft and fall into two general classes, i.e., the sulphate-carbonate-chloride class, Nos. 7 and 19, and the carbonate-chloride class, Nos. 17 and 20. The sodium chloride in waters Nos. 7, 17, 18, and 19 is unusually small in amount. In water No. 20, which is from the deepest of the bedrock wells, sodium chloride forms about 20 per cent of the total solids.

All the bedrock waters analysed can be used for drinking, although water No. 7 contains over 2,000 parts of total solids and is slightly laxative. The softer waters are excellent for washing and the sodium carbonate they contain increases their adaptability for this purpose. The sodium carbonate in waters 7, 17, 19, and 20 will give a "soda" taste to the water which may be objectionable if the water when drunk is not quite cold, and these waters will blacken tea and coffee. None of the waters are suitable for irrigation; water No. 16 is the best adapted for intermittent use for small-scale irrigation. Waters Nos. 7, 17, 19, and 20 are quite unfit for irrigation as they contain so much sodium carbonate or "black alkali", and waters 7, 19, and 20 also contain a considerable amount of "white alkali".

WELL RECORDS—Rural Municipality of MORSE NO. 165, 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	SW.	1	16	7	3	Dug	10	2,368	- 1	2,367	10	2,358	Glacial sand	Slightly hard, clear		D, S	Ample supply for local needs.
2	SE.	2	"	"	"	Bored	60	2,375	- 20	2,355	60	2,315	Glacial drift	Hard, iron, reddish		S	Usually sufficient for stock; also a dry hole at present.
3	NE.	3	"	"	"	Dug	22	2,445	- 17	2,428	18	2,427	Glacial gravel	Hard, clear		D, S	Ample supply for local needs.
4	SW.	6	"	"	"	Bored	60	2,450	- 50	2,400	60	2,390	Glacial drift	Hard, clear iron		D, S	Sufficient for house and 16 head stock.
5	SE.	9	"	"	"	Dug	22	2,500	- 2	2,498	22	2,478	Glacial gravel	Soft, clear		D, S	Ample supply for local needs.
6	NE.	9	"	"	"	Dug	28	2,480	- 16	2,464	28	2,452	Glacial gravel	Moderately soft, clear, iron		D, S	Ample supply for local needs; has also a good dam.
7	NW.	10	"	"	"	Dug	22	2,475	- 18	2,457	22	2,453	Glacial drift	Soft, clear		D, S	Supplies household and only 4 head stock.
8	SW.	10	"	"	"		100	2,475									Dry hole; a second 80-foot dry hole.
9	NE.	12	"	"	"	Dug	26	2,320	- 16	2,304	24	2,296	Glacial sand	Hard, clear		D, S	Sufficient for local needs; also shallow well and dam.
10	NE.	14	"	"	"	Bored	90	2,290	- 55	2,235	90	2,200	Glacial drift	Hard, reddish iron, "alkaline"		S	Sufficient, but usable only for stock; shallow well on NW.¼, section 13, for domestic use.
11	SE.	15	"	"	"	Dug	15	2,400	- 10	2,390	10	2,390	Glacial sand	Hard, clear, "alkaline" iron		D, S	Intermittent supply; usually waters 5 to 6 head stock.
12	SW.	17	"	"	"	Dug	25	2,500	- 15	2,485	22	2,478	Glacial drift	Slightly hard clear		D, S	Sufficient for household and 25 head stock; also several deep bored wells unfit for domestic use.
13	NW.	17	"	"	"	Bored	83	2,500	- 35	2,465	83	2,417	Glacial drift	Hard, clear iron	55	D, S	Supplies household and 15 head stock. #
14	NE.	18	"	"	"	Bored	102	2,460	- 87	2,373	102	2,358	Glacial drift	Hard, clear, iron,		D, S	Supplies household and 8 head stock; also shallow seepage well; several dry holes around 90 feet.
15	SW.	18	"	"	"	Bored	95	2,480	- 83	2,397	95	2,385	Glacial drift	Hard, clear, iron		D, S	Supplies household and 15 head stock; also dam for stock.
16	NW.	19	"	"	"	Bored	120	2,400	- 95	2,305	120	2,280	Glacial drift	Hard, clear, "alkaline" iron	44	N	Insufficient; water comes in very slowly; seepage well supplies household and dam for stock. #
17	SW.	21	"	"	"		75	2,460	- 50	2,410	75	2,385	Glacial gravel	Hard, "alkaline"		D, S	#
18	SE.	21	"	"	"	Bored	70	2,400	- 3	2,397	67	2,333	Glacial gravel	Hard, clear, iron, slightly "alkaline"	42	D, S	Sufficient supply.
19	SW.	21	"	"	"	Drilled	615	2,425	-165	2,260	615	1,810	Belly River ?	Soft, clear		D, S	Sufficient supply.
20	NE.	22	"	"	"	Bored	56	2,340	- 31	2,309	56	2,284	Glacial gravel	Slightly hard		D, S	Sufficient supply; used by neighbours.
21	NW.	22	"	"	"	Bored	60	2,375			60	2,315	Glacial drift	Hard			Ample supply.
22	NW.	23	"	"	"	Bored	35	2,310	- 20	2,290	34	2,276	Glacial sand	Hard, clear		D, S	Ample supply.
23	SW.	24	"	"	"	Bored	85	2,285	- 60	2,225	85	2,200	Glacial drift	Hard, clear, "alkaline"		N	Other wells provide present 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 MORSE NO. 165, 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
24	SW.	24	16	7	3	Dug	16	2,280	- 13	2,267	16	2,264	Glacial sand and gravel	Hard, clear "alkaline"		D, S	Sufficient except in early spring; waters 15 horses.
25	SE.	24	"	"	"	Dug	16	2,275	- 12	2,263	16	2,259	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
26	NE.	24	"	"	"	Bored	90	2,260	- 50	2,230	90	2,190	Glacial gravel	Hard, reddish iron		S	Insufficient for local needs; also 90-foot well, insufficient supply; various wells yield sufficient for needs.
27	SE.	25	"	"	"	Dug	14	2,310	- 11	2,299	14	2,296	Glacial sand	Hard, clear		D, S	Sufficient supply.
28	NE.	25	"	"	"	Dug	11	2,290	- 2	2,288	9	2,281	Glacial sand	Soft, clear	44	D, S	Sufficient for local needs; waters 13 horses; also two shallow wells.
29	NE.	27	"	"	"	Dug	22	2,330	- 18	2,312	20	2,310	Glacial gravel	Hard, clear		D, S	Insufficient for local needs.
30	SW.	27	"	"	"	Bored	95	2,375	- 80	2,295	95	2,280	Glacial drift	Hard, clear, iron, "alkaline"		S	Waters 12 head stock; not suitable for human consumption. #
31	SW.	28	"	"	"	Dug	11	2,340	- 5	2,335	11	2,329	Recent sand	Hard	45	D, S	Ample for household and 30 head stock, small dam for stock in summer.
32	SW.	30	"	"	"	Dug	14	2,350	- 7	2,343	14	2,336	Glacial drift	Hard		D	Sufficient for domestic needs; dam for cattle.
33	NE.	32	"	"	"	Dug	25	2,350	- 17	2,333	25	2,325	Glacial gravel	Hard		D, S	Sufficient supply.
34	SE.	33	"	"	"	Dug	26	2,336	- 18	2,318	26	2,310	Glacial drift	Hard		D, S	Water for household and 15 head stock.
35	NE.	33	"	"	"	Dug	20	2,350	- 11	2,339	16	2,334	Glacial drift	Hard, clear		D, S	Water for household and 15 head stock.
36	SE.	35	"	"	"	Bored	75	2,290			75	2,215		Very "alkaline"			Farm deserted.
37	SW.	36	"	"	"	Bored	36	2,286	- 31	2,255	36	2,250	Glacial drift	Hard, iron		D, S	Intermittent; supply fails in dry seasons; also 28-foot well in slough and 96-foot unused well of "alkaline" water.
1	SE.	2	16	8	3	Bored	65	2,450	- 40	2,410	65	2,385	Glacial drift	Hard	44	D, S	Supplies household and 16 head stock.
2	NE.	2	"	"	"	Bored	101	2,465	- 88	2,377	88	2,377	Glacial drift	Hard, clear, iron		S	Waters 20 head stock. #
3	NW.	3	"	"	"	Bored	70	2,420	- 65	2,355	70	2,350	Glacial drift	Hard, iron, "alkaline"		D	Insufficient supply; second 65-foot well and dam waters 14 head stock.
4	SE.	4	"	"	"	Bored	63	2,440	- 56	2,384	59	2,381	Glacial black sand	Hard, iron, "alkaline"		D, S	Sufficient for household and 20 head stock.
5	NW.	4	"	"	"	Bored	65	2,405	- 25	2,380	65	2,340	Glacial drift	Hard, iron, cloudy	44	S	Supplies 40 head stock.
6	SE.	5	"	"	"	Bored	60	2,430			60	2,370	Glacial sand	Hard, "alkaline", iron		D, S	Insufficient; water for household and 10 head stock; also 60-foot dry hole.
7	NE.	5	"	"	"	Bored	60	2,420	- 52	2,368	60	2,360	Glacial sand	Hard		D, S	
8	SE.	6	"	"	"	Bored	58	2,438	- 38	2,400	58	2,380	Glacial sand	Hard, sulphur		D, S	Supplies household and 25 head stock.
9	NW.	6	"	"	"	Bored	80	2,440	- 10	2,430	80	2,360	Glacial drift	Hard, clear iron		D, S	Supplies household and 10 head stock; a second 80-foot well, unused.
10	NE.	7	"	"	"	Bored	90	2,410	- 30	2,380	90	2,320	Glacial drift	Hard, cloudy, "alkaline"		D, S	Supplies household and 20 head stock.
11	SE.	10	"	"	"	Bored	40	2,420	- 28	2,392	40	2,380	Glacial drift	Hard		D, S	Supplies household and 14 head stock; second 12-foot well for 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 MORSE NO.165, 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
12	NW.	10	16	8	3	Spring										D, S	
13	NE.	10	"	"	"	Bored	40	2,400	- 20	2,380	40	2,360	Glacial sand	Hard,iron, "alkaline"		D, S	Ample supply; waters 12 head stock.
14	SW.	11	"	"	"	Spring											
15	SW.	12	"	"	"	Bored	100	2,480	- 85	2,395	100	2,380	Glacial quick-sand	Hard,iron		D	Insufficient supply; also seepage well.
16	SE.	13	"	"	"	Bored	115	2,475	- 25	2,450	115	2,360	Glacial sand	Hard,iron		D, S	Ample supply; 90 batrels a day; dry years have no effect. #
17	SW.	16	"	"	"	Bored	40	2,360	- 38	2,322	40	2,320	Glacial sand	Hard	56	D	Sufficient only for house; second 80-foot well unused; four dry holes to 40 feet deep.
18	NE.	19	"	"	"	Dug	24	2,336	- 16	2,320	24	2,312	Glacial quick-sand	Hard		D, S	Supplies house and 30 head stock; similar well caved in.
19	SE.	19	"	"	"								Glacial drift	Hard			Similar well on NE.¼,section 19.
20	NE.	20	"	"	"	Dug	55	2,330	- 50	2,280	55	2,275	Glacial quick-sand	Hard,"alka-line"		D, S	Sufficient supply.
21	NE.	22	"	"	"	Bored	106	2,330	?		106	2,224	Glacial drift	Hard,cloudy, "alkaline"		D, S	Waters 20 head stock.
22	SE.	23	"	"	"	Dug	12	2,360	- 7	2,353	12	2,348	Glacial drift	Hard		D, S	Insufficient; dugout for stock; two dry holes 70, and 120 feet deep.
23	SE.	24	"	"	"	Bored	60	2,425	?				Glacial drift	Hard,iron		D, S	Sufficient; waters 15 head stock.
24	SE.	25	"	"	"	Bored	84	2,360	- 54	2,306	84	2,276	Glacial sand	Hard,iron, "alkaline"		S	Insufficient for local needs.
25	SW.	25	"	"	"	Dug	17	2,325	?				Glacial drift				Dry at present; intermittent supply; also nine dry holes 14to 100 feet deep;shallow seepage well.
26	NW.	25	"	"	"	Dug	16	2,325	- 10	2,315	16	2,309	Glacial sand	Hard		D, S	Insufficient supply.
27	SW.	27	"	"	"	Bored	110	2,350	- 70	2,280	110	2,240	Glacial drift	Hard,"alka-line"iron		D, S	Waters 28 head stock; dugouts also used.
28	NW.	27	"	"	"	Drilled	468	2,300	- 60	2,240	468	1,832	Belly River ?	Soft,clear		D, S	Ample supply. #
29	SW.	30	"	"	"	Bored	106	2,300	-104	2,196	106	2,194	Glacial drift	Hard			Intermittent seepage supply.
1	SE.	1	16	9	3	Bored	80	2,475	- 65	2,410	80	2,395	Glacial sand	Hard		D, S	Waters 11 head stock; also similar well.
2	SE.	2	"	"	"	Dug	10	2,500	- 4	2,496	10	2,490	Glacial gravel	Hard,clear		D, S	Waters 17 head stock.
3	SW.	2	"	"	"	Dug	27	2,550	- 19	2,531	27	2,523	Glacial drift	Some "alka-line"		D, S	Sufficient supply.
4	NE.	3	"	"	"	Dug	12	2,600	- 10	2,590	12	2,588	Glacial quick-sand	Soft		D, S	Waters 20 head stock.
5	SW.	3	"	"	"	Dug	9	2,580	- 3	2,577	9	2,571	Recent sand	Soft,clear		D, S	Small dam in ravine; shallow well on NW.¼, section 3, also used.
6	SE.	4	"	"	"	Bored	90	2,608	- 72	2,536	90	2,518	Glacial black sand	Hard,"alka-line"		S	Waters 25 head stock; 20-foot seepage well supplies house.
7	NW.	4	"	"	"	Dug	12	2,530	- 10	2,520	12	2,518	Glacial sand	Hard		D, S	Supplies house and 5 head stock; 20-foot well on NE.¼,section 4, good water,not used.
8	SW.	6	"	"	"	Dug	7	2,450	- 4	2,446	7	2,443	Glacial quick-sand	Hard,clear		D, S	Intermittent supply; usually waters 25 head stock.
9	NW.	6	"	"	"	Dug	12	2,430	- 7	2,423	12	2,418	Glacial gravel and sand	Hard,clear, "alkaline"		D, S	Sufficient supply; seepage from dam.

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 MORSE NO.165, 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
10	SW.	7	16	9	3	Dug	16	2,430	- 12	2,418	16	2,414	Glacial quick-sand	Soft,clear	56	D, S	Supplies house and 8 head stock; also 75-foot dry hole.
11	NW.	8	"	"	"	Dug	13	2,500	- 9	2,491	10	2,490	Glacial sand	Soft,clear		D, S	Intermittent supply; also 15-foot well for stock, and 98-foot well.
12	SE.	9	"	"	"	Bored	52	2,550	- 32	2,518	52	2,498	Glacial sand	Hard,clear, iron		D, S	Supplies house and 13 head stock.
13	NE.	9	"	"	"	Dug	52	2,550	- 41	2,509	52	2,498	Glacial sand	Hard,"alka-line"		D, S	Sufficient for local needs.
14	SE.	10	"	"	"	Bored	90	2,550	- 80	2,470	90	2,460	Glacial gravel	Hard,"alka-line"		D, S	Supplies house and 10 head stock.
15	NE.	11	"	"	"	Dug	20	2,420	- 12	2,408	20	2,400	Glacial sand	Hard,slight-ly"alkaline"		D, S	Supplies house and 40 head stock.
16	SE.	14	"	"	"	Dug	28	2,400	- 27	2,373	28	2,372	Glacial sand	Soft,clear		D	Insufficient supply; dam for stock needs.
17	SW.	14	"	"	"	Bored	48	2,400	- 28	2,372	48	2,352	Glacial sand	Hard,clear, "alkaline" iron		D, S	Supplies house and 20 head stock; also dugout for stock use.
18	SW.	15	"	"	"	Bored	55	2,442	- 40	2,402	55	2,387	Glacial sand	Hard,clear		D, S	Supplies house and 20 head stock.
19	SE.	19	"	"	"	Bored	65	2,450	- 53	2,397	65	2,385	Glacial drift	Hard,iron		D, S	Supplies house and 25 head stock.
20	NW.	19	"	"	"	Bored	70	2,440	- 50	2,390	70	2,370	Glacial drift	Hard,clear	44	D, S	Ample supply; waters 15 head stock.
21	NW.	21	"	"	"	Bored	63	2,344	- 60	2,284	63	2,281	Glacial sand	Hard,iron, "alkaline"		N	Well not in use; secure supply from neigh - bours.
22	SE.	21	"	"	"	Dug	42	2,375	- 22	2,353	42	2,333	Glacial sand	Hard,iron	47	D, S	Sufficient for house and 10 head stock.
23	SW.	22	"	"	"	Bored	42	2,375	- 27	2,348	42	2,333	Glacial sand	Hard,clear, "alkaline"		D, S	Sufficient for 20 head stock and household.
24	NW.	22	"	"	"	Bored	60	2,350	- 52	2,298	60	2,290	Glacial sand	Hard,iron		D, S	Sufficient for house and 10 head stock.
25	NE.	22	"	"	"	Dug	74	2,360	- 71	2,289	74	2,286	Glacial sand	Hard,clear, "alkaline"		D, S	Insufficient for house and 54 head stock; uses dam on NW.¼, section 27, for cattle.
26	SE.	22	"	"	"	Dug	50	2,375	- 41	2,334	50	2,325	Glacial sand	Hard,"alka-line"			Also shallow seepage well.
27	NW.	23	"	"	"	Bored	80	2,350	- 65	2,285	80	2,270	Glacial sand	Hard,clear		D, S	Sufficient for local needs.
28	SE.	23	"	"	"	Bored	65	2,400	- 57	2,434	57	2,343	Glacial sand	Hard,clear		D, S	Supplies house and 20 head stock; large supply from spring.
29	SW.	24	"	"	"	Dug	16	2,350	- 10	2,340	16	2,334	Glacial drift	Hard,clear	50	S	Waters 15 head stock; two springs on this quarter section also.
30	NW.	24	"	"	"												Several dry holes; quicksand ruins the deeper wells.
31	NE.	26	"	"	"	Dug	40	2,300	- 20	2,280	40	2,260	Glacial sand	Hard,clear		D, S	Sufficient for house and 24 head stock.
32	NW.	26	"	"	"	Bored	72	2,300	- 50	2,250	50	2,250	Glacial sand	Hard,clear "alkaline"		D, S	Insufficient; waters 11 head stock; also 80-foot dry hole and dugout for stock.
33	SE.	27	"	"	"	Dug	54	2,350	- 43	2,307	51	2,299	Glacial sand	Hard,clear		D, S	Sufficient for local needs; waters 8 head cattle.
34	NE.	27	"	"	"	Dug	30	2,300	- 23	2,277	30	2,270	Glacial drift	Slightly hard,clear.		D, S	Sufficient for house and 40 head stock.
35	SE.	28	"	"	"	Bored	40	2,350	- 15	2,335	40	2,310	Glacial drift	Hard,iron, rusty		D, S	Supplies household and 10 head stock.

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

WELL RECORDS—Rural Municipality of MORSE NO.165, 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
36	SW.	28	16	9	3	Bored	55	2,325	- 45	2,280	55	2,270	Glacial drift	Hard,"alkaline"iron		D, S	Supplies house and 16 head stock; also small dam for stock.
37	SE.	30	"	"	"	Dug	50	2,370	- 25	2,345	50	2,320	Glacial sand	Hard		D, S	Supplies house and 16 head stock.
38	SW.	30	"	"	"	Bored	87	2,430	- 62	2,368	87	2,343	Glacial sand	Hard		D, S	Supplies house and 10 head stock.
39	SE.	31	"	"	"	Bored	40	2,340	- 34	2,306	40	2,300	Glacial drift	Hard,cloudy, "alkaline"		S	Intermittent supply; spring on NE.¼,section 30, waters stock in dry years.
40	SW.	35	"	"	"	Dug	90	2,300	- 25	2,275	90	2,210	Glacial drift	Hard,clear		D, S	Insufficient supply; will not supply 100 head stock; uses dam on NW.¼,section 35.
1	SE.	1	17	7	3	Dug	13	2,275	- 10	2,265	11	2,264	Glacial sand	Soft,cloudy,	40	D, S	Intermittent supply; usually sufficient.
2	NW.	1	"	"	"	Dug	10	2,247	- 8	2,239	10	2,237	Glacial sand	Soft,a little iron	42	D, S	Sufficient for local needs; several good wells here.
3	NE.	3	"	"	"	Dug	30	2,300	- 20	2,280	30	2,270	Glacial sand	Hard,clear	42	D, S	Sufficient for local needs; also a 25-foot well in house, used for drinking.
43	SW.	3	"	"	"	Bored	60	2,345	- 55	2,290	60	2,285	Glacial sand	Hard,iron, "alkaline"	41	D, S	Insufficient, intermittent supply.
5	NW.	4	"	"	"	Bored	20	2,340	- 14	2,326	20	2,320	Glacial sand	Soft,iron, slightly "alkaline"	40	D, S	Sufficient supply.
6	NE.	4	"	"	"	Bored	27	2,305	- 13	2,292	27	2,278	Glacial sand	Hard,slightly"alkaline"	41	D, S	Sufficient supply.
7	NE.	5	"	"	"	Bored	34	2,330	- 20	2,310	34	2,296	Glacial sand	Hard,some "alkaline" odorous	40	D, S	Sufficient supply.
8	SE.	5	"	"	"	Bored	39	2,322	- 18	2,304	28	2,294	Glacial sand	Very hard, iron	42	D, S	Sufficient supply; second 44-foot well.
9	NW.	6	"	"	"	Bored	25	2,340	- 5	2,335	25	2,305	Glacial sand	Hard,slightly"alkaline"	40	D, S	Intermittent supply.
10	SW.	6	"	"	"	Dug	18	2,338	- 17	2,321	18	2,320	Glacial sand	Hard	44		Intermittent supply.
11	SW.	7	"	"	"	Bored	45	2,330	- 25	2,305	45	2,285	Glacial gravel	Hard,clear	40	S	Sufficient for stock needs.
12	SW.	8	"	"	"	Bored	14	2,350	- 8	2,342	10	2,340	Glacial sand	Soft,iron	44	D, S	Sufficient for local needs; used by two farms.
13	SE.	9	"	"	"	Bored	26	2,315	- 12	2,303	12	2,303	Glacial fine sand	Soft,"alkaline"odorous	40	D, S	Intermittent supply; also three dry holes over 100 feet deep.
14	NE.	10	"	"	"	Dug	9	2,350	- 2	2,348	9	2,341	Glacial drift	Soft	41	D, S	Intermittent supply; usually sufficient.
15	SE.	10	"	"	"		150	2,325									dry hole; base probably in glacial drift.
16	NW.	10	"	"	"	Dug	20	2,350	- 17	2,333	17	2,333	Glacial sand	Hard,cloudy, slightly "alkaline"	40	D, S	Sufficient for local needs.
17	NW.	11	"	"	"	Dug	12	2,290	- 9	2,281	9	2,281	Glacial sand	Soft,cloudy	42	D, S	Insufficient; intermittent supply.
18	SE.	11	"	"	"	Dug	8	2,270	- 4	2,266	8	2,262	Glacial sand	Soft,clear		D, S	Ample supply; also spring.
19	NE.	12	"	"	"	Dug	13	2,275	- 11	2,264	13	2,262	Glacial sand	Medium hard slightly "alkaline"	39	D, S	Sufficient supply.
20	SW.	12	"	"	"	Dug	22	2,253	- 16	2,237	19	2,334	Glacial sand	Hard,some "alkaline"	41	D, S	Sufficient 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 MORSE NO.165, 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
21	SW.	13	17	7	3	Dug	11	2,325	- 9	2,316	11	2,314	Glacial sand	Soft	42	D, S	Sufficient supply.
22	W½.	14	"	"	"	Drilled	180	2,290									Several dry holes at this depth.
23	SW.	15	"	"	"	Bored	30	2,340	- 24	2,316	26	2,314	Glacial sand	Hard, iron, slightly "alkaline"	40	D, S	Sufficient supply.
24	NW.	15	"	"	"	Dug	8	2,338	- 6	2,332	6	2,332	Glacial drift	Hard			#
25	S	15	"	"	"	Dug	7	2,350	- 3	2,347	7	2,343	Glacial sand	Soft		D, S	Sufficient supply.
26	NW.	15	"	"	"	Dug	8	2,340	- 6	2,334	6	2,334	Glacial sand	Hard	42	D, S	Sufficient supply.
27	NE.	16	"	"	"	Dug	14	2,348	- 10	2,338	12	2,336	Glacial sand	Hard	40	D, S	Sufficient supply.
28	SE.	16	"	"	"	Bored	90	2,348	- 70	2,278	90	2,258	Glacial sand	Very hard, iron	42	D, S	Sufficient supply.
29	SW.	16	"	"	"	Bored	90	2,333	- 40	2,293	90	2,243	Glacial sand	Very hard	42	D, S	Sufficient supply. #
30	NW.	16	"	"	"	Dug	8	2,335	- 5	2,330	5	2,330	Glacial sand	Hard, iron	44	D, S	Sufficient supply; used by three farmers; also well at house on SE¼, section 21. See No. 34.
31	SW.	20	"	"	"	Dug	30	2,375	- 16	2,359	30	2,345	Glacial sand	Hard, iron, slightly "alkaline"	39	D, S	Sufficient supply; also 24-foot well unused.
32	SE.	20	"	"	"	Dug	15									N	
33	NW.	20	"	"	"	Dug	21	2,400	- 11	2,389	21	2,379	Glacial sand	Hard	38	D, S	Sufficient for local needs; dam for stock.
34	SE.	21	"	"	"	Dug	16	2,345	- 15	2,330	16	2,329	Glacial drift	Hard, cloudy, "alkaline"		S	Insufficient supply.
35	SE.	21	"	"	"	Dug	16	2,345	- 13	2,332	14	2,331	Glacial sand	Medium hard, "alkaline"	44	D, S	Intermittent supply; also spring with ample supply for stock.
36	NE.	23	"	"	"	Dug	10	2,365	- 9	2,356	9	2,356	Glacial sand		N	N	Intermittent supply.
37	SE.	25	"	"	"	Dug	25	2,330	- 15	2,315	15	2,315	Glacial sand	Medium hard,	40	D, S	Sufficient supply.
38	SE.	28	"	"	"	Dug	14	2,395	- 6	2,389	10	2,385	Glacial gravel	Soft, trace of iron	40	D, S	Sufficient supply; also 30-foot well with very little "alkaline" water; also 20-foot well in coulee with soft water.
39	SW.	30	"	"	"	Bored	101	2,373	- 90	2,283	95	2,278	Glacial sand	Hard, "alkaline" iron		S	Sufficient for local needs.
40	NW.	35	"	"	"	Dug	12	2,312	- 8	2,304	8	2,304	Glacial sand	Hard	44	D, S	Sufficient supply.
41	NE.	35	"	"	"	Bored	46	2,300	- 16	2,284	46	2,254	Glacial drift	"Alkaline"		S	Sufficient for stock; second 26-foot well of "alkaline" water.
42	NE.	35	"	"	"	Dug	16	2,300	- 3	2,297	16	2,284	Glacial gravel and sand	Soft, clear		D, S, I	
43	SE.	36	"	"	"	Dug	11	2,350	- 3	2,347	11	2,339	Glacial sand	Soft	39	D, S	Intermittent supply; usually sufficient for house and 50 head stock.
1	E.	1	17	8	3	Bored	45	2,328	- 39	2,289	45	2,283	Glacial sand	Soft, some "alkali" and iron		D, S	Insufficient; intermittent 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 MORSE NO. 165, 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
2	SW.	1	17	8	3	Dug	12	2,330	- 8	2,322	12	2,318	Glacial sand	Slightly hard, iron		D, S	Sufficient supply.
3	SE.	2	"	"	"	Dug	17	2,280	- 16	2,264	17	2,263	Glacial sand	Hard, slightly "alkaline"	41	D, S	Insufficient; intermittent supply.
4	NW.	2	"	"	"	Bored	65	2,280			65	2,215	Glacial sand	Hard, iron, "alkaline"	43	D, S	Sufficient supply.
5	NW.	3	"	"	"	Drilled	180	2,290			180	2,110	Bearpaw ?	Soft		D, S	Sufficient for local needs.
6	NE.	4	"	"	"	Drilled	140	2,290	- 5	2,285	140	2,150	Glacial drift	Hard, "alkaline"	47	S	Large supply for stock.
7	NW.	7	"	"	"	Dug	17	2,300	- 15	2,285	17	2,283	Glacial drift	Hard	40	D	Intermittent supply; a second 84-foot well not used; dam waters stock.
8	SE.	7	"	"	"	Dug	12	2,300					Glacial drift	Hard, slightly "alkaline"		D, S	
9	NE.	8	"	"	"								Glacial drift		42	D, S	No further information.
10	NE.	9	"	"	"	Dug	12	2,360	- 7	2,353	12	2,348	Glacial drift	Fairly soft	44	D, S	Sufficient supply. #
11	SE.	9	"	"	"		150	2,280	- 60	2,220	150	2,130	Glacial drift	Mineral water		M	Owned by town of Morse.
12	SE.	9	"	"	"	Drilled	210	2,280	- 45	2,235	210	2,070	Glacial sand		45	M	Good yield; owned by town of Morse.
13	SE.	9	"	"	"	Drilled	197	2,321	- 54	2,267	197	2,124	Glacial sand and gravel	Hard	40	M, D, S, I	Yields 20 gallons a minute; owned by town of Morse. #
14	NE.	12	"	"	"	Dug	16	2,340	- 2	2,338	16	2,324	Glacial sand	Soft, clear	46	D, S	Intermittent supply; insufficient during winter.
15	NW.	12	"	"	"	Bored	55	2,350			55	2,295	Glacial gravel	Hard, iron		D, S	Sufficient supply.
16	NW.	12	"	"	"	Bored	70	2,328	- 50	2,278	70	2,258	Glacial drift	Hard, iron	40	D, S	Sufficient supply.
17	SW.	12	"	"	"	Bored	63	2,325			63	2,262	Glacial sand	Hard, some iron	43	D, S	Sufficient for local needs.
18	NW.	14	"	"	"	Bored	76	2,400	- 41	2,359	76	2,324	Glacial sand	Hard, some iron	41	D, S	Sufficient for local needs.
19	SW.	15	"	"	"	Bored	75	2,350	- 45	2,305	75	2,275	Glacial sand	Hard, clear		S	
20	SW.	16	"	"	"	Bored	80	2,367			80	2,287	Glacial sand	Hard, iron, "alkaline"	42	D, S	Sufficient for local needs.
21	NW.	18	"	"	"	Bored	44	2,367	- 20	2,347	44	2,276	Glacial drift	Fairly soft		D, S	Insufficient in winter; slough and dam supply stock; another dug well on property.
22	NE.	19	"	"	"	Dug	10	2,325	- 3	2,322	10	2,315	Glacial sand	Hard, cloudy	56	D, S	Intermittent supply; second similar well; dugout for stock.
23	SE.	20	"	"	"	Bored	63	2,410	- 39	2,371	63	2,347	Glacial drift	Hard		D, S	Not used at present; dugout used for stock.
24	NW.	20	"	"	"	Dug	14	2,330	- 10	2,320	14	2,316	Glacial sand	Hard	40	D, S	Sufficient only for house; dam for stock.
25	NW.	23	"	"	"	Dug	15	2,460	- 10	2,450	15	2,445	Glacial sand and gravel	Soft	38	D, S	Sufficient supply; also 28-foot well with poor supply
26	NW.	24	"	"	"	Dug	14	2,400	- 10	2,390	14	2,386	Glacial gravel	Soft	42	D, S	Insufficient supply.
27	NE.	25	"	"	"	Dug	12	2,370	- 6	2,364	12	2,358	Glacial sand	Soft, clear		D, S	Sufficient supply.
28	NW.	25	"	"	"	Spring								Soft, odorous		S	Ample 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 MORSE NO. 165, 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
29	SW.	25	17	8	3	Dug	16	2,425	- 12	2,413	16	2,409	Glacial gravel	Hard	39	D, S	Sufficient supply.
30	NW.	25	"	"	"	Dug	30	2,443	- 22	2,421	30	2,413	Glacial sand	Soft	41	D, S	Sufficient supply; second similaar well; several springs give ample for stock.
31	NE.	26	"	"	"	Dug	14	2,418	- 12	2,406	14	2,404	Glacial sand	Soft	40	D, S	Sufficient for local needs.
32	SE.	27	"	"	"	Bored	130	2,475	-120	2,355	130	2,345	Glacial drift	Hard		D, S	Also a dry hole 200 feet in depth; base in glacial drift.
33	SE.	27	"	"	"	Bored	23	2,475	- 6	2,469	23	2,452	Glacial drift	Hard, "alkaline" a little iron		D, S	Insufficient supply.
34	NW.	27	"	"	"	Bored	95	2,500	- 55	2,445	95	2,405	Glacial drift	Hard, slightly "alkaline"	44	D, S	Barely sufficient for house and 15 head stock; dugout for stock; 600-foot dry hole.
35	SW.	29	"	"	"	Bored	63	2,380	- 20	2,360	63	2,317	Glacial drift	Hard	40	D, S	Sufficient supply; also well in slough with intermittent supply.
36	NE.	31	"	"	"	Bored	78	2,480	- 41	2,439	78	2,402	Glacial drift	Hard, iron	41	D	Sufficient for stock; not suitable for drinking.
37	NW.	31	"	"	"	Bored	77	2,450	- 21	2,429	77	2,373	Glacial sand	Hard, "alkaline"	42	S	Sufficient for local needs; large supply; will water 225 head stock.
38	SW.	31	"	"	"	Dug	12	2,370	- 5	2,365	12	2,358	Glacial gravel and sand	Slightly hard, "alkaline"	41	D, S	Insufficient supply; also dugout used.
39	SE.	32	"	"	"	Bored	79	2,500	- 44	2,456	79	2,421	Glacial sand	Fairly hard, trace of iron	41	D, S	Sufficient supply. #
40	SE.	32	"	"	"		35						Glacial sand	Hard			Supplies about one barrel a day.
41	NW.	32	"	"	"	Bored	54	2,550	- 38	2,512	54	2,496	Glacial sand	Fairly soft	40	D, S	Sufficient supply; also 144-foot dry hole.
42	NE.	33	"	"	"	Drilled	246	2,550	-186	2,364	246	2,304	Glacial sand	Very hard, little iron		D, S	Ample supply.
43	NW.	34	"	"	"	Drilled	250	2,540	-160	2,380	250	2,290	Glacial drift	Hard		D, S	Ample supply. #
44	SW.	35	"	"	"	Dug	56	2,465	- 50	2,415	56	2,409	Glacial drift	Hard		D, S	Sufficient supply.
1	NW.	4	17	9	3	Bored	41	2,295	- 15	2,280	41	2,254	Glacial drift	Hard, "alkaline" iron, cloudy	42	D, S	Sufficient supply.
2	SE.	5	"	"	"	Bored	38	2,310	- 28	2,282	38	2,272	Glacial sand	Hard, cloudy, "alkaline"	44	D, S	Sufficient supply.
3	NW.	5	"	"	"	Bored	50	2,315			50	2,265	Glacial sand	Hard, clear, "alkaline" iron	42	S	Insufficient supply.
4	NE.	6	"	"	"	Bored	60	2,320			60	2,260	Glacial sand	Hard, iron	42	D, S	Sufficient supply.
5	NE.	7	"	"	"	Drilled	400	2,319	-200	2,119	400	1,919	Belly River ?	Soft, brown			#
6	SW.	13	"	"	"	Dug	20	2,300	- 9	2,291	20	2,280	Glacial drift	Hard, clear	43	D, S	Sufficient supply.
7	NW.	13	"	"	"	Bored	77	2,300	- 29	2,271	77	2,223	Glacial drift	Hard, cloudy, some iron	42	D, S	Sufficient supply.
8	NW.	13	"	"	"	Bored	55	2,300	- 40	2,260	55	2,245	Glacial sand	"Alkaline"		D, S	Sufficient supply; also nine dry holes ranging from 65 to 135 feet.

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 MORSE NO.165, 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	NW.	13	17	9	3	Bored		2,335					Glacial drift	Hard, "alkaline"	42	D	
10	NW.	15	"	"	"	Drilled	443	2,305			443	1,862	Belly River ?	Soft	43	D, S	Sufficient for local needs.
11	NW.	15	"	"	"	Bored	70	2,325	- 48	2,277	70	2,255	Glacial drift	Hard, iron, "alkaline"	43	S	Ample supply for stock; drinking water hauled.
12	NW.	16	"	"	"	Bored	50	2,310	- 40	2,270	50	2,260	Glacial sand	Hard, iron, "alkaline"	42	D, S	Sufficient supply; yields 8 barrels in six hours.
13	SW.	16	"	"	"	Bored	50	2,310			50	2,260	Glacial sand	Hard, iron, slightly "alkaline"	42	D, S	Sufficient supply.
14	NW.	17	"	"	"	Bored	65	2,345	- 55	2,290	65	2,280	Glacial sand	Hard, iron, "alkaline"	42	D, S	Supplies house and 17 head stock; dugout also used for stock.
15	SW.	17	"	"	"	Drilled	464	2,319			464	1,855	Belly River ?	Soft, light brown			Abundant supply.
16	NE.	18	"	"	"	Bored	45	2,300	- 30	2,270	45	2,255	Glacial sand	Hard, "alkaline"	43	D, S	Sufficient with second 45-foot well which is used only for stock.
17	SE.	18	"	"	"	Drilled	425	2,319	- 3	2,316	425	1,894	Belly River ?	Soft			Abundant supply.
18	SE.	18	"	"	"	Drilled	320	2,319	- 60	2,259	320	1,999	Bearpaw	Soft, gas			Abundant supply.
19	SE.	18	"	"	"	Drilled	400	2,319			400	1,919	Belly River ?	Soft			Abundant supply.
20	NW.	20	"	"	"	Bored	58	2,360	- 28	2,332	58	2,302	Glacial drift	Hard, "alkaline"	41	S	Sufficient and suitable only for stock; drinking water obtained ½ mile north.
21	NW.	21	"	"	"	Bored	90	2,295			90	2,205	Glacial drift	Hard, iron, "alkaline"		S	Insufficient; yields 2½ barrels a day; also a 4-foot dugout for stock.
22	NW.	22	"	"	"	Drilled	600	2,320	-230	2,090	600	1,720		Soft, clear	46	D, S	Sufficient for local needs; base probably in Belly River formation.
23	NE.	22	"	"	"	Dug	27	2,310	- 10	2,300	27	2,283	Glacial sand	Hard, clear	44	D, S	Insufficient; intermittent supply; small dugout supplies stock in spring and summer.
24	NE.	23	"	"	"	Bored	90	2,320									Dry hole, base in glacial drift; two similar dry holes; dugout supplies stock; drinking water obtained 1 mile away.
25	NE.	25	"	"	"	Bored	37	2,355	- 17	2,338	37	2,318	Glacial sand	Fairly soft, cloudy	43	S	Waters 150 head stock. A 47-foot well small supply for domestic use.
26	SW.	25	"	"	"	Drilled	85	2,320			85	2,235	Glacial drift	Hard, "alkaline; little sediment	40	D, S	Ample supply.
27	SW.	25	"	"	"	Bored											Four dry holes ranging from 100 to 90 feet in depth; bases in glacial drift.
28	SE.	26	"	"	"	Bored	100	2,320									Six dry holes ranging from 100 to 125 feet in depth; bases in glacial drift; dugout supplies stock; drinking water hauled.
29	SW.	28	"	"	"	Bored	45	2,320	- 39	2,281	45	2,275	Glacial sand	Hard, iron, "alkaline"	42	S	Sufficient for local needs.
30	SW.	29	"	"	"	Bored	40	2,300	- 37	2,263	40	2,260	Glacial drift	Hard, iron, "alkaline"	43	S	Insufficient; limited to 20 head stock; rain water used for domestic purposes.
31	NE.	30	"	"	"	Bored	44	2,300			44	2,256	Glacial drift	Hard, iron, "alkaline"	42	D, S	Sufficient for local needs.
32	SE.	30	"	"	"		18	2,300	- 16	2,284	18	2,282	Glacial drift	Hard, "alkaline"		S	Used only for stock.
33	SW.	30	"	"	"	Bored	45	2,340	- 38	2,302	45	2,295	Glacial drift	Hard, "alkaline"	43	D, S	Together with dugout sufficient.

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 MORSE NO.165, 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	SE.	31	17	9	3		7	2,300	- 5	2,295	7	2,293	Glacial drift	Hard,"alkaline"		S	
35	NW.	34	"	"	"	Dug	17	2,360	- 13	2,347	17	2,343	Glacial drift	Hard	43		
36	SW.	35	"	"	"	Bored	65	2,350	- 50	2,300	60	2,290	Glacial drift	Hard,iron, "alkaline"	43	D, S	Sufficient supply.
37	NE.	36	"	"	"	Dug	14	2,360	- 9	2,351	14	2,346	Glacial drift				Intermittent supply; now empty; several shallow wells; practically no yield.
1	NE.	2	18	7	3	Dug	4	2,230	0	2,230	4	2,226	Glacial sand	Soft,clear		D, S	Sufficient supply; probably a spring.
2	SE.	3	"	"	"	Dug	20	2,300	- 14	2,286	20	2,280	Glacial sand	Hard,iron, slightly brown		D, S	
3	NE.	3	"	"	"	Dug	8	2,275	- 4	2,271	8	2,267	Glacial sand	Hard,"alkaline"some iron	40	D, S	Sufficient for local needs.
4	NW.	3	"	"	"	Dug	12	2,300	- 9	2,291	12	2,288	Glacial sand	Hard		D, S	Sufficient supply; spring in valley gives ample supply of good water.
5	SW.	5	"	"	"	Dug	14	2,320	- 10	2,310	14	2,306	Glacial sand	Soft,clear	42	D, S	Sufficient for local needs.
6	SE.	10	"	"	"	Bored	23	2,210	- 21	2,189	23	2,187	Glacial sand	Hard,iron, "alkaline"	42	S	Insufficient supply; sedond 15-foot well used for domestic needs.
7	SW.	11	"	"	"	Dug	13	2,210	- 10	2,200	13	2,197	Glacial sand	Soft		S	Second similar 11-foot well for stock; 65-foot dry hole; base in glacial drift.
8	SW.	15	"	"	"	Dug	16	2,245	- 13	2,232	16	2,229	Glacial sand	Hard	43	D, S	Sufficient for local needs; second well in house, caved in.
9	SW.	17	"	"	"	Dug	15	2,345	- 7	2,338	15	2,330	Glacial sand	Hard,some iron	42	D, S	Sufficient for local needs.
10	SE.	18	"	"	"	Dug	46	2,310	- 42	2,268	46	2,264	Glacial drift	Fairly hard	42	D	
11	NW.	18	"	"	"	Bored	26	2,290	- 24	2,266	26	2,264	Glacial drift	Soft		D, S	Insufficient supply; second 12-foot well with 1-foot of water.
12	SW.	18	"	"	"	Bored	90	2,350			90	2,260	Glacial drift	Slightly "alkaline"			Small supply; also 20-foot and 65-foot wells with small supplies.
13	SE.	19	"	"	"	Bored	36	2,300	- 9	2,291	36	2,264	Glacial sand	Hard,cloudy, "alkaline"	42	D, S	Sufficient for local needs; also use 45-foot well with 10 feet of water for stock.
14	NW.	20	"	"	"	Dug	11	2,310	- 9	2,301	11	2,299	Glacial sand	Fairly soft, "alkaline"	40	D, S	Sufficient for local needs; also spring in valley, ample supply for stock.
15	NE.	22	"	"	"	Dug	12	2,315	- 9	2,306	12	2,303	Glacial sand	Soft		D, S	Sufficient supply; a second 56-foot well with 25 feet of water; not used now.
16	SW.	23	"	"	"	Dug	25	2,295	- 20	2,275	25	2,270	Glacial drift	Hard,clear	42	D, S	
17	SW.	26	"	"	"	Dug	12	2,320	- 9	2,311	12	2,308	Glacial sand				Ample supply.
18	NE.	27	"	"	"	Bored	70	2,300	- 40	2,260	70	2,230	Glacial sand	Hard,clear, "alkaline"	46	S	Sufficient for local stock needs; a second 14-foot well supplies drinking water.
19	NE.	31	"	"	"	Dug	6	2,300	- 3	2,297	6	2,294	Glacial sand	Hard,iron, "alkaline"	42	D, S	Sufficient supply; also 17-foot well filled in with sand.
20	SW.	35	"	"	"	Bored	68	2,310	- 44	2,266	68	2,242	Glacial sand	Hard,some iron	41	D	Requirements small, but supply sufficient.
21	SW.	36	"	"	"	Dug	20	2,300	- 18	2,282	20	2,280	Glacial sand	Soft	40	D, S	Sufficient supply.
1	SE.	1	18	8	3	Bored	75	2,380	- 65	2,315	75	2,305	Glacial sand	Hard,iron, "alkaline"	42	S	Sufficient supply for stock; drinking water obtained from NE.¼,sec. 36, tp. 17, rge. 8.

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 MORSE NO.165, 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
2	NW.	2	18	8	3	Dug	15	2,360	- 11	2,349	15	2,345	Glacial sand	Hard	44	D, S	Sufficient supply.
3	SW.	3	"	"	"	Drilled	175	2,500	-135	2,365	175	2,325	Glacial drift	Hard, slightly "alkaline"	44	D, S	Sufficient supply.
4	W½.	3	"	"	"	Springs							Glacial drift	Soft		S	Ample supply from five springs; used for cattle only.
5	SE.	4	"	"	"	Bored	110	2,540	-105	2,435	110	2,430	Glacial drift	Hard, "alkaline"	44	D, S	Sufficient for house and 2 head stock.
6	NW.	4	"	"	"	Bored	60	2,440	- 42	2,398	60	2,380	Glacial sand	Hard, "alkaline"	44	D, S	Sufficient for local needs; also 70-foot well with 25-feet of hard "alkaline" water.
7	NE.	5	"	"	"	Bored	100	2,500	- 90	2,410	100	2,400	Glacial sand	Hard, "alkaline"	44	D, S	Sufficient supply.
8	SW.	6	"	"	"	Bored	75	2,440			75	2,365	Glacial drift	Hard, "alkaline"	44	S	Rain water used for drinking.
9	NE.	7	"	"	"	Bored	101	2,465	- 86	2,379	101	2,364	Glacial drift				
10	SE.	7	"	"	"	Bored	40	2,480	- 36	2,444	40	2,440	Glacial drift	Hard	44	D, S	Sufficient supply.
11	SW.	10	"	"	"	Bored	50	2,375	- 25	2,350	50	2,325	Glacial sands	Hard slightly "alkaline"	44	D, S	Supplies house and 30 head stock; similar well with ample supply.
12	NE.	11	"	"	"	Bored	60	2,390			60	2,330	Glacial sand	Hard, "alkaline"	43	S	Sufficient for stock needs.
13	SE.	12	"	"	"	Dug	30	2,350	- 24	2,326	30	2,320	Glacial sand	Slightly hard	42	D	Insufficient supply; second 10-foot well of soft water to surface used for stock.
14	NW.	13	"	"	"	Bored	44	2,350	- 35	2,315	44	2,306	Glacial sand	Hard, "alkaline"		D, S	Sufficient supply.
15	SE.	14	"	"	"	Bored	50	2,340			50	2,290	Glacial drift	Hard, "alkaline"		N	Ample supply.
16	NW.	14	"	"	"	Bored	70	2,320	- 55	2,265	70	2,250	Glacial sand	Hard, iron, "alkaline"	46	D, S	Sufficient supply.
17	NE.	15	"	"	"	Dug	14	2,310	- 10	2,300	14	2,296	Glacial drift	Hard, "alkaline"	42	S	Sufficient for stock; a 16-foot well of soft water for house use.
18	SE.	15	"	"	"	Bored	70	2,350	- 60	2,290	70	2,280	Glacial drift	Hard, "alkaline"	40	D, S	Sufficient supply.
19	SE.	15	"	"	"	Drilled	560	2,355	-125	2,230	560	1,795	Belly River ?	Soft, slightly yellow colour	42	D	Sufficient supply; second 30-foot well, yields ample supply of soft water for stock. #
20	SW.	16	"	"	"	Bored	40	2,360	- 2	2,358	40	2,320	Glacial sand	Hard, "alkaline"	44	D, S	Sufficient supply; a 32-foot well for stock.
21	NE.	16	"	"	"	Bored	39	2,350	- 29	2,321	39	2,311	Glacial sand	Hard, "alkaline" slightly salty	44	D, S	Sufficient supply.
22	NE.	17	"	"	"	Dug	14	2,400	- 8	2,392	14	2,386	Glacial sand	Hard	46	D, S	Second 14-foot well completes supply.
23	NE.	18	"	"	"	Dug	11	2,460	- 7	2,453	11	2,449	Glacial sand	Fairly soft	46	D, S	
24	SE.	19	"	"	"	Dug	13	2,440	- 10	2,430	13	2,427	Glacial sand	Fairly soft	40	D, S	Sufficient supply; second 17-foot well of soft water, ample supply; caved in.
25	NE.	19	"	"	"		23	2,425	- 18	2,407	23	2,402	Glacial sand	Hard	48	D, S	Sufficient supply.
26	SW.	20	"	"	"	Dug	18	2,440	- 8	2,432	18	2,422	Glacial sand	Soft, clear	42	D, S	Sufficient supply; also 23-foot dry hole.
27	NE.	21	"	"	"	Dug	13	2,340	- - 4	2,336	13	2,327	Glacial drift	Hard, "alkaline"	40	D, S	Sufficient supply; also 8-foot well in slough soft water used for drinking and washing.

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 MORSE NO.165, 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				
28	NW.	23	18	8	3	Dug	9	2,320	- 7	2,313	9	2,311	Glacial sand	Soft, clear	44	D, S	Sufficient supply.
29	SW.	25	"	"	"	Dug	11	2,350	- 7	2,343	11	2,339	Glacial sand	Soft, clear	44	D, S	Sufficient supply; dugout also used.
30	SE.	27	"	"	"	Dug	10	2,350	- 7	2,343	10	2,340	Glacial sand	Hard	46	D, S	Sufficient for local needs; 5-foot well supplies water for stock; spring aids the supply.
31	SE.	30	"	"	"	Dug	13	2,425	- 8	2,417	13	2,412	Glacial sand	Hard	46	D, S	Two similar wells; one used for stock, other for garden irrigation.
32	SE.	33	"	"	"	Dug	7	2,300	- 6	2,294	7	2,293	Glacial drift	Fairly soft, cloudy	48	D, S	Sufficient supply.
33	SE.	34	"	"	"	Dug	6	2,310	- 2	2,308	6	2,304	Glacial sand	Hard, "alkaline"	50	D, S	Sufficient supply.
1	SW.	2	18	9	3	Dug	19	2,345	- 17	2,328	19	2,326	Glacial sand	Hard	43	D, S	Sufficient supply.
2	SE.	4	"	"	"	Bored	28	2,405	- 18	2,387	28	2,377	Glacial sand	Hard	43	D, S	Sufficient supply.
3	NE.	5	"	"	"	Dug	6	2,475	0	2,475	6	2,469	Glacial sand	Hard		D, S	Well overflows; abundant supply; spring fed.
4	NW.	6	"	"	"	Dug	9	2,320	0	2,320	9	2,311	Glacial sand	Hard		S	Sufficient for stock needs; obtains drinking /water/ from spring on NE.¼, section 6.
5	SE.	7	"	"	"	Dug	21	2,385	- 15	2,370	21	2,364	Glacial sand	Hard, "alkaline"	42	D	Insufficient for local needs; second similar well; dam also used for stock, and spring supplies large quantities.
6	SW.	8	"	"	"	Dug	12	2,475	- 4	2,471	12	2,463	Glacial sand	Very hard, "alkaline"	42	D, S	Intermittent supply; water hauled.
7	NE.	9	"	"	"	Drilled	280	2,505	-130	2,375	280	2,225	Bearpaw	Fairly soft	42	D, S	Sufficient for local needs. #
8	SW.	10	"	"	"	Drilled	138	2,480	-118	2,362	138	2,342	Glacial drift	Hard, iron, "alkaline"	42	D, S	Sufficient supply.
9	SW.	12	"	"	"	Bored	65	2,390	- 35	2,355	65	2,325	Glacial drift	Hard, iron, "alkaline" red colour	42	D, S	Barely sufficient; dam used for stock.
10	NW.	12	"	"	"	Bored	50	2,425	- 20	2,405	50	2,375	Glacial gravel	Hard	43	D, S	Sufficient supply.
11	SW.	13	"	"	"	Bored	50	2,425	- 44	2,381	50	2,375	Glacial sand	Hard	42	D, S	Just sufficient.
12	SE.	14	"	"	"	Bored	56	2,425	- 39	2,386	56	2,369	Glacial drift	Hard, iron	41	D, S	Sufficient supply.
13	NE.	16	"	"	"	Dug	13	2,405	- 3	2,402	13	2,392	Glacial drift	Hard, "alkaline"	44	D	Sufficient for house; 8-foot dugout supplies stock.
14	NW.	16	"	"	"	Drilled	365	2,470			365	2,105	Bearpaw ?	Soft, light brown colour	44	D, S	Sufficient supply. #
15	SW.	17	"	"	"	Drilled	100	2,450	- 85	2,365	100	2,350	Glacial drift	Hard	41	D, S	Sufficient supply.
16	NE.	18	"	"	"	Bored	31	2,460	- 17	2,443	31	2,429	Glacial drift	Hard	40	D	Intermittent supply; dugout for stock. Many dry holes to 114 feet deep in the drift, and one drilled to 783 feet in Bearpaw.
17	SW.	20	"	"	"	Bored	62	2,520	- 60	2,460	62	2,458	Glacial sand	Hard	42	D, S	Sufficient supply; dam in coulee with 8 feet of water for stock.
18	W½	22	"	"	"	Bored	85	2,500	- 70	2,430	85	2,415	Glacial sand			D, S	Sufficient supply.
19	NW.	23	"	"	"	Dug	20	2,490	- 16	2,474	20	2,470	Glacial drift	Hard, cloudy, "alkaline"	40	D, S	Sufficient 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 MORSE NO. 165, 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
30	NE.	24	18	9	3	Dug	10	2,470	- 8	2,462	10	2,460	Glacial sand	Soft	43	D, S	Insufficient during winter; 14-foot well used in winter; 35-foot well with 20 feet of water, partly caved in and unused.
21	NE.	26	"	"	"	Bored	60	2,515	- 40	2,475	60	2,455	Glacial drift	Hard	41	D, S	Ample supply; never pumped dry; two sloughs supply water for stock in spring.
22	NE.	28	"	"	"	Bored	85	2,475	- 55	2,420	85	2,390	Glacial drift	Hard, iron	43	D, S	Sufficient supply; springs also supply water for stock.
23	NE.	31	"	"	"	Dug	12	2,530	- 4	2,526	12	2,518	Glacial sand	Hard	44	D, S	Sufficient supply.
24	SW.	33	"	"	"	Bored	75	2,460	- 20	2,440	75	2,385	Glacial sand	Soft, slightly "alkaline"	42	D, S	Sufficient supply.
25	SW.	34	"	"	"	Drilled	640	2,390	-110	2,280	640	1,750	Belly River ?	Soft, sulphur, green-blue colour		D, S	Sufficient for local needs. #
26	SW.	35	"	"	"	Dug	12	2,435	- 2	2,433	12	2,423	Glacial sand	Hard, clear	44	D, S	Sufficient supply; waters 100 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.