CANADA

DEPARTMENT OF MINES

AND

TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

WATER SUPPLY PAPER No. 67

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF PART OF THE RURAL MUNICIPALITY OF PRAIRIE ROSE NO. 309 SASKATCHEWAN

By

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

OTTAWA

1936

CANADA

DEPARTMENT OF MINES

BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

GROUND WATER RESOUCES OF THE RURAL MUNICIPALITY OF PRAIRIE ROSE NO. 309 SASKATCHEWAN

BY

B.R. MacKAY, H.N. HAINSTOCK, and G. GRAHAM

WATER SUPPLY PAPER NO. 67

CONTENTS

Illustrations

GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF PRAIRIE ROSE, NO. 309, 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 find the approximate depth to a water-bearing horizon, he must learn: (1) the elevation of the site, and (2) the probable elevation of the water-bearing bed. The elevation of the well site is obtained by marking its position on the map, Figure 2, and estimating its elevation with respect to the two contour lines between which it lies and whose elevations are given on the figure. Where contour lines are not shown on the figure, the elevations of adjacent wells as indicated in the Table of Well Records accompanying each report can be used. The approximate elevation of the water-bearing horizon at the well-site can be obtained from the Table of Well Records by noting the elevation of the water-bearing horizon in surrounding wells and by estimating from these known elevations its elevation at the well-site.[1] If the water-bearing horizon is in bedrock the depth to water can be estimated fairly accurately in this way. If the water-bearing horizon is in unconsolidated deposits such as gravel, sand, clay, or glacial debris, however, the estimated elevation is less reliable, because the water-bearing horizon may be inclined, or may be in lenses or in sand beds which may lie at various horizons and may be of small lateral extent. In calculating the depth to water, care should be taken that the water-bearing horizons selected from the Table of Well Records be all in the same geological horizon either in the glacial drift or in the bedrock. From the data in the Table

---

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

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

GLOSSARY OF TERMS USED

Alkaline. The term "alkaline" has been applied rather loosely to some ground-waters. In the Prairie Provinces, a water is usually described as "alkaline" when it contains a large amount of salts, chiefly sodium sulphate and magnesium sulphate in solution. Water that tastes strongly of common salt is described as "salty". Many "alkaline" waters may be used for stock. Most of the so-called "alkaline" waters are more correctly termed "sulphate waters".

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

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

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

Bedrock. Bedrock, as here used, refers to partly or wholly consolidated deposits of gravel, sand, silt, clay, and marl that are older than the glacial drift.

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

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

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

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

Flood-plain. A flat part in a river valley ordinarily above water but covered by water when the river is in flood.

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

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

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

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

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

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

Hydrostatic Pressure. The pressure that causes water in a well to rise above the point at which it is struck.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Prairie Rose, No. 309, covers an area of 324 square miles in central Saskatchewan. It consists of nine townships, described as tps. 31, 32, and 33, ranges 19, 20, and 21, W. 2nd mer. The centre of the area is approximately 90 miles north of Regina and 176 miles west of the Manitoba boundary. Only the southern two-thirds of the municipality, namely townships 31 and 32, ranges 19, 20, and 21, an area of 216 square miles, is covered by this report. The town of Jansen, located in the northeast corner of township 32, range 20, on the Saskatoon-Winnipeg branch of the Canadian Pacific railway, is the only town in the area under discussion.

The lowest point in the municipality is in the southeastern corner. In this area a number of small lakes, which form part of a series extending from Last Mountain lake to Quill lake, occur at approximate elevations of 1,700 to 1,720 feet above sea-level. The maximum elevation of 1,800 feet is attained in sec. 1, tp. 31, range 19. The remainder of the municipality under discussion has an average elevation of 1,750 feet. A large area in the southeastern part of the municipality is mantled by glacial lake clays. A fairly large area in the northwestern corner, and a small area in township 31, ranges 20 and 21, are covered by moraine. The remainder of the municipality is underlain by boulder clay or glacial till.

Water-bearing Horizons in the Unconsolidated Deposits

The uppermost water-bearing horizon in the area examined is formed by scattered deposits of sand and gravel that occur as pockets in the upper or weathered zone of the glacial drift. These pockets are generally tapped by wells within 30 feet of the surface. In township 32, ranges 20 and 21, the pockets tapped appear to be

more extensive and the aquifer forms the main source of ground water supply. In some areas dry holes in the vicinity of producing wells show the local distribution of the sand and gravel deposits. Wells encountering this aquifer are invariably non-artesian, and are more seriously affected by drought conditions than wells that obtain their supplies from deeper water-bearing horizons. Most of these wells yield a supply of water sufficient for local needs, but in township 32, range 21, the supply is inadequate. The water varies from comparatively soft to quite hard. Unless the water is contaminated by surface seepage water, it is satisfactory for all farm purposes.

A few wells scattered throughout the municipality are obtaining water from isolated sand and gravel pockets in the glacial clay at depths ranging from 40 to 85 feet. The wells tapping them yield varying quantities of hard water, that is suitable for domestic and stock use. Water is more difficult to locate at this depth than at shallow depths.

A lower water-bearing horizon is located in townships 31 and 32, range 19. The wells usually encounter this aquifer at depths of 80 to 120 feet below the surface, but one well tapped it at a depth of 165 feet. The known areal extent of this aquifer is outlined by a boundary line on the accompanyiny map. It probably extends slightly outside the limits indicated on the map, and may extend into the next municipality to the east. The water from wells in the area outlined is under sufficient hydrostatic pressure to cause it to flow above the surface, and the flowing wells in township 32, range 19, yield a particularly abundant supply. The water is invariably hard and highly mineralized, but is suitable for stock requirements and is being used in all cases for domestic purposes.

Another fairly extensive water-bearing horizon in the glacial drift occurs in the area outlined by the "A" boundary line. It is encountered at depths ranging from 115 to 175 feet below the surface, or at elevations of 1,575 to 1,615 feet above sea-level. It is possible that this aquifer will also be encountered by other wells drilled outside of the area indicated. This aquifer extends into the municipality to the south. The water in all the wells drawing from this horizon is under hydrostatic pressure, and rises to a point 35 feet below the surface. In one instance, where the ground surface is low, the water flowed for a time above the surface. The supply from the wells tapping this horizon is in all cases more than sufficient for farm needs. The water is invariably hard and contains iron salts in solution. In some instances the mineralization is so high as to render the water unsuitable for drinking, although it can be used for stock.

The deepest water-bearing horizon in the drift encountered in this municipality occurs in the area outlined by the boundary line "B". Wells tapping this horizon are drilled to depths ranging from 255 feet in the southeastern part of township 31, range 21, and to 320 feet in the southwestern part of township 32, range 21. The elevation of the aquifer ranges from 1,430 feet to 1,476 feet above sea-level. This water-bearing horizon is formed by deposits of sand and gravel that probably lie at the base of the glacial drift, but may occur in the Marine shale series. The area outlined on the map contains wells that are obtaining water from this aquifer and it is possible that the horizon extends outside the area shown. The wells tapping this water-bearing horizon are all non-flowing artesian and the hydrostatic pressure is sufficient to cause the water to rise to a point 40 feet below the surface. The yield is large, but the water is extremely hard and is highly charged with

mineral salts. The well located in NW. ¼, sec. 12, tp. 31, range 21, is not at present in use, but the others in township 32, range 21, are being utilized for stock requirements.

Water-Bearing Horizons in the Bedrock

The Marine Shale series underlies the drift throughout the municipality. The elevation of the top of the bedrock is estimated to be about 1,450 feet above sea-level. No water-bearing horizons were definitely established as being in the bedrock. It is possible, however, although improbable, that the last aquifer described under the unconsolidated deposits may be in the upper part of the bedrock. In the municipality of Usborne No. 310, to the west, and Wreford No. 280, to the southwest, a bedrock aquifer was encountered at an elevation of 1,300 to 1,340 feet above sea-level, and this aquifer may extend into this municipality. However, should the same conditions exist in this municipality as in Usborne, great difficulty would be experienced with the fine sand of the aquifer being forced up into the well casings and shutting off any water supply that might be tapped.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 31, Range 19

Several lakes occupy low-lying ground trending northeast through the centre of the township. In the northwestern part of the township the surface is comparatively flat and is at an approximate elevation of 1,715 feet above sea-level, whereas in the southeastern part the elevation rises somewhat abruptly from 1,710 feet at the lakes to 1,800 feet above sea-level in the southeastern corner. With the exception of the southeastern corner, which is covered by glacial till or boulder clay, the township is mantled by glacial lake clays. Only the eastern half of the township is settled.

The uppermost water-bearing horizon is formed by sand and gravel deposits that occur as scattered pockets in the upper 60 feet of the boulder clay. The wells encountering these pockets yield varying supplies of moderately soft to hard, drinkable water, and the supply from them is usually sufficient for local needs.

In the northeastern part of the township, a second aquifer is encountered that yields water which is under sufficient hydrostatic pressure to cause it to flow above the surface. With the exception of a 165-foot well on section 23, the wells tapping this horizon vary in depth from 80 to 120 feet. The proved extent of this area of flowing artesian wells is outlined on the accompanying map. The yield is abundant and the water although highly mineralized is suitable for both domestic and stock use.

Township 31, Range 20

The general slope of this township is from west to east, the highest elevation of 1,750 feet above sea-level is in the southwestern corner, whereas the lowest of 1,708 feet is in the southeastern corner. The southwestern corner of the area is covered by glacial drift in the form of terminal moraine; the eastern part of the township is mantled by glacial lake clays, and the remainder of the township is underlain by till or boulder clay.

Small quantities of water are being obtained from isolated wells tapping scattered pockets of sand and gravel that occur at depths of 20 to 100 feet in the boulder clay. The water is generally hard and is suitable for both humans and stock. It could not be determined whether these wells have tapped one or two water-bearing horizons. However, a general aquifer does exist in this township, at an elevation of 1,610 to 1,560 feet above sea-level, the proved extent of which is outlined by the "A" boundary line on Figure 1. It is encountered at depths ranging from 130 to 180 feet below the surface. This aquifer may extend beyond the area shown. The hydrostatic pressure is sufficient to cause the water to flow above the surface in one well, and in the other wells to raise the water to within 20 feet of the surface. The yield is abundant and the water is hard and highly charged with mineral salts, but is being used for both domestic and stock requirements.

Township 31, Range 21

The lowest elevation of 1,700 feet is in the southwestern corner of this township. From this point the surface rises gradually to the northern and the southeastern corners, where

an elevation of 1,750 feet is reached. The township is covered by till or boulder clay except the northwestern and southeastern corners which are covered by terminal moraine.

A few wells are obtaining small amounts of hard, drinkable water from scattered pockets of sand and gravel in the boulder clay at depths up to 60 feet from the surface.

In the area outlined by the line "A" on the accompanying map, an aquifer is encountered at depths ranging from 115 to 175 feet below the surface. The proved areal extent of this horizon is outlined on the map, but other wells in the vicinity of this area might encounter the same horizon. The water in the wells drawing from this horizon is under sufficient hydrostatic pressure to rise to a point 45 feet below the surface. There is an abundant yield of hard, mineralized water, iron being common, but in almost all instances the water is suitable for both humans and stock.

One well located in SW. $\frac{1}{4}$, section 15, is obtaining a fair supply of water at a depth of 223 feet below the surface. The aquifer encountered is at an elevation of 1,500 feet above sea-level. It is not known if this is merely an isolated pocket in the glacial drift or if a general water-bearing horizon is present at this depth in this area. It is quite likely that an aquifer occurring above the one encountered was passed through unnoticed. The water is hard and contains a considerable amount of iron salts in solution but is suitable for both humans and stock.

One well, located in NW.$\frac{1}{4}$, section 12, encountered a water-bearing horizon at a depth of 254 feet, or at an elevation of 1,476 feet above sea-level. This water-bearing horizon is probably formed by sand and gravel deposits that occur at the base of the glacial drift, and overlie the bedrock. It is probably fairly continuous throughout the area outlined

by the "B" boundary line. The hydrostatic pressure is sufficient to cause the water to rise to a point 45 feet below the surface. The yield is more than sufficient for local needs, but at the present time the well is not being used. The water is hard and contains a considerable amount of mineral salts in solution.

Township 32, Range 19

This township is comparatively flat, the elevation varying only 35 feet throughout the township. The lowest areas are along the southern and eastern boundaries, whereas the highest elevation is in the northwestern corner. In this corner the glacial drift mantle is in the form of till or boulder clay, whereas over the remainder of the area the till is concealed beneath glacial lake clays.

Only a small area of this township is under cultivation, but a few residents are obtaining fair supplies of water from isolated pockets of sand and gravel in the boulder clay within 25 feet of the surface. These wells are non-artesian, but yield a supply of medium hard, drinkable water, that is sufficient for local needs. The number of wells of this type in this township are too few and too widely distributed to determine whether they are drawing their supplies from a continuous water-bearing horizon or from isolated pockets.

Three flowing artesian wells are located inside the boundary outlined on the accompanying map in the southeastern part of the township. It is not definitely known if the horizon tapped by these wells extends outside the area outlined, but it is probable that the same conditions exist within at least short distances of the proved area, especially to the northeast. These wells yield an abundant supply of hard, highly mineralized water, that is being used for both humans and stock.

Township 32, Range 20

The lowest areas in this township are located along the southern and southeastern parts. From here there is a gradual rise in elevation towards the northern boundary. The relief, however, is very small, the total difference in elevation amounting to less than 50 feet. The township is covered by glacial lake clay, boulder clay, and terminal moraine, as shown on Figure 1.

The uppermost water-bearing horizon in this township is formed by sand and gravel deposits that occur as pockets or lenses within the upper 25 feet of the drift mantle. In the central part of the township these pockets give every appearance of continuity and water is easily obtained at shallow depths. These wells are affected by drought periods, but at no time has there been a shortage of water. The water varies from moderately soft to hard, and is suitable in practically all cases for drinking and for stock. In most wells the supply is more than sufficient for local requirements.

The second water-bearing horizon is tapped by a few wells at depths of 40 to 90 feet from the surface. This aquifer is formed by isolated pockets of sand and gravel that occur in the lower unconsolidated zone of the till or boulder clay. These pockets yield varying quantities of hard, usually drinkable water, but appear to be no more dependable than the shallower wells.

Two wells located in NE.$\frac{1}{4}$, section 2, and NW.$\frac{1}{4}$, section 8, are obtaining good supplies of hard water at depths of 135 feet and 148 feet from the surface, and at an elevation of about 1,590 feet. The areal extent of this aquifer is unknown but it is very probable a continuation of the aquifer that is tapped in the area nonflowing artesian wells outlined by the boundary "A" on the

accompanying map. There is sufficient hydrostatic pressure present to cause the water in one well to flow and in the other to rise to a point 13 feet below the surface. The water is highly mineralized, and in one well is unsuitable for domestic purposes although satisfactory for stock.

Township 32, Range 21

The relief of this township is slight, the average elevation being 1,750 feet. A ridge of low-lying hills occurs in the northwestern corner and a number of "alkali flats" are present in the southeastern part. The southeastern corner, and a small part in the northwestern corner, are mantled by glacial till or boulder clay, and the remainder of the township is covered by moraine. The uppermost water-bearing horizon is formed by scattered sand and gravel pockets in the upper weathered zone of the boulder clays. These pockets are tapped at depths of 15 to 30 feet, and yield varying quantities of comparatively soft to hard water. However, at a number of farms the supply from a single well is insufficient for local needs and must be supplemented by that of a second well, or by hauling water.

A sufficient number of wells are obtaining water at depths of 40 and 60 feet to indicate that they are drawing their supplies from what may be considered as a second water-bearing, horizon. This horizon is formed by isolated pockets of sand and gravel occurring in the unweathered zone of the boulder clay. There is no evidence that these deposits are continuous and dry holes will no doubt be encountered in the vicinity of producing wells. The wells tapping this aquifer yield a hard, drinkable water, but in a few wells the supply is insufficient for local requirements.

One well located in SW. ¼, section 9. encountors a water-bearing horizon at a depth of 200 feet, or at an elevation of 1,550 feet above sea-level. The areal extent of this aquifer is not known, but the general characteristics of the water make it appear probable that it is the same water-bearing horizon as that tapped by the non-flowing artesian wells outlined by the boundary "A" on the accompanying map. The water is under sufficient hydrostatic pressure to rise to a level 30 feet below the surface, and the supply is abundant. The water is hard and unsuitable for humans.

Three wells, located in SW.¼, section 6, SW.¼, section 8, and SW.¼, section 18, are drilled to depths of 320, 280, and 288 feet respectively. The water-bearing horizon encountered is at an average of 1,454 feet above sea-level. The proved extent of this aquifer is outlined by the boundary "B" on the accompanying map. This horizon may be formed by deposits of sand and gravel occurring at the base of the glacial drift, but appear to be in bedrock. The water in these wells is under pressure and rises to within an average distance of 42 feet below the surface. There is an abundant supply of hard, highly mineralized water available from this source, but its high mineralization limits its use for stock.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF PRAIRIE ROSE NO. 309, SASKATCHEWAN

West of 2nd mer. Township / Range	31 / 19	31 / 20	31 / 21	32 / 19	32 / 20	32 / 21	Total No. in Municipality
Total No. of Wells in Township	23	25	30	7	43	56	184
No. of wells in bedrock	0	0	1	0	0	3	4
No. of wells in glacial drift	23	25	29	7	43	53	180
No. of wells in alluvium	0	0	0	0	0	0	0
Permanency of Water Supply							
No. with permanent supply	23	19	29	7	42	47	167
No. with intermittent supply	0	1	1	0	1	2	5
No. dry holes	0	5	0	0	0	7	12
Types of Wells							
No. of flowing artesian wells	3	1	0	3	1	0	8
No. of non-flowing artesian wells	8	16	21	0	20	19	84
No. of non-artesian wells	12	3	9	4	22	30	80
Quality of Water							
No. with hard water	19	18	27	6	38	44	152
No. with soft water	4	2	3	1	5	5	20
No. with salty water	0	0	0	0	0	0	
No. with alkaline water	7	9	13	4	19	14	66
Depths of Wells							
No from 0 to 50 feet deep	12	10	11	4	39	46	122
No from 51 to 100 feet deep	6	3	2	3	2	6	22
No. from 101 to 150 feet deep	4	6	11	0	2	0	23
No. from 151 to 200 feet deep	1	6	4	0	0	0	11
No. from 201 to 500 feet deep	0	0	2	0	0	4	6
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	
No. over 1,000 feet deep	0	0	0	0	0	0	
How the water is used							
No. usable for domestic use	19	20	23	6	36	35	139
No. not usable for domestic use	4	0	7	1	7	14	33
No. usable for stock use	23	20	30	7	43	49	172
No. not usable for stock use	0	0	0	0	0	0	
Sufficiency of Water Supply							
No. sufficient for domestic needs	23	19	30	7	43	48	170
No. insufficient for domestic needs	0	1	0	0	0	1	2
No. sufficient for stock needs	18	16	25	7	37	27	130
No. insufficient for stock needs	5	4	5	0	6	22	42

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

The term "total dissolved mineral solids" as here used refers to the residue remaining when a sample of water is evaporated to dryness. It is generally considered that waters that have less than 1,000 parts per million of dissolved solids are suitable for ordinary uses, but in the Prairie Provinces this figure is often exceeded. Nearly all waters that contain more than 1,000 parts per million of total solids have a taste due to the dissolved mineral matter. Residents

accustomed to the waters may use those that have much more than 1,000 parts per million of dissolved solids without any marked inconvenience, although most persons not used to highly mineralized water would find such waters highly objectionable.

Mineral Substances Present

Calcium and Magnesium

The calcium (Ca) and magnesium (Mg) content of water is dissolved from rocks and soils, but mostly from limestone, dolomite, and gypsum. The calcium and magnesium salts impart hardness to water. The magnesium salts are laxative, especially magnesium sulphate (Epsom salts, $MgSO_4$), and they are more detrimental to health than the lime or calcium salts. The calcium salts have no laxative or other deleterious effects. The scale found on the inside of steam boilders and tea-kettles is formed from these mineral salts.

Sodium

The salts of sodium are next in importance to those of calcium and magnesium. Of these, sodium sulphate (Glauber's salt, Na_2SO_4) is usually in excess of sodium chloride (common salt, NaCl). These sodium salts are dissolved from rocks and soils. When there is a large amount of sodium sulphate present the water is laxative and unfit for domestic use. Sodium carbonate (Na_2CO_3) "black alkali", sodium sulphate "white alkali", and sodium chloride are injurious to vegetation.

Sulphates

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

Chlorides

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

Iron

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

Hardness

Calcium and magnesium salts impart hardness to water. Hardness of water is commonly recognized by its soap-destroying powers as shown by the difficulty of obtaining lather with soap. The total hardness of a water is the hardness of the water in its original state. Total hardness is divided into "permanent hardness" and "temporary hardness". Permanent hardness is the hardness of the water remaining after the sample has been boiled and it represents the amount of mineral salts that cannot be removed by boiling. Temporary hardness is the difference between the total hardness and the permanent hardness and represents the amount of mineral salts that can be removed by boiling. Temporary hardness is due mainly to the bicarbonates of calcium and magnesium and iron, and permanent hardness to the sulphates and chlorides of calcium and magnesium. The permanent hardness

can be partly eliminated by adding simple chemical softeners such as ammonia or sodium carbonate, or many prepared softeners. Water that contains a large amount of sodium carbonate and small amounts of calcium and magnesium salts is soft, but if the calcium and magnesium salts are present in large amounts the water is hard. Water that has a total hardness of 300 parts per million or more is usually classed as excessively hard. Many of the Saskatchewan water samples have a total hardness greatly in excess of 300 parts per million; when the total hardness exceeded 3,000 parts per million no exact hardness determination was made. Also no determination for temporary hardness was made on waters having a total hardness less than 50 parts per million. As the determinations of the soap hardness in some cases were made after the samples had been stored for some time, the temporary hardness of some of the waters as they come from the wells probably is higher than that given in the table of analyses.

Water from the Unconsolidated Deposits

No water samples were obtained from this municipality for chemical analyses. However, from information available on wells in the surrounding areas, and a superficial examination of the wells in this area, a few generalizations may be made. Marked variation in the character of waters from shallow drift wells may occur within narrow limits, but as a rule the water from shallow wells in this area, unless contaminated by organic material, can be used for all farm purposes. It varies from comparatively soft to very hard, but the waters do not appear to be highly mineralized. In the deeper wells of the drift, up to 100 feet, the mineralization increases slightly but the waters are suitable for domestic and stock use in most instances.

The waters from the artosian wells in the area outlined by the boundary line "A" on the accompanying map, are in the majority of cases highly mineralized. The total dissolved solid content in these waters is probably in excess of 1,000 parts per million and the waters may have at least 750 parts per million of permanent hardness. It is probable that many of the waters contain Na_2SO_4 (Glauber's salt) and $MgSO_4$ (Epsom salts) because of the laxative effect produced on humans and also because of the bitter taste imparted to the water in some instances. It is improbable that these waters contain very much Na_2CO_3 (black alkali) or $MgCO_3$ (magnesium carbonate), but they will contain $CaCO_3$ (calcium carbonate) because of their hardness. NaCl (common salt) is undoubtedly present in small amounts, but in no case is it sufficient to render the water unfit for humans. Iron is present in practically all the waters in this area.

The water that is obtained from the few wells that have tapped the water-bearing horizon at the contact of the drift and bedrock, or within the upper part of the bedrock, is ex-

cessively hard, and is highly mineralized. These waters as a rule are used only for stock, but when used continually by humans the body appears to build up a resistance to their ill effects. In every case the waters from this aquifer contained iron. By allowing the water to stand in contact with the air for a considerable time before using, most of the iron salt content will become oxidized and settle as a reddish precipitate. Agitation of the water, and having as much water as possible in contact with the air, will speed up this action.

Water from the Bedrock

No wells in the part of this municipality under discussion are definitely known to be obtaining their water from a bedrock aquifer, and so only a very broad generalization will be made. In the areas to the east the water from the bedrock varies from hard to soft, and contains a high "total dissolved solid content", and it is logical to assume that water from the bedrock in this municipality will have the same general characteristics. It is probable that Na_2SO_4 (Glauber's salt) and NaCl (common salt) will be the predominant mineral salts present in solution. If the water is hard, relatively large amounts of $CaCO_3$ (calcium carbonate), $CaSO_4$ (calcium sulphate), and $MgSO_4$ (Epsom salts) are present. From the samples from wells in the surrounding area, it may be concluded that the water from the bedrock is of poor quality, and probably suitable only for stock. Waters from different water-bearing horizons in the Marine Shale series will doubtless vary in quality.

WELL RECORDS—Rural Municipality of PRAIRIE ROSE, No. 309, SASKATCHEWAN., (Part only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	NW.	1	31	19	2	Dug	32	1,760	- 9	1,751	9	1,751	Glacial sand	Hard, clear "alkaline"		D, S,	Sufficient for local needs.
2	SE.	1	"	"	"	"	10	1,850	- 7	1,843	7	1,843	" "	Soft, clear		D, S	" " " " .
3	NE.	2	"	"	"	Bored	45	1,792			45	1,747	" "	Hard, " , iron		D, S	" " 10 head stock.
4	SW.	2	"	"	"	"	60	1,745	- 54	1,691	54	1,691	" gravel	" , " , hard		D, S	Insufficient for local needs; uses a spring.
5	NW.	2	"	"	"	Spring	6	1,750	+ 1	1,751	4	1,746	" "	Soft, "		D, S	Sufficient for local needs.
6	SW.	9	"	"	"	Dug	10	1,730	- 6	1,724	6	1,724	" sand	Hard,		D, S	" " " " .
7	SE.	10	"	"	"	Bored	40	1,750	- 32	1,718	32	1,718	" gravel	"		D, S	" " 8 head stock.
8	SE.	12	"	"	"	Dug	12	1,775	- 10	1,765	10	1,765	" sand	" , clear		D, S	" " local needs.
9	SE.	13	"	"	"	Drilled	112	1,770	- 24	1,746	112	1,658	" "	", "alkaline" cloar,		S	" " 20 head stock; 27 foot well for house.
10	NE.	14	"	"	"	Bored	81	1,755	- 14	1,741	81	1,674	" "	iron, " , hard, "alkaline"		D, S	Sufficient for local needs.
11	SE.	14	"	"	"	"	73	1,763	- 53	1,710	73	1,690	" "	Hard, clear		D, S	" " 32 head stock; also 2 other wel
12	NE.	23	"	"	"	Drilled	165	1,730	0	1,730	165	1,565	" "	" , " iron, "alkaline"		S	Yields 12 gals. a mimute.
13	SW.	24	"	"	"	Bored	60	1,750	- 20	1,730	60	1,690	" "	Hard		S	Sufficient for local needs.
14	NE.	24	"	"	"	"	35	1,750	- 15	1,735	15	1,735	" "	" , cloudy, "alkaline"		D, S	
15	SE.	25	"	"	"	Dug	30	1,750	- 15	1,735	30	1,720	" gravel	" , hard, cloudy		D, S	Sufficient for local needs.
16	SE.	27	"	"	"	Drilled	125	1,720			125	1,595	"	Hard, iron, "alkaline"		D, S	Was flowing at one time.
17	NE.	34	"	"	"	"	118	1,740	+4	1,744	118	1,622	" sand	" , hard, iron, clear		D, S	Oversufficient for local needs.
18	SW.	36	"	"	"	"	80	1,742	0	1,742	80	1,662	" "	" , " , hard, "alkaline"		D, S	Yields 6 gals. a mimute.
1	SW.	3	31	20	2	Drilled		1,734					" "	Hard, cloudy, iron, "alkaline		D, S	Sufficient for local needs.
2	SW.	16	"	"	"	"	180	1,740	- 20	1,720	180	1,560	" "	Hard, iron, "alkaline"		D, S	" " 35 head stock.
3	NE.	17	"	"	"	"	54	1,745	- 20	1,725	54	1,691	" "	Hard, clear		D, S	" " local needs.
4	SW.	17	"	"	"	"	200	1,740					" "	" , " , iron, "alkaline		D, S	" " " " .
5	SE.	18	"	"	"	"	138	1,726	- 10	1,716	138	1,588	" "	Hard, iron, clear, "alkaline		D, S	" " " " .
6	SW.	18	"	"	"	"	129	1,750	- 18	1,732	129	1,621	" "	Hard, clear, iron		D, S	" " " " .

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 PRAIRIE ROSE, NO. 309, SASKATCHEWAN, (Part only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
7	SE.	19	31	20	2	Dug	10	1,740	- 2	1,738	10	1,730	Glacial sand	Hard, clear		D, S	Sufficient supply except in winter.
8	SE.	20	"	"	"	Drilled	160	1,740	- 20	1,720	160	1,580	" gravel	" , " , iron		D, S	" for 10 head stock.
9	NE.	20	"	"	"	Dug	7	1,740					" "	Soft		D, S	Intermittent supply.
10	NW.	20	"	"	"	Drilled	170	1,750	- 12	1,738	170	1,580	" "	Hard, clear, iron, "alkaline"		D, S	Sufficient for local needs.
11	SW.	21	"	"	"	"	160	1,738			160	1,578	" sand	Hard, "alkaline", iron, clear		D, S	" " " " .
12	SE.	22	"	"	"	"	131	1,728	+ 1	1,729	121	1,607	" "	" , " , iron, "alkaline"		D, S	" " " " .
13	NW.	22	"	"	"	"	180	1,730	- 11	1,719	180	1,550	" "	Hard, iron		D, S	" " 23 head stock.
14	SW.	26	"	"	"	Dug	11	1,736	- 7	1,729	7	1,729	" gravel	Soft		D, S	Insufficient for local needs.
15	NE.	27	"	"	"	Drilled	139	1,730	- 13	1,717	139	1,591	" sand	Hard, clear, iron, "alkaline,		D, S	Sufficient for 20 head stock.
16	NE.	28	"	"	"	"	138	1,730	- 13	1,717	138	1,592	" gravel	Hard, clear		D, S	" " 60 " " .
17	NW.	28	"	"	"	"	100	1,745	- 8	1,737			" sand	" , " , iron		D, S	Insufficient for local needs.
18	NW.	30	"	"	"	"	67	1,750	- 10	1,740	67	1,683	" "	" , hard, cloudy		D, S	Sufficient " " " .
19	NE.	33	"	"	"	Bored	35	1,732	- 12	1,720	35	1,697	" clay	Hard, clear, "alkaline"		D, S	" " " " .
20	NW.	34	"	"	"	Dug	10	1,740					"			N	Dry hole; water is hauled.
1	NW.	1	31	21	2	Drilled	151	1,745	- 30	1,715	151	1,594	" gravel	Hard, clear, iron, "alkaline"		D, S	Oversufficient for 30 head stock.
2	SE.	2	"	"	"	"	180	1,750	- 50	1,700	180	1,570	" " ,sand	Hard, clear, iron		D, S	" " 20 " " .
3	SW.	5	"	"	"	"	134	1,735	- 35	1,700	134	1,601	"	" , hard		D, S	" " 65 " " .
4	SE.	10	"	"	"	"	125	1,735	- 35	1,700	125	1,610	" sand	" , " , clear		D, S	Sufficient for 25 head stock.
5	NE.	10	"	"	"	"	110	1,720	- 25	1,695	110	1,610	" "	" , " , iron		D, S	Oversufficient for 20 head stock.
6	SW.	11	"	"	"	"	140	1,735	- 30	1,705	140	1,595	" "	" , "		D, S	Sufficient for 11 head stock.
7	SW.	12	"	"	"	"	67	1,735	- 12	1,723	67	1,668	" "	" , " , clear		D, S	Oversufficient for 65 head stock.
8	NW.	12	"	"	"	"	254	1,730	- 45	1,685	254	1,476	"	Hard, clear, iron, "alkaline"		D, S	Sufficient for 20 head stock.
9	SE.	14	"	"	"	"	132	1,730	- 35	1,695	132	1,598	" sand	Hard, clear, iron, "alkaline"		D, S	" " 18 " " .
10	SW.	14	"	"	"	"	108	1,735	- 18	1,717	108	1,627	" gravel	Hard, iron, clear		S	Oversufficient for 100 head stock.
11	SW.	15	"	"	"	"	223	1,725					"	Hard, iron		D, S	Insufficient for local needs.

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 PRAIRIE ROSE, NO. 309, SASKATCHEWAN, (Part only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
12	NE.	15	31	21	2	Drilled	118	1,720	- 20	1,700	118	1,602	Glacial gravel	Hard, clear, "alkaline", iron		D, S	Sufficient for 60 head stock.
13	NW.	15	"	"	"	Dug	40	1,715	- 37	1,678	40	1,675	"	Hard, clear, "alkaline"		S	" " 10 " " .
14	SE.	18	"	"	"	"	12	1,715	- 9	1,706	8	1,707	" "	" , hard, clear		S	Insufficient for 8 head stock; haul water.
15	NE.	19	"	"	"	Drilled	192	1,740	-190	1,550	192	1,548	"	Hard, clear, iron		S	Sufficient for local needs.
16	SW.	19	"	"	"	Dug	35	1,720	- 33	1,687	35	1,685	" clay	Hard, clear, "alkaline"		D, S	Insufficient for local needs.
17	NW.	20	"	"	"	Drilled	110	1,725	- 12	1,713	110	1,615	" sand	" , hard, clear, iron		D, S	Sufficient for 90 head stock; also 35 foot we
18	NW.	24	"	"	"	"	130	1,720	- 18	1,702	130	1,590	" gravel	" , " , hard, "alkaline		D, S	" " 50 " " .
19	NW.	24	"	"	"	Dug	8	1,720	- 6	1,714	6	1,714	" "	Soft, clear		D, S	" " domestic use only.
20	SE.	30	"	"	"	"	16	1,730	- 11	1,719	14	1,716	" "	" , "		D, S	Insufficient for local needs.
21	NE.	30	"	"	"	"	16	1,735	- 11	1,724	15	1,720	" sand	Hard, "		D, S	Sufficient for 15 head stock.
22	NW.	30	"	"	"	Drilled	180	1,740	- 40	1,700	180	1,560	"	" , " , iron, "alkaline"		S	Insufficient for local needs. Cylinder down casing and plugging it
23	SW.	32	"	"	"	"	142	1,745	- 20	1,725	142	1,603	" sand	Hard, clear, iron		D, S	Oversufficient for 30 head stock.
24	NW.	32	"	"	"	"	148	1,745	- 20	1,725	148	1,597	" "	" , hard		D, S	" " 17 " " .
25	SE.	32	"	"	"	Bored	80	1,740	- 55	1,685	80	1,660	"	" , " "alkaline", clear		D, S	Sufficient for 30 head stock.
26	SW.	33	"	"	"	"	50	1,740	- 25	1,715	50	1,690	"	" , hard		D, S	" " 10 " " ; good supply.
27	SW.	34	"	"	"	"	9	1,740	- 6	1,734	9	1,731	" gravel	" , soft		D, S	" " 15 " " .
28	NW.	34	"	"	"	"	40	1,745	- 20	1,725	40	1,705	" "	" ,hard, "alkaline"		S, D	Oversufficient for 10 head stock.
29	NW.	34	"	"	"	"	40	1,740	- 20	1,720	40	1,700	" "	" ,hard, clear		S	" " 6 " " .
1	NW.	2	32	19	2	Drilled	90	1,720	+ ?	1,720+	90	1,630	" sand	" , " iron, "alkaline"		D,S	Steady flow; very good supply.
2	SW.	3	"	"	"	"	97	1,740	+ ?	1,740+	97	1,643	" "	Hard, clear, iron, "alkaline"		D, S	Yields 15 gals. a minute; stead flow.
3	NE.	7	"	"	"	Dug	24	1,730	- 18	1,712	18	1,712	" "	Hard, clear		D, S	Sufficient for 60 head stock.
4	SE.	9	"	"	"	Drilled	96	1,715	+ ?	1,715+	96	1,619	" "	" , " , iron, "alkaline"		D, S	Very Heavy flow; yields 30 gals. a minute.
5	NE.	—	"	"	"	Dug	7	1,732	0	1,732	7	1,725	" gravel	Hard, clear		D, S	Fair supply; gets scarce in spring.

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 PRAIRIE ROSE, NO. 309, SASKATCHEWAN, (Part only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	SE.	16	32	19	2	Dug	16	1,732	- 10	1,722	16	1,716	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock.
7	SW.	30	"	"	"	"	28	1,735	- 13	1,722	14	1,721	" gravel	Soft, clear		D, S	" " local needs.
1	NE.	2	32	20	2	Drilled	135	1,735	- 13	1,722	135	1,600	" sand	Hard, cloudy, "alkaline"		D, S	" " 20 head stock.
2	SW.	2	"	"	"	Bored	50	1,730	- 13	1,717	50	1,680	" "	" , hard, cloudy		D, S	" " local needs.
3	SE.	3	"	"	"	dug	20	1,730	- 3	1,727	20	1,710	" clay	Hard, "alkaline"		D, S	" " " " .
4	NE.	7	"	"	"	"	20	1,740	- 10	1,730	10	1,730	" gravel	Hard, clear		D, S	" " 20 head stock.
5	NW.	8	"	"	"	Drilled	148	1,730	+ 1	1,731	148	1,582	" sand	" , "alkaline"		S	" " local needs
6	SE.	9	"	"	"	Dug	6	1,745	- 3	1,742	3	1,742	" gravel	Hard, clear		D, S	" " 20 head stock.
7	NE.	9	"	"	"	"	20	1,745	- 15	1,730	20	1,725	" "	" , "		D, S	" " 25 " " .
8	NE.	10	"	"	"	"	14	1,748	- 10	1,738	10	1,738	" "	" , "		L, S	" " local needs.
9	NW.	10	"	"	"	"	16	1,740	- 10	1,730	10	1,730	" "	Soft, "		D, S	" " " " .
10	SW.	12	"	"	"	"	45	1,742	- 36	1,706	45	1,697	" sand	Hard, " , iron, "alkaline"		D, S	" " 16 head stock.
11	NE.	13	"	"	"	"	22	1,730	- 17	1,713	17	1,713	" gravel	Soft, clear		D, S	" " 15 " " .
12	SE.	14	"	"	"	"	8	1,740	- 4	1,736	8	1,732	" "	" , "		D,	" " local needs.
13	SW.	14	"	"	"	"	16	1,740	- 10	1,730	16	1,724	" "	Hard, "alkaline"		D, S	" " " " .
14	NW.	14	"	"	"	"	18	1,740	- 14	1,726	18	1,722	" sand	Hard, clear, "alkaline"		D, S	" " 38 head stock.
15	SE.	16	"	"	"	"	15	1,740	- 6	1,734	15	1,725	" gravel	Hard, clear			" " 14 " " .
16	SE.	18	"	"	"	Drilled	92	1,750	- 13	1,737	92	1,658	" sand	" , " , "alkaline"		D, S	" " 150 " " .
17	SW.	18	"	"	"	Dug	12	1,735	- 8	1,727	8	1,727	" gravel	Soft, clear		D, S	" " local needs.
18	SE.	20	"	"	"	Bored	60	1,762	- 48	1,714	60	1,702	" sand	Hard, " , iron, "alkaline"		D, S	" " " " .
19	NW.	20	"	"	"	Dug	12	1,750	- 4	1,746	12	1,738	" gravel	Hard, clear		D, S	" " " " .
20	SE.	21	"	"	"	"	24	1,744	- 14	1,730	14	1,730	" "	" , "		D, S	" " 30 head stock.
21	SW.	22	"	"	"	"	14	1,748	- 10	1,738	10	1,738	" "	" , "		D, S	" " 20 " " .
22	NW.	22	"	"	"	"	20	1,750	- 15	1,735	20	1,730	" "	" , "		D, S	" " local needs.
23	SW.	23	"	"	"	"	30	1,740	- 20	1,720	30	1,710	" "	" , " , "alkaline"		D, S	" " 25 head stock.
24	SW.	24	"	"	"	"	16	1,732	- 6	1,726	6	1,726	" "	Soft, clear		D, S	" " local needs.

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 PRAIRIE ROSE, NO. 309, SASKATCHEWAN, (Part, only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
25	NW.	24	32	20	2	Dug	20	1,730	+ 16	1,714	20	1,710	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 9 head stock.
26	NW.	25	"	"	"	"	35	1,750	- 20	1,730	20	1,730	" "	Hard, clear		D, S	" " local needs.
27	SW.	25	"	"	"	Drilled	49	1,750	- 2	1,748	49	1,701	" sand	" , " , "alkaline"		D, S	" " 200 head stock.
28	NE.	26	"	"	"	Dug	22	1,750	- 15	1,735	22	1,728	" gravel	Hard, clear		D, S	Sufficient for local needs.
29	NW.	28	"	"	"		40	1,768	- 10	1,758	40	1,728	" sand	" , " , "alkaline"		D, S	" " 14 head stock.
30	SE.	30	"	"	"	Bored	40	1,756	- 35	1,721	40	1,716	" "	" , hard, clear, iron		D, S	" " local needs.
31	NE.	32	"	"	"	Dug	45	1,760	- 20	1,740	45	1,715	"	" , hard		D, S	" " domestic use and a few stock.
32	NW.	32	"	"	"	"	50	1,800	- 44	1,756			" clay	" , "		D, S	Insufficient for 8 head stock.
33	NW.	34	"	"	"	"	37	1,760	- 25	1,735	37	1,723	" gravel	" , "		D, S	Sufficient for local needs.
34	SW.	36	"	"	"	"	30	1,744	- 20	1,724	30	1,714	" sand	" , " , iron, "alkaline"			Used for C.P.R. locomotives.
1	NW.	2	32	21	2	Bored	40	1,745	- 20	1,725	40	1,705	" gravel	Hard, clear, iron, "alkaline"		D, S	Sufficient for 25 head stock.
2	NE.	2	"	"	"	Dug	35	1,745	- 15	1,730	35	1,710	" sand	Hard, clear		D, S	" " 12 " " .
3	SE.	3	"	"	"	Bored	50	1,745	- 15	1,730	50	1,695	" gravel	" , " , "alkaline"		D, S	" " 20 " " .
4	SE.	4	"	"	"	"	45	1,750	- 25	1,725	45	1,705	" clay	" , hard, clear, iron		S	" " 40 " " .
5	SW.	4	"	"	"	Dug	16	1,750	- 12	1,738	16	1,734	" gravel	" , hard		D, S	Insufficient for 14 head stock.
6	NW.	5	"	"	"	Bored	60	1,750	- 18	1,732	60	1,690	"	Hard, brown		D, S	Oversufficient for 20 head stock.
7	SW.	6	"	"	"	Drilled	320	1,750	- 40	1,710	320	1,430	Bearpaw sand	" , clear, iron, "alkaline"		D, S	Sufficient for 18 head stock.
8	SE.	8	"	"	"	Dug	14	1,750	- 11	1,739	3	1,747	Glacial gravel	Hard, clear		S	" " 6 " " .
9	SW.	8	"	"	"	Drilled	280	1,750	- 40	1,710	280	1,470	Bearpaw sand	" , " , iron, "alkaline"		S	" " 50 " " .
10	SW.	9	"	"	"	"	200	1,750	- 30	1,720	200	1,550	Glacial sand	Hard, clear, iron, "alkaline"		S	" " 60 " " .
11	NE.	11	"	"	"	Dug	18	1,745	- 14	1,731	18	1,727	" gravel	Hard, clear, iron, "alkaline"		D, S	" " 20 " " .
12	NW.	12	"	"	"	"	11	1,745	- 6	1,739	4	1,741	" "	Hard, clear		D, S	" " 40 " " .
13	NW.	13	"	"	"	Bored	20	1,750	- 10	1,740	20	1,730	" sand	" , brown, "alkaline"		S	" " 30 " " ; also a 20 foot house well.
14	SE.	14	"	"	"	Dug	23	1,750	- 18	1,732	23	1,727	" gravel	Hard, clear		D	Sufficient for domestic use only.

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 PRAIRIE ROSE, NO. 309, SASKATCHEWAN, (Part only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
15	SE.	14	32	21	2	Bored	52	1,750	- 30	1,720	50	1,700	Glacial sand	Hard, clear		D, S	Sufficient for 25 head stock.
16	SE.	15	"	"	"	"	50	1,750	- 22	1,728	50	1,700	" gravel	" , "		D, S	Insufficient for local needs.
17	SW.	17	"	"	"	"	90	1,755			90	1,665	"	" , "		D, S	Sufficient for 20 head stock.
18	SW.	18	"	"	"	Dug	13	1,750	- 12	1,738	13	1,737	" "	" , "		D, S	Insufficient for 16 head stock.
19	SW.	18	"	"	"	Drilled	288	1,750	- 16	1,702	288	1,462	Bedrock	" , " , iron, "alkaline"		S	Oversufficient for 36 head stock.
20	NE.	18	"	"	"	Dug	16	1,755	- 10	1,745	16	1,739	Glacial gravel	Hard, clear		D, S	Sufficient for 2 head stock; water hauled in winter.
21	SW.	19	"	"	"	"	12	1,725	- 8	1,717	12	1,713	" " , sand	" , " , "alkaline"		S	Sufficient for 30 head stock.
22	NW.	19	"	"	"	"	25	1,750	- 10	1,740	10	1,740	" " , " ,	Hard, clear		D, S	Yields 6 tanks a day.
23	NE.	19	"	"	"	"	20	1,750	- 18	1,732	20	1,730	" " , "	" , "		D, S	Sufficient for 8 head stock.
24	SW.	20	"	"	"	Bored	60	1,755	- 20	1,735	60	1,695	"	" , green		S	" " 8 " " .
25	NE.	21	"	"	"	Dug	20	1,750			20	1,730	" clay			N	Dry hole.
26	NE.	22	"	"	"	"	12	1,755	- 4	1,751	2	1,753	" sand	Soft, clear		D, S	Oversufficient for 20 head stock.
27	SE.	25	"	"	"	Bored	60	1,750	- 50	1,700	50	1,700	"	Hard, " , "alkaline"		S	Insufficient for 20 head stock.
28	NE.	26	"	"	"	Dug	32	1,750					" clay			N	Dry hole.
29	SW.	27	"	"	"	"	21	1,755	- 11	1,744	21	1,734	" gravel	Hard, clear, iron, "alkaline"		S	Insufficient for local needs; hauls water.
30	NE.	27	"	"	"	"	40	1,760	- 12	1,748			" clay	Hard, clear, "alkaline"			Intermittent supply.
31	SW.	28	"	"	"	"	20	1,750			20	1,730	" "			N	Dry hole.
32	NW.	28	"	"	"	"	18	1,750	- 8	1,742	18	1,732	" sand	Hard, clear		D, S	Insufficient for 12 head stock.
33	SW.	29	"	"	"	"	10	1,750	- 5	1,745	10	1,740	" "	" , " , "alkaline		S	Yields 1 tank a day.
34	NW.	29	"	"	"	"	12	1,750	- 6	1,744	12	1,738	" gravel	Soft, clear		D, S	Sufficient for 70 head stock.
35	NW.	30	"	"	"	"	24	1,750	- 16	1,734	24	1,726	"	" , "		D, S	" " 12 " " .
36	NE.	32	"	"	"	"	6	1,750	- 2	1,748	6	1,744	" sand	" , "		D	Used as domestic supply by many farmers.
37	SE.	33	"	"	"	"	50	1,750	- 42	1,708	50	1,700	" gravel	Hard, "		S	Insufficient for 11 head stock.
38	SE.	33	"	"	"	"	8	1,750	- 5	1,745	8	1,742	" sand	" , "		D	Yields 5 bbls. a day.

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

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

WELL RECORDS—Rural Municipality of .....

PRAIRIE ROSE, NO. 309, SASKATCHEWAN, (Part only)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
39	SW.	34	32	21	2	Dug	42	1,750	- 22	1,728	42	1,708	Glacial clay	Hard, clear, iron		D, S	Insufficient for local needs.
40	SW.	34	"	"	"	"	40	1,750	- 20	1,730	40	1,710	" "	Hard, clear, iron		D, S,	Sufficient for 13 head stock.
41	SW.	36	"	"	"	"	14	1,765	- 14	1,751			" gravel	Hard, clear		D, S	Sufficient for domestic use.
42	NW.	36	"	"	"	"	47	1,750	- 10	1,740	47	1,703	"	" , "		D, S	Insufficient for local needs.

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.