CANADA
DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF BROCK No. 64 SASKATCHEWAN

BY

B. R. MacKay, H. N. Hainstock & P. D. Bugg

Water Supply Paper No. 30

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INTRODUCTION

Lack of rainfall during the years 1930 to 1934 over a large part of the Prairie Provinces brought about an acute shortage both in the larger supplies of surface water used for irrigation and the smaller supplies of ground water required for domestic purposes and for stock. In an effort to relieve the serious situation the Geological Survey began an extensive study of the problem from the standpoint of domestic uses and stock raising. During the field season of 1935 an area of 80,000 square miles, comprising all that part of Saskatchewan south of the north boundary of township 32, was systematically examined, records of approximately 60,000 wells were obtained, and 720 samples of water were collected for analyses. The facts obtained have been classified and the information pertaining to any well is readily accessible. The examination of so large an area and the interpretation of the data collected were possible because the bedrock geology and the Pleistocene deposits had been studied previously by McLearn, Warren, Rose, Stansfield, Wickenden, Russell, and others of the Geological Survey. The Department of Natural Resources of Saskatchewan and local well drillers assisted considerably in supplying several hundred well records. The base maps used were supplied by the Topographical Surveys Branch of the Department of the Interior.

Publication of Results

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

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

How to Use the Report

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

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

If one intends to sink a well and wishes to find the approximate depth to a water-bearing horizon, he must learn: (1) the elevation of the site, and (2) the probable elevation of the water-bearing bed. The elevation of the well site is obtained by marking its position on the map, Figure 2, and estimating its elevation with respect to the two contour lines between which it lies and whose elevations are give 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 rest 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 Brock is an area of 324 square miles in southeastern Saskatchewan. It consists of nine townships described as townships 7,8, and 9, ranges 4,5, and 6, west of the 2nd meridian. The town of Kisbey lies approximately in the centre of the municipality.

The municipality is roughly divisible into three physiographic areas: a gently undulating area in the south, mantled by boulder clay or glacial till, a flat area in the central part formed by an old glacial lake bed, and a rough hilly area, of glacial moraine in the northern part, forming Moose mountain. The boundary between the flat area in the south and the hilly area in the north runs from the northwestern corner of the municipality in a southeasterly direction, swinging to the east along the southern part of township 9, range 4. Along this boundary there is an abrupt increase in elevation of 300 to 400 feet, the elevation of the flat part being approximately 2,000 feet and that of the hilly part 2,700 feet.

Water-bearing Horizons in the Unconsolidated Deposits

The municipality is overlain by a mantle of unconsolidated drift. The thickness of the drift mantle, the upper 30 to 40 feet of which is yellow clay, sands and gravel, varies from a minimum of 80 feet in the south-central part, to a maximum of at least 320 feet in Moose Mountain area.

Along the edge of Moose mountain tongues of glacial gravels extend out into the flat area and these deposits are shown on Figure 1. In the glacial lake bed deposits of fine sand are encountered a few feet from the surface. In the areas covered by glacial till, yellow clay is predominant, and sand and gravel occur as pockets within it.

The upper 30- to 40-foot zone of glacial drift is underlain by a fine, compact blue boulder clay, which is generally barren of

sand or gravel deposits. Throughout the greater part of the municipality, however, a bed of sand or gravel occurs at the base of the blue clay, immediately overlying the bedrock.

The deposits of sand and gravel that occur within the upper 30 to 40 feet of the drift, form a water-bearing horizon. In the hilly area of Moose mountain numerous lakes and undrained depressions are found. In this area water is quite readily obtained at depths up to 30 feet in pockets of sand and gravel generally located along the ravines and valleys. In the area fringing the southern edge of Moose mountain an abundant supply of usable water can be obtained from tongues of glacial gravels, at depths up to 50 feet. An excellent supply of water can also be obtained from the glacial lake sands. In the areas that are mantled by glacial till a moderate supply of water is obtained from pockets of sand and gravel that occur in yellow clay within 30 feet of the surface. The wells that tap these pockets of sand and gravel were affected to a greater degree by drought conditions than those dug into the lake sands and glacial gravels.

A second water-bearing horizon in the glacial drift is formed by deposits of fine sand that occur in the blue clay at a depth of 60 to 80 feet. This horizon is not extensive and appears to be confined to township 7, range 6, as it has not been encountered in the surrounding townships. Wells that have encountered it supply enough water for 75 to 100 head of stock. No other water-bearing horizons are known to occur in this thick blue clay.

The sand and gravel that occur between the blue clay and the bedrock form a third water-bearing horizon. This horizon is known to extend throughout most of the flat area of the municipality, but as no deep wells have been drilled in the thick accumulation of drift in Moose mountain it is not known if it occurs in that

area. Wells tapping this horizon yield an abundant supply of water that is under considerable hydrostatic pressure and rises to within 40 to 50 feet of the surface. The water is used for stock, but not for domestic purposes unless there is a shortage from the other sources, as it has a high mineral salt content. A better supply of water is obtained in the eastern and western parts of the municipality than in the central part.

Water-bearing Horizons in the Bedrock

The Ravenscrag formation immediately underlies the glacial drift throughout the municipality. It is composed of a series of beds of shale, sandy shale, and sandstone, and contains two or more seams of lignite coal. In the central part of the municipality it is encountered at a depth of 80 to 100 feet. In the eastern part, however, it is reached at a depth of 140 feet, and in the western part at a depth of 185 feet.

Three water-bearing horizons are found in the Ravenscrag formation, in townships 7 and 8, range 5, but in the other townships where bedrock was penetrated only two horizons are encountered.

The first horizon is formed by a bed of sand that is overlain by a thin seam of lignite coal and immediately underlain by impervious beds of soft shale. This horizon occurs at depths of 80 to 100 feet and is confined to an area composed of township 7, range 5, and township 8, range 5. This horizon yields only a small supply of hard water that is under slight hydrostatic pressure. The water has a high mineral salt content and is rarely used for domestic purposes. A second water-bearing horizon is formed by a bed of sand that is immediately overlain by a 2-foot coal seam, and underlain by an impervious layer of shale. It occurs at a depth of 140 to 190 feet, and with the possible exception of Moose Mountain area it extends throughout the

municipality. Wells tapping this horizon yield an abundant supply of medium hard to soft water that rises to within 40 feet of the ground surface. The third water-bearing horizon is a bed of fine white sand, and it is encountered at depths of 270 to 380 feet. This horizon occurs in township 7, ranges 4,5, and 6, and in township 8, range 5, and will possibly be found elsewhere in the municipality. It yields an abundant supply of soft, usable water.

Flowing artesian wells occur on the southern slope of Moose mountain. The water-bearing horizon for these wells is a sandy bed that immediately underlies a lignite coal seam, and it is encountered at depths of 80 to 100 feet. This horizon occurs above the three horizons already discussed and will not be found over the flat section to the south of Moose mountain. The water is hard, not usable by humans, and under sufficient pressure to flow to a maximum height of 15 feet above the ground level.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 7, Range 4

This township is overlain with glacial drift to a depth of 100 to 125 feet. Within this depth two water-bearing horizons are known to exist. The upper 20 to 30 feet of the drift contains one water-bearing horizon which extends through two separate areas of the township. The first area consists of the northern two rows of sections. This area includes an old glacial lake bed in which deposits of black clay are found to a depth of about 8 feet, underlain by a fine sand from which the water is obtained. The second area is south of the lake bed and there the horizon is composed of sand or gravel pockets that are found in the yellow clay or between layers of blue clay. Water is not abundant in this area and many dry holes may be dug before a supply of water is located. The water derived from the lake sands is a hard, clear,

usable water, and the individual wells usually yield a supply that is sufficient for 100 head of stock. The second horizon in the unconsolidated deposits is composed of sand or gravel that was laid down on the Ravenscrag formation and later covered over with a thick deposit of glacial drift. The horizon is found about 100 feet below the surface and is one of the main sources of supply for the township. The water derived from it is hard and contains small amounts of iron which give it a reddish colour on standing. It is, however, used for humans and animals, the supply being sufficient for 150 to 200 head of stock. The hydrostatic pressure is sufficient to cause the water to rise to within 30 feet of the surface, at which point it maintains a constant level.

Within this township the Ravenscrag formation contains two water-bearing horizons. The first is a sand bed located beneath a 2-foot seam of coal at a depth of 140 feet. It yields an abundant supply of clear, hard water which is not suitable for humans but is used for domestic purposes when better water cannot be obtained. The hydrostatic pressure is sufficient to cause the water to maintain a constant level 40 feet below the surface.

The well located on SE.$\frac{1}{4}$, section 8, encountered water in bedrock at a depth of 220 feet. There is an abundant supply of clear, hard water which is usable for humans and animals although it has a slight laxative effect until one becomes accustomed to it. The water maintains a constant level 25 feet below the surface.

There is no necessity for a shortage of water in this township. In the old lake basin in the north, water can be found within 30 feet of the surface. Below this horizon, and extending throughout the township, an abundance of water can be obtained from a depth of 100 feet in the glacial drift and from two horizons that lie at 140 feet and 220 feet, respectively, in the Ravenscrag formation.

Township 7, Range 5

The glacial deposits in this township are composed of about 20 feet of yellow clay underlain by 70 to 90 feet of blue clay. In sections 30 to 36 the blue clay is overlain by glacial lake sands. These glacial lake sands, and small pockets of sand and gravel that are found throughout the yellow clay in the remainder of the township, form a water-bearing horizon. The water from it is hard and usable, but is not abundant. A second water-bearing horizon is located immediately below the blue clay at a depth of 90 to 100 feet. It is formed by a bed of sand that is underlain by a thin seam of coal. The water that is obtained from this horizon is very hard and becomes reddish on standing due to the high iron content. Individual wells give a supply sufficient to water 100 to 200 head of stock. The hydrostatic pressure is sufficient to cause the water to rise to within 40 feet of the surface, where it maintains a constant level.

Three water-bearing horizons are located in the Ravenscrag formation. The first is found very near the upper surface of the formation and is hard to distinguish from the lower water-bearing horizon of the glacial drift as the two are separated by only a thin seam of coal. This horizon is formed by a bed of sand or gravel, and occurs at an approximate depth of 100 feet. The water obtained from this horizon is hard, but is usable for both humans and animals. It usually rises to within 30 feet of the surface and the supply is sufficient for 100 to 150 head of stock. The second water-bearing horizon of the Ravenscrag formation is located below a second seam of coal at a depth of 180 to 200 feet. It yields an abundant supply of medium soft, usable water, that rises to within 30 to 40 feet of the surface. The third water-bearing horizon is found at a depth of 240 to 270 feet and is formed by a bed of fine white sand. Wells tapping this horizon yield an abundant supply of soft water that is usable for both

humans and animals, although it is of little use for irrigation purposes. The hydrostatic pressure is sufficient to cause the water to rise to within 50 feet of the surface, where it maintains a constant level. Although the shallow wells yield only a small supply of water in this township an abundance of water can be located at depths of 90, 100, 180 to 200, and 240 to 270 feet.

Township 7, Range 6

Three water-bearing horizons are found in the glacial drift of this township. The first horizon is a 2- to 4-foot sand bed which lies beneath 20 to 30 feet of yellow clay, and which extends throughout the township. The water derived from this horizon is hard and generally slightly "alkaline", although it is usable for both humans and animals. The individual wells tapping this horizon yield a supply of water that is sufficient for 50 to 60 head of stock even in long periods of drought. A second water-bearing horizon occurs at a depth of 60 to 80 feet. It is formed by a bed of black sand within the blue clay. It yields an abundant supply of hard, "alkaline" water that is not used for domestic purposes, but is satisfactory for stock. The wells tapping this horizon are non-flowing artesian in character, the hydrostatic pressure being sufficient to cause the water to rise to within 30 feet of the surface. In the northeastern corner of the township a third horizon is encountered at a depth of 110 to 120 feet. Wells tapping this yield a supply of water sufficient for 200 head of stock. This aquifer is formed by deposits of gravel, and the water obtained from it is usable for both humans and animals. The hydrostatic pressure is sufficient to cause the water to rise to within 40 feet of the surface where it maintains a constant level. This water-bearing horizon is probably only local as deeper wells in other parts of the township do not penetrate it.

In the Ravenscrag formation a water-bearing horizon is encountered beneath a seam of coal at a depth of 185 to 200 feet. This horizon is formed by a bed of fine sand. The water is medium hard in character and is usable for both humans and animals. The hydrostatic pressure is sufficient to cause the water to rise to within 50 feet of the surface, where it maintains a constant level. Individual wells tapping this horizon yield a supply that is sufficient for 200 head of stock. At a depth of 250 to 300 feet in the Ravenscrag formation is a second bed of fine sand which yields an abundance of soft, usable water. The supply from individual wells is sufficient to water 200 to 300 head of stock, but great difficulty is experienced in keeping the fine sand from plugging the sand screens and sealing off the water flow.

Although a fair supply of water is obtained from the wells in glacial drift, at depths of 30 to 80 feet, the main source of supply for any great number of stock is obtained from the bedrock at a depth of 180 to 200 feet. Should other wells be drilled in the township this water-bearing horizon should prove to be the most satisfactory source of supply.

Township 8, Range 4

The northern part of this township is fringed by the slopes of Moose mountain, from which gravel and sand has been eroded and deposited as an outwash plain along the base. These glacial gravels and sands extend in the form of alluvial fans down into the township, mantling the boulder clay. In the southern part of the township is an area that has been an old lake bed. A belt of glacial till appears at the surface between the area covered by the glacial gravels and the glacial lake bed. The approximate location of these areas is shown on the accompanying map. The deposits of sand and gravel that occur in the upper 20 to 30 feet of the glacial drift form a water-bearing horizon that is fairly continuous throughout the township. Wells dug into the glacial

sands and gravel yield an abundant supply of hard, usable water that is sufficient for at least 50 to 200 head of stock. The wells located on SE.$\frac{1}{4}$, section 26, and NW.$\frac{1}{4}$, section 29 are little affected by long periods of drought. The wells located in the lake bed area have a sand aquifer from which hard, usable water is obtained. The individual wells yield a supply that is sufficient for 50 to 100 head of stock. Only a small supply of water is obtained from sand and gravel pockets in the area between the glacial gravels and the glacial lake bed. A second water-bearing horizon is found at a depth of 100 to 170 feet and it is formed by deposits of sand and gravel that are overlain by blue clay. The deeper wells tapping this horizon are found in the eastern part of the township. The water derived from this horizon is hard, and upon standing it has a reddish colour due to the iron content. It is only used for domestic purposes when better water cannot be obtained. The water maintains a constant level at 30 feet below the surface and there is sufficient water to supply 200 to 300 head of stock.

Due to the abundant supply of water obtained from the two horizons in the glacial drift, no wells have been drilled over 180 feet. As a consequence, only one well on SW.$\frac{1}{4}$, section 31 has penetrated the Ravenscrag formation. This well is a flowing artesian well and supplies an abundance of soft, salty water not used for domestic purposes. The water-bearing horizon or aquifer is a sand bed which occurs below a fairly thick seam of coal. It is not found anywhere else in the township although other wells were drilled deeper and at a lower elevation. It is probable that the Ravenscrag formation rises toward the surface along the west side of the township.

Township 8, Range 5

An excellent water-bearing horizon is found within 40 feet of the surface throughout this township. In the lake bed area to

the south sand is sometimes found at the surface and it contains a medium hard, usable water. In the northeastern corner an abundance of water is located in glacial gravels within 20 feet of the surface. In the northwestern corner of the township, extending down to the glacial lake, is an area in which a hard, usable water is obtained 20 to 40 feet below the surface. Individual wells tapping the shallow horizon in any one of these areas are sufficient for 100 to 150 head of stock. In many instances in the old lake bed area, and in the northwestern corner of the township, sand-points can be driven to obtain an abundance of water.

Bedrock of the Ravenscrag formation is penetrated at a depth of 90 to 100 feet in the centre of this township. The uppermost water-bearing horizon is a thin bed of sand, which immediately underlies a seam of coal. A well located on NW.$\frac{1}{4}$, section 28, which taps this horizon, produces a supply of water that is sufficient for 100 to 200 head of stock, but in the two wells drilled on NW.$\frac{1}{4}$, section 22, only a small supply of water was located at this level. A well on NW.$\frac{1}{4}$, section 36, which taps this horizon at a depth of 115 feet in a sand bed lying beneath a small coal seam, flowed for a short time after it was drilled. The water is hard, but usable for both humans and animals. The hydrostatic pressure was sufficient to cause the water when first tapped to rise 15 feet above the surface. The water now rises to 30 feet below the surface. A second water-bearing horizon is located at a depth of about 300 feet. It is formed by a fine sand from which an abundance of soft, usable water is obtained. Some difficulty is experienced in keeping the fine sand from clogging the well. The hydrostatic pressure is sufficient to cause the water to rise to within 20 to 30 feet of the surface.

The shallow glacial drift wells yield a supply of water sufficient for 100 to 150 head of stock, but a much larger supply can be obtained at a depth of 250 to 300 feet throughout the township.

A smaller supply may be obtained at a depth of 100 feet, but it is not advisable to stop drilling at this level if a large supply is required.

Township 8, Range 6

An old glacial lake bed, from 2 to 3 miles in width, extends from the northwestern corner to the southeastern corner of this township. A water-bearing horizon is found throughout the township within 15 to 30 feet of the surface. In the glacial lake area sand is encountered within 2 or 3 feet of the surface, and an abundance of clear, medium hard water is obtained from it at a depth of 15 feet. In this area sand-points are used extensively. In the northeastern corner of the township water is located in sand lying below grey clay at depths of 15 to 20 feet. The water is not as abundant as in the lake bed area, but single wells yield sufficient to water 50 to 100 head of stock. In the southwestern corner of the township the aquifer is a layer of sand between the yellow and blue clays. The water from the aquifer in this area is slightly "alkaline". However, the water is used for domestic purposes and is sufficient to supply 20 to 50 head of stock. A second water-bearing horizon is located in sand beneath the blue clay, at a depth of 130 feet. The water is hard and has an iron content sufficient to colour the water a reddish brown. The hydrostatic pressure is sufficient to cause the water to rise to within 60 feet of the surface where it maintains a constant level. Although a supply of water sufficient to water 50 to 100 head of stock is obtained in the shallow wells, it is probable that a supply sufficient to water 200 to 300 head of stock can be located at the 130-foot level throughout the township.

There are no wells penetrating the Ravenscrag formation in this township, but from the surrounding townships it would seem that water-bearing horizons should be located at depths of 200 to 300 feet.

Township 9, Range 4

The northern half of this township is occupied by the Moose Mountain forest reserve. This area is very rugged, with numerous small lakes and undrained depressions. The highest elevation attained is the summit of Moose mountain, which is 2,700 feet above sea-level. At the very south of the township, in the first half mile, the elevation rises from 2,200 to 2,400 feet. Farther north the ground rises gradually until the forest reserve is reached. Only a few farms are located in the area between the forest reserve and the abrupt rise in elevation. The farmers experience no difficulty in obtaining water in shallow wells at depths of 10 to 40 feet. However, these wells are usually located in the valleys where glacial sands or gravels have been deposited. The small lakes are usually sufficient to water the stock, so that wells are dug only for domestic purposes.

Township 9, Range 5

The Moose Mountain forest reserve occupies the northeastern corner of this township. The surface of this area is very irregular, with numerous lakes surrounded by very abrupt hills. Along the southwestern edge of the moraine is an abrupt rise in elevation, above which is a gently rolling area, where a few farmers are located. They obtain water for stock use from the lakes, but for domestic purposes from wells dug along the valleys to tap the glacial sands and gravels at a depth of 20 to 40 feet. Below the morainic area, fans of glacial gravels are found to extend down over the plain for a short distance. Excellent water is obtained from these glacial gravels at depths of 20 to 40 feet. The water is medium hard and usable for both humans and animals, and individual wells give a supply sufficient for 40 to 50 head of stock.

A water-bearing horizon is found at a depth of 80 to 100 feet in the Ravenscrag formation, in SW.$\frac{1}{4}$, section 2, and SE.$\frac{1}{4}$, section 3, respectively. The aquifer is a black sand that occurs

below a thin seam of coal. The water derived from the sand is soft, and is not suitable for humans although it apparently has no ill effects on stock. The hydrostatic pressure is sufficient to cause the water from both wells to flow, yielding an abundant supply for 800 to 1,000 head of stock. This horizon may continue northward for a considerable distance beneath the area covered by the moraine of Moose mountain, but apparently it does not exist as far north as NE.¼, section 10, where a well 417 feet deep was sunk without locating water. A seam of coal was penetrated in this well at a depth of 320 feet, or at an elevation of 2,100 feet above sea-level, which is the same elevation as that at which coal seams in the other two flowing wells were pierced.

Township 9, Range 6

The northeastern corner of this township is overlain with terminal deposits which form the slopes of Moose mountain. There is a rise of 400 feet in a distance of 2 miles, and the area is very hilly with many rocks and boulders covering the surface. Below this sudden rise is an area of glacial gravels in which an excellent supply of usable water can be obtained at a depth of 20 to 30 feet. There are also a number of springs in this area that yield an excellent supply of water for domestic use. There is another narrow strip of moraine that cuts across the southwestern corner of the township. Between these two morainic areas is a level area that marks the site of a small glacial lake. In the lake bed area a good supply of water can be obtained, even during drought periods, at depths of 15 to 20 feet, and during wet seasons it has been known to be overlain with water to a depth of several feet. In the morainic areas water-bearing pockets of sand and gravel occur, but it is often necessary to sink a number of holes before one of these pockets is located.

No wells penetrate the Ravenscrag formation in this township, but should deep drilling into it be done it is probable that water-bearing horizons would be found in it.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF BROCK, NO. 64, SASKATCHEWAN

Township	7	7	7	8	8	8	9	9	9	Total No. in municipality
West of 2nd mer. Range	4	5	6	4	5	6	4	5	6	
Total No. of Wells in Township	36	23	56	55	54	73	33	28	24	382
No. of wells in bedrock	4	8	4	1	5	0	0	3	0	25
No. of wells in glacial drift	32	15	52	54	49	73	33	25	24	357
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply										
No. with permanent supply	30	21	30	48	52	30	28	16	22	277
No. with intermittent supply	0	0	1	5	0	7	2	8	1	24
No. dry holes	6	2	25	2	2	36	3	4	1	81
Types of Wells										
No. of flowing artesian wells	1	0	0	3	2	0	0	2	2	10
No. of non-flowing artesian wells	8	12	19	6	3	1	2	0	5	56
No. of non-artesian wells	21	9	12	44	47	36	28	22	16	235
Quality of Water										
No. with hard water	30	18	28	50	49	34	25	21	22	277
No. with soft water	0	3	3	3	3	3	5	3	1	24
No. with salty water	0	1	0	1	0	0	0	0	1	3
No. with alkaline water	1	0	12	7	1	8	4	2	2	37
Depths of Wells										
No. from 0 to 50 feet deep	27	12	42	48	47	72	33	23	23	327
No. from 51 to 100 feet deep	2	5	8	1	3	0	0	3	1	23
No. from 101 to 150 feet deep	6	1	2	2	2	1	0	1	0	15
No. from 151 to 200 feet deep	0	3	2	4	0	0	0	0	0	9
No. from 201 to 500 feet deep	1	2	2	0	2	0	0	1	0	8
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	0	0	0	0
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0
How the Water is Used										
No. usable for domestic purposes	28	20	26	49	49	31	28	21	23	275
No. not usable for domestic purposes	2	1	5	4	3	6	2	3	0	26
No. usable for stock	30	21	29	53	52	32	30	24	23	294
No. not usable for stock	0	0	2	0	0	5	0	0	0	7
Sufficiency of Water Supply										
No. sufficient for domestic needs	30	21	31	52	52	37	30	24	23	300
No. insufficient for domestic needs	0	0	0	1	0	0	0	0	0	1
No. sufficient for stock needs	26	17	26	49	51	32	27	18	19	265
No. insufficient for stock needs	4	4	5	4	1	5	3	6	4	36

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 Brock, No. 64, Saskatchewan.

LOCATION						Depth of Well, Ft.	Total dis'vd solids	HARDNESS			CONSTITUENTS AS ANALYSED						CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS									Source of Water
No.	Qtr.	Sec.	Tp.	Rge.	Mer.			Total	Perm.	Temp.	Cl.	Alka-linity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	Fe	
1.	SE.	11	7	4	2	30	1,550											(4)	(1)		(2)		(3)			×1
2.	NE.	20	7	4	2	105	2,280	1,200	1,200		31	425	350	169	1,292	476	2,280	423	272		504		1,030	51		×1
3.	NW.	34	7	4	2	23	2,500												(2)		(3)	(4)	(1)	(5)		×1
4.	NE.	6	8	4	2	24	4,460	2,200	2,200		89	435	540	313	2,710	983	4,310	435	720		932		2,076	147		×1
5.	SE.	15	8	4	2	77	2,080	1,300	1,300		31	140	290	202	1,560	359	2,068	140	515		602		760	51	1	×1

Water samples indicated thus, × 1, are from glacial drift.
Analyses are reported in parts per million; where numbers (1), (2), (3), (4), and (5) are used instead of parts per million, they represent the relative amounts in which the five main constituents are present in the water.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).
Analyses Nos. 1 and 3, by Provincial Analyst, Regina.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

The ground water in the glacial drift of this municipality has a high mineral salt content. Of five samples analysed, only one, taken from SE.¼, sec. 11, tp. 7, range 4, is below 2,000 parts per million. The sample taken from NE.¼, sec. 6, tp. 8, range 4, has a total dissolved solid content of 4,460 parts per million, which is considered to be too high for use, even for animals. The other samples average about 2,200 parts per million, but the water is being used because of shortage of water of better quality.

The predominant mineral salts found in the water samples analysed from this municipality are the sulphates of sodium, magnesium, and calcium. They occur in the order named, with the exception of one sample in which calcium sulphate is first. The other salts are calcium carbonate, which is fourth in order of abundance, and, lastly, sodium chloride or common salt, which is only found in small amounts.

The water is very hard, having a permanent hardness of 1,200 to 2,200 parts per million. This permanent hardness is due to the sulphates of calcium and magnesium and the water cannot be softened by boiling. The other salts found in these samples cause temporary hardness.

The sodium sulphate or Glauber's Salt content is fairly high, but this salt is the least harmful for irrigation. When it occurs in large amounts the water will have a laxative effect. The sodium sulphate content, in combination with the magnesium sulphate or Epsom Salts, would have a laxative effect, especially on those who were not accustomed to drinking the water.

The calcium sulphate and calcium carbonate are found in lesser amounts than the sulphates of sodium and magnesium and are the least harmful for drinking and irrigation. They are tasteless and are not laxative. The small sodium chloride content

is beneficial to both humans and animals. Generally speaking, ground water that has a pronounced odour or taste should be analysed before it is used for domestic purposes. Also, during periods of long drought ground water from wells that were formerly suitable for domestic purposes may become unfit for use due to the fact that evaporation has taken place and a higher concentration of harmful salts will be found in the water.

Water from the Bedrock

No samples were taken from the bedrock wells in this municipality and the following discussion is based on information obtained from samples of water taken from the bedrock in adjoining municipalities. Three water-bearing horizons are found in the bedrock in this municipality. The water from the first horizon is obtained from near the upper surface of the Ravenscrag formation and is similar to that found in the glacial well on NE.$\frac{1}{4}$, sec. 20, tp. 7, range 4. The water is very hard, due to high concentration of calcium and magnesium salts. In most cases the water from this level has a high concentration of iron, which oxidizes out on coming in contact with the air. This high iron content renders the water unfit for domestic use. This water has a strong laxative effect, due to the high concentration of magnesium sulphate (Epsom Salts) and sodium sulphate (Glauber's Salt).

Water from the second horizon in the bedrock of this municipality is generally termed as medium hard to soft, and is slightly salty. The salty taste is due to sodium chloride or common salt. There is probably an increased amount of sodium salts, and smaller amounts of the calcium and magnesium salts, giving the water a softer character. The amount of total solids is also substantially lower. The water from some of the wells that tap this water-bearing horizon is used for irrigation purposes to some extent.

Water from the third horizon of the Ravenscrag formation is soft, due to the large amount of sodium carbonate present, and the lack of calcium and magnesium salts. This water has an average total solid content of 1,100 to 1,500 parts per million. The high soda content makes it unpalatable for drinking and it also is very harmful for irrigation. The sodium chloride or common salt content ranges from 170 to 300 parts per million, which gives the water a salty taste.

WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO. 64. 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	7	4	2	Dug	28	1,960	- 14	1,946	14	1,946	Glacial	Hard, clear, alkaline		S,	Waters 20 head stock in summer, insufficient in winter. Laxative.
2	NE.	2	"	"	"	"	20	1,965	- 16	1,949	16	1,949	" sand	Hard, clear	42	D, S	Waters 30 to 40 head stock, another similar well.
3	NW.	4	"	"	"	"	25	1,985	- 13	1,972	13	1,972	" quicksand	" "		D, S	Supplies one tamk and 20 head stock a day.
4	NE.	5	"	"	"	"	25	1,985					" "	" "		D, S	Very good supply.
5	NW.	7	"	"	"	"	27	2,005	- 13	1,992	13	1,992	" "	" "	44	D, S	Waters 40 head stock.
6	SE.	8	"	"	"	Drilled	220	1,990	- 25	1,965	220	1,770	Ravenscrag white sand	" "		D, S	Good supply, but laxative.
7	NW.	9	"	"	"	Dug	35	1,995	- 7	1,988	7	1,988	Glacial sand	" "		D, S	Insufficient supply, hauls water,
8	NW.	10	"	"	"	"	20	1,975	- 10	1,965	10	1,965	" "	" "	43	D, S, I	Very good supply, used for gardens, irrigation.
9	SE.	11	"	"	"	"	30	1,965	- 15	1,950	15	1,950	" blue clay	Very hard, clear		D, S	Waters 15 head stock. #
10	SE.	14	"	"	"	"	28	1,965	- 16	1,949	16	1,949	" sand	Hard, clear		D, S	" 50 " " .
11	NW.	16	"	"	"	Drilled	60	1,990	- 26	1,964	26	1,964	" "	" turns brown on standing		D, S	Good supply.
12	SE.	17	"	"	"	"	125	1,995	- 30	1,965	30	1,965	" "	Med hard, clear	44	D, S	Well is plugged, sufficient for house use only
13	NE.	17	"	"	"	"	96	1,990	- 25	1,965	25	1,965	" "	Hard, clear		D, S	Waters 75 head stock.
14	SW.	18	"	"	"	Dug	27	2,005	- 21	1,984	21	1,984	" quicksand	" "	45	D, S	" 25 " " ,fair supply.
15	NW.	19	"	"	"	"	22	1,980	- 12	1,968	12	1,968	" sand	" "	43	D, S	" 20 " " .
16	NW.	19	"	"	"	Drilled	108	1,980	- 20	1,960	20	1,960	Ravenscrag gravel	" "	44	S,	Good supply.
17	NE.	20	"	"	"	"	105	1,970	- 35	1,935	35	1,935	Glacial	"turns red on standing	43	D, S	Waters over 60 head stock; laxative.
18	NE.	21	"	"	"	"	66	1,960	- 66	1,894	66	1,894	"	Clear		D, S	Waters from 40 to 100 head stock.
19	SW.	22	"	"	"	"	110	1,960	- 40	1,920	40	1,920	" gravel	Hard, turns red on standing	43	D, S	Waters from 150 to 200 head stock. Water destroys pipes.
20	NW.	23	"	"	"	"	140	1,960	- 50	1,910	140	1,820	Ravenscrag	Hard, clear		D, S	Good supply.
21	NW.	24	"	"	"	Dug	40	1,960	- 15	1,945	15	1,945	Glacial clay	" "		D,	Only sufficient for house use.
22	NW.	24	"	"	"	Drilled	140	1,960	- 40	1,920	140	1,820	Ravenscrag	" "		S,	Very good supply.
23	SW.	27	"	"	"	Dug	12	1,945	- 8	1,937	8	1,937	Glacial sand	" "	43	D, S	Waters from 80 to 100 head stock.
24	NW.	27	"	"	"	Bored	30	1,950	- 26	1,924	26	1,924	" "	bitter Hard, "	44	D,	Sufficient for house use only.
25	NE.	28	"	"	"	Dug	12	1,948	- 10	1,938	10	1,938	" "	" "	44	D, S	Waters 5 head stock, another well for house use.
26	NE.	28	"	"	"	Spring	2	1,930	+ 6	1,936	2	1,928	" gravel	" "	43	D, S, I	Very good supply, rusty, used for garden irrigation.

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 BROCK NO. 64. 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
27	SE.	31	7	4	2	Dug	20	1,955	- 16	1,939	16	1,939	Glacial sand	Hard, iron sulphur, rusty	43	D, S	Waters 100 head stock, laxative.
28	NW.	34	"	"	"	"	23	1,970	- 15	1,955	20	1,950	" clay	Hard, clear	42	S,	Also spring 6 feet deep in creek. #.
29	NW.	35	"	"	"	"	22	1,975	- 14	1,961	14	1,961	"grey sand	" "	43	D, S	No. remarks.
30	NW.	36	"	"	"	"	21	2,000	- 15	1,985	15	1,985	" sand	" "	42	D, S	Over sufficient, supply for 60 head stock.
1	SE.	2	7	5	2	Drilled	90	1,965	- 20	1,945	90	1,875	Glacial sand	Hard, iron turns red on standing	43	D, S	Good supply, but laxative.
2	NW.	5	"	"	"	Dug	24	1,960	- 18	1,942	22	1,938	" "	Hard, clear	43	D, S	Waters 25 head stock.
3	SE.	6	"	"	"	"	50	1,970	- 35	1,935	44	1,926	" "	Very hard ith red sediment	44	S,	" 60 " " .
4	NW.	6	"	"	"	Drilled	186	1,966	- 12	1,954	186	1,780	Ravenscrag sand	Soft, clear	43	D,	Well is plugged with sand only sufficient for house, also well in pasture, over sufficient supply.
5	NW.	9	"	"	"	Dug	22	1,982	- 12	1,970	20	1,962	Glacial gravel	Hard, "	44	S,	Waters 17 head stock.
6	NW.	10	"	"	"	"	28	1,988	- 20	1,968	24	1,964	" quicksand	" "	42	D, S	Waters 40 to 50 head stock.
7	NE.	10	"	"	"	Drilled	95	1,978	- 12	1,966	95	1,883	" yellow sand	"turns red on standing	42	D, S	Good supply, but laxative.
8	NE.	13	"	"	"	"	98	1,985	- 30	1,955	98	1,887	" "	Hard, turns red on standing	44	D, S	Over sufficient for 50 head stock.
9	NE.	16	"	"	"	Dug	18	1,980	- 10	1,970	15	1,965	Glacial sand	Hard, clear	43	D, S	Waters 40 to 50 head stock, but laxative.
10	NE.	19	"	"	"	"	10	1,995	- 7	1,988	7	1,988	" quicksand	Med. hard, clear	44	D, S	Waters 20 head stock.
11	SW.	22	"	"	"	Drilled	102	2,000	- 35	1,965	102	1,898	Ravenscrag fine sand	Very hard, turns red on standing	44	D, S	" 100 " " , but laxative.
12	NW.	23	"	"	"	"	97	2,010	- 40	1,970	97	1,913	Glacial sand	Very hard, clear	43	D, S	Good supply.
13	NE.	23	"	"	"	Dug	47	2,002	- 20	1,982	47	1,955	"	Very hard, clear	42	D, S	Sufficient supply for local needs.
14	NE.	24	"	"	"	"	15	1,990	- 10	1,980	4	1,986	" sand	Hard, clear	43	D, S	Waters 10 head stock.
15	SW.	26	"	"	"	Drilled	180	2,009	- 30	1,979	180	1,829	Ravenscrag sand	Soft, "	44	D, S	Good steady supply.
16	SE.	27	"	"	"	"	270	2,010	-100	1,910	270	1,740	" coal gravel	" " soda	43	D,	Turns black before storm, sufficient for house only, needs water for 200 head stock.
17	SE.	27	"	"	"	"	100	2,010	- 40	1,970	100	1,910	Ravenscrag	Hard, iron, clear	43	S,	Waters 70 head stock, insufficient supply laxative.
18	SE.	30	"	"	"	"	225	2,000	- 40	1,960	225	1,775	" quicksand, coal, sharp gravel	Hard, clear, iron	43	D, S	Good supply, rusts pails.
19	SW.	31	"	"	"	"	180	1,975	- 40	1,935	175	1,800	Ravenscrag, coal sand	Hard, " salty		D, S, I	Waters from 100 to 200 head stock.
20	NE.	32	"	"	"	Dug	15	1,975	- 10	1,965	10	1,965	Glacial sand	Hard, clear	44	D, S	Waters 6 head stock.
21	SE.	36	"	"	"	"	25	1,955	- 20	1,935	20	1,935	" "	" "	42	S,	" 50 " " , but laxative.

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

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

WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO. 64 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				
1	NE.	2	7	6	2	Bored	37	1,980	- 22	1,958	22	1,958	Glacial sand	Hard, clear, iron, alkaline		D, S	Waters 15 head stock, laxative.
2	NW.	2	"	"	"	Dug	12	1,980	0	1,980	0	1,980	" "	Med. hard, clear		D, S	" 15 " " , another well with very alkaline water.
3	SW.	3	"	"	"	Drilled	300	1,980	- 50	1,930	300	1,680	Ravenscrag quicksand	Hard, alkaline iron, cloudy		S,	Waters 5 head stock.
4	NE.	4	"	"	"	Bored	80	1,965	- 30	1,935	70	1,895	Glacial sand	Hard, clear, iron, alkaline		D, S	" 50 " " .
5	?	6	"	"	"	Drilled	254	2,000	- 16	1,984	254	1,746	Ravenscrag sand gravel	Soft, clear		D, S	Sufficient supply for local needs.
6	NW.	10	"	"	"	Bored	40	1,975	- 20	1,955	28	1,947	Glacial sand gravel	Hard, clear iron, alkaline		D, S	Constant supply, waters 14 head stock.
7	SE.	11	"	"	"	"	32	1,980	- 16	1,964	29	1,951	Glacial sand gravel	Hard, clear		D, S	Waters 20 head stock.
8	NE.	12	"	"	"	Dug	14	1,985	- 4	1,981	11	1,974	Glacial quicksand	" " alkaline		D, S	" 26 " " , laxative.
9	SE.	14	"	"	"	"	20	1,935	- 4	1,931	20	1,915	Glacial sand	Hard, clear, iron		D, S, I	" 50 " " , sufficient for garden irrigation.
10	SW.	14	"	"	"	Bored	25	1,990	- 9	1,981	9	1,981	"	Hard, "		D, S	Waters 20 head stock.
11	NW.	14	"	"	"	Dug	30	2,000	- 12	1,988	30	1,970	" gravel	" "		D, S	" 6 " " , good supply.
12	SW.	20	"	"	"	"	20	2,000	- 13	1,987	17	1,983	Glacial gravel	Med. hard, clear, iron		D, S	" 22 " " , also well with alkaline water.
13	SE.	20	"	"	"	"	30	1,990	- 25	1,965	25	1,965	" "	Med. hard, clear, iron		D, S	Waters 30 head stock.
14	NW.	22	"	"	"	Sand-point	20	1,990	?	?	17	1,973	" sand	Hard, clear		D, S	" 75 " " , good supply.
15	NE.	22	"	"	"	Bored	63	1,985	- 33	1,952	62	1,923	" quicksand	" iron red sediment		S,	" 10 " " , not fit for house use.
16	NE.	23	"	"	"	Drilled	190	2,000	- 50	1,950	190	1,810	Ravenscrag gravel	Hard, clear		D, S	" 6 " " , good supply.
17	SE.	25	"	"	"	"	120	1,990	- 40	1,950	120	1,870	Glacial "	" " iron		D, S, I	" 30 " " , used for garden irrigation.
18	E½	26	"	"	"	"	188	2,000	- 22	1,978	188	1,812	Ravenscrag shale coal	Soft, clear		D, S	Good supply.
19	SE.	28	"	"	"	Bored	36	1,980	- 16	1,964	18	1,962	Glacial yellow clay	Hard, "		D, S	Waters 10 head stock, good supply, also 1,000 foot well, no water.
20	NE.	28	"	"	"	D	87	1,985	?	?	84	1,901	Glacial sand	" " alkaline		D,	Insufficient, only 4 pails a day.
21	NE.	30	"	"	"	"	32	2,000	- 27	1,973	28	1,972	" "	Hard, clear, alkaline		S,	Waters 100 head stock.
22	SW.	31	"	"	"	"	30	1,995	- 20	1,975	30	1,965	" "	Soft, clear		D, S	" 100 " " .
23	NE.	31	"	"	"	Bored	70	1,990	- 10	1,980	49	1,941	" quicksand	Hard, alkaline iron, yellow		S,	" 40 " " .
24	NE.	32	"	"	"	"	79	2,005	- 59	1,946	59	1,946	" sand	Hard, alkaline			Insufficient, waters 60 head stock, water enters well too slowly, laxative.
25	NE.	34	"	"	"	"	85	1,995	- 45	1,950	85	1,910	" "	Hard, clear, iron		S,	Waters 10 head stock, laxative, small well for house use only.
26	SW.	35	"	"	"	Dug	22	2,000	- 19	1,981	19	1,981	" "	Hard, alkaline iron, clear		D, S	Just sufficient for 14 head stock.
27	NW.	36	"	"	"	Drilled	120	1,990	- 60	1,930	60	1,930	" "	Hard, clear		D, S	Good supply, waters 75 head stock.

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

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

WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO. 64 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	8	4	2	Dug	24	2,000	- 10	1,990	10	1,990	Glacial gravel	Hard, clear		D, S	Very good supply.
2	NW.	3	"	"	"	"	25	1,984	- 20	1,964	20	1,964	" "	" "		D, S	Sufficient for 80 head stock, in wet season.
3	NE.	4	"	"	"	"	24	1,970			24	1,946	" "	" "		D, S	Sufficient supply.
4	NE.	6	"	"	"	"	24	1,975	- 12	1,963	12	1,963	" sand	" "		D, S	Waters 20 head stock.
5	NE.	8	"	"	"	"	14	1,993	- 8	1,885	8	1,885	" "	alkaline Med. hard, clear		D, S	" 150 " " .
6	NW.	10	"	"	"	"	18	2,000	- 15	1,985	15	1,985	" "	Hard, clear		D, S	" 60 " " .
7	SW.	12	"	"	"	"	28	2,040	- 24	2,016	24	2,016	" "	Med. hard, clear		D, S	" only 10 head stock.
8	NW.	12	"	"	"	"	30	2,030	- 28	2,002	28	2,002	" "	Hard, clear, iron		D, S	" 6 head stock.
9	NW.	12	"	"	"	Drilled	170	2,030	- 32	1,998	32	1,998	" gravel	Hard, clear, iron		D, S	Laxative, insufficient, plugged at base.
10	SE.	14	"	"	"	"	138	2,035	- 29	2,006	29	2,006	" sand	Hard, "		D, S	Very good supply.
11	SE.	14	"	"	"	"	156	2,025	- 29	1,996	29	1,996	" gravel	" " iron		N,	Could be used for household and stock.
12	NW.	14	"	"	"	Dug	10	2,038	- 7	2,031	7	2,031	" "	Very hard, alkaline, clear		D, S, I	Waters 50 head stock, poor garden use.
13	SE.	15	"	"	"	Drilled	77	2,020	- 9	2,011	70	1,950	" sand	Hard, clear, iron		D, S,	Very good supply.
14	NW.	16	"	"	"	Dug	21	2,017	- 17	2,000	17	2,000	" quicksand clay	Hard, "		D, S	Waters 15 to 20 head stock.
15	SE.	18	"	"	"	"	25	1,990	- 19	1,971	19	1,971	Glacial sand	" "		D, S	" about 20 head stock.
16	NE.	18	"	"	"	"	20	2,000	- 10	1,990	10	1,990	" sandy clay	" "		D, S	" 30 head stock.
17	SW.	23	"	"	"	"	10	2,038	- 7	2,031	6	2,032	" gravel	" " alkaline		D, S	" 50 " " .
18	SE.	24	"	"	"	"	16	2,059	- 4	2,055	4	2,055	" sandy clay	Hard, clear, alkaline		D,	Sufficient for house only.
19	SE.	24	"	"	"	"	15	2,059	- 7	2,052	7	2,052	" gravel	Hard, clear		D, S	Waters 50 head stock.
20	SE.	24	"	"	"	Drilled	125	2,059	- 30	2,029	30	2,029	" "	" "		S,	Sufficient supply, if well cleaned 4 other springs similar.
21	SE.	26	"	"	"	Dug.	24	2,090	0	2,090	0	2,090	" "	" "		D, S, I, M	Supplies town, gardens, and stock easily, 2 flowing springs.
22	NE.	26	"	"	"	"	23	2,100	- 12	2,088	12	2,088	" "	" "		D, S, I	Waters 50 head stock and garden, good supply.
23	NW.	26	"	"	"	"	13	2,100	- 9	2,091	9	2,091	" yellow black clay	" "		D, S	Good supply.
24	NW.	29	"	"	"		7	2,070	0	2,070	0	2,070	Glacial blue clay	" "		S,	Very good supply.
25	SW.	31	"	"	"	"	26	2,160	- 23	2,137	24	2,136	" gravel	" "		D,	House well only.
26	SW.	31	"	"	"	Drilled	165	2,160	0	2,160	0	2,160	Ravenscrag "	Soft, iron, salty, rusty		S,	Very good supply.
27	SE.	31	"	"	"	Dug	30	2,105	- 7	2,098	7	2,098	Glacial gravel	Hard, clear, alkaline		D, S	Waters 80 head stock.

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO.64. SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
28	NE.	32	8	4	2	Dug	48	2,153	- 24	2,129	48	2,105	Glacial gravel	Hard, clear, alkaline		D, S	Very good supply, waters 650 head stock.
29	SE.	33	"	"	"	"	20	2,150	- 16	2,134	16	2,134	" sand	Hard, clear, alkaline		D, S	Sufficient for 50 head stock.
30	NE.	33	"	"	"	"	33	2,250	- 30	2,220	30	2,220	" gravel	Hard, clear		D, S	Waters 6 to 8 head stock.
31	SW.	34	"	"	"	"	23	2,150	- 19	2,131	19	2,131	" "	" "		D, S	" 50 head stock.
32	NW.	34	"	"	"	"	12	2,175	- 10	2,165	10	2,165	" quicksand	Soft, "		D, S	" 8 " " .
33	SE.	34	"	"	"	"	33	2,175	- 25	2,150	25	2,150	" gravel	Hard, "		D, S	Very good supply.
34	SE.	35	"	"	"	Drilled	30	2,125	- 18	2,107	18	2,107	" "	Med. soft, clear		D, S, I	Insufficient, garden use.
35	SW.	36	"	"	"	"	160	2,140	- 80	2,060	80	2,060	" sand	Hard, clear, iron, alkaline		S,	Very good supply.
1	SW.	5	8	5	2	Dug	18	1,960	- 10	1,950	0	1,960	Glacial sand	Hard, clear		D, S	Very good supply.
2	NW.	6	"	"	"	"	18	1,967	- 10	1,957	0	1,967	" "	" "		D, S	" " " .
3	NE.	10	"	"	"	"	22	1,975	- 4	1,971	0	1,975	" gravel	" "		D,	Sufficient for school and garden use.
4	NE.	10	"	"	"	Drilled	288	1,975	- 16	1,959	288	1,687	Ravenscrag gravel	Soft, clear		D, S, I	Used to give good supply, plugged now.
5	SW.	11	"	"	"	Sand Point	20	1,967	- 14	1,953	14	1,953	Glacial sand	Hard, "		D, S, I	Very good supply, garden use.
6	SE.	12	"	"	"	Dug	25	1,980	- 21	1,959	21	1,959	" gravel	" "		D, S	Waters 50 head stock.
7	NE.	12	"	"	"	"	20	1,985	- 18	1,967	5	1,980	" sand	Med. hard, clear		D,	Used for garden, good supply.
8	SE.	13	"	"	"	"	36	1,995	- 33	1,962	35	1,960	" gravel	Hard, clear		D, S	Flows quickly, good supply.
9	SE.	14	"	"	"	Sand Point	18	1,980	- 14	1,966	14	1,966	" sand	" "		D, S	Very good supply.
10	NE.	14	"	"	"	Dug	10	1,985	- 7	1,978	0	1,985	" "	" "		D, S	" " " .
11	SE.	15	"	"	"	Bored	24	1,980	- 18	1,962	9	1,971	" gravel Glacial sand	Med. soft, clear		D, S, I	Garden use, waters 25 head stock, excellent irrigation.
12	SE.	16	"	"	"	Sand Point	20	1,975	- 16	1,959	16	1,959	" "	Hard, clear		D, S	Very good supply.
13	NW.	18	"	"	"	Sand Point	13	2,000	- 8	1,992	13	1,987	" "	" "		D, S	Good supply.
14	SW.	18	"	"	"	Sand Point	16	1,970	- 8	1,962	0	1,970	" "	" "		D, S	" " .
15	NW.	19	"	"	"	Dug	20	2,025	- 10	2,015	2	2,023	" "	" "		D, S	Very good supply.
16	NE.	19	"	"	"	"	15	1,997	- 12	1,985	15	1,982	" "	" "		D, S	" " " .
17	SE.	20	"	"	"	"	15	1,995	- 10	1,985	0	1,995	" "	" "		D, S	" " " .
18	SW.	20	"	"	"	"	15	1,995	- 10	1,985	0	1,995	" "	" "		D, S	" " " .
19	SE.	22	"	"	"	"	20	2,000	- 15	1,985	15	1,985	" white clay	Med. hard, clear		D, S	Waters 20 head stock.

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(#) Sample taken for analysis.

WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO. 64 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
20	SW.	22	8	5	2	Dug	28	2,025	- 25	2,000	28	1,997	Glacial sand	Hard, clear		D,	Sufficient, pumped all day.
21	NW.	22	"	"	"	"	15	2,000	- 10	1,990	10	1,990	" "	" "		D, S	Waters 100 head stock, sufficiently.
22	NW.	22	"	"	"	Bored	86	2,020	- 36	1,984	86	1,934	" clay	Med. hard, clear		N,	Not used at present.
23	NW.	22	"	"	"	Drilled	113	2,020					Ravenscrag			N,	Dry hole.
24	NE.	22	"	"	"	Dug	15	2,000	- 10	1,990	0	2,000	Glacial sand	Med. hard, clear		D, S	Sufficient.
25	SE.	23	"	"	"	"	11	2,005	- 8	1,997	2	2,003	" gravel	Med. hard, clear	43	D, S	Waters 50 to 100 head stock, over sufficient.
26	SW.	24	"	"	"	"	8	1,995	- 5	1,990	0	1,995	" " sand	Hard, clear		D, S	Good supply.
27	NE.	24	"	"	"	"	24	2,020	- 20	2,000	20	2,000	Glacial gravel	" "		D, S	Waters 60 head stock, could be used for irrigation.
28	NW.	25	"	"	"	"	20	2,050	- 10	2,040	0	2,050	" "	" "		D, S	Very good supply, could be used for irrigation also bored well similar.
29	NE.	27	"	"	"	Drilled	336	2,035	- 2	2,033	300	1,735	Ravenscrag coal clay			N,	Good supply of water.
30	SW.	28	"	"	"	Dug	60	2,050	- 54	1,996	0	2,050	Glacial sandy clay	Hard, clear		D, S	Waters 75 head stock.
31	NW.	28	"	"	"	"	20	2,047	- 15	2,032	15	2,032	Glacial sand	" "		D, S	Waters 25 head stock could be used for irrigation.
32	NW.	28	"	"	"	Drilled	90	2,040	- 4	2,036	90	1,950	Ravenscrag coal	" " red sediment		S,	Waters from 100 to 200 head stock, laxative.
33	NW.	29	"	"	"	Dug	32	2,045	- 22	2,023	0	2,045	Glacial sandy clay	Hard, clear		D, S	Very good supply, could be used for irrigation
34	SW.	30	"	"	"	"	30	2,045	- 20	2,025	2	2,043	Glacial sand	" "		D, S	" " ", " " " " "
35	NW.	30	"	"	"	"	40	2,055	- 30	2,025	0	2,055	" sandy clay	" "		D, S	" " ", " " " " "
36	SE.	31	"	"	"	"	30	2,055	- 22	2,033	0	2,055	" " "	" "		D, S	" " ", " " " " "
37	SW.	31	"	"	"	"	40	2,055	- 28	2,027	0	2,055	" " "	" "		D, S	" " ", " " " " "
38	SE.	32	"	"	"	"	36	2,043	- 31	2,012	31	2,012	" sand	" "		D, S	Waters 50 head stock.
39	SW.	32	"	"	"	"	20	2,055	- 14	2,041	0	2,055	" sandy clay	" "		D, S	Very good supply.
40	SE.	34	"	"	"	"	14	2,050	- 10	2,040	10	2,040	" gravel	" "		D, S	Waters 50 head stock, could be used for irrigation, also another well similar 16 ft. deep.
41	NE.	35	"	"	"	"	20	2,140	- 16	2,124	7	2,133	" sand	" "		D, S, I	Waters 50 head stock, garden use.
42	NW.	36	"	"	"	"	22	2,140	- 20	2,120	5	2,135	" "	" " alkaline	43	S,	Waters 25 head stock, laxative.
43	NW.	36	"	"	"	Drilled	115	2,140	+ 15	2,155	115	2,025	Ravenscrag coal	Hard, clear, turns red	44	D, S	Supplies 500 gallons a day, laxative.
1	SW.	1	8	6	2	Dug	14	1,985	- 8	1,977	4	1,981	Glacial gravel sand	Hard, clear, alkaline white sediment		D, S	Waters 11 head stock, supplies 1 foot an hour.
2	SW.	4	"	"	"	"	20	1,990	- 5	1,985	19	1,971	Glacial sand	Hard, clear, alkaline		D, S	Waters 30 head stock, insufficient in winter, good supply in summer.

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.

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WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO. 64 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
3	NE.	6	8	6	2	Dug	12	2,015	- 10	2,005	11	2,004	Glacial gravel	Hard, clear, iron		D, S	Sturdy supply, waters 18 head stock, kills plants. 4 dry holes 20 to 23ft. dug in blue clay
4	NW.	6	"	"	"	"	22	2,015	- 16	1,999	20	1,995	" sand gravel	Soft, clear		D, S	Sufficient supply, waters 9 head stock,
5	NE.	8	"	"	"	"	34	2,015	- 24	1,991	20	1,995	Glacial gravel	Hard, clear		D, S, I	Waters 12 head stock, garden use.
6	SW.	13	"	"	"	Sand point	13	1,975	- 5	1,970	7	1,968	" "	Med. hard, clear		D, S, I	" 20 " " , " ".
7	SW.	14	"	"	"	"	12	1,975	- 10	1,965	11	1,964	" "	Soft, clear		D, S, I	Very good supply, waters 17 head stock, garden use.
8	NW.	14	"	"	"	Bored	14	1,980	- 5	1,975	10	1,970	" "	Hard, "		D, S, I	Very good supply, waters 12 head stock, garden use.
9	SE.	15	"	"	"	"	14	1,980	- 4	1,976	10	1,970	" " sand	" "		D, S, I	Very good supply, waters 15 head stock.
10	SE.	16	"	"	"	Dug	14	1,975	- 11	1,964	11	1,964	Glacial sand gravel	" "		D, S, I	Another well, waters 40 head stock. Very good supply on farm.
11	NW.	16	"	"	"	Bored	130	2,000	- 60	1,940	115	1,885	Glacial gravel sand	" " iron		D, S	Very good supply on farm, waters 25 head stock.
12	SW.	18	"	"	"	"	38	2,015	- 8	2,007	16	1,999	Glacial sand	Hard, clear, alkaline		D, S	" " " " ", " 30 " ".
13	SW.	20	"	"	"	Dug	9	1,980	- 4	1,976	8	1,972	" "	Soft, clear		D, S	Waters 28 headstock in summer, another 16 foot well used, insufficient supply in winter.
14	SW.	24	"	"	"	Bored	12	1,985	- 7	1,978	10	1,975	" "	Hard, "		D, S	Good supply, waters 20 head stock.
15	SW.	25	"	"	"	Dug	20	2,040	- 18	2,022	16	2,024	" "	" "		S,	Sufficient supply, not used for drinking.
16	NE.	26	"	"	"	Sand point	9	2,040	- 3	2,037	5	2,035	" "	" "		D, S, I	Very good supply, waters 17 head stock.
17	NW.	26	"	"	"	Dug	20	2,010	- 12	1,998	19	1,991	" grey clay	Very hard, clear		D, S	Waters 7 head stock, gardon use.
18	NW.	34	"	"	"	"	14	2,040			1	2,039	" sand gravel	Hard, clear, iron		D, S	Waters 30 head stock, good supply, well cannot be pumped dry.
19	NW.	36	"	"	"	"	18	2,050	- 15	2,035	?	?	Glacial	Hard, clear		N,	Hauls all drinking water, has no stock.
1	NW.	1	9	4	2	Dug	12	2,410	- 7	2,403	10	2,400	Glacial grey sand	Hard, clear		D, S	Waters from 18 to 20 head stock. Small seepage well.
2	NE.	1	"	"	"	"	10	2,425	- 8	2,417	5	2,420	Glacial blue clay	Med, hard, clear		D, S, I	Waters 50 head stock, garden use.
3	SE.	4	"	"	"	"	24	2,450	- 12	2,438	10	2,440	" stone gravel	Hard, clear		D, S	Very good supply.
4	NW.	7	"	"	"	"	12	2,465	- 2	2,463	11	2,454	Glacial sand	" "		D,	Insufficient supply.
5	SW.	7	"	"	"	"	24	2,475	- 18	2,457	24	2,451	" "	Soft, iron		D, S	Steady supply.
6	NE.	8	"	"	"	"	15	2,520	- 9	2,511	9	2,511	"	Hard, clear	44	D, S	Waters 15 head stock.
7	SW.	9	"	"	"	"	30	2,455	- 15	2,440	15	2,440	" gravel sand	Soft, clear	43	D, S	Waters 20 head stock, another well 42 feet deep, alkaline water.
8	NW.	9	"	"	"	"	17	2,550	- 7	2,543	15	2,535	Glacial sand	" "		D, S	Waters 20 head stock.
9	NW.	10	"	"	"	"	40	2,480	- 6	2,474	32	2,448	" "	Hard, clear		D, S	Very good supply, laxative.

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

WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO. 64 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	NE.	10	9	4	2	Dug	8	2,480	- 4	2,476	0	2,480	Glacial gravel	Hard, clear		D,	Good supply, water enters quickly.
11	SW.	12	"	"	"	"	4	2,455	- 2	2,453	0	2,455	" "	" "		D, S, I	" " " " " " .
12	NW.	12	"	"	"	"	5	2,480	- 2	2,478	0	2,480	" " sand	" "		D, S, I	Very good supply, garden use.
13	NE.	12	"	"	"	Spring	0	2,480	0	2,480	?	?	Glacial				Flowing spring, good supply.
14	NE.	13	"	"	"	Dug	20	2,605	- 13	2,592	14	2,591	" sand	Hard, clear, alkaline		S,	Abundant supply, laxative.
15	SE.	14	"	"	"	"	18	2,490	- 6	2,484	7	2,483	" "	Hard, clear		D, S, I	Good supply, garden use, another well on hill.
16	SW.	14	"	"	"	"	24	2,495	- 15	2,480	20	2,475	" " gravel	" "		D, S, I	Good supply, garden use.
17	NW.	14	"	"	"	"	15	2,525	- 8	2,517	8	2,517	Glacial sand gravel	" "		D, S, I	Strong supply.
18	SW.	16	"	"	"	"	25	2,525	- 15	2,510	0	2,525	Glacial sand	" "		D, S	Strong supply, stock use lake.
19	SW.	18	"	"	"	"	22	2,405	- 14	2,471	3	2,482	" "	" " alkaline		N,	Very good supply, laxative.
20	SW.	24	"	"	"	"	5	2,600	- 1	2,599	2	2,598	"	Hard, clear, alkaline		D, S, I	" " " , garden use.
21	SW.	24	"	"	"	"	12	2,590	- 5	2,585	5	2,585	"	Hard, clear,		D, S, I	" " " " " .
22	SW.	25	"	"	"	"	18	2,590	0	2,590	16	2,574	" gravel	" "		D, S	" " " , waters any amount of stock.
1	SE.	2	9	5	2	Dug	20	2,150	- 18	2,132	0	2,150	Glacial gravel	Med. hard, clear		D, S	Very good supply, wells fills in 10 minutes.
2	SW.	2	"	"	"	Drilled	80	2,200	0	2,200	80	2,120	Ravenscrag coal	Soft, clear, turns rusty		S,	" " " , flows, seepage well for house
3	SE.	3	"	"	"	"	112	2,200	0	2,200	112	2,088	"	Soft, clear		S,	Good supply, condemned on analysis, flows, seepage well for house use.
4	NE.	4	"	"	"	Dug	42	2,200	- 32	2,168	38	2,162	Glacial sand	Hard, clear		D, S	Sufficient supply, seepage well in coulee goes dry easily.
5	SW.	4	"	"	"	"	32	2,125	- 28	2,097	28	2,097	" gravel	" "		D, S	Sufficient for local needs.
6	NE.	5	"	"	"	Bored	38	2,140	- 32	2,108	0	2,140	" gravel sand	" "		D, S	Waters 35 head stock, another well 40 feet deep, white clay and sand.
7	NE.	6	"	"	"	Dug	16	2,100	- 12	2,088	12	2,088	" sand	" "		D, S	Intermittent supply, waters 25 head stock.
8	NE.	10	"	"	"	"	45	2,425	- 30	2,395	30	2,395	" clay sand	" " alkaline		S,	Waters 12 head stock, laxative
9	NE.	10	"	"	"	Drilled	417	2,425					Ravenscrag sand			N,	Dry hole.
10	NE.	16	"	"	"	Dug	20	2,400	- 6	2,394	0	2,400	Glacial clay	Hard, clear		D, S	Sufficient for local needs.
11	NW.	16	"	"	"	"	40	2,440	- 20	2,420	0	2,440	" white sticky clay	" "		D, S	Waters 30 head stock, also another well.
12	NW.	17	"	"	"	"	10	2,440	- 8	2,432	8	2,432	Glacial gravel	Med.hard, clear		D, S	Waters 15 head stock.
13	NW.	20	"	"	"	"	35	2,500	- 34	2,466	0	2,500	" white clay	Hard, clear		D,	Only sufficient for house use.
14	SE.	28	"	"	"	"	20	2,540	- 17	2,523	16	2,524	" sand	" "		D, S	Waters 35 head stock in winter.

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(#) Sample taken for analysis.

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WELL RECORDS—RURAL MUNICIPALITY OF BROCK NO. 64 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
15	NE.	29	9	5	2	Dug	22	2,550	- 8	2,542	0	2,550	Glacial	Hard, clear	45	D,	Only sufficient for house use.
16	SW.	30	"	"	"	"	16	2,450	- 4	2,446	4	2,446	"	" "	47	D, S	Waters 10 head stock.
17	SW.	31	"	"	"	"	10	2,450	- 3	2,447	3	2,447	"	" "		D,	Only sufficient for house use.
18	NE.	31	"	"	"	"	20	2,500	- 10	2,490	10	2,490	"	" "		S,	Well never goes dry, similar well for house use not good supply.
19	NE.	32	"	"	"	"	14	2,540	- 10	2,530	0	2,540	" clay	" " alkaline		S,	Intermittent supply, laxative.
1	SW.	1	9	6	2	Dug	30	2,060	- 27	2,033	27	2,033	Glacial sandy clay	Hard, clear	43	D, S	Sufficient supply, another well waters 60 head stock, neighbours haul water from here.
2	NE.	2	"	"	"	"	30	2,065	- 25	2,040	25	2,040	Glacial sandy clay	" "	43	D, S, I	Waters 30 head stock, garden use, use a spring in summer for stock.
3	SE.	3	"	"	"	"	30	2,050	- 20	2,030	30	2,020	Glacial sand	" "	43	D, S, I	Over sufficient supply.
4	NW.	9	"	"	"	"	22	2,035	- 20	2,015	22	2,013	" "	" " alkaline		D, S	" " " , at first water rose to the surface.
5	NW.	12	"	"	"	"	35	2,080	- 15	2,065	15	2,065	" sand	Hard, clear alkaline	44	D, S	Waters 50 head stock, over sufficient supply.
6	NW.	14	"	"	"	"	40	2,100	- 38	2,062	40	2,060	" gravel	Hard, clear	43	D, S	Insufficient supply, only enough for house and 2 head stock.
7	NE.	14	"	"	"	"	26	2,140	- 20	2,120	18	2,122	" sand	Hard, clear, Glauber salts	41	N,	Good supply of water.
8	NW.	15	"	"	"	"	10	2,055	- 8	2,047	8	2,047	" "	Hard, clear	44	D, S, I	Over sufficient supply,
9	NE.	16	"	"	"	"	24	2,055	- 18	2,037	20	2,035	" gravel	" "	45	S,	Insufficient supply, also 20 foot well which yields 8 pails a day.
10	NE.	17	"	"	"	"	23	2,055	- 20	2,035	20	2,035	" " sand	" "	43	D, S	Waters 40 head stock.
11	NW.	17	"	"	"	"	10	2,065	- 8	2,057	0	2,065	Glacial	" "		D, S	Insufficient supply, haul water.
12	NW.	20	"	"	"	"	18	2,085	- 16	2,069	0	2,085	" sand	" "	43	D, S	Sufficient supply.
13	SE.	20	"	"	"	"	21	2,090	- 19	2,071	21	2,069	" gravel	" "	42	D, S	Waters 50 head stock.
14	SW.	22	"	"	"	"	60	2,100	- 10	2,090	10	2,090	"			N,	Well not finished, expect good supply of water.
15	SW.	23	"	"	"	"	0	2,140	0	2,140			"	Med. soft, clear	42	D, S	Waters 25 head stock, flowing spring.
16	SE.	28	"	"	"	"	4	2,145	1	2,146	1	2,144	"	Hard, clear, iron	51	D, S, I	Over sufficient supply, flowing spring.
17	SE.	30	"	"	"	"	20	2,050	- 15	2,035	20	2,030	" gravel sand	Hard, clear	46	D, S	Over sufficient supply, also another well yields good supply.

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