CANADA
DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF BRATT'S LAKE No. 129 SASKATCHEWAN

BY

B. R. MacKay, H. H. Beach & E. L. Ruggles

Water Supply Paper No. 123

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

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

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

GLOSSARY OF TERMS USED

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Cypress Hills Formation. The name given to a series of conglomerates and sand beds which occur in the southwest corner of Saskatchewan, and 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 côteau. 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 Bratt's Lake comprises an area of 324 square miles, situated in the south-central part of Saskatchewan. It forms a nearly square block of land consisting of nine townships described as tps. 13, 14, and 15, ranges 19, 20, and 21, W. 2nd mer. The centre of the municipality lies about 19 miles south of the city of Regina. The Boundary Line of the Canadian National railways crosses the northeastern part of the municipality, and on it is situated the hamlet of Estlin. The Canadian Pacific Railway's "Soo" line extends through the southwestern part of the municipality. On this line are situated the village of Wilcox, in sec. 19, tp. 13, range 20, and the hamlets of Corrine and Diana, 5 miles southeast and northwest, respectively, of Wilcox.

The surface of the entire municipality is very flat, with only a few, long, low ridges, extending in a northwest-southeasterly direction, that give any appreciable relief. Nowhere, however, does the relief vary by more than 15 or 20 feet throughout the area from an approximate elevation of 1,900 feet above sea-level. Moosejaw creek flows in a northwesterly direction through the extreme southwest corner of the municipality. This creek and a small, intermittently flowing tributary stream constitute the only surface drainage of the municipality.

The provincial government and the residents of the area have gone to considerable expense over a period of years in a careful search for ground water in the area by boring and drilling wells. Consequently, parts of the area are fairly well prospected, and sufficient information has been accumulated regarding conditions in the remaining areas to form conclusions as to the water-bearing characteristics of the sediments forming both the unconsolidated deposits and the bedrock. Water-bearing beds are apparently confined to fairly well-defined areas, and outside of these areas little or no ground water can be found. Dugouts are in general use throughout the municipality as sources of water for stock. The creek also provides water for stock pasturing in the vicinity. Concrete cisterns have been built below the ground in many places, and are used to store drinking water. These cisterns are filled with ice hauled from Moosejaw creek in winter, or with water hauled from producing wells, or with rain water that runs off from the roofs offarm buildings. Such methods of accumulating surface water supplies are very important, and residents outside the proven productive areas are well advised to consider the construction of dugouts and cisterns before going to the expense of extensive prospecting for ground water that may at best yield only small seepages of "alkaline", undrinkable water.

Water-bearing Horizons in the Unconsolidated Deposits

The unconsolidated deposits covering the entire municipality consist of dark chocolate brown to dark grey glacial lake clay, overlying a thick deposit of boulder clay. The boulder clay in turn rests upon the dark grey to black shales of the Marine Shale series that forms the bedrock. The lake clay appears to range from 10 to 20 feet in thickness. The boulder clay in most places is more than 100 feet thick and is believed to attain a thickness of 200 feet in the northwestern part of the municipality.

The boulder clay occurring in this area was laid down by the great continental ice-sheet that many thousands of years ago advanced and retreated over the province of Saskatchewan.

As the ice melted it deposited a heterogeneous mixture of rock flour, sand, gravel, and boulders. These deposits in this area consist almost entirely of boulder clay in the upper part, with thin beds of sands and gravels occurring towards the base. Owing to the damming of the natural drainage channels by the ice, the water from the melting ice formed extensive lakes in many of the lower lying areas. Such a lake, known as glacial lake Regina, once covered much of the plain extending between Missouri coteau and the Moose Mountain uplands. Very fine silts were washed into this lake and gradually settled to the bottom. The past areal extent of the lake is now marked by a deposit of lake clay over a large part of this plain, extending for many miles northwest, south, and southeast of Regina. The clay becomes very sticky when wet, causing many of the dirt roads to be impassable after heavy rains. The lake clay is locally referred to as "gumbo". Due to the compact nature of the clay, little surface water percolates down into it and, as porous sand and gravel beds are almost entirely absent in the clay, little or no ground water can be expected from it. In a few places thin beds of sand or gravel occur between the lake clay and the underlying boulder clay, but even these beds do not form dependable sources of water. Dugouts excavated in this region are found to lose very little of their water, if any, by seepage into the clay. Although the greater part of the area is very flat, low knolls and ridges have been noted in several places. Many such small prominences are made up in part of porous sands and gravels, and wells located on or near the knolls have produced at least small supplies of drinkable water. Should such knolls be found on any farm, they are worth prospecting at shallow depths.

Only in isolated places have aquifers been found in the underlying bluish grey boulder clay, within 100 feet of the surface. These aquifers occur as isolated pockets of sand and gravel, irregularly scattered through the clay. Most of the wells tapping these pockets produce only very small quantities of water, but in some places the yields are sufficient for local requirements. The small proportion of the holes sunk in this municipality that have encountered aquifers at shallow depths illustrates how rarely they occur. The water-bearing beds in the boulder clay occur near their base at depths ranging from 100 to 200 feet from the surface. Prospecting in the area has shown that aquifers in the boulder clay are not continuous over the whole of the municipality. The lines marked "A" on the accompanying map, Figure 1, show approximately the boundaries of the areas in which adequate water supplies are to be expected from the beds and pockets of sand and gravel in the boulder clay. Some continuity in the water-bearing horizons has been noted, but the depths of the different producing wells vary considerably from place to place. Residents contemplating the sinking of wells and desiring to know the approximate depth to the water-bearing bed at any point within the areas bounded by the "A" lines are advised to examine the records of wells in adjacent sections, as given in the table of well records accompanying this report. The records of a number of wells not existing at the present time will be noted in this table. These wells were sunk a number of years ago and have, for various reasons, been filled in. These records were used in conjunction with those of existing wells in determining the limits of the water-bearing horizons.

At a few points within the productive area the glacial drift appears to be thicker than in surrounding areas, and a sand

and gravel aquifer is found at elevations ranging from 1,613 to 1,684 feet above sea-level. Wells tapping this horizon are located in townships 13 and 14, range 19, and in townships 14 and 15, ranges 20 and 21. The town of Rouleau derives its water supply from this aquifer. The sands and gravels appear to lie in the course of a buried stream channel. The deep wells in the southeastern part of the municipality probably tap the same channel. There are undoubtedly several channels spreading out over the area, and the deep wells in the northwest may be tapping branches of this buried drainage system. The Rouleau wells and the well on sec. 19, tp. 14, range 21, appear to have encountered the same aquifer. Owing to their scattered occurrence, and the variations in depth at which the productive beds were encountered, the deep wells in the northern township cannot be definitely correlated with the productive deep wells in the southeastern township. It is possible that a buried channel extends from Rouleau into township 14, range 21, northeasterly through township 15, ranges 21 and 20, and thence southeasterly through the area bounded by the "A" lines into township 13, range 19. The same channel may continue southward into township 12, range 19, of the adjacent municipality.

Outside the areas bounded by the "A" lines, little or no water is obtainable from the glacial drift. An aquifer of limited areal extent has been found in the southeastern part of township 15, range 20, and small, water-bearing pockets have been encountered at isolated points, but the greater number of the holes sunk were dry. The sands and gravels occurring near the base of the drift, in the northwestern and southeastern parts of the municipality, appear to be entirely absent in the northeastern and southwestern parts.

Further drilling in those areas is not recommended. The collection and storage of surface water in dugouts and cisterns must remain the chief source of water supply.

Water-bearing Horizons in the Bedrock

Dark grey, compact shales of the Marine Shale series underlie the glacial drift throughout the municipality, down to depths probably not less than 900 feet. In many parts of the area holes have penetrated the bedrock. No water occurs in the upper 100 feet of the shales, and at lower levels the water found is too salty to be used. Usable water will not be found in the bedrock at any point in this municipality, so that further drilling into the Marine Shale series in any part of the municipality is useless. These shales have been locally referred to as "soapstone". They are distinguished from the clays of the overlying glacial drift by their darker colour, their more soapy feel, the entire absence in them of stones or pebbles, and by the small, roughly cubical fragments into which the shales crumble upon drying.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 13, Range 19

Supplies of water are being derived from the glacial drift throughout the greater part of the township. No water is obtainable from the fine-grained lake clay that covers the area to a depth of 10 to 15 feet. The boulder clay that underlies the lake clay is also too impervious to yield water supplies. On section 26 a pocket of sand, lying 23 feet below the ground surface, in the boulder clay, produces a small supply of water. Small pockets of sand or gravel may be encountered at moderate depths in the boulder clay at other points, but they occur only very sparingly, and will be found only after careful prospecting.

Within the area enclosed by the "A" line as shown on the accompanying map, Figure 1, sand and gravel aquifers have been encountered near the base of the boulder clay. In some places the aquifer is resting directly on top of the marine shales. Wells tapping this horizon range in depth from 90 to 148 feet. The water is under hydrostatic pressure, and rises in many wells to within 50 or 60 feet of the surface. Individual wells as a rule provide ample water for local requirements, but in some wells the yield has decreased considerably owing to quicksand filling in the lower part of the well. Several wells are in disuse owing to this condition. Considerable variation is noted in the quality of the water from place to place. The water from the greater number of the wells is hard and slightly "alkaline", but usable for both domestic purposes and for stock. The water from a few wells, however, contains such large quantities of dissolved mineral salts as to be objectionable for drinking, and from two wells is not considered usable even for stock. The water from some of the wells that have reached the top of the bedrock is found to have a salty taste. Sufficient water should be obtainable by boring or drilling to the lower part of the drift at any point within the area bounded by the "A" line.

A lower water-bearing horizon has been tapped in wells on the SW.$\frac{1}{4}$, section 14, on the SW.$\frac{1}{4}$, section 16, and on the NW.$\frac{1}{4}$, section 20. The lower horizon found on section 14, at a depth of 180 feet, may be in the bedrock, or it may indicate a local increase in the thickness of the drift. Gravel was encountered at the base of the 232-foot well on section 16, at an elevation of 1,668 feet above sea-level, and in the 280-foot well on section 20, at 1,640 feet. This gravel is believed to lie in the bottom of a buried stream channel. This channel may extend from section 16, in a northwesterly direction through section 31. It probably also continues southward through section 9. Moderately large supplies of water are obtainable from each of these wells, and the water rises part way up the wells owing to the hydrostatic pressure. The water is usable in the households. When seeking water supplies on the sections through which this channel is believed to cross, it would be advisable to drill wells to depths from 230 to 280 feet, if an aquifer is not encountered within 150 feet of the surface.

In those sections of the township that lie outside the area bounded by line "A", little or no ground water is obtainable. Numerous dry holes drilled to the top of, or even into, the bedrock indicate that no water-bearing sand or gravel beds occur in this area. Small supplies of water might be found in sand or gravel pockets in the boulder clay after extensive testing, but even these are not to be expected at most points. Residents in these areas are well advised to continue to utilize dugouts and cisterns.

The marine shales have been penetrated at many points throughout the township at depths ranging from 125 to 165 feet. In most places no water has been obtained from the shales, but on sections 1, 12, and 28, small supplies appear to come from this source. The water from the wells on sections 1 and 12 is suitable only for stock watering, and from the well on section 28 is not satisfactory for any farm use. This well was filled in as the supply was very small. Only at isolated points will any water be found in the marine shales, and it will be of very poor quality.

Township 13, Range 20

Little water is being derived from wells in the township, and dugouts and cisterns are used to store water for both domestic and stock use.

The 10- to 15-foot layer of impervious lake clay that covers the area does not yield water, and the upper part of the underlying boulder clay is only sparingly productive. Two or three wells in the township have encountered small pockets of water-bearing sand and gravel at depths of 30 to 40 feet, and obtain small quantities of water. Isolated water-bearing pockets doubtlessly occur at other localities, but they are not numerous and are to be located only by extensive testing. Owing to the small yield from these pockets, it is not advisable to conduct intensive prospecting for them. Several wells bored 80 feet deep, in the southeastern part of the township, have encountered an aquifer of fine sand or gravel near the base of the boulder clay. The area over which this aquifer is believed to extend is bounded by line "A" on the map, Figure 1. The yield from individual wells varies considerably. Unfortunately the water is of very poor quality owing to the high content of dissolved mineral salts. None of the wells yields drinkable water, and the water from some wells is unsuitable for stock. Several of the wells have been filled in as they were of no value. The sinking of additional wells in this area hardly seems advisable, although water that is usable for stock might be obtained at some points.

On section 36 a 212-foot well tapped a gravel aquifer at a depth of 200 feet. A supply of good water, ample for local requirements, is provided. This aquifer is believed to lie in the buried stream channel that was noted in township 13, range 19, and which has also been tapped on sec. 6, tp. 14, range 19, and sec. 12, tp. 14, range 20. The extent of this aquifer in this township has not been definitely determined, but it probably is not present outside of section 36 in the township.

In many parts of the township the drift has not been well prospected. At several points dry holes have been put down, but these may not have been bored deep enough to reach any aquifer that may possibly exist at the base of the boulder clay. The glacial drift varies in thickness from about 100 to 125 feet, and if any drilling is contemplated it should be extended to at least this depth.

A few wells in the township have penetrated the marine shales. No water was obtained in some places, but four deep wells on sections 19, 24, and 28 appear to have found water in the bedrock at a depth of 240 feet. Fairly large supplies of water were available in each well, but due to its very salty character the water was unfit for either domestic or stock use. Good water is not to be expected from the marine shales at any point. Whereas the drift is worthy of further prospecting, boring or drilling should be discontinued when the marine shales are reached.

Township 13, Range 21

This township is only sparsely populated, and consequently only a small amount of prospecting for ground water has been done. Moosejaw creek flows northwesterly across the southwestern part of the township, and is joined by an intermittently flowing tributary crossing sections 6 and 7. The limited number of stock in the area are watered from the creek, or from dugouts. Drinking water is obtained from seepage wells sunk beside dugouts, or is hauled.

Compact, dark lake clay covers the area. Not only is this clay almost entirely non-water-bearing, but little water is available in the underlying boulder clay, except possibly in isolated pockets of sand or gravel. No such pockets have as yet been tapped, but no doubt they occur at a few scattered points, where they may form low knolls or ridges covered with a veneer of lake clay.

A 37-foot well on section 12 produced water that was unusable. On section 6 a 16-foot well derives a small supply of water as seepage from the creek. These are the only wells recorded as having produced water in this township. Owing to the lack of drilling in the area it is impossible to determine whether aquifers exist near the base of glacial drift, as is the case in the southeastern part of the municipality. No continuous water-bearing horizon is believed to occur, but sand beds of small individual areal extent may occur in some places, and should be found at depths between 90 and 150 feet.

The marine shales of the bedrock have been penetrated in several dry holes at depths greater than 100 feet. No water is to be expected from the shales in other sections, and further drilling into them would be useless. Any future prospecting for ground water should be confined to the glacial drift, and the possibilities of obtaining good water supplies from these deposits are very limited.

Township 14, Range 19

Little ground water has been found in this township except on section 6. Stock raising on a large scale is impossible owing to the lack of water. Numerous dry holes have been bored, and drilled in various parts of the area. Dugouts are used to provide water for a small number of stock, and cisterns have been constructed on many farms as reservoirs for drinking water.

The impervious glacial lake clay that forms the surface deposit over the township, and the underlying thick deposit of boulder clay, will yield little or no water. Two wells, 26 and 35 feet deep, on section 23, obtained small quantities of water from thin sand beds, interbedded in the boulder clay. The supplies from these wells were too small, however, to be of use, and the wells are now filled in. On the SE.$\frac{1}{4}$, section 14, wet sand was encountered in digging a cistern, and may indicate a possible source of a small supply of water. Thin beds of sand no doubt occur at other points in the township, and might be located by sinking a number of test holes. Only small supplies of water are to be expected from these aquifers, and in many places they may be no more productive than were the sand beds on section 23. Many deeper holes have penetrated to the base of the drift without finding water. Evidently few if any extensive aquifers occur in the lower part of the boulder clay. On section 6, however, two wells encountered water-bearing beds of sand and gravel at a depth of 270 feet. The water rose 170 feet above the aquifer. These sand and gravel deposits lie in what appears to be a buried stream channel. The extent of the aquifer cannot be definitely determined, but it probably does not extend beyond the line "A", shown on the map, Figure 1. Further prospecting to this depth in the western part of section 5, and on sections 6 and 7, seems advisable. The two wells on section 6 are no longer in use, but did supply sufficient water for local requirements. Throughout the remainder of the township deep drilling into the drift seems useless.

No water is to be found in the bedrock, as is evidenced by a number of dry holes that have penetrated the marine shales.

Township 14, Range 20

Supplies of ground water are obtainable from the glacial drift in this township in the area enclosed by the "A" line as shown on the accompanying map. In the northeastern and southwestern parts of the township little or no ground water is available at any depth.

Glacial lake clay covers the entire township, and probably nowhere exceeds 15 feet in thickness. Beneath the lake clay lies boulder clay to depths ranging from about 120 to 150 feet from the surface. No water is to be expected from the compact lake clay. The boulder clay also is impervious in most places, but small pockets of sand and gravel have been found in the boulder clay in three wells. On the NE.$\frac{1}{4}$, section 22, good water was formerly obtained from a 14-foot well, but this well has been filled in. A 20-foot well on the SE.$\frac{1}{4}$, section 22, derives enough water for 6 or 7 head of stock from an aquifer of sand and gravel. On section 8 a small amount of highly mineralized water was found in a well at a depth of 52 feet. The water was unfit for use, and the well was filled in. From this evidence small supplies of water are to be expected from the boulder clay at shallow depths in other sections. However, these small water-bearing pockets occur only very sparingly in this area, and can be located before digging wells only by sinking a series of test holes. On many sections they are probably altogether absent.

On sections 22, 27, 32, and 34, a fine sand aquifer has been located at depths of 130 to 185 feet or at elevations ranging from 1,740 to 1,780 feet above sea-level. This sand bed occurs at the base of the boulder clay. The water is under hydrostatic pressure, and rises 70 to 113 feet in the wells. Supplies derived are ample for local requirements. The water is hard, and "alkaline", but is usable in the households. Wells sunk to this horizon within the area enclosed by this line "A" should obtain similar supplies of water. On section 12, a water-bearing horizon in the glacial drift was found 297 feet below the surface. The sands and gravels reported at the base of this well are believed to occur at or near the drift-bedrock contact in the continuation of the buried stream channel noted in townships 13 and 14, range 19. The water rises 217 feet in this well, and a large supply of water of good quality is obtained. The extent of this water-bearing horizon in the township cannot be determined owing to a lack of drilling, but it is believed to extend at least through sections 1, 12, and 13 or 14. Throughout the area enclosed by the "A" line it is advisable first to seek water from the upper horizon at depths from 130 to 200 feet. If a satisfactory supply is not obtained then deeper drilling might be attempted in an effort to locate water in the buried stream channel. Further deep drilling in the remainder of the township is considered to be useless.

The marine shales have been encountered at depths ranging from 120 to 150 feet, in dry holes, on many sections. Water has been found in the bedrock in only one well, located on section 36. This well was drilled 875 feet deep, and encountered a water-bearing horizon at a depth of 830 feet. The water, however, was too salty to be used for any farm purpose. Any water present in the marine shales throughout the area would undoubtedly be of this poor quality. Drilling into the bedrock in any part of the township, therefore, cannot be recommended.

Township 14, Range 21

The water supplies of the township are unsatisfactory. A few wells in the northern sections are supplying local requirements, but on many of the farms little or no ground water has been located.

No water has been obtained from the lake clay that forms the surface deposit over the area, but water-bearing sands and gravels occur in the underlying boulder clay at some places. The line "A" on the map, Figure 1, marks the approximate southern boundary of the area in which producing wells occur in this township. Sands and gravels have been penetrated in wells 37 to 105 feet deep on several sections. These aquifers do not appear to be individually continuous over large areas, but occur rather as isolated pockets. Some of the wells are no longer used owing to the very small quantities of water available in them. A few of the wells supply sufficient water for local requirements. The water is hard and contains considerable amounts of dissolved mineral salts. The water from the 60-foot well on section 29 is usable only for stock, but from other wells the water is satisfactory for domestic use. The location of water-bearing sand and gravel pockets cannot be determined from observation at the surface, but can be found only by testing. Small supplies of water could no doubt be located in this manner in pockets at other points throughout the northern part of the township.

In the township to the north, a continuous aquifer occurs at depths of about 90 to 120 feet below the surface.

This aquifer may continue into the northern sections of this township. The well on the NE.$\frac{1}{4}$, section 31, is believed to have encountered this aquifer at a depth of 90 feet. On section 19 a still lower water-bearing horizon was tapped in a well at a depth of 211 feet. This aquifer lies at an elevation of 1,684 feet above sea-level, and is probably a continuation of the aquifer supplying the water to the wells in the town of Rouleau, to the west. The sands and gravels forming this aquifer are believed to lie in a buried stream channel. Owing to lack of information, however, this channel is not traceable beyond these two locations. It may be a part of the channel noted in townships 13 and 14, range 19, and township 14, range 20, or it may be a separate branch of this ancient drainage system. As the direction of the channel is unknown, further drilling to this horizon cannot be recommended except in the vicinity of the well on section 19.

Dry holes have been sunk to varying depths on many sections in the southern part of the township. Aquifers are apparently entirely absent in this area, and further drilling of wells seems futile. No water is to be obtained in any part of the township from the marine shales which underlie the boulder clay at depths ranging from 100 to over 200 feet. All drilling in the area should be discontinued when the shales are reached.

Township 15, Range 19

Very little ground water has been obtained in this township. Over a period of years holes have been sunk in many parts of the area, but only in very few places was any water found.

The mantle of glacial lake clay and the underlying boulder clay that extend over the whole of the township are practically impervious in most places. No water is to be expected from the clays themselves at any point. Isolated sand or gravel aquifers in the boulder clay have been encountered on three sections. A very small supply of water was derived from a thin bed of sand in a 22-foot well on section 6, but the quantity of water available was too small to be of value, and the well is not used. A flowing well was reported on section 28. The depth of the well and the nature of the aquifer are not known. The extent of the aquifer in this well is probably not great. Local sand and gravel beds were also found on section 30, in wells 51 and 125 feet deep. The supply from each of these wells was very small, and the 51-foot well has been filled in. Additional small quantities of water may be available in the vicinity of these wells. On sections 12 and 13, of the township to the west, water supplies are obtained in wells 75 and 93 feet deep. The aquifer that serves these wells may extend into this township in sections 7 and 18. Throughout the remainder of the township little or no water can be expected from the glacial deposits.

The Marine Shale series that underlies the whole area has been penetrated by dry holes in several localities. Water is present in the bedrock several hundred feet below the surface, but even though large quantities may be present the water is so salty that it cannot be used. Water of this nature was obtained in the 1,030-foot hole on section 13. Further drilling into the bedrock in this area is considered useless. Small supplies of water may be located in the drift at some points, but large supplies are not to be expected anywhere in the township. The present methods of obtaining water supplies, by means of dugouts and cisterns, appear to be the only worth-while ways of securing water in the township.

Township 15, Range 20

Ground water supplies are not obtainable in all parts of the township. In the southeast corner and in the western sections a number of wells have found supplies, but in the remaining sections little or no water is available.

No water has been found in the glacial lake clay that mantles the area, or in the upper part of the underlying boulder clay. Sand and gravel beds occur in the lower levels of the boulder clay in some localities, however, and from these are derived water supplies. On sections 11, 12, 13, 14, and 35, water-bearing sand and gravel beds were tapped in wells 69 to 93 feet deep. Each of the wells produces enough water for local requirements. The water, although hard, is usable in the households. Water from the 93-foot well on the SE.¼, section 13, was too highly mineralized to be used for drinking, and the well has been filled in. These aquifers no doubt extend laterally beyond the locations of these wells, but the area over which they will be found cannot be stated. Dry holes on sections 10, 23, and 24 indicate that they do not extend into the northeastern part of the area. Throughout much of the eastern and central parts of the township a number of dry holes have been sunk, indicating the absence of water-bearing beds. In the western part of the township water is obtained from wells on nearly every section. The glacial deposits are quite thick here, and the water is derived from aquifers near the base of the boulder clay, in wells ranging in depth from 80 to 240 feet. Individual wells produce good supplies of water, which in some places are more than are required for domestic and stock use. Only from the well on section 31 is the water reported to be unsuitable for use. Unfortunately the fine sand that forms the aquifer in several of the wells has filled in the lower part of the casings, and cut off the flow of water. In the area lying to the west of the line "A", shown on the map, Figure 1, water supplies should be obtainable from sands or gravels near the base of the glacial deposits. A 232-foot well on section 2, and a 225-foot well on section 19 appear to be tapping a deeper horizon. From the elevation of the aquifers it seems possible that these wells have penetrated sands and gravels lying in a buried stream channel. This may be a continuation of the channel noted in the townships to the south. The areal extent of this deeper water-bearing horizon in the township is not known. Further drilling for water in the western part of the township could be done with confidence, but east of the line "A" very little water can be expected except on those sections previously mentioned.

Water supplies are not obtainable from the marine shales that underlie the boulder clay throughout the entire township.

Township 15, Range 21

Residents of this township are in general better supplied with water than in any other township of the municipality. On nearly every farm satisfactory supplies have been derived from wells.

Water is rarely found close to the surface, as the fine-grained, compact lake clay and the upper part of the underlying boulder clay are quite impervious. On sections 2, 6, 9, 12, 14, 18, 27, and 36, sand or gravel pockets have been tapped in the boulder clay at depths less than 100 feet. Generally, however, a fine sand or gravel aquifer near the base of the glacial deposits is the water-producing horizon. Aquifers have been encountered at or near the base of the drift in wells ranging in depth from 110 to 215 feet. When first sunk, each well yielded ample water for local requirements, but owing to the fine sand filling in the lower part of the casing in many of the wells, the supply has decreased considerably. Other wells continue to be good producers. The water is hard, and has a fairly high content of dissolved mineral salts. The water in a few places may have a slightly laxative effect on persons unaccustomed to the use of highly mineralized water. On section 10, a lower water-bearing horizon was penetrated in a well 234 feet deep. This aquifer may be a continuation of the buried stream channel mentioned in the previous townships. A good supply of usable water is available in this well. Owing to the irregularities in the elevations at which the water-bearing horizons have been struck in this township, it is difficult to predict the depth of well that will be necessary to reach production at any given point. In general, however, the well should be of comparable depth with the wells on adjacent sections. A few dry holes have been sunk in the area, and there are, no doubt, other points at which no water is present. However, these locations appear to be few in this township, and water should be found almost anywhere. No drilling should be continued into the unproductive marine shales of the bedrock. These shales underlie the glacial deposits throughout the township, and appear to lie at a depth of at least 200 feet throughout the greater part of the area.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF BRATT'S LAKE, NO.129, SASKATCHEWAN

Township	13	13	13	14	14	14	15	15	15	Total No. in Municipality
West of 2nd meridian — Range	19	20	21	19	20	21	19	20	21	
Total No. of Wells in Township	80	37	21	36	41	56	33	98	61	463
No. of wells in bedrock	24	7	9	18	23	27	14	12	3	137
No. of wells in glacial drift	56	30	12	18	18	29	19	86	58	326
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply										
No. with permanent supply	33	14	1	4	11	14	7	23	41	148
No. with intermittent supply	0	0	0	0	0	0	0	0	1	1
No. dry holes	47	23	20	32	30	42	26	75	19	314
Types of Wells										
No. of flowing artesian wells	0	0	0	0	0	0	1	0	0	1
No. of non-flowing artesian wells	16	6	0	2	6	2	2	13	21	68
No. of non-artesian wells	17	8	1	2	5	12	4	10	21	80
Quality of Water										
No. with hard water	30	14	1	4	11	14	7	23	41	145
No. with soft water	3	0	0	0	0	0	0	0	1	4
No. with salty water	5	5	1	0	1	0	2	2	1	17
No. with "alkaline" water	15	5	0	2	3	4	1	9	16	55
Depths of Wells										
No. from 0 to 50 feet deep	6	7	9	6	9	13	7	37	15	109
No. from 51 to 100 feet deep	26	16	7	6	9	26	6	30	10	136
No. from 101 to 150 feet deep	24	6	0	10	6	5	4	9	8	72
No. from 151 to 200 feet deep	12	3	1	5	6	4	5	11	18	65
No. from 201 to 500 feet deep	11	4	4	7	9	7	9	10	10	71
No. from 501 to 1,000 feet deep	1	0	0	2	2	1	0	1	0	7
No. over 1,000 feet deep	0	1	0	0	0	0	2	0	0	3
How the Water is Used										
No. usable for domestic purposes	22	7	0	4	8	9	4	16	40	110
No. not usable for domestic purposes	11	7	1	0	3	5	3	7	2	39
No. usable for stock	28	9	0	4	9	9	4	16	41	120
No. not usable for stock	5	5	1	0	2	5	3	7	1	29
Sufficiency of Water Supply										
No. sufficient for domestic needs	27	13	1	3	8	8	4	23	37	124
No. insufficient for domestic needs	6	1	0	1	3	6	3	0	5	25
No. sufficient for stock needs	23	9	0	2	7	8	4	22	32	107
No. insufficient for stock needs	10	5	1	2	4	6	3	1	10	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 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 differance between the total hardness and the permanent hardness and represents the amount of mineral salts that ban 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 excesss 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 Bratt's Lake, No.129, 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	$CaCl_2$	
1	SW.	14	13	19	2nd	225	3,020	1,250	1,050	200	482	535	280	202	1,050	810	2,776	501		29			891	795		ж1
2	SE.	16	13	19	2nd	148	3,020	750	450	300	414	635	50	112	1,271	1,347	3,171	90		234		283	1,881	683		ж1
3	SE.	12	14	20	2nd	297					356	633	115	41	608	904	2,124	205		86		345	900	588		ж1
4	NE.	31	14	21	2nd	256	1,970	440	300	140	107	500														ж1
5	NW.	7	15	21	2nd	200	3,920	1,900	1,800	100	25	580	230	328	2,295	1,103	3,850	412		142	775		2,480	41		ж1
6	SW.	9	15	21	2nd	96	3,040	1,300	1,050	250	36	730	360	274	1,374	547	2,676	645		71	716		1,185	59		ж1
7	SE.	25	15	21	2nd	170	1,730	320	250	70	112	580														ж1
8		27	15	21	2nd	40	2,250											(4)	(1)		(2)		(3)		(5)	ж1
9	SE.	32	15	21	2nd	154					113	850	216	166	857	672	2,238	385		347		52	1,268	186		ж1

Water samples indicated thus, ж1, 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 ($CaCO_3$).
Analysis No. 8 by Provincial Analyst, Regina.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

The glacial lake clay that covers the area is fairly uniform in composition. The underlying boulder clay, however, shows the variations common to glacial deposits, and the water derived from it shows corresponding variations in quality. The boulder clay comprising the greater part of the drift is the main source of the objectionable mineral salts in the water. Any water percolating down from the surface dissolves quantities of mineral salts from the boulder clay in amounts depending on the depth of percolation, and the porosity of the boulder clay. The less porous the clay, the longer the waters are in contact with it, and correspondingly, the greater the amount of mineral salts likely to be taken into solution. It is to be noted, however, that water derived from the deep wells tapping the sand beds lying along the bottom of the buried channel may be less highly mineralized than that from wells tapping isolated pockets in the boulder clay.

None of the analyses made of waters from this municipality shows a total dissolved solid content less than 1,700 parts per million. Water from some of the deeper wells may have a total hardness not exceeding 500 parts per million, but most water from the drift is excessively hard, the hardness exceeding 1,000 parts per million, and may reach 2,000 parts. Much of this hardness is permanent and is not removable by boiling the water.

Nearly all waters from the glacial drift contain large amounts of sodium sulphate (Na_2SO_4) Glauber's salt, in solution. Magnesium sulphate ($MgSO_4$) Epsom salts, is also a common characteristic of waters from the upper part of the drift, but in waters from the buried stream channels it is notably absent.

Sodium sulphate and magnesium sulphate, and particularly the latter, have decided laxative effects on humans and stock if present in large concentrations. Persons unaccustomed to highly "alkaline" waters would find waters with 1,500 parts per million of these salts very objectionable, but in many places in this area water with a total dissolved solid content of 2,000 parts per million is being used with no apparent ill effects. Waters having appreciably greater contents of these sulphate salts would be undrinkable, and would tend to create scour in stock.

Such a water as is indicated by analysis No. 5 on the accompanying table, containing 3,920 parts per million of dissolved solids of which over 3,000 parts per million are sulphate salts, is unfit for any farm use.

Water derived from dugouts or from wells penetrating sand and gravel beds at shallow depths will be hard but drinkable. At greater depths in all parts of this municipality highly mineralized waters are to be expected. All of the analyses on the accompanying table have a general similarity, not only in the type of salt present in solution, but in their relative proportions. The sodium chloride ($NaCl$), common salt, content appears to increase with depth, and water such as that represented by analyses Nos. 2 and 3 would have a distinctly salty taste.

Water from the Bedrock

As water has been found in the Marine Shale series in only very few wells, and as this water is not usable, no samples of the water were obtained for analyses. Glauber's salt and common salt are present in large amounts in water from the shale, giving them a very salty taste, and rendering them unfit even for stock use. Drinkable water is not to be expected in the bedrock anywhere in this municipality.

WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, 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	13	19	2	Bored	155	1,895	- 60	1,835	155	1,740	Marine shales	Hard, clear, "alkaline", salty		S	Plenty of water; 5 dry holes 160 feet deep.
2	NW.	3	"	"	"	Drilled	140	1,900	- 50	1,850	140	1,760	Glacial sand	Hard, clear, iron		D, S	Sufficient for local needs.
3	SE.	4	"	"	"	Bored	150	1,900									Dry hole in Marine Shale. A 230-foot dry hole in soapstone.
4	SE.	4	"	"	"	Bored	94	1,900									Dry hole in glacial drift; another 68-foot dry hole.
5	NE.	4	"	"	"		137	1,900			137	1,763	Glacial drift	Hard, clear, "alkaline"		N	Good supply until filled with sand.
6	SE.	6	"	"	"		165	1,900									Dry hole; may have penetrated the bedrock.
7	SE.	6	"	"	"		70	1,900									Dry hole; 3 dry holes 70 feet, 54 feet and 50 feet.
8	SW.	6	"	"	"		225	1,900									Dry hole in Marine Shale series.
9	SE.	8	"	"	"	Drilled	115	1,910			115	1,795	Glacial coarse gravel	Hard, iron, "alkaline"		N	Unfit for use; plenty of water.
10	SW.	10	"	"	"	Bored	100	1,900			100	1,800	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
11	NW.	10	"	"	"	Bored	132	1,900	- 90	1,810	132	1,768	Glacial sand	Hard, clear, "alkaline"		D, S	Capacity 30 barrels a day; not used now.
12	NW.	10	"	"	"		150	1,900			150	1,750	Glacial drift	Hard			
13	SW.	12	"	"	"		132	1,890									Dry hole in glacial drift.
14	SW.	12	"	"	"		98	1,890									Dry hole in glacial drift; another dry hole 56 feet deep.
15	SW.	12	"	"	"		98	1,890									Dry hole in glacial drift.
16	SW.	12	"	"	"		102	1,890									Dry hole in glacial drift.
17	SW.	12	"	"	"	Drilled	250	1,890			250	1,640	Marine Shales	Soft, clear, "alkaline"		S	Very little water; filled in.
18	NW.	12	"	"	"	Bored	70	1,890					Glacial drift	Hard, "alkaline"		N	Very small yield; now filled in.
19	NE.	12	"	"	"	Bored	90	1,890			90	1,800	Glacial drift	Hard, black		N	Small yield; not used.
20	SW.	14	"	"	"	Bored	225	1,910	- 75	1,835	82	1,828	Glacial sand and silt	Hard, iron, clear		D, S	Plenty of water; #.
21	SW.	15	"	"	"	Bored	127	1,900	- 60	1,840	127	1,773	Glacial silt	Hard, clear, "alkaline"		D, S	Sufficient for local needs; cannot pump dry.
22	SE.	16	"	"	"	Bored	148	1,910	- 73	1,837	148	1,762	Glacial silt	Hard, clear, salty		D, S	Now drilled to 148 feet; #. This well filled in. New well 146 feet deep; same log.
23	SE.	16	"	"	"	Drilled	70	1,910									Dry hole in glacial drift; 3 dry holes 56 feet 60 feet and 70 feet.
24	SE.	16	"	"	"	Drilled	265	1,910									Dry hole in Marine shale; 5 other dry holes.
25	SW.	16	"	"	"	Drilled	232	1,900	- 20	1,680	232	1,668	Bedrock, gravel	Soft, clear		D, S, I	Plenty of water; 2 holes 115 and 85 feet deep filled in.
26	NE.	18	"	"	"	Bored	100	1,910			100	1,810	Glacial drift	Hard, clear, "alkaline"		S	Sufficient; too "alkaline" for drinking.
27	NE.	18	"	"	"	Bored	120	1,915	- 96	1,819	100	1,815	Glacial sand	Hard, clear, "alkaline"		D, S	Hardly enough 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 BRATT'S LAKE, NO. 129, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
28	SW.	19	13	19	2	Bored	60	1,910	− 50	1,860	60	1,850	Glacial drift	Hard, clear, "alkaline"		S	Sufficient but used for stock only; use dug-out for domestic use.
29	NW.	20	"	"	"	Dug & Drilled	280	1,920	− 65	1,855	280	1,640	Bedrock	Soft, clear, "alkaline", iron, salty	44	D, S	Sufficient for local needs; cannot pump dry.
30	NE.	22	"	"	"	Bored	130	1,900	−100	1,800	130	1,770	Glacial sand	Hard, clear, "alkaline", iron		D, S	Plenty of water; laxative.
31	SE.	23	"	"	"	Bored	130	1,900	−100	1,800	130	1,770	Glacial sand	Hard, clear, "alkaline", iron		D, S	Constant yield.
32	SW.	23	"	"	"	Bored	125	1,900	− 60	1,840	125	1,775	Glacial drift	Hard, clear, iron		D, S	Strong supply.
33	NE.	23	"	"	"	Bored	125	1,900			125	1,775	Glacial seamud	Hard, clear, iron		N	Sufficient; not used since 1917; also 3 dry holes, two 300 feet and 200 feet.
34	NE.	24	"	"	"		90	1,905			90	1,815	Glacial drift	Hard, clear, "alkaline"		S	Good supply.
35	SW.	25	"	"	"	Bored	106	1,906	− 60	1,846	106	1,800	Glacial sand	Hard, clear, iron		D, S	Strong supply.
36	SE.	26	"	"	"	Bored	115	1,900			115	1,785	Glacial drift	Hard, "alkaline"			Sufficient for local needs.
37	SE.	26	"	"	"		165	1,900									Dry hole in Marine Shales; 3 dry holes 70 feet, 146 feet and 165 feet.
38	SW.	26	"	"	"	Dug	25	1,900	− 23	1,877	25	1,875	Glacial drift	Hard, clear, sweet		D	Another well 85 feet deep used for stock; hard, "alkaline", water.
39	NE.	27	"	"	"	Bored	146	1,890	− 75	1,815	146	1,744	Glacial drift	Hard, clear, "alkaline", iron, salty		S	Sufficient for stock; a dry hole 175 feet in Marine Shales.
40	SW.	28	"	"	"	Bored	148	1,920					Bedrock				Very small yield; filled in in 1905; also a dry hole on Section 28, in glacial drift.
41	SW.	28	"	"	"	Bored	125	1,920									Dry hole in glacial drift.
42	SE.	28	"	"	"	Bored	90	1,890									Dry hole in glacial drift.
43	SE.	30	"	"	"	Bored	130	1,925									Dry hole in glacial drift.
44	SW.	30	"	"	"	Dug	30	1,925									Dry hole in glacial drift.
45	SW.	30	"	"	"	Bored	100	1,925									Dry hole in glacial drift.
46	NE.	33	"	"	"	Drilled	580	1,900									Dry hole in Marine Shales.
47	NE.	34	"	"	"		105	1,920					Glacial drift	Hard, salty		S	Very strong supply.
48	SW.	34	"	"	"		100	1,920					Glacial drift	Hard, "alkaline"		D, S	Small yield; two other wells 25 and 20 feet deep.
49	SW.	35	"	"	"	Drilled	500	1,920									Dry hole in Bedrock.
50	NE.	36	"	"	"	Bored	100	1,895									Dry hole in glacial drift; also an 80-foot dry hole in glacial drift.
1	SW.	1	13	20	2	Bored	85	1,905	− 78	1,827	85	1,820	Glacial sand	Hard, "alkaline"		N	Unfit for use; cannot pump dry.
2	SW.	2	"	"	"	Dug	80	1,900	− 76	1,824	80	1,820	Glacial sand	Hard, clear, "alkaline"		S	Just sufficient; laxative.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, 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	HEIGHT TO WHICH WATER WILL RISE Elev.	PRINCIPAL WATER-BEARING BED Depth	PRINCIPAL WATER-BEARING BED Elev.	PRINCIPAL WATER-BEARING BED Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
3	NE.	2	13	20	2	Bored	155	1,905									Dry hole in Marine Shales; a 31-foot well; 5 feet of water in glacial gravel.
4	SW.	3	"	"	"	Bored	80	1,900	- 74	1,826	80	1,820	Glacial gravel	Hard, clear, "alkaline"		N	Too "alkaline" for use; poor supply.
5	SE.	6	"	"	"	Bored	75	1,900									Two dry holes in glacial drift.
6	NE.	6	"	"	"	Dug	50	1,900									Two dry holes in glacial drift.
7	SW.	10	"	"	"	Bored	60	1,900	- 70	1,830	50	1,850	Glacial sand	Hard, clear, iron		S	Not enough water, so filled in.
8	NE.	10	"	"	"	Dug	30	1,900			24	1,876	Glacial sand and gravel	Hard, iron, "alkaline", salty		S	Sufficient for 15 to 20 head stock.
9	SW.	12	"	"	"		138	1,900									Ten dry holes from 67 to 138 feet deep in glacial drift.
10	SE.	14	"	"	"	Dug	80	1,910	- 65	1,845	80	1,830	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for local needs; filled in now.
11	SE.	19	"	"	"	Drilled	400	1,896	- 50	1,846	236	1,660	Bedrock	Salty			Plentiful supply; several dry holes 70, 90 and 172 feet deep. Another shallow well.
12	NW.	19	"	"	"		60	1,900									Dry hole in glacial drift.
13	NW.	19	"	"	"		175	1,900									Dry hole in Bedrock.
14	NE.	24	"	"	"	Drilled	1650	1,896			60 774	1,836 1,122	Glacial Belly River	Good, Salty			Insufficient supply.
15	SW.	25	"	"	"	Bored	40	1,910			40	1,870	Glacial drift	Hard, clear		N	Gave little water; not used.
16	SW.	26	"	"	"	Drilled	100	1,900									Dry hole in glacial drift.
17	NW?	28	"	"	"	Drilled	414	1,900	-150	1,750	240	1,660	Bedrock, black seamud	Hard, salty		N	Plenty of water; too salty for use.
18	NW.	28	"	"	"	Drilled	280	1,910	-150	1,760	240	1,670	Bearpaw shale	Hard, salty, clear		N	Too salty for use.
19	NW.	35	"	"	"	Bored	128	1,900									Dry hole; another 80-foot dry hole; both in glacial drift.
20	NE.	36	"	"	"	Drilled	212	1,910	- 50	1,860	200	1,710	Glacial sand	Hard, clear, iron		D, S	Plenty of water; can pump steady for 24 hours.
1	SW.	6	13	21	2	Dug	16	1,860									Dry hole in glacial drift.
2	NE.	12	"	"	"		?	1,885									Dry hole; several dry holes in Bedrock.
3	SE.	12	"	"	"		37	1,870					Glacial drift	Hard, salty		N	Fair supply; not good for stock.
4	SE.	23	"	"	"	Drilled	60	1,885									Dry hole in glacial drift; 11 dry holes; depths 85 feet, 46 feet, 45 feet, 45 feet, and 55 feet in glacial drift.
5	SE.	23	"	"	"	Drilled	350	1,885									Dry hole; 2 other holes 300 feet and 370 feet deep in Marine Shales.
6	NE.	32	"	"	"	Drilled	180	1,890									Dry hole in Marine Shales.
7	NW.	34	"	"	"	Drilled	400	1,885									Dry hole in Bedrock; Marine Shales.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, 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	SE.	4	14	19	2	Bored	165	1,920									Dry hole in Marine Shales; several dry holes to 150 feet; a dry hole 520 feet in Marine shale.
2	NW.	6	"	"	"	Drilled	273	1,935			273	1,662	Glacial sand	Hard, clear, "alkaline"	42	D, S	Sufficient for local needs; now filled in with sand.
3		6	"	"	"	Drilled	370	1,910	−100	1,810	270	1,640	Bedrock sand	Hard			Sufficient supply.
4	NE.	9	"	"	"	Drilled	200	1,910									Dry hole in Marine Shales.
5	SW.	10	"	"	"		100	1,900									No information available; dry hole in glacial drift.
6	NW.	10	"	"	"	Drilled	350	1,920									Dry hole; other holes to depths of 300 feet.
7	NW.	10	"	"	"		70	1,920									Dry hole in glacial drift.
8	NW.	10	"	"	"	Bored	150	1,920									Dry hole in glacial drift.
9	SE.	10	"	"	"	Bored	180	1,900									Dry hole in Marine Shales.
10	SE.	10	"	"	"	Bored	200	1,928									Dry hole in Marine Shales.
11	NE.	12	"	"	"		740	1,900									Dry hole in Marine Shales.
12	SW.	15	"	"	"		140	1,900									Dry hole in glacial drift.
13	SW.	17	"	"	"		120	1,900									Dry hole in glacial drift.
14	SW.	17	"	"	"	Bored	500	1,926									Dry hole in Bedrock; also one 300 feet deep.
15	NE.	18	"	"	"		125	1,920									Dry hole in Marine Shales.
16	SE.	20	"	"	"	Bored	70	1,910									Dry hole in glacial drift.
17	NE.	21	"	"	"	Bored	118	1,910									Dry hole; several wells have been sunk, but no water found.
18	SE.	22	"	"	"		50	1,900									Dry hole in glacial drift.
19	SW.	23	"	"	"	Dug	35	1,900			35	1,865	Glacial drift				Supplies about 1 barrel a day; now caved in.
20	NW.	23	"	"	"	Dug	26	1,912			26	1,886	Glacial clay and sand	Hard, clear, "alkaline"			Insufficient; now filled in.
21	SW.	24	"	"	"	Bored											Dry hole in glacial drift.
22	NE.	29	"	"	"		160	1,910									Dry hole; another hole 150 feet deep in Marine Shale.
23	N.½	29	"	"	"		380	1,910									Several dry holes in Marine Shales.
24	NE.	33	"	"	"	Dug	80	1,922									Several dry holes in glacial drift.
1	SE.	4	"	"	"	Bored	40	1,910									Dry hole in glacial drift.
2	SE.	6	"	"	"		128	1,900									Dry hole; 2 other dry holes 121 feet and 125 feet in Bearpaw Shale.

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WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, 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	HEIGHT TO WHICH WATER WILL RISE Elev.	PRINCIPAL WATER-BEARING BED Depth	PRINCIPAL WATER-BEARING BED Elev.	PRINCIPAL WATER-BEARING BED Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
3	SE.	7	14	20	2		88	1,910									Dry hole in glacial drift; gas present.
4	NE.	8	"	"	"	Dug	52	1,910					Glacial drift	Hard, "alkaline"		N	Too "alkaline" for use; small supply; filled in.
5	NE.	8	"	"	"	Drilled	515	1,910									Dry hole; some water at 55 feet in Bedrock.
6	SE.	12	"	"	"	Drilled	297	1,910	- 80	1,830	297	1,613	Bedrock sand	Hard, clear		D, S	Sufficient for local needs; 2 dry holes 40 feet and 75 feet in glacial drift; #.
7	SW.	17	"	"	"	Drilled	190	1,910									Dry hole in Marine Shale.
8	SE.	18	"	"	"		50	1,910									Dry hole; 1 dry hole 200 feet deep in Bedrock.
9	SW.	19	"	"	"		200	1,900									Dry hole in Marine Shales.
10	SE.	22	"	"	"	Dug	20	1,910	- 10	1,900	20	1,890	Glacial sand and gravel	Hard, clear	42	D, S	Sufficient for 6 to 7 head stock.
11	NE.	22	"	"	"	Bored	130	1,910	- 60	1,850	130	1,780	Glacial sand	Hard, "alkaline"		S	Sufficient for local needs; a 14-foot well good supply; several other wells.
12	NE.	25	"	"	"		210	1,910									Dry hole in Marine Shale.
13	NW.	25	"	"	"		90	1,910									Dry hole; another 80-foot dry hole; both in glacial drift.
14	SE.	27	"	"	"	Drilled	180	1,925	-100	1,825	180	1,745	Glacial fine sand	Hard, clear, "alkaline", iron	42	D, S	Cloudy on standing.
15	SW.	29	"	"	"	Drilled	495	1,920									Dry hole; another dry hole 250 feet deep; both in Bedrock.
16	NW.	29	"	"	"	Drilled	500	1,920									Dry hole; another dry hole 200 feet deep, and one 300 feet in Bedrock.
17	NE.	30	"	"	"		52	1,925									Dry hole in glacial drift.
18	SE.	30	"	"	"		30	1,920									Dry hole in glacial drift.
19		32	"	"	"		325						Bedrock	Hard		N	Well clogged.
20	NW.	34	"	"	"	Drilled	235	1,925	- 72	1,853	185	1,740	Bedrock	Hard, clear, "alkaline", iron	41	D, S	Sufficient for local needs.
21	NW.	36	"	"	"		190	1,925									Dry hole; another 150-foot dry hole; probably in Bedrock.
22	NE.	36	"	"	"		200	1,925									Dry hole; other dry holes at 75 feet, 100 feet, and 110 feet; probably in Marine Shales.
23	NE.	36	"	"	"		875	1,925					Bedrock Shale	Hard, salty		N	Supply useless; several dry holes.
1	SE.	1	14	21	2		150	1,895									Dry hole in Marine Shales; 3 other dry holes.
2	SW.	2	"	"	"		125	1,898									Dry hole; several dry holes from 60 to 100 feet.
3	SE.	3	"	"	"		100	1,895									5 dry holes from 80 to 100 feet deep in Bearpaw.
4	SW.	3	"	"	"	Bored	50	1,895									Dry holes in glacial drift.
5	NW.	3	"	"	"	Bored	50	1,895									Dry hole in glacial drift.

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WELL RECORDS—Rural Municipality of BRATT's LAKE, NO. 129, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	NE.	6	14	21	2	Drilled	500	1,865									Dry hole in Marine Shales.
7	SE.	13	"	"	"	Drilled	600	1,905									Dry hole in Marine Shales.
8	NW.	14	"	"	"		80	1,910									Two dry holes in glacial drift, one 60 feet.
9	SE.	15	"	"	"	Drilled	100	1,905									Six dry holes from 45 to 100 feet in Bearpaw shale and glacial drift.
10	NE.	16	"	"	"	Auger	80	1,905									Dry hole in glacial drift.
11	SW.	18	"	"	"	Bored	75	1,895	- 65	1,830	65	1,830	Glacial sand	Hard		N	Good supply; not used in last 13 years.
12	NW.	19	"	"	"	Drilled	211	1,895	- 72	1,823	211	1,684	Bedrock? fine grey sand	Hard, clear		D, S	Sufficient; 9 tanks a day.
13	SE.	20	"	"	"		105	1,905	- 50	1,855			Glacial drift	Hard, "alkaline"		N	Well has not been used for a number of years.
14	NW.	20	"	"	"	Bored	140	1,910									Dry hole in Bedrock; a 300-foot dry hole also in Bedrock.
15	SE.	21	"	"	"	Dug	37	1,905	- 29	1,876	37	1,868	Glacial clay and sand	Hard, clear	43	D, S	Insufficient; enough for 15 head stock.
16	NE.	21	"	"	"		100	1,910									Dry hole in glacial drift; signs of water at 60 feet.
17	NW.	22	"	"	"	Bored	50	1,910					Glacial gravel	Hard, "alkaline"		N	Not used for 8 years.
18	NW.	22	"	"	"	Bored	200	1,910									Dry hole in Marine Shales; also a dry hole 175 feet deep in Marine Shales.
19	NW.	22	"	"	"		230	1,910									Dry hole in Marine Shales.
20	NW.	22	"	"	"		486	1,910									Dry hole in Marine Shales.
21	NW.	23	"	"	"		65	1,910									Dry hole in Marine Shales.
22	SE.	24	"	"	"		70	1,900									Dry hole in glacial drift.
23	NW.	25	"	"	"		80	1,900					Glacial drift	Hard, "alkaline"			No information.
24	SW.	27	"	"	"	Bored	42	1,910	- 41	1,869	41	1,869	Glacial gravel	Hard, clear		N	Never used because supply too small.
25	SW.	27	"	"	"	Bored	66	1,910									Dry hole; 2 other dry holes 60 feet deep.
26	SE.	29	"	"	"		45	1,900									Dry hole in glacial drift.
27	SW.	29	"	"	"	Bored	60	1,905			60	1,845	Glacial sand and gravel	Hard, "alkaline"		S	Sufficient for 20 head stock; another 167-foot well; small supply.
28		30	"	"	"		105	1,900					Glacial gravel			D	Insufficient for house use.
29	SW.	31	"	"	"	Bored	42	1,900	- 30	1,870	30	1,870	Glacial gravel	Hard, clear	41	D, S	One tank a day; a 160-foot dry hole.
30	NE.	31	"	"	"	Drilled	256	1,940	- 90	1,850	90	1,850	Glacial drift	Hard, clear		D, S	Sufficient for at least 50 head stock; #.
31	NW.	32	"	"	"	Drilled	260	1,910									Dry hole in Marine Shales.
32	NW.	34	"	"	"	Bored	40	1,905	- 20	1,885	26	1,879	Glacial sand	Hard, clear	43	D, S	Plenty of water.

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WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
33	NW.	34	14	21	2	Dug	30	1,905	- 25	1,880	26	1,879	Glacial sand	Hard, clear		N	Well not in use.
1	NW.	3	15	19	2		190	1,900									3 dry holes 168, 145, and 190 feet deep in bedrock.
2	NE.	4	"	"	"		168	1,900									Dry hole; other dry holes 86 feet, 130 feet, and 142 feet.
3	NE.	6	"	"	"		22	1,900			22	1,878	Glacial sand			N	Well not in use; 2 barrels a day; 1 dry hole 40 feet.
4	SE.	12	"	"	"		?										Dry hole in glacial drift.
5	SE.	13	"	"	"	Drilled	2,425	1,926	-236	1,690	1,023	903	Bedrock, sand-stone	Salty, hard			Salty water.
6	NW.	14	"	"	"		455	1,910									Dry hole; 2 other dry holes 72 feet and 112 feet. Filled in, in bedrock.
7	NW.	14	"	"	"		463	1,910									Dry hole in bedrock; filled in.
8	NW.	14	"	"	"		212	1,910									Dry hole in glacial drift.
9	NW.	14	"	"	"		75	1,910									Dry hole in glacial drift.
10	NW.	14	"	"	"		500	1,910									Dry hole in Marine Shale series.
11	NW.	14	"	"	"		300	1,910									Dry hole in Marine Shale series.
12	NW.	14	"	"	"	Bored	250	1,910									Dry hole in Marine Shale series.
13	SW.	15	"	"	"		90	1,900									Dry hole in glacial drift; another dry hole 50 feet deep.
14	NW.	15	"	"	"		1,030	1,900	-430	1,470	1,030	870	Marine Shales	Salty			Salt water.
15	NE.	23	"	"	"		500	1,895									Dry hole in Bedrock.
16	NW.	20	"	"	"		58	1,920									Dry hole; filled in now.
17	SE.	28	"	"	"			1,900	0	1,900			Glacial drift	Hard			Flowing well.
18	NE.	30	"	"	"		125	1,900			125	1,775	Glacial sand	Hard, iron			Filled in; another 140-foot well in glacial quicksand.
19	SE.	30	"	"	"		51	1,900			48	1,852	Glacial sand and gravel	Hard, "alk-aline"			Well filled in.
20	NW.	32	"	"	"	Drilled	305	1,900									Dry hole in Bedrock.
21	NE.	33	"	"	"		300	1,895									Dry hole in Bedrock shale.
22	SW.	34	"	"	"		190	1,890									Dry hole in glacial drift.
23	NW.	36	"	"	"		36	1,885									Dry hole in glacial drift.
1	NW.	1	15	20	2	Drilled	130	1,920	-100	1,820	100	1,820	Glacial drift	Hard, clear	42	D, S	Sufficient for local needs.
2	SE.	2	"	"	"	Drilled	200	1,928					Glacial drift	Hard, clear		D, S	Sufficient supply; farm not occupied at presen
3	SW.	2	"	"	"		232	1,930	- 70	1,860	232	1,698	Glacial sand and gravel	Hard, iron, "alkaline"			Abundant supply.
4	SW.	3	"	"	"	Drilled	116	1,930	- 66	1,864	116	1,814	Glacial fine sand	Hard			Ample supply.

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

WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, 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
5	SW.	3	15	20	2		85	1,932	− 80	1,852	80	1,852	Glacial drift	Hard, iron, "alkaline"		N	Not used; fair supply.
6	SE.	4	"	"	"	Bored	135	1,932	− 70	1,862	135	1,797	Glacial fine sand	Hard, iron, "alkaline", cloudy	42	D, S	Sufficient; cannot be pumped dry.
7	NE.	4	"	"	"		110	1,932									Dry hole; several dry holes in Bedrock Shale.
8	SW.	5	"	"	"	Drilled	145	1,937	− 70	1,867	140	1,797	Glacial fine sand	Hard, clear		D, S	Sufficient; cannot be pumped dry.
9	SE.	6	"	"	"		177	1,937	− 90	1,847	177	1,700	Glacial drift	Hard, iron, "alkaline"		N	Very strong supply; not used now.
10	NW.	8	"	"	"		194	1,937	− 95	1,842	195	1,742	Glacial white sand	Hard, iron, "alkaline"		N	Not used now.
11	NE.	9	"	"	"	Drilled	400	1,930									Dry hole; 1 well 60 feet deep; plenty of water but not good for drinking; several dry holes.
12	NE.	11	"	"	"	Bored	85	1,910	− 63	1,847	85	1,825	Glacial sand	Hard, clear	40	D, S	Sufficient; 16 to 18 tanks a day.
13	NE.	12	"	"	"	Bored	75	1,912	− 60	1,852	75	1,837	Glacial sand	Hard	41	D, S	Sufficient for local needs.
14	SE.	13	"	"	"	Bored	93	1,915	− 89	1,826	93	1,822	Glacial gravel	Hard, "alkaline"		S	Very abundant supply; filled in now.
15	SE.	14	"	"	"	Bored	75	1,927			75	1,852	Glacial drift	Hard, "alkaline", Salty		N	Not used now.
16	SW.	15	"	"	"	Drilled	?	1,930									Not good for house use.
17	SW.	17	"	"	"	Drilled	240	1,930	− 90	1,840	240	1,690	Glacial sand and gravel	Hard, iron			Strong supply; 2 dry holes 200 feet deep.
18	SE.	18	"	"	"		70	1,920			70	1,850	Glacial sand			N	Not in use; plugged.
19	SW.	19	"	"	"	Bored	225	1,900			225	1,675	Bedrock	Hard, clear		S	Sufficient for local needs.
20	SE.	20	"	"	"	Bored	85	1,915									Dry hole in glacial drift.
21	SE.	20	"	"	"	Bored	46	1,915									Dry hole in glacial drift.
22	NE.	20	"	"	"	Drilled	192	1,910									Dry hole; 7 other dry holes from 60 to 80 feet in glacial drift.
23	NE.	21	"	"	"	Bored	85	1,920									Dry hole in glacial drift; also a 50-foot dry hole similar.
24	NE.	21	"	"	"	Drilled	225	1,930									Dry hole; 2 dry wells in Marine Shales; 225 deep and 2 dry wells, 200 feet deep.
25	NE.	22	"	"	"		197	1,910									Dry hole in glacial drift.
26	SW.	23	"	"	"		98	1,910									Dry hole; 7 dry holes of depths 67, 46, 36, 98, 32, 57, and 37 feet.
27	SE.	24	"	"	"	Drilled	570	1,894									1 dry hole in bedrock; 9 dry holes from 28 to 78 feet deep in glacial drift.
28	SE.	26	"	"	"		402	1,905									Dry hole in Bedrock.
29	SE.	29	"	"	"	Drilled	165	1,930	− 60	1,870	165	1,765	Glacial gravel	Hard, clear, iron		N	Sufficient supply; not used now, filled with sand.
30	NE.	30	"	"	"	Drilled	128	1,904	− 88	1,816	128	1,776	Glacial sand	Hard, clear, "alkaline" iron	42	D, S	Can be pumped dry; 3 or 4 barrels a day.

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

WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, 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
31	NE.	31	15	20	2	Drilled	218	1,910			158	1,752	Glacial sand	Salty		N	Unfit for use.
32	NE.	34	"	"	"	Drilled	350	1,885									Dry hole; 29 holes sunk on this section, all dry, all in glacial drift.
33	NW.	35	"	"	"	Drilled	09	1,880			69	1,811	Glacial gravel	Hard, clear, "alkaline"		D, S, I	Sufficient for local needs.
34	NW.	35	"	"	"	Bored	75	1,880			70	1,810	Glacial gravel	Hard, clear		D, S	Cannot be pumped dry; laxative.
35	NE.	36	"	"	"	Drilled	190	1,860									Dry hole in glacial drift.
1	SW.	1	15	21	2		500	1,910									Dry hole in glacial drift.
2	SE.	2	"	"	"	Dug	40	1,915	- 29	1,886	29	1,886	Glacial sand and gravel	Hard, clear, "alkaline", iron	42	D, S	Sufficient for 16 head of horses; 1 dry hole 100 feet deep.
3	SE.	4	"	"	"	Bored	110	1,925			110	1,815	Glacial sand	Hard, clear	42	D, S	Sufficient for 30 head stock.
4	SW.	4	"	"	"	Drilled	170	1,920	- 90	1,830	120	1,800	Glacial sand	Hard, iron, cloudy		N	Not used; insufficient; 5 to 6 dry holes up to 200 feet deep.
5	SW.	5	"	"	"	Drilled	227	1,920	- 80	1,840	210	1,710	Glacial sand	Hard, clear, iron		D, S	Sufficient for local needs.
6	NW.	6	"	"	"		60	1,950					Glacial drift	Hard, "alkaline"		S	Good supply.
7	NW.	6	"	"	"	Bored	30	1,900					Glacial drift	Hard, "alkaline"			Also 100-feet dry hole.
8	NW.	7	"	"	"	Drilled	200	1,925	- 50	1,875	200	1,725	Glacial drift	Hard, iron, cloudy		D, S	Sufficient for local needs; #.
9	NE.	8	"	"	"	Bored	125	1,925	- 60	1,865	00	1,865	Glacial drift	Hard, clear		D, S	Sufficient for local needs; also 2 dry holes.
10	SW.	9	"	"	"	Bored	95	1,920	- 25	1,895	25	1,895	Glacial gravel	Hard, clear, "alkaline", iron	42	D, S	#
11	NE.	10	"	"	"	Drilled	234	1,900	-110	1,790	226	1,674	Glacial sand and gravel	Hard, iron, cloudy		D, S, I	Sufficient for local needs.
12	NE.	11	"	"	"	Drilled	220	1,910			220	1,790	Glacial drift	Hard, clear			Sufficient for local needs; will be pumped all day.
13	SW.	12	"	"	"	Dug	40	1,905	- 6	1,899	40	1,865	Glacial gravel	Hard, clear, "alkaline", iron		D, S, I	Insufficient for local needs.
14	SW.	12	"	"	"	Drilled	1oo	1,905					Glacial gravel	Hard, cloudy, red sediment, "alkaline"		S	Sufficient for local needs.
15	NW.	12	"	"	"		90	1,905	- 70	1,835	90	1,815	Glacial gravel	Hard		D, S	Sufficient for local needs; also a dry hole 200 feet deep in Bedrock.
16	NW.	13	"	"	"	Drilled		1,920					Glacial drift	Hard, clear, "alkaline"	38	S	Sufficient for local needs.
17	SW.	14	"	"	"	Bored	25	1,910	- 24	2,886	25	1,885	Glacial drift	Hard, clear	43	D	Insufficient for local needs.
18	NW.	15	"	"	"	Drilled	175	1,925	- 95	1,830	175	1,750	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
19	SW.	15	"	"	"	Drilled	211	1,915	- 70	1,845			Bedrock, shale				
80	SW.	15	"	"	"		380	1,915									Dry hole in Marine Shale.
21	SE.	18	"	"	"	Bored	112	1,910	- 50	1,860	112	1,798	Glacial drift	Hard, clear	44	D, S	Sufficient for 100 head stock.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BRATT'S LAKE, NO. 129, 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
22	NW.	18	15	21	2		83	1,925					Glacial fine sand	Hard, "alkaline"		S	
23	NW.	18	"	"	"		200	1,940					Glacial sand	Hard, "alkaline"		S	Abundant supply; 2 dry holes in sand.
24	NE.	20	"	"	"	Bored	140	1,900	-100	1,800	140	1,760	Glacial drift	Hard, clear		S	Probably sufficient; a 35-foot well also.
25	NE.	23	"	"	"	Drilled	215	1,935	- 90	1,845	215	1,725	Glacial drift	Hard, clear, "alkaline", iron	42	D, S	Sufficient for local needs.
26	NE.	23	"	"	"	Bored	100	1,930									Dry hole; also 50-foot dry hole; both in glacial drift.
27	NW.	24	"	"	"	Bored	100	1,920	- 94	1,826	100	1,820	Glacial gravel	Hard, clear, "alkaline", iron	43	D, S, I	Sufficient for local needs; 2 dry holes 25 feet deep.
28	SW.	25	"	"	"	Drilled	185	1,925	- 95	1,830	185	1,740	Glacial sand	Hard, clear, "alkaline", iron	40	D, S, I	Sufficient for local needs.
29	SE.	25	"	"	"		170	1,925	- 90	1,835	150	1,775	Glacial gravel and sand				#
30	NE.	26	"	"	"	Drilled	160	1,920	- 80	1,840	160	1,760	Glacial sand and gravel	Hard, iron		D, S	Sufficient for local needs; also an intermittent well.
31		27	"	"	"	Bored	40	1,930	- 36	1,894	40	1,890	Glacial drift	Hard, clear		D, S	Sufficient for local needs; #.
32	SW.	28	"	"	"	Bored		1,910					Glacial drift	Hard, clear			Shallow seepage well.
33	NE.	28	"	"	"	Drilled	125	1,925	-104	1,821	125	1,800	Glacial sand	Hard, iron, "alkaline", clear	42	D, S	Insufficient for local needs.
34	NE.	29	"	"	"	Drilled	178	1,925	-135	1,790	178	1,747	Glacial sandy clay	Hard, iron, "alkaline", cloudy	42	D, S	Sufficient for local needs.
35	NE.	29	"	"	"	Drilled	135	1,925	-108	1,817	135	1,790	Glacial sand	Hard, iron, "alkaline"			
36	SE.	30	"	"	"	Drilled	198	1,945	-160	1,785	198	1,747	Glacial sand and silt	Soft, clear, iron, salt	43	D, S	Sufficient for local needs.
37	SE.	30	"	"	"		211	1,945	-131	1,814	211	1,734	Glacial drift	Hard, iron		N	Sufficient for 30 head stock and 200 head sheep.
38	SW.	30	"	"	"		180	1,936									Dry hole in glacial drift.
39	SE.	32	"	"	"		154	1,905	- 73	1,832	136	1,709	Glacial drift	Hard, iron			Very strong supply; #.
40	SE.	32	"	"	"	Bored	65	1,905					Glacial drift				Small amount of water.
41	SE.	33	"	"	"	Drilled	205	1,900	- 85	1,815	150	1,750	Glacial coarse gravel	Hard, clear	44	D, S, I	
42	SE.	34	"	"	"	Drilled	156	1,930					Glacial gravel	Hard, clear, "alkaline", iron	42	D, S	Sufficient for local needs.
43	NE.	35	"	"	"	Drilled	150	1,930	-120	1,810	150	1,780	Glacial drift	Hard, clear, iron, red sediment	40	D, S	Strong supply.
44	NE.	36	"	"	"		75	1,905	- 72	1,833	75	1,830	Glacial sand	Hard, clear, "alkaline", iron		D, S	Just about sufficient.

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(#) Sample taken for analysis.