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## PRELIMINARY REPORT GROUND－WATER RESOURCES <br> OF THE <br> RURAL MUNICIPALITY OF ROSEDALE <br> NO． 283 <br> SASKATCHEWAN

By
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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY
OF ROSEDALE
NO. 283
SASISATCHENAN
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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF ROSEDALE NO: 283, SASIEATCHEWAN

## 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 severgl hundred well records. The base maps used were supplied by the Topographical Surveys Branch of the Department of the Interior.

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## 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 furthor 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 looality 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 shnuld 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 "oontours". The elevation abeve seamievel.
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 watermbearing 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 pesition 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 osn-be used. The approximate elevation of the water-bearing horizon at the wellm site can ko obtained from the Table of Well Records by noting the elevation of the watermbearing horizon in surrounding wells and by estimating from these known elevations its elevation at the well-site. ${ }^{\frac{1}{2}}$ If the watermbearing horizon is in bedrock the depth to water can be estimated fairly acsurately in this way. If the watermbearing 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 Wiich may lie at variaus 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. Frem the data in the Table

[^0]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 groundwaters. In the Prairie

Provinces, a water is usually desoribed 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 Watermbearing Horizon. A water-bearing
bed, lens, or pocket in unconsolidated deposits or in bedrook.
Buried premalacial Stream Channels, A channel
carved into the bedrock by a stream before the advance of the continental ice-sheet, and subsequently either partly os wholly filled in by sands, gravels, and boulder clay deposited by the ice-sheet or later agencies.

Bedreck. Bedrook, 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 foining paints that have the same elevation above seamerel.

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

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

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

Glacial Drift. The loose, unconsolidated surface deposits of sand, gravel, and clay, or a mixture of these, that were deposited by the continental icemsheet. 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 er 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 besins.
(3) Glacial Outwash. Sand and gravol plains or deltas formed by streams that issued from the ountinental ioe-sheet.
(4) Glacial Lake Deposits. Sand and clay plains formed in glacial lekes during the retreat of the icesheet. 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 wes covered by the continental icemsheet.

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

Unconsolidated Deposits. The mantle or cevering 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 surfece of the ground. These are called Flowing Artesian Wells.
(2) Wells in which the water is under pressure but does nct rise to the surface. These wells are colled NenFlowing Artesian Wells.
(3) Wells in which the water does not rise above
the water table. These wells are alled Non-Artesian Wells.

# - 8 - <br> 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 patohes on the higher parts of Wood Mountain. This is the youngest bedrock formation and, where present, overlies the Ravenscrag formation.

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

Ravenscrag Formation. The name given to a thick series of light-coloured sandstones and shales containing ene or more thick lignite coal seams. This formation is 500 t. 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 neme given to a series of finemgrained 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


#### Abstract

-9- is present, buff. Beds of sand eocur in places in the lower part of the formation. It forms the uppermost bedrook 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 comer 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.


The rural municipality of Rosedale, No. 283, occupies 360 square miles in south-central Saskatchewan, and includes township 28, range 3, and townships 29, 30 , and 31 , ranges 3 , 4, and 5; a.ll west of the Third meridian. The Saskatoon and Duck Lake branch of the Canadian National Railways passes in a northwesterly direction through the municipality. The town of Hanley, which is located on this line, is about 36 miles south and 10 miles east of Saskatoon. The population of the municipality in 1931 was 1,683, of which 362 were resident in Hanley. Brightwater creek, a permanent stroem, occupies a wide, shallow valley that passes in a direction a little north of west through the municipality. The gradient of the creek valley declines from about 1,900 feet above seamlevel noar the southern boundary of the municipality to about 1,710 feet, above sea-level at the northern boundary. In dry seasons the flow of the creek is very small, but there are pools and deep stretches in the creek valley that usually contain enough water for stock requirements. Salt lake is a small lake that covers about 200 acres in the northern half of sec. 35 , tp. 30 , range 3 , and the southern half of sec. 2, tp. 31, range 3. Water-level in this lake, which in places is 12 feet deep, is about 2,004 faet above sea-level. The southern part of Indi lake, waterlevel of which is about 1,727 feet above sea-level, extends for about 2 miles into the northwest quarter of township 31, range 4. There is a small lake in sec. 35, tp. 31, range 5, and the southern part of a shallow lake occupies about $\frac{1}{2}$ squaro mile in secs. 32,33 , and 34 , tp. 31, range 5. The northern part of the valley of Brightwater creek, and an area of about 3 square miles in the northwest part of the municipality, are wooded. East of Brightwater creek the land surface rises towards Allan hills to
nearly 2,200 feet above sea-level in the northeast corner of the municipality. West of Brightwater creck the land surface rises very gradually towards the southwest corner of the municipality, where a small hill rises to over 2,100 feet above sea-level.

The unconsolidated deposits that cover this municipality owe their origin to the continental ice-sheet that many thousands of years ago moved across the province of Saskatchewan, to the water derived from the melting ice, and to the further roworking of these deposits by water and wind. As the ice-sheet advanced and retreated it deposited over the municipality a layer of unstratified, stony clay, referred to as glacial till or boulder clay. Where the ice front paused for considerable periods of time during its retreat, a thicker acoumulation of boulder clay was deposited, along with pockets of sand and gravel partly sorted by the water issuing from the ice front. Such deposits are characterized by numerous hillocks and undrained depressions and are referred to as "moraine". In some places areas of gravels and sand were deposited and these are termed outwash deposits. Where the daming up of natural drainege channels by the ice occurred, the water resulting from the melting ice collected in these depressions and formed extensive lakes, which remained until drained by outlets uncovered by the disappearance of the ice. The extent of these lakes is indicated by deposits of lake clay and sand, the former representing fine material that was held in suspension in the water and settled in the deeper part of the lakes, and the sands, the coarser sediments deposited in the shallow parts of the lakes and around their margins. Wind action on these lake sands has, in places, rearranged them into the form of sand dunes, and streams have reworked the glacial lake deposits and glacial drift along their channels to form a thin veneer of stream alluvium.

The areas covered by these various deposits in the municipality are shown on Figure 2 of the accompanying map. Moraine covers a hillocky area of approximately 17 square miles in the eastern two-thirds of township 29, range 3, and the northeast corner of township 28, range 3; also an approximate area of 62 square miles in the northeastern part of the municipality, and an area of 20 square miles in township 29, range 5, at the southwestern corner of the municipality. A discontinuous bolt of boulder clay extends along the western border of the moraine, from the northern boundary of the municipality southeasterly to near Hanley, and thence to beyond its eastern boundary. It varies in width from half a mile at the northern boundary to practically nothing north of Hanley, from which place it again gradually increases to over 3 miles at the northern boundary of township 29, range 3. There it divides into two belts, an eastern belt $1 \frac{1}{2}$ miles wide, extending to beyond the eastern boundary of township 29, and a western, narrow belt terminating 3 miles south. Boulder clay also covers most of township 28, range 3; a large part of township 29, range 4; the northeastern part of township 29, range 5, and considerable of the southern parts of townships 30, ranges 4 and 5 .

Glacial outwash sands and gravels mantle an area of approximately $4 \frac{1}{2}$ square miles in the vicinity of Salt lake, and two small areas in secs. 1 and 2, tp. 28, range 3.

Glacial lake deposits underlie the wide valley of Brightwater creek and most of the northwestern part of the municipality. Glacial lake clays underlie the lowest part of this valley, bordering Brightwater creek and a branch depression in which lies Indi lake. Glacial lake sands underlie the rem maining lake area in the northwestern part of the municipality lying to the west of Brightwater creek and Indi lake. In the
northern third of township 31, range 5, the lake sands have been reworked by wind action into sand dunes.

Water-bearing Horizons in the Unconsolidated Deposits

Water of good quality is generally found in tho dune sands within 30 feet of the surface. That part of this municipality mantled with dune sands is thinly sottled, however, and the only record obtained was that of a well 13 feet deep, on sec. 32, tp. 31, range 5, which provided enough water for 25 head of stock. The glacial lake clay generally does not yield any water, but in this municipality several wells up to 30 feet deep obtain small supplies of ground water from sandy beds in the glacial lake clay; the deeper wells obtain water from sand and gravel aquifers in the underlying boulder clay. Also, in tho area mantled by glacial lake sands many wells up to 30 feet in depth obtain small supplies of water, whereas in the southern part of this area the wells are 40 to 93 feot deep, and obtain water from the underlying boulder clay. Water is found in tho glacial till and the moraine only in irregularly distributed pockets, lenses, or discontinuous beds of sand and gravel enclosed in the boulder clay that forms by far the greator part of those deposits. The aquifers in boulder clay and the moraine are small in extent and their locations are, therefore, difficult to predict. In the moraine-covered area in the northeastern part of the municipality the wells are from 23 to 315 feet deep, and no wells have reached the bedrock. At several farms the supply of water from the shallower wells is used for the house, and water for stock requirements is obtained from the deeper wells. The glacial drift in this area appears to be very thick, as many of the wells 100 to 315 feet deep obtained hard water. Elsewhere in the municipality the wells in the boulder clay and moraine are less than 100 feet deep, and most of them are less than 50 feet deep. The wells in
the area of glacial outwash sands and gravel that surrounds Salt lake are 84 to 143 feet deep, and have passed into the underlying boulder clay.

Water-bearing Horizons in the Bedrock

The Bearpaw formation is thought to underlie the glacial drift over the central and southern parts of this municipality. It consists principally of dark grey shale which was laid down in the Cretaceous sea in the form of mud and has since been consolidated. Most of the beds of shale contain very little water except near the surface where weathering has opened up fractures and cavities in which water may accumulate. Interbedded with the shale, however, there are some beds of sand that in most cases contain water that is soft or salty. The Belly River formation probably underlies the unconsolidated deposits in the northern part of this municipality, and underlies the Bearpaw formation where present in the central and southern parts of the municipality. There are no outcrops of bedrock in this municipality, and the position of the boundary between the two formations is not known. They and the underlying formation are, consequently grouped together on the map under the designation of Marine Shale series. The Belly River formation is thought to be about 200 feet thick in this municipality.

The Lea. Park formation that underlies the Belly River consists principally of grey shales that contain little or no ground water, but there are beds of sand in the shale that contain soft or salty water, and many wells in this municipality appear to obtain water from aquifers in the Lea Park formation, but the geological horizon of the bedrock aquifers in many wells is largely conjectural.

Wells have been put down to bedrock in all the townships of this municipality except township 30, range 3, and township 31, range 3, and in many townships the bedrock wells are the chief

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scurce of water. There arc two areas of flowing artesian wells in and near the valley of Brightwater creck, the approximate limits of which are show on the map that accompanies this report. The height to which the water rises in the wells varies widely; in the NE. $\frac{1}{4}$, sec. 10 , tp. 29 , range 3 , the water in the wells rises to a maximum of about 2,000 feet above sea-level, but from this point the water-level declines towards the south, west, and north. In many flowing artesian areas it has been found that the water-level in the wells declines rather rapidly unless the flowing wells, are closed in, and many wells that once flowed now have to be pumped. In some countries the flow of water from such wells is controlled by Government regulations, and instructions for the shuttingwin of flowing wells are provided. In this municipality one well at least flows at the rate of about 35 gallons a minute, or 50,400 gallons a day, and only a small proportion of this water is used. It is very unfortunate that such large supplies of water should not be usable for irrigation.

GROUND WATER CONDITIONS BY TOWNSHIPS

## Township 28, Range 3

Brightwater creek rises in the NE. $\frac{1}{4}$, section 17, and flows in a general direction a little west of north through the northwest quarter of the township. The valley of the creek in this township is very wide and shallow. The land surface rises gently from the creek valley to the eastern boundary of the township, where elevations of over 2,000 feet above seam level occur. An area of about $3 \frac{1}{2}$ square miles in the northwestern quarter of the township is underlain by glacial lake clay; moraine occupies about 2 square miles in the northeastern corner of the township, and boulder clay underlies the remainder of the township, except two small areas in sections 1 and 2 that are mantled by glacial outwash sands and gravels.

Only two wells, 21 and 48 feet deep, have been put down in that part of this township underlain by glacial lake clay. The well, 48 feet deep, on the NE. $\frac{1}{4}$, section 30 , obtains a large supply of water that is too "alkaline" for drinking; from the boulder clay that underlies the glacial lake clays. The well. 21 feet deep, on the NE. $\frac{1}{4}$, section 32 , yields a small supply of slightly "alkaline" water. In that part of the township underlain by moraine and boulder clay the wells are 11 to 46 feet deep. A dry hole 90 feet deep was put down on the SE. $\frac{1}{4}$ section 34.

Eight flowing wells in this township, 320 to 569 feet deep, obtain water from aquifers in the bedrock. An aquifer that is about 1,336 feet above seamlevel supplies soft water, which contains 1,670 parts per million of dissolved solids, to a well 569 feet deep on the NE. $\frac{1}{4}$, section 22. An aquifer that is about 1,402 feet above sea-level supplies a well, 486 feet deep, on the SW. $\frac{1}{4}$, section 5. An aquifer that is about 1,518
to l,542 foet above sea-level supplies six wolls, 320 to 369 feet deep, in the northern two-thirds of the township. The flow of water from the bedrock wells in this township ranges from 1 to 35 gallons a minutc, and the water is used for all purposes except irrigation. The water in tho well on the SE. $\frac{1}{4}$ soction 15, contains 1,597 parts por million of dissolvod solids.

Township 29, Range 3

Brightwator creek flows northwesterly through sections
6 and 7. The land surface rises gradually eastwards from tho valley of the creek to the eastern boundary of tho township, where some parts are over 2,050 feet above sea-level. Glacial lake clay occupies nearly 13 square miles in the western part of the township, the area boing about $3 \frac{1}{2}$ miles wide at the southern boundary of the township and a little over 1 mile wide at the northern boundary. An area of about 16 square miles in the eastern two-thirds of the township and an area of about $\frac{1}{2}$ square mile in the northeast corner are underlain by moraine. An irregularly shaped area of boulder clay occupies about $6 \frac{7}{2}$ squaro miles in the northern and eastern parts of the township.

No records of wells in the glacial lake clay of this township were obtained. In that part of the township underlain by moraine and boulder clay the wells aro 16 to 93 foot deep. The water in the well, 40 feot deep, on the NW, $\frac{1}{4}$, section 13, is reported as being soft; the water in the well, 93 feet doep, on the SW. $\frac{1}{4}$, section 28, is too "alkaline" for drinking; and the water in the wells, 88 and 30 feot doep, on the NE, $\frac{1}{4}$, section 3, and the NE. $\frac{1}{4}$, section 24, is "alkaline", but can be used for drinking. The water in the remaining wells in the glacial drift of this township is hard, but is not "alkaline". At three farms the supply of water is not sufficient for local requirements. Six flowing wells and three non-flowing wells obtain water from aquifers in the bedrock. An aquifer that is about 1,445 to 1,490 feet above sea-level supplies four wells on sections 8, 28, 31 and

33, $420,530,402$, and 445 foot deop, respoctivoly. The wator in the wells on sections 31 and 33 contains 1,909 and 2,214 parts per million of dissolved solids, respectively. An aquifer that is about 1,525 to 1,543 fect above sea-level supplies three wells on soctions 11,29 , and $31,485,407$, and 340 feet deep, respectively. An aquifer that is about 1,585 to 1,603 feet above sea-level supplies two wells on seotions 4 and 10, 325 and 425 feet deep, respectively. The distribution of the aquifers in this township is irregular and the records of wells in adjacent sections should be studied before new wells are drilled. The wells in the bedrock provide supplies of water that can be used for all purposes excopt irrigation. The supplies are ample for local requirements. Township 29, Range 4

Brightwater creek passes through the northeastern part of the township, entering it at tho southoast corner of section 13 and crossing the northorn boundary of the township a little west of the centre of section 35. From the creek, the land rises very gradually towards the southwest corner of the township, which is about 1,950 feet above sea-level. Boulder clay underlies almost all the western half of the township, and about 5 square miles in the southeastern part of the township. Glacial lake clay underlies the northeast quarter of the township, and about 4 square miles in the southeast quarter. There are very few wells in the area of glacial lake clay, but a well 16 feet deep, on section 24 , obtains a small supply of hard water from a sandy bed in the clay. In that part of the township underlain by boulder clay the wells are 14 to 47 feet deep. At three farms in this part the water supply is insufficient for local requirements. In a well 30 feot deop, on section 32, the water is too laxative to be fit for drinking, and in two wells, each 20 feet deep, in sections 2 and 28 , the water is

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"alkaline", but is used for drinking.
Soven flowing wells and four non-flowing wolls in this township obtain soft water from aquifers in tho bodrock. The water can be used for all purposes except irrigation. These aquifers at 1,495 to 1,569 fect above sea-lovel, probably underlie the entire township. The supply of water from the bedrock wells is sufficient or more than sufficient for farm needs, and the flow from the well in section 34 is about 35 gallons a minute. The water in the well in section 21 contains 2,040 parts per million of dissolved solids.

## Township 29, Range 5

The southwest quarter of this township is rolling, and some hills are over 2,050 feet above sea-level. From this elevated tract the land slopes gently northwards, and in the northwest the surface is less than 1,850 feet above seamlevel. Almost all of the southern third of the township, and about 7 square miles in the northern two-thirds, are mantled with moraine. The remaining northern and northeastern parts of the township are mantled with boulder clay.

In the moraine-covered area in this township the producing drift wells are 10 to 80 foot deep, and a dry hole 113 feet deep was put down on the SW. $\frac{1}{4}$, section 2. The water from the well on section 21 is too laxative to be used for drinking, and that from two wells on sections 2 and 3 is rather "alkaline". The supply of water at five farms is not sufficient for local requirements, and at other farms several wells are necessary to provide an adequate supply.

In the boulder clay area the wells in the glacial drift are 25 to 100 feet deep. The water in three wells on sections 14 , 22, and 31, 56, 30, and 100 feet deep, respectively, is too highly mineralized for drinking, and the ground water conditions in this
area are very unsatisfactory.
Eight wells in this township, 240 to 900 foot deep, obtain water from bedrock aquifers. An aquifer that is about 965 feet above sea-level supplies a woll 900 foot doop, on section 33, with soft water that contains soda. Tho water is reported as being used for all purposes. Aquifers that aro about 1,262 to 1,333 feet above sea-level supply five wells, 600 to 642 feet above seamlevcl, in the castern half and the northwestern quarter of the township. Theso aquifors probably underlio the entire township. An aquifor that is about 1,609 to 1.612 feet above seamlevel supplies two wells on soctions 32 and 34, 240 and 262 feet doop, respectivoly. This aquifer probably underlies at least the western twopthirds of the township. The water in the well on section 34 contains 2,160 parts por million of dissolved solids, of which 1,288 parts per million is common salt. The supplies of water from the bodrock wells that aro in use are large, and the water is roported as being usod for all. purposes except irrigation, although in several wells it is rather salty.

Township 30, Range 3
The land surface in this township slopes gently
southwestwards from the northeast corner. which is slightly over 2,100 feot above sea-level, to tho southwest corner, which is a little less than 1,850 feet above soa-level. Tho southern part of Salt lake occupies about $\frac{1}{4}$ square mile in section 35 . Glacial lake clay underlies an area of about 4 square milos adjacent to the westorn boundary of the township. Boulder clay ocoupies a belt lying east of the lake clay that oxtends a little east of the Canadian National railways. Moraine underlies all that part of the township east of the boulder clay area except about $3 \frac{1}{2}$ square miles in the vicinity of Salt lake, which area is mantled with
glacial outwash sands and gravels.
In the arca of glacial lake clay in the southwest part of the township a well 25 feet docp obtains a sufficiont supply of hard water for farm requiromonts. In tho aroa of glacial outwash sands and gravels circling Salt lake, all the wells have boen sunk into the underlying glacial drift. In this area and in that part of the township underlain by moraine and by glacial till the wells are 10 to 315 feot deop, but most of thom are 30 to 80 feet deep. In three wells in sections 17, 18, and 21, 54,45 , and 60 feet deep, rospectively, the water is "alkaline", but is used for drinking. In three wells in sections 11, 12, and 16, 60, 130, and 40 feet deep, respectively, the water is too "alkaline" for use except by stock. The aquifer that supplies the well, 315 feet deep, on the NE. $\frac{1}{4}$, section 12 , is thought to be in the glacial drift, as tho water in the woll is hard. The sand of this aquifer has entered the well and has reduced the supply of water. Aquifors in the glacial drift are difficult to trace over considerable distances, but the following aquifers are probably continuous between the wells mentioned. An aquifer that is about 1,865 feet above sea-level provides large supplies of water to two wells on tho $S E . \frac{1}{4}$, section 18, and the NW. $\frac{7}{4}$, section 20,45 and 75 feet deep, respectively. An aquifer that is 2,020 to 2,035 feet above sea-level supplies three wells on sections 24 and 25,45 to 62 feet deep, with hard water. An aquifer that is about 1,920 to 1,943 feet above sealevel supplies two wells on sections 32 and 34,80 and 87 feot deep, respectively, with large quantities of water. On the NW. $\frac{7}{4}$, section 31 , the water in a well 60 feet deep rises above the surface, but the area of artesian flow appears to be very restricted.

The supplies of water from the wells in this township are generally quite satisfactory. Many of the wells yield largo
supplies, and at farms where the water from the deeper wells is not fit to drink, shallow wells are used to provide water for domestic use. Water is hauled at the farm in the NW. $\frac{7}{4}$ section 30, however •

No wells in this township have reached bedrock. The aquifers that supply the bedrock wells in the adjacent townships to the south and the west, however, probably underlie at least the western part of the township, and should bedrock wells be sunk in the southwest part of the township the water in them would probably rise above the surface.

Township 30, Range 4

Brightwater creek follows a very sinuous course through the township from a point a little west of the centre of the southern boundary of section 2 to the northwest corner of the township; the northern part of the creek valley in this township is wooded. In the southeast quarter of the township there are two intermittent streams that flow into Brightwater creek. From the channel of Brightwater creek the surface rises gently northeastwards, attaining about 1,950 feet above sea-level in the northeast corner of the municipality. West of Brightwater creek the surface falls very gradually northwards from elevations of about 1,850 feet above sea-level at the southern boundary of the township to about 1,725 feet above seamlevel in the northwest corner. Boulder clay covers an area of about $4 \frac{1}{2}$ square miles in the southwest quarter of the township and an area of about $\frac{3}{4}$ square mile in the northeast corner. Glacial lake sand occupies about 3 square miles in the northwestern part of the township, in a belt about a mile wide that extends to within $\frac{1}{2}$ mile of its northern boundary. Glacial lake clay underlies the remaining 31 square miles of the township.

Most of the wells in this township obtain water from aquifers in the bedrock. In the northeast corner of the township there is a well in the moraine, 80 feet deep, in which the water rises above the surface. The area of artesian flow does not appear to extend far towards the west or southwest, however, as several deep wells in this part did not obtain water from this aquifer. In the area underlain by glacial lake clay four wells on sections $13,24,32$, and $34,26,80,90$, and 67 feet deep, respectively, obtained hard water from the underlying boulder clay. In the area underlain by glacial lake sands a well 80 feot deep, on the NW. $\frac{3}{4}$, section 19, obtained a large supply of hard water also from the underlying boulder clay. Brightwater creek is used by watering stock.

Seven flowing wells and sixteon non-flowing wells in this township obtain water from aquifers in the bedrock. An aquifer that is 1,405 to 1,424 feet above sea-level was tapped by two wells in sections 5 and 10, 450 and 387 foet deep, respectively. The water in the well on soction 5 contains 2,160 parts per million of dissolved solids, of which 437 parts wore sodium chloride. An aquifor that is about 1,463 to 1,476 feet above sea-level supplies two wells, 298 and 359 feet deep, on the SE. $\frac{1}{4}$, section 6, and NW. $\frac{1}{4}$, section 12. An aquifer that is about 1,515 to 1,555 feet above sea-level supplies eight wells in the southern half of the township, 265 to 330 feet deep. The water from these wells varies considerably in quality; the water in the well on section 3 contains 1,960 parts per million of dissolved solids, of which 297 parts are sodium chloride; the water in the well on the SE. $\frac{1}{4}$, section 12, contains 1.420 parts per million of dissolved solids, of which 582 parts are sodium chloride. An aquifer that is about 1,653 feet above sea-level supplies a well on section 18, 200 feet deep. Aquifers that are about 1,720 to

1,815 feet above sea-level supply nine wells, from 56 to 185 fect deep, in the northern half of the township; the elevation of the aquifer and the water-level in the wells rise towards the northeast. The water of the well 56 feet deep, on the NE. $\frac{1}{4}$, section 31, contains 1,000 parts per million of dissolved solids, of which only 26 parts are sodium chloride. The water of the wells on sections 20, 25, and 27, 96, 185, and 177 feet deop, however, contains 2,040, 2,260, and 2,640 parts per million of total solids, of which 958,148 , and 544 parts respectively, aro sodium chloride, the amount of which decrcases towards the northeast. The supply of water from the bedrock wells that are in use is adecuate for farm requirements and is used for drinking, although the water in some of the wells is not very palatable.

Township 30, Range 5
This township is a plain that slopes very gently to the northwest. Elevations range from about 1, 850 to 1,750 feet above sea-level. The valley of Brightwater creek cuts across the northeast corner of section 36. Boulder clay underlies about $7 \frac{7}{2}$ square miles of the southern third of the township. Glacial lake clay borders Brightwater creek and underlies less than $\frac{1}{4}$ square mile in the northeast corner of the township. Glacial lake sands mantle over 28 square milos of the township. In that part of the township underlain by boulder clay the wolls in the drift are 25 to 37 feet deep, and the water in two of the wells is too highly mineralized to be fit for drinking. In the southern and eastern part of the area underlain by glacial lake sands and gravels, the wells, which are 30 to 90 feet deep, have passed into the underlying boulder clay; in the northwest part several wells 16 to 28 feet deep obtain small supplies of water from the glacial lake sands and gravels.

Six wells in this township obtain water from aquifors in the bedrock. An aquifer that is about 810 foet above seamevel
supplies water that contains 7,120 parts por million of dissolvod solids, of which 6,234 parts aro sodium chlorido, to a woll 960 feet deep on the SE. $\frac{1}{4}$, section 30. No other wolls in this municipality have tapped this aquifer, and the water obtainod is too salty to justify the expense of drilling to it. An aquifer that is about 1,356 to 1,408 fect above sea-level is tapped by two wells, on sections 25 and 28,44 and 366 feet deep, respectively, and probably underlies a large part of the township. The water in the well on section 25 contains 8,060 parts per million of dissolved solids, of which 7,399 parts are sodium chloride, and, therefore, the exponse of drilling to this aquifor does not appear to bo justified. An aquifer that is about 1,455 feet above sea-lovel supplios a well 300 feet doop, on section 32, with salty water. An aquifer that is about 1,586 feet above sea-level supplies a well 186 foot doep, on the NE. $\frac{1}{4}$, section 20 , with soft water. This aquifor does not appoar to extend far north or west of the well site, but it may extend towards the south and the east. An aquifer that is about 1,733 feet above sea-level supplies a well 122 feet deep, on section 4, with water that contains 2,140 parts per million of dissolved solids, of which $6 I l$ parts are common salt; this aquifer does not appear to extend far south of the well site, but it may underlie a part of the southern half of the township. The supply of ground water in this township is not very satisfactory. The water from some of tho de日per wells in the bedrock and in the glacial drift is not suitable for drinking, and at four farms watoris hauled; dugouts are used at two farms.

$$
\text { Township 31, Range } 3
$$

The land surface rises from the southwest corncr of the township, which is about 1,950 feet above sea-level, to the northeast corner of the township, which is nearly 2,200 feet above
sea-level. The northern part of Salt lake extends into the southern half of section 2, and an area of about $1 \frac{7}{2}$ squaro miles in the vicinity of the lako is underlain by glacial outwash sands. Moraine underlies the remaining $34 \frac{7}{2}$ square milos of the township. No records of wells in the glacial outwash sands and gravels were obtained. In the moraine-covered area the wells are 20 to 176 feet deep. Dry holes put down on the SW. $\frac{1}{4}$ section 15, NW. $\frac{1}{4}$, section 28 , and NW. $\frac{1}{4}$, section 29 , were 130,120 airid 20 feet deep, respectively. The uppor part of the glacial drift in this towaship is generally not a good source of water, as the yield from most of the wells loss than 20 feet doep is small, but an exception is on the NE. $\frac{1}{4}$, section 33 , and tho SW. $\frac{1}{4}$, section 24, where a bod of sand supplies two wells, 18 and 12 fect decp, respectively, with moderate supplies of water. An arca of artosian flow in the glacial drift probably extends for a short distance into the southwest corner of the township, but sufficiont information is not available to outline it on the accompanying map.

No wells in this township have reached bedrock, but somo of the bedrock aquifers in the adjacent townships probably extend into this township.

The supply of ground water in this township is not satisfactory. At six farms water is hauled, the water from two wells is not used for drinking, and that from four wells is "alkaline" but is used for drinking,

$$
\text { Township 31, Range } 4
$$

Brightwater creek passes through the southern part of section 6 and the western part of section 19. The southern part of Indi lake occupies parts of sections 28, 29, 32, and 33. In the west the surface is low and flat, but rises northeastwards to a little over 2,050 feet above sea-level in the northeast corner of the township. Glacial lake clay occupies about 15 square miles
in the southorn and westorn parts of the township. About $3 \frac{1}{2}$ square miles in the northwest is underlain by glacial lake sands and gravels. A belt of boulder clay about $\frac{7}{2}$ mile in average width extends southwards from the northern boundary of the township to about the centre of section 11, and boulder clay underlies about $\frac{7}{4}$ square mile in section 1. About 12 square miles in the eastern part of the township are underlain by moraine.

In the moraine-covered area the wells are 16 to 77 feet deep; the supply of water from four wells is insufficient for local requirements, and the water from two wells is not fit for drinking. In a well 77 feet, in the $S E$. $\frac{1}{4}$, section 1 , the water rises above the surface, but the extent of the area of artesian flow is not known. In the boulder clay area the wells, which are 98 to 300 feet deep, yield water that is "alkaline", but is used for drinking. In the part of the township underlain by glacial lake clay the wells are 10 to 140 feet deep. The water in one well, 102 feet deep, on section 9, is too "alkaline" for drinking, and in three other wells, 40,23 , and 140 feet deep, on the NW. $\frac{1}{4}$, section 2, NE. $\frac{1}{4}$, section 6, and SE. $\frac{1}{4}$, section 16 , respectively, the water is "alkaline" but is used for drinking. Springs on the SE. $\frac{1}{4}$, section 23 , and SW. $\frac{1}{4}$, section 27 , supplement the supply of well water. Five flowing wells and one non-flowing well obtain water from aquifers in the bedrock. The deepest well in the township is the Hanley Development Company's well, now abandoned, on the SE. $\frac{1}{4}$, section 6. This well is 2,069 feet deep, and in 1935 was discharging salt water and small quantities of gas. Water was reported at depths of 25,80 , and 480 feet. The aquifer encountered at 480 feet, or 1,285 feet above sea-level, in this well may be the same aquifer that supplies the well on section 7 with salty water. An aquifer that is about 1,416 to 1,458 feet above sea-level supplies two. wells, 386 and 227 feet deep, on the SW. $\frac{1}{4}$, section 16 , and SW. $\frac{7}{4}$, section 19, respectively, with salty water; the water in
the well on section 16 contains 3,460 parts por million of dissolved solids, of which 2,755 parts are common salt. An aquifer that is about 1,504 to 1,550 feet above sea-level supplies two wells on sections 19 and 30, 227 and 204 feet deep, respectively, the water in the well on section 30 containing 2,420 parts per million of dissolved solids. The bedrock wells in the northern half of the township provide large supplies of water which are used for all purposes except irrigation.

Township 31, Range 5

Brightwater creek follows a very winding course through the eastern part of this township, entering it at the southoast corner of section 1 and leaving it at the northwost corner of section 36. The valley of the creek is wooded, and the water is used for stock. There is a small lake in the western half of section 35 , and the southern part of a shallow lake occupies about $\frac{1}{2}$ square mile in sections 33 and 34. Dune sands mantle about 9 square miles in the northern third of the township. Glacial lake sands occupy an area of about 14 square miles south of the dune sands, and underlie about $\frac{3}{4}$ mile in the northeast part of the township. Glacial lake clay underlies about 12 square miles in the southeastern and eastern parts of the township.

The wells in the unconsolidated deposits of this township are all less than 50 feet deep, and most of them are less than 20 feet deep. In the southern half of the township the wells yield small supplies of water. At many farms several wells are needed to supply sufficient water, and at other farms water is hauled. The dune sand area in the northern half of the township is thinly settled. At one farm shallow wells supply water for domestic use and for watering a few head of stock, and the water of the lake is also used for stock.

Three wells in this township obtain water from aquifers in the bedrock. An aquifer that lies at about 1, 349 feet above
sea-level supplies a well 401 fect doop, on section 2, with water that contains 7,000 parts por million of dissolvod solids, of which 6,592 parts are common salt. An aquifer that is about 1,540 to 1,532 foet above sea-level, supplies two wells on sections 16 and 23, 200 and 204 feet deep, with water that contains 3,120 and 2,720 parts per million of dissolved solids, of which 2,195 and 843 parts, respectively, are common salt.

## STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF ROSEDALE; NO: 283, SASKATCHEWAN

| Township | 28 | 29 | 29 | 29 | 30 | 30 | 30 | 31 | 31 | 31 | Total No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| West of 3rd mer. Range | 3 | 3 | 4 | 5 | 3 | 4 | 5 | 3 | 4 | 5 | cipality |
| Total No. of Wells in Township | 17 | 23 | 18 | 44 | 31 | 31 | 36 | 40 | 35 | 38 | 313 |
| No. of wells in bedrock <br> No. of wells in glacial drift <br> No. of wells in alluvium <br> Permanency of Water Supply | 8 | 9 | 11 | 8 | 0 | 23 | 6 | 0 | 6 | 4 | 75 |
|  | 9 | 14 | 7 | 36 | 31 | 8 | 29 | 40 | 28 | 34 | 234 |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 4 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| No. with perman <br> No. with interm <br> No. dry holes <br> Types of Wells | 15 | 23 | 17 | 36 | 31 | 30 | 36 | 36 | 35 | 37 | 294 |
|  | 1 | 0 | 1 | 7 | 0 | 0 | 0 | 0 | 2 | 0 | 11 |
|  | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 4 | 0 | 1 | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| No. of flowing artesian wells <br> No. of non-flowing artesian well <br> No. of non-artesian wells <br> Quality of Water | 8 | 6 | 7 | 0 | 1 | 9 | 0 | 0 | 8 | 3 | 42 |
|  | 1 | 11 | 5 | 18 | 24 | 20 | 19 | 12 | 13 | 5 | 128 |
|  | 7 | 6 | 6 | 25 | 6 | 1 | 17 | 24 | 16 | 29 | 137 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| No. with hard water <br> No. with soft water <br> No. with salty water <br> No. with "alkaline" water <br> Depth of Wells | 8 | 13 | 7 | 32 | 31 | 6 | 31 | 35 | 30 | 32 | 225 |
|  | 8 | 10 | 11 | 11 | 0 | 24 | 5 | 1 | 7 | 5 | 82 |
|  | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 0 | 2 | 1 | 8 |
|  | 2 | 5 | 3 | 8 | 8 | 2 | 5 | 6 | 12 | 5 | 56 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| No. from 0 to 50 feet deep | 8 | 10 | 7 | 27 | 12 | 2 | 25 | 22 | 18 | 34 | 165 |
| No. from 51 to 100 feet deep <br> No. from 101 to 150 feet deep <br> No. from 151 to 200 feet deep | 1 | 4 | 0 | 7 | 15 | 12 | 5 | 11 | 8 | 0 | 63 |
|  | 0 | 0 | 0 | 2 | 3 | 2 | 1 | 5 | 3 | 0 | 16 |
|  | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 2 | 0 | 1 | 6 |
| No. from 201 to 500 feet deep <br> No. from 501 to 1,000 feet deep <br> No. over 1,000 feet deep <br> How the Water is Used | 7 | 8 | 11 | 2 | 1 | 13 | 3 | 0 | 7 | 3 | 55 |
|  | 1 | 1 | 0 | 6 | 0 | 0 | 1 | 0 | 0 | 0 | 9 |
|  | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| No. usable for domestic purposes | 13 | 22 | 16 | 32 | 26 | 29 | 25 | 32 | 28 | 22 | 245 |
| No. not usable for domestic purposes No. usable for stock | 3 | 1 | 2 | 11 | 5 | 1 | 11 | 4 | 9 | 15 | 62 |
|  | 15 | 23 | 18 | 40 | 31 | 29 | 33 | 36 | 35 | 37 | 297 |
| No. not usable for stock <br> Sufficienay of Water Supply | 1 | 0 | 0 | 3 | 0 | 1 | 3 | 0 | 2 | 0 | 10 |
|  |  |  |  |  |  |  |  |  |  |  |  |
| No. suffiaient for domestic needs <br> No. insufficient for domestic needs <br> No. sufficient for stock needs | 16 | 23 | 16 | 38 | 31 | 30 | 33 | 36 | 34 | 32 | 289 |
|  | 0 | 0 | 2 | 5 | 0 | 0 | 3 | 0 | 3 | 5 | 18 |
|  | 13 | 21 | 14 | 30 | 28 | 30 | 22 | 24 | 27 | 18 | 227 |
| No. insufficient for stock neods | 3 | 2 | 4 | 13 | 3 | 0 | 14 | 12 | 10 | 19 | 80 |

## ANLLYSES AND QUALITY OF WATER

Genoral Statoment

Samples of water from representative wolls 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 Goological Survoy by the usual standard mothods. Tho quantities of the following constituents were determined; total dissolved mineral solids, calcium oxido, magnesium oxide, sodium oxide by difforence, sulphate, chloride, and alkalinity. The alkalinity referrod to here is the oalcium 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-othat 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 exomined for bacteria, and thus a water that may be termed suitable for use on the basis of its mineral salt content might be condomned on account of its bacteria content. Waters that are high in bacteria content have usually been polluted by surface wators.

## 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 wators highly objectionable.

Mineral Substances Present
Caloium 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, $\mathrm{MgSO}_{4}$ ), and they are more detrimental to health than the lime or calcium salts. The calcium salts have no laxative or other deleterious effects. The scale found on the inside of steam boilders and teamettles 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, $\mathrm{Na}_{2} \mathrm{SO}_{4}$ ) 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 $\left(\mathrm{Na}_{2} \mathrm{CO}_{3}\right)$ "black alkali", sodium sulphate "white alkali", and sodium chloride are injurious to vegetation. Sulphates

Sulphates $\left(\mathrm{SO}_{4}\right)$ are one of the common constituents of natural water. The sulphate salts most commonly found are sodium sulphate magnesium sulphate, and calcium sulphate ( $\mathrm{CaSO}_{4}$ ). When the water contains large quantities of the sulphate of sodium it is injurious to vegetation.

## Chlorides


#### Abstract

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.


 IronIron (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. $\Lambda$ water that contains a considerable gmount of iron will stain porcelain, enomelled 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 campletely 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 ropresents the amount of mineral salts that can be removed by boiling. Temporary hardness is due mainly to the bicarbonates of calcium and magnesium and iron, and permanent hardness to the sulphates and chlorides of calcium and magnesium. The permanert hardness
can be partly eliminated by adding simple chemical softeners such as armonia or sodium carbonate, or many prepared softeners. Water that contains a large amount of sodium carbonate and small amounts of caloium 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.

| LOCATION |  |  |  |  |  | $\begin{aligned} & \text { Depth } \\ & \text { of } \\ & \text { well,Ft. } \end{aligned}$ | Total dis'vd solids | HARDNESS |  |  | CONSTITUENTS AS ANALYSED |  |  |  |  |  | Source of Water |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No. | Qtr. | Sec. | Tp. | Rge. | Mer. |  |  | Total | Perm. | Temp. | CI. | Alka | CaO | MgO | S04 | $\mathrm{Na}_{2}{ }^{+}$ |  |
| 1 | SE. | 15 | 28 | 3 | 3 | 369 | 1,597 |  |  |  |  |  |  |  |  |  | 3 z |
| 2 | NE. | 22 | 28 | 3 | 3 | 569 | 1,670 |  |  |  |  |  |  |  |  |  | \% 3 |
| 3 | NE. | 31 | 29 | 3 | 3 | 402 | 1,909 |  |  |  |  |  |  |  |  |  | * 3 |
| 4 | NW. | 33 | 29 | 3 | 3 | 445 | 2,214 |  |  |  |  |  |  |  |  |  | 7 3 |
| 5 | NW. | 21 | 29 | 4 | 3 | 333 | 2,040 |  |  |  | 394 | 430 |  |  |  |  | \% 2 |
| 6 | SW. | 34 | 29 | 5 | 3 | 262 | 2,160 | 70 | 15 | 55 | 720 | 430 | 50 | 11 | 603 | 1,227 | 𤣩 2 |
| 7 | NW. | 31 | 30 | 3 | 3 | 60 | 1,360 | 650 | 600 | 50 | 18 | 115 | 70 | 101 | 693 | 302 | 31 |
| 8 | SE. | 3 | 30 | 4 | 3 | 276 | 1,960 | 35 | - | - | 180 | 440 | 30 | 11 | 812 | 902 | ¥ 2 |
| 9 | SE. | 5 | 30 | 4 | 3 | 450 | 2,160 | 45 | - | - | 265 | 400 | 20 | 11 | 902 | 1,020 | 3 3 |
| 10 | SE. | 12 | 30 | 4 | 3 | 329 | 1,420 | 35 |  |  | 353 | 410 | 10 | 7 | 234 | 691 | \# 2 |

Analyses of Water Samples from the Municipality of Rosedale, No. 283, Saskatchewan (cont'd)

| LOCATION |  |  |  |  |  | $\begin{aligned} & \text { Depth } \\ & \text { of } \\ & \text { well,Ft. } \end{aligned}$ | Total dis'vd Solids | HARDNESS |  |  | CONSTITUENTS AS ANALYSED |  |  |  |  |  | $\left\lvert\, \begin{aligned} & \text { Source } \\ & \text { of } \\ & \text { Water } \end{aligned}\right.$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No. | Qtr. | Sec. | Tp. | Rge. | Mer. |  |  | Total | Perm. | Temp. | C1. | Alka- | CaO | MgO | $\mathrm{SO}_{4}$ | $\mathrm{Na}_{2} \mathrm{O}$ |  |
| 11 | NW. | 15 | 30 | 4 | 3 | 265 | 1,820 |  |  |  | 567 | 410 |  |  |  |  | \% 2 |
| 12 | NE. | 20 | 30 | 4 | 3 | 96 | 2,040 | 140 | 80 | 60 | 580 | 405 | 50 | 29 | 525 | 997 | ㅍ |
| 13 | NE. | 24 | 30 | 4 | 3 | 80 | 2,680 | 800 | 800 | 0 | 80 | 145 | 130 | 187 | 1,615 | 768 | \% 1 |
| 14 | NW. | 25 | 30 | 4 | 3 | 185 | 2,260 | 55 |  |  | 90 | 455 | 30 | 11 | 1,058 | 990 | \% 2 |
| 15 | NE. | 27 | 30 | 4 | 3 | 77 | 2,640 | 110 | 25 | 85 | 330 | 420 | 40 | 25 | 1,464 | 1,411 | \% 2 |
| 16 | NE. | 31 | 30 | 4 | 3 | 56 | 1,000 | 190 | 120 | 70 | 16 | 235 | 20 | 43 | 508 | 399 | \% 2 |
| 17 | NW. | 32 | 30 | 4 | 3 | 90 | 2,400 | 1,200 | 1,200 | 0 | 31 | 85 | 310 | 194 | 1,476 | 389 | \% 1 |
| 18 | NE. | 4 | 30 | 5 | 3 | 122 | 2,140 | 55 | - | - | 370 | 400 | 40 | 14 | 836 | 2,036 | \# 2 |
| 19 | STW. | 15 | 30 | 5 | 3 | 48 | 1,654 |  |  |  |  |  |  |  |  |  | * 1 |
| 20 | NE. | 15 | 30 | 5 | 3 | 40 | 3,260 | 1,200 | 1,100 | 100 | 69 | 80 | 470 | 173 | 2,165 | 717 | \% 1 |

Analyses of Water Samples from the Municipality of Rosedale, No. 283, Saskatchewan (Cont'd)

| LOCATION |  |  |  |  |  | Depth of well, Ft. | Total dis'vd solids | HARDNESS |  |  | CONSTITUENTS AS ANALYSED |  |  |  |  |  | SourceofWater |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| No. | Qtr. | Sec. | Tp. | Rge. | Mer. |  |  | Total | Perm. | Temp. | Cl. | $\begin{array}{\|l\|} \hline \text { Alka- } \\ \hline \text { Iinity } \\ \hline \end{array}$ | CaO | Mgo | $\mathrm{SO}_{4}$ | $\mathrm{Na}_{2} \mathrm{O}$ |  |
| 21 | NE. | 25 | 30 | 5 | 3 | 444 | 8,060 | 380 | 360 | 20 | 4,620 | 135 | 230 | 43 | 0 | 3,920 | \# 3 |
| 22 | SE. | 30 | 30 | 5 | 3 | 960 | 7,120 | 260 | 240 | 20 | 4,010 | 120 | 180 | 40 | 0 | 3,355 | ${ }^{2} 3$ |
| 23 | NE. | 27 | 30 | 5 | 3 | 33 | 500 | 340 | 100 | 240 | 14 | 345 | 90 | 54 | 41 | 70 | \# 1 |
| 24 | SW. | 16 | 31 | 4 | 3 | 386 | 3,460 | 50 | 10 | 40 | 1,670 | 395 | 10 | 7 | 238 | 1,833 | \% 3 |
| 25 | SW. | 19 | 31 | 4 | 3 | 227 | 2,680 | 45 |  |  | 710 | 500 | 30 | 7 | 726 | 1,351 | \% 3 |
| 26 | NW. | 30 | 31 | 4 | 3 | 204 | 2,420 |  |  |  | 60 | 460 |  |  |  |  | \% 3 |
| 27 | NE. | 2 | 31 | 5 | 3 | 401 | 7,000 | 320 | 280 | 40 | 4,060 | 170 | 160 | 32 | 12 | 3,480 | \# 3 |
| 28 | SE. | 16 | 31 | 5 | 3 | 200 | 3,120 | 110 | 5 | 105 | 1,330 | 370 | 70 | 14 | 410 | 1,555 | \% 3 |
| 29 | NE. | 23 | 31 | 5 | 3 | 204 | 2,720 | 70 |  |  | 511 | 480 | 30 | 14 | 890 | 1,261 | \# 3 |

[^1]
## Water from the Unconsolidated Deposits

The sediments of the unconsolidated deposits vary widely in composition and in finencss of grain, and, thorofore, the composition of ground wator from the unconsolidated deposits also varies widely. As a general rule tho waters from the dune sands are the least mineralized, whereas the water from the glacial lake clay is the most highly mincralized of the waters from the unconsolidated deposits. The rapidity of circulation of water through the sediments of the aquifers affects the composition of the water, thus water obtainod from springs and spring-fed wells or of wells near river valleys is generally loss highly mineralized than water from wells in flat-lying areas. Probably due to the slow circulation of water at depth, the water of the doop wells is generally more highly mineralized than that of the shallow wells. Most of the waters from the deeper wells in all tho unconsolidated deposits except the dune sands are very hord, and the hardness is not removed by boiling. Sulphates, carbonates, and chlorides are usually present, their relative abundanco being in the ordor given below. Sulphate of calcium $\left(\mathrm{CaSO}_{4}\right)$ is almost invariably present and is usually accompanied by magnesium sulphato ( $\mathrm{MgSO}_{4}$ ). Sodium sulphate $\left(\mathrm{Na}_{2} \mathrm{SO}_{4}\right)$ is present in most of these waters, and in some waters sodium sulphate is more abundant than calcium sulphate.

Sample No. 23 contains an unusually small proportion of dissolved solids. The well, which is 33 feet deop, is in tho glaoial lake sands and the aquifer that supplies the well may extend to the valley of Brightwater creek. This water can be used for all purposes, and it is not nearly as hard as most waters from the glacial drift. Sample No. 7 is from a flowing well in the moraine; this water is slightly laxative as it contains 957 parts per million of the sulphates of sodium and magnesium. It is very hard and the hardness is not reduced to any appreciable extent by boiling. Samples Nos. 13 and 17 are from wells near the margin of

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the glacial lake sand area, and the wator probably comes from the boulder clay that underlios the glacial lake sands. Both waters are excessively hard. Sample No. 13 contains 2.161 parts per million of the sulphates of sodium and magnosium, and tho water is laxative. Sample No. 17 contains 1,410 parts per million of the sulphates of sodium and magnesium, and is less laxative than sample No. 13. Both waters are used for drinking, but water No. 13 is not suitable for this purpose. Samples Nos. 19 and 20 are from wells 48 and 40 feet deep, in the same section, in the area mantled by glacial lake sands. Sample No. 20 is laxative, as it contains 2,025 parts per million of the sulphates of sodium and magnesium. It is excessively hard and is not used for drinking. No detailed analysis of sample No. 19 is available, but the water is probably slightly laxative, and very hard, although it is not nearly as hard as water No. 20. Water from the Bedrock

The water from the bedrock aquifers is generally soft and occasionally salty. Sodium sulphate, sodium carbonate, and sodium chloride are the chief salts in solution, but the relative abundance of these salts varies widely. Calcium salts are present only in small proportions. There are several types of bedrock water in this municipality. The water of the first type, represented by samples 1 to 4, 8, 14, 16, and 26 in the list of analyses, contains sodium sulphate, sodium carbonate, and sodium chloride, their relative abundance being in the order given. Waters of this type are very common in the aquifers of the Marine Shale series. The amount of dissolved solids in the waters of this type, in the list of analyses, ranges from 1,000 to 2,420 parts per million, but in five of the waters analysed the amount of dissolved solids is 1,500 to 2,300 parts per million. Waters of this type are generally slightly laxative and have a "soda" taste, which is especially noticeablo if the water is not quite cold.

The water of the second type, ropresented by samples 5, 15, 18, and 29, contains sodium sulphate, sodium chloride, and sodium carbonate, their relative abundance being in tho order given. The amount of the dissolved solids ranges from 2,040 to 2,720 parts per million. The waters are more salty than the waters of the first type but the "soda" taste is less noticeable. The third type, represented by samples 6, 11, 12, 24, 25, and 28, contains sodium chloride, sodium sulphate, and sodium carbonate, the relative abundance being in the order given. The amount of dissolved solids ranges from 1,820 to 3,460 parts per million. These waters are salty and slightly laxative, and most of them are fit only for stock use.

In the fourth type represented by samples 21, 22, and 27, sodium chloride is the chiof constituent and sodium carbonate and sodium sulphate are quite subordinate in amount. The waters of this type contain 7,000 to 8,160 parts per million of dissolved solids, and are so salty that they are unfit for continuous use, even by stock. Sodium sulphate is the principal laxative constituent in the bedrock waters, and sodium chloride makes the water salty. The types here given arc arranged in order of increasing saltiness. The waters of types 1 and 2 are generally not as laxative as the water of types 3 and 4.

The waters from bedrock aquifers are not suitable for irrigation as they contain too much "black alkali" ( $\mathrm{Na}_{2} \mathrm{CO}_{3}$ ), and "white alkali" $\left(\mathrm{Na}_{2} \mathrm{SO}_{4}\right)$. Calcium sulphate $\left(\mathrm{CaSO}_{4}\right)$ is sometimes added to soft, bedrock waters to counteract the harmful effect of "black alkali" on vegetation. Under favourable conditions of soil and drainage, and by careful control of supply water that contains several thousand parts per million has been successfully used for smallnscale irrigation, but in southern Saskatchewan the conditions of soil and drainage are not generally favourable for irrigation.


| WELL <br> No. | LOCATION |  |  |  |  | TYPE OF wELL | $\begin{gathered} \text { DEPTH } \\ \text { OF } \\ \text { WELL } \end{gathered}$ | Alxitude WELL (above sealevel) | Height to which Water will Rise |  | PRINCIPAL WATER-BEARING BED |  |  | CHARACTER OF WATER | TEMP.OFWATER(in ${ }^{\circ} \mathrm{F}$ ) | USE TO WHICH WATER IS PUT | YIELD AND REMARKS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1/4 | Sec. | Tp. | Rge. | Mer. |  |  |  | $\begin{aligned} & \text { Above }(+) \\ & \text { Beloww }(-) \\ & \text { Surface } \end{aligned}$ | Elev. | Depth | Elev. | Geological Horizon |  |  |  |  |
| 1 | 50. | 2 | 28 | 3 | 3 | Dug | 11 | 1,950 | -. 8 | 1,942 | 21 | 1.939 | Glacial drift | Soft, stag- | 45 | S | Interaitient supply. |
| 2 | STi. | 5 | " | " | " | Drilled. | 400 | 1.888 | + 3 | 1,891 | 480 | 1,402 | Lea Park ? | Soft, soda | 47 | D, S | Large flow: 1 gallon a mimute. |
| 3 | SE. | 15 | " | " | " | Drilleà | 309 | 1,909 | + 8 | 1.917 | 309 | 2.540 | Belly Ruver | Soft |  | D, S | Flows a gallon a iminute; \% |
| 4 | NW. | 18 | " | n | " | Drillea | 300 | 1,891 | + 12 | 1,903 | 300 | 1.537 | Belly Rivar | Soft, soda, | 40 | D, S | Ample supply. |
| 5 | SE. | 20 | " | " | " | Drilled | 352 | 1,870 | $+20$ | 1.890 | 352 | . 518 | Belly River | Soft, soda | 45 | D, 5 | Flows 25 gallons a minute. |
| 6 | NW. | 21 | n | " | n | Drilled | 320 | 1,805 | + 20 | 1,885 | 320 | . 545 | Beily River | Soft, soda | 40 | D, S | Large flow. |
| 7 | 玏, | 22 | " | 1 | " | Drilled | 509 | 1,905 | +. 15 | 1,923 | 509. | +. 336 | Lea Pbrik $=5$ | Soft |  | D, S | Flows 5 gallons a rinute; used by neighbours; |
| 8 | SE. | 25 | " | " | " | Dug | 12 | 1,990 | - 4 | 1,980 | 12 | +.978 | Glacial gravel | Eard, iron | 44 | $\therefore$ S | Sufficient for 4 head stock; 2lso 30-foot wel |
| 9 | NT. | 27 | " | " | H | jrilled | 350 | 1,892 | + 5 | 1,897 | 350 | 7. 542 | Beily River | Soft, iron | 46 | D, S | Flows 15 gallons a minute, has 15 head stock. |
| 10 | INE. | 30 | " | " | $\because$ | Bored | 48 | 1,850 | - 15 | 1.835 | 48 | +.802 | Glacial drift | - Hara, Malk- | 42 | S | Sufficient; waters jo heaci stock; also dam |
| 11 | NT. | 30 | " | " | " | Drilled | 350 | 1,871 | $+26$ | 1,891 | 350 | 7.521 | Belly River | soft, soda | 46 | D, S | supplied by tmo flowing rells. <br> Yields alout 35 gallons a minute. |
| 12 | NE. | 32 | " | " | " | Dag | 21 | 1,570 | - 17 | 1.853 | 21. | 1.849 | Glacial sand. | Hard. 1 ron, slightly "alkaline" | 43 | D, s | Insufficient for more than 10 head stock. |
| 13 | SE. | 34 | " | " | " | Dug | 20 | 1,940 | - 8 | 1,932 | 20 | 1,920 | Glacial gravel | Hard | 43 | $\square$ | Just sufficient for house use; 90-foot dry |
| 14 | SE. | 30 | " | " | " | Boreci | -6 | 2,0+5 | - 43 | 2,002 | 40 | 1.999 | Glacial drift | Hard | 44 | D, s | Sufficient for 30 head stork. |
| 15 | NTR. | 30 | " | " | " | Dixs | 18 | 2,025 | - 14 | 2,011 | 18 | 2.007 | Glacial sand | Bars |  | p, s | \$ufficient for 25 head stock. |
| 1 | NT. | 2 | 29 | 3 | 3 | Bores | 47 | 1.990 | - 17 | 1.973 | 47 | 1.943 | Glacial drift | Hard, iron |  | $\mathrm{D}_{0} \mathrm{~S}$ | Sufficient for 25 head stock. |
| 2 | NE. | 3 | " | " | " | Sored | 88 | 1,960 | - 28 | 1,932 | 88 | 1.672 | Glacial fine sand | $\begin{aligned} & \text { flard, "alk- } \\ & \text { line" } \end{aligned}$ | 44 | D, S | Sufficient for 100 head stock. |
| 3 | NE. | 4 | " | " | " | orillea | 325 | 1,926 | + 25 | 12,953 | 325 | 1,008 | Belly River | Soft, soda | 47 | D. $S$ | Sufficient; waters 100 head stock, |
| 4 | 270. | 8 | " | " | n | Drilled | 420 | 1,880 | $+30$ | 1,910 | 420 | 1,400 | Lea Parly | Soft, soda | 47 | $p, s$ | Fields 25 gallons a mimate. |
| 5 | Si. | 9 | " | " | " | Bored | 40 | 1,920 | - 10 | 1,910 | 401 | 1,880 | Glacial drift | fard, iron, | 43 | $p, s$ | Sufficient; waters 15 head stock. |
| 6 | NT. | 10 | " | 18 | " | Drilled | 425 | 2,010 | - 10 | 2.000 | 4251 | 1.585 | Belly River | Soft, soda |  | $p, s$ | Sufficient for 50 head stock. |
| 7 | E. $\frac{3}{3}$ | 11 | " | " | " | Orilled | 485 | 2,020 | - 60 | 1.950 | 485 | 1.535 | Bedly River | Soft. |  |  |  |
| 8 | SE. | 12 | " | 1 | " | 3ored | 52 | 2,053 | - 38 | 2,015 | 52 | 2.002 | Glacial gravel | Hard.silghtly"alkaline" |  | D, S | Sufficient for 15 head stock. |
| 9 | NT. | 13 | " | " | " | Bored | 40 | 2,041 | - 32 | 2,009 |  | 2,001 | qlacial quicksand | Soft |  | D, s | insufficient; whers 10 head stack. |
| 10 | STI. | 14 | " | " | " | Borea | 30 | 2,015 | $-20$ | 1.995 | 301 | 1,985 | Glacial drift | Eard | 40 | D, s | Sufficient; maters 35 head stock. |
| 11 | NE. | 14 | " | " | " | Dug | 20 | 2,030 | - 18 | 2,012 | 20 | 2.010 | Glacial drift | Gard |  | D, s | Insufficient sumply. |




| WELL <br> No. | LOCATION |  |  |  |  | TYPE OF WELL | DEPTHOFWELL | Altitude Well (above sealevel) | Helght to which Water will Rise |  | PRINCIPAL WATER-BEARING BED |  |  | CHARACTER of water | $\begin{gathered} \text { TEMP. } \\ \text { OF } \\ \text { WATER } \\ \text { (in } \left.{ }^{\circ} \mathrm{F} .\right) \end{gathered}$ | USE TO WHICH WATER IS PUT | YIELD AND REMARKS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1/4 | Sec. | Tp. | Rge. | Mer. |  |  |  | $\begin{aligned} & \text { Above (+) } \\ & \text { Below (-) } \\ & \text { Surface } \end{aligned}$ | Elev. | Depth | Elev. | Geological Horizon |  |  |  |  |
| 10 | SE. | 31 | 29 | 4 | 3 | Drilled | 350 | 1,803 | - 9 | 1,854 | 350 | 1.513 | Belly River | Soft |  | D, S | Sufficient; could weter 300 head stock. |
| 17 | 3 i . | 32 | 11 | " | " | Dus | 30 | 1,870 | - 21 | 1,849 | 30 | 1,840 | Glacial gravel | Hard, bitter, "alkalina" |  | S | Abundent supply; drinicing water is haulod. |
| 10 | NTH. | 34 | " | " | " | Drilled | 300 | 1,820 | + 25 | 1,051 | 300 | 1,520 | Belly River | Soft, soda |  | D, S | Yields 35 gellons a mimite. |
| 1 | SW. | 2 | 29 | 5 | 3 | Dug | 18 | 1,975 | - 15 | 1,900 | 18 | 1,957 | Glacial drift | Very hard | 44 | D, S | Sufficient for 10 head stock; 113-foot dry |
| 2 | NE. | 2 | " | " | " | Dag | 10 | 1,905 | -88 | 1,977 | 18 | 1.907 | Glacial drift | Hard, "alk- | 44 | D, S | hole: dugout for stock. Sufficient supoly. |
| 3 | SE. | 3 | " | " | 1 | Drilleã | 242 | 1,975 | -11\% | 1,557 | ó+2 | 1.333 | Lea Park | Soft, salty. soda | 47 | D, S | abundant supply. |
| 4 | Sin. | 3 | " | H | 11 | Dug | 22 | 1,989 | $=20$ | 1,909 | 22 | 1.907 | Glacial drift | Hard, "alkalina" | 44 | D, S | Sufficient for 5 head stock; 20-foot intermittent well for stock use; 50-foot inter- |
| 5 | NT, | 4 | H | " | " | Dug | 18 | 1,984 | - 15 | 1,969 | 10 | 1,900 | Glacial sand | Hard |  | D, S | mittent well; too nlelaine" for use. <br> Intermittent sưכly; usually paters lo head stock; also two internittont seepage wells, 12 and 14 feet. |
| ¢ | NW, | 6 | " | " | 11 | Bored | 90 | 1,980 | - 50 | 1,930 | -90 | 1,890 | Glacial drift | Hard, iron, slightly "alkaline" | 45 | D, S | Intermittent supply. |
| 7 | SW. | 7 | " | " | " | Bored | 46 | 2,000 | - 28 | 1.972 | 46 | 1.954 | Glacial drift | $\mathrm{Ha}_{2} \mathrm{rd}$, iron | 44 | D, S | Sufficient for 30 head stock. |
| $\delta$ | NE. | 7 | " | " | " | Bored \& Dug | 32 | 1,955 | - 30 | 1.925 | 32 | 1,923 | Glacial sand | Hard | 43 | D, S | Sufficiant for 40 head stock. |
| 9 | SE. | 11 | " | " | 11 | Dug | 13 | 1.940 | - 6 | 1,934 | 13 | 1,927 | Glacial drift | Hard |  | D | Sufficient only for house. |
| 10 | SW. | 13 | " | H | " | Dug | 40 | 1,955 | - 25 | 1,930 | 40 | 1,915 | Glacial sand | Hard, iron | 43 | D, S, I | Oversufficient for 10 head stock. |
| 11 | SE. | 14 | * | " | 11 | Bored | 50 | 1,940 | - 20 | 1,920 | 50 | 1.8884 | Glacial sand | Hard, iron, "alkaline" | 43 | S | Just sufficient for 30 head stock. |
| 12 | NE. | 14 | $\stackrel{H}{ }$ | \# | " | Drilled | 000 | 1,923 | -100 | 1.623 | 000 | 1.323 | Lea Park | Soft |  | N | Second well by dugout; dugout supplies stock: |
| 13 | S | 15 | " | " | " | Dig | 18 | 1,950 | - $1+$ | 1,930 | 18 | 1.938 | Glacial drift | Hard, iron | 43 | D | Sufficient for house; © O-foot well unfit for use; slough for stock. |
| 14 | NTE. | 10 | " | " | $\because$ | bored | 113 | 1,945 | - 70 | 1,875 | 113 | 1.832 | Glacial drift | Soft |  | D, S | use; slough for stock. <br> Sufficient: waters 25 head stock. |
| 15 | STI. | 17 | * | " | " | Bored | 0 | 1,955 | - 75 | 1,800 | 80 | 1,875 | Glacial drift | Hard, iron | 44 | D, S | Oversufficient for 50 head stock. |
| 16 | NTE. | 17 | " | " | " | Dag | 10 | 1,985 |  |  |  |  | Glacial drift | Soft |  | D | Firir supjly of seepage water; drilled well also used for 20 head stock; laxative. |
| 17 | ST. | 19 | " | " | " | Bored | 80 | 1.948 | - | 1,888 | 80 | 1,808 | Glacial drift | Hard, iron, "alkaline" |  | $\mathrm{D}_{3} \mathrm{~S}$ | Sufficiant; rore than 20 head stock watered; 20-foot well, soft water, umused. |
| 18 | NW. | 21 | " | " | " | Boreá | 31 | 1,900 | - 10 | 1,890 | 31 | 1,809 | Glacial drift | Hard, i ron, "alkaline" | 43 | S | Laxative; cistern of rain Witer for domestic use. |
| 19 | NT. | 22 | n | n | " | Dug | 30 | 1,915 | - 1 | 1,914 | 30 | 1.885 | Glacial drift | Hará, iron, "alicaline" | 45 | S | Insufficient for 8 head stock; intermittent supply; cistern for horise use. |
| 20 | SE. | 24 | " | " | " | Bored | 28 | 1,920 | - 18 | 1,902 | 28 | 1,892 | Glacial drift | Hard, i ron | 44 | D, S | Barely sufficient for 20 head stock. |
| 21 | Nin. | 24 | " | " | $\therefore$ | Drilled | 604 | 1,920 | - 70 | 1,850 | 604 | 1.316 | Lea Park | Soft, soda | 44 | D, S | Oversufficient for 50 head stock. |
| 22 | NE. | 27 | " | " | " | Bored | 25 | 1,896 | - 7 | 1,889 | 25 | 1,871 | Glacial drift | Soft |  | D | Sufficient for house; 30-foot well suoplies |
| 23 | NW. | 29 | " | " | " | Bored | 42 | 1,896 | - 15 | 1,881 | 42 | 1.854 | Glacial black | Hard | 144 | D. S | 10 head stock. <br> Sufficient for 50 head stock. |



| $\begin{aligned} & \text { WELL } \\ & \text { No. } \end{aligned}$ | LOCATION |  |  |  |  | TYPE OF WELL | $\begin{gathered} \text { DEPTH } \\ \text { OF } \\ \text { WELL } \end{gathered}$ | Altityde WEIL (above sealevel) | Height to which Water will Rise |  | PRINCIPAL WATER-BEARING BED |  |  | CHARACTER of WATER | $\begin{array}{\|c} \text { TEMP. } \\ \text { OF } \\ \text { WATER } \\ \text { (in } \left.{ }^{\circ} \mathrm{F} .\right) \end{array}$ | USE TO WATER IS PUT | YiELD AND REMARKS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1/4 | Sec. | Tp. | Rge. | Mer. |  |  |  | $\begin{aligned} & \text { Above (+) } \\ & \text { Below ( } \\ & \text { Surface } \end{aligned}$ | Elev. | Depth | Elev. | Geological Horizon |  |  |  |  |
| 24 | NE. | 30 | 29 | 5 | 3 | Dug | 30 | 1,897 | - 30 | 1,857 | 36 | 1.861 | Glacial drift | Hard | 43 | D | Just sufficient for bouse use; 45-foot mell |
| 25 | St. | 31 | - | n | " | Bored | 100 | 1,895 | - 20 | 1,875 | 100 | 1.795 | Glacial drift | Hard, "alk- | 43 | 5 | jaters 30 head stock. |
| 25 | N:\% | 31 | " | " | " | Dug | 40 | 1,845 | - 6 | 1,839 | 40 | 1,805 | Glacial drift | aline" <br> Hard, iron | 44 | D. S | supplies house. <br> Sufficient for house only during summer: dug- |
| 37 | NT. | 32 | " | " | " | Drilled | 240 | 1,849 |  |  | 240 | 1.609 | Belly River | Soft, soda | 40 | D, S | out for stock. ab:zindant supply. |
| 28 | 3 iii . | 33 | " | " | " | Drilleã | 020 | 1,895 |  |  | 620 | 1,275 | Lua Park | Soft, soda | 40 | D, S |  |
| 29 | Nus. | 33 | " | " | " | Drilleã | 900 | 1,865 | $-30$ | 1,835 | 900 | 905 | Lea Park | Soft, soda | 48 | D, s | -bundant supply |
| 30 | Sin. | 34 | , | " | " | Urilled | 252 | 1,074 | - 35 | 1.849 | 202 | 1,012 | Belly River | soft, soda | 45 | D, S | Abundant supply; \#. |
| 31 | Sti. | 35 | " | " | " |  | 020 | 1,888 |  |  | 20' | 1,202 | Lea Park | Soft |  |  | Place doserted. |
| 32 | Sii. | 30 | " | " | " | Bored | 45 | 1,886 | - 10 | 1,870 | +5 | $7.8+1$ | Glacial drift | Hard | 43 | -3, | Sufficient for 200 hoaur stock. |
| 1 | NE. | 2 | 30 | 3 | 3 | 30 cc | 22 | 2.015 | - 10́ | 1,999 | 22 | . 999 | Macial arift | Hard, i ron | 43 | D, S | Just sufaricient for 15 head stook. |
| 2 | NH. | 4 | " | " | " | Borea | 80 | 1,900 | - 38 | 1.922 | 80 | 1.800 | Glacial drift | fiar | 43 | D, S | Sufficient for 40 head stock. |
| 3 | NB. | 6 | " | " | " | Boreà | 85 | 1.850 | - 4 | 1,845 | 25 | . 625 | alacial drift | Hard | 44 | D, S | Sufficient supoly. |
| 4 | N40 | 9 | " | " | " | Borea | 30 | 1.990 | - 24 | 1,900 | 30 | 1.900 | Olacial graval | $\mathrm{Ha}_{2} \mathrm{rd}$ | 43 | D | Sufficient only for house; 45-foot well surpiies stock. |
| 5 | NE. | 11 | " | " | " | Borei | 60 | 2,040 | - 30 | 2,010 | 00 | . .980 | Glacial sand | $\begin{aligned} & \text { Hard, "alir- } \\ & \text { aline" } \end{aligned}$ | 43 | S | Sufficicnt for 50 head stock; not suitable not for house use. |
| ó | SE. | 12 | " | " | " | Drilled | 130 | 2,075 | -100 | 1.975 | 130 | 1.945 | Glacial sand | Hard, iron, "alkalina" | 42 |  | Sufficient for 20 hean stocy. |
| 7 | NE. | 12 | n | " | " | Drislea | 315 | 2,080 | - 90 | 1,990 | 315 | +.705 | Glacial drift | Hard |  | D, S | Just sufficient; abundant supply till sand. came in |
| 8 | Sin. | 14 | " | " | " | Bored | 33 | 2,010 | - 24 | 1.985 | 33 | 1.977 | Glacial drift | Hard | 43 | D, S | Sufficient for 20 head stock. |
| 9 | Sis. | 16 | " | u | " | Bored | 40 | 1.995 | - 10 | 1.985 | 40 | 1,955 | Glacial drift | $\begin{aligned} & \text { Hard, nalk- } \\ & \text { alinuln } \end{aligned}$ | 44 | s | Sufficient for 100 huad stocr; 30-foot mell |
| 10 | SE. | 17 | " | " | " | Bored | 54 | 1,945 | - 19 | 1.920 | 54 | , 891 | Glacial drift | aline" | 43 | D.s | supolies house. <br> Sufficient for 50 head stock. |
| 11 | SE. | 18 | " | " | " | Boreá | 45 | 1,910 | -21 1 | 1.889 | 45 | 1.805 | Glacial drift | Hard, iron, | 43 | D, S | Sufficient for 75 head stock. |
| 12 |  | 20 | " | " | 1 | Bored | 75 | 1,940 | - 40 | 1,900 | 75 | 1,805 | Glacial sand | Eard, iron. | 43 | D, S | \$ufficient for 50 head stock. |
| 13 | Now. | 21 | " | " | 11 | Bored | 60 | 2,000 | - 40 | 1,900 | 50 | 1.940 | Glacial sand | Hard, iron, malxaline" | 43 | i, s | Sust sufficiunt. |
| 14 | Stix. | 22 | " | $\because$ | " | Borua | 105 | 2,000 | - 35 | 1,905 | 105 | 2,895 | Glacial sand | Hard, iron | 42 | D, s | fbundant supply. |
| 15 | Sti. | 23 | " | n | n | Borea | yo | 2,046 | - 202 | 2,025 | $30^{\circ}$ | 2,010 | Glacial sand | Hard |  | D, S | Sufficiunt for 25 haad stock. |
| 10 | Niv. | 23 | " | " | " | Bored | 95 | 2,010 | - 25 I | 1.985 | 95 | 1,915 | Glacial sand | fard, iron | 43 | D, S | cbundant supply. |
| 17 | Nii. | 24 | " | " | " | Bored | 60 | 2,080 | - 30 e | 2,050 | $\bigcirc$ | 2,020 | glacial sand | Frard | 43 | P, S | mmle for 20 head stock. |
| 10 | Sir. | 25 | " | * | " | Bor $e d$ d | 62 | 2,090 | - 37 e | 2,053 | $\bigcirc 2$ | 2,02\% | Glacial drift | Hard, iron | 42 | D, S | Sufficient for 150 head stock, |
| 19 | Nir. | 25 | " | " | " | Bor ${ }^{\text {d }}$ | 45 | 2,080 | - 25 2 | 2,055 | 45 | 2.035 | glacial drift | Hard | 45 |  | ample supply for 20 head stock. |

WELL RECORDS－－Rural Municipality of ROSEDATE MO．．． 283 ．SuSKaTCHERANI．

| WELL No．$\qquad$ | LOCATION |  |  |  |  | TYPE OF WELL | $\begin{gathered} \text { DEPTH } \\ \text { OF } \\ \text { WELL } \end{gathered}$ | Altitude <br> Well <br> （above sea level） leve | HeIght to which Water will Rise |  | PRINCIPAL WATER－BEARING BED |  |  | CHARACTER OF WATER | TEMP． OF WATER （in ${ }^{\circ} \mathrm{F}$ ． | USE TOWHICH WATER IS PUT | YiELD AND REMARKS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 3／4 | Sec． | Tp． | Rge． | Mer． |  |  |  | $\begin{aligned} & \text { Above (+) } \\ & \text { Below (-) } \\ & \text { Surface } \end{aligned}$ | Elev． | Depth | Elev． | Geological Horizon |  |  |  |  |
| 20 | S．i． | 20 | 30 | 3 | 3 | Bored | 100 | 2，025 | － 60 | 1，965 | 100 | 1.925 | Glacial drift | Fard，iron | 42 | D，S | Sufficient for 200 head stock． |
| 21 | NE． | 27 | ＂ | ＂ | ＂ | Bored | 143 | 2，010 | － 33 | 1977 | 143 | 1，807 | Glacial sand | Hard，iron | 43 | D，$S$ | Abundant sup̣ly． |
| 22 | NT． | 27 | ＂ | ＂ | ＂ | Bored | 90 | 2，020 | － 30 | 1．990 | 90 | 1.930 | Glacial sand | Hara，iron | 43 | S | amole suoply． |
| 23 | NE． | 28 | ＂ | ＂ | ＂ | Bored | 78 | 2，038 | － 45 | 1，993 | 70 | 1.900 | Glacial sand | Hard，iron | 41 | D．S | Sufficient；waters 15 head stock． |
| 24 | Viv． | 30 | ＂ | ＂ | ＂ | Dag | 33 | 1，925 | － 0 | 1，919 | 33 | 1，892 | Glacial drift | Hard |  | s | Insufficient；water hanled． |
| 25 | 滩． | 31 | ＂ | ＂ | ＂ | Borea | 100 | 1，940 | － 10 | 1，930 | 100 | 1，840 | Glacial sand | $\mathrm{Hara}^{\text {d }}$ |  | D，S | ample supply；aiso 60－foot flowing well；\＃． |
| 20 | Nu． | 32 | ＂ | ＂ | 11 | Bored | 80 | 2，000 | － 15 | 1，985 | 60 | 1，920 | Glacial sand | Hard | 43 | D，S | Sufficient for 150 head stock． |
| 27 | NE． | 34 | ＂ | 11 | ＂ | Bored | 87 | 2，030 | － 30 | 2，000 | 87 | 1，943 | Glacial sand | Hard，iron， ＂alkaline＂ | 42 | D， $\mathbf{S}$ | Sufficient for 60 head stock． |
| 1 | 週。 | 1 | 30 | 4 | 3 | Drilled | 290 | 1，844 | ＋ 18 | 1，802 | $290^{\circ}$ | 2.548 | Belly River | Soft，soda |  | D，$S$ | Ample supply；dugout for cattle． |
| 2 | SE． | 3 | 1 | 11 | ＂ | Drilled | 276 | 1，825 |  |  | 276 | 1，549 | Belly River | Soft |  | D，S | Sufficient supply；\＃；flowing spring． |
| 3 | 湍． | 4 | 11 | \％ | ＂ | Drilled | 298 | 1，831 |  |  | 298 | 1，533 | Belly River | Soft，soda |  | D．S | Sufficient for house and stock；flowing wlll． |
| 4 | SE ． | 4 | ＂ | n | ＂ | Drilled | 320 | 1，835 | ＋6 | 1.842 | 320 | 1，515 | Belly River | Soft，soda |  | D，$S$ | Sufficient for house and stock． |
| 5 | SE． | 5 | ＂ | ＂ | ＂ | Drilled | 450 | 1，855 |  |  | 450 | 1，405 | Lee Parix | Soft，soda |  | D，S | Sufficient for house and 7 head stock；orig－ inally flowed；\＃． |
| 6 | SE． | 6 | 11 | ＂ | n | Drilled | 398 | 1，801 | － 15 | 1．840́ | 398 | 1，463 | Lea Park | Soft，soda |  | D，S | Sufficient supply． |
| 7 | NE． | 7 | 11 | ＂ | ＂ | Drilled | 330 | 1，842 | － 40 | 1，802 | 330 | 1.512 | Bolly River | Soft，salt |  | D，S | Sufficient supply． |
| 8 | Niv． | 10 | n | ＂ | ＂ | Drilled | 387 | 1，811 |  |  | 387 | 1，+24 | Lea Park | Soft，soda |  | D，S | Sufficient supply；flowing well． |
| 9 | NTI： | 12 | ＂ | n | ＂ | Drilled | 359 | 1.835 |  |  | 359 | 1.476 | Lea Park | Soft，soda |  | D， S | Sufficient supply；flowing rell： |
| 10 | ＊2． | 12 | ＂ | ＂ | ＂ | Drilled | 329 | 1，852 |  |  | 329 | 1，523 | Belly River？ | Soft |  | D，S | Sufficient：flowing well；waters 29 head stock：\＃． |
| 11 | NE． | 13 | ＂ | ＂ | \＃ | Bored | 2 | 1，885 |  |  | 206 | 1，839 | Glacial sand， fine | Hard，iron， sitghty |  | D，S | Sufficient for house and stock；creek sumplies stock in spring． |
| 12 | NT． | 14 | ＂ | ＂ | ＂ | Dri lled | 280 | 1，832 | － 8 | 1，824 | 280 | 1.552 | Belly River | －atralipe！ Soft，loda |  | D，S | Sufficient for 30 head stock． |
| 13 | NT． | 15 | ＂ | $"$ | ＂ | Drilled | 265 | 1，820 | － 20 | 1，800 | 265 | 1.555 | Belly River | Soft，soda |  | D．S | Sufficient for 60 head stock；\＃． |
| 14 | SE． | 18 | ＂ | ＂ | ＂ | Drilled | 200 | 1，853 | － 30 | 1.817 | 200 | 1，053 | Belly River | Soft |  | D，S | Sufficient supply． |
| 15 | N：I． | 19 | ＂ | ＂ | ＂ | Bored | 80 | 1，800 |  |  | 80 | 1，720 | Glacial mand | dard |  | D，S | Sufficient for 40 head stock；creek also |
| 16 | NE． | 20 | 11 | ＂ | ＂ | Bored | 96 | 1，810 | － 30 | 1，780 | 90 | 1，724 | Belly River | Soft，salty |  | D，S | supolies cattle． <br> Sufficient for 60 head a tock；在． |
| 17 | NW． | 23 | ＂ | ＂ | n | Bored | 80 | 1． 835 | － 12 | 1．623 | 80 | 1．755 | Belly River | Soft，soda |  | D，S | Abundant eupply；slightly laxative． |
| 18 | NT， | 24 | ＂ | ＂ | ＂ | Bored | 80 | 1，915 | － 37 | 1，878 | 80 | 1.835 | Glacial drift | $\begin{aligned} & \text { Very hari, } \\ & \text { iron } \end{aligned}$ |  | $D, S$ | Sufficient；waters 14 head stock． |
| 19 | Niv． | 25 | n | － 11 | ＂ | Bored \＆ <br> Drilled | 165 | 1，905 | － 55 | 1，850 | 185 | 1．720 | Belly River | Soft |  | D，$S$ | Sufficient supply；\＃． |
| 20 | NE， | 26 | n | ＂ | 11 | ．．Bored | 135 | 1，895 | －$\quad 0$ | 1，835 | 135 | 1，700 | Beliy River | Soft | 1 | D，S | Sufficient supply． |


| WELL No． | LOCATION |  |  |  |  | TYPE OF WELL | $\left\|\begin{array}{c} \text { DEPTH } \\ \text { OF } \\ \text { WELL } \end{array}\right\|$ | Altitude WELL <br> （above sea level） | HETCHT TO WHICH Water will Rise |  | PRINCIPAL WATER－BEARING BED |  |  | CHARACTER OF WATER | TEMP．OFWATER（in ${ }^{\circ} \mathrm{F}$ ） | USE TO WHICH WATER IS PUT | YIELD AND REMARKS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1／4 | Sec． | Tp． | Rge． | Mer． |  |  |  | $\begin{aligned} & \text { Above (+) } \\ & \text { Below (-) } \\ & \text { Surface } \end{aligned}$ | Elev． | Depth | Elev． | Geological Horizon |  |  |  |  |
| 21 |  | \＄． 27 | 30 | 4 | 3 | Bored | 77 | 1．830 | － 22 | 1.808 | 77 | 1，753 | Belly River | Very oft， |  | D，S | Sufficient supply；not very palatable |
| 22 |  |  |  | ＂ | ＂ | Bored | 50 | 1.780 | － 47 | 1．733 | 50 | 1，724 | Belly River | soda，iron Soft，soda |  | D，S | drinking water often hauled；\＃． Sufficient supply： |
| 23 |  | 7． 32 | ＂ | ＂ | ＂ | Drillea | 90 | 1.790 | － 20 | 1，770 | 90 | 1.700 | Belly river | Hard |  | D，S | Sufficient supply：the wellhas become f |
| 24 |  | －1． 32 | ＂ | ＊ | ＂ |  |  |  |  |  |  |  |  |  |  |  | to 70 feet with sand． |
| 24 |  | 1． 32 | ＂ | ＂ | ＂ | Drilled | 90 | 1，025 | － 50 | 1.707 | 90 | 1，735 | Glacial fine grey sand | $\begin{aligned} & \text { Hard, roda, } \\ & \text { iron } \end{aligned}$ |  | D，S | Sufficient supply；\＃． |
| 25 |  | 8． 34 | ＂ | ＂ | ＂ | Dug | 67 | 1，860 | － 39 | 1，821 | 67 | 1，793 | Glacial blue sand | iron <br> Hard，i ron， ＂alkaline＂ |  | D，S | Sufficient supply． |
| 20 |  | ． 35 | ＂ | n | ＂ | Boret | 110 | 1，090 | － 50 | 1.040 | 110 | 1，780 | Bearpar？ | Soft |  | D，S | Sufficient for 110 head stock |
| 27 |  | ． 35 | ＂ | ＂ | 11 | Bored | 90 | 1，905 | － 50 | 1．85年 | 90 | 1，815 | Bearpam？ | Soft |  | N | Water frauled；many dry holes to 20 feet． |
| 28 |  | － 30 | \＃ | ＂ | ＂ | Drilled | 150 | 7.900 | － 50 | 1，050 | 158 | 1．742 | Belly River | Sxft，soda |  | D，S | Sufficient for 30 head stock， |
| 29 |  | －30 | ＂ | ＂ | ＂ |  | $\bigcirc 0$ | 1，940 |  |  | 80 | 1，800 | Glacial drift | Hard |  | D． S | Sufficient supply；also similar mell． |
| 1 |  | ． 1 | 30 | 5 | 3 | －Dug | 27 | 1，850 | $-13$ | 1.837 | 27 | 1，8゙23 | Glacial drift | ＂alkaline＂． |  |  | Used for washing；no stock；hauls drinking water． |
| 2 |  | ． 2 | ＂ | ＂ | \＃ | Bored | 37 | 2.445 | － 15 | 2，430 | 37 | 2，408 | Glacial gravel | Hard，iron |  | D．S | This and similar well maters house and 20 |
| 3 | S 4 | 月． 2 | ＂ | ＂ | ＂ | Borea | 35 | 1，070 | － 19 | 1，851 | 35 | 1，835 | Glacial drift | Hard |  | D，S | head stock． <br> Sufficient supply． |
| 4 |  | ， 3 | ＂ | ＂ | n | Bored | 38 | 1，850 | － 20 | 1，830 | 36 | 1，612 | Glacial drift | ＂Alkaline＂ |  | S | Farm desertec；well in slough， 25 feet deep． |
| 5 | NW | ． 4 | ＂ | ＂ | $\prime$ | Drilled | 122 | 1.855 | － 40 | 1，815 | 122 | 1，733 | Belly River | Soft |  | D，S，I | Sufficient for 50 head stock；\＃． |
| 0 | N | ． 5 | ＂ | ＂ | ＂ | Bored | 57 | 1，840 | － 14 | 1，020 | 57 | 1.783 | Glaci al sand |  |  |  | Also a dugout． |
| 7 | NE | ． 9 | ＂ | ＂ | ＂ | Bored | $\infty$ | 1，840 | － 40 | 1，800 | 50 | 1，780 | Glacial sand | Fairly hard． |  | D，S | Sufficient for house and 35 head stock． |
| 0 |  | ． 11 | ＂ | n | ＂ | Drilled | 93 | 1，825 |  |  | 93 | 1.732 | Glacial fino <br> blacksand | Hard，iron |  | S | Taters 25 head stock；second mell for house use． |
| 9 |  | ． 14 | ＂ | ＂ | ＂ | Bored | 30 | 1，810 | － 20 | 1，790 | 30 | 1，780 | Glacial drift | Hard |  | D， S | Sufficient for house and 30 head stock． |
| 10 | SE． | ． 14 | ＂ | ＂ | ＂ | Bored | 42 | 1，610 | － 35 | 1，775 | 42 | 1，768 | Glacial drift | Hard． |  | D， S | smole sumply． |
| 11 | NE． | ． 15 | ＂ | ＂ | ＂ | Bored | 40 | 1.805 |  |  | 40 | 1．765 | Glacial drift | Hard，＂alk－ |  | S | Sufficient for atock；hauls drinking water； |
| 12 | Sit． | ． 15 | ＂ | ＂ | ＂ | Bored | 48 | 1.828 | － 28 | 1，800 | 48 | 1，780 | Glacial sand | aline＂ Fairly hard |  | D，S | Sufficient for 70 head stock；also supplies |
| 13 | NE， | ， 20 | ＂ | ＂ | ＂ | Drilled | 186 | 1．772 | － 4 | 1，768 | 186 | 1，580 | Belly River | Soft |  |  | neighbours；\＃ |
| 14 | NE． | ． 20 | ＂ | ＂ | ＂ | Bored | 28 | 1.772 | $-23$ | 1，749 | 28 | 1，744 | Blacial drift | Hard |  | $\checkmark$ | Trouble with pump；farm unoccupiod，shallow |
| 15 | ST． | ． 20 | n | ＂ | ＂ | Dug | 18 | 1，850 | － 14 | 1.830 | 18 | 1，832 | Glacial and | Hard |  | $D, S$ | well used for house across road． <br> Sufficient for 23 head stock；18－foot well： |
| 10 | S＊． | ． 23 | 1 | 11 | ＂ | Bored | 58 | 1.825 | － 40 | 1，779 | 58 | 1，707 | Glacial sand | Hard，iron， ＂alk：line＂ |  | P，S | unused． <br> Sufficient for house and 9 head stock． |
| 17 | NT． |  | ＂ | ＂ | ＂ | Drilled | 444 | 1，800 | －- | 1，740 | 444 | 1，350 | Lea Park | Soft，salty， |  | S | Insufficient for stock；hauls drinking water； |
| 18 | NE． | － 27 | ＂ | 11 | ＂ | Dug | 33. | 1．775 | － 14 | 1，761 | 33 | 1，742 | Glacial drift | gaseous Hard |  | D | creek waters stock；\＃， <br> Farm unoccupied；water hauled to another <br> farm；产． |

WELL RECORDS--Rural Municipality of
ROSEDAE NO. 284 , SASKATCHEWAN



| WELL No． | LOCATION |  |  |  |  | $\begin{gathered} \text { TYPE } \\ \text { OF } \end{gathered}$WELL | $\begin{gathered} \text { DEPTH } \\ \text { OF } \\ \text { WELL } \end{gathered}$ | Altitude Well （above sealevel） | Hetght to which Water will Rise |  | PRINCIPAL WATER－BEARING BED |  |  | CHARACTER OF WATER | TEMP． OF WATER （in ${ }^{\circ} \mathrm{F}$ ．） | USE TO WHICH WATER IS PUT | YIELD AND REMARKS |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | 1／4 | Sec． | Tp． | Rge． | Mer． |  |  |  | $\begin{gathered} \text { Above ( }(+) \\ \text { Below }(-) \\ \text { Surface } \end{gathered}$ | Elev． | Depth | Elev． | Geological Horizon |  |  |  |  |
| 15 | NE． | 18 | 31 | 4 | 3 | Drilled | 312 | 1，770 |  |  | 312 | 1.458 | Lea Parir | Soft；sode |  | D，S | Flowing well supolies 20 head stock． |
| 19 | SW． | 19 | ＂ | ＂ | n | Drilled | 227 | 1，731 | $+22$ | 1，753 | 227 | ． 504 | Lea Park | Soft，sada | 40 | D．S | Abundant supply：\＃ |
| 20 | ST． | 20 | ＂ | ＊ | n | Dug | 10 | 1，779 | － 4 | 1.775 | 10 | 1．769 | Glacial drift | Hard，iron | 42 | D．S | Sufficient suoply． |
| 21 | SE． | 23 | ＂ | ＂ | ＂ | Bored | 60 | 1，930 | － 40 | 1，890 | 60 | ． 870 | Glacial drift | Hard，i ron， ＂alkaline＂ | 43 | S | Intermittent supply；spring use for house and stock． |
| 22 | SEt． | 24 | ＂ | ＂ | ＂ | Bored | 25 | 2，020 | － 15 | 2，005 | 25 | －，995 | Glacial sand | Hard，iron | 43 | D，S | Sufficient for 40 head stock． |
| 23 | NW． | 27 | ＂ | ＂ | n | Drilled | 300 | 1，850 | － 19 | 1，831 | 300 | 1． 550 | Glacial drift | Haris iron． ＂alkaline＂ | 41 | D，S | Sufficient for 25 head stock；alsa 127－foot vell：unused．spring in pasture． |
| 24 | NV． | 30 | ＂ | n＇ | n | Drilled | 20.4 | 1.732 |  |  | 204 | 1．528 | Lea Park | Soft，soda | 40 | D，S | Abundant supply． |
| 25 | SE， | 33 | 11 | ＂ | ＂ | Dug | 3 | 1，730 | － 0 | 1，730 | 3. | 1，727 | Recent alluvium | $\mathrm{Hard}_{\mathrm{g}}$ ，iron． Malraline＂ | 44 | D，S | Sufficient for 10 head stock． |
| 20 | S\％． | 34 | ＂ | ＂ | ＂ | Drilled | 112 | 1，850 | － 8 | 1，842 | 112 | 1．738 | Glacial drift | Hard，irom， | 44 | D．S | fnsufficient owing to filling in． |
| 27 | SE． | 35 | ＂ | ＂ | ＂ | Bored | 40 | 1.970 | － 25 | 1．945 | 40 | 1.930 | Glacial sand | Hard，slight－ | 43 | $\mathrm{D}_{0} \mathrm{~S}$ | \＄ufficient for 15 head stock． |
| 28 | SE． | 30 | ＂ | ＂ | ＂ | Bored | 50 | 2，080 | － 45 | 2， 035 | 50 | 2，030 | Glacial drift | Hard | 44 |  | Sufficient for house：ló－foot well waters 30 head stock． |
| 29 | NTV． | 36 | ＂ | ＂ | ＂ | Bored | 40 | 1，900 | － 10 | 17．950 | 40 | 1.920 | Glacial drift | Hard | 42 | $D=S$ | Insufficient；waters 11 head stock． |
| 1 | $8 \mathrm{Sin}_{5}$ | 1 | 31 | 5 | 3. | Dag | 9 | 1，740 | － 6 | 10．734 | 9 | 1，731 | Glacial fine sand | Hard |  |  | Insufficient supnly；hauls drinking water and stock water in winter． |
| 2 | NE． | 2 | \＃ | ＂ | ＂ | Drilled | 401 | 1．750 | － 2 | 1．748 | 401 | 1，349 | Lea Park | Soft，salty |  |  | Sufficient only for stock use；also similar well：drinking water hauled． |
| 3 | SE． | 4 | H | ＊ | n | Dug | 14 | 1．770 |  |  |  |  | Glacial fine sand | Hard |  | D，$S$ | Insufficient sup ly；supplies house and small number of stock；five shallow wells supply |
| 4 | SE | 5 | ＂ | ＂ | ＂ | Dug | 15 | 1，760 | － 13 | 12．747 | 15 | 3， 745 | Glacial drift | $\begin{aligned} & \text { fard, "alk- } \\ & \text { qline" } \end{aligned}$ |  | $s$ | 10 head stock；water hauled． Insufficient：also well in slough and $24-$ foot well；these wells water 20 head stock； |
| 5 | SE． | 6 | \＃ | ＂ | ＂ | Drge | 12 | 1，745 | － 11 | 1.734 | 12 | 1.733 | Glacial sand | 4ard |  |  | drinking water hauled． Just sufficient for house use；several dry holes；stock water hauled． |
| 6 | SE． | 9 | ＂ | $\cdots$ | ＊ | Dug | 15 | 1，760 | － 14 | 1． 746 | 15 | 1，745 | glacial drift | Hard |  |  | House deserted． |
| 7 | SE． | 10 | ＂ | ＂ | ＂ | Dug | 13 | 1.750 | － 12 | 1．738 | 13 | 1，737 | Glacial sand | ＂1ard，slight－ ly＂alkaline＊ |  | P．$s$ | Used for house and horses；slough and creek fior cattle；water hauled in winter． |
| 8 | ST． | 10 | ＂ | ＂ | ＂ | Dug | 16 | 1.755 | － 12 | 1.743 | 16 | 1.739 | ＊lacial drift | 㖒的 |  | $D$ | Sufficient only for house；creak used for stock；water hauled in winter． |
| 9 | NTE | 12 | ＂ | ＂ | ＂ | Dug | 16 | 1，730 | － 15 | 1，730 | 16 | 1，714 | Glacial gravel | Hexd，slight－ ly＂alkaline＂ |  | D | Barely sufficient for house；creek used fof stock；water hauled． |
| 10 | SW． | 12 | ＂ | $\cdots$ | ＂ | Dug | 14 | 1，740 | － 11 | F．729 | 14 | 1.726 | Glacial sand | Hard |  | s | Sufficient for 40 to 50 head stock：14－foot Mell for house use． |
| 11 | NE． | 14 | ＂ | ， | （1） | Bored | 18 | 1，730 | －16 | 1． 714 | 18 | 1，712 | Glacial drift | Hard．Malk－ eline＂ |  | S | Insufficient for local needs；drinking water hauled． |
| 12 | NiW． | 14 | ＂ |  | n | Dug | 17 | 1，735 | － 15 | 1.720 | 17 | 1，718 | Glacial sand | soft |  | D | Sufficient only for house use；creek waters a2 head stock． |
| 13 |  |  |  |  |  | Dag | 14 | 1，740 | － 9 | 1.731 |  | 1．720 | Glacial drift | Hard |  | \＄ | umple supply；no house on quarter－section． |
| 14 | SE． | 26 | ＂ | n |  | Drilled | 200 | 1，740 |  |  | 200 | 1.540 | Lee Park 7 | Soft． |  |  | 聏ters horses and 22 head cattle；\＃．Also 16－foot well for drinking． |




[^0]:    1 If the well-site is near the edge of the municipality, the map and repert dealing with the adjoining municipality should be consulted in order to obtain the needed information about nearby wells.

[^1]:    Water samples indicated thus, $\#$, are from glacial drift or other unconsolidated deposits.
    Water samples indicated thus, $x 2$, are from bedrock, Belly River formation.
    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 ( $\mathrm{CaCO}_{3}$ ).

