CANADA
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PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF BIG STICK NO. 141 SASKATCHEWAN

By
B. R. MacKay, and D. C. Maddox

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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF BIG STICK, NO. 141 SASKATCHEWAN

INTRODUCTION

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

Publication of Results

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

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

How to Use the Report

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

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

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

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

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

GLOSSARY OF TERMS USED

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Big Stick, No. 141, covers an area of 324 square miles in southern Saskatchewan, and comprises townships 13, 14, and 15, ranges 25, 26, and 27, W. 3rd mer. The approximate centre of the municipality is about 19 miles north of the town of Maple Creek, being 81 miles north of the International Boundary and 23 miles east of the Saskatchewan-Alberta boundary. The Canadian Pacific railway passes through the northwest part of township 27, range 14, and Golden Prairie, the terminus of this line, is the largest centre of population in the municipality.

Maple creek, which occupies a broad, shallow valley, is a permanent stream that enters the municipality in the southwest corner of sec. 5, tp. 13, range 26, and flows in a generally northeasterly direction to Bigstick lake, in township 25, range 15. This is a permanent lake, the water of which is 10 feet deep in places, but it is too "alkaline" for watering stock. Tenaille lake, which discharges into Maple creek, is a permanent lake in township 13, range 26. The water-level of the lake is about 2,379 feet above sea-level. Two intermittent streams enter Maple creek from the west in township 13, range 26, and one of these streams extends into the adjacent municipality on the west. There are several dry lake bottoms in townships 13, 14, and 15, range 26, and in township 14, range 27.

Most of the land surface is flat to gently undulating, but in the northeastern and the northwestern parts of the municipality the country is decidedly rolling, and some of the hills rise to over 2,600 feet above sea-level. The western end of the Great Sand Hills lies in township 14, range 25, but there the hills are low. The valley of Maple creek, and of the intermittent streams in the southwest part of the municipality, are floored by glacial lake clay. Glacial lake sands border the glacial lake clay and underlie

a large part of the municipality. Dune sands form the Great Sand Hills and cover an area about 6 miles long and 1 mile wide in the southern part of township 14, range 27, and two small, detached areas, one of which is in the valley of Maple creek, about 2 miles from Bigstick lake and the other in secs. 4 and 5, tp. 14, range 25. Moraine underlies the hilly parts of the northeast and the northwest, and about 3 square miles in township 13, range 25. Boulder clay underlies a large part of the western and northern parts of the municipality, and there are two detached areas of boulder clay in township 13, range 25. The distribution of the unconsolidated deposits is very irregular, and the reader is referred to Figure 1 of the accompanying map for a more exact description of their distribution. The Bearpaw formation underlies the glacial drift over the entire municipality except about 3 square miles in the valley of the intermittent stream in township 13, range 27, where the Belly River formation underlies the glacial drift.

Water-bearing Horizons in the Unconsolidated Deposits

Great ice-sheets having their centres in the northeast part of Canada advanced and retreated at least three times over southern Saskatchewan, and each carried with it an immense mass of boulders, rock flour, and soil, which in transit became mixed with rock and soil obtained locally, so that the glacial drift is a mixture of rock debris that varies widely in composition, texture, and origin. The deposits of the last ice-sheet have been classified according to their mode of origin, and are shown on Figure 1 of the accompanying map. The deposits of the earlier ice advances are buried beneath the drift of the last ice-sheet, and their presence is indicated only in well sections by yellow, oxidized zones, the tops of which represent old land surfaces, by irregular drift contacts, or by organic deposits such as peat or lignite.

The deposits of the last ice-sheet in this municipality may be briefly described. The boulder clay or till which is the most widespread of the glacial deposits and which underlies some of the more recent glacial deposits consists mainly of unstratified clay or sandy clay containing pebbles or boulders. The till is thought to have been laid down by the ice-sheet mainly during its retreat. The clay itself is nearly impervious to water, but there occurs in it porous pockets, beds, and lenses of sand and gravel that were formed by the action of the water derived from the melting ice. Unless these sandy beds are close to the surface they do not in most cases reveal their presence in any way, and a post-hole auger is generally used to locate them.

The belts of moraine are thought to have been laid down during halts in the retreat of the ice front. The topographical expression of this type of deposit is rounded hills and undrained hollows, and the moraine-covered areas in the northern part of this municipality show this typical morainal topography. In the Missouri Coteau the glacial drift is thought to have been deposited on pre-glacial hills, and it is possible that the higher parts of the moraine-covered areas in this municipality are due to such buried pre-glacial hills. The water escaping from beneath the front of the ice-sheet during its period of stagnation deposited sheets and narrow belts of sand and gravel which are enclosed in unsorted morainic material and form aquifers. The distribution of such deposits, however, is almost as irregular as the pockets in the boulder clay, so that the remarks given as to locating water in the boulder clay or till plain also apply to the moraine.

The glacial lake sands and clay, the last phase of glacial sedimentation, were formed in temporary lakes caused by the accumulation of water to the southwest of the ice front, which prevented the natural drainage of the water northeastwards. In this municipality the glacial lake sands cover a much larger area than the glacial lake clay, which underlies only the valley of Maple creek

and the valleys of the two creeks in the southwest. Ground water is usually found in the glacial lake sands at depths of 25 feet or less. In other parts the sands are quite thin, and the deeper wells pass into the underlying boulder clay. The lake clay is the poorest source of ground water of any of the glacial deposits, as it is generally fine grained and impervious to water. Most of the wells in the glacial lake clay areas either obtain only small amounts of water of poor quality from beds or sand in the clay, or else they pass through the clay and obtain water from sand and gravel in the underlying boulder clay.

The dune sands have been formed by the action of the wind on the glacial lake sands. Ground water of good quality is generally found in the dune sands within 25 feet of the surface, and sand-points are used in many places to obtain water. The circulation of ground water through the dune sands is generally fairly rapid, and the sands do not contribute much mineral matter to the water passing through them, so that this water is mostly soft.

The small precipitation in southern Saskatchewan has influenced the ground water in several ways. The lowering of the water-table in aquifers that are not deep seated has resulted in the decrease of water supply in some shallow wells, and in the drying up during drought conditions of many other shallow wells. The very poorly developed drainage system over the greater part of southern Saskatchewan, which is largely due to the small annual precipitation, has provided little if any means of escape for the mineral salts that the ground water extracts from the glacial drift. These salts accumulate in the ground water and render it "alkaline", or are carried into the undrained lakes and make the waters of these lakes unfit for use even by stock.

In some municipalities the base of the glacial drift forms rather a widespread aquifer, but in this municipality no extensive aquifer at this horizon can be outlined.

Ground water conditions in this municipality are generally good. The glacial lake sands and gravels are probably the best

source of ground water, and large supplies of good water are obtained from these sands and also from the dune sand. The moraine and boulder clay are a less reliable source of water than the glacial lake sands, but where one well does not yield sufficient water it has in most cases been possible to meet the local requirements by the use of two or more shallow wells.

Water-bearing Horizons in the Bedrock

The Belly River formation, Upper Cretaceous in age, which underlies the glacial drift in the valley of the intermittent stream in township 13, range 27, and which underlies the Bearpaw formation elsewhere in this municipality, consists principally of sandstones with subordinate amounts of shale, most of which were laid down in shallow, fresh or brackish water, but some of which were laid down in the sea. Most of these sandstones are loosely cemented and have enough porosity for the accumulation of ground water. Above the Belly River lies the Bearpaw formation which was laid down as mud in rather shallow seas, but which is now in the form of shale that is impervious and contains little or no ground water. Due to changes in the conditions of deposition, however, layers of fine-grained sand, which contain soft or salty water, are occasionally found interbedded with the shales.

Only one well, 250 feet deep, on the NW.$\frac{1}{4}$, sec. 22, tp. 13, range 26, obtains water from a bedrock aquifer. This well was drilled for oil and gas, and the water, which is soft and has a "soda" taste, is thought to come from an aquifer in the Belly River formation. The Bearpaw formation in this municipality is probably not very thick, and its water-yielding capacity has not been tested. The base of the Bearpaw formation where it is exposed near the mouth of Swiftcurrent creek, 80 miles to the northeast, is quite sandy, and soft water is obtained from aquifers at this horizon. Conditions of sedimentation vary widely, however, and it is possible that in this municipality the lower part of the Bearpaw may consist principally of shale and may contain no aquifers.

The Belly River formation in this municipality is a more likely source of ground water than the Bearpaw formation. No detailed log of the well on the NW.¼, sec. 22, tp. 13, range 26, is available. The elevation of the contact of the Belly River and Bearpaw formations in this well is not known, but it seems probable that aquifers in the Belly River formation would be encountered by wells at elevations of about 2,100 feet above sea-level, or at depths of 300 feet, except in the hilly area in the north, but the water may be rather highly mineralized. The water in the well 250 feet deep rises above the ground level to about 2,382 feet above sea-level, but no other wells in this municipality tap this aquifer, and the height to which the water will rise in wells at other places is unknown.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 13, Range 25

The maximum surface relief in this township amounts to almost 200 feet, but the surface is only moderately rolling. The highest area, of slightly less than 2,600 feet above sea-level, occurs in section 3, and the lowest areas, at 2,400 feet above sea-level, occur in parts of sections 34, 35, and 36. In the east-central part of the township and also in parts of sections 2, 3, and 4, boulder clay and moraine cover the surface, whereas the remainder of the area is mantled by glacial lake sands. The sands are thought to be in few places more than 35 feet thick, and are underlain throughout by boulder clay.

Most of the wells in this township derive water from the glacial lake sands at depths ranging from 8 to 27 feet. It appears possible to obtain water within these limits in almost all parts of the area covered by these sands. A few dry, shallow holes have been encountered, but they are uncommon. However, if a well proves dry at 35 feet it should be abandoned and a second well site chosen, as it is improbable that water will be obtained in the underlying drift between depths of 35 and 70 feet. This advice naturally does not apply to those residents who propose to drill deep wells into the bedrock. In order to save the expense of drilling a dry hole, test augers should first be employed to prospect the well site. The supply from some of the wells included in this group is small, and in places it has been necessary to sink additional wells to augment deficient supplies. The water from the wells is only moderately hard, but some of it contains such a high concentration of mineral salts in solution that its use is limited to stock.

In the areas covered by moraine and glacial till a few wells obtain water from sand or gravel pockets or lenses that occur at or near the base of the weathered or yellow boulder clay, in

most places within 35 feet of the surface. Some of the wells sunk in this area do not tap water-bearing deposits, but obtain water by direct seepage from surface water. The water-bearing deposits do not form a continuous horizon, and dry holes may be dug short distances from producing wells. A water-bearing deposit should be located by means of a test auger prior to digging a well, in order to save the expense of sinking a dry hole. The supply from the producing wells depends on the size of the aquifer tapped and also to some extent on the amount of annual precipitation. The supply from some of the wells is inadequate for farm requirements. Most of the water from the wells in this group is hard, and some of it is too highly mineralized for drinking. The information obtained pertaining to the lower or unweathered zone of the boulder clay is meagre, as only two dry holes, located on section 21, and sunk to depths of 60 and 70 feet, were recorded. Here, also, it has been found inadvisable to sink wells more than 35 feet in depth. If they prove dry to this depth they should be abandoned and a second well site chosen.

Two springs occur on sections 8 and 16. Both springs yield large supplies of water, and the overflow is retained by means of reservoirs. The water is used for stock; it is hard and highly mineralized, and is not used for domestic purposes.

Township 13, Range 26

Maple creek, a permanent stream, enters the township in section 5 and meanders in a northerly direction, leaving it in section 33. It occupies a wide, shallow valley that is mantled by glacial lake clay, and which contains swampy, undrained depressions. Tenaille lake occurs in parts of sections 20, 21, 22, 28, and 29, at an elevation of 2,379 feet above sea-level. It is a permanent body of water, and the farmers in the immediate vicinity use it to water their stock. The ground surface of the township is slightly rolling and slopes gently towards Maple creek or Tenaille lake.

The township lies within an area that in former times was the site of a glacial lake, and, as a result, glacial lake sands occur at the surface over most of the area. These deposits vary in thickness from 6 to at least 22 feet. The glacial lake clay in the valley of Maple creek is non-water bearing.

With the exception of one bedrock well, all water is derived from shallow wells sunk into the glacial lake sands. Usually only small quantities of water are obtained from an individual well, but a farmer may have two or more wells that yield sufficient water for local requirements. Sand-points driven into the sand in many cases yield adequate water for local needs. The water is soft to moderately hard, and it is usable for all farm purposes including irrigation. These wells yield adequate supplies of water for all residents of the township.

It has not been necessary to try to locate water at depth, but a company started drilling for gas in the NW.¼, section 22. Water was struck in the Belly River bedrock formation at a depth of 250 feet, or an elevation of 2,130 feet above sea-level. The water is under hydrostatic pressure, rises 6 feet above the surface, flows continuously, and has been used for all farm purposes. It is soft and tastes of baking soda, and a flow of inflammable gas accompanies the water. This is an excellent well and there is no reason to believe that wells to similar depths in other parts of the township would not encounter water-bearing beds in this bedrock formation, but as adequate supplies of water are obtained at shallow depths, there is no necessity for deep drilled wells.

Township 13, Range 27

A small, intermittent stream tributary to Maple creek flows from west to east across the central part of the township, and a smaller stream flows in an easterly direction from its source in the NE.¼, section 14. These two streams meander through a depression, about one mile wide, that is covered by glacial lake clay. This glacial lake clay-covered area consists of a series of

poorly drained "alkaline" flats that have been found unsuitable for cultivation. That part of the township south of the "alkaline" flats, and parts of the northeastern sections, are mantled by glacial lake sands which in some places extend to a depth of 25 feet below the surface. The remainder of the township is a glacial till plain.

The elevation rises gradually from 2,340 feet at the creek, which traverses the centre of the township, to a maximum of 2,460 feet in the northwest corner of the township and in the northern half of section 3. The land is rolling, unwooded, and much of it is used as pasture for stock.

Adequate supplies of water are easily obtained at depths of less than 25 feet in the glacial lake sands. The simplest method of obtaining the water is to drive a sand-point past the top of the water-table. The level of the water-table rises or lowers, depending upon the amount of annual precipitation, but no difficulty is experienced in obtaining sufficient water even in prolonged drought years such as occurred during 1930 to 1934. The water is usually hard and not highly mineralized, and it frequently contains iron.

Only one well was reported as being sunk in the "alkaline" flats region, and it is located in the NE.¼, section 17. The well was dug through 16 feet of clay, and the water, which is rarely used, is hard and the supply is small.

Water-bearing pockets of sand and gravel are very difficult to strike in the upper 90 feet of the glacial drift in the till plain. Most of the wells in this area are dug to depths of less than 25 feet, and depend to a large extent on impounded surface water for their supply. They are dug near undrained depressions, and in years of average rainfall sufficient water is as a rule obtained. These wells proved totally unreliable, however, during the drought years. Most of them are dug entirely in clay. The deepest of these intermittent seepage wells is 54 feet, and it is bored through yellow and blue clay in the NW.¼, section 35.

A bed of fine, water-bearing, blue sand, at least 10 feet thick, occurs in the blue boulder clay at an approximate elevation of 2,340 feet. Four wells, in the NE.¼, section 28, SW.¼, section 30, SW.¼, section 31, and SE.¼, section 33, 100, 130, 95, and 100 feet deep, respectively, have tapped this water-bearing horizon. The water is hard, cloudy, and contains iron, but it is used for drinking. The water rises from a quicksand aquifer under hydrostatic pressure and the supply is abundant, but much difficulty is experienced in keeping the well casings from becoming plugged with sand. The wells are bored 2 feet in diameter, and in many places coarse gravel is placed and packed in the bottoms of the wells in an attempt to control the quicksand. It was found impossible to bore through the thick bed of quicksand. Further boring in this district probably would be useless unless some reliable means of controlling the quicksand is found.

Township 14, Range 25

For the most part the surface of this township is gently to moderately rolling. Maple creek has cut a shallow ravine in the northwestern corner. The highest part of the township, slightly exceeding 2,450 feet above sea-level, occurs in parts of sections 5 and 6, whereas the lowest area, at less than 2,350 feet above sea-level, occurs in the northwestern part along the ravine of Maple creek. A small area in the northwestern corner of the township is covered by glacial lake clay. Glacial lake sands and dune sands cover the remainder of the area. The dune sands cover that part of the area designated the Great Sand Hills.

The dune sands in this township have proved quite productive, and no difficulty should be experienced in obtaining water at shallow depth from them. It may in some places be necessary to sink a second well in order to obtain sufficient water for farm needs, but this is unusual. The water is usually moderately soft, and it is recorded as suitable for drinking as well as for stock. A 39-foot

well located in section 11 is recorded as obtaining water from sand, but it is unlikely that the dune sand and underlying lake sand are of this thickness. It is more probable that the well has tapped a sand pocket in the boulder clay underlying the lake sand. The supply from the well is small and the water is too highly mineralized for drinking.

The glacial lake sands that cover the northwestern part of the township have proved very productive, and large supplies of water are obtained from them at depths not exceeding 32 feet. No difficulty should be experienced in obtaining water from these sands. The supply is usually more than sufficient for local needs and the water is moderately soft and only slightly mineralized. It may be used for domestic purposes as well as for stock.

The glacial lake clay that occurs along the valley of Maple creek, in the northwestern part of the township, has not been prospected for water, and it is improbable that it will be found productive. However, small quantities of water may be found in beds of sand or gravel at its base, usually within 25 feet of the surface. These water-bearing deposits are of scattered distribution, and dry holes may be sunk before a producing deposit is tapped. Wells sunk in or near the valley of Maple creek, and in depressions, should yield small supplies of water.

Township 14, Range 26

Maple creek enters the township in the SW.$\frac{1}{4}$, section 4, meanders in a northeasterly direction, and leaves it in the SE.$\frac{1}{4}$, section 25. The stream flows through a wide, trough-like depression that is floored by glacial lake clay. The northwestern corner of the township is covered with glacial till and most of the remainder is covered by glacial lake sands that are 35 feet thick in some places. Two small areas of wind-blown sand occur in sections 6, and 36. The elevation rises gradually at right angles to the course of Maple creek, and reaches 2,440 feet, in the southeast corner of the township

and approximately 2,425 feet in the northwest corner. The land is slightly undulating to rolling, except in the area mantled by glacial lake clay where it is quite flat. An undrained depression, covering about 500 acres and lying at an elevation of 2,332 feet, occurs in parts of sections 7, 8, and 17. Smaller sloughs and hay flats are scattered throughout the township. The township is unwooded except for a small area in the vicinity of Maple creek, in sections 4 and 9.

The wells in the township are all less than 100 feet deep, and most of them range in depth from 6 to 35 feet. Adequate supplies of water are very easy to obtain from the glacial lake sands, and farmers sometimes dig more than one well in convenient places for watering stock. The water is obtained simply by digging a shallow well or by driving a sand-point down to a point below the water-table. The position of the water-table varies with the amount of annual precipitation. It is usually located at a depth of less than 15 feet, but even during the drought of 1930 to 1934, when it was slightly deeper, the glacial lake sands yielded sufficient water for all requirements. Some of the wells yield very abundant supplies of water, and a 15-foot well in the SE.$\frac{1}{4}$, section 34, waters 200 head of stock a day throughout the year. The water is not highly mineralized, and fifteen wells in the glacial lake sands yield soft water.

In the till covered-area water-bearing sands and gravels are more difficult to locate at shallow depth. A sand-point was driven through a pocket of sand 40 feet thick in the NW.$\frac{1}{4}$, section 33, and this well yields a constant supply of soft water for 470 head of stock.

Four wells, two in the SE.$\frac{1}{4}$, section 20, and two in the NE.$\frac{1}{4}$, section 30, were bored to a quicksand aquifer that occurs in the blue clay of the glacial drift at an approximate elevation of 2,340 feet. This elevation is the same as that of a similar aquifer tapped by four wells in township 13, range 27, but the aquifer may not be continuous. The wells are 65, 75, 90, and 96 feet deep, and the water is under hydrostatic pressure. The water from the two

wells in the SE.¼, section 20, however, is soft, cloudy, contains hydrogen sulphide, and kills plants, whereas the water from the two wells in the NE.¼, section 30, is hard, cloudy, and contains iron.

The farmer in the NW.¼, section 23, dams Maple creek every spring and floods his hay fields. The farmer in the SW.¼, section 27, collects and conserves surface water for stock use by means of a dugout, not because there is any shortage of well water, but because it is a convenient method of watering stock.

Ground water conditions in this township are very good, particularly in the area covered by glacial lake sands, and only five farmers reported an unsatisfactory supply of water.

Township 14, Range 27

The topographic relief in this township is very low, the surface sloping very gently eastwards from about 2,450 feet above sea-level at the western boundary to about 2,350 feet above sea-level at the eastern boundary. There are a few dry lake bottoms in the southeast and northwest parts of the township.

Boulder clay underlies the whole township and is exposed over the greater part of it. It is covered by glacial lake sands in three irregular-shaped areas, totalling about 10 square miles, located in the northern, central, and southeastern parts of the township. A belt of dune sands about three-quarters of a mile wide extends from within the lake sand area in a westerly direction across the township at about a mile north of the southern boundary.

The southern third of the township is very thinly settled, and only one well record was obtained from this part. In the northern two-thirds most of the wells obtain their supplies largely from sand and gravel pockets in the boulder clay, the glacial lake sands being too thin to be water bearing. In the area underlain by these sands the deeper wells, 6 to 87 feet deep, have passed into the underlying boulder clay. There are a few fairly well-defined

aquifers, one of which, on section 19, occurs at about 2,410 feet above sea-level, and supplies water that is rather highly mineralized to two wells 50 and 55 feet deep. Another aquifer which occurs at about 2,357 to 2,400 feet above sea-level supplies seven wells, on sections 22 to 26, with water that varies in composition. The water in two of these wells, 74 and 56 feet deep, on sections 24 and 26, contains only 1,120 and 1,360 parts per million of dissolved solids, respectively. A third aquifer which occurs at about 2,387 to 2,391 feet above sea-level supplies three wells, 38 to 78 feet deep on sections 35 and 36.

The water in several of the wells in this township is described as yellow, and some of the aquifers that supply water to the wells are described as black sand. It is possible that the aquifer is an interglacial deposit of peat or other carbonaceous material. The elevation of this aquifer is about 2,374 to 2,410 feet above sea-level, and it appears to underlie a large part of the northern two-thirds of the township. The water in all the deeper wells, however, is not yellow, and is probably not derived from this carbonaceous layer.

The water in ten wells, 6 to 60 feet deep, in this township is used only for stock, and the water in the well, 52 feet deep, on section 22, is slightly laxative. The supply of ground water in this township is generally satisfactory, and the field reports do not show that water was hauled at any of the farms visited. Dry holes were put down on section 15 to an unknown depth, on the NE.$\frac{1}{4}$, section 30, to 24 feet, and on the SW.$\frac{1}{4}$, section 32, to 65 feet. Springs are reported on the NW.$\frac{1}{4}$, section 30, and the SE.$\frac{1}{4}$, section 33. The hamlet of Golden Prairie is supplied by several wells, 12 to 35 feet deep, some of which yield large supplies of water.

Township 15, Range 25

Bigstick lake, the water of which is too highly mineralized for watering stock, occupies about 7 square miles in the southern

part of the eastern two-thirds of the township. The water-level of this lake is about 2,326 feet above sea-level, and the lake is 10 feet deep in places. Maple creek, which is a permanent stream, discharges into the south end of this lake. That part of the southern two-thirds of the township not occupied by Bigstick lake is comparatively flat, but the northern third of the township is hilly, with some of the summits rising to over 2,550 feet above sea-level. This part of the township is underlain by moraine, and south of the moraine there is a narrow belt of boulder clay with an average width of about three-quarters of a mile. Glacial lake clay underlies the valley of Maple creek, and grades into glacial lake sands that underlie most of the remainder of the township. Approximately one-half square mile in the southeast corner of the township is mantled with dunes that have been formed by wind action on the glacial lake sands.

All the wells in this township except one are less than 40 feet deep, and no wells have been put down into the bedrock. The glacial lake sands yield abundant supplies of water to several wells 10 to 16 feet deep, and sandpoints are used in several wells on sections 18, 19, and 21, but the deeper wells in the glacial lake sand area have passed into the underlying boulder clay, where they obtain "alkaline" water from pockets of sand and gravel. In that part of the township mantled by moraine and boulder clay most of the wells yield moderate supplies of water, although at some farms more than one well is required to obtain an adequate supply. In the 65-foot well on the NW.¼, section 31, the water is too "alkaline" to be used for drinking.

The water in many of the shallower wells in this township is soft. The water in the remaining wells is hard, but in only two wells is the water too "alkaline" to be used for drinking.

No wells have been put down into the dune sands and underlying glacial lake sands, but it is probable that water would be obtained in these sands by the use of sandpoints driven to depths

of not more than 25 feet. The dune sands in this township are probably rather thin.

Township 15, Range 26

The southern half of this township is comparatively flat, and in the southeast the surface slopes gently towards the valley of Maple creek. In the northern half the country is more rolling, and several hills rise to over 2,500 feet above sea-level. There are a number of dry lake bottoms scattered over the township, one of which, in sections 3, 4 and 10, is over 1½ miles long. Boulder clay or glacial till occurs at the surface over the whole township except in an area of about 2 square miles in the northeast that is underlain by moraine, and in an area of about 2 square miles in the southeast part of the township where glacial till is overlain by glacial lake sands.

Two wells on section 1 obtain a sufficient supply of water from the glacial lake sands. The depth of the producing wells in the boulder clay and moraine ranges from 10 to 107 feet, and ground water conditions vary widely. At least twenty-four dry holes, from 10 to 100 feet deep, were put down, and there appears to be a great thickness of clay in some parts of the township. In sections 24, 25, 27, 28, and 30, ground water conditions are very unfavourable, the deeper wells yielding only a small supply of water, and there are many dry holes. A well 37 feet deep on the SE.¼, section 13, yields a very large supply of water, but in the NE.¼, of the same section, a well 86 feet deep yields only a small supply. Five dry holes were put down on this quarter section, from a few feet to 90 feet deep. The water in a well 107 feet deep, on the NE.¼, section 27, was reported as soft, but no analysis of the water is available, and no other deep wells in the vicinity obtained soft water. It seems improbable, therefore, that the aquifer that supplies this well is in the bedrock. The water of eight wells in this township, 7 to 90 feet deep, is too "alkaline" for drinking.

No well-defined aquifers that supply large amounts of water to any groups of wells can be outlined, and the large number of dry holes and the uncertainty of obtaining adequate supplies of water from the deeper wells in this township make it impossible to make recommendations as to digging wells. Dugouts and dams would probably be of value in storing water for farm use, and the impervious nature of the clay in most parts of the township would prevent the loss of water by seepage from such reservoirs.

Township 15, Range 27

Most of the land surface in this township is flat to gently rolling, and is underlain by boulder clay. In the northern third of the township the country is more hilly, and a northwesterly trending chain of hills rises to over 2,600 feet above sea-level. This elevated tract is underlain by moraine.

The wells in the moraine and boulder clay are from 7 to 100 feet thick, but most of the wells in the southern half of the township are less than 30 feet thick. No widespread aquifers in the deeper wells can be outlined, and there seems to be a great thickness of clay in the northern third of the township. The water in most of the wells over 50 feet deep is too "alkaline" for domestic use, although the water of two wells, 92 and 100 feet deep, on section 35, is used for drinking. The water in six wells less than 20 feet deep is too "alkaline" for drinking. The water in several wells less than 20 feet deep, and in a well 40 feet deep on the SW.$\frac{1}{4}$, section 22, is soft. The water in the remaining wells is hard, and in a few wells the water is hard and moderately "alkaline". A well on the NE.$\frac{1}{4}$, section 22, is reported as having passed through 35 feet of gravel and obtains water that is sulphurous and that deposits a black sediment, which is probably caused by the deposition of iron sulphide.

The supply of ground water at several farms in the northern third of the township is not sufficient for local requirements. In the remainder of the township the water supply at most of the farms is sufficient for local requirements, although the water for domestic use is hauled at a farm on the SW.$\frac{1}{4}$, section 11.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF BIG STICK, NO. 141, SASKATCHEWAN

West of 3rd mer. Township / Range	13 25	13 26	13 27	14 25	14 26	14 27	15 25	15 26	15 27	Total No. in municipality
Total No. of Wells in Township	55	26	32	17	48	50	28	87	64	407
No. of wells in bedrock	0	1	0	0	0	0	0	0	0	1
No. of wells in glacial drift	55	25	32	8	48	50	28	87	64	397
No. of wells in alluvium	0	0	0	9	0	0	0	0	0	9
Permanency of Water Supply										
No. with permanent supply	53	23	19	16	40	45	27	54	45	322
No. with intermittent supply	1	1	10	0	0	2	1	9	11	35
No. dry holes	1	2	3	1	8	3	0	24	8	50
Types of Wells										
No. of flowing artesian wells	1	1	0	0	0	0	0	0	0	2
No. of non-flowing artesian wells	0	0	4	0	4	0	0	0	1	9
No. of non-artesian wells	53	23	25	16	36	47	28	63	55	346
Quality of Water										
No. with hard water	51	20	26	11	25	43	19	47	41	283
No. with soft water	3	4	3	5	15	4	9	16	15	74
No. with salty water	0	0	0	0	0	0	0	0	0	0
No. with "alkaline" water	15	8	3	7	5	16	5	34	27	120
Depths of Wells										
No. from 0 to 50 feet deep	55	25	26	17	39	37	27	58	54	338
No. from 51 to 100 feet deep	0	0	5	0	9	13	1	27	10	65
No. from 101 to 150 feet deep	0	0	1	0	0	0	0	2	0	3
No. from 151 to 200 feet deep	0	0	0	0	0	0	0	0	0	0
No. from 201 to 500 feet deep	0	1	0	0	0	0	0	0	0	1
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	0	0	0	0
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0
How the Water is Used										
No. usable for domestic purposes	46	21	20	15	31	36	21	45	35	270
No. not usable for domestic purposes	8	3	9	1	9	11	7	18	21	87
No. usable for stock	54	24	28	16	39	44	23	59	52	339
No. not usable for stock	0	0	1	0	1	3	5	4	4	18
Sufficiency of Water Supply										
No. sufficient for domestic needs	48	18	19	15	40	43	27	54	45	309
No. insufficient for domestic needs	6	6	10	1	0	4	1	9	11	48
No. sufficient for stock needs	33	15	16	15	16	33	19	36	29	212
No. insufficient for stock needs	21	9	13	1	24	14	9	27	27	145

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

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

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

Mineral Substances Present

Calcium and Magnesium

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

Sodium

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

Sulphates

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

Chlorides

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

Iron

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

Hardness

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

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

Analyses of Water Samples from the Municipality of Big Stick, No. 141, Saskatchewan.

No.	LOCATION					Depth of Well, Ft.	Total dis'vd solids	HARDNESS			CONSTITUENTS AS ANALYSED						CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source of Water
	Qtr.	Sec.	Tp.	Rge.	Mer.			Total	Perm.	Temp.	Cl.	Alkalinity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	Na Cl	
1	NW.	22	13	26	3	250	1,440	25			195	1,025	10	11	8	784	1,413	18		23		1,038	12	322	x 2
2	SE.	3	13	27	3	24	460	400	240	100	15	200	40	61	115	115	433	72		127		39	170	25	x 1
3	SW.	27	13	27	3	16	2,320	1,500	1,100	400	65	325	360	259	1,245	259	2,110	325	443		772	39	463	107	x 1
4	NW.	19	14	27	3	50	3,200	2,000	2,000	nil	320	965	390	421	1,181	502	3,029	698		226	933		644	528	x 1
5	SE.	24	14	27	3	74	1,120	800	700	100	50	665	80	194	295	295	1,110	143		400		41	437	83	x 1
6	NE.	26	14	27	3	56	1,300	900	750	150	65	730	80	198	381	259	1,328	143		414		100	504	107	x 1
7	NW.	5	15	27	3	14	5,500	+3,000	+3,000		416	520	310	785	3,194	1,193	5,500	520	46		2,340		1,908	686	x 1
8	NE.	6	15	27	3	20	600	800	500	300	29	300	140	79	148	29	527	151		42	176		10	48	x 1

Water samples indicated thus, x 1, are from glacial drift.
Water samples indicated thus, x 2, are from bedrock, Belly River formation.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).

For interpretation of this table read the section on Analyses and Quality of Water.

WATER FROM THE UNCONSOLIDATED DEPOSITS

Samples Nos. 2 to 8 in the list of analyses are from wells in the glacial drift. Sample No. 2 contains only 460 parts per million of dissolved solids, and was taken from a well 24 feet deep in the glacial lake sands. The water is rather hard, but as the hardness is largely due to the presence of calcium carbonate ($CaCO_3$) and magnesium carbonate ($MgCO_3$), much of it can be removed by boiling. This water can be used for all purposes. Sample No. 8 contains 600 parts per million of dissolved solids, and was taken from a well 20 feet deep in the glacial lake sands. This water is much harder than sample No. 2, and a part of the hardness is due to the presence of magnesium sulphate ($MgSO_4$), which is not removed by boiling. Samples Nos. 5 and 6 are from wells 74 feet and 56 feet deep in the boulder clay; the waters are generally similar in composition, contain 1,120 and 1,360 parts per million of dissolved solids, and are very hard, the hardness being only very slightly decreased by boiling. These waters contain 437 and 564 parts per million, respectively, of sodium sulphate (Na_2SO_4), but are not noticeably laxative unless drunk in large amounts. Samples Nos. 3 and 4 are from wells 16 and 50 feet deep in the boulder clay. They contain 2,320 and 3,200 parts per million of dissolved solids and are excessively hard. Both waters are slightly laxative, as they contain a considerable proportion of sodium sulphate and magnesium sulphate, and sample No. 4 probably has a slight salty taste. Both waters are used only for stock, and contain too large a proportion of sodium salts to be used for irrigation. Sample No. 7 is from a well 14 feet deep in the boulder clay. The water is excessively hard, rather salty, decidedly laxative, and not adapted for continuous use even by stock. The great variation in the water from the glacial drift is well illustrated by samples Nos. 7 and 8, which are from shallow wells in the boulder clay of adjacent sections.

Water from the Bedrock

Sample No. 1 is taken from a well 250 feet deep, the aquifer of which is in the Belly River formation. The water is very soft, and is not laxative, as it contains only 12 parts per million of sodium sulphate and no magnesium sulphate. The water is not noticeably salty, as it contains only 322 parts of sodium chloride (NaCl), but it contains 1,038 parts per million of sodium carbonate (Na_2CO_3), which will give a noticeable "soda" taste to the water and will extract colour from organic compounds like tea or coffee when they are in it. The large proportion of "black alkali" renders this water useless for irrigation purposes. The water is unusual, as most of the water in the Belly River formation contains a considerable proportion of sodium sulphate. Small quantities of gas were reported in this well, and in the presence of such gas the sodium sulphate is usually changed to sodium carbonate.

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

B 4-4
R. 7526

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
1	SE.	1	13	25	3	Dug	13	2,525	- 8	2,517	8	2,517	Glacial lake sand	Hard, clear, "alkaline"	48	D, S	Sufficient; another sand-point well.
2	SW.	3	"	"	"	Dug	11	2,550	- 4	2,546	4	2,540	Glacial fine sand	Hard, clear, "alkaline"	50	S	Sufficient; two other similar wells.
3	NW.	3	"	"	"	Dug	28	2,540	- 8	2,532	8	2,532	Glacial lake sand	Hard, clear	46	D, S	Sufficient for local needs.
4	SW.	4	"	"	"	Dug	15	2,525	- 4	2,521	4	2,521	Glacial lake sand	Hard, clear	50	D, S	Sufficient for local needs.
5	SW.	7	"	"	"	Dug	22	2,450	- 17	2,433	17	2,433	Glacial lake sand	Hard, clear	46	S	Sufficient; similar well for domestic use.
6	SE.	8	"	"	"	Dug	16	2,475	- 14	2,461	14	2,461	Glacial lake sand	Hard, clear	48	D	Abundant supply; flowing spring for stock.
7	SE.	13	"	"	"	Dug	16	2,510	- 12	2,498	12	2,498	Glacial gravel	Hard, clear, "alkaline"	43	S	Sufficient just; similar well for domestic purposes.
8	SE.	14	"	"	"	Dug	14	2,530	- 12	2,518	12	2,518	Glacial lake sand	Hard, clear, "alkaline"	42	D, S	Insufficient; two similar wells.
9	SE.	16	"	"	"	Spring	0	2,500	0	2,500	0	2,500	Glacial sand	Clear, soft,		S	Flowing spring; water dammed for stock; 9-foot house well.
10	SW.	16	"	"	"	Dug	27	2,500	- 22	2,478	22	2,478	Glacial sand	Clear, hard, iron	46	D, S	Sufficient for local needs.
11	NW.	16	"	"	"	Dug	18	2,550	- 15	2,535	15	2,535	Glacial drift	Hard, clear	48	S	Very short of water.
12	NE.	16	"	"	"	Dug	9	2,550	- 6	2,544	6	2,544	Glacial gravel	Hard, clear	48	S, D	Sufficient for local needs.
13	SW.	17	"	"	"	Dug	25	2,500	- 22	2,478	22	2,478	Glacial sand	Hard, clear	46	S	Sufficient for local needs.
14	NW.	17	"	"	"	Dug	18	2,550	- 13	2,537	13	2,537	Glacial drift	Hard, clear	49	D, S	Sufficient for local needs.
15	SW.	18	"	"	"	Dug	14	2,480	- 7	2,473	7	2,473	Glacial sand	Hard, clear, "alkaline"	50	S	Just sufficient with two similar wells.
16	NW.	19	"	"	"	Dug	20	2,470	- 20	2,450	20	2,450	Glacial sand	Hard, clear, "alkaline"	47	D, S	Insufficient; other similar wells.
17	SE.	20	"	"	"	Dug	35	2,540	- 29	2,511	29	2,511	Glacial drift	Hard, clear, "alkaline"	46	S	Sufficient for stock; another well for domestic needs.
18	SE.	21	"	"	"	Dug	25	2,450	- 9	2,441	9	2,441	Glacial sand	Hard, clear, iron	45	D, S	Insufficient; other similar wells.
19	SW.	22	"	"	"	Dug	13	2,550	- 9	2,541	9	2,541	Glacial sand	Hard, clear, "alkaline"	43	D, S	Sufficient for local needs.
20	NE.	24	"	"	"	Dug	14	2,500	- 12	2,488	12	2,488	Glacial drift	Hard, clear	46	S	Intermittent supply.
21	NE.	24	"	"	"	Dug	36	2,500	- 32	2,468	32	2,468	Glacial sand	Hard, clear	48	D, S	Insufficient; another 31-foot well for house hold purposes.
22	SW.	25	"	"	"	Dug	27	2,510	- 17	2,493	17	2,493	Glacial sand	Hard, clear, "alkaline"	42	S	
23	SE.	27	"	"	"	Dug	34	2,525	- 27	2,498	27	2,498	Glacial drift	Soft, clear	42	D, S	Sufficient with two other wells.
24	SW.	27	"	"	"	Dug	23	2,550	- 18	2,532	18	2,532	Glacial sand	Hard, clear, "alkaline"	43	D, S	Just sufficient with another well similar.
25	SW.	28	"	"	"	Dug	23	2,490	- 19	2,471	19	2,471	Glacial sand	Hard, clear, "alkaline"	43	D, S	Sufficient; another similar well.
26	SE.	29	"	"	"	Dug	16	2,500	- 14	2,486	14	2,486	Glacial sand	Hard, clear, "alkaline"	44	D, S	Insufficient for local needs; 12-foot well with small supply.
27	SE.	30	"	"	"	Dug	9	2,485	- 6	2,479	6	2,479	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.

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

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

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

B 4-4
R. 7526

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
28	SE.	31	13	25	3	Dug	16	2,440	- 11	2,429	11	2,429	Glacial sand	Soft, clear	48		Gradually decreased until insufficient supply; also a dry hole.
29	SW.	31	"	"	"	Dug	19	2,500	- 16	2,484	16	2,484	Glacial sand	Hard, clear	50	D, S	Sufficient with another similar well.
30	NW.	31	"	"	"	Dug	12	2,450	- 7	2,443	7	2,443	Glacial sand	Soft, clear	48	D, S	Abundant supply.
31	NE.	32	"	"	"	Dug	8	2,430	- 5	2,425	5	2,425	Glacial sand	Hard, clear, "alkaline"	50	D, S	Abundant supply; no shortage; other similar wells for convenience.
32	NW.	34	"	"	"	Bored	12	2,460	- 10	2,450	10	2,450	Glacial sand	Hard, clear, "alkaline"	48	D, S	Abundant supply; laxative effect; other similar wells.
33	SW.	35	"	"	"	Dug	17	2,450	- 12	2,438	12	2,438	Glacial gravel	Hard, clear	47	D, S	Sufficient for local needs.
1	SE.	1	13	26	3	Dug	15	2,425	- 13	2,412	13	2,412	Glacial sand	Soft, clear, iron	46	D, S	Well not in use.
2	SW.	2	"	"	"	Dug	15	2,410					Glacial sand			N	Dry hole.
3	SW.	2	"	"	"	Dug	12	2,400	- 10	2,390	10	2,390	Glacial sand	Hard, clear, "alkaline"	44		Sufficient for local needs.
4	SE.	6	"	"	"	Dug	5	2,400	- 3	2,397	3	2,397	Glacial sand	Soft, clear		D, S	Flowing springs near this well.
5	NE.	9	"	"	"	Dug	11	2,400	- 9	2,391	9	2,391	Glacial sand	Hard, clear	48	D, S	Sufficient for local needs.
6	SW.	10	"	"	"	Dug	14	2,428	- 12	2,416	12	2,416	Glacial sand	Hard, clear	48	D, S	Sufficient for local needs.
7	SE.	13	"	"	"	Dug	8	2,440	- 6	2,434	6	2,434	Glacial gravel	Hard, clear, "alkaline"		D, S	Abundant supply.
8	SW.	13	"	"	"	Dug	12	2,420	- 7	2,413	7	2,413	Glacial sand	Soft, clear, "alkaline"		S	Shortage of water in winter.
9	SE.	14	"	"	"	Dug	15	2,490	- 13	2,477	13	2,477	Glacial sand	Hard, clear	44	S	Sufficient for local needs.
10	NE.	15	"	"	"	Dug	15	2,400	- 12	2,388	12	2,388	Glacial gravel	Soft, clear		D, S	Very large supplies of water.
11	SE.	18	"	"	"	Dug	17	2,380	- 10	2,370	10	2,370	Glacial gravel	Hard, clear, "alkaline"	44	D, S	Large supply; poor quality; another similar well.
12	SE.	22	"	"	"	Dug	15	2,385	- 13	2,372	13	2,372	Glacial sand	Hard, clear, "alkaline", iron	48	D, S	Insufficient; drilled for gas and little in water.
13	NW.	22	"	"	"	Drilled	250	2,380	+ 2	2,382	250	2,130	Belly River (?) sand	Soft, clear, sulphur	42	D, I	Stock water at lake Tenaille. #.
14	SE.	25	"	"	"	Dug	12	2,450	- 10	2,440	10	2,440	Glacial drift	Hard, cloudy		S	Intermittent supply.
15	NW.	25	"	"	"	Dug	22	2,460	- 16	2,444	16	2,444	Glacial sand	Hard, clear, "alkaline"	50	D, S	Insufficient; hauls water; 40-foot well , small supply.
16	NW.	26	"	"	"	Dug	15	2,430	- 13	2,417	13	2,417	Glacial sand	Hard, clear	44	D, S	No shortage; lake for stock; other similar wells.
17	NE.	31	"	"	"	Sand-point		2,390					Glacial sand				6-foot well yields sufficient water.
18	SW.	32	"	"	"	Dug	8	2,365	- 2	2,363	2	2,363	Glacial sand	Hard, clear, "alkaline"	44	S	Sufficient with dugout.
19	NW.	35	"	"	"	Dug	14	2,400	- 4	2,396	4	2,396	Glacial sand	Hard, clear, "alkaline"	48	D, S	Insufficient; slough for stock.
20	SE.	36	"	"	"	Dug	17	2,360	- 13	2,447	13	2,447	Glacial drift	Hard, clear	48	D, S	Intermittent supply.

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

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

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
21	SW.	36	13	26	3	Dug	11	2,440	- 9	2,431	9	2,431	Glacial drift	Hard, clear, "alkaline"	44	D, S	Insufficient, small supply; other well yields small supply.
1	SE.	1	13	27	3	Bored	15	2,442					Glacial sand	Hard, clear, iron	47	D	Sand-point at base; good supply.
2	SE.	3	"	"	"	Dug	24	2,475	- 20	2,455	20	2,455	Glacial sand	Hard, clear	45	D, S	Sufficient, but poor quality of water; #.
3	SE.	4	"	"	"	Dug	20	2,465	- 18	2,447	18	2,447	Glacial sand	Hard, clear	46	D, S	Intermittent supply; another sand-point well.
4	NW.	6	"	"	"	Dug	13	2,442	- 8	2,434	8	2,434	Glacial sand	Hard, clear		S	Sufficient for local needs.
5	SE.	6	"	"	"	Dug	20	2,463					Glacial gravel				Place deserted; well caved in.
6	NE.	17	"	"	"	Dug	16	2,430	- 8	2,422	8	2,422	Glacial drift	Hard, clear	46	S	Small supply.
7	NE.	19	"	"	"	Dug	12	2,450					Glacial drift			N	Dry hole.
8	NE.	21	"	"	"	Dug	15	2,417	- 11	2,406	11	2,406	Glacial drift	Hard, iron, "alkaline", cloudy		S	Sufficient for local needs.
9	NW.	22	"	"	"	Dug	13	2,420	- 10	2,410	10	2,410	Glacial sand	Hard, clear, iron	46	D, S	Sufficient for local needs.
10	NW.	25	"	"	"	Dug	13	2,420	- 10	2,410	10	2,410	Glacial sand	Hard, clear	40	D, S	Excellent well; large supply.
11	NW.	26	"	"	"	Dug	11	2,427	- 7	2,420	7	2,420	Glacial sand	Hard, clear	50	S	Constant water-level; large supply.
12	SW.	27	"	"	"	Dug	16	2,420	- 12	2,408	12	2,408	Glacial drift	Hard, cloudy, "alkaline"	44	S	Intermittent supply; other wells; some dry holes; #.
13	NE.	28	"	"	"	Dug	30	2,418	- 5	2,413	5	2,413	Glacial drift	Soft, clear	44	D, S	Intermittent supply; fine sand fills in.
14	NE.	28	"	"	"	Bored	100	2,425	- 50	2,375	90	2,335	Glacial fine sand	Hard, iron, cloudy		S	Sufficient water for stock.
15	NW.	29	"	"	"	Dug	15	2,410	- 10	2,400	10	2,400	Glacial drift	Hard, clear	40	S	Sufficient for local needs.
16	SW.	30	"	"	"	Bored	130	2,450	- 20	2,430	130	2,320	Glacial blue sand	Hard, iron, cloudy		D, S	Intermittent supply.
17	NE.	30	"	"	"	Dug	12	2,419	- 9	2,410	9	2,410	Glacial drift	Soft, clear	45	S	Intermittent supply; dry in 1934; other similar wells.
18	NW.	30	"	"	"	Dug	20	2,417	- 18	2,399	18	2,399	Glacial drift	Hard, clear	43	S	
19	[illegible]	31	"	"	"	Bored	95	2,443	- 79	2,364	95	2,348	Glacial drift	Hard, clear	40	D, S	Sufficient for local needs.
20	SE.	33	"	"	"	Dug	40	2,420	- 30	2,390	30	2,390	Glacial drift	Hard, iron, cloudy	46	S	Intermittent supply.
21	SE.	33	"	"	"	Bored	100	2,425	- 50	2,375	90	2,335	Glacial fine sand	Hard, clear, iron		S	Sufficient for local needs; fine sand plugs well.
22	NW.	34	"	"	"	Dug	14	2,389	- 11	2,378	11	2,378	Glacial drift	Hard, clear	45		
23	SE.	35	"	"	"	Dug	24	2,425	- 18	2,407	18	2,407	Glacial drift	Hard, clear	45		Sufficient for local needs.
24	NW.	35	"	"	"	Bored	54	2,406	- 44	2,362	44	2,362	Glacial drift	Hard, cloudy, "alkaline"	57	D, S	Intermittent supply; other similar wells.
25	SE.	36	"	"	"	Dug	28	2,400	0	2,400	0	2,400	Glacial drift	Soft, clear	40	D, S	Intermittent supply; also a dry hole.

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

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

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
1	SE.	1	14	25	3	Dug	11	2,400	- 9	2,391	9	2,391	Glacial sand	Hard, clear, "alkaline"	46	D, S	Insufficient for local needs; also a dry hole in glacial drift.
2	NE.	1	"	"	"	Dug	12	2,400	- 8	2,392	8	2,392	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient supply; well not in use at present.
3	SW.	2	"	"	"	Drilled	10	2,400					Glacial sand	Hard, clear, "alkaline"	50	D, S	Sufficient supply.
4	NW.	7	"	"	"	Dug	12	2,400	- 7	2,393	7	2,393	Recent dune sand	Soft, clear, "alkaline"	45	D, S	Abundant supply.
5	SW.	11	"	"	"	Drilled	39	2,415	- 29	2,386	29	2,386	Recent dune sand	Hard, clear	46	S	Sufficient supply; dugouts also used.
6	SW.	14	"	"	"	Dug	6	2,370	- 3	2,367	3	2,367	Recent dune sand	Hard, clear, "alkaline"	50	D, S	Abundant supply.
7	SE.	15	"	"	"	Dug	14	2,380	- 4	2,376	4	2,376	Recent dune sand	Soft, clear		D, S	Abundant supply.
8	SW.	15	"	"	"	Dug	14	2,380	- 10	2,370	10	2,370	Recent dune sand	Hard, clear	48	D, S	Abundant supply.
9	SE.	16	"	"	"	Dug	7	2,385	- 5	2,380	5	2,380	Recent dune sand	Hard, clear, "alkaline"	50	D, S	Sufficient supply.
10	SE.	16	"	"	"	Bored	20	2,390	- 17	2,373	17	2,373	Recent dune sand	Hard, clear, "alkaline"	50	D, S	Sufficient supply.
11	NW.	16	"	"	"	Dug	18	2,375	- 10	2,365	10	2,365	Glacial sand	Hard, clear		D, S	Abundant supply.
12	NW.	17	"	"	"	Dug	14	2,380	- 8	2,372	8	2,372	Glacial sand	Soft, clear		D, S	Abundant supply.
13	SW.	22	"	"	"	Dug	15	2,370	- 10	2,360	10	2,360	Recent dune sand	Hard, clear		D, S	Abundant supply.
14	SW.	32	"	"	"	Dug	11	2,350	- 8	2,342	8	2,342	Glacial sand	Hard, clear, iron	46	D, S	Abundant supply.
15	SE.	34	"	"	"	Drilled	32	2,300	- 13	2,347	13	2,347	Glacial sand	Soft, clear		D, S	Sufficient supply.
16	SE.	36	"	"	"	Drilled	30	2,350	- 9	2,341	9	2,341	Recent dune sand	Soft, clear	47	D, S	Sufficient supply.
1	SW.	2	14	26	3	Dug	22	2,395	- 20	2,375	20	2,375	Glacial drift	Soft, clear, "alkaline"	48	D, S	Insufficient supply; several dry holes.
2	NW.	4	"	"	"	Bored	20	2,355					Glacial drift	Hard, clear, "alkaline"	40	S	Sufficient supply.
3	NE.	10	"	"	"	Dug	6	2,380	- 5	2,375	5	2,375	Glacial sand	Hard, clear		D, S	Sufficient supply.
4	NW.	11	"	"	"	Dug	12	2,368	- 10	2,378	10	2,378	Glacial sand	Hard, clear	48	S	Sufficient supply.
5	NW.	13	"	"	"	Dug	32	2,345	- 16	2,329	16	2,329	Glacial drift	Hard, clear, "alkaline"	44	S	Insufficient supply; several dry holes.
6	S.½	14	"	"	"	Dug	8	2,375	- 6	2,369	6	2,369	Glacial gravel	Soft		D, S	Sufficient for 18 head stock.
7	SW.	14	"	"	"	Dug	9	2,381	- 4	2,377	4	2,377	Glacial sand	Soft, clear	44	D, S	Sufficient supply.
8	SW.	16	"	"	"	Dug	16	2,365	- 12	2,353	12	2,353	Glacial sand	Soft, clear	48	D, S	Sufficient supply; also a dry hole in glacial drift.
9	SW.	19	"	"	"	Dug	54	2,397	- 47	2,350	47	2,350	Glacial drift	Hard, clear, iron	45	D, S	Insufficient supply.
10	SE.	20	"	"	"	Dug	65	2,419	- 45	2,374	45	2,374	Glacial sand	Soft, cloudy, sulphur	45	N	Sufficient supply, but poor water.
11	SE.	20	"	"	"	Bored	75	2,419			75	2,344	Glacial blue sand	Soft, cloudy, sulphur	45	D, S	Sufficient supply; water unsuitable for plants.

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

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

B 4-4
R. 7526

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
12	NW.	20	14	26	3	Dug	8	2,350					Glacial drift	Hard, clear		D, S	Insufficient supply.
13	NE.	21	"	"	"	Dug	12	2,300					Glacial sand	Soft, clear	45	D	Sufficient supply.
14	NE.	21	"	"	"	Dug	20	2,360					Glacial sand	Soft, clear	46	S	Sufficient supply.
15	NE.	22	"	"	"	Drilled	18	2,368					Glacial sand	Hard, clear	45	D	Sufficient supply.
16	NE.	22	"	"	"	Drilled	18	2,367					Glacial sand	Hard, clear	46	S	Sufficient supply.
17	NE.	22	"	"	"	Dug	8	2,300	- 6	2,354	6	2,354	Glacial sand	Hard, clear	48	D	School well; sufficient supply.
18	NW.	23	"	"	"	Dug	12	2,379					Glacial sand	Medium hard	46	D, S	Sufficient supply; six similar wells.
19	NW.	23	"	"	"	Dug	30	2,380	- 25	2,355	25	2,355	Glacial sand	Hard, clear	44	D	Sufficient supply.
20	SW.	27	"	"	"	Dug	7	2,365					Glacial sand	Soft, clear	48	D, S	Sufficient supply.
21	SE.	28	"	"	"	Dug	13	2,383	- 8	2,375	8	2,375	Glacial sand	Hard, clear	45	D, S	Sufficient supply.
22	NE.	28	"	"	"	Bored	35	2,380					Glacial sand	Hard, clear	44	D, S, I	Sufficient supply.
23	SW.	30	"	"	"	Dug	35	2,413	0	2,413			Glacial sand	Soft, clear	46	D	Sufficient supply; located close to slough.
24	SW.	30	"	"	"	Bored	74	2,430	- 50	2,380	50	2,380	Glacial drift	Hard, iron, cloudy	43	S	Sufficient supply.
25	NE.	30	"	"	"	Bored	90	2,431	- 70	2,361	90	2,341	Glacial sand	Hard, iron, yellow, odor	45	S	Sufficient supply.
26	NE.	30	"	"	"	Bored	96	2,435	- 76	2,359	96	2,339	Glacial sand	Hard, iron, yellow, odor	45	D, S	Sufficient supply.
27	NE.	31	"	"	"	Dug	55	2,415	- 43	2,372	43	2,372	Glacial drift	Hard, iron, clear,	44	S	Sufficient supply.
28	NW.	31	"	"	"	Bored	50	2,421	- 45	2,370	45	2,376	Glacial drift	Hard, clear, iron		D, S	Only sufficient for 7 head stock.
29	NW.	31	"	"	"	Dug	54	2,420	- 42	2,378	42	2,378	Glacial drift	Hard, cloudy, "alkaline"	45	D, S	Sufficient supply.
30	NW.	33	"	"	"	Drilled	40	2,400					Glacial sand	Soft			Sufficient supply.
31	NE.	33	"	"	"	Dug	23	2,450								N	Dry hole in glacial drift.
32	SE.	34	"	"	"	Dug	15	2,370	- 10	2,360	10	2,300	Glacial sand	Hard, clear		D, S	Sufficient supply; a similar well 10 feet deep.
33	SE.	34	"	"	"	Dug	15	2,370	- 10	2,360	15	2,355	Glacial sand	Hard, clear	48	D, S	Sufficient for 200 head stock.
34	NE.	34	"	"	"	Bored	20	2,395	- 15	2,380	15	2,380	Glacial sand	Hard, clear, "alkaline"	42	D, S	Sufficient supply.
1	SE.	2	14	27	3	Dug	23	2,375	- 8	2,367	20	2,355	Glacial sand	Hard, clear	45	S	Sufficient supply.
2	NE.	13	"	"	"	Dug	8	2,365	- 7	2,358	7	2,358	Glacial drift	Hard, clear	55	S	Sufficient supply.
3	NE.	13	"	"	"	Dug	60	2,409	- 35	2,374	35	2,374	Glacial sand	Hard, iron, odor, yellow	40	S	
4	NW.	14	"	"	"	Dug	8	2,387	- 6	2,381	6	2,381	Glacial drift	Hard, clear, "alkaline"	50	S	Sufficient supply.

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

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
5	NW.	14	14	27	3	Dug	20	2,390	- 18	2,372	18	2,372	Glacial drift	Hard, clear, "alkaline"	50	D, S	Sufficient supply.
6	NE.	15	"	"	"	Dug	12	2,390	- 10	2,380	10	2,380	Glacial drift	Hard, clear, "alkaline"	48	D, S	Sufficient supply; also a dry hole.
7	SW.	16	"	"	"	Dug	12	2,400	- 10	2,390	10	2,390	Glacial sand	Hard, clear, "alkaline"	44	D, S	Sufficient supply.
8	NE.	17	"	"	"	Dug	9	2,425	- 7	2,418	7	2,418	Glacial sand	Hard, clear	50	N	
9	NE.	19	"	"	"	Bored	55	2,445	- 33	2,412			Glacial drift	Hard, clear	44	N	
10	NW.	19	"	"	"	Dug	50	2,440	- 30	2,410	30	2,410	Glacial drift	Hard, yellow, "alkaline"		D	Insufficient supply; not used for drinking; #.
11	SW.	21	"	"	"	Dug	8	2,400	- 6	2,394	6	2,394	Glacial sandy clay	Hard, clear	48	S	Insufficient supply.
12	NW.	22	"	"	"	Dug	52	2,410	- 32	2,378			Glacial drift	Hard, iron, cloudy	42	D, S	Insufficient supply; water has laxative effect on strangers.
13	NE.	23	"	"	"	Bored	55	2,420	- 20	2,400			Glacial drift	Hard, cloudy, "alkaline"	40	S	Sufficient supply.
14	NW.	23	"	"	"	Dug	40	2,420	- 35	2,385	35	2,385	Glacial drift	Soft, clear, "alkaline"	42	D	Sufficient supply.
15	SE.	24	"	"	"	Bored	74	2,413	- 56	2,357	56	2,357	Glacial black sand	Hard, iron, cloudy	48	D, S	Sufficient supply; #.
16	SW.	25	"	"	"	Bored	60	2,419	- 55	2,364	55	2,364	Glacial drift	Hard, cloudy, "alkaline"	46	N	Two wells the same are not used.
17	SW.	25	"	"	"	Bored	50	2,415	- 42	2,373	42	2,373	Glacial drift	Hard, clear, "alkaline"	45	D, S	Sufficient supply.
18	NE.	26	"	"	"	Dug	56	2,412	- 46	2,366	46	2,366	Glacial drift	Hard, cloudy, "alkaline"	44	D, S	Sufficient supply; #.
19	SE.	27	"	"	"	Dug	20	2,427	- 10	2,417	10	2,417	Glacial drift	Hard, odour, "alkaline", cloudy	40	S	
20	SW.	30	"	"	"	Dug	17	2,435	- 13	2,422	13	2,422	Glacial drift	Hard, clear, iron	52	D	Well not used now.
21	NW.	30	"	"	"	Dug	6	2,435	- 5	2,430	5	2,430	Glacial sand and gravel	Soft, cloudy	60	S	Also a spring.
22	NE.	30	"	"	"	Bored	41	2,440	- 21	2,419	21	2,419	Glacial sand	Hard, clear	46	D, S	Sufficient supply; dry hole 24 feet deep.
23	SE.	31	"	"	"	Bored	87	2,447	- 77	2,370	77	2,370	Glacial sand	Hard, clear, iron	46	D	Sufficient supply.
24	NW.	31	"	"	"	Dug	16	2,450	- 10	2,440	10	2,440	Glacial sand	Hard, clear, iron	48	D, S	Insufficient supply; two similar wells.
25	SW.	32	"	"	"	Bored	65	2,450	- 61	2,389	61	2,389	Glacial fine sand	Hard, clear	44	D, S, I	Sufficient supply; similar well on hill; two dry holes 65 feet deep in ravine.
26	SE.	33	"	"	"	Dug	6	2,400	- 4	2,396	4	2,396	Glacial sand	Soft, clear, yellow	54	S	Sufficient supply; also a spring near well; also a spring near well; a similar well 12 feet deep.
27	SE.	33	"	"	"	Dug	10	2,412	- 4	2,408	4	2,408	Glacial sand	Soft, clear, "alkaline"	48		Used by C.P.R. for locomotives.
28	NE.	33	"	"	"	Dug	42	2,422	- 34	2,388	34	2,388	Glacial drift	Hard, iron, yellow, clear	43	S	Sufficient supply;
29	NE.	33	"	"	"	Bored	35	2,440	- 25	2,415	25	2,415	Glacial drift	Hard, clear, "alkaline"	44	D	Seven or more wells 12 to 35 feet deep supply hamlet of Golden Prairie.
30	NW.	33	"	"	"	Dug	18	2,420	- 16	2,404	16	2,404	Glacial sand	Hard, cloudy, "alkaline"	46	D, S	
31	SE.	35	"	"	"	Bored	50	2,422	- 35	2,387	35	2,387	Glacial drift	Hard, cloudy, "alkaline"	40	D, S	Sufficient supply.

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

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

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
32	NE.	35	14	27	3	Bored	82	2,424	- 72	2,352	72	2,352	Glacial drift	Hard, iron, "alkaline", cloudy	52	D, S	Sufficient supply.
33	SW.	36	"	"	"	Dug	38	2,422	- 33	2,389	33	2,389	Glacial drift	Hard, iron, cloudy, yellow	48	D, S	
34	NW.	36	"	"	"	Bored	78	2,431	- 40	2,391	40	2,391	Glacial drift	Hard, iron, cloudy	48	D, S	Sufficient supply.
1	SW.	6	15	25	3	Dug	25	2,350	- 20	2,330	20	2,330	Glacial sand	Hard, clear, "alkaline"	43	S	
2	SE.	18	"	"	"	Dug	16	2,360	- 10	2,350	10	2,350	Glacial sand	Soft, clear	43	D, S	Abundant supply.
3	SW.	19	"	"	"	Dug	30	2,425	- 25	2,400	25	2,400	Glacial sand	Hard, clear	43	D, S	Abundant supply.
4	SE.	19	"	"	"	Dug	35	2,360	- 30	2,330	30	2,330	Glacial sand	Hard, clear, "alkaline"	43	D, S	Abundant supply.
5	SE.	20	"	"	"	Dug	10	2,340	- 8	2,332	8	2,332	Glacial sand	Soft, clear	46	D, S	Sufficient for local needs.
6	SE.	21	"	"	"	Dug	32	2,350	- 26	2,324	26	2,324	Glacial sand	Soft, clear	43	D, S	Abundant supply.
7	NE.	21	"	"	"	Dug	10	2,370	- 2	2,308			Glacial drift	Soft, clear	48	D, S	Insufficient for local needs.
8	SW.	22	"	"	"	Dug	14	2,350	- 10	2,340	10	2,340	Glacial sand	Soft, clear	43	D, S	Abundant supply.
9	SE.	25	"	"	"	Dug	16	2,370	- 14	2,356	14	2,356	Glacial fine sand	Soft, clear, "alkaline"	44	D, S	Sufficient for local needs.
10	SE.	27	"	"	"	Dug	24	2,400	- 19	2,361	19	2,361	Glacial sandy clay	Soft, clear	41	D, S	Sufficient for local needs.
11	SW.	28	"	"	"	Dug	21	2,440	- 15	2,425	15	2,425	Glacial gravel	Hard, clear, "alkaline"	42	D, S	Sufficient supply; also another well 12 feet deep.
12	SW.	30	"	"	"	Dug	17	2,440	- 12	2,428	12	2,428	Glacial gravel	Soft, clear	42	D, S	Sufficient supply; five other wells abandoned due to insufficient supply.
13	NW.	30	"	"	"	Dug	16	2,475	- 6	2,469	8	2,467	Glacial gravel	Hard, clear	42	D, S	Sufficient supply; also two other wells 10 feet deep.
14	SW.	31	"	"	"	Dug	10	2,475	- 0	2,409			Glacial drift	Hard, clear	42	D, S	Sufficient supply; also two other wells 10 feet deep.
15	NW.	31	"	"	"	Bored	65	2,520	- 50	2,470			Glacial drift	Hard, clear, "alkaline", odour	43	S	Sufficient for local needs.
16	NW.	34	"	"	"	Dug	31	2,500	- 18	2,482			Glacial drift	Soft, clear	44	D, S	Intermittent supply.
17	NE.	35	"	"	"	Dug	15	2,400	- 8	2,392	8	2,392	Glacial gravel	Hard, clear	43	D, S	
18	SE.	35	"	"	"	Dug	12	2,400	- 6	2,394	6	2,394	Glacial gravel	Hard, clear	43	D, S	Sufficient for local needs.
1	NW.	1	15	26	3	Dug	20	2,400	- 17	2,383	17	2,383	Glacial sand and gravel	Hard, clear	46	D, S	Sufficient supply; also another similar well.
2	SE.	3	"	"	"	Dug	40	2,395									Dry hole in glacial clay.
3	NE.	4	"	"	"	Bored	18	2,400					Glacial drift	Hard, clear	46	D, S	Sufficient for local needs.
4	SE.	5	"	"	"	Dug	50	2,425	- 40	2,385			Glacial drift	Hard, clear, "alkaline", iron		S	Sufficient for local needs.
5	SW.	5	"	"	"	Dug	30	2,425									Dry hole in glacial clay.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
6	SW.	6	15	26	3	Dug	50	2,410	- 40	2,370			Glacial drift	Hard, clear, "alkaline"	48	D	Sufficient for local needs.
7	NE.	6	"	"	"	Dug	19	2,400	- 15	2,385	15	2,385	Glacial sandy clay	Hard, clear, "alkaline"	48	S	Sufficient supply; also a 25-foot well for domestic needs.
8	SW.	7	"	"	"	Dug	22	2,420	- 12	2,408			Glacial drift	Hard, red, "alkaline", iron	48	D, S	Sufficient supply; also two other wells that are not used.
9	NE.	8	"	"	"	Dug	10	2,390									Dry hole in glacial clay.
10	SE.	9	"	"	"	Bored	50	2,380	- 30	2,350			Glacial drift	Hard, clear, "alkaline", iron	46	D, S	Sufficient for local needs.
11	SW.	9	"	"	"	Bored	20	2,380	- 14	2,366	14	2,366	Glacial sand	Hard, clear, "alkaline"	48	D, S	Sufficient for local needs.
12	NW.	10	"	"	"	Dug	35	2,390	- 29	2,361	29	2,361	Glacial sand	Hard, iron, "alkaline", yellow	45	S	Sufficient supply; also another well 16 feet deep.
13	NE.	11	"	"	"	Bored	75	2,410	- 60	2,350			Glacial drift	Hard, iron, "alkaline", yellow	44	D, S	Sufficient for local needs.
14	SW.	12	"	"	"	Dug	12	2,380	- 12	2,368	12	2,368	Glacial gravel	Soft, clear		D, S	Sufficient supply; also another similar well.
15	W.½	13	"	"	"	Dug	26	2,450	- 23	2,427			Glacial drift	Hard, cloudy		D, S	
16	SE.	13	"	"	"	Drilled	37	2,370					Glacial drift	Soft, clear, iron	50	D, S	Sufficient for 300 head horses; also another similar well.
17	NE.	13	"	"	"	Bored	86	2,385	- 71	2,314	81	2,304	Glacial sand	Hard, iron, "alkaline", cloudy	44	D, S	Insufficient supply; also five dry holes to a depth of 90 feet.
18	SE.	14	"	"	"	Dug	60	2,410	- 55	2,355			Glacial drift	Hard, clear	46	D, S	Insufficient for local needs.
19	NE.	14	"	"	"	Bored	90	2,450					Glacial drift	Hard, clear	44	D, S	Sufficient supply; also three dry holes 80, 90, and 100 feet deep.
20	SE.	15	"	"	"	Bored	63	2,425	- 55	2,370			Glacial drift	Hard, iron, "alkaline", cloudy	48	S	Sufficient supply; a 50-foot well is used for domestic needs.
21	NW.	15	"	"	"	Bored	50	2,438					Glacial drift	Hard, clear, "alkaline"	48	D, S	Sufficient supply; but well is now not in use.
22	SE.	16	"	"	"	Bored	42	2,400					Glacial drift	Soft, clear, "alkaline"	46	D, S	Insufficient supply; several other similar wells.
23	SE.	17	"	"	"	Bored	34	2,395	- 24	2,371	31	2,364	Glacial sand	Hard, iron, "alkaline", cloudy	48	S	Intermittent supply; also a 12-foot well; haul water for domestic needs.
24	NE.	17	"	"	"	Bored	50	2,440					Glacial drift	Hard, clear	50	N	Well is not in use.
25	SE.	18	"	"	"	Dug	15	2,400	- 13	2,387	13	2,387	Glacial sand	Hard, clear, "alkaline"	48	D, S	Sufficient for local needs.
26	NW.	18	"	"	"	Dug	12	2,400	- 8	2,392	8	2,392	Glacial sand	Hard, clear, "alkaline"	47	D, S	Intermittent supply.
27	SE.	19	"	"	"	Bored	60	2,430	- 13	2,417	47	2,383	Glacial sand	Hard, clear, "alkaline", iron, odour	48	D, S	Intermittent supply.
28	SE.	20	"	"	"	Bored	75	2,465	- 65	2,400	65	2,400	Glacial sand	Hard, clear, "alkaline"	48	D, S	Sufficient supply; also another well 40 feet deep.

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WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
29	SW.	21	15	26	3	Bored	90	2,490	- 3	2,487			Glacial drift	Hard, clear	48	D, S	Intermittent supply; also four dry holes to a depth of 75 feet.
30	NW.	22	"	"	"	Bored	99	2,490	- 87	2,403	87	2,403	Glacial sand	Hard, clear	44	D, S	Insufficient supply; also another well 84 feet deep.
31	SE.	23	"	"	"	Dug	100	2,460	- 80	2,380	80	2,380	Glacial sand	Hard, clear, "alkaline", iron	44	D	Sufficient for local needs.
32	NW.	24	"	"	"	Dug	32	2,450	- 14	2,436	14	2,436	Glacial drift	Hard, clear	44	D	Intermittent supply; also another well 103 feet deep with a sufficient supply; also four dry holes 30 to 100 feet deep.
33	SW.	25	"	"	"	Bored	97	2,480									Dry hole in glacial clay.
34	SE.	27	"	"	"	Bored	90	2,490					Glacial drift	Hard, iron, "alkaline", cloudy		S	Insufficient supply; an 8-foot well with intermittent supply; haul water for domestic needs.
35	NE.	27	"	"	"	Bored	107	2,485	- 47	2,438			Glacial drift	Soft, clear		D, S	Sufficient supply; also a 14-foot well with intermittent supply.
36	SE.	26	"	"	"	Drilled	100	2,500	- 88	2,412	88	2,412	Glacial sand	Hard, clear, iron	44	D, S	Insufficient supply; also a 50-foot well that is not used.
37	SW.	30	"	"	"	Bored	80	2,450	- 72	2,378			Glacial drift	Hard, cloudy, "alkaline"	46	D, S	Insufficient for local needs.
38	NE.	30	"	"	"	Dug	7	2,450	- 3	2,447	3	2,447	Glacial sand	Hard, clear, "alkaline"	50	S	Sufficient supply; also a 20-foot well and a 14-foot well with intermittent supply.
39	SE.	32	"	"	"	Dug	38	2,450					Glacial drift	Hard, clear, iron	46	D, S	Well in now not in use.
40	NW.	33	"	"	"	Dug	60	2,460	- 45	2,415			Glacial drift	Hard, iron, "alkaline", yellow	46	S	Sufficient for local needs.
41	NW.	34	"	"	"	Dug	20	2,520	- 0	2,520	0	2,520	Glacial gravel	Soft, clear	45	D, S	Intermittent supply; also four dry holes 20 to 25 feet deep.
42	SE.	35	"	"	"	Dug	19	2,520					Glacial drift	Hard, clear	44	D, S	Sufficient supply; also another well 17 feet deep.
43	SW.	35	"	"	"	Dug	10	2,520	- 2	2,518	2	2,518	Glacial gravel	Soft, clear	45	D, S	Sufficient supply; also another well 18 feet deep.
44	SW.	36	"	"	"	Dug	14	2,520	0	2,520	0	2,520	Glacial gravel	Soft, clear, "alkaline"	48	D, S	Sufficient supply; also two other similar wells.
1	SE.	3	15	27	3	Dug	12	2,425	- 10	2,415	10	2,415	Glacial sand	Soft, clear		D	Sufficient supply; also a dugout for d stock needs.
2	SW.	3	"	"	"	Dug	60	2,425	- 45	2,380			Glacial drift	Hard, red, "alkaline", red	40	S	Sufficient for local needs.
3	SE.	4	"	"	"	Dug	27	2,425	- 10	2,415	26	2,399	Glacial gravel	Hard, iron, "alkaline", cloudy	44	D, S	Sufficient supply; also a 60-foot well and many dry holes.
4	NE.	4	"	"	"	Dug	7	2,425	- 1	2,424	1	2,424	Glacial coarse sand	Hard, cloudy	50	N	Intermittent supply; also another similar well.
5	SE.	5	"	"	"	Bored	80	2,425	- 40	2,385			Glacial drift	Hard, iron, sulphur, cloudy	44	S	Sufficient supply; also a 14-foot dry hole.
6	NW.	5	"	"	"	Dug	14	2,445	- 11	2,434	11	2,434	Glacial gravel	Hard, iron. "alkaline", brown	46	S	Sufficient for local needs; #.
7	NE.	6	"	"	"	Dug	20	2,450	- 8	2,442			Glacial drift	Hard, clear	47	D, S	Sufficient supply; #.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
8	SE.	8	15	27	3	Bored	65	2,450	- 40	2,410			Glacial drift	Hard, iron, cloudy	45	S	Sufficient supply; also a 10-foot dry hole.
9	NW.	9	"	"	"	Dug	12	2,440	- 6	2,434	6	2,434	Glacial coarse sand	Hard, clear, "alkaline"	46	D, S	Sufficient supply.
10	SE.	10	"	"	"	Dug	12	2,435	- 6	2,429	6	2,429	Glacial gravel	Soft, clear	42	D, S	Sufficient supply; also a 20-foot well with insufficient supply.
11	SW.	11	"	"	"	Dug	12	2,440	- 10	2,430	10	2,430	Glacial sandy clay	Hard, iron, cloudy	48	S	Insufficient supply; haul water for domestic needs.
12	SE.	12	"	"	"	Dug	14	2,420	- 9	2,411	9	2,411	Glacial sand	Soft, clear	45	D, S	Sufficient supply.
13	SW.	12	"	"	"	Dug	26	2,425	- 20	2,405	20	2,405	Glacial sand	Soft, clear, "alkaline"		D, S	Sufficient supply.
14	SE.	14	"	"	"	Dug	22	2,450	- 16	2,434			Glacial drift	Hard, clear	46	D, S	Sufficient supply; also another well 20 feet deep.
15	SE.	15	"	"	"	Dug	17	2,450	- 11	2,439			Glacial drift	Hard, clear, "alkaline"	40	D, S	Sufficient supply.
16	SE.	16	"	"	"	Dug	9	2,440	- 7	2,433	7	2,433	Glacial gravelly clay	Soft, clear	46	D	Sufficient supply; also a 15-foot well with intermittent supply.
17	SE.	17	"	"	"	Dug	12	2,450	- 8	2,442	8	2,442	Glacial gravel	Soft, clear	48	S	Intermittent supply.
18	SW.	17	"	"	"	Dug	16	2,450	- 5	2,445	5	2,445	Glacial gravel	Soft, clear	47	D	Sufficient supply; also two other wells 10 and 11 feet deep.
19	NE.	17	"	"	"	Dug	10	2,440	- 8	2,432			Glacial drift	Soft, clear	48	S	Intermittent supply.
20	SW.	19	"	"	"	Dug	15	2,475	- 7	2,468			Glacial drift	Soft, clear, "alkaline"	46	S	Sufficient supply.
21	NW.	19	"	"	"	Dug	20	2,490	- 8	2,482			Glacial drift	Hard, clear, "alkaline"	43	D, S	Insufficient supply during the autumn even with the aid of five similar wells.
22		20	"	"	"	Dug	50	2,475	- 44	2,431			Glacial drift	Hard, cloudy, "alkaline"		D, S	
23	SW.	22	"	"	"	Dug	40	2,460	- 38	2,422			Glacial drift	Soft, clear	44	D, S	
24	NE.	22	"	"	"	Dug	35	2,485	- 30	2,455	30	2,455	Glacial gravel	Hard, cloudy, sulphur, black sediment	42	S	Insufficient supply; also another well 75 feet deep.
25	NW.	22	"	"	"	Dug	30	2,490	- 22	2,468	28	2,462	Glacial gravel	Hard, clear, "alkaline"	50	D, S	Sufficient supply.
26	NW.	23	"	"	"	Dug	35	2,485	- 30	2,455			Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient supply.
27	SE.	24	"	"	"	Dug	41	2,410	- 32	2,378			Glacial drift	Hard, clear, "alkaline"	46	S	
28	SW.	25	"	"	"	Bored	95	2,500	- 84	2,416			Glacial drift	Hard, clear, "alkaline"		S	Insufficient supply.
29	SE.	27	"	"	"	Dug	20	2,500	- 15	2,485			Glacial drift	Hard, clear, iron	46	D, S	Sufficient supply.
30	SW.	27	"	"	"	Dug	35	2,510								N	Dry hole in glacial clay.
31	SE.	28	"	"	"	Dug	40	2,500	- 37	2,463			Glacial drift	Hard, clear		N	Intermittent supply.
32	SW.	28	"	"	"	Dug	26	2,500	- 22	2,478	25	2,475	Glacial gravel	Hard, clear, "alkaline"	46	N	Intermittent supply.
33	NW.	28	"	"	"	Dug	15	2,490	- 5	2,485	14	2,476	Glacial sand	Soft, cloudy	50	S	Intermittent supply.

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WELL RECORDS—Rural Municipality of BIG STICK, NO. 141, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
34	SE.	30	15	27	3	Dug	16	2,510	- 6	2,504			Glacial drift	Hard, clear, "alkaline"	42	D, S	Sufficient supply.
35	SW.	30	"	"	"	Dug	25	2,500	- 9	2,491	9	2,491	Glacial gravel	Hard, clear, "alkaline"	42	D, S	Sufficient supply.
36	NW.	30	"	"	"	Dug	17	2,530	- 14	2,516	14	2,516	Glacial sandy clay	Soft, clear	48	D, S	Intermittent supply.
37	NW.	32	"	"	"	Dug	19	2,585	- 13	2,572	13	2,572	Glacial gravel	Hard, clear	44	S	Sufficient supply; also a similar well 26 feet deep.
38	NE.	33	"	"	"	Dug	40	2,590	- 30	2,560	30	2,560	Glacial sand and gravel	Hard, clear	45	D, S	Intermittent supply.
39	SE.	35	"	"	"	Dug	92	2,520	- 84	2,436	84	2,436	Glacial sandy clay	Hard, clear	43	D, S	Sufficient supply; also a similar well 94 feet deep.
40	NW.	35	"	"	"	Bored	100	2,540	- 70	2,470	70	2,470	Glacial sand	Hard, clear	46	D, S	Sufficient supply; also a 20-foot dry hole.
41	SW.	36	"	"	"	Dug	40	2,500	- 34	2,466			Glacial drift	Hard, cloudy, "alkaline"	46	D, S	Intermittent supply.
42	NW.	36	"	"	"	Dug	85	2,485	- 80	2,405	80	2,405	Glacial sandy clay	Hard, clear	48	S	Sufficient supply.

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

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