CANADA
DEPARTMENT OF MINES
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WATER SUPPLY PAPER No. 154

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF LUMSDEN NO. 189 SASKATCHEWAN

By

B. R. MacKay, H. N. Hainstock, & J. A. Chalmers

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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF LUMSDEN NO. 189 SASKATCHEWAN

INTRODUCTION

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

Publication of Results

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

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

How to Use the Report

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

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

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

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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 Lumsden, No. 189, is an area of approximately 320 square miles in the central part of southern Saskatchewan. It is bounded on the north by the eastern part of Last Mountain (Long) lake, by the stream flowing from the lake into Qu'Appelle river, and by Qu'Appelle river. The centre of the municipality lies approximately 6 miles west and 16 miles north of the city of Regina. The area consists of six full townships, described as townships 19, ranges 19, 20, 21, and 22, and townships 20, ranges 19 and 22; and parts of six townships, described as townships 20, ranges 20 and 21, and townships 21, ranges 19, 20, 21, and 22; all west of the Second meridian. The municipality is drained by Qu'Appelle river and its tributaries. The valley of the river is wide and the river meanders in a broad flood-plain. Two permanent streams, Boggy and Wascana creeks, flow into Qu'Appelle river from the south. Cottonwood creek, an intermittent stream, joins Wascana creek in the southwestern part of the municipality, and two intermittent streams, High-hill and Flying creeks, flow into Qu'Appelle river. Numerous small coulées and ravines are tributary to these streams and to Qu'Appelle river.

The area is well served by railways. The Imperial section of the Canadian Pacific railway crosses the central part of the municipality, following the valley of Flying creek and the south shore of Last Mountain lake, and on it are located the hamlets of Brora and Tregarva and the villages of Regina Beach and Lumsden Beach. The Saskatoon and Duck Lake branch of the Canadian National railways runs in a northwesterly direction to Boggy creek and then follows the creek to Craven Junction. Here

the railway branches, one branch running northeastward along Qu'Appelle river and the other running in an easterly direction along the river valley. The town of Lumsden and the village of Disley are located on the west branch of this railway. The northwestern branch is no longer in use. The flood-plains of Qu'Appelle river and the outlet stream of Last Mountain lake are covered by an undetermined thickness of Recent stream deposits. Two extensive areas, one in the eastern part of the municipality and one to the north and west of Qu'Appelle river, in the western part of the municipality, are covered by moraine. The remainder of the area is underlain by glacial till or boulder clay. In a large area in the south-central part of the municipality the glacial till is overlain by glacial lake clay; the till is exposed only along the creeks. The lake clay does not exceed 40 feet in thickness. In the northwestern part of the area the glacial till is overlain by a few small patches of glacial outwash sand and gravel. The maximum elevation of 2,160 feet above sea-level is attained in the moraine-covered area in the eastern part of the municipality. The elevation decreases to the east and north, being less than 1,600 feet along the river in the eastern part and 1,608 feet above sea-level at Last Mountain lake. The Qu'Appelle valley is at least 300 feet deep, and most of its tributaries are at least 150 feet deep. The moraine-covered areas are characterized by undrained depressions, and the eastern moraine area is quite thickly wooded. Tree growth is also extensive in the valleys of Qu'Appelle river and its tributaries.

Water-bearing Horizons in the Unconsolidated Deposits

The Recent stream deposits are a fairly certain source of ground water, and water is usually obtained from these sand

and gravel deposits at shallow depth. In the town of Lumsden a large number of wells obtain a moderate, but dependable, supply of water from sand encountered at a depth of 15 to 25 feet. Two wells obtain water from the Recent deposits in township 21, range 19, and one of them yields an abundant supply. The other well becomes dry in drought periods. The water from the Recent deposits is usable for all farm purposes, and there should be little difficulty in obtaining a satisfactory supply from these deposits. The glacial lake clay does not yield much water, but in township 19, range 22, the lake deposits are of a sandy nature and fairly large supplies of water are derived from them at shallow depth. In many places several wells are used in order to obtain sufficient water for local requirements. Some water is also obtained from sand and gravel pockets encountered in the glacial drift underlying the lake deposits. The lake clay is very impervious, and little water seeps through it into the underlying porous deposits, so that great difficulty is usually experienced in locating water in the areas mantled by lake clay. This is especially so in township 19, range 21. The glacial outwash deposits outlined on Figure 1 of the accompanying map are a very good source of water. Water can be derived from these deposits at depths of 10 to 20 feet, and in many places where the deposits are cut by ravines springs occur. The water from the glacial outwash deposits is quite soft, and suitable for all farm requirements. Considerable difficulty has been experienced in finding water in the morainic deposits in the eastern part of the area. Approximately one-half the holes that were sunk failed to obtain a sufficient supply. Pockets of sand and gravel do occur, however, and are encountered at various depths, down to a maximum depth of 275 feet. Many of the wells tapping these pockets yield large supplies of water, and

are capable of watering 100 to 150 head of stock. The uncertainty of encountering a water-bearing deposit, however, makes the water problem a rather serious one in this area. Water is more easily obtained, however, in the moraine-covered area in the western part of the municipality.

Many wells sunk into the glacial till or boulder clay obtain water in some places from small pockets of sand and gravel, and in other places from extensive beds. In the area outlined by the "A" boundary line, on the accompanying map, little difficulty is experienced in obtaining water from extensive deposits of sand and gravel. In this area a number of springs and wells are supplied in part at least by one or more sand and gravel, water-bearing beds buried at moderate, though variable, depth beneath boulder clay, and, in places, lake clay and boulder clay. The beds possibly are interglacial or glacial outwash deposits which slope westward from the higher ground of the moraine to the northeast and pass underneath the clay. The overlying clay prevents the escape of the water to the surface except at a few places, so that the porous reservoirs of the gravels have become filled with water back a considerable distance and up the frontal slope of the moraine that provides the intake area. The pressure from this head causes the water to break upwards through the thin, and somewhat porous, overlying till, and to form at least three groups of springs. The sands and gravels appear to be deposited in the form of narrow strips, as they are encountered at one locality and are absent a short distance away. The group of springs located in the northwestern corner of township 19, range 19, are known as the Mound springs. In the NE. ¼, sec. 36, tp. 19, range 20, and the NW. ¼, sec. 31, tp. 19, range 19, are several acres of land that contains numerous springs. In the latter locality mounds of spring deposits have

formed around the openings of the springs. The water from these springs is usable for all farm needs. They form the headwaters of Spring creek. Water from wells in the vicinity of the springs forms part of the supply for the city of Regina. A second group of springs, known as the Cooper springs, occurs in the middle of the S. ½, sec. 28, tp. 19, range 20, on the north branch of Flying creek. The water is used for all farm purposes, but it has a slight "alkaline" taste. Dickson springs occur in the SW. ¼, sec. 21, tp. 19, range 20, and also yield an abundant supply of water. In the Cooper and Dickson springs the water does not appear to be under as great pressure as that from the Mound springs. They occur where Flying creek has cut down through the lake clay and boulder clay and has exposed interbedded sand and gravel deposits. Little trouble should be experienced in obtaining an abundant supply of usable water from deposits of sand and gravel in the outlined area.

A number of springs also occur in the vicinity of secs. 23, 24, 25, and 26, tp. 20, range 22, and a number of wells obtain large supplies of water from deposits of sand and gravel in an area paralleling the northern border of the morainic deposits.

Water-bearing Horizons in the Bedrock

The Marine Shale series underlies the glacial drift throughout the municipality. It is exposed in a railway cut on the shore of Last Mountain lake immediately west of Regina Beach. This exposure is at an approximate elevation of 1,630 feet above sea-level. Marine Shale bedrock has been encountered in several wells in Qu'Appelle valley, at an approximate elevation of 1,500 feet above sea-level. It is believed, however, that Qu'Appelle valley lies within a pre-glacial stream valley,

and that the bedrock here is at a lower elevation than elsewhere. A well located in the SE. $\frac{1}{4}$, sec. 8, tp. 20, range 21, is probably in Marine Shale, but the point of contact is not known. It appears probable that with the exception of the deep valley occupied by Qu'Appelle river, the Marine Shale series underlies the drift at an elevation of 1,630 to 1,650 feet above sea-level, although local irregularities doubtless occur. Little water is believed to exist in the Marine Shale series in this municipality and only one well appears to obtain water from it. This well derives water from an aquifer at an elevation of approximately 1,485 feet above sea-level. The water is too highly mineralized to be used, and is characteristic of water from the Marine Shale series.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 19, Range 19

The maximum elevation in this township, 2,150 feet above sea-level, is attained in the northeastern corner. From this locality the elevation decreases fairly rapidly in a southwesterly direction, to somewhat less than 1,950 feet above sea-level in the southwestern corner. The northeastern third of the township is mantled by moraine. This portion is characterized by irregular-shaped hills, undrained depressions, and considerable tree growth. Glacial till or boulder clay underlies the remainder of the township, but in the southwestern corner the till is overlain by the Regina glacial lake clay. The lake clay probably does not exceed 25 feet in thickness anywhere in the township.

A number of wells in the moraine-covered area in the northeastern corner of the township obtain water from small, scattered pockets of sand and gravel at depths of 20 to 185 feet. A few holes have been dug without encountering water, but most of the producing wells yield sufficient water for local needs. The water is hard, and is usable for domestic and stock purposes.

Extensive deposits of sand and gravel occur in the area outlined by the "A" boundary line. These deposits slope southwestward as tongues extending from the higher morainic land to the northeast, and are buried beneath glacial lake clay and boulder clay. At least two different layers of gravel are known to occur within the outlined area. A number of springs are located in section 31, and are known as the Mound springs. They have been much discussed in connection with the water supply of the city of Regina (See Geol. Surv., Canada, Summ.Rept. 1929, Pt. B, p.65).

The water in the sand and gravel deposits is under considerable hydrostatic pressure, and breaks through the overlying clay to form springs. The springs have built up mounds around their openings, hence the name Mound springs. Three test holes were drilled in the vicinity of the springs. Test hole No. 1 struck water-bearing sand at 15 to 50 feet, and the water flowed above the surface at the rate of 51,000 to 170,000 gallons a day. Drilling was continued to 90 feet without encountering any more water-bearing beds. Well No. 2 struck water-bearing beds at 40 to 50 feet, and a flow of about 500,000 gallons of water a day was secured. The water rose 19 feet above the surface. This hole was continued to 150 feet in yellow and blue boulder clay without finding more water. A third well was drilled a considerable distance to the northeast of the other two wells. It was sunk to a depth of 163 feet, and water was found in sandy clay at a depth of 143 to 146 feet. The water rose to 26 feet below the surface, but it could be removed with a bailer faster than it came in. The water from the springs and wells is hard but usable for all general farm purposes. The springs form the headwaters of a tributary of Flying creek, locally known as Spring creek, and probably have the same source as that of the water in wells Nos. 1 and 2.

In other sections in the outlined area a number of wells obtain water at depths of 15 to 30 feet, from deposits of sand and gravel in the boulder clay. Wells of this depth in the southwestern corner have been dug through the overlying lake clay. Information is lacking regarding the thicknesses of the materials pierced in sinking these wells, but many of them penetrated both yellow and blue boulder clay before reaching an aquifer. The water obtained ranges from moderately soft to hard,

and is slightly "alkaline". The water from wells in sections 5, 6, 7, and 8, which are sunk through glacial lake clay is quite highly mineralized. The supply from most of the shallow wells is fairly abundant. Two wells, located in the SW. ¼, section 8, and the SE. ¼, section 14, yield sufficient water for 80 and 100 head of stock, respectively. A 30-foot well in the SW. ¼, section 3, failed to obtain an adequate supply of water from a gravel aquifer and a dugout is used to supplement the supply. A 19-foot well in the SE. ¼, section 31, derived a good supply of water until the wells were sunk at Mound springs, when it became dry. The water in most of the wells is under some hydrostatic pressure.

A number of wells from 35 to 100 feet deep also obtain water from gravel, sandy gravel, or sand aquifers. Some of these wells, no doubt, were dug through the aquifers encountered in the shallower wells with the intention of obtaining a larger supply. The uppermost deposits of sand and gravel are probably absent in some localities. The deposits that form the aquifers for these deeper wells also slope towards the southwest. Boulder clay overlies and underlies the aquifers, and the water is usually under pressure. A 90-foot well in the SW. ¼, section 31, encountered gravel aquifers at depths of 15, 40, and 45 feet. The water in this well is under sufficient pressure to cause it to rise 10 feet above the surface. Most of the wells that tap aquifers at depths of 35 to 100 feet yield fairly abundant supplies, and that from a well in the NE. ¼, section 22, is sufficient for 100 head of stock. A 40-foot well in the SE. ¼, section 9, however, does not yield sufficient water for the farmer's requirements and the supply is supplemented by a dugout. A 40-foot well in the NW. ¼, section 32, yielded

a good supply until the Mound spring wells were sunk, when it became dry. Another well, in the SW. ¼, section 32, was noticeably affected when the wells at Mound springs were sunk, but it did not go dry. The water from most of the wells is hard and it is frequently more highly mineralized than that from the shallower wells. The water from several wells is sufficiently mineralized to cause it to be slightly laxative, and wells in sections 15, 18, 19, and 20 cannot be used for domestic purposes, but are usable for stock.

Three wells obtain water at depths greater than 100 feet. A 163-foot well in the NW. ¼, section 32, derives a small supply of hard water from sandy clay at a depth of 143 to 146 feet. The water rises to a point 26 feet below the surface. A well in the NW. ¼, section 20, obtains hard, "alkaline" water from its base, at a depth of 140 feet. The supply is sufficient for 100 head of stock. A well in the NE. ¼, section 34, derives water from sand from its base, at a depth of 185 feet. It rises to 85 feet below the surface, is hard, and is sufficient for 100 head of stock. It does not appear that continuous horizons exist at depth in this township. An abundant supply of water should be derived without difficulty at depths within 100 feet of the surface. It has been estimated that the Mound spring artesian area is capable of supplying 2,000,000 gallons of water a day. Out of a total of sixty-three recorded wells in this township, only eleven yield insufficient water for local stock needs.

Township 19, Range 20

The surface of this township is fairly level except where cut by Flying and Boggy creeks. These creeks have eroded valleys that are from 50 to 100 feet deep. The elevation increases from 1,850 feet above sea-level in the southwestern

corner to approximately 1,950 feet in the northeastern corner. The township is mantled by boulder clay or glacial till, but except along the creeks, and in an area in the northeastern corner, the glacial till is concealed by glacial lake clay. The lake clay does not exceed 40 feet in thickness. Sands and gravels buried beneath clay are encountered in the area outlined by the "A" boundary line on the accompanying map. These deposits are exposed at places where Flying creek has cut its valley through the lake clay and into the boulder clay. Springs issue from the deposits both in the north and south branches of the creek. The Cooper springs are located on the north branch of Flying creek, in sections 28 and 29, and the Dickson springs occur in the south branch of the creek, in sections 20 and 21. The springs yield an abundant supply of hard, usable water. That from the Cooper springs has a slight "alkaline" taste, and all the water contains iron, but it is used for all general farm purposes. A number of strong springs, known as the western Mound springs, occur in the NE. $\frac{1}{2}$, section 36. These springs form the headwaters of a small creek known locally as Spring creek. The aquifer for these springs appears to lie at a considerable depth, and the water forces its way up through the overlying boulder clay and glacial lake clay to the surface. The water is of good quality and is usable for domestic purposes and for stock.

Few shallow wells in this township derive an abundant supply of water. The glacial lake clay does not yield water. One well located in the NE. $\frac{1}{4}$, section 12, obtains a good supply of usable water from a gravel aquifer at a depth of 20 feet. This is the only well of shallow depth that taps what is thought to be a deposit of outwash gravel. The other shallow wells obtain water from deposits of sand and silt along the stream valleys.

These wells yield water of good quality but are used mainly for domestic needs, the stock being watered at the creeks.

Wells sunk to depths of 30 to 80 feet have encountered deposits of gravel in the glacial till or boulder clay, but the deposits are not thought to form a continuous water-bearing horizon. The water is hard and as a rule slightly "alkaline", and contains a small amount of iron, but most of it is usable for domestic purposes and for stock. The supply from most of the wells is sufficient to meet local requirements, and the water in approximately half of them is under slight hydrostatic pressure.

One well located in the SW. $\frac{1}{4}$, section 33, is sunk to a depth of 135 feet and obtains a good supply of water from a gravel aquifer. The water is hard, slightly "alkaline", and contains a small amount of iron, but it is usable for domestic purposes and for stock. Two wells in the SW. $\frac{1}{4}$, section 2, and the SE. $\frac{1}{4}$, section 3, sunk to depths of 140 feet and 156 feet, encountered some gravel at a depth of 20 to 30 feet, but the gravel did not contain much water. Good supplies are obtained, however, from aquifers encountered at the bases of the wells. Numerous dry holes have been sunk to depths of 80 to 300 feet in the SE. $\frac{1}{4}$ and SW. $\frac{1}{4}$, section 3. The water-bearing deposits are apparently not continuous in this part of the township.

Two wells located in the NE. $\frac{1}{4}$, section 32, obtain water from deposits of sand at depths of 243 and 246 feet, or at elevations of 1,607 and 1,609 feet above sea-level. The aquifer is apparently at or near the base of the drift, but its areal extent is not known. The supply from both wells is sufficient for local needs and the water is usable for all general farm purposes. The hydrostatic pressure is sufficient to cause the water to rise in both wells to a point approximately 175 feet below the surface.

Township 19, Range 21

The surface of this township is very level except in the vicinity of Qu'Appelle valley and its tributary creeks. Qu' Appelle river flows in a northeasterly direction across the northwestern corner of the area, and its valley is approximately 300 feet deep. Boggy creek flows through the eastern part of the township and empties into Qu'Appelle river. Wascana creek drains the western part of the area and joins the river in section 30. These creeks have eroded valleys from 50 to 200 feet deep. Parts of sections 31 and 32 are covered by moraine, and the flood-plain of Qu'Appelle river is formed by Recent stream deposits. The remainder of the township is underlain by glacial till or boulder clay, but except along the valleys the till is concealed by glacial lake clay. The exact thickness of the glacial lake clay is not known, but nowhere is it thought to exceed 30 feet.

A number of wells in the town of Lumsden obtain water at depths of 18 to 25 feet from the Recent deposits in Qu'Appelle valley. The water is under little or no hydrostatic pressure, is hard, usable for domestic and stock needs, and the supply is sufficient for the requirements of the town. The stream deposits in other sections of the township should contain water.

Wells sunk to depths of 16 to 35 feet in the glacial till along the creeks obtain water from pockets of sand and gravel. Springs occur along the banks of Qu'Appelle river and in section 18 along Wascana Creek valley. The water obtained from these wells and springs is hard, but as a rule is usable for domestic purposes and for stock. Two wells located in the SE. $\frac{1}{4}$, section 5, and the SE. $\frac{1}{4}$, section 7, are not usable. The water from the well in section 7 is "alkaline", and that from the well in section 5 is said to be poisonous. The supply of

water derived from the shallow wells is very good, but water can be obtained at shallow depth only along the creeks.

In a number of localities wells sunk to depths of 50 to 82 feet obtain water from pockets of sand and gravel encountered in the glacial till or boulder clay. In some areas these wells have been dug through the overlying lake clay, but in others, such as along the streams, they are dug entirely in boulder clay. Numerous dry holes have been dug, and water appears to be especially hard to obtain, in the area between Boggy and Wascana creeks. In this area wells have been sunk to a depth of 110 feet without striking water, and in order to obtain water farmers dam the coulées leading to the creeks and excavate dugouts to collect and conserve surface water. The wells that tap water-bearing deposits at depths of 50 to 82 feet do not as a rule yield large supplies of water. Only one well, located in the NW. $\frac{1}{4}$, section 12, is reported to yield an abundant supply. Several wells do not yield sufficient water for local needs, and their supplies must be supplemented by hauling, or by the use of surface water collected by dams and dugouts. The water from depths of 50 to 82 feet in the drift is hard and in many cases "alkaline", but it is in most places used for domestic purposes as well as for stock.

Three wells, located in sections 10, 14, and 24, are sunk to depths of 125, 148, and 106 feet, respectively, and tap sand aquifers of unknown areal extent. The water is moderately hard and that from the wells in sections 10 and 14 is usable for domestic purposes and for stock. The water from the well in section 24 is reported to be salty, and is not usable for domestic purposes. The supply from these three wells is abundant. A number of dry holes, up to 225 feet in depth,

have been sunk in the NW. ¼, section 31, and one well tapped a sand aquifer at a depth of 208 feet, but the water was bitter and unfit for use. The supply in this well was shut off by the fine sand plugging the casing and the well was abandoned.

Two wells have been drilled into the Marine Shale series. One of these, located in the SW. ¼, section 33, was drilled to a depth of 580 feet, and encountered some usable water at a depth of 30 feet. Drilling was continued and a considerable amount of water was obtained at a depth of 150 feet, or at an approximate elevation of 1,500 feet. Further drilling failed to encounter other water-bearing deposits. The water from the 150-foot level rose to a point 10 feet below the surface, but it was salty and too highly mineralized for use. It is probable that the water is obtained at the contact of the glacial drift and Marine Shale series. The other well is 850 feet deep and is located in the SW. ¼, section 34. This well failed to encounter a water-bearing deposit. The point of contact of the drift and bedrock was not determined in this well.

The best locations for wells appear to be in the till-covered areas bordering the creeks. Drilling to depths of 125 to 150 feet in the southern part of the township may obtain some water. The best method of increasing the supply of water is to conserve surface water by means of dams and dugouts. Drilling into the Marine Shale series is not recommended.

Township 19, Range 22

Qu'Appelle river has eroded a valley approximately 200 feet deep in the northern part of the township. High-hill creek has eroded a deep valley in the southwestern corner, and empties into Qu'Appelle river in section 20. Recent stream deposits form the flood-plain of the Qu'Appelle. The uplands

to the north of the river are mantled by moraine, but boulder clay or glacial till covers the remainder of the township. Except along the valleys of Qu'Appelle river and High-hill creek the glacial till is concealed by a thin deposit of glacial lake clay.

Throughout the township, wells sunk to depths of 15 to 40 feet obtain water from deposits of sand and gravel. The water is under very little pressure, but a fairly abundant supply is usually obtained. The glacial deposits south of Qu'Appelle river are quite sandy and are a source of water. The supply from these deposits is not large, and where one well does not yield sufficient water two or three have been sunk, the combined supply being sufficient for local requirements. In the moraine-covered part of the township water is not readily obtained at shallow depth, and dry holes have been sunk to a depth of 90 feet in some sections. Springs occurring along the banks of Qu'Appelle river and High-hill creek are used for watering stock. The water from some of the springs in the northeastern part of the township is reported to have an oil-like scum, which is probably iron oxide, and gas bubbles appear at the surface. The vegetation near the spring has been injured by the water. Wells sunk to depths of 56 to 100 feet have tapped beds of water-bearing gravel and sand in the glacial drift. Only one well of this group is located south of Qu'Appelle valley. It is located in section 12 and taps a gravel aquifer at a depth of 65 feet, yielding sufficient water for 100 head of stock. North of the river wells from 56 to 100 feet deep do not obtain an abundant supply of water, and only one well yields a sufficient supply for local needs. The supply from these wells must be supplemented by the use of springs and surface water collected by means of dams and dugouts. Practically all the water

obtained in this township is usable for domestic purposes and for stock. The water from some of the wells is slightly "alkaline", however, and has a laxative effect on humans.

Township 20, Range 19

The greater part of this township is covered by moraine, and is characterized by knolls and depressions. A small area in the southwestern corner is mantled by glacial till. The elevation increases from 2,000 feet in the till-covered area to somewhat more than 2,150 feet above sea-level along the eastern boundary. The moraine-covered area is fairly thickly wooded with poplar and willow.

The supply of water in this township is obtained from sloughs and wells. At least fourteen wells derive water, at depths of 6 to 40 feet, from deposits of sand and gravel in the glacial drift. The water-bearing deposits are overlain by 10 to 30 feet of yellow boulder clay. One well, located in the NW. $\frac{1}{4}$, section 26, yields sufficient water for 40 head of stock, but the others yield only enough for 10 or 15 head, and many of the wells go dry during drought periods. In some sections two or more wells are used, or the supplies are supplemented by using sloughs. The water is often slightly "alkaline" and contains small amounts of iron, but it is usable for domestic purposes and for stock. Two shallow wells in the area outlined by the "A" boundary line obtain water from sand and gravel aquifers. One of these wells yields sufficient water for at least 50 head of stock, but the other yields only 2 barrels a day. The water from both wells is hard, and that from the well in section 6 is slightly "alkaline" and contains a small amount of iron. Both wells are used for domestic needs and for stock. A number of wells in this township obtain water from a considerable depth. Five recorded wells derive water at depths of 70 to

85 feet, but most of them are sunk to depths ranging from 100 to 275 feet. The water-bearing deposits are not continuous, and numerous dry holes have been sunk. Wells that tap water-bearing deposits yield fairly abundant supplies of water under hydrostatic pressure. One well located in the SE. ¼, section 32, sunk to a depth of 257 feet, yields sufficient water for 150 head of stock. Twenty-three dry holes were sunk to a maximum depth of 190 feet in this quarter section before water was encountered. The water from the deep wells is hard and contains some iron, but is being used for all farm purposes.

It is difficult to obtain an abundant supply of water in this township, and many dry holes have been sunk to a considerable depth. Wells sunk in the till-covered area may possibly obtain water in buried sand and gravel deposits that extend to the southwest of the moraine. The best method of increasing the present supply of water is by conserving surface water by means of dams or dugouts.

Township 20, Range 20

Qu'Appelle river forms the northwestern boundary of this township, and its valley is from 200 to 300 feet deep. Spring creek dissects the southern sections of the township, and the valley of Flying creek cuts parts of sections 6 and 7. The flood-plain of Qu'Appelle river is formed by Recent alluvium. Parts of sections 24, 25, and 36 are covered by moraine, and the remainder of the township is mantled by boulder clay or glacial till. Throughout most of the southern part of the area the glacial till is overlain by 5 to 25 feet of glacial lake clay.

Wells sunk to depths of 8 to 25 feet obtain water from sand and gravel aquifers in the glacial drift. Where the

drift is overlain by lake clay wells have been sunk through the clay and into the underlying boulder clay. With the exception of a well in the moraine-covered area, the shallow wells yield sufficient water for farm needs. The water is hard, and that from wells in the area overlain by lake clay is slightly "alkaline", but it is used for domestic purposes. The "A" boundary line outlines an area in which the sand and gravel deposits appear to be fairly numerous.

A number of wells derive water at depth in the glacial drift, but the aquifers tapped are of local areal extent. The supply varies with the size and nature of the aquifer tapped. Some of these wells yield abundant supplies, whereas others sunk to similar depths yield very poor supplies. Numerous dry holes have been sunk, the deepest being a 175-foot hole in the NW. $\frac{1}{4}$, section 10. In those areas where there is a shortage of water, the farmers haul water, use several wells, or water stock at springs.

In 1929 test holes were sunk to depths of 241 and 281 feet, in sections 27 and 34. These wells were sunk through the Recent alluvium into the glacial drift, in which water was obtained. The well in section 27 encountered water at depths of 80 and 185 feet, and the water rose to within 2 feet of the surface. On pumping steadily, however, the hole filled with fine, black sand. The 289-foot well encountered a sand aquifer in the glacial drift, but the sand plugged the casing. This well was sunk 42 feet in the Marine Shale series, but no further water was obtained.

Township 20, Range 21

Only that part of this township to the south of Qu'Appelle river and the outlet stream of Last Mountain lake is in the municipality of Lumsden and is included in this report.

The broad blood-plains of the Qu'Appelle, and of the outlet stream of the lake, are covered with Recent stream deposits. The valley flat in which flows the outlet stream of Last Mountain lake is very marshy and no wells have been sunk in it. Flying creek flows into Qu'Appelle river in the NE. ¼, section 14. The southwestern part of the township is mantled by moraine, and the remainder is underlain by glacial till or boulder clay. In parts of sections 1, 2, and 12 the boulder clay is overlain by a thin veneer of glacial lake clay.

Water supplies in this township are obtained from wells and springs. Only one well was recorded as obtaining water from the Recent stream deposits in Qu'Appelle valley. This well is located in the NE. ¼, section 11, and is dug to a depth of 7 feet. It obtains water from fine gravel, but it becomes dry in periods of drought. The water is moderately soft and is usable for domestic purposes and for stock. Dry holes have been sunk to a maximum depth of 65 feet in both the NE. ¼ and SE. ¼, section 11.

A spring located in the SW. ¼, section 10, yields an abundant supply of hard water that is suitable for all farm needs. Only two wells obtain water at shallow depth in the drift. They are located in the S. ½, section 5, and are 15 feet deep. The supply is abundant and the water is usable for all needs. The people of Lumsden contemplated piping this water into town. It is probable that pockets of water-bearing sand and gravel exist at shallow depth in the drift in other parts of the township. A number of wells sunk to depths of 40 to 102 feet obtain water from pockets of sand encountered in the glacial drift, but only three of these wells derive water at depths less than 75 feet, and it appears that water-bearing beds are most likely to be encountered at depths of 75 to 100 feet.

These water-bearing beds are apparently not continuous, as dry holes have been sunk to a maximum depth of 115 feet in sections 7, 8, 9, and 31. The water in the producing wells is under hydrostatic pressure and rises to points 20 to 40 feet below the surface, where it maintains a constant level. It is hard, and that from some wells is "alkaline", but only two of the wells cannot be used for domestic purposes. The supply from these deep wells is sufficient for local needs, and a 40-foot well located in the NW. $\frac{1}{4}$, section 3, yields sufficient water for 100 head of stock.

One well located in the SE. $\frac{1}{4}$, section 8, drilled to a depth of 325 feet, is thought to be in the Marine Shale series. It tapped an aquifer of sand, but the pressure forced the sand up into the casing and shut off the supply. The base of the well is at an elevation of 1,485 feet above sea-level, but the aquifer is thought to occur above this elevation and may be in the glacial drift. The water is of poor quality and cannot be used for domestic purposes; stock will not drink it if other water is available. Drilling to depths much in excess of 150 feet is not advised.

Township 20, Range 22

The surface of this township slopes from approximately 1,820 feet above sea-level at the southern boundary to 1,780 feet above sea-level at the northern boundary. The southern half of the township is mantled by moraine and is characterized by numerous knolls and undrained depressions. A small area in section 32 is also mantled by moraine. Glacial outwash sands and gravels occur in parts of sections 27, 28, 33, and 34. Glacial till covers the remainder of the township and underlies the outwash sands and gravels.

The supply of water in this township is obtained from wells, springs, and sloughs. Wells sunk to depths of 14 to 40 feet tap pockets of sand and gravel in the glacial drift. Wells of this depth in the moraine-covered part of the township penetrate 15 to 20 feet of yellow boulder clay, and in some localitities have been dug a short distance into the blue boulder clay before encountering a bed of water-bearing sand or gravel. A gravel ridge is reported to occur in section 12, but no wells have been reported in it. The outwash deposits in section 33 yield good supplies of water at depths not exceeding 20 feet. The supply from the other shallow wells, however, varies, some yielding sufficient water for 40 to 50 head of stock, others yielding only a small amount. The water obtained, however, is of good quality and is suitable for domestic purposes or for stock. Wells that are dug entirely in sand or gravel yield moderately soft water, but those that pass through a considerable thickness of clay yield hard water.

Wells sunk to depths of 40 to 125 feet obtain water from pockets of sand and gravel located in the blue boulder clay. The water in most of these wells is under hydrostatic pressure. It is hard, and in some instances slightly "alkaline", but with few exceptions it is usable for domestic purposes and for stock. The supply obtained from these wells varies according to the size and porosity of the aquifer encountered, and most of the wells yield very good supplies of water, especially in the vicinity of sections 24 and 26. In the SE. $\frac{1}{4}$, section 26, a considerable amount of testing for water was done by the town of Lumsden. Three wells obtained water at depths of 10 to 79 feet, and abundant supplies of water appear to be available. Numerous springs are also said to occur in this section. Deposits of sand and gravel are thought to be fairly

numerous in the drift in this township, and it should be possible to obtain sufficient water for local needs from the upper 100 feet of the glacial drift.

Township 21, Range 19

Only that part of the township south of Qu'Appelle river is in the municipality of Lumsden and is discussed in this report. The elevation decreases quite rapidly from approximately 2,070 feet above sea-level at the southern boundary to 1,900 feet at the edge of the valley of Qu'Appelle river. The valley is at least 300 feet deep and the sides are very steep. Recent stream deposits form the flood-plain of the river. The southern part of the area is covered by moraine and the remainder is mantled by glacial till or boulder clay.

Two wells obtain water from the Recent stream deposits at depths of 10 and 11 feet. The aquifers are formed by sand and gravel, and although a good supply is derived from the well in the NW. $\frac{1}{4}$, section 21, the well in the SE. $\frac{1}{4}$, section 26, goes dry during drought periods. The water from both wells is hard and that from the well in section 21 contains iron, but is used for domestic purposes and for stock.

Springs are located on the banks of Qu'Appelle valley and also in two tributary coulées in sections 12 and 13. The water obtained from the springs appears to be quite similar to that from the deeper wells.

Only four recorded wells derive water at depths of less than 40 feet, and they are located in the area covered by glacial till or boulder clay. The aquifers are formed by pockets of sand and gravel, and the water is hard and usable for domestic purposes and for stock. The water in two of the wells is under slight hydrostatic pressure, and these two wells are the only

ones of this depth that yield a sufficient supply of water for local needs. A number of wells sunk to depths of 46 to 218 feet encounter water in pockets of sand and gravel in the glacial drift. Only a few of these wells are more than 100 feet deep. The water is hard and contains iron, but is usable for all general farm purposes. Most of these deep wells yield a good supply of water, but several holes were sunk in sections 2 and 5 before a suitable supply was obtained. An abundant supply was encountered at a depth of 218 feet in section 5. The water obtainable in this township is as a rule usable for domestic needs as well as for stock, but the supply is not always abundant. In most sections surface water can be impounded by constructing small dams across the coulées leading to Qu'Appelle river, or by excavating dugouts.

Township 21, Range 20

Approximately 3 square miles of this township is in the municipality of Lumsden. Most of the area is occupied by the valley slope of Qu'Appelle river. The valley is approximately 300 feet deep. Recent stream deposits form the flood-plain of the river; the SE. $\frac{1}{2}$, section 1, is covered by moraine, and the remainder of the area is mantled by glacial till or boulder clay.

No wells have been sunk into the Recent stream deposits, but they undoubtedly contain usable water at shallow depth. Only one well was reported in this part of the township and it is located in the SW. $\frac{1}{4}$, section 2. It is sunk to a depth of 42 feet and obtains only a small supply of usable water from a sand aquifer in the blue boulder clay. Five other holes were sunk to unknown depths in the same quarter section without encountering water. Two springs occur at an approximate elevation of 1,700 feet above sea-level on the banks of the river. The water from

them is soft, suitable for domestic purposes and for stock, and the supply is abundant.

Township 21, Range 21

That part of this township lying west of Last Mountain lake, an area of approximately 1½ square miles, is in the municipality of Lumsden. The land surface is fairly level, but drops 150 feet in elevation at the lake. A small part of section 6 is covered by moraine, and the remainder of the area is mantled by glacial till or boulder clay. Bedrock was not reported to outcrop, but it is thought to occur at an elevation above that of Last Mountain lake.

Three wells have been sunk to depths of 8, 25, and 40 feet into the glacial till and obtain hard water. That from the 8-foot well contains iron, but is usable for domestic purposes as well as for stock. The water from the 25-foot well in the SE. ¼, section 7, is reported to be laxative, but is used by the campers at Lumsden Beach. The three wells derive abundant supplies of water from sand and gravel aquifers, and little trouble should be experienced in obtaining an adequate supply of water in this area.

Township 21, Range 22

Approximately the southern half of this township is included in the municipality of Lumsden. The area is bounded on the north by Last Mountain lake and on the west by Arm river. The elevation decreases gradually to within a short distance of the lake where it drops 150 feet in a distance of ¼ mile. A deep ravine extends from Last Mountain lake westward through sections 12, 11, 10, and 9. The greater part of the township is covered by glacial till or boulder clay. A small area in the W. ½, section 5, is mantled by moraine. In several areas glacial outwash sand and gravels overlie the till, the largest area being

in the central part of the township. The top soil throughout most of the township is gravelly, and is not suitable for cultivation. Part of Last Mountain Lake Indian Reserve occurs in the northwestern corner of the area under discussion.

The main supply of water is derived from wells sunk to depths of 12 to 40 feet. Wells that tap the glacial outwash deposits yield fairly abundant supplies of water, but in the other areas the aquifers are formed by isolated pockets of sand and gravel, and dry holes have been dug in sections 1, 6, 11, and 14. Two springs in section 10, and two 12-foot wells in sections 9 and 14, obtain water from the glacial outwash deposits. The water from the springs is moderately soft, but that from the wells is hard. The wells in sections 9 and 14 yield sufficient water for 40 to 50 head of stock. With the exception of a 40-foot well in section 21, which yields an intermittent supply, the wells that tap local pockets of sand and gravel yield moderate, but sufficient, supplies of hard, usable water. The supply for Regina Beach is mainly derived from a 15-foot well located in a valley in the SE. $\frac{1}{4}$, section 21. Little trouble should be experienced in obtaining adequate supplies of water from the upper part of the glacial drift in this township.

Two wells located in sections 1 and 6 obtain water at depths of 90 and 97 feet, respectively. The water in these two wells is hard, contains iron, and is under considerable hydrostatic pressure. Both wells yield good supplies of water that is usable for domestic purposes or for stock.

Bedrock, or the Marine Shale series, outcrops in the railway cuts along the southern shore of Last Mountain lake, to the west of Regina Beach. No wells have been sunk into the shale, and drilling into it is not advised as it is very doubtful if usable water can be derived from the Marine Shale in this municipality.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF LUMSDEN NO. 189, SASKATCHEWAN

	Township	19	19	19	19	20	20	20	20	21	21	21	21	Total No. in Municipality
est of 2nd mer.	Range	19	20	21	22	19	20	21	22	19	20	21	22	
otal No. of Wells in Township		70	62	56	49	101	51	35	71	31	5	3	15	549
o. of wells in bedrock		0	0	2	0	0	0	1	0	0	0	0	0	3
o. of wells in glacial drift		70	62	53	49	101	51	33	71	29	5	3	15	543
o. of wells in alluvium		0	0	1	0	0	0	1	0	2	0	0	0	4
ermanency of Water Supply														
o. with permanent supply		61	52	43	33	39	34	14	60	23	3	3	11	376
o. with intermittent supply		1	0	0	0	6	1	6	4	2	0	0	0	20
o. dry holes		8	10	13	16	56	16	15	7	6	2	0	4	153
ypes of Wells														
o. of flowing artesian wells		3	1	0	0	0	0	0	0	0	0	0	0	4
o. of non-flowing artesian wells		31	24	10	4	18	14	9	18	13	0	2	2	145
o. of non-artesian wells		28	27	33	29	27	21	11	46	12	3	1	9	247
uality of Water														
o. with hard water		55	52	42	33	45	34	19	60	24	1	3	9	377
o. with soft water		7	0	1	0	0	1	1	4	1	2	0	2	19
o. with salty water		0	0	2	0	0	0	0	0	0	0	0	0	2
o. with "alkaline" water		19	27	7	3	6	7	4	11	2	0	0	1	87
pths of Wells														
. from 0 to 50 feet deep		45	37	35	28	40	30	16	49	13	5	3	13	314
. from 51 to 100 feet deep		19	12	13	21	25	14	16	21	11	0	0	2	154
. from 101 to 150 feet deep		3	5	4	0	14	3	2	1	4	0	0	0	36
. from 151 to 200 feet deep		3	3	0	0	15	1	0	0	2	0	0	0	24
. from 201 to 500 feet deep		0	5	2	0	7	3	1	0	1	0	0	0	19
. from 501 to 1,000 feet deep		0	0	2	0	0	0	0	0	0	0	0	0	2
. over 1,000 feet deep		0	0	0	0	0	0	0	0	0	0	0	0	0
w the Water is Used														
. usable for domestic purposes		52	44	36	32	44	34	18	57	25	3	3	10	358
. not usable for domestic purposes		10	8	7	1	1	1	2	7	0	0	0	1	38
. usable for stock		62	47	37	32	45	35	20	64	25	3	3	11	384
. not usable for stock		0	5	6	1	0	0	0	0	0	0	0	0	12
fficiency of Water Supply														
sufficient for domestic needs		61	52	43	33	40	34	14	60	23	3	3	11	377
insufficient for domestic needs		1	0	0	0	5	1	6	4	2	0	0	0	19
sufficient for stock needs		51	42	22	20	20	29	13	31	18	2	3	9	260
insufficient for stock needs		11	10	21	13	25	6	7	33	7	1	0	2	136

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 Lumsden, No. 189, Saskatchewan

LOCATION						Depth of well, Ft.	Total dis'vd solids	HARDNESS			CONSTITUENTS AS ANALYSED						CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source of water
No.	Qtr.	Sec.	Tp.	Rge.	Mer.			Total	Perm.	Temp.	Cl.	Alkalinity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	$CaCl_2$	
1			19	20	2	Dickson springs	1,634												673	442	29		378	11		* 1
2	NW.	23	19	20	2	86	4,520	3,000	3,000	n.d.	142	345	590	673	2,755	428	4,238	345	965	2,006			688	234		* 1
3			19	20	2	Cooper springs	1,495												652	434			288	9.8		* 1
4			19	19 20	2	Mound springs	1,270											71	537	371			201	8.14		* 1
5	SW.	33	19	21	2	20	1,300											207	374	318		128	128	39		* 1
6	SW.	33	19	21	2	580	2,705											1,196		352	455		16	189		* 1
7	NW.	13	20	20	2	83	923											(3)	(1)		(2)		(4)		(5)	* 1
8		13	20	21	2	13	1,537											(4)	(1)		(2)		(3)		(5)	* 1
9	NE.	9	21	22	2	12	769											(3)	(1)		(2)		(4)		(5)	* 1
10		9	21	22	2	10	617											(3)	(1)		(2)		(4)		(5)	* 1
11	SE.	21	21	22	2	15	471											(2)	(1)				(3)		(4)	* 1

Water samples indicated thus, * 1, are from glacial drift or other unconsolidated deposits.
Analyses are reported in parts per million; where numbers (1), (2), (3), (4), and (5) are used instead of parts per million, they represent the relative amounts in which the five main constituents are present in the water.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).
Analyses Nos. 7, 8, 9, 10 and 11, by Provincial Analyst, Regina; Analyses Nos. 1, 3, 4, 5, 6, by Milton Hersey Company, Winnipeg.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

Eleven samples of water were analysed and the results are listed in the accompanying table. The water obtained from the drift in this municipality is generally of good quality, and out of a total of 396 producing wells only 38 are not usable for domestic needs and 12 not usable for stock.

Water derived from large deposits of sand and gravel is slightly mineralized as it does not come into contact with the clays. The water from several springs that issue from deposits of gravel that outcrop at the surface is moderately soft. The water from wells and springs that encounter the extensive deposits of sand and gravel overlain by glacial till is more highly mineralized. That from Cooper, Dickson, and Mound springs contains 1,495, 1,634, and 1,270 parts per million of dissolved solids. It is very hard but is usable for all domestic needs as well as for stock.

The water from wells that tap small aquifers at depth in the blue boulder clay is usually highly mineralized and may not be usable for domestic purposes. The water from many of the deeper wells is reported as being "alkaline", and it will contain a considerable amount of magnesium sulphate (Epsom salts) and sodium sulphate (Glauber's salt). Sample No. 2, from an 86-foot well, contains 4,520 parts per million of total dissolved solids. This water is being used for both domestic and stock purposes, but it is extremely hard and should not be used if other water is available. Sample No. 6 is from an aquifer that is thought to occur at or near the contact of the drift and the bedrock. It contains 2,705 parts per million of dissolved solids. The water is not being used and it is reported as being very salty. The 189 parts per million of NaCl (common salt)

shown in the analysis would not give it a salty taste. It may have a laxative effect on those not accustomed to the use of highly mineralized water.

Water from the Bedrock

No water is obtained from the Marine Shale series in this municipality. Any water that is derived from the Marine Shale will undoubtedly be too highly mineralized for any farm purpose.

WELL RECORDS—Rural Municipality of LUMSDEN NO.189, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	S..	1	19	19	2	Bored	70	2,048	- 56	1,992	70	1,978	Glacial sand and gravel	Hard, clear, iron		D, S	Sufficient for 40 head stock.
2	NE.	2	"	"	"	Bored	50	2,042	- 34	2,008	50	1,992	Glacial sandy clay	Hard, clear		D, S	Sufficient for 32 head stock.
3	NW.	2	"	"	"	Bored	80	2,025	- 30	1,995	80	1,945	Glacial gravel	Hard, clear		D, S	Sufficient for 100 head stock.
4	SW.	2	"	"	"	Dug	40	2,010	- 25	1,985	40	1,970	Glacial sand	Hard, clear, iron		D, S	Sufficient for 25 head stock.
5	SW.	3	"	"	"	Bored	30	2,005	- 22	1,983	30	1,975	Glacial gravel	Hard, clear		D, S	Insufficient for local needs; also uses a dugout.
6	SW.	5	"	"	"	Bored	80	1,960	- 68	1,892	80	1,880	Glacial drift	Hard, "alkaline"		S	Sufficient for 40 head stock; reserve supply in dam.
7	NW.	5	"	"	"	Dug	24	1,972	- 12	1,960	12	1,960	Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 20 head stock; haul water for domestic use.
8	SW.	5	"	"	"	Bored	20	1,950	- 8	1,942	8	1,942	Glacial gravel	Hard, clear		D	Sufficient for domestic needs only.
9	SE.	6	"	"	"	Dug	25	1,942	- 23	1,919	23	1,919	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
10	NW.	6	"	"	"	Dug	20	1,940	- 16	1,924	16	1,924	Glacial gravel and sand	Hard, "alkaline"		D, S	Sufficient for 15 head stock.
11	SE.	7	"	"	"	Dug	30	1,960	- 18	1,942	30	1,930	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 12 head stock; also a 25-foot well, small supply.
12	SW.	8	"	"	"	Dug	27	1,970	- 22	1,948	22	1,948	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 80 head stock.
13	SE.	9	"	"	"	Bored	40	2,010	- 28	1,982	28	1,982	Glacial gravel	Hard, clear		D, S	Insufficient for local needs; also use dugout.
14	NW.	9	"	"	"	Bored	60	2,012	- 30	1,982	60	1,952	Glacial drift	Hard, clear, iron		D, S	Sufficient for 40 head stock.
15	NE.	11	"	"	"	Bored	82	2,080	- 52	2,028	82	1,998	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for local needs; also a similar school well.
16	SW.	12	"	"	"	Dug	20	2,060	- 10	2,050	20	2,040	Glacial gravel	Hard, clear		D, S	Sufficient for 25 head stock.
17	SE.	13	"	"	"	Bored	30	2,120	- 26	2,094	26	2,094	Glacial gravel	Hard, clear		S	Sufficient for 30 head stock.
18	NW.	13	"	"	"			2,105					Glacial drift	Soft		D, S	Sufficient for 30 head stock; also uses a dam.
19	SE.	14	"	"	"	Dug	17	2,085	- 13	2,072	13	2,072	Glacial sand	Hard, clear		D, S	Sufficient for 100 head stock.
20	SW.	14	"	"	"	Dug	40	2,062	- 23	2,039	40	2,022	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 40 head stock; also a similar well.
21	SW.	15	"	"	"	Bored	55	2,040	- 30	2,010	55	1,985	Glacial drift	Hard, clear, "alkaline" iron		S	Sufficient for 15 head stock.
22	SW.	15	"	"	"	Bored	30	2,040	- 22	2,018	22	2,018	Glacial drift	Hard, clear		D, S	Sufficient for domestic needs only.
23	NW.	15	"	"	"	Bored	40	2,040	- 15	2,025	40	2,000	Glacial gravel	Hard, cloudy, "alkaline"		S	Sufficient for 30 head stock.
24	NW.	15	"	"	"	Dug	20	2,040	- 18	2,022	18	2,022	Glacial clay	Soft		D	Intermittent supply.
25	NW.	16	"	"	"	Dug	34	2,015	- 14	2,001	14	2,001	Glacial drift	Hard, clear		D, S	Sufficient for 35 head stock.
26	NW.	17	"	"	"	Bored	70	1,990					Glacial drift	Hard, clear, "alkaline" iron		D, S	Sufficient for 13 head stock.

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

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

WELL RECORDS—Rural Municipality of LUMSDEN NO.189, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
27	S.W.	17	19	19	2	Bored	62	1,980	- 27	1,953	48	1,932	Glacial gravel	Hard, clear, iron		D, S	Sufficient for 13 head stock.
28	NW.	18	"	"	"	Drilled	40	1,952	- 30	1,922	40	1,912	Glacial gravel	Hard, clear, iron		D, S	Sufficient for 15 head stock.
29	SE.	18	"	"	"	Bored	80	1,980	- 65	1,915	80	1,900	Glacial drift	Hard, cloudy, "alkaline"		S	Sufficient for 5 head stock; use dam and haul domestic supply.
30	S.W.	19	"	"	"	Drilled	75	1,962					Glacial gravel	Hard, clear, "alkaline"		S	Good supply ; farm vacant.
31	NE.	19	"	"	"	Drilled	50	1,995	- 12	1,983	50	1,945	Glacial drift	Hard, cloudy, iron		D, S	Sufficient for 12 head stock.
32	SE.	20	"	"	"	Bored	38	2,020	- 34	1,986	34	1,986	Glacial gravel	Hard, clear		D	Sufficient for 8 head stock.
33	SE.	20	"	"	"	Bored	67	2,015	- 10	2,005	67	1,948	Glacial gravel	Hard, clear, "alkaline"		S	Abundant supply.
34	NW.	20	"	"	"	Bored	140	1,995	- 20	1,975	140	1,845	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 100 head stock.
35	NE.	22	"	"	"	Bored	100	2,085	- 60	2,025	100	1,985	Glacial sand	Hard, clear		D, S	Sufficient for 100 head stock.
36	NW.	23	"	"	"	Bored	25	2,100	- 18	2,082	25	2,075	Glacial sand and gravel	Soft, clear		D, S	Sufficient for 25 head stock.
37	NW.	24	"	"	"	Dug	28	2,150	- 18	2,132	28	2,122	Glacial gravel	Soft, clear		D, S	Sufficient for 25 head stock.
38	NE.	24	"	"	"	Bored	50	2,150	- 45	2,105	50	2,105	Glacial gravel	Hard, clear		D, S	Sufficient for 20 head stock; also a similar well.
39	NE.	25	"	"	"	Dug	72	2,125	- 71	2,054	71	2,054	Glacial sand	Hard, clear		D, S	Sufficient for domestic needs only; also a dry hole.
40	NE.	27	"	"	"	Bored	42	2,075	- 22	2,053	42	2,033	Glacial sand	Soft, clear		D, S	Insufficient for local needs; haul water and use sloughs; several dry holes.
41	S.W.	28	"	"	"	Bored	30	2,035	- 15	2,020	30	2,005	Glacial gravel	Hard, clear		D, S	Sufficient for 25 head stock.
42	NE.	28	"	"	"	Bored	60	2,060	- 56	2,004	56	2,004	Glacial gravel	Hard, clear		D	Sufficient only for domestic needs; 20-foot dry hole; hauls water and uses sloughs.
43	SE.	28	"	"	"	Bored	60	2,060	- 55	2,005	60	2,000	Glacial sand	Soft, clear		D, S	Sufficient for 15 head stock.
44	SE.	30	"	"	"	Dug	19	1,990	- 13	1,977	13	1,977	Glacial drift	Hard, "alkaline"		D, S	Sufficient for 30 head stock.
45	SW.	31	"	"	"	Drilled	176	2,015	+ 19	2,034	45	1,970	Glacial sand			D, S	Yields 500,000 gallons a day.
46	SW.	31	"	"	"	Drilled	90	2,015					Glacial sand			D, S	Large supply; rises 10-10½ feet above surface; aquifers at 15, 40 and 45 feet below surface.
47	SE.	31	"	"	"	Bored	19	2,000									Became dry when Mound wells sank.
48	NW.	31	"	"	"	Drilled	116	1,975	+ 10	1,985	62	1,913	Glacial gravel and sand	Hard		D, S	Would yield 1,000,000 gallons a day.
49	NW.	32	"	"	"	Drilled	163	2,050	- 26	2,024	143	1,907	Glacial sandy clay			D, S	Can bail dry with a dailer.
50	NW.	32	"	"	"	Drilled	60	2,025					Glacial drift	Hard, yellow, "alkaline" iron		S	Insufficient for local needs.
51	SE.	32	"	"	"	Bored	50	2,030	- 46	1,984	46	1,984	Glacial gravel	Hard, clear		D, S	Sufficient for 25 head stock.
52	NE.	32	"	"	"	Bored	40	2,030									This well went dry with opening of Mound springs; originally good yield.

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 LUMSDEN NO.189, 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
53	SW.	32	19	19	2	Bored	46	2,010	- 18	1,992	46	1,964	Glacial sand	Hard, clear, "alkaline" iron		D, S	Sufficient for 12 head stock.
54	SW.	33	"	"	"	Bored	50	2,040					Glacial gravel	Hard, clear		N	Farm unoccupied; very poor supply.
55	NW.	34	"	"	"	Bored	75	2,080	- 71	2,009	71	2,009	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock; also a similar well.
56	NE.	34	"	"	"	Drilled	185	2,090	- 85	2,005	185	1,905	Glacial sand	Hard clear		D, S	Sufficient for 100 head stock; also three 50-foot dry holes.
57	SW.	35	"	"	"	Dug	20	2,095	- 3	2,092	3	2,092	Glacial sand	Soft clear		D, S	Sufficient for 25 head stock; also a similar 25-foot well.
58	NW.	35	"	"	"	Drilled		2,095					Glacial drift	Hard, clear		D, S	Sufficient for at least 25 head stock.
1	SW.	2	19	20	2	Bored	140	1,920					Glacial drift	Hard, clear, "alkaline" iron		D, S	Sufficient for 30 head stock; also a 300-foot well; small supply.
2	SW.	3	"	"	"	Dug	37	1,898	- 27	1,871	27	1,871	Glacial gravel	Hard, clear, "alkaline"		D	Insufficient for local needs; hauls water for stock.
3	SW.	3	"	"	"	Drilled	300	1,898									Dry hole; several others.
4	SE.	3	"	"	"	Bored	156	1,915	- 76	1,839	156	1,759	Glacial drift	Hard, clear, "alkaline"		D, S	Several holes to 300 feet in depth; sufficient for local needs.
5	SE.	4	"	"	"	Dug	45	1,875	- 33	1,842	45	1,830	Glacial gravel	Hard, clear, "alkaline" iron		D, S	Yields 12 barrels a day; also a similar well.
6	SW.	4	"	"	"	Dug	35	1,875	- 22	1,853	22	1,853	Glacial gravel	Hard, clear, iron		D, S	Sufficient for local needs.
7	NW.	5	"	"	"	Dug	43	1,852	- 41	1,811	43	1,811	Glacial gravel and sand	Hard, clear, "alkaline" iron		D, S	Sufficient for 100 head stock.
8	NE.	6	"	"	"	Bored	46	1,852	- 42	1,810	42	1,810	Glacial sand	Hard, clear, "alkaline" iron		D, S	Sufficient for 100 head stock.
9	SW.	6	"	"	"	Dug	28	1,850	- 24	1,826	-24	1,826	Glacial sand	Hard, clear		D, S, I	Sufficient for 50 head stock; stock also use creek.
10	NE.	10	"	"	"	Dug	31	1,895	- 19	1,876	31	1,864	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 50 head stock; several good wells 28,51,60 amd 80 feet deep.
11	NW.	11	"	"	"	Dug	33	1,915	- 19	1,896	19	1,896	Glacial gravel and sand			N	Small supply.
12	NW.	11	"	"	"	Dug	42	1,895	- 32	1,863	42	1,853	Glacial sand	Hard, clear, "alkaline" iron		S	Sufficient for 80 head stock; similar house well; also creek dammed.
13	NW.	12	"	"	"	Bored	40	1,912	- 34	1,878	34	1,878	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
14	SE.	12	"	"	"	Bored	79	1,940	- 34	1,906	79	1,861	Glacial sand	Hard, clear, "alkaline" iron		D, S	Sufficient for 40 head stock.
15	NE.	12	"	"	"	Dug	20	1,915	- 12	1,903	12	1,903	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 20 head stock.
16	SE.	14	"	"	"	Bored	40	1,940					Glacial drift	Hard, clear, "alkaline" iron		D, S	Sufficient for local needs; also a similar well.
17	SE.	16	"	"	"	Bored	40	1890	- 28	1,862	40	1,850	Glacial gravel and sand	Hard, clear, iron		D, S	Used by village of Tregarva; several wells filled in.

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 LUMSDEN NO.189, 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
18	S..	16	19	20	2	Dug	27	1,890	- 23	1,867	23	1,867	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 25 head stock.
19	SW.	17	"	"	"	Dug	40	1,860	- 37	1,823	37	1,823	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock; also a 40-foot well and a dugout.
20	SE.	18	"	"	"	Bored	80	1,875	- 40	1,835	80	1,795	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 100 head stock.
21	NE.	19	"	"	"		243	1,850	-165	1,685	243	1,607	Glacial drift	Hard			Yields 3 gallons a minute.
22	SE.	20	"	"	"	Dug	35	1,850	- 31	1,819	31	1,819	Glacial gravel	Hard, clear,		D, S	Sufficient for 35 head stock; also strong springs here and on NW.¼, section 20.
23	SW.	21	"	"	"	Bored	31	1,850	- 23	1,827	23	1,827	Glacial sand	Hard, clear, iron		D, S	Sufficient for local needs; also numerous springs.
24	SE.	21	"	"	"	Bored	40	1,880	- 25	1,855	40	1,840	Glacial drift	Hard, clear, "alkaline" iron		D, S	Sufficient for 15 head stock.
25	NE.	23	"	"	"	Bored	50	1,940	- 42	1,898	42	1,898	Glacial stones and sand	Hard, clear, "alkaline"		D, S, I	Sufficient for 15 head stock.
26	NW.	23	"	"	"	Bored	86	1,920	- 20	1,900	86	1,834	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 100 head stock.
27	SE.	24	"	"	"	Dug	35	1,960	- 27	1,933	27	1,933	Glacial gravel	Hard, clear, "alkaline" iron		D, S	Sufficient for 16 head stock; also a 60-foot well.
28	SW.	25	"	"	"	Dug	60	1,960	- 30	1,930	60	1,900	Glacial drift	Hard, clear, "alkaline" iron		D, S, I	Sufficient for 20 head stock.
29	NW.	25	"	"	"	Bored	40	1,945	- 37	1,908	37	1,908	Glacial clay	Hard, clear		D, S	Sufficient for only 15 head stock; uses a dam.
30	NE.	26	"	"	"	Bored	80	1,945					Glacial drift	Hard, "alkaline"		N	Very poor supply; several dry holes.
31	SW.	26	"	"	"	Bored	60	1,925	- 40	1,885	60	1,865	Glacial drift	Hard, clear, "alkaline" iron		D, S	Sufficient for 50 head stock; also a similar well.
32	NE.	27	"	"	"	Bored	64	1,920	- 40	1,880	64	1,856	Glacial gravel	Hard, clear, "alkaline" iron		D, S	Sufficient for 35 head stock.
33	NE.	28	"	"	"	Dug	22	1,865	- 15	1,850	15	1,850	Glacial sand	Hard, "alkaline"		D, S, I	Sufficient for 30 head stock.
34	S½.	28	"	"	"	Springs		1,850					Glacial drift	Hard, iron, "alkaline"		D, S	Several springs yield an abundant supply; also springs on NE.¼, section 29.
35	SW.	30	"	"	"	Dug	50	1,850	- 36	1,814	50	1,800	Glacial sand	Hard, clear, iron		D, S	Sufficient for 20 head stock.
36	NE.	30	"	"	"	Dug	20	1,790	- 10	1,780	20	1,770	Glacial drift	Hard, clear		D	Sufficient for local needs; also use creek.
37	NW.	31	"	"	"	Dug	25	1,730	- 22	1,708	22	1,708	Glacial drift	Hard, clear		D, S	Poor supply; hauls water.
38	NW.	32	"	"	"	Drilled	246	1,855	-176	1,679	246	1,609	Glacial sand	Hard, clear, "alkaline" iron		D, S	Sufficient for 100 head stock.
39	SW.	33	"	"	"	Drilled	135	1,855					Glacial gravel	Hard, clear, "alkaline" iron		D, S	Oversufficient for local needs.
40	NE.	34	"	"	"	Bored	20	1,920					Glacial sand	Hard, clear		N	Good supply usable water.

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 LUMSDEN NO.219, 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
41	SW.	34	19	20	2	Dug	29	1,880	- 27	1,853	27	1,853	Glacial drift	Hard, clear, "alkaline, iron		D, S, I	Sufficient for 20 head stock.
42	NW.	36	"	"	"	Bored	35	1,930					Glacial sand	Hard, clear, "alkaline"		N	Hauls water; well caved in.
43	NE.	36	"	"	"	Springs		1,950					Glacial drift	Hard, clear		D, S	Good flow.
1	SE.	3	19	21	2	Dug	18	1,800	- 15	1,785	15	1,785	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock.
2	SE.	5	"	"	"	Dug	16	1,800	- 8	1,792	8	1,792	Glacial sand	Hard, clear		N	Insufficient for local needs.
3	SE.	7	"	"	"	Dug	35	1,700	- 25	1,675	25	1,675	Glacial gravel	Hard, "alkaline"		N	Insufficient supply; several similar wells.
4	SW.	7	"	"	"	Dug	28	1,700	- 10	1,690	28	1,672	Glacial gravel and sand	Hard, clear, iron		D, S	Sufficient for 25 head stock; also use creek for stock.
5	NW.	10	"	"	"	Drilled	125	1,800	- 96	1,704	125	1,675	Glacial drift	Iron, clear		D, S	Sufficient for local needs.
6	NW.	11	"	"	"	Bored	57	1,800	- 53	1,747	53	1,747	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
7	NW.	12	"	"	"	Dug	59	1,850	- 53	1,797	59	1,791	Glacial drift	Hard, clear, "alkaline"	44	D, S	Abundant supply.
8	SE.	14	"	"	"	Bored	148	1,825	- 68	1,757	148	1,677	Glacial sand	Soft, clear	43	D, S	Abundant supply.
9		15	"	"	"			1,800									Many dry holes sunk, depth unknown.
10	NW.	16	"	"	"	Bored	100	1,820									Dry hole, base in glacial drift.
11	NW.	18	"	"	"	Dug	60	1,680	- 55	1,625	55	1,625	Glacial drift	Hard, clear	43	D, S	Sufficient for local needs; also uses spring and a 20-foot well.
12	SW.	19	"	"	"	Dug	23	1,700	- 17	1,683	17	1,683	Glacial sand	Hard, clear		D, S	Sufficient for local needs; also uses sloughs for stock.
13	NW.	24	"	"	"	Bored	106	1,840	- 80	1,760	106	1,734	Glacial sand	Hard, salty	43	S	Sufficient for 50 head stock; also a 25-foot well for domestic use.
14	SW.	25	"	"	"	Dug	85	1,850	- 82	1,768	82	1,768	Glacial gravel	Hard, clear, iron		D, S	Sufficient for 14 head stock.
15	SE.	27	"	"	"	Bored	110	1,860									Dry hole, base in glacial drift; uses dam and hauls water.
16	NE.	29	"	"	"	Dug	25	1,650	- 23	1,627	23	1,627	Glacial gravel and sand	Hard, clear,		D, S	Sufficient for local needs; also three similar wells and a dam.
17	SE.	39	"	"	"	Dug	22	1,650	- 6	1,644	6	1,644	Glacial sand	Hard, clear		D, S	Sufficient for 40 head stock.
18	SW.	30	"	"	"	Bored	53	1,650	- 12	1,638	53	1,597	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for local needs; uses creek has 50-foot dry hole.
19	NW.	31	"	"	"	Drilled	225	1,810									Dry hole; other dry holes to 100 feet, also 225-foot well, not usable.
20	NW.	31	"	"	"	Bored	82	1,810	- 62	1,748	82	1,728	Glacial sand	Hard, clear, iron	42	D, S	Insufficient for local needs.
21	NE.	33	"	"	"	Bored	80	1,650									Dry hole, base in glacial drift; springs on both sides of valley.
22	NW.	33	"	"	"		20	1,650					Glacial drift	Hard, clear		D, S	Good supply.
23	SW.	33	"	"	"	Drilled	580	1,650	- 10	1,640	150	1,500	Marine Shale series	Very salty		N	Good supply, not usable. #

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of LUMSDEN NO.189, 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
24	SW.	33	19	21	2	Dug	24	1,650	- 21	1,629	21	1,629	Recent sand	Hard,clear	40	D, S	Good supply; several similar wells in Lumsden.
25	NW.	34	"	"	"	Dug & Test Auger	70	1,650	- 38	1,612	38	1,612	Glacial sand	Hard,clear, "alkaline" iron	40	D, S	Small supply; other similar wells.
26	SW.	34	"	"	"	Drilled	850	1,750									Dry hole, base probably Marine Shale.
27	SW.	36	"	"	"	Bored	60	1,850	- 30	1,820	60	1,790	Glacial drift	Hard,clear, "alkaline" iron		D, S	Sufficient for local needs.
28	NE.	36	"	"	"	Dug	35	1,850	- 33	1,817	33	1,817	Glacial sand	Hard,clear		D, S	Sufficient for local needs.
1	SW.	7	19	22	2	Dug	40	1,820					Glacial gravel	Hard,clear, iron	40	D, S	Sufficient for local needs; also a 20-foot well.
2	NE.	10	"	"	"	Dug	20	1,825	- 15	1,810	15	1,810	Glacial sandy clay	Hard,clear		D, S	Sufficient for 50 head stock; also a five similar wells.
3	NW.	12	"	"	"	Dug	65	1,820	- 63	1,757	63	1,757	Glacial gravel	Hard,clear	40	D, S	Sufficient for 100 head stock; several similar wells.
4	NE.	13	"	"	"	Dug	20	1,800					Glacial drift	Hard,clear		D, S	Good supply; farm vacant.
5	SE.	14	"	"	"	Dug	15	1,810	- 11	1,799	11	1,799	Glacial sand	Hard,clear	42	D, S	Sufficient for local needs; also a similar well.
6	NE.	22	"	"	"	Bored	35	1,750	- 32	1,718	32	1,718	Glacial gravel	Hard,clear	40	D, S	Sufficient for 20 head stock; also a 20-foot well.
7	SE.	26	"	"	"	Dug	35	1,650	- 31	1,619	31	1,619	Glacial sand	Hard,clear, "alkaline" iron	42	D, S	
8	SW.	30	"	"	"	Dug	26	1,800	- 22	1,778	22	1,778	Glacial sand	Hard,clear	40	D, S	Sufficient for 15 head stock; also a spring.
9	NW.	30	"	"	"	Bored	55	1,820	- 26	1,794	56	1,764	Glacial gravel	Hard,cloudy, "alkaline" iron		D, S	Sufficient for local needs.
10	SW.	31	"	"	"	Bored	65	1,830	- 70	1,760	100	1,730	Glacial gravel	Hard,clear	40	D, S	Very poor supply; several wells similar depth; some are dry.
11	NW.	31	"	"	"	Bored	35	1,820	- 33	1,787	33	1,787	Glacial sand	Hard,clear	43	D, S	Insufficient for local needs; numerous wells to 80 feet deep small supply.
12	SW.	32	"	"	"	Dug	38	1,810	- 24	1,786	24	1,786	Glacial sandy clay	Hard,clear	44	D, S	Sufficient for 30 head stock; also a 45-foot wel poor water.
13	SW.	33	"	"	"	Bored	90	1,810					Glacial gravel				Very small supply; also two 20-foot wells; haul water from springs.
14	SE.	34	"	"	"	Dug	35	1,800	- 25	1,775	25	1,775	Glacial sand	Hard,clear	40	D, S	Insufficient yield; also 57-foot well supplies house, springs in valley.
15	NE.	34	"	"	"	Bored	80	1,805	- 20	1,785	80	1,725	Glacial drift	Hard,clear	40	D, S	Insufficient for local needs; also a 16-foot seepage well.
16	NW.	36	"	"	"	Bored	90	1,800									Dry hole, base in glacial drift; also a 14-foot well and a spring.
1	NW.	1	20	19	2	Bored	37	2,145	- 31	2,114	31	2,114	Glacial gravel	Hard,clear, "alkaline"		D, S	Sufficient for 8 head stock; six dry holes to maximum depth of 90 feet.
2	SE.	1	"	"	"	Bored	40	2,155	- 30	2,125	40	2,115	Glacial sand	Hard,clear, "alkaline"		D, S	Insufficient for local needs; also a 20-foot dry hole; hauls water and uses slough
3	SW.	2	"	"	"	Dug	30	2,120	- 14	2,106			Glacial sand	Hard,clear, "alkaline"		D, S	Intermittent supply; three similar wells; hauls water.
4	NE.	2	"	"	"	Bored	40	2,140	- 31	2,109	31	2,109	Glacial sand	Hard,clear, iron			Insufficient supply; also three similar wells; hauls water.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of LUMSDEN NO.189, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
5	SW.	3	20	19	2	Bored	85	2,090	- 84	2,006	84	2,006	Glacial sand	Hard, clear		D, S	Insufficient for local needs; uses a shall well and hauls water.
6	NW.	3	"	"	"	Bored	140	2,140									Dry hole, base in glacial drift; many shal dry holes.
7	NW.	4	"	"	"	Drilled	180	2,060	- 60	2,000	180	1,880	Glacial sand	Hard, clear, iron		D, S	Oversufficient for local needs; several farmers haul from here.
8	NE.	4	"	"	"	Bored	75	2,080	- 60	2,020	75	2,005	Glacial drift	Hard, clear		D, S	Sufficient for 13 head stock; also a 95-fo dry hole.
9	NW.	5	"	"	"	Drilled	152	2,038	- 77	1,961	152	1,886	Glacial gravel	Hard, cloudy, iron		D, S, I	Oversufficient for 30 head stock; several wells 40 to 50 feet deep; small supply.
10	SW.	6	"	"	"	Bored	40	1,995	- 30	1,965	40	1,955	Glacial gravel	Hard, cloudy, "alkaline" iron		D, S	Oversufficient for 50 head stock.
11	NE.	6	"	"	"	Dug	32	2,040	- 30	2,010	30	2,010	Glacial sand and gravel			S	Insufficient for local needs.
12	NE.	7	"	"	"	Bored	110	2,045	-107	1,938	107	1,938	Glacial sand	Hard, clear, iron		D, S	Sufficient for 12 head stock; several dry holes.
13	SE.	7	"	"	"	Bored	140	2,050	- 80	1,970	140	1,910	Glacial gravel	Hard, clear, iron		D, S, I	Oversufficient for local needs.
14	NW.	12	"	"	"	Bored	40	2,145	- 35	2,110	35	2,110	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 15 head stock; also a 90- foot dry holes.
15	SE.	13	"	"	"	Bored	35	2,155	- 15	2,140	15	2,140	Glacial sand	Hard, clear		D, S	Intermittent supply; stock water at slough and seepge well.
16	NE.	13	"	"	"	Bored	28	2,165	- 19	2,146	19	2,146	Glacial sand	Hard, clear		D	Sufficient for domestic needs only; hauls water and uses sloughs.
17	NW.	14	"	"	"	Drilled	200	2,130	-185	1,945	200	1,930	Glacial gravel and sand	Hard, clear, iron		D, S	Sufficient for 50 head stock.
18		15	"	"	"		125	2,120	-100	2,020	125	1,995	Glacial sand				
19	SE.	19	"	"	"	Drilled	240	2,060									Dry hole, base in glacial drift; has shall well and uses sloughs.
20	SW.	20	"	"	"	Drilled	252	2,050	-120	1,930	248	1,802	Glacial sand	Hard			Sufficient for local needs.
21	NW.	21	"	"	"	Bored	108	2,105									Dry hole, base in glacial drift.
22		24	"	"	"	Drilled	211	2,175	- 60	2,115	211	1,964	Glacial drift	Hard, clear, iron		D, S	Oversufficient for local needs.
23	NW.	25	"	"	"	Drilled	211	2,135	-202	1,933	211	1,924	Glacial gravel	Hard, clear, "alkaline" iron		D, S	Oversufficient for 17 head stock; twelve dry holes, deepest 173 feet.
24	NW.	26	"	"	"	Dug	20	2,100	- 12	2,088	12	2,088	Glacial sand	Hard, clear		D, S	Sufficient for 50 head stock.
25	NE.	26	"	"	"	Dug	20	2,125					Glacial clay	Hard, clear		D, S	Intermittent supply; hauls water.
26	SE.	28	"	"	"	Bored	75	2,165	- 67	2,098	67	2,098	Glacial drift	Hard, clear, iron		D, S	Insufficient for local needs; also two 100 foot dry holes; hauls water and uses sloug
27	NW.	28	"	"	"	Drilled	169	2,150	-134	2,016	169	1,981	Glacial sand	Hard, iron, cloudy		D, S	Good supply; was 40-foot well now filled i several dry holes.
28	SW.	28	"	"	"	Dug	6	2,135					Glacial sand	Hard		D, S	Insufficient for local needs; hauls water.
29	NW.	30	"	"	"	Drilled	236	2,055	-186	1,869	236	1,819	Glacial sand	Hard, clear		D, S	Oversufficient for local needs; fourteen dry holes to maximum depth of 140 feet.
30	SW.	30	"	"	"	Dug	28	2,060	- 24	2,036	24	2,036	Glacial sand	Hard, clear		D, S	Insufficient for local needs; also a simil well; hauls water.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of LUMSDEN NO.189, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
31	NW.	31	20	19	2	Bored	175	2,054	-155	1,899	175	1,979	Glacial sand	Hard, clear		D, S	Oversufficient for 30 head stock.
32	SE.	32	"	"	"	Drilled	257	2,120	-227	1,893	267	1,863	Glacial sand and gravel	Hard, iron,		D, S	Oversufficient for 50 head stock; twenty-three dry holes deepest 190 feet.
33	NE.	33	"	"	"	Bored	160	2,105	-115	1,990	160	1,945	Glacial drift	Hard, clear		D, S	Insufficient for local needs; hauls water.
34	NW.	34	"	"	"	Drilled	275	2,105					Glacial drift	Hard, iron, cloudy		D, S	Sufficient for local needs.
35	SW.	35	"	"	"	Bored	75	2,080	- 65	2,015	75	2,005	Glacial sand	Hard, clear		D, S	Sufficient for 8 head stock.
36	SE.	35	"	"	"	Dug	25	2,076					Glacial drift	Hard		D, S	Intermittent supply; two dry holes over 130 feet; hauls water.
37	NE.	36	"	"	"	Bored	70	2,000	- 52	1,948	70	1,930	Glacial sand	Hard, clear		D, S, I	Oversufficient for 50 head stock.
1	SE.	2	20	22	2	Dug	60	1,940	- 51	1,889	51	1,889	Glacial sand	Hard, clear		D, S	Sufficient for 50 head stock.
2	SW.	2	"	"	"	Dug	19	1,930	- 12	1,918	19	1,911	Glacial gravel	Hard, clear		D, S	Oversufficient for local needs; also a simil well.
3	SE.	3	"	"	"	Dug	20	1,912	- 15	1,897	15	1,897	Glacial sand	Hard, clear, "alkaline" iron		D, S	Oversufficient for 16 head stock.
4	SW.	3	"	"	"		18	1,895	- 8	1,887	8	1,887	Glacial gravel	Hard, clear		D, S	Sufficient for 100 head stock.
5	NE.	4	"	"	"	Dug	12	1,850	- 6	1,844	6	1,844	Glacial sand	Hard, clear		D, S	Oversufficient for 55 head stock.
6	SW.	4	"	"	"	Spring		1,860					Glacial drift	Hard, clear		D, S	Oversufficient for 300 head stock.
7	SE.	8	"	"	"	Bored	80	1,880									Dry hole, base in glacial drift; haul water and use dam for stock.
8	SE.	9	"	"	"			1,905	- 16	1,889			Glacial drift	Hard, clear		D, S	Sufficient for 20 head stock.
9	NE.	10	"	"	"	Bored	17	1,925	- 16	1,909	16	1,909	Glacial sand	Hard, clear, "alkaline"		D, S	Almost sufficient for local needs.
10	NW.	10	"	"	"	Drilled	175	1,915									Dry hole, base in glacial drift; small amount of water encountered at 40 feet.
11	NW.	12	"	"	"	Bored	80	1,980	- 68	1,912	80	1,900	Glacial drift	Hard, clear, iron		D, S	Sufficient for 25 head stock.
12	SW.	12	"	"	"	Dug	40	1,960	- 28	1,932	40	1,920	Glacial sand	Hard, iron, "alkaline"		D, S	Sufficient for local needs.
13	NW.	13	"	"	"	Bored	83	1,985	- 72	1,913	83	1,902	Glacial gravel	Hard, iron		D, S	Oversufficient for 100 head stock; #
14	SE.	13	"	"	"	Bored	120	2,020	-118	1,902	118	1,902	Glacial drift	Hard, clear		D, S	Small supply; farm vacant; also a 139-foot dry hole.
15	SE.	14	"	"	"	Bored	35	1,972	- 31	1,941	31	1,941	Glacial drift	Hard, clear, iron		D, S	Sufficient for 25 head stock.
16	NE.	14	"	"	"	Bored	48	1,990	- 46	1,944	46	1,944	Glacial gravel	Hard, clear		D, S	Sufficient for 40 head stock.
17	NW.	15	"	"	"	Bored	50	1,890					Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 40 head stock.
18	SE.	16	"	"	"	Bored	100	1,875					Glacial sand	Hard, cloudy, "alkaline" iron		D, S	Sufficient for local needs.
19	NE.	16	"	"	"	Dug	42	1,905	- 36	1,869	40	1,865	Glacial sand	Hard, clear, iron		D, S	Sufficient for 20 head stock; three 80-foot dry holes.

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WELL RECORDS—Rural Municipality of LUMSDEN NO.189, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
20	NE.	17	20	20	2	Spring	8	1,900					Glacial sand	Hard,clear		D, S	Oversufficient for local needs.
21	SW.	18	"	"	"	Dug	20	1,750					Gla cial drift	Hard,clear		D, S	Sufficient for 22 head stock; also a spring
22		19	"	"	"	Drilled	252	1,600	-248	1,352							
23	SE.	20	"	"	"	Dug	34	1,665	- 26	1,639	34	1,631	Glacial sand	Hard,clear, iron		D, S	Sufficient for 70 head stock; was a 60-foot well; caved in.
24	W½.	22	"	"	"	Bored	45	1,925	- 22	1,903	45	1,880	Glacial drift	Hard,clear, "alkaline"		D, S	Sufficient for 50 head stock; several dry holes.
25	NW.	23	"	"	"	Bored	30	1,890					Glacial sand	Hard		D, S	Sufficient for local needs.
26	SW.	23	"	"	"	Dug	25	1,900	- 20	1,880	20	1,880	Glacial sand	Hard,clear		D, S	Sufficient for 60 head stock.
27	SE.	24	"	"	"	Drilled	150	2,010	-130	1,880	150	1,860	Glacial sand	Hard,clear		D, S	
28	SE.	25	"	"	"		80	2,005									Dry hole; several other dry holes; hauls water.
29	SE.	26	"	"	"	Dug	60	1,975	- 50	1,925	50	1,925	Glacial sand	Hard,clear		D, S	Insufficient for local needs; hauls water.
30	NE.	26	"	"	"	Bored	55	1,960	- 15	1,945	15	1,945	Glacial sand	Hard,clear		D, S	Insufficient for local needs; also two simi wells;creek dammed; also well on SW.¼ sect Yields 6 gallons a minute.
31	NW.	27	"	"	"	Drilled	241	1,600	- 10	1,590	185	1,415	Glacial sand	Hard			
32	SW.	34	"	"	"	Drilled	289	1,600					Glacial sand				Fills with sand.
33	SE.	34	"	"	"	Dug	40	1,640					Glacial sand and gravel	Hard,"alkaline"		D, S	Sufficient for local needs.
34	SE.	36	"	"	"	Dug	24	2,010					Glacial gravel	Soft,clear		D, S	Intermittent supply; also use a dam,severa dry holes to 20 feet deep.
1	NW.	3	20	21	2	Bored	40	1,800	- 24	1,776	40	1,760	Glacial sand	Hard,clear		D, S	Sufficient for 100 head stock.
2	SW.	5	"	"	"	Dug	15	1,810	- 12	1,798	12	1,798	Glacial sand	Hard,clear	40	D, S	Sufficient for 20 head stock; also a simil well.
3	NE.	5	"	"	"	Bored	60	1,810	- 20	1,790	60	1,750	Glacial sand	Hard,clear	40	D, S	Abundant supply.
4	SE.	5	"	"	"	Bored	15	1,810					Glacial drift	Hard		D, S	Good supply available; tested by town of Lumsden as source of supply.
5	NE.	6	"	"	"	Bored	80	1,810	- 20	1,790	80	1,730	Glacial sand	Hard,clear, "alkaline"		S	Sufficient for local needs.
6	NE.	7	"	"	"	Bored	80	1,805									Dry hole,base in glacial drift ; uses seepage well.
7	SE.	8	"	"	"	Drilled	325	1,810	-025	1,685	325	1,485	Marine Shale sand	Hard		N	Plugged with sand; also four dry holes 20 70 feet deep.
8	NE.	9	"	"	"	Bored	115	1,800									Dry holes,base in glacial drift;other dry holes and 30-foot seepage wells hauls wate
9	SW.	10	"	"	"	Spring		1,650					Glacial drift	Hard,clear		D, S	Good slow.
10	NE.	11	"	"	"	Dug	7	1,600					Glacial gravel	Soft,clear		D, S	Intermittent supply; also 65-foot dry hol also holes on SE.¼.
11	SE.	16	"	"	"	Bored	90	1,800	- 70	1,730	90	1,710	Glacial sand	Hard,clear, "alkaline"		D, S	Sufficient for 8 to 10 head stock.
12	NE.	19	"	"	"	Bored	75	1,800	- 37	1,763	75	1,725	Glacial sand	Hard,clear, "alkaline" iron	42	D, S	Sufficient for 12 head stock.

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

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

WELL RECORDS—Rural Municipality of LUMSDEN NO.189, 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
13	SW.	19	20	21	2	Bored	60	1,800	- 38	1,762	60	1,740	Glacial drift	Hard, clear, iron	40	D, S	Sufficient for local needs; numerous dug wells.
14	SW.	20	"	"	"	Bored	85	1,800	- 60	1,740	85	1,715	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock; haul drinking water.
15	NE.	30	"	"	"	Bored	102	1,800					Glacial sand	Hard, clear	40	D, S	Sufficient for 60 head stock.
16	NE.	31	"	"	"	Bored	90	1,775									Dry hole, base in glacial sand; several shallow wells; poor supply.
1	SE.	1	20	22	2	Bored	125	1,810					Glacial drift	Hard, clear, "alkaline" iron	45	D, S	Intermittent supply; use several similar wells and haul water.
2	SW.	3	"	"	"	Bored	87	1,810	- 85	1,725	85	1,725	Glacial drift	Hard, clear	40	D, S	Intermittent supply; also a 40-foot well; hauls water.
3	SE.	4	"	"	"	Bored	63	1,810	- 38	1,772	63	1,747	Glacial drift	Hard, clear "alkaline"	40	D, S	Insufficient for local needs; also a similar 53-foot well.
4	NW.	4	"	"	"		75	1,820	- 25	1,795	75	1,745	Glacial drift	Hard, iron, "alkaline"		D, S	Sufficient for local needs; also a 50-foot well and two seepage wells.
5	SW.	6	"	"	"	Bored	42	1,820	- 32	1,788	43	1,777	Glacial gravel	Hard, clear, "alkaline"	40	D, S	Almost sufficient for local needs; also a number of 50-foot dry holes.
6	SW.	8	"	"	"	Bored	63	1,820	- 50	1,770	63	1,757	Glacial gravel	Hard, clear	42	D, S	Sufficient only for 15 head stock.
7	NW.	10	"	"	"	Bored	32	1,810	- 17	1,793	32	1,778	Glacial sand	Hard, clear, iron	41	D, S	Sufficient for 30 head stock; also a 40-foot well similar.
8	SE.	12	"	"	"	Drilled	95	1,810									Dry hole, base in glacial drift; hauls water
9	NE.	12	"	"	"	Bored	60	1,800	- 40	1,760	60	1,740	Glacial sand	Soft, clear	40	D, S	Sufficient for 50 head stock; other 60-foot wells, poor supply.
10	SE.	13	"	"	"	Dug	25	1,800					Glacial drift	Hard, clear, iron		D, S	Sufficient for local needs; also a 20-foot seepage well.
11	NE.	14	"	"	"	Dug	18	1,800	- 16	1,784	16	1,784	Glacial gravel	Hard, clear, "alkaline"	41	D, S	Sufficient for local needs; also a 30-foot well, poor water.
12	SE.	16	"	"	"	Bored	64	1,810	- 30	1,780	64	1,746	Glacial gravel	Hard, clear, "alkaline" iron	42	D, S	Sufficient for local needs.
13	NW.	17	"	"	"	Bored	85	1,810	- 50	1,760	85	1,725	Glacial sand	Hard, clear, "alkaline" iron	40	S	Sufficient for 50 head stock; also a dry hole and two 40-foot wells.
14	SE.	18	"	"	"	Bored	40	1,810	- 35	1,775	35	1,775	Glacial gravel	Hard, clear, iron	40	D, S	Sufficient for 20 head stock; also ten shallow seepage wells.
15	SE.	22	"	"	"	Bored	30	1,800	- 10	1,790	30	1,770	Glacial drift	Hard, clear	40	D, S	Sufficient for 50 head stock; several other wells yield small supply.
16	SE.	23	"	"	"	Bored	70	1,810	- 50	1,760	70	1,740	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 30 head stock.
17	SE.	24	"	"	"	Bored	92	1,805	- 20	1,785	92	1,713	Glacial drift	Hard, clear, "alkaline"	40	D, S	Sufficient for 100 head stock. Other shallow wells.
18	NE.	24	"	"	"	Bored	55	1,795	- 18	1,777	55	1,740	Glacial sand	Hard, clear	40	D, S	Sufficient for 20 head stock; 30-foot well abandoned and dry holes up 84 feet deep.
19	NW.	24	"	"	"	Bored	16	1,800	- 12	1,788	12	1,788	Glacial gravel	Soft, clear	42	D, S	Good supply; farm vacant; several other shallow wells.
20	SE.	26	"	"	"	Bored	79	1,800	- 24	1,776	79	1,721	Glacial gravel	Hard, clear, iron, sulphur	40	S	Oversufficient for 50 head stock; five wells 10 to 79 feet deep; varying supply.
21	NE.	26	"	"	"	Bored	48	1,800	- 47	1,753	47	1,753	Glacial gravel and sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock; two seepage wells and twenty-three wells 20-110 feet deep.

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 LUMSDEN NO. 189, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
22	SE.	28	20	22	2	Dug	36	1,790	- 35	1,755	35	1,755	Glacial sand	Hard, clear, iron	45	D	Sufficient for domestic needs only; also two wells 14 and 25 feet deep.
23	SE.	30	"	"	"	Bored	20	1,800	- 17	1,783	17	1,783	Glacial sand	Hard, clear, "alkaline"	40	S	Insufficient for local needs; also a seepage well hauls water.
24	NE.	32	"	"	"	Dug	14	1,780	- 9	1,771	9	1,771	Glacial sand	Soft, clear	40	D, S	Sufficient for local needs.
25	SE.	33	"	"	"	Bored	18	1,780	- 15	1,765	15	1,765	Glacial sand	Soft, clear	45	D S	Sufficient supply in normal years; also a similar 10-foot well.
26	NE.	33	"	"	"	Dug	22	1,780	- 19	1,761	19	1,761	Glacial gravel and sand	Hard, clear	40	D S	Sufficient for 20 head stock; other shallow wells yield good supply.
27	SE.	34	"	"	"	Dug	32	1,780	- 10	1,770	32	1,748	Glacial drift	Hard, clear	42	D S	Sufficient for 50 head stock; also a 65-foot well, poor supply.
1	SE.	1	21	19	2	Bored	52	2,000	- 27	1,973	52	1,948	Glacial drift	Hard, clear		D S	Sufficient for 150 head stock.
2	SE.	2	"	"	"	Drilled	102	2,000					Glacial drift	Hard, iron, "alkaline"		D S	Oversufficient for 15 head stock.
3	SW.	2	"	"	"	Drilled	164	2,040	-104	1,936	164	1,876	Glacial sand	Hard, clear, iron		D, S	Oversufficient for 50 head stock; also five dry holes, deepest 130 feet.
4	NW.	2	"	"	"	Bored	75	2,000	- 63	1,937	75	1,925	Glacial gravel	Hard, cloudy, iron		D, S	Oversufficient for 50 head stock.
5	NE.	2	"	"	"	Bored	80	1,995	- 76	1,919	76	1,919	Glacial gravel	Hard, iron, cloudy		D, S	Sufficient for 14 head stock.
6	NW.	3	"	"	"	Bored		2,000					Glacial sand	Hard, iron		D, S	Oversufficient for 15 head stock.
7	SE.	5	"	"	"	Drilled	218	2,060	-200	1,860	228	1,842	Glacial sand	Hard, clear, iron		D, S	Sufficient for local needs; also five wells 130 feet deep, small supply.
8	NE.	5	"	"	"	Bored	100	1,985	- 82	1,903	100	1,885	Glacial gravel	Hard, clear		D, S	Oversufficient for 50 head stock.
9	SW.	6	"	"	"	Drilled	186	2,065	-165	1,900	186	1,879	Glacial gravel	Hard, clear		D, S	Oversufficient for 45 head stock.
10	SW.	9	"	"	"	Bored	100	1,985	- 96	1,889	96	1,889	Glacial sand	Hard, clear		D, S	Oversufficient for 40 head stock.
11	NW.	9	"	"	"	Bored	51	1,930									Dry hole; base in glacial drift; haule wate
12	NW.	10	"	"	"	Bored	46	1,935	- 33	1,902	46	1,889	Glacial drift	Hard		D, S	Sufficient for local needs.
13	NW.	12	"	"	"	Bored	35	1,940					Glacial sand	Hard, cloudy, "alkaline"		D, S	Insufficient for local needs; hauls water.
14	SE.	12	"	"	"	Bored	49	1,975	- 45	1,930	45	1,930	Glacial gravel	Hard, clear, iron		D, S	Sufficient for local needs; also has spring in ravine.
15	NE.	13	"	"	"	Spring		1,860					Glacial drift	Hard, clear		S	Yields 75 gallons an hour.
16	SW.	13	"	"	"	Bored	38	1,925	- 28	1,897	38	1,887	Glacial drift	Hard, clear		D, S	Sufficient for 30 head stock.
17	SW.	14	"	"	"	Dug	14	1,920	- 8	1,912	8	1,912	Glacial drift	Soft, clear		D, S	Insufficient for local needs.
18	NW.	21	"	"	"	Dug	11	1,612	- 7	1,605	7	1,605	Recent gravel	Hard, clear, iron		D, S	Sufficient for local needs.
19	SE.	23	"	"	"	Dug	30	1,950	- 14	1,936	30	1,920	Glacial drift	Hard, clear		D, S	Sufficient for 18 head stock.
20	SE.	26	"	"	"	Dug	10	1,612	- 7	1,605	7	1,605	Recent sand			D, S	Intermittent supply; use river and similar well.
1	SW.	2	21	20	2	Spring		1,700					Glacial drift	Soft, clear			Good flow.

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

WELL RECORDS—Rural Municipality of LUMSDEN NO.189, 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
2	SW.	2	21	20	2	Bored	42	1,800	- 38	1,762	38	1,762	Glacial sand	Hard,clear		D	Sufficient for domestic needs only; several shallow dry holes.
3	SE.	3	"	"	"	Spring		1,700					Glacial sand	Soft,clear			
1	SE.	6	21	21	2	Dug	8	1,750	- 6	1,744	6	1,744	Glacial drift	Hard,clear, iron	39	D, S	Sufficient for local needs.
2	NW.	6	"	"	"	Bored	40	1,760	- 27	1,733	40	1,720	Glacial gravelly clay	Hard,clear	40	D, S	Abundant supply.
3	SE.	7	"	"	"	Dug	25	1,630	- 10	1,620	25	1,605	Glacial sand	Hard,clear	42	D, S	Sufficient for local needs.
1	SW.	1	21	22	2	Bored	90	1,775	- 40	1,735	90	1,685	Glacial sand	Hard,clear, iron	42	D, S	Sufficient for 30 head stock.
2	SE.	1	"	"	"	Bored	15	1,775									Several dry holes; base in glacial drift.
3	NE.	6	"	"	"	Bored	97	1,760	- 37	1,723	97	1,663	Glacial drift	Hard,clear, iron	40	D, S	Abundant supply; farm vacant; five or six dry holes 30-40 feet deep.
4	NE.	9	"	"	"	Dug	12	1,775	- 9	1,766	9	1,766	Glacial sand	Hard,cloudy		D, S	Sufficient for 50 head stock. #
5	SE.	10	"	"	"	Spring		1,760					Glacial sand	Soft		D, S	Abundant supply.
6	SW.	10	"	"	"	Spring		1,760					Glacial sand	Soft		D, S	Small supply.
7	NE.	11	"	"	"	Bored	30	1,750	- 20	1,730	20	1,730	Glacial sand	Hard,clear	43	D, S	Sufficient for local needs; was a 50-foot dry hole, now filled in.
8	SW.	12	"	"	"	Dug	12	1,750	- 8	1,742	8	1,742	Glacial gravel and sand	Hard,clear	42	D, S	Sufficient for local needs.
9	NE.	14	"	"	"	Dug	12	1,650	- 5	1,645	5	1,645	Glacial sand	Hard,clear, "alkaline"	43	D, S	Sufficient for local needs; also two 40-foo dry holes.
10	SE.	21	"	"	"	Dug	15	1,710	- 1	1,709	1	1,709	Glacial gravel	Hard,clear		D, S	Yields 7 gallons a minute; also a 15-foot well not used; both wells in Last Mountain Indian Reserve. #
11	SW.	21	"	"	"	Dug	40	1,690	- 35	1,655	35	1,655	Glacial drift	Soft,clear		D, S	Intermittent supply.
12	SW.	22	"	"	"	Bored	15	1,690	- 6	1,684	6	1,684	Glacial gravel	Hard,clear			Located at Regina Beach.

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.