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DEPARTMENT OF MINES

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GEOLOGICAL SURVEY OF CANADA

WATER SUPPLY PAPER No. 189

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF NEWCOMBE NO. 260 SASKATCHEWAN

By

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

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GEOLOGICAL SURVEY

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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF NEWCOMBE, NO. 260, 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 Newcombe, No. 260, covering an area of approximately 424 square miles in southwestern Saskatchewan, consists of nine full townships, described as tps. 25, 26, and 27, ranges 22, 23, and 24; and four part townships described as tps. 23, range 24, and tp. 24, ranges 22, 23, and 24, all W. 3rd mer. The village of Glidden, situated near the centre of the municipality, is located 37 miles east of the Saskatchewan-Alberta border and approximately 154 miles north of the International Boundary line. The southern boundary of the municipality is formed by South Saskatchewan river. A branch line of the Canadian National railways passes in an east-west direction through township 26, ranges 22, 23, and 24, and on it are located the hamlet of Dankin and the villages of Glidden and Madison. Another branch line of the Canadian National railway runs due north from the village of Glidden. The hamlets of Sandgren and Inglenook are situated on this line.

The elevation of South Saskatchewan river in the southwestern corner of the municipality is 1,875 feet above sea-level, and in the southeastern corner is 1,850 feet above sea-level. The northern slope of the valley rises abruptly, and in a distance of approximately one mile the elevation increases to between 2,250 and 2,350 feet above sea-level. A narrow area to the north of the river is deeply dissected by numerous, short valleys, a few of which contain intermittent streams. To the north of this dissected area the elevation decreases slightly for a short distance until two moraine-covered areas are reached. In the eastern morainic area the elevation rises to 2,400 feet, and in the western area to 2,300 feet above sea-level. A flat area occurs in the east-central part of the municipality and extends to the north-central part. It lies at an approximate elevation

of 2,200 feet and is about 100 feet lower than the surrounding country.

In a few localities South Saskatchewan river has formed a flood-plain that consists of a few feet of Recent stream deposits. The ground surface of the moraine-covered areas is very rough and is characterized by numerous, rock-strewn knolls and depressions, and is very unsuitable for agricultural purposes. The greater part of the municipality is mantled by glacial till. In the flat area in the east-central part of the municipality and in other smaller areas the glacial till is concealed by glacial lake clay that varies from a few inches to 40 feet thick. The glacial till or boulder clay in the vicinity of the river has been eroded by water action and the surface is stony. Knolls and ridges of water-worn glacial till outcrop in some areas. These ridges are very stony and are unsuitable for cultivation.

Water-bearing Horizons in the Unconsolidated Deposits

The Recent deposits along South Saskatchewan river are composed of sand and clayey silts, and although no wells have been sunk into them it is very probable that moderate supplies of water could be obtained at shallow depth from these stream deposits.

The glacial lake clay as a rule is non-water-bearing, and no water is obtained at shallow depth in the underlying glacial till. In the northeastern corner of township 26, range 23, water is obtained from what is thought to be glacial lake sands underlying the lake clay. The wells are from 20 to 45 feet deep and an individual well yields sufficient water for 20 to 50 head of stock. The water is moderately hard, and usable for all domestic purposes. It is not under hydrostatic pressure. The deposit of water-bearing sand is not more than 10 feet thick.

It is very possible that wells would encounter pockets of water-bearing sand and gravel at shallow depth in the morainic

deposits, but as the area is not suitable for agricultural purposes it is but sparsely settled and few wells have been dug. The deposits of glacial till consist of 1 to 3 feet of top soil; 5 to 30 feet of oxidized, yellow boulder clay, which in some townships contains a few scattered pockets of sand and gravel; and unoxidized, blue boulder clay. Discontinuous layers of sand occur at various elevations in the blue boulder clay. The uppermost water-bearing horizon in the glacial till is formed by the scattered pockets of sand and gravel in the yellow boulder clay. Wells tapping these deposits are from 10 to 35 feet deep, and are located mainly in townships 25, 26, and 27, range 24. The yield from an individual well is usually small, but the water is moderately hard, usable for all farm purposes, and is the best water obtainable for domestic purposes in the municipality.

A number of wells obtain water from discontinuous deposits of sand at depths of 40 to 75 feet in the blue boulder clay. The water from many of these wells is highly mineralized. It is used for drinking, although that from some wells has a laxative effect on those not accustomed to the use of such water. Most of the wells yield water that is under slight hydrostatic pressure. The water-bearing deposits at depths of 40 to 75 feet are encountered mainly in the western townships.

The main supply of water in this municipality is encountered at depths of 85 to 200 feet, or at elevations varying between 2,050 and 2,200 feet above sea-level. The aquifers are formed by discontinuous beds of sand located at or near the base of the glacial drift. The water is very highly mineralized and that from many wells is not usable for drinking or any domestic purpose. It is usually very hard, "alkaline", and contains sufficient iron to stain the water containers. Many of the wells yield very large quantities of water and most of them yield sufficient water for 30 to 50 head of stock. The water in a few

wells is not under hydrostatic pressure, but in most of them it rises a few feet above the aquifers. Wells that tap this water-bearing deposit at depth are found in all the townships of the municipality except township 24, range 22, and in some they are the only source of water. Wells to similar depth in other sections should encounter water, but it is improbable that it will be suitable for drinking.

Farmers living in township 24, range 22, have not been able to secure a supply of water from wells, and in the southern parts of township 24, range 24, some difficulty is also experienced in getting water. No reason can be given for this fact, as a moderate supply of water is being obtained at depths of 70 to 200 feet in township 24, range 23. It is not known if wells have been sunk to these depths in the townships mentioned above. In these areas water is hauled from South Saskatchewan river. The water from the river should be boiled before it is used for domestic purposes. The collection and retention of surface water by the use of dams and dugouts is recommended. The dugouts should be at least 12 feet deep, and situated in a natural depression where the maximum amount of water is collected.

Water-bearing Horizons in the Bedrock

The Belly River formation underlies the glacial drift throughout the municipality. In the southeastern part coal occurs at an approximate depth of 150 to 200 feet, or at an elevation of 2,015 to 2,085 feet above sea-level. Water is obtained from an aquifer that immediately underlies the thin seam of coal. Coal was also reported to occur at a depth of 160 feet, or at an elevation of 2,185 feet above sea-level, in township 26, range 24. In the northeastern part of the municipality wells that tap the bedrock do not encounter coal, but water is derived from a bed of blue sand, at depths of 100 to 154 feet, that is thought to be part

of the Belly River formation. The water from all these bedrock wells, with the exception of one, is so highly mineralized that it cannot be used for drinking or cooking. It contains a relatively large amount of iron in many places and may act as a laxative. The wells usually yield an abundant supply of water sufficient for 35 to 60 head of stock. The water-level in a few wells cannot be lowered by pumping. Several wells obtain water, at depths of 200 to 300 feet, in the Belly River formation. The water is similar in quality to that derived from shallower depths, but it is not desirable for general farm purposes.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 23, Range 24

Only the part of this township that lies north of South Saskatchewan river is discussed in this report. It consists of approximately half of section 31, and lies entirely in the valley of South Saskatchewan river. The flood-plain at the base of the valley is floored with several feet of Recent sands and silts and the slope of the valley rises abruptly and is mantled by boulder clay or glacial till. No wells have been sunk in this area, but a moderate supply of usable water should be obtained at shallow depth in the Recent stream deposits. The remainder of the township is discussed in the report on the rural municipality of Elinworth, No. 230.

Township 24, Range 22

South Saskatchewan river flows across the southern part of this township, and that part lying to the south of the river is not discussed in this report. The river valley rises abruptly from an elevation of 1,850 feet at the river-level to approximately 2,350 feet above sea-level on the plain. Several deep tributaries extend northward into the township. Recent stream gravels occur in a small area in sections 6 and 7, moraine mantles approximately 6 square miles in the northwestern corner, and the remainder of the township is overlain by boulder clay or glacial till. In a narrow area in the northeastern corner the boulder clay is overlain by glacial lake clay. The ground surface in this area is flat, but elsewhere it is hilly and rolling, particularly in the moraine-covered area.

The field party did not record any wells in this township and it is reported that water for domestic and stock needs is hauled from South Saskatchewan river. The river water should

be boiled before it is used for domestic purposes. Some surface water is conserved in dams and dugouts. This means of increasing the water supply is highly recommended. Dugouts should be excavated at least 12 feet deep. Moderate supplies of water are obtained at depths of 70 to 200 feet in the township to the west and there is no apparent reason why water-bearing deposits may not occur at similar depths in this township.

Township 24, Range 23

Approximately 31 square miles of this township lie within the municipality of Newcombe. South Saskatchewan river cuts the southern part of the township and its valley is steep and is approximately 450 feet deep. The river is at an elevation of 1,860 feet above sea-level. The northern slope is dissected by numerous, deep, short, tributary coulées. An area approximately 2 miles wide to the north of the river is very rough and hilly and is used only for grazing. To the north of this area the land becomes less rough and the elevation decreases to approximately 2,300 feet above sea-level. A small area in the northeastern corner of the township is very rough and hilly, and is covered by moraine. The remainder of the township is mantled by glacial till or boulder clay that is at least 200 feet thick. The glacial till bordering the river is modified by water action. A small deposit of Recent stream sands and silts occurs on the flood-plain of the river, in sections 5 and 6.

The glacial till generally consist of a thin layer of top soil; several feet of oxidized yellow boulder clay; 70 to 130 feet of dark boulder clay; 1 to 5 feet of fine gravel; and unoxidized, blue boulder clay, which probably extends to bedrock. No wells have been sunk in the moraine-covered area, but the deposits in this area are probably similar in composition to the glacial till.

The water supply in this township is derived from South Saskatchewan river, a spring, and from thirteen wells. The river water is used by those residing in the southern part of the township, mainly for stock, but a few use it for household purposes. The spring, situated in a deep valley in the SE.$\frac{1}{4}$, section 8, has been dug out to a depth of 12 feet, and it is the main source of water for those residing in that area. The water flows throughout the greater part of the year and large herds of stock can be watered at the spring. The water is hard, fairly highly mineralized, and contains a sufficient amount of iron to stain the stones over which it flows. This spring is situated at an approximate elevation of 2,185 feet, and its aquifer may be the same as that tapped by the wells in the northern part of the township.

Thirteen wells in the northern part of the area tap what appears to be a continuous gravel aquifer at depths of 70 to 200 feet; or at an average elevation of 2,180 feet above sea-level. The water is hard and fairly highly mineralized, but it is used for all household purposes. It is under sufficient hydrostatic pressure to rise to points 30 to 100 feet below the surface, depending on the depth of the well. The supply from the wells is usually more than sufficient for local needs. It is very probable that wells sunk to similar depths in most sections in the northern part of the township would encounter this water-bearing horizon, as no dry holes have been reported.

Few residents in this township experience a shortage of water, but it appears impossible to obtain water at shallow depth. In the southern part of the area surface water can be conserved by using dams and dugouts. Wells drilled to a depth considerably greater than those in the northern part of the area may encounter water in the southern part of the township. The bedrock was not encountered in this township.

Township 24, Range 24

Parts of sections 1 to 5 inclusive are not discussed in this report. The ground surface throughout the township is very rough and rolling. The area is unsuitable for cultivation and is not thickly settled. Small areas along the northern boundary are rough, stony, mantled by moraine, and attain an approximate elevation of 2,300 feet above sea-level. The remainder of the township is mantled by glacial till, and in section 18 it is overlain by a thin deposit of glacial lake clay.

A few farmers haul water for all farm needs from South Saskatchewan river. Although no dry holes are reported it is probable that attempts have been made to locate water at shallow depth. The river water should be filtered and boiled before it is used for domestic purposes.

In sections 21, 28, 29, 32, and 34, six wells from 29 to 50 feet deep have tapped layers of sand or gravel in the nearly impervious, blue boulder clay. The water from these wells is usable for household purposes and the supply is sufficient for present local requirements. The water is not under hydrostatic pressure, and the aquifers are probably formed by local pockets of sand or gravel. By systematic prospecting in other sections, water-bearing deposits may be located at similar depths.

A 90-foot well in the NW.$\frac{1}{4}$, section 36, taps a bed of sand from which a moderate supply of water is obtained. The water is very highly mineralized and "alkaline", but it is used for drinking and other household uses, although it has a laxative effect on those not accustomed to highly mineralized water. The aquifer of this well is of small extent, as a 127-foot well a short distance away did not penetrate this aquifer, but encountered another bed of sand at the 127-foot level. The water from the 127-foot well is moderately soft in comparison with that from the 90-foot well, but the supply is small and the water is not under

hydrostatic pressure. It is not known if an abundant supply of water can be derived at depth in other parts of the township. Suitable locations exist for the construction of dams and the excavation of dugouts and their use throughout the township to conserve surface water for stock is recommended.

Township 25, Range 22

The surface elevation in the southwestern corner of the township is 2,400 feet above sea-level. From this area the elevation decreases gradually in a northerly and easterly direction to 2,240 to 2,280 feet above sea-level. An area along the western part of the township is mantled by moraine. This area is very rough, with many rock-strewn knolls and ridges, and is not suitable for cultivation. The remainder of the township is mantled by glacial till or boulder clay, overlain in most sections by a deposit of glacial lake clay. Where the glacial till is exposed in this lake basin it is modified by water action, the finer material having been washed away and the boulders left at the surface. The central and northern parts of the township are suitable for cultivation and are fairly thickly settled.

No water is obtained from the glacial lake clay or from the upper part of the glacial till that underlies the lake clay. The glacial lake clay is from a few inches to 10 feet thick and in some sections is separated from the glacial till by a thin layer of dry sand. The main supply of water is located by wells at depths of 103 to 160 feet, or at elevations varying between 2,140 and 2,220 feet above sea-level. The aquifers for these seventeen wells are formed by sand or gravel that is overlain by impervious, blue boulder clay and underlain by a layer of hard, impervious material. It is possible that some of the wells are deriving water from aquifers that occur at the contact of the glacial drift and the underlying bedrock, as coal is reported to

occur at the base of the well in the NE.$\frac{1}{4}$, section 28. The supply of water from the well varies considerably. Four wells located in sections 10, 28, 31, and 36 cannot be pumped dry; six yield adequate supplies of water for 15 to 30 head of stock; and seven yield supplies that are insufficient for 5 to 10 head of stock. The water from all the wells is very highly mineralized, usually termed "alkaline", and contains a considerable amount of iron. That from eight of the wells cannot be used for household purposes, and that from others would not be used if water of better quality were obtainable within reasonable hauling distance. The water from wells that yield an abundant supply is under hydrostatic pressure. It is probable that other wells drilled to similar depths would encounter water-bearing deposits, but a large supply of usable water may not be obtained.

Four wells are thought to derive water from aquifers in the Belly River formation at depths of 160 to 266 feet, or between elevations of 2,015 and 2,082 feet above sea-level. Seams of coal are reported to occur at or near the base of the wells located in the NE.$\frac{1}{4}$, section 33, and the NE.$\frac{1}{4}$, section 34, and the aquifers appear to immediately underlie the seam of coal in these two wells. Each of the four wells yield an abundant supply of water, which is under slight hydrostatic pressure and rises a few feet in the wells, but it maintains a constant level and the wells cannot be pumped dry by a farm pump. The water is of very poor quality, being highly mineralized, "alkaline", contains a large amount of iron, and is unfit for domestic use. Wells sunk to elevations ranging between 2,000 and 2,100 feet above sea-level may encounter water in other parts of the township, but the water will not be of good quality.

The use of dugouts to retain surface water for stock use is recommended throughout the area. These artificial reservoirs should be at least 12 feet deep.

Township 25, Range 23

The maximum elevation of 2,400 feet above sea-level is attained in section 24, from whence it decreases to approximately 2,300 feet at the western border. A narrow area along the eastern border, and approximately 6 square miles in the west-central part of the township are mantled by moraine. The ground surface in these areas is rough, rock-strewn, and is not suitable for cultivation. The remainder of the township is covered by glacial till. A thin deposit of glacial lake clay overlies the till in a low-lying area to the west of the eastern boundary.

The glacial lake clay yields little or no water, but three wells obtain water from pockets of sand that occur at depths of 47 and 54 feet in the underlying glacial till or boulder clay. The moraine-covered areas are not cultivated and no wells have been dug in them, but wells sunk to shallow depths should obtain small quantities of water from scattered pockets of sand and gravel in these deposits. The glacial till usually consists of a few feet of top soil; a zone of weathered, yellow boulder clay that may contain a few pockets of sand and gravel; and a zone of unweathered, blue boulder clay that contains layers of sand at various elevations. Only one 20-foot well, in the NW.$\frac{1}{4}$, section 22, taps a pocket of sand in the yellow clay. This well yields sufficient water for 25 head of stock and the water is under slight hydrostatic pressure. It contains a large amount of mineral salts in solution, is locally termed "alkaline", but may be used for domestic purposes. With further prospecting other water-bearing deposits should be located at shallow depth.

Three wells in sections 14 and 15 tap thin deposits of sand in the blue boulder clay. These wells do not yield sufficient water for 20 head of stock and are a very poor source

of supply. The water is not as highly mineralized as that from the deeper wells and is usable for domestic purposes. It is doubtful if an abundant supply of water can be derived at shallow depth in the blue boulder clay.

The main supply of water in this township is located at depths of 80 to 150 feet, or at an average elevation of 2,150 feet above sea-level. The water-bearing deposits encountered at these depths may form a continuous aquifer, as no wells have failed to locate water in the township. Several of the wells yield large amounts of water, but most of them yield a supply that is sufficient for only 10 to 25 head of stock. The water is very hard, usually "alkaline", and that from many wells is not usable for drinking, cooking, or other household needs. Most of the wells yield water that is under hydrostatic pressure. It is possible that a moderate supply of water can be derived at depths of 80 to 150 feet throughout the township.

The residents of this township are fairly well supplied with water. If additional supplies are required it is advisable to excavate dugouts or construct dams to retain surface water.

Township 25, Range 24

The average elevation throughout this township is 2,300 feet above sea-level. Approximately two-thirds of the township is mantled by moraine, the surface of which is very rough and characterized by numerous, rock-strewn knolls and numerous coulées and ravines. It is very unsuitable for cultivation, but is satisfactory as grazing land. The northern part of the area, and parts of sections 1, 3, 4, 5, and 12, are mantled by boulder clay or glacial till. These areas are suitable for cultivation and the northwestern corner of the township is fairly well settled. The supply of water is entirely derived from wells sunk into the glacial drift. Seven farmers obtain their supply

of water from wells 20 to 36 feet deep that tap pockets of sand and gravel in the oxidized or yellow boulder clay. The wells in the SE.$\frac{1}{4}$, section 18, and the SE.$\frac{1}{4}$, section 31, yield sufficient water for at least 50 head of stock. Some of the other wells do not yield adequate quantities of water for local needs, but usually two or more such wells are used and no shortage of water is experienced. The water is moderately hard, but much of it is termed soft when compared with water from deeper wells. The water from the shallow wells, with the exception of that in the SE.$\frac{1}{4}$, section 31, which is contaminated by sewage water, is usable for domestic needs. The water from several of the wells is under slight hydrostatic pressure.

Three wells located in the NW.$\frac{1}{4}$, section 18, the SW.$\frac{1}{4}$, and NW.$\frac{1}{4}$, section 28, tap sand aquifers at depths of 43, 65, and 50 feet, respectively. They each yield abundant supplies of water and will water over 100 head of stock. The water is hard and slightly "alkaline", but usable for all farm purposes. The hydrostatic pressure is sufficient to cause the water to rise to points 35 to 45 feet below the surface where it maintains constant levels. These wells are an excellent source of supply and similar water-bearing deposits may be located in other sections of the township.

Four wells from 120 to 169 feet deep have been drilled in sections 22, 33, and 36, and they are thought to tap a continuous aquifer of sand. Each well yields a small quantity of water that is not sufficient for more than 20 head of stock. The water is very highly mineralized and although used for household purposes it is not very satisfactory. It contains a considerable quantity of iron which settles out as a reddish precipitate when the water stands in contact with the air. These wells are not satisfactory sources of water, and it does not appear advisable to drill to the above depths. It is not

known if the underlying bedrock contains water-bearing horizons in this part of the municipality. A farmer in section 36 has a dugout 70 by 30 by 6 feet that retains surface water for stock use throughout most of the year. This is an excellent method of increasing the water supply in this township, but the dugouts should be at least 12 feet deep in order to retain water throughout the winter months.

Township 26, Range 22

The ground surface in the central and southeastern sections of this township is very flat. Glacial till or boulder clay mantles the area, but it is exposed only in the northern and western parts of the area, and in small areas in the central part, being concealed elsewhere by a thin deposit of glacial lake clay. The glacial till that outcrops as small knolls in the lake basin has been modified by water action and the finer materials have been washed away leaving stones and boulders exposed at the surface. The surface elevation varies from 2,300 to 2,250 feet above sea-level, decreasing in an easterly direction. This township is very well settled and is mostly suitable for cultivation. The supply of water is obtained from wells and a few artificial reservoirs.

The glacial lake clay is non-water-bearing, and no water is obtained at shallow depth from the underlying glacial till. Only one well, located in the NW.$\frac{1}{4}$, section 30, obtains water at a depth less than 96 feet. This well is 55 feet deep and it derives an abundant supply of water from a bed of gravel. The water is under hydrostatic pressure, and rises 3 feet above the top of the aquifer where it maintains a constant level. The supply is sufficient for more than 50 head of stock, and although the water is hard, highly mineralized, and "alkaline", it is used for domestic needs. The main supply of water in this township

is encountered at depths of 96 to 147 feet, or at an average elevation of 2,150 feet above sea-level. These wells are located in all parts of the township and it appears that the water-bearing deposits are fairly continuous. Five wells yield an oversufficient supply for local needs and cannot be pumped dry. Several of the other wells yield sufficient water for 40 to 50 head of stock, but a few produce enough water for only 10 to 25 head of stock. The water is very highly mineralized and that from some wells cannot be used for domestic needs. The water is very hard, "alkaline", contains a large amount of iron, and has a laxative effect on those not accustomed to the use of highly mineralized water. With few exceptions the water is under hydrostatic pressure, but usually it only rises a few feet in the well where it maintains a constant level. As no dry holes have been sunk it is very probable that water will be located at similar depths in other sections of this township.

Two wells located in the SW.$\frac{1}{4}$, section 1, and the NW.$\frac{1}{4}$, section 3, are thought to have encountered the Belly River formation. The wells are 285 and 300 feet deep, respectively, and penetrated a thin layer of "hardpan" before the aquifer was tapped. The well in section 1 yields an abundant supply of water, but it is not usable and the well is abandoned. The 300-foot well also yields a very large quantity of water and the water-level cannot be lowered by continuous pumping. The water rises to a point 100 feet below the surface where it maintains a constant level. It is very hard, contains a large amount of iron, and is not usable for any domestic purpose, although it apparently has no ill effects on stock. Although holes drilled to similar depths in other parts of the township would probably encounter water-bearing deposits, the poor quality of water to be obtained does not warrant the expense of drilling a well.

In most sections of this township an adequate supply of water for local needs is obtained. In those areas where there is a shortage of water the conservation of surface water by dams and dugouts is recommended. To retain a supply of water throughout the winter months the dugouts should be at least 12 feet deep.

Township 26, Range 23

A small area in the southeastern part of this township is covered by moraine and is characterized by rock-strewn knolls and ridges. Glacial till mantles the remainder of the township, but in the northwestern and northeastern corners and in parts of sections 9 and 16 deposits of glacial lake clay overlie the glacial till. The glacial till-covered area is slightly rolling, but the glacial lake clay-covered areas are flat. The elevation in the southeastern corner is 2,300 feet, but it decreases to an average of 2,200 feet above sea-level in other sections of the township.

No creeks or lakes occur in this township and the supply of water is obtained from wells. The glacial lake clay is non-water-bearing, but a bed of water-bearing sands immediately underlies the lake clay in the northwestern corner of the township. Wells tapping these deposits are from 24 to 42 feet deep, and yield sufficient water for 20 to 50 head of stock. The water is not under hydrostatic pressure, but each well as a rule contains several feet of usable water. In the other glacial lake clay-covered areas there is no indication of water-bearing deposits underlying the lake clay.

In an area bordering the lake clay-covered region in the northwestern corner, a number of wells derive water at depths of 62 to 70 feet deep. The aquifer is usually sand, although in several wells it is gravel. An individual well yields sufficient

water for 15 to 50 head of stock and the water apparently has no ill effects on animals, although that from several wells is so highly mineralized that it cannot be used for domestic purposes. The water contains a considerable amount of iron and it settles as a reddish precipitate when the water stands in contact with the air. The water from most of these wells may act as a laxative on those not accustomed to its use. The water-bearing deposits do not form a continuous aquifer, as deeper wells failed to encounter them.

The residents in the southern parts of the township derive water from wells sunk to depths of 90 to 190 feet. The aquifers are formed by layers of sand in the blue boulder clay and the deposits are not thought to be continuous. The water is very hard, usually "alkaline", and with the exception of that from five wells it is usable for all domestic purposes, although it is not desirable for drinking or cooking. The supply of water varies, but most wells yield sufficient water for domestic needs and 15 to 40 head of stock. Two wells in sections 25 and 34 obtain water at a similar depth and wells sunk to depths of 90 to 190 feet in other sections of the township may also encounter water-bearing deposits.

In the SW.$\frac{1}{4}$, section 28, a 205-foot well is reported to have encountered bedrock at an elevation of approximately 2,015 feet above sea-level. The well passes through 65 feet of clay; 3 feet of fine sand; 125 feet of blue clay; 7 feet of fine sand; a thin layer of shale (soapstone) and gravel. The hard layer is probably shale belonging to the Belly River formation, but it may be part of the glacial drift. The water is very highly mineralized, "alkaline", and is not usable for domestic purposes, but has no apparent ill effect on stock. The well yields an abundant supply of water that is under sufficient hydrostatic pressure to rise to a point 65 feet below the surface where it maintains a constant

level. Possibly other wells would locate this water-bearing horizon, but the poor quality of water and the uncertainty of encountering a water-bearing deposit may not warrant the expense of drilling a well. The conservation of surface water by dams or dugouts is recommended.

Township 26, Range 24

With the exception of a small area in section 5 that is covered by moraine this township is mantled by glacial till or boulder clay. In sections 24, 25, and 31 deposits of glacial lake clay overlie the glacial till to a depth of several feet. The elevation in the northwestern corner is 2,400 feet, from whence it decreases in an easterly and southeasterly direction to elevations of slightly more than 2,200 feet above sea-level. The ground surface is fairly flat in the northeastern corner, but it is more undulating in other parts, becoming very hilly in the southwestern sections.

No water is obtained from the glacial lake clay, but wells that penetrate the clay encounter beds of fine lake sands from which moderate quantities of water are obtained. The wells are from 23 to 34 feet deep and yield adequate supplies of water for 10 to 15 head of stock. The water is hard and is being used for household purposes.

The upper 30 feet of glacial till consists of oxidized or yellow boulder clay and contains isolated pockets of sand and gravel. Nine wells have tapped these pockets of sand and gravel and yield water that is generally usable for all farm purposes. The supply varies with the individual well, but most of the wells yield sufficient water for 10 to 20 head of stock. A 28-foot well in the SE.$\frac{1}{4}$, section 28, can not be pumped dry and yields a very large supply of water. With further prospecting it is very probable that other good supplies of water will be located.

At least twelve wells from 40 to 75 feet deep encounter beds of sand in the unoxidized, blue boulder clay that underlies the yellow clay. The aquifers are probably of small areal extent, but they appear to be fairly numerous at the above-mentioned depths. The water is very highly mineralized; and that from some of the wells is not usable for domestic purposes. It is very hard, "alkaline", and usually has a high iron content. Similar water-bearing deposits should be located in other sections of the township.

Three wells in the NE.$\frac{1}{4}$, section 19, the NE.$\frac{1}{4}$, section 30, and the SE.$\frac{1}{4}$, section 32, tap water-bearing beds at depths of 120, 145, and 115 feet, respectively, or at an average elevation of 2,270 feet above sea-level. Each well yields sufficient water for 20 to 60 head of stock and the water is under hydrostatic pressure rising to points 65 to 110 feet below the surface. The water from two of the wells can be used for domestic purposes, but it is very highly mineralized and acts as a laxative on those not accustomed to its use.

Two wells in the SW.$\frac{1}{4}$, section 18, and the SW.$\frac{1}{4}$, section 34, encounter coal at or near their bases, at an average elevation of 2,160 feet above sea-level. Water is obtained from an aquifer immediately underlying the coal and it rises to a point approximately 60 feet below the surface. The aquifer is thought to be in the Belly River formation. The water is too highly mineralized to be used for drinking, cooking, or any other domestic use, but is used for stock. It is very hard, "alkaline", contains a dark sediment, and that from one well contains a large amount of iron. The supply of water is not abundant, being sufficient for not more than 35 head of stock, and unless water cannot be obtained from the glacial drift drilling into the bedrock is not recommended.

If sufficient water for domestic use is obtainable from shallow wells it is advisable to conserve surface water for stock

use by the construction of dams or the excavation of dugouts. The slightly mineralized surface water is more suitable for stock than the highly mineralized water from deep wells.

Township 27, Range 22

The elevation in the township rises gradually from 2,200 feet above sea-level in the southwestern part to 2,400 feet above sea-level in the northeastern. Glacial till mantles the township, but glacial lake clay overlies the till in part of section 6, and in a narrow area in the west-central part of the township. The ground surface of the glacial till-covered area is rolling and contains a few, undrained depressions that become dry during the early summer months. The glacial lake clay is non-water-bearing, and no water-bearing beds are located in the upper part of the till that immediately underlies the lake deposits. The glacial till usually consists of several feet of top soil; 10 to 20 feet of oxidized or yellow boulder clay that apparently does not contain beds of water-bearing sand and gravel; and at least 100 feet of unoxidized, blue boulder clay that contains discontinuous layers of water-bearing sands at or near its base.

No wells obtain water at depths less than 72 feet, and the main supply is encountered at depths of 72 to 147 feet, or at elevations that vary between 2,160 and 2,200 feet above sea-level, the deposits occurring at a lower elevation in the western sections of the township. Most of the wells yield a supply of water that is more than sufficient for 60 head of stock. With one exception the wells yield water that is under slight hydrostatic pressure, but the water maintains a constant level 40 to 80 feet below the surface, depending on the depth of the well. The water is highly mineralized and that from nine of the eleven wells is not usable for drinking, cooking, or any other domestic use. It is very hard, usually "alkaline", contains a relatively

large amount of iron, and that from some wells has a foul odour. Although the water is not usable for domestic use it apparently has no ill effects on stock, and these wells are the main source of water for stock in this township. It is very probable that other holes sunk to similar depths in the vicinity of the producing wells would obtain an abundant supply of water of similar quality. Five wells are thought to encounter the Belly River formation that underlies the glacial drift throughout the township. Four of the wells in the SW.$\frac{1}{4}$, section 3, the NE.$\frac{1}{4}$, section 12, the SW.$\frac{1}{4}$, section 13, and the NW.$\frac{1}{4}$, section 36, tap a blue sand aquifer at depths varying between 100 and 154 feet, or at an average elevation of 2,200 feet above sea-level. These wells yield large quantities of water that is very highly mineralized, and that from two of the wells is not usable for any household purpose. The water is very hard and it contains a considerable amount of iron that settles as a reddish precipitate when the water stands in contact with the air. These wells are not a satisfactory source of water, although it does not appear to have any ill effects on stock. The fifth well, drilled in the SW.$\frac{1}{4}$, section 22, is 300 feet deep and strikes an aquifer at an elevation of approximately 2,000 feet above sea-level. This well can stand continuous pumping, and the water is under sufficient hydrostatic pressure to cause it to rise to a point 180 feet below the surface. The water is not usable for drinking, cooking, or any other domestic use, but the wells are an excellent source of water for stock.

The wells in this township yield an abundant supply of water that is suitable for stock, but there is a shortage of good drinking water. The best method to obtain water for domestic use is by storing rainwater in cisterns. Such water should be filtered or boiled before it is used. Dams or dugouts to retain surface water are recommended in some sections, and wells sunk beside

these reservoirs will usually yield sufficient seepage water for domestic purposes. Care must be taken that the water in these seepage wells does not become contaminated and it should be examined regularly for bacteria.

Township 27, Range 23

The average elevation throughout this township is 2,200 feet above sea-level. The northern part of the township is slightly rolling, but the southern part is quite flat. Two large depressions occur in the northwestern corner and south-central sections of the township, and in seasons of normal rainfall are inundated by water. In 1935, however, they did not contain water. The township is mantled by glacial till overlain, in several low-lying areas, by a few feet of glacial lake clay. The soil is very suitable for farming and the area is well settled.

The glacial lake clay is non-water-bearing and apparently no beds of water-bearing sand immediately underlie it. The supply of water in this township is derived from a spring, approximately thirty wells, and from intermittent sloughs. The spring located in the NE.$\frac{1}{4}$, section 11, has been deepened to a depth of 6 feet, but it flows only during part of the year. The water is usable for all farm needs and several farmers haul their supplies from it.

Eleven wells, most of which are in the southern part of the township, tap pockets of sand or gravel in the yellow boulder clay at depths of 20 to 35 feet. Two of the wells, located in sections 19 and 20, each yield adequate quantities of water for 50 to 100 head of stock. The other wells will usually supply 10 to 30 head of stock. The water is moderately hard and is suitable for all farm purposes including irrigation. Some farmers who are unable to derive a supply of good drinking water haul from these wells. A second, discontinuous, water-bearing horizon formed by

thin layers of sand in the blue boulder clay is encountered at depths of 40 to 60 feet in widely separated parts of the township. Two wells in the SE.$\frac{1}{4}$, section 18, and the NE.$\frac{1}{4}$, section 27, yield a supply of water that is oversufficient for 100 head of stock. These wells cannot be pumped dry and the water is usable for all farm purposes. The other wells that tap this horizon yield smaller quantities of more highly mineralized water and that from some wells is too highly mineralized to be of any use. The water from most of the wells, however, is very hard, "alkaline", and is not usable for domestic purposes, although it is suitable for stock. Most of the water is under hydrostatic pressure and rises to points 20 to 40 feet below the surface. It is probable that other water-bearing deposits will be located at similar depth throughout the township.

Six wells from 98 to 140 feet deep tap sand aquifers from which variable supplies of water are obtained. Two of the wells cannot be pumped dry by a farm pump, but the others yield smaller quantities of water sufficient for 15 to 20 head of stock. The water is under hydrostatic pressure and rises to different points in the individual wells. The water is highly mineralized, usually "alkaline", and from several wells is not usable for household purposes, but is satisfactory for stock. Dugouts are recommended as a means of collecting surface water for stock use.

Township 27, Range 24

With the exception of a small area in the southeastern corner this township is mantled by glacial till or boulder clay. The elevation in the eastern part is 2,200 feet above sea-level, but it gradually increases to 2,400 feet in the western sections. The ground surface is slightly rolling in the eastern sections, but becomes more rolling in the western part where there are a few high hills. The greater part of the township is suitable for farming and it is very well settled.

No rivers, creeks, or lakes occur in this township and the water supply is obtained from wells or artificial reservoirs. The upper 10 to 35 feet of the glacial till consists of yellow boulder clay and contains a few scattered pockets of sand and gravel. Twelve wells from 20 to 35 feet deep have tapped these pockets of sand and gravel and a few yield sufficient water for 20 to 35 head of stock. Others yield intermittent supplies of water and in many places it is necessary for a farmer to have two or more wells in order to obtain sufficient water for local needs. The water is moderately hard and usable for all farm purposes. By testing with a small hand auger other water-bearing deposits should be located at shallow depth.

The main supply of water is derived from wells 40 to 125 feet that tap discontinuous layers of sand at various elevations in the unoxidized, blue boulder clay. Several of the wells yield large quantities of water that is under hydrostatic pressure, but the others yield smaller supplies that are usually sufficient for local requirements. The water is very highly mineralized and that from some wells cannot be used for any domestic purposes. The well in the NW.$\frac{1}{4}$, section 32, yields water that is so highly mineralized that it is not usable for any farm purpose. When this well was first bored the water was usable, but it gradually became more highly mineralized and "alkaline" until it is unfit for use. It is probable that water can be located in any section of this township, but it will probably be of very poor quality.

The residents of this township, with few exceptions, do not experience a shortage of water for stock use, but good drinking water is very scarce. Several farmers use shallow dugouts to collect surface water for stock, but a dugout should be at least 12 feet deep in order to retain water throughout the greater part of the year. Shallow wells dug beside these artificial reservoirs should derive a suitable supply of water for domestic needs.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF NEWCOMBE, NO.260, SASKATCHEWAN

Township	23	24	24	24	25	25	25	26	26	26	27	27	27	Total No. in municipality
West of 3rd meridian Range	24	22	23	24	22	23	24	22	23	24	22	23	24	
Total No. of Wells in Township	0	0	14	8	21	24	22	28	37	38	17	34	35	278
No. of wells in bedrock	0	0	0	0	4	0	0	2	1	2	5	0	0	14
No. of wells in glacial drift	0	0	14	8	17	24	22	26	36	36	12	34	35	264
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply														
No. with permanent supply	0	0	14	8	21	24	22	28	37	37	17	34	33	275
No. with intermittent supply	0	0	0	0	0	0	0	0	0	1	0	0	2	3
No. dry holes	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Types of Wells														
No. of flowing artesian wells	0	0	1	0	0	0	0	0	0	0	0	0	0	1
No. of non-flowing artesian wells	0	0	13	3	16	16	12	25	19	19	16	19	21	179
No. of non-artesian wells	0	0	0	5	5	8	10	3	18	19	1	15	14	98
Quality of Water														
No. with hard water	0	0	14	8	21	21	20	28	37	35	17	33	31	265
No. with soft water	0	0	0	0	0	3	2	0	0	3	0	1	4	13
No. with salty water	0	0	0	0	0	0	0	1	0	0	0	0	0	1
No. with "alkaline" water	0	0	1	3	14	11	8	21	18	20	8	14	18	136
Depths of Wells														
No. from 0 to 50 feet deep	0	0	1	6	0	2	17	0	11	23	0	24	19	103
No. from 51 to 100 feet deep	0	0	2	1	0	8	1	2	15	11	7	6	14	67
No. from 101 to 150 feet deep	0	0	9	1	14	14	3	24	6	3	8	3	2	87
No. from 151 to 200 feet deep	0	0	2	0	5	0	1	0	4	1	1	1	0	15
No. from 201 to 500 feet deep	0	0	0	0	2	0	0	2	1	0	1	0	0	6
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0	0	0	0	0
How the Water is Used														
No. usable for domestic purposes	0	0	13	8	9	19	18	16	28	27	4	23	30	195
No. not usable for domestic purposes	0	0	1	0	12	5	4	12	9	11	13	11	5	83
No. usable for stock	0	0	14	8	21	23	22	26	37	36	17	33	34	271
No. not usable for stock	0	0	0	0	0	1	0	2	0	2	0	1	1	7
Sufficiency of Water Supply														
No. sufficient for domestic needs	0	0	14	8	21	24	21	28	37	35	17	34	33	272
No. insufficient for domestic needs	0	0	0	0	0	0	1	0	0	3	0	0	2	6
No. sufficient for stock needs	0	0	12	6	19	18	18	24	33	29	17	30	27	233
No. insufficient for stock needs	0	0	2	2	2	6	4	4	4	9	0	4	8	45

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 Newcombe, No. 260, 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	SE.	8	24	23	3rd	Flowing 12	1,200	1,000	900	100	12	155	160	169	676	105	1,073	155	177		504		217	20		*1
2	NW.	10	20	23	3rd	120	3,131												(2)		(3)	(4)	(1)	(5)		*1
3	NW.	21	20	23	3rd	75	2,323												(2)		(3)	(4)	(1)	(5)		*1
4	NW.	29	20	23	3rd	36	1,509												(2)		(3)	(4)	(1)	(5)		*1
5	SW.	29	20	23	3rd	34	094												(2)		(4)	(3)	(1)	(5)		*1
0	SE.	30	20	23	3rd	34	700												(2)		(4)	(3)	(1)	(5)		*1
7	NW.	34	26	23	3rd	52	1,146												(2)		(3)	(4)	(1)	(5)		*1
8	NE.	30	26	24	3rd	145	2,126												(3)			(2)	(1)	(4)		*1
9		14	27	23	3rd	14	411											(3)	(1)		(2)		(4)		(5)	*1
10	NW.	19	27	23	3rd	20	1,090											(2)	(1)						(3)	*1
11		11	27	24	3rd	12	228											(3)	(1)		(2)				(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. 2, 3, 4, 5, 6, 7, 8, 9, and 10, by Provincial Analyst, Regina.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

Eleven samples of ground water from the glacial drift were analysed and the results are listed in the accompanying table. Samples 1,9,10, and 11 are from wells 11 to 20 feet deep, and their total dissolved solid content varies from 228 to 1,200 parts per million. The mineral salts contained in solution are magnesium sulphate (Epsom salts), sodium sulphate, calcium carbonate, and sodium chloride or calcium chloride, their abundance decreasing in the order given. The waters are usable for all farm purposes and are representative of the type of water derived from the few springs and shallow wells that yield an abundant supply of water. The water from the shallow wells that yield small supplies, however, is usually more highly mineralized and may have a total dissolved solid content ranging up to 4,000 parts per million. Water of this character is being used in some cases with no apparent ill effects.

Samples 4, 5, and 6 are taken from wells 34 to 36 feet deep that tap sandy deposits underlying the glacial lake clay in the northwestern corner of township 26, range 23. The total dissolved solid content varies from 694 to 1,509 parts per million. These samples contain a considerable amount of sodium carbonate (black alkali) and the water is unsuitable for irrigation. It is satisfactory, however, for all other farm needs.

Samples 3 and 7 are from wells, 75 and 52 feet deep, respectively, that tap water-bearing deposits in the blue clay in the vicinity of those wells that tap sands immediately underlying the glacial lake clay. These samples have a total dissolved solid content of 2,323 and 1,146 parts per million, but the mineral salts in solution are almost identical and are in the same order of abundance as those in the samples taken from the wells tapping the sands that underlie the lake clay. The water from these two wells is very hard, but is usable for all farm needs.

Samples 2 and 8 are from wells 120 and 145 feet deep, respectively. The sample from the 120-foot well has a total dissolved solid content of 3,131 parts per million, the sulphates of sodium, calcium, and magnesium being the predominant salts. Sodium carbonate (black alkali) and sodium chloride (common salt) also occur in small quantities. The water is used for drinking and other domestic purposes, but it is not altogether satisfactory for such use. It contains a considerable amount of iron that precipitates as iron oxide when the water is left standing in contact with the air. The sample from the 145-foot well has a total dissolved solid content of 2,126 parts per million, with sodium sulphate and sodium carbonate being the predominant salts. This well may be deriving water from an aquifer at the contact of the glacial drift and the underlying bedrock. The water is usable for all farm purposes except irrigation. The water from these two wells contains the same mineral salts in solution as that from the other deep wells in the drift. The water from the other wells, however, is not usable for domestic purposes, as it contains a large amount of mineral salts in solution.

Water from the Bedrock

No samples were collected from wells that tap the Belly River formation, but the water is very highly mineralized and is not usable for any domestic purpose. It probably contains a large amount of sodium sulphate and sodium carbonate, and magnesium sulphate (Epsom salts) may also be abundant as the water from some wells is reported to be laxative. The water from the bedrock contains a large amount of iron. Some of this iron can be removed by aerating and filtering the water.

WELL RECORDS—Rural Municipality of NEWCOMBE, NO. 250, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SE.	8	24	23	3	Spring	12	2,185	0	2,185	12	2,173	Glacial gravel	Hard, clear		D, S, M	Sufficient supply; yields 1,200 gallons; owned by municipality of Newcombe; #.
2	NW.	14	"	"	"	Bored	110	2,290	- 75	2,215	110	2,180	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
3	NE.	17	"	"	"	Bored	70	2,250	- 30	2,220	70	2,180	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
4	NE.	20	"	"	"	Bored	120	2,310	-115	2,195	120	2,190	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
5	NW.	22	"	"	"	Bored	130	2,320	-100	2,220	130	2,190	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
6	NW.	24	"	"	"	Drilled	200	2,310	-100	2,210	120	2,190	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
7	NW.	27	"	"	"	Bored	125	2,300	-120	2,180	125	2,175	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
8	SW.	28	"	"	"	Bored	110	2,285	-100	2,185	110	2,175	Glacial gravelly clay	Hard, clear		D, S	Sufficient for local needs.
9	NW.	28	"	"	"	Bored	127	2,300	-123	2,177	127	2,173	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
10	SW.	30	"	"	"	Bored	115	2,308	-112	2,196	115	2,193	Glacial gravel	Hard, clear		D, S	Insufficient for local needs.
11	SW.	32	"	"	"	Drilled	175	2,300	-100	2,200	120	2,180	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
12	NE.	32	"	"	"	Bored	120	2,295	-115	2,180	120	2,175	Glacial gravel	Hard, clear		D, S	Insufficient for local needs.
13	NW.	33	"	"	"	Bored	115	2,280	-100	2,180	115	2,165	Glacial gravel	Hard, clear, "alkaline"		S	Sufficient for stock needs; imparts a laxative effect.
14	NW.	34	"	"	"	Bored	100	2,270	- 90	2,180	100	2,170	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
1	NW.	21	24	24	3	Bored	36	2,310	- 34	2,276	34	2,276	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
2	NE.	26	"	"	"	Bored	45	2,345	- 40	2,305	40	2,305	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
3	SE.	29	"	"	"	Bored	40	2,300	- 34	2,326	34	2,326	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
4	NE.	32	"	"	"	Dug	29	2,305	- 25	2,340	25	2,340	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
5	NE.	32	"	"	"	Bored	38	2,310	- 26	2,284	38	2,272	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
6	SW.	34	"	"	"	Bored	50	2,345	- 45	2,300	45	2,300	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
7	NW.	36	"	"	"	Bored	90	2,280	- 88	2,192	90	2,190	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for local needs; another well 127 feet deep.
1	NW.	10	25	22	3	Bored	130	2,290	-127	2,163	130	2,160	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs; has never pumped dry.
2	SW.	12	"	"	"	Drilled	265	2,280	-260	2,020	265	2,015	Belly River	Hard, iron, "alkaline", iron		S	Sufficient for local needs; has never pumped dry.
3	NW.	12	"	"	"	Drilled	200	2,285	-250	2,035	266	2,019	Belly River	Hard, clear, "alkaline", iron		S	Sufficient supply; has never pumped dry.
4	SE.	16	"	"	"	Bored	143	2,300	-123	2,177	143	2,157	Glacial sand	Hard, clear		D, S	Sufficient for 15 head stock.
5	NW.	16	"	"	"	Bored	160	2,360	-157	2,203	157	2,203	Glacial sand	Hard, clear, "alkaline", iron		D, S	Insufficient for 10 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 NEWCOMBE, NO. 200, SASKATCHEWAN.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	SE.	20	25	22	3	Bored	178	2,375	-164	2,211	178	2,197	Glacial gravel	Hard, iron, red sediment		S	Sufficient for 20 head stock.
7	NE.	20	"	"	"	Bored	122	2,345	-106	2,239	122	2,223	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 30 head stock.
8	NE.	21	"	"	"	Bored	108	2,330	-100	2,230	100	2,230	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
9	SE.	22	"	"	"	Bored	120	2,300	-102	2,198			Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 15 head stock.
10	SW.	22	"	"	"	Bored	120	2,310	-110	2,200	120	2,190	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 10 head stock.
11	NW.	22	"	"	"	Bored	120	2,320	-112	2,208	120	2,200	Glacial gravel	Hard, clear, iron		S	Sufficient for 15 head stock.
12	NW.	26	"	"	"	Bored	127	2,300	-120	2,180	127	2,173	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 32 head stock.
13	SW.	28	"	"	"	Bored	126	2,330	-104	2,226	104	2,226	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 5 head stock.
14	NE.	28	"	"	"	Bored	128	2,300	-100	2,200	128	2,172	Glacial gravel	Hard, clear, iron		S	Sufficient supply; has never pumped dry; haul water for domestic needs.
15	SE.	31	"	"	"	Bored	130	2,300	-112	2,188	112	2,188	Glacial gravel	Hard, clear, "alkaline"		D, S	Insufficient for more than 6 head stock.
16	NW.	31	"	"	"	Bored	128	2,320	-115	2,205	128	2,192	Glacial gravel	Hard, clear		D, S	Cannot be pumped dry.
17	SW.	32	"	"	"	Bored	135	2,310	-125	2,185			Glacial drift	Hard, clear, iron		D, S	Sufficient for 15 head stock.
18	NE.	33	"	"	"	Bored	160	2,242	-125	2,117	160	2,082	Belly River coal	Hard, clear, iron		S	Cannot be pumped dry.
19	NE.	34	"	"	"	Bored	177	2,250	-130	2,120	177	2,073	Belly River coal	Hard, clear, "alkaline", iron		S	Sufficient for 40 head stock.
20	NW.	34	"	"	"	Bored	103	2,243	- 86	2,157	103	2,140	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 12 head stock.
21	NW.	36	"	"	"	Drilled	200	2,255	-160	2,095	200	2,055	Glacial drift	Hard, clear, "alkaline", iron		S	Has never pumped dry.
1	SE.	2	25	23	3	Bored	96	2,288	- 80	2,208	95	2,193	Glacial sand	Hard, clear		D, S	Sufficient for 45 head stock.
2	NE.	5	"	"	"	Bored	123	2,270	-115	2,155	123	2,147	Glacial sand	Hard, clear, iron		D, S	Oversufficient for 15 head stock.
3	NW.	9	"	"	"	Bored	110	2,260	- 80	2,180	110	2,150	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 35 head stock.
4	NE.	10	"	"	"	Bored	103	2,225	- 83	2,142			Glacial drift	Hard, clear, "alkaline"		S	Insufficient for 13 head stock; also another 85 feet deep is used for domestic needs.
5	NW.	12	"	"	"	Bored	120	2,350	-115	2,235	120	2,230	Glacial drift	Hard, clear, "alkaline", iron		S	Sufficient for 18 head stock; also another well 40 feet deep is used for domestic needs.
6	SE.	14	"	"	"	Bored	120	2,320	- 85	2,235	120	2,200	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 18 head stock; also another well 80 feet deep that is not used; haul water for domestic needs.
7	SW.	14	"	"	"	Bored	54	2,300	- 34	2,266	48	2,252	Glacial sand	Soft, clear		D, S	Insufficient for 18 head stock; another similar well 47 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 NEWCOMBE, NO. 260, SASKATCHEWAN.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
8	SE.	15	25	23	3	Bored	54	2,300	- 47	2,253	47	2,253	Glacial sand	Soft, clear		D, S	Sufficient for 10 head stock.
9	SW.	16	"	"	"	Dug	80	2,250	- 78	2,172	78	2,172	Glacial sand	Hard, clear, iron		D, S	Insufficient for more than 4 head stock.
10	NE.	16	"	"	"	Bored	118	2,225	- 68	2,157	115	2,110	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 50 head stock.
11	SE.	17	"	"	"	Bored	110	2,260	- 80	2,180	110	2,150	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock.
12	SE.	18	"	"	"	Bored	150	2,290	-135	2,155	150	2,140	Glacial drift	Hard, clear, iron		D, S	Sufficient for 12 head stock.
13	NW.	22	"	"	"	Dug	20	2,300	- 15	2,285	20	2,280	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 25 head stock.
14	SW.	27	"	"	"	Bored	127	2,300	-107	2,193	127	2,173	Glacial sand	Hard, clear, iron		D, S	Sufficient for 50 head stock.
15	SE.	28	"	"	"	Bored	135	2,290	-112	2,178	135	2,155	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 30 head stock.
16	NW.	31	"	"	"	Bored	125	2,260	-110	2,150	125	2,135	Glacial sand	Hard, clear, iron		D, S	Sufficient for 25 head stock; also another well 80 feet deep with a good supply.
17	NW.	32	"	"	"	Bored	135	2,260	-131	2,129			Glacial drift	Hard, clear, "alkaline"		S	Insufficient for local needs.
18	SE.	34	"	"	"	Bored	124	2,290	- 76	2,214	124	2,166	Glacial sand and gravel	Hard, clear, "alkaline", iron		D, S	Sufficient for 50 head stock.
19	NW.	36	"	"	"	Bored	130	2,300	-120	2,180	130	2,170	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 25 head stock.
1	SE.	18	25	24	3	Dug	12	2,280	- 7	2,273	7	2,273	Glacial sand and gravel	Soft, clear		D, S	Sufficient for 50 head stock.
2	NW.	18	"	"	"	Bored	43	2,295	- 33	2,262	43	2,252	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient supply; well has never been pumped dry.
3	SW.	20	"	"	"	Dug	20	2,295	- 18	2,277	18	2,277	Glacial sand	Hard, clear		D, S	Sufficient only for 8 head stock.
4	NW.	20	"	"	"	Dug	20	2,280	- 18	2,262	18	2,262	Glacial sand	Hard, clear		D, S	Insufficient supply; another similar well and a 50-foot well with very poor supply.
5	SW.	22	"	"	"	Dug	109	2,300	-150	2,150			Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 10 head stock.
6	SW.	28	"	"	"	Bored	65	2,298	- 45	2,253	65	2,233	Glacial sand	Hard, clear		D, S, I	Abundant supply; well has never been pumped dry.
7	NW.	28	"	"	"	Bored	50	2,295	- 35	2,260	50	2,245	Glacial sand	Hard, clear, "alkaline"		D, S	Oversufficient for 100 head stock.
8	SE.	30	"	"	"	Dug	35	2,285	- 29	2,256	35	2,250	Glacial sandy clay	Hard, clear, "alkaline"		D, S	Sufficient for 14 head stock; also a 26-foot well with a good supply.
9	NE.	30	"	"	"	Dug	24	2,290	- 21	2,269	24	2,266	Glacial sand	Hard, clear		D, S	Sufficient for 18 head stock.
10	SE.	31	"	"	"	Dug	18	2,300	- 10	2,290	18	2,282	Glacial sand	Hard, clear		S	Supply abundant; also another well 16 feet deep with 6 feet of water.
11	NE.	31	"	"	"	Dug	27	2,305	- 24	2,281	24	2,281	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient only for 12 head stock; also another well 35 feet deep with 3 feet of water.
12	NW.	32	"	"	"	Bored	38	2,300	- 20	2,280	38	2,262	Glacial sand	Hard, clear, iron		D, S	Sufficient for 30 head stock.
13	SW.	33	"	"	"	Bored	35	2,315	- 28	2,287			Glacial drift	Hard, clear, "alkaline"		S	Insufficient for 16 head stock; another well 35 feet deep with 7 feet of water.
14	NE.	33	"	"	"	Bored	125	2,290	- 95	2,195	125	2,165	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 20 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 NEWCOMBE, NO. 260, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
15	SE.	30	25	24	3	Bored	128	2,260	-114	2,146	128	2,132	Glacial black sand	Hard, clear, iron		D, S	Sufficient for 20 head stock.
16	NE.	36	"	"	"	Bored	120	2,200	-110	2,150	120	2,140	Glacial white gravel	Hard, clear, iron		D, S	Sufficient for 10 head stock.
1	SW.	1	26	22	3	Drilled	285	2,260					Belly River	Hard, clear		N	Unfit for use; haul water for all requirements.
2	NW.	3	"	"	"	Drilled	300	2,250	-100	2,150	300	1,950	Belly River	Hard, clear, iron		S	Sufficient supply; well has never pumped dry; also another well 120 feet deep with 2 feet of water.
3	SE.	4	"	"	"	Bored	96	2,240	-92	2,148	96	2,144	Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 10 head stock.
4	SW.	4	"	"	"	Bored	126	2,240	-114	2,126	116	2,124	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 25 head stock.
5	NW.	5	"	"	"	Bored	132	2,290	-124	2,166	132	2,158	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 15 head stock.
6	NW.	7	"	"	"	Bored	116	2,300	-102	2,198	102	2,198	Glacial sand and gravel	Hard, clear		D, S	Sufficient supply; has never been pumped dry; supplies the village of Madison with drinking water .
7	NW.	8	"	"	"	Bored	115	2,250	-109	2,141	115	2,135	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient only for 8 head stock; another similar well 110 feet deep.
8	SE.	10	"	"	"	Bored	120	2,270	-106	2,164	120	2,150	Glacial grey sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock.
9	NW.	11	"	"	"	Bored	118	2,265	-114	2,151	118	2,147	Glacial gravel	Hard, clear, "alkaline", iron		S	Sufficient supply; well has never been pumped dry.
10	NE.	12	"	"	"	Dug	120	2,250	-108	2,142	120	2,130	Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 40 head stock.
11	NE.	14	"	"	"	Bored	124	2,270	-112	2,158	124	2,146	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 10 head stock; haul water for domestic needs.
12	NW.	16	"	"	"	Bored	125	2,270	-107	2,163	125	2,145	Glacial sandy clay	Hard, clear, "alkaline", iron		D, S	Sufficient for 50 head stock.
13	NW.	18	"	"	"	Bored	147	2,263	-103	2,160	147	2,116	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 50 head stock.
14	SE.	19	"	"	"	Bored	118	2,268	-114	2,154	118	2,150	Glacial sand and gravel	Hard, clear, "alkaline", salty		D, S	Sufficient for 20 head stock.
15	SE.	22	"	"	"	Bored	125	2,285	-121	2,164	125	2,160	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 25 head stock.
16	NE.	22	"	"	"	Bored	130	2,278	-127	2,151	130	2,146	Glacial drift	Hard, clear, "alkaline", iron		S	Insufficient for more than 5 head stock.
17	SW.	23	"	"	"	Bored	135	2,280	-130	2,150	135	2,145	Glacial gravel	Hard, clear, "alkaline", iron		S	Sufficient supply; well has never been pumped dry.
18	NE.	24	"	"	"	Dug	118	2,260	-113	2,147	118	2,142	Glacial sand and gravel	Hard, clear, "alkaline"		D, S	Sufficient for 25 head stock.
19	NW.	25	"	"	"	Bored	130	2,290	-122	2,168	130	2,160	Glacial sand	Hard, clear, iron		D, S	Sufficient for 18 head stock.
20	NE.	26	"	"	"	Dug	135	2,280	-130	2,150	135	2,145	Glacial sand and gravel	Hard, clear		D, S	Sufficient for 25 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 NEWCOMBE, NO. 260, 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
21	NE.	28	26	22	3	Bored	128	2,305	-121	2,184	128	2,177	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 15 head stock.
22	NW.	30	"	"	"	Dug	55	2,250	- 52	2,198	55	2,195	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 50 head stock.
23	NE.	31	"	"	"	Bored	120	2,276	-113	2,163	120	2,156	Glacial sand	Hard, clear, "alkaline", iron		D, S	Insufficient for 25 head stock.
24	SE.	32	"	"	"	Bored	125	2,295	-122	2,173			Glacial drift	Hard, clear, iron		D, S	Sufficient for 5 head stock.
25	NE.	34	"	"	"	Bored	130	2,300	-100	2,200	130	2,170	Glacial drift	Hard, clear, "alkaline"		D, S	Abundant supply.
26	SW.	35	"	"	"	Bored	145	2,320	-105	2,215	145	2,175	Glacial sand	Hard, clear, "alkaline", iron		N	Unfit for use; haul water for all requirements.
1	SW.	1	26	23	3	Bored	130	2,294	-122	2,172	130	2,164	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
2	NW.	2	"	"	"	Drilled	175	2,270	-145	2,125	175	2,095	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 16 head stock.
3	SE.	4	"	"	"	Drilled	190	2,285	-160	2,125	190	2,095	Glacial drift	Hard, clear		D, S	Sufficient for 30 head stock.
4	NE.	5	"	"	"	Dug	160	2,283	-122	2,161	160	2,123	Glacial drift	Hard, clear		D, S	Sufficient for 40 head stock.
5	NW.	6	"	"	"	Dug	90	2,280	- 74	2,206	90	2,190	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 50 head stock.
6	NE.	7	"	"	"	Bored	80	2,205	- 65	2,140			Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 8 head stock.
7	SW.	10	"	"	"	Drilled	135	2,270	-110	2,160	135	2,135	Glacial drift	Hard, clear, "alkaline"		D, S	Oversufficient for 6 head stock.
8	NE.	10	"	"	"	Bored	110	2,270	-104	2,166			Glacial drift	Hard, clear, "alkaline", iron		D, S	Sufficient for 15 head stock.
9	NW.	10	"	"	"	Bored	120	2,270	-100	2,170	120	2,150	Glacial drift	Hard, clear, "alkaline", iron		D, S	Sufficient for 25 head stock; well cannot be pumped dry; #.
10	SW.	11	"	"	"	Bored	133	2,234	-130	2,104	130	2,104	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 6 head stock.
11	NW.	16	"	"	"	Dug	70	2,230	- 54	2,176	70	2,160	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 30 to 35 head stock; also another well 175 feet deep.
12	SW.	17	"	"	"	Bored	85	2,210	- 60	2,150			Glacial drift	Hard, clear, "alkaline", iron		S	Sufficient for 12 head stock.
13	SW.	18	"	"	"	Bored	62	2,210	- 58	2,152	58	2,152	Glacial sand	Hard, clear, "alkaline", iron		D, S	Insufficient for more than 5 head stock.
14	NE.	18	"	"	"	Bored	76	2,210	- 50	2,160	76	2,134	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 50 head stock.
15	SE.	19	"	"	"	Dug	61	2,210	- 57	2,153	57	2,153	Glacial sand	Hard, clear, "alkaline"		S	Insufficient for more than 8 head stock.
16	NE.	19	"	"	"	Dug	33	2,210	- 30	2,180	30	2,180	Glacial sand and gravel	Hard, clear		D, S	Sufficient for 50 head stock.
17	SW.	20	"	"	"	Bored	35	2,210	- 13	2,197	33	2,177	Glacial gravel	Hard, clear, iron		D, S	Sufficient for 50 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

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	NW.	21	26	23	3		75	2,212	- 60	2,152			Glacial gravel	Hard		D, S, M	Well in village of Glidden; #.
19	NW.	22	"	"	"	Dug	65	2,235	- 61	2,174	65	2,170	Glacial sand	Hard, clear, iron		D, S	Sufficient for 12 head stock.
20	NW.	25	"	"	"	Dug	85	2,200	- 78	2,122			Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for more than 12 head stock.
21	SE.	27	"	"	"	Bored	65	2,210	- 55	2,155	65	2,145	Glacial drift	Hard, clear, "alkaline", iron		S	Sufficient for 25 head stock; another well 79 feet deep with 2 feet of water.
22	SE.	28	"	"	"	Bored	70	2,230	- 65	2,165	70	2,160	Glacial sand	Hard, clear, iron		S	Sufficient for 15 head stock; haul water for domestic needs.
23	SW.	28	"	"	"	Drilled	205	2,220	- 65	2,155	205	2,015	Belly River gravel	Hard, clear, "alkaline"		S	Sufficient for 50 head stock; haul water for domestic needs.
24	SE.	29	"	"	"	Bored	48	2,210	- 46	2,164			Glacial drift	Hard, clear		D, S	Sufficient for 8 head stock.
25	SW.	29	"	"	"	Dug	34	2,210	- 29	2,181	29	2,181	Glacial sand and gravel	Hard, clear		D, S	Sufficient for 20 head stock; #.
26	NE.	29	"	"	"	Bored	38	2,210	- 36	2,174	36	2,174	Glacial sand	Hard, clear, iron		D, S	Oversufficient for 15 head stock.
27	NW.	29	"	"	"	Bored	36	2,204	- 28	2,176			Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock; #.
28	SE.	30	"	"	"	Dug	34	2,210	- 31	2,179	31	2,179	Glacial sand and gravel	Hard, clear		D, S	Sufficient for 50 head stock; #.
29	NE.	30	"	"	"	Dug	36	2,203	- 32	2,171	32	2,171	Glacial sand	Hard, clear		D, S	Sufficient for 50 head stock.
30	NE.	31	"	"	"	Dug	24	2,210	- 19	2,191			Glacial drift	Hard, clear, iron		D, S	Sufficient for 10 head stock.
31	NE.	32	"	"	"	Dug	42	2,225	- 38	2,187	38	2,187	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
32	NW.	33	"	"	"	Dug	40	2,225	- 38	2,187	38	2,187	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
33	SW.	34	"	"	"	Drilled	115	2,200	- 70	2,130	115	2,085	Glacial gravel	Hard, clear, iron		D, S	Sufficient for 40 head stock.
34	NW.	34	"	"	"	Dug	52	2,210	- 50	2,160	50	2,160	Glacial sand	Hard, clear, iron		D, S	Sufficient for 30 head stock; #.
35	SE.	36	"	"	"	Dug	56	2,240	- 53	2,187	56	2,184	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 40 head stock; well has never been pumped dry.
1	NW.	2	26	24	3	Bored	50	2,240	- 45	2,195	50	2,190	Glacial drift	Hard, clear		D, S	Sufficient for 35 head stock.
2	SW.	4	"	"	"	Bored	60	2,330	- 51	2,279	60	2,270	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock; also a 30-foot well with 8 feet of water.
3	SW.	5	"	"	"	Dug	26	2,340	- 22	2,318	26	2,314	Glacial drift	Soft, clear		D, S	Sufficient for 12 head stock.
4	SE.	5	"	"	"	Dug	28	2,330	- 16	2,314	28	2,302	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock; well cannot be pumped dry.
5	NW.	6	"	"	"	Dug	25	2,355	- 22	2,333	22	2,333	Glacial sand	Hard, clear, "alkaline"		D	Insufficient supply; also a 33-foot well with 5 feet of water for stock needs.
6	SE.	8	"	"	"	Bored	75	2,300	- 50	2,250	75	2,225	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 30 head stock.
7	NE.	10	"	"	"	Dug	34	2,243	- 28	2,215	34	2,209	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock.
8	SE.	12	"	"	"	Dug	70	2,225	- 68	2,157			Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for only 4 head stock; another well 72 feet deep, with 3 feet of water, is sufficient for 5 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 NEWCOMBE, NO. 260, 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
9	NW.	12	26	24	3	Bored	40	2,235	- 38	2,197	38	2,197	Glacial sand	Hard, clear		D, S	Insufficient for more than 2 head stock; haul most of the water supply.
10	SE.	13	"	"	"	Bored	50	2,210	- 42	2,168	42	2,168	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 15 head stock.
11	NE.	16	"	"	"	Bored	45	2,285	- 40	2,245	40	2,245	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 5 head stock.
12	SW.	18	"	"	"	Drilled	100	2,345	- 60	2,285	100	2,185	Belly River coal	Hard, clear, "alkaline", iron		N	Unfit for use; also a 60-foot well, with 30 feet of water, which is used for all requirements.
13	NE.	19	"	"	"	Bored	120	2,390	- 70	2,320	120	2,270	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock.
14	SE.	21	"	"	"	Dug	18	2,288	- 11	2,277			Glacial drift	Soft, clear		D, S	Sufficient for 20 head stock; also an 80-foot well, with 5 feet of water, which is not used.
15	SW.	24	"	"	"	Dug	43	2,233	- 39	2,194	43	2,190	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 10 head stock; also a 40-foot well, with 3 feet of water.
16	NW.	24	"	"	"	Bored	75	2,220	- 40	2,180	75	2,145	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 15 head stock.
17	NW.	25	"	"	"	Dug	30	2,228	- 25	2,203	25	2,203	Glacial sand	Hard, clear		D, S	Sufficient for 15 head stock.
18	SE.	26	"	"	"	Bored	35	2,225	- 30	2,195	30	2,195	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for more than 6 head stock.
19	NE.	26	"	"	"	Dug	34	2,230	- 30	2,200	30	2,200	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 8 head stock.
20	SW.	28	"	"	"	Dug	24	2,345	- 19	2,326	19	2,326	Glacial sand	Hard, clear		D, S	Sufficient for 8 head stock; also a 24-foot well, with 6 feet of water, for stock needs.
21	NE.	28	"	"	"	Dug	56	2,258	- 50	2,208	56	2,202	Glacial green sand	Hard, clear, "alkaline"		S	Sufficient for 8 head stock; also 2 other wells 22 and 54 feet deep.
22	NE.	30	"	"	"	Bored	145	2,400	-110	2,290	145	2,255	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 60 head stock; #.
23	SE.	31	"	"	"	Bored	75	2,410	- 60	2,350	75	2,335	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for more than 20 head stock.
24	SE.	32	"	"	"	Bored	115	2,390	- 65	2,325	115	2,275	Glacial sand	Hard, clear, "alkaline"		D, S	Oversufficient for 50 head stock.
25	SW.	34	"	"	"	Drilled	96	2,256	- 50	2,206	96	2,160	Belly River coal	Hard, clear, "alkaline", black sediment, iron		S	Sufficient for 35 head stock.
26	SW.	34	"	"	"	Dug	13	2,256	- 11	2,245			Glacial drift	Hard, clear		D	Insufficient for domestic needs; also another similar well.
27	NE.	35	"	"	"	Dug	16	2,240	- 11	2,229			Glacial drift	Hard, clear, "alkaline"		D	Intermittent supply.
28	NE.	36	"	"	"	Bored	23	2,215	- 20	2,195	20	2,195	Glacial sand	Hard, clear		D, S	Sufficient for 15 head stock.
1	SW.	3	27	22	3	Bored	120	2,290	-105	2,185	120	2,170	Belly River blue sand	Hard, clear, iron		D, S	Oversufficient for 60 head stock.
2	NE.	5	"	"	"	Dug	100	2,260	- 50	2,210	100	2,160	Glacial drift	Hard, clear, "alkaline"		S	Well has never been pumped dry.
3	NE.	9	"	"	"	Bored	120	2,320	- 80	2,240	120	2,200	Glacial drift	Hard, clear, iron		S	Sufficient supply; well has never been pumped dry.
4	NW.	9	"	"	"	Bored	120	2,290	- 80	2,210	120	2,170	Glacial drift	Hard, clear, "alkaline", odour, iron		S	Sufficient for local needs.
5	SW.	10	"	"	"	Dug	100	2,300	- 88	2,212	100	2,200	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 50 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 .....

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	NE.	12	27	22	3	Bored	100	2,315	- 89	2,226	100	2,215	Belly River blue sand	Hard, clear, iron		S	Oversufficient for 20 head stock.
7	SW.	13	"	"	"	Bored	129	2,320	- 90	2,230	129	2,191	Belly River blue sand	Hard, clear, "alkaline", iron		S	Oversufficient for 40 head stock; haul water for domestic needs.
8	SW.	16	"	"	"	Bored	85	2,297	- 67	2,230	85	2,212	Glacial sand	Hard, clear, iron		S	Sufficient for 50 head stock.
9	NE.	16	"	"	"	Bored	103	2,310	- 80	2,230	103	2,207	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 30 head stock.
10	SW.	18	"	"	"	Bored	80	2,240	- 59	2,181	59	2,181	Glacial sandy clay	Hard, clear, "alkaline"		S	Oversufficient for 10 head stock.
11	SE.	19	"	"	"	Bored	72	2,280	- 40	2,240	72	2,208	Glacial drift	Hard, clear		D, S	Sufficient for 50 head stock.
12	SW.	20	"	"	"	Bored	69	2,279	- 38	2,241	69	2,210	Glacial drift	Hard, clear		D, S	Sufficient for 50 head stock.
13	SW.	22	"	"	"	Drilled	300	2,315	-180	2,135	300	2,015	Belly River	Hard, clear		S	Well has never been pumped dry.
14	SW.	23	"	"	"	Bored	114	2,314	-100	2,214	114	2,200	Glacial drift	Hard, clear		S	Sufficient for 15 head stock.
15	NE.	30	"	"	"	Bored	147	2,335	- 92	2,243	147	2,188	Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 60 head stock.
16	NW.	30	"	"	"	Bored	125	2,290	- 85	2,205	125	2,165	Glacial drift	Hard, clear, "alkaline", iron		S	Sufficient for 25 head stock; haul water for domestic needs.
17	NW.	36	"	"	"	Bored	154	2,360	-114	2,246	154	2,206	Belly River blue sand	Hard, clear, iron		D, S	Oversufficient for 50 head stock.
1	NE.	2	27	23	3	Dug	26	2,200	- 22	2,178	26	2,174	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
2	SW.	3	"	"	"	Dug	31	2,210	- 27	2,183	27	2,183	Glacial sand	Soft, clear		D, S	Sufficient for 15 head stock.
3	SE.	4	"	"	"	Bored	38	2,205	- 30	2,175			Glacial drift	Hard, clear, iron		D, S, I	Sufficient for local needs.
4	NW.	4	"	"	"	Dug	20	2,200	- 17	2,183	17	2,183	Glacial sand	Hard, clear		D, S	Sufficient for 15 head stock.
5	SE.	6	"	"	"	Dug	30	2,210	- 25	2,185	25	2,185	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 25 head stock.
6	SW.	7	"	"	"	Bored	55	2,240	- 40	2,200	55	2,185	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for 18 head stock.
7	NW.	7	"	"	"	Bored	60	2,240	- 50	2,190			Glacial drift	Hard, clear, "alkaline"		N	Unfit for use.
8	NE.	7	"	"	"	Bored	42	2,205	- 38	2,167	38	2,167	Glacial sand	Hard, clear		D, S	Sufficient for 30 head stock; also a 45-foot well, with 5 feet of water.
9	NE.	8	"	"	"	Bored	21	2,200	- 10	2,190	21	2,179	Glacial sand	Hard, clear, lime		D, S	Oversufficient for 30 head stock.
10	NE.	11	"	"	"	Dug	6	2,210	0	2,210			Glacial drift	Hard, clear		D, S	Abundant supply.
11	SE.	12	"	"	"	Dug	35	2,285	- 26	2,199			Glacial drift	Hard, clear		D, S	Sufficient for 12 head stock.
12	NW.	13	"	"	"	Bored	98	2,250	- 70	2,180	98	2,152	Glacial drift	Hard, clear, iron		S	Sufficient supply; well has never been pumped dry.
13		14	"	"	"	Dug	14	2,200	- 11	2,189			Glacial gravel	Hard			#.
14	NW.	15	"	"	"	Dug	24	2,205	- 20	2,185			Glacial drift	Hard, clear, "alkaline"		S	Oversufficient for 10 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 NEWCOMBE, NO. 260, SASKATCHEWAN.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
15	SW.	16	27	23	3	Dug	38	2,230	- 33	2,197	38	2,192	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 25 head stock; haul water for domestic needs.
16	SE.	18	"	"	"	Bored	40	2,225	- 20	2,205	40	2,185	Glacial sand	Hard, clear		D, S	Sufficient for 100 head stock.
17	SW	18	"	"	"	Bored	38	2,235	- 30	2,205	38	2,197	Glacial sand	Hard, clear, iron		D, S	Sufficient for 30 head stock.
18	NW.	19	"	"	"	Dug	20	2,230	- 15	2,215	20	2,210	Glacial drift	Hard, clear		D, S	Sufficient for 50 head stock; also another similar well for stock needs; #.
19	NW.	20	"	"	"	Dug	27	2,220	- 23	2,197	27	2,193	Glacial sand	Hard, clear, iron		D, S	Sufficient for 100 head stock; another 23-foot well, with a small supply, is used for domestic needs.
20	NW.	22	"	"	"	Bored	131	2,200	-125	2,075			Glacial drift	Hard, clear, iron, "alkaline"		S	Insufficient for more than 3 head stock.
21	SE.	25	"	"	"	Bored	110	2,300	- 70	2,230	110	2,190	Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 16 head stock.
22	NW.	25	"	"	"	Bored	100	2,280	- 55	2,225	100	2,180	Glacial drift	Hard, clear, "alkaline", iron		S	Well has never been pumped dry.
23	NE.	27	"	"	"	Dug	40	2,214	- 20	2,194	40	2,174	Glacial sand	Hard, clear, iron		S	Sufficient supply; well has never been pumped dry.
24	NW.	28	"	"	"	Bored	72	2,205	- 65	2,140			Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient only for 4 head stock; also another well 46 feet deep.
25	NW.	31	"	"	"	Bored	60	2,195	- 45	2,150	60	2,135	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
26	NE.	32	"	"	"	Drilled	175	2,205	-120	2,085	175	2,030	Glacial sand	Hard, clear, "alkaline", iron		S	Sufficient for 50 head stock; haul water for domestic needs.
27	NW.	34	"	"	"	Dug	34	2,215	- 22	2,193	34	2,181	Glacial drift	Hard, clear, "alkaline"		S	Sufficient for local needs; haul water for domestic needs.
28	NE.	34	"	"	"	Bored	50	2,215	- 32	2,183	50	2,165	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 40 head stock.
29	NE.	36	"	"	"	Bored	140	2,318	- 60	2,258	140	2,178	Glacial drift	Hard, clear, iron		S	Sufficient for 15 head stock; also a 10-foot well, with small supply.
1	SE.	1	27	24	3	Bored	65	2,245	- 55	2,190	55	2,190	Glacial sand	Hard, clear		D, S	Insufficient for more than 15 head stock.
2	NE.	2	"	"	"	Bored	35	2,260	- 32	2,228	32	2,228	Glacial sand	Hard, clear		D, S	Insufficient for 18 head stock; also a 45-foot well now caved in.
3	NW.	2	"	"	"	Bored	110	2,270	- 60	2,210	110	2,160	Glacial drift	Hard, clear, iron		D,S	Sufficient only for 25 head stock.
4	SE.	3	"	"	"	Bored	125	2,290	-100	2,190	125	2,165	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 15 head stock.
5	NE.	5	"	"	"	Dug	25	2,396	- 24	2,372	24	2,372	Glacial gravel	Soft, clear		D, S	Intermittent supply.
6	SE.	6	"	"	"	Dug	48	2,390	- 12	2,378	48	2,342	Glacial sandy clay	Soft, clear		D, S	Sufficient for 40 head stock.
7	SW.	9	"	"	"	Dug	20	2,360	- 17	2,343			Glacial drift	Hard, clear		D, S	Insufficient for more than 5 head stock; haul water.
8	NE.	10	"	"	"	Dug	24	2,260	- 19	2,261			Glacial sand	Hard, clear, iron		D, S	Intermittent supply.
9		11	"	"	"	Dug	12	2,300	- 2	2,298			Glacial sand and gravel	Hard, cloudy			#
10	NW.	12	"	"	"	Bored	42	2,250	- 30	2,220	42	2,208	Glacial drift	Hard, clear, iron		D, S	Sufficient for 50 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 NEWCOMBE, NO. 260, SASKATCHEWAN.

B 4-4
1860—10,000

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
11	NW.	14	27	24	3	Bored	80	2,270	- 50	2,220	80	2,190	Glacial drift	Hard, clear, "alkaline", iron		D, S	Sufficient for 30 head stock.
12	SW.	14	"	"	"	Dug	40	2,280	- 32	2,248	40	2,240	Glacial gravel	Hard, clear, "alkaline", iron		D, S	Sufficient for 50 head stock.
13	NE.	14	"	"	"	Bored	55	2,250	- 48	2,202			Glacial drift	Hard, clear		D, S	Sufficient for only 3 head stock; also an 80-foot well, with 15 feet of water.
14	SW.	15	"	"	"	Bored	63	2,330	- 55	2,275			Glacial sand	Hard, clear		D, S	Sufficient for 15 head stock.
15	NW.	15	"	"	"	Bored	18	2,300	- 9	2,291	18	2,282	Glacial drift	Hard, clear, iron		D, S	Oversufficient for 10 head stock.
16	NE.	20	"	"	"	Bored	94	2,345	- 45	2,300	94	2,251	Glacial drift	Soft, clear, lime		D, S	Sufficient for 30 head stock.
17	SW.	20	"	"	"	Dug	45	2,385	- 37	2,348	37	2,348	Glacial sand	Soft, clear		D, S	Insufficient for more than 9 head stock.
18	SE.	21	"	"	"	Dug	42	2,300	- 30	2,270	42	2,258	Glacial sand	Hard, clear		D, S	Sufficient for 50 head stock.
19	SW.	21	"	"	"	Bored	70	2,350	- 56	2,294	70	2,280	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
20	SE.	22	"	"	"	Dug	22	2,260	- 18	2,242	18	2,242	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 6 head stock.
21	NE.	22	"	"	"	Dug	22	2,265	- 12	2,253	22	2,243	Glacial sand	Hard, clear, "alkaline"		D, S	Oversufficient for local needs.
22	NW.	22	"	"	"	Bored	80	2,290	- 50	2,240	80	2,210	Glacial drift	Hard, clear, "alkaline", iron,		D, S	Sufficient for 40 head stock.
23	NW.	23	"	"	"	Dug	22	2,250	- 17	2,233	22	2,228	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 28 head stock.
24	SE.	25	"	"	"	Bored	44	2,220	- 28	2,192	44	2,176	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
25	SW.	25	"	"	"	Bored	100	2,240	- 40	2,200	100	2,140	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 15 head stock.
26	SW.	26	"	"	"	Dug	30	2,255	- 22	2,233	30	2,225	Glacial gravel	Hard, clear		D, S	Sufficient for 20 head stock.
27	NE.	26	"	"	"	Dug	36	2,250	- 28	2,222			Glacial sand	Hard, clear, "alkaline"		D	Oversufficient for domestic needs; another 50-foot well with 16 feet of water.
28	SE.	28	"	"	"	Bored	84	2,280	-339	2,241	84	2,196	Glacial drift	Hard, clear, "alkaline", iron		D, S	Good supply.
29	NE.	30	"	"	"	Dug	22	2,348	- 17	2,331	17	2,331	Glacial sand	Hard, clear, "alkaline", iron		D, S	Sufficient for 25 head stock.
30	NE.	32	"	"	"	Bored	86	2,300	- 70	2,230			Glacial sand	Hard, "alkaline", black sediment		N	Insufficient supply and unfit for use.
31	NW.	32	"	"	"	Bored	85	2,300	- 65	2,235			Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 7 head stock; haul water for do domestic needs.
32	NW.	33	"	"	"	Bored	85	2,270					Glacial drift	Hard, clear, "alkaline"		S	Sufficient supply; well cannot be pumped dry.
33	NW.	34	"	"	"	Bored	86	2,250	- 40	2,210	86	2,164	Glacial sand	Hard, clear, "alkaline"		D, S	Abundant supply.

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

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