CANADA
DEPARTMENT OF MINES

HON. T. A. CRERAR, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF CHAPLIN No. 164 SASKATCHEWAN

BY

B. R. MacKay & D. C. Maddox

Water Supply Paper No. 140

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INTRODUCTION

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

Publication of Results

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

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

How to Use the Report

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

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

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

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

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

GLOSSARY OF TERMS USED

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Eastend Formation. The name given to a series of fine-grained sands and silts. It has been recognized at various localities over the southern part of the province, from the Alberta boundary east to the escarpment of Missouri 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 Chaplin covers an area of 347 square miles in southern Saskatchewan. It includes a little more than the northeastern half of township 15, range 4, about 1½ square miles in the northeastern corner of township 15, range 5, and the whole of townships 16, 17, and 18, ranges 4, 5, and 6, all west of the Third meridian. Chaplin village, which lies about 5 miles northwest of the centre of the municipality, is about 49 miles west of Moose Jaw, about 116 miles south of Saskatoon, and about 52 miles east of Swift Current.

The ground surface in townships 18, ranges 4, 5, and 6, is rolling to hilly, with hills in the northeast and northwest rising to over 2,550 feet above sea-level. The relief decreases to the south, and there the average elevation is about 2,250 feet. The southwestern part of the municipality has numerous isolated hills and undrained depressions. Chaplin lake occupies a large part of townships 17, ranges 5 and 6, and an arm of the lake extends southward for approximately 3 miles into township 16, range 5. The lake is shallow, and the water in it is too "alkaline" for use by stock. There are no streams in the municipality, and the lake is probably fed by springs. From the arm of the lake a flat belt several miles wide of very sandy territory extends southeasterly to the southeast corner of the municipality. The relief is low to the east of this depression within this municipality, and the country rises gently towards the east.

No. 1 highway and the main line of the Canadian Pacific railway pass westward through the municipality. Chaplin is the largest settlement in the municipality, which is fairly well settled except for the sandy land around Chaplin lake, and the depression south and southeast of the lake, which areas are not adapted for farming.

In secs. 32 and 33, tp. 17, range 5, there are two small, shallow lakes, and in sec. 30, tp. 17, range 4, there is a small lake, the water-level of which lies 2,186 feet above sea-level.

Glacial lake sands underlie a basin approximately 6 miles in width, which includes Chaplin lake and extends to the south and southeast. A belt of glacial outwash sands and gravels, having an average width of about 1½ miles, borders the glacial lake sands on the east and north, and extends from the southeast corner of the municipality north and northeasterly to cross the western border of the municipality in the southwest part of township 18, range 6. The remainder of the municipality is covered by moraine.

Water-bearing Horizons in the Unconsolidated Deposits

Supplies of ground water sufficient for local needs can generally be obtained in the glacial lake sands and the glacial outwash sands and gravels within 20 feet of the surface, but some of the wells in these sand areas have passed into the underlying moraine and obtain their water from sandy lenses or pockets in the boulder clay. Most of the water in the glacial lake sands and glacial outwash deposits is hard, but can be used for all purposes. In the western part of the sandy areas, however, and in wells located within a mile of Chaplin lake, the water is "alkaline". Springs in the sandy areas in the southeast and the northwest provide large supplies of water to some farms.

The depth of the producing wells in the moraine varies from 5 to 110 feet, and no widespread aquifer can be outlined. The moraine consists largely of impervious clay, and ground water in sufficient amounts to supply farms is found only in irregularly distributed lenses or pockets of sand and gravel. Most of these were deposited by streams issuing from the ice front during the

melting of the continental glacier. Most of the well water from the moraine is hard, and can be used for all purposes, but in a few shallow seepage wells the water is comparatively soft. Many of the wells in the northern half of township 18, ranges 4 and 5, and a few wells, distributed elsewhere over the remainder of the moraine-covered area, yield "alkaline" water.

A few fairly well defined aquifers supply some of the deeper wells, but none of them appear to be extensive. One of the most conspicuous is a sand aquifer that occurs in the northeast part of township 16, range 4, and the southeast part of township 17, range 4, which lies at about 2,245 to 2,270 feet above sea-level. This aquifer provides ample supplies of good water to several wells 60 to 85 feet deep, and feeds a spring located on the SW.$\frac{1}{4}$, sec. 4, tp. 16, range 4.

Another aquifer, which lies 2,178 to 2,190 feet above sea-level, supplies three wells 70 to 107 feet deep in secs. 17 and 19, tp. 18, range 4, and sec. 36, tp. 18, range 5, with small amounts of water which can be used only for stock. The linear arrangement of these wells in an approximately northwest direction, and the fact that two dry holes 90 and 95 feet deep, respectively, were put down about a mile west of one of the producing wells, suggest that the aquifer occurs in a buried stream channel that is probably at the base of the glacial drift.

An aquifer about 2,210 to 2,230 feet above sea-level supplies several wells 45 to 110 feet deep, in township 18, ranges 4, 5, and 6, with a moderate supply of water which is suitable only for stock, except in the two most northerly wells of the group. In the southwest part of the municipality an aquifer about 2,110 to 2,125 feet above sea-level supplies four wells, 90 to 100 feet deep, on secs. 3, 4, and 18, tp. 16, range 5, and sec. 28, tp. 16, range 6. In three of the wells the supply of water is large, and the quality is good, but in the

most easterly well the water is "alkaline", and the supply small. This may be due to the fact that this well is near the eastern margin of the aquifer where the sand is fine grained and the circulation of water is sluggish.

The thickness of the unconsolidated deposits is thought to vary greatly in different parts of the municipality; in the vicinity of Chaplin the log of a deep well indicates that the drift is approximately 500 feet thick. Elsewhere in the municipality the thickness of the drift is not known, but it is probably over 100 feet, as several wells from 100 to 120 feet deep did not reach bedrock.

Water-bearing Horizons in the Bedrock

The Bearpaw formation immediately underlies the unconsolidated deposits over the greater part of the municipality, but in the areas of higher relief in the east and north parts of the municipality the Eastend formation overlies the Bearpaw, and underlies the unconsolidated deposits.

The Bearpaw formation consists chiefly of dark grey, impervious shale, but beds of sand that contain soft water are occasionally present, especially near the base of the formation. The deep soft water wells of the Darmody-Riverhurst artesian area, north of this municipality, obtain water from several sand aquifers in the Bearpaw formation. This artesian area is known to extend southwards to within 8 miles of the northern boundary of this municipality, and as the water in the wells is not of the "marginal" type, the southern limit of the Darmody-Riverhurst artesian area probably lies much farther south than indicated, and may extend into this municipality.

The only well in the municipality that penetrates bedrock is the well at Chaplin which was drilled by the Canadian

Pacific Railway Company. The log of this well shows that it passed through sandstone from 500 to 585 feet, and through shale from 585 to 675 feet. The top of the sandstone is about 1,708 feet above sea-level. A well 16 miles north obtained soft water from a sand in the Bearpaw formation that was 1,765 feet above sea-level. The analysis of the water from the Chaplin well showed that it was excessively hard, and quite unlike the water from the Bearpaw sands in wells to the north. The chemical character of the water, which is discussed later, suggests that water from the drift probably enters the well.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 15, Range 4

Most of that part of the township that lies within the rural municipality of Chaplin is a plain which slopes gently southwestwards towards the sandy depression lying southeast of Chaplin lake. There are no streams in this part of the township. Glacial lake sands floor the depression, and extend as a narrow belt about half a mile wide along its northeasterly border. A belt of glacial outwash sands and gravels having an average width of about a mile borders the glacial lake sands on the east. The northeast part of the township is underlain by moraine.

All the farms in this township are located in the moraine-covered area. All the producing wells except one are less than 20 feet deep, the supply of water from them is inadequate for local requirements, and a number of the wells go dry during the dry seasons. The upper part of the moraine in this township appears to be a poor source of water. One well, 60 feet deep, on the NW.$\frac{1}{4}$, section 36, obtains a fairly large supply of hard, slightly "alkaline" water that is used for all purposes. The aquifer that supplies this well lies at approximately 2,270 feet above sea-level, and is probably the same that supplies the spring on sec. 4, tp. 16, range 4, and several wells in the south half of that township. This aquifer probably underlies the northern part of township 15, range 4. A well, 25 feet deep, on the NE.$\frac{1}{4}$, section 36, obtains a supply of water from glacial gravel which appears to be a pocket in the boulder clay, as the well went dry in 1933. This aquifer lies at 2,285 feet, or about 15 feet above the aquifer that supplies the well 60 feet deep in the NW.$\frac{1}{4}$, section 36.

Township 15, Range 5

Only 1½ square miles in the northeastern corner of this township are included in the rural municipality of Chaplin. The entire area is in the depression floored by glacial lake sands that lie at less than 2,000 feet above sea-level. There are no farms in this part of the township, and no well records were obtained. Ground water probably occurs in the sands at depths of less than 20 feet, and any water obtained will probably be decidedly "alkaline".

Township 16, Range 4

The relief is very slight in this township. The land surface slopes very gently westwards towards Chaplin lake, and to the sandy depression south of the lake. Elevations range from a little over 2,300 feet above sea-level to a little less than 2,200 feet above sea-level. There are no lakes or streams in the township. Surface water drains into the depression bordering Chaplin lake or to undrained hollows in the northern half of the township.

Glacial lake sand underlies most of the western third of the township. A belt of glacial outwash sands and gravel, averaging about 1½ miles in width, borders the glacial lake sands on the east. The eastern part of the township is covered by moraine.

Most of the wells in the areas of glacial outwash sands and glacial lake sands obtain supplies of hard water, which are sufficient for local use, within 20 feet of the surface. Several wells, over 30 feet deep, passed through the sands into the underlying moraine, from which they obtain considerable supplies of water. Some springs in section 4, at about 2,260 feet above sea-level, yield a large supply of water, and a spring on section 17, at about 2,225 feet above sea-level, yields a small supply of water. In sections 28 and 33, an aquifer of sand and

gravel about 2,170 feet above sea-level provides two wells, 34 and 38 feet deep, respectively, with ample supplies of hard water.

The water from all the wells, except one in the sandy areas, is hard but not "alkaline", and can be used for drinking. The supply from most of the wells is sufficient for domestic use, and for a small number of stock.

The thickness of the glacial outwash sands on the NW.$\frac{1}{4}$, section 5, is 15 feet, and on the NW.$\frac{1}{4}$, section 9, is 9 feet; elsewhere the thickness is not known, but it is probably less than 20 feet. The shallower wells probably obtain water from the lower part of the sands where the downward percolation of the water has been prevented by the compact underlying clay of the moraine.

In that part of the township underlain by moraine, the shallower wells from 16 to 23 feet deep obtain supplies of hard water that are generally inadequate for farm use, although the water can be used for drinking.

In a well on section 2 the thickness of the yellow weathered part of the moraine is only 10 feet, and it seems likely that the moraine in this section is unusually impervious to ground water. On section 10 a bed of quicksand underlies 12 to 16 feet of clay. This is probably a sand lens in the moraine, and the supply of water from it is small.

Two wells in section 12, 72 and 85 feet deep, obtain large supplies of hard water from a sand aquifer that is approximately 2,250 feet above sea-level. This aquifer also supplies a well 75 feet deep in section 2, and a spring on section 4. It is not known how far northward this aquifer extends in the township, but if large supplies of ground water are needed in the southern half of this township the wells should be made deep enough to tap this aquifer.

The quality of the well water in this township is good. In one well, 12 feet deep, in section 27 the water is termed "alkaline", but is still fit for human use; in all the other wells the water is hard, but not "alkaline".

Township 16, Range 5

The greater part of the township is covered by the glacial lake sands that floor the broad depression occupied by Chaplin lake, and that extends south from it. Most of this area lies at less than 2,200 feet above sea-level. The western mile of the township is rolling, moraine-covered country, in which the elevation ranges from a little less than 2,200 feet above sea-level to a little more than 2,250 feet above sea-level.

Ground water would probably be found in the glacial lake sands at less than 20 feet below the surface except in the marginal parts where these deposits are too thin to retain water. The water in these sands will probably be "alkaline", especially in the sandy depression south of lake Chaplin. No records are available of wells in this township that obtained water from the glacial lake sands. A well 22 feet deep in section 9 is close to the western margin of the sands and passed into the underlying clay of the moraine.

The depth of the wells in the moraine ranges from 22 to 100 feet. In the southern third of the township the supply of water from all the wells except one is adequate only for a few head of stock, and in three wells, 40 to 90 feet deep, the water is too "alkaline" for human use. An aquifer, which is about 2,110 feet above sea-level on section 5, provides an ample supply of water to a well 100 feet deep. This aquifer apparently extends north and west to section 18, and into the townships west, but it does not appear to extend far east of section 5, as a well 90 feet

deep on section 4 obtained only a small supply of "alkaline" water from this aquifer.

In the northern two-thirds of the township the quantity and quality of the ground water supplies are much more satisfactory than in the southern third. Several wells, 22 to 100 feet deep, yield large supplies of hard water. In one well, 45 feet deep, the water is reported as soft; no "alkaline" water is reported in the wells in this part of the township.

The aquifer mentioned which is about 2,125 feet above sea-level probably underlies the western part of the township. An aquifer that is about 2,192 to 2,210 feet above sea-level furnishes two wells, in sections 18 and 19, with large supplies of hard water.

In sections 19 and 20 the boulder clay of the moraine is sandy, and it seems probable that over the northern two-thirds of the township the moraine is fairly porous and forms a more favourable source of ground water than it does in the southern third of the township. The sandy nature of moraine, however, is not so suitable for the construction of dugouts to retain surface water unless special precautions are taken to prevent loss of water by seepage.

Township 16, Range 6

Moraine underlies the whole township except about one-quarter square mile in its northeast corner which is underlain by glacial lake sands. The topography of the township is typical of the moraine type of glacial drift, being characterized by numerous small, rounded knolls and undrained depressions and sloughs. No stream or intermittent drainage channels occur. The land surface in the township ranges from a little less than 2,200 feet above sea-level in some of the undrained hollows to a little over 2,350 feet above sea-level in the southwest corner.

The wells range in depth from 8 to 120 feet, and there appears to be no uniform water-bearing horizon. The supply of water at most of the farms is adequate for domestic needs, and for a small number of stock. In sections 30 to 36, the supply of ground water at several farms is insufficient. In section 36, springs at about 2,200 feet above sea-level supplement the supply of well water. The water in most of the wells is hard, but is fit for human use, but in a few of the deeper wells the water is too "alkaline" for human use.

An aquifer which is about 2,125 feet above sea-level supplies a well on section 28 with large amounts of hard water. A well on section 11, 112 feet deep, obtained water, which is not used for drinking, from a gravel aquifer that is about 2,145 feet above sea-level. An aquifer about 2,198 to 2,215 feet above sea-level supplies very hard water to three wells in sections 8, 10, and 18. Well records show that the thickness of the yellow weathered clay in this township ranges from 3 to 19 feet. The thickness of the glacial drift is not known, but it is probably over 100 feet. In the northern third of the township, well records show that the upper part of the moraine is composed of sandy clay. Two wells in section 14 passed through $3\frac{1}{2}$ and 14 feet of sand before they entered the clay, and a well on section 26 passed through 23 feet of sand. Thin sandy areas may mark buried gravel bars or ridges deposited by streams that issued from the front of the ice when the moraine was being formed.

In attempting to locate supplies of water in the moraine of this township the elevations at which the several aquifers mentioned occur should be considered, although none of the aquifers referred to yield large supplies of good water.

Township 17, Range 4

The relief in this township is slight and the land surface is rolling. In the south and west the general slope of the surface is southwestwards towards the depression occupied by Chaplin lake. In the north the slopes are irregular and follow no definite direction over large areas. Along the western boundary of the township there are three depressed areas, the elevation of which is less than 2,200 feet above sea-level. In one of these, in section 30, there is a small lake, the water-level of which is about 2,186 feet above sea-level.

About 2 square miles near the centre of the western border and about half a square mile in the southwest corner, are underlain by glacial lake sands. Glacial outwash sands cover a belt of territory varying in width from $\frac{1}{2}$ mile to 2 miles, lying to the east of the glacial lake sands. The remainder of the township is covered by moraine.

Several wells from 12 to 30 feet deep, in the glacial lake sand and glacial outwash sand areas, yield sufficient water for domestic use, and for a few head of stock. The water in most of the wells is hard, but in three wells the water is "alkaline". Several dry holes were put down on section 4. In the moraine-covered area the depth of the wells ranges from 5 to 110 feet. The supply of water in most of the wells is adequate for domestic use, and for a few head of stock, but in sections 30 and 35 the supply in several wells is not satisfactory, and in some wells in sections 1 to 3 the water is "alkaline" and has a laxative effect on those not accustomed to its use. In the vicinity of Secretan, three wells, 34 to 70 feet deep, obtain water from an aquifer about 2,245 to 2,261 feet above sea-level. In the northern well the water is "alkaline", and the supply is small. A spring about 2,265 feet above sea-level is probably supplied

by this aquifer, and provides a large supply of water. Another well, on the SE.¼, section 27, is reported to have passed through 40 feet of blue clay having a water sand at 37 feet, and then into 70 feet of dry sand. A well on section 30 at the edge of a marsh area passed through 22 feet of sandy gravel before entering impervious blue clay.

Township 17, Range 5

Most of the southern two-thirds of this township is occupied by Chaplin lake. Bordering the lake is a flat sand plain averaging 2 miles in width. In the northern third of the township the country is gently rolling. With the exception of the northeast corner the township is less than 2,300 feet above sea-level. In section 32 and 33 there are two shallow lakes at elevations of less than 2,200 feet above sea-level, and there is a small, shallow lake in section 36.

Moraine covers a belt averaging a half mile wide along most of the northern boundary of the township. A belt of glacial outwash sands and gravels with an average width of about 1½ miles lies adjacent to the moraine on the south; the remainder of the township is underlain by glacial lake sands.

Four wells, 8 to 18 feet deep, obtain moderate supplies of water from the glacial lake sands, and the glacial outwash sands and gravels. One well on the SE.¼, section 28, 38 feet deep, apparently obtains water, which is too "alkaline" to be used for drinking, from the underlying moraine. In section 34 a spring issuing from the lake sands about 2,235 feet above sea-level yields a large supply of water.

In the moraine an 80-foot well in section 35 obtained hard, clear water from an aquifer about 2,170 feet above sea-level; this aquifer may be the same as that in the 38-foot well in section 28.

A well at Chaplin was drilled by the Canadian Pacific Railway Company to a depth of 675 feet. The main supply of water was obtained in sandstone at depths of 500 to 585 feet. Hard shale was passed through from 585 to 675 feet. The water was excessively hard and was quite unfit for use in locomotives. The analysis of the water is discussed later.

Township 17, Range 6

Chaplin lake and the marginal sandy flats occupy a large part of the eastern half of the township. South and west of the lake, the country is rolling to hilly; many low, rounded elevations are distributed irregularly over the surface, and there are many undrained depressions. In the northern third of the township relief is low, and the land slopes gently towards Chaplin lake. Elevations in the township range from about 2,170 feet above sea-level at the shores of the lake to a little over 2,300 feet above sea-level in the southwest.

Glacial lake sands underlie Chaplin lake, and the low land adjoining it. Glacial outwash sands and gravel border the glacial lake sands in the north, and in the west, and extend south to about the middle of the western boundary. The south-western part of the township lying to the west of the glacial lake sands, and to the south of the glacial outwash deposits, is covered by moraine.

Most of the wells in the areas of glacial lake sands and glacial outwash sands and gravels obtain sufficient water for local needs, within 20 feet of the surface. A few wells have passed through the deposits into the underlying moraine, and have obtained water in sandy beds or lenses in the boulder clay. The water from most of the wells in the sandy area is "alkaline", but in only two wells is the water too "alkaline" for drinking. In two shallow wells on sections 9 and 30, 13 and 16 feet deep, respectively, the water is soft.

An aquifer that is about 2,210 to 2,225 feet above sea-level supplies three wells, 30 to 40 feet deep, in the northern third of the township. In the well on section 13 the water supply is ample, but in the well on section 33 the supply is insufficient for local needs. It would seem advisable to attempt to reach this aquifer, if wells in the northeast quarter of the township do not obtain a satisfactory supply of water in the upper sands.

In that part of this township underlain by moraine the wells are 13 to 59 feet deep. The supply of water in some of the wells is small, and is inadequate for local needs. The deepest well in this area, 59 feet deep, in the NE.$\frac{1}{4}$, section 4, obtained only a small supply of hard water. In sections 2 and 3, on the eastward slopes of these morainic hills, there are springs that supplement the supply of well water. The logs of three wells in the southern third of the township show that the moraine consists of alternate beds of sand and clay, a condition that is not favourable for the construction of dugouts.

Township 18, Range 4

The whole of this township is covered by moraine. An elevated area occupies a large part of the eastern half of the township, and rises to over 2,550 feet above sea-level near the centre of its eastern boundary.

From this high area the land slopes northwards toward the valley of Thunder creek, being less than 2,150 feet at the northern border of the township. It also drains southwards and westwards towards the depression occupied by Chaplin lake. In section 16 there is a very small lake, but there are no streams in the township.

The depths of the aquifers in this township range from 4 to 107 feet. Several shallow wells less than 20 feet deep obtain

small supplies of water which are supplemented by water from sloughs. Two wells, 107 and 90 feet deep, in sections 18 and 17, respectively, obtained small supplies of mineralized water from an aquifer that is about 2,178 to 2,190 feet above sea-level, and twelve wells, in sections 11 and 20, obtain slightly mineralized water from an aquifer that is about 2,200 feet above sea-level.

The quality of the well water in this township is not very good. In most of the deeper wells, and in some of the shallower wells, the water is too "alkaline" for drinking, and in a well on section 11 the water contains so high a concentration of magnesium sulphate (Epsom salts) as to have a laxative effect on humans. Two dry holes, 90 feet and 60 feet deep, were put down on sections 9 and 17, respectively. At a farm on section 11 water for drinking is hauled. A spring on section 6, about 2,295 feet above sea-level, supplies water that is fit only for stock. A spring on section 15, about 2,365 feet above sea-level, yields sufficient water for the farm requirements.

There is little information on the nature of the moraine in this township, but in section 9 a well passed through blue clay to 90 feet, and in section 28 a well passed through 62 feet of blue clay before obtaining water in gravel. It would seem, therefore, that the moraine in this township is composed largely of boulder clay, and is rather impervious to water.

Township 18, Range 5

The land surface over most of this township is rolling, but in the northwest the country is hilly, and elevations of over 2,400 feet above sea-level occur. Most of the township lies between 2,250 and 2,350 feet above sea-level, but at and near the southern boundary of the township there is a depressed area less

than 2,200 feet above sea-level. There are no lakes or streams in the township, and the surface run-off accumulates in sloughs or undrained depressions. The township is underlain by moraine, except for an area of about one-eighth square mile in section 6, which is underlain by glacial outwash deposits.

The depth of the producing wells in this township ranges from 11 to 110 feet, and a large proportion are over 30 feet deep. The water in several of the wells in the southern two-thirds of the township is not suitable for drinking, and in the northern third the water in many of the wells is "alkaline". In sections 21, 28, and 35, the water is laxative. The supply of ground water in the township is not very satisfactory. At several farms water is hauled, and in many others more than one well is used to supply the farm requirements. In section 27 a well 37 feet deep yields a large supply of water. Dry holes were put down to 120 feet on section 19, and to 95 feet on section 25.

An aquifer about 2,210 to 2,235 feet above sea-level supplies five wells, 36 to 110 feet deep, in the northern third of the township with moderate amounts of water.

An aquifer about 2,245 to 2,260 feet above sea-level supplies three wells 53 to 83 feet deep, in sections 14, 18, and 23, with hard water.

The thickness of the yellow oxidized clay in this township is 10 feet on section 9, and 30 feet on section 25. The blue clay is very thick in this township; several wells passed through from 70 to 90 feet of the clay, and a well on section 20 passed through 120 feet of blue clay containing a few layers of gravel.

Township 18, Range 6

Most of the northern two-thirds of the township is occupied by a hill with gentle slopes. The northern and northeastern slopes drain towards the valley of Thunder creek; the

southern and southeastern slopes to the depression occupied by Chaplin lake. The lowest part of the township is at the northeast corner, which is about 2,200 feet above sea-level.

The southern part of the township is occupied by a belt of glacial outwash sands and gravels $\frac{1}{2}$ mile to 2 miles wide. These deposits on section 2 are 15 feet thick, and on section 6, 14 feet thick. The remainder of the township is underlain by moraine. In the glacial outwash deposits several wells from 10 to 25 feet deep obtain sufficient water for farm requirements. In the western part of this sandy area there are two springs about 2,230 to 2,245 feet above sea-level, and in the moraine-covered area in sections 35 and 36, there are springs about 2,280 to 2,290 feet above sea-level on the northeasterly sloping face of the above-mentioned hill. In section 3, aquifers that are above 2,170 and 2,215 feet above sea-level supply "alkaline" water to two 45-foot wells.

The water in the glacial outwash sands and gravels area is of good quality. In the deeper wells, and one well 14 feet deep on section 6, the water is "alkaline", but is used for drinking. In four wells, from 10 to 25 feet deep, the water is soft or fairly soft.

In that part of the township underlain by moraine, the producing wells are less than 30 feet deep. In several of the wells, in sections 31 to 35, on the northern and western slopes of the hill, the water is fairly soft. In a few wells the water is "alkaline", but is used for drinking. The supply of water in the wells in the moraine area is generally sufficient for farm use.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF CHAPLIN, NO. 164, SASKATCHEWAN

Township	15	16	16	16	17	17	17	18	18	18	Total No. in Municipality
West of 3rd mer. Range	4	4	5	6	4	5	6	4	5	6	
Total No. of Wells in Township	7	26	13	46	36	11	32	29	38	30	268
No. of wells in bedrock	0	0	0	0	0	1	0	0	0	0	1
No. of wells in glacial drift	7	26	13	46	36	10	32	29	38	30	267
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply											
No. with permanent supply	5	20	12	41	30	10	28	25	34	27	232
No. with intermittent supply	1	3	1	2	0	0	3	1	0	2	13
No. dry holes	1	3	0	3	6	1	1	3	4	1	23
Types of Wells											
No. of flowing artesian wells	0	0	0	0	0	0	0	0	0	0	0
No. of non-flowing artesian wells	0	5	6	5	5	2	1	6	13	2	45
No. of non-artesian wells	6	18	7	38	25	8	30	20	21	27	200
Quality of Water											
No. with hard water	5	23	13	42	29	10	27	25	32	19	225
No. with soft water	1	0	0	1	1	0	4	1	2	10	20
No. with salty water	0	0	0	0	0	0	0	1	1	0	2
No. with "alkaline" water	2	1	2	3	8	1	14	3	6	7	47
Depths of Wells											
No. from 0 to 50 feet deep	6	22	9	39	28	9	29	24	27	29	222
No. from 51 to 100 feet deep	1	4	4	5	2	1	2	4	8	1	32
No. from 101 to 150 feet deep	0	0	0	2	6	0	1	1	3	0	13
No. from 151 to 200 feet deep	0	0	0	0	0	0	0	0	0	0	0
No. from 201 to 500 feet deep	0	0	0	0	0	0	0	0	0	0	0
No. from 501 to 1,000 feet deep	0	0	0	0	0	1	0	0	0	0	1
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0	0
How the Water is Used											
No. usable for domestic purposes	4	22	10	38	20	6	26	14	20	24	184
No. not usable for domestic purposes	2	1	3	5	10	4	5	12	14	5	61
No. usable for stock	6	23	12	42	29	9	30	26	31	27	235
No. not usable for stock	0	0	1	1	1	1	1	0	3	2	10
Sufficiency of Water Supply											
No. sufficient for domestic needs	1	19	13	35	28	10	23	23	27	27	206
No. insufficient for domestic needs	5	4	0	8	2	0	8	3	7	2	39
No. sufficient for stock needs	1	17	11	27	24	9	21	16	20	26	172
No. insufficient for stock needs	5	6	2	16	6	1	10	10	14	3	73

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

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

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

Mineral Substances Present

Calcium and Magnesium

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

Sodium

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

Sulphates

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

Chlorides

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

Iron

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

Hardness

Calcium and magnesium salts impart hardness to water. Hardness of water is commonly recognized by its soap-destroying powers as shown by the difficulty of obtaining lather with soap. The total hardness of a water is the hardness of the water in its original state. Total hardness is divided into "permanent hardness" and "temporary hardness". Permanent hardness is the hardness of the water remaining after the sample has been boiled and it represents the amount of mineral salts that cannot be removed by boiling. Temporary hardness is the 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 harness 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 Chaplin, No. 164, Saskatchewan

LOCATION						Depth of Well, Ft.	Total dis'vd solids	HARDNESS			CONSTITUENTS AS ANALYSED						CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source of Water
No.	Qtr.	Sec.	Tp.	Rge.	Mer.			Total	Perm.	Temp.	Cl.	Alka-linity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	
1	SW.	18	16	5	3	100	1,120	750			15	355	120	86	377	212	901	215	119		86		456	25	×1
2	NE.	10	1o	o	3	82													(3)		(2)		(1)		×1
3	SW.	10	1o	o	3	112	1,040	750			17	500	270	97	344	98	985	483		14	268		192	28	×1
4	NW.	28	1o	o	3	120	1,360	500			[illegible]	450	80	119	533	367	1,220	143		249		11	790	30	×1
5	SE.	29	17	5	3	590	5,819				196		214	584	4,463	1,678		361	29	27	1,703	261	3,085	323	×2 ?
o	NE.	27	17	6	3	40	780	440	320	120	8	350	60	76	242	197	693	107		36	173	57	358	13	×1
7	SW.	35	18	5	3	36	2,960	2,400			96	440	300	435	1,636	408	2,774	440	131		1,296		749	158	×1

Water samples indicated thus, ×1, are from glacial drift or other unconsolidated deposits.
Water samples indicated thus, ×2, are from bedrock, Bearpaw formation.
Analyses are reported in parts per million; where numbers (1), (2), and (3) are used instead of parts per million, they represent the relative amounts in which the five main constituents are present in the water.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).
Analysis No. 2 by Provincial Analyst, Regina; Analysis No. 5, by Canadian Pacific Railway Company.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

The unconsolidated deposits in this municipality are of two general types, the sands of the glacial lake, and the glacial outwash deposits, and the argillaceous deposits of the moraine. Ground water in the sands is generally less highly mineralized than ground water in the moraine, as circulation of water in coarse-grained sediments is more rapid than in fine-grained sediments, the minerals of the sands are generally less soluble in water than those in the clays, and for the same volume the grains of the sand present a much smaller surface to the percolating waters than do the smaller grains of the clay. In this municipality, however, the water of Chaplin lake is very "alkaline", and water from the wells in the sands that are close to the lake or from wells that are in the sandy depression south of the lake will probably be rather highly mineralized. In some of the shallow seepage wells, in some of the wells located on slopes of the hills, and in some springs the water is soft, but in most of the wells in the unconsolidated deposits the water is hard, and in some of the deeper wells it is excessively hard. The composition of the water in the drift varies widely, but there are certain generalizations that can be made. The sulphates are usually the dominant salts. Calcium sulphate ($CaSO_4$) is usually, but not always, present in larger proportions than magnesium sulphate ($MgSO_4$). Sodium sulphate (Na_2SO_4), varies greatly, in some waters it may be absent, and in others it may be the predominant salt. Sodium chloride (NaCl) is usually present in small proportions, and sodium carbonate (Na_2CO_3) is occasionally present, but neither of these two salts are generally present in sufficient quantities to affect the taste or the use of the water. Calcium carbonate ($CaCO_3$) and magnesium carbonate ($MgCO_3$) are generally present, but in generally smaller proportions than the corresponding sulphates.

Of the above salts, calcium and magnesium sulphates give permanent hardness to the water and calcium and magnesium carbonates give temporary hardness to the water. Sodium and magnesium sulphate are laxative. No upper limit can be set for the content of these sulphates in water for human use, but as a generalization, water that contains much over 1,000 parts per million of these salts will be laxative to persons unaccustomed to its use, and if it contains much over 2,000 parts per million of these salts, it is not well adapted for continuous use, even by persons accustomed to use it.

Magnesium sulphate in considerable amounts makes water bitter. Sodium sulphate is less bitter than magnesium sulphate, and usually does not affect the taste of the water unless it is present in large amounts, and unless the water is warmed.

For domestic use, water containing much sodium carbonate is objectionable as it extracts the colouring matter from organic compounds, such as tea and coffee. So far as known, no waters in this municipality contain sufficient sodium carbonate to affect the colour of organic compounds. Iron forms black compounds with the tannic acid of tea, but the iron is usually removed from the water by boiling before the tea is made.

The table of analyses shows that all the waters from the unconsolidated deposits are hard. The water represented by analysis No. 6 is the softest of the series, and the hardness of this water could be still further reduced by boiling, as a considerable proportion of the hardness is due to the carbonates of calcium and magnesium.

Analysis No. 7 is that of a water that is excessively hard, and that will be very slightly softened by boiling, as the hardness is chiefly due to the sulphates of magnesium and calcium. There are 2,045 parts per million of the combined sulphates of magnesium and sodium in this water, and the water is

laxative. It is rather bitter, due to the large proportion of magnesium sulphate present, and is unfit for human use or for continuous use by stock. The well from which the water was obtained is in the north half of township 18, range 5, where many of the wells yield "alkaline" water. The waters represented by analyses 1, 3, and 4, are hard, but are less highly mineralized than the average ground water in the unconsolidated deposits, and can be used for most purposes although the water represented by analysis No. 4 will be slightly laxative.

Water from the Bedrock

The only well in the municipality that has penetrated into the bedrock is the well at Chaplin, 675 feet deep, drilled by the Canadian Pacific Railway Company. Analysis No. 5 represents water obtained from this well when it was 590 feet deep. Sand was passed through in this well from 500 to 585 feet, and it is probable that no water entered the well below the base of the sand, as shale was encountered between 585 and 675 feet deep.

In the wells of the Darmody-Riverhurst artesian area, which lies north of this municipality, the water in the sands of the Bearpaw formation is soft and the salts in solution consist almost entirely of sodium salts in which the sulphate, carbonate, and chloride are present, the relative abundance being in the order given. Analysis No. 5 shows that sodium sulphate is the principal salt, but that magnesium sulphate is present in large proportions, and that calcium carbonate is next in order of abundance. Sodium carbonate forms less than 5 per cent of the total solids, and sodium chloride forms about 5½ per cent of the total solids. The chemical composition of the water suggests either that water from the drift entered the well or that the main supply of water was from the top of the sandstone which, according to the driller's log, is also the base of the

unconsolidated deposits. This water is very hard, decidedly laxative, and bitter, and is useless for steam raising as it would foam in the boiler, and would deposit scale.

WELL RECORDS—Rural Municipality of CHAPLIN NO.164, 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	NW.	25	15	4	3	Dug	13	2,335			13	2,322	Glacial quick-sand	Soft, clear		D, S	Insufficient supply during past 5 years.
2	SE.	35	"	"	"	Dug	14	2,310	- 10	2,300	14	2,296	Glacial sand	Hard, cloudy, "alkaline"		S	Insufficient supply.
3	NE.	35	"	"	"	Dug	10	2,310	- 6	2,304	10	2,300	Glacial sand	Hard, clear		D, S	Insufficient supply.
4	NW.	36	"	"	"	Bored	60	2,330	- 50	2,280	60	2,270	Glacial sand	Hard, clear, slightly "alkaline"		D, S	Sufficient supply; also 16-foot shallow well in slough.
5	NE.	36	"	"	"	Bored	25	2,310			25	2,285					Went dry in 1933; base in glacial gravel.
6	NE.	36	"	"	"	Dug	14	2,290	- 10	2,280	14	2,276	Glacial gravel	Clear	45	D, S	Intermittent supply.
1	SE.	1	16	4	3	Dug	16	2,315	- 12	2,303	16	2,299	Glacial gravel	Hard		D, S	Very limited, intermittent supply.
2	SW.	1	"	"	"	Bored	75	2,330	- 25	2,305	75	2,255	Glacial drift	Hard, clear, iron	45	D, S	Sufficient supply.
3	NE.	2	"	"	"	Drilled	65	2,335	- 50	2,285				Hard	42	D, S	Intermittent supply; aquifer had not been reached.
4	NW.	3	"	"	"	Dug	22	2,300	- 18	2,282	22	2,278	Glacial sand	Hard, clear	45	D, S	Sufficient supply; second shallow well in sand, fair supply.
5	SW.	4	"	"	"	Dug	17	2,260	- 15	2,245	15	2,245	Glacial qucik-sand	Hard		D, S	Excellent supply; borders a run of springs.
6	NW.	5	"	"	"	Dug	15	2,225	- 12	2,213	15	2,210	Glacial sand	Hard, clear	43	D, S	
7	NW.	9	"	"	"	Dug	16	2,300	- 13	2,287	16	2,284	Glacial quick-sand	Hard, clear	46	D, S	Sufficient supply.
8	SW.	10	"	"	"	Dug	16	2,285	- 13	2,272	16	2,269	Glacial quick-sand	Hard, clear		D, S	Intermittent supply.
9	NW.	10	"	"	"	Dug	12	2,300	- 9	2,291	12	2,288	Glacial quick-sand	Hard		D, S	Not quite sufficient.
10	SW.	12	"	"	"	Bored	72	2,330	- 37	2,293	72	2,258	Glacial sand	Hard,	40	D, S	Excellent supply; also shallow 12-and 14-foot dry holes.
11	NE.	12	"	"	"	Drilled	85	2,330	- 40	2,290	85	2,245	Glacial sand	Hard	40	D, S	Excellent supply.
12	NW.	14	"	"	"	Bored	23	2,290	- 22	2,268	23	2,267	Glacial gravel	Hard	50		Sufficient supply.
13	SW.	17	"	"	"	Bored	36	2,250	- 23	2,227	36	2,214	Glacial sand	Hard, clear	45	D, S	Sufficient supply.
14	NW.	17	"	"	"	Bored	38	2,248	- 18	2,230	38	2,210	Glacial gravel	Hard, clear, iron	44	D, S	Sufficient supply; also 26-foot dry hole. Small spring also used.
15	NE.	19	"	"	"	Dug	14	2,210	- 10	2,200	14	2,196	Glacial sand	Hard, clear	47	D, S	Sufficient supply.
16	SW.	20	"	"	"	Dug	14	2,218	- 13	2,205	14	2,204	Glacial sand	Hard	45	D	Insufficient for local needs.
17	NW.	20	"	"	"	Dug	16	2,215	- 14	2,201	16	2,199	Glacial sand	Hard, clear	45	D, S	Sufficient supply.
18	SW.	27	"	"	"	Dug	12	2,240	- 10	2,230	12	2,228	Glacial gravel	Hard, clear, "alkaline"	50	D, S	Sufficient supply.
19	NE.	27	"	"	"	Dug	19	2,250									Dry hole; base in glacial gravel.
20	NE.	27	"	"	"	Dug	14	2,260	- 10	2,250	14	2,246	Glacial sand	Hard, clear	45	D	Fair supply.
21	SW.	28	"	"	"	Dug	34	2,210	- 32	2,178	34	2,176	Glacial sand and gravel	Hard, clear	46	D, S	Sufficient supply; second well in quicksand; now filled in.

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

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

WELL RECORDS—Rural Municipality of CHAPLIN NO. 164, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
22	NW.	33	16	4	3	Dug	38	2,220	- 34	2,186	38	2,182	Glacial sand	Hard, clear	42	D, S	Excellent supply.
1	SW.	4	16	5	3	Bored	90	2,200	- 70	2,130	90	2,110	Glacial drift	Hard, clear, iron, "alkaline"		S	Limited supply; sufficient only for 7 head stock.
2	NE.	4	"	"	"	Bored	50	2,200	- 48	2,152	50	2,150	Glacial drift	Hard, clear, iron		D, S	Insufficient, intermittent supply; enough only for household and 3 head stock; also a 25-foot well with 2 feet of water.
3	SW.	5	"	"	"	Bored	100	2,210			100	2,110	Glacial drift	Hard, clear, iron	42	D, S	Ample supply; can water over 20 head stock.
4	SE.	7	"	"	"	Dug	32	2,210	- 26	2,184	32	2,178	Glacial sand	Hard, clear		D, S	Sufficient only for 4 head stock and household; also 40-foot well of excessively "alkaline" water.
5	NE.	9	"	"	"	Bored	74	2,220	- 54	2,166	74	2,146	Glacial drift	Hard, clear, iron, "alkaline"		S	Small supply; also 22-foot well of drinking water.
6	SW.	18	"	"	"	Bored	100	2,225	- 63	2,162	100	2,125	Glacial drift	Hard, clear, yellow		D, S	Ample supply. #
7	SW.	18	"	"	"	Dug	22	2,220	- 16	2,204	28	2,192	Glacial gravel	Hard, clear		D, S	Supplies household and 60 head stock; floods skating rink.
8	NW.	19	"	"	"	Bored	40	2,250	- 37	2,213	40	2,210	Glacial sand	Hard, clear		D, S	Supplies household and 40 head stock; also second 45-foot well contains soft water.
9	SE.	19	"	"	"	Bored	20	2,250	- 14	2,236	20	2,230	Glacial drift	Hard		D, S	Sufficient supply.
10	NW.	20	"	"	"	Bored	70	2,215	- 58	2,157	70	2,145	Glacial drift	Hard, clear		D, S	Supplies household and 15 head stock.
1	NE.	3	16	6	3	Dug	16	2,250	- 11	2,239	16	2,234	Glacial sand	Hard, clear		D, S	Supplies household and 15 head stock.
2	NW.	3	"	"	"	Dug	8	2,230	- 4	2,226	8	2,222	Glacial sand	"Alkaline" clear		S	Sufficient for stock needs.
3	NE.	4	"	"	"	Dug	10	2,250	- 4	2,246	5	2,245	Glacial sand	Hard, clear		D, S	Supplies household and 23 head stock.
4	NE.	4	"	"	"	Dug	10	2,250					Glacial sand	Hard, clear		S	Supplies 30 head stock; second well supplies household needs.
5	NW.	4	"	"	"	Dug	15	2,260	- 13	2,247	13	2,247	Glacial sand	Hard, clear		D, S	Supplies household and 7 head stock; several dry holes around 20 feet deep.
6	NE.	5	"	"	"	Dug	12	2,250	- 5	2,245	9	2,241	Glacial sand	Hard, clear		D, S	Supplies household and 17 head stock; also second 40-foot well, poor supply.
7	SW.	5	"	"	"	Dug	14	2,300	- 11	2,289	14	2,286	Glacial sand	Hard, clear	56	D, S	Supplies household and 10 head stock.
8	SW.	8	"	"	"	Bored	50	2,260	- 43	2,217	50	2,210	Glacial sand	Hard, clear, iron, "alkaline".		S	Waters 35 head stock; drinking water obtained from NW.¼, section 8.
9	NW.	8	"	"	"	Dug	8	2,250			8	2,242	Glacial drift			D	Supplies drinking water to SW.¼, section 8.
10	SW.	10	"	"	"	Bored	112	2,250	- 97	2,153	105	2,145	Glacial gravel	Hard, clear, iron		D, S	Used for cooking and 15 head stock. #
11	NW.	10	"	"	"	Dug	14	2,250	- 7	2,243			Glacial sand	Hard, clear		D, S	Supplies household and 18 head stock.
12	NE.	10	"	"	"	Bored	82	2,280	- 78	2,202	82	2,198	Glacial black	Very hard, clear	44	D, S	Supplies household and 20 head stock; also three 14-foot wells, poor supply, also dry holes. #
13	SW.	12	"	"	"	Dug	15	2,230	- 13	2,217	15	2,215	Glacial sand	Hard, clear		D, S	Supplies household and 12 head stock.

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

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

WELL RECORDS—Rural Municipality of CHAPLIN NO.164, 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
14	NW.	12	16	6	3	Dug	12	2,250	- 9	2,241	10	2,240	Glacial sand	Hard,clear		D, S	Sufficient supply.
15	SE.	14	"	"	"	Dug	9	2,250	- 4	2,246	8	2,242	Glacial sand	Hard,clear		D, S	Sufficient supply; floods skating rink; to be enlarged.
16	SW.	14	"	"	"	Dug	14	2,230	- 11	2,219	14	2,216	Glacial quick-sand	Soft,clear		D, S	Supplies household and 10 head stock; used by neighbours during drought.
17	NW.	18	"	"	"	Dug	16	2,275	- 13	2,262	13	2,262	Glacial sand	Hard,clear		D, S	Also 60-foot well. 20 feet "alkaline" water for stock.
18	NW.	19	"	"	"	Dug	14	2,290	- 10	2,280	14	2,276	Glacial sand	Hard,clear		D, S	Supplies household and stock; also dry hole.
19	SW.	21	"	"	"	Dug	8	2,250	- 4	2,246	8	2,242	Glacial sand	Hard,clear		D, S	Supplies household and 4 head stock.
20	SW.	22	"	"	"	Dug	27	2,240	- 20	2,220	22	2,218	Glacial sand	Hard,clear		D, S	Supplies household and 24 head stock; also similar 28-foot well.
21	NW.	22	"	"	"	Dug	12	2,250	- 7	2,243	17	2,233	Glacial sand	Hard,clear		D, S	Supplies household and 20 head stock.
22	SE.	24	"	"	"	Bored	75	2,250			75	2,175	Glacial drift	Contains minerals			Not used domestically.
23	NE.	24	"	"	"	Bored	20	2,260	- 15	2,245	17	2,243	Glacial sand	Hard,clear		D, S	Supplies household and 20 head stock.
24	NE.	26	"	"	"	Dug	13	2,225	- 7	2,218			Glacial drift	Hard,clear		D, S	Supplies household and 15 head stock.
25	NW.	28	"	"	"	Bored	120	2,245	- 60	2,185	12	2,125	Glacial drift	Hard,clear		D, S	Supplies household and 100 head stock; also 2 shallow wells. #
26	NW.	30	"	"	"	Dug	20	2,290	- 19	2,271	19	2,271	Glacial drift	Hard,"alkaline",sulphur		S	Intermittent supply.
27	NW.	34	"	"	"	Bored	23	2,250	- 19	2,231	23	2,227	Glacial sand	Hard,clear		D, S	Insufficient supply; waters 6 head stock.
28	SW.	35	"	"	"	Bored	47	2,220	- 36	2,184	27	2,193	Glacial sand	Hard clear		D, S	Supplies household and 20 head stock; also two shallow wells.
29	SE.	35	"	"	"	Dug	14	2,250	- 12	2,238	11	2,239	Glacial sand	Hard,cloudy, iron		D, S	Intermittent supply; supplies stock in winter only.
30	SE.	36	"	"	"	Bored	54	2,250			54	2,196	Glacial drift	Mineral water	60	S	Insufficient supply; spring located near gives ample supply.
31	SE.	36	"	"	"	Bored	75	2,200	- 70	2,130	65	2,135	Glacial drift	Hard		D, S	Probably spring fed
1	SE.	1	17	4	3	Bored	28	2,275	- 16	2,259	28	2,247	Glacial gravel	Hard,clear	42	D, S	Sufficient supply; few neighbours take water, also 40-foot dry hole, and 16-foot well with good supply of unusable water.
2	NE.	3	"	"	"	Dug	12	2,265	- 10	2,255	12	2,253	Glacial drift	Hard,cloudy, iron	42	D, S	Sufficient for local needs; laxative.
3	NW.	3	"	"	"	Dug	25	2,235	- 20	2,215	25	2,210	Glacial drift		43		
4	SW.	4	"	"	"	Dug	20	2,225	- 15	2,210	20	2,205	Glacial gravel	Hard,clear	42	D, S	Sufficient supply; 5 dry holes to 20 feet deep.
5	NE.	5	"	"	"	Dug	21	2,215	- 18	2,197	21	2,194	Glacial gravel	Hard,clear, "alkaline"		D, S	Sufficient supply; 23-foot well yields good supply for stock use.
6	SW.	6	"	"	"	Dug	25	2,210	- 20	2,190	25	2,185	Glacial sand	Hard,clear, "alkaline"		D, S	Not always sufficient; second 30-foot well yields small supply of good water.
7	NW.	8	"	"	"	Dug	14	2,225	- 9	2,216	14	2,211	Glacial sand	Hard,cloudy yellow	43	D, S	Also 9-foot well yields good supply for stock.
8	SW.	17	"	"	"	Dug	12	2,195	- 10	2,185	12	2,183	Glacial drift	Clear			
9	NW.	18	"	"	"	Dug	15	2,210	- 11	2,199	15	2,195	Glacial drift	Hard,slightly "alkaline"	42	S	

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 CHAPLIN NO.164, 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
10	NE.	19	17	4	3	Dug	13	2,228	- 12	2,216	13	2,215	Glacial drift	Hard, clear, "alkaline"	43	D, S	Sufficient for local needs.
11	SE.	23	"	"	"	Dug	7	2,250	- 5	2,245	7	2,243	Glacial droft	Hard, clear	42	D, S	Sufficient supply.
12	SW.	24	"	"	"	Bored	44	2,235	- 40	2,195	44	2,191	Glacial drift	Hard, clear	42	D, S	Sufficient for stock needs; also 15-foot well for domestic use.
13	SE.	24	"	"	"	Dug	12	2,195	- 11	2,184	12	2,183	Glacial drift	Hard, clear, "alkaline"	43	S	Sufficient for stock needs; also 70-foot well yields good supply, hard water.
14	SW.	27	"	"	"	Dug	5	2,262	- 3	2,259	5	2,257	Glacial drift	Hard, clear	44	D, S	Sufficient supply.
15	NE.	27	"	"	"	Dug	34	2,295	- 31	2,264	34	2,261	Glacial drift	Hard, clear	43	D, S	Sufficient supply.
16	SE.	27	"	"	"	Bored	70	2,315	- 45	2,270	70	2,245	Glacial gravelly sand	Hard, clear	42	D, S	Sufficient supply; also 110-foot well with water seam at 37 feet.
17	NW.	30	"	"	"	Dug	18	2,225	- 17	2,208	18	2,207	Glacial drift	Hard, clear	43		
18	SW.	30	"	"	"	Dug	26	2,215	- 23	2,192	26	2,189	Glacial gravel and quicksand	Hard, clear	43	D, S	Not quite sufficient for stock.
19	SE.	34	"	"	"	Dug	12	2,265	- 10	2,255	12	2,253	Glacial drift	Hard, clear, slightly "alkaline"	43	D	Also 35-foot well unfit for domestic use; spring will water large number stock.
20	SW.	35	"	"	"	Dug	22	2,265	- 12	2,253	22	2,243	Glacial drift	Hard, "alka-line"	43	S	Sufficient for stock needs.
21	NW.	35	"	"	"		40	2,295	- 30	2,265	40	2,255	Glacial drift	Hard, clear, "alkaline"	43		Insufficient supply.
22	SW.	36	"	"	"	Dug	10	2,260	- 8	2,252	10	2,250	Glacial drift	Soft, clear	43	D, S	Sufficient supply.
1	NE.	25	17	5	3	Dug	15	2,225	- 14	2,211	15	2,210	Glacial quick-	Hard, clear	42	D	Sufficient for house needs; also 20-foot dry hole and 15 and 13-foot wells which supply stock.
2	NE.	26	"	"	"	Dug	8	2,215	- 7	2,208	8	2,207	Glacial deposits	Stagnant			
3	SE.	28	"	"	"	Bored	38	2,195	- 23	2,172	38	2,157	Glacial drift	Hard, clear	41	D, S	Sufficient supply; also shallow well for stock.
4	NE.	29	"	"	"	Drilled	675	2,210	?		500	1,710	Bearpaw ?	Very hard			C. P. R. well, water too hard and foaming for boilers. #
5	SW.	34	"	"	"	Dug	18	2,235	- 13	2,222	18	2,217	Glacial drift	Hard, clear	43	D, S	Sufficient supply; also spring with large supply.
6	NE.	35	"	"	"	Bored	80	2,250	- 65	2,185	80	2,170	Glacial drift	Hard, clear	42	D, S	Sufficient supply.
1	SW.	2	17	6	3	Dug	35	2,210	- 32	2,178	35	2,175	Glacial sand	Hard, clear, iron	42	D, S	Sufficient supply.
2	NE.	3	"	"	"	Dug	14	2,228	- 10	2,218	10	2,218	Glacial sand	Hard, clear		D	Sufficient for household needs; also spring flowing continually. On slope of hill.
3	SE.	3	"	"	"	Spring											
4	NE.	4	"	"	"	Bored	59	2,282					Glacial sand	Hard, clear		D, S	Insufficient; intermittent supply.
5	NW.	5	"	"	"	Dug	14	2,245	- 5	2,240			Glacial drift	Hard, clear, "alkaline"	38	D, S	Sufficient supply.
6	SW.	6	"	"	"	Dug	27	2,260	- 5	2,255	27	2,233	Glacial sand	Hard, clear	39	D, S	Insufficient; second 18-foot well for stock.
7	SW.	9	"	"	"	Dug	13	2,250	- 12	2,238	13	2,237	Glacial sand	Soft, clear	44	D, S	Insufficient; intermittent supply.

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

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

WELL RECORDS—Rural Municipality of CHAPLIN NO. 164, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
8	SE.	16	17	6	3	Dug	17	2,210	- 10	2,200	17	2,193	Glacial sand	Hard, clear, "alkaline"	40	D, S	Sufficient supply.
9	NW.	16	"	"	"	Dug	11	2,230	- 9	2,221	11	2,219	Glacial sand	Hard, clear	42	D, S	Sufficient supply; also 40-foot dry hole.
10	NE.	17	"	"	"	Dug	15	2,252	- 13	2,239	15	2,237	Glacial sand	Soft, clear, iron	40	D	Sufficient for house; also 8-foot well limited supply.
11	NE.	17	"	"	"	Dug	15	2,240					Glacial drift	Hard, clear "alkaline"	37	S	Sufficient for stock needs.
12	NW.	25	"	"	"	Dug	15	2,280			15	2,265	Glacial sand	Hard, clear, "alkaline"	42	D, S	Sufficient for local needs.
13	NE.	27	"	"	"	Dug	40	2,250	- 33	2,217	40	2,210	Glacial gravel	Hard, clear	42	D, S	Excellent supply; waters household and 75 head stock; also 35-foot well filled in with quicksand. #
14	SE.	30	"	"	"	Dug	16	2,280			16	2,264	Glacial sand	Soft, clear		D, S	Sufficient for local needs.
15	NE.	31	"	"	"	Dug	10	2,212			10	2,202	Glacial sand	Hard, clear, "alkaline"	41	D, S	Sufficient supply.
16	NW.	31	"	"	"	Dug	12	2,305	- 9	2,296	12	2,293	Glacial sand	Hard, clear, "alkaline"	45	D, S	Intermittent supply.
17	SE.	31	"	"	"	Dug	14	2,240	- 7	2,233	14	2,226	Glacial sand	Hard, clear, "alkaline"	39	D, S	Sufficient supply.
18	NE.	32	"	"	"	Dug	14	2,205	- 2	2,203	14	2,191	Glacial sand	Hard, clear, "alkaline"	40	D, S	Sufficient supply.
19	NW.	32	"	"	"	Dug	10	2,200	- 7	2,193	10	2,190	Glacial sand	Soft, clear, "alkaline"	44	D, S	Sufficient supply.
20	NE.	33	"	"	"	Bored	36	2,255	- 24	2,231	30	2,225	Glacial sand	Hard, clear, "alkaline"	41	D, S	Insufficient supply; also 20 and 60-foot wells completes supply.
21	SW.	34	"	"	"	Bored	38	2,225	- 30	2,195	38	2,187	Glacial sand	Hard, clear, "alkaline"	42	S	Sufficient for stock needs.
22	SW.	34	"	"	"	Dug	13	2,225	- 5	2,220	13	2,212	Glacial sand	Hard, clear, "alkaline"	42	D, S	Sufficient supply.
23	SW.	34	"	"	"	Dug	11	2,225	- 5	2,220	11	2,214	Glacial sand	Hard, clear, "alkaline"	44	D, S	Sufficient supply.
24	SE.	34	"	"	"	Dug	19	2,225			19	2,206	Glacial sand	Hard, clear,	42	D, S	Sufficient supply.
25	SW.	36	"	"	"	Dug	30	2,240			30	2,210	Glacial sand	Hard, iron, "alkaline"	42	D, S	Sufficient supply.
1	NW.	2	18	4	3	Dug	10	2,295	- 6	2,289			Glacial drift	Hard, clear			
2	SW.	6	"	"	"	Dug	2	2,295	0	2,295	2	2,293	Glacial clay	Hard, clear		S	Spring sufficient for stock needs.
3	NW.	9	"	"	"	Dug	7	2,315	- 3	2,312	7	2,308	Glacial gravel	Hard, clear		D	Sufficient for domestic needs; also two dry holes.
4	SW.	11	"	"	"	Bored	96	2,315	- 85	2,230	96	2,21°	Glacial drift	Hard, laxative	43	S	Insufficient; hauls drinking water.
5	SE.	15	"	"	"	Dug		2,365	0	2,365			Glacial drift	Hard, clear		D, S	Spring; sufficient supply.
6	NW.	17	"	"	"	Bored	107	2,285	- 23	2,262	107	2,178	Glacial gravel	Hard, clear, iron	42	S	Sufficient with aid of slough; also 19-foot well and several dry holes.
7	SW.	18	"	"	"	Dug	18	2,285	- 9	2,276	18	2,267	Glacial drift	Hard, clear		S	Sufficient for stock needs.
8	SE.	19	"	"	"	Bored	27	2,295	- 13	2,282	27	2,268	Glacial drift	Hard, clear	42	D, S	Sufficient supply; also 16-foot well suitable only for 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 CHAPLIN NO. 164, 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.	19	18	4	3	Bored	90	2,280	- 45	2,235	90	2,190	Glacial drift	Hard, cloudy	42	S	Suitable only for stock.
10	SW.	20	"	"	"	Bored	71	2,295	- 17	2,278	71	2,224	Glacial drift	Hard, clear, iron	43	S	Suitable only for stock; second 20-foot well for domestic use.
11	SW.	28	"	"	"	Dug	6	2,290	- 3	2,287	6	2,284	Glacial drift			S	Insufficient supply.
12	NE.	28	"	"	"	Bored	63	2,210	- 9	2,201	63	2,147	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient supply.
13	SW.	30	"	"	"	Dug	18	2,260	- 13	2,247	18	2,242	Glacial drift	Hard, clear	43	D, S	Intermittent supply.
14	NE.	30	"	"	"	Dug	14	2,285	- 10	2,275	14	2,271	Glacial drift	Hard, clear	42	D	Sufficient for domestic use; also 2 shallow wells in slough for stock.
15	NW.	31	"	"	"	Bored	25	2,260	- 9	2,251	25	2,235	Glacial drift	Hard, clear	39	D, S	Sufficient for local needs.
16	NE.	32	"	"	"	Dug	10	2,140	- 7	2,133	10	2,130	Glacial drift	Hard, clear	43	D	Sufficient for household; water stock on SE.¼, section 20, at 20-foot well.
17	NW.	32	"	"	"	Dug	11	2,160	- 8	2,152	11	2,149	Glacial drift	Hard, clear, "alkaline"	43	D, S	Sufficient for local needs; second shallow well in slough.
18	SE.	33	"	"	"	Dug	4	2,160					Glacial drift	Hard, clear, "alkaline"	42	D, S	Sufficient for local needs.
19	NE.	33	"	"	"	Dug	12	2,140	- 9	2,131	9	2,131	Glacial sand	Hard, clear	42	D, S	Sufficient for local needs.
20	SE.	34	"	"	"	Dug	30	2,240	- 27	2,213	30	2,210	Glacial sandy gravel	Soft, clear	43	D, S	Sufficient for local needs.
1	NE.	2	18	5	3	Dug	13	2,270	- 6	2,264	13	2,257	Glacial drift	Hard, clear	43	D, S	Sufficient for local needs.
2	SW.	3	"	"	"	Bored	39	2,260	- 34	2,226	39	2,221	Glacial drift	Hard, stagnant		N	A second 8-foot well with good water.
3	NW.	4	"	"	"	Dug	13	2,290	- 11	2,279	13	2,277	Glacial drift		42	S	
4	NE.	5	"	"	"	Dug	18	2,280	- 16	2,264	18	2,262	Glacial drift	Hard, clear	42	D, S	Sufficient supply.
5	NW.	8	"	"	"	Dug	14	2,240	- 10	2,230	14	2,226	Glacial gravel	Soft, clear		D	Usually sufficient for household; second 85-foot well with 60 feet of water used for stock
6	NW.	9	"	"	"	Dug	10	2,300	- 7	2,293	10	2,290	Glacial drift	Hard, clear	43	D	Sufficient for household; also 9-foot well for stock use.
7	NE.	13	"	"	"	Dug	14	2,280	- 8	2,272	14	2,266	Glacial drift	Hard, clear	43	D	Insufficient; also 14-foot well with 4 foot of water used for stock.
8	NE.	14	"	"	"	Bored	75	2,320	- 50	2,270	75	2,245	Glacial blue	Hard, clear, iron		D, S	Sufficient for local needs.
9	NW.	18	"	"	"	Bored	53	2,310	- 36	2,274	53	2,257	Glacial drift		42		
10	SW.	19	"	"	"	Bored	60	2,345	- 55	2,290	60	2,285	Glacial drift	Hard, clear	42	D, S	Insufficient supply; two dry holes 120 feet deep.
11	SE.	19	"	"	"	Bored	42	2,315	- 34	2,281	42	2,273	Glacial drift	Hard, clear	41	S	Insufficient supply; also 12-foot well of drinking water.
12	SW.	20	"	"	"	Bored	88	2,290	- 56	2,234	88	2,202	Glacial gravel	Hard, cloudy stagnant		S	Insufficient for local needs; second 15-foot well aids supply.
13	SE.	20	"	"	"	Bored	52	2,335	- 42	2,293	52	2,283	Glacial drift		42		
14	NE.	21	"	"	"	Bored	110	2,320	- 95	2,225	110	2,210	Glacial drift	Hard, cloudy, "alkaline"	43	S	Sufficient for stock needs; laxative to humans.
15	NW.	23	"	"	"	Bored	83	2,320	- 69	2,251	83	2,237	Glacial drift	Hard, clear, iron	42	N	Well in disuse; water hauled.

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 CHAPLIN NO. 164, 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
16	NW.	24	18	5	3	Dug	45	2,275	- 39	2,236	45	2,230	Glacial drift	Hard, clear	43	S	Sufficient for local needs; drinking water hauled.
17	SE.	25	"	"	"	Dug	24	2,285	- 18	2,267	24	2,261	Glacial sand	Hard, clear	43	D, S	Sufficient for local needs; also two dry holes 90 and 95 feet.
18	NW.	25	"	"	"		21	2,270	- 18	2,252	21	2,249	Glacial drift	Hard, clear	43		Also 11-foot well, 2 feet water.
19	SE.	27	"	"	"	Bored	26	2,315	- 13	2,302	26	2,289	Glacial drift	Hard, stagnant			
20	SE.	27	"	"	"	Bored	37	2,280	- 24	2,256	37	2,243	Glacial drift	Soft, clear	42	D, S	Large supply; supplies several neighbours.
21	NE.	27	"	"	"	Bored	30	2,270	- 18	2,252	30	2,240	Glacial drift	Hard, clear, "alkaline"	43	D, S	Sufficient supply.
22	SE.	28	"	"	"	Dug	23	2,300	- 21	2,279	23	2,277	Glacial drift	Hard, cloudy, "alkaline"	43	D	Not sufficient; slightly laxative.
23	SE.	32	"	"	"	Bored	98	2,320	- 82	2,238	98	2,222	Glacial drift	Hard, clear, "alkaline"	42	D, S	Not always sufficient; can be pumped dry.
24	SE.	33	"	"	"	Bored	60	2,290	- 30	2,260	60	2,230	Glacial drift	Hard, clear, "alkaline" iron		D, S	Sufficient supply.
25	SW.	35	"	"	"	Dug	36	2,270	- 21	2,249	36	2,234	Glacial drift	Hard, clear, salty	43	D, S	Sufficient for local needs; slightly laxative. #
26	SE.	35	"	"	"	Bored	31	2,235	- 16	2,219	31	2,204	Glacial drift	Hard, clear	43	D, S	Insufficient supply.
27	NW.	36	"	"	"	Bored	70	2,250	- 40	2,210	70	2,180	Glacial clay	Hard, clear, "alkaline"	42	S	Insufficient; drinking water hauled.
1	SE.	1	18	6	3	Dug	16	2,290	- 12	2,278	16	2,274	Glacial sand	Fairly soft, clear	41	D, S	Sufficient for local needs.
2	NW.	2	"	"	"	Dug	15	2,265	- 8	2,257	15	2,250	Glacial sand	Fiarly soft, clear	42	D, S	Sufficient for local needs.
3	SW.	3	"	"	"	Bored	45	2,215	- 15	2,200	45	2,170	Glacial gravel	Hard, clear, "alkaline"	41	D, S	Sufficient for local needs.
4	NW.	3	"	"	"	Bored	45	2,260	- 31	2,229	45	2,215	Glacial sand	Hard, "alkaline"		D, S, I	Sufficient for household and some stock; dam completes stock needs.
5	NE.	6	"	"	"	Bored	14	2,245	- 11	2,234	14	2,231	Glacial sand	Hard, clear, "alkaline"	43	D, S	Sufficient supply; also 10-foot dry hole and spring.
6	SE.	6	"	"	"	Bored	25	2,240	- 22	2,218	25	2,215	Glacial sand	Soft, clear	38	D, S	Sufficient supply.
7	SE.	6	"	"	"	Dug	14	2,230	- 11	2,219	14	2,216	Glacial sand	Hard, clear	40	D, S	Sufficient supply; plenty of water for stock in nearby spring.
8	SW.	7	"	"	"	Dug	10	2,300	- 7	2,293	10	2,290	Glacial sand	Fairly soft, clear		D, S	Sufficient for local needs; also spring completes stock needs.
9	SE.	11	"	"	"	Dug	11	2,307	- 8	2,299	11	2,296	Glacial sand	Clear, "alkaline"	42	D, S	Generally sufficient for local needs.
10	SW.	17	"	"	"	Dug	10	2,385	- 6	2,379	10	2,375	Glacial sand	Hard, clear, iron	45	D, S	Sufficient for local needs; second well, water at 3 feet.
11	SW.	18	"	"	"	Dug	24	2,400	- 19	2,381	24	2,376	Glacial sand	Hard, clear, "alkaline"	41	D, S	Sufficient for local needs.
12	SW.	19	"	"	"	Dug	13	2,390	- 10	2,380	13	2,377	Glacial sand	Fairly soft, clear	40	D, S	Sufficient for local needs.
13	SE.	21	"	"	"	Dug	23	2,500	- 17	2,483	23	2,477	Glacial sand	Hard, clear slightly "alkaline"	41	D, S	Sufficient for local needs.
14	NE.	24	"	"	"	Dug	12	2,375	- 9	2,366	12	2,363	Glacial sand	Soft, clear	44	D, S	Sufficient for local needs; second 80-foot unused well.

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 CHAPLIN NO. 164, 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	NE.	31	18	6	3	Bored	14	2,375	- 12	2,363	14	2,361	Glacial sand	Fairly soft, clear	40	D, S	Sufficient supply; second 22-foot well.
16	NW.	32	"	"	"	Bored	22	2,370	- 9	2,361	22	2,348	Glacial sand	Fairly soft, clear	39	D, S	Sufficient for local needs.
17	NW.	34	"	"	"	Bored	25	2,425	- 19	2,406	25	2,400	Glacial drift	Fairly soft, clear	39	D, S	Insufficient; intermittent supply; uses also a dugout for stock.
18	SW.	34	"	"	"	Dug	11	2,410	- 10	2,400	11	2,399	Glacial sand	Hard, cloudy, "alkaline"	44	D, S	Sufficient supply.
19	NE.	34	"	"	"	Dug	13	2,340	- 11	2,329	13	2,327	Glacial sand	Hard, clear	42	D, S	Sufficient for local needs.
20	NW.	35	"	"	"	Dug	12	2,360	- 9	2,351	12	2,348	Glacial gravel	Soft, clear	44	D, S	Supplies household and 10 head stock.
21	NE.	35	"	"	"	Spring		2,290					Glacial drift	Hard, iron	42		
22	SE.	36	"	"	"	Spring		2,280					Glacial drift	Hard, clear	44	D, S	Sufficient supply; large flow; second spring gives intermittent yield.

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

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