CANADA
DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF MAPLE CREEK No. 111 SASKATCHEWAN

BY

B. R. MacKay, H. H. Beach & D. P. Goodall

Water Supply Paper No. 120

OTTAWA
1936

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GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF MAPLE CREEK, NO. 111, 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 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.

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 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 côteau. 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.

<u>Belly River Formation.</u> 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.

<u>Marine Shale Series.</u> 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 IN THE MUNICIPALITY

The rural municipality of Maple Creek comprises an area of 324 square miles in the southwestern part of southern Saskatchewan. The municipality consists of nine townships described as tps. 10, 11, and 12, ranges 25, 26, and 27, W. 3rd mer.

The town of Maple Creek, situated on the main line of the Canadian Pacific railway, in the central part of the area, is about 23 miles east of the Alberta-Saskatchewan boundary or Fourth meridian and $62\frac{1}{2}$ miles north of the International Boundary. Maple Creek has a population of about 1,200 and is the chief trading centre in the area.

Most of the northern two-thirds of the municipality consists of an undulating to nearly level, lowland plain with surface elevations ranging between 2,400 and 2,600 feet above sea-level. From the edge of the lowland southward through the western half of township 11, range 27, and the southern row of townships, the surface is irregular to hilly and rises gradually to attain elevations ranging from 3,000 to 3,400 feet above sea-level along the southern border of the municipality. These uplands form part of the northern flank of Cypress hills, a high plateau lying to the south of this map-area.

The southern townships are drained to the north through a number of small, intermittent streams. The largest of these is Maple creek. This stream rises in the uplands south of the municipality and flows northward in range 26 to cross the northern border of the municipality in sec. 32, tp. 12, range 26. Its largest tributary, Gap creek, flows northward along the western side of range 27 and then eastward to join Maple creek about 2 miles north of the town of Maple Creek. The southeastern part of the municipality is drained by a few, small streams that terminate in large, "alkali" sloughs on the lowlands in township 11, range 25. The greater part of the lowlands is poorly drained and some of the depressions are occupied by shallow lakes and sloughs. Most of these dry up in the summer months or the water becomes too highly charged with mineral salts to be of any value as a source of water for stock. The creeks are of value as a source of water chiefly during the spring run-off. Fairly large volumes of water may be conserved, however, by constructing dams at strategic places in the stream channels. This method of conservation is taken advantage of in several places, but could be still further developed. Most of the creeks in the southern uplands part of the area are fed by springs and in some places the stream flow is fairly constant for a short distance below the spring. These supplies can usually be relied upon to provide water for stock ranging in the southern uplands. The springs are also a source of domestic water supplies on some of the farms, and springs occurring in sec. 20, tp. 10, range 25, provide the entire water supply for the town of Maple Creek. The major source of water in the municipality, however, is the shallow wells sunk in the unconsolidated Recent and glacial drift deposits. The bedrock immediately underlying the unconsolidated deposits is known to be water-bearing only in the southeastern uplands, but deep drilling in the northwestern lowlands has also produced favourable results from a lower bedrock formation.

Water-bearing Horizons in the Unconsolidated Deposits

The unconsolidated deposits consist of Recent sediments laid down by flood-waters in the stream channels, Recent wind-blown sand dunes, and a thick mantle of glacial drift consisting of several types of glacial deposits. The glacial deposits are of wide extent and overlie the bedrock throughout the entire area.

The stream deposits are yielding water only in the southern part of the area. Where fairly deep coulées have been eroded in the land surface and where the gradient is not steep the coulée floor is usually covered with a layer of clay, silts, and fine sand 10 to 20 feet in thickness. These sediments are interbedded with irregular beds and pockets of well sorted, coarser sands and gravels. Such porous beds form excellent reservoirs for the accumulation of ground waters, particularly if they are sealed with impervious clay at the lower end, thus preventing loss of water by underground flow. The water supply of these aquifers is replenished by springs seeping from the coulée banks or by direct seepage from the stream. Waters from this source nearly always contain low concentrations of the soluble mineral salts. Wells producing from the stream deposits are rarely over 20 feet in depth. Owing, however, to the irregular occurrence of the water-bearing beds extensive prospecting may be required in some places before a suitable water supply is located. On the lowlands the creeks occupy narrow channels and have built no flood-plains nor flats and hence offer few suitable well locations.

The wind-blown deposits consist of sand dunes that extend as a belt or irregular-shaped, round-topped hills, 30 to 50 feet in height, composed of fine-grained quartz sand, across the southeastern corner of township 12, range 25. Throughout the remaining parts of the lowland the surface deposits consist largely of lake sands and sandy clays that form part of the glacial drift.

The glacial drift includes all deposits laid down by the great continental ice-sheet, which spread over the province of Saskatchewan many thousands of years ago, and those deposits formed later by flood-waters resulting from the melting of the ice. The sands overlying the lowlands are thought to have been deposited in a lake basin formed after the melting of the ice that at one time extended over most of the northern lowlands of this municipality. Several, irregular-shaped sand belts also extend through the southwestern part of the area. Along the lower reaches of Maple Creek in township 12, range 26, these sands are overlain by a thin blanket of lake clay. The glacial lake deposits are all underlain by a thick layer of boulder clay that reaches a maximum thickness of slightly more than 200 feet. In the absence of the lake sediments the boulder clay forms the uppermost deposit throughout most of the southern part of the municipality. The land surface in the boulder clay or till-covered areas is undulating to steeply rolling. Small, irregular-shaped areas are characterized by numerous, small hills with intervening, undrained depressions that in places form sloughs. These roughly surfaced areas are known as moraines in distinguishing them from the more even surfaced till plains. The moraines are thought to have been formed at those places where the ice-front paused for a considerably longer period during its retreat northward. In this township moraines occur as irregularly shaped patches distributed along the steep slopes in the southern part of the municipality, and over a slightly larger area, comprising about 4 square miles, bordering the area of lake sands in the northwestern part of township 11, range 27.

Wells sunk in the lake sands usually encounter water at depths of 10 to 20 feet. The water is concentrated in the porous sands overlying the less pervious boulder clay. The yield from the wells is variable as is to be expected where the sands are interstratified with a considerable amount of clay and silt. The water also has a tendency to collect in the lower depressions formed in the surface of the underlying clay. These depressions are not always indicated by the surface topography as many occur under level plains. Favourable sub-surface topography is not essential for large accumulations of ground water, however, as the water table follows with some modifications the general contour of the land surface, and where the lake deposits are thick or exceptionally porous large water supplies may occur. The sand dunes are not essentially different in character from the lake sands except that they are, as a rule, more porous, as they contain little or no clay. These deposits also contain water at shallow depths. It has been found a good practice in all parts of the lake basin to test well locations with a small auger before undergoing the expense of sinking a well. Where only small yields are located the total supply is usually increased by sinking several wells in different parts of the farm. As the cost of these wells is relatively low many residents also put down several wells as an added convenience. Quicksand flowing into the wells has reduced the available water supply in some places and a number of wells have been abandoned on this account. Where the quicksands are especially troublesome new wells are dug every two or three years, this method of water recovery being usually more satisfactory than trying to clean out old wells. Sand-points are used with some success in combatting quicksand trouble, but exceptionally fine screens are required and this greatly reduces the yield.

The water obtained from the glacial lake deposits varies greatly as to the amount of dissolved salts it contains, so that little prediction can be made as to the type of water that may be expected in any one locality. In general, these waters contain appreciable amounts of the objectionable sulphate salts in solution. The greater number of the wells are reported to contain water that is drinkable, although many of the waters would not doubt have a laxative effect if taken by persons who are unaccustomed to waters of this type. Other shallow wells, particularly on the lowlands, are reported to yield water that is too highly mineralized for domestic use, but it is being used for watering stock. Only in a few places have the dissolved salts reached such concentrations as to render the water unfit even for stock.

The glacial till underlying the lake deposits is also a source of water supply. In the southern part of the municipality where these deposits occur at the surface water is obtained from isolated pockets of sand and gravel that occur interspersed through the less pervious boulder clay. These water-bearing beds occur at depths usually less than 20 feet from the surface. Their waters are rarely so highly mineralized as to be unsuitable for domestic use. Owing to the erratic distribution of the porous beds in the clay, however, it is necessary in many places to sink a number of test holes before a suitable water supply is located. On many of the farms these shallow aquifers are absent, or where located are inconveniently situated to farm buildings so that deeper wells have been put down to tap more extensive sand and gravel beds and pockets that occur in the boulder clay at greater depths.

In the southern upland part of the municipality these water-bearing beds occur at relatively shallow depths and where they have been cut into by the erosion of stream channels they give rise to flowing springs. Farther north on the lowlands these beds are buried under greater thicknesses of drift and have been tapped by wells at depths ranging from 40 to 217 feet. The areal extent of the individual aquifers has not been traceable over great distances owing to the scarcity of deep wells. They are apparently erratic in their distribution, although some of the beds may have a considerable lateral extent to the southward as their waters are under a fairly large hydrostatic head. These waters also vary as to their mineral salt concentration. In the town of Maple Creek, and within a radius of 5 miles, water obtained from depths over 100 feet is of excellent quality, whereas the water obtained at shallower depths is "alkaline" and in most places is fit only for stock. As few wells in the municipality have been drilled to depths greater than 100 feet it is not known if this condition exists in the deeper aquifers in other parts. It would seem advisable, however, to shut off undesirable waters and prospect for a better quality at greater depths in some places. If deeper drilling proves unsatisfactory the casing can be pulled or perforated at the upper horizon and that water used if desired.

Water-bearing Horizons in the Bedrock

The bedrock immediately underlying the unconsolidated deposits in the municipality consists almost entirely of dark grey, marine shales known as the Bearpaw formation. These shales are overlain by younger bedrock formations only in the uplands in the southeastern part of the municipality where surface elevations range higher than about 3,150 feet above sea-level. Here the Eastend formation directly overlies the Bearpaw through a narrow belt extending along the southern border of township 10, range 25, and the southeastern corner of township 10, range 26. The Eastend beds are believed to be overlain by a still younger formation known as the Ravenscrag in a small area covering about a half a section in the southeastern corner of the municipality. Both these upper formations are expected to be water bearing as they yield an abundance of water to wells and springs in the municipalities bordering on the east and south. Some of the springs that occur in the southeastern part of this township may also have their source in these formations and find their way to the surface through the unconsolidated deposits. These waters are usually well suited to all farm requirements.

The upper 100 to 150 feet of the Bearpaw formation, such as occurs in the higher southern part of the municipality, may also contain thin beds of water-bearing sands from which drinkable waters could be obtained. The middle and lower beds of the formation are known to consist almost entirely of compact, dark grey shales in which little or no water occurs. Such small seepages of water as may be found in the Bearpaw shales are expected to be highly mineralized and would be unsuitable for stock. These shales may be distinguished from the overlying clays of the drift by their darker colour, more friable character, and the entire absence of boulders or gravel in them. The shales usually show some indication of bedding and when allowed to dry they break down into small, roughly cubical, and in many places iron-stained, fragments. The Bearpaw formation may have a thickness of 600 to 700 feet, under the southwestern part of the municipality. In the lowlands much of the formation was removed by erosion prior to the deposition of the glacial drift, so that now it has a thickness of only 200 to 300 feet, or possibly less in the northwestern part of the municipality.

Several wells have been sunk through the Bearpaw into the underlying Belly River formation. This formation, consisting of a thick series of shales, sandstones, and coal seams, underlies the entire area. Although these beds are probably water-bearing at most places, the great depth at which they occur in the southern and eastern parts makes them of little value as a source of water for persons of moderate means. As only one well sunk to a depth of 400 feet, in sec. 36, tp. 11, range 27, is definitely known to yield water from the Belly River formation little prediction can be made as to the depth to water at other places. For the character of the water from the above well the reader is referred to the table of water analyses included in this report.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 10, Range 25

This township is situated on the steeply rolling northern slope of the Cypress Hills uplands. Surface elevations range from 2,600 to 2,750 feet above sea-level on the lowlands in the northern part, to elevation of 3,200 to 3,400 feet on the southern border of the area. A large part of the township consists of range land, particularly the irregularly surfaced southern uplands. Springs are the chief source of water for both domestic and stock needs, although a number of shallow wells sunk in the unconsolidated deposits in the northern half of the township are also used.

The glacial drift mantling the area consists largely of boulder clay of variable thickness. The impervious clay is interspersed with irregular-shaped pockets and thin layers of gravel and sand. The sand and gravel beds are water bearing and are the source of most of the springs recorded in the township. These springs occur at irregular intervals on creek banks and hillsides throughout the area, although the largest flows occur in the more steeply sloping southern half. Some of the spring waters may have their origin in the bedrock formations and find their way to the surface by seeping through the porous beds in the overlying drift. It is probable, however, that most of the springs are confined entirely to the drift deposits and are an outlet for surface waters that collect in the irregular moraine that extends in a southeast-northwesterly direction through the southern part of the township. Some of the largest springs situated in section 20 provide the entire water supply for the town of Maple Creek. The water is collected in a reservoir at the spring and is then piped a distance of about 9 miles to Maple Creek, located in sec. 15, tp. 11, range 26. The surface elevation at the town is about 300 feet lower than at the spring, permitting the water to flow by gravity without the aid of a pumping system. This water system also provides water for the needs of several farms through which the pipe-line is laid. The water flow from the springs is variable, and ranged from about 483,700 gallons to 84,300 gallons a day, between May 28, and November 30, 1934. The water is hard and is excellent drinking water.

Water from other springs in the township is reported to be of similar quality.

Wells tapping sand or gravel pockets in the drift range in depth from 12 to 42 feet. The yields from individual wells vary with the size and porosity of the water-bearing bed tapped. At several places, only compact boulder clay was encountered from which at best only small yields of water are obtained. At other places it was necessary to sink a number of test holes before a suitable water-bearing bed was located. The well waters are variable in character, but none is reported to be so highly charged with mineral salts as to be unsuitable for domestic use.

As no wells in the township are reported to have been sunk through the drift the depth to the bedrock remains unknown. In the southern sections, where surface elevations range higher than 3,150 feet above sea-level, the Eastend formation is believed to form the uppermost bedrock with the exception of a small area in section 1, where the surface rises to elevations greater than 3,400 feet. Here the overlying Ravenscrag formation may immediately underlie the glacial drift. Both these formations may be water-bearing as they are known to contain porous sands that are capable of retaining large ground water supplies. No prediction can be made as to depths to these potential acquifers, however, owing to the variation in the elevation of the land surface.

The Bearpaw formation underlying the drift in the rest of the area is not regarded as being favourable for the accumulation of any large ground water supplies. Such waters as it may contain are expected to be highly mineralized and not suitable for drinking.

Township 10, Range 26

In the northern part of this township the land surface is level or moderately rolling, with a surface elevation of about 2,600 feet above sea-level. Toward the south, through the southern two-thirds of the area, the surface rises rapidly to an elevation as great as 3,200 feet at the highest point in section 1. This part of the township is steeply rolling to hillocky and consists largely of range land. Range stock obtain water from springs and possibly from a few dams constructed in the coulée bottoms. Wells sunk in the unconsolidated drift deposits provide the water requirements of most of the farms in the township.

The glacial drift consists largely of boulder clay or till. A few, small, moraine-covered areas are scattered through the southern half of the township. A roughly V-shaped area extending in northwesterly and northeasterly directions from sections 16 and 17, to cross the northern border in sections 31 and 34, is covered with an undetermined thickness of glacial lake sands and silts. These sediments overlie the boulder clay. No wells are reported to be drawing water from the lake sands, although they may be water-bearing in some places.

The largest ground water supplies in the township are obtained from the porous sand and gravel beds that occur interspersed at irregular intervals through the boulder clay. In the southern part of the area these porous beds give rise to numerous, small, flowing springs. Most of the springs are located in the small stream channels or on the steep northern slopes. Similar aquifers are tapped by wells sunk to depths usually less than

20 feet at several places throughout the southwestern part of the township. The waters from the springs and the wells are reported to be drinkable, although the water from one well situated in section 17 is reported to contain "sulphur". The yield from the shallow wells and springs is variable, but most of them provide ample water for the requirements of the farms on which they are located. Deeper water-bearing beds of sand and gravel occur buried under 30 to 50 feet of boulder clay and have been tapped by wells in the northern part of the area. These aquifers are erratic in their distribution, although at most places depths of wells greater than 60 feet have not been required before encountering one of these beds. The water in the wells usually maintains a fairly constant level several feet above the water-bearing bed, and one well sunk to a depth of 51 feet, in section 32, flowed when first drilled in 1929. In 1935, the water stood within 2 feet of the surface, and was being used for domestic purposes only. The water is hard and tastes slightly of iron. Other deep wells in the township, as a rule, produce water that contains appreciable amounts of the sulphate salts in solution, although none of these waters is reported to be so highly mineralized as to prohibit their use in the household.

These deep aquifers are apparently the most reliable source of water in the township. Although their northern extent has not been determined, they are believed to form a fairly continuous horizon throughout the southern half of the area, and are regarded as being worthy of a test on farms where a suitable water supply is not available at shallow depths. The Bearpaw formation underlying the glacial drift is not known to produce water that is suitable for farm use in this vicinity. Residents are advised to confine their search for water to the overlying unconsolidated deposits and to discontinue drilling when the shales are encountered.

Township 10, Range 27

The surface of this township is irregularly eroded into steep-sided hills and ridges with intervening wide flats and coulées. Surface elevations range from 2,550 feet above sea-level, in the northwestern part, to a maximum of about 2,900 feet on the uplands along the southern border in sections 1 and 2. Drainage is carried northward by Gap creek, a small stream that flows only during flood seasons.

The coulée bottoms are floored by an irregular layer of silts and clays. These deposits are in some places interbedded with pockets of sand and gravel. Wells sunk in the coulée bottoms encounter small to moderate yields of drinkable water in the porous beds at depths less than 20 feet. Owing to the irregular distribution of the sands and gravels it is in many places necessary to sink a number of test holes before a water supply is located. These waters are reported to be hard and are suitable for household use, although the yield is not always sufficient for other farm requirements.

Although most of the wells in the township are located in the till-covered areas a few are also producing from glacial lake deposits that overlie the boulder clay in a wide belt extending along Gap creek as far south as section 4. The lake deposits also overlie an extensive area in the northwestern part of the township. Gap creek has excavated a fairly deep channel through these sand and silt deposits, exposing a thickness of about 30 feet in some places. Small yields of water are obtained from several wells situated in sections 32, 35, and 36. The water probably lies at the contact of the sands with the underlying and less pervious boulder clay, but is not expected to form a continuous horizon throughout the area where the lake sands occur. The water contains fairly large amounts of mineral salts in solution and may not be everywhere suitable for drinking.

Throughout the rest of the township where the surface deposits consist largely of till, water is concentrated in a few, irregular-shaped pockets of sand and gravel that occur sparingly distributed through the boulder clay. These water supplies are usually encountered at depths less than 30 feet from the surface, although greater depths have been required in several sections. The deepest producing well recorded in the township is located in section 19. An adequate yield of hard, "alkali" water was encountered here in a sand bed at a depth of 103 feet. The water is under hydrostatic pressure and rises in the well to within 24 feet of the surface. It is reported to be suitable for domestic use. Similar deep aquifers no doubt occur in other parts of the township at various depths to 100 feet or possibly deeper. Persons drilling deep wells in search of these water-bearing beds should not condemn a location as being unproductive until the drill has reached the underlying Bearpaw formation, as the beds lying at the contact of the glacial drift with the underlying bedrock are commonly water-bearing. The drilling of deep wells into the Bearpaw formation is not recommended, however, as these shales rarely contain beds that are sufficiently porous to allow for large accumulations of ground water and such waters as do occur in the formation would probably be too highly charged with mineral salts to be used as a domestic drinking supply.

Township 11, Range 25

Surface relief in this township is low, with elevations ranging in general between 2,550 and 2,600 feet above sea-level. Most of the area is covered with a layer of glacial lake deposits consisting chiefly of fine sands and silts ranging in thickness from 10 to 30 feet. Several sections in the southern part of the township where the surface rises to elevations greater than 2,600 feet are overlain by glacial till or boulder clay, which is thought to have a thickness of at least 100 feet, and is known to underlie the lake deposits throughout the rest of the township.

Water is obtained almost entirely from shallow wells sunk to depths less than 20 feet, although Hay lake and several shallow sloughs may provide some water for stock. Most of the surface waters, however, are highly mineralized and are not suitable for farm use. Water of better quality has been obtained in section 4, where a large dam has been constructed across Hay creek. Sufficient water is conserved in this way to irrigate about 1,200 acres of hay meadow. Small dams might be constructed elsewhere, although suitable sites are probably scarce throughout the greater part of the area. Most of the wells have been sunk in the glacial lake sands to depths ranging from 10 to 20 feet. The water-bearing sands usually occur as layers interbedded with yellow clays and sandy clays. The waters from this source vary greatly as to yield and quality. On most farms several wells have been put down to ensure an adequate water supply. Quicksand has reduced the available water supply in a few places, although trouble from this source is not reported to be general. The water at most places contains appreciable amounts of sulphate salts in solution and from several wells it is so highly mineralized as to be undrinkable. Fortunately on many of the farms drinkable waters have been located in sufficient quantities for domestic use and the more highly mineralized waters are used only for stock.

Although few wells have been sunk in the boulder clay underlying the lake sands, findings in deep wells in the bordering townships suggest the presence of scattered sand and gravel beds at depths of 40 to 100 feet, from which adequate supplies of water are to be expected.

Township 11, Range 26

Little variation in surface elevation occurs over this township. Elevations range in general between 2,500 and 2,600 feet above sea-level. Maple creek, a small, intermittent stream, extends northward through the western half of the area and is joined by Gap creek flowing in from the west a few miles north of the town of Maple Creek. Although some surface water might be conserved by constructing dams in these channels they cannot be regarded as a permanent water supply. Slough waters are highly mineralized and are reported to be unsuitable for stock use. Ground waters are obtained largely from wells sunk in the glacial drift. The glacial drift throughout most of the western half of the township consists of boulder clay or till. Throughout the rest of the area the till is overlain by glacial lake deposits consisting essentially of fine sand and silts.

A few wells sunk to shallow depths in the lake deposits yield moderately large supplies of water. In most parts of the area, however, the lake deposits produce only small seepages of generally "alkali" water and deeper wells have been put down in the underlying boulder clay.

No distinct water-bearing horizon is recognized in these lower drift deposits as the wells range in depth from 40 to 217 feet. The water occurs in beds of sand and gravel interspersed through the less pervious boulder clay. Some of the aquifers may be of small areal extent, but others, particularly those lying at depths greater than 100 feet, may extend over considerable areas as their waters are under sufficient hydrostatic pressure to cause them to rise in the wells to points within a few feet of the surface. The deepest aquifer to be reported from the drift deposits in the township was tapped at a depth of 217 feet in section 1. A small flow of water was also struck in this well at a depth of 117 feet. The water is soft, and is reported to be suitable for drinking. In section 17 hard water is obtained from a gravel bed at a depth of 140 feet. Here the water stands at a constant level 2 feet from the surface. A flowing well situated in the town of Maple Creek, in section 15, is also thought to be yielding water from one of these deep aquifers in the glacial drift. This well was drilled for gas to a depth of 1,860 feet in 1909. Only an incomplete log of the well is available in which there is no mention of the depth to the water-bearing bed. The water is soft and is used for domestic purposes and garden irrigation. The initial flow of the well is not known, but it was probably much larger than when visited in 1935. At this time it was flowing through a $\frac{1}{2}$-inch pipe at the rate of about 12 barrels a day. Its open flow capacity is probably not much greater, as the pressure at the well head is low. Since the condition of this well is not known it cannot be regarded as representative of what may be expected from other wells drilled to the base of the glacial drift in this vicinity. In view of the findings in the above-mentioned wells in sections 1 and 17, however, it seems reasonable to suppose that the Maple Creek well is yielding from a gravel bed deep in the drift and that this or other aquifers might be located by sinking wells to the base of the drift at depths probably not exceeding 250 feet. It is to be noted that the deeper wells in the township produce a better quality of water than those sunk to intermediate depths of 40 to 100 feet. It might be advisable to shut off highly "alkaline" waters in some cases and drill deeper in search of a better quality of water. Failing to locate drinkable waters at depth the casing could be pulled or perforated at the upper horizon, thus recovering this supply.

Drilling for water in the Bearpaw formation below the drift is not recommended unless the driller is prepared to continue to the Belly River formation below the Bearpaw, where conditions for the accumulation of ground water are more favourable. In the above-mentioned well put down in Maple creek, coal is reported to have been penetrated at 196 feet and a 7-foot seam at a depth of 292 feet from the surface. If this coal is in the upper part of the Belly River formation it is much higher than would normally be expected, as the top of this formation was encountered at a depth of 400 feet in a well drilled in sec. 36, tp. 11, range 27, where a seam of coal produces an abundant yield of good water. In the Maple Creek well no mention is made of water having been struck in the Belly River beds, although the well passed through the entire formation. It is possible, however, that the flow of water in this well is coming from these beds instead of the drift as suggested above. Unfortunately no deep wells from which an accurate log is available have been put down in the bedrock in this vicinity in recent years.

Water for the town of Maple Creek is piped from a spring in sec. 20, tp. 10, range 25, as described in an earlier section of this report.

Township 11, Range 27

Glacial lake deposits overlie a belt about a mile in width extending northward from section 3, and widening toward the north to include most of the northern row of sections. These deposits consist chiefly of fine sands and silts. The rest of the township, including several sections along Gap creek on the eastern side and most of the western half of the township, is covered with boulder clay. The clay forms a level till plain in the east, but in the western part the land surface is more irregular with surface elevations ranging between 2,600 and 2,700 feet above sea-level. The northern part of this area, including slightly more than sections 19, 29, and 30, is moraine covered.

The glacial lake deposits are probably not more than 15 feet thick, as in most of the wells boulder clay was encountered at depths of 15 feet from the surface. Small to moderate yields of water are obtained from these shallow wells, although the sands are not everywhere water bearing. Such waters as do occur contain relatively large amounts of mineral salts in solution, but few are reported to be too highly mineralized for domestic use. These wells are all affected by lowering of the water table during dry years, and it is in many places necessary to dig new wells or deepen the old ones to maintain an adequate water supply for farm use. The expense incurred in digging the shallow wells is low, however, and if the well location is first proved to be productive by means of a test auger this outlay can be reduced to a minimum. The till-covered area also yields water in some places from depths of less than 20 feet. The water here is usually concentrated in sand and gravel pockets, which occur interspersed through the boulder clay, although several of the wells are reported to be drawing their water from sandy boulder clay. These waters are not essentially different from those obtained from the lake deposits and are usually drinkable. The deposits should also be prospected for with a test auger before wells are dug. The depressions are usually the most favourable for the occurrence of this type of water-bearing deposit, although gravel beds may also form low ridges, particularly in the moraine-covered area.

Only one well is reported to have been sunk to a depth greater than 32 feet in the township. This well, situated in section 36, was drilled to a depth of 400 feet. A small yield of water was struck in a bed of sand at a depth of 100 feet and a larger yield at 300 feet. Water from the latter sand is reported to be of poor quality. At a depth of 400 feet a large yield of water was encountered in a bed of coal at an horizon that is probably near the top of the Belly River formation. The uppermost aquifer doubtless is in the glacial drift. The sand penetrated at 300 feet may be in the drift or in the Bearpaw formation. An analysis of the lower water is given in the table of water analyses in a later section of this report.

As no other deep wells have been put down in the township the ground water condition existing in the deeper drift deposits and in the underlying bedrock formations can only be surmised. It seems probable, however, that the drift might be capable of yielding an adequate supply of water on many of the farms at reasonable depths, but these waters may in some places contain relatively large concentrations of mineral salts and be fit only for stock. Persons who contemplate the drilling of deep wells are advised to read the general section of this report dealing with the municipality as a whole and the discussion of the ground water conditions in township 11, range 26.

Township 12, Range 25

The surface of this township is characterized by low relief with elevations ranging between 2,500 and 2,050 feet above sea-level. Surface waters are confined to a few, shallow, "alkali" sloughs. As there are no creeks and few sites suitable for the construction of dams for the conservation of surface waters, most of the residents depend for their water supply upon shallow wells sunk in the unconsolidated deposits.

The unconsolidated deposits mantling the township consist chiefly of glacial lake sands and silts. The prevailing winds have formed the fine sands into a belt of sand dunes extending from the eastern side of section 4, across the eastern border of the township in sections 1 and 12. The lake deposits are not over 30 feet in thickness in most places, and they overlie the less pervious boulder clay of the drift. The boulder clay forms the surface deposits in the absence of the lake clay in a narrow belt extending across the northeastern corner of the township. The shallow lake sand deposits are the chief source of water supply in the area. The water is concentrated in beds of fine, well-sorted sand that usually occur buried under several feet of yellow clay or silt. In some of the wells compact, blue clay was encountered immediately underlying the water-bearing sand bed. Such wells are rarely over 20 feet in depth and in a few places water was struck at depths less than 10 feet. Although the shallow lake deposits are not everywhere water bearing, most of the residents are obtaining an adequate water supply by sinking several wells in different parts of their farms.

These waters are quite variable in quality within short distances. Although most of them are drinkable and some apparently contain only minor amounts of salts in solution, others are reported to be fit only for stock.

Several attempts have been made in this township and in its immediate vicinity, to obtain a more permanent water supply by boring wells to greater depth in the boulder clay. Two of these wells, put down to depths of 52 and 43 feet in sections 5 and 6, encountered moderately large yields of water in beds of sand and gravel, interspersed through the clay. These waters, however, contain relatively large amounts of the mineral salts in solution. The well on section 5, and most of the other wells in the vicinity of the township, are used only for watering stock. A similar type of water may be expected by sinking deep wells in the boulder clay in other parts of the area. The maximum depth to which these potential water-bearing beds may occur is not known. The depth of the drift, however, may not exceed 200 feet, below which occurs the unproductive Bearpaw formation.

Water may be present in the sands and coal seams of the Belly River formation underlying the Bearpaw formation, but the cost of drilling to depths of 400 to 600 feet, necessary to test this horizon, renders this formation of little immediate value as a source of water in this township.

Township 12, Range 26

The land surface in this township is flat to undulating, and rises gradually toward the southeast from an elevation of about 2,400 feet above sea-level, in the valley of Maple Creek, in section 32, to elevations slightly exceeding 2,600 feet in the southeastern part of the area.

Water in the township is obtained chiefly from wells sunk in the unconsolidated deposits, although a few small springs are reported to occur in the eastern part of the area. Small dams and dugouts might also be constructed in some parts of the area to supplement the ground water supplies for stock.

The surface of the township is mantled by a layer, 10 to 15 feet thick, of glacial lake sands and silts from which most of the wells are drawing their water. These are underlain by less pervious boulder clays. The lake deposits are absent in two small areas in the southern part of the township and here the boulder clay forms the surface deposits. Along both sides of Maple Creek, from section 8, northward to the northern border, the surface is covered with a thin mantle of glacial lake clay. The clay is probably thin and underlain by sand at a depth of a few feet.

The ground water conditions existing in the lake deposits are apparently similar to those described in the preceding section dealing with the township bordering on the east. Few of the wells are over 20 feet in depth and the yield from many of them is inadequate for the needs of the farms on which they are located.

"Alkali" waters predominate.

In the southern part of the township the porous lake deposits are apparently thin and most of the residents here have failed to locate sufficient water by sinking shallow wells. Deeper wells have been put down to sand and gravel beds that occur interspersed through the boulder clay at depths ranging from 30 to 100 feet. Although large quantities of water are pumped from these wells, the water is too highly charged with sulphate salts for domestic use. It is used for watering stock, however, without imparting any apparent ill effect. The areal extent of these aquifers, or the maximum depth at which they occur, has not been determined, as no wells are reported to have been sunk far below the upper lake deposits in other parts of the area. It seems probable, however, that stock water might be located at most places at depths less than 100 feet.

Water of better quality is not expected to occur in the Bearpaw formation immediately underlying the drift. This formation is underlain, however, by the Belly River formation, in which large quantities of drinkable water is expected to occur at depths of 350 to 450 feet. This assumption is based upon findings in a deep well drilled in sec. 36, tp. 11, range 27, of which a description and analysis of the water are included in this report.

Township 12, Range 27

With the exception of a small area of till plain in sections 1 and 12, the entire township is overlain with a layer of glacial lake sands and silts. The deposits are probably not over 20 feet in thickness and in many places the underlying boulder clay has been encountered in wells sunk to depths less than 10 feet. They form an undulating to level plain, the surface elevations ranging in general between 2,500 and 2,550 feet above sea-level.

Residents of the township obtain water almost entirely from wells sunk to shallow depths in the lake sands or to gravel beds that in some parts of the area occur between the sands and the underlying boulder clay. In some of the wells several feet of yellow clay was dug through before sand was encountered. Others were sunk wholly in fine sand. Most of the residents report an adequate water supply, although, as a rule, several wells have been dug on each farm. These waters are nearly all hard, but few are reported to be so highly mineralized that they are unsuitable for domestic requirements.

Gravels underlying the lake deposits are located chiefly in the central and western parts of the township, where they have been penetrated by several wells at depths of less than 20 feet. Large yields of hard, drinkable water are produced from these gravels in sections 15, 16, 17, 18, 19, and 20. In sections 18 and 19 the water flows continuously at the surface in the form of springs and is used for watering a large number of stock in this vicinity. The exact areal extent of these water-bearing beds is not known, although they are not expected to occur for more than a mile beyond the borders of the above-mentioned sections.

In the southern part of the township little water is obtainable from the shallow lake deposits, and wells sunk to slightly greater depths in the boulder clay have tapped only small seepages of "alkali" water. Deeper drilling in this part of the area might discover large yields in sand or gravel beds of the lower part of the drift. Such waters, however, may also be highly mineralized and unsuitable for household use.

The Bearpaw formation underlying the drift is not expected to contain water that is fit to drink. The Belly River formation occurring below the Bearpaw is known to be water bearing in the township bordering on the south where a well put down to a depth of 400 feet in section 36 tapped an excellent supply. This horizon should occur at approximately the same depth in section 1, of this township, and if continuous throughout the entire township it should occur at lesser depths toward the northwest and occur at a possible minimum depth of 250 feet in section 31.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF MAPLE CREEK, NO. 111, SASKATCHEWAN

Township	10	10	10	11	11	11	12	12	12	Total No. in municipality
West of 3rd meridian — Range	25	26	27	25	26	27	25	26	27	
Total No. of Wells in Township	31	31	34	56	50	53	63	82	57	457
No. of wells in bedrock	0	0	0	0	1	1	0	0	0	2
No. of wells in glacial drift	30	31	29	54	49	52	63	82	57	447
No. of wells in alluvium	1	0	5	2	0	0	0	0	0	8
Permanency of Water Supply										
No. with permanent supply	23	26	29	45	38	46	46	41	35	329
No. with intermittent supply	6	0	1	7	3	4	11	7	8	47
No. dry holes	2	5	4	4	9	3	6	34	14	81
Types of Wells										
No. of flowing artesian wells	0	0	0	0	1	0	0	0	0	1
No. of non-flowing artesian wells	0	2	1	0	7	1	0	1	0	12
No. of non-artesian wells	29	24	29	52	33	49	57	47	43	363
Quality of Water										
No. with hard water	28	20	26	44	37	47	41	41	35	319
No. with soft water	1	6	4	8	4	3	16	7	8	57
No. with salty water	0	0	0	0	0	0	0	0	0	0
No. with "alkaline" water	3	7	8	32	18	27	16	18	14	143
Depths of Wells										
No. from 0 to 50 feet deep	30	25	28	54	46	52	62	79	57	433
No. from 51 to 100 feet deep	1	6	5	2	1	0	1	3	0	19
No. from 101 to 150 feet deep	0	0	1	0	1	0	0	0	0	2
No. from 151 to 200 feet deep	0	0	0	0	0	0	0	0	0	0
No. from 201 to 500 feet deep	0	0	0	0	1	1	0	0	0	2
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	0	0	0	0
No. over 1,000 feet deep	0	0	0	0	1	0	0	0	0	1
How the Water is Used										
No. usable for domestic purposes	27	22	23	36	24	33	40	35	29	269
No. not usable for domestic purposes	2	4	7	16	17	17	17	13	14	107
No. usable for stock	29	25	29	51	37	49	56	46	41	363
No. not usable for stock	0	1	1	1	4	1	1	2	2	13
Sufficiency of Water Supply										
No. sufficient for domestic needs	23	26	29	45	37	46	47	41	35	329
No. insufficient for domestic needs	6	0	1	7	4	4	10	7	8	47
No. sufficient for stock needs	19	21	17	37	31	34	28	28	25	240
No. insufficient for stock needs	10	5	13	15	10	16	29	20	18	136

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

The term "total dissolved mineral solids" as here used refers to the residue remaining when a sample of water is evaporated to dryness. It is generally considered that waters that have less than 1,000 parts per million of dissolved solids are suitable for ordinary uses, but in the Prairie Provinces this figure is often exceeded. Nearly all waters that contain more than 1,000 parts per million of total solids have a taste due to the dissolved mineral matter. Residents accustomed to the waters may use those that have much more than 1,000 parts per million of dissolved solids without any marked inconvenience, although most persons not used to highly mineralized water would find such waters highly objectionable.

Mineral Substances Present

Calcium and Magnesium

The calcium (Ca) and magnesium (Mg) content of water is dissolved from rocks and soils, but mostly from limestone, dolomite, and gypsum. The calcium and magnesium salts impart hardness to water. The magnesium salts are laxative, especially magnesium sulphate (Epsom salts, $MgSO_4$), and they are more detrimental to health than the lime or calcium salts. The calcium salts have no laxative or other deleterious effects. The scale found on the inside of steam 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 differance between the total hardness and the permanent hardness and represents the amount of mineral salts that ban 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 excesss 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 Maple Creek, No. 111, 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	
1	NW.	22	11	25	3	16	14,880	3,000+	3,000+	n.d.	380	340	380	2,003	10,210	3,750	15,416	340	462		6,148		7,840	626	* 1
2	NW.	22	11	27	3	16	1,360	580	240	340	23	485	130	76	644	475	1,451	233		159		67	954	38	* 1
3	SE.	36	11	27		400	260	140	35	105	5	200	50	25	33	55	250	90		52		51	49	8	* 2

Water samples indicated thus, * 1, are from glacial drift or other unconsolidated deposits.
Water samples indicated thus, * 2, are from bedrock, Belly River formation.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

Only two samples of water were taken for analyses from the unconsolidated deposits of this municipality by the Geological Survey in 1935. These analyses are both of glacial drift waters. Although no analysis was obtained of water from the Recent stream deposits these waters are not expected to differ essentially from those obtained in bordering municipalities where the source beds are apparently similar.

As a rule the stream deposits contain water that has a relatively low concentration of mineral salts. As these waters are derived chiefly by seepage from the streams or from springs on the edges of the stream channel, they contain only minor amounts of mineral salts in solution when they first enter the beds, and since the aquifers are composed largely of sand and gravel containing only minor amounts of readily soluble salts little opportunity is afforded these waters of becoming more highly mineralized.

A wide variation is noted in the mineral salt concentration of waters obtained from the glacial drift. The boulder clay is usually regarded as being the chief source of the objectionable sulphate salts. As a rule, water obtained from wells sunk entirely in clay or encountering only thin sand beds is more highly mineralized than the water from thick beds of sand and gravel. This is particularly noticeable in waters obtained from shallow wells sunk in the lowland areas where there is little underground flow. On the steeper slopes such as occur in the southern part of the municipality there is better opportunity for underground flow as many of the aquifers have an outlet through springs. These waters seldom are so highly mineralized as to be undrinkable, and the spring waters in particular are of excellent quality. Surface evaporation is also an important factor in determining the mineral salt concentration of ground waters. In the lake deposits covering the lowlands of this municipality the water table is close to the surface and much of the water is removed through evaporation, leaving an excess of salts in the remaining water. As there is little or no underground drainage through the underlying boulder clay many of these waters become so highly charged with sulphate salts as to be unfit for man or stock.

It is to be noted that, in general, the mineral salt concentration in drift waters increases with depth. This is a noticeable feature in waters from most of the wells in this municipality that are sunk to depths greater than 30 feet. With a few exceptions these waters are so highly mineralized as to be unsuitable for household use, but most of them are being used for watering stock. Several deep wells put down in the central part of the area are yielding water with a relatively low mineral salt content from beds of gravel. It is possible that these aquifers extend to or near the surface at places in the southern uplands, and their waters have had little contact with the boulder clay.

The so-called "alkali" waters usually contain sodium sulphate (Na_2SO_4), magnesium sulphate ($MgSO_4$), calcium carbonate ($CaCO_3$), magnesium carbonate ($MgCO_3$), and calcium sulphate ($CaSO_4$), with minor amounts of sodium carbonate (Na_2CO_3), and common salt ($NaCl$). These salts are listed in the decreasing order of their most common occurrence. The sulphates of sodium and magnesium are the most harmful salts present. Waters containing in excess of 1,000 parts per million of both these salts tend to have a laxative effect when taken by persons unaccustomed to highly mineralized waters, although waters containing concentrations of nearly twice this amount are commonly used for drinking in different parts of the province without imparting any noticeable ill effects. Stock are apparently less affected by these salts and have been reported to thrive on waters containing a mineral salt concentration as great as 4,000 parts per million.

The second sample listed in the table of water analyses is of water from a sand pocket in the upper part of the glacial drift. This water contains sodium sulphate (Glauber's salt), and magnesium sulphate (Epsom salts), but these salts are not present in sufficient quantities to prohibit the use of the water for the household supply.

The first analysis is of water from a shallow well sunk near a slough in the glacial lake deposits, and shows to what extent these salts may become concentrated through surface evaporation. The extremely high total solid content of 14,880 parts per million of dissolved solids renders this water unfit for humans or stock.

Water from the Bedrock

Although no wells are reported to yield water from the upper bedrock formations, the waters they contain are not expected to differ essentially from those obtained in the municipalities bordering on the south and east. Water from the Ravenscrag formation and the upper part of the Eastend formation rarely contains large amounts of the objectionable sulphate salts, and is usually suitable for domestic use.

The lower Eastend beds and the Bearpaw formation in many cases yield water containing large amounts of the laxative-acting sulphate salts. The waters are so variable in quality, however, that it is difficult to predict the type of water that may be obtained in any one locality. As a rule, the mineral salt concentration increases with depth, so that wells put down in the middle and lower Bearpaw beds may be expected to yield water that is so highly charged with sodium sulphate and sodium chloride (common salt) as to be unfit even for stock.

The third analysis is of water obtained from a coal seam in the Belly River formation. This water has the remarkably low concentration of dissolved solids amounting to only 260 parts per million, and consisting largely of the harmless carbonates. These compounds impart hardness to the water, but a large part of this is temporary hardness and may be removed by boiling the water.

WELL RECORDS—Rural Municipality of MAPLE CREEK NO.111, 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	HEIGHT TO WHICH WATER WILL RISE: Elev.	PRINCIPAL WATER-BEARING BED: Depth	PRINCIPAL WATER-BEARING BED: Elev.	PRINCIPAL WATER-BEARING BED: Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SW.	4	10	25	3	Spring		3,165	0	3,165	0	3,165	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
2	NW.	4	"	"	"	Spring		3,110	0	3,110	0	3,110	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
3	NE.	4	"	"	"	Spring							Glacial drift	Hard, clear		D, S	Sufficient for local needs.
4		5	"	"	"	Spring							Glacial drift	Hard, clear		D, S	Sufficient for local needs.
5	NW.	9	"	"	"	Spring		2,930	0	2,930	0	2,930	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
6		10	"	"	"	Spring							Glacial drift	Hard, clear		D, S	Sufficient for local needs.
7		11	"	"	"	Spring							Glacial drift	Hard, clear		D, S	Sufficient for local needs.
8	SE.	13	"	"	"	Spring		2,960	0	2,960	0	2,960	Glacial drift	Hard, clear, "alkaline"	49	S	Sufficient for 100 head stock; also another spring.
9	SE.	16	"	"	"	Spring		2,980	0	2,980	0	2,980	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
10	SW.	16	"	"	"	Spring		2,900	0	2,900	0	2,900	Glacial gravel	Hard, clear		D, S	Sufficient supply; stock watered also at a creek.
11	NW.	19	"	"	"	Dug	32	2,750	- 30	2,720	30	2,720	Glacial gravel	Hard, clear	48	D, S	Intermittent supply.
12	SE.	20	"	"	"	Dug	10	2,794	0	2,794	0	2,794	Glacial gravel	Hard, clear	46	D, S, I, M	Town of Maple Creek obtains its water supply from these springs.
13	NW.	21	"	"	"	Dug	12	2,800	- 6	2,794	6	2,794	Glacial gravel	Hard		D, S	Sufficient supply.
14	NW.	22	"	"	"	Bored	41	2,900	- 35	2,865			Glacial drift	Hard, clear, "alkaline"		S	Intermittent supply.
15	SE.	22	"	"	"	Dug	28	2,950	- 20	2,930			Glacial drift	Hard	46	D, S	Intermittent supply.
16		22	"	"	"	Dug	43	2,950	- 20	2,930			Glacial drift	Hard		D, S	This well is now abandoned.
17	SW.	22	"	"	"	Dug	41	2,895	- 39	2,856	39	2,856	Glacial gravel	Soft, clear	46	D, S	Intermittent supply.
18	NE.	24	"	"	"	Spring		2,810	0	2,810	0	2,810	Glacial gravel	Hard, clear	46	D, S	Insufficient for local needs; also another similar well.
19	S½.	28	"	"	"	Dug	42	2,800	- 39	2,761	39	2,761	Glacial gravel	Hard, clear, "alkaline"		D, S	Insufficient supply; also two dry holes 35 feet deep.
20	NE.	35	"	"	"	Dug	67	2,745	- 35	2,710	67	2,678	Glacial gravel	Hard, clear	44	D, S	Intermittent supply.
21	NW.	36	"	"	"	Drilled	15	2,600					Recent sand	Hard, clear		D	Intermittent supply; also several springs.
1	SW.	5	10	26	3	Spring		2,860	0	2,860	0	2,860	Glacial sand and gravel	Hard, clear	44	S	Sufficient for 200 head stock.
2	SW.	6	"	"	"	Dug	16	2,925	- 8	2,917	10	2,915	Glacial red sand	Hard, clear	48	D	Sufficient supply; three other similar wells; a dam is used for stock.
3	NE.	6	"	"	"	Dug	18	2,890	- 8	2,882			Glacial drift	Hard, clear, iron	48	D	Sufficient supply; a similar well is used for stock needs.
4	SE.	8	"	"	"	Dug	14	2,770	- 11	2,759	11	2,759	Glacial gravel	Hard, clear	48	D, S	Sufficient supply; a creek is also used for stock needs.
5	SE.	8	"	"	"	Spring	3	2,740	0	2,740	0	2,740	Glacial sand	Hard, clear		D	Sufficient for local needs.
6	NW.	10	"	"	"	Spring		2,800	0	2,800	0	2,800	Glacial gravel	Soft, clear	51	D, S	Abundant supply; also many other springs.

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 MAPLE CREEK NO. 111, 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
7	NW.	17	10	26	3	Dug	16	2,800	- 13	2,787			Glacial drift	Hard, clear, "alkaline"	40	D, S	Insufficient for local needs.
8	SW.	20	"	"	"	Dug	24	2,790	- 20	2,770	22	2,768	Glacial gravel	Soft, clear	48	D	Sufficient supply; yields 200 gallons a day; another well 16 feet deep is used for stock needs.
9	NW.	24	"	"	"	Dug	45	2,790	- 44	2,746	44	2,746	Glacial sand	Soft, clear	48	D, S	Sufficient supply; also a dry hole 40 feet deep.
10	SE.	24	"	"	"	Dug	40	2,790	- 35	2,755			Glacial drift	Hard, clear, "alkaline" iron	46	D, S	Sufficient supply; also a dry hole 35 feet deep.
11	SE.	32	"	"	"	Dug	15	2,540	- 12	2,528			Glacial drift	Hard, clear, "alkaline"	48	S	Sufficient for local needs.
12	SE.	32	"	"	"	Drilled	51	2,540	- 2	2,538	51	2,489	Glacial sand and gravel	Hard, clear, iron	46	D	Abundant supply.
13	SW.	34	"	"	"	Bored	60	2,590	- 30	2,560			Glacial drift	Hard, clear, "alkaline"	46	D, S	Also another similar well.
14	NE.	34	"	"	"	Dug	24	2,585	- 16	2,569	16	2,569	Glacial sandy clay	Hard, clear, "alkaline"	48	N	Sufficient supply, but not used; also two dry holes to a depth of 20 feet.
15	NW.	35	"	"	"	Dug	66	2,580	- 56	2,524			Glacial sand	Hard, clear	46	D, S	Sufficient supply; also a 60-foot dry hole.
16	NW.	35	"	"	"	Bored	90	2,590	- 84	2,506	84	2,506	Glacial sand	Hard, clear, "alkaline"	46	S	Sufficient for local needs.
17	NW.	36	"	"	"	Dug	42	2,590	- 20	2,570	42	2,548	Glacial sand	Hard, clear, "alkaline"	49	D, S	Sufficient for local needs.
1	SW.	1	10	27	3	Bored	22	2,860	- 17	2,843			Glacial drift	Hard, clear	46	S	Sufficient supply; a dam is also used for stock.
2	SW.	3	"	"	"	Dug	30	2,750	- 20	2,730	20	2,730	Recent gravel	Hard, clear	47	D, S	Sufficient supply; also a spring on farm.
3	SE.	4	"	"	"	Dug	14	2,790	- 9	2,781	9	2,781	Recent gravel	Hard, clear	47	D, S	Sufficient supply; stock also watered at a creek.
4	SW.	6	"	"	"	Dug	35	2,900	- 31	2,869	31	2,869	Glacial sand	Soft, clear	46	D, S	Sufficient for local needs.
5	NE.	6	"	"	"	Dug	74	2,900	- 68	2,832	71	2,829	Glacial sand	Soft, clear	45	D	Sufficient for domestic needs; haul water for stock needs.
6	NW.	7	"	"	"	Dug	10	2,825	- 5	2,820	7	2,818	Glacial sand	Hard, clear, "alkaline"	43	D, S	Sufficient for local needs.
7	SE.	8	"	"	"	Dug	20	2,890	- 13	2,877	13	2,877	Glacial sandy clay	Hard, clear, "alkaline"	45	D, S	Sufficient for local needs.
8	SW.	10	"	"	"	Dug	14	2,750	- 6	2,740	13	2,737	Recent gravel	Hard, clear		D	Sufficient for local needs.
9	SW.	12	"	"	"	Dug	18	2,850	- 14	2,836			Glacial sand	Hard, clear	47	S	Insufficient supply; also use a creek for stock needs.
10	NE.	12	"	"	"	Bored	48	2,875	- 34	2,841	41	2,834	Glacial sand and gravel	Hard, clear	47	D, S	Sufficient for local needs.
11	NE.	12	"	"	"	Dug	16	2,850	- 11	2,839	11	2,839	Glacial sand and gravel	Hard, clear	48	S	Sufficient for local needs.
12	NE.	12	"	"	"	Dug	22	2,850	- 19	2,831			Glacial drift	Hard, clear	47	N	Insufficient supply; and well not in use.
13	NE.	14	"	"	"	Dug	16	2,650	- 13	2,637	13	2,637	Recent gravel	Hard, clear	47	D	Constant water-level; a creek is used for stock needs.
14	SE.	15	"	"	"	Dug	17	2,650	- 12	2,638	12	2,638	Recent gravel	Hard, clear, iron	48	D	Sufficient supply; a creek is used for stock needs.
15	SE.	15	"	"	"	Spring		2,650	0	2,650	0	2,650	Glacial drift	Hard, clear	52	D	Sufficient for local needs.

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

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of MAPLE CREEK NO. 111, 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	SW.	17	10	27	3	Dug	22	2,800	- 17	2,783			Glacial drift	Soft,clear	47	D, S	Intermittent supply; haul water.
17	NW.	17	"	"	"	Dug	17	2,850	- 15	2,835	15	2,835	Glacial sand	Soft,clear		D, S	Sufficient for local needs.
18	NW.	19	"	"	"	Drilled	104	2,790	- 24	2,766	103	2,687	Glacial sand	Hard,clear, "alkaline"	47	D, S	Sufficient supply; also 4 dry holes to a depth of 100 feet.
19	SE.	20	"	"	"	Dug	5	2,750	- 0	2,750	0	2,750	Glacial drift	Hard,clear		D, S	Sufficient supply; also another spring.
20	NE.	24	"	"	"	Dug	45	2,750	- 39	2,711	44	2,706	Glacial gravel	Hard,clear, "alkaline"		S	Insufficient for local needs.
21	NW.	28	"	"	"	Bored	40	2,630	- 25	2,605			Glacial sand	Hard,clear	46	D, S	Sufficient supply; also another well 20 feet deep, and a dam for stock.
22	NW.	29	"	"	"	Spring		2,620	0	2,620	0	2,620	Glacial drift	Hard,clear, "alkaline"		S	Sufficient supply.
23	NE.	32	"	"	"	Dug	10	2,625	- 8	2,617	8	2,617	Glacial sand	Hard,clear, "alkaline"	53	S	Insufficient supply; also another well 18 feet deep.
24	SE.	35	"	"	"	Dug	22	2,600	- 19	2,581	20	2,580	Glacial sand	Hard,clear	48	D, S	Insufficient supply; a creek is also used for stock needs.
25	NE.	35	"	"	"	Bored	29	2,560	- 19	2,541	19	2,541	Glacial sand	Hard,clear, "alkaline"	47	D, S	Insufficient supply; a creek is also used for stock needs.
26	NW.	36	"	"	"	Dug	19	2,540	- 13	2,527	13	2,527	Glacial sand	Hard,clear, "alkaline"	48	D, S	Sufficient supply; a creek is also used for stock needs.
1	SW.	2	11	25	3	Dug	25	2,650	- 4	2,646			Glacial drift	Hard,clear, "alkaline"	46	S	Sufficient for local needs.
2	NW.	2	"	"	"	Dug	15	2,600	- 10	2,590	10	2,590	Recent sand	Hard clear, "alkaline"	48	D, S	Sufficient for local needs; also another similar well.
3	NE.	2	"	"	"	Dug	30	2,700	- 23	2,677	23	2,677	Glacial coarse sand	Hard,clear	44	D, S	Sufficient supply; also another similar well.
4	SW.	4	"	"	"	Spring		2,600	0	2,600	0	2,600	Glacial drift	Hard,clear		D, S	Sufficient supply; also a large dam on the NW.¼, section 4.
5	SE.	6	"	"	"	Bored	58	2,600	- 13	2,587	13	2,587	Glacial sand	Hard,clear, "alkaline", odour	47	S	Sufficient for local needs.
6	NE.	7	"	"	"	Dug	17	2,600	- 13	2,587	13	2,587	Glacial sand	Hard,clear	44	D, S	Sufficient supply; also a spring on farm.
7	NE.	11	"	"	"	Dug	12	2,650	- 8	2,642			Glacial drift	Hard,clear, "alkaline"	48	S	Insufficient for local needs.
8	SE.	12	"	"	"	Dug	25	2,650	- 17	2,633	17	2,633	Glacial coarse sand	Hard,clear, iron	44	D, S	Sufficient for local needs.
9	NW.	12	"	"	"	Dug	10	2,650	- 7	2,643	7	2,643	Glacial sand	Soft,clear	44	D	Intermittent supply; also another similar well.
10	NW.	12	"	"	"	Dug	54	2,650	- 34	2,616			Glacial drift	Hard,clear, "alkaline", iron	48	S	Sufficient for local needs.
11	SW.	13	"	"	"	Dug	18	2,600	- 8	2,592			Glacial drift	Hard,clear, "alkaline"	46	D, S	Sufficient for local needs.
12	SW.	13	"	"	"	Bored	30	2,600	- 27	2,573	27	2,573	Glacial sand	Hard,cloudy, iron	44	N	Insufficient supply; and unfit for use.
13	NE.	14	"	"	"	Dug	14	2,600	- 11	2,589			Glacial drift	Soft,clear	48	D	Intermittent supply.
14	NE.	14	"	"	"	Dug	30	2,600	- 15	2,585	15	2,585	Glacial sand	Hard,clear, "alkaline"	44	S	Intermittent supply.

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

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

WELL RECORDS—Rural Municipality of MAPLE CREEK NO. 111, 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.	18	11	25	3	Dug	20	2,600	- 14	2,586	14	2,586	Glacial coarse sand	Soft, clear	44	D, S	Sufficient for local needs.
16	NW.	19	"	"	"	Dug	14	2,540	- 11	2,529	11	2,529	Glacial sand	Hard, clear, "alkaline"	48	D, S	Sufficient supply; also 3 other similar wells.
17	SE.	20	"	"	"	Dug	14	2,550	- 8	2,542	8	2,542	Glacial sand	Hard, clear, "alkaline"	47	D, S	Sufficient for local needs.
18	NW.	20	"	"	"	Dug	12	2,530	- 9	2,521	9	2,521	Glacial sand	Hard, clear	52	S	Sufficient for local needs.
19	SW.	21	"	"	"	Dug	12	2,570	- 7	2,563	7	2,563	Glacial sand	Hard, "alkaline"	53	S	Insufficient for local needs.
20	SE.	22	"	"	"	Dug	48	2,600	- 38	2,562	46	2,554	Glacial coarse sand	Hard, clear	44	D, S	Intermittent supply; also 4 dry holes.
21	NW.	22	"	"	"	Dug	16	2,535	- 11	2,524	11	2,524	Glacial sand	Hard, cloudy, "alkaline"	44	S	Sufficient for local needs. #
22	NE.	22	"	"	"	Dug	12	2,600	- 8	2,592	8	2,592	Glacial sand	Hard, clear, "alkaline", odour	46	S	Sufficient for local needs.
23	NW.	23	"	"	"	Dug	15	2,580	- 12	2,568			Glacial drift	Hard, clear	46	D, S	Intermittent supply; also another well 15 feet deep.
24	SW.	24	"	"	"	Dug	12	2,625	- 9	2,616	9	2,616	Glacial sand	Hard, clear	48	D, S	Sufficient for local needs.
25	NE.	24	"	"	"	Dug	13	2,575	- 11	2,564	11	2,564	Glacial coarse sand	Hard, clear, "alkaline"	48	D, S	Intermittent supply.
26	SE.	25	"	"	"	Dug	20	2,575	- 17	2,558	17	2,558	Glacial sand	Hard, cloudy, "alkaline"	48	S	Insufficient for local needs.
27	SW.	25	"	"	"	Dug	18	2,558	- 11	2,547	11	2,547	Glacial sand	Hard, clear, "alkaline"	46	D, S	Sufficient for local needs; another similar well 12 feet deep.
28	SE.	26	"	"	"	Dug	15	2,555	- 12	2,543	12	2,543	Glacial sand	Hard, clear, "alkaline"	45	D, S	Sufficient for local needs.
29	NE.	26	"	"	"	Dug	14	2,510	- 4	2,506	10	2,500	Glacial sand	Hard, clear, "alkaline"	48	S	Sufficient for local needs.
30	SW.	27	"	"	"	Dug	19	2,550	- 14	2,536	14	2,536	Glacial sand	Hard, clear, "alkaline"	46	D, S	Sufficient supply; also another similar well.
31	NE.	27	"	"	"	Dug	15	2,560	- 11	2,549	11	2,549	Glacial sand	Soft, clear	50	D, S	Sufficient supply; also another well with hard "alkaline" water.
32	SE.	30	"	"	"	Dug	10	2,535	- 8	2,527	8	2,527	Glacial sand	Hard, clear, "alkaline"	45	D, S	Sufficient for local needs.
33	SE.	31	"	"	"	Dug	14	2,550	- 10	2,540	10	2,540	Glacial sand	Hard, clear, "alkaline"	50	D, S	Sufficient for local needs.
34	NW.	31	"	"	"	Dug	12	2,600	- 8	2,592	8	2,592	Glacial sand	Hard		D, S	Insufficient for local needs.
35	NE.	31	"	"	"	Dug	9	2,550	- 5	2,545	5	2,545	Glacial sand	Hard, clear, "alkaline"		S	Insufficient for local needs.
36	NW.	32	"	"	"	Dug	10	2,540	- 6	2,534	6	2,534	Glacial sand	Hard, clear, "alkaline"		S	Insufficient for local needs.
37	SW.	34	"	"	"	Dug	12	2,550	- 10	2,540	10	2,540	Glacial sand	Hard, clear, "alkaline"	46	D, S	Sufficient for local needs.
38	SW.	35	"	"	"	Dug	16	2,550	- 6	2,544	6	2,544	Glacial sand	Soft, cloudy	48	S	Sufficient for local needs.
39	SE.	36	"	"	"	Dug	11	2,550	- 8	2,542	8	2,542	Glacial sand	Hard, clear, "alkaline"	50	D, S	Sufficient for local needs; also another similar well.
40	NW.	36	"	"	"	Dug	6	2,620	- 3	2,617	3	2,617	Glacial sand	Soft, clear	50	S	Sufficient for local needs.

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

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

WELL RECORDS—Rural Municipality of MAPLE CREEK NO. 111, SASKATCHEWAN

B 4-4
R. 7526

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SW.	1	11	26	3	Bored	56	2,585	- 22	2,563	53	2,532	Glacial gravel	Hard, clear, "alkaline"	46	D, S	Sufficient for local needs.
2	NE.	1	"	"	"	Drilled	217	2,575	- 20	2,555	217	2,358	Glacial gravel	Soft, clear, iron	44	D, S	Sufficient for local needs.
3	NW.	2	"	"	"	Dug	22	2,588	- 14	2,574			Glacial sand	Soft, clear	48	S	Sufficient for local needs; also another similar well.
4	NW.	2	"	"	"	Bored	33	2,588	- 18	2,570	33	2,555	Glacial sand and gravel	Hard, clear	49	D, S	Sufficient for local needs.
5	NW.	3	"	"	"	Bored	46	2,547	- 21	2,526	43	2,504	Glacial gravel	Hard, iron, yellow	48	D, S	Sufficient for local needs; also two other wells 30 feet deep that are not used.
6	NW.	4	"	"	"	Dug	15	2,515	- 13	2,502	13	2,502	Glacial sand	Hard, clear, "alkaline"	46	S	Sufficient supply; another similar well; haul drinking water.
7	NE.	6	"	"	"	Dug	12	2,545	- 8	2,537	8	2,537	Glacial sand	Hard, clear	48	D, S	Sufficient for 100 head sheep.
8	NE.	7	"	"	"	Dug	18	2,530	- 15	2,515	15	2,515	Glacial sand	Hard, clear	46	D, S	Sufficient for local needs.
9	NE.	9	"	"	"	Dug	15	2,510	- 12	2,498	12	2,498	Glacial sand	Hard, clear	48	D, S	Sufficient for local needs.
10	NW.	9	"	"	"	Dug	20	2,516	- 15	2,501	18	2,498	Glacial sand	Hard, clear, "alkaline"	48	S	Sufficient for local needs; also another similar well for domestic needs.
11	NW.	10	"	"	"	Dug	15	2,535	- 14	2,521	14	2,521	Glacial sand	Hard, clear, "alkaline"	48	D	Sufficient supply; also another similar well and 16-foot dry hole.
12	SW.	10	"	"	"	Dug	16	2,545	- 11	2,534	11	2,534	Glacial sand and gravel	Hard, clear	50	D, S	Sufficient supply; also another similar well.
13	SW.	12	"	"	"	Bored	30	2,550	- 14	2,536	20	2,530	Glacial sand	Hard, clear, "alkaline"	48	D, S	Sufficient supply; also 7 dry holes to a depth of 30 feet.
14	NE.	12	"	"	"	Dug	20	2,540	- 16	2,524	16	2,524	Glacial sand	Hard, clear	46	D, S	Sufficient for local needs.
15	NE.	12	"	"	"	Bored	22	2,540	- 16	2,524	16	2,524	Glacial sand	Hard, clear, "alkaline" iron	48	N	Insufficient supply; also a 22-foot dry hole.
16	SW.	13	"	"	"	Dug	10	2,525	- 9	2,516			Glacial drift	Hard, clear, "alkaline", iron	48	D	Sufficient supply; also another well 12 feet deep.
17	SW.	13	"	"	"	Dug	8	2,535	- 4	2,531	4	2,531	Glacial sand	Hard, clear, "alkaline", iron	48	S	Sufficient for local needs.
18		15	"	"	"	Drilled	1,860	2,507	0	2,507			Base in Colorado shale	Soft, clear	52	D, I	Yields 12 barrels a day.
19	SW.	16	"	"	"	Dug	15	2,517	- 12	2,505	12	2,505	Glacial sand	Hard, clear	46	D	Sufficient supply; another similar well is used for stock needs.
20	SE.	17	"	"	"	Drilled	140	2,500	- 2	2,498	140	2,360	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
21	SW.	22	"	"	"	Dug	15	2,530	0	2,530			Glacial drift	Hard, clear, "alkaline"	50	S	Insufficient for local needs.
22	SW.	24	"	"	"	Dug	30	2,540					Glacial drift				Well in the process of being dug; a few inches of water at base.
23	NW.	25	"	"	"	Bored	40	2,590	- 28	2,562			Glacial drift	Hard, clear, "alkaline", iron	50	D, S	Sufficient for local needs.
24	NW.	26	"	"	"	Dug	25	2,560	- 15	2,545			Glacial drift	Hard, clear	48	D	Intermittent supply; also another well 12 feet deep that is used 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.

B 4-4
R. 7526

WELL RECORDS—Rural Municipality of MAPLE CREEK NO.111, 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	HEIGHT TO WHICH WATER WILL RISE Elev.	PRINCIPAL WATER-BEARING BED Depth	PRINCIPAL WATER-BEARING BED Elev.	PRINCIPAL WATER-BEARING BED Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
25	SE.	28	11	26	3	Bored	50	2,500	- 5	2,495	40	2,460	Glacial sand and gravel	Hard, clear, "alkaline", soda	46	S	Sufficient supply; haul drinking water from Maple Creek.
26	SW.	35	"	"	"	Sand-point	25	2,580					Glacial sand	Hard, clear	46	D, S	Intermittent supply; also another well 12 feet deep.
27	SW.	36	"	"	"	Bored	14	2,590	- 10	2,580			Glacial drift	Hard, clear	52	D	Intermittent supply; 2 other wells 40 feet deep used only for stock.
28	NW.	36	"	"	"	Dug	17	2,585	- 15	2,570			Glacial drift	Hard, clear, "alkaline"	48	S	Sufficient for local needs.
1	NE.	2	11	27	3	Dug	4	2,540	0	2,540			Glacial drift	Hard, clear, "alkaline"	49	D, S	Sufficient for local needs; a creek is also used for stock needs.
2	NE.	4	"	"	"	Dug	8	2,630	- 3	2,627	3	2,627	Glacial sand	Hard, clear, "alkaline"	48	S	Sufficient supply; also a dam is used for stock needs.
3	NW.	4	"	"	"	Dug	22	2,638	- 12	2,626			Glacial drift	Hard, clear, "alkaline"	48	D, S	Sufficient for local needs; also a spring on farm.
4	SE.	5	"	"	"	Dug	25	2,650	- 15	2,635			Glacial drift	Hard, clear	48	D, S	Sufficient supply; also another well 12 feet deep.
5	SE.	5	"	"	"	Dug	7	2,630	- 3	2,627	3	2,627	Glacial sand	Hard, clear, "alkaline"	48	D, S	Sufficient for local needs.
6	NE.	5	"	"	"	Dug	32	2,640	- 28	2,612			Glacial drift	Hard, clear	47	D, S	Sufficient for local needs; also another well 14 feet deep.
7	SE.	6	"	"	"	Dug	27	2,690	- 20	2,670	23	2,667	Glacial gravel	Hard, clear, "alkaline"	48	S	Sufficient for local needs.
8	NW.	6	"	"	"	Dug	20	2,690	- 16	2,674	18	2,672	Glacial gravel	Hard, clear	46	D, S, I	Sufficient for local needs.
9	NW.	7	"	"	"	Spring							Glacial gravel	Hard		D, S	Sufficient for 100 head stock.
10	NE.	7	"	"	"	Dug	8	2,645	0	2,645			Glacial drift	Soft, clear	48	S	Sufficient supply; also springs along McCoy creek.
11	NE.	7	"	"	"	Dug	14	2,650	- 12	2,638	12	2,638	Glacial sandy clay	Hard, clear, "alkaline"	48	D	Sufficient for local needs.
12	SE.	8	"	"	"	Dug	25	2,650	- 17	2,633	17	2,633	Glacial sand	Hard, clear	47	S	Intermittent supply.
13	NW.	9	"	"	"	Dug	16	2,640	- 12	2,628			Glacial drift	Hard, clear	48	D, S	Sufficient for local needs.
14	NE.	10	"	"	"	Dug	18	2,590	- 14	2,576	14	2,576	Glacial sand	Hard, clear, "alkaline"	46	D, S	Sufficient for local needs.
15	SW.	10	"	"	"	Dug	10	2,590	- 4	2,586	4	2,586	Glacial gravel	Hard, clear, "alkaline"	48	D, S	Insufficient for local needs.
16	SE.	15	"	"	"	Dug	15	2,588					Glacial drift	Hard, clear		S	Sufficient for local needs.
17	NW.	15	"	"	"	Dug	12	2,625	- 6	2,619	6	2,619	Glacial sand	Hard, clear, "alkaline"	48	S	Sufficient supply; also another well 15 feet deep.
18	NE.	16	"	"	"	Dug	12	2,585	- 4	2,581	8	2,577	Glacial sand	Hard, clear, "alkaline"	49	S	Sufficient for local needs.
19	NE.	16	"	"	"	Dug	10	2,590	- 6	2,584	6	2,584	Glacial sand	Hard, clear, "alkaline"	50	D	Sufficient for local needs.
20	SE.	17	"	"	"	Dug	2	2,580	0	2,580	0	2,580	Glacial gravel	Hard, clear, "alkaline"	52	S	Sufficient for local needs.
21	SW.	17	"	"	"	Dug	32	2,680	- 27	2,653			Glacial drift	Hard, clear, "alkaline"	48	D, S	Sufficient for local needs.
22	SE.	18	"	"	"	Dug	28	2,680	- 20	2,660			Glacial drift	Hard, clear	48	D, S	Sufficient for local needs.

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

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

WELL RECORDS—Rural Municipality of MAPLE CREEK NO.111, 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
23	SW.	18	11	27	3	Dug	8	2,642									Dry hole in glacial drift.
24	NW.	20	"	"	"	Dug	16	2,575	- 5	2,570			Glacial drift	Hard,clear, "alkaline"	46	D, S	Insufficient for local needs.
25	NW.	20	"	"	"	Dug	11	2,570	0	2,570	4	2,566	Glacial sand	Hard,brown, "alkaline", iron	46	S	Sufficient for local needs.
26	SE.	22	"	"	"	Dug	16	2,550	0	2,550	9	2,541	Glacial sand	Hard,clear, "alkaline"	50	D, S	Sufficient for local needs.
27	NW.	22	"	"	"	Dug	18	2,535	- 14	2,521			Glacial drift	Hard,clear	50	D	Sufficient for local needs.
28	NW.	22	"	"	"	Dug	16	2,550	- 8	2,542	8	2,542	Glacial sand	Hard,clear, "alkaline"	50	S	Insufficient for local needs. #
29	NW.	24	"	"	"	Dug	18	2,500	- 15	2,485			Glacial drift	Hard,clear, "alkaline", iron	46	D, S	Sufficient for local needs.
30	SE.	27	"	"	"	Dug	6	2,535	- 2	2,533	2	2,533	Glacial sand	Hard,red, "alkaline", iron	50	S	Sufficient for local needs.
31	SE.	28	"	"	"	Dug	11	2,550	- 7	2,543	7	2,543	Glacial sand	Hard,clear, iron		D, S	Sufficient for local needs.
32	SE.	30	"	"	"	Dug	10	2,595									Dry hole in glacial gravel.
33	SW.	30	"	"	"	Dug	14	2,592	- 12	2,580	12	2,580	Glacial gravel	Hard,clear, "alkaline"	48	D	Sufficient for local needs.
34	SW.	30	"	"	"	Dug	15	2,592	- 11	2,581	11	2,581	Glacial gravel	Hard,clear, "alkaline"	48	D, S	Insufficient for local needs.
35	SW.	31	"	"	"	Dug	15	2,600	- 13	2,587	13	2,587	Glacial sand	Hard,clear, "alkaline"	46	D, S	Sufficient for local needs.
36	NE.	31	"	"	"	Dug	14	2,575	- 13	2,562			Glacial drift	Hard,clear, "alkaline"	50	S	Insufficient for local needs.
37	NW.	31	"	"	"	Dug	4	2,600	- 3	2,597	3	2,597	Glacial gravel	Soft,clear		S	Sufficient for 50 head stock.
38	NW.	31	"	"	"	Dug	24	2,595	- 18	2,577			Glacial drift	Hard,clear, "alkaline"	48	S	Intermittent supply.
39	SE.	32	"	"	"	Dug	12	2,590	- 6	2,584	8	2,582	Glacial sand	Hard,clear	46	S	Sufficient for local needs.
40	SW.	32	"	"	"	Dug	12	2,595					Glacial gravel	Hard,clear	50	N	Well is not used.
41	NE.	33	"	"	"	Dug	20	2,545	- 16	2,529			Glacial drift	Hard,clear, "alkaline"	48	D, S	Intermittent supply; also a 20-foot dry hole.
42	SW.	34	"	"	"	Dug	10	2,550	- 0	2,550	7	2,543	Glacial sand	Hard,clear	48	D, S	Intermittent supply; also another well 16 feet deep.
43	NW.	36	"	"	"	Dug	15	2,545	- 12	2,533	12	2,533	Glacial sand	Soft,clear	48	D, S	Insufficient for local needs.
44	SE.	36	"	"	"	Drilled	400	2,525	- 50	2,475	400	2,125	Belly River coal	Hard,clear	44	D, S	Sufficient for local needs. #
1	SE.	1	12	25	3	Dug	20	2,650	- 14	2,536	14	2,536	Glacial sand	Hard,clear	48	S	Sufficient for local needs.
2	SW.	4	"	"	"	Dug	18	2,550	- 14	2,536	14	2,536	Glacial sand	Hard,clear		D, S	Intermittent supply.
3	SW.	4	"	"	"	Dug	12	2,550	- 11	2,539	11	2,539	Glacial sand	Hard,clear, "alkaline"	50	D, S	This well is now abandoned.

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

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of MAPLE CREEK NO. 111, 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
4	SE.	5	12	25	3	Dug	26	2,550	- 23	2,527			Glacial drift	Hard, clear, "alkaline"	52	S	Insufficient for local needs.
5	SE.	5	"	"	"	Drilled	52	2,550	- 14	2,536	14	2,536	Glacial gravel	Hard, clear, "alkaline"		S	Insufficient for local needs.
6	NW.	5	"	"	"	Dug	12	2,560	- 7	2,553	7	2,553	Glacial sand	Soft, clear		S	Intermittent supply.
7	SE.	6	"	"	"	Bored	43	2,590	- 40	2,550	40	2,550	Glacial gravel	Hard, clear, "alkaline"	48	S	Insufficient supply; also a 14-foot well with intermittent supply.
8	NW.	6	"	"	"	Dug	14	2,600	- 10	2,590	10	2,590	Glacial sand	Hard, clear		D, S	Insufficient for local needs.
9	NW.	7	"	"	"	Dug	8	2,550	- 3	2,547	3	2,547	Glacial sand	Hard, clear	48	S	Sufficient for local needs.
10	NE.	7	"	"	"	Dug	18	2,550	- 16	2,534			Glacial drift	Hard, clear		D, S	Sufficient supply; also several dry holes to a depth of 30 feet.
11	SE.	9	"	"	"	Dug	19	2,550	- 10	2,540			Glacial drift	Hard, clear, "alkaline"	50	D, S	Intermittent supply; also two other similar wells.
12	SE.	10	"	"	"	Dug	12	2,550	- 11	2,539			Glacial drift	Hard, "alkaline"	50	D	Sufficient for local needs.
13	SE.	10	"	"	"	Dug	13	2,550	- 7	2,543	7	2,543	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for local needs.
14	SE.	11	"	"	"	Spring		2,600	0	2,600	0	2,600	Glacial sand	Soft, clear		S	Sufficient supply.
15	NW.	12	"	"	"	Dug	20	2,600	- 6	2,594	6	2,594	Glacial sand	Hard, clear		D, S	Insufficient for local needs.
16	NE.	13	"	"	"	Dug	14	2,630	- 8	2,622	8	2,622	Glacial sand	Hard, clear		S	Insufficient for local needs.
17	SE.	14	"	"	"	Dug	10	2,600	0	2,600	0	2,600	Glacial sandy clay	Hard, clear, "alkaline"		S	Sufficient for local needs.
18	SE.	14	"	"	"	Dug	15	2,650	- 12	2,638			Glacial drift	Hard, "alkaline"	50	S	Sufficient supply; a 5-foot well is used for domestic needs.
19	SE.	15	"	"	"	Dug	8	2,570	- 4	2,566	4	2,566	Glacial sand	Hard, clear, "alkaline"	50	D, S	Sufficient for local needs.
20	SE.	16	"	"	"	Dug	18	2,550	- 8	2,542	8	2,542	Glacial gravel	Hard, clear		D, S	Insufficient supply; also several dry holes to a depth of 18 feet.
21	SW.	16	"	"	"	Dug	14	2,550					Glacial sand	Hard, clear		D	
22	NW.	16	"	"	"	Dug	12	2,550	- 4	2,546			Glacial drift	Hard, clear		D	Intermittent supply.
23	SE.	17	"	"	"	Dug	10	2,550	0	2,550	0	2,550	Glacial sand	Hard, clear	50	S	Intermittent supply; also another well for domestic needs.
24	SE.	18	"	"	"	Dug	10	2,550	- 8	2,542	8	2,542	Glacial sand	Hard, clear, "alkaline"	50	N	Insufficient supply; also another well for domestic needs.
25	SW.	18	"	"	"	Drilled	30	2,550	- 25	2,525	25	2,525	Glacial sand	Hard, clear		D, S	Insufficient supply; also two shallow wells.
26	NW.	18	"	"	"	Dug	12	2,550	- 7	2,543	7	2,543	Glacial sand	Hard, clear	46	D, S	Sufficient for local needs.
27	NW.	19	"	"	"	Dug	10	2,550	- 5	2,545	8	2,542	Glacial gravel	Hard, clear		S	Insufficient for local needs.
28	SW.	20	"	"	"	Dug	16	2,550	- 12	2,538	12	2,538	Glacial sand	Hard, clear, "alkaline"	48	S	Sufficient for local needs.
29	SW.	20	"	"	"	Dug	15	2,550	- 12	2,538	12	2,538	Glacial sand	Hard, clear, "alkaline"		D	Sufficient for local needs.
30	NW.	20	"	"	"	Spring		2,520	0	2,520	0	2,520	Glacial sand	Soft, clear	50	S	Sufficient for local needs.

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

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

WELL RECORDS—Rural Municipality of MAPLE CREEK NO.111, 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	HEIGHT TO WHICH WATER WILL RISE Elev.	PRINCIPAL WATER-BEARING BED Depth	PRINCIPAL WATER-BEARING BED Elev.	PRINCIPAL WATER-BEARING BED Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
31	NE.	21	12	25	3	Dug	42	2,550	- 12	2,538	40	2,510	Glacial gravel	Hard, clear, "alkaline"		D, S	Intermittent supply; also an 18-foot slough seepage well.
32	SW.	22	"	"	"	Dug	14	2,550	- 10	2,540	10	2,540	Glacial sand	Soft, clear	46	D, S	Sufficient supply; also another similar well and a spring.
33	NW.	22	"	"	"	Dug	7	2,600	- 3	2,597	3	2,597	Glacial sand	Hard, clear		D, S	A dugout is also used.
34	SW.	23	"	"	"	Dug	9	2,620	- 2	2,618	2	2,618	Glacial sand	Soft, clear	50	D, S	Sufficient supply; another similar well 16 feet deep.
35	NW.	23	"	"	"	Dug	12	2,650	- 9	2,641	9	2,641	Glacial sand	Soft		D, S	Sufficient supply; but not used now.
36	NE.	23	"	"	"	Dug	10	2,600	- 6	2,594			Glacial drift	Soft, clear		D, S	Sufficient supply; but not used now.
37	NE.	24	"	"	"	Dug	12	2,650	- 4	2,646	4	2,646	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
38	SE.	28	"	"	"	Dug	14	2,550	- 12	2,538	12	2,538	Glacial sand	Soft, clear		D, S	Sufficient for local needs.
39	SW.	28	"	"	"	Dug	16	2,550	- 13	2,537	13	2,537	Glacial sand	Hard, clear		D, S	Intermittent supply.
40	NE.	28	"	"	"	Dug	14	2,550	- 12	2,538	12	2,538	Glacial sand	Soft, clear	43	D, S	Insufficient for local needs.
41	NE.	32	"	"	"	Dug	13	2,570	- 9	2,561	9	2,561	Glacial sand	Soft, clear	48	D, S	Sufficient for local needs.
42	NE.	33	"	"	"	Spring		2,550	0	2,550	0	2,550	Glacial sand	Soft, clear		S	Sufficient for local needs.
43	SW.	36	"	"	"	Dug	19	2,590	- 15	2,575	15	2,575	Glacial gravel	Soft, clear	42	D, S	Sufficient for local needs.
44	NE.	36	"	"	"	Dug	15	2,550	- 9	2,541	9	2,541	Glacial sand	Hard, clear	50	D, S	Sufficient supply; also another similar well.
1	SE.	3	12	26	3	Bored	55	2,585	- 35	2,550	40	2,545	Glacial sand and gravel	Hard, clear	45	D, S	Insufficient supply; also many dry holes 12 to 35 feet deep.
2	SE.	4	"	"	"	Bored	100	2,550	- 40	2,510	100	2,450	Glacial sand	Hard, clear, "alkaline"	45	S	Sufficient supply; haul water for domestic needs.
3	SW.	4	"	"	"	Bored	48	2,500	- 36	2,464			Glacial drift	Hard, yellow, "alkaline," iron	46	S	Insufficient supply; another well 78 feet deep not used; also 26 dry holes 12 to 24 feet deep.
4	NW.	4	"	"	"	Dug	12	2,505	- 10	2,495	10	2,495	Glacial sand	Soft, clear	46	D, S	Sufficient for local needs.
5	NE.	6	"	"	"	Dug	30	2,510	- 24	2,486	24	2,486	Glacial gravel	Hard, clear, "alkaline"	46	D, S	Insufficient supply; also a 40-foot dry hole.
6	NW.	6	"	"	"	Dug	20	2,520	- 18	2,502	18	2,502	Glacial sand	Hard, clear, "alkaline," iron	48	D, S	Intermittent supply.
7	SE.	9	"	"	"	Dug	11	2,483	- 8	2,475	8	2,475	Glacial gravel	Hard, clear	46	D, S, I	Sufficient supply; another similar well 9 feet deep.
8	SE.	10	"	"	"	Dug	25	2,590	- 12	2,578	12	2,578	Glacial sand	Hard, clear, "alkaline"	46	D, S	Insufficient for local needs.
9	NE.	10	"	"	"	Dug	14	2,580	- 11	2,569	11	2,569	Glacial sand	Hard, clear, "alkaline"	48	S	Insufficient for local needs.
10	NW.	11	"	"	"	Dug	14	2,585	- 12	2,573	12	2,573	Glacial sand	Hard, clear, "alkaline"	46	D, S	Sufficient for local needs.
11	NW.	11	"	"	"	Spring	2	2,580	0	2,580	0	2,580	Glacial sand	Soft, clear	50	S	Sufficient for local needs.
12	SE.	12	"	"	"	Dug	7	2,590	- 3	2,587	3	2,587	Glacial sand	Hard, clear, iron	48	S	Sufficient for local needs.

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

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

WELL RECORDS—Rural Municipality of MAPLE CREEK NO.11, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
13	SW.	12	12	26	3	Dug	14	2,595	- 11	2,584	11	2,584	Glacial sand	Hard, clear, iron	48	D, S	Insufficient supply; also another well 12 feet deep.
14	NE.	12	"	"	"	Dug	15	2,590	- 12	2,578			Glacial drift	Hard, "alkaline"	48	S	Insufficient supply; also 3 dry holes.
15	NE.	12	"	"	"	Dug	14	2,580	- 11	2,569	11	2,569	Glacial sand	Hard, clear, iron	48	D, S	Constant water level.
16	NE.	13	"	"	"	Dug	13	2,595	- 12	2,583	12	2,583	Glacial sandy clay	Hard, clear, "alkaline"	50	N	Intermittent supply.
17	SE.	15	"	"	"	Dug	11	2,550					Glacial sand	Hard, clear, "alkaline"	47	D, S	
18	SE.	16	"	"	"	Dug	12	2,480	- 11	2,469			Glacial drift	Hard, clear, "alkaline"	48	D, S	Intermittent supply.
19	NE.	16	"	"	"	Dug	12	2,500	- 6	2,494	6	2,494	Glacial gravel	Soft, clear	46	D, S	Sufficient for local needs.
20	SE.	17	"	"	"	Dug	6	2,495	- 1	2,494	1	2,494	Glacial sand	Soft, clear	46	S	Sufficient for local needs.
21	NE.	18	"	"	"	Dug	16	2,460	- 3	2,457	12	2,448	Glacial sand	Hard, clear, iron	47	S	Insufficient supply; also another well 22 feet deep.
22	NW.	18	"	"	"	Dug	12	2,486	- 6	2,480	6	2,480	Glacial sand and gravel	Hard, clear, "alkaline", iron	48	D, S	Sufficient for local needs.
23	SE.	21	"	"	"	Dug	11	2,490	- 7	2,483	7	2,483	Glacial sand	Hard, clear, "alkaline"	45	D, S	Sufficient for local needs.
24	SE.	22	"	"	"	Dug	11	2,500	- 9	2,491	9	2,491	Glacial gravel	Hard, clear	46	D, S	Sufficient for local needs.
25	SW.	22	"	"	"	Dug	15	2,500	- 11	2,489	11	2,489	Glacial sand	Hard, clear	49	S	Sufficient for local needs.
26	SW.	22	"	"	"	Dug	15	2,500	- 9	2,491			Glacial drift	Hard, clear, "alkaline"	45	D	Intermittent supply.
27	SW.	23	"	"	"	Dug	18	2,500	- 11	2,489	17	2,483	Glacial sand	Hard, clear	45	D, S	Sufficient supply; also a 14-foot dry hole.
28	SE.	25	"	"	"	Dug	12	2,500	- 4	2,496			Glacial gravel	Hard, clear	48	D	Sufficient for local needs.
29	SE.	25	"	"	"	Dug	6	2,500	0	2,500	0	2,500	Glacial sand	Soft, clear	48	D, S	Sufficient supply; also 2 springs on farm.
30	SW.	26	"	"	"	Dug	18	2,500	- 14	2,486			Glacial drift	Hard, clear	47	D, S	Insufficient supply; also another similar well.
31	SE.	26	"	"	"	Spring		2,500	0	2,500	0	2,500	Glacial drift	Hard		S	Sufficient for local needs.
32	NW.	26	"	"	"	Dug	25	2,500	- 21	2,479			Glacial drift	Hard, clear	48	D, S	Sufficient for local needs.
33	NW.	27	"	"	"	Dug	12	2,405	- 7	2,398	7	2,398	Glacial sand	Hard, clear, "alkaline"	47	S	Sufficient for local needs.
34	NE.	28	"	"	"	Dug	18	2,400	- 14	2,386			Glacial sand	Hard, clear, "alkaline"	47	D, S	Intermittent supply; also another similar well.
35	SW.	31	"	"	"	Dug	18	2,490	- 15	2,475	15	2,475	Glacial sand	Soft, iron	50	D, S	Sufficient supply; also two springs.
36	SW.	34	"	"	"	Dug	14	2,404	- 8	2,396	10	2,394	Glacial coarse sand	Hard, clear	45	D, S	Intermittent supply.
37	NE.	35	"	"	"	Dug	12	2,490	- 9	2,481	9	2,481	Glacial sand	Soft, clear	45	D, S	Sufficient for local needs.
38	NW.	36	"	"	"	Dug	14	2,490	- 10	2,480	10	2,480	Glacial gravel	Hard, clear, "alkaline"	47	D, S	Sufficient for local needs.

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

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

WELL RECORDS—Rural Municipality of MAPLE CREEK NO. 111, 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.	3	12	27	3	Dug	12	2,540	0	2,540			Glacial drift	Hard, clear, "alkaline"	48	S	Intermittent supply; also 8 dry holes to a depth of 10 feet.
2	SE.	3	"	"	"	Dug	8	2,535	- 5	2,530			Glacial drift	Soft, clear	48	D	Sufficient for local needs.
3	SW.	3	"	"	"	Dug	34	2,540	- 18	2,522			Glacial drift	Hard, clear, "alkaline"	48	S	Sufficient for local needs.
4	SW.	3	"	"	"	Dug	14	2,537	- 8	2,529	10	2,527	Glacial sand	Hard, clear	48	D, S	Intermittent supply; also another similar well.
5	NE.	3	"	"	"	Dug	15	2,540	0	2,540			Glacial drift	Hard, clear, "alkaline", bitter	48	S	Intermittent supply.
6	SE.	4	"	"	"	Dug	16	2,550	- 11	2,539			Glacial drift	Hard, clear, "alkaline"	48	D, S	Intermittent supply; also a 26-foot dry hole.
7	NW.	4	"	"	"	Dug	20	2,540	- 16	2,524			Glacial drift	Hard, clear, "alkaline"	48	D	Sufficient for local needs.
8	SE.	5	"	"	"	Dug	3	2,540					Glacial drift	Hare, clear, "alkaline"	52	S	Insufficient for local needs.
9	NW.	7	"	"	"	Dug	16	2,540					Glacial sand and gravel	Soft, clear	49	D, S	Well is now not used.
10	NW.	8	"	"	"	Dug	21	2,550	- 20	2,530			Glacial sand	Hard, clear	48	D	Sufficient supply; also another similar well.
11	NW.	8	"	"	"	Dug	12	2,545	- 6	2,539	6	2,539	Glacial sand and gravel	Hard, clear	48	S	
12	SW.	9	"	"	"	Dug	16	2,550					Glacial drift	Hard, clear, "alkaline"	48	D	Intermittent supply.
13	SW.	9	"	"	"	Dug	10	2,545	- 6	2,539			Glacial drift	Hard, clear, "alkaline"	48	S	Sufficient for local needs.
14	NE.	10	"	"	"	Dug	14	2,550	- 10	2,540	12	2,538	Glacial sand	Soft, clear	48	D, S	Sufficient for local needs.
15	NW.	10	"	"	"	Dug	13	2,495	- 10	2,485	10	2,485	Glacial sand	Hard, clear	52	D, S	Sufficient for local needs.
16	NE.	13	"	"	"	Dug	20	2,500	- 17	2,483	17	2,483	Glacial sand	Hard, clear	46	D, S	Sufficient for local needs.
17	SE.	15	"	"	"	Dug	14	2,490	0	2,490	7	2,483	Glacial sand and gravel	Hard, clear	49	D, S	Sufficient for local needs.
18	NE.	16	"	"	"	Dug	18	2,530	- 16	2,514	16	2,514	Glacial sand and gravel	Hard, clear	48	D, S	Sufficient for local needs.
19	NW.	17	"	"	"	Dug	16	2,543					Glacial sand and gravel	Hard, clear	48	D, S	Sufficient for local needs.
20	NE.	18	"	"	"	Dug	4	2,540	0	2,540	2	2,538	Glacial gravel	Soft, clear	58	D, S	Sufficient for local needs.
21	SW.	19	"	"	"	Spring		2,520	0	2,520	0	2,520	Glacial coarse gravel	Soft, clear	46	S	Sufficient for 2,800 head sheep and 120 head stock.
22	NW.	20	"	"	"	Dug	10	2,550					Glacial drift	Hard, clear	48	N	Well is not used.
23	SW.	23	"	"	"	Dug	12	2,500					Glacial coarse gravel	Hard, clear	50	D, S	Sufficient supply; also several dry holes to a depth of 12 feet.
24	NW.	23	"	"	"	Dug	9	2,500	- 7	2,493	7	2,493	Glacial sand	Hard, clear	51	D, S	Sufficient for local needs.
25	SE.	24	"	"	"	Dug	9	2,450	- 6	2,444	8	2,442	Glacial gravel	Hard, clear, iron	53	D, S	Sufficient supply; also another well with mineralized water.
26	NE.	24	"	"	"	Dug	22	2,450					Glacial drift	Hard, iron, yellow	48	N	Well is not used.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of MAPLE CREEK NO. 111, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
27	SE.	25	12	27	3	Dug	12	2,460	- 8	2,452	8	2,452	Glacial sand	Hard, clear	48	D, S	Sufficient for local needs.
28	NE.	25	"	"	"	Dug	24	2,500	- 20	2,480	20	2,480	Glacial sand	Hard, clear	48	D, S, I	Sufficient for local needs.
29	SE.	27	"	"	"	Dug	8	2,500					Glacial sand	Hard, clear	50	D, S	Sufficient for local needs.
30	SW.	27	"	"	"	Dug	11	2,500									Dry hole in glacial sand.
31	NE.	28	"	"	"	Dug	10	2,500									Dry hole in glacial sand.
32	SE.	30	"	"	"	Dug	4	2,480	- 2	2,478	2	2,478	Glacial gravel	Soft, clear	48	D	Sufficient for local needs.
33	SE.	31	"	"	"	Dug	15	2,485	- 8	2,477	10	2,475	Glacial sand	Hard, clear, "alkaline"	47	S	Sufficient for local needs.
34	SE.	31	"	"	"	Dug	50	2,500	- 45	2,455	45	2,455	Glacial sand	Hard, clear, "alkaline", iron	48	D, S	Insufficient for local needs.
35	SW.	32	"	"	"	Dug	14	2,490	- 8	2,482			Glacial drift	Hard, clear, "alkaline"	48	D, S	Sufficient for local needs.
36	SW.	32	"	"	"	Dug	10	2,500	- 5	2,495			Glacial drift	Hard, clear	48	D	Sufficient for local needs.
37	SE.	33	"	"	"	Dug	20	2,492	- 13	2,479	13	2,479	Glacial sand	Hard, clear	52	D, S	Sufficient for local needs.
38	NW.	34	"	"	"	Dug	9	2,485					Glacial sand	Soft, clear		D, S	Sufficient for local needs.
39	NE.	34	"	"	"	Dug	10	2,460					Glacial sand	Hard, clear, iron		S	Sufficient for local needs.
40	SE.	35	"	"	"	Dug	8	2,487	0	2,487	0	2,487	Glacial sand	Soft, clear, iron	52	S	Sufficient for local needs; haul water for domestic needs.
41	SE.	35	"	"	"	Dug	9	2,500	- 5	2,495	5	2,495	Glacial sand	Hard, clear, "alkaline"	54	D	Intermittent supply.
42	SE.	36	"	"	"	Dug	8	2,450	- 4	2,446	4	2,446	Glacial sand	Hard, clear, "alkaline"	54	S	Intermittent supply.

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

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