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DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

BUREAU OF GEOLOGY AND TOPOGRAPHY

GEOLOGICAL SURVEY

WATER SUPPLY PAPER No. 268

GROUND-WATER RESOURCES OF TOWNSHIPS 39 to 42, RANGES 1 to 4, WEST OF 4th MERIDIAN, ALBERTA

Records collected and compiled

by

G. S. Hume and C. O. Hage

OTTAWA

1947

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2. Map showing topography and the location and types of wells.

GROUND-WATER RESOURCES OF TOWNSHIPS 35 TO 38, RANGES 1 TO 4, WEST 4TH MERIDIAN, ALBERTA

INTRODUCTION

Information on the ground-water resources of east-central Alberta and western Saskatchewan was collected, mostly in 1935, during the progress of geological investigations for oil and gas. The region studied extends from Edmonton in the west to Battleford in the east, and from township 32 on the south to township 59 in central Alberta, township 63 in eastern Alberta, and in part as far north as township 56 in western Saskatchewan.

This region is crossed by North Saskatchewan and Battle Rivers, and includes other more or less permanent streams. Most of the lakes within the area, however, are alkaline, and water is obtained in wells from two sources, namely, from water-bearing sands in surface or glacial deposits, and from sands in the underlying bedrock.

A division has been made in the well records, in so far as possible, between glacial and bedrock water-bearing sands. In investigations for oil and gas, however, the bedrock wells were used to trace the lateral extent of geological formations, with the result that the records deal more particularly with this type of well. No detailed studies were made of the glacial materials in relation to the water supply, nor were the glacial deposits mapped adequately for this purpose. In almost all of the region investigated in Alberta, and in all but the northeast part of the region studied in Saskatchewan, water can be obtained from bedrock. In a few places, however, the water from the shallower bedrock sands is unsatisfactory, and deeper drilling may be necessary.

The water records were obtained mostly from the well owners, some of whom had acquired the land after the water supply had been found, and hence had no personal knowledge of the water-bearing beds that had been encountered in their wells. Also, the elevations of the wells were taken by aneroid barometer and are, consequently, only approximate. In spite of these defects, however, it is hoped that the publication of these water records may prove of value to farmers, town authorities, and drillers in their efforts to obtain water supplies adequate for their needs.

In collecting this information several parties were employed. These were under the direction of Professors R. L. Rutherford and P. S. Warren of the University of Alberta, C. H. Crickmay of Vancouver, and C. C. Hage, until recently a member of the Geological Survey. The oil and gas investigations of which these water records are a part were undertaken under the general supervision of G. S. Hume.

Publication of Results

The essential information pertaining to ground-water conditions is being issued in reports that in Saskatchewan cover each municipality, and in Alberta cover each square block of sixteen townships beginning at the 4th meridian and lying between

the correction lines. The secretary treasurer of each municipality in Saskatchewan and Alberta will be supplied with the information covering that municipality. Copies of the reports will also be available for study at offices of the Provincial and Federal Government Departments. Further assistance in the interpretation of the reports may be obtained by applying to the Chief Geologist, Geological Survey, Ottawa. Technical terms used in the reports are defined in the glossary.

How to Use the Report

Anyone desiring information concerning ground water in any particular locality will find the available data listed in the well records. These should be consulted to see if a supply of water is likely to be found in shallow wells sunk in the glacial drift, or whether a better supply may be obtained at greater depth in the underlying bedrock formations. The wells in glacial drift commonly show no regional level, as the sands or gravels in which the water occurs are irregularly distributed and of limited extent. As the surface of the ground is uneven, the best means of comparing water wells is by the elevations of their water-bearing beds. For any particular well this elevation is obtained by subtracting the figure for the depth of the well to the water-bearing bed from that for the surface elevation at the well. For convenience, both the elevation of the wells and the elevation of the water-bearing bed or beds in each well are given in the well record tables. Where water is obtained from bedrock, the name of the formation in which the water-bearing sand occurs is also listed in these tables, and this information should be used in conjunction with that provided on bedrock formations, pages 4 to 11, which describes these formations and gives their thickness and sequence. Where the level of the water-bearing sand is known, its depth at any point can easily be calculated by subtracting its elevation, as given in the well record tables, from the elevation of the surface at that point.

With each report is a map consisting of two figures. Figure 1 shows the bedrock formations that will be encountered beneath the unconsolidated surface deposits. Figure 2 shows the position of all wells for which records are available, the class of well at each location, and the contour lines or lines of equal surface elevation. The elevation at any location can thus be roughly judged from the nearest contour line, and the records of the wells show at what levels water is likely to be encountered. The depth of the well can then be calculated, and some information on the character and quantity of water can be obtained from a study of the records of surrounding wells.

GLOSSARY OF TERMS USED

Alkaline. The term "alkaline" has been applied rather loosely to some ground waters that have a peculiar and disagreeable taste. In the Prairie Provinces, water that is commonly described as alkaline usually contains a large amount of sodium sulphate and magnesium sulphate, the principal constituents of Glauber's salts and Epsom salts respectively. Most of the so-called alkaline waters are more correctly termed sulphate waters, many of which may be used for stock without ill effect. Water that tastes strongly of common salt is described as salty.

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 porous bed, lens, or pocket in unconsolidated deposits or in bedrock that carries water.

Buried pre-Glacial Stream Channels. A channel carved into 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 first encountered.

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 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.

(2) Wells in which the water is under pressure but does not rise to the surface.

(3) Wells in which the water does not rise above the water-table.

BEDROCK FORMATIONS IN EAST-CENTRAL ALBERTA

The formations that outcrop in east-central Alberta are mainly of Upper Cretaceous age, but Tertiary beds occur to the southwest in the Red Deer area. These higher strata are sandstones and shales with thin coaly and carbonaceous beds. Commercial coal beds occur in the Upper Cretaceous Edmonton formation, but other thin coal seams are present, particularly in the Ribstone Creek formation and in the Pale and Variegated Beds. Carbonaceous beds also occur in the Bearpaw formation and are widely scattered through other formations. The Edmonton formation contains some harder sandstones, but almost the whole Upper Cretaceous succession consists of softer sands and sandstones alternating with shales in which ironstone nodules are commonly present. The succession, character, and estimated thickness of the formations are shown in the following table:

Age	Formation	Character	Thickness
			Feet
Tertiary	Paskapoo	Sandstones and shales with thin coal seams and carbonaceous beds; basal sandstones, massive and crossbedded; some siliceous limestone 150 to 200 feet above the base of the formation.	A few hundred feet thick in Red Deer area. The thickness increases to the south and west.

	Edmonton	Grey to white bentonitic sandstones with grey and greenish shales; coal seams prominent in some areas as at Castor, Alberta.	1,000 to 1,150
	Bearpaw	Dark shales, green sands with smooth black chert pebbles; partly non-marine, with white bentonitic sands, carbonaceous shales, or thin coal seams similar to Pale Beds; shales at certain horizons contain lobster claw nodules and marine fossils; at other horizons are abundant selenite crystals.	300 to 600; Thins rapidly to the northwest.
Upper Cretaceous	Pale and Variegated Beds	Light grey sands with bentonite; soft, dark grey and light grey shales with selenite and ironstone; carbonaceous shales and coal seams; abundant selenite crystals in certain layers.	950 to 1,000 in Czar-Tit Hills area; may be thinner elsewhere.
	Birch Lake	Grey sand and sandstone in upper part; middle part of shales and sandy shales, thinly laminated; lower part with grey and yellow weathering sands; oyster bed commonly at base.	100 in west, but less to east and south
	Grizzly Bear	Mostly dark grey shale with a few minor sand horizons; marine origin, with selenite crystals and nodules up to 6 or 8 inches in diameter	Maximum, 100
	Ribstone Creek	Grey sands and sandstones at the top and bottom, with intermediate sands and shales; thin coal seams in the vicinity of Wainwright; mostly non-marine, but intermediate shale in some areas is marine.	Maximum, 325 at Viking; thins eastward.
	Lea Park	Dark grey shales and sandy shales with nodules of ironstone; a sand 70 feet thick 110 feet below the top of the formation in the Ribstone area.	950 to 1,100

Paskapoo Formation

The Paskapoo formation was first named by Tyrrell from exposures of the lower part of the formation occurring along Blindman

River near its confluence with the Red Deer. It is composed essentially of sandstones and shales of freshwater deposition, and includes some thin coal seams and carbonaceous beds. The basal beds are massive, crossbedded sandstones that weather buff-yellow, and are in striking contrast to the underlying, light-coloured, bentonitic clays of the Edmonton formation. About 150 to 200 feet above the base of the formation are beds of siliceous limestones containing gastropods and pelecypods, but these beds are lenticular rather than continuous, although a zone of them appears widely distributed at about the same stratigraphic level.

Edmonton Formation

The name Edmonton formation was first applied to the beds containing coal in the Edmonton area, and later to the same beds in adjoining areas. The formation has a total thickness of 1,000 to 1,150 feet, but is bevelled off eastwards, and the east edge of the formation follows a northwest line from Coronation through Tofield to a point on North Saskatchewan River about midway between Edmonton and Fort Saskatchewan. No Edmonton beds occur northeast of this line, but the formation becomes progressively thicker to the southwest due to the fact that the beds dip in that direction and are bevelled across at the surface.

The Edmonton formation consists of poorly bedded grey and greenish clay shales, coal seams, and sands and sandstones that contain clay and a white material known as bentonite. This material when wet is very sticky and swells greatly in volume, and when dry tends to whiten the beds containing it. Such beds are relatively impervious to water, and at the surface produce the "burns" of barren ground, where vegetation is scanty or absent.

Water is relatively abundant in the Edmonton formation, which contains much sand, commonly in the form of isolated lenses distributed irregularly through the formation. Water occurs in these sands, and, hence, there is little uniformity in the depth of wells even within a small area. Water also occurs commonly with coal seams, and, unlike the sand lenses, these beds are much more regular and persistent. In contrast with the water from the bentonitic sands, which is generally "soft", water from the coal seams, as the water from the shallow surface deposits, may be "hard". The basal beds of the Edmonton formation usually contain fresh water, but this may become brackish locally, where the underlying Bearpaw beds contain highly alkaline or salty water.

Bearpaw Formation

In southern Alberta, where the Bearpaw formation is thickest, the beds composing it are mainly shales that have been deposited in sea water. In the area north of township 32 the formation thins to the northwest and becomes a shoreline deposit composed of shales containing bentonite, impure sands, and thin

coal seams. In some areas, as at Ryley and near Monitor, Alberta, and in the Neutral Hills, the Bearpaw contains pebble beds. At Ryley these are consolidated into a conglomerate, but mostly the pebbles are loosely distributed in shale or sandy beds.

In the area immediately north of township 32 the Bearpaw occupies a widespread belt beneath the glacial drift, but farther northwest the belt narrows, and at Ryley and northwestward it is only a few miles wide. This belt crosses North Saskatchewan River about midway between Edmonton and Fort Saskatchewan. Bearpaw beds form the main bedrock deposits of the Neutral Hills. Farther south, where they have an exposed thickness of at least 400 feet, they contain green sands, and beds of marine shale interfinger with the bentonitic shales and sands of the underlying formation. To the north, on the banks of North Saskatchewan River, the division between the Bearpaw and the overlying and underlying formations is indefinite, and the thickness of beds of Bearpaw age is relatively small.

The water in the Ryley area is from the Bearpaw formation, and is salty. In other areas to the south the marine Bearpaw formation carries green sand beds that yield fresh water, but commonly a much better supply is found by drilling through the Bearpaw into the underlying Pale Beds.

In Saskatchewan, Bearpaw beds occur southeast of Macklin and south of Luseland and Kerrobert. Only the basal beds are present, and these contain green sands that are commonly water-bearing.

Pale and Variegated Beds

Underlying the Bearpaw formation is a succession of bentonitic sands, shales, and sandy shales containing a few coal seams. The upper part of this succession, due to the bentonitic content, is commonly light coloured and has been described as the Pale Beds, whereas the lower part is darker, and is known as Variegated Beds. In part, dark shales are present in both Pale and Variegated Beds; others are greenish, grey, brown, and dark chocolate carbonaceous types. The sands may also be yellow, but where bentonite is present it imparts a light colour to the beds. Both Pale and Variegated Beds are characterized by the presence of thin seams of ironstone, commonly dark reddish, but in part purplish. Selenite (gypsum) crystals are, in places, abundant in the shales.

The best sections of Pale Beds exposed in the region are in the Tit Hills, southwest of Czar. These hills carry a thin capping of Bearpaw shales, beneath which, and around Bruce Lake, more than 200 feet of Pale Beds are exposed. The total thickness of Pale and Variegated Beds in the Tit Hills area is about 970 feet. Variegated Beds outcrop near Hawkins on the Canadian National Railway west of Wainwright, but no area exposes the complete succession, which is considered to comprise about 200 feet of beds.

Records of wells drilled into the Pale and Variegated Beds do not, in general, indicate lateral persistence of sands for long distances, nor any uniform average depth to water-bearing sands in a local area. This points to the conclusion that the

sands are mainly lenticular, but as such lenses are numerous few wells fail to obtain water. In the Cadogan area many flowing wells have been obtained from sands about midway in the succession. In western Saskatchewan, Pale and Variegated Beds occur over a wide area from Macklin and Kerrobert northeast through Wilkie to the Eagle Hills, south of Battleford. Numerous outcrops occur in the area south of Unity at Muddy Lake, but south and east around Biggar these beds are almost wholly concealed by glacial drift.

The water from the sands of the Pale and Variegated Beds is generally soft. The supply, apparently, is dependent in part on the size of the sand body that contains the water and in part on the ease with which water may be replenished in the sand. Small sand lenses surrounded by shales may be filled with water that has infiltrated into them, but when tapped by a well the supply may be very slowly replenished. In many instances such wells yield only a small supply, although this is commonly persistent and regular.

Birch Lake Formation

The Birch Lake formation underlies the Variegated Beds, but in many areas the division is not sharp. The type area of the formation is along the north shore of Birch Lake south of Innisfree, where a section 65 feet thick, composed mostly of sand, is exposed. The total thickness of the formation in this area is about 100 feet, and although this is dominantly sand a central part is composed of alternating thin sand and shale beds. At the base of the formation, in a number of places, is an oyster bed, and this is exposed in a road-cut in a section 73 feet thick on the east side of Buffalo Coulée, in sec. 3, tp. 47, rge. 7, W. 4th mer. In both upper and lower parts of the formation the sand is commonly massive and outcrops tend to consolidate into hard, nodular masses from a foot to a few feet in diameter. Apparently these are formed through the deposition of salts from the water that finds an outlet at the outcrops. In fact, in some areas the sand may be traced along the side of a hill by the presence of small springs or nodular masses of sandstone.

The Birch Lake formation occurs under the drift and in outcrops in a large area south of North Saskatchewan River and northeast of a line from Willingdon to Innisfree and Minburn. East of this area the southwest boundary is more irregular, but outcrops are persistent on the banks of Battle River from a few miles north of Hardisty to and beyond the mouth of Grizzly Bear Coulée in tp. 47, rge. 5. It is believed, too, that a large area near Edgerton and Chauvin is underlain by the Birch Lake formation and that it extends southeastward into Saskatchewan around Manitou Lake, and southeast to Vera.

It is thought that the Birch Lake formation thins eastwards from its type section at Birch Lake, and that it loses its identity in western Saskatchewan. Deep wells drilled at Czar, Castor, and elsewhere no longer show the Birch Lake as a clearly recognizable sand formation, so that its southern limit beneath younger formations is unknown. Wherever it occurs as a sand, however, it is water-bearing, although in some areas the sand

is apparently too fine to yield any considerable volume of water. In other areas, however, it persistently yields good wells. There is no apparent uniformity in the character of the water, which is either hard or soft in different wells in the same general area. Direct contact with surface waters that contain calcium sulphate may in time change a "soft" water well to a "hard" water well, and many wells are not sufficiently cased to prevent the percolation of water from surface sands into the well, and hence into the deeper, soft water producing sands. In part this accounts for the change in character of the water in a well, a feature that has been noted by many well owners.

Grizzly Bear Formation

The type locality for the Grizzly Bear formation, which underlies the Birch Lake beds, is near the mouth of Grizzly Bear Coulée, a tributary of Battle River with outlet in tp. 47, rge. 5. The formation is mainly composed of dark shales that were deposited in sea water. At the mouth of Grizzly Bear Coulée two shale sections, each about 100 feet thick, are separated by a zone of thin sand beds. It is now recognized that the upper section is the Grizzly Bear shale, and that the lower one, very similar in character and also deposited in sea water, occurs in the next lower formation, the Ribstone Creek. The Grizzly Bear shale contains a thin nodular zone about 50 feet above the base, that is, at about the centre of the formation. This zone is sandy, and is believed to yield water in various wells. Other thin sands, in places water-bearing, are also present. The impervious nature of the Grizzly Bear shales makes the overlying Birch Lake sand a strong aquifer, as water collects in the sand above the shale. The contact of the Birch Lake and Grizzly Bear formations can be traced in some places by the occurrence of springs issuing from the base of the Birch Lake sand even where this is not exposed.

Grizzly Bear shales occur in a road-cut on the south side of Battle River near the Jasper highway bridge at Fabyan. The shales in this area are about 100 feet thick. It is thought they extend as far west as the Viking gas field, where they have been recognized in samples from deep wells. It is probable, however, that the shales thin westward and thicken eastwards so that their general form is a wedge between both higher and lower sand beds. The position of the thin edge of the wedge to the west is unknown, but evidently the Grizzly Bear marine shale underlies a large area in east-central Alberta, extending into Saskatchewan mainly in the area south of Battle River.

Ribstone Creek Formation

The type area of the Ribstone Creek formation is on Ribstone Creek near its junction with Battle River in tp. 45, rge. 1, W. 4th mer. At this place the lower sand beds of the formation are well exposed. On the north side of Battle River, in the northeast part of sec. 26, tp. 47, rge. 5, near the mouth of Grizzly Bear Coulée, the upper part of the lower sand member of this formation outcrops. Above it, higher on the bank and at a short distance from the river, there is a 12-foot zone of carbonaceous and coaly beds in two layers, each about 2 feet thick, separated by 8 feet of shale. Above this are 90 feet of dark shales that are thought to have been deposited in sea water, that is, they are marine shales.

These marine shales in turn are overlain by a sandy zone about 20 feet thick containing oysters in the basal part. This sandy zone is the upper sand member of the Ribstone Creek formation. It thickens to the east and west from the Grizzly Bear area, but is probably at no place much more than 50 feet thick.

The lower sand member of the Ribstone Creek formation also varies in thickness from a minimum of about 25 feet. On the banks of Vermilion Creek, north of Mannville, the basal sand is at least 60, and may be 75, feet thick. It is overlain by shaly sand and sandy shale beds, which replace the shale beds in the central part of the formation as exposed at the mouth of Grizzly Bear Coulée. In the Wainwright area, where the formation has been drilled in deep wells, the basal sand is 60 feet thick, with the central part composed of shale containing sand streaks. The upper sand member is about 20 feet thick in this area. The total thickness of the formation in the Wainwright area is 180 to 200 feet, but this increases to the west and in the Viking area exceeds 300 feet.

The Ribstone Creek formation is widely exposed in a northwest-trending belt in east-central Alberta. The southern boundary on the Alberta-Saskatchewan meridian is in the south part of township 44, south of Battle River, whereas the northern boundary is in township 51, a few miles north of Lloydminster. The southwest boundary of this northwest-trending belt passes through the mouth of Grizzly Bear Coulée in tp. 47, rge. 5, and beyond to the Tit Hills area in tp. 54, rge. 12, whereas the northeast boundary crosses North Saskatchewan River southwest of Elk Point and extends northwest to include an area only slightly north of St. Paul des Metis and Vilna to tp. 60, rge. 14. Within this belt water wells are common in the Ribstone Creek sands, which are almost without exception water-bearing in some part of the formation. The limits of the belt to the northeast determine the limits of water from this source, but to the southwest of the belt, as here outlined, water may be obtained in this formation by drilling through the younger beds that overlie it. The Ribstone Creek sands are a prolific source of water in many places, and hence the distribution of this formation is of considerable economic importance. Where the formation consists of upper and lower sands with a central shale zone only the sands are water-bearing, although thin sand members may occur in the shale. Where the formation is largely sand the distribution of water may be in any part of the formation, although the upper and lower sands are perhaps the better aquifers. To the east of Alberta along Battle River and Big Coulée in Saskatchewan the Ribstone Creek sands are marine. Marine conditions apparently become more prevalent to the southeast, and it is believed that in this direction the sands are gradually replaced by marine shales. Thus at some distance southeast of Battleford the Ribstone Creek formation loses its identity and its equivalents are shales in a marine succession.

Lea Park Formation

The Lea Park formation is largely a marine shale, and only in the upper 180 feet is there any water. In the Dina area south of Lloydminster the upper beds of the Lea Park consist of silty shales about 110 feet thick underlain by silty sands 70 feet thick. Below these sands are marine shales only, and these yield no fresh water either in east-central Alberta or west-central

Saskatchewan. The sand in the upper Lea Park formation is thus the lowest freshwater aquifer within a very large area. The extent of this sand in the Lea Park, particularly to the northeast, is not known, but as the strata in east-central Alberta have a southwest inclination, progressively lower beds occur at the surface to the northeast. Consequently, at a short distance beyond the northeast boundary of the Ribstone Creek formation, as previously outlined, the sand in the upper Lea Park reaches the surface, and represents the last bedrock aquifer in that direction. Farther northeast water must be obtained from glacial or surface deposits only. In Alberta this area without fresh water in the bedrock includes the country north of North Saskatchewan River in the vicinity of Frog Lake and a large area extending to and beyond Beaver River. In this area, however, more freshwater streams are present than farther south, and bush lands help to retain the surface waters. The area northeast of North Saskatchewan River in Saskatchewan is almost wholly within the Lea Park formation, where water can be found only in surface deposits.

TOWNSHIPS 39 TO 42, RANGES 1 TO 4, WEST FOURTH MERIDIAN, ALBERTA

Physical Features

This area lies mostly north of the Canadian Pacific Railway through Cairns, Cadogan, Provost, and Hayter. It is all hilly country with a relief of a few hundred feet and reaching an elevation of 2,400 feet. Drainage is poor, and there are a number of shallow, alkaline lakes. Most of the area is treeless, but sand hills, particularly in the northeast part, support scrub brush and some trees.

Geology

Except for a couple of small parts in the north the whole area is underlain by Pale and Variegated Beds. These contain numerous sand lenses, which presumably are supplied by downward percolating surface waters, but it is very difficult to account for the flowing wells that occur mostly in tps. 39 and 42, rge. 4, but also elsewhere in the area. Flowing wells are due, presumably, to water that enters the sands and fills them to heights considerably above the surface elevation of the wells. Also, to obtain a distribution of pressure sufficient to cause a well to flow, it would be assumed that the sand bodies must be continuous for considerable distances. This, however, is not believed to be the case, as the water horizons are at various levels and the flowing wells are scattered among other non-flowing wells in their immediate vicinity. Many of the wells have been considered to be in the Pale and Variegated Beds, but it may be that many of these are in the underlying Birch Lake sands, which have a much wider and more uniform distribution. If so, this might account in part for the flowing wells. Deeper wells that are thought to reach Ribstone Creek sands, as on NE. sec. 32, tp. 41, rge. 2, and on SW. sec. 4, tp. 42, rge. 2, also flow and yield some gas with the water. These wells would be expected to be low structurally, but again it is difficult to explain why all wells that reach the Ribstone Creek sands do not flow, as the Ribstone Creek sands are thought to be reasonably continuous and uniform sand beds.

Water Supply

As already indicated, no adequate explanation can yet be given for the occurrence of local flowing wells. The Pale and Variegated Beds contain so many lenticular sands that wells that fail to find water in one are likely to encounter a supply in another at a deeper level. However, many of the sands are probably of quite limited thickness and lateral extent, and, consequently, their yield is low. Mostly the water from them is soft, unless there is contamination by hard surface waters. The deeper sands have provided good flows of water in some wells, and although these sand bodies are known to be continuous over the entire area, yet several wells drilled into them have either failed to find water or have obtained only an inadequate supply. There is no apparent assurance, therefore, that a deep well will find a reasonably good flow of water.

Township 39, Range 1. In this township many wells obtain water from glacial sands, and these lie at various elevations. One sand at elevations of 2,120 and 2,130 feet is encountered in wells 30 to 80 feet deep on sections 15, 17, 18, 30, 32, and 33. This uniformity in elevation suggests that instead of a glacial bed this may be a sand in the Pale Beds. A few wells in glacial materials do not reach this level, as for example the sand between elevations of 2,175 and 2,185 feet encountered in two wells on section 6 and one on each of sections 28 and 35. Many wells 120 to 300 feet deep obtain water in sands of the Variegated Beds. There seems to be considerable variation in the altitude of the various deep water sands encountered, as for example between 2,014 and 2,084 feet, with a lower bed at 1,955 to 1,965 feet that may be in the Birch Lake formation. Thus, although the horizons within the bedrock do not seem to hold a very definite level there are sufficient sands to insure a good supply of water.

Township 39, Range 2. A few wells in this township obtain water from glacial drift. Gravel is reported from a well 103 feet deep on SE. section 8 at the west end of Fleeinghorse Lake, possibly in a drainage channel filled by glacial materials. The glacial wells show no regularity of level whatever in the elevations of the water-bearing beds. Outcrops of Pale Beds are known from the southeast end of Fleeinghorse Lake and are encountered in many wells. Undoubtedly the Pale and Variegated Beds are saturated with water so that wherever a well encounters a sand bed of sufficient porosity a well is assured. Individual sands in the Pale and Variegated Beds do not extend far, but they are fairly plentiful. The result is that water is obtained from sands varying greatly in elevation but occurring locally in roughly defined zones. One of these zones has been encountered in several wells between elevations of 2,050 and 2,090 feet. Another, somewhat deeper zone at about 2,030 feet is perhaps inseparable from a still lower one between 2,000 and 2,015 feet. Still another was encountered in wells on NE. section 16 at a depth of 260 feet, and on SW. section 21 at a depth of 265 feet and an elevation of 1,950 feet, and the lowest one in a well in Provost 300 feet deep at an elevation of 1,886 feet. It is thought that the sand at 1,950 feet elevation is in the Birch Lake formation, whereas the lowest water-bearing bed, at 1,886 feet, may be still lower stratigraphically. Thus it appears that all wells drilled into bedrock find water, although, as in this last well, the depth is very considerable.

Township 39, Range 3. Many wells in this township obtain water from sand and gravel beds in the glacial drift and, for the most part, at elevations between 2,120 and 2,160 feet. The greatest known thickness of drift is 53 feet, as indicated by a well in gravel on NW. section 28. Below the drift many wells from 90 to 400 feet deep obtain water in the underlying formations. In general the same water-bearing sand zones are present here as in the township to the east, and although the evidence from individual wells is inconclusive the information suggests a slight dip to the west. Several of these deeper wells get their water in a zone ranging in elevation from 2,040 to 2,090 feet. A second zone, represented at 2,030 feet in tp. 39, rge. 2, is here tapped by only one well 150 feet deep on SW. section 30 at an elevation of 2,027 feet. The zone, which to the east occurs at an elevation of 2,000 to 2,015 feet, here apparently lies between 1,990 and 2,010 feet. One well, 400 feet deep on SW. section 26, reaches a deep sand, possibly in the Birch Lake formation, at an elevation of 1,898 feet.

Township 39, Range 4. Several wells in this township flow. The water from all of these is probably derived from the same sand zone, and such differences as occur in the records are probably due to inaccurate information regarding the surface elevations and the precise depth at which the water-bearing bed was encountered. The elevations of the sands, as given in the records, show a variation from 2,016 to 2,071 feet, with the water known to rise 12 feet above the surface, or to an elevation of 2,183 feet, in a well 100 feet deep on SW. section 12. This is not as high as in the township to the south. In a well on NE. section 4 a well 260 feet deep obtains water at an elevation of 2,006 feet, and another, 325 feet deep on NW. section 31, at an elevation of 2,003 feet. This sand is also present in the township to the south. Several wells pass through the sand that yields water in the flowing wells without obtaining a supply. One, in SW. section 4, at a depth of 360 feet, reaches a water-bearing bed at an elevation of 1,904 feet. Thus the Pale Beds yield water at various levels in this township. Some water also is obtained from glacial sands and gravels. The maximum thickness of the drift is not known, but one well on NW. section 25 is reported to have encountered a gravel bed at a depth of 104 feet.

Township 40, Range 1. A few shallow wells obtain water in glacial drift in this area, but most of the wells are more than 100 feet deep and obtain their water from the Variegated Beds or lower formations. The surface elevation of this township is greatly different from that of tp. 39, rge. 1, but whereas many of the wells in that township obtain water from sands between elevations of 2,020 and 2,085 feet only a few wells in this township obtain water from a sand at these elevations, and most of the water-bearing beds lie between elevations of 1,930 and 1,990 feet. This suggests that the dip may be northeast, and from the distribution of the wells the amount is calculated at slightly less than 20 feet to the mile. Several sands are apparently present in this township, although not clearly defined. They occur at approximate elevations of 1,905, 1,930, 1,960, 1,985 and 2,025 feet respectively.

Township 40, Range 2. A few shallow wells in this township obtain water from sands in the glacial drift. The others are from 85 to 325 feet deep and tap water-bearing beds in the Variegated Beds that can be roughly separated into groups showing elevations of 1,875, 1,970, 1,995 to 2,005, 2,015 to 2,030, 2,050, and 2,070 to 2,090 feet. The lowest sand was not reached in tp. 40, rge. 1, but the other zones show a similar range of elevations except that they are about 65 feet higher throughout. This again suggests a dip of about 15 feet to the mile to the northeast.

Township 40, Range 3. In this township some shallow wells obtain water from sand and gravel beds in the glacial drift, but many of the wells reach the Pale or Variegated Beds. Pale Beds outcrop in the township, and on NW. section 8 and NE. section 33 the top of the outcrops is at an elevation above 2,250 feet. Several poorly defined sand zones in the bedrock are water-bearing. In a general way these are at elevations of 1,985 to 1,995, 2,005 to 2,010, 2,030 to 2,045, and 2,080 to 2,095 feet. These elevations roughly correspond to those in tp. 40, rge. 2, which leads to the belief that the strata in this area are nearly horizontal.

Township 40, Range 4. In the west part of this township the land is sandy, and for the most part the wells are shallow and obtain their water supply from surface materials. Several deeper wells reach the Pale Beds in the eastern part of the township. In these the water occurs in one or other of two fairly well defined sands. The upper one, at an elevation of 2,070 to 2,085 feet, has been encountered and yields water in wells on sections 14, 16, 25, and 36. The lower one is not quite as definite. It occurs between elevations of 2,015 and 2,035 feet, and is present in wells on sections 1, 2, 12, and 25. It is not known whether the water-yielding bed at an elevation of 2,184 feet in a well 76 feet deep on NE. section 13 is in Pale Beds or in a glacial sand.

Township 41, Range 1. Most of the wells in this township are believed to be in glacial sand or gravel deposits. On SE. section 3 gravel is reported at a depth of 63 feet. Only one well in this area, so far as known, exceeds a depth of 100 feet. This well, 235 feet deep on SE. section 2, encountered a water-bearing sand in the Pale or Variegated Beds at an elevation of 2,045 feet. The well, however, became plugged with sand. Another, much higher sand was encountered in wells on NW. section 12 and SW. section 14 at elevations of 2,195 to 2,210 feet, and is presumably in the Pale Beds. A well on SE. section 4 is reported to have encountered coal at a depth of 15 feet or an elevation of 2,310 feet. No outcrops are known in this township, but it is presumed the coal is in the Pale Beds.

Township 41, Range 2. In this township several shallow wells obtain water in sands in the drift, the water-bearing beds varying in depth to as much as 85 feet. A well 200 feet deep on NE. section 6 and another 205 feet deep on NW. section 12 obtain water in a sand in the Variegated Beds or Birch Lake formation at elevations of 2,015 to 2,020 feet. Four other much deeper wells reach what is thought to be Ribstone Creek sands for their water supply. One of these wells, on SE. section 32, is reported to have encountered water at a depth of 290 feet or an elevation of 1,797 feet. Another, on NE. section 24, is reported to have obtained a good supply of water at 385 feet or an elevation of 1,760 feet. It may be that the elevations of the water-bearing beds as reported are inaccurate and that the two wells are deriving their supply from the same bed. A well on NE. section 34 was drilled to a depth of 487 feet or an elevation of 1,690 feet before obtaining water, whereas a well on NE. section 32 struck an artesian flow at a depth of 385 feet or an elevation of 1,657 feet. This water contains some sulphur, and is accompanied by some gas. It is possible that this is the same sand as that encountered in the wells drilled for oil and gas at Vera, Saskatchewan, at a depth of 234 feet or an elevation of 1,700 feet. If so, it would indicate that the dip of the formation is quite low.

Township 41, Range 3. In this township glacial gravel is reported in a well on SE. section 12 at a depth of 60 feet, and it is believed that the drift continues to a depth of 80 feet. Several wells, 160 to 380 feet deep, reach water-bearing sands in the Pale or Variegated Beds or deeper formations. One water-bearing bed was encountered in several wells at elevations of 2,000 to 2,010 feet; another occurs at an approximate elevation of 1,970 feet; and a still lower one at 1,840 to 1,850 feet. The sand at 1,970 feet may be in the Birch Lake formation, and, if so, the lower horizon may be in the top of the Ribstone Creek formation. Thus, where shallow wells cannot be obtained in the

drift, the underlying formations offer prospects of a supply, though, as is shown in the records, relatively deep wells may be necessary.

Township 41, Range 4. Many wells in this township obtain water from sands in glacial materials, but a few deeper wells reach the underlying bedrock. A sand encountered in wells on SE. section 30 at 330 feet, on SW. section 30 at 270 feet, on NE. section 35 at 160 feet, and in two wells on section 36, occurs at an elevation of 1,950 to 1,980 feet, possibly in the Birch Lake formation. Other wells, on SE. section 14 at 155 feet, on SW. section 24 at 240 feet, and on SE. section 34 at 90 feet, obtain water in a higher sand at elevations of 2,020 to 2,035 feet, possibly in the base of the Variegated Beds. These two sands, therefore, offer prospects for water for the entire township, and should these for any reason fail to be productive at any place a still deeper supply is available in Ribstone Creek sands.

Township 42, Range 1. A considerable part of this township is covered by sand and sandy soil in which water is obtained at shallow depths. In other parts, however, where this source is not available, wells have been drilled to the Ribstone Creek formation, which contains a good supply of soft water. Apparently two sands are present. One has an elevation of 1,843 feet, and is presumably near the top of the formation. The other is about 50 to 60 feet deeper. Undoubtedly water is available in the Ribstone Creek formation beneath the whole township.

Township 42, Range 2. In this, as in tp. 42, rge. 1, a few wells obtain water at very shallow depths from the surface sand and sandy soil. A few deeper wells reach water-bearing sands in the underlying glacial materials, whereas still deeper wells reach the underlying bedrock. In a well on SW. section 29 sand and gravel is reported to a depth of 82 feet; presumably this is about the maximum thickness of drift in this area. Deeper wells obtain water in the Ribstone Creek sands, between elevations of 1,930 and 1,950 feet, at 1,810 feet, and between elevations of 1,755 and 1,795 feet. Most of the water from these sands is soft and where it is hard it is assumed that it has been contaminated by seepage of water into the well from higher glacial or surface sands.

Township 42, Range 3. All wells in this township, so far as known, obtain their supply of water from sand or gravel beds in the glacial drift. The deepest well of which a record is available is 45 feet deep, and none is less than 30 feet deep. The surface of the township has only a slight relief, and no outcrops of bedrock are known, so that the depth to the underlying formations is everywhere uncertain. Presumably, however, the southern part of the township is underlain by Variegated Beds and the northern part by the Birch Lake formation.

Township 42, Range 4. A few wells in this township yield water from glacial sands. Many, however, reach the underlying bedrock, and from it obtain artesian water in many places. The flowing wells are mostly from one sand at an elevation of 2,000 to 2,015 feet, and the water is reported to rise to an elevation of 2,150 feet. In one well, on SW. section 4, the water does not rise to the surface because the elevation there is 2,230 feet,

but water in this well is reported to rise to 2,180 feet. Thus, where the surface elevation is lower than 2,180 feet, water from this sand would be expected to overflow the well. A few other wells in this area are from other sands of limited extent, and in two wells on section 34 the Ribstone Creek formation may have been reached at depths of 379 and 450 feet.

WELL RECORDS—~~Rural Municipality~~ of TOWNSHIPS 39-42, RANGES 1-4 WEST OF 4TH MERIDIAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	S W	4	39	1	4	Drilled	306	2320	-140	2180	306	2014	Pale or variegated beds	Soft		D.S.	Good supply
2	S W	5				"	220	2251	- 80	2171	220	2031	Pale beds sand	"		"	" "
3	S W	6				Dug	40	2214	- 32	2182	40	2174	"	Hard		"	Sufficient
4	N E	6				"	25	2209			25	2184	Sand	"		"	"
5	N W	13				Drilled	300	2266			250	2016		"			
											300	1966	Pale or variegated sand	Soft		"	Good supply
6	N W	15				Bored	40	2169	- 15	2154	40	2129	Glacial clay	Hard		"	Sufficient
7	N W	16				Dug	40	2196	- 38	2158	40	2156	Fine sand	"		"	Poor supply
8	N E	17				"	34	2157	- 27	2130	34	2120	Sand	"		"	Sufficient. Town Well of Hayter.
9	N E	18				"	30	2154			30	2124	"	"		"	Good supply
10	N W	18				"	14	2176	-12	2164	14	2162	Glacial sand	"		"	Poor "
11	S W	21				"	12	2151	- 7	2144	12	2139	" "	"		"	Sufficient
12	S E	22				Drilled	190	2187	-140	2047	190	1997	Pale or variegated sand	Soft		"	Good supply
13	S E	23				"	260	2216	- 90	2126	260	1956	Pale or variegated sand	Hard		"	Sufficient
14	N W	23				Bored	94	2235	- 84	2151	94	2141	Clay	"		"	Poor supply
15	N W	24				Drilled	200	2237	-150	2087	200	2037	Pale or variegated sand	" Alk.		"	Sufficient
16	S E	27				Bored	120	2204			120	2084	Pale or variegated sand	"		"	Good supply
17	S W	28				Dug	28	2212			28	2184	Glacial sand	"		"	Sufficient
18	S E	30				"	14	2140			14	2126	" "	"		"	Limited. Another well the same depth.
19	S W	32				Drilled	235	2252			235	2017	Pale or variegated sand	Soft		"	Good supply
20	S E	32				Bored	78	2216			78	2138	Sand	Hard		"	Sufficient
21	N W	33				"	80	2208	- 78	2130	80	2128	Fine sand	"		"	"
22	N W	34				Drilled	170	2226	-100	2126	170	2056	Pale or variegated sand	"		"	Good supply
23	S W	34				"	160	2205	-100	2105	160	2045	Pale or variegated sand	"		"	" "
24	S E	35				Dug	17	2194	- 8	2186	17	2177	Glacial sand	" Alk.		"	" "
25	N W	36				Drilled	192	2221			192	2029	Gravel ?	"		"	" "
26	S E	36				"	240	2262	-150	2112	240	2022	Pale or variegated sand	"		"	" "
1	N W	3	39	2	4	Drilled	180	2186	- 80	2106	180	2006	Pale or variegated Beds	Soft		D.S.	Good supply
2	S W	4				"	149	2234	- 5	2229	149	2085	Pale or variegated Beds	"		"	" "
3	N W	4				"	180	2209	- 80	2129	180	2029	Pale or variegated Beds	"		"	" "
4	N E	5				"	180	2198	- 80	2118	180	2018	Pale or variegated Beds	"		"	" "
5	N E	7				Bored	50	2183	- 25	2158	50	2133	Sand	Hard		"	Sufficient
6	S E	8				"	103	2181	- 33	2148	103	2078	Coarse gravel	Soft		"	"
7	N W	9				Drilled	125	2185			125	2060	Pale or variegated Beds	"		"	"
8	S E	13				Dug	16	2190	- 13	2177	16	2174	Glacial sand	Hard		"	" . Dry Hole 85 Feet Deep.
9	N E	16				Drilled	260	2214			260	1954	Pale or variegated Beds	Soft		"	Good 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 .....

B 4-4
1000—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
10	S E	17	39	2	4	Bored	32	2186	- 25	2161	32	2154	Sand	Hard		D.S.	Sufficient
11		17				Drilled	173	2200	- 38	2162	173	2027	Pale or variegated Beds	Soft		D.	"
12		17				"	160	2194	- 40	2154	160	2034	Pale or variegated Beds	"		"	Good supply
13		17				"	170	2185			170	2015	Pale or variegated Beds	"		"	" "
14		17				"	175	2186			175	2011	Pale or variegated Beds	"		"	" "
15		17				"	300	2186	- 19	2167	300	1886	Birch Lake	"		"	" "
16	N E	18				"	145	2197	- 70	2127	145	2052	Pale or variegated Beds	"		D.S.	Sufficient
17	S E	19				"	160	2246			160	2086	Pale or variegated Beds	"		"	"
18	S W	20				"	100	2246	- 70	2176	100	2146	Pale or variegated Beds	Hard		"	"
19	S W	20				"	500	2246									Dry Hole. No water struck below 100 Feet.
20	N E	20				"	174	2247	- 60	2187	174	2073	Pale or variegated sand	Soft		"	Good supply
21	S E	20				"	187	2217	- 40	2177	187	2030	Pale or variegated sand	Hard		"	Sufficient
22	N W	21				"	236	2223	- 65	2158	236	1987	Pale or variegated Beds	Soft		"	"
23	S W	21				"	265	2215			265	1950	Pale or variegated Beds	"		"	Good supply
24	S W	22				Bored	50	2219	- 47	2172	50	2169	Glacial clay	Hard Alk.		S.	Poor "
25	N W	22				Dug	30	2252	- 26	2226	30	2222	" gravel	"		D.S.	Sufficient
26	N W	24				Drilled	385	2432									Dry Hole.
27	S W	24				"	360	2359	-280	2079	360	1999	Pale or variegated Beds	Hard		D.S.	Poor supply
28	S E	26				"	86	2368			86	2282	Glacial gravel	"		"	" "
29	S E	27				Dug	40	2290			40	2250	Glacial sand	"		"	Limited supply
30	N W	27				Drilled	150	2242			150	2092	Pale or variegated Beds	Soft		"	Sufficient
31	N E	30				"	280	2251			280	1971	Pale or variegated Beds	"		"	"
32	S E	30				"	180	2246			180	2066	Pale or variegated Beds	"		"	"
33	S W	35				Bored	24	2295	- 16	2279	24	2271	Glacial sand	Hard		"	Good supply
34	N E	36				Drilled	210	2257			210	2047	Pale or variegated sand	" Alk.		"	" "
1	N E	1	39	3	4	Drilled	120	2208	- 90	2118	120	2088	Pale or variegated sand	Soft		D.S.	
2	S W	2				Dug	20	2186			20	2166	Clay	Hard		"	Poor supply
3	S W	4				Bored	68	2196			68	2128	Glacial	Soft		"	Sufficient
4	N W	4				Drilled	60	2192	- 30	2162	30	2162	Glacial	Hard		"	"
5	N W	6				Bored	90	2177	- 20	2157	90	2087	Pale or variegated Beds	Soft		"	Good supply
6	S E	7				Dug	20	2162			20	2142	Glacial	Hard		"	Limited supply
7	S W	9				Bored	60	2187	- 35	2152	60	2127	Glacial clay	"		"	Sufficient
8	N E	10				Drilled	110	2160	Flows	2160+	110	2050	Pale or variegated sand	Soft		"	Flow fills 1 inch pipe the year round.

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

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

WELL RECORDS—~~Rural Municipality~~ of .....

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
9	N E	12	39	3	4	Drilled	180	2171+	Flows	2171	180	1991	Pale or variegated sand	Soft		D.S.	Flow fills ½ inch pipe.
10	S E	14				Bored	50	2197	- 44	2153	50	2147	Glacial clay	Hard		"	Limited supply
11	N E	14				Drilled	160	2203	- 8	2195	160	2043	Pale or variegated sand	Soft Br.		"	Good supply
12	S W	16				Bored	60	2184			60	2124	Glacial	Hard		"	Limited supply
13	S E	18				Dug	42	2179	- 35	2144	42	2137	"	"		"	" "
14	N W	22				Bored	45	2204			45	2159	"	"		"	Sufficient
15	S E	23				Drilled	140	2209	- 25	2184	60	2149	"				
											140	2069	Pale or variegated Beds	Soft		"	Good supply
16	S E	25				"	230	2292	- 85	2207	230	2062	Pale or variegated Beds	Hard		"	" "
17	S W	26				"	400	2298	- 20	2278	400	1898	Birch Lake	Soft		"	" "
18	N W	28				Bored	53	2174	- 40	2134	53	2121	Glacial gravel	"		"	Sufficient
19	S W	30				Drilled	150	2177			150	2027	Pale or variegated sand	Hard		"	Good supply
20	N W	31				Bored	80	2228	- 50	2178	80	2148		"		"	Limited supply
21	S W	31				"	87	2213	- 50	2163	87	2126	Clay	"		"	Limited "
22	N E	32				Dug	25	2150			25	2125	Glacial	"		"	" "
23	S E	34				Drilled	285	2330	-140	2190	285	2045	Pale or variegated sand	Soft		"	Good supply
24	N E	34				"	270	2324	- 40	2284	270	2054	Pale or variegated sand	"		"	" "
25	S W	36				"	275	2285			275	2010	Pale or variegated sand	Hard		"	" "
1		1	39	4	4	Drilled	220	2202	- 16	2186	220	1982	Pale Beds	Soft		D.S.	Good supply. Town Well of Cadogan.
2		1				"	175	2217	- 16	2201	175	2042	" "	"		"	" " . Paulson Hardware
3		1				"	180	2198	- 10	2188	180	2018	" "	"		B.	" " . C.P.R. Well, Cadogan.
4	S W	2				Bored	90	2224	- 55	2169	90	2134	" "	"		D.S.	" "
5	S E	2				Drilled	160	2192	Flows	2192+	160	2032	" "	"		"	Flow Fills ½ inch pipe.
6	N W	2				Bored	60	2190	- 12	2178	80	2130	Sand	Hard		"	Good supply
7	S W	4				Drilled	360	2264	- 60	2204	360	1904	Pale Beds	Soft		"	" "
8	N E	4				"	260	2266	- 48	2218	260	2006	Pale Beds	"		"	" "
9	N E	5				Bored	25	2248	- 20	2228	25	2223	Glacial sand	Hard		"	Sufficient
10	S W	6				Drilled	180	2260	- 70	2190	180	2080	Pale Beds	Soft		D.	" . School Well.
11	S W	6				Dug	15	2280			15	2265	Glacial sand	Hard		D.S.	Good supply
12	N E	6				"	24	2229			24	2205	" "	"		"	Sufficient. Spring on Farm.
13	N E	8				Drilled	325	2300	-160	2140	325	1975	Pale Beds	Soft		N.	Well in village of Cairns.
14	N W	10				"	140	2156	Flows	2156+	140	2016	" "	"		D.S.	Flow Fills ½ Inch Pipe.
15	S E	11				"	130	2177	"	2177+	130	2047	" "	"		"	" " ½ " "
16	S E	12				Bored	96	2161	"	2161+	96	2065	" "	"		"	" " ½ " "
17	S W	12				Drilled	100	2171	+ 12	2183	100	2071	" "	"		"	" " ½ " "
18	N W	13				Bored	55	2183	- 45	2138	55	2128	Glacial sand	Hard		"	Limited supply
19	N W	14				Dug	37	2157			37	2120	Glacial	"		"	" "
20	N E	14				Drilled	240	2184	- 8	2176	240	1944	Pale Beds	Soft		"	Good supply
21	N E	16				Dug	30	2188	- 22	2166	30	2158	Glacial sand	Hard		"	" "
22	N W	18				"	48	2256	- 44	2212	48	2208	" "	"		"	Poor "
23	N W	19				Drilled	257	2320	- 7	2313	257	2063	Pale Beds	Soft		"	Good "
24	N W	20				Dug	21	2188	- 16	2172	21	2167	White sand	Hard		"	Sufficient
25	S W	22				Bored	40	2155			40	2115	Glacial	"		"	Limited 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 .....

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
26	S E	23	39	4	4	Drilled	240	2205	-27	2178	240	1965	Pale Beds	Soft		D.S.	Good supply
27	N W	23				Dug	16	2156	-13	2143	16	2140	Glacial clay	Hard		"	Limited supply
28	N E	24				Drilled	140	2163	-12	2151	140	2023	Pale Beds	Soft		"	Sufficient
29	S E	24				Bored	85	2203	-80	2123	85	2118	Glacial	Hard		"	Limited supply
30	N W	25				"	104	2218	-30	2188	104	2114	" gravel	"		"	Sufficient
31	S E	28				Dug	43	2189	-40	2149	43	2146	Glacial	"		"	Limited supply
32	S W	30				Bored	82	2265	-80	2185	82	2183	Fine sand	"		D.	Sufficient
33	S E	30				Dug	85	2288	-83	2205	85	2203	" "	"		"	Poor supply
34	N W	31				Drilled	325	2258	-20	2238	255	2003	Pale Beds	Soft		D.S.	Good supply
35	S E	34				Bored	50	2213	-10	2203	50	2163	Blue sand	Hard		"	Sufficient
36	S W	36				Dug	18	2174	- 8	2168	18	2156	Glacial sand	"		"	"
37	N E	36				"	56	2208	-50	2158	56	2152	Glacial	"		"	Limited supply
1	S W	2	40	1	4	Dug	15	2230	-11	2219	15	2215	Glacial gravel	Hard		D.S.	Sufficient
2	S E	2				Drilled	180	2234			180	2054	Pale or Variegated Beds	" Alk.		"	Good supply
3	S W	4				Bored	90	2213	-70	2143	90	2123	Sand	"		"	Sufficient
4	N W	4				Drilled	200	2226			200	2026	Pale or Variegated Sand	Soft		"	Good supply
5	N E	4				Drilled	250	2234	-100	2134	250	1984	Pale or Variegated Beds	"		"	"
6	S W	6				"	226	2250	-100	2150	226	2024	Pale or Variegated sand	"		"	"
7	S E	6				"	225	2213	- 60	2153	225	1988	Pale or Variegated beds	Hard		"	"
8	N E	7				"	180	2252	- 80	2172	180	2072	Pale or Variegated sand	"		"	"
9	S W	8				"	176	2226	- 50	2176	176	2050	Pale or Variegated sand	"		"	"
10	N E	12				"	230	2257			230	2027	Pale or Variegated sand	"		"	"
11	N W	12				Bored	109	2237	-100	2137	109	2128	Gray sand	" Alk		"	Sufficient
12	S W	12				Drilled	350	2254	- 70	2184	100	2154	Glacial	"			
											350	1904	Birch Lake	"		"	Good supply
13	N E	14				Dug	14	2207	- 5	2202	14	2193	Glacial gravel	"		"	Sufficient
14	N W	14				Drilled	275	2205	- 70	2135	275	1930	Birch Lake	Soft		"	Good supply
15	N W	16				Dug	16	2268	- 12	2256	16	2252	Glacial sand	Hard		"	Sufficient
16	S W	17				Dug	12	2202			12	2190	Glacial sand	"		"	Poor supply
17	N E	18				"	20	2202	- 10	2192	20	2182	Fine sand	"		S.	Sufficient
18	S W	19				Drilled	220	2184	- 40	2144	220	1964	Birch Lake	Soft		D.S.	Good supply
19	N E	21				"	300	2254			300	1954	" "	"		"	" "
20	S W	25				Bored	104	2242	- 79	2163	104	2138	Pale or Variegated beds	Hard			
21	S W	25				Drilled	275	2242	- 90	2152	275	1967	Birch Lake	Soft		"	Sand trouble
22	N E	25				Dug	36	2190	- 26	2164	36	2154	Glacial gravel	Hard		"	Sufficient
23	S W	27				Drilled	340	2271	-175	2096	340	1931	Birch Lake	Soft		"	Good supply
24	N W	28				"	318	2277	-100	2177	318	1959	Birch Lake	"		"	Sufficient
25	N E	30				"	270	2226	- 90	2136	270	1956	Birch Lake	"		"	Good supply
26	N E	32				"	275	2262	-110	2152	275	1987	Birch Lake	"		"	" "
27	S W	35				Dug	15	2346			15	2331	Glacial gravel	Hard		"	" "

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

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

WELL RECORDS—~~Rural Municipality~~ of .....

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	N E	1	40	2	4	Bored	160	2230	-100	2130	160	2070	Pale or Variegated sand	Hard		D.S.	Good supply
2	S E	4				"	40	2293			40	2253	Glacial sand	"		"	Sufficient
3	N W	9				Drilled	325	2304	-100	2204	325	1979	Variegated beds	Soft		"	Good supply
4	S W	10				"	290	2318	-250	2068	290	2028	Pale or Variegated sand	"		"	Sufficient
5	N E	12				"	195	2209	- 30	2179	195	2014	Pale or Variegated sand	Hard		"	"
6	N E	13				"	245	2240			245	1995	Pale or Variegated beds	Soft		"	Good supply
7	S W	20				"	180	2287	-110	2177	180	2107	Pale or Variegated beds	"		"	Sufficient
8	S W	22				"	153	2241			153	2088	Pale or Variegated sand	"		"	Good supply
9	N E	24				Dug	18	2182			18	2164	Glacial	"		D.	Poor supply
10	S E	25				"	35	2205	- 28	2177	35	2170	" sand	Hard		D.S.	Sufficient
11	N E	28				Drilled	215	2262	-100	2162	215	2047	Pale or Variegated sand	Soft		"	Good supply
12	S W	28				"	180	2264			180	2084	Pale or Variegated sand	Hard		"	" "
13	S E	30				"	200	2168			200	1968	Birch Lake	Soft		"	" "
14	N E	30				Dug	14	2218	- 8	2210	14	2204	Glacial	Hard		"	Sufficient
15	N W	31				Drilled	325	2201			325	1876	Ribstone Creek	Soft		"	"
16	S W	32				"	220	2241			220	2021	Pale or Variegated sand	"		"	"
17	N E	32				Bored	40	2164	- 20	2144	40	2124	Glacial	"		"	"
18	N E	33				"	85	2154	- 35	2119	85	2069	Pale or Variegated beds	Hard		"	"
19	S E	33				Drilled	230	2236			230	2006	Pale or Variegated beds	Soft		"	"
20	S W	34				"	186	2228	- 80	2148	186	2042	Pale or Variegated sand	"		"	Good supply
1	S E	3	40	3	4	Drilled	390	2374			390	1984	Pale or Variegated beds	Hard		D.S.	Sufficient
2	S W	4				"	135	2196	- 30	2166	135	2061	Pale or Variegated beds	"		"	Good supply
3	S E	4				Dug	20	2272			20	2252	Glacial sand	"		"	Limited supply
4	S W	6				Bored	103	2237	- 65	2172	103	2134	Pale Beds ?	"		"	Sufficient
5	N W	7				Dug	35	2243	- 25	2218	35	2208	Glacial clay	"		"	"
6	N W	10				"	20	2324			20	2304		"		"	Limited supply
7	S W	11				Bored	30	2366			30	2336		"		"	" "
8	S E	11				"	115	2322			115	2207	Pale or Variegated beds	"		"	Poor supply
9	N E	12				Drilled	315	2342	-130	2212	315	2027	Pale or Variegated sand	"		"	Good "
10	S E	13				"	365	2306	-160	2146	265	2041	Pale or Variegated sand	"		"	" "
11	N E	13				"	286	2321			286	2035	Pale or Variegated sand	"		"	Sufficient
12	S W	14				"	270	2314			270	2044	Pale or Variegated beds	"		"	"
13	S E	14				Bored	125	2303	- 75	2228	75	2228	sand	"		"	Limited 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~~

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
14	N E	14	40	3	4	Drilled	180	2310			180	2130	Pale Beds ?	Hard		D.S.	Sufficient
15	N W	14				Bored	70	2297	-50	2247	70	2227	Pale or Variegated beds	"		"	"
16	S W	18				Drilled	275	2256	-50	2206	175	2081	Pale or Variegated beds	"		"	Poor supply
											275	1981	Birch Lake	Soft Br.		"	Good "
17	S E	18				"	180	2275			180	2095	Pale or Variegated beds	"		"	" "
18	N W	18				"	280	2276			280	1996	Birch Lake	"		"	Sufficient
19	N E	24				"	162	2261	-60	2201	162	2099	Pale or Variegated beds	"		"	Good supply
20	S E	25				"	375	2238			375	1863	Ribstone Creek	"		"	Sufficient
21	S E	26				Bored	85	2280			85	2195	Pale or Variegated beds	Hard		"	"
22	N W	30				"	55	2204	-15	2189	55	2149	Glacial gravel	"		"	Limited supply
23	S E	31				Drilled	242	2248			242	2006	Pale or Variegated beds	Soft		"	Good supply
24	N W	32				"	290	2300	-167	2133	290	2010	Pale or Variegated beds	"		"	Sufficient
25	N E	36				Bored	75	2200			75	2125	Glacial	"		"	Limited supply
26	S W	36				"	75	2193			75	2118	"	"		"	" "
1	S W	1	40	4	4	Drilled	170	2194	-24	2170	170	2024	Pale Beds	Soft		D.S.	Good supply
2	N W	2				Dug	20	2179	-14	2165	20	2159	Glacial	Hard		"	Sufficient
3	S E	2				Drilled	148	2185	- 5	2180	148	2037	Pale Beds	"		"	Good supply
4	S E	3				Dug	30	2208	-18	2190	30	2178	Glacial	"		"	Sufficient
5	S W	4				"	20	2228	-18	2210	20	2208	" sand	"		"	Limited supply
6	N E	5				"	40	2252			40	2212	Glacial	"		"	Sufficient
7	N E	7				"	14	2253	- 7	2246	14	2239	" gravel	Soft		"	Limited supply
8	S W	9				Spring		2199									
9	S E	10				Bored	52	2197	-30	2167	52	2145	Glacial	Hard		"	Good supply
10	S E	12				Drilled	260	2273	-150	2123	260	2013	Pale Beds	Soft		"	" "
11	N E	13				Bored	76	2260	- 14	2246	76	2184	Pale Beds ?	"		"	" "
12	N E	14				Drilled	150	2237	- 50	2187	150	2087	" "	"		"	" "
13	N E	16				"	235	2306	- 85	2221	235	2071	" "	"		"	" "
14	S W	18				Dug	22	2250			22	2228	Glacial sand	Hard		"	Limited supply
15	S W	18				Bored	90	2250			80	2170	Glacial	Soft		N.	Caved and now abandoned.
16	S W	20				Dug	20	2290			20	2270	"	Hard		D.S.	Limited supply
17	N E	24				"	27	2297			27	2270	"	"		"	" "
18	N E	24				Bored	65	2297			65	2232	"	" Alk.		D.	Sufficient. School Well.
19	S E	25				Drilled	265	2285	- 90	2195	265	2020	Pale Beds	Soft		D.S.	"
20	S W	25				"	170	2252			170	2082	" "	"		"	"
21	S E	28				Dug	25	2285	- 12	2273	25	2260	Glacial sand	Hard		"	"
22	S E	33				"	20	2229	- 12	2217	20	2209	"	"		"	Limited supply
23	N E	33				Bored	100	2304	- 75	2229	100	2204	Sand	"		"	Sufficient
24	S W	33				Dug	22	2262			22	2240	Glacial sand	"		"	"
25	N E	36				Drilled	160	2244	- 50	2194	160	2084	Pale Beds	Soft		"	Good 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 .....

B 4-4
1960—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	S E	2	41	1	4	Drilled	235	2280	-170	2110	235	2045	Pale or Variegated Beds?	Hard		N.	Sand trouble
2	N W	2				Dug	35	2380	- 20	2360	35	2345	Glacial Sand	"		D.S.	Good supply
3	S E	3				Bored	63	2400	- 45	2355	63	2337	Glacial gravel	"		"	Sufficient
4	S E	4				Bored	30	2325	- 26	2299	30	2295	Pale Beds	Soft		"	" . Coal at 15 Feet.
5	N E	4				"	60	2420			60	2360	Sand	Hard		"	Poor supply
6	S W	6				Dug	66	2220	- 54	2166	66	2154	Glacial Sand	"		"	Sufficient
7	S E	10				"	15	2315	- 11	2304	15	2300	Glacial Sand	"		"	"
8	N W	12				Bored	90	2300	- 30	2270	90	2210	Pale or Variegated Beds	"		"	Waters 45 Head of Stock.
9	S W	14				"	85	2280	- 60	2220	85	2195	Pale or Variegated Beds	"		"	Sufficient
10	N W	15				Dug	12	2330	- 7	2323	12	2318	Glacial Sand	"		"	Good supply. Dry Hole 400 Feet Deep.
11	N W	18				Bored	68	2270	- 33	2237	68	2202	Glacial Sand	"		"	" "
12	N W	23				"	35	2140	- 33	2107	35	2105	Glacial Sand	"		"	Poor supply.
13	N W	30				Dug	12	2045	- 9	2036	12	2033	Glacial Sand	"		"	Sufficient
14	S W	32				Bored	46	2040	- 14	2026	46	1994	Glacial gravel	"		"	Good supply
15	S E	33				Dug	34	2040			34	2006	Glacial gravel	"		N.	Water obtained from springs.
1	N W	1	41	2	4	Bored	20	2210	- 14	2196	20	2190	Glacial sand	Hard		D.S.	Sufficient
2	N E	6				Drilled	200	2218			200	2018	Pale or Variegated sand?	Soft		"	Good supply
3	N E	7				Bored	64	2258	- 54	2204	64	2194	Glacial sand	Hard		"	Limited supply
4	S E	12				"	85	2220	- 55	2165	85	2135	Glacial sand	"		"	Good supply
5	N W	12				Drilled	205	2220	- 70	2150	205	2015	Birch Lake sand?	Soft		"	" "
6	N W	14				Dug	12	2090	- 5	2085	12	2078	Glacial sand	Hard		"	Sufficient
7	S E	18				"	30	2208	- 8	2200	30	2178	Glacial sand	"		"	"
8	N E	24				Drilled	385	2145			385	1760	Ribstone Ck.	Soft		"	Good supply
9	S E	30				Dug	19	2218	- 14	2204	19	2199	Glacial sand	"		"	Sufficient. Sandpoint used.
10	S E	32				Drilled	290	2098	- 20	2067	290	1797	Ribstone Ck.	"		"	Good supply
11	N E	32				"	385	2042	+ 22	2064	385	1657	Ribstone Ck.	" Sulphur		"	Continuous flow with some gas.
12	S W	34				Bored	60	2155	- 30	2125	60	2095	Glacial	Hard Alk.		"	Sufficient
13	N E	34				Drilled	487	2177	-347	1830	487	1690	Ribstone Ck.	Soft		"	"
1	N W	4	41	3	4	Dug	46	2191	- 17	2174	46	2145	Glacial sand	Hard		D.S.	Poor supply
2	S W	8				Bored	70	2180	- 40	2140	70	2110	Sand	"		"	Sufficient
3	S W	10				Drilled	160	2221	-140	2081	160	2061	Pale or Variegated sand	Soft		"	Good supply
4	N W	10				Dug	14	2096	- 10	2086	14	2082	Glacial sand	Hard		"	Poor "
5	S E	11				Drilled	215	2225			215	2010	Birch Lake sand	Soft		"	Good "
6	S E	12				Bored	60	2233	- 18	2215	60	2173	Glacial gravel	Hard		"	Sufficient
7	S W	12				Drilled	206	2170	- 15	2155	206	1964	Birch Lake sand	Soft		"	Good supply
8	N W	12				Dug	23	2201	- 14	2187	23	2178	Glacial sand	Hard		"	Sufficient
9	N E	12				Bored	50	2213	- 30	2183	50	2163	Glacial sand	Hard		"	"
10	S W	13				Dug	68	2216			68	2148	Glacial sand	"		"	Good supply
11	N E	14				Drilled	380	2230	- 30	2200	380	1850	Ribstone Creek sand	Soft		"	" "
12	N E	15				Dug	42	2111	- 39	2072	40	2071	Glacial gravel	Hard		"	Poor "
13	S E	16				Bored	60	2111	- 52	2059	60	2051	Glacial	Hard		"	Limited supply
14	S E	17				Drilled	216	2256	-120	2136	216	2040	Pale or Variegated Beds	"		"	Sufficient
15	N W	17				"	210				210	2000	Pale or Variegated Beds	Soft		"	"

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 .....

B 4-4
1800—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
16	N W	18	41	3	4	Drilled	330	2300			330	1970	Birch Lake	Soft		D.S.	Sufficient
17	N E	18				"	185	2195			185	2010	Pale or Variegated Beds	"		"	"
18	S E	19				"	220	2190			220	1970	Birch Lake	"		"	"
19	S E	20				"	240	2261	-100	2161	240	2021	Pale or Variegated Beds	"		"	Good supply
20	N W	20				"	275	2200			275	1925	Birch Lake	"		"	Sufficient
21	N W	24				"	340	2177	-225	1952	340	1837	Ribstone Creek	"		"	"
22	N E	24				Dug	80	2238	- 76	2162	80	2158	Glacial Sand	Hard		"	"
23	S E	27				Bored	115	2171	-113	2058	115	2056	Pale or Variegated Beds	"		"	Poor supply
24	S W	28				Drilled	287	2266	- 90	2176	287	1979	Pale or Variegated Beds	Soft		"	Good "
25	N W	31				Bored	65	2200			65	2135	Glacial	Hard		"	Limited supply
26	S E	32				Dug	30	2076	- 15	2061	30	2046	Glacial	"		"	Sufficient
27	N W	35				"	63	2120			63	2057	Glacial	"		"	Waters 60 Head of Stock.
28	S W	36				Bored	90	2107	- 50	2057	90	2017	Glacial sand	"		"	Poor supply
1	S E	2	41	4	4	Dug	26	2200			26	2174	Glacial	Hard		D.S.	Poor supply
2	S E	6				Bored	75	2270			75	2195	Glacial	Soft		"	
3	S E	12				Dug	12	2140			12	2128	Glacial			"	Waters 100 Head of Stock.
4	S E	14				Drilled	155	2180	- 40	2140	155	2025	Variegated Beds	Hard		"	Sufficient
5	N W	17				Dug	26	2175			26	2149	Glacial	"		"	"
6	N W	20				"	60	2260			60	2200	Sand	"		"	"
7	S W	24				Drilled	240	2260			240	2020	Variegated Beds	Soft		"	"
8	N W	27				"	87	2175	- 2	2173	87	2088	Glacial	Hard		"	"
9	N W	28				Dug	63	2240			63	2177	Glacial gravel	"		"	"
10	S E	30				Drilled	330	2280	-100	2180	330	1950	Birch Lake	"		"	"
11	S W	30				"	270	2240	- 65	2175	270	1970	Birch Lake	Soft		"	"
12	S E	31				Dug	40	2275	- 35	2240	40	2235	Glacial	Hard		"	"
13	S E	32				Bored	50	2215			50	2165	Glacial	"		"	"
14	N W	32				"	22	2240			22	2218	Glacial	"		"	"
15	S E	34				"	90	2125			90	2035	Variegated Beds	"		"	"
16	S E	35				Dug	30	2190			30	2160	Glacial	"			Limited supply
17	N E	35				Drilled	160	2130			160	1970	Birch Lake	Soft		"	Sufficient
18	S E	36				Bored	60	2205			60	2145	Glacial	Hard		"	"
19	S W	36				Drilled	240	2220			240	1980	Birch Lake	Soft		"	"
20	N W	36				"	240	2190			240	1950	Birch Lake	"		"	Good supply
1	N E	10	42	1	4	Dug	17	2113	- 15	2098	14	2099	Fine sand	Hard Alk.		D.S.	Poor supply
2	N W	14				"	24	2070	- 16	2054	24	2046	Sand	Soft		"	Sufficient
3	S E	16				"	14	2128	- 11	2117	14	2114	Glacial sand	"		"	"
4	S E	18				Drilled	385	2158	-180	1978	385	1773	Ribstone Creek	"		"	Good supply
5	S W	18				"	320	2118	- 70	2048	320	1798	Ribstone Creek	"		"	" "
6	S W	20				"	300	2143	-150	1993	300	1843	Ribstone Creek	"		"	" "
7	N W	20				Dug	30	2154			30	2124	Glacial sand	Hard		"	Sufficient
8	S E	22				"	20		- 12	2063	20	2055	Glacial sand	"		"	"
9	N W	22				"	10	2025	- 8	2017	10	2015	Glacial sand	"		"	"
10	N W	26				"	14	2015	- 9	2006	14	2001	Glacial sand	Soft		"	"
11	S W	28				"	17	2008	- 11	1997	17	1991	Glacial sand	Hard		"	"
12	N W	33				"	24	2018	- 3	2015	24	1994	Glacial sand	Soft		D.	Poor supply
13	N E	35				"	7	2015	- 4	2011	7	2008	Glacial sand	Hard		D.S.	Sufficient

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(#) Sample taken for analysis.

WELL RECORDS—~~Rural Municipality~~ of .....

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	S E	2	42	2	4	Dug	14	2106	- 11	2095	14	2092	Fine sand	Hard		D.S.	Good supply
2	N E	2				Drilled	241	2182			241	1941	Ribstone Creek Sand	Soft		"	" "
3	S W	4				"	375	2042	+ 14	2056	375	1667	Ribstone Creek(?)	" Sulphur		"	Continual flow of water with gas.
4	N W	5				Dug	68	2070	- 48	2022	68	2002	Sand	Hard		"	Sufficient
5	S W	6				Bored	80	2148	- 42	2106	80	2068	Sand	"		"	"
6	S E	7				Dug	30	2060	- 20	2040	30	2030	Sand	"		"	"
7	N E	11				"	24	2118	- 19	2099	24	2094	Glacial sand	"		"	Waters 25 Head of Stock
8	N E	12				Drilled	350	2160	-105	2055	350	1810	Ribstone Creek	Soft		"	Good supply
9	N E	14				"	250	2152			250	1902	Ribstone Creek sand	"		"	" "
10	S W	17				Bored	94	2045	- 6	2039	94	1951	Ribstone Creek	Hard		"	" "
11	N E	18				"	30	2055	- 28	2027	30	2025	Sand	"		"	Limited Supply
12	S W	18				"	20	2042	- 17	2025	20	2022	Glacial sand	"		"	Sufficient. Several springs on farm.
13	N E	19				Dug	19	2038	- 15	2023	19	2019	Glacial sand	"		"	"
14	N E	20				Bored	45	2122			45	2077	Sand	"		"	Good supply
15	S E	22				Drilled	240	2171	-100	2071	240	1931	Ribstone Creek	Soft		"	Sufficient
16	S W	22				Dug	24	2240			24	2216	Glacial sand	Hard		"	Good supply
17	N E	23				"	42	2106	- 32	2074	42	2064	Glacial sand	"		"	Sufficient
18	S W	24				"	16	2098	- 12	2086	16	2082	Glacial sand	"		"	"
19	S E	25				"	20	2008	- 16	1992	20	1988	Glacial sand	"		"	"
20	N E	25				"	18	2005	- 16	1989	18	1987	Glacial sand	Soft		"	"
21	N E	26				Drilled	307	2076	- 40	2036	280	1796	Ribstone Creek	Hard		"	"
22	S E	28				Bored	40	2208	- 34	2174	40	2168	Glacial sand	"		"	"
23	N E	28				Drilled	475	2232	-250	1982	475	1757	Ribstone Creek	Soft		"	Sand trouble
24	S W	29				Bored	82	2063	- 15	2048	82	1981	Sand & Gravel	Hard		"	Sufficient
25	N W	30				Dug	25	2030	- 15	2015	25	2005	Glacial sand	"		"	"
26	S W	32				Bored	40	2038	- 30	2008	40	1998	Glacial sand	"		"	"
27	N E	34				Drilled	376	2142	-100	2042	376	1766	Ribstone Creek	Soft		"	"
28	N E	35				Dug	21	2020	- 13	2007	21	1999	Glacial sand	"		"	Good supply
1	S W	1	42	3	4	Dug	35	2098			35	2063	Glacial	Hard		D.S.	Poor supply
2	N W	12				Bored	38	2050	- 30	2020	38	2012	Glacial	"			" "
3	S E	15				"	35	2110			35	2075	Glacial	"		"	" "
4	S E	16				Dug	28	2140	- 15	2125	28	2112	Glacial	"		"	Sufficient
5	S W	18				"	30	2120			30	2090	Glacial	"		"	Poor supply
6	S W	22				"	30	2112			30	2082	Glacial gravel	"		"	Sufficient
7	S E	27				"	45	2110			45	2065	Glacial gravel	Soft		"	Poor supply
1	S E	2	42	4	4	Bored	40	2140			40	2100	Glacial	Hard		D.S.	Poor supply
2	S W	2					120	2135	+ 3	2138	120	2015	Variegated Beds	"		"	Sufficient. Flowing well.
3	S W	4				Drilled	230	2230	- 50	2180	230	2000	Variegated Beds	Soft		"	"
4	N E	5				Bored	40	2275			40	2235	Sand	Hard		"	"
5	N E	6				Dug	22	2230			22	2208		"		"	"
6	N E	9				Drilled	170	2240			170	2070	Variegated Beds	"		"	Good supply
7	N E	14				"	145	2140	- 8	2132	145	1995	Variegated or Birch Lake	"		"	Abundant supply
8	N W	15				"	45	2120	+ 10	2130	45	2075	Fine sand	"		"	" " . Flows
9	S E	16				"	75	2130	+ 7	2137	75	2055	Variegated sand	"		"	Flowing well
10	S W	16				"	170	2185			170	2015	Variegated sand	Soft		"	Sufficient
11	N W	16				"	300	2190			300	1890	Ribstone Creek?	"		"	" . Water at 130 feet.

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WELL RECORDS—~~Rural Municipality~~ of .....

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
12	S E	22	42	4	4	Drilled	100	2125	+ 6	2131	100	2025	Variegated Beds	Soft		D.S.	Flowing well
13	S W	22				"	120	2120	Flows	2120+	120	2000	Variegated Beds	Hard		"	" "
14	N W	23				"	110	2120	+ 6	2126	110	2010	Variegated Beds	"		"	" "
15	S W	26				"	86	2120	Flows	2120+	86	2034	Variegated Beds	"		"	" "
16	N W	27				"	130	2140	+ 10	2150	130	2010	Variegated Beds	"		"	" "
17	S E	28				Bored	62	2240	- 35	2205	62	2178	Blue clay	"		"	Sufficient
18	S W	34				Drilled	450	2265	-150	2115	450	1815	Ribstone Creek	Soft		"	Good supply
19	N W	34				"	379	2220	- 64	2156	379	1841	Ribstone Creek	"		"	Sufficient

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(#) Sample taken for analysis.