CANADA

DEPARTMENT OF MINES

AND

TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

WATER SUPPLY PAPER No. 3

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF COALFIELDS NO. 4 SASKATCHEWAN

By

B. R. MacKay and H. N. Hainstock

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INTRODUCTION

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

Publication of Results

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

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

How to Use the Report

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

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

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

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

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

GLOSSARY OF TERMS USED

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Eastend Formation. The name given to a series of fine-grained sands and silts. It has been recognized at various localities over the southern part of the province, from the Alberta boundary east to the escarpment of Missouri coteau. The thickness of the formation seldom exceeds 40 feet.

Bearpaw Formation. The Bearpaw consists mostly of incoherent dark grey to dark brownish grey, partly bentonitic shales, weathering light grey, or, in places where much iron

is present, buff. Beds of sand occur in places in the lower part of the formation. It forms the uppermost bedrock formation over much of western and southwestern Saskatchewan and has a maximum thickness of 700 feet or somewhat more.

Belly River Formation. The Belly River consists mostly of non-marine sand, shale, and coal, and underlies the Bearpaw in the western part of the area. It passes eastward and northeastward into marine shale. The principal area of transition is in the western half of the area where the Belly River is mostly thinner than it is to the west and includes marine zones. In the southwestern corner of the area it has a thickness of several hundred feet.

Marine Shale Series. This series of beds consists of dark grey to dark brownish grey, plastic shales, and underlies the central and northeastern parts of Saskatchewan. It includes beds equivalent to the Bearpaw, Belly River, and older formations that underlie the western part of the area.

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Coalfields is an area of 324 square miles in the southeastern corner of Saskatchewan. It consists of nine townships described as townships 1, 2, and 3, in ranges 4, 5, and 6, west of the 2nd meridian. A relatively thin mantle of glacial drift covers most of this municipality. The minimum thickness occurs in an area made up of the southwest half of township 1, range 5; all of township 1, range 6, and the southwestern three-quarters of township 2, range 6. Throughout this area, with the exception of along Souris river and its tributary coulées where the Ravenscrag formation outcrops, the drift is from 4 to 40 feet thick. To the east and north, however, the glacial deposits attain a thickness of from 100 to 250 feet, the maximum thickness being in township 3, range 6.

Water-bearing Horizons in the Unconsolidated Deposits

Recent deposits of fine silts and sands occur along the flood-plain of Souris river and some of its larger tributaries. The glacial drift along both sides of the river has been modified by the action of the run-off waters, the finer materials having been washed away leaving the coarser boulders exposed on the surface. This modified till often extends back from the river for a distance of 3 miles. The upper 10-to-30 foot zone of the glacial drift is composed of a yellow clay which contains isolated pockets and strips of sand and gravel and of small surface patches of glacial gravels. A fine blue clay underlies this zone and in some localities it comes to the surface and replaces the yellow clay. Some sand pockets are contained in the upper 10 feet of the blue clay and undoubtedly others will be found scattered throughout it. In one locality a fairly thick deposit of sand was found between the blue clay and the bedrock.

Shallow wells dug into the recent deposits of sand and silt on the Souris River flood-plain obtain a fairly abundant supply of water that is used for drinking as well as for stock.

The patches of glacial gravels and the pockets of sand within the yellow clay and in the upper few feet of the blue clay, are generally water-bearing. This horizon does not yield a large supply of water as the sand and gravel deposits are not numerous. The water contained in the sand pockets within the blue clay is often too "alkaline" for house use, but in most instances it is usable for stock. The water that is obtained from the glacial gravels and from the pockets within the yellow clay, is as a rule low in mineral salts and is used for drinking as well as for stock. During the drought period the majority of the shallow wells that obtained their supply from this water-bearing horizon became completely dry. In the northern part of the municipality dugouts are frequently used for storing a supply of water for stock use during the summer months. This method of retaining a supply of water can be used to advantage throughout the municipality, where it is impossible to obtain water from the glacial drift, and when lack of finances does not permit the drilling of deep wells into the Ravenscrag bedrock formation.

The sand deposits that occur between the blue clay and the bedrock form a second water-bearing horizon in the glacial drift. This horizon was noted in one locality only namely, SE. sec. 3, tp. 3, range 6, and it has only a very small areal distribution. The sand was deposited in a small depression in the pre-glacial bedrock land surface, and although similar deposits may be expected elsewhere in the municipality, they will not form an extensive water-bearing horizon. The water obtained from this horizon is hard in character, fairly abundant in quantity, and is under sufficient pressure to cause it to rise to within 30 feet of the surface.

The Ravenscrag formation outcrops along Souris river in the vicinity of Roche Percée, and underlies the glacial drift throughout the remainder of the municipality. This formation is composed of a series of beds of sandstone sandy clay, shale, and sandy shale. It contains two or more lignite coal seams and in the vicinity of Bienfait, Taylorton, and Roche Percée these seams are being mined by the Manitoba and Saskatchewan Coal Company, the Western Dominion Collieries, Limited, and by small privately owned mines.

Water-bearing Horizons in the Bedrock

Five water-bearing horizons have been noted in the Ravenscrag formation in this municipality. In the southwestern corner of the municipality a fine-grained, soft, light brown sandstone forms a water-bearing horizon at depths of from 20 to 70 feet. An abundant and permanent supply of medium hard, usable water is obtained from wells that are dug into this soft sandstone. The water is not under great pressure and in the majority of the wells there is never more than 5 or 6 feet of water. None of the wells that obtain their water supply from this shallow horizon was affected by the recent drought conditions. The second water-bearing horizon is formed by a coal seam and its associated sand beds and it occurs at depths of from 120 to 180 feet. The water from this horizon is soft and has a high "soda" content. It is under considerable pressure and rises to within 30 to 70 feet of the surface. This horizon yields an abundant supply of water and is more or less confined to the southeastern part of the municipality and to the areas adjacent to where the sandstone comes close to the surface. In the southeastern part of the municipality an abundant supply of soft water is also obtained from sandy shale beds at a depth of 210 to 280 feet. The water from this horizon rises to within 80 to 160 feet of the surface. Throughout the northern half of the municipality a fourth water-bearing horizon is encountered at depths of from 310 to 380 feet, the common depth being around 360 feet. This

horizon is formed by sandy beds and an abundant supply of soft water is obtained from it. The hydrostatic pressure is sufficient to cause the water to rise to within 80 to 200 feet of the surface. Two wells encountered water at depths of 480 to 520 feet in a fifth horizon that consists of sandy shale. The water is soft, contains a high "soda" content, and is more salty in character than that obtained from the higher horizons. It rises to within 100 feet of the surface and is fairly abundant in quantity. An abundant supply of soft water that is usable for both humans and stock can be obtained from the different water-bearing horizons of the Ravenscrag formation throughout the municipality.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 1, Range 4

The glacial drift of this township does not contain a large supply of water. The blue clay comes very close to the surface over most of the township and small deposits of sand and gravel are found either lying on the surface above the clay or within the upper 30 feet of it. These deposits form the only known water-bearing horizon in the glacial drift. As a rule the water is hard and quite "alkaline" in character, especially that obtained from the sand pockets within the blue clay. The best supply is obtained from wells tapping recent sand and gravel deposits in the gullies leading into Souris river. Elsewhere only a moderate supply of "alkaline" water is to be expected from the drift. Numerous dry holes are usually dug before a suitable water-bearing sand pocket is located. Dugouts could be used to advantage throughout the township.

Two water-bearing horizons have been encountered in the Ravenscrag formation. The upper one is a coal seam and its associated sandy beds which occur at a depth of 160 to 180 feet or at an elevation of 1,725 to 1,780 feet. This horizon produces

a fairly abundant supply of soft water which is under sufficient hydrostatic pressure to cause it to rise to within 60 to 100 feet of the surface. The water is usable for both humans and stock. The second horizon is a sand bed which is encountered at a depth of 225 to 245 feet or at an elevation of 1,650 feet. The water from this horizon rises to within 125 feet of the surface, and is soft in character and abundant in quantity. Should these horizons be tapped by other wells throughout the township, an adequate supply of potable water will be obtained.

Township 1, Range 5

The ground water supply from the glacial drift in this township is derived from one water-bearing horizon. The sand and gravel deposits that constitute this horizon occur as pockets within the upper 30 feet of the drift and in old stream channels. In the southwestern corner of the township the drift is quite thin and the water-bearing horizon is absent. Elsewhere, a moderate supply of water is obtained from it by shallow wells, but many of them yield very "alkaline" water. This is the case in sections 1, 9, 10, and 11, but to the north of these sections the water is hard and low in salts. Several dry holes are usually dug before a satisfactory supply is obtained. All of these wells were affected by the drought.

Ground water from the Ravenscrag formation is obtained from two horizons. In the southwestern corner of the township an abundant supply of medium hard, usable water is obtained from a soft, brown coloured sandstone at depths of 25 to 40 feet or at an elevation of 1,905 to 1,920 feet. This water-bearing horizon is confined to this part of the township. The second horizon occurs at a depth of 210 to 285 feet and is a coal seam amd its enclosing sandy shale beds. An abundant supply of soft usable water is also obtained from this horizon. Three wells have tapped this aquifer in the southeastern corner of the block

and should other wells be drilled into it throughout the township, an adequate supply of water is to be expected.

Township 1, Range 6

As there is only a thin mantle of glacial drift in this township, practically no underground water can be obtained from it. Two or three wells, however, are deriving a small supply of slightly "alkaline" water from sand pockets in the drift. A number of shallow wells dug into the flood-plain deposits along Souris river are yielding a fair supply of water.

Throughout the township an abundant supply of medium hard, potable water is obtained from a sandstone bed of the Ravenscrag formation. This sandstone comes to within 15 feet of the surface over most of the township and outcrops along Souris river and its tributary coulées. The water does not appear to be under any great hydrostatic pressure and rises only a few feet above where it is encountered. None of the wells that derive their water from this horizon were affected by the drought conditions.

Township 2, Range 4

Ground water from the glacial drift in this township is derived from one water-bearing horizon. This horizon is composed of the pockets and patches of glacial sand and gravel that occur within the upper 30 feet of the glacial drift. In years of normal rainfall the shallow wells that tap this aquifer give a permanent supply of water, but during drought periods the supply is usually inadequate for local needs. The water is hard and in a few instances slightly "alkaline."

To the writer's knowledge only one well has been drilled into the bedrock. Water was encountered in this well at a depth of 200 feet, but the main supply is being derived from a black sand at a depth of 360 feet. The water is hard in character, abundant in quantity, and rises to within 40 feet of the surface.

Should other deep wells be drilled into the Ravenscrag formation an abundant supply of usable water is to be expected from the above-mentioned horizons or from others that may be encountered.

Township 2, Range 5

The glacial drift in this township contains one known water-bearing horizon, which occurs at a depth of 20 to 35 feet. The sand and gravel deposits that make up this horizon are in the form of pockets and also as fairly extensiv deposits of glacial gravels. The water from this horizon is hard and "non-alkaline", but seepage water from the clay alone is very hard and "alkaline" in character. To the north of Souris river little trouble should be experienced in locating shallow wells that will provide an adequate supply of water for farm needs.

Only one deep well has been drilled into the Ravenscrag formation in this township. This well encountered water in a sand bed at a depth of 360 feet. The water is soft in character and rises to within 160 feet of the surface. A strong flow of inflammable gas occurred when the well was first drilled. This horizon, or others that may be encountered, will provide an adequate supply of water should they be tapped by other deep wells.

Township 2, Range 6

Very little water is derived from the thin mantle of glacial drift in this township. The few sand pockets that occur in the upper part of the drift form its only water-bearing horizon. This horizon appears to be confined principally to the eastern part of the township, and the water derived from it is barely sufficient for local needs and is "alkaline" in character. In the western part of the township, the shallow wells derive only a small seepage of "alkaline" water from the clays.

The water supply of the township is almost entirely derived from the water-bearing horizons of the Ravenscrag formation. In the southwestern corner a sandstone bed forms

an horizon at depths of from 30 to 70 feet. A second water-bearing horizon occurs at a depth of from 120 to 160 feet throughout the township, and in the eastern part water is obtained at a depth of 225 feet. The majority of the deep wells tapping these horizons yield a soft water, but in a few wells the water is hard. The hydrostatic pressure is sufficient to cause the water to rise to within 25 to 60 feet of the surface in the wells tapping the deeper horizons, but in the shallow wells the pressure is slight.

Township 3, Range 4

The pockets of sand that occur within the upper 30 feet of the drift and the surface deposits of glacial sand and gravel in the vicinity of Frobisher form the only known water-bearing horizon in the thick deposit of glacial drift that mantles this township. The pockets of sand yield only a small supply of hard, usable water, but wells dug into the surface deposits of sand and gravel give a permanent supply of water that is high in mineral content. Dugouts are used by some farmers and this method of retaining a supply of water for the summer months can be practised throughout the township.

In the Ravenscrag formation a sandy bed lying below a coal seam at a depth of 320 to 375 feet, or at an elevation of 1,560 feet, constitutes a water-bearing horizon. Wells tapping this horizon produce an abundant supply of medium hard, usable water that rises to within 130 feet of the surface. This condition should prevail throughout the township.

Township 3, Range 5

The glacial drift contains one water-bearing horizon and it is composed of the sand and gravel deposits, which are either in the form of small scattered pockets within the upper 30 feet of the drift or as surface patches of glacial gravels. The glacial gravels occur in parts of sections 12 and 13, section

15, and section 24, and are in the form of knolls and small ridges. Wells tapping these glacial gravels obtain a permanent supply of hard, usable water, and a moderate supply is also obtained from the sand pockets. In the northern part of the township the sandy deposits are scarce and most of the shallow wells are beside dugouts and depend on them for their supply of seepage water. Throughout the township, however, an abundant supply of water from the glacial drift is not to be expected.

Two water-bearing horizons are known to occur in the Ravenscrag sediments. A sandy bed lying at a depth of 360 to 380 feet, or at an elevation of 1,525 to 1,575 feet, yields an abundant supply of soft, usable water, which is high in sodium salts. . The hydrostatic pressure is sufficient to cause the water to rise to within 30 to 200 feet of the surface. In the SE. ¼ sec. 30, another sandy bed occuring at a depth of 480 feet, or at an elevation of 1,430 feet, yields a supply of soft, usable water that is sufficient for fifty head of stock. Should other wells be drilled into these horizons a supply of water that would be sufficient for farms needs will be obtained.

Township 3, Range 6

Two water-bearing horizons occur in the glacial drift in this township. The upper horizon is formed by pockets and strips of sand which occur in the yellow clay and within the upper few feet of the underlying blue clay. This aquifer does not produce a strong supply of water and only three wells were noted that give a supply of water that is sufficient for local needs. In years of normal rainfall the supply is usually sufficient in the summer months, but water has to be hauled in many instances during the winters. When the sand pockets are encountered in the blue clay the water is invariably "alkaline" in character. Dugouts could be used throughout the township as a means of storing a supply of water for stock use during the summer and early winter

months. In the SE. ¼ sec. 3, a second water-bearing horizon was encountered at a depth of 105 feet. This well is obtaining a fair supply of hard, usable water from a sand bed lying at the base of the blue clay. The water is under considerable pressure and rises to within 30 feet of the surface. This horizon has not been encountered elsewhere and thus it appears to be of small areal extent.

Ground water from the Ravenscrag formation is derived from two horizons. The uppermost occurs at a depth of 280 to 360 feet and an abundant supply of soft water is obtained from it. This horizon is composed of a sand bed that occurs directly beneath a lignite coal seam. The hydrostatic pressure is sufficient to cause the water to rise to within 40 to 100 feet of the surface. All of the deep wells are deriving their water supply from this horizon. A water-bearing horizon was struck in one well at a depth of 520 feet, or at an elevation of 1,390 feet. The water from this horizon is quite salty in character. Throughout the township an abundant supply of soft, usable water can be obtained from the water-bearing horizons of the Ravenscrag formation.

Statistical Summary of Well Information in Rural Municipality of Coalfields, No. 4, Saskatchewan

West of 2nd mer. Township / Range	1 4	1 5	1 6	2 4	2 5	2 6	3 4	3 5	3 6	Total No. in Municipality
Total No. of Wells in Township	68	77	41	38	29	79	69	43	58	512
No. of wells in bedrock	5	12	22	1	1	49	4	9	14	87
No. of wells in glacial drift	63	63	14	37	28	60	65	34	54	418
No. of wells in alluvium		2	5							7
Permanency of Water Supply										
No. with Permanent Supply	20	34	33	12	15	24	29	31	16	214
No. with intermittent supply	2	12		2	3	4	8	5	8	44
No. dry holes	46	31	8	24	11	51	32	7	44	254
Types of Wells										
No. of flowing artesian wells										
No. of non-flowing artesian wells	5	3	1	1	1	14	4	9	8	46
No. of non-artesian wells	17	43	32	13	17	14	33	27	16	212
Quality of Water										
No. with hard water	17	43	33	14	17	19	36	28	19	226
No. with soft water	5	3			1	9	1	8	5	32
No. with salty water										
No. with alkaline water	12	7	2	4	3	11		4	6	49
Depths of Wells										
No. from 0 to 50 feet deep	62	73	41	37	28	62	65	34	51	454
No. from 51 to 100 feet deep	1					1			4	6
No. from 101 to 150 feet deep	3					2			2	7
No. from 151 to 200 feet deep						9			1	10
No. from 201 to 500 feet deep	2	3		1	1	5	4	9	10	35
No. from 501 to 1,000 feet deep										
No. over 1,000 feet deep										
How the Water is used										
No. usable for domestic purposes	17	41	31	14	16	25	37	34	20	235
No. not usable for domestic purposes	5	5	2		2	3		2	4	23
No. usable for stock	19	44	43	14	18	28	37	36	24	253
No. not usable for stock	3	2								5
Sufficiency of Water Supply										
No. sufficient for domestic needs	22	46	33	14	18	28	37	36	24	258
No. insufficient for domestic needs										
No. sufficient for stock needs	20	36	30	13	14	26	29	27	12	207
No. insufficient for stock needs	2	10	3	1	4	2	8	9	12	51

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

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

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

Mineral Substances Present

Calcium and Magnesium

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

Sodium

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

Sulphates

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

Chlorides

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

Iron

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

Hardness

Calcium and magnesium salts impart hardness to water. Hardness of water is commonly recognized by its soap-destroying powers as shown by the difficulty of obtaining lather with soap. The total hardness of a water is the hardness of the water in its original state. Total hardness is divided into "permanent hardness" and "temporary hardness". Permanent hardness is the hardness of the water remaining after the sample has been boiled and it represents the amount of mineral salts that cannot be removed by boiling. Temporary hardness is the difference between the total hardness and the permanent hardness and ropresents the amount of mineral salts that can be removed by boiling. Temporary hardness is due mainly to the bicarbonates of calcium and magnesium and iron, and permanent hardness to the sulphates and chlorides of calcium and magnesium. The permanent hardness

can be partly eliminated by adding simple chemical softeners such as ammonia or sodium carbonate, or many prepared softeners. Water that contains a large amount of sodium carbonate and small amounts of calcium and magnesium salts is soft, but if the calcium and magnesium salts are present in large amounts the water is hard. Water that has a total hardness of 300 parts per million or more is usually classed as excessively hard. Many of the Saskatchewan water samples have a total hardness greatly in excess of 300 parts per million; when the total hardness exceeded 3,000 parts per million no exact hardness determination was made. Also no determination for temporary hardness was made on waters having a total hardness less than 50 parts per million. As the determinations of the soap hardness in some cases were made after the samples had been stored for some time, the temporary hardness of some of the waters as they come from the wells probably is higher than that given in the table of analyses.

Analyses of Water Samples from the Municipality of Coalfields, No. 4, Saskatchewan

LOCATION						Depth of Well, Ft.	Total dis'vd Solids	HARDNESS			CONSTITUENTS AS ANALYSED						CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source of Water
No.	Qtr.	Sec.	Tp.	Rge.	Mer.			Total	Perm.	Temp.	Cl.	Alkalinity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	$CaCl_2$	
1.	SE.	1	1	5	2	25	6,580	3000	3,000		73	260	340	947	4531	1316	6,542	260	471		2,821		2,870	120		x 1
2.	NW.	11	1	5	2	11	494											(1)		(2)						x 1
3.	SW.	10	2	5	2	190	2,190										2,190	15		19		865	1,246	8		x 2
4.	SW.	13	3	4	2	25	2,354											(4)	(1)		(2)			(5)	(3)	x 1

Water samples indicated thus, x 1, are from glacial drift.
Water samples indicated thus, x 2, are from bedrock, Ravenscrag formation.
Analyses are reported in parts per million; where numbers (1), (2), (3), (4), and (5) are used instead of parts per million, they represent the relative amounts in which the five main constituents are present in the water.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).

Analysis No. 4, by Provincial Analyst, Regina; Analysis No. 2, by Milton Hersey Company, Winnipeg, Man.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

The water from the glacial drift in this municipality varies greatly in quality. The analyses data on three samples of water from the glacial drift are listed in the accompanying table.

The total dissolved solid content of the waters analysed ranges from 494 to 6,580 parts per million. As a rule the total dissolved solid content of the waters from the glacial drift in southern Saskatchewan is about 1,700 to 3,000 parts per million. It is not advisable to use for drinking purposes or even for stock, those waters of this character that have a total dissolved solid content much exceeding 3,000 parts per million, although in some instances such water is being used without any apparent ill effects. The waters analysed are hard. Two of the samples analysed contain large amounts of sodium sulphate (Glauber's Salt) and magnesium sulphate (Epsom Salts), which make the water permanently hard and laxative but the third is relatively low in these salts and high in the carbonates of calcium and magnesium which make the water temporarily hard but not laxative. The water that is derived from the sand deposits that occur within the upper part of the blue clay, or at depth, contains a larger amount of sulphate salts than does the water obtained from the sand deposits lying above the blue clay.

Water from the Bedrock

One sample of water from the Ravenscrag formation was analysed by the Milton Hersey Company, Winnipeg, Manitoba, and the results are listed in the accompanying table. The water was obtained from a water-bearing horizon at a depth of 190 feet and probably is fairly characteristic of the type of water derived from the lower beds of the Ravenscrag formation. It is soft and contains 2,190 parts per million of total dissolved solids. The sodium salt

content of the water is high and the total dissolved solid content is almost entirely made up of sodium sulphate and sodium carbonate the sulphate being a little in excess of the carbonate. The sodium chloride (common salt) content of the sample analysed is low, 8 parts per million, but as a rule the water from the Ravenscrag formation contains from 100 to 700 parts per million of sodium chloride. The water analysed can be used for drinking but it is not very satisfactory for cooking as it discolours vegetables. Due to the "soda"taste and the common salt content, the water is often unpalatable and does not quench thirst. The water is very injurious to vegetation.

No samples of water from the sandstone occurring in the southwestern part of the municipality, were analysed, but farmers report that it is hard to medium hard, and is suitable for drinking and stock. Analyses of water obtained from the upper part of the Ravenscrag formation in the municipality to the east show that the water is much harder in character than that obtained at depth.

WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

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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	NE.	2	1	4	2	Drilled	182	1,900	- 60	1,840	182	1,718	Ravenscrag, coal	Soft brown colour	44	D. S. I.	Abundant supply.
2	SW.	4	"	"	"	Dug	14	1,925	- 10	1,915	12	1,913	Glacial, sand	Hard, clear alkaline	44	D. S.	Sufficient supply.
3	NE.	5	"	"	"	"	30	1,920	- 18	1,902	30	1,890	" "	Hard, alkaline	44	S.	Abundant " .
4	NE.	6	"	"	"	"	19	1,930	- 17	1,913	17	1,913	" gravel	Hard, alkaline	50	D. S.	Sufficient " .
5	NW.	6	"	"	"	"	30	1,950	- 29	1,921			" clay	Hard, alkaline		S.	Poor supply, all water is alkaline here.
6	SW.	9	"	"	"	"	40	1,920	- 10	1,910			" blue clay	Hard, alkaline	44	D. S.I.	Sufficient supply.
7	SW.	10	"	"	"	"	30	1,865					" clay			N.	Numerous dry holes dug.
8	NW.	10	"	"	"	Drilled	225	1,880	?	?	225	1,655	Ravenscrag, coal, sand	Soft, soda	46	D. S.	Sufficient supply.
9	NE.	11	"	"	"	"	155	1,825	- 82	1,743	155	1,670	Ravenscrag, sand	" "	44	D. S.	" " , kills plants.
10	SE.	12	"	"	"	"	160	1,825	-120	1,705	160	1,665	" "	" "	44	D. S.	" " , " " .
11	NE.	14	"	"	"	Dug	16	1,860	- 12	1,848	12	1,848	Glacial, sand	Hard, clear	45	D. S. I.	Poor supply.
12	NE.	14	"	"	"	"	16	1,860	- 6	1,854	14	1,846	" "	" "	45	S. I.	Moderate supply.
13	SW.	14	"	"	"	"	28	1,870	- 18	1,852			" blue clay	" alkaline	45	D. S.	Insufficient supply.
14	NW.	14	"	"	"	"	12	1,870	- 8	1,862	8	1,862	" sand	Hard, clear	47	D. S.	Sufficient supply.
15	NW.	16	"	"	"	"	10	1,870	- 7	1,863	7	1,863	" sandy clay	" "	46	D. S. I.	" " .
16	SW.	17	"	"	"	"	25	1,880	- 10	1,870			" gravel	" alkaline	43	D. S.	" " .
17	SW.	18	"	"	"	Drilled	245	1,890	-125	1,765	245	1,645	Ravenscrag, sand	Soft, soda	45	D. S. I	" " from Ravenscrag, no shallow wells.
18	SW.	21	"	"	"	Dug	12	1,870	- 10	1,860	10	1,860	Glacial, sand	Hard, clear	46	D. S. I.	Sufficient supply, numerous dry holes.
19	SE.	22	"	"	"	"	13	1,870	- 7	1,863	7	1,863	" gravel	" "	44	D. S. I.	" " .
20	NE.	22	"	"	"	"	16	1,850	- 14	1,836	16	1,834	" sand	" alkaline	46	N.	Too alkaline for use.
21	SE.	27	"	"	"	"	12	1,800	- 9	1,791	7	1,793	" "	Hard, clear	40	D. S. I.	Abundant supply.
1	SE.	1	1	5	2	Drilled	507	1,953	-				Ravenscrag ?			M.	No information obtainable.
2	SW.	1	"	"	"	Dug	20	1,950	- 10	1,940	19	1,931	Glacial, sand	Hard, clear	43	D.	Small supply.
3	SE.	1	"	"	"	"	27	1,920	- 17	1,903	17	1,903	" "	" "		D. S. I.	Sufficient supply, #.
4	SW.	1	"	"	"	Drilled	210	1,950	-160	1,790	210	1,740	Ravenscrag, coal, sand	Soft, soda		D. S. M.	" " .
5	SW.	1	"	"	"	Dug	25	1,960	- 23	1,937	25	1,935	Glacial, sandy clay	Hard, clear		D.	Moderate supply.
6	SE.	1	"	"	"	"	25	1,960	- 17	1,943	23	1,937	Glacial, sand	" , bitter		N.	Too alkaline for use.

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 COALFIELDS NO. 4

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1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
7	SW.	2	1	5	2	Dug	16	1,970	- 10	1,960	10	1,960	Glacial, sand	Hard, clear	44	D.	Only sufficient for house use.
8	NE.	4	"	"	"	"	18	1,975	- 10	1,965	17	1,958	" "	" "	44	D. S.	Abundant supply.
9	SE.	5	"	"	"	"	26	1,975	- 18	1,957	26	1,949	Ravenscrag, sand-stone	" "	43	D. S. I.	Sufficient supply.
10	SW.	5	"	"	"	"	28	1,970	- 21	1,949	23	1,947	Ravenscrag, sand-stone	" "	42	D. S. I.	Abundant supply.
11	SW.	6	"	"	"	"	30	1,965	- 27	1,938	27	1,938	Ravenscrag, sand-stone	" "	44	D. S. I.	" "
12	SE.	7	"	"	"	"	26	1,960	- 19	1,941	22	1,938	Ravenscrag, sand-stone	" "	42	D. S.	" "
13	SW.	8	"	"	"	"	30	1,960	- 27	1,933	30	1,930	Ravenscrag, sand-stone	" "	42	D. S.	" "
14	NE.	8	"	"	"	"	28	1,964	- 25	1,939	25	1,939	Ravenscrag, sand-stone	" "	43	D. S.	Sufficient supply.
15	SE.	9	"	"	"	"	24	1,970	- 19	1,951	19	1,951	Glacial, sand	" alk-aline	46	D. S.	" "
16	SW.	10	"	"	"	Drilled	270	1,960	- 90	1,870	270	1,690	Ravenscrag, coal, sand	Soft, soda	44	D. S.	Abundant supply.
17	SE.	10	"	"	"	Dug	29	1,965	- 25	1,940			Glacial, blue clay	Hard, alk-aline	42	N.	Too alkaline for use. Practically dry.
18	NW.	11	"	"	"	"	11	1,955	- 10	1,945	10	1,945	" sand	Hard, clear	47	D.	Small supply, #.
19	NE.	11	"	"	"	"	20	1,944	- 18	1,926	18	1,926	" gravel	" "	46	D. S.	" "
20	SW.	12	"	"	"	"	20	1,950	- 15	1,935	16	1,934	" "	" "	44	D. S.	Sufficient supply.
21	SE.	12	"	"	"	"	14	1,945	- 8	1,937	8	1,937	" sand	" "	45	D.	Poor supply.
22	NE.	12	"	"	"	"	17	1,920	- 11	1,909	11	1,909	" "	" "		D. S.	Abundant supply.
23	NE.	12	"	"	"	Drilled	285	1,920	- 85	1,835	285	1,635	Ravenscrag, sand	Soft, soda		D. S.	Sufficient supply.
24	NE.	13	"	"	"	Dug	22	1,880	- 18	1,862	18	1,862	Glacial, gravel	Hard, clear	43	D. S.	" "
25	NW.	15	"	"	"	"	25	1,920	- 15	1,905	24	1,896	" sand	" "	46	D. S.	Insufficient supply.
26	SW.	17	"	"	"	"	36	1,960	- 31	1,929	31	1,929	Ravenscrag, sand-stone	" "	43	D. S. I.	Abundant supply.
27	SW.	18	"	"	"	"	36	1,960	- 30	1,930	30	1,930	Ravenscrag, sand-stone	" "	42	D. S. I.	" "
28	SE.	22	"	"	"	"	12	1,900	- 6	1,894	6	1,894	Glacial, sand	" "	46	D. S. I.	3 wells give sufficient supply.
29	SW.	23	"	"	"	"	12	1,900	- 6	1,894	6	1,894	" "	" "	44	D. S. I.	Sufficient supply.
30	SE.	24	"	"	"	"	12	1,880	- 9	1,871	9	1,871	" "	" "	44	D. S.	" "
31	NW.	24	"	"	"	"	10	1,870	- 6	1,864	8	1,862	" "	" "	44	D. S. I.	" "
32	SW.	25	"	"	"	"	20	1,860	- 15	1,845	15	1,845	" "	" "	44	D. S.	" "
33	SE.	32	"	"	"	"	20	1,850	- 17	1,833	17	1,833	" "	" "	46	D. S.	" "

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

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

WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

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1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
34	NW.	32	1	5	2	Dug	6	1,830	0	1,830			Glacial, sand	Hard, clear	48	D. S.	Abundant supply when spring was deepened.
35	SW.	34	"	"	"	"	20	1,850	− 14	1,836	14	1,836	" gravel	" alkaline	46	S.	Poor supply.
1	SW.	2	1	6	2	Dug	20	1,955	− 10	1,945	20	1,935	Glacial, sand	Hard, alkaline	45	S.	Sufficient supply.
2	NW.	2	"	"	"	"	25	1,960	− 17	1,943	12	1,948	Ravenscrag, sand	" clear	42	D. S.	Abundant supply.
3	NE.	3	"	"	"	"	30	1,950	− 24	1,926	4	1,946	" sand-stone	" "	43	D. S.	" " .
4	SW.	4	"	"	"	"	32	1,870	− 26	1,844	30	1,840	Ravenscrag, coal	Soft, alkaline		S.	" " .
5	SE.	6	"	"	"	"	18	1,875	− 14	1,861	17	1,858	" " clay	" clear	43	D.	Poor supply.
6	SW.	6	"	"	"	"	15	1,850	− 12	1,838	9	1,841	Glacial, sandy clay	" "	45	D. S.	Insufficient supply.
7	NE.	6	"	"	"	"	15	1,910	− 4	1,906	3	1,907	Glacial, sand	Hard "	51	D.	Sufficient for domestic use.
8	SW.	10	"	"	"	"	24	1,950			12	1,938	Ravenscrag, sand-stone	" "	44	D. S.	Abundant supply.
9	NW.	10	"	"	"	"	30	1,930	− 22	1,908	19	1,911	Ravenscrag, sand-stone	" "	44	D. S.	" " .
10	NE.	10	"	"	"	"	20	1,940	− 14	1,926	4	1,936	Ravenscrag, sand-stone	" "		D. S.	" " .
11	NW.	11	"	"	"	"	27	1,960	− 21	1,939	12	1,948	Ravenscrag, sand-stone	" "	43	D. S. I.	" " .
12	SE.	12	"	"	"	"	35	1,960	− 30	1,930	7	1,953	Ravenscrag, sand-stone	" "	43	D. S. I.	" " .
13	SW.	13	"	"	"	"	47	1,965	− 43	1,922	10	1,955	Ravenscrag, sand-stone	" "	44	D. S. I.	" " .
14	NW.	15	"	"	"	"	23	1,950	− 15	1,935	23	1,927	Top of Ravenscrag	Soft, brown colour	45	D. S. I.	" " .
15	SE.	14	"	"	"	"	23	1,940	− 19	1,921	7	1,933	Ravenscrag, sand-stone	Hard, clear	44	D. S. I.	" " .
16	SW.	16	"	"	"	"	30	1,925	− 25	1,900	9	1,916	Ravenscrag, sand-stone	" "	44	D. S.	" " .
17	NW.	16	"	"	"	"	15	1,900	− 11	1,889	11	1,889	Ravenscrag, sand-stone	" "	43	D. S.	Sufficient supply.
18	SE.	17	"	"	"	"	35	1,925	− 27	1,898	15	1,910	Ravenscrag, sand-stone	" "	44	D. S. I.	Abundant supply.
19	NW.	17	"	"	"	"	20	1,920	− 9	1,911	17	1,903	Ravenscrag, sand-stone	" "	43	D. S. I.	" " .
20	NE.	18	"	"	"	"	7	1,920	+ 1	1,921	7	1,813	Glacial, sand	Soft, "	45	D. S.	Well fed by springs.
21	SW.	21	"	"	"	"	50	1,920	− 43	1,877	50	1,870	Ravenscrag, sand-stone	Hard, "	45	D. S.	Abundant supply.
22	SE.	22	"	"	"	"	50	1,900	− 45	1,855	50	1,850	Ravenscrag, sand-stone	" "	45	D. S.	" " .
23	SW.	24	"	"	"	"	40	1,940	− 35	1,905	40	1,900	Ravenscrag, sand-stone.	" "	43	D. S.	Sufficient supply.
24	NW.	25	"	"	"	"	55	1,875	− 43	1,832	50	1,825	Ravenscrag, sand-stone, coal	Soft, alkaline	43	D. S.	" " .

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

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

WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

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1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
25	NE.	26	1	6	2	Dug	32	1,900	− 27	1,873	32	1,868	Ravenscrag, sandstone	Hard, clear		D. S.	Sufficient supply.
26	NE.	30	"	"	"	"	24	1,745	− 21	1,724	21	1,724	Stream deposits	" "	44	D. M.	Poor supply for Town of Roche Percee.
27	SE.	32	"	"	"	"	20	1,740	− 14	1,726	13	1,727	" "	" "	42	D.	Only sufficient for domestic use.
28	SE.	32	"	"	"	"	25	1,740	− 18	1,722	22	1,718	" "	" "	42	D.	Insufficient supply.
29	SW.	33	"	"	"	"	27	1,740	− 22	1,718	16	1,724	" "	" "	45	D.	Sufficient supply.
30	SW.	35	"	"	"	"	30	1,740	− 1	1,739	30	1,710	" "	" "	44	D.	Abundant supply.
31	NE.	15	"	"	"	"	41	1,950	− 35	1,915	35	1,915	Ravenscrag, sandstone	" "		D. S.	" " .
1	SW.	1	2	4	2	Dug	24	1,870	− 18	1,852	20	1,850	Glacial, sand	Hard, alkaline	46	D. S. I.	Insufficient supply.
2	SW.	3	"	"	"	"	20	1,750	− 19	1,731	19	1,731	" "	" "		D. S.	Poor supply.
3	SE.	8	"	"	"	"	16	1,850	− 12	1,838	12	1,838	" "	" "	46	D. S.	Sufficient supply.
4	SE.	16	"	"	"	"	17	1,870	− 4	1,866	13	1,857	" "	" clear	53	D. S.	" " .
5	NW.	19	"	"	"	"	14	1,870	− 5	1,865	5	1,865	" "	" "	50	D. S. I.	" " .
6	SE.	22	"	"	"	"	10	1,880	− 4	1,876	5	1,875	" "	" "	48	D. S. I.	Moderate supply.
7	SE.	22	"	"	"	"	6	1,880	− 4	1,876	4	1,876	" "	" "	48	D. S. I.	Abundant supply.
8	SE.	26	"	"	"	"	22	1,870					" clay	" alkaline		D. S.	2 pails a day.
9	NW.	27	"	"	"	"	12	1,870	− 9	1,861	9	1,861	" sand	" clear	44	D. S.	Sufficient supply.
10	SE.	28	"	"	"	"	13	1,870	− 11	1,859	13	1,857	" gravel	" cloudy	44	D. S. I.	" " .
11	SE.	28	"	"	"	"	12	1,860	− 5	1,855	5	1,855	" "	Soft, clear	44	D. S. I.	" " .
12	NE.	30	"	"	"	Drilled	360	1,875	− 40	1,835	200 360	1,675 1,515	Ravenscrag, sand	Hard, " , soda	43	D. S.	Abundant " .
13	SE.	34	"	"	"	Dug	10	1,850	− 6	1,844	5	1,845	Glacial, sand	Soft, clear	48	D. S.	Sufficient " .
14	SW.	35	"	"	"	"	12	1,840	+ 8	1,848	6	1,834	" "	" soda	48	D. S.	Spring, abundant supply.
1	NW.	11	2	5	2	Dug	24	1,760	− 20	1,740	24	1,736	Glacial, clay, boulders	Hard, clear	46	D. S.	Sufficient supply.
2	SE.	15	"	"	"	"	16	1,855	− 7	1,848	16	1,839	Glacial gravel	" "	44	D. S. I.	" " .
3	SW.	15	"	"	"	"	16	1,855	− 11	1,844	16	1,839	" "	" "	46	D. S.	Abundant supply.
4	NE.	15	"	"	"	"	25	1,860	− 22	1,838	25	1,835	" sandy clay	" "	44	D. S. I.	Insufficient supply.
5	NW	17	"	"	"	"	12	1,855	− 6	1,849	9	1,846	" sand	" "	45	D. S. I.	Sufficient supply.

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

WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	NE,	19	2	5	2	Dug	38	1,870	- 35	1,835	35	1,835	Glacial, gravel	Hard, clear, alkaline	45	D. S.	Poor supply.
7	SW,	20	"	"	"	"	38	1,860	- 37	1,823	38	1,822	" "	Hard, cloudy	47	D. S.	Moderate supply.
8	NW.	20	"	"	"	"	12	1,870	- 8	1,862	8	1,862	" "	Soft, clear	44	D. S. I.	Small supply.
9	SE,	22	"	"	"	"	10	1,865	- 5	1,860	5	1,860	" clay	Hard, cloudy	44	D. S.	Insufficient supply.
10	SE.	22	"	"	"	"	28	1,865	- 26	1,839	28	1,837	" sandy, clay	" "	44	S.	Sufficient supply.
11	NE.	22	"	"	"	"	19	1,865	- 17	1,848	17	1,848	" sand	" clear	45	S. I.	Moderate supply.
12	NW.	23	"	"	"	"	20	1,870					" clay			N.	Dry holes.
13	NE.	24	"	"	"	"	11	1,870	- 9	1,861	9	1,861	" gravel	" " alkaline		S.	Poor supply.
14	NW.	28	"	"	"	"	9	1,895	- 4	1,891	9	1,886	" "	Hard, clear	52	D. S. I.	Sufficient supply.
15	NW.	28	"	"	"	Drilled	360	1,895	-160	1,735	360	1,535	Ravenscrag, sand	Soft, soda		D. S.	Well plugged with sand in 1935, Kills plants.
16	SE.	32	"	"	"	Dug	23	1,885	- 21	1,864	21	1,864	Glacial, sand	Hard, clear	46	D. S. I.	Moderate supply.
17	NW.	35	"	"	"	"	17	1,891	- 7	1,884	7	1,884	" clay	" alkaline		D. S.	Shortage of water on this farm.
18	SW.	36	"	"	"	"	6	1,870	0	1,870	2	1,868	" sand	Soft, clear		D. S.	Abundant supply.
1	NW.	3	2	6	2	Drilled	226	1,870	- 60	1,810	226	1,644	Ravenscrag	Soft, clear	45	D. S.	Abundant supply.
2	SE.	6	"	"	"	"	265	1,865	-165	1,700	127	1,738	" fine sand	" "		N.	Plugged with sand.
3	SW.	7	"	"	"	Dug	21	1,870	- 17	1,853	13	1,857	" sand	Hard, clear, alkaline	42	S.	Insufficient supply.
4	SW.	10	"	"	"	Drilled	190	1,880	- 60	1,820	155	1,725	" "	Soft, clear, soda	43	D. S. I.	M. and S. Mine, Bienfait #, 1,000 gals. an hour.
5	SE.	14	"	"	"	Dug	20	1,895	- 10	1,885	8	1,887	Glacial, gravel	Hard, clear	43	D. S.	Sufficient supply.
6	SW.	14	"	"	"	Drilled	165	1,875	- 65	1,810	116	1,759	Ravenscrag, sand	" "	46	D. S.	" for local needs.
7	NW.	14	"	"	"	Dug	16	1,900	- 12	1,888	13	1,887	Glacial "	" " alkaline		D. S.	Insufficient supply, other water too alkaline for use.
8	SE.	16	"	"	"	Drilled	178	1,890	?	?	178	1,712	Ravenscrag	Soft, clear	43	D. S.	Sufficient supply.
9	NW.	18	"	"	"	"	273	1,900	- 25	1,875	?	?	"	" "	44	D. S. I.	" "
10	NW.	19	"	"	"	"	126	1,905	- 60	1,845	125	1,780	" sandstone	" "	44	M.	Supplies town of Bienfait.
11	SW.	20	"	"	"	Dug	40	1,900	- 25	1,875	25	1,875	" "	" "	41	D. S. I.	Abundant supply.
12	SW.	22	"	"	"	"	37	1,900	- 33	1,867	35	1,865	Glacial, sand	Hard, " alkaline	42	S.	Poor supply, alkaline water.
13	NW.	22	"	"	"	"	20	1,900	- 14	1,886	16	1,884	" gravel	Hard, clear	44	S.	Insufficient supply.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
14	SW.	23	2	6	2	Dug	26	1,910	- 21	1,889	22	1,888	Glacial, sand	Hard, clear, alkaline	42	D. S.	Poor supply.
15	NE.	24	"	"	"	"	25	1,860	- 2	1,858	?	?	" sand, clay	Hard, clear		D. S.	" "
16	SE.	24	"	"	"	Drilled	260	1,875	-180	1,695	260	1,615	Ravenscrag, sand	" alkaline	45	D. S. I.	Sufficient supply.
17	SW.	25	"	"	"	Dug	10	1,900	- 6	1,894	6	1,894	Glacial, sand	" clear, alkaline	46	S.	Poor supply.
18	SE.	26	"	"	"	"	33	1,910	- 26	1,884	32	1,878	" "	Hard, clear, alkaline	40	D.	Hauls water and melts snow for stock.
19	NE.	28	"	"	"	Drilled	160	1,910			160	1,750	Ravenscrag ?	Hard, clear, alkaline	42	D. S.	Sufficient supply.
20	SW.	28	"	"	"	"	120	1,900	- 60	1,840	120	1,780	" sandstone	Soft, clear		D. S.	Abundant supply.
21	SW.	29	"	"	"	"	150	1,900	- 60	1,840	138	1,762	" "	" "		D. S.	" "
22	SW.	31	"	"	"	Bored	73	1,900	- 65	1,835	25	1,875	" "	Hard, "	45	D. S.	Sufficient supply.
23	SW.	32	"	"	"	Drilled	126	1,875	- 96	1,779	126	1,749	"	Soft, "	45	D. S. I.	Abundant supply.
24	NE.	32	"	"	"	"	140	1,895	- 35	1,860	140	1,755	"	Hard, " alkaline	44	D. S.	" "
25	NE.	36	"	"	"	"	280	1,880			280	1,600	"	Hard, clear	45	D. S.	Sufficient supply.
1	NW.	1	3	4	2	Dug	16	1,885	- 6	1,879	15	1,870	Glacial, sand	Hard, clear		D.	Only sufficient for house use.
2	NE.	2	"	"	"	Drilled	320	1,885	-100	1,785	320	1,565	Ravenscrag, sand	" "		D. S. I.	Waters 60 head of stock.
3	SW.	3	"	"	"	Dug	10	1,875	- 4	1,871	6	1,869	Glacial, sand	" "		S.	Only waters 10 head of stock.
4	SW.	6	"	"	"	"	25	1,885	- 23	1,862			" clay	" cloudy		D.	Only sufficient for house use.
5	SE.	7	"	"	"	"	15	1,880	- 11	1,869	11	1,869	" sand	" clear		S.	Waters 35 head of stock.
6	NE.	9	"	"	"	"	18	1,875	- 9	1,866	17	1,858	" "	" "	49	D. S. I.	" 30 " " " in summer.
7	NE.	11	"	"	"	"	20	1,890	- 10	1,880	10	1,880	" "	" "	45	D. S.	Insufficient supply.
8	SW.	13	"	"	"	"	25	1,895	- 2	1,893			" "	" "		D. S. M.	Sufficient supply for Town of Frobisher, #.
9	SW.	13	"	"	"	"	18	1,895	- 12	1,883	12	1,883	" "	" "	44	D. S. I.	Waters 15 head of stock.
10	SE.	14	"	"	"	"	10	1,895	- 4	1,891			" clay	" "		D. S.	Seepage from dugout.
11	NW.	15	"	"	"	"	12	1,900	- 10	1,890	10	1,890	" sand	" "		D. S.	3 pails a day.
12	NE.	16	"	"	"	"	10	1,890	- 8	1,882	8	1,882	"	" "	49	D. S.	Sufficient for local needs.
13	SE.	18	"	"	"	"	18	1,890	- 17	1,873	17	1,873	"	" cloudy		D. S.	2 wells water 25 head of stock.
14	SE.	19	"	"	"	"	8	1,895	- 3	1,892	3	1,892	" sand	Soft, clear		D. S.	Insufficient for local needs.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
15	NE.	20	3	4	2	Dug	20	1,900	- 17	1,883	17	1,883	Glacial, sand	Hard, clear		D. S.	Waters 12 head of stock.
16	NE.	21	"	"	"	"	20	1,900	- 5	1,895			" blue clay	" "		D.	Very poor supply.
17	SW.	22	"	"	"	"	10	1,895	- 8	1,887	8	1,887	" sand	" "		D. S.	Waters 50 head of stock in summer.
18	SW.	23	"	"	"	"	12	1,890	- 7	1,883	7	1,883	" gravel	" "		D. S.	Abundant supply.
19	SE.	23	"	"	"	"	16	1,900	- 12	1,888	12	1,888	" "	" "		D. S. I.	Sufficient supply.
20	SE.	23	"	"	"	Drilled	329	1,900	-130	1,770	315	1,585	Ravenscrag, sand	" brown colour		D. S.	Abundant supply.
21	SW.	24	"	"	"	Dug	20	1,900	- 19	1,881	20	1,880	Glacial, sand	Hard, clear	48	D. S.	Used for house and 1 team of horses.
22	NE.	30	"	"	"	Drilled	375	1,905	-200	1,705	375	1,530	Ravenscrag,	" "		D. S.	Sufficient supply.
23	SW.	30	"	"	"	Dug	14	1,900	- 6	1,894	6	1,894	Glacial, clay	" "		D. S.	Insufficient supply for house use.
24	NW.	30	"	"	"	"	8	1,905	- 4	1,901	4	1,901	" gravel	" "		D. S.	Waters 20 head of stock in summer.
25	NE.	31	"	"	"	Drilled	390	1,905	-130	1,775	390	1,515	Ravenscrag	Soft, "		D. S.	Abundant supply.
26	NE.	31	"	"	"	Dug	14	1,905	- 2	1,903			Glacial, clay	" "		D. S.	Waters 30 head of stock.
27	NW.	32	"	"	"	"	24	1,905									No information.
28	SW.	34	"	"	"	"	20	1,905	- 15	1,890	15	1,890	" gravel	Hard, "	42	D. S.	Only waters 2 head of stock.
29	NW.	35	"	"	"	"	32	1,910	- 6	1,904			" clay	Soft, cloudy		D. S.	Seepage from dugout.
30	NW.	36	"	"	"	"	12	1,905					" "		48	D. S.	" " " .
1	SW.	2	3	5	2	Drilled	360	1,883	- 30	1,853	358	1,525	Ravenscrag, sand	Soft, soda, salty	45	D. S.	Sufficient for 100 head of stock.
2	SE.	3	"	"	"	Dug	20	1,883	- 16	1,867	20	1,863	Glacial, sand	Hard, clear		D.	Only sufficient supply for house use.
3	NW.	3	"	"	"	"	11	1,886	- 6	1,880	6	1,880	" "	Soft, clear		D. S.	Waters 50 head of stock.
4	SE.	7	"	"	"	"	16	1,890	- 9	1,881	4	1,886	" "	Hard, "		D. S.	" 30 " " " .
5	SW.	8	"	"	"	"	13	1,895	- 7	1,888	7	1,888	" "	" "		D. S.	Well goes dry in winter.
6	NE.	8	"	"	"	Drilled	360	1,911	-150	1,761	360	1,551	Ravenscrag, sand	Soft, soda, cloudy	44	D. S.	Abundant supply.
7	SW.	9	"	"	"	Dug	14	1,895	- 10	1,885	10	1,885	Glacial, sand	Hard, clear		D. S.	Well not in use at present.
8	NE.	10	"	"	"	"	13	1,892	- 6	1,886	6	1,886	" "	Soft, "		D. S.	Waters 35 head of stock.
9	SW.	11	"	"	"	"	22	1,874	- 16	1,858	12	1,862	" "	Hard, "	46	D. S.	" 40 " " " .
10	SW.	12	"	"	"	"	20	1,896	- 18	1,878	18	1,878	" gravel	" cloudy	44	S.	Only waters 4 head of stock.

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WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
11	NE.	12	3	5	2	Dug	24	1,890	- 20	1,870	20	1,870	Glacial, gravel	Hard, clear		D. S.	Waters 12 head of stock.
12	SE.	13	"	"	"	"	16	1,895	- 12	1,883	12	1,883	" clay	" "		D. S.	Well was dry in 1935.
13	NE.	14	"	"	"	"	20	1,900	- 18	1,882	7	1,893	" sand	" cloudy		D. S.	Only waters 5 head of stock.
14	SE.	16	"	"	"	"	8	1,895	- 2	1,893	2	1,893	" "	Soft, clear		D. S.	Only sufficient for 10 head of stock, also use dugout.
15	SW.	16	"	"	"	"	15	1,900	- 12	1,888	10	1,890	" "	" "		D.	Only sufficient supply for house use.
16	NW.	16	"	"	"	"	16	1,898	- 14	1,884	14	1,884	" clay	Hard, " alkaline		N.	
17	SE.	19	"	"	"	Drilled	301	1,903	- 80	1,823	301	1,602	Ravenscrag, sand	Soft, clear		D. S.	Abundant supply.
18	NW.	22	"	"	"	Dug	14	1,903	- 6	1,897	6	1,897	Glacial, sand			D.	Only sufficient supply for house use.
19	NE.	23	"	"	"	Drilled	400	1,897	?	?	400	1,497	Ravenscrag, sand	Soft, clear, soda		D. S.	Waters 50 head of stock.
20	NW.	24	"	"	"	Dug	36	1,895	- 25	1,870	35	1,860	Glacial, sand	Hard, clear	47	D. S.	" 8 " " " .
21	NE.	24	"	"	"	"	12	1,900	- 10	1,890	10	1,890	" gravel	" "	47	D. S.	" 50 " " " .
22	SW.	28	"	"	"	Drilled	380	1,915	-200	1,715	380	1,535	Ravenscrag, sand	Soft, " soda		D. S.	" 50 " " " .
23	SW.	29	"	"	"	Dug	12	1,920	- 7	1,913	7	1,913	Glacial, sand	Soft, "		D. S.	Very good supply.
24	SE.	30	"	"	"	Drilled	480	1,907	-100	1,807	480	1,427	Ravenscrag, sand	" " soda		D. S.	Waters 50 head of stock.
25	NW.	30	"	"	"	"	360	1,908	- 90	1,818	360	1,548	" "	Soft, "		D. S.	" 200 " " " .
26	NW.	32	"	"	"	Dug	15	1,925	- 10	1,915	10	1,915	Glacial, clay	Hard, "	45	D.	Only sufficient for house use.
27	NW.	34	"	"	"	Drilled	348	1,920	?	?	348	1,572	Ravenscrag	Soft, "	44	D. S.	Waters 75 head of stock.
28	NE.	34	"	"	"	Dug	22	1,922	- 14	1,908	21	1,901	Glacial, gravel	Hard, "		D.	Only sufficient for house use.
29	SE.	34	"	"	"	"	16	1,920	- 13	1,907	13	1,907	" sandy clay	" alkaline		D. S.	Sufficient supply.
30	SE.	36	"	"	"	Drilled	386	1,920	-160	1,760	386	1,534	Ravenscrag, sand	Soft, clear		D. S.	Abundant supply.
31	SE.	36	"	"	"	Dug	19	1,920	- 14	1,906	17	1,903	Glacial, sand	Hard, "	44	D. S.	Waters 5 head of stock.
1	SE.	3	3	6	2	Drilled	115	1,895	- 30	1,865	105	1,790	Glacial, sand below blue clay	Hard, iron, cloudy	44	S.	Waters 19 head of stock.
2	SE.	5	"	"	"	Dug	36	1,905	- 24	1,881	20	1,885	Glacial, sand	Hard, clear, alkaline		S.	Very alkaline, only waters 18 head of stock.
3	SW.	9	"	"	"	"	12	1,900	- 8	1,892	10	1,890	" "	Hard, clear, alkaline		D. S.	Only waters 5 head of stock.
4	NW.	10	"	"	"	Drilled	310	1,910	- 80	1,830	310	1,600	Ravenscrag, sand	Soft, clear, salty	44	D. S. I.	Abundant supply.
5	NE.	10	"	"	"	Dug	18	1,905	- 8	1,897	4	1,901	Glacial, sand	Hard, clear	44	D. S. I.	Insufficient for local needs.

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WELL RECORDS—Rural Municipality of COALFIELDS NO. 4.

B 4-4
1860—10,000

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in°F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	SE.	13	3	6	2	Drilled	340	1,910	-180	1,730	310	1,600	Glacial, sand, below blue clay	Hard, clear	44	D. S. I.	Abundant supply.
7	SW.	14	"	"	"	Dug	10	1,905	- 8	1,897	9	1,886	Glacial, sand	Hard, clear, alkaline	43	D. S.	Only waters 5 head of stock.
8	NW.	14	"	"	"	"	16	1,900	- 12	1,888	10	1,890	" sandy clay	Hard, clear, alkaline	48	D. S.	Only sufficient for house use.
9	SE.	16	"	"	"	"	10	1,900	- 5	1,895	6	1,895	" sand	Hard, clear		D. S.	Waters 40 head of stock.
10	NW.	16	"	"	"	"	33	1,905	- 10	1,895	11	1,894	" "	" "	43	D. S.	Sufficient supply.
11	SW.	18	"	"	"	Drilled		1,910					?	" iron, alkaline	46	D. S.	" " .
12	SW.	19	"	"	"	Dug	12	1,930	- 5	1,925	10	1,920	Glacial, sand	Soft, clear	47	D. S. I.	Only waters 15 head of stock.
13	NE.	20	"	"	"	"	20	1,910	- 3	1,907	19	1,891	" "	Hard, " alkaline	38	S.	Waters 25 head of stock.
14	SE.	20	"	"	"	Drilled		1,905			100	1,805	Ravenscrag, coal	Soft, soda, salty	43	S.	" 40 " " " .
15	SE.	21	"	"	"	Dug	8	1,905	- 4	1,901	6	1,899	Glacial, sand	Soft, clear	44	D. S. I.	" 29 " " " .
16	NW.	26	"	"	"	"	11	1,910	- 3	1,907			" yellow clay	Hard, "	55	D. S.	Seepage from dugout.
17	SW.	27	"	"	"	Drilled	250	1,905	-100	1,805	250	1,655	Ravenscrag, coal, sand	Soft, soda, brown colour		N.	Plugged with sand.
18	NE.	28	"	"	"	Dug	14	1,905	- 11	1,894	7	1,898	Glacial, sand	Hard, clear		D. S.	Waters 24 head of stock.
19	NW.	29	"	"	"	Drilled	380	1,910	- 80	1,830	370	1,540	Ravenscrag, sand	Soft, " soda	40	D. S. I.	Abundant supply.
20	NW.	33	"	"	"	"	372	1,910	- 80	1,830	370	1,540	" coal, sand	Soft, soda, brown colour		D. S.	" " .
21	SW.	34	"	"	"	Dug	15	1,905	- 7	1,898	7	1,898	Glacial, clay	Soft, clear, alkaline	52	D. S.	Insufficient supply.
22	NW.	35	"	"	"	Drilled	280	1,915	- 40	1,875	274	1,641	Ravenscrag, coal	Soft, clear	41	D. S. I.	Abundant supply.

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

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