

CANADA
DEPARTMENT OF MINES

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

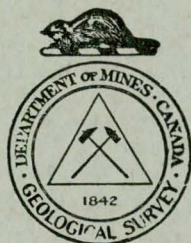
BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY

PRELIMINARY REPORT
GROUND-WATER RESOURCES
OF THE
RURAL MUNICIPALITY OF GRAYSON
No. 184
SASKATCHEWAN

BY

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

Water Supply Paper No. 150



OTTAWA

1936

CANADA
DEPARTMENT OF MINES
BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY

GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY
OF GRAYSON
NO. 184
SASKATCHEWAN

BY
B.R. MacKAY, H.N. HAINSTOCK, and P.D. BUGG

WATER SUPPLY PAPER NO. 150

CONTENTS

	<u>Page</u>
Introduction	1
Glossary of terms used	5
Names and descriptions of geological formations referred to..	8
Water-bearing horizons of the municipality	10
Water-bearing horizons in the unconsolidated deposits	11
Water-bearing horizons in the bedrock	13
Ground water conditions by townships:	
Township 18, Range 4, West of 2nd meridian	14
Township 18, Range 5, " " " "	14
Township 19A, Range 4, " " " "	15
Township 19A, Range 5, " " " "	15
Township 19, Range 4, " " " "	16
Township 19, Range 5, " " " "	18
Township 19, Range 6, " " " "	20
Township 20, Range 4, " " " "	21
Township 20, Range 5, " " " "	23
Township 20, Range 6, " " " "	24
Township 21, Range 4, " " " "	26
Township 21, Range 5, " " " "	27
Township 21, Range 6, " " " "	29
Statistical summary of well information	31
Analyses and quality of water	32
General statement	32
Table of analyses of water samples	36
Water from the unconsolidated deposits	37
Water from the bedrock	38
Well records	39

Illustrations

Map of the municipality.

Figure 1. Map showing surface and bedrock geology that affect the ground water supply.

Figure 2. Map showing relief and the location and types of wells.

GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY

OF GRAYSON, NO. 184

SASKATCHEWAN

INTRODUCTION

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

Publication of Results

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

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

How to Use the Report

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

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

If one intends to sink a well and wishes to find the approximate depth to a water-bearing horizon, he must learn: (1) the elevation of the site, and (2) the probable elevation of the water-bearing bed. The elevation of the well site is obtained by marking its position on the map, Figure 2, and estimating its elevation with respect to the two contour lines between which it lies and whose elevations are give 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

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

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

GLOSSARY OF TERMS USED

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Eastend Formation. The name given to a series of fine-grained sands and silts. It has been recognized at various localities over the southern part of the province, from the Alberta boundary east to the escarpment of Missouri 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 Grayson, No. 184, is an area of approximately 334 square miles in southeastern Saskatchewan. Qu'Appelle river forms the southern boundary. The area consists of seven full townships described as township 19, range 4; townships 20 and 21, ranges 4, 5, and 6; parts of townships 18, ranges 4 and 5; parts of townships 19, ranges 5 and 6; the fractional township 19A, range 4; and part of fractional township 19A, range 5; all west of the Second meridian. The village of Grayson, situated near the centre of the municipality, lies 78 miles east and 18 miles north of Regina.

Crooked lake, an expansion of Qu'Appelle river, lies at an elevation of 1,484 feet above sea-level. The north slope of the valley rises steeply to an elevation of 1,850 feet, and from there the elevation decreases gradually to 1,800 feet in the northwestern part, and 1,750 feet above sea-level in the northeastern part of the municipality. Short, gorge-like valleys, many of which contain intermittent streams, extend northward from Qu'Appelle valley. Kaposvar creek flows in an easterly direction through the northern part of the municipality. Its valley is wide and shallow, and the stream is intermittent, except in the eastern part of the municipality, throughout the greater part of the year. Although the elevation of the plain does not vary more than 50 feet, the ground surface is very rolling and is characterized by numerous hills, ridges, and undrained depressions or sloughs.

Recent alluvium forms the flood-plain of Qu'Appelle river. The greater part of the municipality is covered by moraine. Areas along Kaposvar creek, and an area along Qu'Appelle river in the eastern part of the municipality, are mantled by boulder clay or glacial till.

The deposits of Recent alluvium are composed of silts and sands and range in thickness from 5 to 40 feet. The average vertical section of the glacial till and moraine consists of, in descending order: 1 to 4 feet of top soil; 10 to 30 feet of yellow boulder clay containing scattered pockets of sand and gravel; a discontinuous bed of sand or gravel 3 inches to 4 feet thick; and blue clay containing discontinuous beds of sand and gravel at various elevations. The blue clay is known to extend to a depth of at least 306 feet at one place on the plain, or to an elevation of 1,454 feet above sea-level.

Water-bearing Horizons in the Unconsolidated Deposits

Wells sunk in the Recent alluvium in Qu'Appelle valley yield small supplies of highly mineralized water. Only a few wells have been dug in these deposits, however, as water for stock can be obtained from Qu'Appelle river or from creeks. Numerous flowing springs that occur on the slopes of the valleys yield an abundant supply of slightly mineralized water that is used for domestic, stock, and irrigation purposes. At least forty springs are situated on the NW. $\frac{1}{4}$, sec. 36, tp. 18, range 5, some of which yield sufficient water for large herds of stock.

Most of the residents obtain their supplies of water from an aquifer that lies within the upper 30 feet of the glacial drift. This water-bearing horizon is formed by pockets of sand and gravel that occur within the yellow clay and by a discontinuous layer of sand or gravel that lies between the yellow and blue clay. Small hand augers can be used to advantage in prospecting for this aquifer. Wells that tap pockets of sand and gravel of large areal extent yield an abundant supply of medium hard water that is usable for all general farm purposes. This type of well is quite common in townships 18, ranges 4 and 5, and townships 21, range 4, 5, and 6. Many other wells have tapped smaller pockets of sand and gravel and

yield small or intermittent supplies of more highly mineralized water. Two to five wells of this type are generally used to supply a few head of stock. Small dams and dugouts are also used in some sections to supplement the water supply from the shallow wells.

A second water-bearing horizon is encountered at depths of 35 to 70 feet below the surface. The aquifer is formed by thin layers and pockets of sand that occur within the impervious blue clay. Most of the wells tapping these pockets yield sufficient water for 10 to 15 head of stock, although a few yield sufficient water for 30 to 60 head of stock. The water is strongly "alkaline" and very hard, but it is used for domestic purposes when water of better quality is not obtainable within reasonable hauling distance. This water-bearing horizon is not continuous, as many holes sunk to this depth have failed to locate water. It has been encountered, however, in every township of the municipality, and is the main source of supply in townships 20, ranges 4, 5, and 6, and the northeastern part of township 19, range 4. The residents of the villages of Grayson and Killaly obtain their supply of water from wells that tap such water-bearing pockets.

Drilled wells have encountered layers of sand and gravel within the blue clay in some parts of the municipality, at depths of 75 to 108 feet. These wells are not numerous and the supply from most of them is sufficient only for a few head of stock. The water is of very poor quality, being strongly "alkaline" and very hard, but it is being used for domestic purposes in most instances since water of better quality is not obtainable. It has a marked laxative effect on persons not accustomed to the use of highly mineralized water. This water-bearing horizon is fairly continuous in the central part of township 20, range 4, but it is discontinuous in the other townships and has not been encountered by more than four

wells in each township. The irregular occurrence of this water-bearing deposit is indicated by the many dry holes that have been drilled.

Many holes drilled to depths ranging from 110 to 200 feet were either dry or encountered only small seepages of water. Not one well to this depth yields a sufficient supply of water for local needs and the little water that is obtained is so highly mineralized that it is unfit for use, although it is being used as an auxiliary supply. A 306-foot well on the SE. $\frac{1}{4}$, sec. 22, tp. 20, range 4, tapped an abundant supply of water that was unfit for use as it contained fine material in suspension. A number of holes encountered beds of dry sand and it is possible that the numerous springs along the base of Qu'Appelle valley are draining the water from these beds of sand.

Throughout the municipality there are many undrained depressions that could be deepened and made into reservoirs for the collection of run-off water. In some areas large dams could be constructed across some of the valleys and a supply of water retained for stock purposes. The Provincial Government has constructed a dam in the NE. $\frac{1}{4}$, sec. 27, tp. 19, range 6. It has proved to be a very satisfactory means of retaining run-off water and is used by a number of farmers in that locality. Dugouts are also recommended as a means of storing water for stock use.

Water-bearing Horizons in the Bedrock

The Marine Shale series underlies the glacial drift throughout the municipality. A hole in Qu'Appelle valley on the SE. $\frac{1}{4}$, sec. 36, tp. 18, range 5, 170 feet deep did not encounter the shale, although the base of the hole is at an elevation of 1,330 feet. A 306-foot hole on the SE. $\frac{1}{4}$, sec. 22, tp. 20, range 4, was still in glacial drift when drilling was discontinued. When the bedrock is encountered, drilling should be discontinued as the Marine Shale series is either non-water bearing or contains water that is so highly mineralized as to be rendered unfit for any farm purpose.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 18, Range 4

Qu'Appelle river forms the southern boundary of that part of the township discussed in this report. From the wide flood-plain of Qu'Appelle river, at an elevation of 1,500 feet above sea-level, the slope of the valley rises abruptly to an elevation of 1,850 feet above sea-level. Several deep, gorge-like valleys have been cut in the plain by intermittent streams that drain southward into Qu'Appelle river.

The flood-plain of Qu'Appelle valley consists of Recent deposits of silts, sand, and gravel. The slopes of the valley and the plain above are mantled with glacial till or boulder clay. The area is sparsely settled and only a few wells have been dug. Several farmers obtain their supplies of water from springs and Qu'Appelle river. The dug wells have encountered an abundant supply of water in pockets of sand or gravel in the yellow clay, at depths of less than 20 feet. This water is medium hard and can be used for all farm purposes. Three other wells, ranging from 33 to 48 feet deep, derive moderate supplies of water from discontinuous beds of sand within the blue clay. The water from these wells is more highly mineralized, but is usable for all household purposes. The residents of this township do not experience a shortage of water as springs generally occur along the deep valleys and they are used for watering stock throughout the year.

Township 18, Range 5

Only parts of sections 25, 34, 35, and 36 of this township occur in the municipality of Grayson. This area is occupied by the north slope of the valley and by the flood-plain of Qu'Appelle river. The slope of the valley is mantled by boulder clay or glacial till and the flood-plain is formed by Recent deposits of silts that are quite compact.

An abundant supply of water is obtained from springs that occur along the slope of the valley. The water supply for all farms in this area is derived from these springs and from Qu'Appelle river. At least forty springs are known to exist in the NW. $\frac{1}{4}$, section 36, and most of them flow throughout the year. The water is hard and usable for all farm purposes.

Township 19A, Range 4

This fractional township comprises an area of 9 square miles. Small areas in the southeastern and southwestern corners are covered by boulder clay or glacial till, but the remainder of the area is mantled by moraine. The ground surface of the moraine-covered area is rolling and is characterized by numerous knolls and undrained depressions. Large boulders are of frequent occurrence and some parts of the area are thickly wooded with poplar.

Four wells were recorded in this township and three of them yield an abundant supply of water. They have tapped pockets of sand and gravel in the yellow clay. The water is medium hard and is suitable for all farm needs. The fourth well, situated on the NE. $\frac{1}{4}$, section 2, taps a bed of sand in the blue clay at a depth of 23 feet. The supply of water obtained from this well is small and although the water is highly mineralized it is being used for domestic purposes. A dugout located on the SE. $\frac{1}{4}$, section 2, is used for stock and it will water 50 head. Dugouts could be used for stock in other parts of the township where an adequate supply of water cannot be obtained from shallow dug wells. In 1935 the supply of ground water obtained in the township was sufficient for local needs.

Township 19A, Range 5

This fractional township comprises an area of approximately $5\frac{1}{2}$ square miles. The area is deeply dissected by Qu'Appelle valley and several tributaries, and only three farmers have located in the township.

The flood-plain of Qu'Appelle river is formed by Recent deposits of silts and sands, and the remainder of the township is mantled by glacial till or boulder clay. The main source of water supply is derived from numerous springs that occur along the slopes of the valleys. This water is moderately soft and is suitable for irrigation and domestic purposes. Most of the springs flow throughout the year, so that there is no shortage of water at any season of the year.

Two wells, 33 and 50 feet deep, derive moderate supplies of medium hard water from beds of sand that are overlain by stony blue clay. The water in the 33-foot well is slightly mineralized and does not rise above the sand bed, but the water from the other well is hard and quite highly mineralized. Both wells are used for all farm purposes, but the water from the 50-foot well would probably act as a laxative on those not accustomed to the use of highly mineralized water. There is no shortage of water in this township. It is unlikely that abundant supplies of water will be obtained at depth in this township, either from the glacial drift or from the underlying Marine Shale series and deep drilling is not advised.

Township 19, Range 4

The elevation in this township decreases from 1,850 feet at the south to 1,770 feet above sea-level at the north. The whole area is mantled by moraine and the ground surface is characterized by many small hills, undrained depressions, and numerous large boulders. The upper 30 feet of the glacial drift is composed of yellow or oxidized clay that contains scattered pockets of sand or gravel. A discontinuous layer of sand or gravel, varying from a few inches to 5 or 6 feet, generally underlies the yellow clay and is underlain by blue clay that extends to a depth of at least 210 feet. Thin, discontinuous beds of gravel and sand also occur at different elevations in the blue clay.

The uppermost water-bearing horizon is formed by pockets and lenses of sand and gravel that occur in the oxidized (weathered) zone of the glacial drift. Wells that tap large pockets of sand and gravel within the yellow clay, or thicker beds of sand and gravel at the contact of the yellow and blue clays, yield large amounts of moderately hard water that is often termed soft by the residents. This water is usable for household and irrigation purposes, and in some sections the yield is sufficient to supply 50 to 100 head of stock. Wells that derive water from small pockets of sand and gravel and from thin beds of sand and gravel between the yellow and blue clays, yield smaller supplies of more highly mineralized water. Many of these latter wells become intermittent or go completely dry during periods of drought. In some sections many holes have been sunk before the pockets were located. It is advisable to locate the water-bearing pocket with a small auger before digging.

A second water-bearing horizon occurs at depths of 30 to 60 feet, and extends discontinuously throughout the township. The aquifer is formed by beds of sand in the impervious blue clay. The quantity of water obtained varies with the individual well, but no well will supply more than 60 head of stock and most of them will only supply a few head. The water is more highly mineralized than that derived from the first water-bearing horizon and the iron in some of the water makes it very unsuitable for household purposes, although it is being used. The hydrostatic pressure is usually sufficient to cause the water to rise to points 25 to 40 feet below the surface.

Wells on the SE. $\frac{1}{4}$, section 7, NE. $\frac{1}{4}$, section 15, and SW. $\frac{1}{4}$, section 29, tap small supplies of highly mineralized water at depths of 75, 90, and 72 feet, respectively. The water is "alkaline" and contains a considerable amount of iron, and that from the 75- and 72-foot wells cannot be used for household purposes. These wells are very poor sources of water and are the deepest producing wells in the township. On the SE. $\frac{1}{4}$, section 34, dry holes were drilled 91 and 210

feet deep, and with the exception of the uppermost 30 feet of yellow clay the material penetrated was blue clay.

The water supply in most sections of this township is sufficient for the present number of stock, but it would be necessary to increase the water supply before the number of stock could be increased. It appears inadvisable to drill for water as no continuous water-bearing horizons are known to occur to a depth of 210 feet in the glacial drift. Pockets of water-bearing sand and gravel probably occur, but the uncertainty of encountering them does not warrant the expense of drilling. Farmers are, therefore, advised to excavate deep dugouts in slough basins or other localities where the maximum amount of run-off water will be collected, or to construct small dams and thus retain a supply of water for stock use.

Township 19, Range 5

Qu'Appelle valley dissects the southwestern corner of the township and is occupied by Crooked lake which lies at an elevation of 1,484 feet above sea-level. The north slope of the valley rises abruptly to an elevation of 1,800 feet, which is the average elevation of the township. A deep valley, which contains an intermittent creek, drains the western part of the township. Most of the area is mantled by moraine and is quite rolling, and characterized by numerous undrained depressions. A small area along the southern boundary and an area bordering the deep valley in the western part are mantled by glacial till or boulder clay. The upper part of the glacial till and moraine generally consists of a 30-foot zone of yellow clay that contains scattered pockets of sand or gravel, and it is underlain by a discontinuous bed of sand or gravel. Blue clay, containing discontinuous beds of sand and gravel, underlies the upper zone and extends to a depth of at least 111 feet.

The scattered pockets of sand and gravel and the bed of sand or gravel that in places lies between the yellow and blue boulder clays form a water-bearing horizon. In some sections a number

of holes have been sunk before the aquifer was located. In such areas it is advisable to prospect with a small hand auger prior to digging a well. A few wells tapping this horizon yield fairly large quantities of moderately hard water that is being used for all farm purposes. Those that have tapped small pockets of sand or gravel yield small supplies of more highly mineralized water that is sufficient only for domestic purposes and a few head of stock.

Although this uppermost aquifer is the main source of water for the township, the supply is inadequate in many sections and holes have been sunk to a depth of 111 feet in attempting to locate other water-bearing horizons. Several wells, ranging in depth from 35 to 78 feet, have encountered beds of sand and gravel within the impervious blue clay, and some of them yield large supplies of water. This water is very hard, "alkaline", and usually has a high iron content, although the water from most of the wells is being used for drinking and other household uses. It may act as a laxative on those not accustomed to the use of highly mineralized water.

A well on the NW. $\frac{1}{4}$, section 30, encountered a water-bearing sand at a depth of 111 feet, or an elevation of 1,699 feet above sea-level. This is the deepest well in the township and the water rises to a point 81 feet below the surface. It is very highly mineralized and cannot be used for household purposes. The areal extent of this aquifer is not known, but holes drilled to a depth of 90 feet, on sections 15 and 16, did not encounter it. The water-bearing deposits that occur at depth in the thick mantle of glacial drift apparently occur as pockets rather than continuous layers. Should these pockets be tapped by wells a fairly abundant supply of highly mineralized water is to be expected, but the uncertainty of encountering an aquifer does not appear to warrant the expense of deep drilling. Farmers are, therefore, advised to construct small dams in ravines or to excavate deep dugouts in order to retain a supply of run-off water and increase their present supply of water. Slough basins offer excellent locations

for the excavation of dugouts, since the maximum amount of run-off water will be collected in these depressions. Dugouts should be made at least 12 feet deep.

Township 19, Range 6

Sections 13, 21 to 36, inclusive, and parts of sections 19 and 20, of this township, occur within the municipality of Grayson. The southern boundary of the area under discussion is formed by Qu'Appelle river, Shesheep Indian Reserve, and Crooked lake. The elevation rises from 1,484 feet at Crooked lake to 1,850 feet above sea-level in the western part, and 1,800 feet in the eastern part of the area. Several deep tributary valleys join Qu'Appelle valley.

Recent deposits of sand and silt form the flood-plain of the river, but the remainder of the area is overlain by moraine. The upper 10 to 30 feet of the moraine is composed of oxidized or yellow clay containing a few pockets of sand or gravel at or near its base. It is underlain by impervious blue clay which extends to a depth of at least 200 feet. Pockets and discontinuous layers of sand and gravel also occur sparingly within the blue clay.

A few wells have encountered pockets of sand and gravel at a depth of approximately 20 feet that yield moderate supplies of medium hard water. The water-bearing deposits are not numerous and many dry holes have been dug. The water obtained is usable for all farm purposes, but the supply from **any well** is not sufficient for more than 40 head of stock. An abundant supply of water is not to be expected from the upper 30 feet of the drift, and prospecting with a small hand auger is recommended as a means of locating a water-bearing deposit.

Two wells on the NE. $\frac{1}{4}$, section 28, and the NW. $\frac{1}{4}$, section 32, derive very small supplies of highly mineralized water from thin beds of sand that occur at depths of 65 and 60 feet in the blue clay. The water is unfit for drinking but it is being used since water of better quality is not obtainable. The water-bearing beds are not continuous,

as dry holes have been dug, but similar deposits should exist throughout the township.

In the northeastern corner of the township several wells obtain water from beds of fine sand at depths ranging from 75 to 90 feet. The water is under hydrostatic pressure and rises to points 30 to 60 feet below the surface, and the supply is sufficient for 20 to 50 head of stock. The water is highly mineralized and is not suitable for drinking. The aquifers tapped by these wells are also discontinuous, as deeper holes in other parts of the township did not encounter water.

A 105-foot well on the SE. $\frac{1}{4}$, section 36, is deriving an abundant supply of very "alkaline" water from a gravel bed that lies at an elevation of approximately 1,700 feet. The water is under slight hydrostatic pressure and rises to a point 80 feet below the surface. The water is being used for stock, but is unfit for domestic purposes. This aquifer is not continuous, but other similar deposits probably occur at or near this horizon within the thick deposit of glacial drift.

Although numerous holes have been dug and drilled to depths of 20 to 200 feet there is a shortage of water throughout this township. As there are no known continuous water-bearing horizons in the drift it is questionable if drilled wells will be successful. To increase the supply of water it is, therefore, necessary to excavate dugouts or construct dams to retain the run-off waters. Slough basins are excellent locations for dugouts, since a maximum amount of surface water drains into them. The Provincial Government has constructed a dam in the NW. $\frac{1}{4}$, section 27, and the water retained is the main source of supply for many farmers in that vicinity.

Township 20, Range 4

This township is mantled throughout by moraine, and its ground surface is characterized by numerous small boulder-strewn knolls and undrained depressions. The elevation varies from

approximately 1,735 feet to 1,780 feet above sea-level. A thick growth of poplar occurs in some sections. The moraine is generally composed of 10 to 30 feet of yellow clay and an underlying, unknown thickness of impervious blue clay. Pockets and discontinuous layers of sand and gravel occur at various elevations within these deposits.

Small supplies of moderately hard, usable water are obtained from pockets of sand in the yellow clay in some sections of the township. The wells tapping these pockets are from 20 to 30 feet deep. The supply from these shallow wells is only sufficient, however, for household purposes and a few head of stock, and farmers using such wells must supplement the supply by dugouts and dams, or haul water from wells that yield a permanent supply.

Several wells have encountered a discontinuous aquifer at depths of 35 to 65 feet below the surface, or at an average elevation of 1,700 feet. This aquifer is formed by sand or gravel deposits that occur within the blue clay. The supply from an individual well is generally sufficient for 20 to 60 head of stock, but the water is very "alkaline", contains iron, and is unsuitable for domestic purposes, although it is generally being used for the household.

Wells in sections 7, 15, 18, 20, 21, 22, and 28 tap water-bearing sands at depths of 72 to 90 feet or at an approximate elevation of 1,670 feet. These water-bearing deposits may be fairly continuous. The water contains a large amount of mineral salts in solution and is termed "alkaline". It contains sufficient iron to stain water containers and when the water comes in contact with the air some of the iron settles as a reddish brown precipitate. The water from most of the wells is usable for household purposes, although to one not accustomed to its use it may act as a laxative. The supply from several of the wells is sufficient for 75 to 100 head of stock, but that from a few is adequate for only a few head. Should other wells be sunk to these depths similar deposits will probably be encountered. A 108-foot well in the NE. $\frac{1}{4}$, section 28, obtains an abundant supply of

water, similar to that derived from the above wells, from a bed of sand at an elevation of 1,627 feet. The hydrostatic pressure is sufficient to cause the water to rise to points 20 to 60 feet below the surface in all the wells.

A well on the SE. $\frac{1}{4}$ section 22, obtains an abundant supply of water from a bed of very fine sand at a depth of 306 feet. A layer of water-bearing gravel was passed through at a depth of 165 feet. The fine silty material from the aquifer remains in suspension in the water making it unusable.

Although water-bearing deposits exist throughout the thick mantle of glacial drift they do not occur as continuous horizons, and no fixed elevation or depth at which water might be obtained can be stated. It appears advisable, therefore, to conserve the run-off water by dams or dugouts, rather than to drill deep wells.

Township 20, Range 5

This township is mantled by moraine and the ground surface is characterized by rock-strewn knolls and undrained depressions. The elevation varies from 1,765 to 1,800 feet. The upper 30 feet of the drift is composed of yellow clay, and it is underlain by impervious blue clay to a depth of at least 110 feet. Pockets of sand and gravel occur in places throughout the clays.

The deposits of sand and gravel that occur within the yellow clay, or between it and the blue clay, form the aquifers in a number of shallow wells in the northern sections of the township. A fairly abundant supply of moderately hard water is derived from these wells. This horizon is not continuous, however, and dry holes probably will be dug before a producing well is obtained.

The main supply of water in the township is derived from an horizon that occurs at depths of 35 to 70 feet. The horizon is not continuous, although it has been encountered in all parts of the township, but is formed by fairly extensive deposits of sand and gravel

in the blue clay. The water from the different wells varies greatly in quality and quantity, as does the hydrostatic pressure, and these facts bear out the assumption that the wells tap separate pockets of sand or gravel. The water is usually "alkaline" and contains a considerable amount of iron, but it is being used for domestic purposes in many localities. The water from wells on the NE. $\frac{1}{4}$, section 5, and the SW. $\frac{1}{4}$, section 28, is very highly mineralized. The aquifer in the well on section 28 is formed of a bed of bluish carbonaceous material. The water from these wells should not be used for stock. The village of Grayson uses a 45-foot well, and the water from it is reported as soft. The yield from this well is sufficient for the local needs of the village. A sufficient supply for local needs may be obtained from this second water-bearing horizon, but the water will probably be highly mineralized.

A well on the SW. $\frac{1}{4}$, section 8, taps a sand aquifer at a depth of 110 feet and yields a large supply of water. The water is under hydrostatic pressure and rises to a point 50 feet below the surface, where it maintains a constant level. It is highly mineralized and is usable only for stock. No other wells have been drilled to this depth, so the areal extent of the aquifer is unknown. As the glacial drift is very thick it is probable that water-bearing deposits exist in it, but the quality of the water to be obtained does not warrant the expense of deep drilling. The water supply on most of the farms is sufficient for local needs. Dugouts and dams can be used to store the run-off water for stock use, and the water thus retained would be more beneficial to stock than the highly mineralized water from the wells.

Township 20, Range 6

The surface of this township is very rolling and slopes from an elevation of 1,850 feet in the southwestern corner to 1,800 feet in the northeastern corner. It is mantled by moraine, and small knolls and undrained depressions are common. The southern part of the

township is fairly thickly wooded with poplar.

The uppermost source of ground water in this area is formed by the pockets of sand and gravel that occur in the upper 30 feet of the drift. The pockets are of small areal extent and most of the wells tapping them do not yield an abundant supply of water. The water contains a considerable amount of mineral salts in solution, but it is of better quality than that obtained at greater depths in the drift, and is being used for household purposes. Some difficulty is experienced in locating the water-bearing deposits, and in some sections a number of dry holes have been dug before a producing well was obtained.

Deposits of sand and gravel that occur in the blue clay, at depths of 35 to 70 feet, have been encountered by seventeen wells throughout the township. The supply from the individual wells is usually sufficient for 20 to 80 head of stock. The water is very hard, and slightly "alkaline", but that from most wells is being used for drinking although it would act as a laxative on people not accustomed to its use. The deposits that form the aquifers for these wells do not occur as a continuous horizon, as several holes have been dug to a depth of 70 feet or more without obtaining water.

A few attempts have been made to locate water at depth, but no continuous horizons exist within the upper 130 feet of drift. Wells in the NE. $\frac{1}{4}$, section 2, and the NE. $\frac{1}{4}$, section 6, were drilled to depths of 130 and 100 feet and obtain only small supplies of water. It is possible that other drilled wells may locate abundant supplies of water, but the uncertainty of encountering an aquifer, the poor quality of the water that is usually obtained at depth, and the expense involved do not appear to warrant deep drilling in this township. The construction of dams or the excavation of dugouts to retain the run-off water for stock use is recommended.

Township 21, Range 4

The ground surface of this township is very rolling and is characterized by many knolls and undrained depressions. The elevation is approximately 1,735 to 1,750 feet throughout the area. Kaposvar creek flows across the central part of the township in a wide, shallow valley. The flow of water in Kaposvar creek in the western part of the township is intermittent, but it becomes permanent in the southeastern part. Small areas along the creek and in the northeastern corner are mantled by boulder clay or glacial till, and the remainder of the township is covered by moraine. Deposits of gravel are extensive in parts of sections 7, 8, 9, 17, 18, 28, and 29, and have a thickness of 5 to 20 feet, but elsewhere they occur as scattered pockets within the upper 30 feet of the drift which consists largely of yellow clay. Blue clay underlies the yellow clay and extends to a depth of at least 100 feet; it also contains discontinuous layers of sand or gravel.

The main source of ground water in this township is derived from wells that tap the extensive deposits of sand and gravel in the sections mentioned above, and the small pockets of sand or gravel in the yellow clay. The supply from wells that encountered the larger deposits is sufficient for 30 to 60 head of stock, and the water is moderately hard and suitable for all farm purposes. The supply from the smaller pockets is usually intermittent, and the water more highly mineralized. Two or more wells of this type are used to obtain sufficient water for a few head of stock. Care should be taken to see that these shallow wells do not become polluted by surface water that contains sewage.

Several wells in different sections of the township have tapped thin layers of sand or gravel in the blue clay, at depths of 35 to 67 feet. They yield small quantities of highly mineralized water that is under slight hydrostatic pressure. The water is being used for all farm purposes, but it may act as a laxative on those not accustomed

to its use. The aquifers for these wells are not continuous and holes have been sunk to a depth of 100 feet without encountering water-bearing deposits.

A well on the SW. $\frac{1}{4}$, section 10, obtains a sufficient supply of water for 70 head of stock from a bed of sand at a depth of 80 feet. The water contains a considerable amount of iron, but it is being used for all farm purposes. The hydrostatic pressure is sufficient to cause the water to rise to a point 45 feet below the surface. This horizon is of small areal extent as a hole on the NE. $\frac{1}{4}$, section 4, drilled to a depth of 100 feet, was dry. Similar water-bearing deposits probably occur in the glacial drift throughout the township.

Most farms in this township are supplied with sufficient water for local needs, but a few farmers are forced to haul water for their stock. Water-bearing deposits probably occur discontinuously throughout the lower part of the drift mantle, but no deep wells have been drilled. Dugouts or dams could be used to collect surface runoff water for stock use on those farms where an adequate supply cannot be derived from wells.

Township 21, Range 5

Kaposvar creek flows intermittently in a southeasterly direction through the central part of this township. An area extending from $\frac{1}{2}$ mile to 2 miles on both sides of the creek is mantled by boulder clay or glacial till. The remainder of the township is covered by moraine. The ground surface of the moraine-covered part is characterized by knolls and undrained depressions. The elevation varies from 1,750 to 1,780 feet above sea-level. The glacial deposits generally consist of 10 to 30 feet of yellow clay, containing scattered pockets of sand and gravel, and blue clay that contains thin, discontinuous beds of sand and gravel and extends to a depth of at least 140 feet.

A number of holes have been dug in the upper 30 feet of the drift in an effort to locate adequate supplies of water. Small, isolated pockets of sand or gravel were encountered by twenty wells, and they usually yield sufficient water for local needs. The water is moderately hard, suitable for drinking and for stock, and is sometimes used for the irrigation of gardens. The supply from some of the wells is intermittent, and in such cases a number of wells are used in order to obtain an adequate supply, or water is hauled. Dams or dugouts are recommended as a means of collecting the run-off water for stock use. Small hand augers should be used to prospect the upper 30 feet of the drift prior to digging a well.

Attempts have also been made to obtain water at depths of 40 to 60 feet, but most of the holes were dry. A few encounter thin beds of water-bearing sand, but the supply of water from any of the wells is not sufficient for 10 head of stock. The water is highly mineralized and is unfit for drinking, although that from two wells is being used. A large supply of water is not to be expected from this depth.

Seven holes, ranging from 100 to 140 feet in depth, were drilled in different sections of the township and with the exception of the one in the NE. $\frac{1}{4}$, section 22, none of them encountered water-bearing horizons. The well on section 22 contained 2 feet of water, but it was so highly mineralized that it was unfit for use. The holes on the south half of section 20 struck dry sand and gravel at depths of 100 and 108 feet. In the hole in the SW. $\frac{1}{4}$, section 30, drilling was discontinued in blue clay at a depth of 140 feet. It is possible that water-bearing beds exist at greater depths, but the quality of water to be obtained and the expense involved do not warrant drilling to depth.

This township experiences a shortage of water, and the best method to increase the supply is to collect surface run-off water by dams or dugouts.

Township 21, Range 6

This township has an average elevation of 1,800 feet above sea-level. Kaposvar creek flows through the northeastern corner and boulder clay or glacial till mantles an area on both sides of the creek, the ground surface of which is undulating. The remainder of the township is covered by moraine, the surface of which is characterized by ravines, knolls, and undrained depressions.

The upper 10 to 20 feet of the drift is composed of yellow clay that contains scattered deposits of sand and gravel. This zone is underlain by blue clay which probably extends to the underlying bedrock. The blue clay also contains discontinuous deposits of sand and gravel.

The deposits of sand and gravel in the yellow clay form the uppermost water-bearing horizon in the glacial drift. Practically all wells in the township are dug to this horizon, but none of them obtains an abundant supply of water. By using two or more wells, however, a sufficient supply for 50 to 60 head of stock is obtained. The water is moderately hard and is suitable for all farm uses. These water-bearing deposits should be located by a small test auger before the well is dug.

Three wells, located on the NE. $\frac{1}{4}$, section 3, SW. $\frac{1}{4}$, section 5, and NW. $\frac{1}{4}$, section 8, struck water at depths of 32, 57, and 37 feet, respectively. The aquifers are formed by discontinuous deposits of sand and gravel in the blue clay. The water is hard and "alkaline", and is not suitable for drinking although the water from two of the wells is being used. The water is under slight hydrostatic pressure. The well on section 3 will supply 30 head of stock, but the others yield smaller quantities of water. Similar deposits may exist, but they probably will yield highly mineralized water.

Three wells, located in the NE. $\frac{1}{4}$, section 7, SE. $\frac{1}{4}$, section 10, and NW. $\frac{1}{4}$, section 20, encountered water-bearing deposits at depths of 105, 74, and 95 feet, respectively, or at an elevation of

1,715 feet. The water contains a large amount of mineral salts in solution, cannot be used for drinking, and causes scour in stock. The well on section 10 was filled in. The hydrostatic pressure in the wells in sections 7 and 20 is sufficient to cause the water to rise to points 40 and 60 feet below the surface. This water-bearing horizon may be of considerable areal extent. The poor quality of water obtained, however, does not warrant drilling to this aquifer.

Water-bearing deposits probably occur within the drift below a depth of 105 feet, but it is not advisable to sink deep holes as the water would be highly mineralized. Dugouts and dams are recommended as a means of collecting and storing run-off water for stock use. They can be made at less expense than drilling a deep well and the water collected is not as highly mineralized and is more beneficial for stock. Dugouts should be at least 12 feet deep and situated in such localities as to collect the maximum amount of run-off water. Wells dug beside the dams or dugouts can be used for domestic purposes. Care should be taken, however, to see that the water is properly filtered.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL
MUNICIPALITY OF GRAYSON, NO. 184, SASKATCHEWAN

	Township		Range		18	18	19A	19A	19	19	19	19	20	20	20	21	21	21	Total No. in Muni- cipality
West of 2nd mer.					4	5	4	5	4	5	6	4	5	6	4	5	6		
<u>Total No. of Wells in Township</u>					8	41	5	5	60	55	55	60	45	113	44	58	53	602	
No. of wells in bedrock					0	0	0	0	0	0	0	0	0	0	0	0	0	0	
No. of wells in glacial drift					8	41	5	5	60	55	55	60	45	113	44	58	53	602	
No. of wells in alluvium					0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<u>Permanency of Water Supply</u>																			
No. with permanent supply					8	40	5	5	5	43	19	55	38	58	32	34	41	428	
No. with intermittent supply					0	0	0	0	7	1	11	5	3	13	1	11	3	55	
No. dry holes					0	1	0	0	3	11	25	0	4	42	11	13	9	119	
<u>Types of Wells</u>																			
No. of flowing artesian wells					0	0	0	0	0	0	0	0	0	0	0	0	0	0	
No. of non-flowing artesian wells					1	0	1	1	22	13	2	31	18	8	5	0	5	107	
No. of non-artesian wells					7	40	4	4	35	31	28	29	23	63	28	45	39	376	
<u>Quality of Water</u>																			
No. with hard water					8	40	5	1	53	23	27	54	33	69	27	37	39	431	
No. with soft water					0	0	0	4	4	0	3	6	8	2	6	8	5	52	
No. with salty water					0	0	0	0	0	0	0	0	0	0	0	0	0	0	
No. with "alkaline" water					2	0	2	0	20	11	11	31	19	24	8	10	15	153	
<u>Depths of Wells</u>																			
No. from 0 to 50 feet deep					8	40	5	5	47	43	28	32	30	88	36	43	50	455	
No. from 51 to 100 feet deep					0	0	0	0	12	11	19	26	14	24	8	11	2	127	
No. from 101 to 150 feet deep					0	0	0	0	0	1	7	1	1	1	0	4	1	16	
No. from 151 to 200 feet deep					0	1	0	0	0	0	1	0	0	0	0	0	0	2	
No. from 201 to 500 feet deep					0	0	0	0	1	0	0	1	0	0	0	0	0	2	
No. from 501 to 1,000 feet deep					0	0	0	0	0	0	0	0	0	0	0	0	0	0	
No. over 1,000 feet deep					0	0	0	0	0	0	0	0	0	0	0	0	0	0	
<u>How the Water is Used</u>																			
No. usable for domestic purposes					7	40	5	4	47	32	22	54	30	65	32	38	38	414	
No. not usable for domestic purposes					1	0	0	1	10	12	8	6	11	0	1	7	6	69	
No. usable for stock					7	40	5	5	57	43	26	59	40	70	33	39	44	468	
No. not usable for stock					1	0	0	0	0	1	4	1	1	1	0	6	0	15	
<u>Sufficiency of Water Supply</u>																			
No. sufficient for domestic needs					8	40	5	5	48	43	19	55	38	57	32	34	41	425	
No. insufficient for domestic needs					0	0	0	0	9	1	11	5	3	14	1	11	3	58	
No. sufficient for stock needs					7	40	4	4	34	31	14	46	29	44	24	28	33	338	
No. insufficient for stock needs					1	0	1	1	23	13	16	14	12	27	9	17	11	145	

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

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

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

Mineral Substances Present

Calcium and Magnesium

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

Sodium

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

Sulphates

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

Chlorides

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

Iron

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

Hardness

Calcium and magnesium salts impart hardness to water. Hardness of water is commonly recognized by its soap-destroying powers as shown by the difficulty of obtaining lather with soap. The total hardness of a water is the hardness of the water in its original state. Total hardness is divided into "permanent hardness" and "temporary hardness". Permanent hardness is the hardness of the water remaining after the sample has been boiled and it represents the amount of mineral salts that cannot be removed by boiling. Temporary hardness is the difference between the total hardness and the permanent hardness and represents the amount of mineral salts that can be removed by boiling. Temporary hardness is due mainly to the bicarbonates of calcium and magnesium and iron, and permanent 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 Grayson, No. 184, Saskatchewan

No.	LOCATION				Depth of well, Ft.	Total dis'vd solids	HARDNESS		CONSTITUENTS AS ANALYSE.				CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source of Water				
	Qtr.	Sec.	Tr. Rge.	Cor.			Total	Perm.	Temp.	Cl.	Alka- linity	CaO	MgO	SO ₄	Na ₂ O	Solids	CaCO ₃	CaSO ₄	MgCO ₃	MgSO ₄		Na ₂ CO ₃	Na ₂ SO ₄	NaCl	
1	NW.	2	19A	4	2	30	2,000	1,900	1,400	500	110	575	540	360	812	133	1,849	575	529		478		86	181	x-1
2	SE.	14	19	4	2	65	340	320	200	120	8	170	50	79	115	9	314	90		67	140	4	13	x-1	
3	NW.	35	19	5	2	84	1,980	1,700	1,700		20	115	250	259	1,218	197	1,785	115	452		772		413	33	x-1
4	NW.	26	20	4	2	65	3,000	2,400	2,200	200	28	410	610	360	1,730	163	2,771	410	922		1,073		320	46	x-1
5	NE.	5	20	5	2	66	12,040	3,000+	3,000+	N.D.	60	245	2100	670	7298	1542	10,534	245	4,770		1,997		3,423	99	x-1

Water samples indicated thus, x 1, are from glacial drift.

Hardness is the soap hardness expressed as calcium carbonate (CaCO₃).

For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

Five samples of ground water from the glacial drift were analysed and the results are listed in the accompanying table. Sample No. 1 was taken from a 30-foot well that taps a bed of gravel lying between the yellow and blue boulder clays. The water has a total dissolved solid content of 2,000 parts per million, the mineral salts being calcium carbonate, calcium sulphate, magnesium sulphate (Epsom salts), sodium chloride (common salt), and sodium sulphate, their abundance decreasing in the order named. This water is being used for stock and domestic purposes, although there is sufficient Epsom salts in solution to have a laxative effect on those not accustomed to the use of such water. It contains 181 parts per million of sodium chloride or common salt, which is uncommonly high for water derived from the glacial drift. This water may be polluted by surface waters. Extreme care should be taken to see that surface waters containing sewage do not seep into the wells, and the water should be frequently tested for bacteria content.

Samples 2, 4, and 5 are taken from wells 65 to 66 feet deep. The total dissolved solid content varies from 340 to 12,040 parts per million in these three wells, and this illustrates the fact that the striking of water unfit for use in one locality does not indicate a widespread condition; usable water may be obtained a short distance away. Sample 2 has a total dissolved solid content of 340 parts, and this water is suitable for all farm purposes. Samples 4 and 5 have a total dissolved solid content of 3,000 and 12,040 parts per million. The water is being derived from layers of gravel within the impervious blue clay, and the blue clay is apparently the source of the mineral salts. Sample 4 is used for all purposes, as water of better quality is not available. Persons not accustomed to highly mineralized water will probably find this water to be laxative. Sample 5 is unfit for any purpose, as the water is bitter and contains "sulphur" (hydrogen sulphide).

The water in sample 2 is moderately hard, but that of samples 4 and 5 is extremely hard.

Sample 3 is taken from an 84-foot well and has a total dissolved solid content of 1,980 parts per million, which is composed mainly of the sulphate salts. The water is being used for household and drinking purposes. Samples 3 and 4 are probably representative of the type of water that is obtained from the glacial drift in this municipality.

The water from many wells is reported to contain sufficient iron in solution to render it unsatisfactory for household purposes. Much of the iron can be eliminated by aerating and filtering the water.

Water from the Bedrock

The Marine Shale series has not been encountered in wells in this municipality. Any water that has been derived from the Marine Shale in this general region is usually too highly mineralized to be used for drinking or for stock.

WELL RECORDS—Rural Municipality of

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
1	NE.	26	18	4	2	Dug	12	1,855	- 8	1,847	10	1,845	Glacial sand	Hard, clear		D, S	Sufficient for 35 head stock.
2	NW.	34	"	"	"	Bored	40	1,850					Glacial drift			N	
3	SE.	34	"	"	"	Dug	20	1,855	- 16	1,839	16	1,839	Glacial gravel	Hard, clear		D, S	Sufficient for 30 head stock.
4	NW.	35	"	"	"	Dug	33	1,850	- 29	1,821	29	1,821	Glacial sand and gravel	Hard, iron		D, S	Sufficient for 30 head stock. Another well 30-foot deep is not used very much.
5	SE.	35	"	"	"	Bored	20	1,850	- 12	1,838	17	1,833	Glacial sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for 10 head stock by using another well 40 feet deep.
6	NE.	36	"	"	"	Dug	48	1,850	- 33	1,817	45	1,805	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 40 head stock.
1	NW.	36	"	"	"	Spring		1,729					Glacial drift	Hard, clear, iron		D, S	10 gallons a minute. There are 40 similar springs on this farm.
2	SE.	36	"	"	"	Bored	170	1,500									Dry hole; glacial drift at base.
1	NE.	2	19A	4	2	Dug	23	1,855	- 8	1,847	20	1,835	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for 50 head stock. Hauls from a dugout on SE.¼, section 2, township 19A, range 4, meridian 2. #.
2	SW.	2	"	"	"	Dug	7	1,855	- 4	1,851	4	1,851	Glacial gravel	Hard, clear		D, S	Sufficient for 15 head stock.
3	NW.	2	"	"	"	Dug	30	1,850	- 18	1,832	30	1,820	Glacial gravel	Hard, clear, iron, "alkaline"		D, S	Sufficient for local needs.
4	SE.	12	"	"	"	Dug	18	1,855	- 8	1,847	16	1,839	Glacial gravel	Hard, clear		D, S	Sufficient for 50 head stock. Another similar well.
1	NE.	2	19A	5	2	Dug	12	1,805	- 6	1,799	8	1,797	Glacial gravel	Soft, clear		D, S	Sufficient for local needs.
2	NW.	2	"	"	"	Dug	33	1,800	- 30	1,770	30	1,770	Glacial sand	Soft, clear		D, S	Insufficient for local needs.
3	NW.	2	"	"	"	Spring		1,740					Glacial sand	Soft, clear		S	Sufficient for local needs.
4	NW.	3	"	"	"	Dug	8	1,805	0	1,805	0	1,805	Glacial drift	Soft, clear		D, S	Sufficient for local needs.
5	SE.	10	"	"	"	Dug	50	1,800	- 35	1,765			Glacial drift	Hard, clear		D, S	Sufficient for 30 head stock.
1	NW.	1	19	4	2	Dug	25	1,835					Glacial drift	Hard, clear		D, S	Sufficient for local needs; used also by neighbours.
2	SW.	2	"	"	"	Dug	25	1,845	- 12	1,833	25	1,820	Glacial sand	Hard, clear		D, S	Sufficient for local needs; a similar well was used until 1934.
3	NW.	2	"	"	"	Dug	25	1,849	- 12	1,837	22	1,827	Glacial sand	Hard, clear		D, S	Sufficient for 30 head stock.
4	SW.	4	"	"	"	Dug	25	1,830	- 20	1,810	20	1,810	Glacial sand	Hard, iron, "alkaline"		D, S	Sufficient for 40 head stock.
5	SE.	4	"	"	"			1,830					Glacial drift			D, S	Sufficient for local needs.
6	SE.	6	"	"	"	Dug	16	1,840	- 10	1,830	10	1,830	Glacial sand and gravel	Hard, clear		D, S	Sufficient for local needs.
7	NE.	6	"	"	"	Bored	55	1,820	- 40	1,780	55	1,765	Glacial drift	Hard, cloudy, iron, red sediment		D, S	Sufficient for 25 head stock; used also by neighbours.
8	SE.	7	"	"	"	Bored	75	1,820	- 55	1,765			Glacial yellow clay	Hard, clear iron, "alkaline"		S	Insufficient for 16 head stock. Another similar well 46 feet deep.

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

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

WELL RECORDS—Rural Municipality of

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
9	NW.	9	19	4	2	Dug	20	1,830					Glacial drift				A constant supply of water.
10	NE.	10	"	"	"	Dug	30	1,820	- 24	1,796	26	1,794	Glacial sand	Hard, clear		D, S	Insufficient for 65 head stock.
11	NW.	10	"	"	"	Dug	25	1,820	- 21	1,799	21	1,799	Glacial sand	Hard		D, S	Sufficient for 35 head stock with aid of another well.
12	SE.	12	"	"	"	Dug	40	1,820	- 36	1,784	36	1,784	Glacial gravel	Hard, clear, iron, "alkaline"		D, S	Insufficient for 20 head stock. Another similar well 60 feet deep.
13	SE.	14	"	"	"	Dug	65	1,815	- 53	1,762			Glacial sand	Hard, clear		D, S	Sufficient for 10 head stock. #.
14	SW.	14	"	"	"	Dug		1,815					Glacial drift			D, S	Farmer on NE. ¼, section 22, township 19, range 4, meridian 2, hauls from here.
15	NW.	14	"	"	"	Dug	45	1,810	- 36	1,774	45	1,765	Glacial sand	Hard, clear		D, S	Sufficient for 35 head stock.
16	NE.	15	"	"	"	Bored	90	1,805	- 85	1,720	90	1,715	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
17	SW.	15	"	"	"	Bored	44	1,815	- 39	1,776	43	1,772	Glacial gravel	Hard, clear, iron		D, S	Sufficient for 20 head stock.
18	SE.	16	"	"	"	Spring		1,815					Glacial drift			D, S	Sufficient for local needs.
19	SE.	18	"	"	"	Bored	50	1,810	- 20	1,790	50	1,760	Glacial gravel	Hard, clear, iron, "alkaline"		D, S	Sufficient for 20 head stock.
20	NE.	18	"	"	"	Dug	15	1,800	- 10	1,790	10	1,790	Glacial gravel	Soft, clear		D, S	Sufficient for 12 head stock.
21	SW.	18	"	"	"	Bored	50	1,810	- 20	1,790	50	1,760	Glacial sand	Hard, iron, "alkaline"		D, S	Sufficient for 27 head stock.
22	NW.	20	"	"	"	Dug	15	1,795	- 12	1,783	12	1,783	Glacial sand	Soft, clear		D, S	Sufficient for 30 head stock. Also another well 20 feet deep.
23	SE.	22	"	"	"	Dug	47	1,800	- 40	1,760	47	1,753	Glacial gravel	Hard, clear		S	Sufficient for local needs.
24	NE.	22	"	"	"	Bored	50	1,795	- 36	1,759	36	1,759	Glacial gravel	Hard, clear		D, S	Insufficient for 64 head stock. Also another well 26 feet deep.
25	NW.	22	"	"	"	Dug	35	1,790									Dry hole; glacial blue clay at base.
26	SW.	23	"	"	"	Dug	55	1,800	- 50	1,750	55	1,745	Glacial sand and gravel	Hard, clear		D, S	Sufficient for local needs.
27	SE.	24	"	"	"	Bored	32	1,780	- 28	1,752	28	1,752	Glacial sand and gravel	Hard, clear, iron, "alkaline"		D, S	Sufficient for 25 head stock.
28	SW.	24	"	"	"	Bored	47	1,795	- 42	1,753	42	1,753	Glacial clay	Hard, iron, "alkaline"		S	Intermittent supply. Numerous similar wells.
29	NW.	25	"	"	"	Dug	32	1,780	- 24	1,756	30	1,750	Glacial sand	Hard, clear		D, S	Sufficient for 10 head stock.
30	NE.	26	"	"	"	Dug	24	1,780	- 14	1,766	22	1,758	Glacial fine sand	Soft		D, S	Sufficient for 55 head stock.
31	SW.	26	"	"	"	Bored	47	1,785	- 30	1,755	47	1,738	Glacial gravel (?)	Hard, clear, iron, red sediment		D, S	Sufficient for 25 head stock by using another similar well.
32	NE.	27	"	"	"	Bored	60	1,780	- 20	1,760	60	1,720	Glacial sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for 30 head stock.

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

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

WELL RECORDS—Rural Municipality of

GRAYSON, NO. 184, SASKATCHEWAN.

B 4-4

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
33	SE.	28	19	4	2	Dug	30	1,790	- 24	1,766	30	1,750	Glacial gravel	Hard, clear, iron, "alkaline", red sediment		D, S	Sufficient for local needs with the aid of a similar well.
34	NE.	28	"	"	"	Dug	26	1,780	- 20	1,760	26	1,754	Glacial gravel	Soft, clear		D, S	Sufficient for 100 head stock.
35	SE.	29	"	"	"	Dug	30	1,790	- 18	1,772			Glacial fine sand	Hard, "alkaline", iron, red sediment		D, S	Insufficient for 50 head stock. Another well 70 feet deep yields a very small supply.
36	SW.	29	"	"	"	Bored	72	1,790	- 22	1,768	72	1,718	Glacial sand (?)	Hard, clear, iron, "alkaline"		S	Abundant supply.
37	NE.	29	"	"	"	Dug	24	1,790					Glacial drift			D	Farmer on SW. ¼, section 29, township 19, range 4, meridian 2, obtains his domestic supply from here.
38	SE.	30	"	"	"	Dug	60	1,790	- 25	1,765	60	1,730	Glacial sand	Hard, clear		D, S	Sufficient for local needs. Another 30-foot well used mainly for domestic needs.
39	SE.	32	"	"	"	Dug	25	1,780	- 18	1,762	23	1,757	Glacial sand	Hard, clear, iron, "alkaline", red sediment		D	Insufficient for local needs.
40	NE.	32	"	"	"	Dug	44	1,780	- 42	1,738	42	1,738	Glacial sand and gravel	Hard, clear		D, S	Intermittent supply. Another similar well 27 feet deep.
41	SE.	34	"	"	"	Bored	91	1,775									Dry hole; glacial blue clay at base. Another dry hole 210 feet deep.
42	NW.	34	"	"	"	Bored	54	1,782	- 50	1,732			Glacial sand	Hard, clear, iron, "alkaline", red sediment		S	Intermittent supply.
43	SW.	35	"	"	"	Dug	35	1,775	- 27	1,748	35	1,740	Glacial sand	Hard, clear.		D, S	Sufficient for 20 head stock.
44	NW.	36	"	"	"	Dug	30	1,775	- 20	1,755	20	1,755	Glacial sand	Hard, clear, iron, "alkaline"		S	Sufficient for 30 head stock.
45	SE.	36	"	"	"	Bored	30	1,770	- 22	1,748	28	1,742	Glacial sand	Hard, clear, iron, "alkaline"		S	Sufficient for 20 head stock.
46	SW.	36	"	"	"	Bored	50	1,775	- 49	1,726			Glacial clay(?)	Hard, clear, iron		D	Insufficient for domestic needs.
1	NE.	1	19	5	2	Spring		1,760					Glacial drift	Soft, clear		S	Sufficient for local needs. A 6-foot well near the spring is used for domestic needs.
2	NE.	2	"	"	"	Dug	40	1,800	- 36	1,764	40	1,760	Glacial sandy loam	Hard, clear.		D, S	Abundant supply.
3	NW.	3	"	"	"	Dug	10	1,800	- 7	1,793	7	1,793	Glacial sand	Soft, clear		D, S	Sufficient for 25 head stock. Also used by neighbours.
4	SW.	10	"	"	"	Bored	80	1,800									Dry hole; glacial blue clay at base.
5	SE.	10	"	"	"	Bored	75	1,810	- 45	1,765	73	1,737	Glacial sand	Hard, iron		D, S	Insufficient for local needs. Another well 35 feet deep.
6	SW.	11	"	"	"	Dug	15	1,790	- 11	1,779	13	1,777	Glacial gravel	Hard, clear		D, S	Sufficient for local needs. Another well 5 feet deep.
7	NW.	11	"	"	"	Bored	61	1,800									Dry hole; glacial drift at base. Also a 10-foot seepage well.

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

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

4
WELL RECORDS—Rural Municipality of GRAYSON, NO. 184, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
8	NE.	12	19	5	2	Spring		1,780					Glacial drift	Soft, clear		S	Sufficient for local needs.
9	SE.	12	"	"	"		52	1,800									Dry hole; glacial drift at base.
10	NW.	14	"	"	"	Dug	28	1,780	- 21	1,759	28	1,752	Glacial fine sand	Hard, clear		D, S	Sufficient for 60 head stock; also used by neighbours.
11	NE.	15	"	"	"	Bored	90	1,800									Dry hole; glacial drift at base.
12	SE.	16	"	"	"	Bored	30	1,790	- 20	1,770	30	1,760	Glacial gravel	Soft		D, S	Sufficient for 31 head stock; neighbours obtain domestic supply from this well.
13	NE.	16	"	"	"	Bored	90	1,800									Dry hole; glacial drift at base.
14	NE.	20	"	"	"		22	1,760	- 10	1,750	16	1,744	Glacial coarse gravel	Soft, clear		D, S	Sufficient for 60 head stock.
15	NW.	21	"	"	"	Dug	7	1,760	- 4	1,756	4	1,756	Glacial sand	Soft, clear		D, S	Sufficient for 25 head stock.
16	SW.	22	"	"	"	Bored	50	1,795	- 40	1,755	48	1,747	Glacial sand	Hard, clear, "alkaline"		S	Insufficient for 40 head stock. Another similar well 75 feet deep, used for domestic and stock needs.
17	SE.	22	"	"	"	Dug	27	1,780	- 20	1,760	25	1,755	Glacial sand	Hard, clear, iron		D, S	Sufficient for 30 head stock.
18	NE.	22	"	"	"	Dug	20	1,790	- 17	1,773			Glacial gravel	Hard, clear		D, S	Sufficient for 8 head stock by using 3 other similar wells.
19	SW.	25	"	"	"	Dug	33	1,790									Numerous dry holes; glacial blue clay at base.
20	SW.	26	"	"	"	Dug	25	1,790	- 16	1,774	16	1,774	Glacial fine sand	Hard		D, S	Sufficient for 21 head stock.
21	SW.	27	"	"	"	Drilled	30	1,790	- 18	1,772			Glacial drift			S	Sufficient for 50 head stock and used only in the winter. Another 20-foot well not used.
22	NW.	27	"	"	"	Dug	35	1,800	- 25	1,775			Glacial gravel (?)	Hard, clear, iron		D, S	Insufficient for 50 head stock.
23	SE.	28	"	"	"	Dug	18	1,750	- 11	1,739	18	1,732	Glacial gravel (?)	Hard, "alkaline"		S	Sufficient for 50 head stock.
24	NE.	28	"	"	"	Spring		1,750					Glacial drift	Hard, "alkaline"		S	Sufficient for 50 head stock.
25	NW.	28	"	"	"	Bored	50	1,800	- 35	1,765	50	1,750	Glacial sand and gravel	Hard, iron, "alkaline"		D, S	Sufficient for 10 head stock.
26	SW.	29	"	"	"	Spring		1,700					Glacial drift	Hard			
27	SE.	30	"	"	"	Bored	50	1,800	- 40	1,760	45	1,755	Glacial sand	Hard, "alkaline"		D, S	Sufficient for 36 head stock; with the aid of a dugout.
28	NW.	30	"	"	"	Bored	111	1,810	- 81	1,729	111	1,699	Glacial sand	Hard, clear, iron, "alkaline"		S	Sufficient for local needs. A 10-foot seepage well is used for domestic needs.
29	SE.	31	"	"	"	Bored	75	1,800	- 35	1,765	75	1,725	Glacial coarse sand	Hard, clear, iron, "alkaline"		S	Abundant supply.
30	NE.	31	"	"	"	Bored	50	1,825	- 30	1,795			Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 20 head stock.
31	SW.	32	"	"	"	Dug	50	1,800	- 30	1,770	50	1,750	Glacial sand	Hard, clear		S	Sufficient for local needs.
32	NE.	32	"	"	"	Dug	12	1,740	- 7	1,733	7	1,733	Glacial clay	Hard, iron, "alkaline"		D, S	Sufficient for 20 head stock.

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

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

WELL RECORDS—Rural Municipality of

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
33	SE.	33	19	5	2	Dug	8	1,750	- 3	1,747			Glacial drift			S	Sufficient for local needs.
34	SW.	34	"	"	"	Bored	32	1,810	- 22	1,788	29	1,781	Glacial sand	Hard, clear		D, S	Sufficient for 35 head stock with aid of another well;
35	NW.	34	"	"	"	Bored	75	1,780	- 50	1,730	75	1,705	Glacial sand and gravel	Hard		D, S	Sufficient for 33 head stock.
36	NE.	34	"	"	"	Dug	40	1,780	- 35	1,745	35	1,745	Glacial clay (?)	Hard, iron		D	Sufficient only for household needs.
37	NW.	35	"	"	"	Bored	84	1,775	- 35	1,740	84	1,691	Glacial gravel	Hard, iron, "alkaline"		D, S	Sufficient for local needs. #.
38	NE.	35	"	"	"	Dug	27	1,775	- 23	1,752	27	1,748	Glacial gravel	Hard, clear		D, S	Sufficient for 25 head stock.
39	NE.	35	"	"	"	Bored	50	1,810	- 25	1,785			Glacial clay	Hard, iron, cloudy		D, S	Sufficient for 40 head stock.
1	NE.	13	19	6	2	Bored	135	1,805	- 60	1,745	135	1,570	Glacial sand	Hard, clear, "alkaline"		N	Unfit for use. A 20-foot seepage well is used for domestic needs.
2	NE.	20	"	"	"	Bored	45	1,850									Dry hole; glacial drift at base. Also an 8-foot well with intermittent supply.
3	SE.	21	"	"	"	Dug		1,800									Dry hole; glacial drift at base. A spring is used for stock needs.
4	SE.	22	"	"	"	Dug	80	1,805	0	1,805	40	1,765	Glacial sand	Hard, clear		D, S	Intermittent supply.
5	NW.	22	"	"	"	Bored	104	1,800									Dry hole; glacial blue clay at base. Also a number of seepage wells.
6	NE.	23	"	"	"	Bored	45	1,810	- 30	1,780	30	1,780	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
7	SW.	25	"	"	"	Bored		1,810					Glacial drift	Hard, "alkaline"		N	Unfit for use.
8	SE.	26	"	"	"	Bored	80	1,810	- 68	1,742	68	1,742	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 50 head stock.
9	SW.	26	"	"	"	Dug	14	1,800	- 10	1,790	10	1,790	Glacial sand	Hard, clear		D, S	Sufficient for 10 head stock.
10	NW.	26	"	"	"	Bored	75	1,805	- 60	1,745	60	1,745	Glacial blue sand	Hard, clear, "alkaline"		S	Sufficient for 20 head stock. A 13-foot well is used for domestic needs.
11	SE.	27	"	"	"	Dug	20	1,820	0	1,820	15	1,805	Glacial sand	Soft, clear		D, S	Sufficient for 14 head stock. Two other similar wells.
12	NW.	27	"	"	"	Bored	110	1,800									Dry hole; glacial yellow clay at base. Also a seepage well for domestic needs.
13	NW.	28	"	"	"	Dug	12	1,830	- 8	1,822	8	1,822	Glacial sand and gravel	Hard, clear		D, S	Sufficient for 40 head stock. Also a 40-foot well, which went dry in 1931.
14	NE.	28	"	"	"	Bored	65	1,810	- 60	1,750	40	1,770	Glacial sand	Hard, "alkaline"		N	Unfit for use. Also a 70-foot dry hole.
15	NE.	30	"	"	"	Bored	120	1,850									Several dry holes 80 to 120 feet deep; glacial clay at base.
16	NW.	32	"	"	"	Dug	60	1,850	- 20	1,830	55	1,795	Glacial sand and gravel	Hard, clear, "alkaline"		N	Unfit for use; 2 wells 65 feet and 17 feet deep give small supplies; also a number of dry holes.
17	NE.	32	"	"	"	Dug	13	1,820	- 6	1,814	16	1,804	Glacial sand	Hard, clear, "alkaline"		D	Intermittent supply; also 4 dry holes 200, 100, 60 and 40 feet deep.
18	NE.	33	"	"	"	Dug	40	1,825									Dry hole; glacial blue clay at base. Another dry hole 25 feet deep.
19	SW.	34	"	"	"	Bored	100	1,805									Several dry holes; glacial drift at base.
20	SE.	36	"	"	"	Bored	105	1,805	- 80	1,725	105	1,700	Glacial gravel	Hard, clear, "alkaline"		S	Abundant supply; also a shallow well for domestic needs.

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

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

6
WELL RECORDS—Rural Municipality of GRAYSON, NO. 184, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
21	SW.	36	19	6	2	Bored	90	1,820	− 36	1,784	90	1,730	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 29 head stock; also a seepage well for domestic use.
22	NW.	36	"	"	"	Bored	89	1,800	− 53	1,747			Glacial clay	Cloudy, "alkaline"		S	
1	NE.	2	20	4	2	Dug	30	1,780					Glacial sand	Hard, clear		D, S	Intermittent supply; also another similar well.
2	NW.	2	"	"	"	Dug	32	1,790	− 24	1,766	30	1,760	Glacial gravel	Hard, clear		D, S	Insufficient for local needs.
3	SW.	2	"	"	"	Bored	50	1,770	− 20	1,750	48	1,722	Glacial sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for 40 head stock; also another well 20 feet deep.
4	SE.	3	"	"	"	Dug	30	1,770	− 24	1,746	24	1,746	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for local needs; several similar wells.
5	NE.	4	"	"	"	Dug	33	1,775	− 24	1,751	31	1,744	Glacial fine sand	Hard, clear		D, S	Sufficient for 35 head stock. Also a 20-foot well with small supply.
6	NW.	4	"	"	"		20	1,770	− 16	1,754	16	1,754	Glacial sandy clay	Hard, clear, "alkaline"		D, S	Sufficient for 14 head stock.
7	SE.	4	"	"	"	Dug	25	1,785	− 22	1,763	22	1,763	Glacial sand	Hard, clear		D, S	Sufficient for 30 head stock.
8	NE.	5	"	"	"	Dug	35	1,773	− 30	1,743	32	1,741	Glacial sand	Hard, iron		D, S	Also another 20-foot well with good supply.
9	NE.	6	"	"	"	Bored	60	1,790	− 40	1,750	60	1,730	Glacial sand	Hard, iron, "alkaline"		D, S	Sufficient for 12 head stock.
10	NW.	7	"	"	"	Bored	78	1,765	− 28	1,737	72	1,693	Glacial sand	Hard, iron		D, S	Sufficient for 75 head stock.
11	SE.	8	"	"	"	Bored	53	1,765	− 33	1,732	53	1,712	Glacial gravel	Hard, clear, iron, "alkaline", red sediment		D, S	Sufficient for 50 head stock.
12	SE.	12	"	"	"	Bored	58	1,770	− 43	1,727	58	1,712	Glacial gravel	Hard, clear, iron, "alkaline"		D, S	Sufficient for 22 head stock.
13	NE.	13	"	"	"	Dug	20	1,780	− 16	1,764	16	1,764	Glacial sand	Soft, clear		D, S	Sufficient for 10 head stock.
14	NW.	14	"	"	"	Bored	60	1,760	− 45	1,715	60	1,700	Glacial gravel	Hard, clear, "alkaline" white sediment		S	Insufficient for 20 head stock.
15	SW.	14	"	"	"	Bored	70	1,760	− 30	1,730	70	1,690	Glacial gravel(?)	Hard, clear, iron, "alkaline"		S	Sufficient for local needs.
16	SW.	15	"	"	"	Bored	75	1,770	− 35	1,735	75	1,695	Glacial gravel(?)	Hard, clear, iron, "alkaline"		D, S	Abundant supply.
17	SE.	16	"	"	"	Bored	50	1,770	− 35	1,735	50	1,720	Glacial sand	Hard, iron, "alkaline"		D, S	Sufficient for 19 head stock.
18	SW.	16	"	"	"	Bored	50	1,770	− 35	1,735	50	1,720	Glacial sand	Hard, iron, "alkaline"		D, S	Sufficient for local needs.
19	SE.	18	"	"	"	Bored	60	1,765	− 25	1,740	60	1,705	Glacial sand	Hard, iron, "alkaline"		D, S	Sufficient for 20 head stock.
20	NE.	18	"	"	"	Bored	72	1,751	− 42	1,709			Glacial drift	Hard, clear, iron, "alkaline"		D, S	Sufficient for 22 head stock.

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

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

WELL RECORDS—Rural Municipality of GRAYSON, NO. 184, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
21	SW.	20	20	4	2	Bored	73	1,750	- 60	1,690			Glacial drift	Hard, clear, iron, "alk- aline"		D, S	Sufficient for 60 head stock.
22	SE.	20	"	"	"	Bored	80	1,750	- 50	1,700			Glacial drift			N	Not in use at present.
23	NW.	20	"	"	"	Bored	62	1,751	- 15	1,736	62	1,689	Glacial sand	Hard, clear, iron, "alk- aline"		D	Sufficient for local needs.
24	SW.	21	"	"	"	Bored	75	1,750	- 35	1,715	75	1,675	Glacial gravel (?)	Hard, clear, iron, "alk- aline", red sediment		D, S	Abundant supply.
25	SE.	21	"	"	"	Bored	90	1,760	- 30	1,730	87	1,673	Glacial gravel	Hard, iron, "alkaline"		D, S	Sufficient for 25 head stock.
26	NW.	22	"	"	"	Bored	50	1,750	- 30	1,720	60	1,690	Glacial sand	Hard, iron, "alkaline"		S	Sufficient for 16 head stock; also a shallow well for domestic needs.
27	SE.	22	"	"	"	Drilled	306	1,760	- 10	1,750	300	1,450	Glacial sand(?)	Hard		N	Not used; due to a very fine sandy material in suspension.
28	SE.	22	"	"	"	Bored	80	1,760	- 26	1,734	26	1,734	Glacial drift	Hard, iron, "alkaline", red sediment		D, S	Insufficient for 20 head stock.
29	NW.	23	"	"	"	Bored	60	1,760	- 25	1,735	60	1,700	Glacial sand	Hard, iron		S	Sufficient for 10 head stock.
30	SE.	24	"	"	"	Dug	21	1,780	- 17	1,763	17	1,763	Glacial gravel	Hard, clear, iron		D, S	Sufficient for 25 head stock. A 12-foot well gives a supply in summer.
31	NW.	24	"	"	"	Bored	60	1,785	- 40	1,745	60	1,725	Glacial sand	Hard, clear, iron, "alk- aline"			Sufficient for 24 head stock.
32	SE.	25	"	"	"	Dug	10	1,780	- 2	1,778	9	1,771	Glacial sand	Soft		D, S	Intermittent supply; another similar well 12 feet deep.
33	SW.	26	"	"	"	Bored	60	1,760	- 35	1,725	60	1,700	Glacial sand	Hard, clear, iron, "alk- aline"		D, S	Sufficient for local needs.
34	NW.	26	"	"	"	Bored	65	1,770	- 45	1,725	65	1,705	Glacial sand	Hard, clear, iron, "alk- aline", red sediment		D, S	Sufficient for local needs. Also another similar well. #.
35	NE.	28	"	"	"	Bored	108	1,735	- 68	1,667	108	1,627	Glacial gravel (?)	Hard, clear, iron, "alk- aline"		D, S	Abundant supply.
36	NW.	28	"	"	"	Bored	90	1,756					Glacial drift	Hard, clear, iron, "alk- aline"		S	Insufficient for 20 head stock. There are numerous wells on this farm, but water has to be hauled.
37	NW.	29	"	"	"		20	1,760	- 14	1,746			Glacial drift	Hard		D, S	Sufficient for local needs.
38	NE.	30	"	"	"	Dug	28	1,758	- 24	1,734	28	1,730	Glacial sand	Soft, clear		D, S	Sufficient for local needs.
39	SW.	30	"	"	"	Bored	50	1,768	- 50	1,718	60	1,708	Glacial sand	Hard, clear, iron, "alk- aline"		D, S	Sufficient for 25 head stock.
40	SE.	32	"	"	"	Dug	22	1,766	- 16	1,750	-22	1,744	Glacial gravel	Soft		D, S	Sufficient for 85 head stock. Another well 20 feet deep has a poor 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					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
41	SE.	33	20	4	2		20	1,765					Glacial drift	Hard		D, S	Sufficient for local needs.
42	SE.	34	"	"	"	Bored	55	1,765	- 30	1,735	52	1,713	Glacial sand	Hard, clear, iron		D, S	Sufficient for 60 head stock.
43	NW.	36	"	"	"	Bored	65	1,735	- 50	1,685	50	1,685	Glacial gravel	Hard, clear, iron, "alkaline", red sediment		D, S	Sufficient for 10 head stock.
1	SE.	1	20	5	2	Bored	30	1,770	- 13	1,757	30	1,740	Glacial gravel	Hard, clear, iron, "alkaline", red sediment		S	Sufficient for 11 head stock.
2	SV.	1	"	"	"	Dug	13	1,770					Glacial sand	Hard		D	Sufficient for domestic needs.
3	SE.	2	"	"	"	Dug	28	1,775	- 23	1,752			Glacial clay	Hard, "alkaline"		D, S	Sufficient for 20 head stock.
4	NW.	2	"	"	"	Dug	28	1,775	- 18	1,757	27	1,748	Glacial sand	Hard		D, S	Sufficient for 20 head stock.
5	SE.	4	"	"	"	Bored	70	1,780	- 35	1,745	70	1,710	Glacial sand	Hard, clear, "alkaline"		S	Abundant supply; also a 60-foot seepage well used for domestic needs.
6	NW.	4	"	"	"	Bored	74	1,788	- 44	1,744	74	1,714	Glacial fine sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for local needs.
7	NE.	5	"	"	"	Bored	66	1,800	- 36	1,764	66	1,734	Glacial fine sand	Hard, clear, sulphur, "alkaline"		S	Sufficient for local needs. #.
8	NE.	6	"	"	"	Bored	90	1,800									Dry hole; glacial blue clay at base; two other 90-foot dry holes; also a 90-foot seepage well.
9	SW.	8	"	"	"	Drilled	110	1,806	- 50	1,756	110	1,696	Glacial sand	Hard, "alkaline"		S	Sufficient for 26 head stock.
10	NW.	11	"	"	"	Dug	45	1,770					Glacial drift	Hard, clear		D, S	Abundant supply.
11	SE.	11	"	"	"	Dug	37	1,773	- 20	1,753	37	1,736	Glacial drift	Hard, clear, iron, "alkaline"		D, S	Sufficient for local needs.
12	SW.	13	"	"	"	Dug	45	1,785					Glacial drift	Hard, clear, iron, "alkaline"		S	Sufficient for local needs.
13	SE.	16	"	"	"	Dug	33	1,770	- 18	1,752	33	1,737	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
14	NE.	16	"	"	"		70	1,785	- 40	1,745	45	1,740	Glacial sand	Soft, clear		D, S	Sufficient for local needs.
15	SW.	16	"	"	"	Bored	39	1,778	- 21	1,757	39	1,739	Glacial gravel	Hard, "alkaline"		D, S	Abundant supply.
16	NW.	16	"	"	"	Dug	45	1,789	- 15	1,774	45	1,744	Glacial sand	Soft, clear		D, S	Sufficient for local needs.
17	SE.	17	"	"	"	Bored	45	1,790	- 35	1,755			Glacial clay	Hard, iron		D, S	Sufficient for 30 head stock.
18	NE.	17	"	"	"	Dug	40	1,778	- 20	1,758	40	1,738	Glacial sand	Hard, clear, iron, "alkaline"		S	Sufficient for local needs.
19	SE.	18	"	"	"	Bored	60	1,788	- 45	1,743	60	1,728	Glacial gravel	Hard, clear, iron, "alkaline"		S	Sufficient for local needs.

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

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

WELL RECORDS—Rural Municipality of

GRAYSON, NO. 184, SASKATCHEWAN.

B 4-4

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
20	NE.	20	20	5	2		60	1,765	- 58	1,707			Glacial clay	Soft, clear		D	Intermittent supply; also a 49-foot well that is unfit for use.
21	SW.	22	"	"	"	Dug	18	1,765	- 14	1,751	18	1,747	Glacial gravel	Hard		D, S	Sufficient for 24 head stock.
22	SW.	24	"	"	"	Dug	42	1,770	- 20	1,750	42	1,728	Glacial gravel	Hard, clear, iron, "alkaline"		D, S	Oversufficient for 100 head stock.
23	SE.	24	"	"	"	Bored	73	1,790	- 40	1,750			Glacial drift	Hard, clear, iron, "alkaline"		D, S	Sufficient for 45 head stock.
24	SW.	26	"	"	"	Dug	45	1,790	- 15	1,775	45	1,745	Glacial gravel	Hard, clear, iron, "alkaline"		D, S	Sufficient for 75 head stock; used also by neighbours.
25	SE.	28	"	"	"	Bored	53	1,785	- 47	1,738	47	1,738	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 40 head stock.
26	SW.	28	"	"	"		70	1,775	- 58	1,717	58	1,717	Glacial bluish muck	Hard, clear, iron, "alkaline"		S	Sufficient for local needs; also 2 wells 24 feet deep, with intermittent supply; used for domestic needs.
27	NW.	28	"	"	"	Dug	26	1,800	- 16	1,784	26	1,774	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 40 head stock.
28	NW.	30	"	"	"	Dug	35	1,795	- 26	1,769			Glacial clay	Hard, clear		D, S	Insufficient for 35 head stock; also a 29-foot well used mainly for domestic needs.
29	SW.	31	"	"	"	Dug	14	1,800	- 11	1,789	11	1,789	Glacial sand	Soft		D, S	Sufficient for 30 head stock with aid of another similar well.
30	SW.	31	"	"	"	Bored	74	1,800									Dry hole; glacial clay at base.
31	SE.	31	"	"	"	Dug	16	1,790	- 13	1,777	13	1,777	Glacial sand	Soft		D, S	Sufficient for 30 head stock.
32	NE.	32	"	"	"	Dug	18	1,775	- 8	1,767	8	1,767	Glacial gravel	Soft, clear		D	Sufficient for local needs; another well 15 feet deep has a better supply.
33	SW.	34	"	"	"	Dug	18	1,778	- 12	1,766	12	1,766	Glacial sand	Hard, clear, "alkaline"		S	Insufficient for 10 head stock. A 21-foot well is used for domestic needs.
34	NW.	36	"	"	"	Dug	42	1,760	- 37	1,723	37	1,723	Glacial fine sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for 75 head stock.
1	SE.	2	20	6	2	Dug	66	1,810	- 51	1,759	66	1,744	Glacial sand	Hard, "alkaline"		D, S	Sufficient for 24 head stock.
2	SW.	2	"	"	"	Dug	14	1,805	0	1,805	0	1,805	Glacial sand	Hard, clear, "alkaline"		D, S	Intermittent supply; also an 80-foot dry hole.
3	NW.	2	"	"	"	Dug	20	1,810	- 16	1,794	16	1,794	Glacial sand	Hard, clear		D, S	Sufficient for 27 head stock; also a 50-foot well with small supply and 2 dry holes 75 and 55 feet deep.
4	NE.	2	"	"	"	Bored	130	1,810					Glacial gravel	Hard, clear		D, S	Sufficient for local needs; also several dry holes 60 and 90 feet deep.
5	SW.	3	"	"	"	Dug	10	1,830	- 7	1,823	7	1,823	Glacial sand	Hard, clear, iron		D, S	Sufficient for 35 head stock.
6	NW.	3	"	"	"	Bored	40	1,825	- 10	1,815	15	1,810	Glacial gravel	Hard, clear		D, S	Sufficient for 52 head stock.
7	SE.	4	"	"	"	Dug	13	1,820	- 8	1,812	8	1,812	Glacial sand	Soft		D, S	Insufficient for 20 head stock.
8	SW.	4	"	"	"	Bored	50	1,825									Dry hole; glacial clay at base.
9	NE.	4	"	"	"	Dug	40	1,830	- 37	1,793			Glacial sand (?)	Hard, "alkaline"		S	Intermittent supply; also a number of dry holes.

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

GRAYSON, NO. 184, SASKATCHEWAN.

B 4-4

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
10	NW.	5	20	6	2	Dug	46	1,850	- 40	1,810	40	1,810	Glacial bluish sand	Hard, iron, "alkalige", red sediment		D, S	Sufficient for 24 head stock.
11	SW.	6	"	"	"	Dug	17	1,870	- 12	1,858	12	1,858	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 16 head stock; a similar well 10 feet deep; also a number of dry holes. Several dry holes; glacial clay at base.
12	NW.	6	"	"	"	Dug	30	1,860									
13	NE.	6	"	"	"	Bored	100	1,850	- 60	1,790	60	1,790	Glacial sand	Hard, "alkaline"		N	Well caved in.
14	NW.	7	"	"	"	Dug	16	1,855	- 8	1,847	8	1,847	Glacial sand	Hard, clear		D, S	Intermittent supply.
15	NW.	10	"	"	"	Bored	60	1,830	- 30	1,800	60	1,770	Glacial sand	Hard, clear		D, S	Sufficient for 50 head stock; also another well 38 feet deep.
16	NE.	11	"	"	"	Dug	16	1,800	- 8	1,792	8	1,792	Glacial sand	Hard, clear		D, S	Sufficient for 35 head stock; 2 other similar wells.
17	SW.	12	"	"	"	Bored	50	1,810	- 34	1,776	40	1,770	Glacial sand and gravel	Hard, clear		D, S	Sufficient for 24 head stock; also another well 10 feet deep.
18	NW.	12	"	"	"	Dug	13	1,800	- 3	1,797	10	1,790	Glacial red sand	Hard, clear, iron		D, S	Insufficient for local needs; also several dry holes.
19	NE.	12	"	"	"	Bored	58	1,800					Glacial drift	Hard, clear, "alkaline"		S	Sufficient for 25 head stock; a 13-foot well is used for domestic needs.
20	SW.	14	"	"	"	Bored	50	1,805	- 32	1,773	50	1,755	Glacial sand and gravel	Hard, clear, "alkaline"		D, S	Sufficient for 40 head stock.
21	NE.	14	"	"	"	Dug	47	1,800	- 39	1,761			Glacial drift	Hard, clear		D, S	Sufficient for 20 head stock; also another well 17 feet deep.
22	SW.	15	"	"	"	Bored	50	1,820	- 30	1,790	30	1,790	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 32 head stock.
23	NE.	16	"	"	"	Dug	42	1,820	- 28	1,792			Glacial yellow clay	Hard, clear, "alkaline"		D, S	Sufficient for 55 head stock.; another similar well 32 feet deep.
24	NW.	17	"	"	"	Dug	30	1,840	- 28	1,812			Glacial clay (?)	Hard, clear, "alkaline"		D, S	Sufficient for 6 head stock.
25	SE.	18	"	"	"	Dug	35	1,845	- 15	1,830	35	1,810	Glacial sand	Hard, clear, "alkaline"		D, S	Intermittent supply.
26	NE.	18	"	"	"	Dug	40	1,840	- 35	1,805	35	1,805	Glacial gravel	Hard, clear, "alkaline"	44	D, S	Sufficient for 40 head stock.
27	SW.	20	"	"	"	Dug	36	1,835	- 32	1,803	32	1,803	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 35 head stock.
28	NW.	20	"	"	"	Dug	30	1,830	- 15	1,815			Glacial sand	Hard, clear		D, S	Sufficient supply by using 3 other wells 23, 20 and 12 feet deep.
29	NW.	21	"	"	"	Dug	23	1,820	- 13	1,807	21	1,799	Glacial gravel	Hard, clear, "alkaline"		D	Sufficient for household needs only; also a 100-foot dry hole.
30	SW.	23	"	"	"	Dug	24	1,800	- 8	1,792	24	1,776	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for 55 head stock; another well 15 feet deep for domestic needs; also several dry holes 20 to 30 feet deep.
31	SE.	24	"	"	"	Dug	12	1,805	- 6	1,799	9	1,796	Glacial gravel	Hard		D, S	Intermittent supply.
32	SW.	24	"	"	"	Bored	70	1,805	- 60	1,745	60	1,745	Glacial sand(?)	Hard, clear, "alkaline"		S	Sufficient for 60 head stock. A 14-foot well is used for domestic needs.
33	NW.	25	"	"	"	Bored	53	1,800	- 49	1,751	49	1,751	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 80 head stock. 3 other wells 16 feet deep with small supplies.
34	NE.	25	"	"	"	Bored	70	1,800									3 dry holes 40, 60 and 70 feet deep; glacial clay at base.
35	SW.	26	"	"	"	Bored	33	1,800	- 21	1,779	33	1,767	Glacial sand	Hard, clear		D, S	Sufficient for 62 head stock; another 22-foot well sufficient for 200 head stock.

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

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

WELL RECORDS—Rural Municipality of

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
36	SE.	28	20	6	2	Dug	30	1,800	- 16	1,784	16	1,784	Glacial sand and gravel	Hard, clear		D, S	Sufficient for 35 head stock.
37	SW.	28	"	"	"	Dug	27	1,810	- 18	1,792	6	1,804	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 6 head stock.
38	SW.	30	"	"	"	Dug	20	1,810					Glacial clay	Hard		N	Intermittent supply.
39	NE.	30	"	"	"	Dug	35	1,815	0	1,815			Glacial drift	Hard, clear		D, S	Intermittent supply; several similar wells.
40	SW.	31	"	"	"	Bored	40	1,814	- 26	1,788	26	1,788	Glacial sand	Hard, clear	42	D, S	Sufficient for local needs; 5 similar wells; also dry holes 50 to 60 feet deep.
41	SE.	32	"	"	"	Dug	38	1,805	- 28	1,777	38	1,767	Glacial sand	Hard, iron, "alkaline", red sediment		S	Sufficient for 90 head stock.
42	SW.	34	"	"	"	Dug	30	1,800	- 27	1,773	27	1,773	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for local needs in wet seasons.
43	SE.	35	"	"	"	Dug	50	1,800									2 dry holes 20 and 60 feet deep; glacial clay at base.
44	SW.	35	"	"	"	Dug	35	1,805					Glacial drift	Hard, cloudy		S	Intermittent supply.
45	NW.	36	"	"	"	Dug	56	1,805	- 50	1,755	50	1,755	Glacial gravel	Hard, clear, "alkaline"		D, S	Sufficient for 20 horses; 2 other wells 48 and 36 feet deep.
1	ST.	4	21	4	2	Bored	35	1,750	- 15	1,735	30	1,720	Glacial sand	Hard, clear, iron		D, S	Oversufficient for 20 head stock.
2	NE.	4	"	"	"	Dug	26	1,750	- 22	1,728	24	1,726	Glacial sand	Soft, clear	40	D, S	Sufficient for local needs; several dry holes up to a depth of 100 feet.
3	SE.	5	"	"	"	Dug	23	1,750	- 17	1,733	19	1,731	Glacial sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for 60 head stock.
4	SW.	7	"	"	"	Dug	10	1,750	- 7	1,743	7	1,743	Glacial sand	Soft, clear		D, S	Insufficient for 11 head stock.
5	NW.	7	"	"	"	Dug	8	1,750	- 4	1,746	4	1,746	Glacial sand	Hard, clear		D, S	Sufficient for 7 head stock; another similar well.
6	NE.	8	"	"	"	Dug	42	1,750									Dry hole; glacial blue clay at base.
7	SE.	8	"	"	"	Dug	8	1,750					Glacial drift	Hard		D, S	
8	SW.	10	"	"	"	Bored	80	1,750	- 45	1,705	80	1,670	Glacial sand	Hard, clear, iron		D, S	Sufficient for 70 head stock.
9	SW.	14	"	"	"	Dug	16	1,750	- 13	1,737	13	1,737	Glacial sand	Hard, clear		D	Sufficient for household needs only.
10	SW.	15	"	"	"	Dug	22	1,750	- 19	1,731	19	1,731	Glacial sand	Hard, clear		D, S	Sufficient for 40 head stock.
11	NW.	16	"	"	"	Dug	46	1,740	- 36	1,704	46	1,694	Glacial sand	Hard, cloudy, "alkaline"		D, S	Sufficient for 30 head stock.
12	SE.	18	"	"	"	Dug	10	1,745	- 6	1,739	6	1,739	Glacial sand	Hard, clear		D, S	Sufficient for 50 head stock.
13	NE.	18	"	"	"	Dug	10	1,750	- 7	1,743	7	1,743	Glacial sand	Soft, clear		D, S	Sufficient for 40 head stock; another similar well.
14	SW.	20	"	"	"	Dug	5	1,740	- 3	1,737	3	1,737	Glacial gravel	Soft, clear		D, S	Oversufficient for local needs.
15	SW.	22	"	"	"	Dug	10	1,735	- 5	1,729	6	1,729	Glacial sand	Soft, clear		D, S	Sufficient for 17 head stock.
16	NW.	22	"	"	"	Bored	40	1,740	- 30	1,710	40	1,700	Glacial sand	Hard, clear,		D, S	Sufficient for 48 head stock; also 2 other wells 14 and 6 feet deep.

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

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

WELL RECORDS—Rural Municipality of GRAYSON, NO. 184, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
17	NW.	23	21	4	2	Dug	14	1,740	- 11	1,729	11	1,729	Glacial sand	Hard, clear		D, S	Sufficient for 40 head stock; another similar well.
18	SW.	24	"	"	"	Dug	23	1,735	- 17	1,718	17	1,718	Glacial sand	Hard, clear		D, S	Sufficient for 15 head stock.
19	NE.	26	"	"	"	Dug	20	1,750	- 15	1,735	20	1,730	Glacial sand	Hard, clear		D	Intermittent supply.
20	SW.	26	"	"	"	Bored	67	1,740	- 57	1,683	65	1,675	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for 30 head stock.
21	NE.	29	"	"	"	Dug	8	1,735	- 2	1,733	2	1,733	Glacial sand	Hard, clear		D, S	Sufficient for 12 head stock.
22	SW.	31	"	"	"	Dug	9	1,740	- 5	1,735	8	1,732	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for 13 head stock; another similar well.
23	NW.	31	"	"	"	Dug	8	1,740	- 4	1,736	7	1,733	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for 6 head stock.
24	NE.	31	"	"	"	Dug	8	1,730	- 4	1,726	7	1,723	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for 12 head stock; also a 25-foot dry hole.
25	NW.	32	"	"	"	Bored	58	1,735	- 28	1,707	46	1,689	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 10 head stock; also other wells 7 to 9 feet deep with good supply.
26	NW.	33	"	"	"	Dug	18	1,735	- 13	1,722	17	1,718	Glacial sand	Hard, clear		N	Unfit for use.
27	NE.	36	"	"	"	Dug	25	1,750									Four dry holes; glacial drift at base.
1	NE.	2	21	5	2	Dug	10	1,760	0	1,760	0	1,760	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
2	NE.	3	"	"	"	Dug	10	1,760	0	1,760	0	1,760	Glacial sand	Hard, clear		D, S	Intermittent supply.
3	SE.	4	"	"	"	Dug	35	1,750									Dry hole; glacial blue clay at base.
4	SW.	4	"	"	"	Dug	50	1,770					Glacial drift	Hard, clear, "alkaline"		D	Intermittent supply.
5	NW.	4	"	"	"	Dug	42	1,770									Dry hole; glacial blue clay at base
6	SE.	6	"	"	"	Dug	12	1,780	0	1,780	10	1,770	Glacial sand	Soft, clear		D	Insufficient for local needs; another well 30 feet deep.
7	SE.	7	"	"	"	Dug	17	1,770	- 12	1,758	12	1,758	Glacial sand	Soft, clear		D, S	Intermittent supply; another similar well 60 feet deep.
8	NW.	9	"	"	"	Dug	10	1,760	0	1,760	0	1,760	Glacial sand and gravel	Soft, clear		D, S	Sufficient for local needs; another well 12 feet deep, with small supply.
9	NE.	9	"	"	"	Dug	8	1,760	- 4	1,756	4	1,756	Glacial sand	Hard, clear		D, S	Sufficient for local needs; another similar well 6 feet deep.
10	SW.	10	"	"	"	Bored	60	1,760									Dry hole; glacial blue clay at base.
11	NW.	10	"	"	"	Dug	40	1,760					Glacial drift	Hard, clear, "alkaline"		N	
12	NE.	10	"	"	"	Dug	6	1,770	- 2	1,768	2	1,768	Glacial sand	Soft, clear		D, S	Sufficient for local needs.
13	SW.	12	"	"	"	Dug	10	1,755	- 5	1,750	5	1,750	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
14	SW.	13	"	"	"	Bored	60	1,760	- 45	1,715			Glacial clay	Hard, clear, "alkaline"		N	Unfit for use.
15	SE.	14	"	"	"	Dug	35	1,760	- 25	1,735			Glacial clay	Hard, clear, "alkaline", iron		N	Intermittent supply.

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

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

WELL RECORDS—Rural Municipality of

GRAYSON, NO. 184, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (-) Surface	Elev.	Depth	Elev.	Geological Horizon				
16	SE.	16	21	5	2	Dug	12	1,760	- 5	1,755	5	1,755	Glacial sand	Soft, clear		D, S	Sufficient for local needs; another similar well.
17	SE.	18	"	"	"	Dug	18	1,760	- 4	1,756	4	1,756	Glacial sand	Hard, clear		D, S	Sufficient for local needs; another well 14 feet deep with fair supply; and a 70-foot well which is not used.
18	SW.	19	"	"	"	Dug	6	1,765	- 4	1,761	4	1,761	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
19	SW.	20	"	"	"	Drilled	108	1,765									Dry hole; glacial drift at base.
20	SE.	20	"	"	"	Bored	50	1,760	- 45	1,715			Glacial clay	Hard, clear, "alkaline"		S	Insufficient for local needs; another well 12 feet deep with good supply; also dry holes to a depth of 110 feet.
21	NW.	22	"	"	"	Dug	30	1,760					Glacial clay	Hard, clear, "alkaline"		D, S	Sufficient for household needs only.
22	NE.	22	"	"	"	Dug	8	1,750	- 2	1,748	2	1,748	Glacial sand	Hard, clear		D, S	Sufficient for local needs; another well 110 feet deep; unfit for use; also dry holes to a depth of 100 feet.
23	NW.	24	"	"	"	Dug	10	1,750	- 4	1,746	4	1,746	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
24	SE.	24	"	"	"	Dug	10	1,750	- 4	1,746	4	1,746	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
25	NE.	24	"	"	"	Dug	10	1,750	- 4	1,746	4	1,746	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
26	NW.	25	"	"	"	Dug	10	1,760					Glacial sand	Soft, clear		D, S	Sufficient for local needs.
27	NE.	27	"	"	"	Dug	8	1,760	- 2	1,758	2	1,758	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
28	NE.	28	"	"	"	Dug	18	1,760	- 12	1,748	12	1,748	Glacial sand	Hard, clear		D	Sufficient for domestic needs only. Two 8-foot wells with good supplies.
29	NW.	28	"	"	"	Dug	6	1,760	0	1,760	0	1,760	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
30	NE.	30	"	"	"	Dug	10	1,780	8	1,772			Glacial clay	Hard, clear, "alkaline"		D, S	Intermittent supply; another similar well; also a dry hole 55 feet deep.
31	SW.	30	"	"	"	Bored	140	1,760									Two dry holes; glacial blue clay at base.
32	NW.	32	"	"	"	Dug	8	1,770	- 3	1,767	3	1,767	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
33	SE.	32	"	"	"	Dug	6	1,770	0	1,770	0	1,770	Glacial sand	Hard, clear		D, S	Sufficient for local needs; another similar well.
34	NE.	33	"	"	"	Dug	12	1,760	- 4	1,756	4	1,756	Glacial gravel	Hard, clear		D, S	Intermittent supply.
35	NW.	34	"	"	"	Dug	12	1,760	- 6	1,754	10	1,750	Glacial gravel	Hard, clear		D, S	Intermittent supply; another well 6 feet deep; not used.
36	SE.	35	"	"	"	Dug	12	1,750	- 0	1,750	3	1,747	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
1	NE.	3	21	6	2	Bored	42	1,790	- 32	1,758	32	1,758	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 30 head stock.
2	SE.	4	"	"	"	Dug	14	1,800	- 8	1,792	8	1,792	Glacial sand	Hard, clear		D, S	Intermittent supply.
3	NW.	4	"	"	"	Dug	15	1,790									Four dry holes; glacial blue clay at base.
4	SW.	5	"	"	"	Bored	50	1,815	- 57	1,758	57	1,758	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for 6 head stock.
5	NW.	5	"	"	"	Dug	14	1,820	0	1,820	5	1,815	Glacial sand	Hard, iron, rusty		D, S	Sufficient for 15 head stock.
6	NE.	6	"	"	"	Dug	13	1,800									Several dry holes; glacial clay at base.
7	NW.	7	"	"	"	Dug	11	1,800	- 7	1,793	3	1,797	Glacial gravel (?)	Hard, "alk- aline"		S	Sufficient for 30 head stock.
8	NE.	7	"	"	"	Bored	105	1,820	- 40	1,780	105	1,715	Glacial sand	Hard, "alk- aline"		S	Oversufficient for 12 head stock; a shallow well is used for domestic needs.

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

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

WELL RECORDS—Rural Municipality of GRAYSON, NO. 184, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
9	NW.	8	21	6	2	Bored	37	1,820	- 27	1,793	37	1,783	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock.
10	NW.	9	"	"	"	Dug	14	1,800	- 2	1,798	2	1,798	Glacial sand	Soft, clear		D, S	Oversufficient for 20 head stock.
11	NE.	9	"	"	"	Dug	30	1,800	- 29	1,771	16	1,784	Glacial sand	Hard, clear, "alkaline"		D	Sufficient for domestic needs.
12	SE.	10	"	"	"	Dug	16	1,790	- 10	1,780	10	1,780	Glacial sand	Hard, clear		D, S	Sufficient for 40 head stock.
13	SE.	11	"	"	"	Dug	18	1,790	- 2	1,788	12	1,778	Glacial gravel	Hard, clear		D, S	Sufficient for 35 head stock; another well 36 feet deep.
14	SE.	13	"	"	"	Dug	15	1,800	- 3	1,792	8	1,792	Glacial sand	Soft, clear		D, S	Sufficient for 15 head stock; another seepage well for domestic needs.
15	SE.	15	"	"	"	Dug	20	1,790	- 10	1,780	10	1,780	Glacial sand	Hard, clear		D, S	Oversufficient for 30 head stock; 2 other similar wells.
16	SW.	16	"	"	"	Dug	20	1,800	- 14	1,786	14	1,786	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock.
17	SW.	18	"	"	"	Dug	10	1,800	- 5	1,795	5	1,795	Glacial sand	Hard, clear		D, S	Oversufficient for 50 head stock.
18	NW.	18	"	"	"	Dug	23	1,810	- 11	1,799	21	1,789	Glacial sand and gravel	Hard, cloudy, "alkaline"		D, S	Sufficient for 16 head stock.
19	SW.	20	"	"	"	Dug	24	1,820	- 18	1,802	22	1,798	Glacial sand	Hard, clear		D, S	Intermittent supply.
20	NW.	20	"	"	"	Bored	95	1,810	- 60	1,750	95	1,715	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for local needs; another shallow well used for stock and domestic needs.
21	NE.	20	"	"	"	Dug	22	1,805	- 11	1,794	11	1,794	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock.
22	NW.	21	"	"	"	Dug	30	1,810	- 26	1,784	26	1,784	Glacial sand	Hard, clear		D, S	Sufficient for 20 head stock; also another well.
23	SE.	22	"	"	"	Dug	16	1,780	- 10	1,770	10	1,770	Glacial sand	Soft, clear		D, S	Sufficient for 50 head stock; also 3 other wells.
24	SW.	24	"	"	"	Dug	16	1,800	- 12	1,788	12	1,788	Glacial sand	Soft, clear		D, S	Sufficient for 10 head stock.
25	NE.	24	"	"	"	Dug	9	1,800	- 1	1,799	7	1,793	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for domestic needs only.
26	SE.	26	"	"	"	Dug	12	1,800	- 3	1,797	3	1,797	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 20 head stock.
27	NW.	30	"	"	"	Dug	21	1,800	- 18	1,782	18	1,782	Glacial gravel	Hard, clear		D, S	Sufficient for household needs only; also another well for stock needs.
28	SE.	32	"	"	"	Dug	26	1,820					Glacial sand	Soft, clear		D, S	Sufficient for local needs.
29	NW.	32	"	"	"	Dug	21	1,815	- 17	1,798	17	1,798	Glacial sand	Hard, clear		D, S	Sufficient for 10 head stock; another well used for stock.
30	SW.	34	"	"	"	Dug	13	1,805	- 7	1,798	7	1,798	Glacial sand	Hard, clear, "alkaline"		D, S	Intermittent supply.
31	NE.	35	"	"	"	Dug	9	1,790	- 5	1,785	5	1,785	Glacial sand	Hard, rusty, iron, "alkaline"		D	Sufficient for domestic needs only. A 10-foot well is used for stock.
32	SE.	36	"	"	"	Bored	32	1,800	- 25	1,775	30	1,770	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for 35 head stock; another similar well 30 feet deep.

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

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

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