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WATER SUPPLY PAPER No. 299

GROUND-WATER RESOURCES OF TOWNSHIPS, 7 to 10, RANGES 26 to 29, WEST OF PRINCIPAL MERIDIAN, MANITOBA

(Virden Area)

By

E. C. Halstead

OTTAWA

1949

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CONTENTS

Part 1

	Page
Introduction	1
Publication of results	1
How to use the report	1
Glossary of terms used	2
General discussion of ground water	4
Discussion of water analyses	5

Part 11

	Page
Virden area, tps. 7 to 10, rges. 26 to 29, W. Princ. mer.	8
Introduction	8
Physical features	8
Geology	9
Table of formations	9
Water supply	11
Township 7, range 26, west Princ. meridian	11
" 7, " 27, " " "	12
" 7, " 28, " " "	12
" 7, " 29, " " "	13
" 8, " 26, " " "	13
" 8, " 27, " " "	13
" 8, " 28, " " "	13
" 8, " 29, " " "	14
" 9, " 26, " " "	14
" 9, " 27, " " "	14
" 9, " 28, " " "	14
" 9, " 29, " " "	15
" 10, " 26, " " "	15
" 10, " 27, " " "	15
" 10, " 28, " " "	16
" 10, " 29, " " "	16
Table of analysis	17
Record of wells	18
Table of well records	

Illustrations

Preliminary map - Townships 7 to 10, ranges 26 to 29, west Principal meridian, Manitoba:

Figure 1. Map showing surface and bedrock geology;

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

PART I

INTRODUCTION

The present report is an attempt to assemble the data on ground-water resources in a form that will be useful to well drillers, farmers, municipal authorities, and others interested in obtaining adequate water supplies.

Publication of Results

The essential information pertaining to ground-water conditions is being issued in reports that, in Manitoba, cover a square block of sixteen townships lying between the correction lines and beginning at the Saskatchewan boundary. The reports on the most southerly strip of the province include in addition the two townships lying north of the International Boundary. The secretary-treasurer of each municipality will be supplied with the information covering that municipality, and copies of the reports will also be available for study at offices of the Provincial and Federal Departments. Further assistance in interpreting the reports may be obtained by applying to the Chief Geologist, Geological Survey of Canada, Ottawa.

How to Use the Report

Anyone desiring information concerning ground-water in any particular locality will find the available data listed in the well records, and other pertinent information on the maps of the area. For those unfamiliar with these reports it is, perhaps, advisable that that part dealing with the area as a whole be read first, so as to be in a better position to understand the more particular descriptions of each township that follow. Also, the map accompanying the report should prove a useful source of reference when reading the text.

The map consists of two figures. Figure I shows bedrock and surface geology. The water-bearing properties of the bedrock change from formation to formation, and are referred to in subsequent pages. The type of glacial deposit at the surface may be determined from the map, and its possibilities as an aquifer are also discussed in this report.

Figure 2 shows the location and types of wells in the area, the land relief (topography), and the drainage pattern. Not every well is plotted on the map, but most of those giving pertinent information are shown, and probably include 90 per cent of the wells in the area. Where ground water is not readily available, or carries too much dissolved salts to be used, dugouts often form the only means of supply. The topography is shown by contours, or lines of equal elevation, spaced at vertical intervals of 50 feet.

The well records are compiled from data obtained by interviewing farmers, and in many cases their accuracy depends upon the farmer's memory. Wherever possible data were checked by plumb-line measurement to the nearest foot. The wells are tabulated by townships and sections, and the total depth of the well, depths to the water level at high and low stages, and, where possible, the depth at which the water-bearing horizon occurs, are all listed. The general character of the water is stated, and the use to which it can be put. Wells from which samples were taken for analysis are indicated on the well-record sheets. An idea of how much water a well can be expected to yield is suggested by the number of stock (cattle and horses only) that can be watered at it. One head is assumed to consume between 8 and 10 gallons of water a day. Unless ~~followed by the word "only"~~

the figure for the number of stock watered is not necessarily the maximum yield of the well, but simply the greatest amount that the present user has required. The word "only" indicates that the figure given is the maximum yield of the well. To obtain the position of an aquifer at any given point, the elevation of the point should be determined from the contours on Figure 2 of the map. Elevations of adjacent wells may be found in the well records and the depth to the aquifer can usually be determined from them. By comparing elevations the depth of the aquifer below the unknown point may be estimated. This method is particularly applicable to bedrock wells, but may not be successful where information is too limited, or where the glacial drift is thick and of an irregular character. In such instances a person searching for water should refer to the text for information on the nature of the deposits in that area.

GLOSSARY OF TERMS USED

Alkaline. The term 'alkaline' or 'alkali' water has been applied rather loosely to waters having a peculiar and disagreeable taste, and commonly a laxative effect. The waters so described in the Prairie Provinces are those heavily charged with sulphates of magnesium and sodium (respectively Epsom salts and Glauber's salts) and are more correctly termed sulphate waters. Truly 'alkaline' waters owe that property to the presence of calcium carbonate and calcium bicarbonate. In this report an attempt to adhere to local terminology is made by referring to sulphate waters as 'alkali' in the well records, and the term 'alkaline' is avoided.

Alluvium. Deposits of clay, silt, sand, gravel, and other material in lake beds and in flood plains of modern streams. The term also includes the material in river terraces, which once formed part of the flood plain but are now above it.

Aquifer. A porous bed, lens, pocket, or deposit of material that transmits water in sufficient quantity to satisfy pumping wells and springs.

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.

Bentonite and bentonitic clays have the property of swelling when water is added to them. They occur as white beds as much as 2 feet thick, but usually much thinner, and are probably formed by the weathering of volcanic ash.

Buried pre-Glacial Stream Channel. A channel eroded into the surface of 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.

Coal Seam. The same as a coal bed. It is 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 relatively steep slope separating level or gently slopping areas.

Flood Plain. A flat part of a river valley ordinarily above water, but submerged when the river is in flood. It is an area where silt and clay are being deposited.

Glacial Drift. A general term that includes all the loose, unconsolidated materials that were deposited by the ice-sheet, or by the waters associated with it. Clay containing boulders usually forms a large part of the glacial drift in an area, and is called glacial till or boulder clay, and is not to be confused with the more general term glacial drift, which occurs in the following several forms:

(1) Terminal Moraine or Moraine. A ridge or series of ridges formed by glacial drift that was laid down at the margin of a moving ice-sheet. The surface is characterized by irregular hills and undrained basins.

(2) Kame Moraine. Assorted deposits of sand and gravel laid down at or close to the ice margin. The topography is similar to that of a terminal moraine.

(3) Ground Moraine. Boulder clay (till) laid down at the base of an ice-sheet. The topography may vary from flat to gently rolling.

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

(5) Glacial-lake Deposits. Sand, silt, and clay deposited in glacial lakes during the retreat of the ice-sheet.

Shoreline. A discontinuous escarpment, with intervening gravel beaches and bars, which indicates the former margin of a glacial lake.

Ground Water. The water in the zone of saturation below the water-table.

Hydrostatic Pressure. The pressure that causes water in a well to rise above the point at which it was first encountered in the well, namely, at the level of the aquifer.

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

Pervious or Permeable. Beds are pervious or permeable when they permit the perceptible passage or movement of ground water, as in the case of sands and gravels.

Pre-Glacial Land Surface. The surface of the land as it existed before the ice-sheet covered it with drift.

Recent Deposits. Deposits that have been laid down by the agencies of water and wind since the disappearance of the continental ice-sheet; for example, alluvium in stream valleys.

Sand Point or Driven Well. A sand point is a piece of perforated and screened pipe 2 or 3 feet long, which ends in a sharp point. It is fastened to lengths of ordinary pipe and forced down into surface deposits of a sandy or gravelly nature. The depth of such a well rarely exceeds 30 feet.

Unconsolidated Deposits. The mantle or covering of alluvium, pre-glacial soils, and glacial drift consisting of loose, uncemented material that overlies the bedrock.

Variegated. Beds so described show different colours in alternating beds or lenses.

Water-table. The upper limit of the part of the ground saturated with water. This may be near the surface or many feet below it. A water-table is said to be perched when a zone of saturated material is separated from the main water-table below by a zone or zones of unsaturated material.

Water-worked Till. Glacial till or boulder clay that has been subjected to water action, usually near the margins of glacial lakes, so that the fine clay has been washed out and a deposit that may be composed mainly of sand and gravel is left behind.

Wells. The term refers to any hole sunk in the ground by any means for the purpose of obtaining water. If no water is obtained they are referred to as dry holes. Wells yielding water are divided into four classes:

(1) Flowing Artesian Wells. Wells in which the water is under sufficient hydrostatic pressure to flow above the surface of the ground at the well.

(2) Non-flowing Artesian (Sub-artesian) Wells. Wells in which the water is under sufficient hydrostatic pressure to raise it above the level of the aquifer, but not above the level of the ground at the well.

(3) Non-artesian Wells. Wells in which the water does not rise above the water-table or the aquifer.

(4) Intermittent Non-artesian Wells. Wells that are generally dry for a part of each year.

GENERAL DISCUSSION OF GROUND WATER

Almost all the water recovered from beneath the earth's surface for both domestic and industrial uses is meteoric water, that is, water derived from the atmosphere. Most of this water reaches the surface as rain or snow. Part of it is carried off by streams as run-off; part evaporates either directly from the surface and from the upper mantle of soil, or indirectly through transpiration of plants; and the remainder sinks into the ground to be added to the ground-water supplies.

The proportion of the total precipitation that sinks into the ground will depend largely upon the type of soil or surface rock, and on the topography; more water will sink into sand and gravel, for example, than into clay; if, on the other hand, the region is hilly and dissected by numerous streams, more water will be immediately drained from the surface than in a relatively flat area. Light, continued precipitation will furnish more water to the underground supply than brief torrential floods, during which the run-off may be nearly equal to the precipitation. Moisture falling on frozen ground will not usually find its way below the surface, and, therefore, will not materially replenish the ground-water supplies. Light rains falling during the growing season may be wholly absorbed by plants. The quantity of moisture lost through direct evaporation depends largely upon temperature, wind, and humidity. Locally these deposits may become very extensive. The water-bearing properties of alluvial deposits are variable, but, in general, such deposits form favourable aquifers. They are porous, and readily yield a part of their contained water, although in places their porosity may be greatly reduced by the presence of fine silt and clay. This type of deposit may be expected to yield moderate domestic supplies through shallow wells, and larger supplies if the deposits are extensive.

In some areas of relatively steep slopes, valleys have been partly filled with sand and gravel, which, in turn, have been covered with impervious clay and silt. These circumstances commonly give rise to artesian conditions in the lower part of the valley.

DISCUSSION OF WATER ANALYSES

Both the kind and quantity of mineral matter dissolved in a natural water depend upon the texture and chemical composition of the rocks with which the water has been in contact. Pollution is caused by contact with organic matter or its decomposition products. Analyses of well waters for mineral content are made by the Department of Health and Public Welfare, Winnipeg, and by the Bureau of Mines, Department of Mines and Resources, Ottawa.

As the ground-water survey of Manitoba progresses an effort is made to secure samples representative of each major aquifer encountered; the purpose of this is to compare the chemical characteristics of waters from the various geological horizons and, thereby, assist in making correlations of the strata in which the waters occur. The mineral content of natural waters is also of interest to the consumers, though the effects of the constituents are usually already apparent. The quantities of the various constituents for which tests are made are given as 'parts per million', which refers to the proportion by weight of each constituent in 1,000,000 parts of water. A salt when dissolved in water separates into two chemical units called 'radicals', and these are expressed as such in the chemical analyses. In one group are included the metallic elements of calcium (Ca), magnesium (Mg), sodium (Na), and iron (Fe), and in the other group are the sulphate (SO_4), chloride (Cl), bicarbonate (HCO_3), carbonate (CO_3), and nitrate (NO_3) radicals. The radicals listed in the analyses tabulated in the second part of this report can be combined to give the actual quantity of the particular salts present in the water, but this is not done here as the radicals alone give enough information to identify the water types. In fact, the sulphate, chloride, and carbonate radicals, plus the hardness, serve to identify a water, and crude field tests on the basis of these constituents were used in some areas to outline more completely zones of the various water types.

The following mineral constituents include all that are commonly found in natural waters in quantities sufficient to have any practical effect on the value of waters for ordinary uses:

Silica (SiO_2) is dissolved in small quantities from almost all rocks. It is not objectionable except in so far as it contributes to the formation of boiler scale.

Iron (Fe) in combination is dissolved from many rocks as well as from iron sulphide deposits with which the water comes in contact. It may also be dissolved from well casings, water pipes, and other fixtures in quantities large enough to be objectionable, but separates as the hydrated oxide upon exposure of the water to the atmosphere. Excessive iron in water causes straining on porcelain or enamelled ware, and renders the water unsuitable for laundry purposes. Water is usually considered not potable if the iron content is more than 0.5 part per million.

Calcium (Ca) in the water comes from mineral particles present in the surface deposits, the chief sources being limestone, gypsum, and dolomite. Fossil shells provide a source of calcium, as does also the decomposition of igneous rocks. The common compounds of calcium are calcium carbonate ($CaCO_3$) and calcium sulphate ($CaSO_4$), neither of which have injurious effects on the consumer, but both of which cause hardness.

Magnesium(Mg) is a common constituent of many igneous rocks and, therefore, very prevalent in ground water. Dolomite, a carbonate of calcium and magnesium, is also a source of the element. The sulphate of

magnesia ($MgSO_4$) combines with water to form 'Epsom salts,' and renders the water unwholesome if present in large amounts.

Sodium(Na) is derived from a number of the important rock-forming minerals, so that sodium sulphate and carbonate are very common in ground waters. Sodium sulphate (Na_2SO_4) combines with water to form 'Glauber's salt' and excessive amounts make the water unsuitable for drinking purposes. Sodium carbonate (Na_2CO_3) or 'black alkali' waters are mostly soft, the degree of softness depending upon the ratio of sodium carbonate to the calcium and magnesium salts. Waters containing sodium carbonate in excess of 200 parts per million are unsuitable for irrigation purposes[1]. Sodium sulphate is less harmful.

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[1] "The extreme limit of salts for irrigation is taken to be 70 parts per 100,000, but plants will not tolerate more than 10 to 20 parts per 100,000 of black alkali (alkaline carbonates and bicarbonates)". Frank Dixey, in 'A Practical Handbook of Water Supply', Thos. Murby & Co., 1931, p. 254.

Sulphates (SO_4) referred to in this report are those of calcium, magnesium, and sodium, and have been mentioned above in referring to these radicals. They are also formed by oxidation of iron sulphides, and, hence, it is not uncommon to find iron in sulphate waters. Sulphates cause permanent hardness in water, and injurious boiler scale. Sodium and magnesium sulphates are laxative when present in quantities of more than 900 parts per million. The writers found that acclimatized people could drink water containing as much as 2,000 parts per million of all three of the principal sulphates, but that when all were present in quantities over 1,500 parts per million the water was commonly laxative to those not accustomed to it.

Chloride (Cl) is a constituent of all natural waters and is dissolved in small quantities from rocks. Waters from wells that penetrate brines or salt deposits contain large quantities of chloride, usually as sodium chloride (common salt) and less commonly as calcium chloride and magnesium chloride. Sodium chloride is a characteristic constituent of sewage, and any locally abnormal quantity suggests pollution from this source. However, such abnormal quantities should not, in themselves, be taken as positive proof of pollution in view of the many sources from which chloride may be derived. Chlorides impart a salty taste to water if present much in excess of 500 parts per million. In southwestern Manitoba waters with as much as 3,000 parts per million of chloride are used domestically, though more than 1,500 parts per million is generally considered undesirable. The following figures apply to chlorides: stock will require less salt if the water bears 2,000 parts per million; more than 5,000 parts per million is unfit for human consumption; more than 8,000 parts per million is unfit for horses; more than 9,500 parts per million is too much for cattle; and more than 15,500 parts per million is excessive for sheep. Magnesium chloride, less common than sodium chloride, is very corrosive to metal plumbing.

Nitrates(NO_3) found in ground water are decomposition products of organic materials; they are not harmful in themselves, but they do point to probable pollution. It is recommended that a bacterial test be made on water showing an appreciable nitrate content, if it is to be used for domestic purposes.

Carbonates (CO_3) in water are indicated in the table of analyses as 'alkalinity'. Calcium and magnesium carbonate cause hardness in water, which may be partly removed by boiling. Sodium carbonate causes softness in waters, and is referred to under 'Sodium' above.

Bicarbonates (HCO_3). Carbon dioxide dissolved in water renders the insoluble calcium and magnesium carbonates soluble as bicarbonates. The latter are decomposed by boiling the water, which changes them to insoluble carbonates.

Hardness is a condition imparted to waters chiefly by dissolved calcium and magnesium compounds. It here refers to the soap-destroying power of water, that is, to the amount of soap that must first be used to precipitate the above compounds before a lather is produced. The hardness of water in its original state is its total hardness, and is classified as 'permanent hardness' and 'temporary hardness'. Permanent hardness remains after the water has been boiled. It is caused by mineral salts that cannot be removed from solution by boiling, but it can be reduced by treating the water with natural softeners, such as ammonia or sodium carbonate, or with many manufactured softeners. Temporary hardness can be eliminated by boiling, and is due to the presence of bicarbonates of calcium and magnesium. Waters containing large quantities of sodium carbonate and small amounts of calcium and magnesium compounds are soft, but if the latter compounds are present in large quantities the water is hard. The following table[1] may

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[1]Thresh, J.C., and Beale, J.F.: The Examination of Waters and Water Supplies; London, 1925, p. 21.

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be used to indicate the degree of hardness of a water:

Total Hardness

Parts per million	Character
0-50	Very soft
50-100	Moderately soft
100-150	Slightly hard
150-200	Moderately hard
200-300	Hard
300 +	Very hard

The above table gives the generally accepted figures for hardness, but the people of southwestern Manitoba have become accustomed to harder waters, and the following table, based on about 800 field determinations of hardness, by the soap method, is more applicable:

Parts per million	Character
0-100	Very soft
100-150	Soft
150-250	Moderately hard
250-350	Hard
350-500	Very hard
500+	Excessively hard

Waters having a hardness of up to 300 parts per million are commonly used for laundry purposes. In southwestern Manitoba, hardness ranges from less than 50 parts per million to more than 2,500 parts per million.

PART II

TOWNSHIPS 7 to 10, RANGES 26 to 29, WEST PRINCIPAL MERIDIAN, MANITOBA (Virden Area)

Introduction

An investigation of the glacial geology and the ground-water resources of tps. 7 to 10, rges. 26 to 29, W. Prin. mer., was carried on by the writer during the field season of 1948.

Physical Features

The general character of the topography is that of a level to undulating plain sloping to the east to where the flat lake-bed of the former glacial Lake Souris borders the map-areas. Elevations vary from 1,800 feet above sea-level along the west side, to 1,400 feet above sea-level on the east side. Isolated hills rise 75 to 80 feet above the surrounding plains in the north part of the area. Many minor undrained depressions (sloughs) from 2 to 6 feet in depth and as much as several acres in area are scattered over the plain. They hold water for much of the year, and are surrounded by small poplar trees and brush.

Five streams trend southeast across the area. Jackson and Stony Creeks are intermittent streams, crossing the southwest quarter. Pipestone Creek flows southeast, and cuts a channel about 100 feet deep, where it crosses tps. 9 and 10, rge. 29. East from the village of Cromer, it follows a shallow channel that north of Reston turns to flow east to Oak Lake. Gopher and Bosshill Creeks cut channels through the more rolling, north part of the area, and then flow east through the town of Virden and empty into Assiniboine River.

Geology

Table of Formations

Age	Formation	Character	Thickness (Feet)
Recent	Alluvium	Stream-laid mud, silt, sand and gravel	
Pleistocene	Lake deposits	Silty clays, fine sands and silts, duned sands, assorted sands and gravel in beaches and deltas	0-50
	Glacial drift	Till, clay, sand, gravel, boulders, assorted sand and gravel in outwash plains	0-400
Upper Cretaceous	Riding Mountain	Upper beds of medium to light grey, hard, siliceous shales (Odanah shale), with some thin layers of fine, blue sand and bentonite beds; lower beds of slippery clay shale that tends to slump	1,000+

Age	Formation	Character	Thickness (Feet)
	Vermilion River	Dark grey and black shales; comprising three members: Pembina (dark shale, numerous bentonite bands near base); Boyne (grey, calcareous shale, non-calcareous dark shale near base); and Morden (calcareous speckled shale, overlying dark grey, non-calcareous, blocky shale with thin partings of white sand)	80 + - 140 + - 190 + -
	Favel	Grey shale with white calcareous material; some bands of limestone; some bentonite	150 + -
Lower and Upper Cretaceous	Ashville	Dark grey to black shales with silt and sands	40 + -
Lower Cretaceous	Swan River	White to green sandstone, black shale and silt	50 +
Jurassic		Light grey to red shale, calcareous sandstone, grey to buff to brown shales, light grey limestone and sandstone	380 + -
Jurassic or earlier	Amaranth	Red beds and gypsum	220

The map-area is underlain by Upper Cretaceous shales of the Riding Mountain formation. These shales do not outcrop, and four dry holes drilled in sec. 34, tp. 10, rge. 26, reached shale at depths of 45, 54, 65, and 145 feet respectively below the surface. The water-bearing possibilities of the bedrock are unknown, as none of the recorded wells in this area is supplied from aquifers in the bedrock. In adjacent areas, drilled wells into bedrock yield an abundant supply of water, which commonly carries so much of the sulphates of sodium and calcium that its use is limited to stock.

With the exception of that part of the area included in range 26, the surface deposits are ground moraine, the upper 20 feet or more of which is a yellow clay, with many boulders and lenses of sand and gravel. This till is underlain by a blue clay, averaging 50 feet in thickness, that is compact, impervious, and commonly called "hardpan" by local drillers. Gravel and sand may form lenses or thin seams between the yellow clay and the blue clay, and will yield a variable quantity of hard, clear water.

Abandoned drainage channels and present stream courses trend southeast across the ground moraine. These are lined with water-worked till and shallow deposits of outwash sand and gravel. Dug wells along these channels will yield an abundant supply of hard, clear water. Outwash gravels and deltaic gravels border the basin of the former glacial Lake Souris, and are excellent aquifers. These gravels cover many acres, and are commonly 20 feet or more thick. A transition zone of water-worked till lies between the bordering deltaic gravels and the glacial-lake sands.

Water Supply

Water supply is no problem along the east side of the area, where sandpoints and dug wells are used in the sands and gravels that constitute excellent aquifers. The remainder of the area obtains an inadequate supply of water from dug wells that tap pockets of sand and gravel within the ground moraine. Abandoned stream channels traverse the area and are lined with sand and gravel that provide excellent aquifers. A well-known channel, with an aquifer of sand 9 feet thick, is that on which the well of the Reston Creamery is dug. Other channels are shown on the accompanying map, and anywhere along these a sufficient supply of hard, clear water should be available. In the north part of the area the wells are dug to depths of 40 feet or more to lenses and seams of sand and gravel at the contact of the yellow and blue clay. The supply is not dependable, and dugouts are needed on many farms to assure a supply for stock during periods of drought. A few drilled wells, in the north part of the area, afford a variable supply as to quantity and quality.

Township 7, Range 26. Sandpoints, 7 to 40 feet in depth, are used throughout the township and are driven into the lake-bed sands and outwash gravels that form the surface deposits. Dug wells, 8 to 18 feet deep, are used on the farms adjacent to Pipestone Creek;

they are dug into silty lake-bed deposits, and yield sufficient hard, clear water. A dug well 18 feet deep, in section 32, is dry in winter, but in summer yields enough water for about 25 head of stock. In section 30, a dug well 20 feet deep yields alkali water useful only for stock, but sufficient for 100 head.

An unlimited supply of hard, clear water is pumped from the lake-bed sands in the village of Pipestone, in section 9.

During seasons of drought this township may experience a rapid lowering of the water-table, and dug wells as well as sandpoints will fail. To assure a constant supply, the sandpoints can be driven deeper, in order to keep the point, well below the water-table.

Township 7, Range 27. Ground moraine, consisting of yellow clay with lenses of sand and gravel, comprises the surface deposits of this township except along the east side, where outwash gravels are present. A narrow, abandoned stream channel that trends southeast across the township is composed of gravel and sand deposited by running water. Water supply from the ground moraine is limited, and is available only from dug wells that reach lenses of sand or gravel carrying sufficient water to supply the local needs. Many sections have no wells, and dugouts supply the water needed for stock. Along abandoned stream channels, dug wells in the sand and gravel supply local needs. The town of Reston is without water except in that part of the town through which an abandoned stream channel runs. The well at the Reston Creamery is 18 feet deep, and is dug into 9 feet of gravel that overlies 9 feet of blue clay. The well carries an average of 10 feet of water and supplies 16,000 gallons a day. A similar well at the Canadian Pacific Railway station is used to supply many of the residents of the town with water.

In SE. $\frac{1}{4}$ section 28, a dug well, 22 feet deep, is in a gravel pocket within yellow clay. The well holds an average of 18 inches of hard, clear water, and is sufficient for 20 head of stock. In SW. $\frac{1}{4}$ section 36, a dug well 18 feet deep, in a local gravel pocket, yielded 5 gallons of water a day during the period of drought in the thirties. In the same section two holes were drilled 210 feet deep into blue clay; one was dry, and the other yielded abundant salty water unfit for stock use.

Township 7, Range 28. Dugouts are necessary for a continuous supply of water for stock on many of the farms in this township. The wells are all dug wells averaging 12 feet in depth, and are dug into yellow clay or local lenses and pockets of sand or gravel. These wells yield a limited supply of water, and are commonly dry during the winter months. In NW $\frac{1}{4}$ section 21, a total of eleven dry holes have been dug. Dug wells, in shallow sands along Stony Creek, yield sufficient potable water, but these sand aquifers are not extensive. No drilled wells were reported, and it is probable that a drilled well would yield an alkali water unfit for domestic or stock use.

Township 7, Range 29. The surface deposits of this township are ground moraine that presents a rolling, irregular topography pitted with many sloughs. A strip of water-worked till about three-quarters mile wide parallels Stony and Jackson Creeks from section 35 to section 1, and supplies three notable wells: in section 35, a dug well 10 feet deep and 6 feet square is dug in gravel and yields sufficient water even in the years of drought: in section 25, a dug well 9 feet deep, dug in gravel, yields an abundant supply for 70 head of stock; a third well, at the Canadian Pacific Railway station in the village of Sinclair, is 14 feet deep and is in gravel overlain by 8 feet of yellow clay. This well and two others near it supply the village with water. Elsewhere, wells dug into sand and gravel pockets in the till supply inadequate quantities of water commonly high in sulphates, and the wells must be supplemented by dugouts.

Township 8, Range 26. Water-worked till and shallow water-laid deposits of silt, sand, and gravel form the surface deposits of this township except for the deltaic gravels of the southwest quarter and in sections 31 and 32. The areas of outwash gravels are the best aquifers, and wells in these deposits yield abundant hard, clear water. Sandpoints driven to depths of 12 to 20 feet are used in the southeast of the township, and elsewhere dug wells 8 to 25 feet deep are common. In NW. $\frac{1}{4}$ section 16, a dug well 16 feet deep reaches blue clay, and yields alkali water sufficient for 20 head of stock. Eight dry holes have been dug on this section. A dug well 25 feet deep, in SW. $\frac{1}{4}$ section 28, yields alkali water, and is commonly dry in winter. On the same section, a dry hole, bored to a depth of 64 feet, penetrated 60 feet of blue clay.

Township 8, Range 27. The aquifers of the township are local pockets of sand and gravel in yellow clay, which forms the surface deposits to depths of 20 feet or more. A limited supply of water has been recovered from dug wells, averaging 18 feet in depth, that are commonly dry during the winter months, and dugouts are the only means of supply at such times. Two dug wells 16 feet deep, in SE. $\frac{1}{4}$ section 5, are in a pocket of gravel, and yield sufficient water for 70 head of stock. In SE. $\frac{1}{4}$ section 12, a well dug 18 feet deep in a similar pocket of gravel yields enough water for 150 head of stock.

Township 8, Range 28. The only aquifers known in this township are pockets of sand and gravel in the yellow clay that forms the top 20 feet of the surface deposits. The present wells are dug wells, four feet square, usually with a wooden cribbing, and averaging 12 feet in depth. None of these will supply water for more than about 30 head of stock. In NE. $\frac{1}{4}$ section 2, a well dug 14 feet deep in a strip of outwash gravel yields abundant water for 40 head of stock. Dugouts are the only means of supply on many farms, such as in sections 3 and 27, where dry holes 80 to 140 feet deep have been bored and drilled.

Township 8, Range 29. The wells of this township are dug to an average depth of 14 feet. Most of those recorded are known to be located on gravel deposits laid down in stream courses that were later abandoned. Stony and Jackson Creeks cross the township and supply water for stock during the summer months. The water in the dug wells is hard, clear, commonly high in sulphates, and sufficient for 35 to 60 head of stock. In farms other than those where surface deposits of gravel or stream channels are present, wells are dug into yellow and blue clay, which yield a limited supply of water except in winter, when the wells are commonly dry.

Township 9, Range 26. In the eastern part of this township, where the surface deposits are sandy, sandpoints are used at depths of 8 to 12 feet. Dug wells in the deltaic gravels are dependable, and will water 30 head or more of stock. In the vicinity of Scarth, which is without water except for dugouts, the surface deposits are water-laid silts and clays, which are relatively impervious and are underlain by a yellow clay. A dug well in NW. ¼ section 9 is 24 feet deep, and yields a little hard, clear water. In NE. ¼ section 29, a dug well 40 feet deep yields sufficient water for 20 head of stock. A well 20 feet deep, in section 8, is dug in sand, and yields water sufficient for 80 head of stock. Many sections have two wells, a dug well for stock and a sandpoint well for domestic use.

Township 9, Range 27. Yellow clay, averaging 15 feet in depth and containing local pockets of sand and gravel, forms the surface deposits of this township, and overlies blue clay. Wells dug 15 feet deep in this clay yield a limited supply of commonly alkali water, and wells on the abandoned stream channels that trend southeast across the township will yield abundant hard, clear water. In NE. ¼ section 12, a dug well 52 feet deep yields alkali water unfit for domestic use. Across the road allowance, in SE. ¼ section 13, is a dug well, 18 feet deep, in a pocket of gravel, which supplies abundant hard, clear water. In SW. ¼ section 35, two wells, one bored 54 feet deep and the other drilled to a depth of 184 feet, will supply about 10 head of stock. At the railway station in Woodnorth, a dug well 11 feet deep supplies the village with water.

Township 9, Range 28. The wells of this township are either along Pipestone Creek or are dug into outwash gravels along abandoned stream channels. The dug wells average 14 feet in depth and yield water slightly softer than recorded elsewhere. At Cromer, an unlimited supply of water can be pumped from an aquifer of coarse gravel and cobbles that lies at a depth of 15 to 20 feet below the surface. Many sections report no wells or dugouts, and Pipestone Creek supplies water for the stock. A drilled well, 345 feet deep in SE. ¼ section 28, yields a little salty water from a thin seam of fine sand within blue clay.

Township 9, Range 29. The surface of this township is gentlly rolling, and is pitted with numerous sloughs. Dug wells averaging 12 feet in depth supply water from local pockets of sand and gravel in the drift or outwash along stream channels. A dug well 16 feet deep, in section 10, is in sand and yields sufficient hard, clear water for 40 head of stock. In NE. $\frac{1}{4}$ section 14, a dug well 8 feet deep, in gravel, supplies 35 head of stock. At Butler Station, a dug well 14 feet deep, dug in sand, yields hard, clear water sufficient for the villagers.

Township 10, Range 26. The topography of this township is that of an irregular, rolling plain. Bosshill Creek flows across the township and is joined by Gopher Creek and a small intermittent tributary that flows from the north. The surface deposits are varied; in the belt across sections 19 to 24, and extending north to section 33, is a deposit of deltaic gravels and sand. Sandpoints driven to an average depth of 14 feet are commonly used, and the sand yields abundant hard, clear water. In the southeast quarter, the surface deposits are lacustrine sands in which sandpoints can be used.

Dug wells vary in depth from 8 to 60 feet. These wells are excavated in gravel or clay, and most of them yield hard, clear water sufficient for 20 to 50 head of stock. Where the surface deposits are water-laid till and glacial till, the wells are dug to an average depth of 40 feet. Such wells are found in sections 4, 5, 7, 8, 30, 31, 32, and 34. They penetrate impervious yellow clay for 12 to 15 feet, then pass into blue clay, and reach a seam of gravel at an average depth of 40 feet. The water, sufficient for 20 head of stock, is commonly too alkali for domestic use.

Six dry holes were drilled in section 34 in search of a supply of water for the Virden Airport. These wells ranged in depth from 80 to 305 feet, the log indicating a dry sand, 20 feet thick, about 40 feet below the surface and bedrock at 55 feet. A small seepage was encountered in drilling the 80-foot hole, the water entering from a seam of sandy blue clay at a depth of 20 feet below the surface. This section was then abandoned, and drilling operations commenced in section 22, on the outskirts of the town. A drilled well 98 feet deep encountered a water-bearing sand and gravel bed 18 feet thick at a depth of 80 feet, and yielded a little water. A second well was drilled to a depth of 154 feet, and a coarse sand and gravel seam, 7 feet thick, was encountered at a depth of 147 feet. The well is now used by the Virden Creamery, and can supply 35 imperial gallons of water a minute. A well 97 feet deep, in NE. $\frac{1}{4}$ section 8, was dug to a depth of 50 feet and then drilled to shale at 97 feet below the surface. An abundant supply of water, high in salts of sodium carbonate, is pumped from this well.

Township 10, Range 27. The surface deposits of this township are ground moraine consisting of an upper 20 to 40 feet of yellow clay underlain by blue clay. Seams of sand and gravel varying from a few inches to 3 feet are encountered at the contact of the yellow and blue clay. The wells are all dug wells averaging 40 feet in depth, but they range from 13 to 73 feet. These wells, 4 feet square, are dug to the sand between the yellow and blue clay or to a local lens or pocket of sand and gravel in the ground moraine. Most of the wells remain about one-quarter full of water, which invariably contains much sodium and calcium sulphates. In times of drought, the wells can be pumped dry, but will slowly fill with enough water for 10 to 12 head of stock. Dugouts are found on many sections, and are necessary to assure a sufficient supply of water for stock. Gopher and Bosshill Creeks are useful for watering stock, and the shallow deposits of sand and gravel along them are sources of limited supplies during periods of drought when other wells are dry.

Township 10, Range 28. The water-bearing zones of this township are tapped by sandpoints, dug wells, and drilled wells. Sandpoints 8 feet deep are used in sections 16 and 22, and are driven into pockets of sand. Dug wells, 10 to 18 feet deep, yield an average supply of hard, clear water from the shallow deposits of sand and gravel found along present streams and abandoned water channels. Other dug wells, 30 to 65 feet deep, reach lenses and pockets of sand and gravel within the yellow clay that forms the surface deposit. These wells yield hard, alkali water sufficient for 10 to 15 head of stock, and dugouts are needed to augment the supply. Four wells are reported drilled to sand lenses within yellow and blue clay, and yield alkali water with a high iron content. In SW. $\frac{1}{4}$ section 4, a drilled well 118 feet deep, yields alkali water sufficient for 6 horses. In sections 7 and 17, drilled wells, 90 feet deep, supply alkali water useful only for stock. A fourth drilled well, 110 feet deep, in section 20, taps a seam of gravel within blue clay, and the water rises 12 feet in the casing.

Township 10, Range 29. Local pockets and shallow deposits of sand and gravel scattered through the ground moraine in this township yield abundant hard, clear water. These wells average 12 feet in depth, and commonly supply 40 head of stock. In SE. $\frac{1}{4}$ section 5, a dug well 5 feet deep, in gravel, has never been pumped dry, and will water 100 head of stock. Drilled wells in sections 14, 18, 20, 24, and 32 range from 73 to 325 feet in depth. The water obtained is salty or alkali, being useful only for stock. In section 20, a drilled well, 180 feet deep, yields sufficient water for 100 head of stock, and the water rises to within 20 feet of the surface.

ANALYSES OF WELL WATERS FROM a test well drilled for the Virden Airport, Virden, Manitoba.

Sample Number	¼	Section	Township	Range	Meridian	Owner	Depth of well (feet)	Aquifer *	Total dissolved solids (parts per million)	Constituents as Analysed (parts per million) Caloium (Ca)	Magnesium (Mg)	Alkalis (as Na)	Sulphate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Bicarbonate (CO_3)	Alkalinity (Methyl Orange)	Hardness as($CaCO_3$) (pts. per million) Ca hardness	Mg hardness	Total hardness
	NW	22	IO	26	Ist.		98	Sand and gravel	425	43	I4	IOO	35	7		2I4	357	I64	I64	328

Analysed by;
The National Testing Laboratories Ltd.
Winnipeg, Manitoba. Nov.7, 1940.

NO. 669

* Symbols used for aquifers

Record of Wells

The well records of the Virden area follow in tabulated form. A commentary on these has been made on page 1 of this report.

As a rule, the depth to the 'Principal Water-bearing Bed', has been taken as the total depth of the well, and its elevation is given as such. This commonly applies to wells drilled into bedrock or to wells obtaining water from the sub-artesian or artesian aquifer in glacial or bedrock formations; digging or dilling is continued to where a good supply is obtained and then operations are stopped. In shallow surface deposits (to a depth of 30 feet), wells are usually dug a little below the water-table during a dry season, and thereafter water may enter and leave the well at a point below the normal water-table. The height to which water will rise in such a well depends on the amount of rainfall for the season and on the lowering of the water-table by excessive pumping. During the season of 1948, the amount of rainfall exceeded that of former years, and the recorded 'height to which water will rise in the well' is 2 to 5 feet higher than average.

Wells that are dug beside dugouts are not included in the well records.

WELL RECORDS—~~Rural Municipality of~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	NE	1	7	29	WPM	dug	13	1657	-3	1654	13	1644	Glacial, gravel	hard, clear		D.S.	Sufficient supply; dugout
2	NE	2	"	"	"	"	18	1679	-15	1664	18	1661	" clay	" "		D.	Often dry in early spring; supplemented by dugout
3	NE	4	"	"	"	"	12	1686	-1	1685	12	1674	" gravel	" "		D.S.	Not sufficient during winter
4	SW	6	"	"	"	"	11	1742	-6	1736	11	1731	" "	" "		D.	Sufficient supply; dugout
5	SW	9	"	"	"	"	15	1677	-4	1673	15	1662	" "	" "		D.S.	Sometimes dry during winter
6	SW	10	"	"	"	"	11	1659	-5	1654	11	1648	" "	" "		D.	Two wells, never dry
7	NE	12	"	"	"	"	10	1654	-4	1650	10	1644	" yellow clay	" "		D.S.	
8	SE	13	"	"	"	"	14	1659	-3	1656	14	1645	" gravel	" "		D.	Well at C.P.R. station
9	NW	14	"	"	"	"	7	1669	-4	1665	7	1662	" yellow clay	" "		D.	Dugout for stock
10	SE	17	"	"	"	"	8	1685	-4	1681	8	1677	" gravel	" "		D.S.	Sufficient for 25 head; supplemented by dugout
11	SE	20	"	"	"	"	20	1693	-17	1676	18	1675	" "	" "		D.S.	Two wells; sufficient for 100 head
12	SE	23	"	"	"	"	10	1661	-4	1657	10	1651	" sand	" "		D.S.	Sufficient for 30 head
13	SW	23	"	"	"	"	13	1698	-4	1694	13	1685	" yellow clay	" "		D.S.	Three dugouts
14	NW	25	"	"	"	"	9	1662	-4	1658	9	1653	" gravel	" "		D.S.	Sufficient for 70 head
15	SE	33	"	"	"	"	9	1772	-7	1715	9	1713	" yellow clay	" "			Not used; one dugout
16	SE	34	"	"	"	"	17	1701	-7	1694	14	1687	" gravel	" "		D.S.	Supply usually sufficient
17	SW	35	"	"	"	"	10	1668	-4	1664	10	1658	" "	" "		D.S.	Sufficient even in dry years
1	NE	2	8	29	WPM	dug	18	1650	-14	1636	18	1632	Glacial, till	hard, clear		D.S.	Sufficient supply
2	NE	3	"	"	"	"	13	1690	-6	1684	13	1677	" gravel	hard, alkali clear		D.S.	Sufficient for 35 head
3	NE	5	"	"	"	"	8	1705	-4	1701	8	1697	" yellow clay	hard, clear		D.S.	Sufficient for 15 head; dugout
4	NE	7	"	"	"	"	9	1710	-6	1704	9	1701	" gravel	" iron		D.S.	Unlimited supply
5	SE	11	"	"	"	"	14	1655	-7	1648	14	1641	" "	" clear		D.S.	Creek crosses farm
6	SE	14	"	"	"	"	12	1655	-9	1646	12	1643	" "	" iron		D.S.	" " "
7	SE	15	"	"	"	"	14	1699	-8	1691	14	1685	" "	" clear		D.S.	Sufficient with creek for stock
8	SE	21	"	"	"	"	18	1729	-3	1726	12	1737	" sand	" "		D.S.	Have 18ft. sandpoint in house
9	SE	32	"	"	"	"	11	1750	-4	1746	6	1744	" gravel	" "		D.S.	Sufficient for 20 head in dry years
10	NW	34	"	"	"	"	16	1736	-9	1727	10	1726	" "	" "		D.S.	Sufficient supply
1	NE	3	9	29	WPM	dug	6	1724	-2	1722	6	1718	Glacial, clay	hard, clear		D.	Dugout for stock
2	NW	4	"	"	"	"	13	1740	-4	1736	13	1727	" gravel	" "		D.S.	Two similar wells, sufficient supply
3	SE	5	"	"	"	"	14	1758	-7	1751	14	1744	" "	" "		D.S.	Sufficient supply, 2 dugouts
4	NW	8	"	"	"	"	15	1764	-5	1759	15	1749	" "	" "		D.S.	Sufficient supply
5	SE	10	"	"	"	"	16	1731	-11	1720	16	1715	" sand	" "		D.S.	Sufficient for 40 head
6	NE	10	"	"	"	"	10	1737	-5	1732	10	1727	" "	" "		D.	Supplemented by dugout, well sufficient for 10 head
7	NW	12	"	"	"	"	10	1671	-7	1664	10	1661	" gravel	" "		D.S.	Sufficient supply
8	NE	14	"	"	"	"	8	1703	-4	1669	8	1665	" "	" "		D.S.	Sufficient for 35 head
9	SW	21	"	"	"	"	14	1758	-8	1750	14	1744	" "	" "		D.	Dugout for stock
10	SW	23	"	"	"	"	8	1715	-4	1711	8	1707	" yellow clay	" "		D.S.	One dugout
11	NW	24	"	"	"	"	12	1688	-9	1679	12	1676	" gravel	" "		D.S.	Often dry during winter
12	SW	27	"	"	"	"	8	1743	-3	1740	8	1735	" "	" "		D.S.	Sufficient supply
13	NE	28	"	"	"	"	10	1742	-4	1738	10	1732	" "	" "		D.	Dugout for stock
14	NE	33	"	"	"	"	14	1748	-4	1744	14	1734	" "	" "		D.	Well is C.P.R. well at Butler Station

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~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
15	NE	35	9	29	WPM	dug	8	1693	-5	1688	8	1685	Glacial, gravel	soft, clear		D.S.	Usually sufficient
16	NW	36	"	"	"	"	9	1709	-6	1703	7	1702	" sand	" "		D.	Dugout for stock
1	SE	5	10	29	WPM	dug	20	1748	-6	1742	20	1728	Glacial, gravel	hard, clear		D.S.	Sufficient for 100 head
2	NW	7	"	"	"	"	8	1784	-3	1781	8	1776	" "	" "		D.	Dugout for stock
3	SW	12	"	"	"	"	12	1720	-6	1714	10	1710	" "	" "		N.	Sufficient for 30 head
4	NE	14	"	"	"	"	12	1718	-8	1710	4	1714	" "	" iron		D.S.	Sufficient for 15 head
5	SE	18	"	"	"	drilled	195	1738					Glacial, coarse gravel	" salty		S.	Sufficient for 100 head
6	SE	18	"	"	"	dug	18	1742	-9	1733	18	1724	" gravel	" clear		D.	Sufficient supply
7	SE	20	"	"	"	drilled	180	1750	-20	1730	175	1575	" sand	" "		D.S.	Abundance of water for over 100 head
8	SW	22	"	"	"	dug	10	1740	-3	1737	10	1730	" quick-sand	" "		D.	Two dugouts for stock
9	NW	24	"	"	"	drilled	90	1766	-45	1721	90	1650	" "	" alkali		S.	Not sufficient; two dugouts
10	NE	24	"	"	"	"	80	1734	-20	1714	80	1654	" gravel	" clear		S.	Have a well dug 60ft., no supply
11	SW	27	"	"	"	dug	10	1716	-2	1714	10	1706	" "	" "		D.S.	Not sufficient for stock
12	NW	30	"	"	"	sand-point	8	1756					" sand	med. hard clear		D.	Sufficient only in wet years
13	NW	32	"	"	"	dug	15	1749	-7	1742	6	1743	" "	soft "		D.S.	Sulfur in water, supplies 100 head
14	SW	34	"	"	"	"	8	1718	-4	1714	8	1710	" gravel	med. hard, "		D.	
15	SW	35	"	"	"	"	8	1698	-2	1696	8	1690	" "	hard, "		D.S.	Sufficient supply
16	NW	36	"	"	"	"	10	1688	-6	1682	10	1678	" "	" "		D.S.	Sufficient for 40 head
17	SW	36	"	"	"	drilled	73	1689	-12	1677	73	1616	" sand	" "		S.	Unfit for human use analysis showed, water 50 head
18	SW	36	"	"	"	dug	18	1689	-14	1675	18	1671	" gravel	" "		D.	Sufficient 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~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	NE	3	9	28	WPM	dug	12	1525	-6	1519	12	1513	Glacial, sand	hard, clear		D.	Sufficient supply
2	NE	3	"	"	"	"	21	1525	-10	1515	21	1504	" gravel	" "		S.	" "
3	SE	3	"	"	"	"	14	1507	-8	1484	14	1493	" "	" "		D.	Sufficient for domestic use
4	NE	6	"	"	"	"	20	1670	-5	1665	20	1650	" "	soft "		D.S.	Supplemented by one dugout
5	SW	9	"	"	"	"	11	1543	-1	1542	11	1532	" "	" "		D.	Sufficient supply
6	SE	10	"	"	"	"	30	1515	-2	1513	30	1485	" clay	hard, alkali		N.	Water has concentration of sulfate salts
7	NE	14	"	"	"	"	14	1634	-8	1626	14	1620	" gravel	" clear		D.S.	Two dugouts; well was dry in '30's
8	SE	18	"	"	"	"	12	1609	-4	1605	12	1597	" "	" "		D.S.	Sufficient supply
9	SW	19	"	"	"	"	13	1543	-10	1533	13	1530	" "	" "		D.	" "
10	SW	19	"	"	"	"	15	1615	-7	1608	15	1600	" "	" "		D.S.	" "
11	NW	23	"	"	"	"	10	1602	-6	1596	10	1592	" "	" "		D.S.	Two dugouts
12	SW	24	"	"	"	"	14	1595	-4	1591	14	1581	" "	" "		D.	Two dugouts for stock
13	NW	26	"	"	"	"	10	1625	-2	1623	10	1615	" "	" "		D.S.	Sufficient supply
14	SE	28	"	"	"	drilled	345	1640	-220	1420	345	1295	" clay ?	" salty		N.	One dugout, water too salty in well
15	NE	31	"	"	"	dug	10	1685	-2	1683	10	1675	" gravel	" clear		D.S.	Sufficient supply
16	SW	33	"	"	"	"	12	1646	-2	1644	12	1634	" "	" "		D.S.	" "
17	NW	34	"	"	"	"	12	1650	-4	1646	12	1638	" "	soft, "		D.	Sufficient supply; one dugout
1	SE	2	10	28	WPM	dug	65	1644	-3	1641	65	1579	Glacial, gravel	hard, alkali		D.S.	Sufficient supply
2	NW	2	"	"	"	"	18	1652	-3	1649	18	1634	" "	" clear		D.S.	Usually sufficient
3	SW	3	"	"	"	"	15	1650	-1	1649	15	1635	" "	soft, "		D.	One dugout for stock
4	SW	4	"	"	"	drilled	118	1689	-15	1674	118	1571	" clay	hard, iron		S.	No supply, will go dry
5	SE	5	"	"	"	dug	16	1664	-2	1662	16	1648	" gravel	" clear		D.	Dugout supplies the stock
6	SW	5	"	"	"	"	12	1666	-8	1658	12	1654	" "	" "		D.S.	Two dugouts
7	NW	7	"	"	"	"	8	1695	-3	1692	8	1687	" "	" "		D.	Three dugouts
8	NW	7	"	"	"	drilled	90	1695	-15	1680	90	1605	" "	" iron		S.	Water has a high iron content
9	NE	11	"	"	"	dug	15	1636	-6	1630	15	1621	" clay	" clear		D.	Two similar wells
10	NW	12	"	"	"	"	33	1624	-3	1621	33	1591	" "	" alkali		D.S.	Sufficient supply
11	NE	12	"	"	"	"	14	1613	-6	1607	14	1599	" gravel	" clear		D.S.	Creek crosses farm
12	SE	12	"	"	"	"	30	1617	-6	1611	30	1587	" clay	" alkali		S.	Sufficient supply
13	SW	16	"	"	"	sand-point	8	1676			8	1668	" gravel	" iron		D.	Sufficient supply
14	SE	17	"	"	"	drilled	90	1696	-30	1666	90	1606	" clay	" alkali		S.	Water has a salty taste
15	NE	20	"	"	"	dug	10	1699	-2	1697	10	1689	" gravel	" clear		D.	Sufficient supply
16	NE	20	"	"	"	drilled	110	1700	-98	1602	110	1590	" blue clay	" alkali		S.	Sufficient for stock
17	NW	21	"	"	"	dug	26	1691	-4	1687	26	1665	" clay	" "		S.	Not sufficient
18	NW	23	"	"	"	"	39	1651	-4	1648	39	1612	" sand	" clear		D.S.	Sufficient supply
19	NE	24	"	"	"	"	14	1578	-9	1569	14	1555	" "	soft, "		D.S.	Sufficient for 80 head
20	NE	25	"	"	"	"	27	1599	-8	1591	27	1572	" clay	hard, clear		N.	
21	NW	28	"	"	"	"	24	1658	-8	1650	20	1638	" sand	" "		D.S.	Water is slightly alkaline; sufficient for 80 head
22	NW	29	"	"	"	"	6	1695	-2	1693	6	1689	" gravel	" "		D.	Dugout for stock
23	SE	30	"	"	"	"	50	1714	-20	1694	50	1564	" clay	" "		D.	Sufficient supply; one dugout
24	NE	32	"	"	"	"	44	1658	-20	1638	44	1614	" "	" "		S.	Water is slightly alkali
25	SE	32	"	"	"	"	23	1694	-6	1688	23	1671	" gravel	" "		D.S.	Not sufficient in winter months
26	NE	34	"	"	"	"	13	1627	-7	1620	9	1618	" "	soft, clear		D.S.	Sufficient for 100 head or more
27	NE	35	"	"	"	"	29	1588	-17	1571	29	1559	" clay	hard, "		D.S.	Sufficient supply
28	NE	35	"	"	"	"	12	1568	-1	1567	12	1556	" gravel	" "		S.	Well is in creek flats
29	NW	36	"	"	"	"	28	1585	-8	1577	28	1557	" quick-sand	" "		D.S.	Sufficient supply
30	NW	36	"	"	"	"	18	1599	-10	1589	18	1571	" quick-sand	" "		N.	Not a sufficient supply

NOTE—All depths, aititudes, 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~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

B 4-4
R. 7526

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SE	2	7	26	WPM	sand-point	16	1446			16	1430	Glacial lake, sand	hard, clear		D.S.	Sufficient supply
2	SE	4	"	"	"	"	14	1455			14	1441	" " "	" "		D.S.	" "
3	NW	4	"	"	"	dug	12	1450	-7	1443	12	1438	" " "	med. hard, clear		D.S.	" "
4	NE	5	"	"	"	sand-point	15	1471			15	1456	" " "	hard, "		D.S.	" "
5	SE	6	"	"	"	dug	7	1462	-4	1458	7	1455	" " "	" "		D.S.	Can get water anywhere at a depth of 7 ft. with a sandpoint
6	NW	6	"	"	"	"	8	1463	-4	1459	8	1459	" " "	" "		D.S.	Sufficient for 100 head
7	SW	8	"	"	"	"	10	1458	-6	1452	10	1448	Glacial, gravel	" "		D.	Sufficient supply
8	SE	9	"	"	"	"	8	1453	-6	1447	8	1445	" "	soft, "		D.S.	Will water 150 head
9	SE	10	"	"	"	sand-point	12	1444			12	1432	Glacial lake, sands	hard, "		D.S.	Never fails
10	SW	10	"	"	"	"	15	1447			15	1432	" " "	" "		D.S.	
11	SE	12	"	"	"	"	17	1431			17	1414	" " "	" "		D.S.	Three sandpoints
12	SW	13	"	"	"	"	12	1430			12	1418	" " "	med. hard, "		D.S.	
13	NW	14	"	"	"	"	12	1455			12	1443	" " "	hard, "		D.S.	
14	SW	15	"	"	"	"	15	1453			15	1438	" " "	med. "		D.S.	Dug 6ft. then sandpoint driven to depth of 15ft., waters 100 head
15	SE	16	"	"	"	"	40	1455			40	1415	" " "	" " "		D.S.	Three sandpoints
16	SE	17	"	"	"	"	14	1443			14	1429	" " "	" " "		D.S.	
17	NW	20	"	"	"	dug + sand-pt.	25	1446	-15	1431	25	1421	Glacial, gravel	hard, clear		D.S.	Gravel below 23ft. of lacustrine clay
18	NW	21	"	"	"	sand-point	18	1452			18	1434	" "	" "		D.S.	Sufficient supply
19	SW	22	"	"	"	"	18	1448			18	1430	" "	" "		D.S.	Total of four sandpoints
20	NW	22	"	"	"	"	34	1440	-13	1427	34	1406	" "	very hard, clear		D.S.	First water level at 20 feet
21	SE	23	"	"	"	"	28	1450			28	1422	" "	" "		D.S.	
22	NW	24	"	"	"	"	22	1430			22	1408	" sand	hard, "		D.S.	Two sandpoints same depth
23	SW	27	"	"	"	dug	17	1440	±10	1430	17	1423	" "	" "		D.S.	Creek crosses farm
24	SE	28	"	"	"	"	10	1446	-6	1440	10	1436	" gravel	" "		D.S.	Nine ft. sandpoint at house
25	NE	30	"	"	"	"	20	1448	-10	1438	20	1428	" "	alkali, clear		D.S.	Sufficient for 100 head
26	SW	32	"	"	"	"	18	1452	-3	1449	16	1436	" sand	soft "		D.S.	Not sufficient, waters 25 head in summer but often dry in winter
27	NW	36	"	"	"	sand-point	13	1428			13	1415	" gravel	hard, clear		D.S.	Sufficient supply
1	SE	1	8	26	WPM	sand-point	20	1429			20	1409	Glacial lake sands	hard, clear		D.S.	Sufficient supply
2	SW	5	"	"	"	"	12	1477			12	1465	" " "	med. hard, "		D.S.	" "
3	NW	5	"	"	"	"	15	1475			15	1460	" " "	" "		D.S.	Sufficient for 50 head
4	NE	6	"	"	"	dug	8	1454	-4	1450	8	1446	Glacial, gravel	" "		D.S.	Sufficient supply
5	SW	7	"	"	"	"	10	1416	-1	1415	10	1406	" , till	hard, "		D.S.	
6	SW	9	"	"	"	"	22	1470	-15	1455	18	1452	" , gravel	soft, "		D.S.	Will supply 50 head
7	NW	11	"	"	"	sand-point	15	1437			15	1422	" , sand	med. hard "		D.S.	
8	NE	14	"	"	"	"	20	1435			20	1415	" , "	hard, "		D.S.	Three sandpoints
9	SE	15	"	"	"	dug	15	1437	-2	1435	15	1422	" , gravel	" "		D.S.	One dugout
10	NW	16	"	"	"	"	16	1456	-12	1444	16	1440	" blue clay	alkali, clear		D.S.	Not sufficient for more than 20 head. Dug 8 dry holes
11	SE	17	"	"	"	"	16	1457	-8	1449	16	1441	" till	hard "		D.S.	Often dry in late winter months

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~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
12	NW	17	8	26	WPM	dug	8	1468	-4	1464	8	1460	Glacial, gravel	hard, clear		D.S.	Sufficient supply
13	NE	18	"	"	"	"	15	1483	-5	1478	15	1468	" "	" "		S.	Water is greenish in colour, ill-effects for human consumption
14	NW	18	"	"	"	"	18	1481	-3	1478	8	1473	" "	" "		D.S.	Sufficient for 50 head
15	SE	19	"	"	"	"	13	1473	-9	1464	13	1460	" Sand	" "		D.S.	Sufficient for 30 head
16	NE	20	"	"	"	"	20	1459	-10	1449	20	1439	" till	" "		D.S.	Sufficient supply; one dugout
17	SW	28	"	"	"	"	25	1441	-23	1418	25	1416	" quicksand	alkali, "		D.S.	Bored a 64ft. dry hole in blue clay
18	SW	29	"	"	"	"	30	1458	-25	1433	30	1428	" clay	" "		S.	Supply supplemented by dugout
19	SW	30	"	"	"	"	12	1473	-5	1468	12	1461	" yellow clay	hard, "		D.S.	Not sufficient; one dugout
20	SE	31	"	"	"	"	8	1477	-4	1473	8	1469	" gravel	" "		D.S.	Sandpoint for domestic supply
21	SW	32	"	"	"	"	10	1474	-8	1466	10	1464	" sand	" "		D.S.	Sufficient supply
1	NW	2	9	26	WPM	sand-point	9	1423			9	1414	Glacial, sand	hard, clear		D.S.	Abundance of water
2	SW	2	"	"	"	"	8	1418			8	1410	" "	" "		D.S.	Sufficient supply
3	SW	3	"	"	"	dug	12	1424	-4	1420	12	1412	" quicksand	" "		D.S.	Can use sandpoint too
4	NE	4	"	"	"	"	14	1427	-7	1420	14	1413	" sand	" "		D.S.	Not sufficient in dry years
5	SW	4	"	"	"	"	14	1437	-8	1429	14	1423	" gravel	" "		D.S.	Sufficient supply
6	SE	5	"	"	"	"	10	1445	-3	1442	10	1435	" sand	" "		D.S.	Creek crosses farm
7	SE	6	"	"	"	"	20	1479	-4	1475	20	1459	" gravel	soft, clear		D.S.	Sandpoint 20ft. deep at house
8	SW	6	"	"	"	"	10	1461	-6	1455	10	1451	" "	hard, "		D.S.	Two similar wells
9	NW	6	"	"	"	"	16	1470	-7	1463	16	1454	" "	med., hard "		D.	Two dugouts on section
10	SE	8	"	"	"	"	20	1471	-13	1458	18	1453	" sand	" "		D.S.	Sufficient for 80 head
11	NW	9	"	"	"	"	21	1437	-21	1416	26	1411	" "	" "		D.S.	Well is dug 21ft. then a sandpoint has been driven to sand
12	NW	9	"	"	"	"	24	1436	-16	1420	24	1412	" "	" "		S.	Also have a dugout
13	SW	10	"	"	"	"	11	1423	-5	1418	11	1412	" "	" "		D.S.	Sufficient for 75 head
14	SE	11	"	"	"	"	15	1420	-7	1413	15	1405	" "	" "		S.	Sandpoint for domestic use
15	SW	15	"	"	"	"	12	1428	-3	1425	12	1416	" gravel	" "		D.S.	Often dry in early spring
16	NE	16	"	"	"	"	10	1427	-5	1422	10	1417	" sand	" "		D.S.	Can use a sandpoint
17	NW	16	"	"	"	"	6	1421	-4	1417	6	1415	" till	" "		D.	Sufficient supply
18	NE	17	"	"	"	"	16	1446	-8	1438	12	1432	" "	" "		S.	Sufficient for 75 head
19	SE	18	"	"	"	"	11	1466	-5	1461	11	1455	" sand	" "		D.S.	Sufficient supply
20	SW	22	"	"	"	"	8	1431	-4	1427	8	1423	" "	" "		D.S.	Sufficient supply
21	NW	22	"	"	"	"	12	1427	-3	1424	12	1415	" "	soft, "		D.S.	Sufficient supply
22	NE	23	"	"	"	"	10	1429	-5	1424	10	1419	" "	hard, "		D.S.	Sufficient for 40 head
23	NW	23	"	"	"	"	15	1418	-6	1412	15	1403	" "	med. hard, "		D.S.	Sufficient supply
24	SW	27	"	"	"	"	8	1433	-2	1431	8	1425	" "	" "		D.S.	Sandpoint in house
25	SE	28	"	"	"	"	10	1427	-5	1425	6	1421	" "	soft, "		D.S.	Will supply 50 head
26	NE	28	"	"	"	"	12	1447	-5	1442	12	1435	" gravel	" "		S.	Unlimited supply
27	NE	29	"	"	"	"	40	1451	-33	1418	40	1411	" clay	hard, "		D.S.	Usually sufficient for 20 head
28	NW	30	"	"	"	"	12	1480	-8	1472	12	1468	" sand	" "		D.S.	
29	NE	30	"	"	"	"	12	1487	-4	1483	12	1475	" gravel	" "		D.S.	Sufficient for 50 head
30	SE	32	"	"	"	"	10	1473	-5	1468	10	1463	" sand	" "		D.S.	Sufficient supply
31	SW	34	"	"	"	"	15	1437	-8	1429	15	1422	" "	soft, "		D.S.	Sufficient supply
1	SE	2	10	26	WPM	dug	18	1438	-12	1426	18	1420	Glacial lake, sand	hard, clear		S.	Supplies 50 head
2	NW	2	"	"	"	sand-point	8	1440			8	1432	" " "	" "		D.S.	

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

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

WELL RECORDS—~~Rural Municipality of~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
3	SW	3	10	26	WPM	dug	8	1433	-6	1427	8	1425	Glacial lake, sand	soft, clear		D.S.	Unlimited supply
4	NW	3	"	"	"	"	7	1432	-3	1429	7	1425	" " "	hard, "		D.S.	Have a 10ft. sandpoint
5	SE	4	"	"	"	"	13	1427	-8	1419	13	1414	" " "	soft, "		D.	
6	NE	4	"	"	"	"	10	1431	-4	1427	10	1421	" " "	hard, "		D.S.	Abundant supply
7	NW	4	"	"	"	"	46	1439	-12	1427	46	1393	Glacial, blue clay	" "		S.	Similar well at house dug 35ft. Sufficient supply
8	NE	5	"	"	"	"	45	1455	-39	1416	45	1410	" gravel	" "		D.S.	Water in gravel below 44ft. of yellow clay
9	SE	6	"	"	"	"	10	1479	-6	1473	10	1469	" sand	" "		D.S.	Four shallow wells, sufficient for 30 head
10	NW	7	"	"	"	"	45	1502	-25	1477	45	1457	" till	" "		D.S.	Supplemented by dugout; supplies 20 head
11	NW	8	"	"	"	"	60	1477	-40	1437	60	1417	" clay	alkali, "		D.S.	Will water 20 head
12	NE	8	"	"	"	drilled	97	1469			97	1372	Bedrock, shale	hard, soda		S.	Sufficient supply
13	NE	8	"	"	"	dug	50	1472	-30	1442	50	1422	Glacial, sand	" clear		D.	Sufficient for domestic use
14	NE	9	"	"	"	"	16	1447	-12	1435	16	1431	" "	soft, "		D.S.	Supply is sufficient
15	SW	10	"	"	"	"	8	1424	-6	1418	8	1416	" "	hard, "		D.S.	Sufficient supply
16	NW	10	"	"	"	"	15	1439	-5	1434	15	1424	" "	" "		D.S.	" "
17	NW	13	"	"	"	"	9	1455	-6	1449	9	1446	" "	" "		D.S.	Sufficient for 12 head
18	NW	14	"	"	"	"	14	1432	-9	1423	14	1418	" "	" "		D.S.	Can use sandpoint at house
19	SE	15	"	"	"	"	17	1444	-11	1433	17	1427	" "	" "		D.S.	Abundance of water
20	NW	15	"	"	"	"	22	1445	-14	1431	22	1423	" blue clay	" "		D.	Sufficient for domestic use
21	NW	16	"	"	"	"	8	1440	-1	1439	8	1432	" gravel	" yellow		S.	Discoloured from sookage water
22	SE	18	"	"	"	"	14	1487	-4	1483	14	1473	" sand	" clear		D.S.	Sufficient supply
23	NW	18	"	"	"	"	14	1482	-3	1479	14	1468	" "	" "		D.S.	Sufficient 20 head. Analysis reports good water
24	SW	19	"	"	"	"	18	1481	-10	1471	16	1465	" gravel	soft "		D.S.	Usually sufficient
25	SW	20	"	"	"	"	11	1462	-7	1455	10	1452	" "	hard "		D.S.	Sufficient for 45 head
26	SE	20	"	"	"	"	16	1459	-10	1449	16	1443	" "	soft "		D.S.	Will supply 50 head
27	SE	21	"	"	"	"	14	1445	-3	1442	12	1433	" sand	" "		D.S.	Sufficient supply
28	NE	21	"	"	"	sand-point	14	1474			14	1460	" "	med. hard, "		D.	
29	NW	22	"	"	"	drilled	154	1451			154	1297	" gravel	hard, clear			Pumping test - 35 Imperial Gals/minute
30	NW	22	"	"	"	drilled	98	1451			98	1353	" "	" "			Water analysis given
31	NE	25	"	"	"	dug	6	1426	-2	1424	6	1420	" "	" "		D.S.	Creek crosses farm
32	NW	26	"	"	"	"	17	1461	-2	1459	17	1444	" "	" "		D.S.	Never dry
33	SW	27	"	"	"	"	30	1451	-15	1436	30	1421	" "	" "		D.S.	Sufficient for 65 head
34	NE	28	"	"	"	"	31	1475	-4	1471	31	1444	" sand	soft "		D.S.	Abundant supply
35	SW	28	"	"	"	"	18	1472	-6	1466	18	1454	" "	hard, "		D.S.	Two wells both same depth
36	SE	29	"	"	"	"	15	1477	-7	1470	15	1462	" gravel	med. hard, clear		S.	Two sandpoints both 14 feet deep
37	SW	29	"	"	"	dug	10	1477	-6	1471	10	1467	" sand	hard, "		D.S.	Two sandpoints besides the well
38	SE	30	"	"	"	"	12	1496	-3	1493	12	1484	" gravel	" "		S.	Sufficient supply
39	NE	30	"	"	"	"	32	1490	-26	1464	32	1458	" yellow clay	" alkali		N.	
40	NE	31	"	"	"	"	32	1505	-16	1489	32	1473	" gravel	" iron		D.S.	Sufficient supply
41	SE	31	"	"	"	"	40	1509	-33	1476	40	1469	" yellow clay	" clear		D.S.	Sufficient for 12 head; supplemented by dugout
42	NW	32	"	"	"	"	44	1500	-35	1465	44	1456	" yellow clay	" alkali		D.S.	Water almost unfit for domestic use
43	SE	32	"	"	"	"	35	1490	-29	1461	35	1455	" sand	" clear		D.S.	Sufficient supply
44	SE	33	"	"	"	"	14	1470	-9	1461	14	1456	" "	" "		D.S.	Sandpoint 13 ft. deep at house
45	SW	34	"	"	"	"	29	1452	-18	1434	29	1423	" gravel	" "		D.S.	One dugout
46	NW	34	"	"	"	drilled	160	1451			45	1406	" "	dry			Small amount of seepage water

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

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(#) Sample taken for analysis.

WELL RECORDS—~~Rural Municipality of~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
47	SW	34	10	26	WPM	drilled	265	1451					bedrock, shale	dry			Shale at 65 feet
48	SW	34	"	"	"	"	180	1451					" "	dry			Dry sand at 60 feet
49	SW	34	"	"	"	"	180	1451					" "	dry			Shale at 145 feet
50	SE	34	"	"	"	"	305	1451					" "	dry			Shale at 54 feet
51	SE	34	"	"	"	"	80	1451			20	1431	Glacial, clay				Small quantity of water at 20 feet
52	SW	36	"	"	"	dug	14	1443	-12	1431	14	1429	" sand	hard, clear		D.S.	Will supply 10 head
1	SW	3	7	27	WPM	dug	5	1503	-2	1501	5	1498	Glacial, gravel	hard, clear		D.	Three dugouts for stock
2	SE	4	"	"	"	"	15	1509	-5	1504	15	1494	" "	" "		D.	Well often dry in winter
3	NW	5	"	"	"	sand-point	11	1536			11	1525	" sand	" "		D.	Two dugouts for stock
4	NW	6	"	"	"	dug	12	1559	-8	1551	12	1547	" "	" "		D.S.	Sufficient for 15 head; 3 dugouts
5	SE	8	"	"	"	"	12	1509	-2	1507	12	1497	" "	" "		N.	Never dry
6	SW	9	"	"	"	"	18	1520	-12	1508	18	1502	" clay	" alkali		D.	Well at C.P.R. Station, Reston
7	SW	9	"	"	"	"	19	1522	-10	1512	19	1503	" gravel	" iron		D.	Well at Reston Creamery, capacity up to 16,000 gal/day
8	NE	12	"	"	"	"	16	1460	-11	1449	16	1444	" sand	" clear		D.S.	Sufficient for 40 head
9	NW	12	"	"	"	"	11	1466	-4	1462	11	1455	" gravel	" "		D.S.	Sufficient supply
10	SW	12	"	"	"	"	10	1472	-4	1468	10	1462	" "	" "		D.S.	" "
11	NE	18	"	"	"	"	10	1528	-3	1525	10	1518	" "	" "		D.S.	One dugout for stock
12	SE	19	"	"	"	"	6	1541	-2	1539	6	1535	" "	" "		D.S.	Will water 70 head, but frequently well is dry in winter
13	SE	20	"	"	"	"	10	1482	-5	1477	10	1472	" clay	" "		S.	Not a dependable supply
14	NW	21	"	"	"	"	11	1477	-5	1472	11	1466	" gravel	" "		D.	Sufficient supply. Well near Pipestone Creek
15	SW	26	"	"	"	"	10	1463	-3	1460	10	1453	" sand	hard, "		D.S.	Sufficient supply
16	SE	27	"	"	"	"	18	1470	-6	1464	18	1452	" gravel	med., "		D.S.	" "
17	SE	28	"	"	"	"	22	1496	-20	1476	20	1476	" "	hard, hard, "		D.S.	Will water 20 head
18	SW	36	"	"	"	"	18	1480	-16	1464	16	1464	" quick-sand	" "		D.	Averaged 5 gals/day during drought
19	SW	36	"	"	"	drilled	210	1500			210	1290	" boulder clay	salty		N.	Tried drilling wells but always got salty water
1	SE	1	8	27	WPM	dug	12	1456	-4	1452	12	1444	Glacial, gravel	hard, clear		D.S.	Dry in 1934
2	SW	2	"	"	"	"	14	1499	-10	1489	14	1485	" sand	" "		D.S.	Not sufficient; one dugout
3	SE	5	"	"	"	"	16	1500	-8	1492	16	1484	" gravel	" slightly alkali		D.S.	Sufficient for 70 head
4	SW	5	"	"	"	"	12	1488	-4	1484	12	1476	" "	" clear		D.S.	Usually sufficient for 10 head
5	NE	6	"	"	"	sand-point	20	1491			18	1473	" "	" "		D.S.	Two dugouts
6	SE	7	"	"	"	dug	15	1482	-12	1470	15	1467	" "	" "		D.S.	One dugout
7	NE	7	"	"	"	"	21	1491	-15	1476	21	1470	" till	" "		D.S.	Sufficient supply
8	SE	12	"	"	"	"	15	1460	-7	1453	12	1448	" gravel	" "		D.S.	Dry in 1934
9	NE	12	"	"	"	"	13	1477	-5	1472	13	1464	" "	" "		D.S.	One dugout
10	SW	14	"	"	"	"	14	1406	-7	1399	14	1392	" till	" "		D.S.	Well was dry in '30's
11	SW	15	"	"	"	"	22	1511	-10	1501	22	1489	" till	" "		D.S.	Sufficient for 20 head
12	NW	15	"	"	"	"	10	1520	-5	1515	10	1510	" gravel	" "		D.S.	Easily pumped dry
13	NE	16	"	"	"	"	10	1521	-7	1514	10	1511	" "	" "		D.S.	Usually sufficient; one dugout
14	SW	17	"	"	"	"	16	1505	-12	1493	16	1489	" "	" "		D.S.	Sufficient supply
15	NE	18	"	"	"	"	16	1510	-8	1502	16	1484	" till	" bitter		N.	
16	NE	18	"	"	"	"	18	1497	-13	1484	18	1479	" "	hard clear		D.S.	One dugout

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~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
17	SE	18	8	27	WPM	dug	18	1493	-15	1478	18	1475	Glacial, till	hard, clear		D.	Sufficient supply
18	SE	19	"	"	"	"	12	1508	-5	1503	12	1496	" gravel	" "		N.	Strong in alkali, not used
19	NE	20	"	"	"	"	14	1564	-2	1562	14	1550	" till	" "		N.	Two dugouts
20	NE	23	"	"	"	"	16	1490	-8	1482	16	1474	" gravel	" "		D.	Sufficient supply
21	SW	24	"	"	"	"	12	1580	-5	1575	11	1569	" "	" yellow		D.S.	" "
22	SW	24	"	"	"	"	7	1480	-2	1478	7	1473	" "	" clear		D.S.	Never has been dry
23	SW	29	"	"	"	"	14	1565	-7	1558	14	1551	" till	" "		D.S.	Sufficient supply; one dugout
24	SW	30	"	"	"	"	14	1507	-6	1501	14	1493	" gravel	" "		D.S.	Sufficient supply
25	SE	33	"	"	"	"	12	1521	-3	1518	12	1509	" till	" "		D.S.	One dugout
26	NW	34	"	"	"	"	10	1524	-4	1520	10	1514	" gravel	" "		D.S.	Sufficient supply
27	SE	34	"	"	"	"	8	1516	-6	1510	8	1508	" till	" "		D.S.	
28	NW	36	"	"	"	"	11	1485	-4	1481	11	1474	" gravel	" "		D.S.	Sufficient supply
29	NE	36	"	"	"	"	14	1472	-4	1468	14	1458	" "	" "		D.S.	Can use a sandpoint
1	NE	1	9	27	WPM	dug	12	1462	-2	1460	12	1450	Glacial, sand	soft, clear		D.	One dugout for stock
2	NE	4	"	"	"	"	11	1535	-4	1531	11	1524	" gravel	hard, "		D.S.	Will supply 30 head
3	NE	5	"	"	"	"	22	1547	-5	1542	22	1525	" "	" "		D.	A dugout for stock
4	SW	7	"	"	"	"	9	1579	-6	1573	9	1570	" sand	" "		D.	Two dugouts for stock
5	NE	9	"	"	"	"	10	1534	-5	1529	10	1524	" gravel	" "		D.S.	Supply supplemented by dugout
6	SE	9	"	"	"	"	11	1531	-5	1526	11	1520	" "	" "		D.	Well at Woodnorth Station
7	NE	10	"	"	"	"	12	1524	-6	1518	12	1512	" "	" "		D.S.	Not a sufficient supply
8	NW	11	"	"	"	"	12	1512	-6	1506	10	1502	" quick-sand	" "		D.S.	Sufficient for 25 head; two dugouts
9	NE	12	"	"	"	"	52	1488	-7	1481	52	1436	" clay	" alkali iron		S.	Not sufficient. Will water about 10 head. Often dry
10	SE	13	"	"	"	"	18	1488	-6	1482	16	1472	" gravel	soft, clear		D.S.	Usually sufficient; one dugout
11	SW	15	"	"	"	"	27	1539	-15	1524	27	1512	" clay	hard, "		D.	Dugout for stock
12	NE	18	"	"	"	"	10	1574	-4	1570	10	1564	" gravel	" "		D.S.	Sufficient for 50 head
13	NW	19	"	"	"	"	25	1583	-15	1568	25	1558	" clay	" "		D.S.	One dugout
14	SE	21	"	"	"	"	10	1532	-2	1530	10	1522	" gravel	" "		D.	Sufficient supply
15	SW	25	"	"	"	"	8	1484	-4	1480	8	1476	" clay	" "		D.S.	Well is on flats of Gopher Creek
16	SW	25	"	"	"	"	10	1494	-4	1490	10	1484	" "	" "		D.S.	Sufficient supply
17	NE	25	"	"	"	"	14	1503	-5	1498	14	1489	" gravel	med. hard, "		D.S.	Sandpoint is used in the house
18	NE	27	"	"	"	"	7	1506	-2	1504	7	1499	" "	" "		D.S.	Supplemented by one dugout
19	SE	30	"	"	"	"	12	1579	-3	1576	12	1567	" "	hard, clear		D.	Sufficient supply
20	SW	33	"	"	"	"	14	1566	-5	1561	14	1552	" "	" "		D.S.	Sufficient for 30 head
21	SW	34	"	"	"	"	28	1557	-26	1531	28	1529	" clay	" "		S.	Alkali water, supplies 15 head; 2 dugouts
22	SW	35	"	"	"	bored	54	1550	-27	1523	54	1496	" "	" "		D.	Also a drilled well 186ft. for stock; one dugout
23	SE	36	"	"	"	dug	9	1488	-3	1485	6	1482	" gravel	" "		D.S.	Sufficient for 50 head
24	NE	36	"	"	"	"	45	1499	-30	1469	45	1454	" clay	" "		D.S.	Two other wells; one dugout
1	SW	1	10	27	WPM	dug	27	1511	-10	1501	27	1484	Glacial, yellow clay	hard, clear		D.	Sufficent supply
2	SW	1	"	"	"	"	32	1518	-11	1507	32	1486	" "	" alkali		S.	Usually sufficient
3	NE	2	"	"	"	"	40	1535	-25	1510	40	1495	" blue clay	" "		D.	Supplemented by two dugouts
4	NW	3	"	"	"	"	40	1585	-22	1563	40	1545	" gravel	" clear		D.S.	Sufficient supply
5	SE	4	"	"	"	"	48	1584	-15	1569	48	1536	" "	" iron		D.S.	Will supply 150 head

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~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	NW	5	10	27	WPM	dug	30	1583	-18	1565	30	1553	Glacial, yellow clay	hard, alkali		S.	Sufficient supply
7	NW	5	"	"	"	"	20	1553	-5	1548	20	1533	" gravel	med. hard, clear		D.	Sometimes dry in winter
8	SE	5	"	"	"	"	13	1586	-6	1580	13	1573	" yellow clay	hard, "		D.	One dugout for stock
9	NE	7	"	"	"	"	20	1570	-6	1563	20	1550	" sand	" "		D.	Well is near the creek
10	SW	7	"	"	"	"	35	1625	-10	1615	35	1590	" yellow clay	" "		D.S.	Usually sufficient
11	NW	8	"	"	"	"	27	1600	-18	1582	27	1573	" gravel	" "		D.S.	Sufficient for 35 head
12	SW	9	"	"	"	"	12	1590	-3	1587	12	1578	" yellow clay	"		N.	Stock water at Gopher Creek
13	SW	10	"	"	"	"	30	1582	-9	1573	30	1552	" "	" "		D.S.	Sufficient for local needs
14	NE	12	"	"	"	"	30	1498	-14	1484	30	1468	" sand	" iron		D.S.	Sufficient supply
15	SE	13	"	"	"	"	24	1496	-12	1484	24	1472	" "	" clear		N.	One dugout
16	SE	13	"	"	"	"	42	1498	-7	1491	42	1454	" "	" alkali		S,	Usually not sufficient
17	NE	13	"	"	"	"	64	1509	-24	1485	64	1445	" "	" "		S.	Will go almost dry and not water 60 head of stock
18	SW	14	"	"	"	"	54	1560	-14	1546	54	1506	" "	" "		D.S.	Dug several dry holes
19	SE	15	"	"	"	"	55	1574	-25	1549	55	1519	" clay	" clear		D.S.	Sufficient supply
20	NW	15	"	"	"	"	50	1582	-15	1567	50	1532	" "	" slighty alkali		D.S.	One dugout
21	NE	16	"	"	"	"	44	1588	-5	1583	44	1544	" "	" clear		D.S.	Usually a sufficient supply
22	SE	16	"	"	"	"	46	1588	-18	1570	46	1542	" "	" iron		D.	Similar dug well for stock
23	NE	17	"	"	"	"	32	1597	-12	1585	32	1565	" sand	" clear		S.	Supplemented by a dugout
24	NE	17	"	"	"	"	40	1596	-16	1580	40	1556	" "	" "		D.	Sufficient supply
25	NE	18	"	"	"	"	30	1590	-10	1580	30	1560	" clay	" "		S.	Digging a new well
26	SE	18	"	"	"	"	23	1595	-2	1593	23	1572	" gravel	" "		D.S.	Sufficient for 35 head
27	NW	18	"	"	"	"	22	1662	-6	1656	22	1640	" "	" "		D.S.	One dugout
28	SE	19	"	"	"	"	21	1566	-13	1553	21	1545	" "	" "		D.S.	Well is in a ravine; sufficient for 50 head
29	NE	19	"	"	"	"	28	1587	-12	1575	28	1559	" "	" "		D.S.	Sufficient for 45 head
30	NW	20	"	"	"	"	28	1590	-7	1583	28	1562	" "	" "		D.	Sufficient for domestic needs
31	NW	20	"	"	"	"	26	1587	-6	1581	26	1561	" "	" alkali		S.	Sufficient for 25 head
32	SE	20	"	"	"	"	45	1599	-20	1579	45	1534	" "	" clear		D.S.	Usually sufficient for 40 head
33	SW	21	"	"	"	"	47	1587	-17	1570	45	1542	" "	" alkali		D.S.	Never dry in thirty years
34	NE	22	"	"	"	"	52	1570	-32	1538	40	1530	" sand	" clear		D.S.	Supplemented by dugout; well will water 15 head
35	NW	24	"	"	"	"	43	1517	-5	1512	43	1474	" "	" "		D.	Stock water at creek
36	NE	25	"	"	"	"	52	1528	-40	1488	40	1488	" gravel	" "		D.S.	Sufficient for 50 head
37	NE	26	"	"	"	"	42	1549	-16	1533	42	1507	" "	" iron		D.S.	One dugout
38	SE	26	"	"	"	"	42	1556	-17	1539	42	1514	" clay	" alkali		S.	Supplemented by dugout; sufficient for 30 head
39	SE	27	"	"	"	"	43	1568	-11	1557	43	1525	" "	" clear		D.S.	Sufficient supply
40	NW	27	"	"	"	"	50	1586	-20	1566	50	1536	" "	" "		D.S.	Two dugouts
41	NE	28	"	"	"	"	46	1592	-20	1572	46	1546	" "	" alkali		S.	Sufficient supply
42	SW	28	"	"	"	"	73	1600	-58	1542	73	1527	" "	" clear		D.S.	Sufficient for 25 head
43	NE	29	"	"	"	"	55	1609	-43	1566	55	1654	" gravel	" iron		D.S.	Sufficient supply
44	SE	30	"	"	"	"	30	1590	-3	1587	30	1560	" "	" clear		S.	Sufficient supply
45	SW	30	"	"	"	"	28	1594	-9	1585	28	1566	" "	" "		D.S.	" "
46	SW	31	"	"	"	"	36	1591	-18	1573	36	1555	" "	" iron		D.S.	Sufficient for 30 head; one dugout
47	NE	31	"	"	"	"	9	1577	-2	1575	9	1568	" "	" clear		D.S.	Well near creek
48	NE	32	"	"	"	"	52	1606	-36	1570	52	1554	" sand	" "		D.S.	Sufficient supply
49	NW	33	"	"	"	"	50	1609	-25	1584	50	1559	" gravel	" "		D.S.	" "
50	NE	34	"	"	"	"	35	1570	-20	1550	35	1535	" "	" "		D.S.	Usually waters 30 head

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

WELL RECORDS—~~Rural Municipality of~~ Townships 7-10, Ranges 26-29, West Principal Meridian, Manitoba.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
51	SE	35	10	27	WPM	dug	41	1555	-18	1537	41	1514	Glacial, clay	hard, iron		D.S.	One dugout
52	NW	35	"	"	"	"	43	1564	-10	1554	43	1521	" "	" alkali		N.	Have a dugout for stock
53	SW	36	"	"	"	"	32	1545	-12	1533	32	1513	" gravel	" iron		D.S.	Have one dugout
54	NE	36	"	"	"	"	53	1537	-40	1497	50	1487	" gravel	" "		D.S.	Usually sufficient; one dugout
1	NW	1	7	28	WPM	dug	14	1575	-10	1565	14	1561	Glacial, gravel	hard, clear		D.S.	Sufficient supply
2	NE	3	"	"	"	"	15	1599	-11	1588	15	1584	" sand	" "		D.	One dugout
3	NW	3	"	"	"	"	12	1614	-3	1611	12	1602	" gravel	" "		D.	Usually sufficient; one dugout
4	SE	4	"	"	"	"	12	1610	-6	1604	12	1598	" "	" "		D.S.	Sufficient supply
5	NE	5	"	"	"	"	8	1596	-2	1594	8	1588	" "	" "		D.S.	One dugout
6	NW	6	"	"	"	"	12	1645	-6	1639	12	1633	" "	" "		D.S.	Sufficient for 45 head
7	SW	7	"	"	"	"	8	1653	-3	1650	4	1649	" "	" "		D.S.	Usually sufficient for 30 head
8	NW	7	"	"	"	"	10	1647	-5	1642	10	1637	" "	" "		N.	One dugout
9	NW	8	"	"	"	"	8	1611	-5	1606	8	1603	" "	" iron		D.S.	Dry in dry seasons
10	SW	9	"	"	"	"	10	1577	-5	1572	10	1567	" "	" clear		D.S.	Sufficient supply
11	NW	9	"	"	"	"	16	1600	-10	1590	16	1584	" "	" "		D.S.	Never dry; one dugout
12	NE	12	"	"	"	"	10	1569	-3	1566	10	1559	" "	" "		D.S.	Often dry in winter
13	SE	13	"	"	"	"	12	1573	-3	1570	12	1561	" "	" "		D.S.	Two wells; one dugout
14	SE	15	"	"	"	"	10	1600	-6	1594	10	1590	" sand	" "		D.	Dugout for stock
15	SE	17	"	"	"	"	15	1601	-11	1590	15	1586	" till	" "		D.	Dugout for stock
16	SE	18	"	"	"	"	12	1619	-8	1611	12	1599	" gravel	" "		D.	Sufficient supply; one dugout
17	NW	21	"	"	"	"	12	1626	-3	1623	9	1617	" clay	" "		D.	Dug eleven dry wells
18	NE	22	"	"	"	"	10	1591	-5	1586	10	1581	" sand	" "		D.S.	Sufficient supply; one dugout
19	SE	25	"	"	"	sand-point	5	1658			5	1653	" "	" "		D.S.	Two dugouts
20	NE	25	"	"	"	dug	8	1556	-5	1551	8	1548	" gravel	" "		D.S.	Sufficient for 40 head
21	SW	28	"	"	"	"	8	1627	-2	1625	8	1619	" quicksand	" "		N.	Not sufficient
22	SW	30	"	"	"	"	9	1624	-2	1622	9	1615	" gravel	" "		D.	Sufficient supply
23	SW	31	"	"	"	"	11	1614	-6	1608	11	1603	" "	" iron		D.S.	Sufficient for 60 head
24	NW	31	"	"	"	"	12	1618	-5	1613	12	1606	" "	" clear		D.	Sufficient supply
25	NW	34	"	"	"	"	14	1635	-8	1627	14	1621	" clay	" "		D.	Not sufficient; one dugout
26	SE	36	"	"	"	"	12	1591	-8	1583	12	1579	" gravel	" "		D.S.	Sufficient supply
27	NW	36	"	"	"	"	13	1585	-4	1581	9	1576	" "	" "		D.S.	Sufficient for 12 head
1	NW	4	8	28	WPM	dug	15	1640	-3	1637	15	1625	Glacial, till	hard, clear		D.S.	Sufficient supply
2	NE	6	"	"	"	"	14	1641	-4	1637	14	1627	" "	" "		D.S.	Usually sufficient; one dugout
3	NE	10	"	"	"	"	13	1626	-6	1620	13	1613	" gravel	" "		N.	Sufficient supply
4	NW	11	"	"	"	"	14	1632	-4	1628	11	1621	" "	" "		D.S.	Can use a sandpoint
5	SE	11	"	"	"	"	14	1619	-4	1615	14	1605	" till	" "		D.S.	Sufficient supply
6	SW	15	"	"	"	"	12	1606	-4	1602	12	1594	" "	" "		D.	" "
7	SE	16	"	"	"	"	7	1610	-1	1609	7	1603	" "	" "		D.S.	" "
8	SE	17	"	"	"	"	15	1634	-3	1631	15	1619	" "	" "		S.	Sufficient for 30 head; one dugout
9	SE	23	"	"	"	"	12	1585	-5	1580	12	1573	" gravel	" "		D.S.	Sufficient supply
10	SE	24	"	"	"	"	12	1558	-2	1556	12	1546	" "	" "		D.S.	Often dry in winter
11	NE	24	"	"	"	"	16	1518	-10	1508	16	1502	" "	" "		D.	Sufficient supply
12	NE	25	"	"	"	"	18	1512	-12	1500	18	1494	" "	" "		D.	" "
13	NE	25	"	"	"	"	14	1512	-8	1504	14	1498	" till	" "		S.	" "
14	SE	26	"	"	"	"	14	1514	-10	1504	14	1500	" "	" "		D.	Sufficient for domestic use
15	SE	31	"	"	"	"	8	1658	-4	1654	8	1650	" gravel	" "		D.S.	Sufficient supply
16	NW	32	"	"	"	"	8	1663	-2	1661	8	1655	" "	" "		D.	" "
17	SW	35	"	"	"	"	16	1508	-4	1504	14	1494	" "	" "		D.S.	Sufficient for 30 head

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.