CANADA
DEPARTMENT OF MINES
AND
TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA
WATER SUPPLY PAPER No. 313

GROUND-WATER RESOURCES OF TOWNSHIPS 11 to 14, RANGES 18 to 21, WEST OF PRINCIPAL MERIDIAN, MANITOBA

(RIVERS AREA)

By

E. C. Halstead

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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 porvious 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 staining 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 11 TO 14, RANGES 18 TO 21, WEST PRINCIPAL MERIDIAN, MANITOBA

(Rivers area)

Introduction

An investigation of the glacial geology and the ground water resources of tps. 11 to 14, rges. 18 to 21, W. Princ. mer., was conducted by the writer during the field season of 1950.

Physical Features

The general character of the topography is that of an uneven, rolling plain with undrained depressions and wooded areas of scrub aspen and poplar. The southern part is flatter, as the surface was modified by the waters of glacial Lake Souris. Minnedosa River crosses the area in a valley narrow north of Rapid City and wider with gently sloping sides south of it. The river flows southwest to a point south of Rivers where it turns southeast and joins the Assiniboine in tp. 10, rge. 20, south of the area.

The altitudes vary from more than 1,900 feet above sea-level in the northern part of the area to less than 1,250 feet above sea-level in the floor of the valley in which Assiniboine River crosses the southwest corner.

Geology

Table of Formations

Age	Formation	Character	Thickness (feet)
Recent	Alluvium	Stream-laid mud, silt, sand, and gravel	
Pleistocene	Lake beds	Silty clay, fine sand and silt, duned sand, assorted sand, 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 shale (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 +
	Vermilion River	Dark grey and black shale, 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, over-lying dark grey, non-calcareous, blocky shale with thin partings of white sand)	80 ± 140 ± 190 ±

Age	Formation	Character	Thickness (feet)
	Favel	Grey shale with white calcareous material; some bands of limestone; some bentonite	150 ±
Lower and Upper Cretaceous	Ashville	Dark grey to black shale with silt and sand	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 shale, light grey limestone and sandstone	380 ±
Jurassic or earlier	Amaranth	Red beds and gypsum	220

Upper Cretaceous shales of the Riding Mountain formation underlie the overburden in this area, but their water-bearing possibilities have not been investigated as only one well pumps water from bedrock.

The overburden over much of this area consist of ground moraine, in places modified by the action of water. The upper 20 feet or more is made up of a buff weathered till in which local and temporary flows of meltwater have brought about enough sorting to produce the pockets or lenses of sand and gravel now encased in the till. These lenses form local aquifers that commonly yield a sufficient supply of water for household use. Underlying the weathered till is a blue, clay-rich till that is, in places, more than 300 feet thick. This till is impervious and test holes drilled into it are dry.

Meltwater from ice masses that stagnated at Riding and Duck Mountains followed the present courses of Oak and Minnedosa Rivers. Upon reaching glacial Lake Souris the waters of these streams dumped their load of sand and gravel, building an outwash plain with its apex at Rivers that extended south to the Assiniboine Valley. At Rivers and Wheatland the sand and gravel averages 20 feet in thickness.

Water Supply

One well reaches bedrock and yields an abundant supply of water that is hard and precipitates iron. Other wells drilled to bedrock could be expected to supply abundant water, but the thickness of overburden that has to be penetrated makes the drilling of such a well costly.

Good water, sufficient for a household or farm supply, is being obtained in the area of outwash sand and gravel in and south of Rivers.

Local patches and lenses of sand and gravel are the only source of water in the glacial deposits, and where these are lacking dugouts are needed. In tps. 13 and 14, rge. 20, for instance, test holes have been dug into impervious clay to depths of 300 feet. The supply of water in this area is not sufficient and is lacking in many sections. The supply for stock can, however, be assured by building dugouts.

Artesian aquifers are known in an area near Forrest. In section 1, tp. 12, rge. 19, and in sections 23 and 24, tp. 11, rge. 19, wells encountered water that flowed at the surface from a zone of coarse sand below blue clay at depths of 72, 36, and 47 feet respectively. Other flowing wells are recorded in sections 7 and 26, tp. 14, rge. 20.

Township 11, Range 18. The surface of this township is uneven to flat, sloping south to the Assiniboine Valley. Waters of glacial Lake Souris modified the surface material, and silt and clay deposited on the lake bottom filled undrained depressions smoothing the surface. A branching intermittent creek follows broad shallow channels across the township.

Ground water is recovered from glacial drift, and neither the depth to bedrock nor its water-bearing possibilities are known from well records. The upper 20 feet of the glacial drift is buff weathered till and below this is a clay-rich blue till of variable thickness. The wells are bored 30 to 95 feet through the blue till to aquifers of fine sand and gravel. The supply of water is commonly sufficient, but wells are on record that will supply only 12 to 15 head, and others that are dry in winter months.

In NE.$\frac{1}{4}$ section 23 a bored well 60 feet deep reached an aquifer below blue clay. When the well was completed the water was under sufficient pressure to rise to the surface and flow, but at present it rises to a point 9 feet from the surface.

The quality of the water is characteristic of that from southwestern Manitoba, that is, it has a concentration of sulphate salts and hence is known locally as alkali water. The iron content is high enough in some water to make it unsuitable for household use.

Township 11, Range 19. The uneven surface of this township slopes south to the Assiniboine Valley. Ground moraine modified by waters of glacial Lake Souris covers the township except in the southwest quarter where sandy deposits formed in the lake cover an area of twelve or more

sections. Wells 10 to 16 feet deep, dug into this sand, supply an abundance of good water in sections 4, 5, 8, 17, and 18. Elsewhere wells are dug or bored 40 to 100 feet to aquifers below blue clay.

The water in this township is hard with much iron, but commonly sufficient for 20 or more head of stock. In NW.$\frac{1}{4}$ sections 23 and 24, wells bored 36 and 37 feet respectively reach an aquifer below blue clay, and in both wells the water is under sufficient pressure to rise to the surface and flow. Test holes 100 to 128 feet deep dug on sections 14 and 20 were dry, and dugouts are the only source of supply. A well 26 feet deep in NE.$\frac{1}{4}$ of section 6 was never sufficient and commonly dry until the last 2 years and now will water 60 head of stock.

The water-bearing possibilities of the bedrock are not known, as no wells are recorded that reach it. Wells drilled 125 feet penetrate blue clay for this entire distance.

Township 11, Range 20. The rolling surface of this township has been smoothed by waters of glacial Lake Souris. In the southern part of the township sandy lake-beds are common, but elsewhere ground moraine covers the township except where outwash gravel is present along Minnedosa River Valley.

Wells that average 10 feet in depth in sections 1 to 6, inclusive, supply an abundance of water. Similar wells in outwash gravel are found in sections 9, 10, 15, and 16.

In the northern part of the township wells are bored to depths of 90 to 100 feet to aquifers below blue clay, and with some exceptions yield an abundant supply of water that is commonly alkali and iron-bearing. The supply of water in this part has been a problem to maintain because the fine sand below the blue clay becomes quicksand when penetrated and rises in the lower part of the casing, thus sealing off the source of water.

A dry hole in SW.$\frac{1}{4}$ section 18 was drilled 345 feet deep, but on the same quarter section a hole drilled 215 feet reached an aquifer at 140

feet and the water rose to a point 70 feet below the surface of the well. Dry holes drilled in sections 10 and 14 reached bedrock at depths of 100 to 140 feet respectively.

Township 11, Range 21. In the area of outwash gravel that covers the northwest quarter of the township and extends to Assiniboine River, water can be obtained at moderate depths. Elsewhere water may be obtained from sand or gravel layers below blue clay at depths of from 70 to 90 feet, although this is not certain and some dry holes have been dug or drilled. Test holes in sections 1, 7, and 14 reached depths of 225, 147, and 103 feet respectively, and each penetrated sand and gravel that was dry.

Springs along the Minnedosa Valley are a source of supply in sections 27 and 34. The supply of water is also plentiful in most wells, particularly along the Assiniboine Valley where one well in SW$\frac{1}{4}$ section 17, 55 feet deep, yields 250 gallons a minute, the water being pumped through a pipe line to the Rivers Airport.

Township 12, Range 18. Ground moraine covers the township and two intermittent creeks flow south across it. The surface slopes from an elevation of 1,650 feet above sea-level in the northwest corner of the township to less than 1,450 feet in the southeast corner.

Shallow dug wells in gravel along the creeks yield an abundance of good water. Elsewhere wells are dug or drilled 40 to 100 feet to gravel or sand below blue clay. In sections 33, 31, and 27 drilled wells reach layers of sand or gravel at depths of 100 and 140 feet and water of average quality rises 50 to 70 feet in the casing. The water is hard, commonly alkali, with much iron. On SW.$\frac{1}{4}$ section 32, a dugout is the only source of supply, as test holes 130 and 152 feet deep penetrated blue clay and were dry.

Township 12, Range 19. Ground moraine, which covers the township, has an uneven surface with undrained depressions and clumps of scrub poplar and aspen.

The water supply is not abundant and dugouts are needed to assure sufficient water for stock. In sections 11, 19, 34, and 35 shallow dug wells 10 to 20 feet deep yield water from local surface deposits of sand in ground moraine, and elsewhere water is obtained at depths of 80 to 140 feet in wells bored or drilled to a layer of fine sand below blue clay. However, dry holes 140, 100, 300, and 150 feet have been drilled in sections 16, 22, 25, and 31.

The water from the bedrock is hard and alkali and only one well, in SE.$\frac{1}{4}$ section 17, at a depth of 288 feet, has been drilled into it.

Along highway No. 10, in the southeast corner of SE.$\frac{1}{4}$ section 1, a test hole drilled by California Standard Company encountered a strong flow of fresh water at a depth of 72 feet in a zone of coarse sand. The water was alkali and the flow approximated 93 gallons a minute. Fifty-six feet of casing was run in the hole and cemented to control the water flow and plug the hole.

Township 12, Range 20. This township is covered with ground moraine with an uneven surface marked by undrained depressions and wooded areas. Across its northeast corner Minnedosa River occupies a broad valley with gently sloping sides.

In most of the township, water may be obtained from layers of gravel or sand underlying blue clay. In general these may be reached by wells 50 to 80 feet deep, but in sections 1, 2, and 3, wells 120 to 130 feet deep are necessary. In sections 13, 24, and 26 local lenses of outwash gravel yield water at depths of 10 to 18 feet. Dugouts are seldom used, but in SE.$\frac{1}{4}$ section 14, where test holes were dry, they are the only source of supply.

Township 12, Range 21. Minnedosa River crosses the southeast quarter of the township in a broad valley with gently sloping sides. An outwash plain built by an earlier river that followed the course of the present Minnedosa covers that part of the township west of the river.

Water can be obtained everywhere from outwash gravels at depths of less than 20 feet except at Rivers, where most wells are 20 feet or more deep. In those areas where the outwash gravels are not present, especially in sections 29 to 36, a supply of water that is not sufficient and is of poor quality is obtained from lenses of sand in blue clay at depths not greater than 40 feet.

The following test holes were drilled by The International Water Supply Limited, Regina, Saskatchewan, in search of water for the Airport.

No.	¼ Section	Elevation (Feet)	Depth (Feet)	Aquifer (Feet)	Pumping test
	NE.8	1,550	189	0-75 sand	Insufficient water
	NE.8	1,550	249	92-98 fine sand	5 imperial gallons a minute(IGPM)
1	NW.16	1,500	79		No water
2	NW.16	1,500	65	50-52 fine sand	Insufficient water
3	NW.16	1,500	62	52-59 gravel	10 IGPM., drawdown 1½ feet
4	NW.16	1,502	61	51-59 gravel	10 IGPM., drawdown nil
5	NW.16	1,550	70		No water
6	NE.16	1,502	63	53-63 sand	8 IGPM.
7	SW.16	1,554	75		No water
8	NW.16	1,550	67	60-63 sand	2 IGPM
9	NW.16	1,550	54	53-54 sand	No water
10	NW.16	1,550	66	53-65 gravel	10 IGPM
11	NW.16	1,550	63	53-61 gravel	20 IGPM., drawdown nil
12	SW.16	1,554	89		No water
13	NE.17	1,502	229		No water

No.	¼ Section	Elevation (Feet)	Depth (Feet)	Aquifer (Feet)	Pumping test
14	SW.16	1,554	89	69-74 fine sand	No water
15	NW.16	1,500	67	60-64 fine sand	Little water
16	NE.17	1,502	72		No water
17	NE.17	1,502	68	58-68 sand	Little water

Township 13, Range 18. The water supply has presented a problem in this township, and until dugouts were built water in sufficient quantity was not available for stock. Twelve sections are dependent on dugouts for stock supply and household use, but drinking water must be haulod from nearby towns. The few wells present are dug into local pockets of surface sand in the ground moraine or to the base of the buff weathered till that averages 20 feet in thickness. The buff weathered till is underlain by impervious blue clay and aquifers that occur below this clay in other townships are not present here.

In NE.¼ section 22 a test hole penetrated 300 feet of blue clay and four test holes in section 15 penetrated blue clay to depths of 103, 151, 164, and 190 feet and none encountered water. In SW.¼ section 14 a spring issuing from the surface gravel yields a supply of water sufficient for 100 head in dry years.

Township 13, Range 19. Minnedosa River crosses the northeast quarter of the township in a valley that is narrow as far as Rapid City and wider south from there. Gravel, deposited as outwash, underlies Rapid City and mantles the east side of the valley.

A good supply of water is available in the town, the creamery, for example, obtaining sufficient water from two dug wells 15 and 20 feet deep into gravel. The remainder of the township depends on shallow wells dug into local surface deposits of gravel or in ground moraine at the

contact of the weathered upper till and the underlying blue clay. The supply is not abundant and where water cannot be obtained under the above conditions it is useless to dig or drill deeper into the impervious blue clay. Nine sections in which this is true are dependent entirely on dugouts.

Township 13, Range 20. Minnedosa River follows a broad valley with gently sloping sides that crosses the southeast quarter of the township. Except in the valley the entire township is covered by ground moraine.

Shallow wells in local pockets of fine sand or gravel yield a supply sufficient for domestic needs. Deeper wells bored or drilled into blue clay are not satisfactory and commonly the water of such clay is exhausted within 6 months of the time the well is dug.

In SW.$\frac{1}{4}$ Section 19, however, after three test holes 40, 57, and 75 feet deep proved dry, an additional test hole was drilled to a depth of 360 feet, encountering shale at 358 feet. This well obtained an abundant supply of water. The water from this well is hard with a concentration of sulphates and much iron, but it is better quality than water from the till. It is evident that adequate supplies of water cannot be obtained in much of this township unless the costly method of drilling to bedrock is attempted. Dugouts will in most places be required to assure a sufficient supply for stock.

Township 13, Range 21. In the southern part of this township a limited supply of water is obtained from shallow wells less than 20 feet deep dug into the weathered buff till or into pockets of sand, but dugouts are needed to assure a stock supply. Dry holes 150 and 300 feet deep were drilled on sections 3, 4, and 13. A drilled well 147 feet deep in SE.$\frac{1}{4}$ section 20 and 138 feet deep in section 21 yield a sufficient supply of hard, alkali water with much iron.

In the northern part of the township many wells dug 50 to 100 feet deep into lenses of gravel and sand within the till commonly yield sufficient water. In section 2, however, holes drilled 95, 135, and 275 feet in depth were dry.

Township 14, Range 18. Ground moraine covers this township and test holes indicate 345 feet of clay overlying bedrock in section 12. In sections 18 and 19, however, a bed of sand less than 10 feet thick covers the ground moraine and wells dug in this obtain an adequate supply of water. In some sections wells dug to lenses of sand or gravel in the upper 20 to 30 feet of weathered till obtain water, but 18 sections are dependent on dugouts for a supply. The search for water has been costly and not too successful. Test holes 110 to 375 feet deep have been drilled on sections 2, 5, 10, 12, 15, 21, and 24, all of which were in blue clay and dry. In NE.$\frac{1}{4}$ section 5, however, a well 86 feet deep reaches an aquifer at 85 feet from which fresh water rises 72 feet in the casing. Another well in SE.$\frac{1}{4}$ section 22 obtained water that rises to within 22 feet of the surface from a layer of sand at a depth of 70 feet.

Township 14, Range 19. Minnedosa River flows along the east side of the township in a valley with steep walls 150 feet high. East of the river the wells are less than 25 feet deep and obtain supplies from lenses of sand in the upper weathered part of the ground moraine.

West of the river, however, the supply of water is a problem, and 17 sections depend on dugouts, although in sections 3, 8, and 9 dug wells yield water from local pockets of gravel in ground moraine. In NW.$\frac{1}{4}$ sections 31 and 33 wells drilled 105 and 200 feet, respectively, to aquifers in blue clay yield abundant hard water with much iron.

Township 14, Range 20. This township is underlain by ground moraine whose surface is uneven, much wooded, and covered with undrained depressions.

Near Moline, wells dug or bored 60 to 80 feet obtain an excellent supply of water from a layer of gravel below blue clay. The water is hard, has much iron, and rises to a point within 20 feet of the surface of the

ground. Elsewhere, wells are dug 30 to 40 feet to lenses of sand or gravel in the ground moraine except in sections 26, 28, and 29, where wells are drilled 110, 200, and 150 feet respectively.

Township 14, Range 21. Ground moraine with an uneven, wooded surface covers the township. This ground moraine has local pockets of sand distributed all through it, which supply water to wells dug 30 to 50 feet deep. This water is hard, commonly alkali, and contains much iron. In NE.$\frac{1}{4}$ section 30, SW.$\frac{1}{4}$ section 31, and SW.$\frac{1}{4}$ section 32 wells are drilled 135, 155, and 165 feet, respectively, to bedrock.

At Cardale, two wells about 50 feet apart are dug to gravel below blue clay at depths of 30 and 36 feet. These wells yield an abundant supply of hard water that is slightly alkali and contains much iron.

ANALYSES OF WELL WATERS FROM Tps. 11 to 14, Rges. 18 to 21, W. Princ. mer., Man (Rivers Area)

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)								Hardness as ($CaCO_3$) (pts. per million)		
										Calcium (Ca)	Magnesium (Mg)	Alkalis (as Na)	Sulphate (SO_4)	Chloride (Cl)	Nitrate (NO_3)	Bicarbonate (HNO_3)	Alkalinity (as $CaCO_3$)	Ca hardness	Mg hardness	Total hardness
4751	S.W.	19	13	20	WPM	G. Shanks	360	Sh.	2060	204.0	45.0	393.1	1126.5	154.0	4.4	122.0	100.0	509.0	185.2	694.2
4752	S.W.	34	13	18	WPM	J. Calen	12	Gr.	2162	308.0	151.0	80.0	809.9	199.0	354.0	246.4	202.0	768.5	621.4	1389.9
4753	S.W.	36	11	19	WPM	H. Heide	54		1398	405.0	115.4	270.0	1291.0	229.0	0.0	507.5	416.0	1010.5	474.9	1485.4
4754	S.W.	28	11	19	WPM	R. J. Marvin	50	Sd.	2842	554.0	144.7	39.8	1611.6	0.0	7.1	461.2	378.0	1382.2	595.4	1977.6

* Symbols used for aquifers

NO. 669

Discussion of Analyses

Four samples of water from the Rivers area were selected for analyses, the results of which are in the foregoing table. The numbers in the first column are for laboratory identifications and have no significance.

Sample No. 4751. The water is hard and the sulphate concentration is high. Water with a high sulphate concentration commonly precipitates a red mass of iron hydroxide that makes the water unsuitable for laundry purposes. This sample is from bedrock and is better water than the other samples analysed.

Sample No. 4752. This water is taken from a dug well in a local pocket of sand. In percolating through the porous surface deposits the water has picked up and concentrated the constituents shown in the analyses and is very hard.

Sample Nos. 4753 and 4754 appear to be from similar wells about 3 miles apart, but the quality of the water differs greatly. This is a good example of the variation in the quality of the water within short distances because of the heterogeneous nature of the glacial material, and possibly also because of the concentration of soluble minerals in lenses in the till.

Record of Wells

The well records of the Rivers 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 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 drilling is continued until 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 lower than 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 the well depends on the amount of rainfall for the season and on the lowering of the water-table by excessive pumping. During the field season of 1950 the amount of rainfall was above average and the recorded height to which water will rise is higher than average.

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

WELL RECORDS

TOWNSHIPS . 11.-12.-13.-14 RANGES . 18.-19.-20.-21. WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION					DESCRIPTION				WATER LEVEL		PRINCIPAL WATER-BEARING BED			WATER			REMARKS
	¼	Sec.	Tp.	Rge.	Owner	Type	Elevation *	Depth (Feet)	Classification +	Above (+) Below (-) Surface	Elev. *	Depth (Feet)	Elev. *	Geological Horizon	Quality	No. of dugouts	Use °	
1	N.W.	1	11	18		bored	1275	33	N.A.	-28	1247	33	1242	gravel	hard, clear		D.S.	Sufficient supply.
2	S.W.	1	"	"		drilled	1270	70	N.A.	-30	1240	70	1200	clay	" , iron		S.	" "
3	S.W.	1	"	"		bored	1274	40	N.A.	-20	1254	40	1234	fine sand.	" , clear		D.	" "
4	N.W.	2	"	"		"	1290	65	N.A.	-20	1270	65	1225	clay.	" , iron		D.S.	" "
5	N.W.	3	"	"		drilled	1312	65	N.A.			65	1247		" , clear		D.	Can pump 3 pails a day.
6	S.E.	3	"	"		"	1302	94	N.A.	-25	1277	94	1208	gravel.	" , iron		D.S.	Sufficient supply.
7	S.E.	4	"	"		bored	1302	44	N.F.A.	-9	1293	44	1258		" , clear		D.S.	" "
8	S.W.	4	"	"		drilled	1310	65	N.F.A.	-10	1300	65	1245	clay	" , iron.		S.	Sufficient for 25 head.
9	N.W.	5	"	"		bored.	1319	48	N.A.	-20	1299	48	1271		" , alkali		S.	Sufficient supply.
10	N.E.	5	"	"		"	1311	40	N.A.	-8	1303	40	1271	clay	" , "		S.	Dug well 12 ft. deep for house.
11	S.W.	6	"	"		dug	1321	30	N.A.	-22	1299	30	1291		" , clear	1	D.S.	
12	N.E.	6	"	"		drilled	1320	75	N.A.	-50	1180	75	1245	gravel.	" , "	1	D.S.	Sufficient supply.
13	N.E.	7	"	"		"	1324	76	N.A.	-20	1320	76	1248		" , iron	1	S.	Sufficient for 30 head.
14	S.W.	7	"	"		dug	1329	27	N.A.	-11	1318	27	1302		" , "	1	D.S.	" " 15 "
15	S.W.	8	"	"		"	1323	30	N.A.	-18	1305	30	1293	clay	" , clear		D.S.	Sufficient supply.
16	N.E.	8	"	"		drilled	1316	70				70	1246	gravel	" , alkali		D.S.	" "
17	S.W.	9	"	"		dug	1311	20				20	1291	clay	" , clear		D.	Four such wells, no supply.
18	N.W.	10	"	"		bored	1312	30	N.A.	-18	1294	30	1282	"	" , iron		S.	Sufficient for 20 head.
19	S.E.	10	"	"		drilled	1304	50	N.A.	-30	1274	50	1254	black sand.	" , "		D.S.	Sufficient supply.
20	S.E.	11	"	"		"	1288	70	N.A.	-20	1268	70	1218	clay	" , "		D.S.	" "
21	S.W.	12	"	"		dug	1288	90	N.A.	-20	1268	90	1198		" , alkali		S.	" "
22	N.E.	13	"	"		bored	1337	60				60	1277	sand.	" , iron		D.S.	Sufficient for 20 head only.
23	S.W.	13	"	"		drilled	1306	75	N.A.	-15	1291	75	1231	fine sand.	" , "		S.	Sufficient supply.
24	S.W.	13	"	"		"	1291	28				28	1211	gravel.	" , clear		D.	Well is near creek.
25	N.E.	14	"	"		dug	1321	53	N.A.	-28	1293	53	1268	clay	" , "		D.S.	Sufficient supply.
26	S.W.	14	"	"		"	1310.	35	N.A.	-8	1302	35	1275		" , iron		D.S.	" "
27	S.W.	15	"	"		bored	1314	30				30	1284	gravel.	" , "		N.	Well is caving.
28	N.W.	15	"	"		dug	1321	36	N.A.	-29	1292	36	1285	fine sand.	" , "		S.	Sufficient supply.
29	S.W.	16	"	"		"	1305	27	N.A.	-16	1289	27	1278		" , "		S.	" "
30	S.W.	16	"	"		"	1310	54	N.A.	-28	1282	54	1256		" , clear		S.	
31	S.E.	16	"	"		"	1307	20	N.A.	-18	1289	20	1287	sand.	" , iron		D.S.	Sufficient for 20 head.
32	N.E.	18	"	"		"	1329	10				10	1319		" , clear		D.S.	Spring on creek bank.
33.	S.E.	19	"	"		bored	1354	70				70	1284		" , iron	1	D.S.	Not sufficient.
34	S.W.	20	"	"		dug	1347	40				40	1307	fine sand.	" , clear		D.S.	Sufficient supply.
35	N.W.	20	"	"		bored	1359	40	F.A.	-0	1354	40	1319	" "	" , iron		S.	Well flows.

* All elevations in feet above sea-level
\# Sample taken for analysis

+ Classification: F.A.-Flowing Artesian
N.F.A.-Non-Flowing Artesian
N.A.-Non-Artesian
I.N.A.-Intermittent Non-Artesian

° Use: S-Stock I-Irrigation M-Municipal D-Domestic
N-Not used G-Greenhouse or Garden

WELL RECORDS TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION					DESCRIPTION				WATER LEVEL		PRINCIPAL WATER-BEARING BED			WATER			REMARKS
	¼	Sec.	Tp.	Rge.	Owner	Type	Elevation *	Depth (Feet)	Classification +	Above (+) Below (-) Surface	Elev. *	Depth (Feet)	Elev. *	Geological Horizon	Quality	Temp. (in °F)	Use °	
36	N.W.	21	11	18		dug	1338	37	N.A.	-11	1327	37	1301		hard, iron		D.S.	Two similar wells.
37	N.E.	21	"	"		bored	1353	40	N.A.	-25	1328	40	1313	clay	" , "		D.S.	Sufficient supply.
38	S.W.	22	"	"		dug	1347	35	N.A.	-10	1337	35	1312		" , clear		N.	
39	N.E.	23	"	"		bored	1336	60	N.F.A.	-9	1327	60	1276	fine sand.	" , iron.		D.S.	Well formerly overflowed.
40	N.E.	23	"	"		"	1342	40	N.A.	-10	1332	40	1302	" "	" , "		D.S.	Sufficient supply.
41	S.E.	23	"	"		"	1330	80				80	1250		" , alkali		D.S.	Drilled several wells.
42	N.E.	24	"	"		"	1347	65	N.A.	-25	1322	65	1282	clay	" , iron		D.S.	Sufficient for 12 head only.
43	S.W.	24	"	"		"	1330	35	N.A	-15	1315	35	1295	clay	" , "		S.	Sufficient supply.
44	S.W.	24	"	"		dug	1332	55	N.F.A.	-15	1317	55	1277	clay	" , "		D.	" "
45	S.W.	25	"	"		bored	1351	54	N.A.	-8	1343	54	1297		" , "		D.	" " "
46	N.E.	25	"	"		"	1365	44	N.A.	-22	1353	44	1321		" , "		N.	
47	S.W.	26	"	"		"	1359	40	N.A.	-20	1339	40	1319	clay	" , "		D.S.	Sufficient supply.
48	S.W.	27	"	"		"	1367	75				75	1292	sand	" , "		D.S.	" "
49	N.W.	27	"	"		"	1375	68				68	1307	sand.	" , "		D.S.	Sufficient for 20 head.
50	S.E.	28	"	"		"	1360	52	N.A.	-10	1350	52	1308	clay	" , "		N.	
51	N.W.	28	"	"		"	1365	52	N.A.	-32	1333	52	1313	sand.	" , "			
52	N.W.	28	"	"		drilled	1373	130	N.A.	-65	1308	65	1308		" , alkali		S.	Sufficient supply.
53	S.E.	29	"	"		bored	1376	75	N.A.	-20	1356	75	1301	sand.	" , iron		S.	Sufficient for 10 head.
54	N.E.	30	"	"		"	1388	70				70	1318	clay	" , "		S.	Sufficient supply.
55	S.E.	30	"	"		dug	1383	17	N.A.	-9	1374	17	1366	"	" , clear		N.	
56	S.W.	30	"	"		bored	1395	65	N.A.	-20	1375	65	1330	"	" , iron		D.S.	Sufficient supply.
57	S.E.	31	"	"		"	1408	50	N.A.	-10	1398	50	1358	"	" , "		S.	Sufficient for 25 head.
58	S.W.	31	"	"		"	1434	51	N.A.	-9	1425	51	1383		" , "		N.	
59	N.W.	31	"	"		"	1439	48				48	1391		" , "		D.S.	Sufficient for 15 head only.
60	N.W.	32	"	"		"	1433	80	N.A.	-25	1408	80	1353	clay	" , "		D.S.	Sufficient supply.
61	S.W.	32	"	"		"	1394	60	N.A.	-15	1379	60	1334	"	" , "		S.	" "
62	N.E.	32	"	"		"	1413	60	N.A.	-30	1383	60	1353	sand.	" , "		D.S.	Sufficient for 50 head.
63	S.W.	33	"	"		"	1405	38	N.A.	-17	1388	38	1367	gravel	" , "		D.S.	" " 50 "
64	S.E.	33	"	"		"	1418	44	N.A.	-22	1396	44	1374	clay	" , clear		D.S.	Sufficient supply.
65	S.W.	34	"	"		dug	1405	40	N.A.	-18	1387	40	1365		" , alkali		S.	Sufficient for 25 head.
66	N.W.	35	"	"		bored	1422	40	N.A	-25	1397	40	1382		" , iron		D.S.	Sufficient supply.
67	S.E.	35	"	"		"	1376	42	N.A.	-20	1356	42	1334		" , "		S.	" "
68	S.W.	36	"	"		"	1388	37	N.A.	-14	1374	37	1351		" , "		N.	

* All elevations in feet above sea-level
# Sample taken for analysis

+ Classification: F. A.–Flowing Artesian
N. F. A.–Non-Flowing Artesian
N. A.–Non-Artesian
I. N. A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS

TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (m³F) dugouts	Use °	REMARKS
1	N.E.	1	12	18		bored	1431	20	N.A.	-16	1415	20	1411		hard, clear		D.S.	Not sufficient.
2	S.W.	1	"	"		"	1408	24	N.A.	-12	1396	24	1384	fine sand.	" ,		D.S.	Sufficient supply.
3	S.W.	2	"	"		"	1437	44	N.A.	-6	1431	44	1393		" , iron		D.S.	" "
4	N.W.	2	"	"		"	1445	30	N.A.	-14	1431	30	1415	clay	" , "		D.S.	" "
5	S.E.	3	"	"		dug	1439	40				40	1399		" , "	1	D.S.	" "
6	N.E.	3	"	"		drilled	1466	50	N.A.	-25	1441	50	1416		" , "		D.S.	" "
7	S.W.	3	"	"		bored	1438	40	N.A.	-37	1401	40	1398		" , "		D.S.	" "
8	S.W.	5	"	"		"	1441	62	N.A.	-28	1413	62	1379	clay.	" , "		D.S.	Sufficient for 100 head.
9	S.E.	5	"	"		"	1465	26	N.A.	-9	1456	26	1439		" clear		N.	Too alkali to use.
10	N.W.	6	"	"		dug	1481	27	N.A.	-23	1458	27	1454		" , iron		D.	A similar dug well for stock
11	S.W.	6	"	"		bored	1459	48	N.A.	-20	1439	48	1411		" , alkali		D.S.	Sufficient supply.
12	N.E.	7	"	"		"	1525	26	N.A.	-23	1502	26	1499	gravel.	" , clear	1	D.S.	Sufficient for 20 head.
13	N.W.	8	"	"		drilled	1494	125	N.F.A.	-25	1469	125	1369		" , alkali		S.	Dug well 12 ft. for house.
14	S.W.	9	"	"		bored	1488	73	N.A.	-23	1465	73	1415		" , iron		S.	Sufficient supply.
15	S.E.	10	"	"		dug	1475	40	N.A.	-23	1452	40	1435		" , "		D.S.	Sufficient for 20 head.
16	S.E.	11	"	"		drilled	1447	26	N.A.	-15	1432	26	1421	gravel.	" , "		D.S.	Sufficient supply.
17	N.W.	11	"	"		dug	1450	8	F.A.	0	1450	8	1442	clay	" , "		D.S.	" "
18	N.W.	12	"	"		bored	1452	60	N.A.	-20	1432	60	1392	"	" , "	1	S.	" "
19	S.E.	14	"	"		"	1474	60				60	1414	"	" , "		D.S.	" "
20	S.E.	15	"	"		"	1476	50	N.A.	-16	1460	50	1426	sand.	" , "		D.S.	Also a bored well 46 ft. deep.
21	S.W.	16	"	"		"	1512	46	N.A.	-35	1477	46	1466	clay.	" , "		D.S.	Sufficient for 70 head.
22	N.W.	16	"	"		"	1531	65	N.A.	-45	1486	65	1466	"	" , "		D.S.	Sufficient supply.
23	N.E.	17	"	"		"	1547	75	N.A.	-45	1502	75	1472	"	" , "		S.	" "
24	N.W.	17	"	"		"	1547	70	N.A.	-30	1517	70	1477	gravel.	" , "		D.S.	Sufficient for 100 head.
25	S.W.	18	"	"		drilled	1530	80	N.A.	-35	1495	80	1450	"	" , "	1	D.S.	Sufficient supply.
26	N.W.	18	"	"		bored	1562	83	N.A.	-53	1509	83	1479		" , alkali		N.	
27	N.W.	19	"	"		"	1592	70	N.A.	-40	1552	70	1522	gravel.	" , "		D.S.	Sufficient for 50 head.
28	N.E.	19	"	"		"	1588	75	N.A.	-50	1538	75	1513	fine sand.	" , iron.		S.	Sufficient supply.
29	S.E.	21	"	"		"	1545	51	N.A.	-25	1520	51	1494		" , "		S.	" "
30	N.E.	20	"	"		"	1574	98	N.A.	-40	1534	98	1476		" , "		D.S.	Sufficient for 30 head.
31	S.W.	21	"	"		dug	1539	15	N.A.	-7	1532	15	1524	sand.	" , clear		D.S.	Sufficient supply.
32	S.W.	21	"	"		bored	1549	47	N.A.	-27	1562	47	1502		" , block.		N.	
33	N.W.	22	"	"		bored	1519	32	N.A.	-30	1489	32	1487	gravel.	" , iron		D.S.	Not sufficient.
34	N.W.	22	"	"		"	1524	40	N.A.	-36	1488	40	1484	"	" , "		D.S.	" "
35	S.E.	22	"	"		dug	1506	9	N.A.	-6	1500	9	1497	fine sand.	" , clear		D.S.	Sufficient supply.

* All elevations in feet above sea level
# Sample taken for analysis

+ Classification. F.A.-Flowing Artesian
N.F.A.-Non-Flowing Artesian
N.A.-Non-Artesian
I.N.A.-Intermittent Non-Artesian

° Use: S-Stock I-Irrigation M-Municipal D-Domestic
N-Not used G-Greenhouse or Garden

WELL RECORDS TOWNSHIPS . 11. to. 14 ..... RANGES ...18. to. 21 ..... WEST OF. Prino. ....MER. PROVINCE ..MANITOBA.....

Well No.	LOCATION					DESCRIPTION				WATER LEVEL		PRINCIPAL WATER-BEARING BED			WATER			REMARKS
	¼	Sec.	Tp.	Rge.	Owner	Type	Elevation *	Depth (Feet)	Classification +	Above (+) Below (-) Surface	Elev. *	Depth (Feet)	Elev. *	Geological Horizon	Quality	No. of dugouts	Use °	
36	N.W.	23	12	18		dug		8		-7		8		gravel.	hard, clear		D.S.	Sufficient supply.
37	S.E.	24	"	"		bored	1498	45	N.A.	-20	1478	45	1453	gravel.	" , alkali		D.S.	Sufficient for 25 head.
38	N.E.	24	"	"		dug	1497	13	N.A.	-6	1491	13	1484	"	" , clear		D.S.	" " 50 " .
39	N.W.	24	"	"		"	1523	28	N.A.	-25	1498	28	1495	clay.	" , "		D.	Stock well dug 60 feet.
40	S.E.	25	"	"		bored	1511	50	N.A.	-5	1506	50	1461		" , "		D.S.	Had a flowing well 50 feet.
41	S.W.	25	"	"		"	1536	46	N.A.	-20	1516	46	1490	sand.	" , iron.		D.S.	Sufficient supply.
42	N.E.	26	"	"		dug	1534	6	N.A.	-4	1530	6	1529	sand.	" , clear		D.S.	" " .
43	N.W.	26	"	"		"	1574	84	N.A.	-60	1514	84	1490	clay	" , iron.	1	S.	Sufficient for 15 head only.
44	N.E.	27	"	"		drilled	1582	100				100	1482	"	" , "	1	D.S.	Sufficient supply.
45	S.W.	27	"	"		bored	1570	60	N.A.	-58	1512	60	1510		" , "		D.	Not sufficient.
46	S.E.	29	"	"		"	1575	70	N.A.	-9	1566	70	1505	fine sand.	" , "	1	S.	Sufficient for 25 head.
47	N.W.	30	"	"		"	1643	57	N.A.	-54	1589	57	1586	clay	" , "	1	N.	
48	S.W.	31	"	"		"	1647	100	N.A.	-20	1627	100	1547	"	" , "	1	S.	Also a bored well 90 ft.
49	S.E.	32	"	"		"	1625	120	N.A.	-70	1555	120	1505	"	" , "	1	D.	Not sufficient.
50	S.W.	32	"	"		drilled	1613	125	N.A.	-60	1553	125	1488	black sand.	" , "		D.S.	Sufficient supply.
51	S.E.	33	"	"		drilled	1612	120	N.A.	-60	1552	120	1492	" "	" , "	1	S.	
52	S.E.	35	"	"		bored	1572	72	N.A.	-50	1522	72	1500	sand.	" , "		D.S.	Sufficient supply.
53	S.E.	36	"	"		dug	1524	15	N.A.	-4	1520	15	1509	"	" , clear		D.S.	Sufficient for 10 head.
54	N.E.	36	"	"		"	1538	12	N.A.	-6	1532	12	1526	gravel.	" , "		D.S.	" " 100 " .
1	S.E.	1	13	18		bored	1553	63	N.A.	-34	1519	63	1490	clay	hard, iron	1	S.	Sufficient supply.
2	S.W.	4	"	"		drilled	1640	160?							" , "	1	D.	" " .
3	N.E.	6	"	"		dug	1699	14	N.A.	-5	1694	14	1685	clay	" , clear	1	D.	Dug several dry holes.
4	S.W.	7	"	"		"	1713	16				16	1697	"			N.	Drilled 81 feet, dry hole.
5	N.E.	10	"	"		"	1654	15	N.A.	-5	1649	15	1639	"	hard, clear	1	D.	Sufficient supply.
6	S.E.	14	"	"		"	1650	35	N.A.	-8	1642	35	1615		" , "	1	D.S.	" " .
7	N.W.	15	"	"		"	1677	15				15	1662	sand.	" , "	1	D.	" " .
8	N.W.	16	"	"		"	1708	20	N.A.	-14	1694	20	1688	clay	" , "	1	D.	" " .
9	N.E.	17	"	"		"	1721	18				18	1703	"	" , "	1	D.S.	Not sufficient.
10	N.E.	18	"	"		"	1746	11	N.A.	-5	1741	11	1735	fine sand	" , "		D.S.	Sufficient supply.
11	S.W.	18	"	"		"	1721	20	N.A.	-3	1718	20	1701	clay	" , "	1	S.	Sufficient for 20 head.
12	N.W.	19	"	"		bored	1764	75	N.A.	-15	1749	75	1689	gravel.	" , iron			Not good water.
13	N.E.	22	"	"		dug	1707	20	N.A.	-15	1692	20	1687	clay	" , clear	2	D.	Drilled 325 feet.
14	N.W.	27	"	"		"	1727	12				12	1715	"	" , "	1	D.	
15	S.W.	29	"	"		"	1722	12	N.A.	-10	1712	12	1710	"	" , "	1	D.	

* All elevations in feet above sea-level
# Sample taken for analysis

+ Classification: F. A.-Flowing Artesian
N. F. A.-Non-Flowing Artesian
N. A.-Non-Artesian
I. N. A.-Intermittent Non-Artesian

° Use: S-Stock I-Irrigation M-Municipal D-Domestic
N-Not used G-Greenhouse or Garden

WELL RECORDS

TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) dugouts	Use °	REMARKS
16	N.W.	31	13	18		dug	1752	16	N.A.	-13	1739	16	1736	fine sand.	hard, iron		D.S.	Sufficient supply.
17	N.E.	32	"	"		"	1785	12				12	1773	gravel.	" ,clear		D.	" "
18	N.W.	33	"	"		bored	1754	70	N.A.			70	1684	sand.	" ,alkali	1	S.	Sufficient for 12 head.
# 19	S.W.	34	"	"		dug	1757	12	N.A.	-8	1749	12	1745	gravel.	" ,clear	1	D.	Sufficient supply.
1	S.W.	3	14	18		dug	1759	12	N.A.	-10	1749	12	1747	clay	hard,clear	1	D.	Decreases seasonally.
2	N.E.	5	"	"		drilled	1804	102				102	1702	fine sand.	" , "	1	D.S.	Drilled a dry hole 300 ft. deep
3	N.W.	6	"	"		bored	1819	32	N.A.	-30	1789	32	1787	gravel.	" , "		D.S.	Not sufficient.
4	S.E.	9	"	"		dug	1783	30	N.A.	-4	1779	30	1753		" ,alkali	1	D.	Sufficient supply
5	N.W.	12	"	"		"	1731	12				12	1719	gravel.	" ,clear	1	D.	" "
6	S.W.	16	"	"		bored	1843	60	N.A.	-35	1808	60	1783	fine sand.	" ,iron.		D.S.	" "
7	N.W.	18	"	"		dug	1786	9				9	1777	gravel	" ,clear		D.S.	" "
8	N.E.	18	"	"		"	1796	12	N.A.	-8	1788	12	1784	"	" ,iron.		D.S.	" "
9	N.W.	19	"	"		"	1783	14				14	1769	"	" ,clear		D.S.	Sufficient for 50 head.
10	S.W.	20	"	"		"	1836	28	N.A.	-25	1811	28	1808	sand.	" , "	1	D.S.	Sufficient supply.
11	S.E.	20	"	"		bored	1832	60	N.A.	-40	1792	60	1772	fine sand.	" , "	1	D.S.	Sufficient for 40 head.
12	S.E.	21	"	"		dug	1830	20				20	1810	clay.	" , "	1	D.S.	Sufficient supply.
13	S.W.	21	"	"		bored	1835	55	N.A.	-10	1825	55	1780	sand.	" , "	1	D.S.	Sufficient for 10 head only.
14	N.W.	22	"	"		dug	1801	15	N.A.	-10	1791	15	1786	gravel.	" , "	1	D.	No supply in drier years.
15	S.W.	27	"	"		"	1795	12				12	1783	clay	" , "	1	D.S.	Not sufficient.
16	N.W.	28	"	"		"	1833	15	N.A.	-12	1821	15	1818		" , "		D.S.	Sufficient supply.
17	S.E.	30	"	"		"	1813	30	N.A.	-26	1787	30	1783	gravel.	" , "	1	D.S.	Not sufficient.
18	N.W.	33	"	"		"	1817	15	N.A.	-9	1808	15	1802	"	" , "		D.	Sufficient supply.
19	N.W.	34	"	"		"	1773	12	N.A.	-10	1763	12	1761	sand.	" , "	1	D.S.	" "
1	S.W.	1	11	19		dug	1326	22				22	1304	fine sand.	hard, clear		D.S.	Sufficient for 10 head, only.
2	N.E.	1	"	"		drilled	1318	60				60	1258		" ,iron.	1	S.	Dug well 30 feet for drinking.
3	N.W.	2	"	"		dug	1348	55				55	1293		" ,clear		D.S.	Sufficient for 25 head only.
4	S.E.	2	"	"		drilled	1331	46	N.A.	-21	1310	46	1285		" , "		D.S.	" " 65 " .
5	S.E.	3	"	"		"	1333	35	N.A.	-10	1323	35	1298	gravel.	" ,iron		S.	" " 40 " only.
6	S.W.	4	"	"		dug	1360	15	NA.	-12	1348	15	1345	sand.	" ,clear		S.	" " 50 " .
7	S.E.	5	"	"		"	1362	16	N.A.	-14	1348	16	1346	"	" , "		D.	Sufficient supply.
8	N.E.	6	"	"		"	1413	26	N.A.	-14	1399	26	1387	"	" , "		D.S.	Has watered 60 head.
9	N.E.	8	"	"		"	1362	15				15	1347	"	" , "		D.S.	Sufficient for 100 head.
10	S.W.	9	"	"		"	1364	20	N.A.	-17	1347	20	1344	"	" , "	1	D.S.	Sufficient supply.

* All elevations in feet above sea-level
\# Sample taken for analysis

+ Classification: F. A.–Flowing Artesian
N. F. A.–Non-Flowing Artesian
N. A.–Non-Artesian
I. N. A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec	Tp	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) Augouts	Use °	REMARKS
11	S.E.	10	11	19		drilled	1350	58	N.F.A.	-15	1335	58	1292	sand.	hard, iron.		S.	Sufficient supply.
12	S.W.	11	"	"		bored.	1348	70				70	1278		" , "		S.	" "
13	S.W.	12	"	"		dug	1349	20				20	1329	gravel.	" , clear		D.	" "
14	S.E.	16	"	"		bored	1337	60	N.F.A.	-15	1322	60	1277	sand.	" , "		D.S.	Sufficient for 40 head.
15	S.W.	17	"	"		dug	1369	12	N.A.	-9	1360	12	1357	fine sand.	" , "	1	D.S	" " 4 " only.
16	S.E.	18	"	"		"	1372	10	N.A.	-6	1366	10	1362	sand.	" , "		D.S.	Sufficient supply.
17	N.E.	18	"	"		"	1549	53	N.A.	-45	1504	53	1496	clay	" , iron		D.S.	Sufficient for 65 head.
18	S.W.	21	"	"		bored.	1361	67	N.A.	-63	1298	67	1294	"	" , alkali		D.S.	Sufficient supply.
19	S.E.	22	"	"		dug	1357	24	N.A.	-18	1339	24	1333	"	" , iron.		S.	" "
20	N.E.	22	"	"		"	1388	25	N.A.	-18	1370	25	1363	"	" , "		S.	" "
21	N.W.	23	"	"		"	1366	36	F.A.	+6 inches	1366	36	1330	"	" , "		S.	" "
22	NW	24	"	"		"	1368	47	F.A.	0	1368	47	1321	"	" , "		S.	" "
23	S.E.	25	"	"		drilled.	1395	100?							" , "		D.S.	" "
24	S.W.	25	"	"		dug	1409	40	N.A.	-35	1374	40	1369		" , "		D.S.	" "
25	N.W.	26	"	"		"	1413	40				40	1373		" , "		S.	
26	N.E.	27	"	"		drilled.	1410	86	N.A.	-30	1380	86	1324	clay	" , "	1	D.S.	Sufficient for 25 head.
27	S.E.	27	"	"		bored.	1401	36	N.A.	-12	1389	36	1365		" , "		D.S.	Sufficient supply.
28	NW	28	"	"		"	1471	62	N.A.	-57	1414	62	1409	sand.	" , "	1	D.S.	Sufficient for 50 head.
# 29	S.W.	28	"	"		dug	1433	50	N.A.	-46	1387	50	1383	"	" , clear		D.S.	Sufficient supply.
30	S.W.	29	"	"		bored.	1550	70	N.A.	-28	1522	70	1480	clay	" , alkali	1	S.	" "
31	N.E.	30	"	"		"	1582	56	N.A.	-47	1535	56	1526		" , clear		S.	" "
32	N.W.	30	"	"		drilled	1569	75	N.A.	-40	1529	75	1494	clay	" , iron	1	S.	Sufficient for 12 only.
33	S.E.	30	"	"		bored.	1542	70	N.A.	-17	1525	70	1472		" , "		S.	" " 15 head.
34	N.E.	31	"	"		"	1479	60	N.A.	-13	1466	60	1419	sand.	" , "		D.S.	Sufficient supply.
35	S.E.	33	"	"		"	1437	78	N.A.	-25	1412	78	1359	"	" , "	1	S.	Sufficient for 50 head.
36	N.E.	34	"	"		"	1458	85	N.A.	-25	1433	85	1373		" , clear	1	S.	" " 15 " .
37	N.E.	35	"	"		"	1468	70	N.A.	-28	1440	70	1398		" , iron	1	D.S.	Sufficient supply.
38	S.E.	36	"	"		"	1428	50	N.F.A.	-3	1425	50	1378		" , "		N.	
# 39	S.W.	36	"	"		drilled	1438	54	N.A.	-30	1408	54	1384		" , "	1	D.S.	Sufficient supply.
1	S.E.	2	12	19		bored	1481	85	N.F.A.	-15	1466	85	1396		hard, iron	1	D.S.	Sufficient supply.
2	S.E.	3	"	"		dug	1477	80				80	1397		" , "		D.S.	" "
3	S.W.	4	"	"		bored.	1468	70	N.A.	-25	1443	70	1398	gravel.	" , "		D.S.	" "
4	S.E.	5	"	"		drilled	1474	90				90	1384	clay	" , "	1	S.	" "
5	N.E.	6	"	"		dug	1498	80	N.A.	-70	1428	80	1418	"	" , "		S.	Sufficient for 10 head.

* All elevations in feet above sea-level
\# Sample taken for analysis

+ Classification: F.A.–Flowing Artesian
N.F.A.–Non-Flowing Artesian
N.A.–Non-Artesian
I.N.A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Prine. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) dugouts	Use ○	REMARKS
6	S.E.	7	12	19		drilled	1491	125				125	1366	sand	hard, iron			Supplies about 2 barrels a day.
7	S.W.	7	"	"		bored	1527	69	N.A.	-10	1517	69	1458		" , clear			Stagnant odour.
8	S.E.	8	"	"		drilled	1498	140	N.A.	-70	1428	140	1358	sand.	" , iron		D.S.	Sufficient for 30 head.
9	S.W.	8	"	"		bored	1530	48	N.A.	-12	1518	48	1482	clay	" , alkali		S.	" " 10 " only.
10	N.E.	9	"	"		"	1540	115	N.A.	-40	1500	115	1425	sand	" , iron		D.S.	Sufficient supply.
11	N.W.	10	"	"		drilled	1536	117	N.A.	-52	1484	117	1419	sand.	" , clear		N.	
12	S.E.	12	"	"		bored	1508	50	N.A.	-28	1480	50	1458		" , "		S.	Sufficient for 30 head.
13	N.E.	12	"	"		dug	1531	22	N.A.	-12	1519	22	1509		" , "		D.	Sufficient supply.
14	S.E.	13	"	"		bored	1550	28	N.A.	-26	1524	28	1522	fine sand.	" , "	1	D.S.	Sufficient for 4 head only.
15	S.W.	15	"	"		"	1576	138	N.A.	-66	1510	138	1438	sand.	" , "		D.S.	Sufficient supply.
16	S.W.	16	"	"		drilled	1558	180				180	1378		" , iron		D.S.	" "
17	S.E.	17	"	"		"	1569	288	N.A.	-40	1529	288	1281	shale	" , alkali	1	D.S.	" "
18	S.E.	18	"	"		"	1577	45	N.A.	-20	1557	45	1532	clay.	" , iron.		S.	Sufficient for 100 head.
19	S.E.	19	"	"		dug	1611	17	N.A.	-9	1602	17	1594	sand.	" , clear	1	D.S.	Sufficient supply.
20	S.W.	19	"	"		"	1610	23	N.A.	-9	1601	23	1587		" , iron	1	S.	
21	N.E.	20	"	"		drilled	1634	85	N.A.			85	1549	fine sand.	" , "	3	D.	Supplies 2 barrels a day.
22	S.E.	20	"	"		bored	1611	68	N.A.	-52	1559	68	1543		" , alkali	1	S.	Not sufficient.
23	S.W.	20	"	"		"	1600	130	N.A.	-40	1660	130	1470		" , clear		D.S.	Sufficient for 40 head.
24	S.E.	21	"	"		"	1615	70	N.A.	-65	1550	70	1545	sand.	" , "	1	D.	Sufficient for house only.
25	N.E.	21	"	"		"	1639	65	N.A.	-25	1614	65	1574	clay	" , iron	1	D.	Sufficient supply.
26	S.E.	27	"	"		"	1581	90				90	1491		" , "	1	N.	
27	N.E.	25	"	"		"	1639	22	N.A.	-6	1633	22	1617	clay	" , clear	1	D.	Drilled a dry hole 300 feet.
28	N.E.	26	"	"		"	1642	60				60	1582	"	" , "	1	N.	
29	N.W.	27	"	"		"	1657	65				65	1592	gravel.	" , iron	1	D.S.	Sufficient for 20 head only.
30	S.W.	29	"	"		"	1650	54	N.A.	-20	1630	54	1596	"			N.	Well just dug.
31	N.W.	29	"	"		"	1678	80?							hard, clear	1	D.S.	Sufficient for 10 head only.
32	N.E.	32	"	"		"	1707	60	N.A.	-35	1672	60	1647	clay	" , iron	1	D.S.	Sufficient supply.
33	N.W.	33	"	"		"	1694	90	N.A.	-80	1614	90	1604	"	" , "		S.	" "
34	N.W.	34	"	"		dug	1689	12	N.A.			12	1677	fine sand.	" , "		D.S.	" "
35	N.W.	35	"	"		"	1703	16	N.A.			16	1697	gravel.	" , clear		D.S.	" "
1	N.E.	2	13	19		dug	1703	10	N.A.	-5	1698	10	1693	clay	hard, alkali		N.	
2	S.W.	2	"	"		"	1697	5				5	1692	gravel.	" , clear		D.S.	Well is in a gravel pit.
3	N.E.	2	"	"		"		20		-10		20		"	" , "		S.	Sufficient for 30 head.
4	S.W.	4	"	"		bored	1710	65	N.A.	-15	1695	65	1645	clay	" , "		D.S.	" " 15 " .

* All elevations in feet above sea-level
\# Sample taken for analysis

+ Classification: F. A.–Flowing Artesian
N. F. A.–Non-Flowing Artesian
N. A.–Non-Artesian
I. N. A.–Intermittent Non-Artesian

○ Use; S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS TOWNSHIPS ...11. to. 14.... RANGES ..18. to. 21..... WEST OF..Prine....MER. PROVINCE ..MANITOBA.....

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (–) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) dugouts	Use °	REMARKS
5	S.W.	4	13	19	School Well.	bored	1709	21	N.A.	-7	1702	21	1688		hard,clear		D.	Sufficient supply.
6	N.W.	5	"	"		drilled	1719	70	N.A.	-30	1689	70	1649	sand	" , "		D.S.	" " .
7	N.E.	6	"	"		"	1711	70	N.A.	-21	1690	70	1641		" , -		D.S.	Sufficient for 20 head.
8	N.E.	7	"	"		dug	1701	48	N.A.	-10	1691	48	1653	gravel	" , -		D.	Sufficient supply.
9	N.E.	8	"	"		bored	1753	35	N.A.	-18	1735	35	1718		" , "		D.S.	Sufficient for 60 head.
10	N.W.	8	"	"		"	1742	58	N.A.	-50	1692	58	1684	sand.	" , "		D.S.	" " 10 " only.
11	N.W.	9	"	"		"	1755	75	N.A.	-20	1735	75	1680		" ,iron		D.S.	Sufficient supply.
12	N.E.	9	"	"		dug	1758	46	N.A.	-18	1740	46	1712		" ,clear		N.	
13	N.W.	10	"	"		"	1766	24	N.A.	-5	1761	24	1742	clay	" , "		S.	Not sufficient.
14	S.W.	10	"	"		bored	1757	16				16	1741		" ,odour	1	N.	
15	S.E.	11	"	"		dug	1735	11	N.A.	-8	1727	11	1724	clay	" ,clear	1	D.	Sufficient supply.
16	N.W.	11	"	"		"	1769	20				20	1749	"	" , "	1	S.	Bored a dry hole 100 feet.
17	N.W.	16	"	"		bored	1745	20	N.A.	-5	1740	20	1725		" , "		D.	Sufficient supply.
18	N.E.	16	"	"		"	1760	25	N.A.	-15	1745	25	1735	fine sand	" , "	1	D.	" " .
19	S.E.	16	"	"		drilled	1764	64				64	1700	gravel	" ,iron		D.S.	" " .
20	N.E.	17	"	"		dug	1705	30	N.A.	-24	1681	30	1675				N.	
21	S.W.	17	"	"		"	1689	18	N.A.	-2	1687	18	1671	clay	hard,clear		D.S.	Sufficient for 15 head.
22	S.E.	21	"	"		"	1745	14	N.A.	-11	1734	14	1731	gravel	" , "		D.S.	Sufficient supply.
23	N.E.	21	"	"		"	1749	9				9	1740		" , "		D.	
24	N.W.	22	"	"		"	1785	22	N.A.	-16	1769	22	1763		" , "		D.S.	Sufficient for 20 head.
25	N.E.	22	"	"		"	1804	14	N.A.	-12	1792	14	1790	gravel	" , "		D.S.	Sufficient supply.
26	N.W.	23	"	"		"	1829	26	N.A.	-22	1807	26	1803	"	" , "		D.S.	" " .
27	N.E.	23	"	"		"	1837	60	N.A.	-20	1817	60	1777	fine sand.	" ,iron		D.S.	" " .
28	S.W.	26	"	"		"	1836	23	N.A.	-20	1816	23	1813	gravel.	" ,clear		D.S.	" " .
29	S.E.	27	"	"		"	1796	16	N.A.	-13	1783	16	1780	"	" , "		D.S.	" " .
30	S.E.	28	"	"		"	1727	35	N.A.	-31	1696	35	1692		" , "		D.S.	" " .
31	S.W.	33	"	"		"	1782	16				16	1766	gravel.	" , "	1	D.	" " .
1	N.E.	1	14	19		bored	1815	26	N.A.	-10	1805	26	1789	fine sand.	hard,clear		D.S.	Drilled 2 dry holes 87 and 110.
2	S.W.	1	"	"		dug	1764	16	N.A.	-13	1751	16	1749	clay	" , "		D.S.	Sufficient supply.
3	S.E.	2	"	"		"	1639	12	N.A.	-8	1631	12	1627	shale.	" , "		D.S.	Sufficient for 100 head.
4	N.W.	3	"	"		"	1817	12	N.A.	-4	1813	12	1805	gravel.	" , "		D.	Well is in a gravel pit.
5	S.E.	8	"	"		"	1805	10	N.A.	-5	1800	10	1795	"			N.	
6	N.W.	12	"	"		"	1801	12	N.A.	-8	1773	12	1789	fine sand.	hard,clear		D.S.	Sufficient supply.
7	N.W.	13	"	"		"	1707	17	N.A.	-9	1698	17	1690		" , "			

* All elevations in feet above sea level
# Sample taken for analysis

+ Classification: F. A.–Flowing Artesian
N. F. A.–Non-Flowing Artesian
N. A.–Non-Artesian
I. N. A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS

TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F)	Use °	REMARKS
																dugouts		
8	N.E.	13	14	19		dug	1755	16	N.A.	-12	1743	16	1739	fine sand.	hard, clear		D.S.	Sufficient supply.
9	S.W.	23	"	"		"	1632	36	N.A.	-21	1611	36	1596	sand.	" , "		D.S.	" "
10	N.E.	30	"	"		"	1875	28	N.A.	-12	1863	28	1847	gravel	" , "		D.S.	Sufficient for 6 horses only
11	N.W.	31	"	"		drilled	1920	105	N.F.A.			105	1815	clay	" , iron		D.S.	Sufficient supply in dry years.
12	N.W.	33	"	"		"	1903	200				200	1703		" , clear		D.S.	" "
1	S.E.	1	11	20		dug	1430	24	N.A.	-9	1421	24	1406		hard, clear		D.S.	Sufficient supply.
2	N.E.	1	"	"		"	1396	14	N.A.	-10	1386	14	1382		" , "		D.S.	" "
3	N.W.	2	"	"		"	1399	15				15	1384	gravel	" , "		D.S.	Not sufficient.
4	N.W.	3	"	"		"	1428	14	N.A.	-7	1421	14	1414	"	" , "	1	D.S.	Sufficient for 20 head.
5	N.W.	4	"	"		"	1428	10				10	1420	"	" , "	1	D.S.	" " 20 " only.
6	S.W.	5	"	"		"	1406	14	N.A.	-7	1399	14	1392	clay	" , "		D.S.	Sufficient supply.
7	N.E.	5	"	"		"	1411	20	N.A.	-3	1408	20	1391	"	" , "		D.S.	" "
8	S.E.	6	"	"		"	1411	18	N.A.	-10	1401	18	1393	sand	" , iron		S.	Sufficient for 50 head.
9	N.E.	8	"	"		drilled	1395	135	N.F.A.	-80	1315	135	1260	gravel.	" , "		D.S.	Sufficient supply.
10	N.E.	9	"	"		dug	1262	15	N.A.	-12	1250	15	1247	sand.	" , clear		D.S.	" "
11	S.E.	13	"	"		"	1482	14	N.A.	-11	1471	14	1468		" , "		D.	" "
12	N.E.	14	"	"		"	1377	10	N.A.	-7	1370	10	1367	fine sand.	" , "		D.S.	Sufficient for 20 head.
13	S.W.	14	"	"		"	1375	20	N.A.	-6	1369	20	1355		" , "	1	S.	
14	S.W.	15	"	"		bored	1328	72	N.A.	-12	1316	72	1256	shale	" , "		D.S.	Sufficient supply.
15	S.W.	17	"	"		drilled	1408	150	N.A.	-100	1308	150	1258	sand.	" , iron		D.S.	Sufficient for 50 head.
16	S.W.	18	"	"		"	1434	175	N.F.A.	-35	1399	175	1259	fine sand	" , "			Fills in with sand.
17	S.W.	18	"	"		dug	1404	20	N.A.	-10	1394	20	1384	sand.	soft, clear		D.	Sufficient supply.
18	N.W.	19	"	"		"	1318	26	N.A.	-22	1296	26	1292		hard, "		D.S.	Sufficient for 10 head.
19	N.W.	21	"	"		"	1414	40	N.A.	-25	1389	40	1374	fine sand.	" , "		S.	" " 25 " only.
20	S.W.	21	"	"		"	1328	40	N.A.	-30	1298	40	1288	sand.	" , "		D.S.	" " 30 " "
21	S.W.	22	"	"		drilled	1391	125	N.A.	-100	1291	125	1266	fine sand.	" , iron		S.	Sufficient supply.
22	S.W.	23	"	"		dug	1394	50	N.A.	-40	1354	50	1344		" , "	1	D.S.	Sufficient for 50 head.
23	S.W.	24	"	"		bored	1523	60	N.A.	-50	1473	60	1463	sand.	" , clear	1	D.S.	Sufficient supply.
24	N.W.	24	"	"		"	1417	50	N.A.	-40	1377	50	1367			1	N.	
25	S.E.	24	"	"		dug	1561	70	N.A.	-57	1504	70	1491		hard, iron		S.	Sufficient supply.
26	S.W.	27	"	"		bored	1403	90	N.F.A.	-22	1381	90	1313		" , clear	1	N.	
27	N.E.	28	"	"		"	1420	100	N.F.A.	-25	1395	100	1320		" , "	1	S.	Sufficient supply.
28	N.W.	30	"	"		"	1427	95	N.F.A.	-25	1402	95	1332	fine sand	" , "		D.S.	" "
29	S.E.	30	"	"		"	1447	30	N.A.	-3	1444	30	1417		" , "	1	D.S	Sufficient for 25 head only.

* All elevations in feet above sea-level
# Sample taken for analysis

+ Classification: F. A.–Flowing Artesian
N. F. A.–Non-Flowing Artesian
N. A.–Non-Artesian
I. N. A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) dugouts	Use °	REMARKS
30	S.E.	31	11	20		bored	1433	53	N.A.	-15	1418	53	1380	fine sand.	hard, alkali		N.	
31	S.W.	34	11	"		"	1423	90				90	1333		" , "	1		No supply.
32	N.W.	34	"	"		"	1448	96	N.A.	-66	1382	96	1352		" , iron	1	D.S.	Sufficient for 10 head only
33	N.W.	35	"	"		dug	1453	62	N.A.	-12	1441	62	1391		" , "		D.S.	Sufficient supply.
34	S.E.	36	"	"		drilled	1565	90				90	1475	clay	" , alkali	1	N.	Too alkali.
1	S.W.	1	12	20	Blacksmith shop	drilled	1462	125	N.F.A.	-25	1437	125	1337	clay	hard, alkali		D.S.	Sufficient supply.
2	S.W.	1	"	"		bored	1454	42	N.A.	-18	1436	42	1412	fine sand.	" , "		S.	Well in ravine for drinking water.
3	N.W.	1	"	"		"	1493	80	N.A.	-15	1478	80	1413	sand.	" , iron		D.S.	Sufficient supply.
4	N.E.	2	"	"		"	1493	120	N.F.A.	-30	1463	120	1373	gravel.	" , "	1	D.S.	Sufficient for 30 head.
5	S.E.	2	"	"		"	1474	53	N.A.	-16	1458	53	1421		" , clear		D.S.	Sufficient supply.
6	N.E.	3	"	"		"	1479	130	N.A.	-90	1389	130	1349	fine sand.	" , "		D.S.	" "
7	N.E.	3	"	"		"	1481	40	N.A.	-35	1446	40	1441		" , "		S.	No supply.
8	N.E.	3	"	"		"	1477	80	N.A.	-40	1437	80	1397	fine sand.	" , "		S.	
9	N.W.	3	"	"		dug	1482	50	N.A.	-25	1457	50	1432	clay	" , iron		S.	Sufficient supply.
10	N.W.	4	"	"		"	1478	37	N.A.	-9	1469	37	1441		" , "		D.S.	" "
11	N.E.	4	"	"		drilled	1464	74	N.A.	-50	1414	74	1390	clay	" , "		D.S.	" "
12	N.E.	5	"	"		dug	1470	48	N.A.	-16	1454	48	1422		" , alkali		D.S.	" "
13	N.W.	7	"	"		bored	1538	67	N.F.A.	-10	1528	67	1471	clay	" , iron	1	S.	" "
14	S.E.	8	"	"		dug	1480	54	N.A.	-20	1460	54	1426	fine sand.	" , "	1	D.S.	Sufficient for 50 head.
15	S.E.	10	"	"		bored	1541	24	N.A.	-19	1522	24	1517		" , "		D.S.	Sufficient supply.
16	N.W.	10	"	"		dug	1530	48	N.A.	-6	1524	48	1482		" , alkali		S.	Sufficient for 50 head.
17	S.W.	11	"	"		bored	1504	70	N.F.A.	-15	1489	70	1434	black sand.	" , iron		D.S.	Sufficient supply.
18	S.E.	12	"	"		"	1522	80	N.A.	-20	1502	80	1442		" , "		D.	" "
19	N.W.	13	"	"		"	1592	18	N.A.	-15	1577	18	1574	gravel.	" , alkali		N.	Sufficient for 6 horses only
20	S.E.	13	"	"		"	1572	78.	N.A.	-20	1552	78	1494	fine sand	" , iron	1	S.	" " 175 head in dry years.
21	S.W.	14	"	"		"	1594	28	N.A.	-12	1582	28	1566	fine sand	" , "		D.S.	Sufficient supply.
22	S.E.	15	"	"		"	1564	33	N.A.	-10	1554	33	1531		" , clear		D.S.	Not sufficient.
23	N.W.	17	"	"		drilled	1597	52	N.A.	-46	1551	52	1545	clay	" , "	1	S.	Sufficient for 15 head only.
24	S.W.	18	"	"		dug	1575	42	N.A.	-40	1535	42	1533	sand.	" , "		D.	Two such wells.
25	N.W.	22	"	"		bored	1687	98				98	1589	fine sand.		1		Dry hole at time of interview.
26	N.E.	24	"	"		dug	1628	10	N.A.	-7	1621	10	1618	sand.	hard, clear		D.S.	Sufficient for 20 head.
27	S.W.	24	"	"		dug	1596	10	N.A.	-7	1589	10	1586	gravel.	" , "	1	D.	Sufficient supply.
28	S.E.	25	"	"		bored	1661	40	N.A.	-33	1628	40	1621	"	" , iron		S.	Sufficient for 30 head.
29	N.E.	33	"	"		dug	1646	37	N.A.	-32	1614	37	1609	"	" , clear	1	D.S.	Sufficient supply.

* All elevations in feet above sea-level
# Sample taken for analysis

+ Classification: F. A.–Flowing Artesian
N. F. A.–Non-Flowing Artesian
N. A.–Non-Artesian
I. N. A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS

TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) dugouts	Use °	REMARKS
30	N.W.	24	12	20		bored	1636	60	N.A.	-40	1596	60	1576	clay	hard, iron		D.S.	Sufficient supply.
31	N.W.	26	"	"		dug	1638	12	N.A.	-9	1629	12	1626	fine sand.	" , alkali		D.S.	Sufficient for 25 head.
32	N.W.	27	"	"		bored	1642	36	N.A.	-12	1630	36	1606	gravel.	" , iron.		D.S.	Two bored wells.
33	S.E.	28	"	"		"	1654	30	N.A.	-24	1630	30	1624	sand.	" , clear		D.S.	300 gals/day.
34	N.W.	28	"	"		"	1613	32	N.A.	-16	1597	32	1581	clay	" , iron		D.S.	Sufficient supply.
35	N.E.	34	"	"		dug	1682	48	N.A.	-40	1642	48	1634	gravel	" , clear		D.S.	Sufficient for 150 head.
36	N.W.	35	"	"		"	1682	40	N.A.	-38	1644	40	1640	fine sand.	" , alkali	1	N.	
1	N.W.	1	13	20		dug	1673	16	N.A.	-13	1660	16	1657	gravel.	hard, clear		D.S.	Sufficient supply.
2	S.E.	3	"	"		"	1663	16	N.A.	-8	1655	16	1647	gravel.	" , "		D.S.	Sufficient for 40 head.
3	S.E.	6	"	"		"	1574	70	N.A.	-50	1524	70	1504	clay	" , "	1	D.	Not sufficient.
4	N.E.	10	"	"		"	1593	18	N.A.	-8	1585	18	1575	fine sand.	" , "		D.S.	Sufficient for 6 head only.
5	N.E.	11	"	"		"	1631	16	N.A.	-1	1630	16	1615		" , "		D.S.	Sufficient supply.
6	N.E.	12	"	"		bored	1662	18	N.A.	-15	1647	18	1644	gravel	" , "		D.S.	Sufficient for 30 head.
7	N.W.	14	"	"		dug	1576	12	N.A.	-10	1566	12	1564	clay	" , "		D.S.	Sufficient supply.
8	S.E.	19	"	"		"	1709	15				15	1694	clay	" , "	1	D.	" "
# 9	S.W.	19	"	"		drilled	1717	360	N.F.A.	-25	1692	360	1357	shale at 358	" , iron		D.S.	" "
10	N.W.	22	"	"		dug	1631	19	N.A.	-10	1621	19	1612	clay	" , clear	1	D.	" "
11	S.E.	25	"	"		"	1596	20	N.A.	-5	1591	20	1576		" , alkali	1	N.	
12	S.W.	26	"	"		"	1575	14	N.A.	-2	1573	14	1561	sand	" , clear	2	D.S.	Sufficient supply.
13	S.W.	27	"	"		"	1644	10	N.A.	-8	1636	10	1634	fine sand.	" , "	1	D.	" "
14	S.E.	28	"	"		"	1671	10	N.A.	-4	1667	10	1661	"	" , "	1	D.	" "
15	S.E.	30	"	"		drilled	1764	115	N.F.A.	-7	1757	115	1649	shale at 115'		1		Only lasted 1 month and then went dry.
16	N.W.	30	"	"		"	1760	100	N.F.A.	-15	1745	100	1660	clay	hard, iron		S.	Sufficient supply.
17	S.W.	32	"	"		"	1781	90	N.A.	-30	1751	90	1691	"	" , "	1	D.S.	Sufficient for 40 head.
18	S.E.	32	"	"		bored	1781	74	N.A.	-20	1761	74	1707	"	" , clear		S.	Sulphur odour to water.
19	S.E.	34	"	"		"	1738	27	N.A.	-4	1734	27	1711	"	" , alkali	1	N.	Too alkali.
20	S.E.	35	"	"		dug	1658	12	N.A.	-10	1648	12	1646	sand	" , clear		D.S.	Sufficient supply.
21	N.W.	36	"	"		bored	1688	58	N.F.A.	-6	1682	58	1630		" , "		N.	
1	N.E.	3	14	20		dug	1776	8	N.A.	-5	1771	8	1768	gravel	hard, clear		D.S.	Sufficient supply.
2	N.W.	4	"	"		drilled	1810	118	N.F.A.	-18	1792	118	1692	clay		1	N.	
3	N.E.	5	"	"		"	1826	63	N.A.	-30	1796	63	1763	"	hard, iron		S.	
4	N.E.	6	"	"		"	1810	150	N.F.A.	-27	1783	150	1660	"	" , "		S.	Sufficient supply.
5	N.E.	7	"	"		"	1821	54	F.A.	+2	1823	54	1767	"	" , "		S.	Dug well at house 16 ft. deep

* All elevations in feet above sea-level
\# Sample taken for analysis

+ Classification: F.A.–Flowing Artesian
N.F.A.–Non-Flowing Artesian
N.A.–Non-Artesian
I.N.A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS TOWNSHIPS ..11 .to .14.... RANGES .18. to. 21..... WEST OF Princ. .....MER. PROVINCE ..MANITOBA.....

Well No.	LOCATION					DESCRIPTION				WATER LEVEL		PRINCIPAL WATER-BEARING BED			WATER			REMARKS
	¼	Sec.	Tp.	Rge.	Owner	Type	Elevation *	Depth (Feet)	Classification +	Above (+) Below (-) Surface	Elev. *	Depth (Feet)	Elev. *	Geological Horizon	Quality	No. of dugouts Temp. (in °F)	Use ○	
6	N.W.	8	14	20		drilled	1835	84	N.F.A.	-10	1825	84	1751	clay			N.	
7	N.W.	9	"	"		bored	1820	33	N.A.	-8	1812	33	1787	sand	hard, iron		D.S.	Sufficient supply.
8	N.E.	13	"	"		dug	1813	18	N.A.	-7	1806	18	1795			1	N.	
9	N.E.	14	"	"		"	1824	40	N.A.	-20	1804	40	1784	clay	hard, iron	1	N.	Sufficient supply.
10	S.W.	15	"	"		drilled	1852	65	N.A.	-20	1832	65	1787	"	" , alkali		S.	Sufficient for 40 head.
11	N.W.	15	"	"		dug	1873	60	N.A.	-25	1848	60	1813	"	" , iron	1	S.	Sufficient supply.
12	N.E.	16	"	"		drilled	1874	60	N.A.	-30	1844	60	1814	"	" , "		D.S.	Sufficient for 40 head.
13	N.W.	16	"	"		"	1849	68	N.A.	-15	1834	68	1781	"	" , "		D.S.	Sufficient supply.
14	S.E.	16	"	"		"	1838	60	N.A.	-15	1823	60	1778	"	" , "		D.S.	Sufficient for 50 head.
15	S.W.	17	"	"		bored	1838	70	N.A.	-20	1818	70	1768	gravel	" , "		D.S.	Sufficient supply.
16	N.W.	17	"	"		dug	1841	28	N.A.	-12	1829	28	1813	"	" , clear		D.S.	Sufficient for 20 head
17	N.E.	18	"	"		bored	1850	60	N.A.	-30	1820	60	1790	"	" , "		D.S.	" " 40 "
18	N.W.	18	"	"		dug	1858	44	N.A.	-25	1833	44	1814	clay	" , iron		D.S.	" " 40 "
19	S.E.	19	"	"		bored	1849	80	N.A.	-23	1826	80	1769	gravel	" , alkali		D.S.	Sufficient supply.
20	S.W.	19	"	"		dug	1868	44	N.A.	-29	1839	44	1824		" , iron		D.S.	" "
21	S.W.	21	"	"		"	1871	46	N.A.	-40	1831	46	1825	gravel	" , clear		D.S.	" "
22	S.W.	22	"	"		"	1879	65	N.A.	-20	1859	65	1814		" , iron		S.	Sufficient for 30 head.
23	N.E.	26	"	"		drilled	1907	110	F.A.	0	1907	110	1797		" , "		D.S.	" Supply.
24	S.W.	27	"	"		bored	1894	68				68	1826	clay	" , "	1	S.	Sufficient for 40 head.
25	N.W.	28	"	"		dug	1899	40	N.A.	-4	1895	40	1859		" , clear		D.	" Supply.
26	S.E.	28	"	"		"	1884	40	N.A.	-35	1849	40	1844	clay	" , "		D.S.	Sufficient for 30 head.
27	S.W.	28	"	"		drilled	1881	200				200	1681		" , iron		D.S.	Sufficient supply.
28	N.E.	29	"	"		"	1882	150				150	1732		" , clear		D.	Not sufficient.
29	N.W.	30	"	"		dug	1886	32	N.A.	-18	1868	32	1854		" , "		D.S.	Sufficient for 40 head.
30	S.W.	30	"	"		bored	1879	33	N.A.	-7	1872	33	1846		" , "		N.	
31	N.E.	31	"	"		"	1912	82	N.A.	-35	1877	82	1830	clay	" , "		D.S.	Sufficient supply.
32	S.W.	32	"	"		dug	1893	61	N.A.	-16	1877	61	1832		" , iron		D.S.	" "
33	S.E.	32	"	"		bored	1903	20	N.A.	-4	1899	20	1883	fine sand	" , "		D.S.	" "
34	N.E.	33	"	"		dug	1908	70	N.A.	-20	1888	70	1838	clay	" , "		D.S.	" "
35	N.E.	35	"	"		bored	1933	64	N.A.	-15	1918	64	1869	gravel	" , clear		D.	" "
36	N.W.	36	"	"		drilled	1735	60	N.A.	-40	1695	60	1675		" , iron		S.	Sufficient for 20 head.
1	N.E.	10	11	21		dug	1416	34	N.A.	-30	1386	34	1382	sand	hard, clear		D.	Sufficient supply.
2	N.E.	11	"	"		drilled	1405	165	N.A.	-35	1370	165	1240	fine sand	soft, iron			Not sufficient.
3	N.W.	12	"	"		dug	1313	26	N.A.	-18	1295	26	1287	sand	hard, "		D.S.	Sufficient supply.

* All elevations in feet above sea-level
\# Sample taken for analysis

\+ Classification: F.A.–Flowing Artesian
N.F.A.–Non-Flowing Artesian
N.A.–Non-Artesian
I.N.A.–Intermittent Non-Artesian

○ Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS

TOWNSHIPS 11 to 14 ..... RANGES 18 to 21 ..... WEST OF Princ. ..... MER. PROVINCE MANITOBA .....

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) dugouts	Use °	REMARKS
4	N.W.	20	11	21		dug	1508	102	N.A.	-100	1408	102	1406		hard, clear		D.S.	Sufficient supply.
5	S.W.	24	"	"		"	1463	10	N.A.			10	1453	sand.	" , "		D.S.	" "
6	N.E.	25	"	"		"	1465	65				65	1400		" , "		S.	" "
7	N.E.	27	"	"		"	1499	80	N.A.	-78	1421	80	1419		" , "		S.	Sufficient for 70 head
8	N.W.	36	"	"		"	1486	20	N.A.	-17	1469	20	1466		" , "		D.S.	Sufficient supply.
9	S.E.	36	"	"		bored	1464	32	N.A.	-10	1454	32	1432	sand.	" , "		D.	" "
10	N.E.	36	"	"		dug	1476	12	N.A.	-5	1471	12	1464	clay	" , "		D.	" "
1	S.W.	1	12	21		dug	1471	10	N.A.	-2	1475	10	1467	fine sand	hard, clear		D.S.	Sufficient for 50 head.
2	N.E.	2	"	"		"	1488	14				14	1474	" "	" , "		D.S.	Sufficient supply.
3	N.E.	6	"	"		"	1519	89	N.A.	-56	1463	89	1430		" , "		D.S.	Sufficient for 50 head.
4	N.E.	12	"	"		drilled	1554	60				60	1494		" , "	1	N.	Used to water 30 head.
5	N.E.	13	"	"		dug	1536	20	N.A.	-15	1521	20	1516		" , "		D.S.	Sufficient supply.
6	N.W.	20	"	"		"	1557	7	N.A.	-3	1554	7	1550	fine sand.	" , "		D.S.	" "
7	S.W.	23	"	"		"	1585	40	N.A.	-36	1549	40	1545	sand.	" , "		D.	" "
8	S.E.	25	"	"		"	1611	17	N.A.	-13	1598	17	1594	"	" , "		D.	" "
9	N.W.	25	"	"		"	1589	7	N.A.	-3	1586	7	1582	gravel	" , "		D.	" "
10	S.E.	27	"	"		"	1587	24	N.A.	-22	1565	24	1563	sand.	" , "	1	D.	" "
11	N.W.	27	"	"		"	1585	10	N.A.	-3	1582	10	1575	fine sand	" , "		D.	" "
12	N.W.	28	"	"		"	1573	14	N.A.	-7	1566	14	1559	sand.	" , "	1	D.	" "
13	S.W.	29	"	"		"	1570	32	N.A.	-13	1557	32	1538		" , "		N.	
14	N.W.	30	"	"		"	1583	16	N.A.	-12	1571	16	1567	fine sand.	" , "		D.S.	Sufficient for 30 head.
15	S.E.	32	"	"		"	1587	28	N.A.	-8	1579	28	1559	gravel.	" , "		D.S.	Sufficient supply.
16	S.W.	33	"	"		bored	1577	13	N.A.	-7	1570	13	1564		" , "	1	D.	" "
17	N.E.	33	"	"		"	1611	16	N.A.	-7	1604	16	1595	clay	" , "	1	D.S.	" "
18	N.W.	34	"	"		"	1616	8	N.A.	-4	1612	8	1608	gravel.	" , "	1	D.	" "
19	S.E.	34	"	"		dug	1610	34	N.A.	-19	1591	34	1576	clay	" , iron.		D.S.	" "
20	S.W.	36	"	"		"	1614	27	N.A.	-7	1607	27	1587	sand	" , "	1	D.S.	Sufficient for 30 head
1	S.W.	3	13	21		bored	1640	30	N.A.	-18	1622	30	1610	clay	hard, clear	1	N.	Drilled dry holes 300 feet
2	S.E.	3	"	"		dug	1639	18	N.A.	-10	1629	18	1621	gravel	" , alkali	1	S.	Sufficient supply.
3	N.E.	4	"	"		"	1668	35	N.A.	-27	1641	35	1633	clay	" , clear	1	D.	Sufficient supply.
4	S.E.	4	"	"		bored	1640	30	N.A.	-14	1626	30	1610	sand.	" , "	1	D.S.	" "
5	N.E.	6	"	"		dug	1644	14	N.A.	-9	1635	14	1630	sand.	" , "		D.S.	Sufficient for 10 head.
6	S.E.	7	"	"		"	1661	40	N.A.	-10	1651	40	1621	"	" , "		D.S.	" " 25 "

* All elevations in feet above sea-level
# Sample taken for analysis

+ Classification: F.A.-Flowing Artesian
N.F.A.-Non-Flowing Artesian
N.A.-Non-Artesian
I.N.A.-Intermittent Non-Artesian

° Use: S-Stock I-Irrigation M-Municipal D-Domestic
N-Not used G-Greenhouse or Garden

WELL RECORDS

TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Prin. MER. PROVINCE MANITOBA

Well No.	LOCATION ¼	Sec.	Tp.	Rge.	Owner	DESCRIPTION Type	Elevation *	Depth (Feet)	Classification +	WATER LEVEL Above (+) Below (-) Surface	Elev. *	PRINCIPAL WATER-BEARING BED Depth (Feet)	Elev. *	Geological Horizon	WATER Quality	No. of Temp. (in °F) dugouts	Use ○	REMARKS
7	N.W.	10	13	21		bored	1678	7	N.A.	-5	1673	7	1671	clay	hard, clear		D.	Sufficient supply.
8	S.E.	13	"	"		dug	1644	14	N.A.	-4	1640	14	1630	clay	" , "		N.	
9	N.W.	13	"	"		"	1724	12	N.A.	-7	1717	12	1712	"	" , "	1	D.S.	Drilled a dry hole 150 feet.
10	N.E.	14	"	"		"	1732	40	N.A.	-30	1702	40	1692	gravel	" , "	1	D.S.	Watered 15 head in dry years.
11	S.W.	15	"	"		"	1674.	11	N.A.	-8	1666	11	1663	"	" , "		D.S.	Sufficient supply.
12	N.W.	17	"	"		drilled	1705	120	N.F.A.	-18	1687	120	1585	clay	" , iron		D.S.	Sufficient for 15 head.
13	S.W.	19	"	"		dug	1719	40	N.A.	-30	1689	40	1679	sand.	" , clear		D.S.	" " 30 " .
14	S.E.	20	"	"		bored	1736	27	N.A.	-25	1711	27	1709		" , iron		D.	A drilled well 147 feet deep, for stock supply.
15	S.E.	21	"	"		"	1726	45	N.A.	-44	1682	45	1681	sand.	" , clear		D.	
16	N.W.	21	"	"		drilled	1740	138	N.F.A.	-20	1720	138	1602	shale	" , iron		S.	Sufficient for 50 head.
17	N.W.	22	"	"		"	1745	125	N.F.A.	-20	1725	125	1620		" , "		S.	" " 50 " .
18	S.W.	23	"	"		dug	1732	30				30	1702	clay	" , clear	1	S.	Sufficient supply.
19	N.W.	24	"	"		drilled	1756	100	N.A.	-45	1711	100	1656		" , iron		S.	Sufficient for 45 head.
20	N.W.	27	"	"		dug	1753	40	N.A.	-6	1747	40	1713		" , "		S.	Not sufficient.
21	N.E.	27	"	"		"	1771	50	N.F.A.	-3	1768	50	1721		" , clear		D.S.	Sufficient supply.
22	S.W.	28	"	"		"	1776	50				50	1726		" , iron		N.	
23	S.E.	30	"	"		"	1749	37	N.A.	-7	1742	37	1712		" , "		S.	Sufficient for 20 head.
24	N.W.	30	"	"		"	1765	30	N.A.	-18	1747	30	1735		" , clear		D.S.	Sufficient supply
25	S.W.	32	"	"		drilled	1751	90	N.A.	-12	1739	90	1661		" , iron		D.S.	Sufficient for 25 head.
26	N.E.	32	"	"		dug	1770	31				31	1739	gravel	" , clear		D.S.	" " 20 " .
27	N.W.	33	"	"		drilled	1776	76	N.A.	-12	1764	76	1700		" , iron		S.	Sufficient supply.
28	N.W.	34	"	"		dug	1788	14	N.A.	-10	1778	14	1774		" , alkali		N.	
29	S.E.	35	"	"		"	1771	21	N.A.	-10	1761	21	1750		" , "		S.	Sufficient for 10 head.
30	N.E.	35	"	"		"	1758	50	N.A.	-25	1733	50	1708		" , clear		S.	Sufficient supply.
1	N.W.	1	14	21		drilled	1812	60	N.A.	-15	1797	60	1752	gravel	hard, iron		D.S.	Sufficient supply.
2	N.W.	4	"	"		"	1797	80				80	1717		" , "		D.S.	Sufficient for 40 head.
3	S.W.	6	"	"		dug	1768	29	N.A.	-19	1749	29	1739	gravel	" , "		S.	" " 70 " .
4	S.W.	7	"	"		drilled	1780	75	N.A.	-25	1755	75	1705	fine sand.	" , clear		D.S.	Sufficient supply.
5	S.E.	8	"	"		dug	1780	20	N.A	-10	1770	20	1760	clay	" , iron		D.S.	Sufficient for 60 head.
6	S.W.	8	"	"		drilled	1784	135	N.F.A.	-10	1774	135	1649		" , "		D.S.	Sufficient supply.
7	N.E.	9	"	"		dug	1808	45	N.A.	-30	1778	45	1763	clay	" , alkali		D.S.	Sufficient for 50 head.
8	S.E.	9	"	"		"	1793	44	N.A.	-26	1767	44	1749	"	" , iron		D.S.	Sufficient supply.
9	N.E.	10	"	"		"	1848	60	N.A.	-30	1818	60	1788	sand.	" , "		D.S.	" " .
10	S.W.	10	"	"		bored	1878	35	N.A.	-32	1846	35	1783	clay	" , "		N.	Also a dug well 30 ft. deep.

* All elevations in feet above sea-level
# Sample taken for analysis

+ Classification: F. A.–Flowing Artesian
N. F. A.–Non-Flowing Artesian
N. A.–Non-Artesian
I. N. A.–Intermittent Non-Artesian

○ Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden

WELL RECORDS TOWNSHIPS 11 to 14 RANGES 18 to 21 WEST OF Princ. MER. PROVINCE MANITOBA

Well No.	LOCATION					DESCRIPTION				WATER LEVEL		PRINCIPAL WATER-BEARING BED			WATER			REMARKS
	¼	Sec.	Tp.	Rge.	Owner	Type	Elevation *	Depth (Feet)	Classification +	Above (+) Below (-) Surface	Elev. *	Depth (Feet)	Elev. *	Geological Horizon	Quality	Temp. (in °F)	Use °	
11	S.E.	11	14	21		dug	1808	30	N.A.	-9	1799	30	1778		hard, iron		D.S.	Sufficient supply.
12	S.E.	12	"	"		"	1828	47	N.A.	-7	1821	47	1781	clay	" , "		D.S.	" " .
13	N.E.	13	"	"		"	1844	25	N.A.	-14	1830	25	1819		" , "		D.S.	" " .
14	S.W.	14	"	"		drilled	1832	70	N.A.	-15	1817	70	1762		" , "		D.S.	Sufficient for 40 head.
15	S.W.	15	"	"		bored	1820	60				60	1760		" , "		D.S.	" " 35 " .
16	S.E.	16	"	"		dug	1841	40				40	1801	gravel	" , clear		D.S.	
17	N.W.	16	"	"		"	1815	34	N.A.	-21	1794	34	1781		" , iron		S.	Sufficient for 10 head.
18	N.W.	17	"	"		"	1789	35	N.A.	-20	1769	35	1754		" , "		D.S.	Sufficient supply.
19	N.W.	18	"	"		"	1802	40	N.A.	-15	1787	40	1762		" , clear		D.S.	Sufficient for 15 head.
20	S.E.	19	"	"		"	1810	33	N.A.	-12	1798	33	1777		" , "		D.S.	Sufficient supply.
21	S.W.	19	"	"		bored	1800	45	N.A.	-20	1780	45	1755	clay	" , "		D.S.	Sufficient for 20 head only.
22	S.W.	20	"	"		dug	1792	32	N.A.	-10	1782	32	1760	clay	" , "		D.S.	" " 50 " .
23	N.E.	21	"	"		"	1833	30	N.A.	-20	1813	30	1803	"	" , iron		D.S.	Sufficient supply.
24	N.W.	22	"	"		bored	1838	44	N.A.	-12	1826	44	1794	gravel	" , clear		D.S.	" " .
25	S.E.	23	"	"		"	1858	47	N.A.	-27	1831	47	1811	clay	" , iron		D.S.	Sufficient for 15 head.
26	N.E.	24	"	"		drilled	1858	90?				90	1768		" , "		D.S.	" " 25 " .
27	N.W.	25	"	"		dug	1872	32	N.A.	-14	1858	32	1840	clay	" , "		D.S.	Sufficient supply.
28	S.E.	26	"	"		bored	1869	55	N.A.	-20	1849	55	1814	gravel	" , "		D.S.	" " .
29	S.W.	26	"	"		dug	1858	22	N.A.	-15	1843	22	1836	clay	" , clear		D.	" " .
30	S.W.	27	"	"		dug	1858	42	N.A.	-22	1836	42	1816	sand	" , "		D.S.	" " .
31	S.W.	29	"	"		"	1806	20	N.A.	-6	1800	20	1786		" , iron		D.	" " .
32	N.E.	30	"	"		drilled	1819	135	N.F.A.	-20	1799	135	1684	shale	" , "		S.	Sufficient for 30 head.
33	S.W.	31	"	"		"	1831	155	N.F.A.	-15	1816	155	1676	shale at 151'	" , "		S.	Dug well 40 ft. for house.
34	S.W.	32	"	"		"	1827	165	N.A.	-40	1787	165	1662	shale	" , "		S.	Sufficient supply.
35	N.W.	32	"	"		dug	1843	36	N.A.	-8	1835	36	1807	gravel	" , "		D.	" " .
36	N.W.	32	"	"		"	1843	30	N.A.	-6	1837	30	1813	"	" , "		D.	" " .
37	S.E.	33	"	"		"	1853	38	N.A.	-18	1835	38	1815		" , "		D.S.	" " .
38	S.E.	34	"	"		"	1860	85				85	1775	clay	" , "		D.S.	Sufficient for 20 head.
39	N.E.	35	"	"		"	1899	35	N.A.	-28	1871	35	1864	sand	" , "		D.S.	" " 15 " .
40	N.E.	36	"	"		bored	1904	60	N.A.	-40	1864	60	1844		" , "		S.	" " 25 " .

* All elevations in feet above sea-level
# Sample taken for analysis

+ Classification: F.A.–Flowing Artesian
N.F.A.–Non-Flowing Artesian
N.A.–Non-Artesian
I.N.A.–Intermittent Non-Artesian

° Use: S–Stock I–Irrigation M–Municipal D–Domestic
N–Not used G–Greenhouse or Garden