CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES, FORESTS AND SCIENTIFIC SERVICES BRANCH

GEOLOGICAL SURVEY

WATER SUPPLY PAPER No. 298

GROUND-WATER RESOURCES OF TOWNSHIPS, 7 to 10, RANGES 22 to 25, WEST OF PRINCIPAL MERIDIAN, MANITOBA

(Oak Lake Area)

By

E. C. Halstead

OTTAWA

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

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

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

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

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

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

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

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

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

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

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

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

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

GENERAL DISCUSSION OF GROUND WATER

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

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

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

DISCUSSION OF WATER ANALYSES

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

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

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

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

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

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

Magnesium(Mg) is a common constituent of many igneous rocks and, therefore, very prevalent in ground water. Dolomite, a carbonate of calcium and magnesium, is also a source of the element. The sulphate of magnesia ($MgSO_4$) combines with water to form 'Epsom salts,' and renders the water unwholesome if present in large amounts.

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

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

Sulphates (SO_4) referred to in this report are those of calcium, magnesium, and sodium, and have been mentioned above in referring to those 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 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.

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

PART II

TOWNSHIPS 7 TO 10, RANGES 22 TO 25, WEST PRINCIPAL MERIDIAN, MANITOBA (Oak Lake Area)

Introduction

An investigation of the glacial geology and the ground-water resources in and near Oak Lake was conducted by the writer during the field season of 1948.

Physical Features

The main topographic feature of the Oak Lake area is the valley of Assiniboine River, which is about a mile wide and 150 feet deep. The valley walls are gullied by short streams with narrow channels, and the river itself follows an irregular winding course along a flat valley floor, marked by many Ox-bow lakes.

A recessional moraine, comprising a belt of irregular hills half a mile wide, trends southeast across tp. 10, rge. 25. Oak Lake is 5 miles long and 3 miles wide. Two small creeks empty into it on its west side. The lake drains through a low marsh area to Plum Lakes and into Plum Creek, which empties into Souris River. The latter follows a shallow valley that crosses the southeast corner of Oak Lake area, in tp. 7, rge. 22.

The entire area was covered by glacial Lake Souris, so that the general topography is that of a gently rolling plain with an average elevation of 1,410 feet above sea-level. A belt of sand dunes about 6 miles wide trends southeast across the area. These dunes are for the most part covered with small poplar trees. The growth of vegetation on the dunes has retarded migration, but much of the belt is waste land.

Geology

Table of Formations

Age	Formation	Character	Thickness (Feet)
Recent	Alluvium	Stream-laid mud, silt, sand and gravel	
Pleistocene	Lake deposits	Silty clays, fine sands and silts, duned sands, assorted sands and gravel in beaches and deltas	0-50
	Glacial drift	Till, clay, sand, gravel, boulders, assorted sand and gravel in outwash plains	0-400
Upper Cretaceous and Paleocene	Turtle Mountain Ravenscrag	Soft shale, lignite beds, fine-grained white to yellowish sand and sandstone;	300-400
	Boissevain	greenish grey sandstone and sand	100

Age	Formation	Character	Thickness (Feet)
Upper Cretaceous	Riding Mountain	Upper beds of medium to light grey, hard, siliceous shales (Odanah shale), with some thin layers of fine, blue sand and bentonite beds; lower beds of slippery clay shale that tends to slump	1,000 +
	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, overlying dark grey, non-calcareous, blocky shale with thin partings of white sand)	80 ± 190 ±
	Favel	Grey shale with white calcareous material; some bands of limestone; some bentonite	150 ±
Lower and Upper Cretaceous	Ashville	Dark grey to black shales with silt and sands	40 ±
Lower Cretaceous	Swan River	White to green sandstone, black shale and silt	50 +
Jurassic		Light grey to red shale, calcareous sandstone, grey to buff to brown shales, light grey limestone and sandstone	380 ±

Age	Formation	Character	Thickness (Feet)
Jurassic or earlier	Amaranth	Red beds and gypsum	220

Upper Cretaceous shales of the Riding Mountain formation underlie the Oak Lake area and outcrop along the valley of Assiniboine River. In the northeast, these shales outcrop or are covered with only a thin mantle of soil. Elsewhere, the shale is found in drilled wells at a depth of about 100 feet. The supply of water from this shale is salty or alkali and useful only for stock.

The Oak Lake area lies within the basin of glacial Lake Souris. The surface deposits are lake sands, silts, and clays, underlain by glacial drift that varies in thickness from little or nothing in the northeast to about 150 feet in the south. Bored wells, to depths of 100 feet in tp. 10, rge. 22, penetrate glacial till of which two types are in evidence: a greyish buff, sandy till varying in thickness from 10 to 20 feet, and, underlying it, a more compact blue-grey till. Neither of these tills is appreciably permeable, but both contain irregularly distributed lenses and pockets of sand and gravel that commonly yield highly mineralized water.

The glacial-lake sands and silts vary in thickness from almost nothing to as much as 40 feet. The sands are duned in a belt 6 miles wide trending southeast through townships 8 and 9 across the area. This belt is mostly waste land. The sands are porous and yield an abundance of good water, which can be recovered in an economical way by means of sandpoints.

A recessional moraine, which formed at the edge of an ice-sheet that moved from the northeast, left a belt of moranic hills trending southeast across tp. 10, rge. 24. Lake bed sands are very thinly distributed east of the moraine.

Alluvial deposits, mainly of a silty nature, are found in the valleys of Assiniboine and Souris Rivers. Few wells have been dug in the alluvium, and its water-bearing characteristics are not known.

Water Supply

The water supply in the Oak Lake area is derived from three principal water-bearing zones. The uppermost zone comprises lake sands, which are duned over much of the central part of the area. Rainfall soaks immediately into these sands, which yield their water readily. This water is hard and clear, and sandpoints are used as the most satisfactory type of well. Shallow, dug wells in the sands are unsatisfactory because they cave in frequently and are subject to freezing during the winter months.

Deeper, dug or bored wells reach the second water-bearing zone, which is found in lenses and pockets of gravel within the underlying glacial till. The supply is variable in quality and quantity. Alkali waters are commonly encountered, and the supply may diminish so that these wells are generally dry during periods of drought.

Drilled wells are not numerous. They are in use along the east side of the area where dug wells do not yield a sufficient supply. The drilled wells are sunk into bedrock, which lies about 100 feet below the surface of the ground. The water is usually under sufficient hydrostatic pressure to rise about 80 feet in the wells. This water, which is that of the third water-bearing zone, has a higher mineral content than that of the other zones. In most wells it is salty, and is useful only for watering stock.

Township 7, Range 22. The surface of this township is covered with silty lacustrine deposits. These are shallow, and are underlain by 10 to 30 feet of yellow clay, which is porous and will yield a supply of potable water sufficient for domestic use. Lenses and pockets of sand and gravel are also found in the yellow clay, and are a source of water. A dug well 30 feet deep or less will, therefore, penetrate the first water zone. Such wells may go dry in dry seasons or freeze during excessively cold winters.

The yellow clay is underlain by a blue clay, which has an average thickness of 60 feet. A second water-bearing zone is found at the contact of the blue clay and the underlying shale. Dug wells to the top of the shale should yield a supply of water, but it may be alkali. In S.W.¼ section 26 a dug well 54 feet deep reaches the contact of the blue clay and the shale. This well yields a supply of hard and clear water sufficient for domestic use only. A dug well 60 feet deep in N.E.¼ section 22 was a source of hard, clear water, but is no longer in existence.

Bedrock lies about 90 feet below the surface in this township. Several wells are drilled into the bedrock, which is the greyish-green shale of the upper member of the Riding Mountain formation. The drilled wells supply salty water that is used only for stock. Two drilled wells, 150 feet and 160 feet deep in sections 24 and 33 respectively, yield a sufficient supply of soft water. The deepest drilled well is 390 feet, and the water rises within 80 feet of the surface. In section 9, a drilled well 170 feet deep yielded water under sufficient subartesian pressure to raise the water to 20 feet below the surface of the ground. Within the first year the pressure dropped, and the water now comes only to within 70 feet of the surface. Similarly, in section 1, a drilled well 220 feet deep encountered water under sufficient subartesian pressure to reach to within 12 feet of the surface, but subsequently dropped to 100 feet below the surface. A drilled well, 154 feet deep, in section 15 can easily be pumped dry, and a dry hole, 480 feet deep, was drilled in section 16.

Souris River is a source of stock water during the summer months. In dry seasons a supply of potable water for domestic use can be obtained by digging shallow wells in sands and alluvium along the edge of the river.

Township 7, Range 23. Sandy, lake-bed deposits of glacial Lake Souris cover this township. In the southern half and in the northwest quarter of the township, the sand averages 20 feet in thickness. This sand is fine grained, and all rainfall immediately soaks into, and moves freely through, it. Sandpoints are driven 20 feet or more into the sand, and an abundance of water is obtained. The water is hard, and the percentage of dissolved salts is negligible, so that besides being in adequate supply the water is also of excellent quality.

In the remainder of the township, water is obtained from wells that average 20 feet in depth, and are dug into till below the surface of the sands. The supply from them is not sufficient, and many are not deep enough and are dry during the winter months.

In section 15, a well 140 feet deep is drilled 40 feet into bedrock, and yields salty water that rises 15 feet from the surface of the ground. In sections 27, 28, 34, and 35 are wells drilled to depths of 120, 125, 140, and 132 feet respectively. All drilled wells yield salty water useful for stock only. Dugouts and shallow dug wells are also used to augment the supply where sandpoints cannot be used.

Township 7, Range 24. Lake-bed sands form the surface deposits of this township. These sands have been transported by the wind and are built into dunes. All the rain falling on the township is immediately absorbed by this porous sand, which is as much as 50 feet thick in some sections and is an excellent aquifer, saturated with hard and clear water. Water supply is no problem. Sandpoints can be used anywhere in the township, and an abundance of good water is obtained.

Township 7, Range 25. The water supply of this township is not a problem, because the surface deposits are lake-bed sands, which form an excellent aquifer. Sandpoint wells, varying in depth from 12 to 45 feet, are in use throughout the township. The water pumped from the sand is hard and clear, and in sufficient quantity to supply local needs.

Township 8, Range 22. The surface deposits in this township are lacustrine sands and silts; in the south half and along Plum Creek, they are silty. Two water-bearing zones are known. The upper zone, in yellow clay is reached by dug wells, from 12 to 25 feet deep. Lenses and pockets of sand are encountered in the yellow clay, and these yield a variable supply of water. Dug wells in section 6, one 16 feet deep and the other 21 feet deep, are both sufficient for 70 head or more of stock. In section 4, dug wells 20 and 25 feet deep will yeild a little more than a barrel a day.

The second water-bearing zone is in the south half of the township, and is at the upper surface of the bedrock, which lies 100 feet or more below the surface of the ground. Three drilled wells reach this zone. One, 120 feet deep in section 2, yields a supply of potable water that can be used for domestic purposes and stock. Another well, drilled in section 4 to a depth of 171 feet, yields salty water. The third well, in section 9, is 280 feet deep and yields a sufficient supply of water rich in sodium salts. All three wells are in bedrock, and the aquifers into which they are drilled yield water under sufficient subartesian pressure to rise in the casing to within 12 or 15 feet below the surface of the ground.

The central part of the township is a duned sand area, and the north part is mantled with lake-bed sands. These surface deposits are 10 to 15 feet deep on the average and water is obtained from them by means of dug wells, most of which supply sufficient water for 100 head of stock. In the north part of the township, the wells are dug into sand which overlies blue clay at a depth of about 12 feet. The water supply here is excellent during wet years, but during dry years and in the winter months, especially February and March, the wells will be dry.

Township 8, Ranges 23, 24, and 25. The surface deposits of these three townships are wind-blown lacustrine sand, which in some sections formed sand dunes. The land bordering Oak Lake is often flooded. The sand throughout the three townships, is an excellent aquifer, and there is no water problem. Sandpoints are driven into the surface sands to a depth of 25 feet or more, and an abundance of hard, clear water is pumped from them. In some sections, wells dug only 10 or 12 feet into the sand yield sufficient water, but may go dry as a result of lowering of the water-table in dry seasons.

Township 9, Range 22. The surface deposits of this township are lake-bed silts and clays. In the southwest corner, in sections 5 and 6, are lake bed sands that have been duned.

Two principal water-bearing zones are known in this township. One lies within 20 feet of the surface, and is reached by wells, 11 to 20 feet deep dug through the shallow silts into the underlying clay. Two dug wells in section 26, one 32 feet and the other 29 feet deep, are reported to be dug in yellow clay and to obtain hard, clear water from the upper water-bearing zone. The supply is limited, and may be insufficient in dry seasons. Dugouts are necessary on many sections where the wells that tap the upper water-bearing zone are used. In N.E.¼ section 18, wells 15 feet deep using sandpoints yield abundant water.

A second water-bearing zone consists of layers or lenses of fine sands at variable depths in blue clay. The water is variable in quality. A bored well 112 feet deep in S.E.¼ section 24 yeilds abundant water with a sulphur odour. Bored wells 68, 75, 95, 96, and 98 feet deep are reported bored to the second water-bearing zone. The water supply is always sufficient, and in most wells the water is suitable for both domestic and stock use.

Townships 9, Range 23. In that part of this township south of the Canadian National railway, the surface deposits are lacustrine sands, which are duned, and the area is mostly waste land. Water supply is no problem here as wells using sandpoints and dug wells averaging 10 feet in depth can supply sufficient water.

The remainder of the township is covered with silty and sandy lake-bed deposits, which range in depth from almost nothing to more than 15 feet. Wells are dug 10 to 15 feet into the surface sands, and sufficient hard, clear water is obtained. In sections 28 and 29, sandpoints were driven 28 and 20 feet respectively to obtain water. Where the surface sands are not thick enough to yield a supply of water, wells must be sunk to a second water-bearing zone in lenses of sand in the blue clay that underlies the township. In N.W.¼ section 28, a well 25 feet deep reaches a sand lens in the blue clay, and supplies sufficient water for 40 head of stock. In section 24 a well 43 feet deep also yields a sufficient supply although in the same section a hole 120 feet deep is dry. Wells 85 and 88 feet deep are dug in sections 35 and 36 respectively. They reach blue clay, and yield abundant hard, clear water.

Township 9, Range 24. Areas of duned sand of variable thickness occupy much of this township. Some wells dug 20 feet deep are entirely in sand, which yields abundant hard, clear water. Dug wells or wells using sandpoints, and averaging 12 to 14 feet in depth are the common means of supply. Nowhere in the township is the water supply limited.

Township 9, Range 25. Surface deposits of lake-bed sands form the uppermost water-bearing zone in this township. The sands are duned in the northeast quarter of the township. Sandpoints are not used. An adequate supply of hard, clear water can be obtained anywhere in this township by means of dug wells averaging 15 feet in depth.

Township 10, Range 22. In that part of this township north of Assiniboine River, the surface deposits are outwash gravels, which form an excellent aquifer. Dug wells, 15 to 20 feet deep, will yield a sufficient supply of hard, clear water. In the remainder of the township, two water-bearing zones have been the source of supply. The upper one lies within 30 feet of the surface and many wells are reported to be dug to it. The supply is variable, as the aquifer is in yellow clay and consists of sand pockets and lenses. Alkali water is reported to be pumped from these wells; the degree of mineral concentration is variable, but as analyses are not available an exact interpretation cannot be given. The water supply from this source is not dependable; some wells will water 50 head of stock and others are often dry.

The second water-bearing zone lies at an average depth of 90 feet below the surface of the ground. This aquifer is a bed of fine, black sand underlying blue clay. An abundance of potable water is recovered from these wells. The iron content is high, but not to the extent of being harmful for domestic use or laundry purposes. The wells, on the average, are two-thirds full. The limits of this aquifer are not defined, but wells are reported to be dug to this aquifer in sections 5, 6, 8, 10, and 19.

There are two drilled wells in the township. One in S.E.¼ section 24 is 90 feet deep and the other, in N.E.¼ of the same section is drilled to a depth of 50 feet. Both wells yield hard, clear water, sufficient for about 20 head of stock.

Township 10, Range 23. The uppermost water-bearing zone in this township is in yellow clay, which underlies a thin mantle of water-laid deposits, and is about 30 feet thick. Wells are dug to depths of 15 or 28 feet in the clay, and most of them obtain a good supply of water although commonly it is alkali. Dugouts are necessary to augment the supply in some sections.

Two wells in the southeast quarter of the township are pumping water from the second water-bearing zone, as described for tp. 10, rge. 22. One is a drilled well, 116 feet deep, in section 1, and the other is a dug well 90 feet deep in section 12. The latter yields alkali water.

Blue clay, with an average thickness of 20 feet, underlies yellow clay in this township at a depth of 30 feet or more. Lenses and seams of gravel are encountered at various depths in the blue clay and yield a little water. Wells, averaging 45 feet in depth are dug into the blue clay and yield a small supply of slightly alkali water. In N.W.¼ section 16, a dug well 61 feet deep encounters a relatively good aquifer in the blue clay, which yields hard and clear water. In the same section, and abandoned well, 200 feet deep, is reported to have been drilled 100 feet through blue clay, and then to have encountered a layer of gravel 100 feet thick. The water-bearing possibilities of the gravel are unknown. A dug well, 121 feet deep, is reported in section 28; in digging this well a seam of gravel was encountered in the blue clay at a depth of 113 feet. This well yields an abundance of alkali water. A dry hole was drilled in N.E.¼ section 28 to a depth of 240 feet in unconsolidated deposits.

Township 10, Range 24. Local pockets of gravel and sand are found throughout this township. Wells 9 to 15 feet deep are dug into these deposits and yield a small supply of potable water. Where these near-surface deposits are wanting, water is obtained by digging wells to depths of 30 feet or more into the underlying clay. In the north of the township, bedrock is within 13 feet of the surface, and water is found at the contact of the shale and clay. The surface of the shale is irregular, and the wells may have to be dug to greater depths to reach the contact zone.

On the road allowance between sections 18 and 19 of this township, a spring issues from the bedrock shale and overlying clay exposed in the road cut. The spring is about 50 feet lower than the average elevation of the township.

A drilled well in S.E.¼ section 15 is 110 feet deep, and the shale bedrock is encountered at 50 feet below the surface of the ground. The well is drilled 60 feet into the shale. The water supply from this well is decreasing, probably due to plugging of the casing.

Township 10, Range 25. Water supply is adequate for the local needs of this township. Assiniboine River flows across the township, and many springs issue from the contact of the bedrock and the overlying unconsolidated material exposed along the banks of the river. The springs yield an abundance of hard, clear water. South of the river, the surface deposits are lake-bed sands and gravels from which an abundance of potable water can be obtained by means of dug wells or sandpoints. North of the river, ridges and hills of lake sands are also dependable aquifers. Dug well, 15 to 20 feet deep yield sufficient hard, clear water for domestic and stock use. Along the border of the township, bedrock shale outcrops or is covered by only a thin mantle of soil. Wells dug 8 to 10 feet deep in the weathered and fractured shale supply hard, clear water, but may go dry in years of drought and are usually dry in the winter months.

Record of Wells

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

As a rule the depth to the 'Principal Water-bearing Bed' has been taken as the total depth of the well, and its elevation is given as such. This commonly applies to wells drilled in bedrock or in wells obtaining water from a sub-artesian or artesian aquifer in glacial or bedrock formations; digging or drilling is continued until a good supply of water is obtained and then operations are stopped. In shallow surface deposits (up to 30 feet deep), wells are usually dug a short distance below the water-table during a dry season, and thereafter water may enter and leave the well at any point below the water-table. The figures on the height to which the water will rise in the well will fluctuate, depending on the amount of rainfall received during the season. The rainfall for the season of 1948 exceeded that of other years and the height of the water in the dug wells recorded here, is 2 to 5 feet above that for average years. In those parts of the area where sandpoints are used in wells, not all such wells are recorded.

WELL RECORDS—~~Rural Municipality of~~ TOWNSHIPS 7 to IO, RANGES 22 to 25, WEST PRINCIPAL MERIDIAN
(OAK LAKE AREA)

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
I	NW	2	7	22	Ist	drilled	I65	I430	-30	I400	I65	I265	Bedrock, shale	hard, salty		S.	Sufficient supply.
2	NW	3	"	"	"	"	230	I425	-90	I335	230	II95	" , "	" , "		S.	Dug well 22 feet supplies water for domestic use.
3	NE	5	"	"	"	"	390	I426	-80	I346	390	I036	Bedrock, shale	" , "		S.	Water is very salty.
4	SE	7	"	"	"	dug	32	I432	-23	I409	32	I400	Glacial, clay	" , iron	43	D.S.	Sufficient supply. (of the surface.)
5	NW	9	"	"	"	drilled	I70	I444	-70	I374	I70	I274	Bedrock, shale	" , salty		S.	At first water came within 20 feet
6	SE	IO	"	"	"	"	220	I430	-I00	I330	220	I2I0	" , "	" , "	43	S.	Sufficient for stock.
7	NE	II	"	"	"	dug	4I	I428	-26	I402	4I	I387	Glacial, clay	" , alkali		N.	
8	SE	I2	"	"	"	drilled	2I4	I4I0	-25	I385	2I4	II96	Bedrock, shale	" , salty		S.	Sufficient supply
9	SE	I2	"	"	"	dug	30	I405	-27	I378	30	I375	Glacial, clay	" , clear		D.	Abundant supply for domestic use.
IO	NE	I2	"	"	"	drilled	I20	I409			I20	I289	Bedrock, shale	" , salty	42	S.	Dry in summer of 1936.
II	NE	I2	"	"	"	dug	30	I409	-20	I389	30	I379	Glacial, clay	" , clear		D.	Sufficient for domestic needs.
I2		I3	"	"	"	drilled	I68	I4I2	-I7	I395	I68	I244	Bedrock, shale	" , salty		S.	Sufficient supply.
I3		I3	"	"	"	dug	I3	I4I0	-II	I399	I3	I397	Glacial, sand	" , clear		D.	
I4	NE	I4	"	"	"	"	I7	I4I8	-6	I4I2	I7	I40I	" , clay	" , "		N.	
I5	NE	I5	"	"	"	drilled	I54	I436			I54	I282	Bedrock, shale	" , salty	43	D.S.	Well can often be pumped dry.
I6	NW	I5	"	"	"	dug	27	I430	-25	I405	27	I403	Glacial, clay	" , iron	43	D.	Sufficient supply.
I7	SE	I6	"	"	"	drilled	230	I450			230	I220	Bedrock, shale	" , salty		S.	Drilled a dry hole 480 feet deep.
I8	SE	20	"	"	"	dug	I0	I397	-6	I39I	I0	I387	Glacial, gravel	soft, clear	42	D.	Sufficient supply.
I9	SW	2I	"	"	"	"	I5	I379	-6	I373	I5	I364	" , "	" , "	43	D.	Sufficient supply.
20	NE	22	"	"	"	"	60	I403	-26	I377	60	I343	" , clay	hard, clear		N.	
2I	NE	23	"	"	"	"	29	I398	-20	I378	29	I369	" , "	" , "		D.	Sufficient for domestic needs.
22	SW	23	"	"	"	drilled	I5I	I4I5			I5I	I264	Bedrock, shale	soft, salty		D.S.	Sufficient for local needs.
23	NW	24	"	"	"	"	I50	I409	-38	I37I	I50	I259	" , "	" , clear	44	D.S.	Sufficient for local needs.
24	NE	24	"	"	"	"	I47	I4I0			I47	I263	" , "	hard, alkali		D.S.	Sufficient supply.
25	SE	25	"	"	"	"	I20	I4I2			I20	I292	" , "	soft, clear	42	D.S.	
26	NE	26	"	"	"	"	I20	I4I5			I20	I295	" , "	" , "	42	D.S.	
27	SW	26	"	"	"	dug	54	I4I5	-I4	I40I	54	I36I	Glacial, clay	hard, "		D.S.	Not a sufficient supply.
28	SE	28	"	"	"	"	I0	I4I5	-8	I407	I0	I405	" , "	" , "	42	D.	One dugout.
29	SE	29	"	"	"	drilled	I68	I420	-I2	I408	I68	I252	Bedrock, shale	" , "		S.	Two dug wells.
30	SW	30	"	"	"	dug	I2	I427	-6	I42I	I2	I4I5	Glacial, sand	" , "		S.	Supplemented by one dugout.
3I	SW	3I	"	"	"	"	I2	I420	-8	I4I2	I2	I408	" , "	" , "		D.	Dugout for stock.
32	NW	32	"	"	"	"	I5	I422	-I2	I4I0	I5	I407	" , clay	" , "		D.	One dugout.
33	NE	32	"	"	"	"	II	I4I8	-9	I409	II	I407	" , "	soft, "	42	D.S.	Sufficient supply.
34	NW	33	"	"	"	"	28	I420	-22	I398	28	I392	" , "	hard, "		D.S.	
35	NW	34	"	"	"	drilled	I60	I420			I60	I260	Bedrock, shale	soft, "		D.S.	Sufficient supply.
36	NW	34	"	"	"	dug	I9	I420	-I6	I404	I9	I40I	Glacial, clay	hard, "		D.	Three similar wells.
37	NE	35	"	"	"	drilled	I80	I4I9	-50	I369	I80	I239	" , "	" , "		D.S.	
38	SW	36	"	"	"	dug	2I	I4I9	-I6	I403	2I	I398	" , "	" , "		D.S.	Sufficient supply.
39	NW	36	"	"	"	"	I8	I420	-I5	I405	I8	I402	" , "	" , "	42	N.	
I	SE	I	8	22	Ist	dug	I3	I446	-I0	I436	I3	I433	Glacial, clay	hard, clear	42	D.S.	Not a sufficient supply.
2	SE	2	"	"	"	drilled	I20	I409	-I5	I394	I20	I289	" , "	soft, "	42	D.S.	Sufficient supply.
3	SE	3	"	"	"	dug	2I	I4I0	-I7	I393	2I	I389	" , "	" , "	43	D.S.	" "
4	SW	4	"	"	"	drilled	I7I	I430	-I0	I420	I7I	I249	Bedrock, shale	hard, "		S.	Steadily decreasing supply.
5	NW	4	"	"	"	dug	20	I409	-I6	I393	20	I389	Glacial, sand	hard, clear		D.	Supplies about I0 head.
6	NW	4	"	"	"	drilled	I00	I4I3	-II	I402	I00	I3I3	Bedrock, shale	" , salty		S.	Sufficient for stock.
7	SW	4	"	"	"	dug	25	I427	-22	I405	25	I402	Glacial, clay	" , clear		D.	Supplies about one barrel a day.
8	SE	5	"	"	"	"	23	I450	-I9	I43I	23	I427	" , sand	soft, "		D.S.	Sufficient supply.
9	NE	6	"	"	"	"	I6	I4I2	-I0	I402	I6	I396	" , "	hard, "		D.S.	Sufficient for 60 head of stock.
I0	NW	6	"	"	"	"	2I	I4I4	-II	I403	2I	I393	" , "	" , "		D.S.	Will water 70 head.
II	SE	8	"	"	"	"	I8	I406	-I2	I394	I8	I388	" , yellow clay	" , "		D.S.	Sufficient supply.
I2	SE	9	"	"	"	drilled	280	I406	-I2	I394	280	II26	Bedrock, shale	" , soda		S.	Well was dug 40 ft., no supply.

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

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

WELL RECORDS—~~Rural Municipality of~~ (OAK LAKE AREA) TOWNSHIPS 7 to IO, RANGES 22 to 25, WEST PRINCIPAL MERIDIAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
I3	SW	I3	8	22	Ist	dug	I8	I434	-I3	I42I	I8	I4I6	Glacial, sand	hard, clear		D.S.	One dugout.
I4	NE	I4	"	"	"	"	I3	I43I	-I0	I42I	I3	I4I8	" , "	" , "		D.S.	Sufficient supply.
I5	NE	I6	"	"	"	"	II	I4I6	-8	I408	II	I405	" , "	" , "		D.S.	Sufficient for 50 head.
I6	NW	I9	"	"	"	"	I3	I386	-7	I379	I3	I373	" , quick-sand	" , "		D.S.	Supplies about 70 head.
I7	SW	23	"	"	"	"	I2	I422	-9	I4I3	I2	I4I0	" , "	" , "		D.S.	Water anywhere at a depth of 9 feet.
I8	NE	24	"	"	"	"	6	I370	-2	I368	6	I364	" , sand	" , "		D.S.	Sufficient supply.
I9	NW	24	"	"	"	"	I2	I428	-9	I4I9	I2	I4I6	" , "	" , "		D.S.	Sufficient for 90 head.
20	NE	24	"	"	"	"	I4	I4I7	-I0	I407	I4	I403	" , quick-sand	" , "		D.S.	Abundance of water.
2I	NE	26	"	"	"	sand-point	I8	I428	-I5	I4I3	I8	I4I0	Glacial, clay	hard, clear		N.	
22	NW	27	"	"	"		I2	I400			I2	I388	" , sand	hard, clear		D.S.	Sufficient supply.
23	NW	28	"	"	"	dug	7	I4I4	-2	I4I2	7	I407	" , "	" , "		D.S.	Sufficient supply.
24	NE	29	"	"	"	"	I6	I392	-I2	I380	I6	I376	" , quick-sand	" , "		D.S.	Usually a sufficient supply.
25	NE	30	"	"	"	"	I2	I406	-8	I398	I2	I394	" , "	" , "		D.S.	Dry in dry seasons.
26	SW	3I	"	"	"	"	I6	I4I3	-I0	I403	I6	I397	" , sand	" , "		D.S.	Usually sufficient for 40 head.
27	NW	33	"	"	"	"	I6	I420	-5	I4I5	I6	I404	" , sand	" , "		D.S.	Sufficient supply.
28	SW	33	"	"	"	"	I2	I42I	-8	I4I3	I2	I409	" , clay	" , "		D.S.	Sufficient supply.
29	SW	34	"	"	"	"	9	I4II	-4	I407	9	I402	" , quick-sand	" , "		D.S.	Sufficient for local needs.
30	NW	35	"	"	"	"	I7	I4I0	-8	I402	I7	I393	" , sand	" , "		D.S.	Sufficient supply.
3I	NE	35	"	"	"	"	I9	I4I7	-I0	I407	I9	I398	" , clay	" , "		D.	Sufficient for domestic use.
32	NW	36	"	"	"	"	20	I4I2	-I3	I399	20	I392	" , quick-sand	" , "		D.S.	Sufficient supply.
33	NE	36	"	"	"	"	2I	I420	-7	I4I3	2I	I399	" , clay	" , "		D.S.	Supply may get low, but never fails.
I	SW	4	9	22	Ist	dug	II	I436	-2	I434	II	I425	Glacial, sand	hard, sediment		D.S.	Sufficient for local needs.
2	SE	4	"	"	"	"	I6	I423	-I3	I4I0	I6	I407	" , "	" , clear		D.S.	Three similar dug wells.
3	NW	7	"	"	"	"	I6	I4I3	-3	I4I0	I6	I397	" , "	" , "		D.S.	Can use sandpoints.
4	NE	7	"	"	"	"	35	I409	-I3	I396	35	I374	" , clay	" , "		D.S.	Sufficient supply.
5	NW	8	"	"	"	"	I9	I4I6	-I7	I399	I9	I397	" , clay	" , "		D.	Sufficient for domestic use.
6	NW	8	"	"	"	"	I7	I409	-I3	I396	I7	I392	" , clay	" , "		S.	Sufficient for stock.
7	SE	9	"	"	"	"	28	I4I7	-9	I408	28	I389	" , sand	" , clear		D.S.	Water is slightly alkali.
8	SW	I0	"	"	"	"	I6	I405	-2	I403	I6	I389	" , "	" , "		D.	
9	SW	I0	"	"	"	"	I9	I4I8	-II	I407	I9	I399	" , "	" , cloudy		D.S.	One dugout for stock.
I0	SW	I2	"	"	"	"	9	I4I3	-6	I407	9	I404	" , "	" , clear		D.	One dugout for stock.
II	SE	I4	"	"	"	"	I9	I4I7	-5	I4I2	I9	I398	" , clay	" , "		D.	Well often dry; dugout for stock.
I2	SE	I6	"	"	"	"	32	I4I9	-20	I399	32	I387	" , "	" , yellow		S.	Digging a new well.
I3	NE	I6	"	"	"	"	29	I4I4	-23	I39I	29	I385	Glacial, quick-sand	hard, clear		D.S.	Supplemented by a dugout.
I4	NW	I6	"	"	"	"	I2	I4I5	-I0	I405	I2	I403	" , sand	" , "		D.S.	Well was just dug.
I5	NE	I8	"	"	"	sand-point	I5	I399			I5	I384	" , "	" , "		D.S.	Three sandpoints.
I6	NW	I9	"	"	"	bored	75	I409	-6	I403	75	I334	" , clay	" , "		D.S.	Sufficient supply.
I7	SW	I9	"	"	"	dug	II	I408	-6	I402	II	I397	" , "	" , clear		S.	Water is alkali and used only for stock.
I8	SW	20	"	"	"	"	20	I39I	-I2	I379	20	I37I	" , sand	" , iron		D.S.	Can use sandpoints.
I9	NW	2I	"	"	"	"	I2	I4I0	-6	I404	I2	I398	" , "	" , clear		D.S.	Sufficient supply.
20	NW	23	"	"	"	"	96	I402	-8	I344	96	I306	" , clay	" , "		N.	
2I	SE	24	"	"	"	bored	II2	I440	-I4	I426	II2	I328	" , "	" , "		N.	Water has sulfur odor.
22	SE	25	"	"	"	"	98	I42I	-27	I394	98	I323	" , "	" , "		S.	Water is alkali.
23	SW	27	"	"	"	dug	I2	I396	-6	I390	I2	I384	" , sand	" , "		D.S.	Sufficient supply.
24	NW	30	"	"	"	bored	II9	I422	-I4	I408	II9	I303	" , clay	" , "		D.S.	Sufficient supply.
25	NE	33	"	"	"	dug	34	I4I4	-5	I409	34	I380	" , "	" , "		D.	Sufficient supply.
26	SW	35	"	"	"	"	68	I400	-3	I397	68	I332	" , "	" , "		D.S.	Water is alkali and high in Iron.
27	SE	35	"	"	"	"	95	I4I5	-6	I409	95	I3I4	" , "	" , "		D.S.	Sufficient supply.

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

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

(OAK LAKE AREA)

WELL RECORDS—~~Rural Municipality of~~ TOWNSHIPS 7 to 10, RANGES 22 to 25, WEST PRINCIPAL MERIDIAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	HEIGHT TO WHICH WATER WILL RISE: Elev.	PRINCIPAL WATER-BEARING BED: Depth	PRINCIPAL WATER-BEARING BED: Elev.	PRINCIPAL WATER-BEARING BED: Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SW	5	10	22	1st	dug	80	1409	-60	1349	80	1329	Glacial, sand	hard, clear		D.S.	Water is salty and contains much iron.
2	SW	6	"	"	"	"	130	1428	-70	1358	130	1298	" , gravel	" , "		D.S.	Supplemented by one dugout.
3	NW	8	"	"	"	"	76	1363	-36	1327	76	1289	" , yellow clay	" , "		D.S.	Sufficient supply.
4	SE	9	"	"	"	bored	83	1414	-12	1402	83	1331	" , clay	" , "		N.	Well needs repair and cleaning.
5	SW	10	"	"	"	"	100	1407	-20	1387	85	1322	" , black sand	" , iron		S.	Sufficient for 20 head.
6	SW	10	"	"	"	dug	25	1400	-12	1388	25	1375	" , gravel	" , "		D.	Drilled a well 600 feet deep.
7	NE	10	"	"	"	"	24	1404	-4	1400	24	1380	" , clay	" , clear		D.	Sufficient supply.
8	NW	12	"	"	"	"	22	1395	-4	1391	22	1373	" , "	" , alkali		S.	Not a sufficient supply.
9	SW	13	"	"	"	"	24	1417	-8	1409	24	1393	" , "	" , clear		D.S.	Sufficient supply.
10	NW	14	"	"	"	"	34	1386	-20	1366	34	1352	" , clay	" , "		N.	Water is alkali.
11	SW	14	"	"	"	bored	90	1390	-60	1330	90	1300	" , black sand	" , iron		S.	Water is slightly salty.
12	SW	16	"	"	"	dug	27	1373	-15	1358	27	1346	Glacial, yellow clay	" , clear		D.S.	Two dugouts.
13	NE	18	"	"	"	"	24	1304	-20	1284	24	1280	" , clay	" , "		S.	Sufficient supply; 2 wells.
14	NW	18	"	"	"	bored	20	1230	-16	1214	20	1210	" , gravel	" , "		D.S.	Sufficient supply.
15	SE	19	"	"	"	"	90	1290	-30	1260	90	1200	" , yellow clay	" , "		S.	Sufficient supply of alkali water.
16	SE	22	"	"	"	dug	30	1343	-14	1329	30	1313	" , "	" , "		D.	Two dugouts for stock.
17	SW	23	"	"	"	"	30	1315	-10	1305	30	1285	" , "	" , "		S.	Alkali water.
18	NE	24	"	"	"	"	41	1395	-35	1360	41	1354	" , "	" , "		D.S.	Also a 50 foot drilled well.
19	SE	24	"	"	"	"	19	1421	-16	1405	19	1402	" , "	" , "		D.S.	Also a 90 foot drilled well.
20	NW	26	"	"	"	"	20	1226	-4	1222	20	1206	" , "	soft, "		D.S.	Sufficient supply.
21	SE	27	"	"	"	"	24	1235	-20	1215	24	1211	" , "	hard, "		D.	Often dry especially in summer.
22	NE	29	"	"	"	"	15	1209	-7	1202	15	1194	" , gravel	" , "		D.	Usually sufficient.
23	NE	30	"	"	"	"	20	1237	-10	1227	20	1217	" , "	" , "		D.S.	Sufficient for 50 head.
24	SW	30	"	"	"	"	15	1215	-8	1207	15	1200	" , "	" , "		D.S.	Sufficient supply.
25	NW	33	"	"	"	"	41	1244	-34	1210	41	1203	" , "	" , "		D.S.	Sufficient for 50 head.
26	SE	36	"	"	"	"	30	1313	-26	1287	30	1283	" , clay	" , "		S.	Alkali water, sufficient for stock.
1	NE	4	7	23	1st	sand-point	20	1420			20	1400	Glacial, gravel	hard, clear	42°	D.S.	Sufficient supply.
2	NE	6	"	"	"	"	27	1410			27	1383	" , sand	" , "		D.S.	" "
3	SE	8	"	"	"	"	20	1420			10	1410	" , "	" , "		D.S.	Sufficient supply.
4	SW	10	"	"	"	dug	21	1420	-18	1402	21	1399	" , clay	" , "		D.S.	One dugout.
5	NE	12	"	"	"	"	23	1400	-19	1381	23	1377	" , sand	" , "	43°	D.S.	Dry in winter months.
6	NE	13	"	"	"	sand-point	35	1420			35	1385	" , "	" , "		D.S.	Sufficient supply.
7	NE	14	"	"	"	"	25	1425			25	1400	" , "	" , iron	42°	D.S.	Three sandpoints.
8	SW	14	"	"	"	dug	12	1425	-5	1420	12	1423	" , clay	" , clear		D.	Sufficient supply.
9	NW	15	"	"	"	drilled	140	1405	-15	1390	140	1265	Bedrock, shale	" , salty		S.	Shallow dug well 14 ft. for domestic use
10	SE	16	"	"	"	dug	20	1420	-16	1404	20	1400	Glacial, clay	" , clear		D.S.	Often dry in winter months.
11	NE	16	"	"	"	"	14	1420	-9	1411	14	1406	" , "	" , "	42°	D.S.	Can use sandpoints.
12	SW	17	"	"	"	sand-point	25	1420	-12	1408	25	1395	" , sand	" , "		D.S.	Sufficient supply.
13	SW	20	"	"	"	dug	18	1425	-8	1417	18	1407	Glacial, sand	hard, clear		D.	Well is at C.P.R. Station in Deleau.
14	SE	20	"	"	"	sand-point	25	1426			25	1401	" , "	" , iron	42°	D.S.	Sufficient supply.
15	SW	22	"	"	"	dug	23	1420	-15	1405	23	1397	" , clay	" , clear		D.	" "
16	NW	22	"	"	"	"	20	1420	-13	1407	20	1400	" , "	" , "		D.S.	Supplemented by one dugout.
17	NW	23	"	"	"	"	22	1430	-14	1416	22	1408	" , sand	" , "		D.	Sufficient supply.
18	SE	23	"	"	"	"	18	1431	-11	1420	18	1413	" , "	" , "		D.S.	Sufficient supply.
19	SE	24	"	"	"	"	14	1435	-10	1425	14	1421	" , clay	" , "		D.S.	Water is alkali.
20	NE	26	"	"	"	sand-point	35	1420			35	1385	" , sand	" , "		S.	Sufficient supply.
21	SE	27	"	"	"	drilled	120	1424			120	1304	Bedrock, shale	" , salty		S.	Supplemented by one dugout.
22	NW	27	"	"	"	dug	21	1427	-17	1410	21	1406	Glacial, clay	" , clear		D.S.	Sufficient supply.
23	SE	28	"	"	"	drilled	125	1425			125	1300	Bedrock, shale	"" , salty		S.	Dug well 20 ft. deep for domestic use.
24	SE	30	"	"	"	sand-point	23	1420			23	1397	Glacial, sand	" , clear		D.S.	Sufficient supply.
25	SW	30	"	"	"	"	25	1420			25	1395	" , "	" , "		D.S.	Occasionally dry in late summer.

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

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

(OAK LAKE AREA)

WELL RECORDS—~~Rural Municipality of~~ TOWNSHIPS 7 to IO, RANGES 22 to 25, WEST PRINCIPAL MERIDIAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	HEIGHT TO WHICH WATER WILL RISE: Elev.	PRINCIPAL WATER-BEARING BED: Depth	PRINCIPAL WATER-BEARING BED: Elev.	PRINCIPAL WATER-BEARING BED: Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
26	SE	32	7	23	Ist	sand-point	20	I420			20	I400	Glacial, sand	hard, clear		D.S.	Sufficient supply.
27	SW	33	"	"	"	dug	20	I418	-I9	I399	20	I398	" , clay	" , iron	42°	D.S.	Drilled a dry hole I50 feet.
28	NW	34	"	"	"	drilled	I40	I415	-40	I375	I40	I275	Bedrock, shale	" , salty		S.	Not a sufficient supply.
29	SW	34	"	"	"	dug	I8	I418	-I0	I408	I8	I400	Glacial, clay	" , clear		D.S.	Sufficient supply.
30	NE	34	"	"	"	"	I8	I418	-I4	I404	I8	I400	" , "	" , "		D.S.	Supplemented by one dugout.
3I	SW	35	"	"	"	drilled	I32	I410	-25	I385	I32	I278	Bedrock, shale	" , salty		S.	Sufficient supply.
32	NE	36	"	"	"	dug	I6	I410	-I2	I398	I6	I394	Glacial, clay	" , clear		D.	Dry in summer of I94I.
I	NW	I	8	23	Ist	dug	I9	I394	-I6	I378	I9	I375	Glacial, clay	hard, clear		D.S.	Supply sufficient for 20 head.
2	NW	2	"	"	"	"	I2	I384	-6	I378	I2	I372	" , sand	" , "		D.S.	Sufficient supply.
3	NE	5	"	"	"	sand-point	37	I408	-I2	I396	37	I37I	" , "	" , "		D.S.	" " .
4	SW	II	"	"	"	dug	I2	I393	-6	I387	I2	I38I	" , "	" , "		D.S.	" " .
5	SW	25	"	"	"	"	8	I374	-3	I37I	8	I366	" , "	" , "		D.S.	Two sandpoints.
6	NW	36	"	"	"	"	23	I417	-20	I397	23	I394	" , "	" , "		D.S.	Sufficient for 30 head.
I	SE	I	9	23	Ist	dug	22	I420	-I8	I402	22	I398	Glacial, sand	hard, clear		D.S.	Sufficient supply.
2	NW	2	"	"	"	"	25	I435	-I7	I4I8	25	I4I0	" , "	" , "		D.S.	Sufficient for 70 head.
3	SE	3	"	"	"	"	I4	I43I	-2	I429	I4	I4I7	" , "	" , "		D.S.	Sufficient supply.
4	NE	4	"	"	"	"	7	I423	-3	I420	7	I4I6	" , "	" , "		D.S.	Sufficient supply.
5	NW	8	"	"	"	"	I4	I407	-I0	I397	I4	I393	" , "	" , "		D.S.	Two dugouts.
6	NE	I0	"	"	"	"	I6	I422	-II	I4II	I6	I406	" , "	" , "		D.S.	One dugout.
7	SW	II	"	"	"	"	II	I420	-6	I4I4	II	I409	" , clay	" , "		D.S.	Sufficient supply.
8	NE	II	"	"	"	"	I2	I426	-4	I422	I2	I4I4	" , sand	" , "		D.S.	Sufficient supply.
9	SE	I2	"	"	"	"	I2	I427	-5	I422	I2	I4I5	" , "	" , "		D.	Sufficient supply.
I0	NW	I6	"	"	"	sand-point	I5	I404			I5	I389	" , "	" , "		D.S.	Sufficient for local needs.
II	NE	I7	"	"	"	dug	9	I390	-5	I385	9	I38I	" , "	" , "		D.S.	Supplemented by one dugout.
I2	NE	I7	"	"	"	"	I4	I392	-2	I390	I4	I378	" , "	" , "		D.S.	Sufficient supply.
I3	NE	I8	"	"	"	"	I3	I4I2	-7	I405	I3	I399	" , "	" , "		D.	Can easily be pumped dry.
I4	NW	I8	"	"	"	dug	I6	I406	-6	I400	I6	I390	" , "	" , "		D.S.	Sufficient supply from two similar wells
I5	NW	20	"	"	"	"	I6	I407	-II	I396	I6	I39I	" , "	" , "		S.	Sufficient for stock.
I6	NW	2I	"	"	"	"	2I	I403	-II	I392	2I	I382	" , "	" , "		D.S.	Sufficient supply.
I7	SW	22	"	"	"	"	II	I397	-8	I389	II	I386	" , "	" , "		D.S.	Supply is low in winter.
I8	NE	22	"	"	"	"	I8	I395	-I4	I38I	I8	I377	" , "	" , "		D.S.	Sufficient supply.
I9	SW	23	"	"	"	"	II	I400	-8	I392	II	I389	" , "	" , iron		D.S.	Water anywhere at depth of 8 feet.
20	SE	23	"	"	"	"	I7	I397	-I0	I387	I7	I380	" , "	" , "		D.S.	Usually sufficient.
2I	NE	23	"	"	"	"	22	I4I4	-I7	I397	22	I392	" , "	" , "		D.	Similar dug well for stock.
22	SE	24	"	"	"	"	43	I425	-5	I420	43	I382	" , clay	" , clear		D.S.	Sufficient supply.
23	NW	24	"	"	"	"	25	I404	-5	I399	25	I379	" , "	" , "		D.	Dug a dry hole I20 feet deep.
24	NW	27	"	"	"	"	38	I400	-37	I343	38	I342	" , "	" , "		D.	Sufficient for domestic use.
25	NW	28	"	"	"	"	25	I4I9	-I5	I404	25	I394	" , sand	" , "		D.S.	Sufficient for 40 head.
26	SW	28	"	"	"	sand-point	28	I404			28	I376	" , "	" , "		D.S.	Sufficient supply.
27	SW	29	"	"	"	"	20	I428			20	I408	" , "	" , "		D.S.	Two sandpoints.
28	NE	32	"	"	"	dug	I7	I374	-7	I367	I7	I357	" , clay	" , "		D.S.	Sufficient supply.
29	SW	35	"	"	"	dug	85	I386	-25	I36I	85	I30I	" , clay	" , "		D.S.	Sufficient supply.
30	NE	35	"	"	"	"	46	I393	-32	I36I	46	I347	" , "	" , "		S.	Sufficient supply.
3I	SW	36	"	"	"	"	88	I436	-II	I425	88	I348	" , "	" , "		D.S.	Sufficient supply.
I	SE	I	I0	23	Ist	drilled	II6	I438	-6I	I377	II6	I322	Glacial, sand	" , "		D.S.	Sufficient supply.
2	SE	I	I0	23	"	bored	70	I438	-60	I378	70	I368	" , "	" , "		D.S.	" " .
3	NW	4	I0	23	"	drilled	75	I402	-8	I394	75	I327	" , "	" , "		D.S.	Sufficient supply; one dugout.
4	NW	5	"	"	"	"	80	I450	?	?	80	I370	Glacial, clay	hard, salty		D.S.	Sufficient supply.
5	NE	7	"	"	"	dug	25	I445	-II	I434	25	I420	" , "	" , alkali		S.	Sufficient supply.

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

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

WELL RECORDS—~~Rural Municipality~~ of (OAK LAKE AREA) TOWNSHIPS 7 to IO, RANGES 22 to 25, WEST PRINCIPAL MERIDIAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
6	NE	7	IO	23	Ist	dug	I9	I439	-I2	I427	I9	I420	Glacial, clay	hard, clear		D.	Sufficient supply.
7	NE	8	"	"	"	"	28	I429	-I7	I4I2	28	I40I	" , "	" , "		D.	" " .
8	SW	8	"	"	"	"	I5	I442	-7	I435	I5	I427	" , "	" , "		D.S.	" " .
9	SW	9	"	"	"	"	43	I429	-33	I396	43	I386	" , "	" , "		S.	Unfit for human consumption.
IO	SE	9	"	"	"	"	28	I4I0	-I7	I393	28	I382	" , "	" , "		D.S.	Supplemented by a dugout.
II	NE	I2	"	"	"	"	90	I370	?	?	90	I280	" , "	" , alkali		S.	Sufficient supply.
I2	SW	I6	"	"	"	"	22	I428	-I4	I4I4	22	I406	" , sand	" , iron		D.S.	" " .
I3	NW	I6	"	"	"	"	30	I405	-22	I383	30	I375	" , "	" , clear		D.S.	Drilled a well 200 feet deep.
I4	NW	I6	"	"	"	"	6I	I400	-4I	I379	6I	I339	" , clay	" , "		D.S.	Water somewhat alkali.
I5	NW	I7	"	"	"	"	I6	I430	-II	I4I9	I6	I4I4	" , sand	" , "		D.	Supplemented by one dugout.
I6	SE	I8	"	"	"	"	2I	I450	-IO	I440	2I	I429	" , gravel	" , "		D.S.	Slightly alkali.
I7	NW	I8	"	"	"	"	20	I445	-I6	I429	20	I425	" , sand	" , "		D.S.	Scarcity of water in dry years.
I8	NE	I9	"	"	"	"	24	I449	-20	I429	24	I425	" , "	" , alkali		D.S.	Sufficient supply; one dugout.
I9	NW	20	"	"	"	"	20	I409	-I2	I397	20	I389	" , yellow clay	" , clear		D.S.	Sufficient supply.
20	SW	2I	"	"	"	"	40	I384	-20	I364	40	I344	" , quick-sand	" , "		D.S.	Usually sufficient.
2I	NE	28	"	"	"	"	I2I	I380	-30	I350	II3	I269	" , gravel	" , alkali		N.	Drilled a dry hole 240 feet.
22	SE	29	"	"	"	"	42	I398	-I6	I382	42	I356	" , clay	" , clear		D.S.	Usually sufficient; one dugout.
23	SW	30	"	"	"	"	24	I449	-8	I44I	24	I425	" , sand	" , alkali		D.S.	Sufficient supply.
24	NE	30	"	"	"	"	40	I4I6	-20	I396	40	I376	" , yellow clay	" , clear		D.S.	Supplemented by one dugout.
25	NW	30	"	"	"	"	I9	I442	-I4	I428	I9	I423	" , sand	" , "		D.S.	Sufficient for 40 head.
26	SW	33	"	"	"	"	52	I39I	-42	I349	52	I339	" , clay	" , alkali		S.	Dugout also; sufficient supply.
I	NE	2	7	24	Ist	sand-point	55	I426			55	I37I	Glacial, sand	hard, clear		D.S.	Sufficient supply.
2	SE	7	"	"	"	"	28	I454			28	I426	" , "	" , iron		D.S.	Another sandpoint 37 feet deep.
3	SW	I2	"	"	"	"	30	I427			30	I397	" , "	" , clear		D.S.	Sufficient supply.
4	NW	I4	"	"	"	"	28	I438			28	I4I0	" , "	" , "		D.S.	" " .
5	SE	I7	"	"	"	"	25	I43I			25	I406	" , "	" , "		D.S.	" " .
6	SW	I7	"	"	"	"	I8	I428			I8	I4I0	" , "	" , "		D.S.	" " .
7	SW	22	"	"	"	"	25	I423			25	I398	" , "	" , "		D.S.	" " .
8	SW	23	"	"	"	"	32	I433			32	I40I	" , "	" , "		D.S.	" " .
9	NW	24	"	"	"	sand-point	I5	I446			I5	I43I	Glacial, gravel	" , "		D.S.	Sufficient supply.
IO	SE	27	"	"	"	"	I6	I43I			I6	I4I5	" , sand	" , "		D.S.	" " .
II	SW	27	"	"	"	"	I8	I428			I8	I4I0	" , "	" , "		D.S.	" " .
I	SW	I2	8	24	Ist	sand-point	20	I4I8			20	I398	Glacial, sand	hard, clear		D.S.	Sufficient supply.
2	SW	27	"	"	"	dug	I3	I420	-8	I4I2	I3	I407	" , "	" , "		D.S.	Sandpoint at house.
3	SE	27	"	"	"	sand-point	I4	I422			I4	I408	" , "	" , "		D.S.	Sufficient supply.
I	NE	II	9	24	Ist	sand-point	I2	I420			I2	I408	Glacial, sand	hard, clear		D.S.	Sufficient supply.
2	NW	I2	"	"	"	"	II	I4I5			II	I404	" , "	" , "		D.S.	" " .
3	NW	I3	"	"	"	dug	8	I395	-5	I390	8	I387	" , "	" , "		D.S.	" " .
4	NE	I4	"	"	"	"	7	I404	-4	I400	7	I397	" , "	" , "		D.S.	" " .
5	NE	I5	"	"	"	"	I4	I4II	-8	I403	I4	I397	" , "	" , "		D.S.	" " .
6	SW	22	"	"	"	"	I2	I402	-9	I393	I2	I390	" , "	" , "		D.S.	Sandpoint can be used.
7	SE	23	"	"	"	"	7	I402	-4	I398	7	I395	" , "	" , "		D.S.	Sufficient supply.
8	NW	25	"	"	"	"	22	I369	-3	I366	22	I387	" , "	" , "		S.	Water condemned.
9	SW	25	"	"	"	"	I2	I4I7	-6	I4II	I2	I405	" , "	" , "		D.S.	Sufficient supply.
IO	SE	26	"	"	"	"	2I	I404	-I4	I390	2I	I383	" , "	" , "		D.S.	" " .
II	NE	26	"	"	"	"	I7	I394	-I	I393	I7	I377	" , "	" , "		D.S.	" " .
I2	NE	27	"	"	"	"	I2	I4I6	-IO	I406	I2	I404	" , "	" , "		D.S.	" " .
I3	NE	28	"	"	"	"	IO	I4I5	-5	I4I0	IO	I405	" , gravel	" , "		D.S.	" " .

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

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

WELL RECORDS—~~Rural Municipality of~~ (OAK LAKE AREA) TOWNSHIPS 7 to IO, RANGES 22 to 25, WEST PRINCIPAL MERIDIAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
I4	NE	29	9	24	Ist	dug	8	I4I9	-3	I4I6	8	I4II	Glacial, sand	hard, clear		D.S.	Sufficient supply.
I5	SE	30	"	"	"	"	IO	I4I4	-6	I408	IO	I404	" , "	" , "		D.S.	" " .
I6	SE	3I	"	"	"	"	IO	I440	-2	I438	IO	I430	" , "	" , "		S.	Similar well for domestic use.
I7	SE	32	"	"	"	"	I2	I429	-6	I423	I2	I4I7	" , "	" , "		D.S.	Sufficient supply.
I8	NE	33	"	"	"	"	8	I4I2	-4	I408	8	I404	" , "	" , "		D.S.	River crosses farm.
I9	NE	36	"	"	"	"	IO	I239	-I	I238	IO	I229	" , "	" , "		D.	Sufficient supply.
20	SW	36	"	"	"	"	I5	I355	-5	I350	I5	I340	" , "	" , "		D.S.	Shale base in well.
I	NE	IO	IO	24	Ist	dug	23	I385	-I2	I373	23	I362	Glacial, sand	hard, clear		D.S.	Water at top of the shale.
2	SE	I2	"	"	"	"	32	I4I4	-I7	I397	32	I382	" , yellow clay	" , "		D.S.	Water is slightly alkali.
3	NW	I3	"	"	"	"	24	I405	-2I	I429	24	I426	" , sand	Hard, "		D.S.	Sufficient supply.
4	SE	I4	"	"	"	"	32	I444	-28	I4I6	32	I4I2	" , "	" , "		D.S.	Sufficient for 30 head.
5	NW	I4	"	"	"	"	I2	I4II	-6	I405	I2	I399	" , "	" , "		D.	Two similar wells; sufficient supply.
6	NE	I5	"	"	"	"	I5	I370	-9	I36I	I5	I355	" , clay	" , "		D.S.	Sufficient supply.
7	SW	I5	"	"	"	"	35	I409	-I9	I390	35	I374	Bedrock, shale	" , "		D.S.	Sufficient supply; one dugout for 60 head.
8	SE	I5	"	"	"	drilled	IIO	I438	-20	I4I8	IIO	I328	" , "	" , salty		S.	Supply is decreasing; not sufficient.
9	SE	I5	"	"	"	dug	I9	I438	-IO	I428	I9	I4I9	Glacial, quick-sand	" , clear		D.	Decreases in winter months.
IO	SW	I6	"	"	"	"	I5	I423	-8	I4I5	I5	I408	" , "	" , "		D.S.	Sufficient supply.
II	SE	I6	"	"	"	"	I8	I402	-6	I396	I8	I384	" , "	" , "		D.S.	Sufficient supply.
I2	SW	I7	"	"	"	"	22	I432	-I3	I4I9	22	I4I0	" , "	" , "		D.S.	Sufficient supply.
I3	SW	20	"	"	"	"	9	I424	-3	I42I	9	I4I5	" , "	" , "		D.S.	Can use a sandpoint.
I4	SE	20	"	"	"	"	I2	I427	-7	I420	I2	I4I5	" , "	" , "		D.S.	Sufficient supply.
I5	SW	2I	"	"	"	"	I4	I422	-7	I4I5	I4	I408	" , "	" , "		D.S.	Sufficient supply.
I6	NW	22	"	"	"	"	27	I420	-2I	I399	27	I393	" , gravel	" , "		D.S.	Well has a shale base.
I7	NW	23	"	"	"	"	26	I4I7	-I3	I404	26	I39I	Bedrock, shale	" , alkali		D.S.	Sufficient supply.
I8	SE	24	"	"	"	bored	38	I440	-6	I434	38	I402	Glacial, clay	" , clear		D.S.	Sufficient supply.
I9	NW	24	"	"	"	dug	24	I452	-IO	I442	24	I428	" , "	" , "		D.S.	Sufficient supply.
20	NW	25	"	"	"	bored	33	I460	-I3	I447	33	I427	" , "	" , "		D.	Two similar wells on farm.
2I	NW	26	"	"	"	dug	3I	I457	-2I	I436	3I	I426	Bedrock, shale	" , alkali		S.	Water too alkali for domestic use.
22	NE	26	"	"	"	"	30	I456	-2I	I435	30	I426	" , "	" , "		S.	Have no drinking water.
23	NW	27	"	"	"	"	26	I463	-I9	I444	26	I437	Glacial, gravel	" , clear		D.S.	Sufficient supply; 26 feet to shale.
24	NE	27	"	"	"	"	28	I45I	-25	I426	28	I423	" , clay	" , "		D.	Sufficient supply.
25	SW	28	"	"	"	"	I8	I433	-I4	I4I9	I8	I4I5	" , sand	" , "		D.S.	Sometimes dry in winter months.
26	SW	30	"	"	"	"	I2	I430	-6	I424	I2	I4I8	" , "	" , "		S.	Sufficient supply.
27	SE	30	"	"	"	"	8	I433	-4	I429	8	I425	" , "	" , "		S.	Use a sandpoint for domestic supply.
28	SE	3I	"	"	"	"	20	I438	-I3	I425	20	I4I8	" , "	" , "		D.S.	Sufficient supply.
29	NE	32	"	"	"	"	I3	I456	-6	I450	I3	I443	Bedrock, shale	" , "		D.S.	Sufficient supply.
30	NW	32	"	"	"	"	I4	I452	-8	I444	I4	I438	Glacial, sand	" , "		S.	Two similar wells on farm.
3I	SW	33	"	"	"	"	IO	I430	-8	I422	IO	I420	" , gravel	" , gravel		D.	Sufficient supply.
32	SE	33	"	"	"	"	30	I370	-27	I343	30	I340	Glacial, sand	" , clear		D.S.	Sufficient supply.
33	NE	34	"	"	"	"	24	I456	-I3	I443	24	I432	" , "	" , iron		D.S.	Sufficient supply.
34	NW	35	"	"	"	"	40	I472	-28	I444	40	I432	" , gravel	" , alkali		S.	Supplemented by a dugout.
35	SE	36	"	"	"	"	23	I428	-7	I42I	23	I405	" , sand	" , clear		D.S.	Sufficient supply; one dugout.
I	NW	6	7	25	Ist	sand-point	28	I435			28	I407	Glacial, sand	hard, clear		D.S.	Sufficient supply.
2	NW	I4	"	"	"	"	35	I426			35	I39I	" , "	" , iron		D.S.	" " .
3	SW	I6	"	"	"	"	45	I427			45	I382	" , "	" , clear		D.S.	Three sandpoints all deeper than average
4	NE	I6	"	"	"	"	20	I428			20	I408	" , "	" , iron		D.S.	Sufficient supply.
5	NW	I7	"	"	"	"	I2	I430			I2	I4I8	" , "	" , clear		D.S.	Sufficient supply.
6	NE	I8	"	"	"	"	25	I435			25	I4I0	" , "	" , "		D.S.	" " .
7	SE	20	"	"	"	"	I2	I423			I2	I4II	" , "	" , "		D.S.	" " .
8	SW	22	"	"	"	"	24	I4I4			24	I390	" , "	" , iron		D.S.	" " .

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

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

WELL RECORDS—~~Rural Municipality of~~ (OAK LAKE AREA) TOWNSHIPS 7 to IO, RANGES 22 to 25, WEST PRINCIPAL MERIDIAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	HEIGHT TO WHICH WATER WILL RISE: Elev.	PRINCIPAL WATER-BEARING BED: Depth	PRINCIPAL WATER-BEARING BED: Elev.	PRINCIPAL WATER-BEARING BED: Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
9	SE	24	7	25	Ist	sand-point	20	I400			20	I380	Glacial, sand	hard, iron		D.S.	Sufficient supply.
IO	NE	28	"	"	"	dug	I2	I4I2			I2	I400	" , "	" , clear		D.S.	Can use a sandpoint.
II	SW	29	"	"	"	sand-point	I2	I443			I2	I43I	" , "	" , "		D.S.	Sufficient supply.
I2	NE	3I	"	"	"	"	25	I422			25	I397	" , "	" , "		D.S.	" " .
I3	SE	33	"	"	"	dug	I8	I4I5	-9	I406	I8	I397	" , "	" , "		D.S.	Also use a sandpoint.
I4	NE	35	"	"	"	sand-point	27	I40I			27	I374	" , "	" , "		D.S.	Sufficient supply.
I	SE	6	8	25	Ist	sand-point	I2	I4II			I2	I399	Glacial, sand	hard, clear		D.S.	Sufficient supply.
2	NW	8	8	25	"	"	8	I4I2			8	I404	" , "	" , "		D.S.	" " .
3	SW	I9	"	"	"	"	I5	I4I2			I5	I397	" , "	" , "		D.S.	" " .
4	NE	30	"	"	"	"	I5	I4I7			I5	I402	" , "	" , "		D.S.	" " .
5	SW	32	"	"	"	dug	II	I4I3	-6	I407	II	I402	" , "	" , iron		D.S.	Creek crosses farm.
I	SE	4	9	25	"	sand-point	I2	I39I			I2	I379	Glacial, sand	" , clear		S.	Sufficient supply.
2	NE	4	"	"	"	"	I2	I389			I2	I377	" , "	" , "		D.S.	" " .
3	NE	5	"	"	"	dug	8	I392	-5	I387	8	I384	" , "	" , "		S.	Sandpoint for domestic use.
4	NW	6	"	"	"	"	I2	I4I2	-5	I407	I2	I400	" , "	" , "		S.	Sandpoint " " " .
5	NW	7	"	"	"	"	I8	I4I8	-I2	I406	I8	I400	" , "	" , "		D.S.	Sufficient supply.
6	SW	I4	"	"	"	"	20	I4II	-I2	I399	20	I39I	" , "	" , "		D.S.	Sufficient supply.
7	SE	I5	"	"	"	"	II	I4II	-3	I408	II	I400	" , "	" , "		D.S.	" " .
8	NW	I5	"	"	"	"	I4	I424	-II	I4I3	I4	I4I0	" , "	" , "		D.S.	" " .
9	SW	I8	"	"	"	"	II	I422	-6	I4I6	II	I4II	" , "	" , "		D.S.	" " .
IO	NE	28	"	"	"	"	8	I428	-4	I424	8	I420	" , "	" , "		D.S.	" " .
II	NE	33	"	"	"	"	IO	I4I7	-5	I4I2	IO	I407	" , "	" , "		S.	Sandpoint for domestic use.
I2	NW	35	"	"	"	"	I5	I4I4	-9	I405	I5	I399	" , "	" , "		D.S.	Sufficient supply.
I	SE	I	IO	25	Ist	dug	2I	I429	-I6	I4I3	2I	I408	Glacial, sand	hard, clear		D.	Sufficient supply.
2	SE	4	"	"	"	"	I3	I423	-3	I420	I3	I4I0	" , "	med. hard, "		D.S.	Sufficient supply.
3	NE	I3	"	"	"	"	20	I378	-8	I370	20	I358	" , "	" , "		D.	" " .
4	NE	I3	"	"	"	"	36	I386	-7	I379	36	I350	" , "	hard, "		S.	" " .
5	SE	I4	"	"	"	"	7	I276	-4	I272	7	I269	Bedrock, shale	med. hard, "		D.S.	Not sufficient in dry years.
6	NW	I7	"	"	"	"	22	I428	-I6	I4I2	22	I406	Glacial, gravel	hard, "		S.	Sandpoint 22 ft. deep, for domestic use.
7	SW	2I	"	"	"	"	I4	I2I8	-I0	I208	I4	I204	" , "	" , "		D.S.	Sufficient supply.
8	SW	22	"	"	"	"	I6	I383	-I2	I37I	I6	I367	" , "	" , "		D.S.	" " .
9	SE	22	"	"	"	"	IO	I389	-6	I383	IO	I379	" , "	med. hard, "		D.S.	" " .
IO	NE	23	"	"	"	"	II	I397	-6	I39I	II	I386	" , "	soft, "		D.S.	" " .
II	SW	23	"	"	"	"	I8	I4I3	-II	I402	I8	I395	" , "	hard, "		D.S.	Sandpoint can also be used.
I2	NE	23	"	"	"	"	7	I393	-4	I389	7	I386	Bedrock, shale	" , "		D.	Well at schoolhouse.
I3	NW	24	"	"	"	"	24	I428	-20	I408	24	I404	Glacial, gravel	" , "		D.S.	Averages about 35 barrels.
I4	NE	24	"	"	"	dug	I7	I394	-I3	I38I	I7	I377	Glacial, sand	" , "		D.	Sufficient supply.
I5	NE	24	"	"	"	"	I9	I388	-I2	I376	I9	I369	" , "	" , "		S.	" " .
I6	SE	25	"	"	"	"	II	I439	-9	I430	II	I428	" , "	" , "		D.S.	" " .
I7	SW	26	"	"	"	"	2I	I422	-9	I4I3	2I	I40I	" , clay	" , "		D.	Not sufficient; one dugout.
I8	SE	27	"	"	"	"	I7	I4I4	-I0	I404	I7	I397	Bedrock, shale	" , "		D.S.	Two similar wells; sufficient.
I9	NE	30	"	"	"	"	50	I4I6	-II	I405	50	I366	Glacial, gravel	" , "		D.S.	Sufficient supply.
20	SE	3I	"	"	"	"	30	I233	-20	I2I3	30	I203	Bedrock, shale	" , "		D.S.	" " .
2I	NE	33	"	"	"	"	I5	I444	-9	I435	I5	I429	" , "	" , "		D.	" " .
22	NE	34	"	"	"	"	I5	I455	-4	I45I	I5	I440	" , "	" , "		D.S.	Three similar wells.
23	NE	35	"	"	"	"	I2	I458	-7	I45I	I2	I446	Glacial, sand	" , "		D.S.	Sufficient supply.
24	NE	36	"	"	"	"	I7	I463	-I2	I45I	I7	I446	" , "	" , "		D.S.	Sufficient supply.
25	NW	36	"	"	"	"	I8	I454	-I2	I442	I8	I436	" , "	" , "		D.S.	Sandpoint can also be used.

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

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