CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

WATER SUPPLY PAPER NO. 10

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF ELMSTHORPE NO. 100 SASKATCHEWAN

By

B. R. MacKay and H. H. Beach

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INTRODUCTION

Lack of rainfall during the years 1930 to 1934 over a large part of the Prairie Provinces brought about an acute shortage both in the larger supplies of surface water used for irrigation purposes and the smaller supplies of ground water required for domestic and stock-raising purposes by settlers, villages, and Indian reserves. The drought conditions resulted in repeated crop failures, and in a large number of farms in the acute drought areas of Saskatchewan and Alberta being abandoned. In an effort to relieve the serious situation a number of special studies of the water problem were begun by both Federal and Provincial Governments and allied organizations. The Federal Department of Agriculture undertook among other phases of the drought problem an investigation into the existing supplies of surface water, their conservation in dug-outs, and how they could be made more generally available for irrigation. The Geological Survey of the Federal Department of Mines began an extensive study of the underground water conditions of southern Saskatchewan, this water being used principally for domestic and stock-raising purposes. For many years past the water problems in this and other provinces of Canada have engaged the attention of the Geological Survey, and considerable information had already been collected. A number of short reports dealing with the ground water conditions of special areas in Manitoba, Saskatchewan, and Alberta have been published by both the Federal and Provincial Geological Surveys, but no systematic study of the sources of the ground water, its quantity and quality as affected by the drought conditions has, up to the present, been attempted.

Field Work

The senior author was in charge of this investigation and was instructed to cover as much of the territory as possible in the season. To effect this it was decided to maintain an office at Regina and to have a large party consisting of twenty-six units, each to consist of three men who would cover their respective areas and visit every farm. In order that the information gathered by these different party units would be as complete and uniform as possible a questionnaire was prepared on which could be tabulated answers to all the essential questions required for a detailed study of the ground water conditions. An effort was made in the field by each party unit to fill in the questionnaire as completely as possible. In many instances, however, it was found that wells had either been abandoned, or the resident had little or no knowledge of the character of the water-bearing horizon and associated beds. When a party unit had completed the survey of a township the set of questionnaires and a report describing the characteristic features pertaining to the underground water conditions were mailed to the field office. Messrs. D.C. Maddox, F.H. Edmunds, H.H. Beach, H.N. Hainstock, R.D. MacDonald, and D.P. Goodall acted as supervisors in inspecting the work of the field units.

During the field season an area of 80,000 square miles, comprising 2,200 townships, was systematically examined, and records of approximately 60,000 wells were obtained, together with water samples for analyses obtained from 720 representative wells. These are systematically classified so that information pertaining to any well may be readily consulted. These records are supplemented by a set of 24 sectional sheets which cover all of southern Saskatchewan north to include township 32. Each sectional sheet comprises 120 townships. On these are indicated by symbol the location, type, and source of water of each of the 60,000 wells.

Publication of Results

The publication of such a great mass of detailed information is out of the question. This forms the permanent record of the Geological Survey. It is highly desirable, however, that a digest of the essential information pertaining to the ground water conditions of each municipality be furnished in convenient form to the municipality offices, to certain Provincial and Federal departments, and to allied organizations, at which centres it will be possible for any resident of the municipality or other party interested in any particular area to consult these reports. Should anyone find that he requires more detailed data than that contained in the report such additional information as the Geological Survey possesses can be procured on application to the Director, Bureau of Economic Geology, Department of Mines, Ottawa. In making such request the applicant should indicate the exact location of the area by giving the quarter section, township, range and meridian.

The reports have been prepared principally for farm residents, municipal bodies, and well drillers who are either contemplating sinking a well for the first time or considering deepening their well to a lower horizon in order to obtain a more abundant supply of water. In describing the water and geological conditions a certain number of technical terms must of necessity be used, and in case the reader should not be familiar with them their meanings have been defined in the glossary.

How to Use the Report

It is advisable that anyone desiring water information pertaining to a particular section of the municipality read over first the section dealing with the municipality as a whole, as by so doing he will be in a much better position to understand the section of the report dealing with the ground water conditions of the area in which he is particularly interested. As he reads the text he should keep open before him for constant reference the accompanying map of the municipality on which are two figures, one showing the surface and bedrock geology of the area as they affect the ground water supply, and the other the relief and the location and type of water wells. The land relief is shown by means of lines of equal elevation, termed "contours", which lie generally at vertical intervals of 50 feet. The elevation above sea-level of each fourth line is indicated on the map. The statistical summary that follows the text gives at a glance the main characteristics of the wells in each township of the municipality and of the municipality as a whole as listed under the various sub-headings. This is followed by a section dealing with the analyses and quality of the water derived from the unconsolidated deposits and from bedrock. The table of well records gives the detailed information pertaining to each well. In this are tabulated the altitude of the well, its depth, the height to which the water will rise, and the elevation of the water horizon. The wells are grouped in the table by townships and are numbered from the lower right corner of the township westward and northward, and the location of each well by its quarter section is given. The elevations used were determined by aneroid barometer and were checked frequently by elevations on the published maps or by instrument surveys.

Where the ground surface of an area is comparatively flat every effort has been made to indicate the position of the water-bearing horizon in feet below the surface. In rolling country where there is a considerable difference of elevation within short distances a uniform figure for the water horizon is not generally possible. It then becomes necessary to indicate the position in terms of the elevation of a water-bearing bed in feet above sea-level.

Should one desire to ascertain at any location at which no well has as yet been sunk, the approximate depth at which a particular water-bearing horizon can be reached it is necessary to know two things--first, the elevation of the land surface, and second, the probable elevation of the water-bearing bed, or aquifer. The elevation of the land surface can be obtained by noting the position of the well site on the map, Figure 2, with respect to the two bounding contour lines of known elevation, and estimating either how far above the lower, or how far below the upper, control elevation line the well site lies. The approximate elevation of the water-bearing horizon at the well site can be obtained by noting on the table of well records the elevation of the horizon in the wells adjacent to the proposed location and from the range of elevations given and the relative positions of the wells shown on the map to select what appears to be its most probable elevation at the new well site. Having determined this elevation the depth that it is necessary to sink in order to tap it is the difference between its elevation and the elevation of the land surface. This method is especially applicable when the water-bearing horizon is in bedrock. In unconsolidated deposits the water horizon either conforms to the rolling land surface or occurs in isolated sand beds at various horizons that do not form a continuous water-bearing bed over a large area. Care should be taken in making any calculations for depth of water-bearing horizons to be sure that the elevations selected for the determinations occur in the same geological horizon, that is they should be either all in glacial drift or in the same bedrock formation.

The table of well records also contains notes on the temperature, quality, and quantity of the water being obtained from the various wells, and from this it is possible to draw reasonable conclusions as to the character and quantity of the water likely to be encountered at the proposed well site.

Glossary of Terms Used

Alluvium. Deposits of earth, silt, sand and gravel, and other transported material made by rivers, floods, or other causes upon land that has been submerged beneath the waters of lakes or rivers.

Aquifer. Layers or pockets of water-bearing sand or gravel that occur in unconsolidated deposits or as beds forming part of a bedrock formation.

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

Bedrock. Bedrock, as here used, refers to deposits of gravel, sand, silt, and marl that have been laid down by the agency of water and which through a long period of time and the weight of the overlying sediments have become cemented into a solid rock.

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

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

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

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

Flood-plain. A flat section in a river valley that is covered by water when the river is in flood.

Glacial Drift. The loose, unconsolidated surface deposits of sand, gravel, and clay, or a mixture of these, which were deposited by the continental ice-sheet. It is also referred to as glacial till or boulder clay.

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

Hydrostatic Pressure. The pressure exerted by the water at any given point. It is due mainly to the weight of the column of water occurring at higher levels in the same aquifer or water-bearing bed.

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

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

Potable. Drinkable.

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

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

Saline. Salty, having a high content of sodium chloride.

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

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

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

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

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

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

Water-bearing Horizon. A layer in either unconsolidated deposits or in bedrock formation that is water-bearing; same as aquifer.

Zone of Saturation. An area in which the permeable rocks are saturated with water that will move under ordinary hydrostatic pressure.

Names and Descriptions of Geological Formations, Referred to in These Reports.

Wood Mountain Formation. The local name given to a series of gravel and thin sand beds which have a maximum thickness of 50 feet, and which occur as isolated patches on the higher elevations of Wood mountain. They are the youngest of the consolidated rocks and, where present, rest upon the beds of the Ravenscrag formation.

Cypress Hills Formation. The local name given to a series of conglomerates and sand beds occurring in the southwest corner of Saskatchewan, which rests upon the Ravenscrag or older formations. The thickness of this formation varies from 30 to 125 feet.

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

Whitemud Formation. The local name given to a series of white, grey, and buff coloured clays and sands that varies in thickness from 10 to 75 feet. The base of this formation grades in places into a coarse, limy sand having a maximum thickness of 40 feet.

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

Marine Shale Formation. The general name given to the thick deposit of incoherent, dark grey to dark brownish grey, plastic shales, which weather light grey to buff in places. It forms the bedrock over the greater part of southern and central Saskatchewan. In the eastern half of the province it has a thickness of at least 700 feet. In the western part of the province it consists of a series of dark shales averaging 700 feet in thickness, termed the Bearpaw formation. This is underlain by a series of sands, shales, and coal seams, known as the Belly River formation, which reaches a maximum thickness of 900 feet.

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Elmsthorpe occupies an area of nine townships described as townships 10, 11, and 12, ranges 22, 23, and 24, west of the 2nd meridian. The centre of the municipality is 40 miles southeast of Moose Jaw and 40 miles southwest of Regina. The northwest-southeast diagonal of the municipality roughly divides it into two areas of markedly differing topographic relief. The surface of the northeastern half of the area is flat or gently rolling. It rises gradually from an elevation of 2,000 feet above sea-level at the northeastern corner to approximately 2,150 feet along the diagonal. Here the ground rises abruptly to form the eastern slope of highlands that cover the southwestern half of the municipality. This highland area is part of the Missouri Coteau which extends from the International Boundary northwesterly across the southern half of the province. The southwestern half of the municipality has an average elevation of approximately 2,450 feet above sea-level, but reaches to heights exceeding 2,800 feet in Dirt hills a few miles south of the town of Claybank.

Adequate supplies of water are obtainable in this municipality from the Recent stream gravels, the glacial deposits, and certain of the underlying bedrock formations.

Water-bearing Horizons in the Unconsolidated Deposits.

Shallow wells dug in the sands and gravels lying along the bottoms of coulees yield small supplies of medium hard, drinkable water. Considerably larger supplies, sufficient for 100 head of stock or more, are derived from wells sunk in the Recent deposits along the valley of Avonlea creek north of the southern edge of sec. 28, tp. 11, range 22. Upstream from this area the creek water is often rendered undrinkable by seepages of salty, alkaline water from the Marine shale which outcrops along the banks.

The glacial deposits extend as a mantle of varying thickness over the whole township. A belt of irregular hillocks and depressions formed of yellow or blue clay containing small irregular pockets of sand and gravel, technically known as a terminal moraine, covers the southwestern highland area to depths of 25 to 35 feet. The sand pockets encountered at depths of 10 to 15 feet from the surface yield small supplies of hard, alkaline water. Large supplies, suitable for 50 or 60 head of stock, are often obtained from shallow wells located at the bottoms of slopes.

A more uniform deposit of glacial drift or till, termed ground moraine, composed of yellow or bluish grey boulder clay, overlies the lower slopes of the northeastern part of the municipality with an average thickness of 10 to 15 feet. Due to its impervious character this boulder clay yields very little water. If adequate supplies cannot be obtained from the boulder clay it is advisable to sink to the underlying water-bearing bedrock formations where these are known to be present.

Water-bearing Horizons in the Bedrock

There are two good water-bearing bedrock formations in this area, namely the Ravenscrag and the Eastend. The uppermost of these is the Ravenscrag. It consists of beds of yellow to brown clays, brown shales, bluish grey sands, and coal seams. As a complete section of this does not occur in this municipality its total thickness cannot be given. It probably does not greatly exceed 200 feet in any part of the area. Large supplies of soft to excessively hard, drinkable water, with occasionally considerable amounts of soda and other mineral salts, are to be derived from the water-bearing beds of this formation. The second water-bearing horizon occurs at the top of the Eastend formation, which lies approximately 45 feet below the Ravenscrag formation. It consists of a coarse sand, which is underlain by some 70 feet of fine grey sands and silts. The coarse sand at the top of the Eastend yields soft, drinkable water with considerable amounts of soda. In the lower parts of the formation the water is found to be generally much harder and highly alkaline. The supply obtainable from the coarse sand is usually sufficient for local stock requirements.

At its base the Eastend formation becomes shaly and grades downward imperceptibly into the dark grey, compact Marine shale, which immediately underlies the drift along the eastern border of the municipality. The upper part of the Marine shale yields small supplies of salty, alkaline water which is not suitable for drinking and is generally considered injurious to stock. The supply becomes materially smaller with increasing depths in the shale, and it is improbable that any adequate supplies of water suitable for farm requirements will be obtained from this formation.

The formations referred to above were originally laid down comparatively uniformly over the whole municipality. Breakage and displacement of the beds, technically known as faulting, have considerably altered their original areal distribution, resulting in marked changes in water conditions over small areas. The normal succession of these beds from the Ravenscrag down to the Marine shale forms the highlands of the southwestern half of the municipality and may be observed outcropping at various localities along the escarpment that marks its eastern boundary. Prior to the faulting and erosion these bedrock formations originally extended uniformly over the northeastern part of the area, as they do over the southwestern half at the present time. Sometime prior to the laying down of the glacial deposits two breaks or faults occurred in the bedrock, causing a triangular block in the north-central part of the township to sink and become tilted to the southwest as though it were hinged along a northwesterly trending line in the municipality to the north. The beds along the western edge of this fault block, where the displacement is greatest, have dropped some 250 feet, bringing beds of the Ravenscrag formation in contact with those of the Marine shale formation. In the northeastern part of the block the Ravenscrag has been largely removed by erosion and the immediately underlying coarse grey sand at the top of the Eastend beds and lower beds are found in contact with the Marine shale along the eastern bounding fault. Large supplies of water suitable for both domestic and stock use are obtainable throughout this down-faulted block, but immediately to the east of the eastern fault only small supplies of salty, alkaline water characteristic of the Marine shale occur.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 10, Range 22

In general, the ground water supplies of this township are not sufficient for local requirements. Glacial deposits composed largely of compacted boulder clay overlie the northeastern half of the township. Over the higher areas to the southeast the glacial deposits increase somewhat in thickness and become more porous, due to the presence of large and more numerous pockets of sand and gravel. Shallow wells dug to depths of 25 feet or less into the clay obtain small seepage of hard, alkaline water. Supplies derived from individual wells in the sand and gravel pockets are usually sufficient for domestic use and a few head of stock. Small supplies of soft or medium hard potable water can usually be obtained by sinking shallow wells close to sloughs or in the small deposits of stream gravel that are found occasionally along the bottoms of small coulees on the upland area.

The bluish grey sandstones and yellow clays of the Ravenscrag underlie the glacial deposits throughout the southwestern half of the township at depths varying from 10 to 30 feet. This formation in turn overlies the fine grey silts and sands of the Eastend formation which, due to its lower elevation, extends a maximum of one mile farther east than the northeastern boundary of the Ravenscrag. Individual wells dug or bored into the Ravenscrag formation yields supplies of soft to medium hard, slightly alkaline water in quantities sufficient for household requirements and at least 25 head of stock. The Eastend formation yields much smaller supplies of more highly mineralized water. In the northeastern part of the township the marine shale immediately underlies the drift at depths of 15 to 20 feet from the surface, but in the southwestern corner of the township it lies at 80 to 100 feet below the surface. Only small seepages, sufficient for 4 or 5 head of stock, can be expected from wells sunk into the shale. The high content of alkali salts in the water renders it unfit for domestic use and seldom suitable for stock consumption.

Township 10, Range 23

This township is covered by an irregular mantle of glacial drift having an irregular surface and a great variation in in character and thickness. It is composed of yellow and blue boulder clay with isolated pockets or beds of sands and gravel of limited areal extent. Wells sunk to depths of 10 to 15 feet into these sand pockets throughout the entire area yield small quantities of hard water with varying degrees of alkalinity. The supply is adequate for household requirements and usually sufficient for 10 to 25 head of stock. A better quality of water may be obtained by digging shallow seepage wells near small sloughs, which are common throughout the township, or into the thin beds of sands and gravel occurring along the bottoms of coulees.

The Ravenscrag bedrock formation underlies the glacial drift throughout the township. Owing to a lack of information, it is impossible to be certain at what depths the bedrock will be encountered. One well, located in N.W. $\frac{1}{4}$, section 16, drilled to a depth of 45 feet, is believed to be producing from the Ravenscrag. It is probable that a supply of water adequate for average farm requirements will be obtained from the blue sands of this formation ~~at~~ depths not greater than 60 feet. Similar supplies of a more highly mineralized water may be expected from the fine grey sands and silts of the underlying Eastend formation, the top of which immediately underlies the glacial drift in the northeastern part of the township. The Eastend grades downward into the Marine shale, the contact being reached at about 2,170 feet above sea-level. As no adequate supplies of water can be expected from this impervious formation, prospecting for it should be confined to the upper formations and to the glacial drift.

Township 10, Range 24

A mantle of glacial drift of greatly varying thickness covers the entire township. Shallow wells dug into it do not usually yield sufficient quantities of water for domestic and stock-raising requirements. Little or no deeper drilling has been done in the township. It is believed, however, that adequate supplies of fairly good water will be found from the two underlying bedrock formations.

Where the glacial drift is thicker and consists of blue clay with occasional pockets of sand and gravel interspersed through it, a more abundant supply of water is to be expected. The yield obtained naturally depends upon the thickness and extent of the sand pocket encountered. Most wells throughout the township sunk in the drift yield hard, alkaline water in quantities barely sufficient for household use and for about 5 head of stock. In winter these wells are even less productive. Shallow wells located near sloughs and at the bottoms of slopes, however, generally give sufficient quantities for local needs.

The Ravenscrag bedrock formation underlies the glacial drift. No definite information is available in regard to the thickness of the drift, but it seems probable that the Ravenscrag will be reached at depths less than 60 feet. A single hole drilled to a depth of 240 feet in NE. $\frac{1}{4}$, section 32, indicated that the Eastend grades into the dark grey or brown Marine shale at an elevation of 2,170 feet above sea-level. The shale will probably be encountered at similar elevations throughout the township. Supplies of soft or medium hard, drinkable water sufficient for local needs can be expected from wells drilled into the Ravenscrag and Eastend formations, but deeper drilling into the underlying Marine shale will not yield more than small seepages of undrinkable salty water.

Township 11, Range 22

Fair supplies of ground water are obtained in this township from the Recent sands and gravels in the bottoms of coulées along Avonlea creek, from the extensive thin layer of glacial drift, and from the Ravenscrag sandstone in the western half of the area. Water derived from wells situated in coulees in the western and southern parts of the township is of medium hardness, and only slightly alkaline, and in quantities sufficient for domestic use and a few head of stock. When larger supplies are required dams are constructed across the coulees, thus conserving the runoff. Shallow wells located along the valley of Avonlea creek and along the coulees in the northeastern corner of the township yield supplies that are generally unfit for human consumption, but used for watering stock. The high alkalinity suggests that the water may be derived either from the glacial boulder clay covering the uplands or from the Marine shale that underlies this area at very shallow depths.

Glacial till lies as a blanket of 10 to 25 feet thick over the entire township with the exception of the bottoms of the coulees and larger stream valleys. The till is composed largely of blue clay with isolated pockets of sand. Wells sunk into the clay yield small supplies of highly alkaline water, which is generally unfit for household requirements but is used for watering a few head of stock.

A northeasterly-trending fault or break crosses the township from the eastern edge of section 5 to the western edge of section 34. The entire area west of the fault line has dropped, causing the Ravenscrag formation on the west side to become the uppermost bedrock formation. On the east side of the fault the Marine shale underlies the glacial boulder clay at depths of 10 to 25 feet from the surface. Water derived from shallow wells sunk into the Ravenscrag is generally of medium hardness and contains varying amounts of soda. The supply obtainable from individual wells is sufficient for domestic use and for 25 to 50 head of stock. Care should be taken in drilling not to penetrate into the Marine shale, as the water derived from it is apt to contaminate that of the overlying formations.

Township 11, Range 23

Suitable supplies of ground water for both household and stock use are obtainable from the glacial deposits and from several horizons in the underlying bedrock formations that occur in this township. The glacial deposits are of two types, terminal moraine and glacial moraine or till. The terminal moraine consists of irregular hillocks of glacial drift with knolls and undrained depressions. It is composed of yellow and blue boulder clay with scattered pockets of sands and gravels, and overlies the highlands of the western part with considerable variation in thickness. The ground moraine that covers the rest of the township is formed almost entirely of a compact, impervious, yellow and blue boulder clay with no appreciable amount of sand and gravel. It has an average thickness of not more than 15 feet.

Wells sunk to shallow depths in the terminal moraine give a few barrels a day of hard, slightly alkaline, drinkable water. Larger supplies, generally sufficient for farm requirements, can be obtained from wells dug to depths of 15 to 25 feet along the bottoms of slopes. Similar supplies are nearly always obtainable from the thin beds of sand and gravel that lie along the bottoms of the coulées. Wells sunk in the ground moraine are generally unproductive, and it becomes necessary to sink through it into the underlying bedrock in order to obtain an adequate supply of water.

There are two water-bearing bedrock formations in this township, namely, the sands and coal seams of the Ravenscrag and Eastend formations.

The areal extent of the formations is limited by a fault that trends across the area in a northwesterly direction from the southeast corner of section 12 to the northwest corner of section 32, and which has already been described in detail. West of the fault the formations occur in their normal sequence. The Ravenscrag underlies the terminal moraine over the higher land in the southwest. It is underlain at an approximate elevation of 2,225 feet above sea-level by the Eastend formation, with the thin, coarse sand bed lying in between. The Eastend grades downward into the Marine shale, at an approximate elevation of 2,140 feet above sea-level. This shale immediately underlies the glacial drift a few feet below the surface in a belt from ½ mile to 2 miles wide lying immediately to the west of the fault. No wells have been sunk into the bedrock in the southwestern half of the township, but should any be drilled it is probable that adequate supplies of medium hard water will be obtained from the water-bearing horizon of the Ravenscrag and Eastend formations. The greatest depth at which the lower horizon will be encountered is 175 feet, at the southwestern corner of the township.

The Marine shale borders the fault as a narrow belt on the west, lying only a few feet from the surface. The small seepages derived from it are generally too highly mineralized to be suitable for household use, but are often suitable for stock. In the area east of the fault the thin layer of glacial drift is underlain by the Ravenscrag formation. Wells dug or bored to depths of 50 feet or less in this northeastern half of the township yield large supplies of soft or medium hard water from the sands of this formation and the coarse sand bed at its base. This lower horizon will be encountered at depths of about 100 feet from the surface, immediately east of the fault. The ground surface slopes uniformly to the northeast, with the result that this aquifer is found at decreasing depths in this direction and comes within a few feet of the surface in the northeast corner of the township. Springs that occur along the sides of the coulées derive their supplies from the same source. No wells have been sunk into the underlying Eastend sands in this part of the area. It seems likely, however, that it would produce small quantities of alkaline, but drinkable, water.

Township 11, Range 24

The ground water supplies of this township are derived from several horizons, both in the heavy mantle of glacial drift which forms a belt of hillocks and undrained kettles (terminal moraine), and in the underlying Ravenscrag and Eastend bedrock formations. The terminal moraine is composed of blue clay with many boulders and isolated sand pockets of limited areal extent. Water readily collects to form ponds in the depressions that characterize this belt. Shallow wells dug near the ponds yield small supplies of hard, alkaline water in sufficient quantities for domestic requirements and a few head of stock throughout the summer, but during the winter months the supply becomes negligible. Considerable amounts of salts have been leached from the glacial deposits and concentrated in many of the deeper depressions. Water derived from these sources is not fit for drinking, but is used for stock. Wells sunk to shallow depths into the sand pockets in the blue clay yield small supplies of water with a varying degree of alkalinity. The supplies derived from them generally show less seasonal variation than those from wells situated near ponds. Considerably larger supplies of drinkable water are frequently obtainable from wells dug at the bottoms of slopes to depths of 25 feet or less. Occasionally this water comes to the surface as springs, as for example, NW.$\frac{1}{4}$, section 15, NE.$\frac{1}{4}$, section 16, and NE.$\frac{1}{4}$, section 32.

The Ravenscrag formation underlies the glacial deposits at varying depths throughout the western and southern parts of the township. Several wells in the southern half of this area dug to depths not exceeding 50 feet into the blue sands yield soft or medium hard water in sufficient quantities for local needs.

The fine grey sands and silts that compose the Eastend formation underlie the Ravenscrag, where present, at an approximate elevation of 2,275 feet above sea-level. In the broad valley in the northeastern part of the township the Ravenscrag is not present and the Eastend immediately underlies the thin mantle of glacial drift. Wells which have been sunk into the Eastend give small supplies of hard, slightly alkaline, but potable water. In the northeast corner of the township there is a small area in which the Marine shale forms the bedrock beneath the glacial drift. The contact of this formation with the overlying Eastend is at about 2,250 feet above sea-level. Owing to the poor quality of all water from the shale drilling into it is not to be recommended.

Township 12, Range 22

Underground water supplies of this township are derived from three horizons, namely the Recent stream gravels along Avonlea creek, the glacial drift moraine that covers the greater part of the township, and the underlying Eastend formation in the western half of the area.

Wells sunk to depths of 20 to 25 feet into the gravels along the creek produce large supplies of medium hard, slightly alkaline water which is quite suitable for domestic and stock use. The glacial drift, consisting of 5 to 20 feet of blue clay with occasional small pockets of coarse sand, overlies the bedrock generally throughout the township except along the creek valleys and in areas in which Eastend sandstone is exposed at the surface. Wells sunk into the blue clay produce only small seepages of hard alkaline water which is not generally suitable for household use, and not in sufficient quantities for more than a few head of stock.

The fault in the bedrock described in the township to the south is known to extend in a nearly straight line across this township from SE.¼, section 4, to NW.¼, section 35. East of the fault the bedrock is the Marine shale. The block to the west has dropped down so that the Eastend sandstone is the upper formation throughout the western part of the township. Many springs are located along the fault line and yield large supplies of soft, drinkable water.

The amount of drop increases uniformly along the fault to the south, resulting in the Eastend increasing in thickness from about 15 feet along the northern border to at least twice this thickness in the southwestern part of the township. Supplies of soft, usually alkaline water with varying amounts of soda can be obtained by digging or boring to shallow depths in the Eastend throughout the part of the township west of the fault. The supply is generally sufficient for both domestic and local stock raising requirements. Care should be taken not to penetrate the underlying Marine shale which yields a highly alkaline salty water in sufficient quantities to render the supplies derived from the Eastend unfit for domestic use.

For reasons given above wells sunk to the east of the fault should not go beneath the glacial deposits and not penetrate the Marine shale.

Township 12, Range 23

Adequate supplies of drinkable water are being obtained from the bedrock formations at shallow depths throughout the greater part of this township, the mantle of glacial drift which covers the township being seldom more than 5 to 10 feet in thickness. The drift is largely composed of blue clay and is practically non-water-bearing. Shallow wells dug into the sands and gravels that lie along the bottoms of coulées and valleys, however, give suitable supplies of medium hard, slightly alkaline water in sufficient quantities for household use. Shallow wells located along the bottoms of the steeper slopes in the southwestern corner of the township yield larger supplies of water of similar quality.

The Ravenscrag formation underlies the drift down to an approximate elevation of 2,100 feet above sea-level, throughout the southwestern half of the area with the exception of the extreme southwest corner, where Marine shale occurs west of the northwesterly trending fault. Wells dug to depths of 25 to 35 feet into the Ravenscrag yield a moderately hard, often soda-bearing, water in sufficient quantities for local requirements. At the base of the Ravenscrag there is a coarse sand bed which gave fairly large supplies of soft, drinkable water.

The Eastend formation occurs immediately below this coarse sand bed and underlies the glacial drift throughout the greater part of the northeastern half of the township. It varies in thickness from 30 feet at the northeastern corner to about 80 feet at the centre of the township. The fine grey sands and silts of this formation yield small quantities of soft, alkaline, soda-bearing water which is rather unsatisfactory for drinking but is suitable for watering stock. Throughout the northeastern half of the township wells sunk to obtain water for household use should not pass below this formation, as the underlying Marine shale yields only very small supplies of highly mineralized water which is usually unfit for human consumption and tends to create scour in stock. The same conditions exist in the Marine shale in the extreme southwestern corner of the township.

Township 12, Range 24

The greater part of this township is occupied by Dirt hills, which rise from an elevation of 2,850 feet above sea-level on the plain along the northern border to upwards of 2,800 feet in section 16. These hills are composed of Ravenscrag and Eastend bedrock formations covered by a deposit of glacial drift of greatly varying thickness. The lowlands are covered by 20 to 25 feet of yellow and blue boulder clay.

The glacial deposits covering the uplands are composed of heavy blue boulder clay with occasional small pockets of sand of limited areal extent. Shallow wells encountering these sand pockets yield small supplies of hard, usually quite alkaline water in sufficient quantities for household requirements and for a few head of stock. It may be necessary to sink several wells of this type should larger supplies be required. Thin deposits of sand and gravel are to be found in the bottoms of many of the coulées. Adequate supplies of medium hard, slightly alkaline water are generally obtainable from shallow holes sunk into the gravels.

The compacted boulder clay that covers the lowlands gives only small seepages of highly alkaline water, which is usually unfit for drinking, but where occasional beds of sand and gravel are encountered larger quantities of a more potable water may be expected.

The Ravenscrag formation forms the greater part of Dirt hills above an elevation of 2,120 feet above sea-level. No borings have been done into this formation on the upper parts of Dirt hills from which it is possible to give either the actual thickness of the drift overburden or the horizon in the Ravenscrag at which water may be expected. Along the northern and eastern slopes the drift covering is very thin or even absent and many springs occurring along the bottoms of the slopes give large supplies of soft or medium hard water. These springs are believed to have their source in the coal seams and sand beds of the Ravenscrag. This formation also underlies the northeastern part of the township east of the fault zone that trends northwesterly from section 12 to section 33. Adequate supplies of hard, slightly alkaline, iron-bearing water are obtainable from this formation at depths not usually exceeding 30 feet.

The second bedrock water-bearing horizon in the township is a coarse grey sand which marks the top of the Eastend formation. This horizon occurs immediately beneath the light buff to chalky white, sandy, refractory clays which form a conspicuous outcrop on the escarpment southeast of Claybank and which have been locally designated as the Whitemud beds. Wells sunk in this coarse grey sand yield fairly large supplies of soft, drinkable water with varying degrees of mineral salts.

The lower part of the Eastend formation is composed of very fine grey sands and silts which grade downward into the Marine shale formation that underlies the glacial drift in the lowlands in the vicinity of Claybank. The compact nature of either the basal part of the Eastend formation or the Marine shale makes them very poor water-bearing horizons, and the water derived from them is so high in soda and other mineral salts as to be unsuitable for domestic use. As there appears to be no hope of obtaining adequate supplies of potable water in either the basal Eastend or the underlying Marine shale formation prospecting for water in the northern lowlands area west of the fault should be confined to the sand and gravel deposits in the glacial drift.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL
MUNICIPALITY OF ELMSTHORPE, No. 100, SASKATCHEWAN

West of 2nd mer. — Township / Range	10 / 22	10 / 23	10 / 24	11 / 22	11 / 23	11 / 24	12 / 22	12 / 23	12 / 24	Total No. in municipality
Total No. of Wells in Township	57	20	30	44	51	44	31	51	31	359
No. of wells in bedrock	44	2	0	27	15	13	8	41	12	162
No. of wells in glacial drift	13	18	30	14	36	31	21	9	19	191
No. of wells in alluvium	0	0	0	3	0	0	2	1	0	6
Permanency of Water Supply										
No. with permanent supply	40	16	23	36	39	32	27	47	29	289
No. with intermittent supply	3	2	1	3	5	12	2	2	1	31
No. dry holes	14	2	6	5	7	0	2	2	1	39
Types of Wells										
No. of flowing artesian wells	0	0	2	0	3	4	2	2	4	17
No. of non-flowing artesian wells	10	10	7	10	10	13	11	16	17	104
No. of non-artesian wells	30	6	14	26	26	15	14	29	8	168
Quality of Water										
No. with hard water	40	15	22	38	40	39	13	46	23	276
No. with soft water	3	3	2	1	4	5	16	3	7	44
No. with salty water	7	0	0	7	2	0	4	0	0	20
No. with alkaline water	14	6	14	20	11	13	11	24	18	131
Depth of Wells										
No. from 0 to 50 feet deep	42	18	27	37	39	43	25	42	29	302
No. from 51 to 100 feet deep	13	2	2	7	12	1	5	7	1	50
No. from 101 to 150 feet deep	2	0	1	0	0	0	0	1	0	4
No. from 151 to 200 feet deep	0	0	0	0	0	0	0	0	0	0
No. from 201 to 500 feet deep	0	0	0	0	0	0	1	1	0	2
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	0	0	0	0
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	1	1
Potability of Water										
No. potable for domestic use	33	14	19	26	31	33	23	34	24	237
No. not potable for domestic use	10	4	5	13	13	11	6	15	6	83
No. potable for stock use	37	18	22	36	42	42	28	48	28	301
No. not potable for stock use	6	0	2	3	2	2	1	1	2	19
Sufficiency of Water Supply										
No. sufficient for domestic needs	43	18	23	36	44	42	29	48	30	313
No. insufficient for domestic needs	0	0	1	3	0	2	0	1	0	7
No. sufficient for stock needs	32	10	14	24	28	19	21	33	24	205
No. insufficient for stock needs	11	8	10	15	16	25	8	16	6	115

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

The term "total dissolved mineral solids" as here used refers to the residue remaining when a sample of water is evaporated to dryness. It is generally considered that waters that have less than 1,000 parts per million of dissolved solids are suitable for ordinary uses, but in the Prairie Provinces this figure is often exceeded. Nearly all waters that contain more than 1,000 parts per million of total solids have a taste due to the dissolved mineral matter. Residents accustomed to the waters may use those that have much more than 1,000 parts per million of dissolved solids without any marked inconvenience, although most persons not used to highly mineralized water would find such waters highly objectionable.

Mineral Substances Present

Calcium and Magnesium

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

Sodium

The salts of sodium are next in importance to those of calcium and magnesium. Of these, sodium sulphate (Na_2SO_4) is usually in excess of sodium chloride (NaCl). These sodium salts are dissolved from rocks and soils. Sulphate of sodium is commonly known as "Glauber's Salts" and when there is a large amount present the water is laxative and unfit for domestic use. Sodium carbonate (Na_2CO_3) "Black Alkali", and sodium sulphate and sodium chloride "White Alkali" are injurious to vegetation, and waters that contain a large amount of them cannot be used for irrigation.

Sulphate

Sulphates (SO_4) are one of the common constituents of natural water. The sulphate salts most commonly found are sodium sulphate (Glauber's Salts, Na_2SO_4), magnesium sulphate (Epsom

Salts, ($MgSO_4$), and calcium sulphate ($CaSO_4$). Waters that contain these sulphate salts are called "sulphated waters". When the water contains large quantities of the sulphate of sodium ("White Alkali") it is injurious to vegetation and cannot be used for irrigation. According to John C. Thresh, London, "The continued use of water that contains 1,200 parts or more per million of magnesium sulphate and 500 parts or more per million of sodium sulphate causes diarrhoea and scour among stock, and one-half this quantity makes the water unfit for domestic use".

Chloride

Chloride (Cl) is a common constituent of all natural water and is dissolved in small quantities from rocks. It usually occurs as sodium chloride (common salt, NaCl) and if the quantity is much over 400 parts per million the water has a brackish taste; if the water contains much over 400 parts per million it becomes too salty to be fit for domestic use.

Iron

Iron (Fe) is dissolved from many rocks and the surface deposits derived from them, and also from well casings, water pipes, and other fixtures. In the table of analyses given in this report, the iron content is less than 1 part per million unless otherwise noted. More than 0.1 part per million of iron in solution will settle out as a red precipitate upon exposure to the air. Water that contains not more than 0.5 part of iron per million is considered as the usual upper limit for potable water, but this amount is often exceeded. From 1 to 3 parts per million the water may be considered only fair, and in excess of 3 parts per million the water is bad. A water that contains a considerable amount of iron will stain porcelain, enamelled ware, and clothing that is washed in it, and when used for drinking purposes has a tendency to cause constipation.

Hardness

Calcium and magnesium salts impart hardness to water. Hardness of water is commonly recognized by its soap-destroying powers as shown by the difficulty of obtaining lather with soap. The total hardness of a water is the hardness of the water in its original state. Total hardness is divided into "permanent hardness" and "temporary hardness". Permanent hardness is the hardness of the water remaining after the sample has been boiled and it represents the amount of mineral salts that cannot be removed by boiling. Temporary hardness is the difference between the total hardness and the permanent hardness and represents the amount of mineral salts that can be removed by boiling. Temporary hardness is due to the bicarbonates of calcium and magnesium, and permanent hardness to the carbonates, sulphates and chlorides of calcium and magnesium. The permanent hardness can be partly eliminated by adding natural chemical softeners such as ammonia or sodium carbonate, or many prepared softeners. Water that contains a large amount of sodium carbonate and small amounts of calcium and magnesium salts is soft, but if the calcium and magnesium salts are present in large amounts the water is hard. The following table taken from "The Examination of Water and Water Supplies" by John C. Thresh, London, 1925, can be used for determining the degree of hardness of a water.

Total Hardness (Total Ca and Mg content in parts per million)	Character
Less than 50	Very soft
50 - 100	Moderately soft
100 - 150	Slightly hard
150 - 200	Moderately hard
200 - 300	Hard
Over 300	Excessively hard

Many of the Saskatchewan water samples analysed by the Geological Survey have a total hardness greatly in excess of 300 parts per million; when the total hardness exceeded 3,000 parts per million no exact hardness determination was made. Also no determination for temporary hardness was made on waters having a total hardness less than 50 parts per million.

The term "alkaline" has been applied rather loosely to ground water. Its original meaning was a chemical one and it implied that the substance in question would neutralize acids. The carbonates of calcium, magnesium, and sodium are the only compounds found in ground water that would make it alkaline chemically. A later application of the term "alkaline" was to soils that contain sufficient "black alkali" or "white alkali" to make them unfit for vegetation. In the Prairie Provinces a water is usually considered to be alkaline when it contains so much dissolved solids as to be unfit for human consumption; except that water that tastes strongly of common salt is described as "salty". Many alkaline waters may be used for stock. Most alkaline waters are more correctly termed "sulphated" waters.

Analyses of Water Samples from the Municipality of Elmsthorpe, No. 100, Saskatchewan

LOCATION					Depth of well, ft.	Total dis'vd solids	Cl.	HARDNESS			CONSTITUENTS AS ANALYSED					CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS								Source
Qtr	Sec	Tp.	Rge	Mer				Total	Perm.	Temp.	Alk'ity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	
NW.	28	11	23	2	56	3,340												(4)		(5)	(1)	(2)	(3)	x 1
SW.	2	12	23	2	10	1,500												(4)		(5)	(1)	(2)	(3)	x 1
NW.	33	12	24	2	34	2,557												(2)		(3)	(4)	(1)	(5)	x 2
NE.	24	11	23	2	50	1,260	43	20	Not det.		585	10	4	406	645	1,288	18		8		590	601	71	x 2
NW.	20	12	22	2	54	4,120	44	100	15	85	655	70	22	2,132	1,712	3,908	125		46		508	3,156	73	x 2

Source. Water samples indicated thus, x 1, are from Ravenscrag formation.
Water samples indicated thus, x 2, are from Eastend formation.

x Analyses are generally reported in parts per million. For interpretation of this table read the section on Analyses and Quality of Water.

Where numbers (1), (2), (3), (4), and (5) are used instead of parts per million, they represent the relative amounts in which the five main constituents are present in the water.

General Statement

As only two samples of ground water were collected and analysed from this municipality and these were from the bedrock, the following discussion of the character of the water derived from the unconsolidated deposits and the bedrock formations is based on generalizations made from analyses of water collected in several adjoining municipalities in which the Recent and glacial deposits and bedrock formations show a close similarity.

Water from the Unconsolidated Deposits

Ground water from the thin beds of Recent stream silts and sand, and occasionally gravels, along the upper reaches of Avonlea creek in township 11, range 22, is generally of very poor quality. Mineral salts, particularly Glauber's Salts (Na_2SO_4), Epsom Salts ($MgSO_4$), and common salt ($NaCl$), have been leached out of the boulder clay and underlying Marine shale causing the water to be too laxative for human consumption and it has a tendency to produce scour in stock. Downstream from the northern boundary of township 11, range 22, ground water from the Recent stream deposits is much softer, and although often containing considerable amounts of soda and Glauber's Salts is quite suitable for household use.

Marked variations in the character of the glacial deposits occur within very small areas. Correspondingly, large variations are often found in the quality of waters from wells sunk to similar depths, and only 50 feet apart. It must not be inferred, therefore, that if undesirable water is struck in one well, poor water conditions must necessarily exist over a large area in the drift-covered districts. Ground water derived from sand and gravel deposits in the drift, however, is usually very hard, the total hardness being in excess of 300 parts per million and occasionally over 750 parts per million. The Glauber's Salts (Na_2SO_4), Epsom Salts ($MgSO_4$), and common salt (NaCl) content is low and often negligible and the water if not contaminated by vegetable matter is considered quite suitable for household use. Water derived from boulder clay is exceedingly hard, having a total hardness in some instances of nearly 2,000 parts per million. The sulphate salt content is also high. Analyses show an excess of 2,000 parts per million of combined sulphates of sodium and magnesium. Water containing more than 1,000 parts per million of these two salts often has a laxative effect on humans, tends to produce scour in stock, and is not suitable for irrigation. Water so mineralized should not be used if better supplies are available within reasonable hauling distance. When the combined sulphate content is in excess of 500 parts per million the water has a saline and even a bitter taste and is locally referred to as "alkaline". From the strictly chemical standpoint such water is not alkaline and may be more correctly termed "sulphate" water. The word "alkaline" has a wide usage throughout the Prairie Provinces and includes highly sulphated water; it is retained in the general description of the waters discussed in this report.

Water from the Bedrock

Ground water from the Ravenscrag formation shows considerable variation in quality, depending both upon the depth of the horizon from the surface and the character of the source beds. In general the water from the greater depths in the formation is soft, whereas supplies from shallower wells is moderately to excessively hard, i.e., total hardness ranging from 700 to 1,500 parts per million. There are, however, several exceptions to this generalization, as very hard water has been obtained at depths of 200 to 300 feet in the Ravenscrag. The Glauber's Salts content averages 450 parts per million and has exceeded 1,000 parts per million in several wells. Common salt rarely exceeds 60 parts per million but Soda (Na_2Co_3) ranges from negligible amounts to over

1,000 parts per million. It is generally considered that water having an excess of 200 parts per million of this salt is unsuitable for irrigation. Water from the Ravenscrag is drinkable but due to the soda content it is less desirable for household use than supplies from glacial gravels.

The Eastend formation yields a water that is very soft, but contains on an average of 500 to 600 parts per million of soda which gives the water a flat taste. The amounts of Glauber's Salts present increases with depth in the formation and occasionally exceeds 3,000 parts per million. Supplies from the lower part of this formation are not usually suitable for human consumption, but shallow wells into the Eastend, particularly in the northeastern part of the municipality, are used in the households. The third, fourth, and fifth analyses given on a preceding page are typical of water from the Eastend, the fifth sample being derived from the lower part of the formation which immediately overlies the Marine shale. Less variation exists in the quality of water from the Marine shale than in supplies from the unconsolidated stream bed and glacial deposits and the Ravenscrag and Eastend formations. This is due to the fact that the shale itself is consistently uniform throughout the entire municipality, whereas the overlying deposits show marked variation in character over small areas. Water from the shale has a very high mineral salt content. Analyses of eight samples of ground water from the Marine shale bedrock taken at widely separated localities all show an excess of 2,000 parts per million of total solids, and in one instance 4,120 parts per million. The combined sulphate salts of sodium and magnesium (Glauber's Salts and Epsom Salts) vary between 1,000 and 3,100 parts per million. Common salt varies from 500 to 1,400 parts per million, giving the water a distinctly salty taste. These high figures are to be expected in waters from a formation known definitely to be of marine origin. A much greater variation is noted in the total hardness of waters from the shale, and appears to be more or less proportionate to the total solid content. Several samples are slightly to moderately hard, i.e., the total hardness is less than 200 parts per million, whereas in other instances the water is excessively hard having a total hardness of 1,000 to 3,000 parts per million of dissolved calcium and magnesium carbonate salts.

Ground water from the Marine shale has a strong laxative effect and is quite unsuitable for domestic use. It has a tendency to produce scour in stock.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
1	SW.	1	10	22	2	Bored	35	2,240	- 10	2,230	6	2,234	Glacial gravel	Hard, clear		D, S	Sufficient for 40 head stock.
2	SW.	1	"	"	"	Dug	14	2,240	- 9	2,231	6	2,234	" "	" "		D, S	" " 40 " " .
3	SE.	4	"	"	"	Bored	80	2,400					Ravenscrag and Marine shale				Dry hole. Two other dry holes 82 and 140 feet deep.
4	NE.	4	"	"	"	Dug	18	2,375	- 8	2,367	8	2,367	Glacial gravel	Hard, clear	42	D, S	Sufficient for local needs.
5	SE.	7	"	"	"	"	11	2,425	- 6	2,419	6	2,419	Sandy clay	" "		D, S	Insufficient for local needs.
66	SE.	8	"	"	"	Bored	20	2,405	- 16	2,389	16	2,389	Ravenscrag sand	" "	45	D,	Sufficient for household only.
7	NW.	9	"	"	"	"	28	2,340	- 19	2,321	20	2,320	" "	" "	43	D, S	Sufficient for 20 head stock.
8	SW.	10	"	"	"	"	28	2,290	- 8	2,282	20	2,270	" "	" iron			Sufficient for 12 head stock.
9	SW.	10	"	"	"	Dug	30	2,290					Eastend sandy clay				Dry hole.
10	NW.	10	"	"	"	"	24	2,275	- 9	2,266	11	2,263	Eastend sand	Hard, clear	42		Sufficient for 30 head stock.
11	NW.	12	"	"	"	"	25	2,200	- 22	2,178	23	2,177	" "	" "	42		Sufficient for household use only.
12	NW.	12	"	"	"	"	25	2,200	- 21	2,179	24	2,176	Marine shale	Hard, alkaline salty, bitter		N,	Unfit for household or stock use.
13	NW.	12	"	"	"	"	25	2,200	- 25	2,175	25	2,175	Glacial clay	Hard, clear, alkaline		D, S	Good supply.
14	SE.	14	"	"	"	"	20	2,200			20	2,180	Marine shale	Hard, clear, alkaline		S,	Good supply, suitable for stock only.
15	NE.	14	"	"	"	"	20	2,170	- 5	2,165	20	2,150	Eastend sand	Hard, clear	42	D,	Sufficient for household only.
16	NE.	14	"	"	"	Bored	40	2,170			40	2,130	" "	" "		S,	Sufficient for 50 head stock, a drinking
17	NW.	16	"	"	"	"	28	2,260	- 16	2,244	16	2,244	" "	" "		D, S	Sufficient for 24 head stock.
18	SE.	17	"	"	"	"	30	2,300	- 18	2,282	30	2,270	" "	" "	42	D, S	Sufficient for 10 head stock.
19	SE.	17	"	"	"	"	70	2,300	- 42	2,258	42	2,258	" white sand	" " alakline	42	S,	Sufficient for 8 head stock. Cannot be used in household.
20	SE.	18	"	"	"	"	143	2,400					Marine shale				Dry hole.
21	SW.	18	"	"	"	Dug	40	2,425	- 30	2,395	30	2,395	Ravenscrag sand	Hard, clear	43	D, S	Sufficient for 6 head stock.
22	SW.	18	"	"	"	Bored	75	2,425	- 75	2,350	75	2,350	Marine shale	Hard, alkaline, salty		N,	Unfit for household or stock use.
23	NW.	18	"	"	"	Dug	12	2,400	- 6	2,396	10	2,390	Glacial sand	Hard, alkaline		D, S	Poor supply, seepage from slough.
24	NW.	19	"	"	"	"	22	2,475	- 16	2,459	10	2,465	Ravenscrag sand	Soft, clear		D, S	Poor supply, sufficient for household only.
25	SE.	20	"	"	"	"	30	2,300	- 18	2,282	20	2,280	Eastend sand	Hard, clear	43	D, S	Sufficient for 16 head stock.
26	NE.	20	"	"	"	Bored	30	2,250	- 10	2,240	10	2,240	Glacial sand	" "		D,	Sufficient for household needs only.
27	NE.	20	"	"	"	"	75	2,250	- 25	2,225	70	2,180	Ravenscrag sand	" iron, yellow colour	44	S,	Sufficient for 14 head stock. Marine shale at 75 feet.

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 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
28	NW.	21	10	22	2	Bored	45	2,240	- 1	2,239	45	2,195	Eastend sand	Hard, clear	42	S,	Sufficient for 60 head stock.
29	NW.	22	"	"	"	Dug	18	2,100	- 6	2,094	12	2,088	Marine shale?	Hard, slightly alkaline	cold	D,	Sufficient for household needs only.
30	NE.	22	"	"	"	Bored	32	2,190					" "		-		Dry hole.
31	NE.	24	"	"	"	Dug	15	2,120	- 12	2,108	15	2,105	Glacial sand	Hard		D, S	Sufficient for local needs.
32	SE.	25	"	"	"	Bored	32	2,075	- 6	2,069	32	2,043	" gravel	Hard, clear	42	D, S	" " 12 head stock.
33	NE.	26	"	"	"	Dug	22	2,100	- 18	2,082	16	2,084	Marine shale	" bitter alkaline		D, S	Poor supply.
34	NW.	28	"	"	"	Bored	40	2,200	- 25	2,175	25	2,175	" "	Hard, alkaline salty	42	S,	Sufficient for 15 head stock.
35	NE.	28	"	"	"	"	32	2,170	- 24	2,146	32	2,138	" "	Hard, clear		D,	" " household needs only. Seepage from slough and from bedrock.
36	NE.	28	"	"	"	"	30	2,170	- 6	2,164	22	2,148	" "	" alkaline, bitter		N,	Unfit for household use or stock.
37	SE.	30	"	"	"	"	80	2,365	- 80	2,285	80	2,285	Ravenscrag sand	Hard, alkaline clear	42	D, S	Sufficient for 10 head stock.
38	SE.	31	"	"	"	Dug	65	2,190	- 20	2,170	43	2,153	Eastend sand	Soft, clear	42	S,	" " 15 " " , not a good drinking water.
39	NW.	31	"	"	"	Bored	60	2,200			60	2,140	Marine shale	Hard, salty	42	S,	Sufficient for 10 head stock. Not good water for man or stock.
40	NE.	33	"	"	"	Dug	15	2,160	- 10	2,150	15	2,145	Outwash gravel,	Med. hard, alkaline	43	D, S	Sufficient for 17 head stock.
41	NE.	33	"	"	"	"	12	2,160	- 7	2,153	12	2,148	Marine shale	Hard, strongly alkaline		N,	Unfit for household or stock use.
42	NE.	36	"	"	"	"	15	2,050	- 9	2,041	15	2,025	Glacial drift	Hard, clear, alkaline	43	D,	Sufficient for household needs only.
43	NE.	36	"	"	"	"	12	2,050	-		12	2,038	" gravel	Hard, clear	43	S,	Sufficient for 15 head stock.
1	NW.	4	10	23	2	Dug	14	2,375	- 12	2,363	14	2,361	Glacial sand	Hard, clear alkaline	44	D, S	Sufficient for 20 head stock.
2	NE.	5	"	"	"	"	15	2,360	- 10	2,350	10	2,350	" "	Hard, clear	41	D, S	" " local needs.
3	SE.	6	"	"	"	"	22	2,330	- 14	2,316	22	2,308	" clay	" " alkaline		S,	" " 8 head stock.
4	SW.	7	"	"	"	"	14	2,420	- 11	2,409	14	2,406	" sand, gravel	Hard, clear, alkaline		D, S	" " household needs only.
5	SE.	9	"	"	"	"	15	2,375	- 11	2,364	12	2,363	Glacial sand	Soft, clear	43	D, S	" " local needs.
6	NW.	12	"	"	"	Bored	25	2,450					Blue clay				Dry hole.
7	NE.	12	"	"	"	Dug	14	2,425	- 12	2,413	14	2,411	Glacial sand	Hard, clear	46	D, S	Sufficient for 12 head stock.
8	NW.	13	"	"	"	Bored	26	2,475	- 6	2,469	26	2,449	" blue clay	" "	42	D, S	" " 5 " ". Seepage from slough.
9	SW.	16	"	"	"	Drilled	45	2,400	- 8	2,392	45	2,355	Ravenscrag	Soft, clear		D, S	Sufficient for local needs.
10	NW.	20	"	"	"	Dug	16	2,415	- 12	2,403	16	2,399	Glacial clay	" "	48	D, S	" " 32 head stock. Seepage from slough.
11	NW.	21	"	"	"	"	20	2,400	- 12	2,388	20	2,380	" sand	Hard, clear, alkaline			Sufficient for 32 head stock.

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(#) Sample taken for analysis.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
12	NE.	21	10	23	2	Dug	30	2,420					Glacial clay				Dry hole, 25 other shallow dry holes.
13	NE.	23	"	"	"	"	26	2,470	- 16	2,454	26	2,444	" sand	Hard, clear, alkaline		D, S	Sufficient for 30 head stock.
14	SE.	24	"	"	"	"	19	2,424	- 15	2,405	19	2,401	" clay	Hard, clear alkaline	43	S,	Poor supply, 1½ bbls. a day.
15	SW.	30	"	"	"	"	12	2,450	- 10	2,440	12	2,438	" sand	Hard, clear, alkaline		D, S	Suffi ient for 6 head stock.
16	NE.	33	"	"	"	Bored	70	2,325	- 40	2,285	70	2,255	" clay	Hard, clear, alkaline	42	S,	Very poor supply.
17	SE.	34	"	"	"	"	30	2,310	- 10	2,300	30	2,280	" sand	Hard, clear, alkaline		S,	Sufficient for 12 head stock.
18	NW.	35	"	"	"	"	30	2,250	- 14	2,236	30	2,220	" "	Hard, clear	42	D,	" " house needs only.
19	NE.	35	"	"	"	"	85	2,220	- 35	2,185	85	2,135	Ravenscrag shale	" "	42	D, S	Well not used.
1	SW.	1	10	24	2	Dug	15	2,360	- 10	2,350	3	2,357	Glacial sand	Med. Hard, clear	42	D, S	Sufficient for 7 head stock.
2	NW.	1	"	"	"	"	14	2,380	- 8	2,372			" "	Hard, clear, alkaline, iron	41	D, S	" " 14 " " .
3	SE.	2	"	"	"	"	21	2,360	- 19	2,341	21	2,339	" "	Soft, clear		D,	" " household needs only.
4	SW.	2	"	"	"	"	14	2,375	- 12	2,363	12	2,363	" " gravel	Med. Hard, clear		D,	" " " " " . Seepage from slough.
5	NW.	3	"	"	"	"	14	2,375	- 6	2,369	12	2,363	Glacial gravel, sand	Hard, clear		D, S	Sufficient for 8 head stock.
6	SW.	4	"	"	"	Bored	40	2,325	- 30	2,395	30	2,295	Glacial sand	" alkaline iron		D, S	Insufficient supply enough for 8 head stock.
7	NE.	5	"	"	"	Dug	16	2,340	- 8	2,332	14	2,326	" "	Hard, cloudy, alkaline		D, S	Sufficient for local needs.
8	SE.	15	"	"	"	"	14	2,400	- 2	2,398	14	2,386	" " gravel	Hard, clear, alkaline		S,	Insufficient supply, enough for 20 head stock.
9	NE.	15	"	"	"	"	14	2,420	- 13	2,407	12	2,408	Glacial, sand	Med. hard, clear		D,	Sufficient for household needs only.
10	SE.	16	"	"	"	"	8	2,360	- 3	2,360	4	2,356	" " gravel	Med. " clear	48	D, S	Large supply.
11	SW	16	"	"	"	"	6	2,340	0	2,340	4	2,336	Glacial sand	Hard, clear, alkaline	48	D, S	" " .
12	NE.	17	"	"	"	"	30	2,410	- 6	2,404	30	2,380	" "	Hard, clear		S,	Sufficient for local needs.
13	SW.	17	"	"	"	Bored	44	2,350	- 26	2,324	44	2,306	" "	" "		S,	" " 25 head stock.
14	SW.	19	"	"	"	Dug	14	2,340	- 13	2,327	13	2,327	" "	Hard, clear, alkaline		D, S	Insufficient supply, enough for 20 head stock.
15	NW.	20	"	"	"	"	43	2,350					" "				3 dry holes; samd depth.
16	NE.	20	"	"	"	"	14	2,390	- 9	2,381	13	2,377	" "	Hard, clear, alkaline		N,	Good supply, but unfit for man or stock.
17	NE.	22	"	"	"	"	11	2,380	- 8	2,372	6	2,374	" "	Hard, clear		D, S	Sufficient for 10 head stock.
18	NE.	24	"	"	"	"	14	2,460	- 11	2,449	11	2,449	" "	" cloudy alkaline	46	S,	Sufficient for 22 head stock. Shallow well for household needs.
19	NE.	25	"	"	"	Bored	45	2,455			45	2,410	" "	Hard, clear, alkaline		D,	Sufficient for household needs only.

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(#) Sample taken for analysis.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in ° F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
20	SW.	26	10	24	2	Dug	7	2,390	- 1	2,389	6	2,384	Glacial sand	Hard, alkaline clear		D, S	Sufficient for 40 head stock.
21	SE.	27	"	"	"	"	16	2,390					" clay	Hard, clear, alkaline			Dry hole.
22	NE.	27	"	"	"	"	30	2,465	- 27	2,438	30	2,435	" "	Soft, clear	-	D, S	Sufficient for 6 head stock. Near slough.
23	SW.	27	"	"	"	Bored	25	2,400					" "				Dry hole.
24	SE.	28	"	"	"	"	90	2,430					" "				" ".
25	NW.	30	"	"	"	"	60	2,340					" "				" ", it had small seepage of water prior to 1931.
26	NE.	31	"	"	"	Dug	14	2,370	- 10	2,360	10	2,360	" sand, gravel	Hard, clear, alkaline		D, S	Sufficient for 12 head stock.
27	SW.	32	"	"	"	"	16	2,420	- 16	2,406	16	2,406	Glacial blue clay	Hard, clear, alkaline	46		" " household needs only.
28	NE.	32	"	"	"	"	20	2,430	- 18	2,412	20	2,430	Glacial blue clay		42	D,	Well drilled 200' into Marine shale. Struck water at depth of 166 ft.
29	NW.	34	"	"	"	Bored	120	2,455					Marine shale				Dry hole. All water is hauled.
30	NW.	36	"	"	"	Dug	16	2,380	- 14	2,366	16	2,364	Glacial clay	Hard, clear, alkaline	48		Practically dry. All water is hauled.
1	NW.	3	11	22.	2	Bored	65	2,065	- 15	2,050	15	2,050	" sand	Hard, clear, alkaline		D, S	Sufficient for 15 head stock.
2	SE	4	"	"	"	"	50	2,125	- 10	2,125	25	2,100	Ravenscrag shale	Soft, salty, alkaline	42	D, S	Yields several tanks a day; 4 test holes into Marine shale gave very little water.
3	SE.	5	"	"	"	"	40	2,135	- 20	2,115	20	2,115	Marine shale	Hard, clear, salty, alkaline	44	S,	Sufficient for 25 head stock.
4	SE.	5	"	"	"	Dug	26	2,130	- 18	2,112	18	2,112	Ravenscrag shale	Hard, clear, salty, alkalino	42	D, S	Largo supply.
5	NE.	5	"	"	"	Borod	30	2,100	- 5	2,095	30	2,070	" "			D,	Sufficient for housohold noods only.
6		8		"	"	Dug	15	2,095			15	2,080	?	Hard, clear		D, S	" " " and 5 head stock.
7	NE.	8	"	"	"	"	10	2,065	- 6	2,059	6	2,059	Ravenscrag sand	" "		D, S, M	Vory good supply.
8	NE.	10	"	"	"	"	14	2,050	- 5	2,045	5	2,045	Glacial sand	" " alkaline	42	D, S	Sufficiont for local noods in wet years.
9	NE.	11	"	"	"	"	12	2,040	- 12	2,028	12	2,028	" clay	Hard, clear, alkalino		D, S	" " housohold noods only.
10	NE.	12	"	"	"	"	16	2,040	- 11	2,029	12	2,028	" "	Hard, clear		D,	Sufficiont for housohold noods only, 2 dry holos 46' and 98' into Marino shalo.
11	SW.	13	"	"	"	"	19	2,025	- 16	2,009	16	2,009	" sand	" "	42	D, S	Sufficiont for 15 head stock.
12	NE.	14	"	"	"	"	30	2,010	- 15	1,995	30	1,980	Marino shalo	" " salty, soda		N.	Unfit for housohold or stock uso. Soopago woll 5ft, doop noar crock givos largo supply of good wator.
13	NE.	14	"	"	"	"	6	2,005	- 2	2,003	2	2,003	Rocont sand	Hard, iron, brown colour		S,	Largo supply, poor water for humans or stock.
14	NW.	15	"	"	"	"	12	2,005	- 3	2,002	3	2,002	Glacial sand	Hard, cloar, alkalino		D, S	Small supply.
15	SE.	16	"	"	"	Bored	70	2,059					Marine shale	Hard, clear, salty			Fair supply, but unfit for humans or stock.
16	SW.	17	"	"	"	"	12	2,100	0	2,100	12	2,088	Recent sand	Hard, clear			Sufficient for local needs in wet years.

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WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
17	NE.	18	11	22	2	Dug	6	2,050	- 2	2,048	6	2,044	Recent gravel	Hard,clear	48	D, S	Sufficient for local needs.
18	NW.	20	"	"	"	"	12	2,040	- 3	2,037	3	2,037	Glacial clay	" "	42	D,	" " household needs only.
19	SE.	22	"	"	"	"	10	2,005	- 6	1,999	6	1,99	" "	" " alkaline	42	D, S	" " 15 head stock.
20	SW.	22	"	"	"	"	12	2,005	- 3	2,002	3	2,002	" sand	Hard,clear, alkaline	43	S,	Used for a few head of stock during winter.
21	NW.	22	"	"	"	test auger	20	2,000	- 10	1,990	5	1,995	Marine shale	Hard,black sediment			Fair supply, but unfit for humans or stock.
22	NE.	22	"	"	"	Dug	16	2,000	- 14	1,986	14	1,986	" "	Hard,clear, alkaline	43		Small supply, " " " " " ".
23	SW.	23	"	"	"	"	25	2,020	- 25	1,995	25	1,995	" "	Hard,clear, very alkaline			" " " " " " " ".
24	SW.	24	"	"	"	"	25	2,010	- 25	1,985	15	1,995	Red sand	Hard,clear		D,	Sufficient for household needs only.
25	SW.	27	"	"	"	"	14	2,000	- 6	1,994	12	1,988	Marine shale	" salty, alkaline			Fair supply, nut unfit for humans or stock.
26	SW.	28	"	"	"	"	16	2,025	- 6	2,019	6	2,019	Glacial clay	Hard,clear, alkaline	42	D, S	Sufficient for household needs only.
27	NW.	28	"	"	"	"	15	2,025	- 5	2,020	5	2,020	" "	Med.hard,iron brown colour	44	D,	" " " " ".
28	SE.	30	"	"	"	"	40	2,040	- 20	2,020	20	2,020	Eastend sand	Hard,clear, alkaline,salty	43	D, S	" " 50 head stock.
29	SE.	30	"	"	"	Bored	42	2,040	- 27	2,013	27	2,013	" "	Hard,clear, alkaline	43	S,	" " 50 " ".
30	SW.	30	"	"	"	"	72	2,065	- 37	2,028	72	1,993	" "	Hard,clear, alkaline,salty	42	D, S	" " 12 " ".
31	NE.	32	"	"	"	"	40	2,000	- 15	1,985	40	1,960	" "	Hard,clear	42	D, S	Large supply.
32	SE.	34	"	"	"	"	100	2,035					Marine shale	" " alkaline		N,	Unfit for humans or stock use.
33	SE.	34	"	"	"	Dug	16	2,005	- 12	1,993	3	2,002	" "	Hard,clear, alkaline		N,	" " " " " ".
34	SW.	34	"	"	"	"	16	2,000	- 8	1,992	9	1,991	" "	Hard,clear, alkaline		S,	Sufficient for 5 head stock. Laxative.
35	NW.	34	"	"	"	"	16	2,010	- 8	2,002	8	2,002	Grey clay	Hard,clear, alkaline		D, S	" " 6 " ".
36	NW.	34	"	"	"	Bored	35	2,010					Marine shale?	Black sediment		N,	Small supply.
1	NW.	1	11	23	2	Bored	85	2,180	- 25	2,155	85	2,095	Glacial gravel	Hard,clear		D, S	Large supply.
2	NE.	2	"	"	"	Dug	12	2,190	- 8	2,182	10	2,180	" sand	Med. hard, clear,iron		D, S	Sufficient for 100 head stock.
3	NW.	3	"	"	"	"	18	2,370	- 13	2,357	13	2,357	" gravel	Hard,clear		D,	" " household needs only.
4	SW.	4	"	"	"	"	16	2,360	- 12	2,348	16	2,344	" "	" "		D, S	Insufficient, 8 bbls. a day.
5	NW.	4	"	"	"	"	16	2,375	0	2,375	16	2,359	" sand	" iron	42	D, S	Large supply.
6	NE.	4	"	"	"	"	15	2,375	- 13	2,362	13	2,362	" blue clay	" clear		S,	Small seepage, 1 bbl. a day.
7	SE.	5	"	"	"	"	4	2,425	- 0	2,425	4	2,421	" sand	" " alkaline		S,	Sufficient for 20 head stock. Flowed until 1929.

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8	SE.	5	11	23	2	Dug	40	2,425					Glacial clay				Dry hole.
9	SW.	5	"	"	"	"	14	2,425	- 10	2,415	10	2,415	" sand	Med, hard, iron, brown	43	D, S	Sufficient for 20 head stock.
10	SW.	7	"	"	"	"	12	2,470	- 8	2,462	8	2,462	" gravel	Hard, clear, alkaline		D, S	Small supply. Laxative.
11	SW.	8	"	"	"	Spring		2,425	0	2,425			Probably raven-scrag	Hard, clear, alkaline, bl-ack sediment	cold	S,	Sufficient for 40 head stock.
12	NE.	9	"	"	"	Dug	15	2,400	- 11	2,389	11	2,389	Glacial coarse gravel	Hard, clear, iron	42	D, S, I	Sufficient for 10 head stock and watering garden.
13	SE.	10	"	"	"	"	12	2,340	- 5	2,335	11	2,329	Glacial sand and gravel	Soft, black, sediment	stag-nant odour	N,	Unfit for humans or stock.
14	SE.	10	"	"	"	"	18	2,340	- 13	2,327	13	2,327	Glacial sand	Hard, clear, soda, bitter	42	S,	Large supply. Unfit for human consumption.
15	SE.	12	"	"	"	"	14	2,155	- 12	2,143	12	2,143	Fine sand	Hard, clear, alkaline salty	46	D, S	Sufficient for local needs, seepage from dam in coulee.
16	NW.	12	"	"	"	Bored	58	2,160	- 6	2,154	58	2,102	Marine shale	Hard, clear alkaline	43	S,	Sufficient for local stock needs.
17	SE.	13	"	"	"	Dug	12	2,110	- 9	2,101	9	2,101	Eastend sand	Hard, black colour	44	D, S	" " 8 head tock.
18	NW.	14	"	"	"	Bored	60	2,180	- 40	2,140	40	2,140	Marine shale, black sand	Hard, slightly salty		S,	" " 15 head stock. Laxative.
19	NW.	14	"	"	"	Dug	19	2,180	- 17	2,163	14	2,166	Glacial sand	Hard, clear	43	D,	" " household needs only.
20	NW.	15	"	"	"	"	22	2,300			22	2,278	Glacial gravel	" "		D, S	" " local needs. Laxative.
21	SE.	16	"	"	"	Bored	20	2,400	- 10	2,390			" blue clay	" "	43	D,	Small seepage, 2 dry holes into blue clay.
22	SW.	18	"	"	"	Dug	14	2,350	- 10	2,340	10	2,340	" sand and gravel	" "		D,	Small supply.
23	SW.	19	"	"	"	Bored	60	2,350	- 20	2,230			Glacial deposits	" "		N,	
24	NW.	19	"	"	"	Dug	20	2,250					" clay	" "		D, S	Sufficient for 20 head stock.
25	NE.	21	"	"	"	"	16	2,195	- 2	2,193			" blue clay	" " alkaline		N,	Use flowing spring, sufficient for 17 head stock.
26	SE.	22	"	"	"	"	16	2,210	- 13	2,197	13	2,197	" gravel	Hard, clear		D,	Sufficient for household needs only.
27	NW.	22	"	"	"	"	19	2,230	- 12	2,218	12	2,218	" "	Med. hard, clear		D, S	" " 3 households and 15 head stock.
28	SW.	24	"	"	"	"	14	2,125	- 10	2,115	14	2,111	Ravenscrag sand	Hard, clear, iron		D, S	" " local needs.
29	NE.	24	"	"	"	Bored	80	2,085	- 50	2,035	50	2,035	Eastend clay	Soft, clear, cloudy		D, S	Large supply. Kills plants. #.
30	NW.	25	"	"	"	"	60	2,070		2,030	50	2,020	Ravenscrag sand	Soft, clear, iron, soda	43	D, S	" " .
31	NE.	26	"	"	"	"	55	2,060	- 35	2,025	35	2,025	" "	Soft, clear, soda	43	D, S	" " .
32	NW.	27	"	"	"	"	100	2,125					" "				Dry hole. Coal near bottom of hole.
33	SE.	28	"	"	"	"	80	2,180	- 40	2,140	80	2,100	" "	Soft, clear, soda		S,	Large supply. Coal struck at 25 feet.

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(#) Sample taken for analysis.

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	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
34	NW.	28	11	23	2	Bored	56	2,160	- 44	2,116	56	2,104	Ravenscrag sand	Soft, clear, soda	42	D, S	N. due to high bacteria content. Large supply.
35	NW.	30	"	"	"	"	35	2,190	- 16	2,174	35	2,155	Glacial sand	Hard, clear		D,	# Sufficient for 3 household only.
36	NW.	30	"	"	"	Dug	6	2,180	- 1	2,179	1	2,179	" "	" iron, soda			" " 40 head stock.
37	SE.	31	"	"	"	"	5	2,140	- 1	2,139			" gravel			N,	Very small supply.
38	SE.	31	"	"	"	Bored	26	2,160	- 17	2,143	17	2,143	" "	Hard, clear, alkaline, iron		D, S	Sufficient for 9 head stock.
39	SE.	32	"	"	"	"	100	2,150					Marine shale				Dry hole.
40	SW.	32	"	"	"	"	28	2,150			6	2,144	Glacial blue clay	Hard, alkaline		N,	Bad odour. Unfit for humans or stock.
41	SW.	34	"	"	"	"	25	2,100	- 16	2,084	25	2,075	Glacial gravel	Med. hard clear, iron	42	D, S	Insufficient for local needs. Dry hole struck coal at 85 feet.
42	NW.	34	"	"	"	Dug	18	2,100	- 3	2,097	18	2,082	glacial sandy clay	Hard, clear		D, S	Sufficient for 12 head stock.
43	NW.	35	"	"	"	"	11	2,050	- 7	2,043	5	2,045	Ravenscrag sand	Soft, clear	48	D, S	" " 20 " " .
44	SE.	36	"	"	"	"	21	2,030	- 8	2,022	8	2,022	" "	Hard, alkaline	44	D, S	Large supply.
45	NE.	36	"	"	"	"	24	2,010	- 20	1,990	20	1,990	" "	Hard, alkaline		N,	Sufficient for 6 head stock.
1	NW.	1	11	24	2	Dug	10	2,420	- 5	2,415	10	2,410	Glacial gravel	Hard, clear, alkaline		D, S	Sufficient for local needs.
2	NW.	1	"	"	"	Bored	26	2,420	- 16	2,420			Glacial clay	Soft, clear		N,	Very small supply.
3	SE.	2	"	"	"	Dug	20	2,400	- 18	2,382	20	2,380	" sand	Hard, clear			Yields 1 bbl. a day. Similar well used for stock.
4	NW.	2	"	"	"	"	16	2,320	- 5	2,315	16	2,304	" gravel	Soft, clear	42	D, S	Sufficient for stock.
5	SE.	3	"	"	"	"	20	2,400	- 18	2,382	20	2,380	" "	Hard, clear, alkaline		S,	Sufficient for local stock needs. Similar well for stock use.
6	SE.	3	"	"	"	"	40	2,400	- 34	2,366	30	2,370	Ravenscrag clay			N,	Large supply, unfit for humans or stock.
7	NW.	3	"	"	"	"	16	2,360	- 10	2,350	10	2,350	Glacial sand	Hard, clear, alkaline	43	D, S	Sufficient for 20 head stock.
8	NE.	3	"	"	"	Bored	65	2,320	- 12	2,308	65	2,255	" "	Soft, clear		D, S	" " local needs.
9	SE.	4	"	"	"	"	30	2,380	- 5	2,375			Ravenscrag blue clay	Hard, "		D,	" " household needs only.
10	SE.	4	"	"	"	Dug	25	2,380	- 15	2,365	25	2,355	Glacial gravel	" "		D, S	" " 20 head stock. Situated in a slough.
11	SW.	4	"	"	"	"	20	2,400	- 5	2,395						N,	Well caving in.
12	NW.	4	"	"	"	"	22	2,425	- 17	2,408	22	2,403	Ravenscrag clay	Hard, clear, alkaline		D, S	Insufficient for local needs. Very little water.
13	NE.	4	"	"	"	"	16	2,390	- 11	2,379	11	2,379	" "	Hard, clear	42	S,	Sufficient for 12 head stock.
14	SW.	5	"	"	"	"	14	2,375	- 8	2,367	10	2,365	" "	" " alkaline	42	D, S	" " household only.
15	NW.	6	"	"	"	"	11	2,390	- 4	2,386	4	2,386	Glacial gravel	Hard, clear		S,	Practically dry.

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(#) Sample taken for analysis.

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
16	NE.	9	11	24	2	Bored	25	2,400	- 5	2,395	19	2,381	Glacial gravel	Med. hard, soda		D, S	Very small supply.
17	NE.	9	"	"	"	"	46	2,400	- 11	2,389			Ravenscrag clay	Med. hard, soda		S,	" " " .
18	SW.	10	"	"	"	"	16	2,375	- 2	2,373	10	2,365	" "	Soft, clear	42	D, S	N. Several dry holes.
19	NE.	10	"	"	"	Dug	12	2,320	- 8	2,312	10	2,310	Glacial gravel	Hard, clear	42	D, S	Supply not known.
20	SW.	12	"	"	"	"	7	2,350	- 2	2,348	2	2,348	" sand	" " iron	42	D, S	Large supply. Was a flowing well before 1930
21	NE.	12	"	"	"	"	16	2,350	- 10	2,340	12	2,338	" clay	Hard, clear		S,	Small supply. Use dam in coulee.
22	SE.	13	"	"	"	"	30	2,300	- 26	2,374	26	2,274	Eastend sand	"		N,	Went dry in 1928. Has remained so.
23	SE.	13	"	"	"	"	14	2,300	- 5	2,295	14	2,286	Glacial gravel	Hard, clear, alkaline		D, S	Sufficient for 16 head stock, in summer, nearly dry in winter.
24	SW.	13	"	"	"	"	14	2,350	- 13	2,337	14	2,336	" clay	Hard, clear		D,	Sufficient for household needs only.
25	SW.	14	"	"	"	Bored	16	2,310	- 2	2,308	16	2,294	" gravel	" "		D,	" " " ".
26	NW.	15	"	"	"	Dug	16	2,400	- 1	2,451			" clay	" "		S,	Flowing well sufficient for local stock needs.
27	NE.	16	"	"		" "	7	2,425	+ 1	2,426			" "	" " alkaline		S,	" " " " " " ".
28	SE.	17	"	"	"	"	8	2,500	- 2	2,498			" grey sand	Soft, clear	42	D, S	Sufficient for 100 head stock.
29	SE.	23	"	"	"	"	16	2,285	- 10	2,275	10	2,275	" gravel and sand	Hard, clear, iron		D, S	" " local stock needs. Similar well 12 feet deep.
30	NW.	23	"	"	"	"	18	2,290	- 12	2,288	16	2,274	Eastend sand	Hard, clear, alakline		S,	Small supply.
31	NW.	23	"	"	"	Bored	25	2,290					" "	Hard, clear	42	D, S	Sufficient for 15 head stock.
32	NW.	24	"	"	"	Dug	18	2,210	- 10	2,200	18	2,192	Glacial gravel	Med. hard, clear		D, S	Used only in winter.
33	NE.	25	"	"	"	"	14	2,200	- 5	2,195	3	2,197	Marine shale?	Hard, clear		D, S	Sufficient for 30 head stock.
34	NW.	25	"	"	"	Spring		2,300					Glacial gravel	" "		D, S	Supplies 15 households and 85 head stock.
35	SE.	30	"	"	"	Dug	ˋ6	2,540					" "			D,	Sufficient for household needs only. Spring nearby.
36	SW.	31	"	"	"	"	18	2,490	- 14	2,476	18	2,472	" sand	Hard, clear alkaline		D, S	Sufficient for household needs only. Similar well nearby.
37	NW.	32	"	"	"	"	12	2,550	- 8	2,542	12	2,538	" gravel	Hard, clear, alkaline		D,	Sufficient for household needs only.
38	NE.	32	"	"	"	"	4	2,525	0	2,525			" "	Hard, clear, alkaline		D, S	Flowing well; large supply.
39	NW.	36	"	"	"	"	20	2,290	- 19	2,271			Eastend clay	Hard, alk-aline bitter			Small supply. Unfit for human or stock use.
1	NE.	2	12	22	2	Dug	10	2,020	- 4	2,016	4	2,016	Glacial sand	Hard, very alkaline	cold	S,	Sufficient for 50 head stock.
2	NW.	2	"	"	"	"	30	2,020	- 10	2,010	24	1,996	Marine shale	Hard, clear, very alkaline	"	S,	" " 10 " ".
33	NE.	3	"	"	"	"	16	2,020	- 11	2,009	16	2,004	" "	Hard, clear salty, alkaline	43		Too alkaline for household or stock use.
4	NE.	3	"	"	"	Drilled	296	2,020					" "				Dry hole.

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WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
1	SE.	1	12	23	2	Bored	34	2,025	- 28	1,997	35	1,990	Ravenscrag sand	Hard, clear, iron	42	D, S	Sufficient for 6 head stock.
2	SW.	1	"	"	"	"	58	2,010	- 48	1,962	58	1,952	" "	Hard, alkaline		N,	
3	SE.	2	"	"	"	"	58	2,010	- 48	1,962	58	1,952	" "	" " black sediment		N,	Large supply.
4	SW.	2	"	"	"	Dug	6	2,010	0	2,010	6	2,004	" "	Hard, alkaline clear	42	S,	Sufficient for local stock needs.
5	SW.	2	"	"	"	"	10	2,010	0	2,010	10	2,000	" "	Soft, soda		D, S	" " " needs. #
6	SE.	5	"	"	"	"	30	2,125	- 5	2,120			Glacial sand			N,	Located in coulee.
7	SE.	6	"	"	"	Drilled	214	2,175	- 60	2,115	214	1,96	Marine shale ?	Soft, clear	42	D,	Yields 1 bbl. every 3 hours.
8	SW.	6	"	"	"	Dug	20	2,210	- 18	2,192	20	2,190	Glacial clay	Hard, clear, iron		D, S	Insufficient for local needs.
9	NW.	6	"	"	"	"	20	2,210	- 12	2,198	12	2,198	" gravel	Hard, clear		D, S	Sufficient for 16 head stock.
10	NW.	6	"	"	"	Bored	112	2,210					Marine shale				Dry hole.
11	NW.	7	"	"	"	"	60	2,200	- 54	2,146	60	2,140	Ravenscrag sand	Hard, iron, cloudy	44	D, S	Sufficient for 12 head stock.
12	NE.	8	"	"	"	"	50	2,060	- 25	2,035	50	2,010	" "	Med. hard		D, S	" " 60 " " .
13	NE.	9	"	"	"	Dug	15	2,040	- 5	2,035			Glacial gravel	Hard, clear			" " 30 " " .
14	NE.	12	"	"	"	Bored	65	1,975	- 45	1,930	65	1,910	Eastend sand	Hard, clear, alkaline	42	D, S	" " local needs.
15	SW.	12	"	"	"	Dug	10	2,000	- 4	1,996	10	1,990	Recent gravels	Hard, alkaline		D, S	" " " " .
16	SE.	13	"	"	"	"	5	1,950	- 2	1,948	2	1,948	Eastend sand	Hard, clear	44	D, S	" " " " .
17	NE.	14	"	"	"	"	43	1,960	- 16	1,942	18	1,942	" red clay	" " alkaline		S,	" " " stock needs. Unfit for humans.
18	SE.	15	"	"	"	"	16	2,000	- 10	1,990	10	1,990	Whitemud clay	Hard, clear		D,	Sufficient for household needs only.
19	SE.	15	"	"	"	Bored	45	2,000	- 25	1,975	25	1,975	" "	" " alkaline		D,	" " " " " .
20	NE.	15	"	"	"	Dug	20	1,980	- 8	1,972	12	1,968	Eastend sand	Hard, clear		D,	" " " " " .
21	NE.	15	"	"	"	Bored	90	1,980	- 30	1,950	90	1,890	" "	" " alkaline	42	S,	" " local stock only.
22	SW.	18	"	"	"	Dug	18	2,160	- 12	2,148	18	2,142	Glacial sand	Soft, clear		D, S	" " 16 head stock.
23	NE.	19	"	"	"	"	25	2,035					?	" soda		D, S	" " 20 " " .
24	SE.	19	"	"	"	"	22	2,045	- 18	2,027	13	2,032	Ravenscrag clay	Hard, clear, alkaline		D, S	" " 11 " " .
25	SE.	20	"	"	"	"	18	2,010	- 6	2,004			Whitemud clay	Hard, clear, alkaline	44	D, S	Insufficient for local needs.
26	NE.	20	"	"	"	"	18	2,000	- 15	1,985	15	1,985	Eastend sand	Hard, clear alkaline	43	D, S	Sufficient for 20 to 30 head stock.
27	SE.	22	"	"	"	Bored	60	1,975	- 30	1,945	60	1,915	" clay	Hard, clear, alkaline	42	S,	" " 30 head stock. Unfit for humans.

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(#) Sample taken for analysis.

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
28	NW.	23	12	23	2	Bored	50	1,950	- 20	1,930	50	1,900	Eastend clay	Hard, clear	42	S,	Sufficient for 20 head stock. Unfit for humans.
29	NW.	23	"	"	"	Dug	12	1,950	- 6	1,944	6	1,944	Glacial? sand	Soft, "	43	D, M	Large supply of good drinking water.
30	SW.	24	"	"	"	"	12	1,950	- 9	1,941	10	1,940	Ravenscrag yell-ow clay	Hard, "	43	D, S	Sufficient for local household needs.
31	SW.	25	"	"	"	"	10	1,950	- 8	1,942	8	1,942	Eastend sand	" " alkaline	43	S,	" " 18 head stock.
32	SE.	26	"	"	"	"	16	1,950	- 16	1,934	16	1,934	" "	Hard, clear, alkaline	43	S,	" " 10 " " .
33	SE.	26	"	"	"	"	15	1,945	- 9	1,936	11	1,936	" sandy clay	Hard, clear	42	D, S	Yields about 30 bbl. a day.
34	NW.	26	"	"	"	Spring	10	1,930	0	1,930			Glacial gravel	" "		D, S	Sufficient for local needs.
35	SE.	27	"	"	"	Dug	20	1,945	- 9	1,941			Marine shale	" " alkaline		D, S	" " 6 head stock.
36	NE.	27	"	"	"	"	20	1,945	- 7	1,938	7	1,938	Eastend sand	Hard, clear	42	D, S	" " 10 " " .
37	SW.	28	"	"	"	"	12	1,995	- 8	1,987	8	1,987	" "	" "	43	D, S	" " local needs.
38	SE.	29	"	"	"	"	15	1,995	0	1,995			Marine shale	" " alkaline, iron		S,	" " 6 head stock. Unfit for humans.
39	SE.	29	"	"	"	"	30	2,000	- 26	1,974			Eastend sand	Hard, clear	43	D,	" " local house needs only.
40	SW.	30	"	"	"	"	20	2,035	- 17	2,018	17	2,018	" clay ?	" " Alkaline		D,	" " " " " " .
41	SW.	30	"	"	"	"	23	2,035	- 18	2,017	18	2,017	" "	Hard, clear, alkaline		S,	" " 20 head stock.
42	NW.	30	"	"	"	"	12	2,020	- 8	2,012	12	2,008	Ravenscrag shale	Soft, clear		D, S, I	" " local needs.
43	SE.	31	"	"	"	"	11	2,000	- 5	1,995	5	1,995	Whitemud clay	Hard, " alkaline		S,	" " 17 head of stock. Unfit for humans.
44	SE.	32	"	"	"	"	8	1,975	- 2	1,973	2	1,973	Glacial gravel	Hard, clear	42	D, S	Sufficient for 30 head stock.
45	SW.	32	"	"	"	"	22	1,965	- 18	1,947	18	1,947	Eastend grey sand	" " alkaline	42		" " 10 " " .
46	SW.	33	"	"	"	"	24	1,960	- 5	1,954	5.	1,955	Eastend grey sand	Hard, clear		D,	" " local household needs only.
47	NE.	34	"	"	"	"	26	1,920	- 10	1,910	6	1,914	Eastend grey sand	" " iron		D, S	Large supply maybe obtained anywhere along coulee.
48	NW.	35	"	"	"	"	15	1,920	- 10	1,910	10	1,910	Eastend grey sand	Hard, alkaline		S,	Sufficient for 6 head stock. Unfit for humans.
1	SW.	4	12	24	2	Dug	88	2,075	- 85	2,690	88	2,687	Glacial clay	" clear	48	D,	" " household needs only.
2	NE.	5	"	"	"	Spring	7	2,565	- 0	2,565		2,558	Whitemud sand	" "	46	D, S	" " 20 head stock.
3	SW.	5	"	"	"	Dug	12	2,475	- 8	2,467	12	2,463	Glacial gravel	" " alkaline	45	D, S	" " 12 " " .
4	SW.	6	"	"	"	"	23	2,437	- 17	2,420	23	2,414	" sand	Soft, clear	41	D, S	" " 18 " " .
5	SE.	7	"	"	"	"	12	2,480	- 8	2,472	12	2,468	" "	" "	48	D, S	" " 18 " " .
6	SW.	12	"	"	"	"	4	2,340	0	2,340	4	2,336	Ravenscrag shale	Hard, clear, alkaline	42	D, S	Large supply.

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WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horison	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
7	NE.	12	12	24	2	Dug	16	1,990	- 12	1,978	16	1,974	Glacial sand	Soft, clear	43	D, S	Insufficient for local needs.
8	NE.	12	"	"	"	"	23	1,990	0	1,990	23	1,967	Ravenscrag shale	Hard, clear, alkaline	42	S,	Large supply.
9	SE.	13	"	"	"	"	3	1,990	0	1,990	3	1,987	" "	Soft, clear	42	D, S	" " .
10	NW.	17	"	"	"	"	15	2,390	- 15	2,375	8	2,382	Glacial clay	Hard, " alkaline	44	D, S	Sufficient for local needs.
11	NE.	18	"	"	"	"	4	2,350	0	2,350	4	2,346	Whitemud clay	Hard, " alkaline		N.	Unfit for humans or stock.
12	SW.	18	"	"	"	Spring		2,390	0	2,390			Glacial drift	Soft, clear	47	D, S	Small supply.
13	NW.	18	"	"	"	Dug	12	2,350	- 6	2,344	12	2,338	" sand, gravel	Hard, " alkaline	45	D, S	Sufficient for 8 head stock.
14	SW.	19	"	"	"	"	12	2,250	- 8	2,242	12	2,238	Glacial sand, clay	Med. hard clear	47	D, S	" " household needs only.
15	NW.	19	"	"	"	"	12	2,170	- 8	2,162	12	2,158	Glacial sand, clay	Hard, clear, alkaline	42	D, S	" " 16 head stock.
16	SE.	24	"	"	"	"	5	2,100	0	2,100	5	2,095	Ravenscrag shale	Soft, clear		D, S, M	Large supply.
17	NE.	25	"	"	"	"	22	2,030			22	2,008	Glacial yellow clay	Hard, bitter, alkaline		N,	" " . Unfit for humans or stock.
18	SE.	26	"	"	"	Spring		2,120	0	2,120			Ravenscrag sand	Soft, clear	44	D, S	Sufficient for at least 60 head stock.
19	NW.	26	"	"	"	Dug	26	2,125	- 20	2,105	26	2,099	Whitemud sandy clay	Hard, " iron, alkaline	41	D, S	" " 30 head stock.
20	NE.	27	"	"	"	"	14	2,125	- 2	2,123	14	2,111	Ravenscrag sand	Soft, " clear	46	D, S	" " 17 " " .
21	SE.	28	"	"	"	Spring		2,450	0	2,450			" "	Soft, soda	44	D, M	Large supply.
22	NW.	30	"	"	"	Dug	24	2,150	- 14	2,136	24	2,126	Eastend "	Hard, alkaline	41	S,	Sufficient for 40 head stock.
23	SW.	32	"	"	"	"	8	2,125	- 3	2,122	8	2,117	" "	Soft, clear	47	D, S	" " local needs.
24	NW.	33	"	"	"	"	34	2,105	- 34	2,071	38	2,067	" "	Hard, alkaline clear	42	D, M	Insufficient, supplies 120 persons with drinking water. #.
25	SE.	33	"	"	"	Spring		2,170	0	2,170			" "	Med. hard, clear	44	D, S	Sufficient for 25 head stock.
26	SW.	34	"	"	"	Dug	12	2,190	- 6	2,184	12	2,978	Ravenscrag "	Hard, stronly alkaline, clear	43		" " 17 " " . Unfit for humans.
27	NW.	34	"	"	"	"	32	2,105	- 26	2,179	32	2,173	Glacial "	Hard, clear	46	D, S	" " 70 " " .
28	SW.	35	"	"	"	"	22	2,125	- 19	2,106	22	2,103	" "	Med. hard	44	D, S	" " 18 " " .

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.