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DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF TULLYMET No. 216 SASKATCHEWAN

BY

B. R. MacKay, H. N. Hainstock & G. L. Scott

Water Supply Paper No. 161

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CONTENTS

Page

Introduction..... 1

Glossary of terms used..... 5

Names and descriptions of geological formations referred to.. 8

Water-bearing horizons of the municipality..... 10

Water-bearing horizons in the unconsolidated deposits..... 11

Water-bearing horizons in the bedrock..... 14

Ground water conditions by townships:

Township 22, Range 11, west of 2nd meridian..... 15

Township 22, Range 12, " " " " 16

Township 23, Range 11, " " " " 19

Township 23, Range 12, " " " " 20

Township 24, Range 10, " " " " 21

Township 24, Range 11, " " " " 23

Township 24, Range 12, " " " " 24

Pipikisis Indian Reserve No.81..... 26

Okanase Indian Reserve No.82..... 26

Star Blanket Indian Reserve No.83..... 27

Little Black Bear Indian Reserve No.84..... 28

Statistical summary of well information..... 29

Statistical summary of well information Indian Reserves..... 30

Analyses and quality of water..... 31

General statement..... 31

Water from the unconsolidated deposits..... 35

Water from the bedrock..... 35

Well records..... 36

Illustrations

Map of the municipality.

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

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

GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF TULLYMET NO.216 SASKATCHEWAN

INTRODUCTION

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

Publication of Results

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

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

How to Use the Report

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

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

If one intends to sink a well and wishes to find the approximate depth to a water-bearing horizon, he must learn: (1) the elevation of the site, and (2) the probable elevation of the water-bearing bed. The elevation of the well site is obtained by marking its position on the map, Figure 2, and estimating its elevation with respect to the two contour lines between which it lies and whose elevations are give on the figure. Where contour lines are not shown on the figure, the elevations of adjacent wells as indicated in the Table of Well Records accompanying each report can be used. The approximate elevation of the water-bearing horizon at the well-site can be obtained from the Table of Well Records by noting the elevation of the water-bearing horizon in surrounding wells and by estimating from these known elevations its elevation at the well-site.[1] If the water-bearing horizon is in bedrock the depth to water can be estimated fairly accurately in this way. If the water-bearing horizon is in unconsolidated deposits such as gravel, sand, clay, or glacial debris, however, the estimated elevation is less reliable, because the water-bearing horizon may be inclined, or may be in lenses or in sand beds which may lie at various horizons and may be of small lateral extent. In calculating the depth to water, care should be taken that the water-bearing horizons selected from the Table of Well Records be all in the same geological horizon either in the glacial drift or in the bedrock. From the data in the Table

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

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

GLOSSARY OF TERMS USED

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Bearpaw Formation. The Bearpaw consists mostly of incoherent dark grey to dark brownish grey, partly bentonitic shales, weathering light grey, or, in places where much iron

is present, buff. Beds of sand occur in places in the lower part of the formation. It forms the uppermost bedrock formation over much of western and southwestern Saskatchewan and has a maximum thickness of 700 feet or somewhat more.

Belly River Formation. The Belly River consists mostly of non-marine sand, shale, and coal, and underlies the Bearpaw in the western part of the area. It passes eastward and northeastward into marine shale. The principal area of transition is in the western half of the area where the Belly River is mostly thinner than it is to the west and includes marine zones. In the southwestern corner of the area it has a thickness of several hundred feet.

Marine Shale Series. This series of beds consists of dark grey to dark brownish grey, plastic shales, and underlies the central and northeastern parts of Saskatchewan. It includes beds equivalent to the Bearpaw, Belly River, and older formations that underlie the western part of the area.

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Tullymet is an area of approximately 185 square miles in southeastern Saskatchewan. It consists of: three full townships, described as townships 22, 23, and 24, range 12; four partial townships, described as townships 22, 23, and 24, range 11, and township 24, range 10, all west of the second meridian. The main line of the Canadian National railways traverses the northeastern part of township 24, range 10. There are no trading settlements in the municipality; the residents in the southern parts are served mainly by the villages of Balcarres and Lipton, and the residents in the northern parts usually trade at the villages of Ituna or Hubbard. The rural post office of Tullymet is located in the NE.$\frac{1}{4}$, sec. 26, tp. 23, range 12. The post office is situated 50 miles southwest of the city of Yorkton.

Little Black Bear Indian Reserve No. 84, Star Blanket Indian Reserve No. 83, Okanase Indian Reserve No. 82, and all but the southern mile of Pipikisis Indian Reserve No. 81, cover an area of approximately 118 square miles. They are located southeast of the rural municipality of Tullymet and the water conditions of these indian reserves are discussed separately, but are included in the report of the municipality. The agency and the File Hills Indian school are situated in the northwest corner of Okanase Indian Reserve No. 82, 6$\frac{1}{2}$ miles southeast of Tullymet post office.

A small, flat area covered by glacial lake clays occurs in the southeastern corner of Pipikisis Indian Reserve. Glacial till-covered areas occur in the eastern part of the indian reserves and the southern parts of townships 22, ranges 11 and 12. The remainder of the municipality and of the indian reserves is covered by moraine. The ground surface of the till-covered areas is slightly undulating, contains shallow sloughs,

and is thinly wooded with poplar. The ground surface of the moraine-covered area is rough and hilly. Sloughs and small lakes are very numerous and the entire moraine-covered area is quite thickly wooded. A dense growth of poplar and willow occurs in the western portions of Star Blanket, Okanase, and Pipikisis Indian Reserves. The top soil is quite sandy in places and contains stones and boulders. The municipality is sparsely settled, roads are poor, and very little of the land is under cultivation. Stock raising is carried on extensively in the western townships of the municipality.

File hills, a low range of hills, run in a southwest-northeast direction, across the western parts of the indian reserves, and attain a maximum elevation of 2,260 feet in the western part of Star Blanket Indian Reserve. The drainage of the municipality and indian reserves is at right angles to the trend of File hills. Pheasant creek, a small, intermittent stream, flows in a southerly direction through township 24, range 10, and the western parts of Little Black Bear and Star Blanket Indian Reserves. The valley that contains this creek is about $\frac{1}{4}$ mile wide and less than 50 feet deep. Another small, intermittent creek flows in a southwesterly direction through township 22, range 12.

Water-bearing Horizons in the Unconsolidated Deposits

Approximately one-third of the farmers were short of well water during the drought of 1930 to 1934. Most of the wells in the municipality are dug by hand and they generally range from 8 to 30 feet in depth, and seldom exceed 40 feet. The upper 40 feet of the glacial drift usually consists of 10 to 25 feet of yellow, red, or black clay, and 15 to 30 feet of blue clay. Isolated pockets of sand and occasionally gravel occur at or near the contact of the yellow and blue clays. Farmers experience considerable difficulty in striking one of these pockets of sand and

gravel, and many dry holes or seepage wells are dug before a pocket is encountered. Occasionally non-water-bearing beds of sand or gravel are struck within 40 feet of the surface, but a fairly abundant supply of water generally is obtained. The water is not under pressure. The supply from some wells is sufficient for only 20 head of stock, whereas that from others is adequate for 50 head of stock. The drought of 1930 to 1934 affected the supply to some extent, but very few of the producing wells became intermittent. The water is generally hard and slightly "alkaline", but it is suitable for drinking. A few wells that tap thick surface deposits of sand yield moderately soft water, since the seepage water passes directly into the sand without coming into contact with the clay which is the chief source of mineral salts in the ground water. Most of the farmers who were short of water during the drought had been depending on seepage wells, sloughs, and small lakes as a source of water for stock. During the drought the sloughs and seepage wells became dry and the farmers were forced to haul water.

Throughout the municipality and the indian reserves wells bored or drilled to depths in excess of 50 feet generally obtain a permanent supply of water. Most of the deep wells are between 80 and 250 feet in depth; the deepest drilled well, 320 feet, is located near the File Hills Indian school. Many dry holes were bored and drilled to depths of 100 feet, but only seven dry holes were made between depths of 100 and 180 feet. Most of the deep wells tap sand aquifers and there is only one district in the municipality where a definite water-bearing horizon exists at a uniform elevation and extends over a fairly large area. Usually the deep wells tap discontinuous beds of sand. One well may strike an aquifer at 110 feet below the surface, whereas another well drilled on the adjacent section to a depth of 150 feet does

not encounter a water-bearing bed of sand or gravel. The fairly continuous water-bearing horizon was tapped at an elevation of 2,100 to 2,115 feet above sea-level by four wells in the northern part of township 24, range 11. The wells are 90 to 100 feet deep and the aquifer is a dirty, mucky sand. Water from aquifers that lie over 50 feet below the surface rises under pressure, and the supply is abundant and constant. The drought of 1930 to 1934 did not perceptibly decrease the supply, and many wells have never been pumped dry. Generally the water is hard and so highly mineralized as to be unfit for drinking, although it is suitable for stock use. It usually has a high iron content. Several wells in the southern 9 miles of the municipality are either becoming plugged or have already become completely plugged by fine sand.

Before digging a shallow well farmers are advised to use a test auger to locate a pocket of water-bearing sand or gravel. The test holes need not exceed a depth of 30 to 40 feet. The possibilities of obtaining water at depth in all parts of the municipality are considered good. The water will probably be too highly mineralized for drinking, but it will be quite suitable for stock. The only disadvantage to deep drilling as a means of securing water is that trouble may be experienced by sand plugging the casing and shutting off the supply of water. The glacial drift is very thick and it is believed to be in excess of 400 feet. Water-bearing horizons are apt to occur in the glacial drift at depths in excess of 50 feet, and the probabilities of striking water are considered good.

As an alternative to drilling, deep dugouts could be excavated and there are many sloughs that offer excellent locations for these artificial reservoirs. The dugouts should be made at least 12 feet deep. The surface water collected is more beneficial

for stock than the highly mineralized water from deep wells.

Water-bearing Horizons in the Bedrock

The Marine Shale series underlies the glacial drift throughout the municipality. No well in the municipality or in the indian reserves is deriving its water supply from an aquifer in the Marine Shale series. The Marine Shale series seldom contains water-bearing horizons in this part of Saskatchewan and it is, therefore, inadvisable to drill into it in a search for water.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 22, Range 11

This is a partial township west of the Pipikisis and Okanase Indian Reserves. The western parts of sections 6 and 7 are mantled by glacial till, whereas the remainder of the township is covered by moraine. The ground surface in the moraine-covered area is very undulating and hilly, and is characterized by numerous sloughs and small lakes. Church lake, in section 20, is the largest of these undrained depressions, and is 7 feet deep and approximately 120 acres in area. Most of the undrained depressions became dry during the drought of 1930 to 1934. The ground surface is less undulating in the glacial till-covered area.

Of the eleven farmers interviewed, seven depend on shallow hand dug wells or haul water for stock, and the remaining four use deep drilled wells. Most of the shallow hand dug wells are unreliable in drought years and winters and only two yield a permanent supply of water. These two wells are located in the NW.$\frac{1}{4}$, section 4, and the NW.$\frac{1}{4}$, section 31, and are 22 and 10 feet deep, respectively. The aquifer is sand and the 22-foot well yields sufficient water for 20 head of stock. Pockets of sand and gravel are very difficult to locate in the upper 30 feet of the glacial drift. In years of average rainfall sloughs and seepage wells supply an adequate amount of water for stock. During the drought of 1930 to 1934 the supply from the seepage wells became intermittent and farmers were forced to haul water from Church lake in section 20.

Four drilled wells in the NE.$\frac{1}{4}$. section 5, NW.$\frac{1}{4}$, section 6, SW.$\frac{1}{4}$, section 7, and NW.$\frac{1}{4}$, section 19, struck discontinuous beds of sand and gravel at depths of 138, 231, 250, and 165 feet, respectively. The 231- and 250-foot wells have probably struck the same gravel aquifer at an elevation of 1,845

feet above sea level. The log of the 231-foot well shows that it passed through 20 feet of yellow clay, 210 feet of blue clay, and 6 inches hardpan, and gravel. The water in the four wells rises under hydrostatic pressure and the supply is abundant. The highest pressure was recorded in the 250-foot well where the water rose to a point 40 feet below the surface. The water is hard and highly mineralized, contains iron, and unsuitable for drinking, but is used for stock. Seepage wells are used for household purposes or water is hauled. A fifth drilled well, in the SE.$\frac{1}{4}$, section 18, struck a sand aquifer at a depth of 196 feet below the surface, but the abundant supply was partly shut off by sand plugging the casing and the well has been abandoned. The quantity and quality of the water were similar to those in the other four drilled wells. Two dry holes 180 feet deep were drilled in the SW.$\frac{1}{4}$, section 16.

Before digging a well, farmers are advised to prospect the upper 40 feet of the glacial drift by means of a testing auger. Drilling is preferable to boring with a large auger in this township, and the probabilities of striking a permanent supply of water in the drift at depths greater than 150 feet below the surface are good. The glacial drift is at least 320 feet thick, and possibly extends to a depth of 500 feet. The numerous undrained depressions offer ideal locations for the excavation of deep dugouts. This means of collecting and conserving surface water is recommended for farmers who are unable to obtain sufficient water from shallow wells and who cannot finance deep drilling operations.

Township 22, Range 12

The southeastern part of the township is mantled by glacial till, whereas the remainder is covered by moraine. The ground surface in the moraine-covered district is rolling and

hilly. The top soil in the northwestern parts of the township is very stony and light, and this area which is sparsely settled is largely devoted to the raising of live stock. The ground surface in the till-covered area is slightly undulating and the area is more thickly settled. Poplar bluffs, and sloughs, are very numerous in all but the southeastern part of the township. The headwaters of a small, intermittent stream occur in the NW.$\frac{1}{4}$, section 36, and the stream flows in a southerly direction through a shallow valley approximately $\frac{1}{4}$ mile wide. Another shallow, wide ravine occurs in the western part of the township.

Farmers living adjacent to these two valleys are able to obtain fairly abundant supplies of hard, slightly mineralized water from wells dug in the floors of the valleys. The wells are seldom more than 10 feet deep and the aquifers are formed by sand that underlies light-coloured boulder clay. Two springs, located in section 4, and the SW.$\frac{1}{4}$, section 23, were used by many farmers during the drought as a source of water for both domestic and stock use.

Elsewhere in the township deposits of sand and gravel in the upper part of the drift are scarce, and it is very difficult to locate a permanent supply of water at depths of less than 100 feet. Numerous holes have been dug or bored to depths of 20 to 100 feet, but they either fail to encounter water or obtain only small seepage supplies. These wells usually penetrate 20 feet of weathered boulder clay, and then blue boulder clay. Thin layers of sand are occasionally struck in the blue clay, but the supply of water obtained is small and is highly mineralized. A 47-foot bored well in the SW.$\frac{1}{4}$, section 8, penetrated 32 feet of yellow clay and 12 feet of blue clay before striking a 3-foot layer of fine sand. The supply of water from this well is very poor and it is so highly mineralized that some live stock refuse to drink it. Those farmers who were dependent upon shallow wells for a water

supply, were forced to haul water during the drought years when seepage wells and sloughs became dry.

In sections 1, 2, 10, 11, 12, and 13, a number of wells have been drilled to depths ranging from 91 feet to 208 feet. They encounter discontinuous beds of sand, since a 190-foot well in the SW.$\frac{1}{4}$, section 2, and a 150-foot well in the SE.$\frac{1}{4}$, section 11, did not strike water. The water from the producing wells rises under pressure to an average height of 50 feet below the surface and the supply is abundant. Unfortunately the water is highly mineralized and unsuitable for drinking. The water from a 91-foot well in the SE.$\frac{1}{4}$, section 1, is even disliked by stock. The fine sand that usually forms the aquifers in these wells causes considerable trouble by plugging the well casings and shutting off the supply. Two 110-foot wells, one in the NW.$\frac{1}{4}$, section 2, and the other in the NE.$\frac{1}{4}$, section 10, have been rendered useless by sand plugging the casings, and the 208-foot well in the SW.$\frac{1}{4}$, section 12, yields only 9 barrels of water a day. Farmers owning drilled wells either use shallow seepage wells or haul water for domestic purposes as the water from the drilled wells has an objectionable taste, probably due to the high iron content, and some of the water is strongly laxative.

It is evident that abundant supplies of water can be obtained from the glacial drift at depths greater than 100 feet in this township, but due to the poor quality of the water, and the difficulty experienced with the sand shutting off the supply, farmers are well advised to excavate deep dugouts in preference to drilling. The dugout, if made deeper than 12 feet and located where the maximum amount of water can be collected, will prove satisfactory, and the surface water is more beneficial for stock than the highly mineralized water from deep wells.

Township 23, Range 11

This is a partial township west of the Star Blanket and Little Black Bear Indian Reserves. The entire township is covered by moraine. The ground surface is very rolling and rough, and is dotted with sloughs and small lakes. The township is thickly wooded with poplar and willow.

The upper 100 feet of the glacial drift is largely composed of clay, but occasional large pockets of sand are located in the upper 25 feet of the drift. The only shallow wells in the township that yield a permanent supply of water are 25 feet or less in depth. The pockets of sand are very difficult to locate, but when a well has tapped one of them the supply is usually quite abundant. The sand deposits underlie yellow clay and the water obtained is hard and suitable for drinking. Numerous attempts are usually made before a permanent supply of water is obtained and several farmers in the township have been unable to locate deposits of water-bearing sand. These farmers depend on sloughs and seepage wells for a water supply in years of average rainfall, and during the drought of 1930 to 1934 they were forced to haul water. A farmer in the NW.$\frac{1}{4}$, section 32, drilled two dry holes 80 and 110 feet deep and they were entirely in clay.

Three drilled wells in the NW.$\frac{1}{4}$, section 18, SW.$\frac{1}{4}$, section 20, and SE.$\frac{1}{4}$, section 30, struck deposits of fine water-bearing sand at depths of 125, 175, and 190 feet, or at elevations of 2,030, 1,985, and 1,980 feet above sea-level. The water rises under hydrostatic pressure to points approximately 50 to 60 feet below the surface, and the supply is abundant. The water is hard, contains a large amount of iron, and has a disagreeable taste. The 125-foot well has become plugged by sand and the other two drilled wells are also gradually being plugged by sand. In the 190-foot

well the drill passed through 40 feet of yellow boulder clay and 150 feet of blue clay that contains small stones, before entering the water-bearing sand bed.

Farmers are advised to dig wells and dugouts in this township. Before digging a well test holes should be sunk at many places in order to locate a pocket of sand. Testing need not exceed a depth of 30 feet. The ground surface is very favourable for the excavation of deep dugouts, the numerous slough basins providing ideal locations for these artificial reservoirs. They should be at least 12 feet deep. Boring is not recommended, but deep drilling will probably strike abundant supplies of highly mineralized water. Difficulty may be experienced, however, with sand plugging the casings. The glacial drift is probably more than 400 feet thick and water-bearing horizons of sand or gravel are apt to occur at any depth within it.

Township 23, Range 12

This township is mantled by moraine, the ground surface is rough, and is characterized by undrained depressions. The area is sparsely settled and very little land is under cultivation. The raising of live stock is the chief occupation.

The supplies of water obtained from the upper part of the drift in this township are generally small, and only eight wells, all less than 26 feet deep, have struck pockets of sand or gravel that yield fairly abundant and constant supplies of water. The upper 30 feet of the drift consists of 10 to 20 feet of yellow, weathered boulder clay, and underlying blue clay that may or may not contain pockets of gravel. Great difficulty is often experienced in locating one of these pockets and two farmers in section 5 have dug and tested to depths of 30 feet without obtaining a permanent supply of water. Sand was struck in several

of the holes, but it did not contain water, and a well in the SW.$\frac{1}{4}$, section 5, penetrated 14 feet of dry sand. When a pocket of water-bearing sand or gravel is encountered, however, a fairly abundant supply of water is usually obtained. The water is hard and is suitable for all farm needs.

Three wells in the NE.$\frac{1}{4}$, section 1, the NW.$\frac{1}{4}$, section 4, and the NW.$\frac{1}{4}$, section 34, obtain abundant supplies of highly mineralized water at depths of 115, 86, and 85 feet, respectively. The aquifers are formed by sand and the water rises under hydrostatic pressure. In the 115- and 85-foot drilled wells the water rises to points 50 feet below the surface, and in the 86-foot bored well the water rises to a point 78 feet below the surface. The 115-foot well was drilled through 20 feet of yellow clay, and 95 feet of blue clay that contained a few stones, before the sand was struck. The water in these wells has a high iron content and it is not used for drinking if shallow well water is obtainable. A 100-foot dry hole was drilled in the SW.$\frac{1}{4}$, section 13. At least six farmers have no permanent supply of water and use sloughs or tank water for stock.

Since pockets of sand or gravel that yield fairly abundant supplies of hard, drinkable water occur in the upper 30 feet of the glacial drift, farmers are advised to prospect thoroughly for them by sinking test holes with augers. The glacial drift is estimated to be in excess of 400 feet thick, and drilling to depths greater than 80 feet in the drift will probably strike permanent supplies of highly mineralized water. The excavation of deep dugouts is recommended for collecting and storing a supply of surface water for stock use.

Township 24, Range 10

Part of Little Black Bear Indian Reserve occupies the southern mile of this township and only sections 7 to 36 inclusive are discussed in this report. The entire township is covered by

moraine. The ground surface is rolling and is characterized by many knolls and depressions. Pheasant creek flows intermittently in a southeasterly direction through the centre of the township. The valley through which it passes is approximately one-quarter of a mile wide and less than 50 feet deep. Poplar bluffs occur throughout the township.

The supply of water obtained in this township is not abundant and eleven of the thirty-two farms visited are short of water. Every well, with the exception of a 50-foot bored well in the NE.$\frac{1}{4}$, section 7, has been dug to depths less than 31 feet. The yield from these shallow wells is variable and depends upon the extent of the sand or gravel pocket that has been tapped and upon the amount of rainfall. The aquifers generally underlie yellow boulder clay, but occasionally wells have been dug that strike a sand or gravel aquifer directly beneath the top soil. These latter wells yield soft water, whereas wells that penetrate the yellow clay yield water that is hard and sometimes "alkaline". The supply of water in the shallow wells was reduced by the drought of 1930 to 1934, but generally an individual well will water from 20 to 30 head of stock regardless of the seasonal rainfall. One 26-foot well in the NW.$\frac{1}{4}$, section 28, waters 50 head of stock. Farmers who were short of water during the drought of 1930 to 1934 used sloughs for stock when possible, or hauled water from neighbouring wells. Dugouts are not used extensively. Their excavation is advised. Slough basins are numerous and they are good locations for these artificial reservoirs.

The 50-foot bored well was the only attempt to secure water at depth. This well penetrated 40 feet of boulder clay and obtains water in 10 feet of gravel. The water rises under pressure to a point 30 feet below the surface and the supply is sufficient for 40 head of stock. The water is hard and "alkaline",

but it is used for drinking. The glacial drift is very thick in this township and is probably in excess of 400 feet. Water-bearing horizons of sand and gravel are apt to be struck at any level within it and deep drilled wells will probably encounter water. The water will probably be hard and too highly mineralized for drinking, but should be suitable for stock.

Township 24, Range 11

Part of the Little Black Bear Indian Reserve occupies sections 1, 2, and 3, and a portion of section 4, and this area is not included in the discussion of this township. The entire township is covered by moraine and the ground surface is very hilly and rough, contains numerous sloughs and small lakes, and is thickly wooded with poplar.

A fairly abundant supply of water is obtained in this township and only six of the thirty farmers interviewed are short of water and are forced to haul water for stock. The wells in this township range from 8 to 100 feet in depth. The aquifers for these wells are composed of discontinuous deposits of sand and gravel.

Wells less than 50 feet deep usually yield water which is not under pressure and which is more highly mineralized than that from the deeper wells. The water is hard but not "alkaline" and it is used for drinking. Dry holes were bored to depths of 50 and 90 feet in sections 14, 18, and 26, and numerous dry holes were dug in the NE.$\frac{1}{4}$, section 16, before a good supply of slightly mineralized water was obtained from a pocket of sand.

The wells that are deeper than 50 feet yield water that is under hydrostatic pressure, and the supply from these wells is more abundant than that from the shallower wells. The water is highly mineralized and is generally unsuitable for drinking. Four deep wells in the NW.$\frac{1}{4}$, section 16, the NW.$\frac{1}{4}$, and NE.$\frac{1}{4}$, section 28, and the SE.$\frac{1}{4}$, section 30, tap a common water-bearing horizon

at an elevation of 2,100 to 2,115 feet above sea-level. The wells are 100, 100, 90, and 95 feet deep, respectively, and they tap an aquifer composed of sticky, dirty sand. The water rises under pressure to points 60, 60, 50, and 65 feet below the surface and none of the wells has even been pumped dry. The water is hard, contains iron, and has a bitter taste due to the large amount of mineral salts in solution. It cannot be used for drinking although it imparts no ill effects to stock. No other wells in the municipality encountered this sticky sand and its areal extent is apparently limited to the northern part of this township. The 100-foot well in the NW.$\frac{1}{4}$, section 16, penetrated 40 feet of red clay, and 50 feet of blue clay containing small stones, before the sand was struck.

No attempts have been made to secure water at depths greater than 100 feet in this township, but the glacial drift is believed to be over 400 feet thick, and other water-bearing horizons of sand or gravel should be located at depths greater than 100 feet in this thick drift mantle.

The numerous depressions are suitable locations for the excavation of deep dugouts. These dugouts should be at least 12 feet deep and their excavation is recommended when deep drilling operations cannot be financed.

Township 24, Range 12

This township is mantled by moraine and the ground surface is rough and hilly, contains numerous undrained depressions, and is thickly wooded. Only a small part of the township is under cultivation.

All the producing wells in the township are dug to depths of 20 feet or less, or are drilled to depths of 130 feet or more, but numerous dry holes have been dug, bored, and drilled to depths ranging from 20 feet to 150 feet. It appears that if permanent

supplies of water cannot be located within a depth of 25 feet they will not be obtained until a depth of 130 feet is reached. The upper 25 feet of the glacial drift is composed of yellow boulder clay that contains pockets of sand and gravel at or near its base. Wells tapping these pockets usually yield a supply of water that is sufficient for 20 to 40 head of stock. As the pockets of water-bearing sand or gravel are not of frequent occurrence it is usually necessary to dig a number of holes before a producing well is obtained. The water is hard and not too highly mineralized to prevent it being used for drinking.

Abundant supplies of water are obtained only from the deep, drilled wells. Three wells have been drilled in the SE.$\frac{1}{4}$, section 4, the NE.$\frac{1}{4}$, section 19, and the NW.$\frac{1}{4}$, section 20, and they are 130, 230, and 220 feet deep, respectively. The aquifers are formed by sand, and the 220- and 230-foot wells have struck the same water-bearing horizon at an elevation of 1,975 feet above sea-level. The water in all three wells is under pressure and in the 220- and 230-foot wells it rises to points 80 feet below the surface. The drought of 1930 to 1934 did not perceptibly decrease the supply in these wells. The water is hard and too highly mineralized for drinking, but it has no ill effects on stock.

Farmers are advised to use test augers for locating pockets of sand and gravel before digging a shallow well. These tests need not exceed a depth of 30 feet. Boring is not recommended, but drilling to depths in excess of 125 feet will probably locate a water-bearing horizon. The glacial drift is thought to be in excess of 400 feet thick, and water-bearing horizons of sand or gravel are apt to occur at any horizon below a depth of 125 feet. Deep dugouts located in slough basins will prove satisfactory as a means of conserving surface water for stock. Their excavation is advised when water cannot be obtained at shallow depth and when drilling cannot be financed.

Pipikisis Indian Reserve No. 81

Pipikisis Indian Reserve covers an area of approximately 40 square miles, of which approximately 31 square miles are discussed in this report. The western two-thirds of this area are covered by moraine and the ground surface is hilly and thickly wooded. A small area in the southeastern corner is quite flat and is mantled by a thin covering of glacial lake clays. The remainder of the area is covered by glacial till and the ground surface is less undulating than it is in the moraine-covered district. Two small, shallow lakes occur in the southeastern and northeastern parts of the reserve.

No wells were visited in this indian reserve but the Indian agent reports that the inhabitants use sloughs and shallow seepage wells.

Okanase Indian Reserve No.82

Okanase Indian Reserve comprises an area of approximately 22 square miles, and lies immediately north of Pipikisis Indian Reserve No. 81. The eastern part of the reserve is mantled by glacial till and the remainder of the area is covered by moraine. The ground surface is rough and hilly and thickly wooded. A particularly dense growth of poplar covers an area of approximately 9 square miles in the western part of the reserve. The agency and the File Hills Indian school are located in the northwestern corner. Four wells, 60, 130, 226, and 320 feet deep, have been drilled in the western part of the reserve. The 60-foot well is located one mile south of the agency. The well, drilled on a hill, penetrated 15 feet of yellow clay, 30 feet blue clay, and 11 feet of muddy clay and gravel. The water rises under pressure to a point 20 feet below the surface and the supply is abundant. The water is suitable for all needs, but the well is seldom used. The 130-foot well was drilled on a slope near the agency, and it penetrated 17 feet of yellow boulder clay, 88 feet of blue boulder

clay, 12 feet of hardpan, 5 feet of sandy clay, and 8 feet of sand and gravel. The water is hard and contains iron, and the hydrostatic pressure is sufficient to cause the water to rise to a point 90 feet below the surface. The well has never been pumped dry although it is used extensively.

The 226-foot well is located at a point 1 mile east of the western boundary and 1 mile north of the southern boundary of the reserve. This well penetrated 10 feet of black clayey loam, 25 feet of yellow clay, and 191 feet of blue clay. The water is hard and the supply is small. A shallow well dug near the drilled well is used by the residents as the water from it is not as highly mineralized as that from the deep well.

The 320-foot drilled well was made in 1932 for the File Hills Indian school. The aquifer is sand and the water rises under pressure to a point 85 feet below the surface. The water is hard, "alkaline", contains iron, and is not suitable for drinking. A 114-foot dry hole was sunk in the vicinity of this drilled well. The school uses shallow wells and during the drought of 1930 to 1934 the water supply was inadequate for its needs. Although drilled wells that yield abundant supplies of water are provided for the residents, they are seldom used. The water from sloughs, small lakes, and seepage wells is preferred to that of the drilled wells and most of the water used by the Indian residents is obtained from these sources.

Star Blanket Indian Reserve No. 83

The Star Blanket Indian Reserve occupies an area of approximately 21½ square miles and is located immediately north of Okanase Indian Reserve. Pheasant creek flows intermittently in a southeasterly direction through the eastern 1½ miles of the reserve. The valley that contains the stream is very wide and shallow. A strip of country about three-quarters mile wide is

mantled by boulder clay or glacial till. The remainder of the reserve is covered by moraine. The ground surface is very undulating, especially in the western half of the reserve. Tree growth is extensive and it is particularly dense in the southern and western parts. Sloughs and small lakes are very numerous.

No wells were recorded in the Indian reserve. The agency reports that the residents depend almost entirely on sloughs, small lakes, and shallow seepage wells for a supply of water both for drinking and for stock.

Little Black Bear Indian Reserve No.84

Little Black Bear Indian Reserve covers an area of approximately 43 square miles. It is located immediately north of Star Blanket Indian Reserve No. 83. Pheasant creek flows intermittently in a southerly direction through the eastern part of the reserve. A small area in the southeastern part of the reserve along Pheasant creek is mantled by boulder clay, but the remainder of the reserve is covered by moraine. The ground surface is rough and hilly and quite thickly wooded with poplar.

Two drilled wells 160 feet deep were reported in this Indian reserve. One of these wells is located at a point 1½ miles east of the western boundary and 1½ miles north of the southern boundary. It was drilled on a slope and the log of this well, in descending order, is as follows: 4 feet top soil; 25 feet yellow boulder clay; 15 feet blue boulder clay; 10 feet sand and gravel; 102 feet blue clay; 3 feet sand; and 1 foot gravel. The water rises to a point 110 feet below the surface and the supply is abundant. The water is hard and is suitable both for drinking and for stock. The other 160-foot drilled well is located approximately one-half mile south of the above well, but no information regarding this well was obtained.

Although drilled wells are provided for the residents, they are seldom used as the Indians prefer using surface water from sloughs, small lakes, and seepage wells.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF TULLYMET, NO. 216, SASKATCHEWAN.

West of 2nd meridian — Township / Range	22 / 11	22 / 12	23 / 11	23 / 12	24 / 10	24 / 11	24 / 12	Total No. in Municipality
Total No. of Wells in Township	15	74	17	35	45	43	42	271
No. of wells in bedrock	0	0	0	0	0	0	0	0
No. of wells in glacial drift	15	74	17	35	45	43	42	271
No. of wells in alluvium	0	0	0	0	0	0	0	0
Permanency of Water Supply								
No. with permanent supply	8	36	9	11	33	26	20	143
No. with intermittent supply	3	5	3	10	6	5	7	39
No. dry holes	4	33	5	14	6	12	15	89
Types of Wells								
No. of flowing artesian wells	0	0	0	0	0	0	0	0
No. of non-flowing artesian wells	5	8	3	3	1	8	3	31
No. of non-artesian wells	6	33	9	18	38	23	24	151
Quality of Water								
No. with hard water	10	37	11	21	35	29	27	170
No. with soft water	1	4	1	0	4	2	0	12
No. with salty water	0	0	0	0	0	0	0	0
No. with "alkaline" water	3	2	0	1	21	3	2	32
Depths of Wells								
No. from 0 to 50 feet deep	8	55	12	31	45	36	28	215
No. from 51 to 100 feet deep	0	11	1	3	0	7	4	26
No. from 101 to 150 feet deep	1	5	2	1	0	0	8	17
No. from 151 to 200 feet deep	4	2	2	0	0	0	0	8
No. from 201 to 500 feet deep	2	1	0	0	0	0	2	5
No. from 501 to 1,000 feet deep	0	0	0	0	0	0	0	0
No. over 1,000 feet deep	0	0	0	0	0	0	0	0
How the Water is used								
No. usable for domestic purposes	7	34	11	20	38	25	23	158
No. not usable for domestic purposes	4	7	1	1	1	6	4	24
No. usable for stock	10	41	12	21	39	31	27	181
No. not usable for stock	1	0	0	0	0	0	0	1
Sufficiency of Water Supply								
No. sufficient for domestic needs	8	36	9	11	33	26	19	142
No. insufficient for domestic needs	3	5	3	10	6	5	8	40
No. sufficient for stock needs	7	32	8	11	25	24	15	122
No. insufficient for stock needs	4	9	4	10	14	7	12	60

STATISTICAL SUMMARY OF WELL INFORMATION IN
INDIAN RESERVES, SASKATCHEWAN.

West of 2nd meridian	No. 81	No. 82	No. 83	No. 84	Total No. in Reserves
Total No. of Wells in Reserves	?	7	?	2	9
No. of wells in bedrock		0		0	0
No. of wells in glacial drift		7		2	9
No. of wells in alluvium		0		0	0
Permanency of Water Supply					
No. with permanent supply		5		2	7
No. with intermittent supply		1		0	1
No. dry holes		1		0	1
Types of Wells					
No. of flowing artesian wells		0		0	0
No. of non-flowing artesian wells		4		2	6
No. of non-artesian wells		2		0	2
Quality of Water					
No. with hard water		6		2	8
No. with soft water		0		0	0
No. with salty water		0		0	0
No. with "alkaline" water		1		0	1
Depths of Wells					
No. from 0 to 50 feet deep		2		0	2
No. from 51 to 100 feet deep		1		0	1
No. from 101 to 150 feet deep		2		0	2
No. from 151 to 200 feet deep		0		2	2
No. from 201 to 500 feet deep		2		0	2
No. from 501 to 1,000 feet deep		0		0	0
No. over 1,000 feet deep		0		0	0
How the Water is used					
No. usable for domestic purposes		6		2	8
No. not usable for domestic purposes		0		0	0
No. usable for stock		6		2	8
No. not usable for stock		0		0	0
Sufficiency of Water Supply					
No. sufficient for domestic needs		5		2	7
No. insufficient for domestic needs		1		0	1
No. sufficient for stock needs		5		2	7
No. insufficient for stock needs		1		0	1

ANALYSES AND QUALITY OF WATER

General Statement

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

Total Dissolved Mineral Solids

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

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

Mineral Substances Present

Calcium and Magnesium

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

Sodium

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

Sulphates

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

Chlorides

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

Iron

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

Hardness

Calcium and magnesium salts impart hardness to water. Hardness of water is commonly recognized by its soap-destroying powers as shown by the difficulty of obtaining lather with soap. The total hardness of a water is the hardness of the water in its original state. Total hardness is divided into "permanent hardness" and "temporary hardness". Permanent hardness is the hardness of the water remaining after the sample has been boiled and ~~it represents the~~ amount of mineral salts that cannot be removed by boiling. Temporary hardness is the difference between the total hardness and the permanent hardness and represents the amount of mineral salts that can be removed by boiling. Temporary hardness is due mainly to the bicarbonates of calcium and magnesium and iron, and permanent harness to the sulphates and chlorides of calcium and magnesium. The permanent hardness

can be partly eliminated by adding simple chemical softeners such as ammonia or sodium carbonate, or many prepared softeners. Water that contains a large amount of sodium carbonate and small amounts of calcium and magnesium salts is soft, but if the calcium and magnesium salts are present in large amounts the water is hard. Water that has a total hardness of 300 parts per million or more is usually classed as excessively hard. Many of the Saskatchewan water samples have a total hardness greatly in excess of 300 parts per million; when the total hardness exceeded 3,000 parts per million no exact hardness determination was made. Also no determination for temporary hardness was made on waters having a total hardness less than 50 parts per million. As the determinations of the soap hardness in some cases were made after the samples had been stored for some time, the temporary hardness of some of the waters as they come from the wells probably is higher than that given in the table of analyses.

Water from the Unconsolidated Deposits

No samples of water from the glacial drift in this municipality or the Indian reserves were collected. Wells less than 30 or 40 feet deep usually yield water of better quality than do the deep, bored or drilled wells. The water from the shallow dug wells is usually described as being hard and slightly "alkaline". A few wells yield soft water. These soft water producing wells are seldom more than 20 feet deep, and they have been dug entirely in sand or gravel, with little or no overlying boulder clay. The water from the shallow wells is suitable for all farm needs. The deep bored or drilled wells yield hard, highly mineralized water that commonly contains a relatively large amount of iron. The main constituent mineral salts in the water obtained at depth in the drift are probably the sulphates of magnesium and sodium. These two salts cause the water to be laxative. Lesser quantities of calcium sulphate, calcium carbonate, and sodium chloride will probably be found in the water. The iron contained in solution imparts an objectionable taste to the water. The water from the deep wells is seldom used for drinking, but it is usually suitable for stock.

Water from the Bedrock

Water is seldom found in the Marine Shale series that underlies the glacial drift in this part of Saskatchewan. On the rare occasions when water has been obtained, it is generally so highly mineralized with sodium sulphate, magnesium sulphate, and sodium chloride that it cannot be used for any farm purpose.

WELL RECORDS—Rural Municipality of TULLYMET NO. 216, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	NW.	4	22	11	2	Dug	22	2,130	- 11	2,119			Glacial sand	Hard, "alkaline"		D, S	Sufficient for 20 head stock.
2	NE.	5	"	"	"	Drilled	138	2,140	-100	2,040	138	2,002	Glacial sand	Hard, iron		S	Abundant supply. A 27-foot well provides drinking water.
3	NW.	6	"	"	"	Drilled	231	2,080	- 70	2,010	231	1,849	Glacial gravel	Hard, iron, "alkaline"		S	Abundant supply; a seepage well provides drinking water.
4	SE.	7	"	"	"	Dug	12	2,130	- 5	2,125			Glacial drift	Soft		D, S	Seepage water from a dam hauls water occasionally.
5	SW.	7	"	"	"	Drilled	250	2,090	- 40	2,050	250	1,840	Glacial sandy gravel	Hard, iron		D, S	Abundant supply for stock; sometimes hauls drinking water.
6	NW.	9	"	"	"	Drilled	180	2,170					Glacial drift				One of two similar dry holes; hauls stock and drinking water.
7	SW.	16	"	"	"	Dug	25	2,170					Glacial drift				One of two dry holes; hauls water.
8	SE.	18	"	"	"	Drilled	196	2,130			196	1,934	Glacial fine sand	Hard, iron		N	Well has been plugged by sand; hauls water from a lake.
9	NW.	19	"	"	"	Drilled	165	2,140			165	1,975	Glacial sand			S	Sufficient supply.
10	NW.	20	"	"	"	Dug	7	2,150	- 2	2,148			Glacial drift	Hard, "alkaline"			Seepage well beside a slough, stock are watered at a lake.
11	NW.	31	"	"	"	Dug	10	2,150	- 8	2,142			Glacial sand	Hard		D, S	Sufficient supply.
1	SE.	1	22	12	2	Drilled	91	2,070	- 51	2,019	91	1,979	Glacial sand	Hard, "alkaline"		S	Abundant supply, but stock do not like the water; uses a dam. A seepage well is used for drinking water.
2	SE.	2	"	"	"	Drilled	180	2,060	- 80	1,980	180	1,880	Glacial fine sand	Hard, iron		S	Abundant supply; hauls drinking water.
3	NW.	2	"	"	"	Drilled	110	2,060	- 80	1,980	110	1,950	Glacial sand	Hard		S	Abundant supply, but well has been plugged by sand; hauls water.
4	SW.	2	"	"	"	Drilled	190	2,060					Glacial drift				One of several dry holes; hauls stock and drinking water.
5	SE.	3	"	"	"	Bored	95	2,050					Glacial drift				The deepest of many dry holes; hauls water.
6	NE.	3	"	"	"	Dug	20	2,035	- 15	2,020			Glacial sand	Hard		D, S	Sufficient supply.
7	NE.	4	"	"	"	Bored	65	2,050					Glacial drift				Dry hole; uses a 10-foot well in a ravine which yields sufficient water.
8	SE.	6	"	"	"	Dug	8	2,040	- 4	2,036			Glacial sand	Hard		D	Sufficient for 15 head stock.
9	NW.	6	"	"	"	Dug	8	2,035	- 2	2,033			Glacial sand	Soft		D, S	Plenty of water; can obtain water anywhere in ravine at 8 feet.
10	SW.	8	"	"	"	Bored	47	2,060	- 44	2,016			Glacial fine sand	Hard, "alkaline"		S	Intermittent supply; some stock refuse this water; hauls water a distance of 2½ miles.
11	NE.	10	"	"	"	Bored	62	2,050	- 40	2,010			Glacial sand	Hard		S	Insufficient and waters only 25 head stock; 110-foot well plugged by sand.
12	SE.	11	"	"	"	Drilled	150	2,070					Glacial drift				Dry hole; hauls water.
13	SW.	12	"	"	"	Drilled	208	2,080	-140	1,940	208	1,872	Glacial sand	Hard, iron		D, S	Delivers 9 barrels of water a day; an 18-foot well yields a fair supply.
14	SE.	12	"	"	"	Drilled	96	2,090	- 45	2,045	96	1,994	Glacial sand	Hard, iron soda		D, S	Abundant supply.
15	SE.	13	"	"	"	Drilled	130	2,110	- 90	2,020	130	1,980	Glacial sand	Hard		S	Abundant supply; a 24-foot well is used for drinking water.

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

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

WELL RECORDS—Rural Municipality of TULLYMET NO. 216, SASKATCHEWAN

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
16	NW.	13	22	12	2	Dug	20	2,110					Glacial drift				One of numerous dry holes; hauls water.
17	NE.	13	"	"	"	Drilled	110	2,130	- 45	2,085	110	2,020	Glacial sand	Hard, iron		S	Abundant supply; a 24-foot well yields a good supply of house water. Many seepage wells
18	NE.	14	"	"	"	Bored	50	2,105					Glacial drift				Dry hole; hauls water from a spring.
19	SE.	15	"	"	"	Dug	8	2,050	- 4	2,046	4	2,046	Glacial sand	Hard		D, S	Plentful supply.
20	SE.	16	"	"	"	Bored	45	2,100					Glacial drift				One of many dry holes; uses sloughs and hauls water.
21	SW.	17	"	"	"	Bored	40	2,080					Glacial drift				Numerous dry holes; hauls water and uses sloughs.
22	SW.	18	"	"	"	Dug	8	2,090	- 2	2,088			Glacial sand	Soft		D, S	Good supply; well is never dry.
23	SW.	23	"	"	"	Dug	10	2,100	- 6	2,094			Glacial sand	Hard		D, S	Sufficient supply; also a good spring in a ravine used.
24	NW.	23	"	"	"	Dug	10	2,090	- 6	2,084	6	2,084	Glacial sand	Hard		D, S	Good supply.
25	SE.	23	"	"	"	Bored	65	2,110					Glacial drift				Dry hole; hauls water from a spring.
26	NE.	24	"	"	"	Bored	25	2,130	- 12	2,118			Glacial drift	Hard		D, S	Sufficient for 10 head stock.
27	NE.	25	"	"	"	Dug	18	2,140	- 3	2,137			Glacial sand	Hard		D, S	Intermittent supply; uses a dugout and hauls from Church lake.
28	SW.	25	"	"	"	Bored	25	2,110	- 20	2,090			Glacial drift	Hard		D, S	Intermittent supply; a 20-foot well in a ravine yields a good supply.
29	SE.	26	"	"	"	Dug	7	2,100	- 2	2,098			Glacial sand	Hard		D, S	Plentiful supply.
30	SE.	27	"	"	"	Dug	8	2,100	- 4	2,096	4	2,096	Glacial sand	Hard		D, S	Good supply.
31	SW.	28	"	"	"	Dug	24	2,120	- 20	2,100	20	2,100	Glacial sand	Soft		D, S	Will water over 50 head stock; also uses sloughs.
32	SE.	29	"	"	"	Dug	16	2,100	- 13	2,087			Glacial sand	Hard		D, S	One of two good shllow wells that water 50 head stock; several dug dry holes.
33	SW.	30	"	"	"	Dug	20	2,125					Glacial drift				Dry hole; uses sloughs and hauls water.
34	NW.	31	"	"	"	Dug	17	2,160	- 15	2,145	15	2,145	Glacial sand	Hard		D, S	Good supply.
35	NE.	34	"	"	"	Dug	18	2,145					Glacial drift			D, S	Seepage well; hauls water.
36	NE.	36	"	"	"	Dug	12	2,150	- 6	2,144			Glacial sand	Soft		D, S	Will water 100 head stock.
1	SE.	5	23	11	2	Dug	16	2,170	- 12	2,158			Glacial drift	Hard		D, S	Intermittent supply.
2	SW.	5	"	"	"	Dug	20	2,155					Glacial drift				Dry hole; hauls water.
3	NW.	6	"	"	"	Dug	25	2,140	- 20	2,120			Glacial sand	Hard		D	School well; sufficient supply.
4	NW.	6	"	"	"	Dug	8	2,150	- 6	2,144	6	2,144	Glacial sand	Hard		D, S	Good supply.
5	SE.	6	"	"	"	Dug	20	2,150					Glacial drift				Dry hole.
6	SW.	7	"	"	"	Dug	9	2,150	- 4	2,146	4	2,146	Glacial sand	Hard		D, S	Good supply.

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

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

WELL RECORDS—Rural Municipality of TULLYMET NO.216, SASKATCHEWAN

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
7	SW.	16	23	11	2	Dug	15	2,170	- 12	2,158			Glacial sand	Hard		D, S	Plenty of water.
8	SE.	18	"	"	"	Dug	25	2,150					Glacial drift				Severaly dry holes; hauls water for stock from Douglas lake.
9	NW.	18	"	"	"	Drilled	125	2,155			125	2,030	Glacial fine sand	Hard,iron		D, S	Poor supply since sand particles plugged the casing.
10	SW.	20	"	"	"	Drilled	175	2,160	- 55	2,105	175	1,985	Glacial fine sand	Hard,iron		D, S	Abundant supply when not shut off by sand plugging.
11	SW.	30	"	"	"	Dug	18	2,160	- 8	2,152			Glacial sand	Hard		D, S	Good supply for 7 head stock.
12	SE.	30	"	"	"	Drilled	190	2,170	- 40	2,130	190	1,980	Glacial fine sand	Hard,iron		S	Abundant supply, but is troubled by sand plugging.
13	NW.	31	"	"	"	Dug	14	2,155	- 10	2,145			Glacial sand	Hard		D, S	Good and constant supply.
14	NW.	32	"	"	"	Drilled	110	2,160					Glacial drift				Dry hole; another dry hole 80 feet deep; uses seepage wells.
15	SE.	33	"	"	"	Dug	18	2,160	- 9	2,151			Glacial sand	Soft		D, S	Good supply; neighbours haul water from this well for washing.
1	NE.	1	23	12	2	Drilled	115	2,140	- 50	2,090	115	2,025	Glacial sand	Hard,iron		D, S	Abundant supply; also uses a shallow seepage well.
2	SE.	2	"	"	"	Dug	9	2,140	- 4	2,136	4	2,136	Glacial sand	Hard		D, S	Good supply.
3	NE.	2	"	"	"	Dug	9	2,140	- 4	2,136	4	2,136	Glacial sand	Hard		D, S	Good supply.
4	NW.	4	"	"	"	Bored	86	2,150	- 78	2,072	86	2,064	Glacial sand	Hard,iron, "alkaline"		S	Sufficient for 50 head stock; several seepage wells used.
5	SE.	5	"	"	"	Bored	30	2,150					Glacial drift				Dry hole; has made many unsuccessful test 10 to 30 feet deep.
6	SW.	5	"	"	"	Bored	27	2,160					Glacial drift				Dry hole; has dug numerous dry holes, several containing dry sand.
7	SE.	6	"	"	"	Dug	10	2,155	- 6	2,149			Glacial sand	Hard		D, S	Good supply.
8	NE.	7	"	"	"	Dug	12	2,140	- 10	2,130	10	2,130	Glacial sand	Hard		D, S	Good supply.
9	SW.	7	"	"	"	Dug	25	2,140	- 23	2,117			Glacial sand	Hard		D, S	Sufficient supply.
10	SW.	13	"	"	"	Dug	20	2,155	- 16	2,139			Glacial sand	Hard		D, S	Good supply; one drilled dry hole 100 feet deep.
11	SE.	24	"	"	"	Dug	20	2,160	- 12	2,148			Glacial sand	Hard		D, S	Good supply; farmers tank water from this well.
12	NW.	24	"	"	"	Dug	20	2,155	- 15	2,140			Glacial drift	Hard		D, S	Intermittent seepage well hauls water.
13	NE.	26	"	"	"	Dug	12	2,150	- 6	2,144	6	2,144	Glacial sand	Hard		D, S	Good supply.
14	NE.	30	"	"	"	Dug	30	2,140	0	2,140			Glacial drift	Hard		D, S	Intermittent seepage well; uses sloughs and hauls water.
15	SW.	32	"	"	"	Dug	20	2,150	0	2,150			Glacial drift	Hard		D, S	Several similar seepage wells; uses sloughs and hauls water.
16	NE.	34	"	"	"	Dug	35	2,160					Glacial drift				Dry hole; hauls water.
17	NW.	34	"	"	"	Drilled	85	2,160	- 50	2,110	85	2,075	Glacial sand	Hard,iron		D, S	Abundant supply, but farm is abandoned.
1	NE.	7	24	10	2	Bored	50	2,200	- 30	2,170	40	2,160	Glacial gravel	Hard,"alkaline"		D, S	Sufficient for 40 head stock; one other 24-foot seepage well used.

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

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

WELL RECORDS—Rural Municipality of TULLYMET NO.216, SASKATCHEWAN

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
2	SE.	8	24	10	2	Dug	18	2,190	- 10	2,180	15	2,175	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 20 head stock; uses a 14-foot well also.
3	SW.	10	"	"	"	Dug	16	2,155	- 10	2,145			Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 20 head stock.
4	NW.	14	"	"	"	Dug	14	2,125	- 6	2,117			Glacial drift	Soft		D, S	Sufficient for 32 head stock.
5	NW.	15	"	"	"	Dug	12	2,150	- 7	2,143	7	2,143	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 7 head stock.
6	SE.	16	"	"	"	Dug	14	2,150	- 9	2,141	12	2,138	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 16 head stock.
7	SW.	16	"	"	"	Dug	17	2,155	- 5	2,150	15	2,140	Glacial gravel	Hard, iron		D, S	Sufficient for 20 head stock; 1 dry hole 17 feet deep.
8	SE.	17	"	"	"	Dug	15	2,190	- 12	2,178	13	2,177	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 20 head stock.
9	SE.	18	"	"	"	Dug	14	2,200					Glacial drift				Dry hole.
10	NE.	18	"	"	"	Dug	14	2,190	- 11	2,179	11	2,179	Glacial gravel	Hard		D, S	Insufficient for 65 head stock.
11	SW.	18	"	"	"	Dug	27	2,190	- 20	2,170			Glacial drift	Hard, "alkaline"		D, S	Poor supply; uses another 12-foot well with a gravel aquifer.
12	NW.	18	"	"	"	Dug	18	2,190	- 8	2,182	17	2,173	Glacial gravel	Hard, "alkaline"		D, S	Intermittent supply; also uses a dugout.
13	SE.	20	"	"	"	Dug	20	2,170	- 8	2,162	17	2,153	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 25 head stock.
14	NE.	21	"	"	"	Dug	14	2,150	- 10	2,140	11	2,139	Glacial sand	Hard, "alkaline"		D, S	Sufficient for 25 head stock.
15	NW.	22	"	"	"	Dug	8	2,150	- 3	2,147	3	2,147	Glacial sand	Hard, "alkaline"		D, S	Sufficient for 24 head stock; another well 22 feet deep used.
16	SE.	22	"	"	"	Dug	17	2,150	- 7	2,143			Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 23 head stock; a 16-foot well yields soft water.
17	NE.	22	"	"	"	Dug	22	2,155	- 19	2,136	19	2,136	Glacial sand	Hard		D, S	Poor supply; another 6-foot well in sand is also used.
18	NE.	23	"	"	"	Dug	20	2,155	- 2	2,153			Glacial drift	Hard, "alkaline"		D, S	Intermittent supply; 1 dry hole 23 feet deep.
19	NW.	25	"	"	"	Dug	22	2,170	- 7	2,163	18	2,152	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 20 head stock.
20	NE.	26	"	"	"	Dug	18	2,170	- 12	2,156	12	2,158	Glacial sand	Hard, "alkaline"		D, S	Sufficient for 13 head stock.
21	SE.	28	"	"	"	Dug	24	2,150	- 18	2,132			Glacial drift	Hard, "alkaline"		D, S	Sufficient for 13 head stock.
22	NW.	28	"	"	"	Dug	26	2,160	- 6	2,154	24	2,136	Glacial gravel	Hard		D, S	Sufficient for 50 head stock.
23	NE.	29	"	"	"	Dug	10	2,145	- 9	2,136	9	2,136	Glacial sand	Soft		D	40 head stock are watered at sloughs.
24	SW.	30	"	"	"	Dug	25	2,175					Glacial drift				Dry hole.
25	NW.	31	"	"	"	Dug	14	2,160	- 4	2,156	4	2,156	Glacial sand	Soft		D	A 20-foot well yields sufficient water for 25 head stock.
26	SE.	31	"	"	"	Dug	12	2,160	- 6	2,154	6	2,154	Glacial gravel	Hard, "alkaline"		D, S	Insufficient for 25 head stock.
27	NW.	32	"	"	"	Dug	10	2,155	- 7	2,148	7	2,148	Glacial gravel	Soft		D, S	Sufficient supply.
28	SW.	33	"	"	"	Dug	18	2,155					Glacial drift				Dry hole.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of TULLYMET NO.216, SASKATCHEWAN

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
29	SW.	34	24	10	2	Dug	30	2,160	- 23	2,137	28	2,132	Glacial gravel	Hard, "alkaline"		D, S	Sufficient for 30 head stock.
30	NW.	34	"	"	"	Dug	30	2,160	- 25	2,135	28	2,132	Glacial sand	Hard		D, S	Sufficient for 20 head stock; also uses a 40-foot well in gravel.
31	NW.	36	"	"	"	Dug	20	2,170	- 10	2,160	17	2,153	Glacial gravel	Hard, "alkaline"		D	Sufficient for house use.
32	NE.	36	"	"	"	Dug	25	2,170	- 13	2,157			Glacial drift	Hard, "alkaline"		D, S	Intermittent supply.
1	SW.	6	24	11	2	Dug	18	2,170	- 15	2,155			Glacial sand	Hard		D, S	Sufficient supply.
2	NW.	6	"	"	"	Bored	80	2,150	- 60	2,090			Glacial drift	Hard		S	Sufficient supply; a 16-foot well is used for the house.
3	SE.	7	"	"	"	Dug	12	2,160	- 8	2,152			Glacial gravel	Hard		D, S	Plentiful supply.
4	NE.	7	"	"	"	Dug	12	2,180	- 8	2,172			Glacial sand	Hard		D, S	Good supply.
5	NE.	10	"	"	"	Dug	9	2,180	- 7	2,173			Glacial sand	Hard		D, S	Good supply.
6	SW.	12	"	"	"	Dug	27	2,180	- 23	2,157			Glacial drift	Hard		D, S	Sufficient supply.
7	NW.	14	"	"	"	Dug	50	2,180					Glacial drift				Dry hole; hauls water.
8	SE.	16	"	"	"	Dug	8	2,180	- 4	2,176	4	2,176	Glacial fine sand	Soft		D, S	Plenty of water; many dry holes dug before this well was located.
9	NE.	16	"	"	"	Dug	8	2,180	- 6	2,174	6	2,174	Glacial sand	Soft		D, S	Bails dry but refilles fast; numerous dry holes dug.
10	NW.	16	"	"	"	Bored	100	2,190	- 60	2,130	90	2,100	Glacial sandy clay	Hard, iron, bitter		S	Abundant supply; seepage well is used for drinking water.
11	SW.	18	"	"	"	Bored	50	2,200	- 30	2,170	50	2,150	Glacial sand	Hard, iron, "alkaline"		D, S	Well waters 25 head stock.
12	NW.	18	"	"	"	Bored	90	2,200					Glacial drift				Dry hole; hauls water.
13	SE.	19	"	"	"	Dug	45	2,180	- 30	2,150	45	2,135	Glacial fine sand	Hard		D, S	Good supply.
14	SE.	20	"	"	"	Dug	50	2,200	- 36	2,164	45	2,155	Glacial fine sand	Hard		D, S	Sufficient supply; also uses sloughs for stock.
15	NE.	20	"	"	"	Dug	15	2,205	- 8	2,197			Glacial sand	Hard		D, S	Sufficient for 50 head stock.
16	SE.	22	"	"	"	Dug	12	2,180	- 9	2,171			Glacial sand	Hard		D, S	Sufficient for 15 head stock.
17	SW.	22	"	"	"	Dug	60	2,180	- 40	2,140			Glacial sand	Hard, iron		D, S	Sufficient supply.
18	NE.	24	"	"	"	Dug	40	2,180	- 30	2,150			Glacial drift	Hard, "alkaline"		S	Poor supply; hauls water.
19	NW.	25	"	"	"	Dug	13	2,190	- 11	2,179			Glacial sand	Hard		D, S	Good supply.
20	NE.	26	"	"	"	Dug	50	2,190					Glacial drift				Dry hole; hauls water.
21	NE.	28	"	"	"	Bored	100	2,200	- 60	2,140	100	2,100	Glacial sand	Hard, iron		S	Abundant supply; hauls drinking water.
22	SW.	28	"	"	"	Dug	40	2,200					Glacial drift				One of several dry holes; uses seepage wells and sloughs.
23	NW.	28	"	"	"	Bored	90	2,205	- 50	2,155	90	2,115	Glacial sand	Hard, iron, bitter.		S	Abundant supply; uses a seepage well for drinking water.
24	SE.	30	"	"	"	Bored	95	2,200	- 65	2.135	95	2,105	Glacial sand	Hard, iron		S	Abundant supply; hauls drinking water.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of TULLYMET NO.216, SASKATCHEWAN

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
25	NW.	30	24	11	2	Dug	20	2,205	- 10	2,195			Glacial gravel	Hard		D, S	Fair supply.
26	SE.	32	"	"	"	Bored	50	2,200	- 40	2,160			Glacial drift	Hard		D, S	Sufficient supply.
27	NE.	32	"	"	"	Bored	50	2,200	- 40	2,160			Glacial sand	Hard, "alkaline"		D, S	Sufficient supply.
28	SW.	33	"	"	"	Bored	40	2,205	- 35	2,170			Glacial sand	Hard		D, S	Sufficient supply.
29	NW.	34	"	"	"	Bored	38	2,190	- 35	2,155			Glacial drift	Hard		D, S	Insufficient supply.
30	SW.	36	"	"	"	Dug	11	2,180	- 9	2,171			Glacial sand	Hard		D, S	Sufficient supply.
1	SE.	2	24	12	2	Drilled	150	2,180					Glacial drift				One of numerous dry holes; hauls water.
2	SE.	3	"	"	"	Dug	18	2,170	- 15	2,155			Glacial gravel	Hard		D, S	Good supply.
3	SE.	4	"	"	"	Drilled	130	2,170			130	2,040	Glacial sand	Hard, iron		D, S	Abundant supply.
4	NW.	5	"	"	"	Dug	20	2,160	- 10	2,150			Glacial drift	Hard		D, S	Sufficient supply.
5	SW.	6	"	"	"	Dug	20	2,155	- 15	2,140			Glacial sand	Hard		D, S	Sufficient supply.
6	SE.	9	"	"	"	Dug	14	2,180	- 4	2,176			Glacial sandy clay	Hard		S	Sufficient supply; a 12-foot well used for the house.
7	NW.	9	"	"	"	Dug	20	2,180	- 15	2,165			Glacial sandy clay	Hard		D, S	Sufficient supply; a 12-foot well also used.
8	SE.	10	"	"	"	Dug	20	2,190	- 15	2,175			Glacial drift	Hard		D, S	Intermittent supply.
9	SE.	12	"	"	"	Dug	6	2,150	- 2	2,148	2	2,148	Glacial sand	Hard		D, S	Good supply.
10	NE.	12	"	"	"	Bored	90	2,180	- 45	2,135			Glacial drift	Hard, iron, "alkaline"		S	Insufficient supply; a 20-foot well is used for house.
11	SE.	16	"	"	"	Dug	18	2,190	- 14	2,176	14	2,176	Glacial sand	Hard		D, S	Sufficient for 20 head stock.
12	NW.	17	"	"	"	Dug	18	2,190	- 14	2,176			Glacial drift	Hard		D, S	Sufficient supply.
13	NE.	19	"	"	"	Drilled	230	2,200	- 80	2,120	230	1,970	Glacial sand	Hard		D, S	Abundant supply of laxative producing water. Several dry holes about 100 feet deep.
14	NE.	20	"	"	"	Dug	8	2,200	- 6	2,194	6	2,194	Glacial gravel	Hard		D, S	Sufficient supply.
15	NW.	20	"	"	"	Drilled	220	2,195	- 80	2,115	220	1,975	Glacial sand	Hard, iron		S	Abundant supply; a 23-foot well is used for drinking.
16	SW.	24	"	"	"	Dug	35	2,200					Glacial drift				Dry hole; uses sloughs and hauls water.
17	SW.	25	"	"	"	Dug	10	2,200	- 6	2,194			Glacial sand	Hard		D, S	Abundant supply; several farmers tank from this well.
18	SE.	27	"	"	"	Dug	80	2,220					Glacial drift				Dry hole.
19	NE.	28	"	"	"	Dug	13	2,210	- 9	2,201			Glacial drift	Hard		D, S	Intermittent supply; hauls water.
20	SE.	32	"	"	"	Dug	12	2,200	- 8	2,192			Glacial gravel	Hard, "alkaline"		S	Sufficient for 50 head stock; 1 dry hole 45 feet deep.
21	NW.	32	"	"	"	Dug	10	2,200	- 8	2,192			Glacial drift	Hard		D, S	Intermittent supply; uses sloughs for stock.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of TULLYMET NO.216, SASKATCHEWAN

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
22	SW.	33	24	12	2	Dug	12	2,200	- 8	2,192			Glacial sand	Hard		D, S	Intermittent supply; hauls water.
23	SE.	36	"	"	"	Dug	40	2,200					Glacial drift				One of many dry holes; uses sloughs and seepage wells.
24	NE.	36	"	"	"	Dug	20	2,240	- 10	2,230			Glacial sand	Hard		D, S	Good supply for 30 head stock; also uses sloughs for stock.
									OKANASE INDIAN RESERVE NO.82								
1						Drilled	130	2,180	- 90	2,090	122	2,058	Glacial gravel	Hard, iron		D, S	Abundant supply; used by residents in vicinity of Agency.
2						Drilled	60	2,190	- 20	2,170	49	2,041	Glacial gravel	Hard		D, S	Abundant supply, but residents seldom use the water.
3						Drilled	226	2,210			226	1,984	Glacial sand?	Hard		D, S	Fair supply; well seldom used; also another shallow well.
4						Drilled	320	2,190	- 85	2,105	320	1,870	Glacial sand	Hard, iron,		D, S	File Hills Indian school well; abundant supply, but seldom used. Shallow wells used; one dry hole 114 feet deep. Short of water during the drought of 1930 and 1934.
									LITTLE BLACK BEAR INDIAN RESERVE NO.84								
1						Drilled	160	2,200	-110	2,090	159	2,041	Glacial sand	Hard		D, S	Abundant supply; another similar well 400 yards distant.

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.