CANADA
DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

# GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF GLEN BAIN No. 105 SASKATCHEWAN

BY

B. R. MacKay, H. H. Beach & E. L. Ruggles

Water Supply Paper No. 116

SEE ADDITIONAL INFORMATION ON BACK PAGE

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# GROUND WATER RESOURCES OF THE RURAL MUNICIPALITY OF GLEN BAIN, NO. 105 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 fine the approximate depth to a water-bearing horizon, be 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 given 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.

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

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

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

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

<u>Water Table</u>. 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.

<u>Wells</u>. 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 <u>Flowing Artesian Wells</u>.

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

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

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 rests 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 Glen Bain covers an area of 324 square miles in southwestern Saskatchewan. The municipality embraces nine townships, described as tps. 10, 11, and 12, ranges 7, 8, and 9, W. 3rd mer. The centre of the municipality lies about 42 miles southeast of the city of Swift Current and 63 miles north of the International Boundary. A low-lying, slightly rolling plain occupies the northeast part of the municipality and extends in southwesterly direction through townships 11, range 8 and 9. Notukeu creek flows from the west across this plain. The greater part of the plain has a surface elevation of approximately 2,360 feet above sea-level, rising gradually to 2,400 feet along the edges of the broad lowland or valley. South from the creek valley the land is more irregularly rolling and rises to elevations exceeding 2,600 feet on the tops of several of the hills in the southeast quarter of the municipality, and over 2,550 feet throughout much of the southwestern region. North and west of the creek the land surface rises fairly uniformly to an elevation of 2,600 feet and then more abruptly to form an irregularly dissected highland with elevations exceeding 2,850 feet in the northwest corner of the municipality. The southern slopes of this upland are cut by numerous coulées leading towards Notukeu creek.

The Swift Current-Meyronne branch of the Canadian Pacific railway passes in a general westerly direction across the southern part of the area from sec. 4, tp. 10, range 7, to sec. 6, tp. 11, range 9. On this railway line are located the hamlets of Arbuthnot, Glen Bain, and Esme. The Avonlea-Neidpath branch of the Canadian National railways cuts across the northwest corner of the area, and on this line is situated the village of St. Boswells.

Ground water supplies in the municipality are derived from the Recent deposits along Notukeu creek, from the glacial drift that covers the area, and, to a very limited extent, from the Bearpaw bedrock formation that underlies the drift throughout nearly the entire municipality. Notukeu creek provides water for stock and in places where the ground water supplies are inadequate dams have been constructed in coulées or dugouts excavated to conserve the surface water for farm use.

## Water-bearing Horizons in the Unconsolidated Deposits

Recent alluvial deposits consisting of silts interbedded with beds of sand have been laid down under flood conditions in a narrow belt extending along the channel of Notukeu creek. These deposits probably do not exceed 25 feet in thickness at any point. Shallow seepage wells are reported to have been dug close to the creek in several localities, but these wells rely almost entirely on direct seepage from the creek for their water. The fact that the sand beds that occur in the silts are water bearing is indicated by wells in townships 11, ranges 7 and 8, and township 12, range 7. Most of the wells yield satisfactory water supplies, although on the NE.$\frac{1}{4}$, sec. 12, tp. 12, range 7, the water obtained is of poor quality, being highly charged with mineral salts. Little prospecting with a 2-inch auger should be required at most points along the creek to find a sand pocket interbedded in the silts from which drinkable water could be obtained. The finer silts overlying the wider valley flats in some places more remote from the stream channel yield water of poorer quality. It is presumable that these less porous beds do not allow any rapid circulation of the ground water and such mineral salts as may occur become gradually concentrated through surface evaporation of the water.

A mantle of glacial drift consisting of till, moraine, and lake clay covers the municipality, with considerable local variations in thickness. The distribution of the three types of glacial deposits in the municipality is shown on the map accompanying this report, Figure 1.

A great ice-sheet moved in a southwesterly direction over western Canada many thousands of years ago, and upon melting it gradually retreated to the northeast. During this advance and retreat a deposit of unsorted clays, silts, and boulders, collectively termed till or boulder clay, was deposited by the ice over th greater part of the area. At some places, and particularly on the uplands, the retreating ice front paused for considerable periods of time, and additional deposits of boulder clay interspersed with irregular pockets of sands and gravels were deposited. These deposits are known as moraine and differ from the till plain in having a more irregularly rolling surface. The boulder clay comprising the greater part of both the till plain and the moraine is usually yellowish in the weathered zone at or near the surface, but becomes greyish blue at depths. The pockets of sand and gravel that occur scattered through the clay, with no apparent uniformity as to depth from the surface or individual areal extent, thickness, or porosity, form the water-bearing beds in these types of deposits. As the ice melted lakes were formed in the lower areas and were fed by streams running from the uplands. Large amounts of silts and fine sands were carried down into the lakes and were deposited more or less uniformly over the bottom. After the lakes gradually disappeared a level area of lake clay remained.

The lowland area in the northeast of the municipality, and extending westward along Notukeu Creek valley, is covered by such clay and was once the bed of a glacial lake. The clay appears to range in thickness from about 30 to 60 feet. The light blue-grey lake clay is very compact and impervious and yields only small supplies of hard water. Beds of fine sand are generally found at the base of the clays or between the lake clay and the underlying boulder clay and serve as good reservoirs for ground water. Wells throughout this area have tapped these aquifers and have obtained good supplies of water in nearly all places. These sand beds are considered to be the best source of ground water in the municipality.

The boulder clay composing the greater part of the moraine and till plain is too impervious to produce much water. Moreover, such water as does percolate through the clay in some places dissolves mineral salts in quantities sufficient to make the water unfit for farm use. A number of holes have been sunk into the clay at various points and, having failed to encounter porous sand or gravel beds, yield no water. The sand and gravel pockets appear to be fairly numerous in most parts of the municipality and have been tapped at depths ranging from 6 to 110 feet. Where only small pockets are encountered the yield of water is small, but usually enough water for local domestic and stock requirements is obtained. The quality of the water is variable. The water from some of the shallow wells is soft, but that obtained from pockets or beds occurring below the upper 20 feet of the weathered zone is almost invariably hard and contains a fairly high concentration of dissolved mineral salts. This dissolved mineral salt content makes the water from some of the wells unfit for drinking, and in a few places unsuited even for watering stock. The degree of mineralization usually increases with depth from the surface and the most satisfactory supplies of drinking water may be expected from shallow wells. The water from the drift south of Notukeu creek generally contains more dissolved mineral salts than in the lowlands and in the highlands to the north. Difficulty is experienced in locating ground water supplies in the drift in some localities. Since the sand and gravel pockets do not form continuous horizons but occur only as isolated pockets, it is advisable to use a test auger and sink test holes in the drift at several points before digging wells. If satisfactory ground water supplies cannot be found in the drift then the construction of dams or dugouts in suitable places should be considered.

## Water-bearing Horizons in the Bedrock

Three bedrock formations, known respectively as the Cypress hills, Eastend, and Bearpaw formations, are known to underlie the glacial drift in various parts of this municipality. The Cypress Hills and Eastend prior to the deposition of the glacial drift may have extended over the greater part of the municipality. At the present time, however, they are confined to a small area in the northwest corner of the municipality, as shown on the map, Figure 1. Since they occur entirely within township 12, range 9, they will be discussed in the section of the report dealing with that township.

The Bearpaw formation occurs immediately beneath the glacial drift in all other parts of the municipality, and underlies the Eastend formation in the small area in which it occurs. The Bearpaw formation consists essentially of dark grey to dark brownish grey shales which weather light grey or buff when exposed at the surface. The shales are distinguishable from the blue clays forming the lower part of the glacial drift by their more soapy feel, the absence in them of stones or boulders, and by the small, roughly cubical fragments into which they crumble upon weathering. Holes have been dug through the drift into the Bearpaw at many places in the municipality, but water has been found in very few places. Most of the water is too highly mineralized to be used for any farm requirements. On the SE.$\frac{1}{4}$, sec. 18, tp. 11, range 8, drinkable water is believed to be coming from the bedrock. On the NW.$\frac{1}{4}$, sec. 35, tp. 10, range 7, the NW.$\frac{1}{4}$, sec. 5, and the SE.$\frac{1}{4}$, sec. 12, tp. 11, range 8, small supplies of water have been obtained that are usable only for stock. Water may occur at isolated points in thin beds of sand occurring between the glacial drift and the underlying bedrock and in the upper few feet of weathered zone in the shales. It is very improbable that deeper boring into the Bearpaw formation will locate water supplies. The search for ground water in this municipality should be confined to the Recent deposits and to the glacial drift, and it is advisable to stop boring or drilling after the upper few feet of the Bearpaw formation has been penetrated.

# GROUND WATER CONDITIONS BY TOWNSHIPS

## Township 10, Range 7

Water supplies in this township are obtained from dams and dugouts and from wells. The dams and dugouts provide water for stock and are the source of the water in a number of shallow seepage wells dug close to them to provide household supplies. Wells have been sunk into the glacial drift which covers the whole township, and into the Bearpaw formation which underlies the drift.

The glacial drift is of the moraine type except in a small area covering the eastern parts of sections 13 and 24 where glacial till occurs. No wells have been dug into the till, but ground water conditions in it will probably be similar to those in the moraine. The thickness of the drift varies irregularly over the township. It is probably nowhere much less than 50 feet thick, but it is known to exceed 100 feet in several wells in the central parts. The drift consists largely of yellow, sometimes sandy, clay grading into darker blue-grey clay at depth. A few wells, ranging in depth from 12 to 72 feet, have been dug into the boulder clay and have obtained small supplies of water. The water is of poor quality due to the large content of dissolved mineral salts and is not suitable for drinking, and the supplies from two of the wells located on sections 5 and 14 are unfit even for stock use. These wells encountered no extensive gravel or sand beds.

At several places, however, wells in the drift have penetrated gravel and sand pockets interbedded in the clays, at depths of 6 to 77 feet. Five of these wells do not produce enough water for local requirements, but ample supplies are obtained in most places. Where the porous beds have been penetrated water is hard and in about half of the wells is too highly mineralized for household use; from two wells it cannot be used for stock. Drinking water is obtained from shallow seepage wells located beside dams and dugouts on many of the farms. Gravel or sand aquifers probably occur on nearly every section in this township, but prospecting of the drift has not been sufficiently extensive in some places to locate them. The number of dry holes that have been sunk at widely separated localities indicate that these aquifers are not continuous. Where satisfactory water supplies have not been found a series of test holes spaced to cover systematically as large an area as possible should be put down in order to locate sand or gravel aquifers.

Twelve or more wells have penetrated the underlying Bearpaw formation in various parts of the township, and only two of these produce water. These wells are located on the NE.$\frac{1}{4}$, section 25, and the NW.$\frac{1}{4}$, section 35, and are 110 and 126 feet deep, respectively. Only small supplies of water are obtainable from each of the wells. The water from the well on section 35 is used only for stock owing to its high dissolved mineral content, and the water obtained from the deep well on section 25 is so highly mineralized as to be harmful to stock. The dry holes that penetrate the bedrock in this township range in depth from 60 to 229 feet. What little water is found in the Bearpaw formation is of very poor quality, and no appreciable yields can be expected at most places. Wells should not be dug or bored more than a few feet beyond the base of the glacial drift. Should a reasonable amount of prospecting in the drift fail to produce an adequate water supply, residents are obliged to construct dams in coulées or excavate dugouts for the conservation of the surface water.

Township 10, Range 8

Many of the farms in this township are poorly supplied with ground water, and on some sections where water has been obtained it is of very poor quality. Wells have been dug into the glacial drift and into the underlying Bearpaw formation, but water is obtained only from the drift. A number of dams and dugouts have been constructed and store enough surface water to provide for the stock and supply drinkable water to shallow seepage wells dug close to them.

Two types of deposits make up the glacial drift in this township. As shown on the map, Figure 1, glacial till, till plain or boulder clay covers the western part of the township, and moraine covers the remainder of the area. These deposits appear to increase in thickness from north to south, as on section 27 a well log shows them to be 50 feet thick and on sections 9 and 10, 90 feet thick. Yellow boulder clay underlain by darker clay forms the greater part of the moraine, and scattered through the clays are pockets of sand and gravel. The compact clays are poor sources of water, but the more permeable sands and gravels yield larger supplies. Some of these pockets have been tapped in wells ranging in depth from 18 to 80 feet. The quantity of water obtainable depends on the lateral extent, thickness, and porosity of the pocket tapped, all of which factors vary greatly from place to place. Some wells have located ample water supplies, but a few others are evidently drawing water from small pockets and do not yield sufficient supplies for local requirements. The water is hard and has a high content of dissolved mineral salts which tend to make it unfit for drinking in four of the wells reported. A few wells have been dug 65 to 75 feet deep into the clays without striking any sand or gravel aquifers. Small seepages of water are obtained from the clay, but the water is too highly mineralized to be used for the household or for stock. The productive pockets are by no means plentiful, but careful testing at shallow depths in coulées, at the bases of slopes or on low gravel ridges, should eventually yield water at most places. When prospecting for water it should be remembered that if poor water is found in one well other aquifers in the vicinity may yield better water due to irregularities existing in the composition of the drift. If ground water supplies cannot be found in the drift dams and dugouts should be built to store surface water.

Dry holes, 60 to 400 feet deep, have penetrated the underlying Bearpaw shales. Further attempts to obtain ground water supplies from the bedrock would doubtless be futile, and any water that might be found would not be usable due to the high concentration of objectionable mineral salts present in seepages from the shales. Any search for water in the area should be confined to the glacial drift.

Township 10, Range 9

The generally poor ground water conditions noted in the townships to the east also prevail in this township. Water supplies of this township are obtained from dams and dugouts and from wells. The ground water supply available is not generally sufficient in itself, so that the farmers have been obliged to resort to the storage of surface water. Shallow seepage wells dug close to the dams or dugouts supply water for the households on those farms where satisfactory supplies have not been found in deeper wells.

The glacial drift covering the township ranges in thickness from about 60 to 100 feet, increasing irregularly from south to north. Till composes the greater part of the drift, but glacial lake deposits cover a small area in the northwest, and moraine occurs in parts of sections 10, 11, 14, and 15, as shown on the accompanying map, Figure 1. No wells have been dug into the glacial lake clay in this township, but ground water supplies should be obtainable from sand or gravel beds occurring at the base of the lake clay at depths of 60 feet or less, as indicated by wells that have been sunk in the township to the north.

The till and moraine deposits are made up of yellowish boulder clay grading downward into darker bluish grey clays. Sands and gravels occur as isolated pockets scattered through the clays. The compact boulder clay will produce little ground water, as illustrated by the 60-foot well on section 35. Moreover, the water contains large concentrations of dissolved mineral salts which make it unsuitable for drinking and sometimes even unfit for stock. In places where the clay is more sandy large supplies are found, but water obtained from these sandy clays in this township is also of poor quality. Most of the wells in the glacial drift have encountered sand or gravel pockets which appear to be quite numerous in this area. The depths at which these pockets have been tapped range from 14 to 110 feet. As these aquifers vary in lateral extent their capacity as reservoirs for ground water also varies. Although sufficient water for local needs is usually found a few wells tapping the sands or gravels yield only small supplies. The water is hard and contains large amounts of dissolved mineral salts, chiefly the sulphates. The greatest concentration of these salts is usually found in the water from the deeper wells. The water from many of the wells is too highly charged with the sulphates to be used for drinking and farmers have been obliged to resort to shallow seepage wells for household supplies. From some wells the water is even too "alkaline" for stock use and the surface water stored in the dams and dugouts must then be used. Several dry holes have been dug into the drift, but as water-bearing sands and gravels have been encountered in the greater number of the wells at least small supplies of water could undoubtedly be found by further testing in most parts of the township.

Several wells have penetrated the Bearpaw formation that underlies the drift, but throughout the township water was found only in the 90-foot well on section 20. The quantity of water available from this well is small, and the water is too highly mineralized to be used. A moderate supply of water is available in the 200-foot well on section 30, but the water can only be used for stock. Most of the water in this well probably comes from the drift, but small seepages may be derived from the Bearpaw shales. Further drilling into the bedrock is not advised, as no water will be found at most points and such water as will be found will be of very poor quality. No water can be expected by drilling deep wells into the shales. All further prospecting to obtain ground water in this area should be confined to the glacial drift.

## Township 11, Range 7

Farmers residing on the lowland plains in the northern part of the township generally experience little difficulty in obtaining an adequate ground water supply, but considerable difficulty has been experienced in obtaining satisfactory supplies in many places on the higher land towards the south. The sandy soil on the highlands has drifted badly during the drought period and several of the farms have been abandoned. Notukeu creek crosses the northern sections of the township and provides water for the stock in the vicinity. Shallow seepage wells have been dug close to the creek and provide supplies of good water.

The wells on the NE.$\frac{1}{4}$, section 32, which are dug into the Recent deposits along the creek pass through about 15 feet of sandy clay and then strike a water-bearing sand bed. The water obtained is of good quality and supplies are sufficient for local requirements. Similar supplies should be obtainable from these deposits along the creek with only a small amount of prospecting. The accompanying map, Figure 1, shows the approximate distribution of the Recent stream deposits, glacial lake clay, the till, and moraine deposits in the township. Wells have been sunk into the lake clay covering the lowland plains in the northern part of the township and have obtained good water supplies in most places. Little or no water can be expected from the clay itself, but sand beds interbedded with or lying immediately beneath the lake clay serve as aquifers. These sands have been encountered at depths ranging from 20 to 55 feet. Other wells dug in this area should obtain similar good water supplies within this range of depth.

The till and moraine that cover the remainder of the township consist largely of compact boulder clay in which are irregularly scattered pockets of sand and gravel. Generally the boulder clay is too impervious to yield more than small seepages of ground water, but more sandy phases that are more productive occur in some places. Small supplies are being drawn from the clay in a few wells in this township, but only one such well yields enough water for local needs. The water is highly mineralized and is usually suitable only for stock. Larger supplies of water of better quality are found in the sand and gravel pockets. Wells have tapped these aquifers at depths ranging from 13 to 100 feet, and in most places have obtained satisfactory supplies of water within 60 feet of the surface. The water in some of the deeper wells contains large concentrations of dissolved sulphate salts which render the water unfit for drinking. The water from wells sunk 70 to 90 feet on the SE.$\frac{1}{4}$, section 1, and NW.$\frac{1}{4}$, section 28, respectively, is not usable for stock. The sands and gravels do not form continuous horizons through the boulder clay, so that at some points only the boulder clay is encountered in the wells. Water-bearing sand and gravel pockets, as yet untapped, doubtless occur in most sections of the township, and could be located by sinking a series of test holes. The depth of test hole necessary to prove or disprove the possibility of obtaining an adequate water supply should rarely exceed 70 feet.

The Bearpaw formation underlies the glacial drift throughout the township and appears to be almost entirely unproductive of ground water. Holes bored 65 to 110 feet deep have penetrated the shales, but in only one well, located on section 20, was any water found. A small quantity of water was found in the 100-foot hole on this section, but was too "alkaline" to be used. It is highly improbable that deeper holes in the bedrock would produce any water, so digging should be discontinued as soon as the dark shales of the Bearpaw formation are reached.

### Township 11, Range 8

Satisfactory water supplies have been difficult to obtain on some of the farms in this township, but by digging several wells and by constructing dams and excavating dugouts an adequate supply of water has been secured in most places.

Notukeu creek, which winds across the township from section 19 to section 36, is used for watering stock in the vicinity and forms the source of water in a few seepage wells dug close to the channel. Ground water is obtained from the Recent deposits close to the creek, from the glacial drift that covers all other parts of the township, and in small amounts from the underlying Bearpaw formation.

The Recent deposits occur in a narrow strip, probably not exceeding a few hundred feet in width, bordering the creek channel. Wells 23 and 26 feet deep on section 26 and 27 have tapped water-bearing sand beds in the alluvium. The well on section 26 yields a supply of soft water barely sufficient for local needs, but the supply from the well on section 27 is considered ample. The water from this latter well is moderately hard. Water should be readily obtained by digging wells into the Recent deposits almost anywhere along this narrow belt.

The water-bearing properties of the sandy lake clays that cover the lowland areas, as shown on the map, Figure 1, have not been as carefully tested in this township as in adjoining areas. On section 22, several wells were dug and encountered only clay. Water seeped into these wells from the clay, but it had a very high content of dissolved mineral salts. The water from one of the wells is usable for stock, but the water from the other wells was too highly mineralized to be suitable for any farm use and the wells were filled in. Water-bearing sands and gravels occur near the base of the clay in some places and have been tapped in wells 12 and 25 feet deep on sections 34 and 35. Supplies from these wells are sufficiently large to satisfy local requirements. The water is hard. From the well on section 35 it is too "alkaline" to be used for drinking. Owing to the small number of wells dug it is not known just how numerous the sand and gravel aquifers are in the area covered by the lake clays, but they are to be expected in most sections and should yield fairly large supplies of water.

Glacial till covers a small area in the northwestern part of the township, and moraine deposits cover the remaining upland regions. The till and moraine in the northwest corner are only sparingly productive of water. Due to the limited occurrence of productive beds in the boulder clay a number of dry holes have been dug into the glacial drift and into the bedrock in this area. A sand aquifer was found in a 60-foot well on the NE.$\frac{1}{4}$, section 32, but only a small supply of water is obtained. Gravels and sands may occur in the bottoms of some of the coulées, and it seems advisable to test carefully to depths of 15 to 20 feet for water in these places before considering the sinking of deeper wells. Supplies of water for stock in this area are obtained by storing surface water in dams and dugouts. Shallow seepage wells dug close to these surface reservoirs provide water for the households. In view of the number of holes that have already been sunk in this part of the township any water that may be found is hardly worth the time and money expended. It seems advisable rather to confine all efforts to the storage of the surface water by means of dams or dugouts.

In the southern part of the township the moraine is more productive of ground water. Gravel and sand pockets encountered in wells 10 to 105 feet deep yield supplies of good water. In only one of the wells reported is the supply insufficient for the farm requirements. A well on the SW.$\frac{1}{4}$, section 6, provides water for 60 head of stock. The water from these wells is hard and although quite "alkaline" it is used for household purposes in most places. In areas where sand or gravel aquifers have not been found the water seeping into the wells from the clays is highly mineralized and unfit for drinking. At some points sand or gravel pockets will not be found, but they probably occur on nearly every section, and additional water supplies could be obtained by sinking wells after aquifers have been located by testing.

Water has been obtained from the Bearpaw formation in three wells in the southern part of the township. On section 5 a small supply of highly mineralized water is derived from the bedrock in a well 110 feet deep. The water is usable only for stock. Similar water is found in a 65-foot well on section 12. A small supply is obtained from a 160-foot well on section 18; the water is of unusually good quality for water from this source and is usable in the household. Dry holes 65 to 200 feet deep have been sunk into the bedrock in this southern part of the township and also in the northwest corner. No further search should be made for water in the Bearpaw in the northwestern district, but in the south supplies suitable for stock might be found in the upper part of the shales. The uncertainty of finding water even for stock in the bedrock, due to its generally impervious nature and the limited areal extent of the producing aquifers, makes deep drilling an undertaking of questionable worth in this area, and future prospecting for ground water in the township should be confined to the overlying glacial drift, or the upper few feet of the underlying shales.

## Township 11, Range 9

Water supplies in the township are obtained from Notukeu creek, from dams and dugouts, and from wells. Notukeu creek crosses the lowland area of the township from section 7 to section 13. Some of the farmers water their stock at the creek, and on section 7 a dam has been constructed across the creek to provide a reservoir for this purpose. The ground water supplies in many sections are in themselves inadequate, so that it has been necessary to store surface water to provide for the stock. Household supplies on some farms are obtained from seepage wells dug close to the dams or the dugouts.

No wells are drawing water from the Recent deposits which are found along the creek. Sands or gravels interbedded with the clays and silts are expected to be water bearing, and should be found at depths not exceeding 25 or 30 feet. Aquifers will not occur at all points and some testing may be necessary to find them. The water will be suitable for stock, and in most localities should also be suitable for drinking.

The lake deposits which cover the lowland area in the central and southern parts of the township consist essentially of sandy clay in which occur isolated sand or gravel beds of limited areal extent. As evidenced by the 38-foot well on section 4, little water is to be derived from the clay. However, larger supplies are obtained where sands or gravels have been encountered. These aquifers lie at depths of 20 to 75 feet below the surface. The sands and gravels found at the greater depths were probably derived from the boulder clay by waters issuing from the ice previous to the formation of the glacial lake and the deposition of the lake clays. Supplies from these aquifers are ample for local needs, one well on section 14 watering 50 head of stock, but the water is of poor quality in some places. The dissolved mineral salt content in the water from the deeper wells is high and makes the water unsuitable for drinking. The water from deep wells on sections 7 and 9 also has a bad effect on stock. However, water suitable for stock should be available from wells in most parts of this area, and drinking water can usually be obtained from shallow seepage wells.

Little water can be obtained from the boulder clay which is the main constituent of the till plain and moraine that mantle the remaining parts of the township. The clay will yield small seepages of water, but it will generally be found too "alkaline" for drinking and may not be suitable for stock. However, pockets of water-bearing sand and gravel are scattered through the clay, and where tapped by wells yield water supplies. In this township the pockets have been encountered in wells 16 to 90 feet deep. The water supply in most of these wells is ample for local requirements, but in a few places where only small underground reservoirs are tapped very limited quantities of water are obtained. Much of the water is of good quality and from a few wells is reported to be moderately soft, but it is usually hard and contains considerable amounts of the sulphate salts. The water from nearly every well is drinkable. If the demand for ground water supplies in the township increases it would be advisable to test carefully in the drift for water-bearing sand or gravel pockets. These do not form continuous horizons, but are believed to be fairly numerous in the till and moraine.

No water has been obtained in the few wells that have penetrated the underlying Bearpaw formation. These holes range in depth from 60 to 160 feet. Only small seepages of water of very poor quality could be expected from the bedrock at any place, and further attempts to obtain water supplies from this source are not recommended. All search for ground water should be confined to the overlying Recent and glacial deposits.

Township 12, Range 7

Less difficulty has been experienced in obtaining adequate water supplies in this township than in other parts of the municipality. The greater part of the supply is derived from wells, but in a few places stock are watered from Notukeu creek which crosses the southeastern part of the township.

A few wells have been dug into the Recent deposits close to the creek, on section 12. On the SW.$\frac{1}{4}$ of this section good water supplies are readily obtained from sand beds lying within 20 feet of the surface. Water is also easily obtained from these deposits on the NE.$\frac{1}{4}$, but it is highly mineralized and is usable only for stock. Water for stock should be found by digging wells into the Recent deposits at any point along the creek, and drinkable water at places where the sand or gravel beds are sufficiently extensive.

The lake clay which covers the whole township remote from the stream appears to range in thickness from 40 to 50 or more feet. In digging wells water-bearing sand beds are encountered beneath the fine sandy clay at depths of from 20 to 50 feet. Darker clay usually underlies the sands. In the northeastern part of the township the sand beds appear to be absent from the lake deposits, but sand and gravel aquifers have been found in the boulder clay which underlies the lake clay. These aquifers occur at depths of 80 to 130 feet below the surface. Supplies obtained in all parts of the township are adequate for local requirements. Individual wells yield enough water for 10 to 50 head of stock, and the supply from the well on the NE.$\frac{1}{4}$, section 36, is reported to be ample for 260 head. The water is hard and from a few wells is "alkaline", but it is all of good quality for household use. The water-bearing beds in this area are either fairly continuous or are sufficiently numerous that no wells have failed to find water. In the northeast part depths to productive beds will probably exceed 75 feet, but throughout the remainder of the area this depth should not exceed 50 feet.

A well was dug 130 feet deep on section 33 and is believed to have penetrated the Bearpaw formation. This well has been filled in and the records of the boring were not obtainable. Some water may be present in the upper part of the bedrock, but it would no doubt be too highly mineralized for household use and may not be satisfactory for watering stock. As the overlying unconsolidated deposits are water producing, it is generally unnecessary to seek water from the shales of the Bearpaw formation in this township.

## Township 12, Range 8

Ground water supplies in some parts of the township are inadequate, and sloughs, dams, and dugouts provide surface water for stock watering. Wells dug into the glacial drift on some sections provide ample supplies.

Glacial lake clay, till plain, and moraine deposits make up the drift covering, the areal distribution of these three types of deposits being shown on the accompanying map, Figure 1. Good water supplies have been obtained from sand beds lying near the base of the lake clay at depths of from 30 to 45 feet. The water from the sand aquifers is of good quality. On the SW.$\frac{1}{4}$, section 3, and on the NW.$\frac{1}{4}$, section 24, no sands have been encountered, but small seepages of water are derived from the clay. The water-bearing sands may not be continuous throughout the area covered by the clay, but it is possible that these two wells have not been dug deep enough to tap aquifers that might exist. Testing to a depth of about 50 feet would be advisable on both farms.

The moraine in the southwest corner of the township is only sparingly productive of ground water. The moraine consists essentially of boulder clay in which are scattered pockets of water-bearing gravel and sand. These pockets are not numerous, as indicated by several dry holes that have been dug. Only clay was encountered in a 50-foot well on section 6, and a small seepage of water obtained. On sections 16 and 17 water-bearing sands were tapped in wells 75 and 14 feet deep, respectively. The supplies from these wells are considered ample, but the water from the 75-foot well, characteristic of supplies from many of the deep wells in the drift throughout the municipality, is usable only for watering stock. Aquifers occur in the moraine at other points, but they can be located only by testing. In some parts of this area it may not be possible to find water and surface reservoirs will be necessary.

The till that covers the remainder of the township is similar in composition to the moraine, but the water-bearing pockets appear to be more numerous. A few dry holes have been dug, but in most places aquifers have been found at depths ranging from 12 to 90 feet. Supplies are adequate for local needs, but the dissolved mineral salt content in the water from several wells is sufficient to make the water unfit for household use. Shallow seepage wells beside dams or dugouts supply drinking water on some farms. Further testing for aquifers in the till is advisable, as undoubtedly many of these underground reservoirs remain as yet untapped.

Small quantities of water were found in the Bearpaw shales in wells 95 and 104 feet deep, sunk on the SW.$\frac{1}{4}$, section 4, and the SW.$\frac{1}{4}$, section 14. The water in both of these wells is too highly mineralized to be used even for stock. Dry holes 68 to 118 feet deep have penetrated the bedrock at various points. Usable water is not to be expected from the Bearpaw formation anywhere in this township, and the present water supplies may be increased only by careful testing for aquifers in the glacial drift or by further conserving the surface water.

Township 12, Range 9

The greater part of the water supply of the township is obtained from wells in the glacial drift. One well is drawing water from the underlying Bearpaw formation, and dams and dugouts conserve the surface water for stock use.

The moraine which covers the southern sections and the till plain which covers the rest of the township are composed largely of boulder clay. The clay is fairly compact and is not a source of any large supplies of water. Sand and gravel pockets are scattered through the boulder clay, however, and when tapped by wells yield water supplies. The pockets vary in size and occur at irregular intervals, so that no information can be given regarding the necessary depth of well, or the quantity of water that will be obtained. In this township pockets have been tapped at depths ranging from 12 to 90 feet. Nearly every well supplies enough water for local needs. The water is hard and is usually of good quality. In four wells the high mineral salt content of the water makes it undrinkable and the water from a well on section 14 is not usable even for stock. Sand and gravel reservoirs have been located with little difficulty in most parts of the township and additional supplies should be found readily. Sands, gravels, and clays have probably been washed into the bottoms of some of the coulées and should contain water in some places. Small supplies of good water should be found by digging shallow wells in the coulée bottoms.

The map, Figure 1, shows the Cypress Hills formation occurring in the extreme northwestern part of the township. This formation consists of alternating beds of gravels cemented to form conglomerate, and sand or sandstone. The lower beds are usually good reservoirs for ground water and may be expected to be water bearing in this area. No wells have penetrated the formation here, but water supplies should be found at depths ranging from about 60 to 80 feet.

The Eastend formation underlies the Cypress Hills formation and underlies the drift in a narrow belt outside the area of this formation. It is composed of light-coloured fine sands and silts grading downward into dark coloured fine sands, silts, clays, and, finally, shales undistinguishable from the underlying Bearpaw formation. Water-bearing horizons may occur in this formation, but it is probably less productive than the owerlying Cypress Hills formation or the glacial drift. A well on the NW.$\frac{1}{4}$, section 33, is believed to have passed through the formation to find water at the contact of the Eastend and Bearpaw formations.

The Bearpaw formation underlies the Eastend formation and occurs directly below the glacial drift throughout the remainder of the township. No water is being derived from the shales of the Bearpaw formation, but good supplies are obtained at the contact between the drift and the Bearpaw formation in wells on the SW.$\frac{1}{4}$, section 33, and the NW.$\frac{1}{4}$, section 34, and at the contact of the Eastend and Bearpaw formations on the NW.$\frac{1}{4}$, section 33. On section 9, a 90-foot hole appears to have penetrated the Bearpaw formation, but no water was found. In the highlands area in the northwest additional ground water supplies could probably be obtained by sinking wells 60 to 100 feet deep to the top of the Bearpaw formation, but it is inadvisable to continue deeper into the formation. Throughout the remainder of the area little or no water can be expected from the bedrock. The glacial drift appears to be the best source of ground water in the township and should be prospected carefully when further supplies are needed.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL
MUNICIPALITY OF GLEN BAIN, NO.105, SASKATCHEWAN

| Township | 10 | 10 | 10 | 11 | 11 | 11 | 12 | 12 | 12 | Total No. in municipality |
|---|---|---|---|---|---|---|---|---|---|---|
| West of 3rd mer. — Range | 7 | 8 | 9 | 7 | 8 | 9 | 7 | 8 | 9 | |
| Total No. of Wells in Township | 57 | 40 | 45 | 49 | 40 | 38 | 43 | 47 | 30 | 389 |
| No. of wells in bedrock | 12 | 5 | 6 | 9 | 13 | 4 | 1 | 12 | 2 | 64 |
| No. of wells in glacial drift | 45 | 35 | 39 | 38 | 25 | 34 | 38 | 36 | 28 | 318 |
| No. of wells in alluvium | 0 | 0 | 0 | 2 | 2 | 0 | 4 | 0 | 0 | 8 |
| Permanency of Water Supply | | | | | | | | | | |
| No. with permanent supply | 42 | 31 | 34 | 40 | 30 | 33 | 43 | 33 | 26 | 312 |
| No. with intermittent supply | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| No. dry holes | 13 | 9 | 11 | 9 | 10 | 5 | 0 | 14 | 4 | 75 |
| Types of Wells | | | | | | | | | | |
| No. of flowing artesian wells | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| No. of non-flowing artesian wells | 11 | 6 | 16 | 10 | 7 | 8 | 3 | 5 | 14 | 80 |
| No. of non-artesian wells | 33 | 25 | 18 | 30 | 23 | 25 | 40 | 29 | 12 | 235 |
| Quality of Water | | | | | | | | | | |
| No. with hard water | 42 | 30 | 33 | 33 | 27 | 28 | 43 | 34 | 25 | 295 |
| No. with soft water | 2 | 1 | 1 | 7 | 3 | 5 | 0 | 0 | 1 | 20 |
| No. with salty water | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| No. with "alkaline" water | 21 | 18 | 21 | 16 | 13 | 14 | 8 | 11 | 6 | 128 |
| Depths of Wells | | | | | | | | | | |
| No. from 0 to 50 feet deep | 30 | 19 | 16 | 32 | 17 | 22 | 32 | 29 | 18 | 215 |
| No. from 51 to 100 feet deep | 21 | 19 | 23 | 14 | 14 | 13 | 7 | 15 | 12 | 138 |
| No. from 101 to 150 feet deep | 3 | 1 | 4 | 3 | 7 | 2 | 4 | 4 | 0 | 28 |
| No. from 151 to 200 feet deep | 2 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 7 |
| No. from 201 to 500 feet deep | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 0 | 0 |
| How the Water is Used | | | | | | | | | | |
| No. usable for domestic purposes | 27 | 17 | 14 | 32 | 20 | 26 | 39 | 24 | 22 | 221 |
| No. not usable for domestic purposes | 17 | 14 | 20 | 8 | 10 | 7 | 4 | 10 | 4 | 94 |
| No. usable for stock | 59 | 26 | 25 | 36 | 28 | 31 | 42 | 31 | 25 | 284 |
| No. not usable for stock | 5 | 5 | 8 | 4 | 2 | 2 | 1 | 3 | 1 | 31 |
| Sufficiency of Water Supply | | | | | | | | | | |
| No. sufficient for domestic needs | 44 | 31 | 32 | 39 | 28 | 33 | 42 | 33 | 26 | 308 |
| No. insufficient for domestic needs | 0 | 0 | 2 | 1 | 2 | 0 | 1 | 1 | 0 | 7 |
| No. sufficient for stock needs | 32 | 14 | 21 | 26 | 19 | 24 | 40 | 24 | 25 | 225 |
| No. insufficient for stock needs | 12 | 17 | 13 | 14 | 11 | 9 | 3 | 10 | 1 | 90 |

## 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.

Analyses of Water Samples from the Municipality of Glen Bain, No. 105, Saskatchewan

| LOCATION | | | | | | Depth of Well, Ft. | Total dis'vd solids | HARDNESS | | | CONSTITUENTS AS ANALYSED | | | | | | CONSTITUENTS AS CALCULATED IN ASSUMED COMBINATIONS | | | | | | | | | Source of Water |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No. | Qtr. | Sec. | Tp. | Rge. | Mer. | | | Total | Perm. | Temp. | Cl. | Alkalinity | CaO | MgO | $SO_4$ | $Na_2O$ | Solids | $CaCO_3$ | $CaSO_4$ | $MgCO_3$ | $MgSO_4$ | $Na_2CO_3$ | $Na_2SO_4$ | NaCl | $Fe_2O_3$ | |
| 1 | SW. | 26 | 10 | 7 | 3 | 77 | 6,460 | | | | | | | | | | | | (3) | | (2) | | (1) | (4) | (5) | x1 |
| 2 | SE. | 24 | 10 | 8 | 3 | 50 | 2,980 | 700 | 420 | 280 | 32 | 415 | 20 | 180 | 1,755 | 1,116 | 2,989 | 36 | | 320 | 80 | | 2,500 | 53 | | x1 |
| 3 | NE. | 30 | 10 | 8 | 3 | 68 | 10,280 | 3,000+ | 3,000+ | n.d. | 1,000 | 405 | 540 | 803 | 5,342 | 2,775 | 9,557 | 465 | 680 | | 2,393 | | 4,369 | 1,650 | | x1 |
| 4 | NE. | 10 | 11 | 9 | 3 | 60 | 4,900 | 2,400 | 2,400 | | 132 | 350 | 340 | 464 | 2923 | 1,136 | 4,623 | 350 | 350 | | 1,383 | | 2,322 | 218 | | x1 |
| 5 | NW. | 6 | 12 | 7 | 3 | 48 | 460 | 340 | 300 | 40 | 10 | 95 | 90 | 43 | 267 | 74 | 479 | 95 | 90 | | 128 | | 149 | 17 | | x1 |
| 6 | SW. | 18 | 12 | 8 | 3 | 12 | 1,000 | 600 | 600 | | 43 | 275 | 110 | 108 | 332 | 134 | 783 | 197 | | 65 | 229 | | 221 | 71 | | x1 |
| 7 | NE. | 33 | 12 | 8 | 3 | 42 | 4,040 | 2,200 | 2,200 | | 70 | 455 | 210 | 457 | 2,382 | 963 | 3,850 | 376 | | 66 | 1,267 | | 2,025 | 116 | | x1 |
| 8 | NW. | 4 | 12 | 9 | 3 | 85 | 1,820 | 850 | 850 | | 27 | 490 | 90 | 184 | 910 | 532 | 1,802 | 161 | | 278 | 152 | | 1,166 | 45 | | x1 |
| 9 | NW. | 33 | 12 | 9 | 3 | 95 | 360 | 340 | 340 | n.d. | 14 | 275 | 40 | 83 | 90 | 69 | 399 | 72 | | 171 | 3 | | 130 | 23 | | x2 |

Water samples indicated thus, x1, are from glacial drift or other unconsolidated deposits.
Water samples indicated thus, x2, are from bedrock, Eastend formation.
Analyses are reported in parts per million; 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.
Hardness is the soap hardness expressed as calcium carbonate ($CaCO_3$).
Analysis No. 1 by Provincial Analyst, Regina.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

The quality of the water derived from Recent stream deposits at any one place seems to depend largely upon the porosity of the sediments forming the source beds. Sands and gravels allow water to circulate freely and since they do not contain inherently large amounts of readily dissolvable mineral salts, the water is only moderately hard, and suitable for domestic use. The silts, on the other hand, tend to prevent water circulating rapidly, and thus allow percolating waters ample opportunity to dissolve such mineral salts as are present in the silts. These waters are appreciably "alkaline", and may be unsuited to domestic use, as in sec. 12, tp. 12, range 7, where few sand or gravel pockets are interbedded in the silts. Drinkable water should be found in the Recent deposits, however, along the creek at most places in this municipality.

Considerable variations in the character of the glacial deposits are also noted, often within very limited areas. This condition results in corresponding variations in the quality of the ground water obtainable from these sources. The boulder clay comprising the greater part of the drift is the source of the contaminating mineral salts found in most of the waters occurring in the area. Water percolating down from the surface through the boulder clay dissolves quantities of mineral salts in amounts depending on the depth of percolation and the porosity of the clays. The less porous the clay the longer the waters are in contact with it, and a better opportunity for dissolving large quantities of mineral salts is provided. Water collecting in sand or gravel beds at shallow depths usually has a low mineral content. However, if the overlying clays are highly charged with salts, then the water will be correspondingly highly mineralized even at shallow depths. As the water percolates to greater depths the content of dissolved salts increases, and water from deep wells in the boulder clay is frequently unfit for use. The mineral salts found most commonly in solution in waters from the drift are, in the decreasing order of their relative abundance: sodium sulphate ($Na_2SO_4$), magnesium sulphate ($MgSO_4$), calcium sulphate ($CaSO_4$), calcium carbonate ($CaCO_3$), and varying amounts of magnesium carbonate ($MgCO_3$) and sodium chloride ($NaCl$). The calcium and magnesium salts contribute to the hardness of the water. Sodium sulphate and magnesium sulphate have laxative effects, and the concentration of these salts in solution generally determines the suitability of the water for domestic or stock raising purposes.

The sixth analysis on the accompanying table is of water from a sand bed in the drift, only 12 feet from the surface, on the SW.$\frac{1}{4}$, sec. 18, tp. 12, range 8. The water is very hard, but the sulphate salts are not in sufficient concentration to render it unsatisfactory for domestic use. Analysis No. 8 is of water also derived from sand, but under a greater thickness of boulder clay. The water is slightly harder, and the 1,166 parts per million of sodium sulphate present would tend to give it a bitter taste, but it is being used for drinking. Examples of waters derived from porous beds of limited areal extent under considerable thicknesses of compact boulder clay are given by analyses Nos. 2, 4, and 7. Water represented by analysis No. 2 is considered to approach the upper limit of waters considered satisfactory for drinking. Waters of the quality indicated by analyses Nos. 4 and 7 would undoubtedly have laxative effects upon persons not accustomed to highly mineralized waters. Both of these waters contain over 2,000 parts per million of sodium sulphate, and over 1,200 parts per million of magnesium sulphate.

The character of waters from still greater depths in the boulder clay is illustrated by analyses nos. 1 and 3. Both of these waters are highly mineralized and not suitable for household or stock uses, due to the very high concentrations of the sulphate salts. The 1,650 parts per million of common salt in the latter water would give it a distinctly salty taste in addition to its decided laxative effects, created by the sulphates in solution. The occurrence of 10,280 parts per million of total solids in solution in the water from the well on the NE.$\frac{1}{4}$, sec. 30, tp. 10, range 8, places it among the most highly mineralized water as yet analysed in the course of this water investigation in the province. Mineral salts are apparently present in solution in only small quantities in the lake clay in the northeastern part of the municipality, as all the ground water obtained in this area is reported to be of good quality, even in the deeper wells. The water from the deep wells in the lake clay area towards the west is more highly mineralized. Analysis No. 6 is of water from the sands under the lake clay and represents water from a 48-foot well located on sec. 6, tp. 12, range 7. This water is only moderately hard, and the combined sulphate salts do not exceed 370 parts per million. Such water is quite suitable for drinking, and is believed to be characteristic of the waters derived from this horizon in the eastern lake clay covered region.

## Water from the Bedrock

No water is being derived from the Cypress Hills formation in this municipality. The water that would be obtained by digging wells into the formation would be similar to the water derived from this source in the municipality to the west. This water is fairly soft, has a small dissolved mineral content, and is of excellent quality for all purposes.

Waters from the Eastend formation will usually have a higher content of dissolved solids than water from the Cypress Hills formation, but will be satisfactory for all farm requirements. Analysis No. 9 is of water from this formation and is of very good quality.

Water from the Bearpaw formation is highly mineralized, and resembles in character the water obtained from the compact boulder clay of the glacial drift. As the water in the bedrock has seeped down from the surface, it has dissolved mineral salts from the boulder clay and these become concentrated in the upper beds of the Bearpaw formation. The amount of salts present in the water varies from place to place, and in a few wells in the municipality the water from the Bearpaw is usable for household purposes. The concentration of salts in the water in other wells is higher, and the water can be used only for stock. From the deeper wells, however, the water is useless owing to excessive mineralization which in many instances exceeds 6,000 parts per million of dissolved solids. Normal samples of water from the Bearpaw give analyses similar to Nos. 3, 4, and 7, in the table, with probably even greater concentrations of common salt than is indicated by these analyses.

# WELL RECORDS—Rural Municipality of GLEN BAIN, NO. 105, 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 | HEIGHT TO WHICH WATER WILL RISE: Elev. | PRINCIPAL WATER-BEARING BED: Depth | PRINCIPAL WATER-BEARING BED: Elev. | PRINCIPAL WATER-BEARING BED: Geological Horizon | CHARACTER OF WATER | TEMP. OF WATER (in °F.) | USE TO WHICH WATER IS PUT | YIELD AND REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | SW. | 1 | 10 | 7 | 3 | Dug | 26 | 2,565 | − 22 | 2,543 | 22 | 2,543 | Glacial gravel | Hard, clear, slightly "alkaline" | | D, S | Another similar well. The two wells yield sufficient supply. |
| 2 | SW. | 2 | " | " | " | Bored | 45 | 2,555 | − 39 | 2,516 | 39 | 2,516 | Glacial quick-sand | Hard, clear, "alkaline" | 42 | D, S | Fair supply. Not good quality for human use. |
| 3 | SE. | 3 | " | " | " | Bored | 55 | 2,550 | − 20 | 2,530 | 55 | 2,495 | Glacial quick-sand | Hard, clear, "alkaline" | 42 | S | Sufficient supply; laxative. Water conditions fair. |
| 4 | SW. | 3 | " | " | " | Dug | 24 | 2,545 | − 16 | 2,529 | 22 | 2,523 | Glacial gravel | Slightly hard, clear | | D, S | Sufficient supply with another 30-foot well in sand. |
| 5 | NW. | 3 | " | " | " | Dug | 30 | 2,565 | − 22 | 2,543 | 27 | 2,538 | Glacial gravel | Hard, clear | 42 | D, S | Steady strong supply; waters 60 head stock. |
| 6 | SE. | 4 | " | " | " | Dug | 20 | 2,540 | − 10 | 2,530 | 10 | 2,530 | Glacial quick-sand | Hard, clear | | D, S | Well supplies other farmers; supplies 12-15 tanks a day. Another 40-foot well supplies house. |
| 7 | NW. | 4 | " | " | " | Drilled | 229 | 2,550 | | | | | | | | | Appears to be a dry hole in Bearpaw shale. |
| 8 | N½. | 5 | " | " | " | Dug | 32 | 2,560 | − 14 | 2,546 | 14 | 2,546 | Glacial black clay | Hard, dark colour, iron, "alkaline" | 44 | N | Stock refuse to drink water. Seepage supply only. Haul water. |
| 9 | SE. | 6 | " | " | " | Bored | 45 | 2,530 | − 30 | 2,500 | 30 | 2,500 | Glacial drift | Hard, iron, clear, "alkaline" | | S | Waters 10 head stock; water seeps in slowly. |
| 10 | NW. | 7 | " | " | " | Bored | 60 | 2,610 | − 30 | 2,580 | 60 | 2,550 | Glacial sand | Hard, clear | | D, S | Excellent supply. Well cannot be pumped dry. |
| 11 | SE. | 9 | " | " | " | Drilled | 200 | 2,550 | | | | | | | | | No information; probably a dry hole in Bearpaw shale. |
| 12 | SE. | 9 | " | " | " | Dug | 6 | 2,500 | − 4 | 2,496 | 0 | 2,500 | Glacial gravel | Hard, clear, slightly "alkaline" | | D, S | Sufficient supply. Neighbours use this well in dry seasons. |
| 13 | SW. | 10 | " | " | " | Bored | 80 | 2,585 | | | | | | | | | Dry hole in Glacial drift. |
| 14 | SW. | 12 | " | " | " | Bored | 39 | 2,545 | − 34 | 2,511 | 34 | 2,511 | Glacial sand | Hard, clear | | D, S | Insufficient. Unsuitable for humans. |
| 15 | NW. | 12 | " | " | " | Bored | 62 | 2,550 | − 42 | 2,508 | 62 | 2,488 | Glacial gravel | Hard, clear, "alkaline" | 43 | S | Sufficient supply. |
| 16 | NE. | 12 | " | " | " | Bored | 38 | 2,550 | − 28 | 2,522 | 28 | 2,522 | Glacial sandy clay | Hard, clear | 42 | D, S | Steady supply. |
| 17 | NW. | 13 | " | " | " | Bored | 72 | 2,490 | − 32 | 2,458 | 72 | 2,418 | Glacial sand | Hard, cloudy, yellow, "alkaline" | 42 | S | Very strong supply. Water is too "alkaline" for use. |
| 18 | SE. | 14 | " | " | " | Bored | 72 | 2,515 | − 37 | 2,478 | 37 | 2,478 | Glacial clay | Hard, clear, "alkaline" | | N | Steady supply. Water too mineralized for use. Seepage well beside slough also. |
| 19 | SW. | 14 | " | " | " | Bored | 63 | 2,550 | − 20 | 2,530 | 63 | 2,487 | Glacial sand | Hard, iron, cloudy, "alkaline" | | S | Laxative on humans. Many other wells dug but all too mineralized. |
| 20 | SW. | 15 | " | " | " | Bored | 92 | 2,600 | | | | | | | | | Dry hole in Bearpaw shale. Has drilled 5 dry holes from 50 to 90 feet deep. |
| 21 | SW. | 18 | " | " | " | Bored | 60 | 2,615 | − 50 | 2,565 | 50 | 2,565 | Glacial gravel | Hard, clear, slightly "alkaline" | 42 | S | Waters 6 head stock a day. |
| 22 | SE. | 19 | " | " | " | Dug | 24 | 2,555 | − 18 | 2,537 | 18 | 2,537 | Glacial gravel | Hard, clear | | S | Sufficient supply; seepage from dam. |
| 23 | SE. | 19 | " | " | " | Bored | 60 | 2,555 | − 6 | 2,549 | 54 | 2,501 | Glacial gravel | Hard, clear, "alkaline" | | S | Good supply. Well used for stock when other goes dry. |

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 GLEN BAIN, NO. 105, 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | NW. | 20 | 10 | 7 | 3 | Bored | 60 | 2,500 | | | | | | | | | Dry hole; Bearpaw soapstone at base. |
| 25 | SE. | 22 | " | " | " | Bored | 72 | 2,535 | - 40 | 2,495 | | | Glacial sandy clay | Hard, iron, cloudy, "alkaline" | | S | Sufficient supply; unfit for humans; scours stock sometimes. |
| 26 | NE. | 25 | " | " | " | Bored | 110 | 2,500 | - 90 | 2,410 | 90 | 2,410 | Bearpaw | Hard, clear, "alkaline" | | S | Water scours stock. Seepage well used now for stock. |
| 27 | SW. | 26 | " | " | " | Bored | 77 | 2,490 | - 52 | 2,438 | 77 | 2,413 | Glacial coarse sand | Hard, cloudy, yellow on standing, "alkaline" | | N | Insufficient supply. Several wells too "alkaline" for use. |
| 28 | SE. | 27 | " | " | " | Bored | 38 | 2,490 | - 8 | 2,482 | 38 | 2,452 | Glacial quicksand | Hard, clear, iron, "alkaline" | | S | Sufficient supply. |
| 29 | SE. | 28 | " | " | " | Bored | 108 | 2,510 | | | | | | | | | Dry hole; reached the Bearpaw formation. Several dry holes. Hauls water. |
| 30 | NE. | 28 | " | " | " | Spring | | 2,535 | + 5 | 2,540 | 0 | 2,535 | Glacial gravel | Hard, clear | | D, S | Sufficient supply. Neighbours haul water from here. |
| 31 | SW. | 30 | " | " | " | Bored | 40 | 2,540 | - 26 | 2,514 | 26 | 2,514 | Glacial blue clay | Hard, clear, "alkaline" | | S | Sufficient supply. |
| 32 | NE. | 30 | " | " | " | Dug | 70 | 2,520 | | | | | | | | | Dry hole; two other seepage wells used. Also 3 other dry holes in Bearpaw. |
| 33 | NW. | 31 | " | " | " | Bored | 12 | 2,490 | - 5 | 2,485 | 5 | 2,485 | Glacial clay | Hard, clear, "alkaline" | | S | Plenty of water too "alkaline" for humans. |
| 34 | SE. | 32 | " | " | " | Bored | 30 | 2,525 | - 18 | 2,507 | 18 | 2,507 | Glacial sand | Hard, clear | 43 | D, S | Sufficient supply with the use of another similar well. |
| 35 | NW. | 32 | " | " | " | Bored | 90 | 2,510 | | | | | | | | | Dry hole in Bearpaw soapstone. |
| 36 | NE. | 34 | " | " | " | Bored | 39 | 2,540 | - 24 | 2,516 | 24 | 2,516 | Glacial gravel | Soft, clear | 43 | D, S | Sufficient supply. Also a 48-foot well with very "alkaline" water. |
| 37 | NE. | 34 | " | " | " | Bored | 66 | 2,540 | - 56 | 2,484 | 56 | 2,484 | Glacial clay | Hard, cloudy, "alkaline" | | S | Intermittent, insufficient supply. Another 20-foot well with good water; caved in. |
| 38 | SE. | 35 | " | " | " | Bored | 150 | 2,500 | | | | | | | | | Dry hole in Bearpaw soapstone. |
| 39 | NW. | 35 | " | " | " | Bored | 126 | 2,520 | - 66 | 2,454 | 100 | 2,420 | Bearpaw shale | Hard, iron, green colour, "alkaline" | 42 | S | Insufficient supply. Well filled in 20 feet. Water comes in slowly. |
| 40 | NW. | 36 | " | " | " | Bored | 60 | 2,520 | - 57 | 2,463 | 57 | 2,463 | Glacial white clay | Hard, cloudy, "alkaline" | 43 | S | Intermittent supply. Laxative on humans. Several dry holes. |
| 41 | NE. | 36 | " | " | " | Dug | 18 | 2,510 | - 8 | 2,502 | 8 | 2,502 | Glacial sand | Soft, clear | | D, S | Insufficient supply. |
| 1 | SW. | 3 | 10 | 8 | 3 | Bored | 60 | 2,620 | - 50 | 2,570 | 50 | 2,570 | Glacial clay | Hard, clear, slightly "alkaline" | | | Poor supply; well filled in. |
| 2 | SW. | 3 | " | " | " | Dug | 20 | 2,600 | - 16 | 2,584 | 16 | 2,584 | Glacial sand | Hard, clear | | D, S | Insufficient supply. |
| 3 | NW. | 3 | " | " | " | Dug | 20 | 2,585 | - 17 | 2,568 | 17 | 2,568 | Glacial gravel | Hard, clear | | D, S | Sufficient for local needs. |
| 4 | NW. | 3 | " | " | " | Bored | 45 | 2,600 | - 33 | 2,567 | 33 | 2,567 | Glacial sand | Hard, clear, iron, "alkaline" | | D, S | Insufficient supply. |
| 5 | SE. | 4 | " | " | " | Bored | 105 | 2,670 | | | | | | | | | Dry hole in glacial drift; drinking water hauled. |
| [illegible] | NE. | 5 | " | " | " | Dug | 16 | 2,650 | - 10 | [illegible] | 10 | 2,640 | Glacial sand | Hard, clear | | D, | Two other similar wells; sufficient supply when all 3 wells 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 GLEN BAIN, NO. 105, 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. | 6 | 10 | 8 | 3 | Dug | 40 | 2,560 | - 36 | 2,524 | 36 | 2,524 | Glacial quicksand | Hard, clear, iron | | D, S | Good supply. |
| 8 | NW. | 9 | " | " | " | Drilled | 400 | 2,540 | | | | | | | | | Dry hole in Bearpaw shale; several other dry holes. |
| 9 | SE. | 10 | " | " | " | Bored | 70 | 2,555 | - 66 | 2,489 | 66 | 2,489 | Glacial sand | Hard, iron, cloudy, yellow | 42 | S | Poor quality; laxative on humans; small supply comes in quickly. |
| 10 | SW. | 10 | " | " | " | Bored | 90 | 2,550 | | | | | | | | | Dry hole in Bearpaw shale; water conditions poor. |
| 11 | NW. | 12 | " | " | " | Bored | 60 | 2,575 | - 40 | 2,535 | 60 | 2,515 | Glacial sand | Hard, clear, "alkaline" | | S | Laxative on humans. Supplies a large number of stock. |
| 12 | NE. | 12 | " | " | " | Bored | 45 | 2,580 | - 42 | 2,538 | 42 | 2,538 | Glacial sand | Hard, clear, "alkaline" | | D, S | Sufficient supply for stock; several shallow dry holes. |
| 13 | SW. | 14 | " | " | " | Bored | 65 | 2,540 | - 52 | 2,488 | 65 | 2,475 | Glacial sand | Hard, iron, "alkaline", red on standing | 42 | S | Sufficient supply; too laxative for humans. |
| 14 | NW. | 14 | " | " | " | Bored | 80 | 2,525 | - 73 | 2,452 | 73 | 2,452 | Glacial sand | Hard, iron, "alkaline", red on standing | 42 | S | Only sufficient for 13 head stock; too mineralized for human use. |
| 15 | W.½ | 15 | " | " | " | Bored | 75 | 2,490 | - 63 | 2,427 | 63 | 2,427 | Glacial clay | Hard, "alkaline", iron, sulphur, cloudy | | S | Insufficient supply. Makes stock sick. Only uses well when absolutely necessary. |
| 16 | NE. | 15 | " | " | " | Bored | 45 | 2,510 | - 37 | 2,473 | 37 | 2,473 | Glacial quicksand | Hard, iron, "alkaline", cloudy on standing | 42 | S | Laxative on humans; insufficient supply. Only waters 8 head stock. |
| 17 | SE. | 16 | " | " | " | Bored | 70 | 2,500 | - 20 | 2,480 | 60 | 2,440 | Glacial sand | Hard, iron, clear, turns red on standing | 42 | S | Sufficient supply. Neighbors also use this well. |
| 18 | NW. | 17 | " | " | " | Dug | 45 | 2,500 | - 38 | 2,462 | 38 | 2,462 | Glacial sand | Hard, clear, slightly "alkaline" | 42 | D, S | Sufficient supply. |
| 19 | SW. | 18 | " | " | " | Bored | 58 | 2,560 | - 46 | 2,514 | 58 | 2,502 | Glacial quicksand | Hard, clear, sulphur, "alkaline" | | S | Sufficient supply. Dugout used in summer. |
| 20 | NE. | 18 | " | " | " | Bored | 70 | 2,500 | | | | | | | | | Dry hole in Bearpaw shale. |
| 21 | SE. | 19 | " | " | " | Bored | 60 | 2,490 | | | | | | | | | Dry hole in Bearpaw soapstone; seepage well for drinking water. |
| 22 | NW. | 20 | " | " | " | Bored | 60 | 2,465 | - 44 | 2,421 | 60 | 2,405 | Glacial quicksand | Hard, clear, "alkaline" | | S | Water is "alkaline" after standing in blue clay; scours stock. Sufficient supply with dam. |
| 23 | SE. | 24 | " | " | " | Bored | 56 | 2,560 | - 8 | 2,552 | 56 | 2,504 | Glacial gravel and sand | Hard, yellow, "alkaline", cloudy | | S | Sufficient supply; use shallow seepage well for house. |
| 24 | SW. | 26 | " | " | " | Bored | 65 | 2,445 | - 47 | 2,398 | | | Glacial clay | Hard, iron, cloudy, sulphur, "alkaline" | | S | Scours stock. Only use well in winter. |
| 25 | SW. | 27 | " | " | " | Bored | 60 | 2,465 | | | | | | | | | Dry hole in Bearpaw clay. Also a seepage well by dam, supplies 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 GLEN BAIN, NO. 105, 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 26 | NE. | 30 | 10 | 8 | 3 | Bored | 68 | 2,420 | - 20 | 2,400 | 66 | 2,354 | Glacial gravel | Hard, iron, very "alkaline", clear | | N | Large supply. Cannot use water. Another 66-foot well supplies good drinking water. |
| 27 | SE. | 34 | " | " | " | Bored | 70 | 2,440 | - 50 | 2,390 | 50 | 2,390 | Glacial clay | Hard, clear, sulphur, "alkaline" | | S | Seldom use well. Insufficient supply. Another 12-foot well used for drinking water in sand. |
| 28 | NE. | 35 | " | " | " | Dug | 22 | 2,460 | - 20 | 2,440 | 19 | 2,441 | Glacial gravel | Soft, clear | | D, S | Insufficient supply. A 45-foot well with 6 feet of "alkaline" water;scours stock. |
| 29 | NE. | 36 | " | " | " | Dug | 16 | 2,490 | - 14 | 2,476 | -14 | 2,476 | Glacial quicksand | Hard, clear | | D, S | Insufficient supply. A 70-foot dry hole in blue clay and stones. |
| 1 | SE. | 1 | 10 | 9 | 3 | Dug | 40 | 2,550 | - 36 | 2,514 | 36 | 2,514 | Glacial quicksand | Hard, clear, iron | | D, S | Sufficient supply. Well caved in. |
| 2 | SE. | 2 | " | " | " | Dug | 19 | 2,520 | - 16 | 2,504 | 16 | 2,504 | Glacial sand | Soft, clear | | D, S | Insufficient supply. |
| 3 | NW. | 2 | " | " | " | Bored | 50 | 2,500 | - 45 | 2,455 | 45 | 2,455 | Glacial sand | Hard, clear, "alkaline" | | S | Sufficient supply. Also a 14-foot well in gravel for house use. |
| 4 | NW. | 3 | " | " | " | Dug | 18 | 2,510 | - 3 | 2,507 | 18 | 2,492 | Glacial quicksand | Hard, clear | 42 | D, S | Was a large supply, but well caved in. Another 20-foot well; small supply. |
| 5 | NE. | 4 | " | " | " | Bored | 55 | 2,470 | - 30 | 2,440 | 55 | 2,415 | Glacial sand | Hard, clear, sulphur | | D, S | Water from 8 to 10 head stock. |
| 6 | NE. | 5 | " | " | " | Bored | 90 | 2,500 | - 75 | 2,425 | 90 | 2,410 | Glacial sand | Hard, clear, "alkaline" | | S | Good supply at first. Well caved in. Water scours stock. |
| 7 | SE. | 6 | " | " | " | Bored | 35 | 2,482 | - 22 | 2,460 | 75 | 2,447 | Glacial quicksand | Hard, clear, strongly "alkaline" | 42 | S | Sufficient supply. Laxative on humans. |
| 8 | SW. | 9 | " | " | " | Dug | 27 | 2,510 | - 23 | 2,487 | 23 | 2,487 | Glacial gravel | Hard, clear | | D, S | Insufficient supply. A seepage well 12 feet deep. Small supply for stock. |
| 9 | NE. | 9 | " | " | " | Bored | 100 | 2,470 | - 70 | 2,400 | 100 | 2,370 | Glacial sand and gravel | Hard, iron, sulphur,clear, "alkaline" | | S | Sufficient supply. |
| 10 | SE. | 10 | " | " | " | Bored | 80 | 2,520 | - 50 | 2,470 | 50 | 2,470 | Glacial drift | Hard, cloudy, yellow color | 42 | S | Slow flow of water into well. 3 similar wells. Insufficient supply;laxative. |
| 11 | NW. | 10 | " | " | " | Bored | 110 | 2,490 | - 50 | 2,440 | 110 | 2,380 | Glacial sand and gravel | Hard, iron, cloudy, "alkaline" | 42 | S | Laxative on humans. Water 50 head stock. A 13-foot seepage well for house. 2 dry holes 105 and 90 feet deep. |
| 12 | NE. | 12 | " | " | " | Bored | 70 | 2,560 | - 53 | 2,507 | 70 | 2,490 | Glacial sand | Hard, clear, "alkaline" | 42 | D, S | Slightly laxative. Sufficient supply. Several dry holes less than 70 feet deep. |
| 13 | SE. | 13 | " | " | " | Bored | 50 | 2,550 | - 50 | 2,500 | 60 | 2,490 | Glacial sand | Hard, clear, "alkaline" | 43 | S | Laxative on humans. Sufficient for stock use; several 60-foot dry holes sunk. |
| 14 | SE. | 15 | " | " | " | Dug | 14 | 2,520 | - 12 | 2,508 | 14 | 2,506 | Glacial sand and gravel | Hard, clear | | D, S | Sufficient supply. |
| 15 | SE. | 16 | " | " | " | Bored | 50 | 2,490 | | | | | | | | | Dry hole in Bearpaw shale. Haul water. |
| 16 | SE. | 19 | " | " | " | Bored | 80 | 2,455 | - 42 | 2,413 | 80 | 2,375 | Glacial sandy blue clay | Hard, Glauber salts, iron | 42 | S | Laxative on humans. Fair supply, but too mineralized. |
| 17 | NE. | 20 | " | " | " | Bored | 90 | 2,430 | - 80 | 2,350 | 80 | 2,350 | Bearpaw shale | Hard, iron, clear, "alkaline" | | S | Insufficient supply. Water scours stock. |
| 18 | NW. | 21 | " | " | " | Bored | 90 | 2,440 | | | | | Glacial drift | | | N | Slight seepage of "alkaline" water;also 85-foot dry hole. |
| 19 | NW. | [illegible] | " | " | " | Bored | 105 | 2,450 | ;100 | 2,350 | 100 | 2,350 | Glacial sand | Hard, iron, "alkaline" | 42 | N | Only a very small seepage of poor water. |
| 20 | SE. | [illegible] | " | " | " | Bored | 110 | 2,500 | | | | | | | | | [illegible] in Bearpaw shale; shallow wells, have very slight seepage, usually dry. |

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 GLEN BAIN, NO. 105, 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21 | W. ½ | 25 | 10 | 9 | 3 | Dug | 16 | 2,465 | − 8 | 2,457 | 12 | 2,453 | Glacial gravel | Hard, clear | | D, S | Sufficiently strong supply. 2 dry holes. |
| 22 | SW. | 27 | " | " | " | Bored | 60 | 2,440 | − 50 | 2,390 | 60 | 2,380 | Glacial sand | Hard, clear | | D, S | Sufficient supply of good water. |
| 23 | SW. | 30 | " | " | " | Bored | 85 | 2,440 | − 45 | 2,395 | 85 | 2,355 | Glacial sandy blue clay | Hard, clear, iron, Glauber salts | | N | Laxative; large supply but too mineralized. |
| 24 | NW. | 30 | " | " | " | Bored | 200 | 2,390 | − 60 | 2,330 | 200 | 2,190 | Bearpaw | Hard, iron, mineralized, clear, | 42 | S | Laxative; large supply of poor water. |
| 25 | SW. | 31 | " | " | " | Bored | 90 | 2,390 | − 15 | 2,375 | 90 | 2,300 | Glacial quick-sand | Hard, clear, "alkaline", sulphur | | S | Water scours stock; sufficient supply, but not used often. |
| 26 | NE. | 32 | " | " | " | Bored | 42 | 2,380 | − 17 | 2,363 | 42 | 2,338 | Glacial gravel | Hard, clear, strongly "alkaline" | 42 | S | Laxative. Good supply. Seldom used even for stock. |
| 27 | SE. | 33 | " | " | " | Bored | 70 | 2,410 | − 40 | 2,370 | 70 | 2,340 | Glacial sand | Hard, clear, strongly "alkaline" | 42 | N | Fair supply; cannot be used; laxative. 100-foot dry holes in Bearpaw. |
| 28 | SW. | 34 | " | " | " | Drilled | 160 | 2,410 | | | | | | | | | Dry hole in Bearpaw shale; water obtained from [illegible]. |
| 29 | NW. | 34 | " | " | " | Bored | 30 | 2,390 | − 20 | 2,370 | 30 | 2,360 | Glacial sand | Hard, clear, "alkaline" | 42 | S | Laxative on humans. Sufficient supply for stock. Haul drinking water. |
| 30 | NW. | 35 | " | " | " | Bored | 60 | 2,390 | − 30 | 2,360 | 30 | 2,360 | Glacial blue clay | Hard, clear, iron, "alkaline" | | S | Insufficient supply. Well filled in; water used to scour stock. |
| 1 | SE. | 1 | 11 | 7 | 3 | Bored | 70 | 2,510 | 0 | 2,510 | 70 | 2,440 | Glacial sand or gravel | Hard, cloudy, brown, "alkaline" | | S | Sufficient supply; stock will not drink this water. Also a seepage well for house. |
| 2 | | 1 | " | " | " | Bored | 34 | 2,520 | − 6 | 2,514 | | | Glacial quick-sand | Soft, clear | | D, S | Insufficient supply. |
| 3 | SW. | 2 | " | " | " | Bored | 21 | 2,520 | − 18 | 2,502 | 21 | 2,499 | Glacial gravel | Hard, clear | | D, S | Insufficient supply, now; used to be a good supply. |
| 4 | SW. | 4 | " | " | " | Bored | 56 | 2,510 | − 26 | 2,484 | 26 | 2,484 | Glacial clay | Hard, clear, "alkaline" | | S | Sufficient supply. Also a 20-foot well; strong supply of "alkaline" water. |
| 5 | NW. | 4 | " | " | " | Bored | 30 | 2,515 | − 24 | 2,491 | 24 | 2,491 | Glacial gravel and sand | Hard, clear, "alkaline" | | S | Sufficient supply. |
| 6 | NE. | 5 | " | " | " | Bored | 53 | 2,560 | | | 52 | 2,508 | Glacial gravel | Medium hard, clear | | D, S | Strong supply; comes in quickly. |
| 7 | NE. | 9 | " | " | " | Bored | 108 | 2,565 | | | | | | | | N | Dry hole in Bearpaw shale; very slight seepage of "alkaline" water could not be used. |
| 8 | NE. | 9 | " | " | " | Bored | 50 | 2,550 | − 30 | 2,520 | 50 | 2,500 | Glacial sand or gravel | Hard, "alkaline", slightly yellow | | S | Sufficient supply. Also a spring. |
| 9 | SE. | 12 | " | " | " | Bored | 95 | 2,500 | − 75 | 2,425 | 95 | 2,405 | Glacial sand | Hard, clear, "alkaline" | 42 | N | Large supply; not used as farm has been abandoned. |
| 10 | NW. | 12 | " | " | " | Bored | 100 | 2,510 | − 70 | 2,440 | 100 | 2,410 | Glacial black clay and gravel | Hard, iron, red sediment, "alkaline" | | S | Sufficient supply. |
| 11 | NE. | 13 | " | " | " | Dug | 18 | 2,390 | − 6 | 2,384 | 18 | 2,372 | Glacial sand | Hard, clear, "alkaline" | 44 | D, S | Laxative on humans. Sufficient supply. |
| 12 | SW. | 14 | " | " | " | Dug | 20 | 2,4[illegible] | − 12 | 2,448 | 12 | 2,448 | Glacial fine sand | Hard, iron, "alkaline", fairly good | | D | Insufficient supply. Several dry holes [illegible] feet deep in blue clay. |

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 GLEN BAIN, NO. 105, 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 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13 | NW. | 14 | 11 | 7 | 3 | Dug | 15 | 2,440 | - 10 | 2,430 | 15 | 2,425 | Glacial gravel | Hard, clear | | D, S | Sufficient supply. Dry hole 28 feet deep. |
| 14 | SE. | 16 | " | " | " | Dug | 18 | 2,480 | - 10 | 2,470 | 10 | 2,470 | Glacial gravel | Hard, clear | | D | Sufficient supply. |
| 15 | SE. | 16 | " | " | " | Bored | 130 | 2,460 | | | | | | | | | Dry hole in Bearpaw soapstone. |
| 16 | SW. | 16 | " | " | " | Spring | 0 | 2,460 | 0 | 2,460 | 0 | 2,460 | Glacial drift | | | | No information. |
| 17 | NE. | 16 | " | " | " | Bored | 90 | 2,450 | | | | | | | | | Dry hole, Bearpaw clay. |
| 18 | NE. | 20 | " | " | " | Bored | 45 | 2,400 | - 20 | 2,380 | | | Glacial clay and sand | Hard, clear, "alkaline" | | S | Insufficient supply. A 100-foot well with "alkaline" water from Bearpaw; water cannot be used. |
| 19 | SW. | 21 | " | " | " | Bored | 55 | 2,420 | - 30 | 2,390 | | | Glacial clay | Hard, clear, "alkaline" | | D, S | Insufficient supply; also 2 shallow wells yield good water. |
| 20 | SE. | 22 | " | " | " | Dug | 15 | 2,400 | - 5 | 2,395 | 5 | 2,395 | Glacial sand | Soft, clear | | D | Insufficient supply. Also 2 seepage wells. |
| 21 | SW. | 22 | " | " | " | Bored | 135 | 2,420 | | | | | | | | | Dry hole in Bearpaw clay. |
| 22 | NW. | 22 | " | " | " | Bored | 84 | 2,440 | | | | | | | | | Dry hole in Bearpaw clay. About 10 similar dry holes. |
| 23 | SE. | 24 | " | " | " | Dug | 13 | 2,370 | - 4 | 2,366 | 13 | 2,357 | Glacial sand | Hard, clear, "alkaline" | 43 | D, S | Sufficient supply. |
| 24 | SW. | 26 | " | " | " | Dug | 18 | 2,360 | - 15 | 2,345 | 15 | 2,345 | Glacial quick-sand | Hard, clear, "alkaline" | | S | Strong supply. Also 45-foot well in sand; good house supply. |
| 25 | NW. | 28 | " | " | " | Bored | 90 | 2,370 | - 85 | 2,285 | 85 | 2,285 | Glacial sandy clay | Hard, clear, "alkaline" | | S | Insufficient supply. Also a 16-foot seepage well for house and 48-foot well for stock. |
| 26 | NW. | 30 | " | " | " | Dug | 42 | 2,370 | - 40 | 2,330 | 40 | 2,330 | Glacial quick-sand | Soft, clear, "alkaline" | | D, S | Very strong supply. |
| 27 | SE. | 32 | " | " | " | Bored | 55 | 2,350 | - 45 | 2,305 | 55 | 2,295 | Glacial quick-sand | Hard, clear, iron | | D, S | Sufficient supply. |
| 28 | NE. | 32 | " | " | " | Dug | 20 | 2,350 | - 15 | 2,335 | 15 | 2,335 | Recent sand | Hard, clear | | D, S | Sufficient supply. Another similar well. |
| 29 | SE. | 34 | " | " | " | Dug | 20 | 2,350 | - 18 | 2,332 | 18 | 2,332 | Glacial quick-sand | Soft, clear | 42 | D, S | Insufficient supply. Another 16-foot seepage well |
| 30 | SW. | 36 | " | " | " | Dug | 35 | 2,360 | - 28 | 2,332 | 28 | 2,332 | Glacial sand | Hard, clear | | D, S | Sufficient supply. |
| 31 | NE. | 36 | " | " | " | Dug | 45 | 2,350 | - 35 | 2,315 | 45 | 2,305 | Glacial sand | Hard, clear | 42 | D, S | Sufficient supply. Also one similar well. |
| 1 | N.½ | 4 | 11 | 8 | 3 | Bored | 200 | 2,450 | | | | | | | | | Several dry holes in Bearpaw clay. |
| 2 | NW. | 5 | " | " | " | Bored | 110 | 2,440 | -105 | 2,335 | 110 | 2,330 | Bearpaw clay | Hard, iron, red sediment, "alkaline" | | S | Waters 10 head stock. 65-foot dry hole struck bedrock. 50-foot well in gravel for house. |
| 3 | SE. | 6 | " | " | " | Bored | 62 | 2,400 | - 50 | 2,350 | 62 | 2,338 | Glacial sand | Hard, iron, clear, "alkaline" | | S | Well caved in. Gave sufficient supply. Dug-out for stock. Soft water from seepage well. |
| 4 | SW. | 6 | " | " | " | Bored | 64 | 2,400 | - 40 | 2,360 | 64 | 2,336 | Glacial gravel | Hard, iron, "alkaline", red sediment | | S | Waters 60 head of stock. Hauls drinking water from ½ mile west. |
| 5 | NW. | [illegible] | " | " | " | Bored | 54 | 2,400 | - 34 | 2,366 | 5[illegible] | [illegible]46 | Glacial gravel | Hard, iron, clear, "alkaline" | | S | [illegible]cient 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 GLEN BAIN, NO. 105, 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | SW. | 7 | 11 | 8 | 3 | Bored | 65 | 2,440 | - 40 | 2,400 | 65 | 2,375 | Glacial blue clay | Hard, clear, "alkaline", blue colour | | S | Insufficient supply. 30-foot well for house; 110-foot well caved in; probably in bedrock. |
| 7 | NE. | 8 | " | " | " | Bored | 59 | 2,400 | - 25 | 2,375 | 59 | 2,341 | Glacial sand | Hard, iron, "alkaline", clear | | D, S | Sufficient supply. |
| 8 | NE. | 10 | " | " | " | Dug | 10 | 2,460 | - 6 | 2,454 | 10 | 2,450 | Glacial sand | Hard, clear | | D, S | Good supply. Another shallow well not used. |
| 9 | SE. | 12 | " | " | " | Bored | 65 | 2,470 | - 30 | 2,440 | | | Glacial clay | Hard, iron, "alkaline", clear, red sediment | | S | Sufficient supply. Laxative. A 20-foot well yields sufficient supply for house and stock. |
| 10 | SW. | 15 | " | " | " | Bored | 75 | 2,390 | 0 | 2,390 | 40 | 2,350 | Glacial gravel | Hard, iron, "alkaline", salty, clear | | S | Sufficient supply. Seepage well; supply soft water for house use. |
| 11 | SE. | 17 | " | " | " | Bored | 105 | 2,400 | - 75 | 2,325 | 75 | 2,325 | Glacial quicksand | Hard, clear, "alkaline" | | D, S | Insufficient supply. Only used for house. A 62-foot well; strong supply for stock. |
| 12 | SE. | 18 | " | " | " | Bored | 160 | 2,360 | -15[illegible] | 2,208 | 152 | 2,208 | Bearpaw | Hard, iron, "alkaline", clear | | D | Sufficient supply for house use. |
| 13 | S.½ | 18 | " | " | " | Bored | [illegible] | 2,350 | - 40 | 2,310 | 105 | 2,245 | Glacial drift | [illegible], brown, colour, mineralized | | D, S | Sufficient supply. |
| 14 | SE. | 22 | " | " | " | Bored | 80 | 2,380 | - 55 | 2,325 | 55 | 2,325 | Glacial clay | Hard, iron, clear, "alkaline" | | S | Sufficient supply. Several wells filled in. Drinking water hauled. |
| 15 | W.½ | 26 | " | " | " | Dug | 23 | 2,350 | - 20 | 2,330 | 20 | 2,330 | Recent sand | Hard, clear | | D, S | Sufficient supply. |
| 16 | SE. | 27 | " | " | " | Dug | 26 | 2,350 | - 24 | 2,326 | 24 | 2,326 | Recent sand | Soft, clear | | D, S | Insufficient supply. |
| 17 | NE. | 30 | " | " | " | Bored | 110 | 2,400 | | | | | | | | | Several dry holes in Bearpaw shale; slight seepage of non-usable water. |
| 18 | NE. | 31 | " | " | " | Bored | 1[illegible] | 2,460 | | | | | | | | | Many dry holes striking Bearpaw shale between 40 and 50 feet. |
| 19 | W.½ | 32 | " | " | " | Bored | 80 | 2,450 | | | | | | | | | Dry hole in Bearpaw shale. A 25-foot seepage well for house. 11 dry holes. |
| 20 | NE. | 32 | " | " | " | Bored | 60 | 2,400 | - 53 | 2,347 | 60 | 2,340 | Glacial quicksand | Hard, clear | | D, S | Insufficient supply. A 130-foot well in Bearpaw not used. Supply from seepage wells. |
| 21 | SW. | 34 | " | " | " | Bored | 12 | 2,360 | - 6 | 2,354 | 12 | 2,348 | Glacial sandy clay | Hard, clear | | | Sufficient supply except in winter; another similar well. |
| 22 | SW. | 35 | " | " | " | Dug | 25 | 2,350 | - 17 | 2,333 | 17 | 2,333 | Glacial sand and gravel | Hard, iron, clear, "alkaline" | | S | Sufficient supply. Haul drinking water. Creek flows through this quarter. |
| 1 | SE. | 2 | 11 | 9 | 3 | Bored | 60 | 2,390 | - 35 | 2,355 | 60 | 2,330 | Glacial sand | Hard, clear | | D, S | Very strong supply. 2 other wells similar. |
| 2 | NW. | 3 | " | " | " | Dug | 20 | 2,390 | - 8 | 2,382 | 20 | 2,370 | Glacial sand | Hard, iron, clear, | | D, S | Sufficient supply. Creek used for stock. |
| 3 | SW. | 4 | " | " | " | Bored | 38 | 2,390 | - 32 | 2,358 | 32 | 2,358 | Glacial clay | Hard, iron, clear, "alkaline" | | S | Insufficient supply. A 15-foot well in sand yields house supply. |
| 4 | NE. | [illegible] | " | " | " | Dug | 30 | 2,380 | - 28 | 2,352 | 2[illegible] | [illegible]52 | Glacial sand | Hard, clear | | D, S | I[illegible]cient supply. |
| 5 | SE. | 6 | " | " | " | Bored | 60 | 2,380 | - 42 | 2,338 | 42 | 2,338 | Glacial blue sand | Hard, iron, clear, "alkaline" | | S | Su[illegible]ent supply. 8-foot seepage well in pasture. Drinking water hauled. |

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 GLEN BAIN, NO. 105, 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | NE. | 7 | 11 | 9 | 3 | Bored | 75 | 2,380 | - 70 | 2,310 | 70 | 2,310 | Glacial sand | Hard, clear, "alkaline" | | N | Sufficient supply. Unfit for use. Haul drinking water. |
| 7 | SW. | 9 | " | " | " | Bored | 100 | 2,390 | - 90 | 2,300 | 90 | 2,300 | Glacial sandy clay? | Hard, cloudy, "alkaline" | | S | Sufficient supply comes in quickly. Can only use water for swine. Scours stock. |
| 8 | SW. | 9 | " | " | " | Dug | 35 | 2,380 | - 30 | 2,350 | 30 | 2,350 | Glacial sand | Hard, clear | | D, S | Sufficient supply. |
| 9 | NE. | 10 | " | " | " | Bored | 50 | 2,370 | - 50 | 2,320 | 50 | 2,320 | Glacial sand | Hard, clear, iron, "alkaline" | | D, S | Sufficient supply. Laxative. Use dam for stock in summer. |
| 10 | SE. | 12 | " | " | " | Bored | 140 | 2,400 | - 70 | 2,330 | 70 | 2,330 | Glacial gravel | Hard, iron, "alkaline", clear | | D, S | Sufficient supply. Laxative. Well has a 70-foot reservoir. |
| 11 | NW. | 12 | " | " | " | Bored | 90 | 2,350 | - 60 | 2,290 | 90 | 2,260 | Glacial sand | Hard, clear, "alkaline" | | D, S | Sufficient supply. A 32-foot well near slough yields small supply of "alkaline" water. |
| 12 | SW. | 14 | " | " | " | Bored | 50 | 2,370 | - 20 | 2,350 | 42 | 2,328 | Glacial sand | Hard, clear, "alkaline" | | S | Waters 50 head stock. A 24-foot well in gravel good supply for house use. |
| 13 | SW. | 17 | " | " | " | Bored | 150 | 2,400 | | | | | | | | | Dry hole in Bearpaw; use river. Haul drinking water. |
| 14 | NE. | 19 | " | " | " | Bored | 30 | 2,410 | - 23 | 2,387 | 23 | 2,387 | Glacial sand | Hard, clear, $CaCO_3$ | | D, S | Waters 10 head stock. Several dry holes 100 feet deep in Bearpaw. |
| 15 | NE. | 20 | " | " | " | Bored | 30 | 2,400 | - 15 | 2,385 | 28 | 2,372 | Glacial sand or gravel | Hard, clear, "alkaline" | | S | Insufficient supply. Laxative. Use dam in summer. |
| 16 | N.½ | 23 | " | " | " | Bored | 50 | 2,400 | - 32 | 2,368 | 48 | 2,352 | Glacial sand | Hard, clear | | D, S | Fair supply. Also use 2 dams. |
| 17 | NW. | 26 | " | " | " | Dug | 30 | 2,500 | - 12 | 2,488 | 12 | 2,488 | Glacial sand | Medium hard, clear | | D, S | Just sufficient supply. |
| 18 | SW. | 27 | " | " | " | Bored | 130 | 2,460 | | | | | | | | | Dry hole in Bearpaw. |
| 19 | NE. | 27 | " | " | " | Dug | 30 | 2,500 | - 12 | 2,488 | 15 | 2,485 | Glacial sand | Soft, clear | | D, S | Insufficient for 12 head stock. 2 seepage wells give small supply of "alkaline" water. |
| 20 | NW. | 28 | " | " | " | Bored | 50 | 2,480 | | | | | | | | | Dry hole in Bearpaw; haul water for house. |
| 21 | NW. | 29 | " | " | " | Dug | 16 | 2,450 | - 12 | 2,438 | 12 | 2,438 | Glacial sand | Soft, clear | | D, S | Sufficient supply. 3 wells similar to this supply house and stock. |
| 22 | SW. | 33 | " | " | " | Bored | 65 | 2,480 | - 55 | 2,425 | 55 | 2,425 | Glacial black clay | Hard, clear, "alkaline" | | S | Insufficient supply. 14 dry holes. All clay to 90 feet. |
| 23 | SW. | 34 | " | " | " | Dug | 30 | 2,475 | - 10 | 2,465 | 30 | 2,445 | Glacial sand | Hard, clear, "alkaline" | | S | Sufficient supply with 20-foot well in quicksand; 4 feet of water. 40-foot well caved in. |
| 1 | SE. | 1 | 12 | 7 | 3 | Dug | 42 | 2,390 | - 30 | 2,360 | 30 | 2,360 | Glacial sand | Hard, clear | 43 | D, S | Sufficient supply, |
| 2 | NE. | 3 | " | " | " | Dug | 21 | 2,320 | - 16 | 2,304 | 16 | 2,304 | Glacial quicksand | Hard, clear, "alkaline" | 43 | D, S | Sufficient supply. |
| 3 | SE. | 4 | " | " | " | Dug | 12 | 2,345 | - 10 | 2,335 | 10 | 2,335 | Glacial sand | Hard, clear | | D, S | Waters 20 head stock. |
| 4 | SW. | 6 | " | " | " | Dug | 45 | 2,358 | - 44 | 2,314 | 44 | 2,314 | Glacial gravel | Hard, clear | 45 | D, S | Water 10 head stock. |
| 5 | NW. | 6 | " | " | " | Bored | 48 | 2,370 | - 4[illegible] | 2,324 | 46 | 2,324 | Glacial sand | Hard, clear | | D, S | Sufficient supply. |
| [illegible] | NE. | 6 | " | " | " | Bored | 48 | 2,340 | - 46 | [illegible]94 | 45 | 2,294 | Glacial sand | Hard, clear | 42 | [illegible] | Waters 13 head stock. |
| 7 | SW. | 10 | " | " | " | Dug | 30 | 2,350 | - 24 | 2,326 | 24 | 2,326 | Glacial sand | Hard, clear | | D, S | Waters 40 head stock. |

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 GLEN BAIN, NO. 105, SASKATCHEWAN.

| 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 | | | | |
| 8 | NE. | 10 | 12 | 7 | 3 | Dug | 20 | 2,340 | - 12 | 2,328 | 10 | 2,330 | Glacial sand | Hard, clear, "alkaline" | | D, S | Waters 25 head stock; a 14-foot well with 5 feet of water in sand. |
| 9 | SW. | 12 | " | " | " | Bored | 22 | 2,335 | - 18 | 2,317 | 18 | 2,317 | Recent sand | Hard, clear | 43 | D, S | Excellent supply. Good water can be located anywhere on this section. |
| 10 | NE. | 12 | " | " | " | Dug | 12 | 2,350 | - 8 | 2,342 | 12 | 2,338 | Recent sand | Hard, clear, "alkaline" | 44 | S | Sufficient supply. Laxative. Several wells dug, all same quality of water. |
| 11 | SW. | 13 | " | " | " | Dug | 23 | 2,350 | - 16 | 2,334 | 16 | 2,334 | Glacial coarse sand | Hard, clear | 45 | D, S | Waters 15 head stock. |
| 12 | NW. | 15 | " | " | " | Dug | 38 | 2,350 | - 30 | 2,320 | 30 | 2,320 | Glacial sandy clay | Hard, clear | 44 | D, S | Waters 20 head stock. |
| 13 | SW. | 16 | " | " | " | Dug | 40 | 2,355 | - 30 | 2,325 | 35 | 2,320 | Glacial sand | Hard, clear | 42 | D, S | Sufficient supply. |
| 14 | SE. | 17 | " | " | " | Dug | 45 | 2,360 | - 41 | 2,319 | 41 | 2,319 | Glacial sand | Hard, clear | 45 | D | Sufficient supply. A 45-foot well yields sufficient supply for 20 head stock. |
| 15 | SW. | 17 | " | " | " | Dug | 45 | 2,360 | - 44 | 2,316 | 44 | 2,316 | Glacial quicksand | Hard, clear | 45 | D, S | Sufficient supply. |
| 16 | NW. | 17 | " | " | " | Dug | 40 | 2,370 | - 37 | 2,333 | 37 | 2,333 | Glacial coarse sand | Hard, clear | | D, S | Sufficient supply for 10 head stock. |
| 17 | SW. | 18 | " | " | " | Dug | 48 | 2,370 | - 46 | 2,324 | 46 | 2,324 | Glacial sand | Hard, clear | | D, S | Sufficient supply. |
| 18 | SE. | 19 | " | " | " | Dug | 40 | 2,370 | - 37 | 2,333 | 37 | 2,333 | Glacial gravel or coarse sand | Hard, clear | | D, S | Wat[illegible] head stock. |
| 19 | NW. | 20 | " | " | " | Dug | 45 | 2,355 | - 35 | 2,320 | 35 | 2,320 | Glacial quicksand | Hard, clear | 43 | D, S | Sufficient supply. |
| 20 | NE. | 20 | " | " | " | Dug | 20 | 2,330 | - 17 | 2,313 | 17 | 2,313 | Glacial sand | Hard, clear | 42 | D, S | Good supply. |
| 21 | SE. | 22 | " | " | " | Bored | 60 | 2,350 | - 30 | 2,320 | 30 | 2,320 | Glacial clay | Hard, clear, "alkaline" | 45 | S | Sufficient supply. A 30-foot well with 18 feet of hard water for house use. |
| 22 | NW. | 22 | " | " | " | Bored | 40 | 2,370 | - 30 | 2,340 | 30 | 2,340 | Glacial sandy blue clay | Hard, clear | 43 | D, S | Waters 10 head stock. |
| 23 | NE. | 22 | " | " | " | Bored | 120 | 2,360 | - 80 | 2,280 | 120 | 2,240 | Glacial gravel and sand | Hard, clear | 42 | D, S | Waters 4 head stock. Sufficient supply. |
| 24 | NW. | 23 | " | " | " | Bored | 40 | 2,365 | - 34 | 2,331 | 34 | 2,331 | Glacial quicksand | Hard, clear | | D, S | Sufficient supply. |
| 25 | SW. | 24 | " | " | " | Bored | 55 | 2,340 | - 47 | 2,293 | 47 | 2,293 | Glacial sand | Hard, clear | 42 | D, S | Waters 20 head stock. |
| 26 | SE. | 26 | " | " | " | Bored | 130 | 2,370 | - 80 | 2,290 | 80 | 2,290 | Glacial gravel | Hard, iron, red sediment, "alkaline" | 45 | D, S | Waters 20 head stock. Laxative. |
| 27 | SW. | 27 | " | " | " | Bored | 110 | 2,370 | - 70 | 2,300 | 110 | 2,260 | Glacial quicksand | Very hard, clear | 42 | D, S | Sufficient supply. |
| 28 | SW. | 28 | " | " | " | Dug | 38 | 2,370 | - 22 | 2,348 | 22 | 2,348 | Glacial drift | Hard, iron, clear | | D, S | Waters 16 head stock. 2 other wells, one 38 and 50 feet in quicksand. |
| 29 | NE. | 28 | " | " | " | Dug | 36 | 2,370 | - 28 | 2,342 | 28 | 2,342 | Glacial quicksand | Hard, clear | 43 | D, S | Waters 50 head stock. Excellent supply. |
| 30 | SE. | 29 | " | " | " | Bored | 60 | 2,350 | - 18 | 2,332 | 18 | 2,332 | Glacial sandy blue clay | Hard, clear | 43 | D, S | Sufficient supply. |
| 31 | SE. | 33 | " | " | " | Bored | 76 | 2,365 | - 65 | 2,300 | 65 | 2,300 | Glacial gravel | Hard, iron, clear, red sediment, "alkaline" | 45 | D, S | Waters 10 head stock. A 130-foot well in Bearpaw now filled in. |
| 32 | NE. | 33 | " | " | " | Dug | 76 | 2,[illegible] | - 68 | 2,297 | 76 | 2,289 | Glacial gravel | Hard, iron "alkaline", clear, red sediment | 45 | D, S | Waters 14 head stock. |

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 GLEN BAIN, NO. 105, 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | NE. | 34 | 12 | 7 | 3 | Bored | 50 | 2,355 | - 50 | 2,305 | 40 | 2,315 | Glacial sandy blue clay | Hard, clear | 42 | D, S | Sufficient supply. |
| 34 | NW. | 35 | " | " | " | Bored | 100 | 2,360 | - 55 | 2,305 | 100 | 2,260 | Glacial gravel | Hard, clear | 42 | D, S | Waters 20 head stock. |
| 35 | NE. | 36 | " | " | " | Dug | 22 | 2,310 | - 13 | 2,297 | 3 | 2,307 | Glacial gravel | Hard, clear | 43 | D, S | Supplies village of St. Boswells. Waters 260 head stock. Excellent supply. |
| 1 | SE. | 2 | 12 | 8 | 3 | Dug | 32 | 2,360 | - 26 | 2,334 | 26 | 2,334 | Glacial quicksand | Hard, clear | | D, S | Sufficient supply. A 12-foot well. Strong supply in quicksand. |
| 2 | SW. | 3 | " | " | " | Dug | 20 | 2,400 | - 10 | 2,390 | 10 | 2,390 | Glacial yellow clay | Medium hard, clear | | D, S | Sufficient supply now. |
| 3 | NW. | 3 | " | " | " | Bored | 90 | 2,420 | - 19 | 2,401 | | | Glacial sand | Hard, clear, | 42 | D, S | Sufficient supply. A 30-foot well for drinking. Hard to obtain water here. |
| 4 | SW. | 4 | " | " | " | Bored | 95 | 2,430 | - 90 | 2,340 | 90 | 2,340 | Bearpaw shale | Hard, strongly mineralized, "alkaline", cloudy | 42 | N | Killed several head of stock. 3 dry holes less than 100 feet in Bearpaw. Small supply. Haul water. |
| 5 | NW. | 4 | " | " | " | Bored | 58 | 2,440 | | | | | | | | | Dry hole in Bearpaw. |
| 6 | NW. | 6 | " | " | " | Bored | 50 | 2,480 | - 48 | 2,432 | 48 | 2,432 | Glacial clay | Hard, clear | 42 | D, S | Intermittent insufficient supply. 2 dry holes 50 feet deep. |
| 7 | SE. | 9 | " | " | " | Bored | 75 | 2,475 | - 25 | 2,450 | 75 | 2,400 | Glacial quick-sand | Hard, clear, "alkaline" | | S | Sufficient supply. An 85-foot dry hole. 20-foot well in sand, good supply. |
| 8 | NE. | 10 | " | " | " | Bored | 108 | 2,400 | | | | | Bearpaw shale | | | N | Slight seepage, could not be used. Shallow well for house use. Several dry holes. |
| 9 | SE. | 13 | " | " | " | Dug | 47 | 2,370 | - 45 | 2,325 | 45 | 2,325 | Glacial sand | Hard, clear | 42 | D, S | Sufficient supply. |
| 10 | NE. | 13 | " | " | " | Dug | 47 | 2,370 | - 44 | 2,326 | 44 | 2,326 | Glacial sand | Hard, clear | 42 | D, S | Excellent supply. |
| 11 | SW. | 14 | " | " | " | Bored | 104 | 2,430 | - 40 | 2,390 | 54 | 2,376 | Bearpaw | Hard, clear, "alkaline" | | N | Well filled in because too "alkaline"; shallow well for house use. |
| 12 | SE. | 16 | " | " | " | Bored | 75 | 2,520 | - 20 | 2,500 | 75 | 2,445 | Glacial quicksand | Hard, clear, "alkaline" | | S | Laxative. Sufficient for large number of stock. 20-foot well for house use. |
| 13 | SW. | 17 | " | " | " | Dug | 14 | 2,490 | - 7 | 2,4[illegible]3 | 10 | 2,480 | Glacial quicksand | Hard, clear | 42 | D, S | Good supply. |
| 14 | SW. | 18 | " | " | " | Dug | 12 | 2,480 | - 6 | 2,474 | 6 | 2,474 | Glacial quicksand | Hard, clear | 42 | D, S | Sufficient supply for a large number of stock. |
| 15 | NE. | 18 | " | " | " | Dug | 12 | 2,520 | - 6 | 2,514 | 6 | 2,514 | Glacial quicksand | Hard, clear | 43 | D, S | Excellent supply. Had 50-foot dry holes. |
| 16 | SW. | 19 | " | " | " | Bored | 32 | 2,560 | - 20 | 2,540 | 20 | 2,540 | Glacial gravel and clay | Hard, clear, "alkaline", sulphur | | D, S | Sufficient supply. |
| 17 | SW. | 19 | " | " | " | Bored | 103 | 2,590 | | | | | | | | | Dry hole in Bearpaw shale. A 68-foot dry hole with gas. |
| 18 | NW. | 20 | " | " | " | Bored | 60 | 2,550 | - 50 | 2,500 | 50 | 2,500 | Glacial sand | Hard, clear | 44 | D, S | Sufficient supply. Also use another shallow well iwth "alkaline" water. |
| 19 | SE. | 23 | " | " | " | Dug | 12 | 2,380 | - 9 | 2,371 | 9 | 2,371 | Glacial quicksand | Hard, clear | 42 | D, S | Sufficient supply. |
| 20 | NW. | 24 | " | " | " | Bored | 32 | 2,380 | - 30 | 2,350 | 30 | 2,350 | Glacial black muck | Hard, clear, "alkaline" | | D, S | Insufficient supply. Haul drinking water. |
| 21 | NW. | 25 | " | " | " | Bored | 80 | 2,380 | | | | | | | | | Haul drinking water. Several dry holes over 80 feet [illegible]arpaw. |
| 22 | NE. | 27 | " | " | | Bored | 40 | 2,475 | - 20 | 2,455 | 40 | 2,435 | Gl[illegible]ravel | Hard, clear, iron, "alkaline" | | S | Haul drinking [illegible]. Sufficient supply. Poor quality. |

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 GLEN BAIN, NO. 105, 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 23 | NE. | 28 | 12 | 8 | 3 | Dug | 42 | 2,500 | - 33 | 2,467 | 33 | 2,467 | Glacial sand and clay | Hard, clear | | D, S | Sufficient supply. A 40-foot well with 9 feet of water; comes in quickly. |
| 24 | NE. | 32 | " | " | " | Bored | 68 | 2,565 | - 48 | 2,517 | 68 | 2,497 | Glacial clay and gravel | Hard, clear, "alkaline" | 42 | S | Laxative on humans. Sufficient for stock use. |
| 25 | NW. | 33 | " | " | " | Bored | 68 | 2,570 | - 60 | 2,510 | 60 | 2,510 | Glacial clay and gravel | Hard, clear | | S | Sufficient supply. 15-foot well in gravel and sand. Good supply. |
| 26 | NE. | 33 | " | " | " | Bored | 42 | 2,540 | - 5 | 2,535 | 42 | 2,498 | Glacial drift | Hard, iron, mineralized, green, cloudy | 42 | S | Laxative on humans. Sufficient supply. seepage well for house. 118-foot dry hole in Bearpaw. |
| 27 | SW. | 36 | " | " | " | Dug | 30 | 2,390 | - 15 | 2,375 | 10 | 2,380 | Glacial sand | Hard, clear | 42 | D, S | Sufficient supply. |
| 1 | NW. | 2 | 12 | 9 | 3 | Dug | 20 | 2,490 | - 14 | 2,476 | 14 | 2,476 | Glacial sand and gravel | Hard, iron, clear | | D, S | Sufficient supply. 2 dams in coulée hold water all year. |
| 2 | NW. | 3 | " | " | " | Bored | 60 | 2,520 | - 40 | 2,480 | 60 | 2,460 | Glacial sand | Hard, clear | 42 | D, S | Excellent supply. Waters 25 head stock. |
| 3 | NW. | 4 | " | " | " | Bored | 85 | 2,530 | - 50 | 2,480 | 85 | 2,445 | Glacial sand | Hard, clear | 42 | D, S | Very good supply. |
| 4 | SW. | 5 | " | " | " | Bored | 60 | 2,480 | - 40 | 2,440 | 60 | 2,420 | Glacial sand | Hard, clear, iron | | D, S | Sufficient supply. Also use a spring. |
| 5 | NE. | 6 | " | " | " | Bored | 60 | 2,490 | - 40 | 2,450 | 60 | 2,430 | Glacial sand | Hard, iron, "alkaline", red sediment | | S | Sufficient supply. Also a spring for stock with "alkaline" water. |
| 6 | NW. | 7 | " | " | " | Dug | 20 | 2,460 | - 10 | 2,450 | 20 | 2,440 | Glacial sand | Soft, clear | | D, S | No information. Good quality of water. |
| 7 | E.½ | 9 | " | " | " | Dug | 90 | 2,500 | | | | | | | | | Dry hole in Bearpaw shale. A seepage well beside a dugout gives small supply. |
| 8 | SE. | 10 | " | " | " | Dug | 20 | 2,475 | - 14 | 2,461 | 14 | 2,461 | Glacial gravel and sand | Hard, clear, iron | | D, S | Sufficient supply with 2 dams. |
| 9 | SE. | 12 | " | " | " | Bored | 50 | 2,500 | | | | | | | | | Dry hole in glacial drift. |
| 10 | SE. | 13 | " | " | " | Dug | 16 | 2,500 | - 11 | 2,489 | 11 | 2,489 | Glacial gravel and quicksand | Hard, clear, slightly "alkaline" | | D, S | Sufficient supply for house only. Dam used for stock. |
| 11 | W.½ | 13 | " | " | " | Dug | 14 | 2,510 | | | | | | | | | Dry hole in glacial drift. Fair supply in dugout but too "alkaline" for house purposes. |
| 12 | SW. | 14 | " | " | " | Bored | 30 | 2,550 | - 15 | 2,535 | 30 | 2,520 | Glacial clay and sand | Hard, sulphur, "alkaline", iron, dark colour, blackens pail | | N | Stock will not drink this water. |
| 13 | SE. | 15 | " | " | " | Bored | 50 | 2,560 | - 30 | 2,530 | 50 | 2,510 | Glacial sand and gravel | Hard, iron, clear | | D, S | Sufficient supply. A dam also used. |
| 14 | SW. | 15 | " | " | " | Bored | 50 | 2,560 | - 30 | 2,530 | 50 | 2,510 | Glacial sand and gravel | Hard, iron, clear | | D, S | Sufficient supply. |
| 15 | NW. | 22 | " | " | " | Bored | 75 | 2,750 | - 60 | 2,690 | 75 | 2,675 | Glacial sand or gravel | Hard, iron, sulphur, clear | | D, S | Sufficient supply. Water comes in quickly. |
| 16 | SE. | 23 | " | " | " | Dug | 16 | 2,620 | - 12 | 2,608 | 12 | 2,608 | Glacial gravel | Clear, hard | 43 | D, S | Sufficient supply. |
| 17 | SW. | 24 | " | " | " | Dug | 12 | 2,600 | 0 | 2,600 | 12 | 2,588 | Glacial sand | Hard, clear | | D, S | Sufficient supply. |
| 18 | NE. | [illegible] | " | " | " | Spring | 0 | 2,600 | 0 | 2,600 | 0 | [illegible] | Glacial quicksand | Hard, clear, "alkaline" | 43 | S | Sufficient for stock. Too "alkaline" for human use. |

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 GLEN BAIN, NO. 105, 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 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 19 | NW. | 25 | 12 | 9 | 3 | Dug | 12 | 2,640 | − 7 | 2,633 | 7 | 2,633 | Glacial coarse gravel | Hard, clear | | D, S | Sufficient supply. |
| 20 | NW. | 27 | " | " | " | Bored | 90 | 2,800 | − 60 | 2,740 | 90 | 2,710 | Glacial sand and gravel | Hard, clear, "alkaline" | | D, S | Sufficient supply. |
| 21 | SW. | 33 | " | " | " | Bored | 60 | 2,800 | − 40 | 2,760 | | | Glacial clay | Hard, clear | 42 | D, S | Excellent supply. |
| 22 | NW. | 33 | " | " | " | Bored | 95 | 2,830 | − 65 | 2,765 | 95 | 2,735 | Eastend | Hard, clear | | D, S | Excellent supply. Waters 50 head stock. |
| 23 | NW. | 34 | " | " | " | Bored | 60 | 2,750 | − 30 | 2,720 | 60 | 2,690 | Glacial clay | Hard, clear | 42 | D, S | Large supply. |
| 24 | NE. | 36 | " | " | " | Bored | 46 | 2,670 | − 35 | 2,635 | 44 | 2,626 | Glacial quick-sand | Hard, clear | | D, S | Sufficient supply. |
| 25 | NE. | 36 | " | " | " | Bored | 82 | 2,680 | | | | | Glacial blue sand and clay | | | | Dry hole. Also 2 springs in pasture. |
| | NW | 33 | 12 | 8 | 3 | | 83 | 2550 | − 25 | 2525 | 72 | 2478 | Bearpaw | | | | No other information |
| | NE | 27 | 12 | 8 | 3 | | 65 | 2500 | | | | | " | | | | Soil very changeable with a great deal of mineral & alkali. Left as dry hole. |
| | SW¼ | 3 | 9 | 11 | 3 | | 28 | 2600 | | | | | Glacial | | | | No other inform. |
| | NW¼ | 34 | 8 | 11 | 3 | | 40 | 2600 | | | | | Bearpaw | | | | Selenite crystals |

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.

ADDITIONAL
INFORMATION
SINCE
1935–

O. H. M. S.

M. & R. 15

## TABLE OF WATER ANALYSES

R.M. Glenbain No. 105

| Sample No. | Name and Address | T tal Solids | Colif. Orgs. | Lab. No. | Odour | Colour | Sediment | pH | Nitrates | Nitrites | Ca | Mg | Mn | Fe | $SO_4$ | $HCO_3$ | $CO_3$ | CL | Hard | Alk. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 48-2194 | J. Wilhelm, Vanguard | 424 ppm. | 15 | 2895 | s.s. | Clear | Nil | 7.2 | 19.00 ppm | Nil | 1 | | | v.s.t. | | 1 | | v.s.t. | 400 ppm. | 406 ppm. as bicarbonate. |
| 48-2195 | Wm. Mayer, Gravelbourg | 1696 ppm. | 240 | 2898 | slight | Clear | s.d. | 7.6 | Nil | .03 ppm. | 2 | 3 | 1 | s.t. | 1 | 2 | | trace | | |

Note: s.s. --- slight stale
s.d. --- slight diatomateous

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF GLEN BAIN, No. 105, SASKATCHEWAN

| Township | 10 | 10 | 10 | 11 | 11 | 11 | 12 | 12 | 12 | Total No. in municipality |
|---|---|---|---|---|---|---|---|---|---|---|
| West of 3rd Meridian Range | 7 | 8 | 9 | 7 | 8 | 9 | 7 | 8 | 9 | |
| Total No. of Wells in Township | 57 | 40 | 45 | 49 | 40 | 41 | 43 | 47 | 30 | 392 |
| No. of wells in bedrock | 12 | 5 | 6 | 9 | 13 | 4 | 1 | 12 | 2 | 64 |
| No. of wells in glacial drift | 45 | 35 | 39 | 38 | 25 | 37 | 38 | 36 | 28 | 321 |
| No. of wells in alluvium | 0 | 0 | 0 | 2 | 2 | 0 | 4 | 0 | 0 | 8 |
| Permanency of Water Supply | | | | | | | | | | |
| No. with permanent supply | 42 | 31 | 34 | 40 | 30 | 36 | 43 | 33 | 26 | 315 |
| No. with intermittent supply | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 3 |
| No. dry holes | 13 | 9 | 11 | 9 | 10 | 5 | 0 | 14 | 4 | 75 |
| Types of Wells | | | | | | | | | | |
| No. of flowing artesian wells | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| No. of non-flowing artesian wells | 11 | 6 | 16 | 10 | 7 | 8 | 3 | 5 | 14 | 80 |
| No. of non-artesian wells | 33 | 25 | 18 | 30 | 23 | 28 | 40 | 29 | 12 | 338 |
| Quality of Water | | | | | | | | | | |
| No. with hard water | 42 | 30 | 33 | 33 | 27 | 30 | 43 | 34 | 25 | 297 |
| No. with soft water | 2 | 1 | 1 | 7 | 3 | 5 | 0 | 0 | 1 | 20 |
| No. with salty water | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| No. with "alkaline" water | 21 | 18 | 21 | 16 | 13 | 15 | 8 | 11 | 6 | 129 |
| Depths of Wells | | | | | | | | | | |
| No. from 0 to 50 feet deep | 30 | 19 | 16 | 32 | 17 | 25 | 32 | 29 | 18 | 218 |
| No. from 51 to 100 feet deep | 21 | 19 | 23 | 14 | 14 | 13 | 7 | 15 | 12 | 138 |
| No. from 101 to 150 feet deep | 3 | 1 | 4 | 3 | 7 | 2 | 4 | 4 | 0 | 28 |
| No. from 151 to 200 feet deep | 2 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 7 |
| No. from 201 to 500 feet deep | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 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 | 0 | 0 |
| How the Water is Used | | | | | | | | | | |
| No. usable for domestic purposes | 27 | 17 | 14 | 32 | 20 | 29 | 39 | 24 | 22 | 224 |
| No. not usable for domestic purposes | 17 | 14 | 20 | 8 | 10 | 7 | 4 | 10 | 4 | 94 |
| No. usable for stock | 39 | 26 | 26 | 36 | 28 | 34 | 42 | 31 | 25 | 287 |
| No. not usable for stock | 5 | 5 | 8 | 4 | 2 | 2 | 1 | 3 | 1 | 31 |
| Sufficiency of Water Supply | | | | | | | | | | |
| No. sufficient for domestic purposes | 44 | 31 | 32 | 39 | 28 | 36 | 42 | 33 | 26 | 311 |
| No. insufficient for dom. purposes | 0 | 0 | 2 | 1 | 2 | 0 | 1 | 1 | 0 | 7 |
| No. sufficient for stock needs | 32 | 14 | 21 | 26 | 19 | 27 | 40 | 24 | 25 | 228 |
| No. insufficient for stock needs | 12 | 17 | 13 | 14 | 11 | 9 | 3 | 10 | 1 | 90 |

# WELL RECORDS—Rural Municipality of GLEN BAIN NO. 105

| | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A. Myer | 103 | SW | 14 | 11 | 7 | 3 | Bored | 42 | 2427 | -24 | 2403 | 38 | 2389 | Glacial sand | hard, alkaline | 42° | S | unpstable - stock only. Bearpaw at 55 to 60' (3 dry holes). |
| W. Myer | 104 | SE | 36 | 11 | 7 | 3 | Bored | 42 | 2363 | -34 | 2329 | ? | ? | Glacial sand full depth | hard | 42° | D. S. # | Sample No. 48-2195 Waters 10 head stock. |
| Wilhelm | 102 | SE | 36 | 11 | 9 | 3 | Bored | 47 | 2508 | -26 | 2482 | 44 | 2464 | Glacial sand | hard | 42° | D. S. # | Sample No. 48-2194 Waters 40 head of stock |

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.

Form NR. 423—1000—5-48