CANADA
DEPARTMENT OF MINES

HON.T. A. CRERAR, MINISTER; CHARLES CAMSELL, DEPUTY MINISTER

BUREAU OF ECONOMIC GEOLOGY

GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF BONE CREEK No. 108 SASKATCHEWAN

BY

B. R. MacKay, H. H. Beach & R. Johnson

Water Supply Paper No. 88

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INTRODUCTION

Lack of rainfall during the years 1930 to 1934 over a large part of the Prairie Provinces brought about an acute shortage both in the larger supplies of surface water used for irrigation 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.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

WATER-BEARING HORIZONS OF THE MUNICIPALITY

The rural municipality of Bone Creek covers an area of 324 square miles in the southwestern part of Saskatchewan. The municipality is described as tps. 9, 10, and 11, ranges 16, 17, and 18, W. 3rd mer. The villages of Instow and Scotsguard are situated on the Lethbridge-Weyburn branch of the Canadian Pacific railway, which extends up the valley of Notukeu creek along the southern boundaries of townships 9, ranges 16 and 17, and leaves the municipality in the southwest corner of the latter township. Scotsguard, the principal centre of population in the area, lies 38 miles south and 17 miles west of the city of Swift Current and 50 miles north of the International Boundary.

The greater part of this municipality is an irregularly rolling upland ranging in elevation from 2,950 to 3,050 feet above sea-level. On only a few isolated hilltops in the centre of the area does the elevation rise above 3,100 feet above sea-level. Toward the northern boundary the elevations decrease gradually to approximately 2,900 feet along the edge of Swiftcurrent Creek valley. The sides of the valley are very steep and the bottom of the valley lies some 200 feet below the adjoining uplands. Toward the southern border the ground surface falls away more gradually to an elevation of approximately 2,900 feet in the broad valley of the easterly flowing Notukeu creek and thence rises again to elevations exceeding 3,000 feet along the southern boundary of the municipality.

The two creeks mentioned above constitute the major drainage features of the area. Swiftcurrent creek flows throughout the year and is joined by several northerly flowing, intermittent creeks in township 11, range 17. Notukeu creek flows only during the spring or early summer, but small, spring-fed lakes and swamps occur in undrained depressions along its course.

Little difficulty has been experienced in finding adequate supplies of water by sinking wells in this area, so that few dugouts have been excavated or dams constructed. In many parts of the area, suitable dam sites in coulées, for the storing of surface water, form a potential source of water for stock for considerable periods of time, should the present supplies derived from wells prove inadequate.

Ground water is derived from wells sunk into the unconsolidated glacial deposits and from the underlying Cypress Hills, Ravenscrag, Eastend, and Bearpaw bedrock formations. The areal distribution of each of these deposits within the area and the ground water conditions presented by each will be discussed in the succeeding sections of this report.

Water-bearing Horizons in the Unconsolidated Deposits

The Recent deposits of the municipality are confined largely to a narrow belt extending along the stream channel of Notukeu creek. These deposits are composed essentially of fine silts and probably nowhere greatly exceed 20 feet in thickness. In most places these silts are too finely grained to permit ready passage of water, but at a few points small supplies of generally highly mineralized water may be expected at shallow depths from them. Small areas of similar deposits also occur in a few places along the valley of Swiftcurrent creek, but such small supplies of water as they might yield are not conveniently located for residents on the bordering uplands.

The layer of glacial drift that overlies practically the entire municipality varies in thickness from a maximum of 90 feet on the uplands to negligible thickness along the sides of Swiftcurrent Creek valley where numerous exposures of bedrock occur. The glacial drift was laid down by the great continental ice-sheet that advanced and retreated over the province of Saskatchewan many thousands of years ago. The drift is composed mainly of compact bluish grey boulder clay which weathers to a light brown or yellow colour at or near the surface.

Two types of glacial drift differing essentially in their porosity and the regularity of the surface have been recognized in the area. These are known as till plain and moraine. The glacial till plain is composed almost entirely of till or boulder clay, but scattered through the till with no apparent regularity of occurrence or size are pockets of sands and gravels that are generally water-bearing. The till-covered areas are generally more gently rolling than the moraine. Shallow wells in the till-covered areas yield small supplies of water that is generally drinkable, but no continuous water-bearing horizons are traceable over any large areas.

The areas of moraine are confined almost entirely to the upland parts of the municipality. The surface of these areas is irregularly rolling and characterized by many low knolls and ridges and undrained depressions. The moraine is also composed of boulder clay in which the sand and gravel pockets are generally more numerous than in the till plain area. In localized areas shallow wells encountering these gravels yield large supplies of water of good quality. At other places careful testing would be required before even small supplies were found. Only in the extreme northwest and southeast corners of the area can the glacial deposits be considered to form an important source of water. Over much of the area the bedrock has been proved to be productive of large supplies of water and sinking wells through the drift into the bedrock is considered more advisable than undertaking extensive prospecting at shallow depths.

Water-bearing Horizons in the Bedrock

Four distinct bedrock formations are known to underlie the glacial deposits in different parts of this municipality. These occur in descending order in the following sequence: the Cypress Hills formation, the Ravenscrag formation, the Eastend formation, and the Bearpaw formation. All of these formations are believed to have originally extended over most of the municipality, but erosion before the advance of the continental ice-sheet had removed in places the upper formations, so that in some places lower formations now underlie the drift. The areal extent of each of these formations as they occur

immediately beneath the glacial drift is indicated on Figure 1 of the map accompanying this report.

The uppermost or Cypress Hills formation is confined to the northeastern and north-central parts of the municipality. It was laid downward originally as a deposit formed by a large river upon an irregular pre-existing bedrock surface and consequently much greater variations in the elevations at which this formation occurs from place to place are to be expected than for the more uniformly deposited underlying formations. Normally the Cypress Hills conglomerate immediately overlies the Ravenscrag formation, but over most of townships 11, ranges 16 and 17, erosion had removed the Ravenscrag and in places the Eastend formations prior to the deposition of the Cypress Hills formation, and in their absence the Cypress Hills conglomerate is found to rest upon the Eastend or even the Bearpaw.

The greater part of this formation is made up of rounded quartzite boulders ranging from 3 to 5 inches in diameter, cemented firmly in a lime-sand matrix. Interspersed through the consolidated conglomerate are beds of sand, gravel, clay, and loose cobble stones.

Throughout the area underlain by the Cypress Hills formation, good supplies of water are quite generally obtained from the sand and gravel beds at depths of 30 and 135 feet from the surface. A large number of wells sunk into the formation, particularly in the eastern parts of the area, yield supplies of soft water. Other supplies vary considerably in quality, but in only a few places is the mineral salt concentration in the water sufficiently high to render the water unfit for domestic use.

The Ravenscrag formation underlies the Cypress Hills conglomerate where it is present in the northern part of the area and elsewhere throughout the greater part of the municipality occurs immediately beneath the glacial drift down to an elevation of 2,850 to 2,800 feet above sea-level. A relatively thick section of the formation underlies the areas of high elevation in township 9, range 18, and townships 9 and 10,

range 17. The upper part of the Ravenscrag is composed of yellow to brown shales and clays, beds of soft sandstone, and thin seams of lignite coal. Throughout the area of high elevation mentioned above moderately large supplies of hard, drinkable water, containing varying quantities of mineral salts, can generally be obtained from these sand beds and coal seams at depths not exceeding 80 feet. The lower part of the Ravenscrag formation below the lowest coal seam is composed of shales and clays and massive beds of soft, coarse sandstone. From the data available from the logs of wells in the central part of the municipality no distinction can be made between the lower part of the Ravenscrag and the underlying Eastend formation, if present, due to the similarity of their physical appearance and texture. Consequently in the following discussion the water-bearing horizons of the Eastend formation, if such is present, are referred to the lower part of the Ravenscrag.

The lower part of the Ravenscrag is considered to be the most consistently productive water-bearing horizon in the municipality. Large supplies of soft water are almost certain to be encountered in it at elevations above 2,760 feet, in all parts of townships 9 and 10, ranges 17 and 18. The most common horizon at which soft water supplies are obtained lies between 2,800 and 2,850 feet. The water is under hydrostatic pressure and rises to elevations of nearly 2,950 feet. The depths of wells required to tap the soft water-bearing sands in these four townships vary between 100 and 250 feet, depending largely upon the surface elevation of the selected well site. The same horizon exists at similar depths in parts of the remaining five townships of the municipality, as will be discussed in the sections of this report dealing with the individual townships.

The Eastend formation is believed to underlie the drift in the extreme northwestern part of the municipality and to extend for an undetermined distance under the Ravenscrag in the northwestern and

western parts of the municipality. No wells have been sunk in the Eastend formation in the northwest part of the municipality where it forms the uppermost bedrock formation, and elsewhere no wells are known to be definitely drawing water from the Eastend formation.

The Bearpaw formation underlies the more recent bedrock formations where present and the glacial drift throughout the entire municipality. The upper part of this formation, above elevations of 2,550 to 2,600 feet above sea-level, is composed of dark grey shales interbedded with fairly extensive sand beds from which large supplies of soft water may be obtained. Wells in township 9, range 16, yield large supplies of soft, brownish coloured water from a sand bed at an approximate elevation of 2,570 feet. At greater depths in the formation the sands occur only sparingly and the formation is composed almost entirely of shale. This shale is generally recognizable in drilling by its dark grey colour, almost black when wet, by its soapy feel, and by the small, roughly cubical fragments into which it crumbles upon drying.

Drilling below an elevation of 2,550 feet above sea-level is inadvisable in any part of the municipality. The compact shales, which will probably be encountered before this level is reached, will yield only small supplies of highly mineralized water, unfit for any farm use.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 9, Range 16

The mantle of glacial drift overlying this township varies considerably in thickness from place to place. It probably does not greatly exceed 20 feet at any point in the till-covered northeastern corner, but thickens to at least 65 feet in the east-central parts and may reach thicknesses of 80 to 100 feet along the southwestern and western parts of the township that are covered by moraine. Only two wells in the area, located on sections 2 and 11, are producing water from gravel pockets in the upper few feet of the drift. Both wells yield small supplies of moderately soft, drinkable water. It is probable that extensive prospecting in the upper 30 feet of the drift will yield similar supplies. The greater number of the residents of the area, however, have sunk wells either to the base of the drift or into the underlying bedrock. Wells in the east-central part of the township have encountered beds of sand lying at the contact between the boulder clay and the underlying bedrock at depths of 35 to 65 feet and from these fairly large supplies of soft to hard "alkaline" water are obtained. The harder waters are not generally suitable for domestic use due to the large amounts of sulphate salts present in solution, but are generally satisfactory for watering stock. An 80-foot well located on the NE. $\frac{1}{4}$, section 30, has also tapped this horizon and obtains a large supply of hard, highly mineralized, but drinkable water. Where the sands are present at the drift-bedrock contact, fairly large quantities of water, suitable at least for stock watering, are assured. These beds are not present at all points, however, in which case it is necessary to deepen the wells into the bedrock.

The greater part of the ground water used in the township is obtained from the Ravenscrag and Bearpaw formations. The Ravenscrag formation is considered to underlie a little more than the western half of the township, its approximate eastern boundary being as

indicated on Figure 1 of the accompanying map. Soft water is available from an extensive sand deposit in the lower part of the Ravenscrag encountered throughout this part of the area at elevations between 2,830 and 2,770 feet above sea-level. The depths of wells tapping this horizon vary from a maximum of 173 feet in section 30 and at other places along the western boundary of the municipality to 15 feet in section 35 where the surface elevations are much lower. The supplies obtainable from this aquifer along the western boundary of the township are large, but become smaller near the eastern edge of the area where the sand bed is presumably thinner. Water in the basal sand bed of this formation is under sufficient hydrostatic pressure to rise in several wells along the western border from 50 to 100 feet above the aquifer, and in the valley of Notukeu creek where this sand bed is near the surface several springs that flow throughout the year occur.

The Bearpaw formation underlies the Ravenscrag formation in the western part and the glacial drift throughout the remainder of the township. The contact of the Ravenscrag and Bearpaw formations is believed to occur at elevations between 2,800 and 2,770 feet. Wells sunk to depths between 221 and 290 feet on sections 5, 9, 34, and 35 yield large supplies of soft, brownish coloured water from a sand bed in the Bearpaw formation at an approximate elevation of 2,560 feet. This sand bed may underlie the entire township. The depth necessary to tap the horizon depends on surface elevations and will vary from 200 feet in the eastern lowlands to more than 400 feet at some sites along the western boundary of the township.

Drilling below an elevation of 2,550 feet above sea-level is not advisable in any part of the township, as below this elevation the Bearpaw formation is composed almost entirely of shale and yields only small quantities of water that is unsuitable for farm use.

Township 9, Range 17

The glacial drift covering this township is largely moraine and varies in thickness from 10 feet or less on the hill slopes to nearly 50 feet over the uplands. An area of 9 square miles in the

southwestern part of the township is covered by a till plain. A few residents have obtained small supplies of hard, drinkable water from shallow wells sunk into the glacial drift. In this township, however neither type of glacial drift can be considered an important source of ground water and most of the wells have been sunk through the drift into the Ravenscrag formation.

Although adequate supplies of water of varying quality are obtained at many places from sand beds and occasionally coal seams of the Ravenscrag formation at depths not exceeding 100 feet, most of the residents have obtained large supplies of soft water from sand beds in the lower part of the formation at depths between 100 and 233 feet. The elevations down to which wells have been drilled to obtain soft water supplies vary between 2,920 and 2,760 feet, suggesting the presence of more than one sand bed in the lower part of the Ravenscrag. One water-bearing sand bed occurring at elevations between 2,850 and 2,800 feet appears to be fairly continuous under the entire township and other less extensive beds are believed to occur at higher elevations where a greater thickness of the Ravenscrag is present. As in the township to the east, the soft water in the lower sand beds is under considerable hydrostatic pressure, rising above the aquifer in some wells 50 to 150 feet. Water in wells located in the valley of Notukeu creek and sunk to the lower sand horizon is under sufficient pressure to rise and flow at the surface.

Large supplies of soft water might also be obtained from sand beds in the upper part of the Bearpaw formation which underlies the Ravenscrag throughout the township below an approximate elevation of 2,760 feet above sea-level. The Ravenscrag has been found to be productive at all points where wells have been sunk into it and it has not been necessary to drill wells into the underlying formation.

Township 9, Range 18

A thin layer of glacial till covers the western lowland half of the township and grades into an irregularly rolling moraine that mantles the eastern half of the area and has a somewhat greater thickness. Two shallow wells located in section 33 are producing small supplies of hard, drinkable water from isolated pockets of sands and gravels in the boulder clay. Other wells on sections 16, 22, 26, and 30 have obtained larger supplies from sand beds occurring at the contact of the drift and the underlying bedrock at depths of 38 to 56 feet. This latter horizon is evidently not everywhere productive, as the greater number of the wells in the township have been sunk to the sand beds and coal seams that form aquifers in the Ravenscrag formation.

In the area of high elevation in the southeastern part of the township the Ravenscrag formation is relatively thick. Many residents obtain adequate supplies of hard, mineralized water from the sand beds and coal seams in the upper part of the formation at depths ranging from 80 feet on the lower slopes to 184 feet on the higher parts of the uplands.

Large supplies of soft, drinkable water are available from the sand beds of the lower part of the Ravenscrag, which underlie the entire township. These sand beds have been encountered at elevations between 2,895 and 2,775 feet above sea-level in wells varying in depth from 120 to 244 feet, depending on surface elevation of the selected well site. It is believed that one aquifer extends under the entire township at an approximate elevation of 2,800 feet, and other less extensive beds have been tapped at higher levels in isolated localities. The Bearpaw formation underlies the Ravenscrag below an approximate elevation of 2,760 feet throughout the township.

Sand beds may occur in the upper part of the Bearpaw formation from which moderately large supplies of soft water could be

obtained by deep drilling, but as the Ravenscrag has been found to be productive at all points in the township, where wells have penetrated into it, it is not necessary to sink wells into the Bearpaw.

Township 10, Range 16

A thin layer of glacial till covers the southwestern and southeastern sections, and grades northward into an irregularly rolling area of glacial moraine that mantles the remainder of the township. Over much of the area these glacial deposits are generally too thin to be sources of water. Two wells sunk in the glacial till to depths of 65 and 78 feet in sections 1 and 11 are believed, however, to draw water from gravel pockets occurring at or near the base of the glacial drift. In section 12, wells 26 and 28 feet deep yield adequate supplies of only moderately hard water from localized pockets of sand in the upper part of the glacial drift. Throughout the remainder of the township wells have penetrated the Cypress Hills and Ravenscrag formations at depths between 20 and 50 feet below the surface.

In the northeastern part of the township the glacial drift is underlain by the Cypress Hills formation, as shown on Figure 1. In this area fairly large supplies of generally soft, drinkable water are obtained from sand and gravel beds that lie at elevations between 2,920 and 2,890 feet above sea-level and are believed to form a part of the Cypress Hills formation. The depths of wells vary between 40 and 110 feet depending upon the elevation of the well sites.

The Ravenscrag formation occurs beneath the Cypress Hills formation in the northeastern parts and underlies the glacial drift throughout the remainder of the township, with the exception of a small area in the southeastern corner. In sections 6 and 17, small supplies of highly mineralized but drinkable water were obtained from sand beds of this formation at depths of 40 and 50 feet.

Wells between 80 and 103 feet deep in sections 14, 16, and 21 are deriving adequate supplies of hard, drinkable water from coal seams and sand beds in the upper parts of this formation.

With the exception of a small area in the southeastern corner of the township, fairly large supplies of soft water are believed to be available from the thick beds of sand forming the lower part of the Ravenscrag formation. The elevations at which water has been encountered in this horizon vary between 2,850 and 2,800 feet above sea-level. In the southern part of the township the surface elevations are low and, therefore, the sand probably will be reached at depths of 40 to 100 feet. In the northern part of the township surface elevations vary between 2,950 and 3,050 feet, and it, therefore, becomes necessary to sink wells to depths of 120 to 220 feet to reach this horizon.

Large supplies of soft water may also occur in extensive sand beds in the upper part of the Bearpaw formation which underlies the Ravenscrag throughout the uplands and occurs immediately beneath the thin layer of glacial till in the extreme southeast corner. A sand bed yielding large supplies of soft, brownish coloured, drinkable water was encountered at an approximate elevation of 2,570 feet in the Bearpaw formation in wells in the adjoining township to the south. This horizon will probably be found to be productive in at least the southern part of the township. There will be little necessity of sinking wells through the overlying formations into the Bearpaw in the upland areas, but in the lowlands of the southeast corner the sand beds of this formation form the best source of water.

Township 10, Range 17

Glacial till covers the hill-sides to shallow depths in the northwest corner and along the eastern border of this township, whereas the remaining upland parts of the area are blanketed by a mantle of irregularly rolling moraine which has, at places, a thickness of 60 feet

or more. The till is generally too thin to form a source of any large large supply of water, but water-bearing sand and gravel pockets have been found scattered through the boulder clay in the moraine at several points. In sections 14, 16, and 24, residents are obtaining adequate supplies of soft or only moderately hard water from localized pockets of sand and gravel in the glacial drift at depths ranging between 16 and 33 feet. A 54-foot well on section 22 obtains a large supply of hard, highly mineralized water from a gravel pocket in the lower part of the glacial drift. Although shallow wells can be expected in many places to yield sufficient quantities of hard, drinkable water for domestic requirements it is advisable in most parts of the township to sink wells into the underlying bedrock rather than to undertake extensive prospecting in the glacial drift.

No wells are considered to tap aquifers in the Cypress Hills formation that underlies the glacial drift in a small area in the northwestern corner of the township. Water has been readily obtained from sand and gravel beds in the Cypress Hills formation in adjoining townships, but the formation in this township will probably be too thin to form an important source of water. It will be necessary, generally, to extend wells down into the underlying Ravenscrag formation. Wells sunk to depths of 50 to 100 feet in any part of the township can generally be expected to obtain adequate supplies of hard, slightly mineralized water from coal seams and sand beds of the upper part of the Ravenscrag formation. Should water not be encountered at this horizon large supplies of soft water may be expected from the sand beds forming the lower part of the Ravenscrag formation at elevations between 2,800 and 2,885 feet. The depths of wells necessary to tap these horizons will vary from 125 to 300 feet depending on surface elevation at the well sites. The basal sands of the Ravenscrag are almost certain to be productive at elevations above 2,800 feet and hence there is generally little or no necessity to extend wells to greater depths.

Should it be necessary to sink deeper, moderately large supplies of soft water may be expected in sand beds in the upper part of the Bearpaw formation at elevations of between 2,800 and 2,550 feet above sea-level.

Township 10, Range 18

The glacial drift covering this township consists of a thin layer of glacial till over the greater part of the area, grading into smaller areas of irregularly rolling moraine in the southeastern and north-central parts of the township. Small supplies of water can be obtained from local pockets of sand and gravel occurring interspersed in the boulder clay that comprises the drift. A 63-foot well in section 1 and a 26-foot well dug on section 5, yield adequate supplies of hard, drinkable water from sand pockets occurring at or near the base of the drift. In most places, however, several test holes would be necessary to locate productive sand or gravel pockets in the glacial drift, and residents have sunk wells into the underlying Cypress Hills and Ravenscrag formations where larger supplies of water are to be expected.

The Cypress Hills formation is considered to underlie the glacial drift in a large area covering the greater part of the eastern half of the township as outlined on Figure 1. Wells ranging between 37 and 125 feet in depth in sections 14, 24, 32, 33, 35, and 36, yield adequate supplies of water for all local farm requirements, from the sands and gravels of the Cypress Hills formation. The waters from different wells vary in character from soft to hard and are highly mineralized, but can be used for drinking. This formation is evidently not uniform in thickness or porosity in all parts of the area as in many places it has been found to be unproductive; it then becomes necessary to sink deeper wells into the underlying Ravenscrag formation.

At many points scattered over the entire township wells ranging in depth between 40 and 150 feet have encountered water-bearing coal seams and sand beds in the upper part of the Ravenscrag formation. These wells generally yield fairly large supplies of hard, mineralized water. The water from this source, however, can be used for domestic purposes.

Should these upper beds prove to be unproductive it is advisable to sink deeper as large supplies of soft water are almost certain to be obtained from massive sand beds in the lower part of the Ravenscrag at elevations between 2,790 and 2,890 feet. Most of the residents of this township have drilled wells through the water-bearing beds in the Cypress Hills formation and the upper part of the Ravenscrag formation to obtain soft water from this horizon. Wells penetrating this horizon vary in depth from 99 feet in section 31 to 250 feet in section 15 where the surface elevation is more than 100 feet higher. As large supplies of soft water are available in the basal sands of the Ravenscrag it is seldom necessary in this township to drill wells into the Bearpaw formation, that is below an approximate elevation of 2,790 feet above sea-level.

Soft water aquifers can be expected in the upper sandy part of the Bearpaw formation down to elevations of approximately 2,550 feet. A 285-foot well on section 12 yields a large supply of soft water from a sand bed in the Bearpaw formation at an approximate elevation of 2,705 feet. In this well a large supply of soft water was encountered in the sand bed in the lower part of the Ravenscrag at a depth of 206 feet, but the seepage of highly mineralized water from still higher horizons could not be shut off and the well was drilled to greater depth.

Township 11, Range 16

The glacial drift overlying this township ranges in thickness from a thin veneer along the steep sides of Swiftcurrent Creek valley to 20 to 80 feet on the uplands. The glacial drift consists of rolling moraine grading into a more level till plain in the north-central part

of the township. The supplies of ground water available from scattered sand and gravel pockets in the glacial drift are seldom adequate for local requirements and most residents have sunk wells into the underlying Cypress Hills formation. Wells in sections 17, 19, and 30 sunk to depths of 35, 72, and 10 feet, respectively, yield adequate supplies of drinkable water from sand pockets in the glacial drift. Wells 72 and 63 feet deep, in sections 7 and 18, yield only very small supplies of drinkable water from sand pockets believed to occur at the contact of the drift and the underlying bedrock.

Fairly large supplies of generally soft water are being obtained from beds of sand, gravel, and loose cobblestones in the Cypress Hills formation at depths between 35 and 135 feet, and it is probable that similar supplies of water will be available in this formation throughout most of the township. However, in a few places the formation is thin and no water can be obtained from it, in which case it becomes necessary to sink deeper wells into the underlying Ravenscrag formation.

The Ravenscrag formation underlies the Cypress Hills formation in the southwestern corner of the township, but in most of the northern and eastern parts of the area it probably was completely eroded away and the Cypress Hills beds were deposited on the sediments of the Bearpaw formation. Wells on sections 5, 6, and 36, sunk to depths of 108, 160, and 55 feet, are drawing their supplies from sand beds in the upper part of the formation. A coal seam was reported in the 55-foot well on section 36, indicating that the Ravenscrag beds escaped erosion in at least a small area in the northeastern corner of the township. Fairly large supplies of soft water can be expected from the basal sands of the Ravenscrag where this formation is present. These sands will probably be encountered in the southwestern corner of the township at elevations between 2,830 and 2,790 feet. In this part of the township it would be necessary to drill wells to depths of 150

and 200 feet to reach this horizon.

Should the Ravenscrag be absent or unproductive water may possibly be obtained in sand beds in the upper part of the Bearpaw formation. This formation underlies the glacial drift in Swiftcurrent Creek valley. In the northern sections it underlies the Cypress Hills formation and throughout the remainder of the township it underlies the Ravenscrag formation. A 265-foot well, in section 24, yields a large supply of soft water from a sand bed in the Bearpaw formation at an approximate elevation of 2,730 feet. The Ravenscrag is apparently absent at this site. In most parts of the area wells will generally have to be drilled to depths exceeding 250 feet to reach productive beds in the Bearpaw formation. Drilling should not be continued below an approximate elevation of 2,550 feet in any part of the township, as the compact marine shales of the lower part of the Bearpaw formation will be encountered below this elevation and little or no water is to be expected from them.

Township 11, Range 17

Swiftcurrent creek, which flows in an easterly direction along the northern border of the township, provides water for stock pasturing in the creek valley. Springs, in the tributary valley that extends southward from Swiftcurrent creek in the central part of the township, also provide water for stock. Throughout the greater part of the township, however, wells sunk into the bedrock formations form the main source of water.

A thin layer of glacial till covers most of the township with the exception of small areas along the southern, western, and eastern boundaries where the glacial drift consists of more irregularly rolling moraine. Several residents of the township obtain their water supplies from wells, 24 to 75 feet deep, that tap sand and gravel pockets interspersed in the glacial boulder clay. The supplies from these wells are not generally large, but with the exception of wells

located in the SW. ¼, section 1, SW. ¼, section 19, and NE. ¼, section 30, provide ample quantities for local farm requirements. The character of the water varies from soft to hard and highly mineralized, and is, in a few places, reported to be unfit for domestic use.

Most of the wells in the township have been sunk through the glacial drift into the Cypress Hills formation that underlies the entire township with the exception of a small area in Swiftcurrent Creek valley where the Bearpaw formation immediately underlies the glacial drift. Wells ranging in depth between 10 and 127 feet have penetrated water-bearing beds of sand, gravel, and loose cobble stones in this formation. The supplies thus obtained are generally fairly large. The water varies in quality from soft to hard and highly mineralized, but can generally be used for household purposes.

The lower part of the Ravenscrag formation may underlie the Cypress Hills formation in the areas of relatively high elevation along the southern, eastern, and western boundaries of the township. If such is the case supplies of soft water are to be expected from sand beds that probably occur at depths of 150 to 250 feet or at elevations between 2,850 and 2,790 feet.

In areas of lower elevation in the northern and central parts of the township the Ravenscrag is absent and the Bearpaw formation is considered to immediately underlie the Cypress Hills formation. The Bearpaw formation also underlies the small areas of Ravenscrag at an approximate elevation of 2,800 feet and immediately underlies the glacial drift in Swiftcurrent Creek valley.

The results of well drilling in other parts of this municipality and in the adjoining municipality to the north indicate that large supplies of soft water will probably be encountered in sand beds in the upper part of the Bearpaw formation above elevations of 2,550 feet. Drilling below this level is not advisable, however, as only small supplies of highly mineralized, undrinkable water can be expected

from the compact, dark marine shales that comprise the greater part of the formation below this level.

Township 11, Range 18

Glacial drift is entirely absent at some places along the lower slopes of Swiftcurrent Creek valley. Along the upper valley slopes it is probably nowhere more than 20 feet thick. Over the uplands, however, the drift exceeds 60 feet in thickness in many places and constitutes an important source of water. The greater part of the drift forms a till plain, but a more irregularly rolling area of moraine is present in a narrow area extending along the eastern part of the township.

Most of the well water used in this township is obtained ffom scattered sand and gravel pockets in the drift at depths of 15 and 60 feet. In many places these wells provide adequate supplies of water for all local farm requirements. However, some residents have found it necessary to sink two or more wells in order to obtain an adequate supply. On a few farms prospecting in the drift failed to find productive pockets and hence the residents have been forced to haul water. The waters being obtained from the glacial drift are hard and in a few places, too highly mineralized to be used for drinking.

The Cypress Hills formation underlies the glacial drift in a small area along the eastern boundary and over the southeast corner of the township as shown on Figure 1. In sections 1 and 2, ample supplies of hard, mineralized, but drinkable water are being obtained from wells between 55 and 65 feet deep penetrating beds of sand and coarse gravels in this formation. In most places in the township, however, the Cypress Hills formation is very thin and it is not an important source of water supply.

A few thin beds representing the lower part of the Ravenscrag formation are believed to underlie the glacial drift and to extend beneath the Cypress Hills formation in the uplands area lying to the

east and south of Swiftcurrent Creek valley. Large supplies of soft water can be expected from the sand beds of this formation at depths between 100 and 200 feet; or at elevations between 2,850 and 2,790 feet above sea-level. These water-bearing sands were penetrated at depths of 195 and 172 feet in sections 3 and 22, respectively. This horizon may not be productive in the close vicinity of the valley as the water-bearing sands will probably be thin or altogether absent in this area.

The Eastend formation underlies the glacial drift in the area west of Swiftcurrent Creek valley and extends downwards to an approximate elevation of 2,800 feet. On the uplands it probably extends for a considerable distance beneath the Ravenscrag formation, but since there is a marked similarity between the lower part of the Ravenscrag and the upper part of the Eastend the position of actual contact is of little importance.

In the valley of Swiftcurrent creek in the northwestern part of the township only the lower and more shaly part of the Eastend formation probably remains. The water-bearing sand beds are few and of limited areal extent. In the narrow area occurring on both sides of the creek where higher beds occur it is probable that water-bearing beds will be encountered at depths not exceeding 130 feet.

The Bearpaw formation immediately underlies the glacial drift along the lower reaches of Swiftcurrent Creek valley. On the uplands it underlies the Eastend formation where present and elsewhere extends beneath the Ravenscrag at an approximate elevation of 2,800 feet. In adjoining townships large supplies of soft water have been obtained from sand beds in the upper part of the Bearpaw formation and wells sunk to sufficient depth in this township might yield similar supplies of water. Water was reported to have been encountered at a depth of approximately 400 feet in a well on section 26. However, since no definite information is available regarding the actual yield or quality of water found in this well no conclusions as to the possibility of

finding an adequate water supply at this depth in the Bearpaw can be drawn.

Wells should not be drilled below elevations of 2,550 feet in any part of the township as this formation is believed to be almost entirely non-productive below this elevation.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF BONE CREEK, NO. 108, SASKATCHEWAN

West of 3rd meridian — Township	9	9	9	10	10	10	11	11	11	Total No. in municipality
Range	16	17	18	16	17	18	16	17	18	
Total No. of Wells in Township	27	29	39	28	25	41	25	34	29	277
No. of wells in bedrock	17	21	32	24	21	39	20	20	7	201
No. of wells in glacial drift	10	8	7	4	4	2	5	14	22	76
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply										
No. with permanent supply	27	28	39	28	25	41	25	34	29	276
No. with intermittent supply	0	0	0	0	0	0	0	0	0	0
No. dry holes	0	1	0	0	0	0	0	0	0	1
Types of Wells										
No. of flowing artesian wells	1	1	0	0	0	1	0	1	0	4
No. of non-flowing artesian wells	20	19	34	6	12	32	5	8	19	155
No. of non-artesian wells	6	8	5	22	13	8	20	25	10	117
Quality of Water										
No. with hard water	7	10	17	9	18	27	10	22	25	145
No. with soft water	20	18	22	19	7	14	15	12	4	131
No. with salty water	0	0	0	0	0	0	0	0	1	1
No. with "alkaline" water	8	1	3	3	4	11	0	10	8	48
Depths of Wells										
No. from 0 to 50 feet deep	9	11	8	9	6	3	4	20	16	86
No. from 51 to 100 feet deep	12	8	4	14	14	17	14	10	10	103
No. from 101 to 150 feet deep	1	7	10	4	2	11	5	4	0	44
No. from 151 to 200 feet deep	1	2	11	1	1	7	1	0	2	26
No. from 201 to 500 feet deep	4	1	6	0	2	3	1	0	1	18
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	25	27	35	26	20	37	25	27	22	244
No. not usable for domestic purposes	2	1	4	2	5	4	0	7	7	32
No. usable for stock	27	27	37	28	24	41	25	33	28	270
No. not usable for stock	0	1	2	0	1	0	0	1	1	6
Sufficiency of Water Supply										
No. sufficient for domestic needs	26	28	38	28	25	40	24	31	28	268
No. insufficient for domestic needs	1	0	1	0	0	1	1	3	1	8
No. sufficient for stock needs	25	25	38	24	24	39	19	28	23	245
No. insufficient for stock needs	2	3	1	4	1	2	6	6	6	31

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 Bone Creek, No. 108, 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	Alka-linity	CaO	MgO	SO_4	Na_2O	Solids	$CaCO_3$	$CaSO_4$	$MgCO_3$	$MgSO_4$	Na_2CO_3	Na_2SO_4	NaCl	
1	SE.	22	10	16	3	108	214																		*1

Water sample indicated thus, * 1, is from bedrock, Cypress Hills formation.
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

No samples of water were taken for analyses in this municipality. The following generalizations regarding the general characteristics of waters from the unconsolidated glacial deposits is based upon the reports of residents, observations at well sites, and such analyses as do exist of waters from similar types of sediments in adjoining municipalities.

The quality of waters from the glacial deposits seems to depend upon the areal extent and porosity of the aquifer and upon its depth below the surface. The boulder clay contains inherently large amounts of readily dissolvable mineral salts. These salts are taken into solution by downward percolating waters which are thus rendered bitter and often undrinkable. Extensive gravel and sand deposits at or near the surface are not covered by any appreciable thickness of boulder clay and yield a soft, to only moderately hard, clear water. Such water if uncontaminated by surface pollution, that is, sewage or other decaying organic matter, is considered to be quite satisfactory for domestic use. Thin, porous beds found beneath greater thicknesses of boulder clay yield correspondingly more highly mineralized waters, although thick gravel deposits under 30 feet or more of boulder clay yield a moderately soft water at several points in this area. Sulphate salts are the most common constituents forming the total solids content of the water, and particularly sodium sulphate (Na_2SO_4, Glauber's salt), magnesium sulphate ($MgSO_4$, Epsom salts), and calcium sulphate ($CaSO_4$). Calcium sulphate contributes only to the hardness of the water, but when the combined sulphates of sodium and magnesium greatly exceed 1,000 parts per million in waters they create decided laxative effects on persons unaccustomed to highly mineralized waters, and these waters may be entirely unsuited for domestic use. In places the water derived by seepage from the compact boulder clay has a total solid content exceeding 5,000 parts per million. Such water tends to have a scouring effect on stock.

Water from the Bedrock

A determination of the total solid content of a sample of water from the Cypress Hills formation was made by the Provincial Analyst, Regina. This water from a 108-foot well located on the SE. ¼, sec. 22, tp. 10, range 16, shows a total solid content of only 214 parts per million, which is remarkably low for well water in the Prairie Provinces. The water is reported to be soft. This small total solid content is believed to be characteristic of much of the water obtained from the Cypress Hills formation in the eastern part of the municipality. A few of the supplies obtained from this formation are reported to be hard and highly mineralized. These hard waters probably contain sulphate salts which have been absorbed during the percolation of the water through the overlying glacial drift.

Water supplies obtained from the sand beds and coal seams of the upper Ravenscrag are usually hard and contain varying amounts of Epsom salts and Glauber's salt. The content of these salts is rarely high enough to render the water unfit to drink.

Analyses were made of samples of water obtained from the extensive soft water horizon occurring in the lower Ravenscrag in the adjoining municipality to the south, and although it is not definitely proven, it is assumed that these analyses give a fair conception of the quality of the water found at this same horizon in the municipality. The total dissolved solid content of the water is found to be generally less than 1,000 parts per million and the total hardness less than 100 parts per million. The solid content is made up chiefly of sodium carbonate (Na_2CO_3) and sodium sulphate (Na_2SO_4). Small amounts of calcium carbonate ($CaCO_3$), magnesium carbonate ($MgCO_3$), and sodium chloride (NaCl) are also present in the water. This water is of very good quality for household and stock use. The high concentration of sodium salts, particularly "black alkali", however, may cause harmful effects on garden plants if used continually, although many residents

use the water for this purpose with no reported ill effects.

The brownish coloured, soft water obtained from the upper Bearpaw will probably contain similar quantities of the same mineral salts as water from the lower Ravenscrag. The cause of this coloration of the water has not been definitely determined, but may be due to decayed vegetable matter in the beds of the formation or to fine particles of clay suspended in the water. The colouring does not appear to affect the quality of the water for domestic use.

Although no wells have been drilled into the Bearpaw formation below an elevation of 2,550 feet above sea-level many wells in surrounding districts have penetrated this part of the formation. The small supplies of water obtained are highly charged with dissolved sulphate salts and common salt (NaCl). The water, therefore, cannot be used for drinking and is not generally suitable for stock.

WELL RECORDS—Rural Municipality of BONE CREEK, NO. 108, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	NW.	2	9	16	3	Dug	10	2,790	- 8	2,782	8	2,782	Glacial gravel	Soft, clear	44	D, S	Sufficient for local needs.
2	NE.	5	"	"	"	Drilled	272	2,830	-150	2,680	272	2,558	Bearpaw sand	Soft, brown	44	D, S	Sufficient for local needs.
3	NW.	5	"	"	"	Spring	0	2,810	+ 10	2,820			Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs; 10 gallons a minute.
4	NW.	8	"	"	"	Bored	60	2,850	- 30	2,820	60	2,770	Ravenscrag black sand	Soft, clear	44	D, S	Sufficient for local needs.
5	NW.	8	"	"	"	Drilled	115	2,850	- 35	2,815	115	2,735	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
6	SW.	9	"	"	"	Drilled	290	2,860	-144	2,716	290	2,570	Bearpaw sand	Soft, brown	44	D, S	Sufficient for local needs.
7	NE.	9	"	"	"	Dug	70	2,875	- 60	2,815	60	2,815	Ravenscrag sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
8	NE.	11	"	"	"	Dug	20	2,840	- 18	2,822	18	2,822	Glacial sand and gravel	Soft, clear, "alkaline"	44	D, S	Insufficient for local needs.
9	NW.	13	"	"	"	Bored	45	2,850	- 30	2,820	45	2,805	Glacial sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
10	NE.	14	"	"	"	Bored	63	2,850	- 33	2,817	63	2,787	Glacial sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
11	NE.	18	"	"	"	Bored	60	2,900	- 18	2,882	60	2,840	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
12	SW.	18	"	"	"	Drilled	100	2,875	- 3	2,872	100	2,775	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
13	SE.	22	"	"	"	Bored	65	2,825	- 45	2,780	65	2,760	Glacial sand	Hard, clear, iron, "alkaline"	44	S	Sufficient for local needs.
14	SW.	23	"	"	"	Bored	65	2,810	- 45	2,765	65	2,745	Glacial sand	Hard, clear, iron, "alkaline"	44	S	Sufficient for local needs.
15	SW.	24	"	"	"	Bored	42	2,750	- 24	2,726	42	2,708	Glacial sand	Soft, clear	44	D, S	Sufficient for local needs.
16	SW.	25	"	"	"	Bored	65	2,760	- 57	2,703	57	2,703	Glacial sand	Soft, clear	44	D	Insufficient for local needs.
17	SE.	26	"	"	"	Bored	62	2,815	- 40	2,775	62	2,753	Glacial sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
18	NE.	30	"	"	"	Dug	80	2,975	- 72	2,903	72	2,903	Glacial sand and gravel	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
19	SW.	30	"	"	"	Drilled	173	3,000	- 73	2,927	173	2,827	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
20	NE.	32	"	"	"	Bored	80	2,900	- 43	2,857	80	2,820	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
21	NW.	33	"	"	"	Dug	81	2,900	- 65	2,835	81	2,819	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
22	SE.	33	"	"	"	Bored	44	2,835	- 32	2,803	44	2,791	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
23	SW.	34	"	"	"	Bored	29	2,800	- 22	2,778	22	2,778	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
24	NE.	34	"	"	"	Drilled	255	2,825	-148	2,677	255	2,570	Bearpaw sandstone	Soft, brownish	44	D, S	Sufficient for local needs.
25	NE.	35	"	"	"	Dug	15	2,850	- 10	2,840	15	2,835	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
26	NE.	35	"	"	"	Drilled	221	2,850	- 95	2,755	221	2,629	Bearpaw sand	Soft, brownish	44	D, S	Sufficient for local needs.

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 BONE CREEK, NO. 108, 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
27	NW.	36	9	16	3	Bored	48	2,850	- 28	2,822	48	2,802	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
1	NE.	5	9	17	3	Bored	61	2,960	- 21	2,939	61	2,899	Ravenscrag sand	Soft, clear	43	D, S	Sufficient for local needs.
2	NW.	8	"	"	"	Bored	19	2,966	- 17	2,949	17	2,949	Glacial gravel	Hard, clear	43	D	Sufficient for local needs.
3	NW.	8	"	"	"	Dug	22	2,966	- 15	2,951	22	2,944	Ravenscrag clay	Hard, clear		D, S	Sufficient for local needs.
4	NW.	8	"	"	"	Dug	22	2,966	- 20	2,946	20	2,946	Glacial coarse gravel	Hard, clear	43	D, S, I	Sufficient for local needs.
5	NW.	8	"	"	"	Bored	52	2,966	- 22	2,944	52	2,914	Ravenscrag sand	Soft, clear, sulphur	43	D, S, I	Sufficient for local needs.
6	NW.	10	"	"	"	Drilled	149	2,950	- 47	2,903	149	2,801	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
7	SW.	12	"	"	"	Bored	35	3,010	- 19	2,991	19	2,991	Glacial sand and gravel	Soft, clear	43	D, S	Insufficient for local needs. Another similar well.
8	SE.	15	"	"	"	Drilled	128	2,940	+ 6	2,946	128	2,812	Ravenscrag black sand	Soft, clear	44	D, S	
9	NW.	15	"	"	"	Drilled	190	2,950	-100	2,850	190	2,760	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
10	SE.	16	"	"	"	Drilled	140	2,940	- 12	2,928	140	2,800	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
11	NE.	18	"	"	"	Drilled	100	2,995	- 40	2,955	100	2,895	Ravenscrag sand	Soft, clear	43	D, S	Sufficient for local needs.
12	NE.	21	"	"	"	Drilled	130	2,983	- 35	2,948	130	2,853	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
13	NW.	23	"	"	"	Dug	15	2,980	- 10	2,970	10	2,970	Glacial sand	Soft, clear	44	D, S	Sufficient for local needs.
14	NE.	23	"	"	"	Dug	88	2,975	- 55	2,920	88	2,887	Ravenscrag sand	Soft, clear, "alkaline"		D, S	Sufficient for local needs.
15	SW.	24	"	"	"	Dug	40	2,950	- 25	2,925	40	2,910	Ravenscrag sand	Soft, clear	43	D, S	Sufficient for local needs.
16	SE.	24	"	"	"	Bored	61	2,910	- 16	2,894	61	2,849	Ravenscrag black sand	Hard, clear	43	D, S	Sufficient for local needs.
17	NE.	25	"	"	"	Dug	50	2,950			50	2,900	Glacial drift	Hard, cloudy, bitter taste	43	D, S	Sufficient for local needs.
18	SW.	25	"	"	"	Drilled	110	3,000	- 3	2,997	110	2,890	Ravenscrag sand	Hard, clear	44	D, S	Sufficient for local needs.
19	SW.	27	"	"	"	Drilled	130	3,000	- 70	2,930	130	2,870	Ravenscrag black sand	Soft, clear	43	D, S	Sufficient for local needs.
20	NE.	25	"	"	"	Dug	14	3,040	- 11	3,029	11	3,029	Glacial sand	Hard, clear	44	D, S	Sufficient for local needs.
21	NE.	28	"	"	"	Bored	62	3,055	- 49	3,006	49	3,006	Ravenscrag sand	Hard, clear	44	D, S	Sufficient for local needs.
22	SW.	30	"	"	"	Bored	130	3,000	-110	2,890	130	2,870	Ravenscrag sand	Soft, clear	43	D, S	Sufficient for local needs.
23	NW.	33	"	"	"	Dug	28	3,115	- 18	3,097	28	3,087	Glacial sand	Hard, clear	43	D, S	Sufficient for local needs.
24	SE.	33	"	"	"	Drilled	156	3,075	- 96	2,979	156	2,919	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
25	SE.	34	"	"	"	Dug	75	3,055					Ravenscrag clay at base				Dry hole.
26	SE.	35	"	"	"	Dug	39	3,040	- 14	3,026	14	3,026	Ravenscrag coal	Soft, clear		N	Used up to 2 years ago; but now abandoned.

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 .....

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				
27	SE.	35	9	17	3	Drilled	233	3,050	-133	2,917	233	2,817	Ravenscrag black sand	Soft, clear	43	D, S	Sufficient for local needs.
28	NE.	36	"	"	"	Dug	80	2,950	- 77	2,873	80	2,870	Ravenscrag sand	Hard, clear	43	D, S	Sufficient for local needs.
1	NE.	1	9	18	3	Drilled	125	3,020			125	2,895	Ravenscrag sand	Soft, clear		D, S, I	Sufficient for local needs.
2	NW.	2	"	"	"	Bored	135	3,080	-129	2,951	135	2,945	Ravenscrag sand-stone	Hard, clear, iron		D, S	Sufficient for 9 head stock. Can be pumped dry easily.
3	SE.	4	"	"	"	Dug	100	3,060	- 81	2,979	100	2,960	Ravenscrag sand and clay	Hard, clear		D, S	Sufficient for local needs.
4	SW.	5	"	"	"	Dug	50	3,025	- 46	2,979	50	2,975	Ravenscrag sand-stone	Soft, clear		D, S	Sufficient for 25 head stock easily.
5	SW.	6	"	"	"	Drilled	127	3,000			127	2,873	Ravenscrag black sand	Soft, clear		D, S	Sufficient for local needs.
6	NE.	6	"	"	"	Drilled	104	3,010					Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs.
7	NW.	7	"	"	"	Drilled	179	3,050	- 60	2,990	179	2,871	Ravenscrag sand	Soft, clear			No one living on place. Well used very little.
8	SW.	9	"	"	"	Drilled	45	3,030			45	2,985	Ravenscrag sand	Hard, clear, iron, "alkaline"		S	Sufficient for 34 head stock. Hauls drinking water.
9	SE.	10	"	"	"	Drilled	184	3,100	-134	2,966	184	2,916	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs.
10	SW.	10	"	"	"	Drilled	225	3,060			225	2,835	Ravenscrag sand	Soft, clear		D, S	Large supply. Not used now. Deserted.
11	SW.	12	"	"	"	Drilled	280	3,055			280	2,775	Ravenscrag sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
12	NE.	12	"	"	"	Bored	87	3,040	- 75	2,965	87	2,953	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs. Big supply.
13	NE.	15	"	"	"	Drilled	149	3,090	- 84	3,006	149	2,941	Ravenscrag coal	Hard, clear		D, S	Sufficient for local needs.
14	SE.	16	"	"	"	Drilled	175	3,040	- 16	3,024	175	2,865	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs. Very large supply.
15	NE.	16	"	"	"	Bored	56	3,030	- 26	3,004	56	2,974	Glacial sand	Hard, clear, "alkaline"		S	Easily sufficient for 13 head stock.
16	NE.	17	"	"	"	Drilled	180	3,020			180	2,840	Ravenscrag sand	Soft, clear		D, S	Sufficient for local needs.
17	NW.	18	"	"	"	Drilled	123	2,960			122	2,838	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
18	NE.	18	"	"	"	Drilled	135	2,980	- 15	2,965	135	2,845	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs.
19	SE.	20	"	"	"	Drilled	184	3,020	- 84	2,936	184	2,836	Ravenscrag blue-grey sand	Soft, clear		D, S	Sufficient for local needs.
20	SE.	21	"	"	"	Drilled	80	3,020	- 50	2,970	80	2,940	Ravenscrag coal	Hard, clear, iron		D,S	Sufficient for local needs.
21	NE.	22	"	"	"	Dug	38	3,010	- 18	2,992	38	2,972	Glacial drift	Hard, clear, "alkaline"		D, S, I	Sufficient for local needs.
22	SE.	23	"	"	"	Drilled	120	3,050			120	2,930	Ravenscrag blue sand	Hard, clear		D, S	Sufficient for local needs. Large supply.
23	SE.	24	"	"	"	Drilled	244	3,100			244	2,856	Ravenscrag blue sand rock	Soft, clear		D, S	Sufficient for local needs.
24	SW.	26	"	"	"	Bored	40	2,990	- 15	2,975	40	2,950	Glacial sand	Hard, clear, iron		D, S	

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

WELL RECORDS—Rural Municipality of BONE CREEK, NO. 108, SASKATCHEWAN

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
25	NE.	28	9	18	3	Drilled	255	3,070	-110	2,960	255	2,815	Ravenscrag black sand	Soft, clear		D, S	Yields 6 gallons a minute.
26	SW.	28	"	"	"	Drilled	240	3,020	- 70	2,950	240	2,780	Ravenscrag black sandstone	Soft, clear		D, S, I	Sufficient for local needs.
27	NW.	29	"	"	"	Drilled	176	2,990	- 40	2,950	176	2,814	Ravenscrag black sand	Soft, clear		D, S	Sufficient for local needs.
28	SE.	30	"	"	"	Drilled	120	3,000	- 90	2,910	120	2,880	Ravenscrag black sand	Soft, clear		D, S	Has been pumped all day without water stopping.
29	SW.	30	"	"	"	Bored	45	2,960	- 38	2,922	45	2,915	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
30	NW.	31	"	"	"	Drilled	120	2,950	- 40	2,910	120	2,830	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs. Large supply.
31	SE.	32	"	"	"	Drilled	200	2,995	-100	2,895	200	2,795	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
32	NE.	32	"	"	"	Drilled	200	2,990	- 50	2,940	200	2,790	Ravenscrag blue sand	Soft, clear		D, S	
33	NE.	33	"	"	"	Dug	14	3,040	- 11	3,029	11	3,029	Glacial sand	Hard, clear		D, S	Insufficient for local needs; also 43-foot well; water unfit for use.
34	SE.	33	"	"	"	Dug	14	3,030	- 11	3,019	14	3,016	Glacial sandy clay	Hard, clear		D, S	Sufficient for 10 head stock.
35	SE	34	"	"	"	Drilled	190	2,990	- 60	2,930	190	2,800	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
36	SE.	35	"	"	"	Drilled	180	2,980	- 70	2,910	180	2,800	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs.
37	SW.	35	"	"	"	Drilled	236	3,000			236	2,764	Ravenscrag blue sand	Soft		D, S	
38	NW.	35	"	"	"	Drilled	160	3,000	- 50	2,950	160	2,840	Ravenscrag fine brown sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
1	SW.	1	10	16	3	Bored	65	2,850	- 30	2,820	65	2,785	Glacial gravel	Hard, clear, "alkaline"	44	S	Sufficient for local needs.
2	NE.	3	"	"	"	Bored	54	2,900	- 42	2,858	42	2,858	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
3	SW.	6	"	"	"	Drilled	40	2,900			40	2,860	Ravenscrag sand	Hard, "alkaline"		D, S	Sufficient for local needs.
4	SW.	10	"	"	"	Bored	38	2,900	- 26	2,874	26	2,874	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs; also a spring with the same aquifer.
5	SW.	11	"	"	"	Bored	78	2,950	- 74	2,876	74	2,876	Glacial gravel	Soft, clear	44	D, S	Sufficient for local needs.
6	SE.	12	"	"	"	Dug	28	2,925	- 22	2,903	28	2,897	Glacial sand	Hard, clear	44	D, S	Sufficien for local needs.
7	NE.	12	"	"	"	Dug	26	2,935	- 16	2,919	16	2,919	Glacial sand	Soft, clear	44	D, S	Sufficient for local needs.
8	NE.	13	"	"	"	Dug	110	3,00	-107	2,893	107	2,893	Cypress Hills sand	Soft, clear	44	D, S	Insufficient for local needs.
9	SE.	14	"	"	"	Bored	82	3,050	- 78	2,972	78	2,972	Ravenscrag coal	Soft, clear	44	D, S	Sufficient for local needs.
10	SW.	16	"	"	"	Drilled	80	3,000	- 60	2,940	60	2,940	Ravenscrag sand	Hard, cloudy		D, S	Sufficient for local needs.
11	SE.	17	"	"	"	Dug	50	2,950	- 48	2,902	48	2,902	Ravenscrag sand	Hard, clear, "alkaline"	44	S	Insufficient for local needs.
12	SE.	19	"	"	"	Drilled	180	3,000	-120	2,880	180	2,820	Ravenscrag black sand	Soft, clear, iron		D, S	Sufficient for local needs.
13	NW.	20	"	"	"	Dug	90	3,010	- 88	2,922	88	2,922	Cypress Hills sand	Hard, clear	44	D, S	Sufficient for local needs.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BONE CREEK, NO. 108, 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
14	SW.	21	10	16	3	Dug	103	2,985	- 95	2,890	95	2,890	Ravenscrag sand	Hard, clear	44	D, S	Sufficient for local needs.
15	SE.	21	"	"	"	Bored	37	2,950	- 77	2,873	77	2,873	Ravenscrag sand	Hard, clear	44	D, S	Sufficient for local needs.
16	SE.	22	"	"	"	Bored	108	3,000	-102	2,898	102	2,898	Cypress Hills sand	Soft, clear	45	D, S	Sufficient for local needs; #.
17	NE.	23	"	"	"	Bored	82	3,000	- 60	2,940	82	2,918	Cypress Hills sand	Hard, clear	44	D, S	Sufficient for local needs.
18	SE.	24	"	"	"	Dug	100	3,020	- 97	2,923	97	2,923	Cypress Hills sand	Soft, clear	44	D, S	Insufficient; supply poor because cribbing faulty.
19	NE.	25	"	"	"	Dug	50	3,010	- 47	2,963	47	2,963	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
20	SW.	27	"	"	"	Drilled	136	2,980	- 85	2,895	136	2,844	Ravenscrag sand	Soft, clear	44	D, S	Sufficient for local needs.
21	NW.	28	"	"	"	Dug	85	3,000	- 20	2,980	85	2,915	Cypress Hills sandstone	Hard, clear		D, S	Sufficient for local needs.
22	SE.	29	"	"	"	Dug	78	2,980	- 68	2,912	68	2,912	Cypress Hills gravel	Soft, clear	44	D, S	Sufficient for local needs.
23	NW.	32	"	"	"	Dug	43	2,980	- 40	2,940	40	2,940	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
24	NW.	34	"	"	"	Dug	44	2,950	- 39	2,911	39	2,911	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
25	SE.	34	"	"	"	Dug	96	3,010	- 90	2,920	90	2,920	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
26	NE.	35	"	"	"	Dug	70	2,990	- 67	2,923	67	2,923	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
27	NW.	36	"	"	"	Dug	72	3,000	- 69	2,931	69	2,931	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
1	SE.	1	10	17	3	Drilled	87	2,940	- 47	2,893	87	2,853	Ravenscrag black sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for local needs.
2	SE.	2	"	"	"	Drilled	215	3,060	-115	2,945	215	2,845	Ravenscrag sand	Soft, clear		D, S	Sufficient for local needs.
3	SW.	5	"	"	"	Dug	65	3,125	- 50	3,075	50	3,075	Cypress Hills coarse gravel	Hard, clear		D, S	Sufficient for local needs.
4	NW.	8	"	"	"	Drilled	225	3,075	- 30	3,045	225	2,850	Ravenscrag sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
5	NE.	8	"	"	"	Bored	72	3,075	- 60	3,015	60	3,015	Ravenscrag coal	Hard, clear, iron		D, S	Sufficient for local needs.
6	SE.	9	"	"	"	Dug	60	2,990	- 56	2,934	56	2,934	Ravenscrag coal	Hard, clear, iron		D, S	Sufficient for local needs.
7	NE.	9	"	"	"	Dug	26	3,075	- 16	3,059	26	3,049	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs.
8	SE.	13	"	"	"	Drilled	90	3,000	- 50	2,950	90	2,910	Ravenscrag coal	Soft, clear		D, S	Sufficient for local needs.
9	NE.	14	"	"	"	Dug	20	3,095	- 17	3,078	17	3,078	Glacial sand	Soft, clear		D, S	Sufficient for local needs.
10	NE.	16	"	"	"	Dug	33	3,050	- 13	3,037	33	3,017	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
11	SW.	16	"	"	"	Drilled	160	3,110	- 90	3,020	160	2,950	Ravenscrag sand	Hard, clear		S	Sufficient for local needs.
12	NE.	17	"	"	"	Dug	52	3,000	- 48	2,952	52	2,948	Ravenscrag sand	Hard, clear		S	Sufficient for local needs.

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

WELL RECORDS—Rural Municipality of BONE CREEK, NO. 108, 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
13	NW.	17	10	17	3	Bored	51	3,000	- 49	2,951	49	2,951	Ravenscrag sand	Hard, clear		D	Sufficient for domestic use only.
14	SE.	18	"	"	"	Dug	85	3,025	- 82	2,943	82	2,943	Ravenscrag sand	Hard, clear		D, S	Sufficient for local use.
15	NW.	18	"	"	"	Drilled	80	2,975	- 20	2,955	80	2,895	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs.
16	SW.	21	"	"	"	Bored	96	2,800	- 90	2,710	96	2,704	Ravenscrag sand	Hard, rusty		D, S	Sufficient for local needs.
17	SE.	22	"	"	"	Dug	54	3,100	- 44	3,056	54	3,046	Glacial clay and gravel	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
18	NE.	22	"	"	"	Bored	75	3,100	- 30	3,070	75	3,025	Ravenscrag coal	Hard, clear		D, S	Sufficient for local needs.
19	SE.	23	"	"	"	Dug	25	2,990	- 20	2,970	20	2,970	Ravenscrag clay and coal	Soft, clear		D, S	Sufficient for local needs.
20	NW.	24	"	"	"	Dug	16	2,910	- 13	2,897	13	2,897	Glacial gravels	Soft, clear		S	Sufficient for local needs.
21	SE.	25	"	"	"	Drilled	135	3,020			135	2,885	Ravenscrag sand	Soft		D, S	Abandoned.
22	NE.	26	"	"	"	Dug	20	3,050	- 13	3,037	13	3,037	Ravenscrag coal	Hard, clear		S	Sufficient for local needs.
23	SW.	31	"	"	"	Drilled	136	3,020			136	2,884	Ravenscrag sand	Soft			Abandoned.
24	SE.	32	"	"	"	Bored	66	3,095	- 30	3,065	66	3,029	Ravenscrag coal	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
25	NW.	35	"	"	"	Dug	62	3,040	- 54	2,986	54	2,986	Ravenscrag coal	Hard, clear		D, S	Sufficient for local needs.
1	NE.	1	10	18	3	Bored	63	2,975	- 50	2,925	63	2,912	Glacial sand	Hard, clear, "alkaline"		S	Sufficient for local needs.
2	NW.	2	"	"	"	Drilled	185	2,985	- 20	2,965	165	2,820	Ravenscrag sand	Soft, clear, iron		D, S	Sufficient for local needs.
3	SE.	4	"	"	"	Drilled	200	3,020	- 60	2,960	200	2,820	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
4	NE.	4	"	"	"	Drilled	222	3,020	- 80	2,940	222	2,798	Ravenscrag sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
5	NE.	5	"	"	"	Dug	26	2,980	- 14	2,966	26	2,954	Glacial sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
6	SE.	6	"	"	"	Bored	80	2,965	- 40	2,925	80	2,845	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs.
7	NW.	6	"	"	"	Drilled	100	2,950	- 40	2,910	100	2,850	Ravenscrag black sand	Hard, rusty, iron, "alkaline"		D, S	Sufficient for local needs.
8	SE.	7	"	"	"	Drilled	150	2,980			150	2,830	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
9	SE.	8	"	"	"	Drilled	90	2,990					Ravenscrag sand	Hard, clear, iron		D, S	Sufficient for local needs.
10	SW.	9	"	"	"	Bored	95	3,000	- 65	2,935	95	2,905	Ravenscrag blue sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for local needs.
11	NW.	9	"	"	"	Drilled	165	2,990	- 85	2,905	148	2,842	Ravenscrag black sand	Soft, clear		D, S	Large supply.
12	NE.	9	"	"	"	Drilled	143	3,005	- 90	2,915	140	2,865	Ravenscrag sand	Hard, clear, iron		D, S	Sufficient for local needs.
13	SE.	10	"	"	"	Drilled	176	3,000			173	2,827	Ravenscrag black sand	Soft, clear		D, S	Yields 6 gallons a minute.
14	SW.	12	"	"	"	Drilled	235	2,990	- 35	2,955	285	2,705	Bearpaw sand	Hard, clear, iron		S	Sufficient for local needs.

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 BONE CREEK, NO. 108, 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
15	SW.	12	10	18	3	Drilled	65	2,990	- 50	2,940	50	2,940	Cypress Hills sand	Hard, clear, "alkaline"		D	Insufficient for local needs.
16	NE.	13	"	"	"	Drilled	150	3,000	- 50	2,950	150	2,850	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs.
17	SW.	14	"	"	"	Dug	56	2,995	- 42	2,953	56	2,939	Cypress Hills sand	Hard, clear		D, S	Sufficient for local needs.
18	SW.	15	"	"	"	Drilled	250	3,030	- 90	2,940	250	2,780	Ravenscrag sand	Hard, clear		D, S	
19	SW.	16	"	"	"	Bored	54	2,990	- 40	2,950	54	2,936	Ravenscrag coal	Hard, clear		D, S	Sufficient for 20 head of stock.
20	SE.	18	"	"	"	Drilled	186	2,985	- 50	2,935	186	2,799	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
21	SW.	19	"	"	"	Drilled	170	3,000			170	2,830	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
22	NE.	19	"	"	"	Drilled	190	3,020	-100	2,920	190	2,830	Ravenscrag blue sand	Soft, clear		D, S	Sufficient for local needs. Large supply.
23	SW.	20	"	"	"	Bored	40	2,990	- 28	2,962	28	2,962	Ravenscrag sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
24	NE	20	"	"	"	Bored	60	3,020	- 51	2,969	51	2,969	Ravenscrag sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
25	SE.	23	"	"	"	Drilled	135	2,970	- 35	2,935	135	2,835	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs.
26	SW.	23	"	"	"	Bored	84	2,960	- 23	2,937	84	2,876	Ravenscrag clay	Hard, clear		D, S	Sufficient for local needs.
27	SW.	24	"	"	"	Drilled	125	2,975	- 62	2,913	125	2,850	Cypress Hills sand	Hard, clear		D, S	Sufficient for local needs.
28	NW.	24	"	"	"	Drilled	100	2,955	- 30	2,925	100	2,855	Ravenscrag sand	Hard, red, "alkaline"		S	Sufficient for local needs.
29	SE.	25	"	"	"	Bored	68	2,953	- 34	2,919	68	2,885	Glacial sandy blue clay	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
30	SE.	27	"	"	"	Drilled	108	3,000	- 80	2,920	80	2,920	Ravenscrag black sand	Hard, clear, iron		S, I	Sufficient for local needs.
31	NW.	28	"	"	"	Drilled	141	3,025	- 50	2,975	137	2,888	Ravenscrag sand	Hard, clear, iron		D, S	Sufficient for local needs. Big supply.
32	NW.	30	"	"	"	Bored	70	2,950	- 11	2,939	70	2,880	Ravenscrag sand	Hard, clear		D, S	Sufficient for local needs. Big supply
33	SE.	31	"	"	"	Bored	70	2,990	- 30	2,960	70	2,920	Ravenscrag sand	Hard, clear, "alkaline"		D, S	Sufficient for local needs. Big supply
34	NW.	31	"	"	"	Drilled	99	2,930	+ 8	2,938	99	2,831	Ravenscrag black sand	Soft		D, S, I	Sufficient for local needs. Fills ¼-inch pipe.
35	NW.	32	"	"	"	Bored	115	3,000	- 49	2,951	115	2,885	Ravenscrag blue sand	Hard, clear		D, S	Sufficient for local needs.
36	NE.	32	"	"	"	Bored	85	3,020	- 83	2,937	83	2,937	Cypress Hills gravel	Soft, clear		D, S	Sufficient for 20 head stock.
37	NW.	33	"	"	"	Drilled	105	3,020	- 65	2,955	65	2,955	Cypress Hills cobblestones	Soft, clear		D, S	Sufficient for local needs.
38	NE.	33	"	"	"	Drilled	117	3,005	- 60	2,945	117	2,888	Ravenscrag black sand	Soft, clear		D, S	Sufficient for local needs.
39	NW.	34	"	"	"	Drilled	128	3,025	- 60	2,965	128	2,897	Ravenscrag coarse sand	Soft, clear		D, S	Sufficient for local needs.
40	NE.	35	"	"	"	Dug	37	2,950	- 32	2,918	32	2,918	Cypress Hills sand	Hard, clear		D, S	Sufficient for local needs.
41	NE.	36	"	"	"	Drilled	64	2,950	- 34	2,916	65	2,886	Cypress Hills sand	Hard, clear, iron, "alkaline"		S	Sufficient; cannot be pumped dry.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BONE CREEK, NO. 108, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SW.	1	11	16	3	Dug	65	3,000	- 62	2,938	65	2,935	Cypress Hills clay and sand	Hard		D, S	Abandoned.
2	NE.	3	"	"	"	Dug	65	2,950	- 60	2,890	60	2,890	Cypress Hills sand and gravel	Hard, clear		D, S	Sufficient for local needs.
3	SW.	5	"	"	"	Drilled	108	2,980	- 68	2,912	108	2,872	Ravenscrag sand	Hard, clear	44	D, S	Sufficient for local needs.
4	SW.	6	"	"	"	Drilled	160	3,000	- 60	2,940	160	2,840	Ravenscrag sand	Hard, clear, iron	44	D, S	Sufficient for local needs.
5	NW.	7	"	"	"	Dug	72	2,975	- 67	2,908	67	2,908	Glacial drift	Soft, clear	44	D, S	Insufficient. Supply very limited.
6	NW.	9	"	"	"	Dug	40	2,970	- 30	2,940	40	2,930	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
7	SW.	12	"	"	"	Dug	65	2,980	- 62	2,918	62	2,918	Cypress Hills sand	Soft, clear		D, S	Sufficient for local needs.
8	NW.	12	"	"	"	Dug	85	3,000	- 82	2,918	82	2,918	Cypress Hills sand	Soft, clear		D	Insufficient for local needs.
9	SW.	14	"	"	"	Dug	195	3,010	-132	2,878	132	2,878	Cypress Hills sand	Soft, clear		D, S	Sufficient for local needs.
10	NW.	14	"	"	"	Dug	65	3,000	- 60	2,940	60	2,940	Cypress Hills sand and gravel	Hard, clear		D, S	Sufficient for local needs.
11	SW.	15	"	"	"	Dug	52	2,970	- 49	2,921	52	2,918	Cypress Hills sand	Soft, clear		D, S	Insufficient for local needs.
12	NE.	17	"	"	"	Dug	35	2,980	- 30	2,950	35	2,945	Glacial sand	Soft, clear		D, S, I	Sufficient for local needs.
13	NW.	18	"	"	"	Dug	63	2,975	- 61	2,914	63	2,912	Glacial drift	Hard		D, S	Insufficient. Well abandoned in 1929.
14	SW.	19	"	"	"	Dug	72	2,975	- 68	2,907	72	2,903	Glacial drift	Hard, clear	44	D, S	Sufficient for local needs.
15	NE.	24	"	"	"	Drilled	265	3,000	-200	2,800	265	2,735	Bearpaw sand	Soft, clear		D, S	Sufficient for local needs.
16	SE.	25	"	"	"	Dug	110	3,000	-108	2,892	108	2,892	Cypress Hills sand	Soft, clear		D	Sufficient for domestic needs only.
17	NE.	27	"	"	"	Dug	135	2,950	-133	2,817	133	2,817	Cypress Hills cobblerock and fine gravel	Soft, clear	44	D, S	Sufficient for local needs.
18	NW.	27	"	"	"	Dug	90	2,950	- 87	2,863	90	2,860	Cypress Hills sand	Hard, clear		D, S	Insufficient for local needs.
19	SW.	28	"	"	"	Dug	60	2,950	- 57	2,893	57	2,893	Cypress Hills sand	Soft, clear	44	D, S	Insufficient for local needs. Springs along creek.
20	SE.	30	"	"	"	Dug	90	3,000	- 87	2,913	87	2,913	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
21	NW.	30	"	"	"	Dug	10	2,960	- 6	2,954	6	2,954	Glacial sands	Hard, clear	44	D, S	Sufficient for local needs.
22	SE.	33	"	"	"	Dug	120	2,850	-117	2,733	117	2,733	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
23	SE.	34	"	"	"	Dug	75	2,940	- 70	2,870	70	2,870	Cypress Hills cobble rock and sand	Hard, clear		D, S	Sufficient for local needs.
24	SW.	36	"	"	"	Dug	55	2,950	- 52	2,898	55	2,895	Ravanscrag coal	Soft		D, S	Sufficient. Can be pumped dry. Abandoned.
1	SW.	1	11	17	3	Dug	30	3,000	- 26	2,974	26	2,974	Glacial sand	Hard, clear		D, S	Insufficient for local needs.
2	SE.	4	"	"	"	Dug	30	2,925	- 20	2,905	30	2,895	Glacial drift	Hard, clear, "alkaline"		N	Has not been used for many years.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BONE CREEK, NO. 108, 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
3	NE.	4	11	17	3	Drilled	42	2,955	- 12	2,943	42	2,913	Glacial drift	Hard, clear, sulphur		S	Sufficient for local needs.
4	SW.	4	"	"	"	Dug	24	2,925	- 12	2,913	24	2,901	Glacial drift	Hard, cloudy, "alkaline"		S	Sufficient for local needs.
5	NW.	4	"	"	"	Bored	90	2,900	- 50	2,850	90	2,810	Cypress Hills sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
6	NE.	5	"	"	"	Dug	30	2,900	- 27	2,873	27	2,873	Cypress Hills cobblestone	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
7	NE.	9	"	"	"	Dug	50	2,900	- 45	2,855	45	2,855	Cypress Hills sandstone	Soft, clear	44	D, S	Sufficient for local needs. Also spring along creek.
8	SW.	10	"	"	"	Dug	63	2,950	- 53	2,897	63	2,887	Cypress Hills sand	Hard, clear, iron		D, S	Sufficient for local needs.
9	SE.	12	"	"	"	Dug	110	2,990	-105	2,885	105	2,885	Cypress Hills sand	Hard, clear		D	Sufficient for local needs.
10	NE.	12	"	"	"	Dug	110	2,950	- 85	2,865	110	2,840	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs.
11	SE.	12	"	"	"	Dug	65	2,975	- 57	2,918	57	2,918	Glacial drift	Hard, clear	44	D, S	Sufficient for local needs.
12	SW.	13	"	"	"	Dug	75	2,950	- 67	2,883	67	2,883	Glacial drift	Soft, clear	44	D, S	Sufficient for local needs.
13	NE.	13	"	"	"	Dug	110	2,975	-105	2,870	105	2,870	Cypress Hills sand	Soft, clear		D, S	Sufficient for local needs.
14	NW.	13	"	"	"	Dug	65	2,900	- 45	2,855	65	2,835	Glacial driff	Hard, clear	44	D, S	Sufficient for local needs.
15	NW.	15	"	"	"	Dug	50	2,850	- 47	2,803	47	2,803	Cypress Hills sand	Soft, clear	44	D, S	Sufficient for local needs; also springs along creek.
16	SW.	16	"	"	"	Dug	50	2,900	- 46	2,854	46	2,854	Cypress Hills sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
17	NE.	17	"	"	"	Dug	55	2,900	- 50	2,850	50	2,850	Cypress Hills cobblestone	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
18	NE.	17	"	"	"	Dug	56	2,900	- 50	2,850	50	2,850	Cypress Hills sandy clay	Hard, clear	44	D, S	Sufficient for local needs.
19	SE.	18	"	"	"	Dug	28	2,875	- 13	2,862	28	2,847	Cypress Hills cobblestone	Soft, clear	44	D, S	Sufficient for local needs.
20	SW.	19	"	"	"	Dug	60	2,975	- 58	2,917	58	2,917	Glacial drift	Hard, clear, "alkaline"	44	S	Insufficient for local needs; also 2 seepage wells near slough.
21	SW.	20	"	"	"	Dug	22	2,900	0+	2,900+	22	2,878	Glacial sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
22	NW.	21	"	"	"	Dug	52	2,875	- 47	2,828	47	2,828	Cypress Hills cobblestones	Hard, clear, "alkaline"	44	S	Sufficient for local needs.
23	NW.	24	"	"	"	Dug	73	2,975	- 70	2,905	70	2,905	Cypress Hills sandstone	Soft, clear	44	D, S	Sufficient for local needs.
24	SW.	25	"	"	"	Dug	127	2,975	-125	2,850	125	2,850	Cypress Hills congomerate	Hard, clear	44	D, S	Sufficient for local needs.
25	SE.	28	"	"	"	Dug	10	2,750	- 8	2,742	8	2,742	Cypress Hills congomerate	Soft, clear	44	D, S	Sufficient for local needs.
26	NE.	30	"	"	"	Bored	30	2,950	- 28	2,922	28	2,922	Glacial sand	Hard, clear	44	D, S	Insufficient for local needs. Also spring in coulée; same aquifer.
27	NE.	31	"	"	"	Bored	35	2,950	- 25	2,925	25	2,925	Glacial sand	Hard, clear, "alkaline"	44	D, S	Sufficient for local needs.
1	SE.	1	11	18	3	Drilled	60	2,995	- 48	2,947	48	2,947	Cypress Hills gravel	Hard, clear		S	Sufficient; yields 14 barrels at one pumping.
2	SW.	1	"	"	"	Dug	55	2,990	- 53	2,937	20	2,970	Cypress Hills gravel	Hard, clear, "alkaline"		S	Sufficient for 25 head stock.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of BONE CREEK, NO. 108, 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
3	SW.	2	11	18	3	Dug	65	3,045	- 60	2,985	30	3,015	Cypress Hills gravel	Hard, clear		D, S	Sufficient for 30 head stock.
4	NW.	3	"	"	"	Drilled	195	3,045			195	2,850	Ravenscrag sand	Soft, clear		D, S	Sufficient for local needs.
5	NW.	4	"	"	"	Dug	14	2,960	- 10	2,950	11	2,949	Glacial gravel	Hard, clear		D, S	Sufficient; neighbours haul.
6	NE.	6	"	"	"	Dug	20	2,900	- 17	2,883	17	2,883	Glacial sand	Hard, clear		D	Sufficient for household needs.
7	NW.	7	"	"	"	Dug	22	2,830	- 13	2,817	18	2,812	Glacial sand	Hard, clear		D, S	Sufficient for local needs.
8	NE.	7	"	"	"	Dug	52	2,850			42	2,808	Glacial clay and gravel	Hard, clear, iron, red sediment		D, S	Also 10-foot well used for house.
9	SE.	9	"	"	"	Dug	36	2,970	- 21	2,949	36	2,934	Glacial brown sandy clay	Hard, clear, "alkaline"		D, S	Sufficient for 25 head stock.
10	NW.	10	"	"	"	Bored	30	2,970	- 18	2,952	28	2,942	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
11	NE.	10	"	"	"	Dug	25	2,990	0	2,990	0	2,900	Glacial clay	Soft, clear		S	Insufficient. Hauls water.
12	NE.	14	"	"	"	Bored	36	2,960	- 24	2,936	34	2,926	Glacial sand	Hard, clear, epsom salts		D, S	Sufficient for 15 head stock; also 30-foot well.
13	SE.	16	"	"	"	Bored	32	2,950	- 29	2,921	28	2,922	Glacial sand	Hard, clear, iron, "alkaline"		D, S	Sufficient for 36 head stock.
14	SE.	17	"	"	"	Bored	53	2,910	- 46	2,864	50	2,860	Glacial sand	Hard, clear, salty, "alkaline"		D, S	Not in use at present.
15	NE.	17	"	"	"	Dug	80	2,940	- 36	2,904	36	2,904	Glacial drift	Hard, clear, "alkaline"		S	Insufficient for local needs.
16	SW.	18	"	"	"	Dug	48	2,910	- 39	2,871	48	2,862	Glacial sand	Hard, clear, "alkaline"		D, S	Insufficient for local needs.
17	SE.	19	"	"	"	Dug	40	2,865	- 15	2,850	40	2,825	Glacial gravel	Hard, clear		D, S	Sufficient for 25 head stock.
18	NE.	21	"	"	"	Dug	60	2,940	- 15	2,925	60	2,880	Glacial drift	Hard, clear, "alkaline"		D, S	Sufficient for local needs.
19	NW.	22	"	"	"	Dug	28	2,930	- 12	2,918	28	2,902	Glacial sand and gravel	Hard, clear		D, S	Sufficient for local needs.
20	SE.	22	"	"	"	Drilled	172	2,945	- 12	2,933	150	2,795	Ravenscrag blue sand	Soft	42	D, S	Sufficient for local needs.
21	NW.	23	"	"	"	Dug	42	2,945	- 25	2,920	42	2,903	Glacial sandy clay	Hard, clear, iron		D, S	Sufficient for 10 head stock.
22	NE.	24	"	"	"	Dug	34	3,040	0	3,040	34	3,006	Glacial gravel	Hard, clear		D, S	Sufficient for local needs.
23	SE.	25	"	"	"	Bored	92	3,000	- 42	2,958	50	2,950	Glacial gravel	Hard, clear, "alkaline"		S	Insufficient; hauls water.
24	SE.	26	"	"	"	Drilled	400?	2,950	- 50	2,900			Bearpaw sand(?)	Soft(?)		N	Was never used as pump was broken on installing
25	NE.	26	"	"	"	Dug	64	2,940	- 44	2,896	64	2,876	Ravenscrag black sand	Hard, clear		S	Sufficient for 30 head stock.
26	SW.	31	"	"	"	Dug	18	2,950	- 14	2,936	18	2,932	Glacial sand	Hard, clear		D, S	Sufficient for 50 head stock.
27	SE.	36	"	"	"	Bored	65	2,980	- 20	2,960	65	2,915	Glacial sand	Hard, clear		D, S	Sufficient for local needs.

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.