CANADA
DEPARTMENT OF MINES

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BUREAU OF ECONOMIC GEOLOGY
GEOLOGICAL SURVEY

PRELIMINARY REPORT

GROUND-WATER RESOURCES OF THE RURAL MUNICIPALITY OF LAJORD No. 128 SASKATCHEWAN

BY

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

Water Supply Paper No. 122

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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

<u>Alkaline</u>. 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".

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

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

<u>Buried pre-Glacial Stream Channels</u>. 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.

<u>Bedrock</u>. 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.

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

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

<u>Continental Ice-Sheet</u>. The great ice-sheet that covered most of the surface of Canada many thousands of years ago.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Cypress Hills Formation. The name given to a series of conglomerates and sand beds which occur in the southwest corner of Saskatchewan, and 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 côteau. 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 Lajord is an area of 360 square miles in southeastern Saskatchewan. It consists of townships 13, 14, and 15, ranges 16, 17, and 18, and township 16, range 16, all west of the Second meridian. The Brandon and Regina branch of the Canadian National railways traverses the northern 2 miles of township 16, range 16, and on it is located the hamlet of Davin. The Arcola and Moose Mountain section of the Canadian Pacific railway passes through township 14, range 16, and townships 15, ranges 16 and 17, and on it are located the hamlets of Kronau and Lajord. The Boundary branch of the Canadian National railways runs across the southwestern part of the municipality, and on it are located the hamlets of Gray, Riceton, and Bechard. The hamlet of Kathrinthal is located in sec. 7, tp. 16, range 16. The hamlet of Lajord is 25 miles southeast of the city of Regina.

A deposit of black, "gumbo", glacial lake clay, approximately 10 feet thick, covers townships 13 and 14, ranges 16, 17, and 18; townships 15, ranges 17 and 18; a little more than the southwestern half of township 15, range 16; and parts of secs. 6 and 7, tp. 16, range 16. This large area was the site of part of an extensive lake called glacial Lake Regina. The land is very flat and treeless, and the heavy, "gumbo" soil is very impervious, but is excellent for the growing of cereal grains. In places long, gently sloping and rounded ridges rise a few feet above the flat plain. A small area south of Kathrinthal is covered by glacial outwash sands and gravels. A belt ranging from ½ mile to 1½ miles in width bordering the lake clays on the east, running northwesterly through the northeastern part of township 15, range 16, and the southwestern part of township 16, range 16, is mantled by glacial lake sands less than 30 feet thick.

Glacial till and moraine cover the remaining part of townships 15 and 16, range 16. The ground surface rises rapidly from the old shore-line of the glacial lake at an elevation of 1,975 feet above sea-level to a maximum elevation of 2,005 feet at the northeastern corner of township 16, range 16. The northeastern part of the municipality is rough and rolling in contrast with the very flat ground surface in the glacial lake bed. The land surface is particularly rough and hilly in the vicinity of Manybone Creek valley. The top soil in this area is also lighter and more sandy than that in the lake clay-covered region.

The municipality is drained principally by Wascana creek and its tributary stream, Manybone creek. Wascana creek enters the municipality in sec. 1, tp. 14, range 16, meanders in a northwesterly direction across the flat plain, and leaves the municipality in sec. 35, tp. 15, range 18. The valley in the upper part of its course is narrow, and is about 30 feet deep, but it gradually widens until the creek flows through a wide depression rather than in a narrow valley. This depression, particularly in that part of the municipality southwest of Kronau, becomes swampy in wet seasons. Manybone creek flows intermittently in a southwesterly direction across township 16, range 16, township 15, range 17, and joins Wascana creek in sec. 25, tp. 15, range 18. A large swamp is formed at the junction of the two streams. A smaller creek flows in a westerly direction across the northern part of township 14, range 16, and joins Wascana creek in sec. 25, tp. 14, range 17.

Water-bearing Horizons in the Unconsolidated Deposits

Water in this municipality is derived from a few small springs, dugouts, rain-water cisterns, and wells that tap aquifers within the glacial drift. A few farmers residing in the vicinity of the creeks use surface water for stock during wet years, and also obtain seepage water from wells dug near or in the stream valleys.

Seven springs in townships 15 and 16, range 16, yield small supplies of slightly mineralized water that is usable for drinking. These springs are located in the floors of small ravines and the water is not under great pressure.

The producing wells in the municipality are from 3 to 231 feet deep. Water-bearing sands and gravels in the glacial drift are located without great difficulty in the northeastern half of township 15, range 16, township 16, range 16, and within the areas outlined by the boundary lines "A" and "B". Water-bearing sands and gravels are very difficult to locate in the glacial drift in the remainder of the municipality, particularly in the six western townships, where only a very few wells yield adequate supplies of usable water.

The impervious nature of the thick covering of lake clay prevents any considerable amount of rainfall from seeping into the underlying boulder clay, and, consequently, water is very difficult to locate in that part of the municipality situated within the glacial lake basin. A series of low knolls and ridges outlined by the "B" boundary line contain deposits of water-bearing sands and gravels that are tapped at depths of 12 to 52 feet. These deposits are in the form of pockets and, consequently, the supply of water from individual wells is variable, and depends largely on the size of the pocket encountered, but every well in this area yields an adequate supply of water for local requirements, and a few wells yield an oversufficient supply and are the sources from which a number of neighbouring farmers haul water. The water is hard and usually "alkaline", but that from different wells varies greatly in quality. With two or three exceptions, the only producing wells in townships 13 and 14, range 17, that yield usable water are located in the area outlined by the "B" boundary line.

A continuous water-bearing horizon of sand and gravel in the glacial drift is struck, at depths of 72 to 98 feet, by seven wells in the area outlined by the "A" boundary line. These wells yield a very abundant supply of water that usually rises under slight pressure. The water from these wells is sold to farmers in the surrounding districts, and the well in the NW. $\frac{1}{4}$, sec. 20, tp. 13, range 18, has furnished as many as 18 tanks of water a day. The water is hard, "alkaline", usually contains iron, and the degree of "alkalinity" varies in the individual wells. The water from two wells is too highly mineralized for drinking.

Outside of the outlined areas usable water is extremely difficult to locate at any depth in the glacial drift in the glacial lake basin. In a large area extending north and east from Gray there is not a single producing well. Water is sometimes found in pockets of sand and gravel in the boulder clay underlying the "gumbo" clay, but it is in many cases so highly mineralized that it cannot be used even for stock. Numerous dry holes have been dug, bored, and drilled in the lake clay-covered area, and most farmers do not make any further attempts to derive water from wells. Deep dugouts are used extensively for collecting and storing surface water for stock, and cisterns are often used for collecting rain water for drinking and domestic purposes. Many farmers tank drinking water throughout the year, and in many places it is hauled a distance of several miles.

Water-bearing sands and gravels in the glacial drift are struck without much difficulty at depths of 8 to 135 feet in that part of the municipality lying outside the glacial lake basin. Only five farms in this part of the municipality are short of water. Wells that tap aquifers within the hard, blue boulder clay usually derive water under pressure, and the supply is more abundant and constant than it is in wells that tap pockets of sand and gravel in the yellow or oxidized boulder clay of the upper 30 feet of the drift. The water from wells in this part of the municipality is hard and often "alkaline", but only in a few wells is the water too highly mineralized for drinking.

The supply of water is a major problem for most of the farmers in the glacial lake clay-covered area. The most economical method of relieving the acute shortage of water is to collect and conserve surface water in deep dugouts. Existing dugouts could be improved and deepened to ensure a permanent supply of water.

Much of the surface water from rain and melting snow is evaporated and very little of it seeps through the "gumbo" clay. Dugouts at least 12 feet deep and located in slight depressions should prove a satisfactory means of retaining water for stock purposes. The possibility of striking water at depths greater than 100 feet in the glacial lake clay-covered area is very slight, and deep boring or drilling is not recommended. The records of existing wells prove that if water-bearing sands and gravels are to be encountered in the glacial drift, they will almost certainly be located within depths of 100 feet.

Water-bearing Horizons in the Bedrock

The Marine Shale series underlies the glacial drift throughout the municipality. No water has been located in the bedrock in this municipality, although many dry holes have been sunk into it in every township, excepting townships 15 and 16, range 16. The Marine Shale series rarely contains water-bearing beds, and drilling into it in search of water is not recommended. The shale is often locally termed grey "soapstone".

The surface of the bedrock is not flat, but very uneven, and is dissected by pre-glacial stream channels that are now filled in with glacial drift. The irregularity of the bedrock surface is illustrated in wells sunk in township 14, range 18. In the SE. ¼ and NE. ¼, section 17, the bedrock was struck in wells at depths of 38 and 26 feet, whereas in the NE. ¼, section 20, two dry holes, 143 and 157 feet deep, were sunk entirely in glacial drift. In township 13, range 16, the bedrock was struck at depths of 40 to 90 feet, or at elevations of 1,850 to 1,890 feet above sea-level. The surface of the bedrock appears to slope towards the west or northwest. The deepest dry hole in the municipality was drilled 985 feet deep in the NW. ¼, sec. 14, tp. 14, range 18. It is believed that at least the lower 800 feet of this well is in bedrock. Drilling holes to depths greater than 125 feet is not recommended.

GROUND WATER CONDITIONS BY TOWNSHIPS

Township 13, Range 16

The elevation rises very gradually from 1,890 feet at the southwestern corner of the township to 1,960 feet at the northeastern corner. Glacial lake clay covers the township to a depth of 5 to 15 feet. The land is very flat in the southwestern part of the township, but becomes slightly undulating towards the northeast. Long, gently sloping swells in the ground surface result in the formation of large, shallow depressions that collect and retain surface water, and these extensive, shallow, marshy areas are more common in the south-central part of the township.

The thickness of the glacial drift varies, but it is not more than 100 feet thick, and in some places it is only 40 feet thick. Light grey clay, yellow or brown clay, or blue clay underlies the lake clay down to the base of the drift. Small pockets of water-bearing sand and gravel occur in the boulder clay, and in many places wells are dug that penetrate layers of dry or damp sand. The pockets of water-bearing sand and gravel are more prevalent near the base of the drift.

Adequate supplies of usable water are very difficult to locate in the glacial drift in most sections of the township, especially water that is not too highly mineralized for drinking. The producing wells are from 15 to 90 feet deep, and water was obtained only after numerous unsuccessful attempts. The 15-foot well was dug near a slough in the SE. $\frac{1}{4}$, section 13, where a small spring occurs. The aquifer is quicksand and the supply is constant and fairly abundant. The water is hard and slightly "alkaline", and many farmers haul water from this well for drinking and household purposes. Pockets of water-bearing gravel are easily struck in the SE. $\frac{1}{4}$, section 7, at depths of less than 35 feet, but the water is usable only for stock. Other wells in the township that yield adequate supplies of water are located in the SW. $\frac{1}{4}$, section 6, NW. $\frac{1}{4}$, section 10, SW. $\frac{1}{4}$, section 15, NE. $\frac{1}{4}$, section 24, SE. $\frac{1}{4}$, section 26, NE. $\frac{1}{4}$, section 28, and SW. $\frac{1}{4}$, section 35. The 34-foot well in the SW. $\frac{1}{4}$, section 35, yields an abundant supply of drinkable water, and many farmers in its vicinity haul water from this well for domestic purposes. Six wells in the township yield water under slight hydrostatic pressure.

Numerous dry holes have been dug, bored, and drilled in this township. The Marine Shale series that underlies the glacial drift has been definitely located in wells in the SE. $\frac{1}{4}$, section 2, SW. $\frac{1}{4}$, section 9, SE. $\frac{1}{4}$, section 14, and NE. $\frac{1}{4}$, section 19. The contact of the glacial drift and bedrock in these wells occurs at elevations of 1,820, 1,850, 1,890, and 1,855 feet above sea-level, respectively. About twenty-five dry holes, approximately 40 feet deep, were dug in the SE. $\frac{1}{4}$, section 14, and struck a 6-inch layer of white clay at the contact of the drift and the shale. Two dry holes, 247 and 745 feet deep, were drilled in the NE. $\frac{1}{4}$, section 19. These wells struck "soapstone" or Marine Shale 40 feet below the surface, and the base of the deeper well is still within the Marine Shale at an elevation of 1,150 feet above sea-level. These two wells indicate the futility of searching in the bedrock for water-bearing beds. Prospecting for water should be entirely confined to the glacial drift, and when "soapstone" is encountered in a well excavating in that particular hole should be discontinued.

Most of the farmers in the township have no well water supply and depend on dugouts to collect and store sufficient water for stock use. One farmer in the NE. $\frac{1}{4}$, section 28, also uses a small dam for retaining surface water. Cisterns for collecting rain water are used by many farmers as sources of water for domestic purposes, whereas other farmers haul drinking water throughout the year. The excavation of dugouts seems to be the only practical method of alleviating the shortage of water in this township. Boring or drilling to depths greater than 100 feet is not advised in any part of the township.

Township 13, Range 17

The boulder clay or glacial till in this township is covered by a veneer of glacial lake clay 3 to 10 feet thick. The ground surface is flat and the elevation varies from 1,880 to 1,910 feet above sea-level, the latter elevation being attained in the northeastern corner of the township. The impervious nature of the lake clay causes surface water seepage to be very slow, and in the spring, and after heavy rainfall, pools of water stand in the slight depressions for some time. A marshy area occurs in the eastern halves of sections 1 and 12. The township is a flat, treeless plain with no watercourses or permanent bodies of water.

Ground water suitable for drinking or stock is not plentiful due to the lack of extensive aquifers in the glacial drift. A long, low ridge extends in a northwest-southeast direction across the township, and nearly all the producing wells in the township are located on this ridge. This ridge is outlined approximately by the "B" boundary line on the accompanying map. In this area water is obtained from beds of sand and gravel in the boulder clay at depths of 22 to 44 feet. The supply of water obtained is quite variable, but in every instance it is adequate for local requirements. A 34-foot well in the NE. $\frac{1}{4}$, section 12, yields an abundant and constant supply of water, and the water-level is only 4 feet above the base of the well, whereas a 22-foot well in the NW. $\frac{1}{4}$, section 12, in which the water-level also stood, when examined in 1935, 4 feet above the base of the well had its supply considerably decreased by the drought of 1930 to 1934. A 36-foot well in the NW. ¼, section 31, holds only 3 feet of water, but the well has never been pumped dry since it was dug in 1914. A well was dug by the Grand Trunk railway in the NE. ¼, section 29. This well was 30 feet in diameter, and 43 feet deep, and the water-level stood at a point 22 feet below the surface. The aquifer was quicksand and the well yielded an abundant supply of hard water, but it is now filled in.

Outside the area outlined by the "B" boundary line, only two producing wells were recorded. These two wells are located in the NE. ¼, section 30, and the NW. ¼, section 36, and are 20 and 96 feet deep, respectively. The 20-foot well yields only 2 barrels of water a day and the water is too highly mineralized for drinking and imparts a laxative effect on stock. The 96-foot well was bored through the following materials, in descending order:

	Feet
Gumbo clay	7
Yellow clay	15
Blue clay	31
Sand	10
Hardpan	3
Coarse gravel	5
Sand	7
Sand, water	18

Water rose from the sand at the base of the well to a point 20 feet below the surface, and shortly afterwards the casing became plugged with sand and the well was rendered useless. The water from the wells in the township is nearly always "alkaline" and that from six wells only is used for drinking.

Except for the well in the NE. ¼, section 30, which yields 2 barrels of water a day, no wells outside the area outlined by the "B" boundary line are being used. Numerous dry holes have been dug, bored, and drilled to a maximum depth of

575 feet. A few wells that yielded unusable water were filled in. A well 80 feet deep, in the SW. $\frac{1}{4}$, section 8, struck tho Marine Shale series at a depth of 76 feet, or at an elevation of 1,809 feet above sea-level. A 40-foot well in the SE. $\frac{1}{4}$, section 24, struck "soapstone" or shale at an elevation of 1,855 feet. Two wells 400 and 575 feet deep, in the SW. $\frac{1}{4}$, section 2, and the NW. $\frac{1}{4}$, section 29, were undoubtedly drilled for a considerable distance in the Marine Shale. Except for these two wells, all the dry holes are 100 feet or less in depth. The depth to the Marine Shale series varies considerably throughout the township, but it is very doubtful if the glacial drift exceeds 125 feet in thickness anywhere in the township, and in many places it is probably less than 75 feet thick. If water cannot be obtained in the glacial drift it is inadvisable to continue drilling as the Marine Shale series in this part of Saskatchewan rarely contains water-bearing horizons. The excavation of dugouts is the only practical method of increasing the supply of water for stock. The collecting of rain water in cisterns for domestic needs is also recommended.

Township 13, Range 18

This township is a flat, treeless plain, and 8 to 10 feet of "gumbo" or glacial lake clay overlies the boulder clay or glacial till. The difference in surface elevation is not more than 25 feet, but there is a gentle rise from the eastern to the western boundaries of the township. A few, low, wide ridges that do not trend in any definite direction rise slightly above the level surface of the plain.

Except within the area outlined by the "A" boundary line, water conditions in this township are very poor, and in fact only one well outside of the outlined area is being used. It is located in the SW. $\frac{1}{4}$, section 9. Within the outlined area seven wells have struck a water-bearing horizon of sand and gravel at depths of 72 to 98 feet, or at elevations of 1,812 to 1,843 feet. In six wells the water rises under pressure, but in the 72-foot well in the SW. $\frac{1}{4}$, section 28, the water does not rise above the aquifer, probably due to sand plugging the casing, as this is the only well from which the supply has gradually decreased. The other six wells yield an abundant supply of water, and the 98-foot well in the NW. $\frac{1}{4}$, section 21, has never been pumped dry. The farmer in the NW. $\frac{1}{4}$, section 20, has sold as many as 18 tanks of water for stock use during a day. Water from the well in the NE. $\frac{1}{4}$, section 19, was also sold during the years 1913, 1914, and 1934. The water from these wells is hard, "alkaline", and usually contains iron, and that from the wells in the NW. $\frac{1}{4}$, section 20, and the SE. $\frac{1}{4}$, section 30, is highly "alkaline" and unsuitable for drinking. Except for a dry hole, 120 feet deep, in the NW. $\frac{1}{4}$, section 21, no difficulty was experienced in obtaining water in this outlined area. The limits of this water-bearing horizon, as shown on Figure 1 of the map accompanying this report, are definitely known, since numerous wells failed to strike the water-bearing horizon to the north, east, and south of the outlined area.

The well in the SW. $\frac{1}{4}$, section 9, struck a pocket of sand in the glacial drift at an elevation of 1,740 feet, and the supply of water has been sufficient for 50 head of stock since the well was made in 1904. The water is too highly mineralized for drinking. Wells in sections 3, 5, 34, 35, and 36, in the glacial drift, struck water that is too highly mineralized even for stock, and they are not in use. The water in the 32-foot well in the NE. $\frac{1}{4}$, section 36, was very salty, whereas that from other wells was very "alkaline".

Numerous dry holes have been sunk in this township to a maximum depth of 320 feet. Seven dry holes, 90, 100, 120, 128, 240, 250, and 320 feet deep, were drilled in the SE. $\frac{1}{4}$, section 17, and the 240-, 250-, and 320-foot holes have probably encountered the Marine Shale series. The glacial drift appears to be thicker in this township than in townships 13, ranges 16 and 17. Two dry holes, 140 feet deep, struck "soapstone" at an elevation of approximately 1,770 feet above sea-level in the NW.$\frac{1}{4}$, section 31, and wells 275, 175, and 208 feet deep in the SE. $\frac{1}{4}$, section 4, NE. $\frac{1}{4}$, section 12, and SE. $\frac{1}{4}$, section 36, reported "soapstone" or shale, but the contact was not established. In any case the six producing wells in the western part of the area prove conclusively that the drift is at least 100 feet thick in that part of the township. Dugouts and rain-water cisterns are used by many farmers for collecting water for stock and domestic purposes, whereas other farmers haul water. The excavation of deep dugouts is recommended as one of the best methods of retaining surface water. Boring or drilling is not advised in any part of the township except in the area outlined by the "A" boundary line. All efforts to locate water should be confined to the glacial drift.

Township 14, Range 16

The boulder clay or glacial till in this township is covered by a 5- to 15-foot layer of glacial lake clay, or black "gumbo" clay. The elevation rises gradually towards the east, attaining 1,960 feet in both the southeastern and northeastern corners of the township. In the western part of the area the ground surface is flat, but in the eastern part it becomes slightly undulating. Wascana creek flows intermittently in a northwesterly direction across the township through a ravine approximately 25 feet deep. The slopes of the banks of the ravine are steeper in this township than they are in the northwestern part of the municipality. Small tributary streams flow in a westerly direction across the northern sections of the township. The plain is devoid of any tree growth.

Ground water conditions are better in this township than they are in other parts of the municipality covered by glacial lake clay. The producing wells are from 12 to 231 feet deep and tap aquifers in the glacial drift. Most of the producing wells are less than 100 feet deep, and five of them yield water under slight hydrostatic pressure. In some quarter sections no difficulty is experienced in striking pockets of water-bearing sand and gravel, whereas in others it has been found impossible to obtain a water supply from the glacial drift. Three wells, 116, 231, and 120 feet deep, in the NE. $\frac{1}{4}$, section 4, NE. $\frac{1}{4}$, section 14, and SW. $\frac{1}{4}$, section 15, are the only wells over 100 feet deep that have struck water. The 231-foot well penetrated the following material, in descending order:

	Feet
Yellow clay	40
Blue clay	30
Yellow clay	25
Grey clay	128
Compact sand (water)	8

Water rose from the sand to a point 190 feet below the surface, but the well is not in use.

The supply of water from the producing wells in the township is quite variable. Some of the wells, such as those in the NE. $\frac{1}{4}$, section 10, SW. $\frac{1}{4}$, section 15, and SE. $\frac{1}{4}$, section 22, yield an abundant supply of water, whereas others yield small, but in many cases adequate, supplies of water. Mostly the water is highly mineralized and is not suitable for drinking. Several wells have struck water that was too highly mineralized even for stock. A well in the NW. $\frac{1}{4}$, section 12, yields a good supply of water, but it is so "alkaline" that it is used for stock only during the winter months when surface water cannot be obtained. Good drinking water is very scarce, and only eight wells were recorded that are being used as a source of water for domestic purposes, and even some of these yield "alkaline" water.

Dry holes as deep as 560 feet have been sunk in the township. A 186-foot dry hole in the NE. $\frac{1}{4}$, section 4, encountered the bedrock or Marine Shale series at an elevation of 1,830 feet above sea-level, or 120 feet below the surface. "Soapstone" was also reported at a depth of 150 feet, or at an elevation of 1,770 feet above sea-level, in a 160-foot well in the SE. $\frac{1}{4}$, section 21. It is also very probable that a considerable part of the drilling in the 560-foot well in the NE. $\frac{1}{4}$, section 5, was in the Marine Shale series, since the base of the hole is at an elevation of 1,380 feet. The thickness of the glacial drift must vary considerably, since the sand aquifer in the 231-foot well in the NE. $\frac{1}{4}$, section 14, at an elevation of 1,707 feet, is in the glacial drift.

At least thirteen farmers in the township have been unable to obtain a satisfactory supply of water from wells. In spite of the fact that wells have tapped aquifers in the glacial drift at a maximum depth of 231 feet, boring or drilling for water is not recommended. Excavating dugouts is a more economical and more certain method of securing a permanent supply of water, and the surface water collected will not be so highly mineralized as water from wells. The dugouts must be at least 12 feet deep to be satisfactory. The gumbo clay is quite impervious and much of the surface water runs into depressions rather than seeping into the ground.

Township 14, Range 17

This township is a flat, treeless plain, and is covered by glacial lake clay. The elevation does not vary more than 25 feet, the maximum elevation being approximately 1,920 feet above sea-level, in the southeastern corner of section 13. Low, gently sloping ridges rise above the plain level to heights of less than 15 feet. Wascana creek flows in a northwesterly direction across sections 25, 26, 27, and 33, and a small tributary stream joins the creek in the SE. ¼, section 25. The course of Wascana creek is through a wide, flat depression in the glacial lake basin, and much of the land in the vicinity of the creek is swampy and covered with water in wet seasons. The swampy area extends southward from the creek in sections 27 and 22.

All the producing wells in the township that are in use are located within an area outlined on Figure 1 of the accompanying map by the line "B". Outside of this area there is not a single producing well that yields water fit for use, and most of the wells are dry holes. The producing wells in the outlined area are from 12 to 52 feet deep, and tap aquifers of sand and gravel within the glacial drift. The water in the wells is not under pressure, but the supply is adequate and often quite abundant. The 12-foot well in the NE. ¼, section 15, yields 214 barrels of water a day, and a 38-foot well in the SE. ¼, section 17, will yield 5 tanks of water at a time which only slightly lowers the water-level in the well. A water-bearing bed of gravel underlies blue boulder clay throughout most of the NE. ¼, section 16, at a depth of 30 feet. One 30-foot well in this quarter section contains only 3 feet of water, but as many as 9 tanks of water a day have been sold from this well to neighbouring farmers. The quality of the water varies considerably. It is always hard, but that from some wells is used for drinking, whereas in others, such as those in the NE. ¼, section 24, the water is very "alkaline" and can be used only for stock. Wells in the SW. ¼, section 6, NE. ¼ and NW. ¼, section 15, NE. ¼, section 16, and SE. ¼, section 17, yield water that is used for drinking, and these wells are used by many farmers in this district as sources from which water for domestic purposes is tanked. The only quarter section in the outlined area wherein water was not obtained is the SE. ¼, section 7, where two dry holes, 66 and 117 feet deep, were drilled. The base of the 66-foot well is in a bed of fine, dry, glacial sand. The 117-foot well penetrated a bed of coarse, damp sand, at a depth of 80 feet, which was underlain by shale. The elevation of the contact between the glacial drift and the bedrock in this well is 1,820 feet above sea-level.

Adequate supplies of usable water are almost impossible to locate in the glacial drift outside of the area outlined by the "B" boundary line. A few wells such as those in the NW. ¼, section 9, SW. ¼, section 18, and SE. ¼, section 20, struck adequate supplies of very highly mineralized water at depths of 45, 50, and 38 feet, in the glacial drift.

Numerous dry holes have been dug, bored, and drilled to a maximum depth of 250 feet. Bedrock or the Marine Shale series was encountered in wells 45, 60, and 50 feet deep, in the NE. ¼, section 14, NW. ¼, section 25, and NE. ¼, section 26, at elevations of 1,865, 1,840, and 1,850 feet above sea-level, respectively. Most of the wells, however, especially those in the NW. ¼, section 3, that are 100, 200, and 250 feet deep, were sunk in material that does not appear to be bedrock. The wells in the NW. ¼, section 3, were drilled through 10 feet of black gumbo clay, 40 feet of yellow boulder clay, and blue boulder clay to the base of the holes. The base of the 239-foot well in the NE. ¼, section 21, is believed to be at the contact of the glacial drift and the bedrock, at an elevation of 1,665 feet above sea-level, but this has not been proved.

Dugouts could be used for conserving surface water for stock use in those parts of the township where it is impossible to obtain any usable water from the glacial drift. Drinking water must be tanked, or rain water caught and stored in cisterns can be used for domestic purposes. It is highly improbable that many wells will yield water that is usable for drinking.

Township 14, Range 18

This township is covered by approximately 10 to 15 feet of glacial lake clay. The land is very flat, particularly in the northwestern half of the township, but in the southeastern half the flat, treeless plain is broken by slight rises or ridges. The elevation of the ground surface varies between 1,885 and 1,910 feet, there being a slight rise towards the southern boundary of the township.

Ground water conditions are extremely poor in this township. Only five wells have struck water in the glacial drift, and they are located in the NE. $\frac{1}{4}$ and SW. $\frac{1}{4}$, section 2, SE. $\frac{1}{4}$, section 3, and NE. $\frac{1}{4}$, section 10. Of these five wells, four have been filled in, and the remaining well, in the SE. $\frac{1}{4}$, section 3, which is 72 feet deep, is only used occasionally as it is partly plugged with quicksand. The water in this well is hard and slightly "alkaline", and it was sold for drinking purposes before the casing became clogged with sand. Those wells that were abandoned either yielded a paltry supply of water, or the water was too highly mineralized for use.

Numerous dry holes, most of them less than 200 feet deep, have been sunk in the township. Six dry holes, 80, 102, 124, 160, 160, and 985 feet deep, were drilled in the NW. $\frac{1}{4}$, section 14. Apparently the glacial drift contains very few pockets of water-bearing sand and gravel, and farmers have abandoned the idea of obtaining water from wells.

The Marine Shale series underlies the glacial drift throughout the township. The shale, or "soapstone" as it is sometimes locally termed, was definitely encountered in wells in the NE. $\frac{1}{4}$, section 2, NW. $\frac{1}{4}$, section 14, SE. $\frac{1}{4}$, and NE. $\frac{1}{4}$, section 17, and NW. $\frac{1}{4}$, section 33. The contact of the glacial drift and the Marine Shale bedrock in these wells is at depths of 60, 67, 38, 26, and 60 feet, respectively, or at elevations of 1,845, 1,823, 1,857, 1,874, and 1,830 feet above sea-level. It is, therefore, quite probable that the glacial drift is less than 100 feet thick over the greater part of the township. One well in the NW. $\frac{1}{4}$, section 33, was bored through 88 feet of "gumbo" clay, but it is not known if all of this material is lake clay or part of it is weathered shale.

The excavation of deep dugouts in slight depressions seems to be the only economical and practical method of collecting and retaining water for stock in this township. Drinking water must be tanked or rain water collected in cisterns. Drilling to depths in excess of 100 feet is not advised.

Township 15, Range 16

The ground surface rises from a minimum elevation of 1,900 feet at the southwestern corner of the township to a maximum elevation of 2,120 feet at the northeastern corner. The rise in elevation is very gradual to the 2,000-foot contour and is then quite rapid and irregular to the northeastern corner of the township. The southwestern half of the township is covered by glacial lake clay. An area $\frac{1}{2}$ mile to $1\frac{1}{2}$ miles wide, bordering the glacial lake clay-covered area on the northeast, is mantled by glacial lake sands that in some places attain a thickness of 30 feet. The remainder of the township is covered by glacial till and moraine. That part of the township covered by glacial lake clay is flat, whereas the remainder of the area is undulating and rolling. The land is not eroded. The soil in the glacial till-covered area is a heavy, black, clay loam, but in the remainder of the township it is much lighter and sandy.

Two small springs are located in small ravines in the SW. $\frac{1}{4}$, section 21, and the SE. $\frac{1}{4}$, section 35. The former spring flows intermittently, and the water from the latter spring is quite soft and usable for drinking. The wells in this township are from 8 to 75 feet deep and tap pockets of sand and gravel rather than continuous aquifers. In the area covered by moraine and glacial till adequate supplies of water are not very difficult to locate, but in the lake clay-covered areas it is very difficult to obtain sufficient water for local requirements. Nearly all the producing wells are less than 45 feet deep. Variable supplies of water are obtained in the glacial lake sands and gravels at depths of less than 30 feet. For instance, abundant supplies of slightly mineralized water are easily obtained in wells less than 15 feet deep in the SE. $\frac{1}{4}$, section 22, whereas only small, inadequate supplies of hard, "alkaline" water can be obtained in the NW. $\frac{1}{4}$, section 14.

Water is not obtained in the glacial lake clay, but scattered pockets of water-bearing sand and gravel exist in the underlying boulder clay at depths of less than 45 feet. Most of the farmers in the township who have an unsatisfactory water supply are located in the area covered by glacial lake clay. The water that is obtained from the pockets of sand and gravel in the glacial drift varies considerably in quality and quantity. A 42-foot well in the NE. $\frac{1}{4}$, section 4, derives water under slight pressure from a cemented gravel deposit. The well yields 5,000 to 6,000 gallons of water a day, but the water is salty and "alkaline", and has a laxative effect on stock. An 11-foot well in the SE. $\frac{1}{4}$, section 19, has never been pumped dry and the water rises to a point 2 feet below the surface. The water from this well is hard, but not "alkaline", and is usable for drinking.

Another well, in the SW. $\frac{1}{4}$, section 33, 11 feet deep, yields soft but slightly "alkaline" water. Two wells 20 and 27 feet deep, in the NE. $\frac{1}{4}$ and SE. $\frac{1}{4}$, section 25, yield a fairly abundant supply of water that is under hydrostatic pressure. Most of the shallow wells were affected by the drought of 1930 to 1934. Five dry holes were bored in the NW. $\frac{1}{4}$, section 4, but these are the only dry holes reported in the township. These dry holes were bored through the following materials descending order:

	Feet
Black clay	10
Gravel	6
Hard, light clay	12
Gravel	1
Clay	31
Blue clay with stones.	

The Marine Shale series that underlies the glacial drift was not encountered in any of the wells in the township. The base of the glacial drift probably occurs at an elevation of approximately 1,825 feet above sea-level. Those farmers who obtain insufficient or unusable water from wells use dugouts as a means of collecting and storing surface water. These dugouts are highly recommended and they should prove satisfactory if their site is carefully chosen and they are dug at least 12 feet deep. Testing augers should prove useful in locating pockets of water-bearing sand and gravel in this township prior to digging a well.

Township 15, Range 17

This township is a flat, treeless plain, and is covered by a deposit of glacial lake clay. Low, slightly rounded ridges occur in the western part of the township. Wascana creek flows intermittently in a northwesterly direction from section 3 to section 19. Manybone creek, a tributary of Wascana creek, enters the township in section 36, flows in a southeasterly direction, and leaves the township in section 30. Both streams flow through shallow, wide depressions in the glacial lake bed, and in the spring these wide depressions are flooded with water. There is a gradual rise of about 65 feet in elevation from the southwestern corner of the township to the northeastern corner.

Pockets of water-bearing sand and gravel are difficult to find in the unconsolidated deposits, and when water is found it is in many cases too highly mineralized for stock. Only six farmers in the township have an adequate supply of usable water, and they are located in the SE. $\frac{1}{4}$ and NW. $\frac{1}{4}$, section 20, NE. $\frac{1}{4}$, section 22, NW. $\frac{1}{4}$, section 25, NE. $\frac{1}{4}$, section 32, and SE. $\frac{1}{4}$, section 36. Most of these wells are in or near creek valleys and derive their water by seepage of surface water. The supply from the wells in the NW. $\frac{1}{4}$, section 25, and the SE. $\frac{1}{4}$, section 36, is more than sufficient for local needs, and the 14-foot well in the former quarter section has never been pumped dry. The only well in the township that yields water under pressure is 52 feet deep, and is located in the NW. $\frac{1}{4}$, section 16. Unfortunately the water from this well is much too highly mineralized even for stock use. The farmer at this locality uses dugouts and cisterns to collect and retain surface water, and when these sources fail water must be hauled a distance of 8 miles. Dugouts are used extensively in the township for retaining surface water for stock. Drinking water is very scarce and rain water is used when it is available, or water is hauled from neighbouring wells.

Many dry holes have been sunk to a maximum depth of 540 feet. It is very probable that most of the dry holes more than 100 feet deep have passed through the glacial drift and extend into the Marine Shale series. A 496-foot dry hole in the NW. $\frac{1}{4}$, section 5, passed through the following materials, in descending order:

	Feet
Black, gumbo clay	20
White clay	10
Hardpan with stones	20
Blue clay	225
Brown shale	221

The contact between the drift and the shale is at an elevation of 1,615 feet above sea-level. Other wells in the township place the contact at elevations of 1,835, 1,855, 1,725, 1,895, and 1,890 feet above sea-level, from which it appears that the surface of the Marine Shale series is very uneven. It is futile to bore or drill into the shale or "soapstone" for water. Farmers are advised to excavate dugouts to collect and retain surface water, rather than to attempt to locate water at depth.

Township 15, Range 18

This township is a flat, treeless plain that is broken by low, gently sloping swells. The entire area is covered by a thick deposit of glacial lake clay, locally known as "gumbo" clay. Wascana creek flows in a northwesterly direction across the northeastern corner of the township, and Manybone creek joins Wascana creek in the SE. $\frac{1}{4}$, section 25. Another small tributary stream flows into Wascana creek from the northeast in the SW. $\frac{1}{4}$, section 36. The stream flows through a wide, shallow depression in the lake bed. These depressions become marshes in wet seasons, and a particularly large swampy area occurs at the junction of Wascana and Manybone creeks.

The only producing wells in this township are those located in the northeastern corner of the township in the flood-plains of creeks. These wells are 13 to 16 feet deep and derive water directly by seepage from the creeks. The supply is very small and the water is usually too "alkaline" for drinking. The other holes that were reported in this township are dry holes that have been sunk into the glacial drift or into the underlying Marine Shale series. It is apparently impossible to locate beds of water-bearing sand and gravel in the glacial drift, and the farmers no longer attempt to locate water by wells. About thirty dry holes were reported in eight quarter sections in the township. Eleven dry holes, 40 to 740 feet deep, were sunk in the NW. $\frac{1}{4}$, section 18. Only one of these wells, 580 feet deep, reported a definite contact between the glacial drift and the bedrock. This 580-foot well was drilled through 40 feet of clay and 30 feet of dry sand, and the Marine Shale series was struck at a depth of 70 feet, or at an elevation of 1,825 feet above sea-level.

Practically all the water used for stock in this township is collected in dugouts. Rain water is collected in cisterns and used for drinking and domestic purposes. Dugouts are the only practical method of obtaining water for stock. The Marine Shale series does not contain water-bearing beds, and since this formation is probably less than 100 feet below the surface costly boring or drilling operations are not recommended. Numerous dry holes sunk into the Marine Shale occur in this part of Saskatchewan, and have proved conclusively the futility of boring or drilling into this Marine Shale.

Township 16, Range 16

Approximately 5 square miles in the southwestern corner of the township, in the vicinity of Kathrinthal, are overlain by deposits of glacial lake clay, glacial lake sands, glacial outwash sands and gravels, and glacial till. The greater part of the northeastern half of the township is a till plain, whereas the remainder of the township is covered by moraine. The ground surface rises from an elevation of 1,960 feet at the southwestern corner of the township to an elevation of 2,205 feet at the northeastern corner. Manybone creek flows intermittently in a southwest direction across the southern half of the township. The creek flows through a valley about 90 feet deep in the eastern part of the township, but the valley becomes shallower and widens out when the flat, glacial lake clay-covered area is reached in the southwestern corner of the township. Another small creek has its source in the SW. $\frac{1}{4}$, section 28, and flows westward through sections 29 and 30. The moraine-covered areas, and the areas in the vicinity of Manybone creek, are rough and hilly. The southwestern corner is fairly level, and the till-covered sections are slightly undulating. The township is not wooded.

Springs occur in the floors of the ravines and were reported to occur in the NW. $\frac{1}{4}$, section 10, NE. $\frac{1}{4}$, section 13, SE. $\frac{1}{4}$, section 19, and NE. $\frac{1}{4}$, section 22. The spring in the NE. $\frac{1}{4}$, section 13, was dug out to a depth of 3 feet and drilled, and the highest point to which the water has risen is 8 feet above the surface. The water from the springs is not highly mineralized, and that from the springs in sections 10 and 13 is soft.

The wells in this township are from 10 to 135 feet deep, and very little difficulty is experienced in tapping deposits of water-bearing sand and gravel in the glacial drift within these depths. Only three farmers in the township have been unable to obtain a sufficient supply of water. Adequate supplies of water are easily located at depths of less than 30 feet in the bottoms of the ravines. Those farmers living in the vicinity of Manybone creek water their stock at the stream. The sand and gravel pockets or lenses occur in the glacial drift not only in the upper 10 to 30 feet of the weathered or yellow boulder clay, but also within the underlying blue boulder clay. The water in those wells that tap aquifers beneath a layer of hard, blue boulder clay is under pressure, and the supply is more abundant and constant than it is in the shallower wells. For instance, a 24-foot well in the NE. $\frac{1}{4}$, section 26, taps an aquifer of quicksand above the blue boulder clay, and the supply is sufficient for about 30 head of stock, but is readily affected by drought conditions. A 37-foot well in the NE. $\frac{1}{4}$, section 27, was dug through 2 feet of yellow boulder clay, 33 feet of hard, blue boulder clay, and 2 feet of gravel. Water rises from the gravel to a point 27 feet below the surface, and the well has never been pumped dry since it was dug, in 1922. The water from wells in this township is usually hard, and sometimes "alkaline", but it is used for drinking.

Dry holes 50 to 125 feet deep were sunk in the SW. $\frac{1}{4}$, section 5, NW. $\frac{1}{4}$, section 20, NE. $\frac{1}{4}$, section 29, and SW. $\frac{1}{4}$, section 36. Dry holes 50, 80, and 125 feet deep were bored in the NE. $\frac{1}{4}$, section 29, yet 300 feet away from these dry holes a 42-foot bored well struck an adequate supply of water in sand. This illustrates the pocket arrangement of the sand and gravel in the glacial drift.

No wells have passed through the glacial drift into the underlying Marine Shale series. The elevation of the base of the glacial drift is probably 1,750 to 1,800 feet above sea-level, and the drift probably is much thicker in the northeastern part of the township than it is in the southwestern part. The probability of striking water in sand and gravel in the blue boulder clay of the glacial drift is good, and boring or drilling operations are recommended. Drilling into the underlying bedrock, however, is not advisable. This is the only township in the municipality wherein the ground water conditions can be termed satisfactory.

STATISTICAL SUMMARY OF WELL INFORMATION IN RURAL MUNICIPALITY OF LAJORD, NO. 128, SASKATCHEWAN

West of 2nd mer. — Township	13	13	13	14	14	14	15	15	15	16	Total No. in municipality
Range	16	17	18	16	17	18	16	17	18	16	
Total No. of Wells in Township	93	45	32	68	58	40	58	74	39	63	570
No. of wells in bedrock	13	7	9	3	7	11	0	12	2	0	64
No. of wells in glacial drift	80	38	23	65	51	29	58	62	37	63	506
No. of wells in alluvium	0	0	0	0	0	0	0	0	0	0	0
Permanency of Water Supply											
No. with permanent supply	19	16	13	32	12	5	52	35	8	55	247
No. with intermittent supply	1	0	0	2	0	0	1	1	1	2	8
No. dry holes	73	29	19	34	46	35	5	38	30	6	315
Types of Wells											
No. of flowing artesian wells	0	0	0	0	0	0	2	0	0	5	7
No. of non-flowing artesian wells	6	2	7	6	0	0	5	1	0	14	41
No. of non-artesian wells	14	14	6	28	12	5	46	35	9	38	207
Quality of Water											
No. with hard water	20	15	13	34	12	5	44	36	9	48	236
No. with soft water	0	1	0	0	0	0	9	0	0	9	19
No. with salty water	0	0	2	0	0	1	3	1	0	0	7
No. with "alkaline" water	14	13	9	25	7	5	36	22	5	15	151
Depths of Wells											
No. from 0 to 50 feet deep	74	26	3	39	35	5	49	47	23	43	344
No. from 51 to 100 feet deep	16	17	13	23	17	24	9	17	10	17	163
No. from 101 to 150 feet deep	1	0	7	2	3	6	0	1	3	3	26
No. from 151 to 200 feet deep	0	0	3	2	1	4	0	5	1	0	16
No. from 201 to 500 feet deep	1	1	6	1	2	0	0	3	0	0	14
No. from 501 to 1,000 feet deep	1	1	0	1	0	1	0	1	2	0	7
No. over 1,000 feet deep	0	0	0	0	0	0	0	0	0	0	0
How the Water is Used											
No. usable for domestic purposes	8	6	4	13	5	1	29	16	2	51	135
No. not usable for domestic purposes	12	10	9	21	7	4	24	20	7	6	120
No. usable for stock	16	11	8	29	10	1	35	21	9	55	195
No. not usable for stock	4	5	5	5	2	4	18	15	0	2	60
Sufficiency of Water Supply											
No. sufficient for domestic needs	19	12	12	32	12	4	52	35	8	54	240
No. insufficient for domestic needs	1	4	1	2	0	1	1	1	1	3	15
No. sufficient for stock needs	14	11	9	26	11	3	34	15	5	47	175
No. insufficient for stock needs	6	5	4	8	1	2	19	21	4	10	80

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. Resident 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 differance between the total hardness and the permanent hardness and represents the amount of mineral salts that ban be removed by boiling. Temporary hardness is due mainly to the bicarbonates of calcium and magnesium and iron, and permanent hardness 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 excesss 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 Lajord, No. 128, 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	NW.	20	13	18	2	90	2,460												(2)		(3)	(4)	(1)	(5)	ж 1
2	SW.	6	14	17	2	31	1,391												(2)		(4)	(3)	(1)	(5)	ж 1
3	SE.	30	15	16	2	11	10,966												(2)		(3)	(4)	(1)	(5)	ж 1
4	NE.	22	15	17	2	30	3,814												(2)		(3)	(4)	(1)	(5)	ж 1

Water samples indicated thus, ж 1, are from glacial drift or other unconsolidated deposits.
Analyses are reported in parts per million; where numbers (1), (2), (3), (4), and (5) are used instead of parts per million, they represent the relative amounts in which the five main constituents are present in the water.
Analyses by Provincial Analyst, Regina.
For interpretation of this table read the section on Analyses and Quality of Water.

Water from the Unconsolidated Deposits

Analyses of four water samples, taken from wells whose aquifers lie within the glacial drift, are shown on the accompanying table. It will be noticed in these samples that although the quantity of total dissolved solids is variable, the constituent salts and the order of their magnitude are almost identical. The sulphate salts of sodium, magnesium, and calcium predominate, and the water is a sulphated water. Whether the water is usable or not is dependant upon the amounts of sodium sulphate (Glauber's salt) and magnesium sulphate (Epsom salts) in solution, as these salts impart a laxative effect to the water.

Sample 1 was taken from one of the wells that tap a water-bearing horizon of sand and gravel within the area outlined by the "A" boundary line. The water from this well is not used for drinking since it acts as a laxative, but large quantities of it are sold for stock use. The total dissolved solid content of 2,460 parts per million, which is largely composed of Glauber's salt and Epsom salts, makes the water too highly mineralized for drinking, but it should impart no ill effects to stock.

Sample No. 2 was taken from a well in the area outlined by the "B" boundary line. The total dissolved solids of 1,391 parts per million is, comparatively speaking, quite low for water from the glacial drift in the part of the municipality covered by glacial lake clay. This well is used by many farmers as a source from which drinking water is tanked, but the presence of sodium sulphate and magnesium sulphate in the water causes it to be slightly laxative on some people.

Sample 3 was taken from a well within the area overlain by glacial lake clay. The water contains 10,966 parts per million of total dissolved solids and cannot be used for any farm purpose.

The water from this well is quite typical of that from many wells in the part of the municipality that is covered by glacial lake clay.

Sample No. 4 is also of a highly mineralized water that is not usable for domestic needs, but may be suitable for stock.

Water from the Bedrock

No water has been obtained from the Marine Shale series in this municipality. If water were obtained from the Marine Shale it would probably be so highly mineralized with sodium sulphate, magnesium sulphate, and sodium chloride that it could not be used for any farm purpose.

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, 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	SE.	2	13	16	2	Bored	90	1,910								5	Dry hole in Marine Shale; one of several unsuccessful attempts; uses cistern and hauls water from section 13.
2	SE.	3	"	"	"	Bored	40	1,895									One of two dry holes in glacial drift.
3	SW.	5	"	"	"	Bored	30	1,890					Glacial gravel?	Hard, iron, "alkaline"		D, S	Well bored in a slough; water is probably seepage from slough.
4	SW.	6	"	"	"	Dug	17	1,895	- 4	1,891	17	1,878	Glacial gravel	Hard, iron		D, S, I	Sufficient supply; another well 35 feet deep yields a good supply.
5	SE.	7	"	"	"	Dug	32	1,890	- 18	1,872	30	1,860	Glacial gravel	Hard, iron, "alkaline"		S	Good supply; but water is highly mineralized. Water is not difficult to obtain on this farm.
6	NW.	8	"	"	"	Bored	25	1,895	- 21	1,874			Glacial drift	Hard, very "alkaline"		N	Poor supply and water is too mineralized for use.
7	SW.	9	"	"	"	Bored	45	1,895									One of several dry holes in Marine Shale.
8	SE.	9	"	"	"	Dug	28	1,900	- 22	1,878	22	1,878	Glacial sand and gravel	Hard, iron, "alkaline"		S	Sufficient supply.
9	SW.	10	"	"	"	Dug	45	1,905	- 38	1,867	38	1,867	Glacial sand	Hard, "alkaline"			Well yielded a fair supply, but it is now caved in.
10	NW.	10	"	"	"	Bored	45	1,905	- 32	1,873	45	1,860	Glacial fine sand	Hard, "alkaline"		S	Sufficient supply, but well can be pumped dry; six dry holes in glacial drift about 40 feet deep.
11	SW.	11	"	"	"		40	1,910									Dry hole in glacial drift.
12	SE.	13	"	"	"	Dug	15	1,940	- 9	1,931			Glacial fine sand	Hard, "alkaline"		D, S	Very good supply; many neighbours haul drinking water from this well.
13	NW.	13	"	"	"		40	1,935									Dry hole in glacial drift.
14	SE.	14	"	"	"	Dug	40	1,930									One of twenty-five dry holes dug to the base of the glacial drift and a few penetrated the Marine Shale.
15	SW.	15	"	"	"	Dug	30	1,915	- 4	1,911	36	1,879	Glacial sand and gravel	Hard, iron, "alkaline"		S	Abundant supply; several dry holes in glacial drift.
16	SW.	16	"	"	"	Bored	74	1,895									One of many dry holes in glacial drift.
17	NE.	17	"	"	"	Dug	30	1,895									One of three dry holes in glacial drift.
18	NE.	19	"	"	"	Drilled	745	1,895									Dry hole in Marine Shale; another dry hole in Marine Shale 247 feet deep.
19	NW.	20	"	"	"	Bored	45	1,890					Glacial fine sand	Hard		N	Very small supply; wells cannot be sunk deeper than 45 feet because of quicksand.
20	NE.	21	"	"	"	Bored	70	1,900									One of two dry holes, probably in glacial drift.
21	NE.	22	"	"	"		135	1,920									One of four dry holes in glacial drift; uses cisterns and dugouts.
22	SE.	22	"	"	"	Dug	50	1,915	- 35	1,880			Glacial drift	Hard, "alkaline"		S	Sufficient for 12 head stock only; hauls drinking water from section 13.
23	SW.	24	"	"	"	Dug	40	1,945					Glacial drift	Hard, "alkaline"		N	Good supply of water.
24	NE.	24	"	"	"	Dug	35	1,955	- 32	1,923	32	1,923	Glacial sand and gravel	Hard, "alkaline"		D, S, I	Very good supply.
25	SE.	25	"	"	"	Dug	45	1,955	- 38	1,917	38	1,917	Glacial drift	Hard		D, S	
26	SE.	26	"	"	"		72	1,940	- 42	1,898	72	1,868	Glacial drift	Hard, iron, "alkaline"		S	Abundant supply; several dry holes as deep as 60 feet in glacial drift.

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 LAJORD, NO. 128, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE: Above (+) Below (−) Surface	HEIGHT TO WHICH WATER WILL RISE: Elev.	PRINCIPAL WATER-BEARING BED: Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
27	NE.	27	13	16	2	Bored	90	1,925									The deepest of several dry holes in glacial drift; uses cisterns and dugouts.
28	NE.	28	"	"	"	Bored	42	1,915	- 19	1,896	19	1,896	Glacial fine sand	Hard, iron, "alkaline"		D, S	Plenty of water; many dry test holes in glacial drift; a small ravine has been dammed.
29	NW.	34	"	"	"	Dug	90	1,945	- 85	1,860	85	1,860	Glacial gravel	Hard, iron, "alkaline"		S	Well has not been in use for five years; water is unfit for drinking.
30	SW.	35	"	"	"	Dug	34	1,945	- 20	1,925			Glacial gravel	Hard		D, S, I	Abundant supply; several farmers haul drinking water from this well; several dry holes in glacial drift.
31	NW.	35	"	"	"	Dug	17	1,945					Glacial drift	Hard		N	Poor supply and well is partly caved in.
1	SW.	2	13	17	2	Drilled	400	1,895									Dry hole in Marine Shale.
2	SE.	3	"	"	"	Bored	30	1,895									Dry hole in glacial drift.
3	SW.	4	"	"	"		40	1,890									Dry hole in glacial drift.
4	SW.	8	"	"	"	Bored	30	1,885									Two dry holes 80 feet deep in Marine Shale; one dry hole 24 feet deep in glacial drift.
5	NE.	12	"	"	"	Dug	34	1,890	- 30	1,860	30	1,860	Glacial sand	Hard, "alkaline"		D, S, I	Plenty of water.
6	NW.	12	"	"	"	Dug	22	1,895	- 18	1,877			Glacial gravel	Hard, "alkaline"		D, S, I	Sufficient supply, but the well can be pumped dry.
7	SE.	14	"	"	"	Dug	33	1,890	- 28	1,862	28	1,862	Glacial gravel	Hard, "alkaline"		S	Good supply.
8	NE.	15	"	"	"	Bored	20	1,885	- 8	1,877			Glacial drift	Hard, "alkaline"		N	Well has caved in.
9	SW.	15	"	"	"	Dug	22	1,885	- 19	1,866			Glacial gravel	Hard, very "alkaline"		N	Well yielded 5 barrels of water a day before it caved in.
10	SW.	18	"	"	"		65	1,885									Dry hole, probably in glacial drift.
11	SE.	23	"	"	"	Dug	24	1,890	- 15	1,875	24	1,866	Fine sand glacial	Hard, "alkaline"		S	Plenty of water; three farmers haul water from this well in winter.
12	NE.	24	"	"	"	Dug	35	1,900					Glacial gravel	Hard		N	Well is now caved in.
13	SE.	24	"	"	"	Dug	40	1,895									One of three dry holes in Marine Shale.
14	SE.	27	"	"	"	Dug	44	1,890	- 36	1,854			Glacial gravel	Hard, "alkaline"		S	Sufficient for 35 head stock only. Hauls drinking water.
15	NW.	28	"	"	"	Dug	35	1,885	- 30	1,855	30	1,855	Glacial sand	Hard, "alkaline"		D, S	Sufficient for 10 head stock.
16	SW.	28	"	"	"	Bored	35	1,885	- 30	1,855	30	1,855	Glacial sand	Hard, "alkaline"		D, S	Good supply of water.
17	NE.	29	"	"	"	Dug	43	1,890	- 22	1,868	22	1,868	Glacial fine sand	Hard		N	Well dug 30 feet in diameter by C.N.R; well could not be pumped dry; well is now filled in.
18	NW.	29	"	"	"	Drilled	575	1,895									Dry hole drilled by the C.N.R. in Marine Shale.
19	SW.	30	"	"	"	Drilled	90	1,900									The deepest of five dry holes, probably in glacial drift.
20	NE.	30	"	"	"	Dug	20	1,895	- 16	1,879	16	1,879	Glacial gravel	Hard, soda, "alkaline"		S	Yields 2 barrels of water a day.
21	NW.	31	"	"	"	Dug	36	1,895	- 33	1,862	33	1,862	Glacial gravel	Hard		D, S	Well has never been pumped dry since it was dug in 1914.

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 LAJORD, NO. 128, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
22	SW.	33	13	17	2	Bored	38	1,890					Glacial sand and gravel	Hard, "alkaline"		D, S	Plenty of water.
23	NW.	33	"	"	"	Bored	50	1,890									Dry hole in glacial drift.
24	SE.	34	"	"	"		100	1,895									One of seven dry holes probably in glacial drift.
25	SW.	35	"	"	"	Bored	100	1,895									Dry hole in glacial drift; numerous dry test holes less than 50 feet deep.
26	SW.	36	"	"	"	Bored	64	1,900					Glacial sand	Soft, "alkaline"		S	Yields one barrel of water a day; hauls drinking water.
27	NW.	36	"	"	"	Bored	96	1,905	− 20	1,885	87	1,818	Glacial fine sand	"alkaline"		N	Well plugged with sand soon after it was bored; dry hole 77 feet deep.
1	SE.	3	13	18	2	Dug	30	1,895					Glacial drift	Hard		N	Yielded 2 barrels of water a day before it was filled in; dry hole 90 feet deep in glacial drift.
2	SE.	4	"	"	"	Drilled	375	1,900									One of several dry holes, probably in Marine Shale.
3	SW.	5	"	"	"	Bored	55	1,905	− 47	1,858			Glacial sand	Hard, odour, "alkaline"		N	Well yielded 2 tanks of water a day at one time, but supply gradually decreased.
4	SW.	8	"	"	"	Bored	250	1,900									Dry hole in Marine Shale.
5	SW.	9	"	"	"		165	1,905					Glacial sand	"alkaline"		S	Well can water 50 head stock; water too mineralized for drinking.
6	NE.	12	"	"	"	Bored	175	1,890									Dry hole, probably in Marine Shale.
7	SE.	17	"	"	"	Drilled	320	1,900									Dry hole in Marine Shale; several dry holes over 120 feet deep in glacial drift; uses cisterns and dugouts.
8	NE.	19	"	"	"	Bored	84	1,915	− 63	1,852	84	1,831	Glacial gravel	Hard, "alkaline"		D, S	Good supply; water was sold in 1913, 1914, and 1934.
9	NW.	20	"	"	"	Bored	95	1,915	− 50	1,865	85	1,830	Glacial fine sand	Hard, iron, "alkaline"		S, I	18 tanks of water a day are sold from this well; rain water is used for domestic purposes;
10	NW.	20	"	"	"	Bored	91	1,915	− 61	1,854	91	1,824	Glacial fine sand	Hard, iron		S	Yields one tank of water an hour; #.
11	NW.	21	"	"	"	Dug	98	1,910	− 70	1,840			Glacial sand?	Hard, iron, "alkaline"		D, S	Well has never pumped dry; one dry hole 120 feet deep.
12	SW.	26	"	"	"	Bored	122	1,900									Dry hole, probably in glacial drift.
13	SW.	28	"	"	"	Bored	72	1,915	− 67	1,848	67	1,848	Glacial fine sand	Hard, salty, "alkaline"		D, S	Supply gradually decreases since 1910; sufficient but not abundant supply of water.
14	SE.	30	"	"	"	Bored	85	1,920	− 60	1,860	83	1,837	Glacial gravel	Hard, iron		S	Sufficient for 17 head stock.
15	SW.	30	"	"	"	Bored	84	1,920	− 72	1,848			Glacial drift	Hard, iron, "alkaline"		D, S	Yields 5 tanks of water a day; well can be pumped dry.
16	NW.	31	"	"	"	Bored	140	1,910									One of two dry holes in Marine Shale.
17	NW.	34	"	"	"		400	1,905									Dry hole in glacial drift.
18	NE.	34	"	"	"	Bored	60	1,905	− 58	1,847			Glacial drift	Hard, "alkaline"		N	Poor supply and well has been abandoned.
19	NE.	35	"	"	"	Bored	60	1,900	− 58	1,842	58	1,842	Glacial sand and gravel	Hard, odour, "alkaline"		N	Water is unfit for stock.
20	NE.	36	"	"	"	Dug	32	1,895					Glacial gravel	Salty		N	Water is too mineralized for stock.

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

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

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
21	SE.	36	13	18	2	Drilled	208	1,895									Dry hole in Marine Shale.
1	SE.	1	14	10	2	Dug	52	1,950					Glacial fine sand	Hard, iron, "alkaline"		S	Sufficient, but supply decreases during the drought.
2	NE.	3	"	"	"	Dug	56	1,955	- 30	1,925	46	1,909	Glacial fine sand	Hard, "alkaline"		S	Sufficient for stock; hauls drinking water; several dry holes as deep as 100 feet in glacial drift.
3	NE.	4	"	"	"	Bored	110	1,950	- 76	1,874	100	1,850	Glacial gravel	Hard, "alkaline"		D, S	Sufficient supply; two dry holes 44 and 45 feet deep in glacial drift and one well 186 feet deep in Marine Shale.
4	NE.	5	"	"	"	Drilled	560	1,940									Dry hole in Marine Shale; three dry holes up to 48 feet deep in glacial drift.
5	NE.	6	"	"	"	Bored	50	1,925									Dry hole in glacial drift.
6	NE.	8	"	"	"	Bored	30	1,925	- 26	1,899	26	1,899	Glacial gravel	Hard, iron		D, S	Largely seepage water from a creek; another similar well used; farmers haul water from these wells.
7	SE.	10	"	"	"	Dug	42	1,940	- 16	1,924	42	1,898	Glacial fine sand	Hard, "alkaline"		S	Quicksand has partly filled the well; water is a laxative on horses.
8	NE.	10	"	"	"	Bored	50	1,940			50	1,890	Glacial fine sand	Hard, iron		D, S	Good supply for 60 head stock; an 80-foot well became plugged with sand.
9	NE.	11	"	"	"	Bored	49	1,940	- 46	1,894	46	1,894	Glacial sand and gravel	Hard		N	Well is now abandoned.
10	NW.	12	"	"	"	Bored	60	1,940			60	1,880	Glacial gravel and sand	Hard, "alkaline"		S	Good supply of water; used for stock only in winter.
11	SW.	13	"	"	"	Bored	55	1,935	- 52	1,883	52	1,883	Glacial sand			N	Well is now abandoned.
12	SE.	13	"	"	"	Bored	55	1,935	- 48	1,887	48	1,887	Glacial yellow sand	"Alkaline"		S	Sufficient for 30 head stock.
13	NE.	14	"	"	"	Drilled	231	1,930	-190	1,740	223	1,707	Glacial sand			N	Well is now abandoned.
14	SW.	15	"	"	"	Drilled	120	1,940	- 90	1,850	90	1,850	Glacial sand and gravel	Hard		D, S	Abundant supply, but casing often plugs with quicksand.
15	SW.	17	"	"	"	Dug	14	1,905					Glacial sand	Hard, "alkaline"		S	Plenty of water when a nearby creek is flowing; several dry holes in glacial drift.
16	NW.	20	"	"	"	Bored	80	1,910					Glacial drift	Very "alkaline"		N	Base of well in Marine Shale; water is too mineralized for use.
17	SE.	21	"	"	"	Drilled	100	1,920									Dry hole in Marine Shale.
18	SE.	22	"	"	"	Bored	90	1,925	- 70	1,855	90	1,835	Glacial sand	Hard		D, S	Abundant supply.
19	SE.	23	"	"	"	Bored	55	1,930	- 51	1,879	51	1,879	Glacial sand	"Alkaline"		D, S	Good supply, but well is now abandoned.
20	SE.	25	"	"	"	Dug	23	1,940	- 10	1,930			Glacial drift	Hard, very "alkaline"		N	One of several wells dug that yield water too "alkaline" for use.
21	SW.	26	"	"	"	Bored	45	1,930	- 30	1,900			Glacial drift	Hard, "alkaline"		S	Intermittent supply; a 35-foot well near a creek yields a good supply; hauls drinking water.
22	NW.	27	"	"	"	Dug	15	1,935	0	1,935			Glacial sand	Hard, "alkaline"		S	Intermittent supply; a 28-foot well yields plenty of mineralized water; hauls drinking water.
23	NE.	29	"	"	"	Dug	26	1,915					Glacial fine sand	Hard, "alkaline"		N	Water was too highly mineralized for use and well was filled in.
24	SW.	30	"	"	"	Dug	25	1,895	- 18	1,877	25	1,870	Glacial gravel	Hard		D, S	Plenty of water.

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

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	HEIGHT TO WHICH WATER WILL RISE Elev.	PRINCIPAL WATER-BEARING BED Depth	PRINCIPAL WATER-BEARING BED Elev.	PRINCIPAL WATER-BEARING BED Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
25	NE.	31	14	16	2	Dug	30	1,905									One of two dry holes in glacial drift.
26	NW.	32	"	"	"	Dug	35	1,905									Dry hole in glacial drift.
27	SE.	33	"	"	"	Bored	36	1,930			31	1,899	Glacial gravel	Very "alkaline"		S	Sufficient supply; a 30-foot well also yields a good supply; one dry hole 40 feet deep.
28	SE.	34	"	"	"	Dug	35	1,940	- 33	1,907			Glacial drift	Hard, "alkaline"		D, S	Five test holes revealed very little water of poor quality.
29	NE.	35	"	"	"	Bored	85	1,950									The deepest of four dry holes.
30	NW.	35	"	"	"	Bored	88	1,950									The deepest of three dry holes in glacial drift; a dugout is used and water is hauled.
31	NE.	36	"	"	"	Bored	30	1,955	- 12	1,943			Glacial gravel	Hard, "alkaline		S	Sufficient for 25 head of stock; Five dry holes 55 feet deep in glacial drift.
1	SW.	2	14	17	2	Bored	90	1,895									The deepest of five dry holes in glacial drift.
2	NW.	3	"	"	"	Drilled	250	1,895									The deepest of several dry holes, probably in glacial drift.
3	NE.	3	"	"	"	Test Auger	50	1,895									One of many dry test holes bored in glacial drift.
4	SW.	4	"	"	"	Bored	50	1,885									Five dry holes 35 to 50 feet deep in glacial drift.
5	NW.	4	"	"	"	Bored	90	1,890									Dry hole in glacial drift.
6	SW.	5	"	"	"	Dug	49	1,890									Two dry holes 16 and 49 feet deep in glacial drift.
7	SW.	6	"	"	"	Bored	31	1,895	- 23	1,872	26	1,869	Glacial fine sand	Hard		D, S, I	Good supply; several farmers haul drinking water from this well; #.
8	SE.	7	"	"	"	Drilled	117	1,900									Dry hole in Marine Shale; another dry hole 66 feet deep in glacial drift.
9	SE.	8	"	"	"	Bored	52	1,890	- 44	1,846			Glacial drift	"Alkaline"		S	Sufficient for 14 head stock; rain water used for domestic purposes.
10	NW.	8	"	"	"	Dug	43	1,895	- 30	1,865	30	1,865	Glacial fine sand and water	Hard, "alkaline"		S	Yields 50 barrels of water a day; hauldrinking water.
11	NW.	9	"	"	"	Drilled	45	1,890					Glacial gravel	"Alkaline"		N	Very small supply of highly mineralized water; several dry holes about 50 feet deep.
12	NW.	11	"	"	"	Drilled	60	1,905									Dry hole in glacial drift; four other dry holes 50 feet deep.
13	NE.	14	"	"	"	Test Auger	45	1,910									Dry hole, probably in Marine Shale.
14	NW.	15	"	"	"	Dug	19	1,905	- 14	1,891			Glacial fine sand	Hard			Sufficient supply.
15	NE.	15	"	"	"	Dug	12	1,900					Glacial drift	Hard		D, S	Well dug near a small creek. Yields 214 barrels of water a day; 3 dry holes as deep as 90 feet.
16	NE.	16	"	"	"	Bored	30	1,905	- 27	1,878	27	1,878	Glacial gravel	Hard		D, S	Abundant supply of good water. Water found anywhere on this quarter section. Farmers buy water here.
17	SE.	17	"	"	"	Dug	38	1,900	- 22	1,878	22	1,878	Glacial sand and gravel	Hard, iron		D, S	Good supply and several farmers haul from this well. Will pump 5 tanks of water without lowering the water level.
18	SW.	18	"	"	"	Bored	50	1,900					Glacial sand	Very "alkaline"		S	Water is used for stock only when dugout is dry; one dry hole 70 feet deep.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, SASKATCHEWAN.

WELL No.	LOCATION					TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE		PRINCIPAL WATER-BEARING BED			CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
	¼	Sec.	Tp.	Rge.	Mer.				Above (+) Below (−) Surface	Elev.	Depth	Elev.	Geological Horizon				
19	NW.	19	14	17	2		60	1,895									Two dry holes 30 and 60 feet deep in glacial drift.
20	SE.	20	"	"	"		38	1,900					Glacial gravel	Very "alkaline"		N	Good supply of unusable water.
21	NE.	21	"	"	"	Drilled	239	1,905									Dry hole, probably in Marine Shale.
22	SE.	22	"	"	"		80	1,900									Dry hole in glacial drift.
23	NE.	24	"	"	"	Bored	33	1,900					Glacial drift	Very "alkaline"		S	Another well near a creek struck a good supply at a depth of 23 feet.
24	NW.	25	"	"	"	Bored	60	1,900									One of four dry holes, two in Marine Shale two in glacial drift.
25	NE.	26	"	"	"	Bored	50	1,900									One of two dry holes in Marine Shale.
26	SE.	30	"	"	"	Bored	45	1,895									Dry hole in glacial drift.
27	SW.	30	"	"	"		138	1,890									Dry hole, probably in glacial drift; haul water.
1	NE.	2	14	18	2	Bored	58	1,905					Glacial drift	Hard, very "alkaline"		N	Poor supply and well was filled in.
2	SW.	2	"	"	"	Bored	72	1,910					Glacial drift	Hard, salty, "alkaline"		N	Good supply, but water was too mineralized for use and well is now filled in.
3	NE.	2	"	"	"	Bored	130	1,905									Dry hole in Marine Shale.
4	SE.	3	"	"	"	Bored	72	1,910	− 50	1,860			Glacial fine sand	Hard, "alkaline"		D, S	Sufficient supply, although the casing is partly plugged with sand; a 65-foot well yields unusable water.
5	NW.	4	"	"	"		35	1,895									Dry hole in glacial drift.
6	NE.	5	"	"	"		39	1,900									Dry hole in glacial drift.
7	NW.	9	"	"	"		70	1,895									Dry hole in glacial drift.
8	NE.	10	"	"	"		60	1,900					Glacial drift	Hard, very "alkaline"		N	Poor supply of unusable water; two dry holes 80 and 100 feet deep, probably in glacial drift.
9	SE.	13	"	"	"		140	1,895									The deepest of six dry holes, probably in glacial drift.
10	NW.	14	"	"	"	Drilled	985	1,890									The deepest of at least seven dry holes in Marine Shale.
11	SW.	16	"	"	"		80	1,895									Dry hole in glacial drift.
12	SE.	17	"	"	"		97	1,895									Dry hole in Marine Shale; another dry hole 75 feet deep in glacial drift.
13	SW.	17	"	"	"		100	1,895									Dry hole, probably in glacial drift.
14	NE.	17	"	"	"	Bored	100	1,900									Dry hole in Marine Shale.
15	NE.	18	"	"	"		54	1,905									The deepest of two dry holes in glacial drift.
16	SE.	18	"	"	"		80	1,900									The deepest of three dry holes, probably in glacial drift.
17	NE.	20	"	"	"		157	1,905									Dry hole, probably in glacial drift.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, 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
18	SW.	20	14	18	2	Test-Auger	65	1,890									Dry hole in glacial drift.
19	SE.	28	"	"	"	Bored	75	1,905									Dry hole in glacial drift.
20	SE.	32	"	"	"	Bored	32	1,905									Dry hole in glacial drift.
21	NW.	33	"	"	"	Bored	156	1,890									Dry hole in Marine Shale; another 88-foot well in glacial drift.
1	SE.	1	15	16	2	Dug	25	1,955	- 13	1,942			Glacial drift	Hard		D	Barely sufficient water.
2	NW.	2	"	"	"	Bored	32	1,960	- 19	1,941			Glacial gravel	Hard, iron, salty, sulphur, "alkaline"		N	Three other wells also yielded highly mineralized water.
3	NW.	3	"	"	"	Dug	17	1,955					Glacial sand	Hard, "alkaline"		N	Sufficient for 15 head stock, but well is not used.
4	SE.	4	"	"	"	Dug	32	1,940					Glacial gravel	Hard, iron, "alkaline"		S	Yields 50 barrels of water a day, but water is very laxative.
5	NW.	4	"	"	"	Bored	42	1,945					Glacial drift	"Alkaline"		N	A 60-foot well also yielded unusable water; five dry holes 60 feet deep in glacial drift.
6	NE.	4	"	"	"	Dug	42	1,945	- 35	1,910	42	1,903	Glacial hard cemented gravel	Salty, "alkaline"		S	Yields 5,000 gallons of water a day, but the water is laxative on stock.
7	NE.	5	"	"	"	Drilled	40	1,940					Glacial drift	Hard, "alkaline"		D, S	Poor supply; dugouts are used in summer.
8	SE.	8	"	"	"	Drilled	44	1,940					Glacial drift	Hard, iron, "alkaline"		D, S	#
9	SE.	9	"	"	"	Dug	19	1,950	- 12	1,938			Glacial fine sand	"Alkaline"		D, S	Sufficient supply.
10	SW.	9	"	"	"	Dug	30	1,950					Glacial drift	"Alkaline"		N	Poor supply and well was filled in.
11	SE.	10	"	"	"	Dug	12	1,955					Glacial gravel	"Alkaline"		N	Six wells dug that yielded water unfit for use; uses a dugout for stock and hauls drinking water.
12	NE.	10	"	"	"	Dug	25	1,960					Glacial drift	"Alkaline"		S	Water can be used for stock.
13	NW.	11	"	"	"	Dug	30	1,965	- 24	1,941			Glacial fine sand	Hard, iron, "alkaline"		N	Good supply for 25 head stock, but water is unfit for use.
14	SE.	12	"	"	"	Dug	12	1,970	- 0	1,970	0	1,970	Glacial sand	Soft		D, S	Sufficient for 30 head stock; a 9-foot well is also used.
15	NW.	12	"	"	"	Dug	26	1,970	- 23	1,947	23	1,947	Glacial fine sand	Very "alkaline"		N	An 8-foot well also yielded water unfit for use; horses are watered at a creek.
16	NW.	14	"	"	"	Dug	20	1,975					Glacial sand	Hard, "alkaline"		D, S	Not quite sufficient water.
17	NW.	17	"	"	"	Bored	28	1,950	- 8	1,942			Glacial sand	"Alkaline"		D, S	Good supply of water; probably seepage from a creek.
18	SE.	18	"	"	"	Bored	30	1,940	- 15	1,925			Glacial sand and gravel	Hard		D, S	Good supply.
19	SE.	19	"	"	"	Dug	11	1,955	- 2	1,953			Glacial sand?	Hard		D, S	Well has never pumped dry.
20	SW.	21	"	"	"	Dug	8	1,960	- 5	1,955	5	1,955	Glacial fine sand	Hard, "alkaline"		D, S	Sufficient for 11 head stock; an intermittent flowing spring located in a small ravine.
21	SE.	22	"	"	"	Dug	12	1,975	- 8	1,967	8	1,967	Glacial gravel	Soft		D, S	Plenty of water.
22	NE.	24	"	"	"	Dug	11	2,000	- 2	1,998	2	1,998	Glacial sand and gravel	"Alkaline", iron		D, S	Sufficient supply.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	Elev.	PRINCIPAL WATER-BEARING BED Depth	Elev.	Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
23	SE.	25	15	16	2	Dug	27	2,030	- 12	2,018	27	2,003	Glacial gravel	"Alkaline"		D, S	One of two similar wells located in a ravine; sufficient supply.
24	NE.	25	"	"	"	Bored	20	2,060	- 10	2,050	20	2,040	Glacial gravel	Hard		D, S	Good supply of water.
25	NE.	27	"	"	"	Dug	8	2,000	- 2	1,998	5	1,995	Glacial fine sand	"Alkaline", iron		D, S	Yields 15 barrels of water in years of average rainfall and 4 barrels in winter and drought years.
26	SE.	29	"	"	"	Dug	15	1,980					Glacial sand	Hard		D, S	Sufficient for 15 head stock.
27	SE.	30	"	"	"	Dug	11	1,960	- 2	1,958	9	1,951	Glacial sand	Hard, salty, "alkaline"		N	Water is too mineralized for use; #.
28	SE.	31	"	"	"	Dug	16	1,980	- 8	1,972	4	1,976	Glacial sand	Hard		D, S	Sufficient supply.
29	SW.	33	"	"	"	Dug	11	1,995	- 6	1,989			Glacial sand and gravel	Soft, "alkaline"		D, S	Sufficient supply; three other wells 11, 12, and 20 feet deep are never dry.
30	SE.	35	"	"	"	Bored	75	2,060					Glacial drift	Hard, "alkaline"		S	One of three wells 75 feet deep. Several wells about 16 feet deep; a spring near a creek yields soft water.
1	NW.	5	15	17	2	Drilled	496	1,890									Dry hole in Marine Shale; two other dry holes 200 and 380 feet deep, the former probably in glacial drift.
2	NW.	10	"	"	"	Bored	36	1,900									One of about twelve dry holes in glacial drift.
3	SW.	10	"	"	"	Drilled	60	1,895									One of several dry holes in Marine Shale.
4	SE.	12	"	"	"	Bored	60	1,910									One of eight dry holes 40 to 60 feet deep in glacial drift.
5	NE.	14	"	"	"	Bored	60	1,920					Glacial drift	"Alkaline"		N	Water in three wells too mineralized for use; hauls water.
6	NW.	16	"	"	"	Bored	52	1,915	- 30	1,885	52	1,863	Glacial yellow sand	Very "alkaline"		S	Occasionally used for stock in winter, but it is very laxative. Hauled water 8 miles in dry years. Also uses rainwater cisterns.
7	NE.	17	"	"	"	Bored	55	1,910									One of three dry holes in Marine Shale.
8	SE.	20	"	"	"	Bored	18	1,905	- 4	1,901			Glacial fine sand	Hard, iron		D, S	Yields 36 barrels of water a day.
9	SW.	20	"	"	"	Bored	60	1,905					Glacial drift	Very "alkaline"		N	Well filled in because water was so "alkaline".
10	NW.	20	"	"	"	Bored	30	1,900					Glacial drift	Hard		D, S	Barely sufficient for 12 head stock.
11	NE.	20	"	"	"	Bored	50	1,900					Glacial sand	"Alkaline"		S	A 45-foot well also yields "alkaline" water; water in a dugout is also mineralized; haul drinking water.
12	SE.	21	"	"	"	Dug	16	1,915	- 4	1,911			Glacial sand	Hard, "alkaline"		D	Direct seepage from a creek; uses dugout for stock; dry hole 100 feet deep, probably in glacial drift.
13	NW.	22	"	"	"	Dug	12	1,920					Glacial gravel	Hard, "alkaline"		S	Water used for stock only in autumn; four wells 16 to 38 feet deep yield unusable water; hauls water.
14	NE.	22	"	"	"	Dug	10	1,920	- 6	1,914			Glacial fine sand	Hard		D, S	One of three wells near a creek; sufficient supply; #.
15	SW.	23	"	"	"	Bored	50	1,925					Glacial drift	"Alkaline"		N	Very poor supply of highly mineralized water.
16	NW.	25	"	"	"	Dug	14	1,940	- 7	1,933	9	1,931	Glacial sand and gravel	Hard, "alkaline"		D, S	Well was never pumped dry.

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(#) Sample taken for analysis.

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, 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
17	NE.	25	15	17	2	Bored	30	1,950	- 23	1,927			Glacial fine sand	Salty		N	Well not in use.
18	NE.	26	"	"	"	Bored	36	1,945	- 16	1,929			Glacial drift	"Alkaline", cloudy		N	Water too mineralized for use; a 12-foot well yields a small supply of drinking water.
19	SW.	27	"	"	"	Dug	12	1,925	0	1,925			Glacial gravel	Hard		D, S	One of four wells deriving seepage water from a creek; insufficient supply.
20	SE.	28	"	"	"	Bored	40	1,920	- 20	1,900			Glacial drift	Very "alkaline"		S	Water used for stock in winter; 4-foot well yields drinking water.
21	SW.	30	"	"	"	Drilled	200	1,895									Dry hole in Marine Shale; dugouts and cistern are used.
22	NW.	32	"	"	"	Dug	14	1,910	- 7	1,903			Glacial drift	"Alkaline"		N	Water is too highly mineralized for use.
23	NE.	32	"	"	"	Dug	14	1,920					Glacial gravel	Hard, "alkaline"			
24	NW.	33	"	"	"	Bored	200	1,925									Dry hole in Marine Shale in the hamlet of Kronau.
25	NW.	33	"	"	"	Drilled	400	1,925									Dry hole in Marine Shale; a 175-foot well struck a small supply of unusable water at 170 feet.
26	NW.	34	"	"	"	Drilled	200	1,940									One of several dry holes in MarineShale.
27	SE.	35	"	"	"	Bored	20	1,950					Glacial drift	Hard, "alkaline"		N	Very poor supply.
28	NE.	35	"	"	"	Drilled	540	1,960									Dry hole in Marine Shale; also a 30-foot dry hole in glacial drift.
29	SE.	36	"	"	"	Bored	26	1,950					Glacial fine sand	Very "alkaline"		N	A 9-foot well near a creek yields sufficient usable water.
30	SW.	36	"	"	"	Bored	24	1,950	- 18	1,932			Glacial drift	Hard, "alkaline"		D, S	Poor supply; a well 12 feet deep near a creek is also in use.
1	NE.	9	15	18	2		158	1,885									One of several dry holes, probably in glacial drift.
2	NW.	13	"	"	"	Dug	30	1,890									Dry hole in glacial drift.
3	SW.	18	"	"	"		35	1,895									One of four dry holes in glacial drift.
4	NW.	18	"	"	"	Drilled	740	1,895									The deepest of many dry holes in Marine Shale and glacial drift.
5	NE.	23	"	"	"	Test Auger	45	1,890									One of several dry test holes in glacial drift.
6	SW.	24	"	"	"	Dug	14	1,890					Glacial drift	"Alkaline"		D, S	Another well 16 feet deep is also used; seepage water from a creek .
7	NW.	25	"	"	"	Dug	16	1,890	- 12	1,878			Glacial sand and gravel	"Alkaline"		S	One of two wells that yield small supplies of seepage water. Insufficient supply.
8	NE.	32	"	"	"	Drilled	144	1,885									One of three dry holes, probably in glacial drift.
9	SE.	33	"	"	"	Bored	50	1,890									Several dry holes in glacial drift.
10	SE.	35	"	"	"	Dug	13	1,890					Glacial gravel	Hard, "alkaline"		S	Seepage water from Wascana creek; sufficient for 18 head stock.
11	SE.	36	"	"	"	Dug	16	1,895	- 12	1,883			Glacial sand	"Alkaline"		S	Yields about 2 barrels of water a day. Several wells near a creek are used for stock.
12	NE.	36	"	"	"	Bored	30	1,895									Dry hole in glacial drift.

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WELL RECORDS—Rural Municipality of LAJORD, NO. 128, SASKATCHEWAN.

WELL No.	LOCATION ¼	Sec.	Tp.	Rge.	Mer.	TYPE OF WELL	DEPTH OF WELL	ALTITUDE WELL (above sea level)	HEIGHT TO WHICH WATER WILL RISE Above (+) Below (−) Surface	HEIGHT TO WHICH WATER WILL RISE Elev.	PRINCIPAL WATER-BEARING BED Depth	PRINCIPAL WATER-BEARING BED Elev.	PRINCIPAL WATER-BEARING BED Geological Horizon	CHARACTER OF WATER	TEMP. OF WATER (in °F.)	USE TO WHICH WATER IS PUT	YIELD AND REMARKS
1	SW.	1	16	16	2	Dug	30	2,110	− 34	2,076	34	2,076	Glacial gravel	Hard		D, S	Sufficient for 30 head stock.
2	NE.	3	"	"	"	Bored	85	2,100	− 81	2,091	81	2,019	Glacial sand and gravel	Soft, "alkaline"		D, S	Good supply for 50 head stock.
3	SW.	4	"	"	"	Dug	15	2,025	− 12	2,013	12	2,013	Glacial gravel	Slightly "alkaline"		D, S	Sufficient for 17 head stock.
4	SE.	5	"	"	"	Dug	16	2,010	− 8	2,002	8	2,002	Glacial gravel	Soft, "alkaline"		D, S	Sufficient for 42 head stock.
5	SW.	5	"	"	"	Dug	18	2,000	− 12	1,988	18	1,982	Glacial fine sand	Hard, "alkaline"		D, S	Sufficient supply; dry hole 40 feet deep in glacial drift.
6	SE.	7	"	"	"	Bored	22	2,000	− 20	1,980	20	1,980	Glacial gravel	Hard		D, S	Sufficient supply.
7	SE.	7	"	"	"	Bored	60	2,010	− 16	1,994			Glacial sand	Hard, "alkaline"		N	Water too mineralized for use; several shallow wells are used by the colony of Kathrinthal.
8	NE.	8	"	"	"	Dug	110	2,040	− 6	2,034	6	2,034	Glacial sand and gravel	Soft		D, S	Sufficient supply; stock are also watered at a creek.
9	NW.	9	"	"	"	Dug	26	2,025	− 23	2,002			Glacial gravelly clay	Hard		D, S	Sufficient supply; stock also use Many Bone creek.
10	SW.	10	"	"	"	Bored	135	2,050	− 85	1,965	135	1,915	Glacial gravel	Hard, "alkaline"		D, S	Good supply; an 8-foot well dug near a creek yields good quality water.
11	NW.	10	"	"	"	Spring		2,030			0	2,030	Glacial gravel	Soft		D, S	
12	SE.	11	"	"	"	Bored	86	2,160	− 78	2,082	86	2,074	Glacial sand	Soft		D, S	Ample supply of water.
13	SE.	12	"	"	"	Dug	20	2,160	− 18	2,142			Glacial gravel	Soft		D	An 8-foot well yields sufficient water for 40 head stock; a 6-foot well in a slough is dry in winter.
14	NE.	13	"	"	"	Dug	3	2,130	+ 8	2,138	0	2,130	Glacial gravel	Soft		D, S, I	Plenty of water; a 12-foot well near the creek is also used.
15	NE.	13	"	"	"		115	2,170	− 30	2,140	115	2,055	Glacial fine sand			N	Well has been abandoned.
16	SE.	19	"	"	"	Dug	10	2,080					Glacial sand	Hard		D, S	Sufficient supply; two flowing springs located in a valley.
17	NW.	20	"	"	"	Dug	22	2,100	− 21	2,079	21	2,079	Glacial fine sand	Hard		D, S	Sufficient for 20 head stock; one dry hole 70 feet deep in glacial drift.
18	NE.	20	"	"	"	Bored	60	2,120	− 40	2,080	40	2,080	Glacial sand	Hard		D, S	Good supply.
19	NW.	21	"	"	"	Bored	60	2,105	− 25	2,080	60	2,045	Glacial drift	Hard, "alkaline"		D, S	Plenty of water for 25 head stock.
20	NE.	22	"	"	"	Bored	30	2,115	− 26	2,089	26	2,089	Glacial fine sand	Hard		D	Two 10-foot wells near a creek also used; a spring near creek is used for stock.
21	SW.	24	"	"	"	Bored	80	2,160	− 40	2,120			Glacial drift	Hard		D, S	Sufficient supply.
22	SE.	25	"	"	"	Bored	70	2,170					Glacial drift	"Alkaline"		S	Sufficient for stock; water is too "alkaline" for drinking.
23	NE.	26	"	"	"	Dug	24	2,170	− 19	2,151	19	2,151	Glacial fine sand	Hard, "alkaline"		D, S	Sufficient for 27 head stock.
24	SE.	27	"	"	"	Bored	70	2,145	− 15	2,130	70	2,075	Glacial sand	Hard, "alkaline"		D, S	Abundant supply.
25	NE.	27	"	"	"	Dug	37	2,160	− 27	2,133	35	2,125	Glacial gravel	Hard		D, S	Well has never pumped dry; plenty of water for 27 head stock.
26	SE.	28	"	"	"	Bored	30	2,125	− 20	2,105	26	2,099	Glacial sand and gravel	Hard		D, S	Plenty of water; a 26-foot well yields a small supply of water.

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

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

WELL RECORDS—Rural Municipality of LAJORD, NO. 128, 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	NE.	29	16	16	2	Bored	42	2,120	− 22	2,098	43	2,078	Glacial sand	Hard		D, S	Good supply; three dry holes 50, 80, and 125 feet deep in glacial drift.
28	NW.	30	"	"	"	Dug	60	2,090	− 30	2,060			Glacial drift	Hard		D, S	Plenty of water.
29	SW.	31	"	"	"	Dug	15	2,100					Glacial gravel	Hard		D, S	Not quite sufficient for 24 head stock.
30	NE.	31	"	"	"	Bored	38	2,100	− 6	2,094	20	2,080	Glacial gravel	Hard		D, S	Sufficient for 60 head stock.
31	NE.	32	"	"	"	Bored	90	2,130	− 65	2,065			Glacial drift	Hard, "alkaline"		D, S	Sufficient but supply decreased in drought years; a 14-foot well yields better drinking water.
32	NE.	32	"	"	"	Bored	50	2,140					Glacial drift	Hard, "alkaline"		D, S	Sufficient supply; a 30 -foot well yields better quality water.
33	NE.	34	"	"	"	Dug	31	2,170	− 20	2,150	26	2,144	Glacial gravel	Hard		D, S	Barely sufficient for 30 head stock.
34	SW.	35	"	"	"	Dug	18	2,170	− 6	2,164			Glacial sand	Hard		D	One of several shallow wells in hamlet of Davin. Sufficient supply.
35	SW.	36	"	"	"	Dug	48	2,180	− 28	2,152	45	2,135	Glacial gravel	Hard, very "alkaline"		S	Well was dry in March, 1935; a 106-foot well and dam used; dry hole 75 feet deep.
36	NW.	36	"	"	"	Bored	50	2,205	− 40	2,165			Glacial drift	Hard, "alkaline"		S	Hardly enough water; hauls water for domestic purposes.
37	NE.	36	"	"	"	Bored	100	2,200	− 40	2,160	100	2,100	Glacial fine sand	Hard, iron		S	Water is too hard for drinking; good supply.

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

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