No. 00002

CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA
TOPICAL REPORT NO. 29

WATER SUPPLY AT TOWN OF BROCKET, PEIGAN INDIAN RESERVE, ALBERTA

BY

A. MacS. STALKER

OTTAWA
1960

CANADA

DEPARTMENT OF MINES AND TECHNICAL SURVEYS

GEOLOGICAL SURVEY OF CANADA

TOPICAL REPORT NO. 29

WATER SUPPLY, TOWN OF BROCKET PEIGAN INDIAN RESERVE, ALBERTA

By

A. MacS. Stalker

OTTAWA
1960

Contents

WATER SUPPLY AT TOWN OF BROCKET, PEIGAN INDIAN RESERVE, ALBERTA

Introduction

Following are the results of a preliminary study of the water-supply of the town of Brocket, Peigan Indian Reserve, Alberta. This study was carried out on September 29, 1960. The quantity of water available to the town is adequate, but the water is very hard and has an iron content above the recommended limit. In addition the water has a bad taste, odour, and at times a slight colour. In general the townspeople refuse to drink this water, preferring instead to haul water for this purpose or to use water brought into town by an old pipe from a spring situated a half mile to one mile southwest of town.

The town of Brocket is growing in population, and the demand for water should increase at an even faster rate. Thus supplies that might appear adequate at present, such as the springs southwest of town, would only supply adequate water for a limited number of years.

Geology: Bedrock

This area is underlain by the Porcupine Hills formation of Tertiary age. This formation consists mainly of freshwater, fine and coarse-grained, crossbedded sandstones, with interbedded sandy clays. Normally this formation should contain good aquifers, but in this area only some of its lower beds are present, and its local catchment area is small. It is not expected that much water can be obtained from this formation.

The Willow Creek formation underlies the Porcupine Hills formation. It consists largely of freshwater shales with minor amounts of sands and sandy clays. The thickness of this formation is estimated to be 1,000 feet. Due to the shaly and impervious nature of this formation only a small amount of water can be withdrawn from it.

The St. Mary formation of Cretaceous age underlies the Willow Creek formation. It consists largely of an alternating series of freshwater, hard, coarse, thick sandstone beds and soft shales and sandy shales. It is approximately 2,000 feet thick. The sandstone beds are relatively porous and the possibility of their containing adequate aquifers is good.

Geology: Surficial

The high land, a half mile or so west of Brocket, has practically no mantle of surficial deposits. This bedrock lowers rapidly eastward, however, and the 150 feet high banks of the Oldman River just north of Brocket are cut entirely in glacial deposits. There is a strong possibility that these deposits are fill in an interglacial valley that trended southward past Brocket. The deposits where observed consisted entirely of clayey till, and there is no possibility of obtaining adequate supplies of water from this material. If a buried valley does exist here, however, there may be gravel in its bottom, which could supply large quantities of water. The possible presence of such a valley should be borne in mind in any future investigations.

Present Water Supply

The town is presently supplied with water from a well on the flats of the Oldman River, just below the cliffs north of town. This was formerly a Canadian Pacific Railway well used to supply water for their steam engines. The well is about 18 feet deep, and about 12 feet square. The well evidently goes about 7 feet into bedrock, but its water is thought to come from the coarse gravel present above the bedrock. The well is lined with timbers above bedrock, and several of these are becoming rotten. Some of the boards in the well, forming a platform and support for the pump and pipe, were once evidently sheathed with metal; this sheathing is rusty and almost gone. Various unused iron pipes hang above or in the well. Some roots have pierced the timber sides to reach water in the well.

A square dug-out 40 feet wide and 8 feet deep is present a short distance from the well, to which it is connected as a supplementary water-supply for the well. This dug-out is not covered, is not fenced in, is open to animals, has a heavy growth of weeds, and is completely filthy. Much of the taste and odour in the Brocket water-supply comes from this dug-out.

The well and dug-out are reported to have supplied up to 85,000 gallons of water a day when the railway's chief motive power was steam. Present use is only a fraction of this amount.

Other Possible Water Sources: Springs

Several springs occur in the bedrock ridge, a southern continuation of the Porcupine Hills, southwest of Brocket. Water can be and is piped into Brocket from these springs by gravity flow. At time of visit the 'Agency Spring', the spring nearest town, had a flow of one or two gallons per minute. A lower spring nearby to the southeast was estimated to be flowing less than one gallon per minute. The various 'Stock Farm' springs, about a mile farther from town, had a combined estimated flow of about 15 gallons per minute. Thus all the springs together had an estimated flow of about 17 gallons per minute, or about 25,000 gallons per day. This is reported to be soft water. It would be difficult to collect all this water for a town supply.

It was suggested at time of visit that flow had decreased due to the dry season. This would appear likely, as the catchment area is small and shallow. If the flow does decrease in dry years, this indicates that the springs are rather unreliable, for it is in dry times that a good water-supply is most needed. It is not thought that the supply from these springs would prove adequate for more than a few years, as demand in Brocket steadily increases.

Other Possible Water Sources: Wells

Wells near Brocket have not proven satisfactory. Logs of wells near town were not available and so the reason for this could not be established. The usefulness of deeper drilling could not be ascertained during this quick survey, and it is likely that good aquifers would not be found at less than 1,000 foot depth.

Good wells are present one and a half to two miles south of Brocket, however, and two of these flow at a reported rate of 15 gallons per minute each. These good wells occur along a northeastward-trending line and may be associated with a buried valley. However, these wells are rather far from Brocket and the amount of water in them is probably insufficient for the future needs of the town.

Conclusions

1. The springs to the southwest of Brocket will not supply sufficient water for the future needs of the town.

2. Although little is known about their potentialities, wells near Brocket appear unable to supply sufficient water for the future needs of the town.

3. The presently used well (former C.P.R. well), or another well in the vicinity, can supply sufficient water for the foreseeable needs of Brocket. The poor quality of the water in town is due chiefly to the water system rather than to the water that enters the well. Although the water is naturally very hard and contains iron, it is similar to that used in the town of Pincher Creek, where it is satisfactory. Additional iron is added to the water from pipes and other ironwork in the well.

Recommendations

1. Fill in dug-out. This dug-out is unnecessary, makes little appreciable increase in amount of water available, and is largely responsible for the bad taste and odour of the water.

2. Tear up any pipes connecting dug-out to well, and put in clay dam to prevent seepage from dug-out to well. The clay dam does not need to be wide.

3. Remove all unnecessary pipes and ironwork from well, to cut down on iron content.

4. Pump the well much more strongly than is presently being done. This will keep the water fresher, and dilute the iron being added to well.

5. Decrease diameter of well to ease maintenance. This could be done by placing casing in the centre of the well. The casing should have proper screens at the gravel horizon to allow entrance of ground water, and should rise above ground level to prevent entrance of surface water. The space between the casing and present well walls should be filled with coarse gravel. This gravel should be covered with clay or other impervious material in order to deter downward seepage of surface water. This procedure would have but minor effect on amount of water available from the well. The diameter of the casing is not too important, but two and a half feet or larger is suggested.

NOTE: It might prove more satisfactory to dig a new well nearby than to recondition the present well. If this is done it is recommended that it be a somewhat greater distance from the cliff, in order to lessen surface seepage from run-off down the cliff. Much the same construction methods as suggested above for the present well should be used. Casing, with screens at the gravel horizon just above bedrock, would form the main part of the well. Coarse gravel should surround the casing, and the casing should rise above ground level.

6. Fence in well area.

7. Chemical analysis of water from the present well should be made next spring, to determine whether iron content and hardness decrease when river level is high.

8. Water temperature be taken when this well or others are sampled.

9. If another well is drilled into bedrock at or near Brocket it should be continued to much greater depth if water is not found at ordinary depths. This would allow deeper aquifers to be tested. There seems to be little advantage in continuing to drill wells to depths or aquifers that have proven unsatisfactory in the past.

10. In any future ground-water surveys that may be made on the Reserve the drillers' logs of oil company shot holes should be studied. The possibility of a buried valley underlying the Brocket area should also be investigated.