WATER SUPPLY - VILLAGE OF HALKIRK

NE-24-38-16-W4

The Village of Halkirk plans to install a distribution system to supply water to village residents. The population of the village is 210, and initially, 25 houses will be connected to the distribution system. The village drilled a test well to determine whether an adequate quantity of groundwater could be obtained to supply the distribution system. A pumping test was conducted on this well from August 18 to August 20.

Most wells in the Halkirk district are completed in the lower member of the Edmonton formation. The Edmonton formation is overlain by 10 to 50 feet of glacial drift and underlain by the Bearpaw formation. At Halkirk, a deep test hole drilled by the Castor School Division encountered inflamable gas but only a small quantity of water in the Bearpaw formation. Water encountered below the Bearpaw formation would likely be saline. Sand and gravel deposits in the glacial drift may yield small quantities of hard, possibly alkaline water.

The lower Edmonton member is made up of brown and grey silty shale, coal, and minor fine-grained sandstone. Most wells obtain water from fractured coal seams. The village well and a farm well on the NW 18, Tp. 38, R. 15, W. 4th Mer., 1/2 mile south of Halkirk, are reported to be the two best wells in the district. In both wells water is obtained from a zone about 25 feet thick made up of one or more coal seams, associated with beds of soft sandstone. This zone is found at a depth of 118 feet in the village well and at a depth of 135 feet in the farm well 1/2 mile south of Halkirk. On the east side of Halkirk, at the school, zone appears to have shaled out.

Water from the lower Edmonton member is of poor quality. The water has a high soda content and may have a high chloride content, and a moderately high iron content. Water samples were taken from the village well for chemical and bacteriological analysis, and from the school well for bacteriological analysis.

	Village Well Aug. 20/59 (continuous production for 2 1/2 days)	School well (date unknown)
CHEMICAL ANALYSIS:		
Total Solids	2148	1612
Ignition loss	124	420
Hardness	60	95
Sulphates	2	Nil
Chlorides	436	36
Alkalinity	1255	1425
Nature of Alkalinity	Bicarbonate of lime, soda and magnesia	Bicarbonate of soda, lime and magnesia
Nitrites	Nil	Nil
Nitrates	Nil	Nil
Iron	0.1	1.0
	Chemically unsuitable soda = 88.7 grains/gal.	Chemically unsuitable soda = 98.7 grains/gal.
BACTERIOLOGICAL ANALYSIS		
SPC	480	> 3000
MPN	Negative	Negative

A pumping test was conducted on the village well. No wells could be used for observation wells. The test was started at an initial pumping rate of 6.8 gpm. Production was continuous at this rate for 2100 minutes except for a 30-minute interruption at 1740 minutes due to a power failure. The pumping rate was then increased to 11.1 gpm. and pumping continued for a further 1500 minutes. Depth to water measurements were made using an electric line; the drawdown was measured with a steel tape, from the initial water level mark on the electric line.

Drawdown curves were prepared from data at both pumping rates. At the initial pumping rate drawdown data were plotted directly. After the rate was increased the total drawdown was plotted as a continuation of the first drawdown curve and the difference between the observed drawdown and the extrapolated drawdown trend was also plotted as a drawdown curve for a pumping rate of 11.1 - 6.8 = 4.3 gpm.

In an ideal aquifer of infinite areal extent the plot of drawdown versus the logarithm of time should fall on a straight line. In this test the drawdown plot at both pumping rates is curved, and approaches a straight line only after several hundred minutes pumping. This indicates that the aquifer is not of infinite areal extent, but is bounded by one or more impervious boundaries. The transmissibility of the aquifer, determined from the slope of the latter part of each drawdown curve, is about 400 gpd./ft. The available drawdown is about 33 feet so the maximum pumping rate should not exceed 7gpm. This figure is only an approximat'on; drawdown observations for a much longer pumping period would be needed to adequately evaluate the long-term perfcrmance of this aquifer.

One possibility, evident from the results of this pumping test, is that if the observed drawdown plot (at a constant pumping rate) is not a straight line but continues to bend downward, then the calculated transmissibility will decrease rapidly with time and the maximum permissible pumping rate will also decrease. This would occur in an aquifer of limited areal extent if recharge to the aquifer is low. The chemical quality of water in the aquifer indicates that recharge of fresh water to this aquifer is very limited, and the pumping test indicates the presence of at least one impermeable hydrologic boundary; therefore, this possibility cannot be ignored.

While this well will provide an adequate supply of water to satisfy the present requirements of the village, it probably will not be adequate to satisfy the future requirements. The well may either decline in production, or demand may exceed the rated well capacity. In either case, it appears that additional groundwater may be difficult to obtain. I recommend, therefore, that further test drilling should be carried out before this aquifer is utilized as a source of supply for the distribution system. Two or three test holes should be drilled west of the village well to determine the extent of the aquifer. These wells could then be used as observation wells for additional pumping tests to determine the location of the hydrologic boundaries of this aquifer and the volume of water that can be produced from the aquifer. These wells should be spaced at least 800 feet apart. The results of this testing program should indicate conclusively whether

or not an adequate supply of groundwater can be obtained. If the results are unfavorable, then the possibility of utilizing surface water as a source of supply should be investigated.

W. A. Meneley,
Groundwater Geologist,
Research Council of Alberta.

September 4, 1959.

RESEARCH COUNCIL OF ALBERTA

Groundwater Division
11315 - 87 Avenue
Edmonton, Alberta

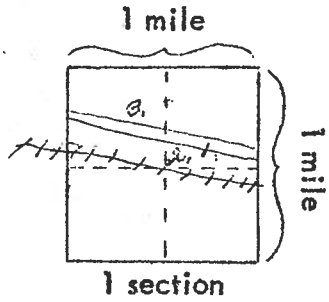
J. H. Ainsworth
Municipal Secretary
Halkirk, Alta.

Dear Sir:

As part of the Research Council's investigation of the groundwater resources of the province of Alberta, we continually conduct an inventory of water analyses received from the Provincial Analyst and from the Pollution Control Laboratory. The chemical analysis attached to this letter lacks either a legal land description or necessary well depth—water level information. It would therefore be much appreciated if you would provide the information requested below and return this letter. Do not detach the analysis report from this letter, as it is the only copy we have. Please feel free to copy it if you want the information.

~~Quarter Section~~ North 1/2 Section 24 Township 38 Range 16 Mer. 4

Please mark the approximate location of the well(s)



Well # 1 - 380'
2 - 250'
3 - 193'

Total depth of well _____ ft.

Depth of water level below land surface 80' - 150' ft.

Was the water sample sent in treated with a softener or conditioner? NO

We are enclosing a stamped, self-addressed envelope for your use in returning this form. Please enclose both this and the attached water analysis in the envelope. Thank you for your co-operation.

Yours truly,

A. Badry

A. Badry (Miss),
Geologist.

AB/dc
Encl.

may I suggest that you read Mr Meneally's report of several years ago. We do not seem to have any rhyme nor reason to our water - it is a gathering of several little quantities that do not relate to one another. We are sadly lacking on advice and would appreciate any conclusions your dept. may come up with in future. We do not have enough and will eventually run shorter Mr Meneally - told me that within a few years - we most likely will have to go