

MEMORANDUM

TO Dr. Foweraker, Head
Groundwater Section
Water Investigations Branch

FROM A.P. Kohut
Geological Engineer
Groundwater Section

November 14, 1975

SUBJECT Dean Park Estates Production Well ✕

OUR FILE 0239013

YOUR FILE

The report of Robinson, Roberts and Brown Limited, dated February 1975 on the above subject forwarded in the September 24, 1975 memorandum of G.A. Duffield, has been reviewed. The additional information forwarded by G.A. Duffield, October 30, 1975 on the North Saanich well was also considered and the following comments were prepared.

The consultant's proposed 40 US gpm yield of the Dean Park well is predicated on the theoretical calculation that the water level in the well after 200 days pumping at the above rate will be 420 feet below the ground surface. Calculated interference on the nearby North Saanich well is 50 feet. The calculations are based on an aquifer transmissivity of 200 US gpd/ft, determined from a 50-hour pump test and an estimated storage coefficient of 0.002. The specific capacity of the well for 50 hours pumping was 0.18 Igpm/ft of drawdown. However, this specific capacity is expected to decrease with time as the cone of influence of the well expands. Several important factors indicate that the theoretical analysis of the pump test is applicable only for the duration of the test and extrapolation of the test results over a 200-day period may not be warranted. These factors are:

1. The theoretical analysis applies to granular aquifers of intergranular permeability and porosity, not fractured rocks with secondary fracture permeability.
2. Fracture zones are limited in width and boundary effects may become apparent after long-term pumping. The theoretical analysis above assumes an isotropic aquifer of apparently infinite areal extent.
3. Fracture systems may not be normal to the well, but may be dipping away from the well. In effect, flow to the well may not be horizontal and could be from a preferred direction.
4. Water removed from storage should be discharged instantaneously with decline in head. This does not necessarily occur in fractured rocks. A randomly fractured rock for example throughout its thickness may be considered isotropic. If a well contains several fracture zones, dewatering below a fracture system may result in flow continuing along the fractures to the well and then cascading down the well to the water level. The aquifers in this case could be considered anisotropic.

See all associated correspondence & summary by DCF on 0239013 9/1 Dec/75

5. The pump test was conducted during the winter months in January at a time when infiltration from rainfall to the bedrock fractures may have been appreciable.
6. Although an interference of 50 feet was calculated for the effect of the Dean Park well pumping at 40 US gpm, on the North Saanich well, the comparable effect of the North Saanich well on the Dean Park well was not considered. The North Saanich well is currently rated at 25 to 30 lpgm.

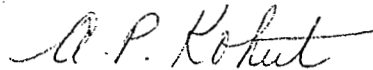
A safe long-term pumping yield of 40 US gpm may not be practical in the light of existing data since:

- (a) applicability of the theoretical pump test analysis of granular deposits to fractured rock is limited;
- (b) pumping at 40 US gpm, will dewater all of the upper fracture zones above 420 feet;
- (c) the fracture zones cannot be considered isotropic aquifers of infinite areal extent but rather anisotropic aquifers of unknown orientation and limited extent;
- (d) boundary effects which will reduce the well yield may become apparent after long-term production.

It is recommended that initially the well be operated at moderate rates of 15 to 25 US gpm with a program of metering well discharge and water levels and also a monitoring program on adjacent wells. A long duration pump test of several days during the summer months when rainfall is minimal would be an advisable means of assessing the well under "drought" conditions and determine whether boundary conditions may be encountered. Establishment of a monitor well equipped with a water level recorder is needed to determine the relationship between rainfall and water level changes in the bedrock wells. The well would provide valuable records of long-term water level fluctuations and indications of aquifer depletion or recharge. The information would be particularly useful if other wells are planned for the immediate area. Chemical analyses should be undertaken on a routine basis before and after pump tests and especially during the dry summer months to assess any changes in water quality. Changes in water quality may be indicative of the source and mechanism of groundwater recharge, aquifer depletion due to overpumping or occurrence of salt water intrusion.

Initial operation of the well at 15 to 25 US gpm would indicate 192 to 321 US gpd/dwelling unit utilizing 112 lots. Upon completion of an adequate monitoring interval (one year for example) and/or completion of a long-term pump test, the performance of the well could be reviewed and the well yield reassessed.

Complete records with regards to pumping rates and quantities pumped from the North Saanich well should also be maintained. It is understood that a second production well for the Dean Park development has been completed. The need for an adequate monitoring program on these wells is therefore imperative.



A.P. Kohut
Geological Engineer

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