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Groundwater Division

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SUBJECT: PRELIMINARY NOTES ON HYDROGEOLOGY AT THE SITE OF THE PROPOSED DEVELOPMENT ON GLOVER ROAD NEAR LANGLEY, B.C.

Attachments:

- Figure 1: Location of proposed development.
- Figure 2: Well location map.

Water Investigations Branch

- Figure 3: Map showing locations of observation wells and production well.
- Figure 4: Graphical representation of data collected from observation wells and production well #6, and precipitation data following the completion of grouting operation on well No. 6 on October 28th, 1971.

The following comments are of a preliminary nature only and have been prepared at the request of the Department of Public Works (Mr. J. Buchanan).

WELL LOG DATA

The hydrogeology of the general area from Langley north to the development site, appears to be complex and is not expected to follow the simple "artesian-type basin" model.

Referring to Figure 2, section 18, well Nos. 1, 2, 3 and 4, we find the well logs show clay and silt extending to depths of from 100 up to 400 feet before any water-bearing silty sand and gravel suitable for well completion is encountered.

At the project site area which is closer to the valley wall than the above mentioned wells, the thickness of clay or silty clay overlying coarser beds is much thinner and only reaches a depth of 128 feet at production well #6. Well No. 4, Thatchers Well, and No. 5 in Section 12, show well completion depths of 365 feet and 590 feet respectively. Howeven no detailed well logs are available.

Referring to Figure 2, Section 11, well No. 12, the log for the well shows a 260 foot deep well drilled for Potters Distilleries Ltd. There is an aquifer at this site under artesian pressure between 237 and 260 feet and the well yield is 300 gallons per minute at a pumping depth of 160 feet. The source or sources of recharge and the extent of the aquifer are not known.

HYDROGEOLOGY

From an inspection of Figure 4, we can make some observations and speculations about relationships that may exist between the production well No. 6, the observation well, Mufford's well and the daily precipitation record.

The curve for the piezometric level fluctuations in the observation well and an "average value" curve drawn through the readings for Mufford's well both show a similar rise from early November, and reach a peak and then a "stabilized" condition in the last part of November. The abrupt fluctuations in Mufford's well readings may, in part, be due to the pressure gauge used to make readings and to the drain off for domestic supply requirements.

The flow measurements in the production well have also been represented graphically in Figure 4 and the curve, after allowing for a correction, shows a somewhat similar pattern to the piezometric head curves for the other two wells. There is a rise at the beginning of the month and then a stabilized condition.

The first part of all three curves are interpreted to be a response to the recovery of the piezometric surface following the marked reduction in flow of well No. 6 after the casing was sealed by grouting. The latter part of the curves are interpreted as a normal response after recovery and "stabilization" of the aquifer has taken place.

Because the aquifer is a leaky artesian situation, recharge will be slow and the response to any sudden increase in precipitation will be slow.

The histogram in Figure 4, of the daily precipitation records for Langley Prairie, do not show any marked correlation on a <u>day to day</u> basis with the other curves. For example, the general "stabilization" of the curves near the end of November occurs at a time of increased precipitation.

SUMMARY

The data indicates that free-flowing wells in the project area with respond to "well interference" or more specifically, will be development affected by any new production wells at the development site.

CONCLUSIONS

There is insufficient test data to quantitatively assess well interference and the groundwater potential at the development site. Further information is required on the following:

(1) Groundwater recharge.

(ii) Aquifer limitations and well construction problems.

(111) Well interference.

To obtain further information on the above, will require additional test wells, observation well drilling and carefully controlled well tests.

Measurements would have to be taken in all wells for a period preceding and following the tests. The tests should be carried out in the summer and fall.

During the test period, alternative water supplies may have to be made available to nearby well owners and if a permanent production well is installed, the same well owner may require a new well or a connection to a new piped source of supply.

ADDITIONAL NOTES

(i) <u>Groundwater recharge</u> may not necessarily be confined to the adjacent slopes in the project area.

The high yield of Potters Distilleries well indicates complexities in the hydrogeology and possible outside sources of recharge.

(ii) Aquifer limitations and well construction problems. The water-bearing sands and gravel beds within the thick silt sequence appears to be very limited. To explore the extent of the Potters Distilleries well aquifer outside the development area would be very costly. This particular aquifer would appear to be free of silt, which is a problem in so many artesian wells in the Nickomekl-Serpentine Basin. In order to obtain a "silt-free" water supply, some well owners find the only method is to allow the well to "free flow". Increasing the entrance velocity into the well screen or bore by pumping results in fine particles of silt in the aquifer being taken into suspension. Water Resources Service, some years ago, found the same problem in the construction of a test well near Fry's Corner north of Cloverdale. The use of a sandgravel pack did not solve the problem but only caused the pack to be clogged off by silt. This silt was released after further surging. However, the clogged condition quickly came back again once pumping was resumed. Allowing the well to "free flow" overcame this problem.

No pumping test could be run in production well No. 6 before the grouting job and it would have been unwise to have delayed the grouting job to do so.

However, the contractor's pump was run for a short time during the grouting operation and a very silty condition was observed in the water discharged from the pump. This is taken to indicate that problems in well completion <u>might</u> be anticipated in any pumped production well completed in this aquifer. Further test well drilling and construction would be required to find out the extent of this problem.

It is recommended that further pumping tests should not be carried out in production well #6, as long as a supply of water is required for other purposes from this well.

It is recommended that the observation well, near production well #6, should continue to be read on a monthly basis as long as interest in a groundwater supply from the development area continues.

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