

PACIFIC HYDROLOGY CONSULTANTS LTD. Consulting Hydrogeologists

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Project No. B720101

June 5, 1997

Brio Industries Inc.
110 - 3728 North Fraser Way
BURNABY, B.C. V5J 5G1

Attention: Ms. Marron Strang
General Manager, Springfield Division

Subject: **Feasibility of Obtaining Additional Groundwater by Constructing a Vertical Well at the Brio Springwater Installation near Agassiz**

Dear Sirs:

1.0 INTRODUCTION

On May 27, 1997, Ed Livingston, P. Eng., Associate Consultant of Pacific Hydrology Consultants Ltd. (PHCL), met with Mr. Al Key of Kemax Project Management Ltd. at the Brio spring near Agassiz to discuss the feasibility of obtaining additional water by constructing a vertical well near the east end of the paved truck-loading area. From PHCL's previous work on this project and from discussion with Mr. Key, we understand the following:

1. The present installation, which collects the flow from four horizontal wells, has been a satisfactory source of springwater which is transported by trucks on a 24-hour schedule to a bottling plant.
2. The flow of the four wells has a large seasonal fluctuation with low flow occurring between mid August and late October. During the low-flow period, the flow has been adequate for Brio's requirements for bottling.
3. There are no water meters on the wells or on the outlet and overflow pipes from the tank so the variations in flow have only been estimated, but the variation may be as great as 10 to 1.
4. There are a number of test holes on the Brio property, some horizontal, some vertical. Most of these were drilled with a percussion drill but several were done by a rotary drill designed to drill horizontal holes. In general, the results were negative except in the zone which is supplying the water.

Background information concerning Brio's Agassiz springwater source is contained in two letters prepared by PHCL:

1. A letter dated July 3, 1992 to Springfield Water Corporation on the subject "Springs on District Lot 5566, North of Lougheed Highway and West of Agassiz, B.C."

2. A letter dated March 24, 1995 to Brio Industries Inc. titled "Requirements of California Department of Health Services for a Water Bottling License".

On June 3, there was further discussion at the Brio office among Marron Strang, General Manager of Springfield Division of Brio Industries Inc., Al Key of Kemax and Ed Livingston of PHCL about the feasibility of obtaining additional water from a vertical well. Ms. Strang is to check with the industry association to make sure that water from such a well can still be called springwater. Ms. Strang stated that additional capacity at the time of low flow from the present installation is desirable for sales of bulk water beyond present requirements of the Springfield bottling operation.

Livingston pointed out that the usual way to deal with such a situation is to equip the facilities with water meters in order to collect flow data during one low flow period so as to measure how much water is actually available and, of course, how much additional capacity may then be required for present and future sales.

2.0 ADDITIONAL WATER

The evidence from drilling and other activity associated with the development of the present Brio springwater source indicates that the source of the water is some type of geologic structure in bedrock - probably a shear zone. The actual alignment and shape of this zone is unknown but information from drilling shows that horizontal holes extend through the zone and intersect solid rock at about 15 m. The experience with the small earth tremor on November 31, 1993, which greatly reduced the discharge rate of the flow from the horizontal holes, is evidence that the permeable zone is probably made up of rock fragments, which are rather loose.

Under the prevailing conditions, a properly constructed well in the water-bearing zone is very likely to be successful; however, the challenge is to delineate the water-bearing zone.

3.0 GROUNDWATER DEVELOPMENT PROCEDURES

Based on present knowledge, the drilling of a vertical or slightly inclined hole directly down-slope from the existing Brio horizontal wells is considered to have the best chance of intersecting the water-bearing zone.

Each vertical hole must be constructed to deal with flowing artesian conditions. Each hole should be started with 200 mm (8") diameter surface casing, which is firmly seated in slowly permeable material - probably bedrock. The bedrock surface under the steep hillside may be quite steeply inclined and may require grouting to make a good seal. Drilling can then continue as a 200 mm diameter open hole until the water-bearing zone is encountered, following which it may be necessary to drill with 150 mm (6") diameter casing. If the water-bearing zone is encountered and it is composed of loose rock fragments, the well can be completed with a well screen. There are several drilling contractors in the Lower Fraser Valley who are equipped and qualified to carry out drilling and well completion, as described.

The June 3, 1997 meeting considered the possibility of obtaining more water below the highway where there are additional springs. Mr. Key said that there are two houses in that area that obtain water from springs but he did not know whether the spring users have water licenses. All agreed that it is important not to offend these residents. Mr. Key suggested that it may be possible to make an agreement with them by offering to construct a fire line and hydrant fed from the Brio reservoir, in order to give them fire protection which they don't have at present. Mr. Key will look over the area in the near future to further assess the situation.

The discussion of June 3 closed with Ms. Strang stating that she will now confer with others in the Brio management before making any decision about further action.

4.0 CLOSURE

This letter has been prepared to document the recent site visit and discussion by Al Key (Kemax Project Management Ltd.) and Ed Livingston (PHCL) on May 27, 1997, and the subsequent discussions at the office of Brio Industries Inc. on June 3, 1997. The letter is considered to accurately reflect the discussion concerning development of additional water at the Brio springwater source near Agassiz. However, please do not hesitate to call for further discussion or clarification.

Yours truly,

PACIFIC HYDROLOGY CONSULTANTS LTD.



Ed Livingston, P. Eng.
Associate Consultant

c.c. Mr. Al Key
Kemax Project Management Ltd.