CANOE CREEK INDIAN BAND

COMPLETION REPORT CONCERNING IMPROVEMENTS TO THE DOG CREEK VILLAGE SPRING

PACIFIC HYDROLOGY CONSULTANTS LTD.

OCTOBER 13, 1989

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October 13, 1989

Canoe Creek Indian Band
Administration Office
General Delivery
DOG CREEK, B. C. V0L 1J0

Attention: Mr. David Archie

Subject: **Completion Report Concerning Improvements to the Dog Creek Village Spring**

Dear Sirs:

This letter is further to a discussion on September 26 at the Archie Residence at Dog Creek among David Archie of Canoe Creek Indian Band, Ed Livingston of Pacific Hydrology Consultants Ltd. and Walter Koftinoff of Pacific Pump & Pressure Installation Ltd., about the improvements which were being made to the Dog Creek Village Spring.

1.0 INTRODUCTION

The purpose of this letter is to describe the results of the work carried out to improve the Dog Creek Spring so as to prevent the intermittent problems with coliform bacteria and the growth of algae.

Background information about the geology of the Dog Creek Village Spring is contained in Pacific Hydrology's letter-report of December 9, 1987 to Canoe Creek Indian Band on the subject **Hydrogeological Investigation to Assess the Feasibility of Developing an Alternative Groundwater Source for Domestic Water Supply on Dog Creek Indian Reserve No. 1.** Additional background information is contained in Pacific Hydrology's recent letters of July 11 to Canoe Creek Indian Band and of July 25 to Civic Engineering Services Ltd. The final proposal under which the recent improvements to the Spring were carried out is contained in a letter dated September 18, 1989 from Pacific Hydrology to the Band.

2.0 FIELD PROGRAM

Work on the Spring got underway on September 25 under the direction of Mr. Walter Koftinoff of Pacific Pump & Pressure Installations Ltd., a site superintendent recommended by Pacific Hydrology. Mr. Koftinoff was aided in the work by Mssrs. Wilfred Grinder and Jake Roper who were made available to the project by the Band.

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In preparation for the work, the water line from the Spring to the concrete reservoir was shut off to prevent sediment from entering the reservoir. The three main sources of water were cleared of overburden and vegetation, and plans were made for capturing the flow from the three sources. Steel plate and tubing were then ordered and arrangements were made to rent a welder.

On September 26, the welder and other materials were obtained and brought to the site. While the water collectors were being fabricated by Mr. Koftinoff, excavation of the water sources was being completed by Mssrs. Grinder and Roper. The first collector was installed at the west and largest source.

During the previously mentioned meeting of September 26 among Archie, Koftinoff and Livingston, Mr. Koftinoff proposed that he complete the piping to the reservoir. This was approved by Mr. Archie who said that the additional material would be purchased by the Band and delivered to the site.

On September 27, Livingston returned to Vancouver. Mr. Koftinoff completed the fabrication of the collectors which were then installed by Mssrs. Grinder and Roper. The piping materials were brought to the site and the piping was partially completed.

On September 28, the project was completed and Mr. Koftinoff returned home. The combined flow from the three main sources was measured by timing the filling of a container of known volume; this combined flow was measured to be 1.33 L/sec (17.6 igpm).

3.0 EXCAVATION OF THE SPRING DISCHARGES AND COLLECTOR DESIGN

Each of the three main sources of spring discharge was excavated to expose the water-bearing gravel and the compact silt which lies beneath it. This excavation resulted in an overhang of the brush-covered bank above the spring. The collectors were designed to be seated firmly in the silt to form a "dam" so that all of the water would be forced to enter the collector.

The collectors were fabricated from 100 mm (4") square tubing, 6 mm (¼") steel plate and heavy-weight expanded metal. For the two main collectors, "windows" were cut along one side of the square tubing and a strip of expanded metal was welded over the openings. The ends of the tubing were covered by pieces of plate and a 30 cm (1 ft) long steel pipe nipple was welded into the side opposite the windows. The whole assembly was then welded to a steel plate with the windows facing away from the plate, and with the pipe connection extending through a hole in the plate. The plate

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extends about 5 cm (2") below the bottom of the square tubing and several centimetres above it and beyond both ends, as shown on Photograph 1 in the attachments.

The assembly was set in place with the windows facing the water-bearing gravel. The plate was pounded down into the silt to form a tight seal, the ends were sealed with compact silt and the space between the collector and the water-bearing gravel was filled with clean gravel. The top of the gravel was sloped away from the Spring and was then covered with soil. A sheet of 6 mil plastic was placed over the soil with the front edge over the steel plate and the back edge placed as far into the excavation as possible. Several short lengths of 2 x 6 boards were placed on the plastic sheet to hold it in place, following which it was covered with soil. Because of this design, any material that caves from above will be prevented from reaching the Spring and any water will be diverted by the plastic over the plate to also prevent it from entering the Spring.

The two main spring flows were improved as described above; the smaller spring in the centre was completed in a similar manner except that the collector, fabricated from a short piece of square tubing, was installed with the axis into the spring. A flange of steel plate on the outer end was then seated firmly in the silt and gravel and plastic placed as described above.

As mentioned previously, the combined flow from the three collectors at the end of September was measured and found to be 1.33 L/sec (17.6 igpm). This is most of the water at the spring site. The amount of water bypassing the collectors is estimated to be about 0.11 L/sec ($1\frac{1}{2}$ igpm). This water has been diverted so that it does not enter the reservoir. In the event that this remaining water is needed, it can be recovered by additional collectors.

The water is conveyed from the collectors to the existing valve box by a simple pipe system: a 50 mm (2") diameter black polyethylene pipe runs from the west collector to a reducer on the existing 300 mm (12") diameter PVC pipe that leads to the concrete valve box; a 38 mm ($1\frac{1}{2}$") polyethylene pipe runs from the east collector to a tee in the 50 mm diameter pipe; and, a 25 mm (1") diameter polyethylene pipe runs from the centre spring to a tee in the 38 mm diameter pipe. A sketch of the piping arrangement is included in the attachments. This system protects the water from contamination and should not freeze because the water is relatively warm.

A significant benefit of this installation is that the steep bank on the compact silt below the spring discharges will not be eroded by the flow from the Spring. This will result in increased stability of the slope above the Spring and less silt and sand in the reservoir.

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4.0 DISCUSSION

The excavation of the spring discharges carried out during this project shows that the geology of the aquifer is somewhat different than interpreted and as outlined in our report of December 9, 1987. The water is discharging from gravel overlying the compact silt as expected; however, the gravel is not a uniform horizon or a channel fill. Rather, it is a very poorly sorted bouldery gravel; the bottom part in some places is very compact and resembles till. Water flow is quite localized, apparently in three small permeable zones which are not at the same elevation. The maximum flow is from the west zone, the intermediate flow is from the east zone and the least concentration of flow is in the middle. The elevation of the west zone is higher than the east zone.

The gravel looks like a glacial deposit but it is difficult to see why a glacial deposit would be as local as the gravel seems to be. Patches of dirty glacial gravel are exposed in the compact silt in the cuts along the access road but these are completely dry. As stated previously, the water is probably coming from the volcanic rocks exposed in the bluffs to the north. It is not clear how the water gets from the rock to the gravel at the Spring. Perhaps there is a continuous narrow band of gravel extending from the rock bluffs to the Spring.

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5.0 POSSIBLE SOURCE OF POLLUTION

Mr. Koftinoff reported that when the 300 mm (12") diameter PVC pipe leading from the spring to the valve box was excavated, the overburden was wet and had a bad smell. This overburden has sloughed down the steep slope to cover the upper end of the valve chamber which is covered by boards. It is possible that coliform-bearing water may get into the valve chamber at that point, especially after rain or snow melt.

The condition at the valve chamber should obviously be corrected; this is probably best accomplished by cleaning off the upper end of the valve box and by preventing soil from the slope or moisture from the soil from reaching the valve chamber. A few hours of hand work should resolve this.

6.0 SUMMARY AND CONCLUSIONS

The project to improve the Dog Creek Village Spring, as reported in this letter, may be summarized as follows:

1. Collectors have been installed to collect most of the spring discharge.
2. The installation has been designed to prevent water or debris, that originates up-slope, from reaching the spring water.

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3. The installation will not freeze and requires little maintenance.

4. A possible source of pollution was identified as seepage water that enters the valve box. This situation can be eliminated by a few hours of hand work to clean off the upper end and to install a protective waterproof covering.

Yours truly,

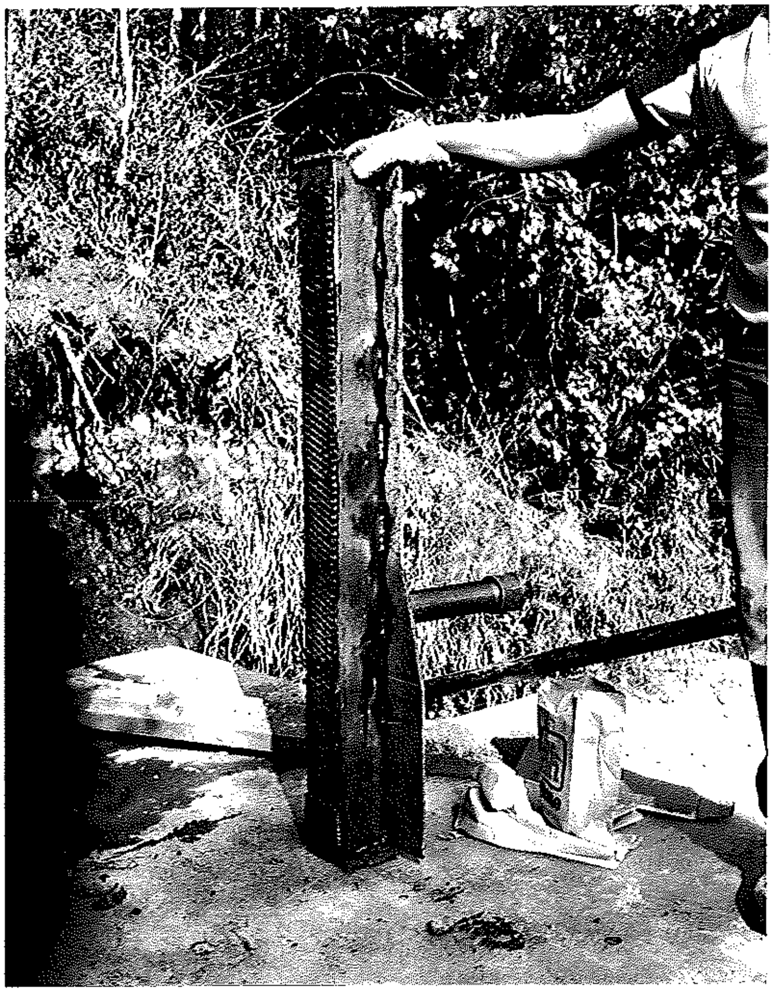
PACIFIC HYDROLOGY CONSULTANTS LTD.

E. Livingston

E. Livingston, P. Eng.

Attachments

ATTACHMENTS



Photograph 1.

Collector for west spring discharge fabricated from square steel tubing, 6 mm ($\frac{1}{4}$") plate and expanded metal. Photograph is a bottom view showing the plate extending below the tubing; the outlet pipe can be seen on the right.

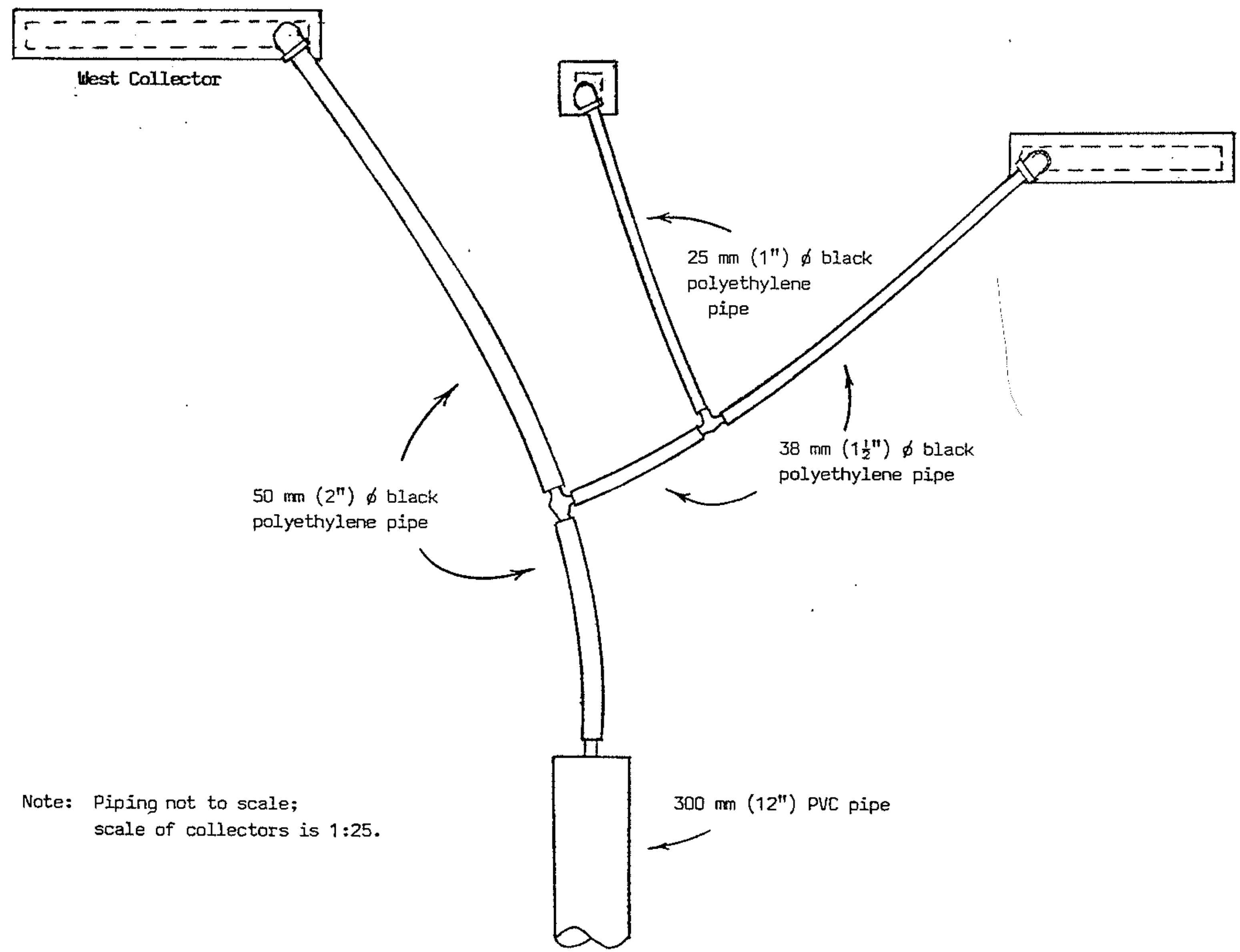
Photograph 2. View of West Collector in place showing the gravel pack sloping away from the spring discharge.

Photograph 3. West Collector with plastic sheet in place over the gravel pack.

Photograph 4. West Collector completed.

FIGURE 1

ARRANGEMENT OF COLLECTORS AT DOG CREEK VILLAGE SPRING



Note: Piping not to scale;
scale of collectors is 1:25.