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Water Rights Branch  
Ministry of the Environment  
BUILDINGS

J. C. Foweraker, Head  
Groundwater Section  
Water Investigations Branch

January 4

78

Wikkerink Well - Cobble Hill Area

92 B 12 #12

Further to your memorandum of November 1, 1977 on the above, please find enclosed a report prepared by M. Zubel, Geological Engineer with our staff. It is concluded from available data and theoretical considerations that Mr. Wikkerink probably affected water levels in the area during the 1977 irrigation season, including lowering of water levels in Rodger's Spring and the Gillett well. To verify this, a controlled pump test of Mr. Wikkerink's well, combined with monitoring water levels in the Gillett and Rodger wells, would be required.

As the Rodger and Gillett wells have been deepened and the supply problem alleviated for the time being, no further action may be required. It is recommended, however, that the concerned well owners monitor water levels in their wells on a daily or weekly basis during the irrigation season. The individuals should keep a record of these observations. Moreover, it would be advisable for Mr. Wikkerink to install a flow meter on his well to monitor and record his use of water during the irrigation season. Periodic water level measurements might also be taken in Mr. Wikkerink's well. This type of information would be particularly useful should there be any abnormal declines in water levels in the future and/or should additional wells be constructed in the area.



J. C. Foweraker

APK/1ml

Encls.

M. ZUBEL

FILE

M. Zubel  
6 Jan/78

December 30, 1977

Our File: 92B12

WIKKERINK WELL - COBBLE HILL AREA

I. INTRODUCTION

On November 1, 1977 Mr. G. Bryden, Assistant Regional Engineer, Water Rights Branch, requested the Groundwater Section of the Water Investigations Branch to investigate the effects that Mr. Wikkerink's well, and his uses therefrom, have on the existing surface and groundwater supplies in the area (Cobble Hill); with particular reference to Rodger Spring and Taggart Creek and tributaries (see Figure 1).

This report deals with an office study of the available information pertaining to the enquiry and a half-day visit of the site. The office study included a review of:

- a) the air photographs containing the Wikkerink, Gillett and Rodger properties
- b) the surficial geology map containing the Shawnigan Lake-Mill Bay area
- c) the drilling logs of the Wikkerink, Gillett and Rodger wells
- d) the drilling logs of other wells within a half mile radius
- e) correspondence relating to the enquiry

The purposes of the site visit were to:

- a) obtain more exact on-site information and locations of the wells and existing surface water supplies
- b) talk to the property owners about their water supplies
- c) obtain water samples for analyses using Hach test kits

## II. ENQUIRY BACKGROUND

On August 3, 1977 Drillwell Enterprises Ltd. completed a 102-foot, 6-inch diameter well in surficial deposits on Mr. Bill Wikkerink's property (see Figure 1). On August 10, 1977, B. C. Aquifer Testing performed a 4-hour pump test at which time the well yielded 75 U.S.gpm with 52 feet of drawdown. According to Mr. R. Gillett, on the same day a gauge, monitoring the water level of his 6-foot deep dug well, indicated the previously full well was empty (see Appendix 1). On August 11, Mr. Wikkerink's test pump was removed and according to Mr. Gillett, "the water in the dry well came up about halfway". A regular pump was installed mid-day in the Wikkerink well and by 12:30 that night, Mr. Gillett's gauge indicated empty again. Mr. Gillett stated that he "saw no more water in well till September 5". On August 15, Mrs. Rodger telephoned Mr. G. Bryden (Assistant Regional Engineer, Water Rights Branch) and complained that her 3-foot dug well was dry. Because this well enclosed a licensed spring, Mr. Bryden investigated the problem by visiting the site on August 19, and writing a report on August 24 (see W.R.B. File No. 0212230).

Since Mr. Bryden's visit, the Gilletts and the Rodgers decided to remedy the situation by having Drillwell Enterprises Ltd. deepen their dug wells to bedrock. Consequently, on August 19, the two dug wells were deepened to approximately 20 feet (depth of bedrock) and since then, there has not been any problems with the wells drying up, even during continuous pumping of the Wikkerink well. However, according to Mr. Gillett, "water has been down and up since then but no dates recorded, changes have always been tied to the Wikkerink's pump and always noticeable in the house by the colour of the water".

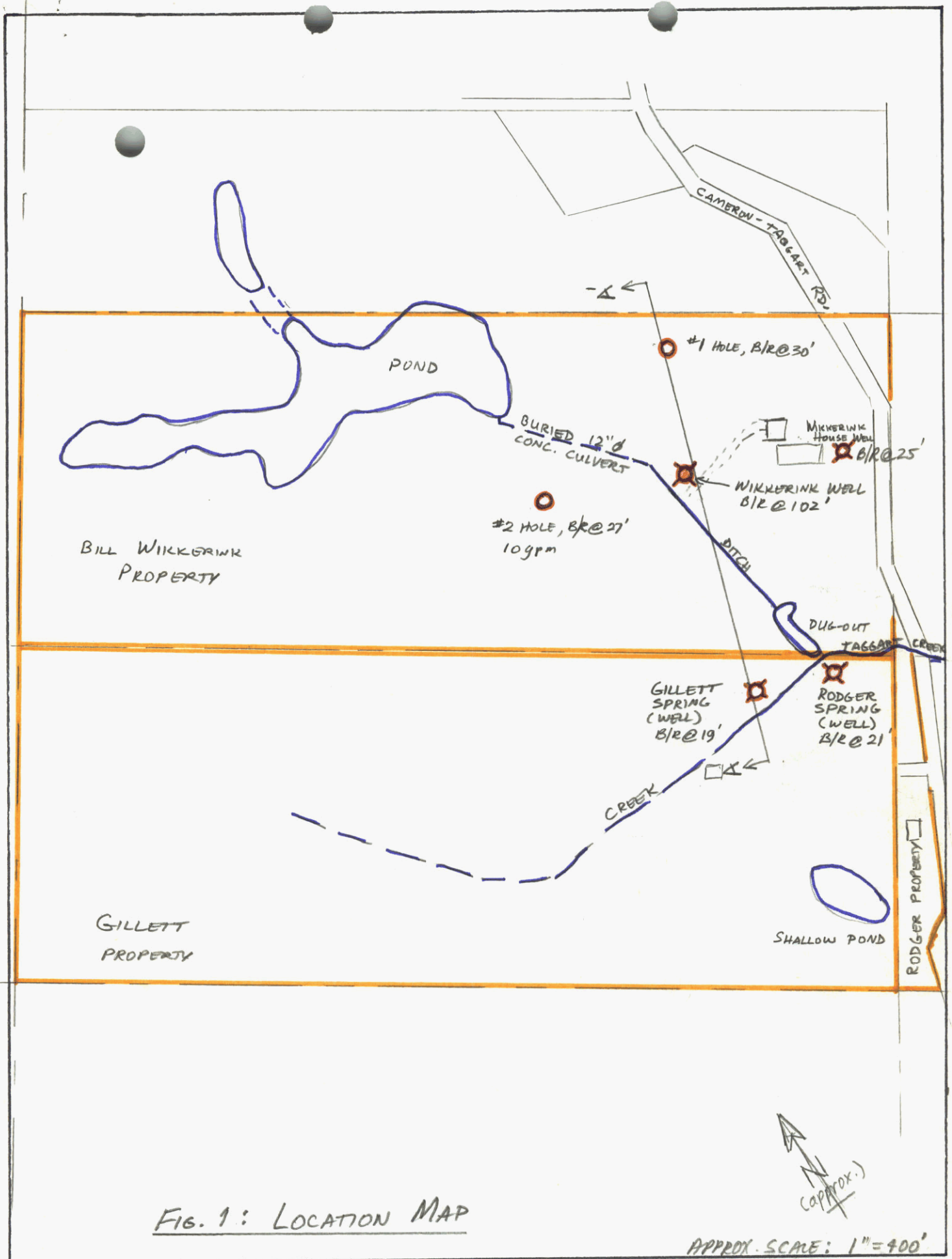


FIG. 1: LOCATION MAP



APPROX. SCALE: 1"=400'

### III. SURFACE WATER FEATURES

An examination of the air photographs and a field visit were used to determine the nature and extent of the available surface water features.

On the N.E. section of the Wikkerink property there is a small, shallow, marshy lake which drains into a buried 12-inch diameter concrete culvert by means of a gate. This water is used primarily for irrigation. The outflow from the culvert empties into a narrow, channeled "creek" which is connected to a dugout, where some water is stored for irrigation. Overflow from the dugout empties into the main Taggart Creek at the Gillett-Wikkerink property line. On the Gillett property there are two surface water features that can be seen on the air photos: a creek across the property, and a shallow pond on the S.E. section. The creek does not flow at a constant rate along its course. During the field visit, it was noticed that the creek flowed at about 20 gpm in some places and in others there did not appear to be any flow, while in some places the water came out of the ground as springs. The quality of the creek water was tested at several places using Hach test kits and the following results were obtained:

<u>Location</u>	<u>Temp., °C</u>	<u>Conductivity</u>	<u>Ph</u>	<u>Hardness</u>	<u>Fe</u>	<u>Chlòride</u>
Upstream	1.5	80 micromhos/cm	7.4	25.7 mg/l	<0.3 mg/l	11.4 mg/l
Downstream	1.5	80 micromhos/cm	7.3	42.8 mg/l	<0.3 mg/l	11.4 mg/l

The results of these tests indicate that the creek water is low in mineralization.

There are also two springs (Mr. Gillett's and Mr. Rodger's) on the N.E. section of the property which are enclosed and not readily identifiable on the air photos. These springs were being used as the sole source of domestic water

for the Gilletts and Rodgers until they "ran dry". Each water quality tests of samples from these springs were performed and the following results were obtained:

<u>Location</u>	<u>Temp., °C</u>	<u>Conductivity</u>	<u>Ph</u>	<u>Hardness</u>	<u>Fe</u>	<u>Chloride</u>
Gillett house	8.5	170 micromhos/cm	7.3	94.1	0.3 mg/l	19.1 mg/l
Rodger spring	10.2	180 micromhos/cm	7.3	94.1	0.3 mg/l	15.3 mg/l

The results of these tests indicate that the spring water is also low in mineralization.

#### IV. GROUNDWATER CONDITIONS

From the available drilling logs of the wells drilled on the Wikkerink and Gillett properties (see Appendix 2), the following observations were made:

- 1) The main groundwater aquifer is contained within a gravel layer just above the bedrock.
- 2) The depth to bedrock is generally shallow (19-48 ft.) with one well encountering the bedrock at 102 feet.
- 3) The groundwater table varies from 0 to 6 feet below the ground.

A cross-section (Figure 2) containing the deep Wikkerink well, a shallower well and the Gillett well shows that the deeper Wikkerink well is located in a "trough" or bedrock low which may be a buried channel that controls the groundwater flow by acting as a sink into which the surrounding groundwater moves. Air photographs of the area show scars of several old meltwater channels which may be traced to include the site of the deeper Wikkerink well. These suggest further evidence of a probable buried channel. However, to confirm this, more detailed drilling and/or geophysical testing would be required.

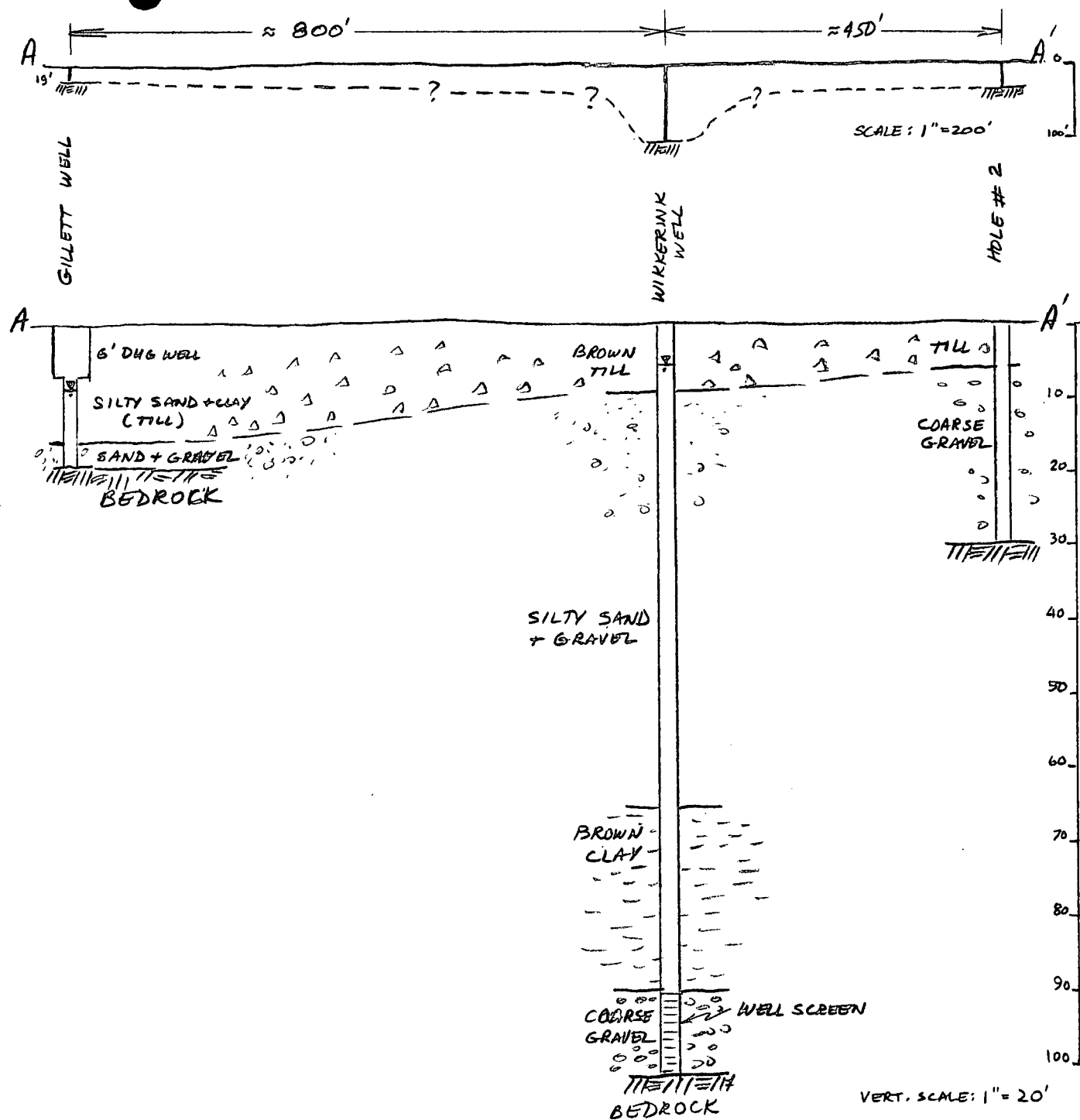


FIG. 2: CROSS-SECTION A-A' SHOWING  
WIKKERINK WELL IN POSSIBLE CHANNEL.

The present functioning wells in the area and their capacities as rated by the drilling contractor:

- 1) Rodger (surficial) well, yielding 15 gpm (domestic use)
- 2) Gillett (surficial) well, yielding 15 gpm (domestic use)
- 3) Wikkerink (surficial) well, yielding 75 gpm (irrigational use)
- 4) Wikkerink (bedrock) well yielding approximately 15 gpm (domestic use)

#### V. WIKKERINK WELL PUMPING EFFECTS

In order to predict the actual drawdown effects that Mr. Wikkerink's pumping well has on the Rodger or Gillett well, a properly performed pump test should be carried out on the Wikkerink well with observations taken in the neighbouring wells. Since this was not possible to do at this time, a mathematical approach was considered. This theoretical approach is limited however, since the overburden material in which the wells are located is not uniform in character and permeability, nor is the formation of uniform thickness, and infinite extent. Keeping this in mind, however, the Theis formula was used as a reasonable approximation. In its simplest form, the Theis formula is:

$$s = \frac{114.6 Q}{T} W(u) \quad (\text{Anon, 1975})$$

where

$s$  = drawdown, ft.

$Q$  = pumping rate, gpm

$T$  = coefficient of transmissivity, gpd per foot

$W(u)$  = "well function of  $u$ "

where

$$u = \frac{1.87 r^2 S}{Tt}$$

and

$r$  = distance, ft. from pumped well to point where drawdown is measured

$S$  = storage coefficient

$t$  = time since pumping started, days



Based on the driller's pumping test results, the specific capacity of the well is approximately 1.25. Using this figure, the transmissivity of the aquifer is in the range of 2,000 to 10,000 gpd per foot. If the coefficient of storage is  $10^{-4}$  (an average value for artesian conditions), then the drawdown,  $s$ , in a well 800 feet away, caused by a well pumping at 70 gpm for 1 day will be in the range of 3.1 to 9.2 feet. This range is in close agreement with Mr. Gillett's claim that within one day the pumping activities of Mr. Wikkerink's well caused at least three feet of drawdown in his well (approximately 800 feet away).

#### VI. CONCLUSIONS

A proper investigation of the effects Mr. Wikkerink's well, and his uses therefrom, have on the existing surface and groundwater supplies in the area cannot be done without performing a controlled pump test of Mr. Bill Wikkerink's well and monitoring the drawdown in the Gillett and Rodger wells; as well as measuring the flow in Taggart Creek by means of a weir. This type of investigation was not done at this time because of the lack of money, time, equipment and manpower. However, a mathematical approach to the problem was considered and the calculation of drawdown using the Theis formula closely agreed with Mr. Gillett's observations. Nevertheless, this result should not be used as conclusive evidence that Mr. Wikkerink's pumping activities are solely responsible for the "drying up" because of the limitations of the Theis formula. Furthermore, the precipitation records for the winter of 1976-77 indicated lower amounts of rainfall to the area than in past years; suggesting that there was less recharge to the groundwater system which may have had some effect on the "drying up" of the Rodger and Gillett springs.

As was previously mentioned, the "drying up" problem has been alleviated by the deepening of the shallow wells and because the situation is controlled at this time, no further action or investigation is recommended. However, beginning in May of 1978, if it is possible, the water levels in the Rodger and Gillett wells should be monitored by means of a staff gauge and a record of the fluctuations in water level which may be caused by the pumping activities of Mr. Wikkerink's well should be kept by the owners on a daily or weekly basis. Moreover, it would be advisable for Mr. Wikkerink to install a flow meter on his well to monitor and record his use of water during the irrigation season. An access port should also be made on the well head to permit periodic (weekly) water level measurements in the well. This type of information would be useful to all parties concerned should there be any abnormal declines in water levels in the future.



M. Zubel  
Geological Engineer  
Groundwater Section

MZ/bmg

#### REFERENCES

Anon, Ground Water and Wells, Johnson Division, UOP Inc., St. Paul, Minnesota, 1975.

To: Water Rights Branch,  
Paul Buildings Victoria.  
Problem Report

2800 Cameron Tuggart Road.  
Cahill Hill B.C. V0R 1L0.

Section 3 Range 6. (APPENDIX 1)

Dug well, approx 6'0" below ground was in use before we bought property and we have used it without any problems for fourteen years. It was possible to pump water out quicker than it came in during the Summer so installed gauge with indicator in kitchen to indicate when water level was near point of pump intake. Water level always returned to near or above ground in a few hours.

Wed Aug 10<sup>th</sup> 1977 - Gauge indicated well was empty. Found Bill Wikkenink had been running test pump in his drilled well.

Thu Aug 11<sup>th</sup> - Test pump taken out, water in dug well came up about half way.

Fri Aug 12<sup>th</sup> (12:30 AM) Gauge indicated empty again. Informed by Bill Wikkenink that regular pump had been installed midday Aug 11<sup>th</sup>.

(Saw no more water in well till Sept 5<sup>th</sup>).

Wed Aug 17<sup>th</sup> - Drilled own well in centre of dug well.  
Fri Aug 19<sup>th</sup> - Hit rock at 20' with about 2' of <sup>gravel</sup> water above. Installed pump and quantity of water seemed O.K. but cloudy.  
Cleaned in a few days.

Sun Sept 4<sup>th</sup> - Noticed water in house was cloudy again.

Mon Sept 5<sup>th</sup> - Water appeared in bottom of dug well. Informed by Bill Wikkenink that pump had been stopped Fri evening Sept 3<sup>rd</sup>.  
Water in house very brown.

Tue Sept 6<sup>th</sup> Water 18" up from bottom.

Thu Sept 8<sup>th</sup> Water 33" up from bottom and clearing.

P.S. Water has been ~~up~~ down and up since then but no dates recorded, changes have always been tied to the Wikkenink's pump and always noticeable in the house by the colour of the water.

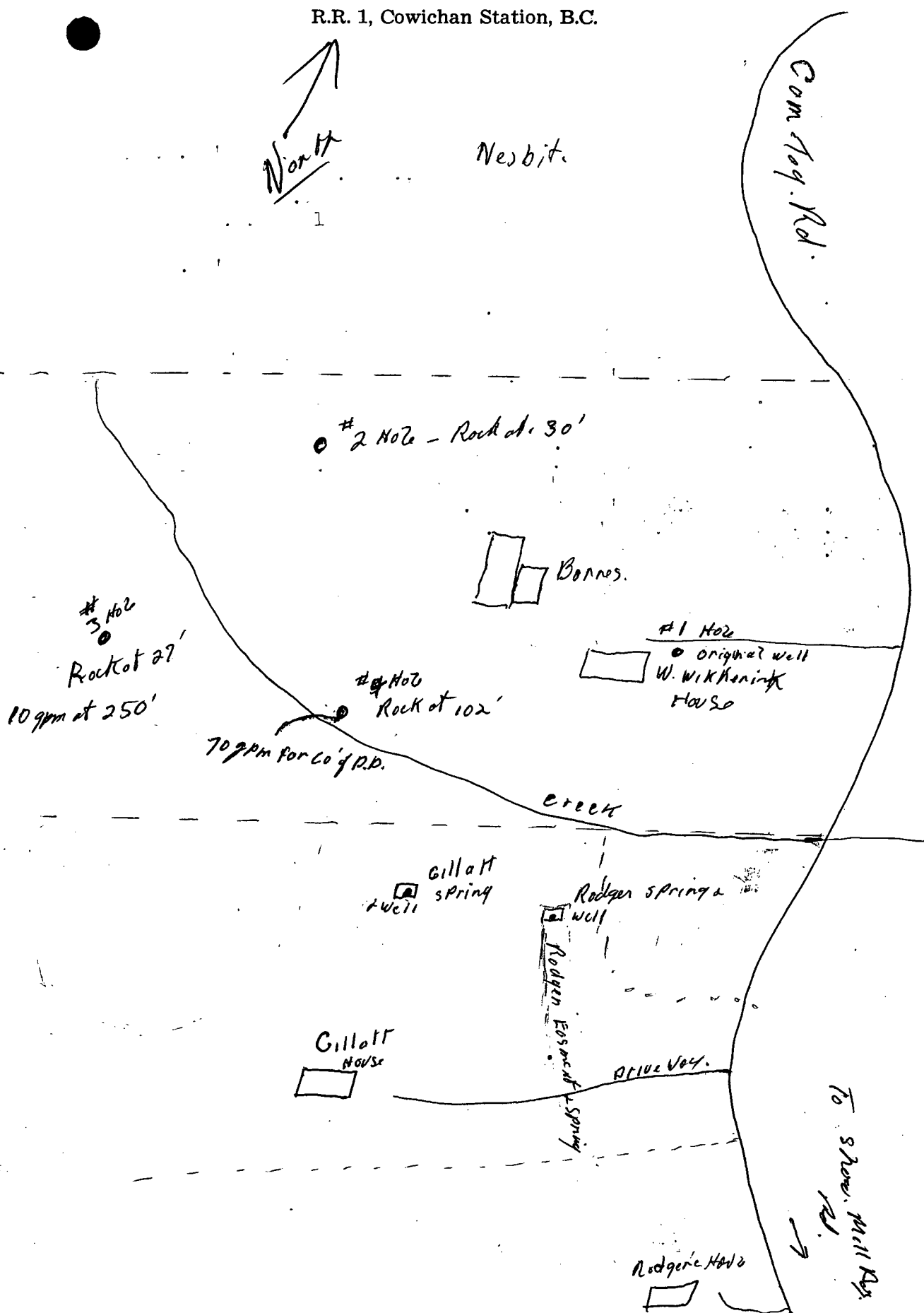
Robert R. H. Gillett.

# Drillwell Enterprises Ltd.

(APPENDIX 2)

KEN SLADE — Phone 746-5268

R.R. 1, Cowichan Station, B.C.



# WELL LOG CONSTRUCTION RECORD



# WELL LOG CONSTRUCTION RECORD

OWNER

Gordon Rodger

Address

Cameron Township Rd.

Well Location

In Spring on Cement on G. Nett Property

Date Started

Date Completed

Aug 77

DRILLWELL ENTERPRISES LTD.

KEN SLADE PH. 746-5268

R. R. 1, COWICHAN STATION, B. C.

Drilling Method

Cable Tool

Driller

W. Easton

Helper

D. Slade

File

Folio

Signed By

## LOG OF FORMATIONS

Depth

Descriptions

0 to 3 Dug Hole.3 to 17 Silty sand & gravel17 to 21 Med gravel.

## GENERAL REMARKS

Pumped For 2 hrs with contractorPump - 16' for 15 gpm.

## CASING RECORD

Dia. 6 ins. Wt. 19 #/ft. From 0 to 21

Dia. \_\_\_\_\_ ins. Wt. \_\_\_\_\_ #/ft. From \_\_\_\_\_ to \_\_\_\_\_

Dia. \_\_\_\_\_ ins. Wt. \_\_\_\_\_ #/ft. From \_\_\_\_\_ to \_\_\_\_\_

Shoe \_\_\_\_\_ Welded \_\_\_\_\_ Cemented \_\_\_\_\_

## SCREEN RECORD

Make \_\_\_\_\_ Material \_\_\_\_\_

Slot opening \_\_\_\_\_ Length \_\_\_\_\_

Top \_\_\_\_\_ ft. Bottom \_\_\_\_\_ ft.

Fittings Top \_\_\_\_\_ Fittings Bottom \_\_\_\_\_

Gravel Pack \_\_\_\_\_ Natural \_\_\_\_\_

Development Method \_\_\_\_\_

## ROCK WELL DATA

Open Bore Hole \_\_\_\_\_ Dia. \_\_\_\_\_ ins.

From \_\_\_\_\_ ft. to \_\_\_\_\_ ft.

## PRODUCTION DATA

Static Level 4' (avg 77) ft.Measured from 9' - 10'Pumping Level 16 ft. at 15 GPM

\_\_\_\_\_ ft. at \_\_\_\_\_ GPM

Bail Test \_\_\_\_\_ ft. at \_\_\_\_\_ GPH

\_\_\_\_\_ ft. at \_\_\_\_\_ GPH

Recommended Pump Setting \_\_\_\_\_ ft.

Recommended Max. Pump Output \_\_\_\_\_ GPM  
GPH

Duration of Test \_\_\_\_\_ Hrs.

## PUMP DATA

Make \_\_\_\_\_ Type \_\_\_\_\_

Model \_\_\_\_\_ Serial No. \_\_\_\_\_

Size \_\_\_\_\_ HP \_\_\_\_\_ Drop Pipe \_\_\_\_\_ ins.

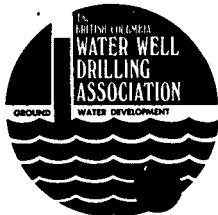
GPM \_\_\_\_\_ Head \_\_\_\_\_ ft. \_\_\_\_\_ RPM

Motor \_\_\_\_\_ Volts \_\_\_\_\_ PH \_\_\_\_\_

Well Seal \_\_\_\_\_

Water Analysis — Hardness \_\_\_\_\_ PPM

PH \_\_\_\_\_ Iron \_\_\_\_\_ PPM



# WELL LOG CONSTRUCTION RECORD

OWNER BILL WINKERINK

Address \_\_\_\_\_

Well Location CAN. - TAGGART RD #1 & #2

Date Started July 26/77

Date Completed July 29/77

## DRILLWELL ENTERPRISES LTD.

KEN SLADE PH. 746-5268

R.R. 1, COWICHAN STATION, B.C.

Drilling Method AIR ROTARY

Driller Doug WATT Helper DAVE SLADE

File \_\_\_\_\_ Folio \_\_\_\_\_

Signed By Doug WATT

#1

### LOG OF FORMATIONS

Depth

Descriptions

0 to 6 Loose clay + GRAVEL

to

6 to 30' COURSE GRAVEL

to

30' to 32' GRANITE (BEDROCK)

to

to PULLED OUT ALL

to THE CASING

to

#2

to

to

0 to 15' LOOSE BROWN TILL

to

15' to 27' COURSE GRAVEL

to

27' to 30' BROKEN BEDROCK

to

30' to 250' GRANITE

to

to

to 250'

to 10 gpm

to

to

to

to

### GENERAL REMARKS

147' 3 1/2 gpm

190' 6

210' 10

### CASING RECORD

Dia. 6 ins. Wt. \_\_\_\_\_ #/ft. From 0 to 30'

Dia. \_\_\_\_\_ ins. Wt. \_\_\_\_\_ #/ft. From \_\_\_\_\_ to \_\_\_\_\_

Dia. \_\_\_\_\_ ins. Wt. \_\_\_\_\_ #/ft. From \_\_\_\_\_ to \_\_\_\_\_

Shoe ☒ Welded ☒ Cemented \_\_\_\_\_

### SCREEN RECORD

Make \_\_\_\_\_ Material \_\_\_\_\_

Slot opening \_\_\_\_\_ Length \_\_\_\_\_

Top \_\_\_\_\_ ft. Bottom \_\_\_\_\_ ft.

Fittings Top \_\_\_\_\_ Fittings Bottom \_\_\_\_\_

Gravel Pack \_\_\_\_\_ Natural \_\_\_\_\_

Development Method \_\_\_\_\_

### ROCK WELL DATA

Open Bore Hole Dia. 6 ins.

From 30 ft. to 250 ft.

### PRODUCTION DATA

Static Level \_\_\_\_\_ ft.

Measured from \_\_\_\_\_

Pumping Level \_\_\_\_\_ ft. at \_\_\_\_\_ GPM

\_\_\_\_\_ ft. at 10 GPM

Bail Test 250 ft. at \_\_\_\_\_ GPH

AIR BLOWN ft. at \_\_\_\_\_ GPH

Recommended Pump Setting \_\_\_\_\_ ft.

Recommended Max. Pump Output \_\_\_\_\_ GPM  
GPH

Duration of Test \_\_\_\_\_ Hrs.

### PUMP DATA

Make \_\_\_\_\_ Type \_\_\_\_\_

Model \_\_\_\_\_ Serial No. \_\_\_\_\_

Size \_\_\_\_\_ HP \_\_\_\_\_ Drop Pipe \_\_\_\_\_ ins.

GPM \_\_\_\_\_ Head \_\_\_\_\_ ft. \_\_\_\_\_ RPM

Motor \_\_\_\_\_ Volts \_\_\_\_\_ PH \_\_\_\_\_

Well Seal \_\_\_\_\_

Water Analysis — Hardness \_\_\_\_\_ PPM

PH \_\_\_\_\_ Iron \_\_\_\_\_ PPM





Nov. 28/77

Mark Zuber

The #4 Witherink well ran from Aug 5 till mid Oct. with only short stops (see odd hour) at 75 vsgm. and was running when I pumped the Rodgers & Killatt wells.

I don't think that Rodgers or Killatt will have any problem with domestic water unless Witherink puts another hole into that draw (which he may do) and takes the water table down further.

I feel that a far more serious problem exists on the Kilsmaiden Rd. corner and the department should have been monitoring wells in that area for the past 3 yrs.

There are 3 holes available for monitoring equipment. 1 on Herb Bootman property 1 on Klar Lickering property and one on Jack Worthington's property. Check it out & see what you can do.

If you need further info. please call

Thank you  
Ken Lick.

File No: 0212230

Date: August 24th, 1977.

Subject: Mrs. J. G. Rodger's [F.L. 18431 - 1,000 gpd domestic use on Rodger Spring] complaint that a Mr. Bill Wikkerink's well is pumping Rodger Spring [and several other wells and sources of water] dry.

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Attention of: Mr. P. G. Odynsky, Regional Engineer, Victoria.

Pursuant to a telephone conversation with a Mrs. Rodger of Cobble Hill, on August 15th, 1977, in which she complained of a well on a Mr. Bill Wikkerink's property pumping her spring dry [see attached speedy memo], I visited the said site with Mrs. Rodger on August 19th, 1977.

While visiting the site I met a Mr. R. Gillett [the owner of the land on which Rodger Spring and Mrs. Rodger's R/W exists]. Mr. R. Gillett had a well-drilling company deepening his dug well while I was there and likewise complained of a lack of water due to Mr. Bill Wikkerink's recently drilled well. In fact, Mr. Gillett reported that his 6' deep dug well [which overflows in the winter months into South Taggart Creek, and therefore perhaps should be classified as a spring] has not gone dry in the 14 years he has lived in this location, but that in 3 hours after the commencement of the pump testing of Mr. Bill Wikkerink's new well, his well went dry.

Both Mr. Gillett and Mrs. Rodger claim that when Mr. Bill Wikkerink commences pumping from his well, that a decline in the water levels in both their sources of water supply is noticeable, while when he stops pumping, the water level starts climbing again. This allegation would tend to suggest that perhaps Rodger Spring, Mr. Gillett's well [or spring], and South Taggart Creek, are all within the recharge area of the groundwater source of Mr. Bill Wikkerink's well. Therefore, all three and any other wells or stream sources in the immediate area, could be influenced by the pumping of water from Mr. Bill Wikkerink's well.

When I inspected Rodger Spring it was being recharged by water from a 1" diameter pipe from the overflow from Mr. Bill Wikkerink's reservoir which he installed at Mrs. Rodger's request. [This supply is tentative, though, because as soon as Mr. Bill Wikkerink starts pumping from his reservoir to irrigate his fields there will be no overflow from his reservoir and, therefore, no flow into Rodger Spring.] Mrs. Rodger would prefer to have her source of domestic water supply not pumped dry rather than depend on the whims of Mr. Wikkerink's irrigation practice.

Recommendations:

I recommend that Water Investigations Groundwater Division:

- (1) Be requested to investigate the groundwater supplies in this area with regards to this situation and report to us any correlation they find between the Wikkerink well and Rodger Spring and other

(cont'd) File 0212230 - Rodger Spring - August 24th, 1977.

- (1) surface water and groundwater sources in the area. [Perhaps a safe yield can be recommended by W.I.B. Groundwater Division for the Wikkerink well such that no adverse affects in water supply for other sources could be attained.]
- (2) Be given a copy of the attached sketches and be advised to approach either, or both, Mrs. Rodger, 2790 Cameron-Taggart Road, or Mr. R. Gillett, 2800 Cameron-Taggart Road, both of Cobble, Hill, B.C., in order to obtain more exact on-site information and locations.  
*RODGERS: 743-9301      GILLETT 7432208      WIKK. - 743 9276*
- (3) Be advised that all three parties [Gilletts, Rodgers, and Wikkerinks] are on good terms with one another at present and that caution and diplomacy be exercised in dealing with any of the three parties [i.e., Mrs. Rodger has requested that Mr. Wikkerink supply her with water by pumping water from the overflow of his reservoir into Rodger Spring so that she may have at least some domestic supply of water to her house and garden. Mr. Bill Wikkerink has complied with her request and therefore she does not wish to antagonize him so that he no longer will maintain this supply].

When Water Investigations Groundwater Division reports back to us, then we may be able to suggest, or recommend, to the Comptroller, further action based on more substantial data to remedy the above reported situation. A report should be requested as soon as possible to facilitate the handling of the existing problems.

GB/nm  
Atts.

George Bryden, P. Eng.,  
Ass't. Regional Engineer, Victoria,  
Water Rights Branch.