COMPLETION REPORT

PRODUCTION WELL NO. 78-1

BEACHCOMBER WATER SYSTEM

NANOOSE AREA

FOR

NANAIMO REGIONAL DISTRICT

R. B. ERDMAN

W. L. BROWN, P. ENG.

AUGUST 1978

77-050A

BROWN, ERDMAN & ASSOCIATES LTD.
1401 BEWICKE AVENUE, NORTH VANCOUVER, BRITISH COLUMBIA

PAGE 1

WELL OWNER NANAIMO REGIONAL DISTRICT WELL NO. 1 DRAWDOWN ☑
LOCATION BEACH COMBER - NANOOSE JOB NO. _____ RECOVERY ☐

DATE	TIME	ELAPSED TIME MINUTES	DTW	Q US GPM		REMARKS
19-7-78	12:00	0	93.28			Measure point 1.7' A.G.L.
		1	124.30	205		
		1.5	129.01			
		2	129.45			
		2.5	130.28			Water silty
		3	130.78			
		3.5	131.00			
		4	131.09			
		4.5	131.17			
		5	131.33			
		6	131.45			Water clear
		7	131.52			
		8	131.60			
		9	131.67			
		10	131.71			
		12	131.76			
		14	131.83			
		16	131.91			
		18	131.93			
		20	131.94			
		25	132.03			
		30	132.02			EC 332 Ω mho 10°C
		35	132.06			
		40	132.06			
		45	132.07			
		50	132.20			
		60	132.26			
		70	132.30			
		80	132.32			
		90	132.37			
		100	132.41			
		125	132.50	205		

20 HP

143' to suction.

BROWN, ERDMAN & ASSOCIATES LTD.
1401 BEWICKE AVENUE, NORTH VANCOUVER, BRITISH COLUMBIA

PAGE _____

WELL OWNER _____ WELL NO. _____ DRAWDOWN ☐
LOCATION _____ JOB NO. _____ RECOVERY ☐

DATE	TIME	ELAPSED TIME MINUTES	DTW	Q US GPM		REMARKS
19-7-78	14:30	150	132.60	205		
	15:20	200	132.62			
	16:10	250	132.47			
	17:00	300	132.56			
	17:50	350	132.63			
	18:40	400	132.68			
	19:30	450	132.72			
	20:20	500	132.86			1205
	21:10	550	132.98			2 hr. 15 m
	22:00	600	133.02			10 hr. 02 m
	22:50	650	133.07			5 hr. 0850
	23:40	700	133.12			
20-7-78	00:30	750	133.17			
	01:20	800	133.30			
	02:10	850	133.29			
	03:00	900	133.34			
	03:50	950	133.44			
	04:40	1000	133.47			
	05:30	1050	133.49			
	06:20	1100	133.62			
	07:10	1150	133.64			
	08:00	1200	133.64			
	08:50	1250	133.59			EC 305 Ω mho 10°C
	09:40	1300	133.65			
	10:30	1350	133.68			
	11:20	1400	133.65			
21	12:10	1450	133.19			
22	13:00	1500	132.78			1500
	13:50	1550	132.72			

BROWN, ERDMAN & ASSOCIATES LTD.
1401 BEWICKE AVENUE, NORTH VANCOUVER, BRITISH COLUMBIA

PAGE _____

WELL OWNER _____ WELL NO. _____ DRAWDOWN ☐
LOCATION _____ JOB NO. _____ RECOVERY ☐

DATE	TIME	ELAPSED TIME MINUTES	DTW	Q / GPM		REMARKS
22-7-78	17:30	4650	134.32			
		42	.32			
		50	.32			
		98	.32			
		50	.29			
		09	.29			
		50	.29			
		50	.46			
		50	.58			
		51	.54			
		50	.63			
		52	.66			
		50	.72			
		53	.75			
		50	.74			
		54	.76			
		50	.81			
		55	.80			
		50	.75			
		56	.76			
		50	.75			
23-7-78	11:00	59	134.81			

WTN 40098

ERNIE PLUNET
TELEPHONE 245-3756
R.R. 1, YELLOW POINT ROAD
LADYSMITH, B.C.
V0R 2E0

WELL LOG

OWNER Regional District of Nanaimo

ADDRESS _____

WELL LOCATION Beachcomber */.

DATE STARTED June 1,1978

DATE COMPLETED July 14,1978

YIELD 200to300 GALLONS PER MINUTE

PUMPING WATER LEVEL _____ FEET FROM SURFACE

STATIC LEVEL _____ FEET

CASING USED 14ft.of12in. &

TYPE OF SCREENS USED Johnston stainless-steel screen, size 50 thou.

BOTTOM OF CASING _____ FEET FROM SURFACE

STICK-UP ABOVE GROUND _____ FEET

DRILLER: Dan Hoyt.

DEPTH	MATERIAL
0	
	Brown clay till, coarse cobbles.
8	
	Coarse blue clay till.
17	
	Lightly bound till, mostly sand and gravel.
54	
	Silty grey sand.
65	
	Blue clay till.
74	
	Fine silty sand (tight to drive)
92	
	Blue silt.
105	
	Fine blue sand.
142	
144	42" BLANK RISER
	Gravel.
	5ft SCREEN
153	
	5ft BLANK
	Blue till.
158	
	5ft SCREEN
	Boulders.
163	
	Blue clay.
221	
	Rock.
226	

INVOICE

_____ FEET CASING @	$_____
_____ CASING SHOE @	$_____
_____ FEET WELL HOLE @	$_____
_____ SCREEN	$_____
_____ HOURS DEVELOPING TIME @	$_____
TOTAL	$_____

DRILLING AND DEVELOPMENT

The drilling of Production Well No. 78-1, which is located on District Lot 62, Plan 694R south of the intersection of Claudet Road and Northwest Bay Road, commenced in May 1978. A 12-inch diameter surface casing was set to a depth of 16 feet and drilling then proceeded with 8-inch diameter casing to a depth of 221 feet at which depth drilling was terminated in shale bedrock.

Two main water-bearing zones were penetrated in this well. The upper zone which is present from 142 to 153 feet is made up of corase sand and gravel with a few tight silty layers being present. The lower zone extends from 158 to 163 feet and consists of large boulders.

The well was screened with two lengths of 50/1000 inch slot, stainless steel, continuous wire wound well screen set from 147.4 to 152.7 feet and from 157.7 to 163 feet. The two screens are separated by five feet of 7-inch diameter blank pipe and the upper screen is fitted with three feet of 7-inch diameter riser and a type 'K' packer to seal the annular space between the screen assembly and the 8-inch diameter casing. The bottom of the 8-inch casing is at 146.4 feet below ground surface and the top of the 'K' packer is at a depth of 144.4 feet.

After setting and exposing the well screen by pulling back the 8-inch casing the development of the well was carried out by the use of surge blocks and bailing.

PUMP TESTING AND AQUIFER COEFFICIENT

The subject well was test pumped at a rate of 205 US gallons per minute for 7100 minutes between July 19th and July 24th, 1978. During the test the water level declined from a static water level of 93.28 feet to a stable pumping level of 135.2 feet.

Water level measurements were taken during both the draw-down and recovery stages of the test. Near the completion of the test a water sample was collected for chemical analysis. Four boundaries are present near the well as indicated by the recovery data. These boundaries give

PUMP TESTING AND AQUIFER COEFFICIENT, cont'd.

transmissibilities that range from a high of 155,000 US gpd/ft to a low of less than 16,000 US gpd/ft. The specific capacity of the well as tested is 4.9 US gallons per foot of drawdown. The low specific capacity indicates that the effective transmissibility around the well is 16,000 US gpd/ft.

Transmissibility is the field measurement of the amount of water in gallons per day that will flow through a one foot wide strip of aquifer under a hydraulic gradient of one to one.

WELL CAPACITY AND WATER QUALITY

The static water level was measured at a depth of 93.28 feet and the top of the 'K' packer is at a depth of 144.4 feet. If the well was drawn down to the top of the packer (to do this it would be necessary to set a submersible type pump in the 7-inch casing between the screens) the total available drawdown would be slightly over 51 feet. with a specific capacity of 4.9 gallons per minute per foot of drawdown the maximum capacity of the well is 250 US gpm. To allow for possible decline in the static water level later in the summer or a decline in the specific capacity of the well after a few years of use the continuous productive capacity has been reduced by 28 percent to 180 US gpm (150 Imp. gpm or 11 lt/sec).

The water sample collected near the end of the test was analyzed by an independent laboratory and showed the results on the attached report. This analysis shows the water to be of good chemical quality except for the phosphates content which, as noted by the chemist, is above the limit set by the Canadian Drinking Water Standards. Phosphates will promote the growth of algae in open reservoirs that are exposed to sunlight. The level of phosphate in the water will cause no deleterious physiological effects.

RECOMMENDATIONS AND CONCLUSIONS

1. Based upon available data and information we conclude that the Beachcomber Well 78-1 has a safe productive capacity of 150 Imp. gpm (11 litres per second).

2. The production pump should have the following characteristics governed by the diameter of the well screens (ID 6 5/8 inches) and the setting of the pump suction in the five foot long 7-inch diameter blank pipe separating the two screens between depths of 152.7 to 157.7 feet.

   Type - vertical turbine.

   Discharge - 150 Imp. gpm (11 l/sec).

   Maximum outside diameter of bowls - 5 11/16 inches.

   Maximum length of bowls - 36 inches.

   Suction setting (below present ground surface) - 156 feet.

   Total dynamic head - 140 feet plus system pressure.

3. The pump controls must include a manual flow control valve and a check valve to ensure that water does not cascade back into the well and backwash the well. If backwashing occurs the well will start producing sand.

4. The low static water level of 94 feet might necessitate the use of prelube water. If this is used care must be taken to ensure that the prelube water is only allowed to flow into the well for a very short period of time. If excessive amounts of prelube water are allowed to cascade into the well the screens will become iron slimed in less than six months rendering the well useless.

5. An automatic flow control valve should be placed on the discharge of the pump so that a discharge rate of 150 Imp. gpm is never exceeded during start-up when the 94 feet of pump column is being filled.

RECOMMENDATIONS AND CONCLUSIONS, cont'd.

6. The well <u>should not be</u>

   a) over pumped - as in (5) above;

   b) vibrated - the pump must not be suspended by the 8-inch diameter casing;

   c) rawhided - the discharge rate of the pump should be tuned to the water requirements of the water system so that it remains on or off for at least one hour;

   d) backwashed - as in (3) above.

7. The chemical analysis attached shows that the water is of excellent quality and is fit for human consumption.