

CERTIFICATION OF WATER QUANTITY AND QUALITY FOR THE SOUTH LOT  
OF A RURAL SUBDIVISION

AT 34830 KIRKPATRICK AVENUE IN THE DISTRICT OF MISSION

(District of Mission Subdivision Application S91-02 and File PRF 15-40)

Prepared for

Messrs. J. Langston and K. Kandt  
34830 Kirkpatrick Avenue, R.R. 6  
MISSION, B.C. V2V 6B2

Prepared by

PACIFIC HYDROLOGY CONSULTANTS LTD.  
204 - 1929 West Broadway  
VANCOUVER, B.C. V6J 1Z3

AUGUST 15, 1991

**PACIFIC HYDROLOGY CONSULTANTS LTD.**  
CONSULTING GROUNDWATER GEOLOGISTS

204 - 1929 WEST BROADWAY  
VANCOUVER, B.C. V6J 1Z3  
TELEPHONE: (604) 738-9232

August 15, 1991

Messrs. J. Langston and K. Kandt  
34380 Kirkpatrick Avenue, R.R. 6  
MISSION, B.C. V2V 6B2

Subject: **Certification of Water Quantity and Quality for the South Lot of a  
Rural Subdivision at 34830 Kirkpatrick Avenue in the District of  
Mission**

District of Mission Subdivision Application S91-02 and File  
PRF 15-40

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Dear Sir:

This letter-report is further to several telephone discussions between Mr. John Langston and Ed Livingston, P. Eng., of Pacific Hydrology Consultants Ltd. and, in particular, it is further to discussions between Langston and Livingston during Ed Livingston's site visit of May 28 to the subject property at 34830 Kirkpatrick Avenue; the latter discussion is reported in a letter dated June 3, 1991.

## 1.0 INTRODUCTION

The purpose of this letter is to present information which confirms that a new dug well constructed on the South Lot of the proposed subdivision of Lot 21, Section 34, Township 17, Plan 43028, New Westminster District, will "...provide a quantity of water not less than 2500 litres per day per parcel and provide a sustained yield of 9 litres per minute for a minimum of four hours", as required under District of Mission Bylaw No.

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2203-1990. This letter also discusses the quality of groundwater yielded by the Well and provides the required hydrogeologic impact assessment with respect to:

- (i) Impact of each proposed well on neighbour wells both within and adjacent to the proposed subdivision, and
- (ii) Long term impact of the proposed wells on the source aquifer.

The topographic setting of the proposed Langston/Kandt Subdivision is shown on Figure 1 in Appendix A and the subdivision layout and site topography is shown on Figure 2, prepared from a sketch plan provided by the Owner; access to the south lot is by a panhandle off Kirkpatrick Avenue. As shown on Figure 2, the septic tanks and drain fields for the houses on both lots of the proposed Langston/Kandt Subdivision are located more than 30 m (100 ft) in a downslope direction of the wells.

The subject Langston/Kandt Well on the south Lot is about 6.1 m (20 ft) deep. It was excavated by a backhoe through 5.5 m (18 ft) of clay into fine sand sediments; 0.91 m (36") diameter PVC casing surrounded by drain rock was then set in the hole and the upper part of the hole was backfilled with excavated material to form a surface seal. The Well on the north Lot was constructed in a similar manner, but with 0.9 m (3 ft) concrete rings. The Well on the north Lot has been in use for about ten years without any water shortages.

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## 2.0 HYDROGEOLOGY

The proposed Langston/Kandt Subdivision is located on the south side of Kirkpatrick Avenue, at the base of the southeast-facing slope of a mountain. According to Geological Survey of Canada Map 1485A, **Surficial Geology Mission British Columbia**, the surficial cover in the area of the proposed Subdivision is locally complex; the subject property is shown to be underlain by "Recessional glaciofluvial deposits: Sa, recessional channel and floodplain deposits laid down by proglacial streams; gravel and sand up to 40 m thick, normal range of thickness 5-25 m".

The sediments reported to have been encountered in the excavation for the subject well certainly do not fit the description of the surficial geology given above. The 5.5 m (18 ft) of clay at surface, through which the Well was excavated, is probably a patch of lacustrine sediment within the glaciofluvial deposits. The Well is located in an obvious area of groundwater discharge, as shown by the above-surface water level in the Well, by the type of local vegetation and by the permanent pond on the North Lot; the overflow from the pond reportedly only stops under drought conditions.

## 3.0 WELL CAPACITY

To assess whether the capacity of the subject well on the south Lot of the proposed subdivision satisfies District of Mission Bylaw 2203-1990, the Well was pump tested by A & H Construction Ltd., according to instructions by Pacific Hydrology and under Pacific Hydrology's supervision, using a test pump discharging through polyethylene pipe to the nearby ditch. The pumping rate during the test was determined by timing the filling of a container of known volume. The data collected during the pumping test, along with standard straight line plots on semi-logarithmic graph paper, are attached in Appendix B.



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The pumping test of the subject Well was continued for 480 minutes (8 hours) at a constant rate of 54.4 litres per minute (12.0 igpm). At this rate, the total drawdown was about 3.58 m (11.75 ft) and the plot of the drawdown (Figure 3, Page B - 3) indicates that the pumping water level was approaching stability when pumping was terminated. After pumping stopped, the recovery of the water level was observed for about eight hours; the water level was within 7.6 cm (0.25 ft) of the original overflow level at the end of eight hours showing that recharge conditions are satisfactory.

Pump testing of the shallow large diameter Well on the South Lot of the proposed Langston/Kandt Subdivision has shown that the capacity of the Well is much more than the minimum quantity requirement specified in District of Mission Bylaw 2203-1990. Because the Well is located in a groundwater discharge zone, we expect that there will be little, if any, reduction in well capacity in late summer when groundwater conditions are at a minimum. Such a conclusion is supported by the experience with the Well on the north Lot.

#### **4.0 GROUNDWATER QUALITY**

Appendix C contains a certificate of analysis from Norwest Labs' dated July 2, 1991 and identified as Water Sample Number 91-3775. The results presented by Norwest show that the water from the new Well satisfies B.C. Ministry of Health's Drinking Water Standards for all parameters checked, including bacteriological. Attention is drawn to the fact that the water contains an elevated level of nitrate at 3.9 mg/L; this is still well below the drinking water limit of 10 mg/L which, even at that level, is only of concern to small babies. In some cases, nitrate may be a sign of pollution; in this case, the nitrate is almost certainly from natural sources, perhaps originating from peat or other buried organic material. Flowing artesian conditions show that the nitrate does not come from a nearby source such as pastured livestock.

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In spite of the overall low mineralization, the water represented by the Norwest analysis is a complex sodium + calcium + magnesium/chloride + bicarbonate type water, reflecting changes due to ion exchange along the path of flow. The water is very soft.

## **5.0 HYDROGEOLOGIC IMPACT ASSESSMENT**

In the prevailing situation, use of the subject well on the south Lot is unlikely to have any impact on existing drilled and/or dug wells or on the source aquifers in the area.

## **6.0 SUMMARY AND CONCLUSIONS**

1. The Well on the South Lot of the proposed Langston/Kandt rural Subdivision, at 34830 Kirkpatrick Avenue in the northeast part of the District of Mission, is located in a groundwater discharge area at the base of a southeast-facing mountain slope.
2. The dug well constructed in 1991, which is to be used as the source of domestic water for the south Lot of the proposed Langston/Kandt Subdivision of Lot 21, Section 34, Township 17, Plan 43028, New Westminster District, can clearly "...provide a quantity of water not less than 2500 litres per day per parcel and provide a sustained yield of 9 litres per minute for a minimum of four hours", as required by District of Mission Bylaw No. 2203-1990.

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3. A chemical analysis carried out by Norwest Labs shows that the groundwater from the subject Well on South Lot of the proposed Langston/Kandt Subdivision meets B.C. Ministry of Health's drinking water quality standards for all parameters checked. There is some nitrate in the water but it is well below the drinking water limit and is not indicative of pollution.
  
4. Under the prevailing circumstances, the new dug well on the south Lot of the proposed Langston/Kandt Subdivision will not have any negative impacts on other existing drilled and/or dug wells in the area, or on the source aquifers.

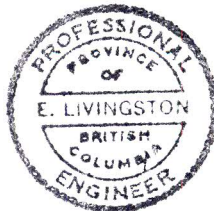
We trust that this letter will satisfy District of Mission regarding the required certification of water quantity and quality from the new dug well on the South Lot of the proposed Subdivision. Please call if we can be of further assistance with this matter.

Yours truly

PACIFIC HYDROLOGY CONSULTANTS LTD.

*E. Livingston*

E. Livingston, P. Eng.



Attachments

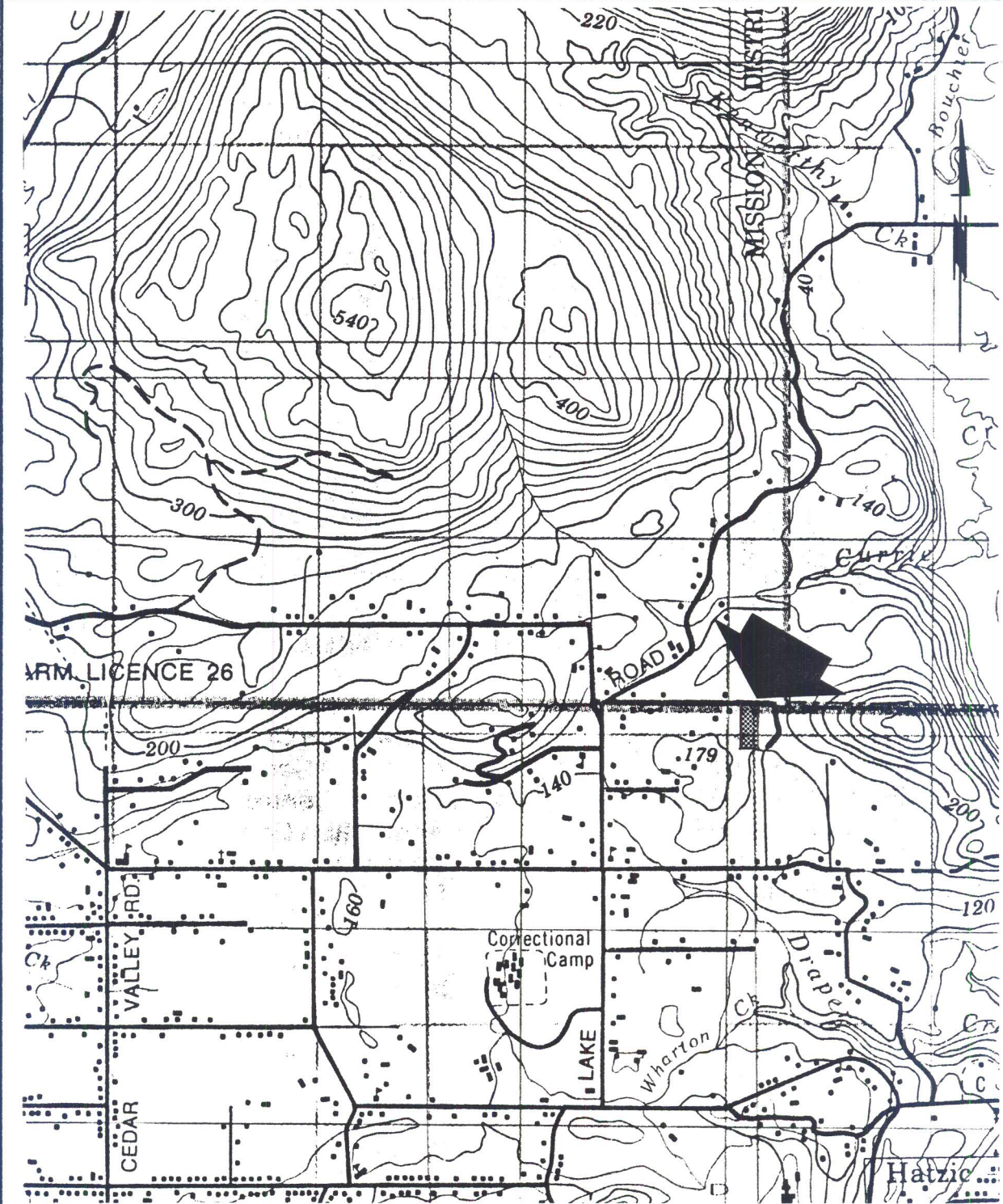
APPENDIX A

AREA LOCATION MAP AND SUBDIVISION PLAN



FIGURE 1

AREA LOCATION MAP - PROPOSED LANGSTON/KANDT  
SUBDIVISION ON KIRKPATRICK AVENUE, MISSION



Notes:


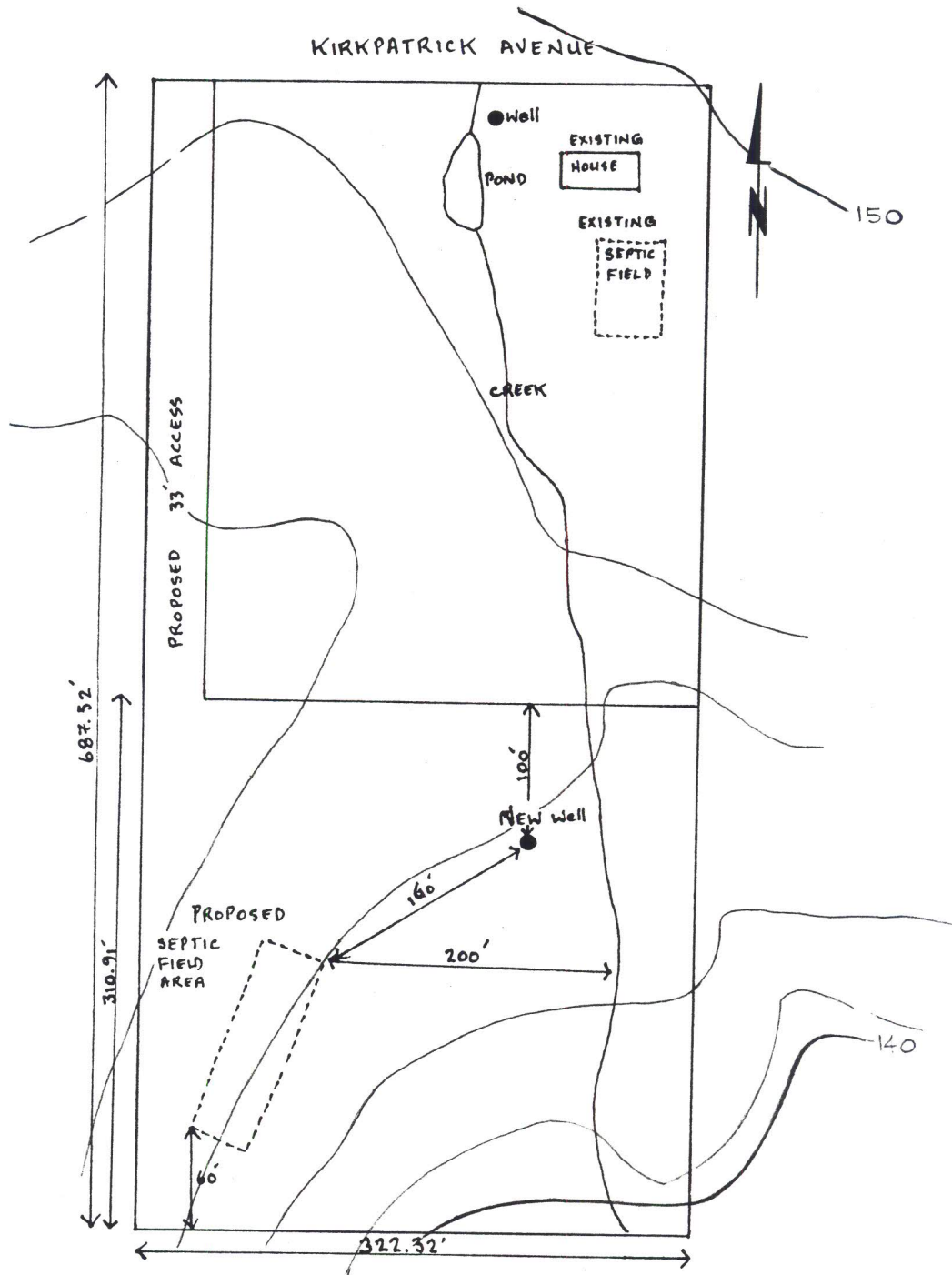
1. The base map is 1:50,000 scale topographic map N.T.S. 92G/1, Mission, enlarged to a scale of approximately 1:30,000; contour interval is 20 metres.
2.  indicates location of proposed Langston/Kandt Subdivision at 34380 Kirkpatrick Ave.

FIGURE 2

LOT LAYOUT AND WATER WELL LOCATIONS ON  
PROPOSED LANGSTON/KANDT SUBDIVISION



Notes:

1. Legal property description: Lot 21, Sec. 34, Tp. 17, Plan 43028, N.W.D., at 34380 Kirkpatrick Avenue.
2. The scale of the base map is as shown; contours should be considered approximate only.
3. ● approximate (unsurveyed) location of a shallow large diameter well.

APPENDIX B

PUMPING TEST DATA AND PLOTS



**PUMP TEST – DRAWDOWN DATA**

CONTRACTOR A & H Construction Ltd.

02	JULY	1991
DAY	MONTH	YEAR

PROJECT LANGSTON/KANDT – DIST. OF MISSION SUB. APPL'N S91-02

Location 34380 Kirkpatrick Avenue, Mission

Well Dug Well on South Lot Pumping Rate (Q) Constant at 12 igpm (54.5 L/min)

Datum Point Top of P.V.C. casing Elevation of Datum Point 1 ft (0.3 m) above ground level

Static Water Level "0"; flowing @ 1/2 gpm Well Details 0.9 m (36") P.V.C. casing to 6.1 m (20 ft)

TIME		ELAPSED TIME t (MIN.)	DISTANCE TO WATER (in)	DRAWDOWN (ft)		PUMPING RATE (L/min)	PUMPING RATE (igpm)	REMARKS
HR.	MIN.							
08	00							Start pump.
08	01	1	1	0.08		54.5	12	
08	02	2	2½	0.21				
08	03	3	4½	0.375				
08	04	4	6	0.50				
08	05	5	8	0.67				
08	07	7	13	1.08				
08	09	9	17	1.42				
08	11	11	21	1.75				
08	13	13	25	2.08				
08	15	15	28	2.33		54.5	12	
08	20	20	37½	3.125				
08	25	25	44	3.67				
08	30	30	51	4.25				
08	40	40	62½	5.21				
08	50	50	72	6.00		54.5	12	
09	00	60	94	7.83				
12	00	240	133	11.08				
16	00	480	141	11.75				Stop pump.



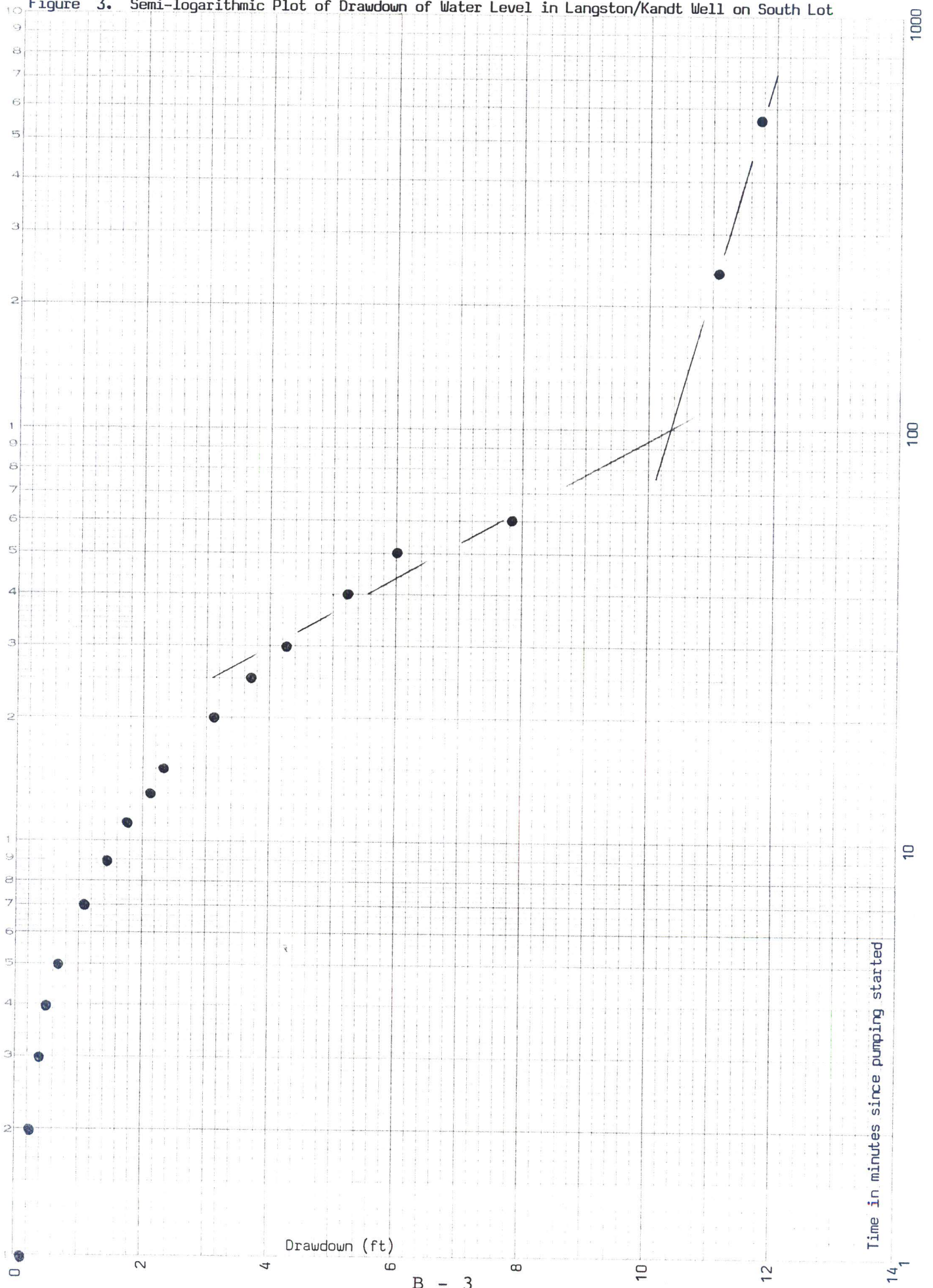
Well Dug Well on South Lot at 34380 Kirkpatrick Avenue, Mission

Datum Point Top of P.V.C. casing Elevation of Datum Point 1 ft (0.3 m) above ground level

Static Water Level "0"; flowing @ 1/2 gpm Total Drawdown 11.75 ft (3.58 m)

TIME		ELAPSED TIME SINCE PUMPING STARTED	ELAPSED TIME SINCE PUMPING STOPPED	RATIO (t/t')	DISTANCE TO WATER	RESIDUAL DRAWDOWN	REMARKS
HR.	MIN.	t (min.)	t' (min.)		(in)	(ft)	
16	00	480			141	11.75	Stop pump.
16	01	481	1	481	139	11.58	
16	02	482	2	241	137 1/2	11.46	
16	03	483	3	161	136	11.33	
16	04	484	4	121	134	11.17	
16	05	485	5	97	130	10.83	
16	07	487	7	69.6	126	10.50	
16	09	489	9	54.3	122	10.17	
16	11	491	11	44.6	118	9.83	
16	13	493	13	37.9	113	9.42	
16	15	495	15	33	106	8.83	
16	20	500	20	25	99	8.25	
16	25	505	25	20.2	92	7.67	
16	30	510	30	17	85	7.08	
16	40	520	40	13	73	6.08	
16	50	530	50	10.6	62	5.17	
17	00	540	60	9	39	3.25	
20	00	720	240	3	16	1.33	
24	00	960	480	2	3	0.25	

Figure 3. Semi-logarithmic Plot of Drawdown of Water Level in Langston/Kandt Well on South Lot



DIETZGEN CORPORATION  
MADE IN U.S.A.

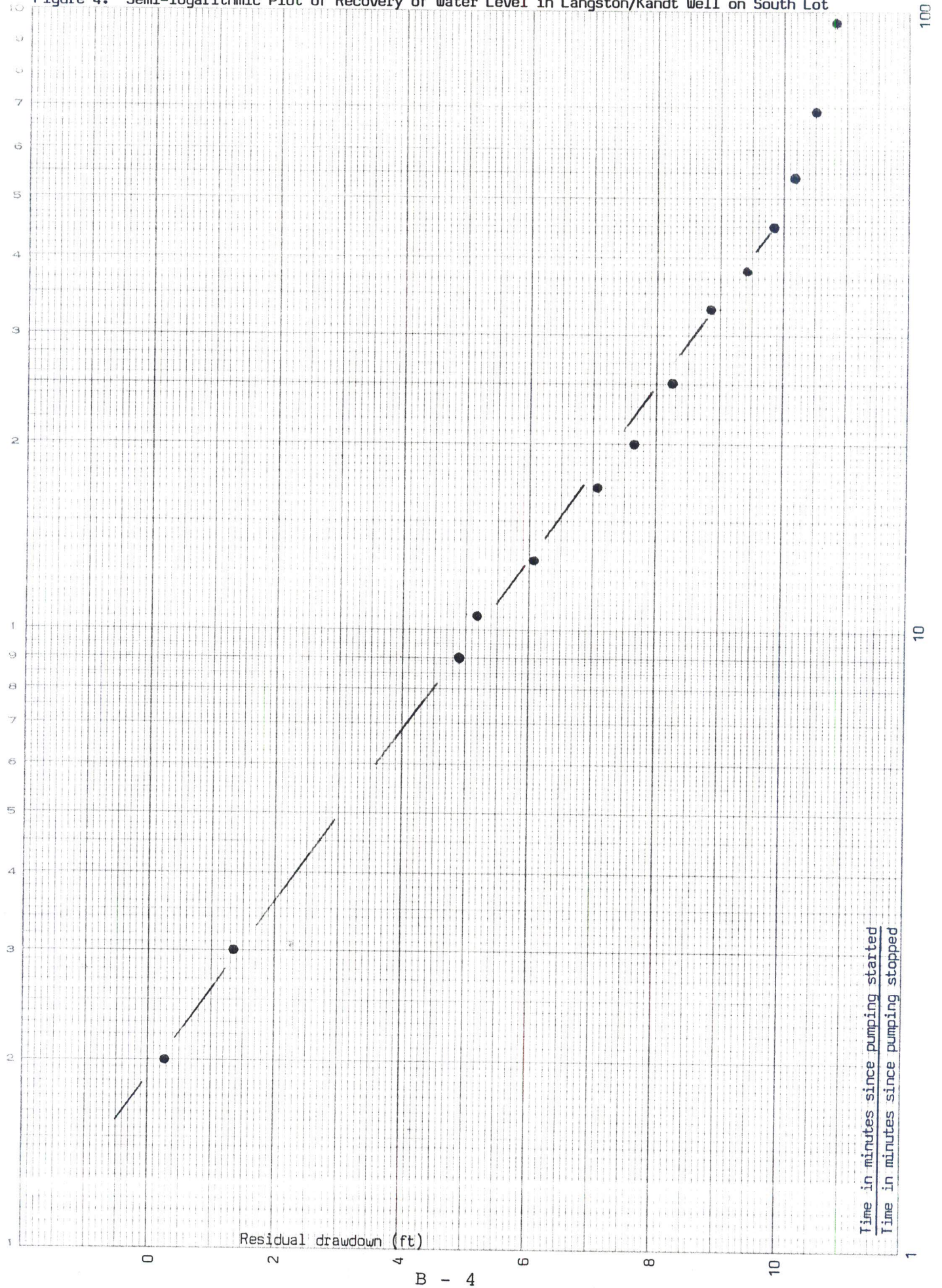
NO. 340-L310 DIETZGEN GRAPH PAPER  
SEMI-LOGARITHMIC  
3 CYCLES X 10 DIVISIONS PER INCH

Time in minutes since pumping started



Figure 4. Semi-logarithmic Plot of Recovery of Water Level in Langston/Kandt Well on South Lot

NO. 340-L220 DIETZGEN GRAPH PAPER  
 SEMI-LOGARITHMIC  
 2 CYCLES X 20 DIVISIONS PER INCH  
 DIETZGEN CORPORATION  
 MADE IN U.S.A.



Time in minutes since pumping started  
 Time in minutes since pumping stopped

**APPENDIX C**

**WATER QUALITY CERTIFICATE**



# Norwest Labs



*"We Solve Problems"*

203 - 20771 Langley By-Pass  
Langley, B.C. V3A 5E8  
Phone (604) 530-4344  
Fax (604) 534-9996

Date: July 26, 1991

Work Order No.: 3095

Source of Sample:

Domestic Well Water from New Well  
34380 Kirkpatrick Avenue, Mission

## CERTIFICATION OF POTABILITY

Norwest Soil Research Inc. certifies that the above mentioned  
water sample number 91-3775 supplied by K. Kandt  
meets the chemical and bacteriological requirements specified  
by the 1989 Guidelines for Canadian Drinking Water Quality for the  
constituents tested.

Sincerely,

Dr. Thomas F. Guthrie, P.Ag.  
Laboratory Manager

Note: all reports are the confidential property of our clients.  
Publication of statements, conclusions or extracts from or regarding  
our reports is not permitted without our written approval. Any  
liability attached thereto is limited to the fee charged.



# NORWEST LABS

"Keeping B.C. Growing"

TELEPHONE (604) 530-4344  
FACSIMILE (604) 534-9996

## WATER ANALYSIS REPORT

W.O. NUMBER : 3095  
LAB. NUMBER : 913775

SAMPLE SUBMITTED BY :

K. KANDT  
34380 KIRKPATRICK AVENUE  
RR6 MISSION, B.C. V2V 6B2

SAMPLE RECEIVED : 07-02-1991  
ANALYSIS COMPLETED : 07-26-1991  
SAMPLE RETAINED FOR 30 DAYS

SAMPLE IDENTIFICATION : NEW WELL WATER - 34380 KIRKPATRICK AVENUE  
MISSION

### ANALYTICAL RESULTS

### GUIDELINES FOR DRINKING WATER

pH	6.42	pH values between 6.5 & 8.5 considered acceptable
Electrical Conductivity	0.08 ms/cm	Values above 1.0 ms/cm indicate increasing salt content
Total Dissolved Solids	70 mg/l	Objective level 500 mg/l; higher values indicate high salts
Total Suspended Solids	0 mg/l	Values above 250 mg/l indicate increasing levels of sediment
Ammonium-N	0.0 mg/l	Acceptable values below 0.5 mg/l; objective level below 0.01 mg/l
Potassium	1.0 mg/l	No acceptable level set; values normally in the 0.5 to 10 mg/l range
Calcium	7.0 mg/l	Below 200 mg/l acceptable; objective level below 75 mg/l
Magnesium	2.0 mg/l	Below 150 mg/l acceptable; objective level below 50 mg/l
Sodium	13.0 mg/l	Below 300 mg/l acceptable; over 20 mg/l high for low sodium diets
Iron	0.00 mg/l	Above 0.3 mg/l may cause staining & deposits; objective limit 0.05 mg/l
Copper	0.00 mg/l	Below 1.0 mg/l acceptable; objective limit below 0.01 mg/l
Zinc	0.00 mg/l	Below 5.0 mg/l acceptable; objective limit below 1.0 mg/l
Manganese	0.07 mg/l	Below 0.05 mg/l acceptable; objective limit below 0.01 mg/l
Phosphate-P	0.0 mg/l	No acceptable limit set; below 0.2 mg/l desirable
Sulphate-S	0.4 mg/l	Below 500 mg/l acceptable; objective limit below 250 mg/l
Nitrate-N	3.9 mg/l	Below 10 mg/l acceptable; high values may indicate contamination
Chloride	8.8 mg/l	Below 250 mg/l acceptable
Fluoride	0.65 mg/l	Values up to 1.2 mg/l desirable; under 1.5 mg/l acceptable
Boron	0.10 mg/l	Below 5.0 mg/l acceptable
Carbonate	0 mg/l	Presence indicates alkaline water
Bicarbonate	12 mg/l	Presence indicates mildly alkaline water
Hardness (CaCO <sub>3</sub> equiv)	26 mg/l	Soft waters are less than 75 mg/l; hard waters above 150 mg/l
Total coliforms	0/100ml	Above 2/100 ml unacceptable
Fecal coliforms	0/100ml	Greater than 0/100ml unacceptable

Results quoted as zero indicate concentrations below the following detection limits:

Less than 0.01 mg/l Fe, Cu, Zn, Mn, B

Less than 0.05 mg/l Na, Ca, Mg, K, PO<sub>4</sub>-P, NH<sub>4</sub>-N, NO<sub>3</sub>-N

Less than 0.10 mg/l Cl, F, SO<sub>4</sub>-S; Less than 1 mg/l TDS, TSS, carbonate & bicarbonate